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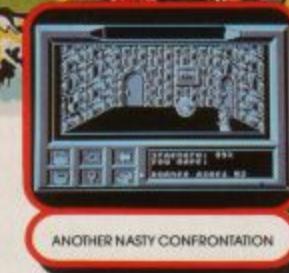
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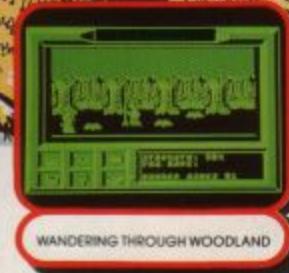
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Technical breakthrough a boost for Electron

A LINK-UP between leading development companies in the Electron market has resulted in two major breakthroughs for the machine – enhanced sound and a budget-priced mouse package.

Back room boys at Project Expansions joined forces with their opposite numbers at Slogger to accomplish the technological achievements which will go a long way towards guaranteeing the Electron's future.

A specially designed cartridge will provide four channel BBC-compatible sound for the first time.

It is also likely to mean that the background music to

A SURVEY of retailers stocking Electrons has shown that the price of the machine has gone up by some 50 per cent in the last few months.

Such is the renewed interest in the micro that people can now expect to pay around £60 as compared to an all-time low of £39 six months ago.

most BBC and Electron-compatible games can be heard by Electron users.

To be marketed at £39.95, the cartridge will come complete with a free copy of Superior Software's Speech!

program. The mouse package is the result of liaison between the two companies and a third party, Nidd Valley Micro Products.

It combines the best selling Nidd Valley Digimouse, along with a conversion of the Illustrator software package – also from Nidd Valley – with the Project Expansions User Port.

And at £74.94, it costs around half the price of the only mouse package currently available for the Electron.

The new user port can also be used with the AMX Art package without the need for the AP5 from Advanced Computer Products.

"We feel that both these new products provide major benefits for Electron users", said a spokesman for the companies involved.

"The machine is now a much more attractive proposition than it has ever been before".

Designs aid the blind

POPULAR Electron program Knitwear Designer has found a new role – helping to raise money for the blind.

The package lets users design their own woollies and print out money-saving patterns.

So it was a "perfect fit" for a Christmas Fair selling handicraft articles made by the blind at Surbiton near London.

Visitors to the fund-raising event were able to see Knitwear Designer in action during a special computer-aided sweater design demonstration.

Guide Dogs for the Blind and the Kingston and District Social Club for the Blind are among groups that will benefit financially from the fair.



Sporting touch

NOTED BBC TV sports commentator David Vine has contributed to a booklet which is available free with Tynesoft's new Electron program Winter Olympiad 88.

The game simulates events of the Winter Olympics taking place in Calgary, Canada, next month.

Tynesoft (091-414 4611) has organised a competition for purchasers of Winter Olympiad 88. The winner will receive a week's holiday for two in Calgary to see the games.

Winter Olympiad 88 costs £9.95.

STAR OF THE BIG SHOW

A DRAMATIC upsurge in interest in the Electron was seen at the recent Electron & BBC Micro User Show held in London.

Exhibitors involved in both the BBC Micro and Electron markets said their Electron customers outnumbered those for BBC Micro products by a ratio of five to one.

"There is a major revival of interest in the machine", said

Chris Rudge of Project Expansions.

Among the capacity crowds that once again flocked to the New Horticultural Hall, Westminster, for the three day show were a number of foreign Electron enthusiasts.

One six-strong party from Holland spent a total of more than £10,000 on both hardware and software for the Electron.

"The show turned out to be an Aladdin's cave for us", said Jan De Veet from Amsterdam.

And the next show promises to be just as significant for Electron users when it moves north.

It will be held at UMIST, Manchester, from March 18 to 20 with companies prominent on the Electron scene playing leading roles.



Head of MicroLink Derek Meakin (left) looks on as Telecom Gold general manager Clem Jones signs the £1.3 million deal between the two companies.

MicroLink set for expansion

A MASSIVE expansion of the MicroLink electronic mail service is now being planned following the completion of a £1.3 million contract with Telecom Gold.

MicroLink – which has a section specifically for Electron users – was launched in April 1985 as a means of encouraging people to start exploring the exciting new world of electronic communications.

It became an instant success, not only throughout Britain, but in Europe, the Middle East and Australasia.

The MicroLink service has been housed on a Prime 750 computer in Telecom Gold's top-

security London headquarters.

As part of the new deal, the service is being transferred to a machine that is four times more powerful – the Prime 9955.

"The phenomenal development of MicroLink has meant that we have now outgrown the computer that has served us so well", said MicroLink chairman Derek Meakin.

"The new machine will give us much greater flexibility. It will allow us to provide a much faster service, introduce a variable charging structure to meet the different needs of our users, and make possible the creation of new and exciting facilities".

PAC DOESN'T TAKE OFF

LEADING Electron software distributor Mastertronic has hit a snag with one of its most popular titles.

Electron users who bought Jet Pac discovered the game won't run on their machines, although the packaging says it will.

Mastertronic, which licensed the game from Ultimate/US Gold for its budget price Ricochet label, says it's all a

simple mistake.

"Ultimate/US Gold led us to believe the game was Electron and BBC Micro-compatible, when in fact it only runs on the BBC Micro", Mastertronic's Sharon Wade told *Electron User*.

"We're very sorry about the error. If Electron owners return their cassettes to us they can have a refund or another game".

THE GALLUP CHART

TOP 10

ELECTRON SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	3	SOCER BOSS <i>Alternative</i>	1.99
2	1	AROUND THE WORLD IN 40 SCREENS <i>Superior</i>	6.95
3	5	PAPERBOY <i>Elite</i>	9.95
4	2	FOUR GREAT GAMES <i>Micro Value</i>	3.99
5	4	SUPERIOR COLLECTION VOL 2 <i>Superior</i>	9.95
6	5	CODENAME DROID <i>Superior</i>	9.95
7	7	TRIPLE DECKER <i>Alternative</i>	1.99
8	8	STRYKER'S RUN <i>Superior</i>	9.95
9	•	MICROPOWER MAGIC <i>Micropower</i>	7.95
10	•	DARTS <i>Blue Ribbon</i>	1.99

Compiled by Gallup/Microscope

The budget-priced Soccer Boss from Alternative takes the number one slot this month. As well as Darts entering the chart at number 10, Micropower Magic re-enters at 9. Watch out for the new releases from ASL, Mirrorsoft and Superior which may well make it into the charts next month.

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VISA



THIS month we'll take a rest from the computer to look at some very useful electronic circuits we'll be using shortly to build an Electron weather station.

They're called amplifiers – electronic circuits for magnifying small electrical signals. Using them we can examine very small currents and voltages using our Plus 1 even if they're so small the analogue port can't normally measure them.

This is useful, as some transducers produce very small signals. A diagrammatic representation of what an amplifier does is shown in Figure I.

As you can see, its output should be an exact, but larger, copy of the input. The amount of magnification provided by the amplifier is called its gain.

There are lots of ways to build amplifiers, depending on the application. In fact, they're probably the most widely-used building blocks

GAIN A LOT WITH OP AMPS

JOE PRITCHARD shows how to read low level signals on the analogue port

in electronics. They can be found in everything from transistor radios to computer monitors.

Our amplifiers will be very simple, using a chip called an operational amplifier or op amp. Rather than explain how op amps work we'll just examine the practical side of these useful circuits.

Op amps have two big advantages. They're easy to use and give predictable and repeatable results. So,

what will we want our amplifier to do?

- Boost up small signals to a level in the range 0 to 1.8V.
- Prevent signals larger than 1.8V getting to the input of the Plus 1's ADC. This offers it some protection.
- Obtain its power from the 5V that's available from the Plus 1.
- Have a predictable and easily alterable gain.

With an op amp, it's fairly

easy to fulfil these requirements. There are several we could use, but the one picked for this job is called the CA3140.

This chip has some useful properties, one being the ability to work properly when powered by a voltage as low as 5V. Many op amps require +15V, 0V and -15V to work correctly.

One small problem we have with simple op amp circuits is something called signal inversion, shown diagrammatically in Figure II.

This means the output signal is a magnified mirror image of the input signal. The behaviour of such inverting amplifiers is described by the equation:

$$\text{Output volts} = -\text{Gain} \times \text{Input volts}$$

The minus sign indicates that signal inversion has occurred. There are ways around this, either by adding another amplifier with signal inversion after the first one (two inversions taking us back to the original) or by designing the amplifier so inversion doesn't occur.

In this article we'll see two types of amplifier circuit, one exhibits inversion and one does not.

Let's start with the one that doesn't. Not surprisingly, it's called a non-inverting amplifier. Figure III shows the simplest form of this circuit. The triangle is an electronic symbol for an amplifier.

The numbers refer to the pin numbers on the package the chip comes in. The plus

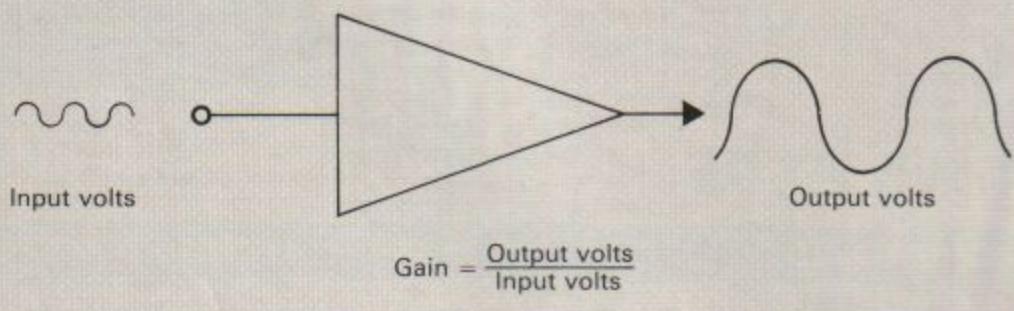


Figure I: A simple amplifier in block form

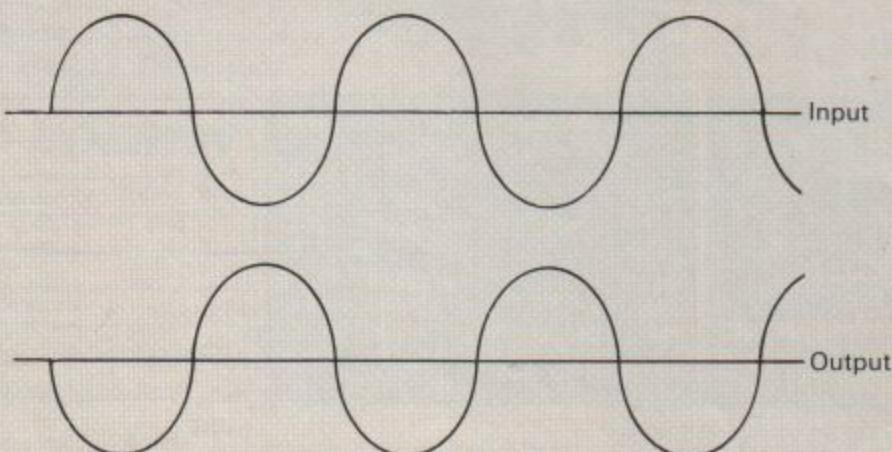


Figure II: A 180° phase shift (Inversion) of the output waveform

and minus signs on two pins indicate inputs to the op amp.

They aren't quite the same electronically, but we won't go into detail now. In all these amplifiers, the gain is set by the values of three resistors. The gain of this circuit is given by:

$$\text{gain} = \frac{R_2 + R_3}{R_3}$$

and the value of resistor R_1 is given by:

$$R_1 = \frac{(R_2 + R_3)}{(R_2 + R_3)}$$

To design an amplifier like this, first pick a value for R_3 , and a gain. R_2 can be selected with the equation:

$$R_2 = (\text{gain} \times R_3) - R_3$$

R_1 can be picked using the R_1 equation. In each case, make the resistor value in ohms. The gain is just a number.

Sometimes these equations produce resistor values that aren't available from the manufacturers. In this case either take the nearest available values and recalculate the gain, or change R_3 until you get R_1 and R_2 values for the gain required that are available.

The former is usually the course taken, since we can normally live with small alterations in gain rather than have to fiddle about with the equations.

In very precise work we might use devices called preset resistors. These are similar to the potentiometer we've used previously except their values are altered with a screwdriver.

Figure IV shows a non inverting amplifier with a gain of 9.7. The only additions made to the earlier circuit are the three diodes at the output. These serve to protect the ADC input from voltages in excess of about 1.8V.

A diode will only conduct electricity when two conditions are satisfied:

- The anode end of the diode must be more positive than the cathode end.
- The amount by which the

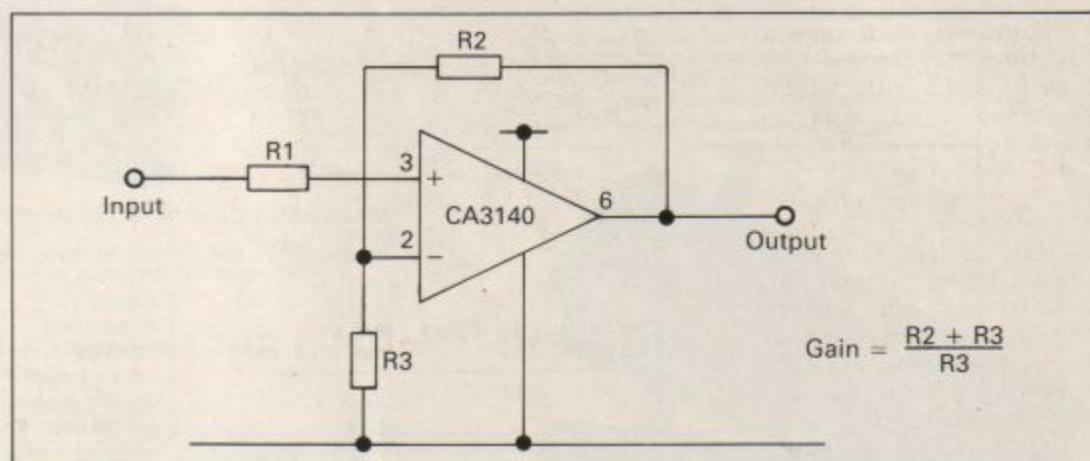


Figure III: A simple op amp circuit

anode is more positive than the cathode must be a minimum of 0.2V for a germanium type or 0.6V for a silicon type.

For the 1N4001 silicon diode, each anode has to be 0.6V more positive than the diode cathode.

With three in series like this, the anode connected to pin 6 of the op amp has to be 1.8V more positive than the cathode of the diode connected to 0V for the

diodes to conduct electricity. Therefore, once the output of the op amp at pin six gets over 1.8V, the diodes will all conduct electricity and effectively reduce the voltage at the ADC input to 1.8V.

The input uses the LDR/potentiometer arrangement detailed in the May 1987 issue of *Electron User*.

Plug the amplifier into the ADC port after first checking your connections carefully.

Wire up the input circuit, type in and run the program:

```
10 REPEAT
20 PRINT ADVAL(1)
30 UNTIL 0
```

Now adjust the potentiometer until the value read back from the ADC is about 30000 or so. The LDR will be much more sensitive to changes in light

Turn to Page 10 ►

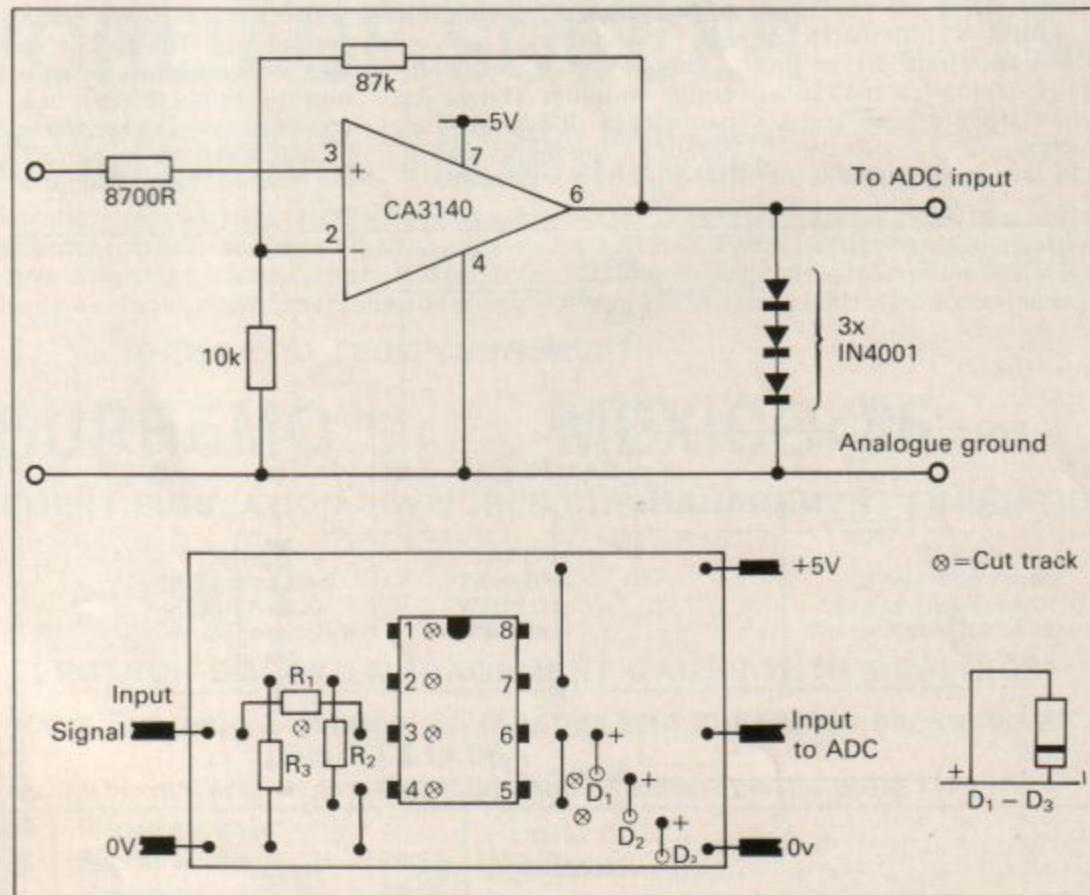


Figure IV: A simple amplifier using the CA3140

Hardware Projects

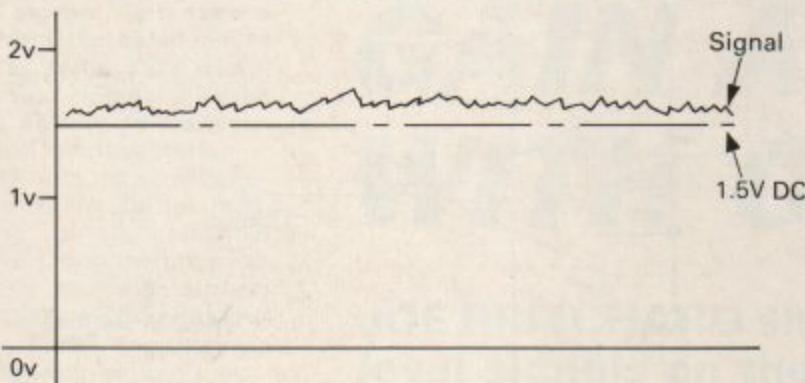


Figure V:
A constant
1.5v dc
superimposed
on low level
signal

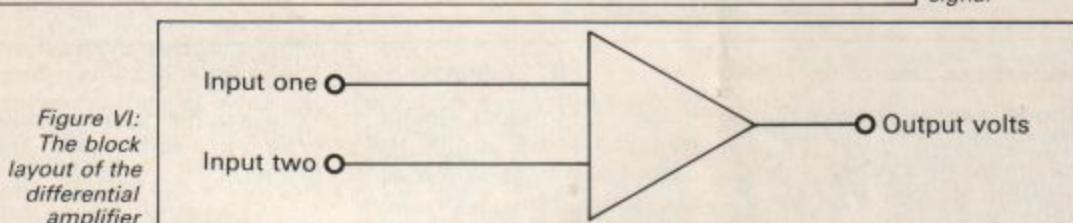


Figure VI:
The block
layout of the
differential
amplifier

From Page 9

level, indeed, darkness or bright light will send the ADC off the scale.

The second amplifier we'll look at this month is called the differential amplifier. This amplifies the difference in voltage between two inputs.

Figure V illustrates a common situation when we're trying to measure small signals from transducers.

In fact, we'll encounter it

next month when we start work on the circuits to monitor weather conditions.

The problem is that we've got a small signal superimposed on a fairly constant big signal. In this case we've got a small signal on top of a 1.5V signal. We can't amplify the tiny signal without also amplifying the big 1.5V signal.

This is where the differential amplifier shows its usefulness. It's shown in Figure VI. The minus sign in its equation indicates it

shows the property of signal inversion.

Figure VII shows the actual circuit we use to make a differential amplifier. Again, the gain is set by the resistors used and in this circuit is about 10. It will invert the input signal at the output.

There are two ways around this. The first is to take care which way we connect the inputs to input one and input two. The second is to use software to correct the readings taken from the

circuit. Whatever we do however, the use of the amplifier remains the same; we apply the constant voltage – in this case about 1.5V – to one input and the signal to the other.

To demonstrate this, let's say we apply the constant voltage to input one and the signal to input two. Assume the signal is 1.6V, and the gain of the amplifier is five. The output of the amplifier will therefore be:

$$\begin{aligned} \text{Output} &= -((\text{input1}-\text{input2}) \times 5) \\ &= -((1.5-1.6) \times 5) \\ &= -(-0.1) \times 5 \\ &= -(-0.5) \\ &= 0.5 \text{ Volts} \end{aligned}$$

● Next time we'll look at some electronic circuits which allow the Electron to monitor temperature – the first part of the Electron User weather station.

TRANSDUCERS

Transducers appear in two forms – those for input and those for output.

As their name suggests, input transducers transform mechanical information into electrical signals. Output transducers do the opposite.

If all this seems a little complex, consider that a microphone is an input transducer and a loudspeaker is an output one.

A simple piezo-electric microphone (an electro-mechanical transducer) transforms variations in air pressure (sounds) into a varying electrical current.

Similarly a thermistor (a thermo-resistive transducer) displays a change in its resistance with a change in its temperature.

Further examples are light bulbs, light emitting diodes (LEDs), light dependant resistors (LDRs) and the microphones used in telephones.

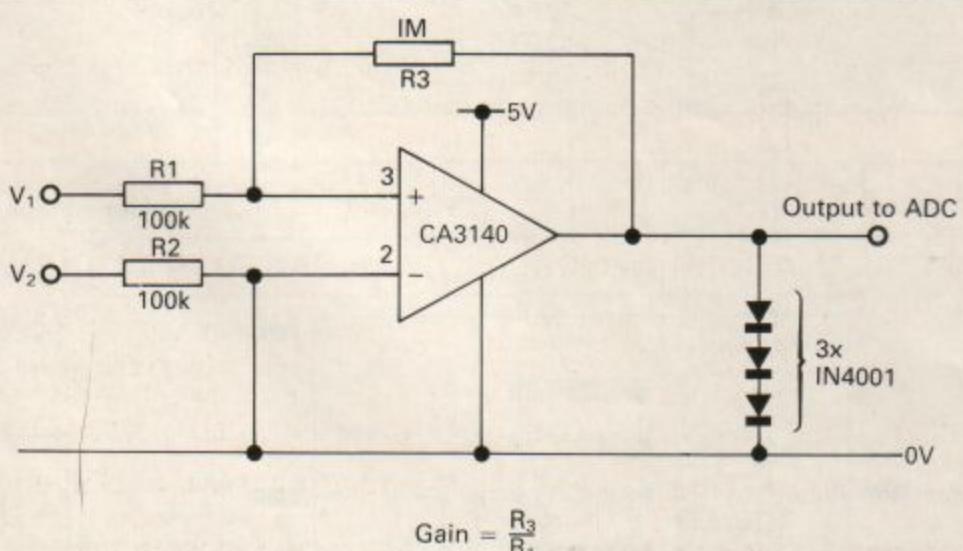


Figure VII: The circuit diagram of a differential amplifier

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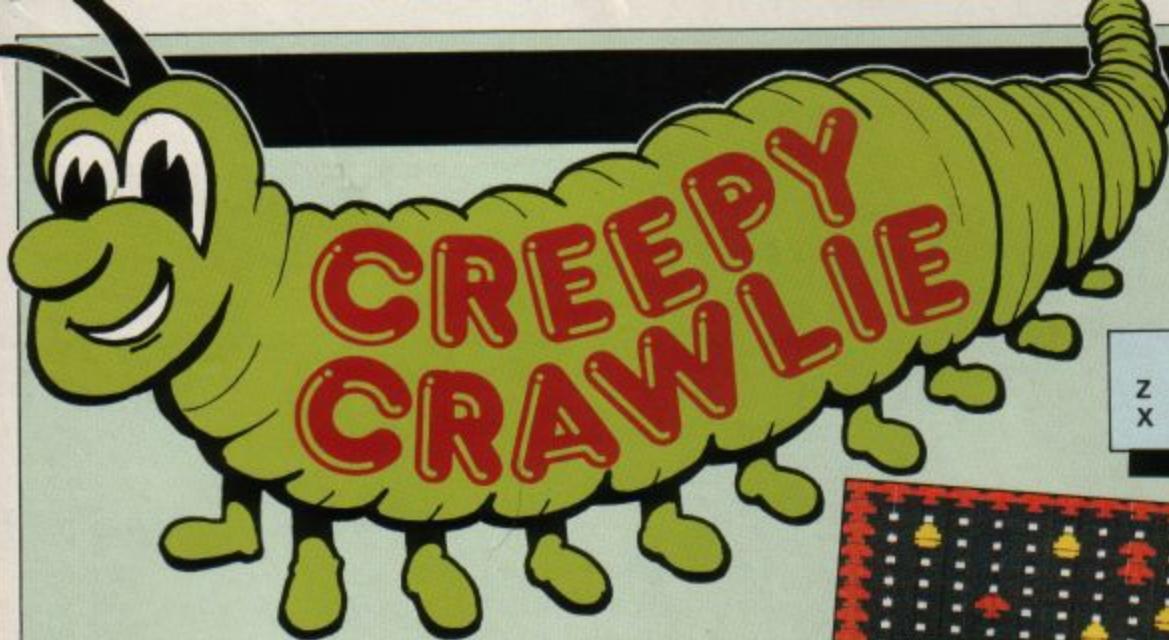
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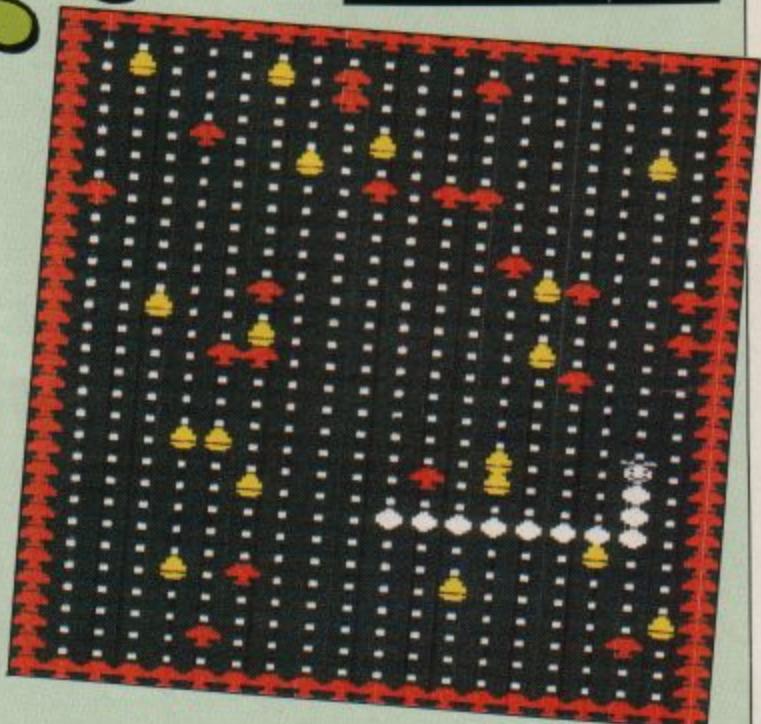
IN this fast-moving arcade game you control a pet caterpillar called Ziggy and your task is to guide it round the garden looking for food.

During your travels you'll come across tasty yellow berries to eat. The problem however, is that the more you eat, the longer your body grows and the more difficult it becomes to control.

Watch out for poisonous

red toadstools – take a bite out of one of these and you're dead. The garden is surrounded by a ring of this deadly fungus so be careful not to wander too close to the edge. You should also avoid running into your ever-growing tail.

The game is very fast, but if you find it too difficult you can slow it down by deleting line 60 and changing the MODE 5 in line 40 to MODE 2.



CONTROLS
 Z = Left * = Up
 X = Right / = Down

```

10 REM **** Ziggy ****
20 REM *By Neil Hoggarth*
30 REM (c) Electron User
40 MODE 5
50 VDU 23,1;0;0;0;0;
60 VDU 19,3,2;0;
70 VDU 23,224,231,24,60,9
0,126,90,36,24,23,225,0,24,6
0,126,126,126,60,24,23,226,0
,60,126,255,255,24,24,60,23,
227,24,60,60,126,126,0,126,6
0
80 DIM posx%(30),posy%(30)
)
90 COLOUR 1
100 PRINT TAB(0,5)STRING$(21,"*");
SPC(18)**;
110 COLOUR 3
120 PRINT SPC(6)"Ziggy.";S
PC(6);
130 COLOUR 1
140 PRINT "**";SPC(18)**;
";
150 COLOUR 2
160 PRINT 'By Neil Hoggart
h';
170 COLOUR 1
180 PRINT STRING$(21,"*");
TAB(4,30)"Press any key";
190 A=GET
200 s%=0
210 REPEAT
220 Len%=10
230 FOR i%=0 TO (len%-1)
240 posx%(i%)=i%+1
250 posy%(i%)=1
260 NEXT
270 dead% = FALSE
280 COLOUR 3
290 FOR x%=0 TO 19
300 FOR y%=0 TO 30
310 PRINT TAB(x%,y%)."";
320 NEXT
330 NEXT
340 COLOUR 1
350 FOR x%=0 TO 19
360 PRINT TAB(x%,0)CHR$226
;TAB(x%,30)CHR$226;
370 NEXT
380 FOR y%=1 TO 29
390 PRINT TAB(0,y%)CHR$226
;TAB(19,y%)CHR$226;
400 NEXT
410 FOR i%=1 TO 20
420 COLOUR 1
430 PROCprnt(226)
440 COLOUR 2
450 PROCprnt(227)
460 NEXT
470 p% = 9
480 COLOUR 3
490 d% = 2
500 FOR i%=0 TO p%
510 PROCpseg(i%,1)
520 NEXT
530 REPEAT
540 IF (INKEY(-98) AND NOT
(d% = 2)) d% = 4 ELSE IF (INKEY(
-67) AND NOT(d% = 4)) d% = 2 ELS
E IF (INKEY(-105) AND NOT(d%
= 1)) d% = 3 ELSE IF (INKEY(-73
) AND NOT(d% = 3)) d% = 1
550 nx% = posx%(p%)-(d% = 2)+(d%
= 4)
560 ny% = posy%(p%)-(d% = 3)+(d%
= 1)
570 cx = FNchr(nx%,ny%)
580 p% = (p% + 1) MOD Len%
590 PROCpseg(p%,0)
600 posx%(p%) = nx%
610 posy%(p%) = ny%
620 PROCpseg(p%,1)
630 IF c% = 130 OR c% = 129 OR dead%
= TRUE ELSE IF c% = 131 PROCsco
re: IF (s%/20) = INT(s%/20) UNT
IL TRUE: UNTIL 0
640 UNTIL dead%
650 SOUND 0,-15,6,10
660 *FX21,0
670 A = INKEY(150)
680 CLS
690 COLOUR 1
700 PRINT TAB(5,5)"Game Ov
er.";TAB(4,7)"You scored ";s
%
710 COLOUR 2
720 PRINT TAB(4,20)"Press
SPACE";TAB(3,22)"to play aga
in."
730 REPEAT UNTIL GET
740 RUN
750 DEFPROCscore
760 s% = s% + 1
770 posx%(len%) = 1
780 posy%(len%) = 1
790 Len% = Len% + 1
800 SOUND 1,-15,100,1
810 ENDPROC
820 DEFPROCprnt(A)
830 LOCAL x%,y%
840 REPEAT
850 x% = RND(18)
860 y% = RND(28) + 1
870 UNTIL FNchr(x%,y%) = ASC
880 PRINT TAB(x%,y%)CHR$A;
890 ENDPROC
900 DEFPROCpseg(j%,k%)
910 PRINT TAB(posx%(j%),po
sy%(j%));
920 IF j% = p% AND k% = 1 VDU 22
4: PRINT TAB(posx%(j%)-(d% = 4)
+(d% = 2), posy%(j%)-(d% = 1)+(d%
= 3))CHR$(225);:ENDPROC ELSE
IF k% = 1 VDU 225:ENDPROC ELSE
PRINT ".":ENDPROC
930 DEFFNchr(x%,y%)
940 VDU 31,x%,y%
950 AX% = 135
960 = (USR(8FFF4) AND &FF00) D
IV&100

```

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



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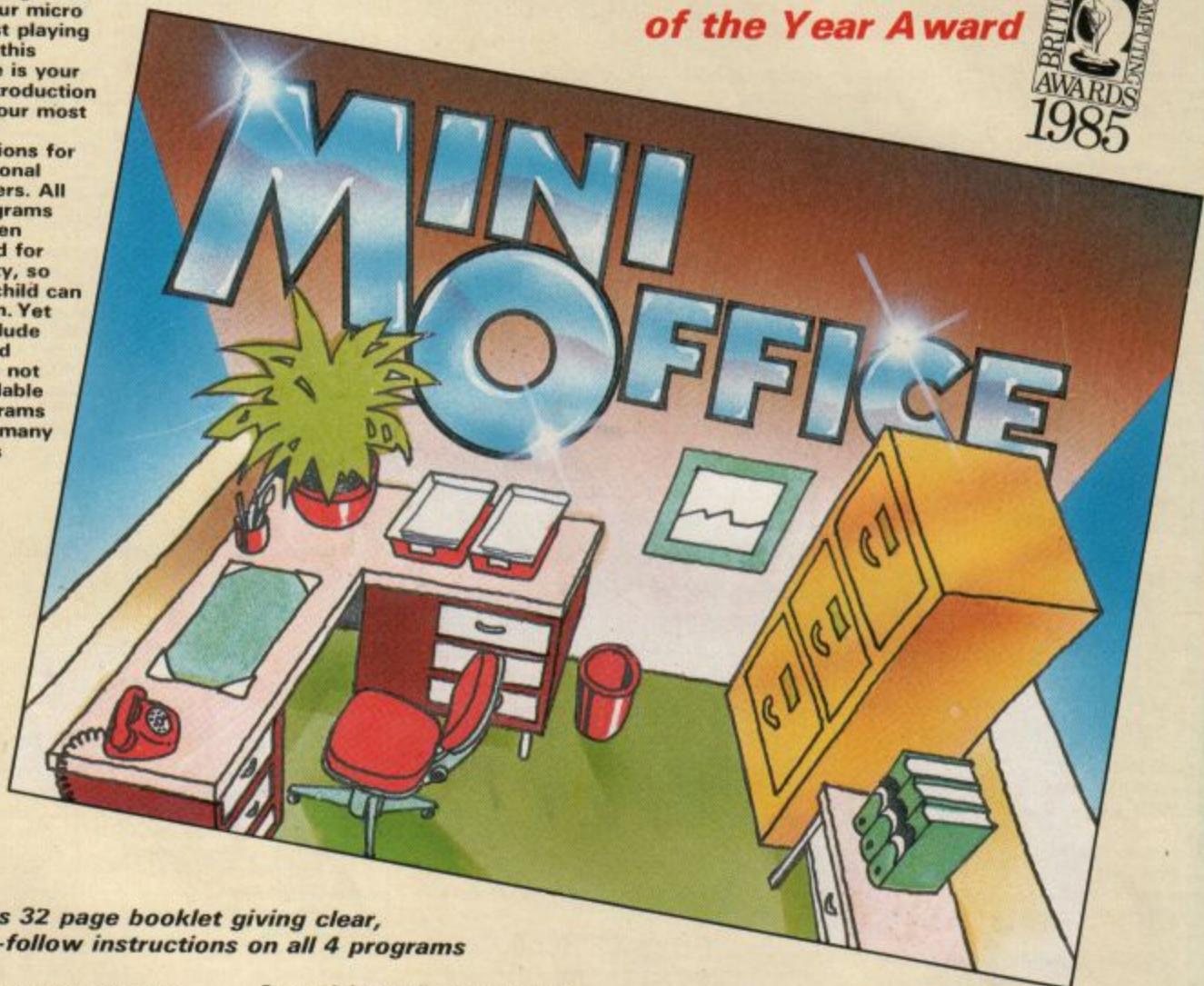
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Spreadsheet: Enables you to use your micro for home accounts or pocket money records. It creates a display of numbers in rows and columns. Continuous updating is possible, and a changed figure can be instantly reflected throughout the rest of the spreadsheet.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

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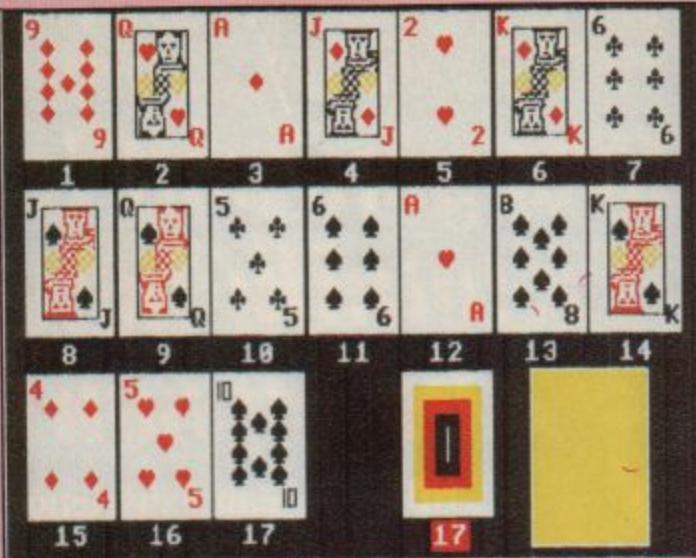
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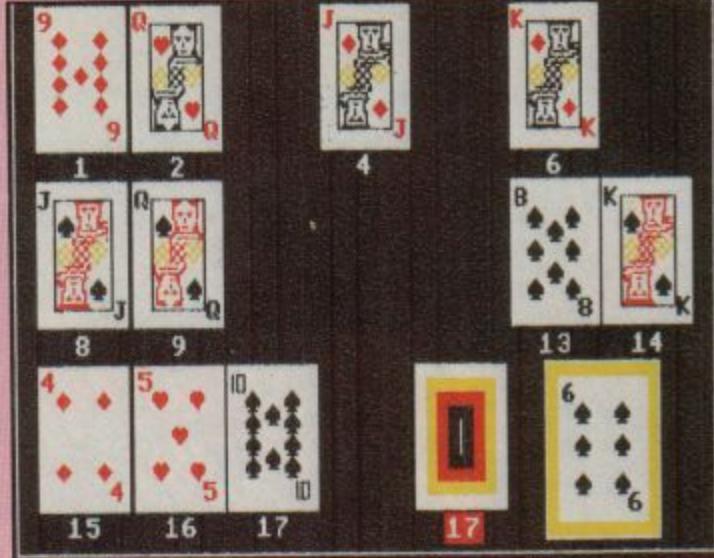
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TO ORDER PLEASE USE THE FORM ON PAGE 53



Enter your lowest Red card: 12

Figure I: The opening screen



Automatic mode: Electron

Figure II: The Electron's turn

Micro challenge

KEITH OWENS and PHIL ORD present the fascinating card game Newmarket

NEWMARKET is a two player micro version of the popular card game of the same name, featuring superb graphics and a challenging opponent – the Electron.

The rules are very simple, made even easier because the program has been written to do all of the laborious work for you.

The object of the game is for one of the two players – you or your Electron – to discard all of the cards in their possession. This must be achieved in the following manner.

Initially, three hands of 17 cards each are dealt, the Electron's face down in a pile, yours laid out on the screen. The remaining hand of 18 cards, known as the dead pack, is kept in case you wish to change the one you have been dealt. The

start screen is illustrated in Figure I.

When prompted, you play your lowest red card by inputting the number displayed directly underneath it. You may pass if you wish by pressing Return. Aces are regarded as low.

If you hold the next consecutive card of the same

suit, it is removed automatically. If haven't got it in your hand, control will pass back to the Electron.

If it cannot follow, control returns to you. You must then play your lowest black card. This process is repeated until either player has discarded all 17 cards, thus producing a winner.

When the game has finished, press the spacebar for a new one or Q to exit the program.

After entering the listing it is essential to save it before you run it, even on tape based systems, since part of the program is deleted when the program is run for the first time.

VARIABLES

swap%	True if hand is swapped
pc%	Player's card count
cl%	Electron's card count
cg%	Decide who's go it is

PROCEDURES

chars	Define the characters
deal	Deal the cards
blank	Delete used cards
swap	Change player's hand
window	Clears the windows

```

10 REM Newmarket
20 REM By Phil Ord and Ke
ith Owens.
30 REM (c) Electron User
40 *KEY10AY=0:MEY=0:MGY=0
:MFY=0:IM
50 PROCchars:IF EX=1GOTO1
00
60 VDU21
70 *KEY 0 DELETE220,260IM
RUN:FIN
80 *FX138,0,128
90 EX=1:END
100 IF PAGE<=8E00 THEN 150
110 VDU21

```

```

120 *KEY 1 *TAPEIM FOR 1%=
0 TO TOP-PAGE STEP 4:1%&E00
=1%:PAGE:NEXTIM PAGE=&E00IM
OLDIM RUN:FIN
130 *FX138,0,129
140 END
150 MODE1:VDU23,1,0;0;0;0;
160 Z=RND(-TIME):Z=RND(12)
+40
170 IF AX=1 Z=52
180 DIM NX(2),C(52),S(52)
190 PROCinit:PRORandom
200 VDU20:GOTO670
210 DEFPROCchars
220 VDU23,224,54,127,127,1

```

```

27,62,28,8,0,23,225,8,28,28,
107,127,107,8,28,23,226,8,28
,62,127,62,28,8,0,23,227,8,2
8,62,127,127,127,28,62
230 VDU23,229,0,94,82,82,8
2,82,82,94,23,231,254,252,8
232,72,8,24,16,23,233,64,223
,192,111,56,56,16,16,23,234,
1,243,6,252,24,216,8,136,23,
235,32,34,39,32,32,60,62,0
240 VDU23,236,132,36,116,4
,4,28,60,0,23,239,16,19,48,4
7,32,59,196,223,23,240,31,28
,159,225,7,188,65,241,23,241
,12,12,51,51,204,204,51,51,2
3,242,204,204,51,51,204,204,
48,48
250 VDU23,243,143,130,189,
224,135,232,249,56,23,244,25
1,35,228,4,246,12,200,8,23,2
45,8,24,16,18,23,16,63,127,2
3,246,136,140,132,36,116,4,2
54,255,23,247,0,60,56,32,32,
46,36,33
260 VDU23,248,0,124,60,4,4
,228,68,4,23,249,17,16,27,24
,63,96,207,128,23,250,8,8,15
6,28,246,3,251,2,23,252,153,

```

Turn to Page 19 ►

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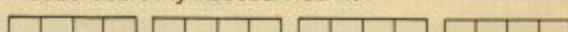
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From Page 17

```

102,102,153,153,102,102,153,
23,253,255,127,32,46,36,33,4
9,17
270 ENDPROC
280 DEFPROCrandom
290 FORI% = 1 TO Z:N%(IX)=IX
:NEXT:FORI% = Z TO 2 STEP-1:D%
=RND(1%):T% = N%(D%):N%(D%) = N%
(IX):N%(IX)=T%:NEXTI%
300 RESTORE:FORI=1T052:REA
DC(1),S(1):NEXT
310 ENDPROC
320 DEFPROCcard:suit$=CHR$(S+223):IFS=10RS=3colour=1:G
C=0ELSEIFS=20RS=4colour=0:GC
=1
330 VDU5,24,XX:Y%-197:XX+1
60;Y%+10:;GCOL0,131:CLG
340 GCOL0,colour:SOUND0,-1
5,4,1
350 ON C GOSUB370,380,390,
400,410,420,430,440,450,460,
470,480,490,500
360 ENDPROC
370 MOVEXX+120,Y%-155:VDU6
5:PROC1:MOVEXX+5,Y%:VDU65:RE
TURN
380 PROCc:PROC2:RETURN
390 PROCc:PROC2:PROC1:RETU
RN
400 PROCc:PROC3:RETURN
410 PROCc:PROC3:PROC1:RETU
RN
420 PROCc:PROC3:PROC4:RETU
RN
430 PROCc:PROC3:PROC4:PROC
5:RETURN
440 PROCc:PROC3:PROC4:PROC
6:RETURN
450 PROCc:PROC7:PROC1:RETU
RN
460 MOVEXX+120,Y%-155:VDU2
29:PROC7:PROC8:MOVEXX+5,Y%:V
DU229:RETURN
470 PROC1:RETURN
480 PROCq:RETURN
490 PROCk:RETURN
500 RETURN
510 DEFPROC:MOVEXX+5,Y%:V
DU48+C:MOVEXX+123,Y%-160:VDU
48+C:ENDPROC
520 DEFPROC1:MOVEXX+64,Y%-
80:PRINTsuit$:ENDPROC
530 DEFPROC2:MOVEXX+64,Y%-
28:PRINTsuit$:MOVEXX+64,Y%-1
32:PRINTsuit$:ENDPROC
540 DEFPROC3:MOVEXX+28,Y%-
28:PRINTsuit$:MOVEXX+28,Y%-1
32:PRINTsuit$:MOVEXX+98,Y%-2
8:PRINTsuit$:MOVEXX+98,Y%-13
2:PRINTsuit$:ENDPROC
550 DEFPROC4:MOVEXX+28,Y%-
75:PRINTsuit$:MOVEXX+98,Y%-7
5:PRINTsuit$:ENDPROC
560 DEFPROC5:MOVEXX+64,Y%-
48:PRINTsuit$:ENDPROC
570 DEFPROC6:MOVEXX+64,Y%-
48:PRINTsuit$:MOVEXX+64,Y%-1
88:PRINTsuit$:ENDPROC
580 DEFPROC7:T$=suit$+CHR$(8+CHR$10:t$=STRINGS(4,T$):MOVEXX+28,Y%-26:PRINTt$:MOVEXX+100,Y%-26:PRINTt$:ENDPROC
590 DEFPROC8:MOVEXX+64,Y%-
48:PRINTsuit$:MOVEXX+64,Y%-1
10:PRINTsuit$:ENDPROC
600 DEFPROC9:MOVEXX+1,Y%:V
DU74:MOVEXX+131,Y%-160:VDU74

```

```

610 MOVEXX+65,Y%-14:VDU18,
8,GC,253,231,8,8,10,239,240,
8,8,8,10,18,8,2,241,18,8,GC,
252,18,8,2,242,8,8,10,18,8
,GC,243,244,8,8,10,245,246:P
ROCdraw:ENDPROC
620 DEFPROC:MOVEXX+1,Y%:V
DU81:MOVEXX+131,Y%-160:VDU81
630 MOVEXX+65,Y%-14:VDU18,
8,GC,247,248,8,8,10,249,250,
8,8,8,10,18,8,2,241,18,8,GC,
252,18,8,2,242,8,8,10,18,8
,GC,233,234,8,8,10,235,236:P
ROCdraw:ENDPROC
640 DEFPROC:MOVEXX+1,Y%:V
DU75:MOVEXX+131,Y%-160:VDU75
:GOTO610
650 DEFPROCdraw:MOVEXX+32,
Y%-14:GCOL0,0:DRAWXX+130,Y%-
14:DRAWXX+130,Y%-171:DRAWXX+
32,Y%-171:DRAWXX+32,Y%-14
660 GCOL0,colour:MOVEXX+36
,Y%-35:PRINT:suit$:MOVEXX+92
,Y%-130:PRINT:suit$:ENDPROC

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

```

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```

:CLS:IFWS$="Y":swap% = TRUE
790 ENDPROC
800 DEFPROC:FORI=1T034:
C=C(N%(I)):S=S(N%(I)):IFS=10
RS=3:r% = r%+1 ELSE IFS=20RS=4b
% = b%+1
810 NEXT:XX=730:Y% = 468:SOU
ND0,-15,4,1:PROCback:ENDPROC
820 DEFPROCblank(n%):IFn%<
8 Y% = 992:XX=-120+(n%)*170 EL
SE IFn% > 7 AND n% < 15 Y% = 734:XX=
-120+(n%)-7)*170 ELSE IFn% >
14 Y% = 468:XX=-120+(n%)-14)*
170
830 PROCwindow:XX=986:Y% = 4
48:ENDPROC
840 DEFPROCplayer
850 IFc% = 1 su$="Red" ELSE
su$="Black"
860 fault=0:VDU4,12,7:PRIN
TTAB(3,2) Enter your lowest
";su$; card:;:INPUT"PC
870 IFPC>17 GOTO 860
880 IFPC=0 cg% = cg%+1:GOT08
90 ELSE GOT0900
890 IFcg% = 2 cg% = 0:PROCchan
ge:GOT0940 ELSE GOT0948
900 s% = S(N%(PC)):S=s%:C=C(
N%(PC)):IFS% <> c AND s% <> d% TH
EN 860
910 PROCcheck:IF fault GOT
0860
920 VDU12:PROCblank(PC):cg
% = 0:p% = 1:PROCcard:pc% = pc%+1:
S(N%(PC)) = 5:PROCwin(1)
930 REPEAT:PROCp_cards:PRO
Cc_cards:UNTILNOTgo% AND NOTgo
2%:PROCchange:IFp% = 1 GOT0850
940 PROCcomp:ENDPROC
950 DEFPROCchange:IFc% = 1 c
% = 2:d% = 4 ELSE IFc% = 2 c% = 1:d% =
3
960 ENDPROC
970 DEFPROCcomp
980 IFc% = 1 su$="Red" ELSE
su$="Black"
990 FORK=1T034:z% = 0:IFS(N
%(K)) = c% OR S(N%(K)) = d% GOTO
1000 ELSE GOT01030
1000 FORJ=1T034:IF C(N%(K))
<= C(N%(J)) AND S(N%(J)) = c% OR
S(N%(J)) = d% z% = z%+1
1010 IFc% = 1 AND z% = r% OR c% = 2
AND d% = b% J% = K:J = 34:K = 34:NEXT
:NEXT:GOT01050
1020 NEXT
1030 NEXT
1040 cg% = cg%+1:IFcg% = 2:cg% =
0:PROCchange:GOT01090 ELSE G
OT01090
1050 VDU4,12:PRINTTAB(6,2)-
Electron's lowest ";su$; ca
rd:VDU5:FORD=1T01000:NEXT:s
% = S(N%(J)):S=s%:C=C(N%(J))
1060 IFS=20RS=3 r% = r%+1 ELS
E IFS=20RS=4 b% = b%+1
1070 X% = 986:Y% = 448:cg% = 0:p%
= 2:PROCcard:ec% = ec%+1:PROCnc
:S(N%(J)) = 5:PROCwin(2)
1080 REPEAT:PROCc_cards:PRO
Cc_cards:UNTILNOTgo% AND NOTgo
2%:PROCchange:IF p% = 2 GOTO 9
88
1090 PROCplayer:ENDPROC
1100 DEFPROCp_cards:go% = 0
1110 FORI=1T0107
1120 IFS(N%(I)) = s% AND C(N%(I))
= c+1 VDU4,12:PRINTTAB(7,2)
'Automatic mode: Player':VDU
5:go% = TRUE:C=C(N%(I)):p% = 1:p

```

```

ROCblank(I):PROCcard:pc% = pc%
+1:S(N%(I)) = 5:PROCwin(1):I=1
7:NEXT:GOT01110
1130 NEXT:ENDPROC
1140 DEFPROCc_cards:go2% = 0
1150 FORI=1T034
1160 IFS(N%(I)) = s% AND C(N%(I))
= c+1 go2% = TRUE:VDU4,12:PRI
NTTAB(7,2) Automatic mode: E
lectron':VDU5:C=C(N%(I)):GOT
01170 ELSE GOT01190
1170 IFS=10RS=3 r% = r%+1 E
LSE IFS=20RS=4 b% = b%+1
1180 J% = I:p% = 2:PROCcard:ec%
= ec%+1:PROCnc:S(N%(J)) = 5:PR
OCwin(2):I=34:NEXT:GOT01150
1190 NEXT:ENDPROC
1200 DEFPROCcheck:FORI=1T01
7
1210 IFS(N%(I)) = c% AND C(N%(I))
< C OR S(N%(I)) = d% AND C(N%(I))
< C I = 17:NEXT:fault=-1:EN
DPROC
1220 NEXT:ENDPROC
1230 DEFPROCnc:cl% = cl%+1:VD
U5,24,780,222;844;262;18,0,1
29,16,18,0,3:IF cl% > 9 MOVE78
2,254:PRINT:cl%:ENDPROC ELSE
MOVE798,254:PRINT:cl%:ENDPR
OC
1240 DEFPROCback:x% = -20:y% =
-20:col% = 4:FORK=1T05:x% = x%+2
y% = y%+20:col% = col%+1:IFcol
% = 1 col% = 3
1250 VDU24,XX+X:(Y%-197)+Y
;((X+160)-x%:(Y+10)-y%:;GC
OL0,128+col%:CLG:NEXT:ENDPRO
C
1260 DATA8,1,3,2,11,4,1,1,1
2,1,4,2,9,1,6,2,2,3,7,3,10,3
5,2,13,2,5,1,2,4,10,2,8,2,6
1,3,1,9,4,1,3,11,3,7,2,13,4
4,3,12,2
1270 DATA 10,1,12,4,4,1,13,
1,8,3,2,1,7,1,11,2,3,4,9,2,6
4,1,2,13,3,7,4,2,2,11,1,5,3
1,4,9,3,6,3,4,4,10,4,3,8,
4,5,4,12,3
1280 DEFPROCwin(w%)
1290 IFec% = 17 Ropc% = 17 VDU4,
12:PRINTTAB(14,2)'Newmarket'
;:FORS=1T050STEP2:SOUND1,-1
5,S,1:NEXT:SOUND1,1,100,40:V
DU5,24,28,210,1252,1010,18,0
,128,16,18,0,3
1300 IFw% = 1 AND pc% = 17 MOVE
32,704:PRINT'Well done. You've
beaten the Electron':G% = G
%+1:GOT01330
1310 Ifw% = 2 AND ec% = 17 MOVE
32,704:PRINT'Bad Luck, the E
lectron has beaten you':F% = F
%+1:GOT01330
1320 GOT01360
1330 *FX 15,1
1340 MOVE320,608:PRINT'Elec
tron's score':FX:MOVE320,5
44:PRINT'Player's score':G%
:MOVE96,448:PRINT'Hit Space
to replay or Q to exit':W=GE
T
1350 IF W=ASC'Q' VDU22,6:EN
D ELSE RUN
1360 ENDPROC

```

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

MOST of us buy a printer with the intention of using it to produce listings of our programs and documents from word processors such as View.

When it comes to choosing one though, we are usually faced with a barrage of jargon and a plethora of printer terminology. Here are some of the terms you'll come across and their meanings:

- **CPS** – Characters per second. The number of characters printed in one second is a vital statistic used to compare many printers. Such values can only be used as a rough guideline because some printers have very fast, low quality, print modes.

- **LPM** – Lines per minute. This vital statistic is rarely quoted, simply because it gives a very accurate printer comparison figure (only the most favourable statistics are ever quoted!).

- **CPL** – Characters per line. The number of characters that can fit on one line. The actual number can vary depending on the size of the text printed. Standard size text is normally printed in some multiple of 20, that is 20, 40, 80 or even 160 characters. A good, general purpose printer should be able to print 80 columns.

- **CPI** – Characters per inch. The normal value for reasonable sized text is 10.

- **NLQ** – Near letter quality. A mode offered by some dot matrix printers to simulate the quality of a proper typewriter.

- **Print head** – The sharp end of the printer that does the actual work. Some types of print head, daisy wheels for instance, are interchangeable to access different fonts.

- **Tractor feed** – Refers to the way in which paper is fed through some machines. The tractor is a wheel cov-

Dotty and noisy, but we couldn't do without them

In the first part of a new series
JULIA FORESTER explains a much
misunderstood area of computers

ered in pins. Anyone wishing to use standard computer paper (fanfold) would need this.

- **Friction feed** – Most printers offer this option. It's used to feed single sheets of paper, letters for example, through the machine.

- **Sheet feeder** – This expensive option is available with some printers but it's of little use in the home. Sheet feeders allow stacks of paper to be fed through the machine one sheet at a time when producing either a long document or a lot of individual letters.

- **Bit image mode** – This is only available with dot matrix printers and is used for producing graphics and screen dumps.

- **Bi-directional** – This refers to way in which a printer produces each line of text. Bi-directional printers produce text output when the head travels from left to right and from right to left.

Because of this, their speed in lines per minute is almost twice that of a comparable uni-directional printer operating in the same mode. In NLQ mode most printers only print in one direction.

- **DIP switches** – DIP stands for dual in-line package. These tiny switches are used

to set up certain characteristics of the printer at switch-on. For instance, which character set is present.

DIP switches are invariably hard to get at, a knitting needle or something similar is usually needed to alter them. This only has to be done once though.

Broadly speaking, all printers can be divided into two distinct categories, parallel and serial, this refers to the way in which data is sent.

Serial printers connect to the computer's serial port via an RS232 interface. This form of data transmission is slow but since only three wires are needed it is used where printers are connected remotely, sometimes miles away from their host terminals.

Parallel data transmission is much faster, but requires 11 wires to send data. Because of the costs involved, it is rarely used for remote terminals, but widely found in the single user environment.

The Plus 1 and Rombox Plus expansions incorporate a parallel printer port and is all that's required for most printers. Serial printers, sometimes offered at bargain prices are not rec-

ommended, because they will require extra hardware and software to run properly.

Printers produce their output in a variety of different ways. Ink jets, spark jets, thermal ribbons, thermal paper, daisy wheels and golf balls. Some (usually called plotters) draw each letter.

By far the most common and versatile method though, is the dot matrix, so I'll be concentrating on printers using this technique. Unless stated otherwise, all of the examples have been tested on the Epson-compatible Panasonic KX-P1081.

A simple dot matrix printer forms each letter by firing a preset character pattern of 9 x 9 pins at the ribbon, forming an image on the paper. Individual characters are produced on a grid of 5 x 7 dots.

This method is very fast, but noisy. The quality of the print may also suffer because of the limited number of dots making up each character.

Most dot matrix printers can also be pressed into producing monochrome screen dumps (with shading for colour), this makes them more useful to the average Electron owner.

To cut down on pins, thus cutting cost, some budget printers do not produce true lower case descenders. Descenders are the parts of letters we write below the line in the characters p, g, and y for example.

This is fine for listings, but useless for word processing where quality is often important. Very cheap printers don't even produce lower case letters and should be avoided.

When it comes to printing in special styles and producing special effects, the printer manuals are, more often than not, somewhat less than helpful.

In fact printers are a lot smarter than we give them credit for. Many have international character fonts, internal ram and even word processing modes to perform functions like automatic justification.

Because most printers can be attached to almost any general purpose microcomputer, producing an individual manual for every possible computer configuration just wouldn't be economically viable for the manufacturer.

Instead, most adopt the industry standard format for output to printer commands. Here are some common examples found in industry standard Basic's and their meanings:

- LPRINT – Send a stream of characters or control codes to the printer.
- LLIST – List the Basic program in memory
- PRINT#9,27 – Send an escape code to device number or output stream nine.

Try typing those in to the Electron and not surprisingly they won't work. The first two produce the error message Mistake and the last produces the message Channel.

Simply, the first two just don't exist in the Electron's Basic language and are not understood. On the other hand the last command does, but still generates an error. Why this happens

requires further explanation.

The Electron is attempting to print to a file and files must first be opened by the commands OPENIN, OPEN OUT and OPENUP. If you type:

X=OPENOUT"TEST"

The Electron cassette filing system returns two in X. This number is known as a file handle, now type:

PRINT #X,"HELLO"

or even

PRINT #2,"HELLO"

Both of these commands should work without problem. Although nothing will be printed because the Electron is sending output to a file and not to the printer.

All of these problems stem from the fact that the Electron's Basic is far in advance of the industry standard commands. It is much more user friendly.

The example above, PRINT#9,27, is a historical hangover of many earlier Basics. Device nine refers in this case to the line printer, but it could just as easily have been the tape reader, a disc drive, a monitor or even a control port connected to a robotic arm.

Although powerful, this system is very complex to understand and hard to use if all you want to do is use a printer.

The Electron's advanced Basic provides some very simple commands to interface to a printer. VDU 2 turns the printer on and copies all screen output to it. VDU 3 turns the printer off. PRINT CHR\$(2) and PRINT CHR\$(3), or pressing Ctrl+B and Ctrl+C do the same things.

So to list the program in memory type:

VDU 2
LIST
VDU 3

At certain times it may be necessary to output special

characters to the printer only without displaying them on the screen as such characters could adversely affect the display.

A typical example is VDU 14, which enables the double width print mode on Epson compatible printers.

If this code is sent to the screen driver it enables paged mode and would cause printing to hang at the end of each page. To send codes to the printer only type VDU 1, followed by the code to be sent like:

VDU 2
VDU 1,14
VDU 3

In typical style of "We understand it, so you must" a special code called the escape character is treated by manuals with no explanation. It is used to inform the printer controller of an impending command line.

Characters following the escape code are not printed, rather they tell the printer to reconfigure itself in some way. The escape character is commonly expressed as ESC, Escape, CHR\$(27), CHR\$(1B) or even CHR\$(1B).

In all of these cases the escape character, which has an Ascii value of 27 (1B hexdecimal) can be sent to the printer by typing VDU 1,27.

A simple example are the Epson codes to switch italics on and off: ESC+4 switches italics on and ESC+5 switches italics off.

Such command lines are often called escape sequences. In this case the escape code is followed by the character 4 or 5.

It is vital to remember that unless specified, letters or numbers following the escape code represent the characters Ascii value.

In the above example, characters 4 and 5 have Ascii values of 52 and 53 respectively, so the commands translate:

VDU 1,27,1,52:REM on
VDU 1,27,1,53:REM off

Some escape sequences can switch the printer into several different modes by changing one parameter or variable. Consider the sequence to place the Panasonic into different character pitches (widths): ESC+w+n.

The command part of the sequence is the ESC+w. The letter n is a variable with a value between zero and three. Sequences such as these can be translated simply:

VDU 1,27,1,119,1,2

This selects character pitch two giving 15 characters per inch.

Just for the sake of structured programming, it is often easier and indeed clearer to express the characters themselves rather than their Ascii values. For example:

10 ESC=27:n=2:on=2:off=3
20 VDU on
30 VDU 1,ESC,1,ASC'w',1,n
40 PRINT "15 CPI"
50 VDU off

Is far more elegant than:

10 VDU 2
20 VDU 1,27,1,119,1,2
30 PRINT "15 CPI"
40 VDU 3

One other special character found in the manuals is null, which has an Ascii value of zero. This is often used to terminate an escape sequence, although it is not usually needed. Used on its own null does nothing.

This feature forms the basis of Program 1 which tests for the presence and status of a parallel printer. The program attempts to send a series of nulls to the printer and then examines the printer buffer status using ADVAL(-4).

If after a short delay, the buffer has not been cleared then the printer is assumed to be either not present or off line.

Programs found in printer

Turn to Page 22 ►

Exploring Printers

Feature

From Page 21

manuals can appear to be very difficult to translate. Not surprisingly, because of the power of Electron Basic, this is not usually the case.

Consider Program II which cycles the Panasonic through its various print mode combinations. This program, not written in Electron Basic, is provided for comparison and should not be typed in. Program III has the same effect, written in Electron Basic.

The main part of the translation takes place in Lines 40, 50, 70 and 90. Line 40 informs the computer of the presence of a printer on I/O port one. This translates simply into VDU 2. A better

```

10 REM Program I
20 *FX 15
30 free% = ADVAL(-4)
40 VDU 2
50 IX = 0
60 REPEAT IX = IX + 1
70 VDU 1,0
80 UNTIL IX = 200 OR ADVAL
(-4) < 10
90 VDU 3
100 TIME = 0: REPEAT UNTIL TIME
E > 10
110 IF ADVAL(-4) <> free% PR
INT "Printer not on line!"
```

example is in Line 90 of Program II:

```
90 PRINT #1, CHR$(27) + "!" +
```

CHR\$(N);

This translates to:

```
90 VDU 1,27,1,ASC"!",1,N
```

Here the PRINT #1 has been replaced by VDU 1.

Each number or variable

```

10 REM Program II
20 REM Not Electron Basic
30 WIDTH "LPT1:", 255
40 OPEN "LPT1": AS #1
50 PRINT #1, CHR$(27) + "!" +
CHR$(0);
60 FOR N = 0 TO 63
70 PRINT #1, CHR$(27) + "!" +
CHR$(0);
80 PRINT #1, "Mode:"; N; CHR
$(9);
90 PRINT #1, CHR$(27) + "!" +
CHR$(N);
100 PRINT #1, "Not Electron
Basic"; CHR$(10);
110 NEXT
120 END
```

```

10 REM Program III
20 REM Select print mode
30 WIDTH 255:REM not requi
red
40 VDU 2
50 VDU 1,27,1,ASC"!",1,12
,1,0
60 FOR N = 0 TO 63
70 VDU 1,27,1,ASC"!",1,0
80 PRINT "Mode:"; N;
90 VDU 1,27,1,ASC"!",1,N
100 PRINT " Happy Christma
s from Electron User"
110 NEXT
120 VDU 3
130 END
```

bracketed by the CHR\$ statement is inserted into the VDU statement directly separated by commas.

Any character surrounded by quotes, the ! character in this case, is replaced by either ASC"character" or the Ascii value of the character. For example, the ! mark has an Ascii value of 33 so the line could have

been written:

```
90 VDU 1,27,1,33,1,N
```

Most other programs to be found in the manuals will translate in a similar fashion.

● In the second part of this series I'll be revealing how fast or slow some printers really are. ■

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It's a hard life . . .

Program: *Life of Repton*

Price: £6.95 (cassette) £9.95 (3½in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

YES, he's back! Superior Software's enormously popular Repton makes yet another appearance – his fourth. This time he stars in the story of his life.

For old hands, the *Life of Repton* is a collection of 40 new screens for Repton 3. If you're a fan, that alone should be enough for you to go out and buy a copy.

If, on the other hand, you've been living in the asteroid belt for the last two years then a few words of explanation will be in order.

Repton is a cute little reptilian character and the object is to move him around a maze collecting diamonds and killing monsters as you go. Each maze contains earth which you can dig through and barriers through which nothing can pass.

You need to plan your route carefully, otherwise a boulder may fall and trap a diamond or squash Repton. There are several puzzles on each screen and you can call up a map of the easier screens to help your planning.

Life of Repton includes the original Repton 3 shell, but not the screens. The 40 new screens load in blocks of eight. The first set depicts Repton as a

baby, the second shows him at school, the third is Repton in his teens, the fourth at work and the fifth is Repton as an old man.

The graphics in each section have been redesigned – so in the baby set, humpty-dumptys take the place of boulders, teddy bears take the place of diamonds, a fireplace is the skull and irate dogs and toy soldiers become monsters.

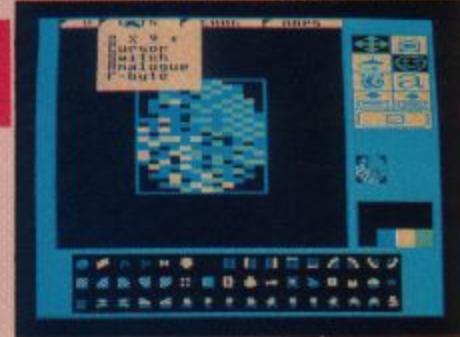
The graphics in the other ages are similarly appropriate – as a teenager, cigarettes take the place of the skull,



while at work a floppy disc is the spirit. As an OAP war medals become the diamonds.

Life of Repton also includes the screen editor. This allows you to edit existing screens or construct new ones. The editor is an excellent piece of software in itself.

Before you can edit a screen however, you must successfully complete it. When you do, you are given a five-digit code number to be



used in the editor. You are also given a password for the next screen so you don't have to start from screen one every time you play.

The instructions are generally helpful, although I did find one oddity in the part which tells you the puzzles are not impossible. It says: "We assure you that Around the World can be completed".

Back with the program, if you manage to complete all five sets of eight screens without using a password you are eligible to enter a competition. Upon completion of a set, a congratulatory message appears along with a competition entry code number. To enter, you need all five code numbers.

Minor niggles apart, *Life of Repton* is a superb game which will keep you busy for days, probably weeks. If you don't have a Repton game already then buy this.

Ian Waugh

Sound.....	10
Graphics.....	10
Playability.....	9
Value for money.....	10
Overall.....	9

Dodgy scenario

Product: *Cops and Robbers*

Price: £1.99 (cassette)
Supplier: Atlantis Software, 28 Station Road, London SE25 5AG.
Tel: 01-771 8642

THE latest budget release from Atlantis features Light Fingers Lonegan who is raiding the headquarters of the Acme Diamond Company. He has set off the alarm system, which means the whole building is swarming with police. Lonegan must try to find all the diamonds, open the safe and escape to his car.

Points are scored for collecting diamonds. These gems look suspiciously like an asterisk symbol and may be coloured blue or green. I had to guess they were meant to be the jewels.

Additional points are scored for

shooting policemen. Lonegan is armed with a 0.45 Magnum. His poor carrying capacity necessitates frequent trips back to the getaway car.

If Lonegan makes the trip to the cellar, the policemen are replaced by ghosts. They are hell-bent on tracking down the villain, but are armed only with truncheons, which means they must get close to Fingers to be able to haul him off to jail.

The other activity Lonegan must attempt is safe breaking. This involves finding a three number code by guess-work. The numbers on the safe change in response to a prod from the robber's nose. I have not yet cracked the combination.

The graphics aren't really up to par, even for software at this price. The sprites are simple and undergo a sort of jerky animation, but the overall speed of movement is quite good. The

scenery that supports the action can probably best be described as plain or perhaps boring.

I find this game wholly inappropriate. It strikes me as abhorrent that success is measured by the ability to shoot policemen or steal diamonds.

It should have been given a fantasy setting where the nasties which must be shot are not recognisable as creatures from the Earth.

Cops and Robbers was never destined to be a blockbuster. As it stands, it surely must be given a miss.

Rog Frost

Graphics.....	5
Sound.....	5
Playability.....	7
Value for money.....	4
Overall.....	4

Trouble in store

Product: Warehouse
Supplier: Top Ten, 12, Chiltern Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA.
Tel: 0734 302600

ARCADE adventures show no signs of losing their popularity and I have managed to sneak a look at a pre-production version of Warehouse, a new game by Pillar Graphics.

You are Fred the storekeeper to Alf, an interstellar trader. The stores have recently been moved to Tymorg, but this has left a backlog of irate customers.

Keeping alive the belief that the customer is always right – whoever said that did not work in the retail trade – your task is hampered by the fact that the warehouse is crawling with lots of nasties and littered with tricks and traps. Added to this, you don't know what you are looking for.

Like other games of this ilk you have to search a maze for certain items. The screen doesn't scroll, but instead flicks quickly from one to the next.

Controls are left, right, up, down and fire – yes, your thoughtful employers haven't left you completely

defenceless. You can carry three items at once, and apart from the goods there are other items you will need to complete your task.

Your first challenge, sorry, customer, is a writer, and for him you must find a notebook and ink. When you find them, take them to the office and put them on the conveyor belt.

Monsters appear on every screen from a portal but a quick blast will close it for good if you can't get to it. Help is provided by portal blasters, extra ammo, transporter keys, alien freeze devices and other handy bits and pieces you collect on your travels.

You get five lives, which is considerably better than two verbal warnings and one written one. But when you're reincarnated – Oh, no! Not another warehouse assistant – you're in a different part of the warehouse too.

There are four different starting points, which gives you a better picture of the maze than if you were plonked back at the start each time.

The sprites are big and chunky and the movement is smooth, though you do seem to get zapped by the baddies before they actually touch you, which I resented.



Also, it was rather frustrating to find that you can't move and fire at the same time. So to attack a portal with all guns blazing to knock out emerging aliens requires some dexterous key manipulation.

Your other customers include a priest, a lockmaker, a mechanic and an assassin. A word of warning – the warehouse is also the headquarters of Zorg, the most wanted man in the universe.

Warehouse is not going to do the reputation of the MSC, YTS or JTS any good at all. You don't even get any money, just a place in the hall of fame – when you're dead. But it's fun while you're alive.

Ian Waugh

Sound.....	4
Graphics.....	8
Playability.....	8
Value for money.....	10
Overall.....	9

Bewitching adventure

Program: Spellbinder
Price: £9.95 (cassette)
Supplier: Superior Software, Regents House, Skinner Lane, Leeds LS Tel: 0532 459453

IN true adventuring tradition, Spellbinder asks you to take the role of a powerful and wise Magelord entrusted with the awesome task of banishing the evil Zorn.

In order to do this, you must search the foreboding Castle of Lorraine, find Zorn and then by mixing the ultimate spell, despatch him to the wilderness forever.

Released in the aftermath of a glut of arcade/adventure hybrids, Spellbinder must offer more than the usual range of features, particularly with its relatively high price tag. This it does, mainly through its icon system, its size, graphical detail and spell-collecting and casting procedures.

Playing Spellbinder is not difficult. The character moves freely around each room, though you do have to be accurate when guiding him through one of the many doors.

Control is aided by a well thought out icon system complementing the

four definable keys. These icons, selected by function keys, enable you to mix and cast spells, examine and use items to be found in the adventure, and keep tabs on what items you have in your possession.

Spellbinder's graphics are not outstanding. However, the program designers have put some thought into littering the stone-walled castle with the sort of medieval accoutrements you would expect to see in a place like this.

Heraldic shields and gargoyles adorn the walls and you find suits of armour, wooden barrels and sturdy chests dotted around the place, all adding atmosphere to the proceedings.

What is more impressive than the detailed graphics, is the sheer number of rooms comprising the two floors, three citadels, catacomb and dungeon.

One-way doors, secret passages and teleports all confuse the explorer, but I found the colour coding of the various parts of the castle (the game is in two-colour, high resolution Mode 4) most helpful in creating a game map.

What makes this more than a mapping and avoiding the monsters affair,

are the weird and wonderful spells you are called on to cast. First however, you must find the ingredients for each spell – items like burnt oak leaves, toad legs and sulphur are all essential components of the common spells.

The instruction leaflet details some spells, but it is up to you to obtain the knowledge to create the rest. Speaking to the stone dwarves, browsing through the bookshelves and similar ruses will all help glean the necessary information.

The game sticks to some quite strict adventuring rules – it is more a problem-solving graphical puzzle than a key-bashing exercise in dexterity.

The spell element, which you must master if you aspire to solve Spellbinder, is far from easy. It is this aspect of the game, coupled with the thought put into much of the design which marks it out as better than most of the other, similar offerings.

Clive Gifford

Sound.....	7
Graphics.....	8
Playability.....	8
Value for money.....	7
Overall.....	8

Fun on a pogo stick

Product: Ransack
Price: £9.95
Supplier: Audiogenic, Winchester House, Canning Road, Weelstone, Harrow HA3 7SJ.
Tel: 01-861 1166

IT seems just yesterday that I was enthralled with Peter Scott's Omega Orb. Like an old friend, Mr Scott is back again with something resembling a space hopper on a pogo stick.

However, Al is not your average toy, but an artificial life form – terms like robot and android having long since been abandoned on grounds of mechanical discrimination.

Initially, he's just armed with a front firing laser, but has the ability to collect a myriad of different weapons, including four types of smart bomb and six types of laser.

The scenario is a good old shoot-'em-up, with plenty to shoot at. There are 44 different aliens with 200 attack patterns, all spread over eight planet-scapes. Each planet (named after a popular arcade game) is no less than 104 screens wide, giving an action-

packed 832 screens.

At the end of each level you are awarded a bonus screen. You have to bounce on top of an alien spaceship while shooting the baddies. I haven't managed it yet.

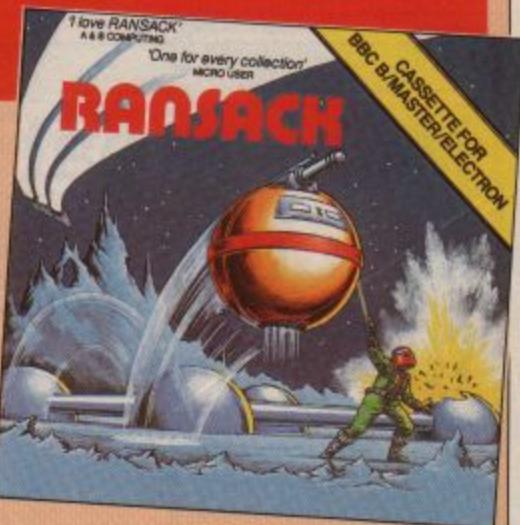
The scrolling landscape moves at a devilish speed and you'll have to practice hard to see the end of each level.

What makes Ransack so challenging is a feature that is very easy to miss when you first play the game, especially when, like me, you don't read the instructions.

The landscape is not just scenery – it's a hazard. As you bounce along merrily blasting away at every mild mannered alien in sight, you might fail to notice the appearance of electrified spikes, which have quite a shocking effect on your energy level.

The spikes can be neutralised by a certain type of smart bomb – you will have to discover which one yourself. The problem with smart bombs, and other armament for that matter, is that they fly through the air along with everything else and are liable to be shot by a stray laser bolt, so beware.

The sound employed by Ransack is just what you'd expect from this type



of game, with lots of atmospheric pops, bangs and whizzes. While the title tune sounds familiar, it's unusual and witty.

This is one for every collection. Now where did I put my multi-function, ultra-cluster, auto-sighting, hyper-ranging pogo stick?

Guilder

Sound.....	8
Graphics.....	9
Playability.....	8
Value for money.....	8
Overall.....	8

Two-wheeled terror

Product: Despatch Rider
Supplier: ASL, Winchester House, Canning Road, Weelstone, Harrow HA3 7SJ.
Tel: 01-861 1166

DICK Decker is one of life's failures. Veteran of a dozen previous jobs, his fiance has given him an ultimatum – get a steady job or the wedding is off.

The Derek Dorkin Despatch Agency provides Dick with a 750cc Yamasaki speed machine and a further warning – bend my bike and I'll bend your head! With two such supportive people behind him how can Dick possibly fail?

His job involves delivering mail to the Royal Snail offices in separate streets. The road is divided grid style, giving five lanes along which Dick can ride. Pressing the up and down keys causes the bike to change lanes.

Response is instantaneous, but it is very easy to forget that the keys do not auto-repeat, which often results in the loss of a life, and you have to start all over again from the beginning.

As Dick rides along the street, the screen scrolls from right to left. The faster he rides the faster it scrolls. This can be rather jerky at times, but con-

sidering that it's all done by software (it's a hardware scroll on the BBC Micro version) it is quite good and perfectly acceptable.

ASL provides a generous seven bikes which are lost through collisions and lack of fuel. Across the top of the screen is a fuel gauge and the bike is kept topped up by riding through barrels labelled gas.

The bell rings as you touch a barrel, indicating refuelling. Often you encounter four barrels in a row, but unfortunately the bell only rings once. To make the most of this abundance of fuel you must perform some rapid lane changing.

The Yamasaki has a rather unusual fuel economy characteristic – it uses petrol at a constant rate no matter how fast you are going. Therefore, the faster you go the less likely you are to run out of fuel.

I don't know where this town is, but the roads are an absolute nightmare. Each street is strewn with cones, burst water mains, concrete blocks, tacks and greasy patches. All appear to be positioned in such a way as to cause the most inconvenience.

In many instances the obstacles completely block the road ahead. In such cases there is fortunately a ramp



just in front of the roadblock which will send you sailing over the hazard.

Due to a combination of no shadow on the ground below the bike and the length of time spent airborne, you can never be quite sure whether you have landed and moved up the road one lane or are still in flight.

This minor niggle aside, I found Despatch Rider a very testing and enjoyable game.

Jon Revis

Sound.....	7
Graphics.....	8
Playability.....	8
Value for money.....	8
Overall.....	8

More great Electron games

This month we introduce a new volume in our *Ten of the Best* series – 10 more games to give you many hours of fun and entertainment.

These four packages are crammed with the best games from the last two years of *Electron User*. As an added bonus a previously unpublished game has been added to each one – stunning machine code masterpieces from our technical wizard, Roland Waddilove.

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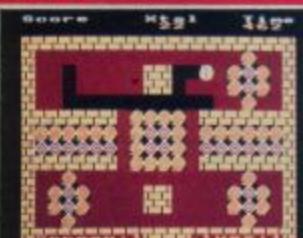
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Solitaire: The Electron version of the age-old game

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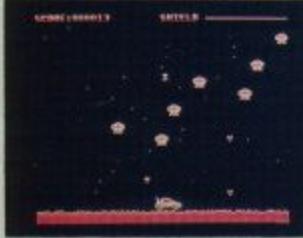
Volume 3



Rockfall: Come diamond mining in this fun packed game with its own screen designer.
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Invasion Force: Can you survive wave after wave of relentlessly advancing aliens.
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Volume 4



Lunar Invasion: Defend the moon from wave after wave of marauding aliens in this superb multi-screen arcade game.
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Reversi: Combine cunning and chance as you try to out-think your Electron at this classic

board game.
Fishing: Relax and enjoy a quiet afternoon by a shady brook. You'll regret if you let this one get away.
Cavern Capers: Escape from the depths of the planet by blasting oil drums and dodging deadly fireballs.
Craal: Escape from the maze and win the beautiful princess in this superb text adventure.
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.

NEW

TO ORDER PLEASE USE THE FORM ON PAGE 53

electron user ARCADE CORNER

Compiled by MARTIN REED

THIS month's pokes come courtesy of Wayne Buttigieg from Staines, Middx, Nicholas Case from Salisbury, Wilts, Peter Clarke from Wootton Bassett, Wilts, Kevin Fernando from Dartford, Kent, Gary McGuire from Loanhead, Midlothian and Stuart Sharp from Portslade, East Sussex.

You'll also find a map of most of the locations in Bug Byte's Plan B. This shows the position of the keys and objects you'll encounter along the way.

Share your hints, tips, peeks and pokes with fellow *Electron User* arcade addicts, but please ensure they are all your own work.

Send them to:

Arcade Corner
Electron User
Adlington Park
Adlington
Macclesfield SK10 5NP

Cybertron Mission – Micro Power

Two quick pokes allow you to vary the start level and initial number of lives. Start with:

*LOAD CYBERTRON

Then enter:

```
?&1A06=x :REM x=lives
?&1A16=x :REM x=start level
CALL 84F80
```

to start the game.

Commando – Elite

Commando provides an ideal opportunity to see how you'd fare as a one-man destruction machine. If however, you don't feel you're cut out to be Rambo, these pokes should help. Start off with:

*LOAD TGAME

Repton – Superior Software

I thought it wouldn't be long before Repton made an appearance in this column, and I'm sure this first appearance won't be the last. Here we present the passwords for our little green-skinned hero's first outing:

A	SCREEN ONE
B	CHAMELEON
C	TERRAPIN
D	SIDEWINDER
E	GECKO
F	PYTHON
G	SALAMANDER
H	IGUANA
I	CUTTLEFISH
J	OCTOPUS
K	GIANT CLAM
L	THE KRAKEN

Moonraider – Micro Power

Moonraider was probably the first version of Scramble released for the Electron and remains popular to this day. To give yourself a greater chance of getting to the later zones, enter the following:

```
PAGE=&B00
LOAD"GAME1"
```

Wait until the GAME1 file has loaded, then enter:

```
32000 IF PAGE=&B00 THEN ?&1
94B=&A9:?:194C=1:?:194D=&EA
:CALL 81900
RUN
```

The rest of the game will now load with infinite lives.

Plan B – Bug Byte

For infinite energy and ammo in this *Electron User* Golden Game, enter the following routine:

```
10 !&900=&208D29A9:!:904=
&8009A902
20 !&900=&0EA90221!:90C=
&F42004A2
30 !&910=&A043A2FF!:914=
&FFF72009
40 !&918=&748DEAA9!:91C=
&3F758D3F
50 !&920=&8D3F828D!:924=
&B34C3F83
60 !&928=&8A48084C!:92C=
&A0489848
70 !&930=&FE2903CA!:934=
&A903CA8D
80 !&938=&03C78D00!:93C=
&AA68A868
90 !&940=&4C602868!:944=
&414C502E
100 !&948=&8000D424E
110 CALL &900
```

and type RUN.

Vindaloo – Tynesoft

This clever cheat allows the player to jump from the current level to the next by simply walking off the left or right of the screen. To start type:

```
LOAD"
70 PAGE=&1400
RUN
```

Then enter:

LOAD"

Wait until the next file has loaded and enter:

30 REM

Fast forward the tape to the beginning of the file called MAIN and type:

RUN

Electron Invaders – Micro Power

To obtain infinite lives on this simple Space Invaders clone:

```
*LOAD INV1
?&309E=&A9:?:3f19F=1:
?&30A0=&EA
CALL 83000
```

Repton 3 – Superior Software

Repton 3 took the basic idea of the original game several stages further, not the least of which was the screen designer. In its various guises – Repton 3, Around the World in 40 Screens and Life of Repton – it continues to be a top seller.

The passwords and edit codes for the first three sets of screens, as

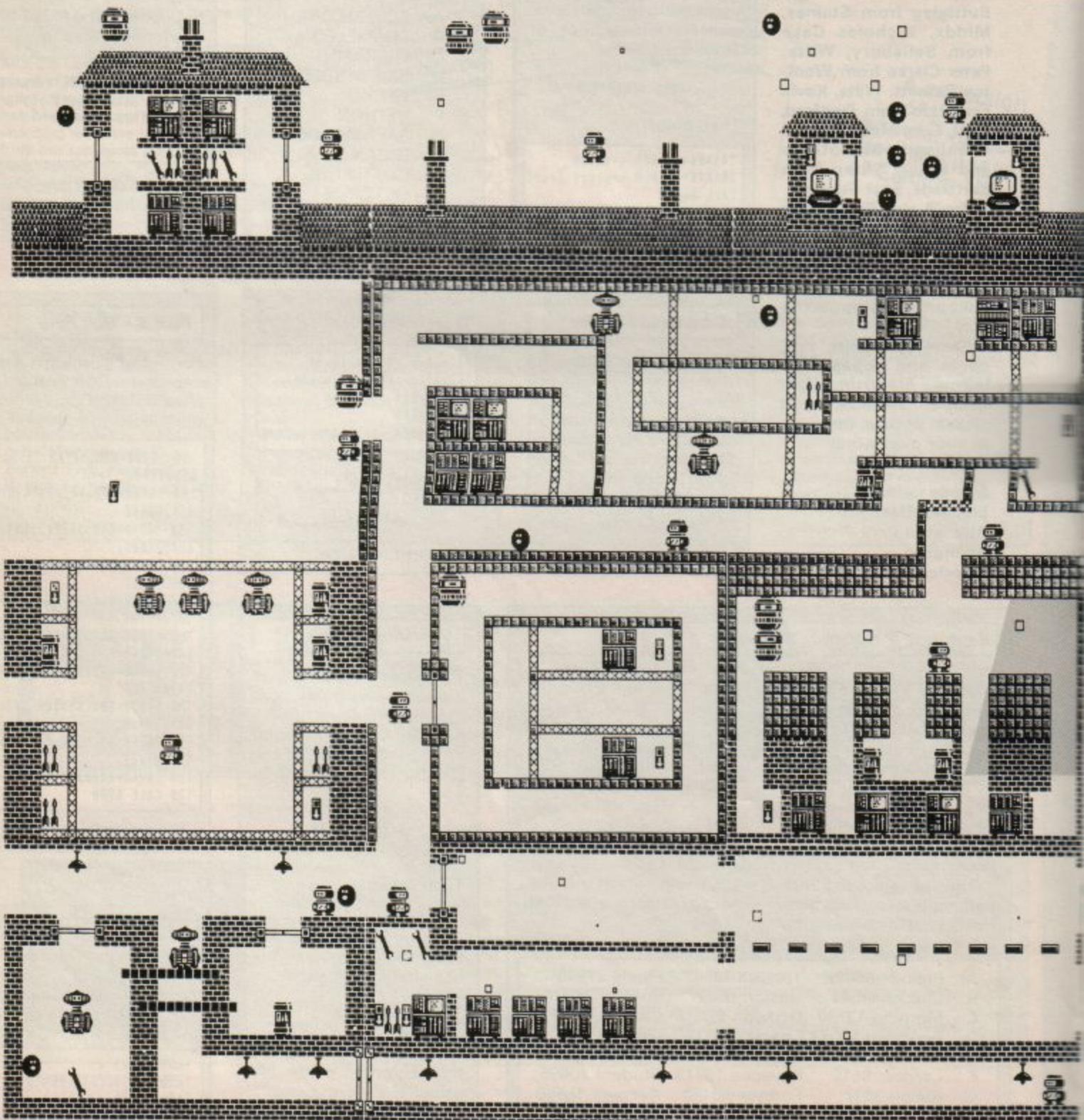
supplied with the original game, are shown below:

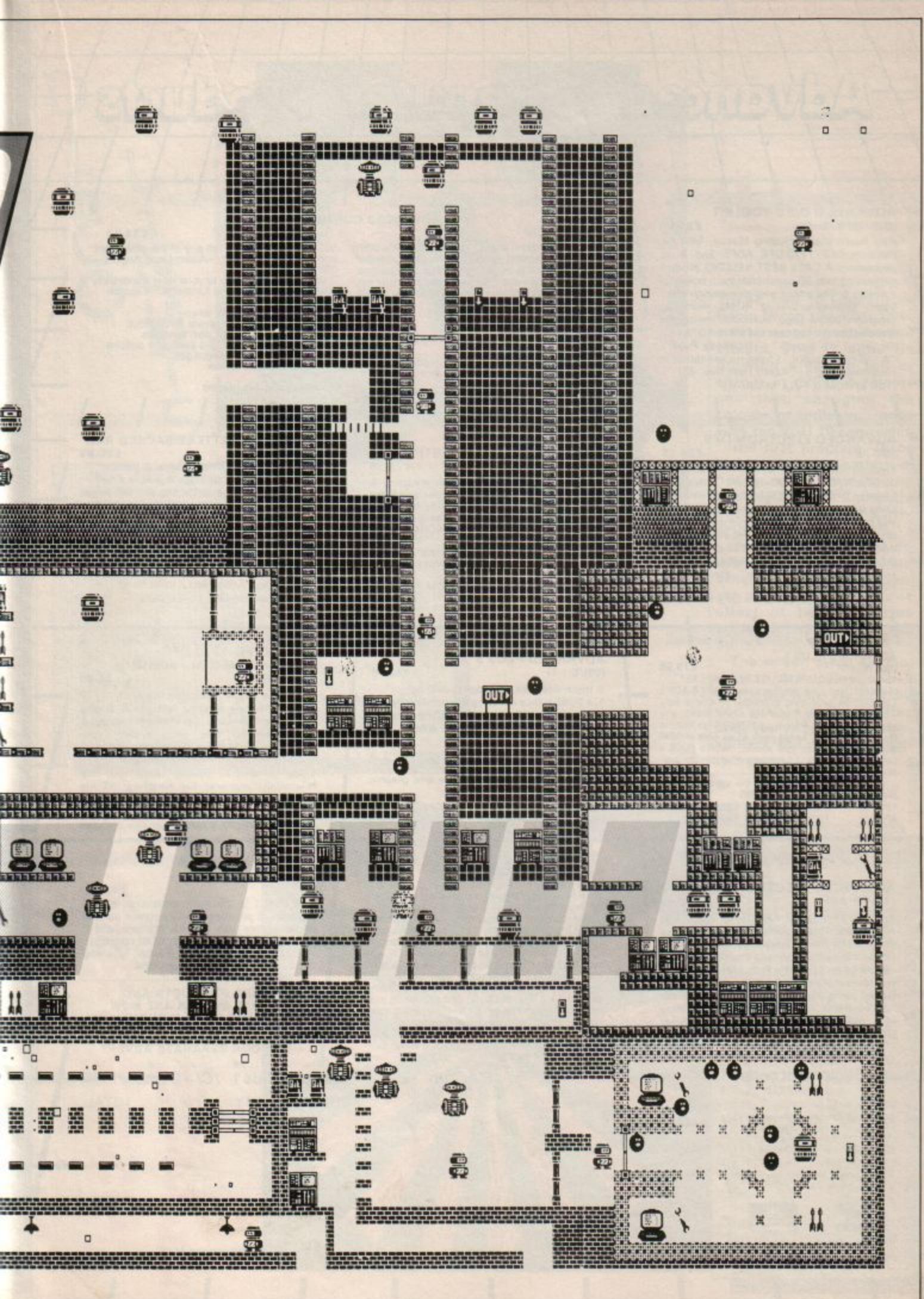
The passwords and edit codes are also compatible with the BBC Micro version of the game. The data files, however, are not – one cannot be loaded into the other's editor, because the characters in the BBC Micro version are much larger.

A	Prelude 56882	Toccata 48042	Finale 27246
B	Citadel 44544	Upstart 6527	Enliven 24937
C	Morning 13330	Octagon 27492	Contest 3200
D	Awkward 33023	Chaotic 20312	Illegal 19786
E	Fritter 24656	Majesty 1356	Appease 3346
F	Lawless 8515	Revenue 16713	Student 20055
G	Ration 3447	Foresee 50190	Average 16660
H	Tobacco 2303	Reserve 65280	Phoenix 51762

Bug-Byte

PLAN B MAN





Advanced Computer Products

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(01) /M/B/E/C £34.50

Any Acorn user including Master, BBC B+, Electron, DFS, 1770 DFS, ADFS, 2nd. & co-processors A.C.P.'s BEST SELLING product containing over 30 commands inc.: - powerful memory & disc editor, search memory/disc/basic, catalogue/unplug ROMs, load/run programs below page, automatic menu, file transfer (inc. locked cassette files), ADFS util etc. etc. ("it's superb" ... Database Pubs. - "A top-class toolkit - I have no hesitation in recommending it ... Acorn User Nov. 86) (16K EPROM & FULL MANUAL)

ADVANCED ELECTRON DFS

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Electron & Plus 3 users gain BBC compatibility by adding the Advanced Electron DFS (1770 DFS) this is the same disc filing system supplied with the BBC B+. Now you can produce and access (compatible) BBC disc based software. A.C.P. also supplies 5 1/4" disc drives to add to your Plus 3 (inc. 2nd. drive adaptor). "ACP has produced another superb ROM for the Electron" - Electron User Feb '86

(supplied on 16K EPROM + DFS MANUAL)

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(08) /E + 1/ £79.98

"DISC DRIVE COMPATIBILITY AT LONG LAST" (Electron User June '86) this sums up AP4 & ACP's approach to producing products. AP4 is a fully ACORN compatible disc interface & will accept any standard drive inc. PSU, runs 1770 DFS (as fitted in the B+ & Master), keeps page & Eos, util in ROM & provides a spare rom socket. ACP's PLUS 4 comes out on top. I can recommend it to anyone. (E.U. June '86)

AP4 should be considered the standard interface for the Electron (AU July '86)

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(14) /E+ASR/ £19.99

An alternative to our AED(05) for Plus 3 and ASR users. This optional alternative DFS is designed for use in Sideways RAM (ASR) and allows the user to operate a disc filing system & Eos when using the Plus 3 (in ADFS page would normally be & 1D). The DFS is simply loaded using the software supplied with the ASR from disc. (optional upgrade for existing AED users £9.50 on return of original EPROM) (3 1/2" ADFS disc + manual)

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"ACP is much better than any of the other front end systems I've seen." - *Acorn User, August 1987*

"I can recommend it to anyone who wants easy access to the Electron's functions." - *Electron User, August 1987*

ACPs main features are:-

- Pull down windows operate throughout
- Users can create their own windows
- Simple to change MOS's config options
- Easy entry to other languages
- Floating point calculator
- File manager
- Sideways ROMs utilities

(20) /M/B/E/C

ACP is a front end control panel language providing a sophisticated yet friendly interface between user and computer for access to Languages, MOS functions and the users own file utility etc. Main features include pull down windows, simple to change MOS config, floating point calculator, file manager, SW ROM's facilities.

(16K EPROM & FULL MANUAL)

"It's very easy to create an entire customised front end for your own use." - *Acorn User, August 1987*

ADVANCED DISC INVESTIGATOR

(06) /M/B/E/C £28.75

A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40track discs to 80track discs, verify two non-standard discs. ("ADI features an extremely comprehensive sector editor, and one of the finest I've seen" - *Tubeline on Prestel*)

(supplied on 16K EPROM + manual)

ADVANCED BATTERY BACKED RAM

(18) M/E/+1 £39.99

For Master and Electron users. A battery backed 32k RAM cartridge A.B.R. is a self contained cartridge containing two 16k pages of sideways RAM with a rechargeable battery back up. Each 16k page can be individually locked by software. Supplied with full software support, to include loading software, ROM save, advanced print buffer and a disc utility MAKEROM.

"It's a superb Addon and a must for all serious Electron Users" - *EU June*

ADVANCED PLUS 5

(09) /E + 1/ £66.70

A triple interface cartridge providing 1) a TUBE interface allowing a second processor to be connected, increasing BOTH speed & memory (PAGE & HIMEM & BEEP in all modes) 2) a 1 MHz BUS for control applications & prommers 3) the USER PORT for mouse and graphic devices. Also contains 2/3 ROM sockets and on board operating software for 2nd processor.

ADVANCED QTR MEG RAM

(19) /M(ADM)/E+1(ADE) £79.95

New Hi-tech cartridge (normal size) containing an incredible 256k of Sways RAM although it could be used to store many pages of Sways ROM images its primary and best use is as a RAM Disc supported by our advanced 1770DFS (Master/ADM or Electron ADE) are now upgraded to access the 256k in AQR. Now databases (i.e. Viewstore) can perform at breathtaking speed (over twice as fast as some other 1 Meg Silicon Discs) and animation with up to 25 screens becomes a reality. Price must reflect real value for money and package prices for AQR and ADM are available at £99.95 (existing ROMs may be upgraded when purchasing AQR for £5)

ADVANCED 1770 DFS

3 versions ADM/C(11) - ADB(12)

ADE (13)

ACP have totally re-written the Acorn 1770 DFS, enhancing existing features & adding new ones. The result is probably the fastest & most powerful disc filing system your computer could have. With the ability to operate in double density occupying both sides of a disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC

(16K EPROM + comprehensive manual)

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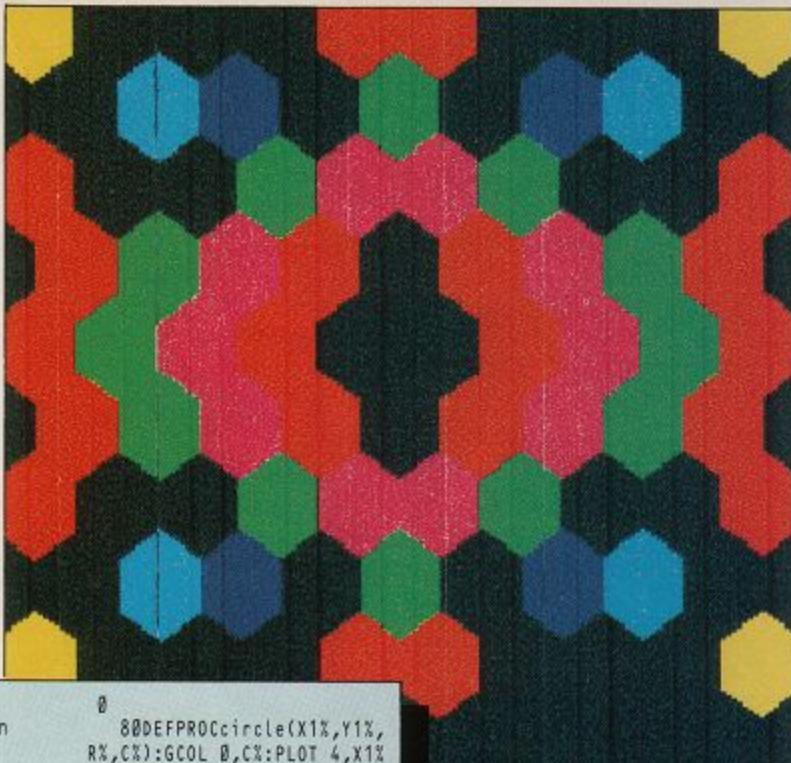
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Exp date

(Ref E32)

DISCO LIGHTS



```

10REM Disco Lights
20REM By Robin Nixon
30REM
40REM (c) Electron User
50REM
60MODE 2:VDU 23;8202;0;0
;0;:FOR Y%=959 TO 0 STEP -1
92:FOR XX=63 TO 1215 STEP 1
20:READ CX:PROCcircle(XX,YX
,64,CX):NEXT XX,Y%:FOR Y%=8
63 TO 128 STEP -192:FOR XX=
127 TO 1183 STEP 120:READ C
X:PROCcircle(XX,Y%,64,CX):N
EXT XX,Y%
70REPEAT:FOR XX=1 TO 15:
VDU 19,XX,RND(7);0;0;0;:TIM
E=0:REPEAT UNTIL TIME>5:VDU
19,XX,0;0;0;:VDU 19,RND(15
),RND(8)-1;0;0;0:NEXT:UNTIL

```

```

80DEFPROCcircle(X1%,Y1%
,R%,C%):GCOL 0,C%:PLOT 4,X1%
+SIN(0)*R%,Y1%+COS(0)*R%:FO
R Z=0 TO PI*2 STEP PI/3:PLO
T 4,X1%,Y1%:PLOT 85,X1%+SIN
(Z)*R%,Y1%+COS(Z)*R%:NEXT:E
NDPROC
90DATA 7,11,11,10,1,1,10
,11,11,7,8,13,13,9,3,3,9,13
,13,8,1,2,3,15,4,4,15,3,2,1
,8,13,13,9,3,3,9,13,13,8,7,
11,11
100DATA 10,1,1,1,10,11,11,7
,12,6,5,14,2,14,5,6,12,1,2,
3,15,4,15,3,2,1,1,2,3,15,4,
15,3,2,1,12,6,5,14,2,14,5,6
,12

```

10

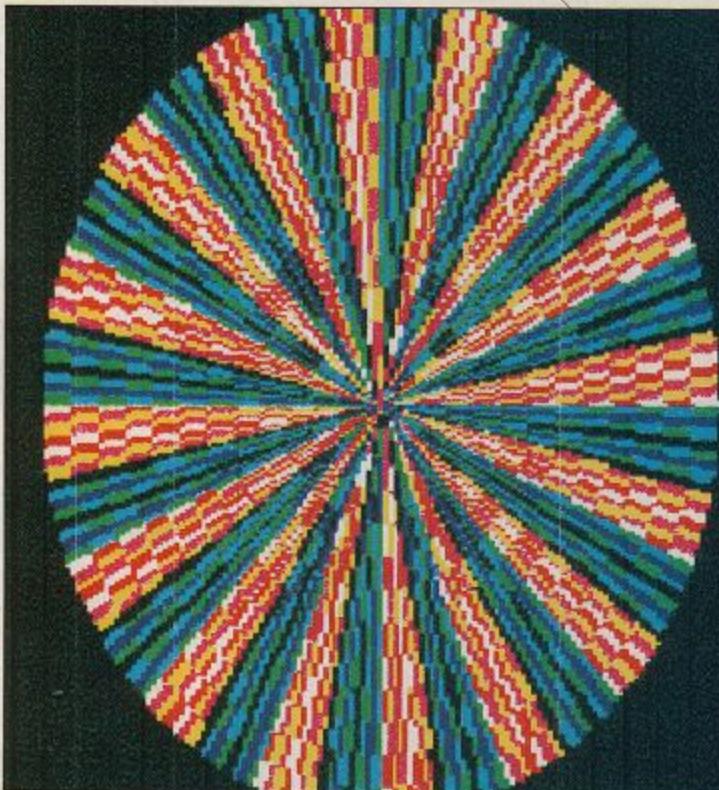
LINERS

THESE two 10 Liners from Robin Nixon use VDU 19 to create amazing animation effects. This is done by drawing a screen full of shapes in different colours and then changing the colours of individual ones with the VDU 19 command.

The first program, Disco Lights, sets up a pattern of hexagons to emulate the flashing lights at a discotheque. The second Catherine Wheel, draws a set of concentric circles, each resembling a pie chart. When drawn, the colours are switched to give the effect of two Catherine wheels spinning inside each other.

The screen takes 13 minutes to draw, but is well worth the wait. We suggest you grab a cup of coffee once you've typed it in, then sit back and watch the pattern grow.

CATHERINE WHEEL



```

10REM Catherine Wheel
20REM By Robin Nixon
30REM
40REM (c) Electron User
50REM
60D%=0:G%=0:MODE 2:PRINT
'Please wait...':VDU23;8202
;0;0;0;:FOR NX=8 TO 15:VDU
19,NX,NX-8;0;0;0;:NEXT:DIM
A(240),B(240):C%=1:FOR Z=0
TO PI*2 STEP PI/120:A(CZ)=S
IN(Z):B(CZ)=COS(Z):CZ=CZ+1:
NEXT:CLS
70FOR SX=500 TO 20 STEP
-40:PROCcircle(644,511,SX):
NEXT:REPEAT:FOR XX=1 TO 15:
VDU 19,XX,7;0;0;:VDU 19,XX,
0;0;0;:NEXT:UNTIL 0
80DEFPROCcircle(X1%,Y1%
,R%,G%):G%=(G MOD 2 + 1):GCOL 0,D
%:PLOT 4,X1%+A(1)*R%,Y1%+B(
1)*R%:FOR C%=1 TO 240:PLOT
4,X1%,Y1%:PLOT 85,X1%+A(C%)*
R%,Y1%+B(C%)*R%:DX=D% MOD
15 +1
90PLOT 85,X1%+A(C%)*R%,Y
1%+B(C%)*R%:DX=D% +1:IF G%=
1 GCOL 0,D% ELSE GCOL 0,16-D%
100NEXT:ENDPROC

```

I must have been mad!

WHEN Tynesoft asked if I would like to do a major title conversion for them just after I had completed co-writing FutureShock I said "Yes" immediately without really wondering what I was getting into.

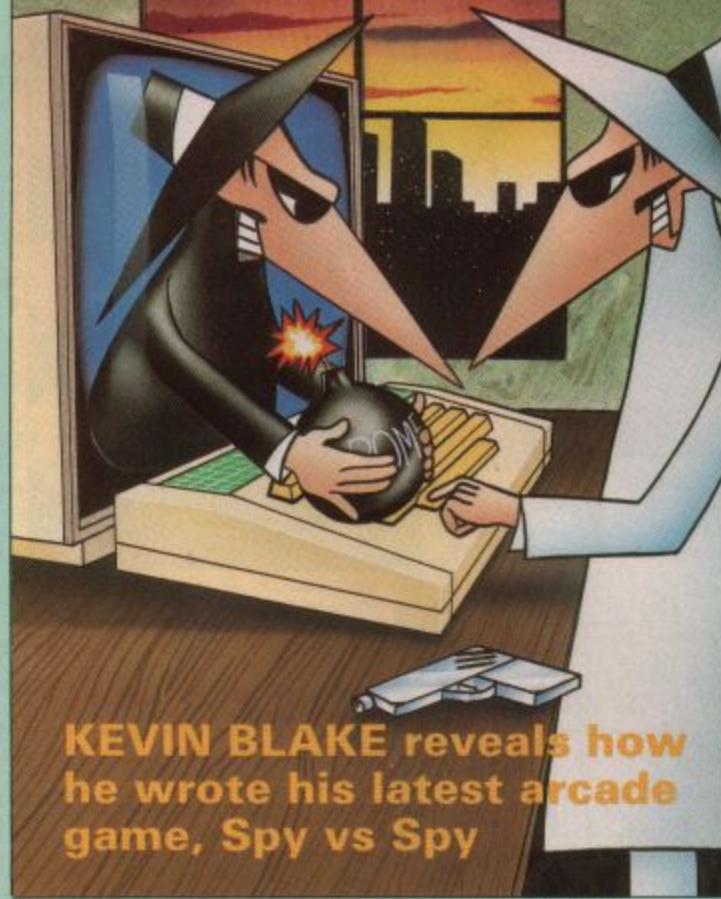
Spy vs Spy took around five months to write, which is two months longer than it usually takes me to complete a full priced game — I've written or co-written 12 to date.

The main reason for this extra time is the very complex nature of the game itself. In all I used 131 sprites — game characters — all of which had to be compressed to save memory, then tabulated.

Once this mammoth task had been completed all I had to do was to supply my machine code poke subroutine with the sprite number and x,y position to print it in a particular manner on screen.

The inanimate objects making up the scene such as cupboards and pictures are directly poked, or as I say, plonked, on to the screen, meaning that they wipe out anything underneath them.

The spy sprites, however, had to use a completely different method so that they didn't wipe out the background. In addition to this, they had to let you see



KEVIN BLAKE reveals how he wrote his latest arcade game, Spy vs Spy

the background around the edge of each sprite.

This means storing the background of the sprite somewhere in memory and then checking the sprite against a mask or template as it is printed. This technique ensures that the sprite isn't surrounded by a blank box and leads to realistic

movement when the stored background is replaced and the spy moved to a new position.

Spy vs Spy, being a conversion, had to have the same addictiveness and playability as the original versions. It had already been released on the CBM 64, Spectrum, Atari and Amstrad micros, all of which

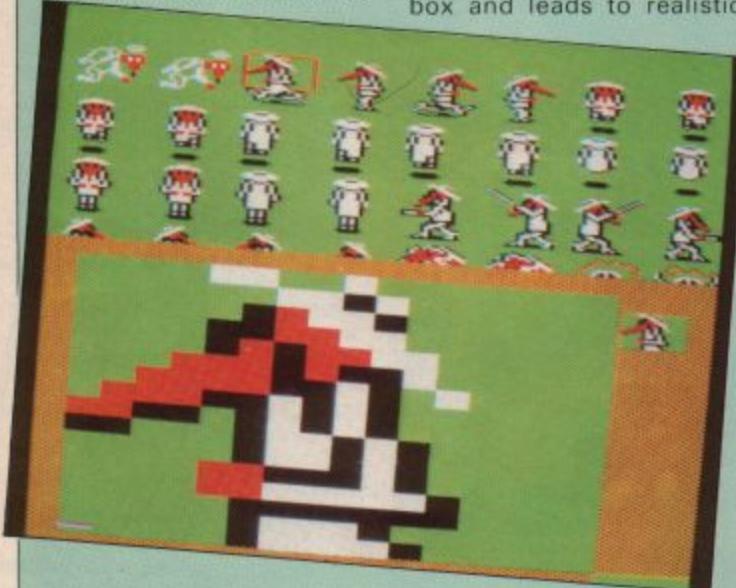
have at least 20k more memory than the Electron, which for various reasons, particularly speed, would have its version running in Mode 5.

The unique thing about Spy vs Spy is, of course, the simulvision. This is the way in which each spy has his own playing window, but is able to encroach upon his opponent and vice versa. This means each spy has his own room screen most of the time, and also his own set of screen colours.

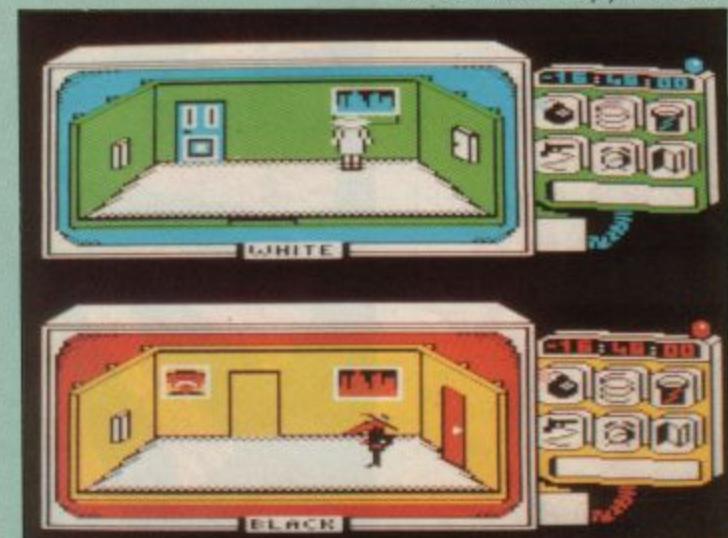
Without the simulvision the screen would look bland and this is often the trademark of a lot of Electron software. Really the desired effect is to imitate Mode 2 with eight individual colours and yet still have the speed of Mode 5.

The recent BBC Micro titles I have been involved with all use a colour palette switching routine which allows you to have a different palette of colours linked to the machine's VIA interrupts. As these interrupts are missing on the Electron, I had to use the screen sync, which is a perfectly good substitute.

I was then able to individually control the colours in two areas of the screen, without either half affecting the other. This allowed me to turn off the top or bottom half of the screen when a spy wanders



The sprite designer used ...



White searching for booby traps

into his opponent's room.

Having now got two areas of screen whose colours I could change, the game still presented me with a problem. The program itself is so large that on the BBC Micro version there are areas of hidden screen memory used for data and a music player.

On the Electron version, I still had to use some of this code and to leave it on screen would spoil the whole effect – as seen with the Electron version of Superior Software's Citadel. So I decided to add a third colour change section to hide it.

The problem here was that I couldn't put it at the top or bottom of the screen due to technical reasons, so it had to go somewhere in between. Luckily, due to the program design (the two box simulvision – I could get away with putting it in the middle).

One of the most eye-catching features of the screen design of the Spy vs Spy series – there are two sequels – is the trapulator, a box that hangs on the side of the playing screen, showing the status of your spy and the traps he is able to use.

No matter how hard I tried, I couldn't get the design of it right, so I enlisted the help of friend and co-writer of many of the



games I've written, Jason Sobell.

Between us, we managed to link up my trusty BBC Micro and his Amstrad CPC via their RS232s and passed the screen across from the Amstrad version, which has a screen layout identical to Mode 2. I wrote a short program to convert this to Mode 5, then tidied it up to my requirements.

With all the main technical routines done, other ones could be brought in from previous games I'd done – keyboard scans, score routines and so on, to speed up development.

Spy vs Spy has many little fiddly bits in it. Playing or seeing it for the first time, it

looks like a straightforward cute little game – I can assure you it isn't. It took me weeks to work out what everything does. The original instructions weren't very clear, but the Tynesoft ones – which I rewrote especially – are much better.

One of the most interesting aspects of writing games that involve lots of different screens is the actual designing of the screen and the number of them you can fit into your game.

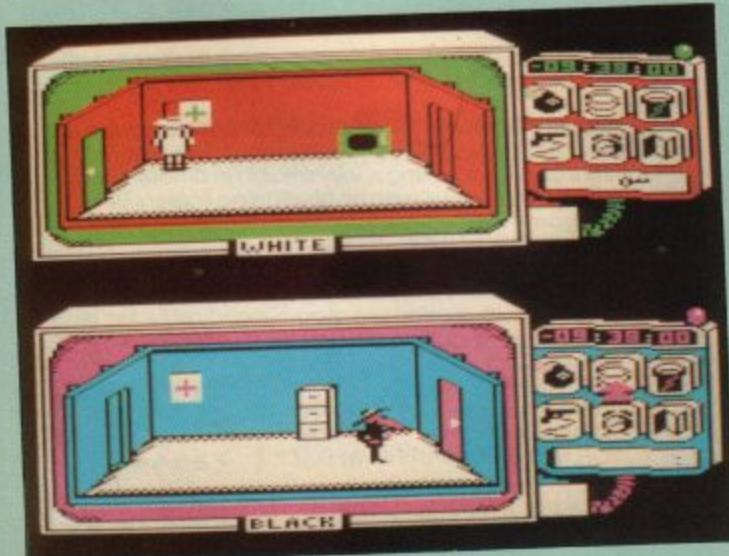
If you can compress your data enough, it is possible to squeeze in hundreds. However, this number is limited by the amount of memory you've got left after all your other routines are in and finished.

I only had four pages left – just 1k of memory. This, however, still allowed me to have 64 different screens in any of the seven embassies and there are seven levels, all with different numbers of screens to give varying levels of difficulty.

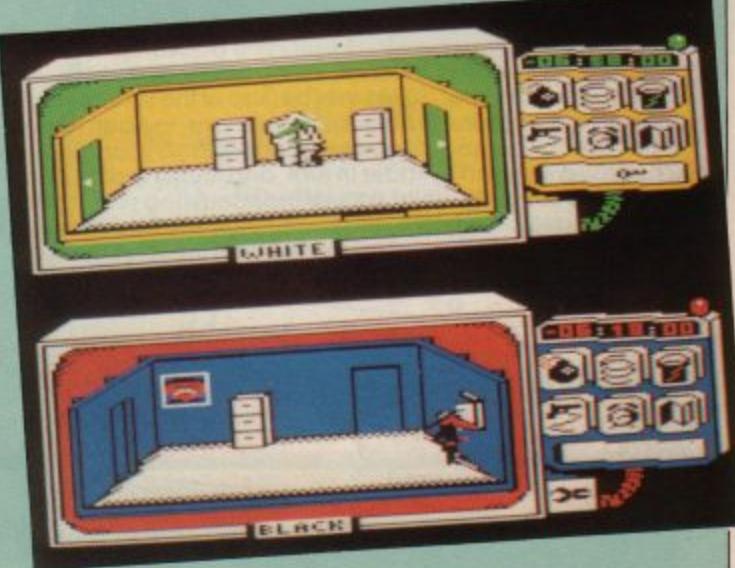
Well, what more can I say, except that I thoroughly enjoyed writing it and hope you have just as much fun playing it.

I'm now working on my second US conversion for Tynesoft, this time a sports simulator for the Electron called Indoor Sports. It has already been released in this country on most other computers by US Gold/Advance and consists of four events – 10 Pin Bowling, Table Tennis, Airball and Darts.

This is my 11th full price program and the seventh for Tynesoft: Caveman Capers, Bugeyes, Frankenstein 2000, Bugeyes 2, Ian Bothams Test Match, Winter Olympics, Vindaloo, Commonwealth Games, Future Shock, Spy vs Spy and Indoor Sports. Several were co-written with Jason Sobell and Dave Croft.



White placing a booby trap



Both Black and White active

The Superior Collection

Volume 3

For the
Acorn Electron

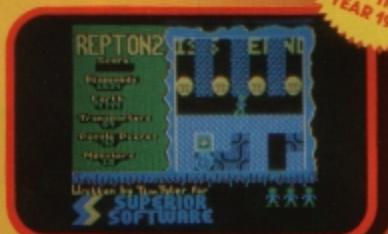
NEW
RELEASE



SYNCRON

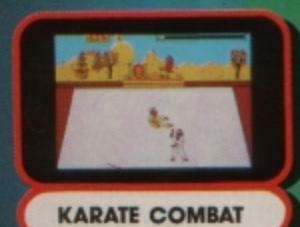


REPTON



REPTON 2

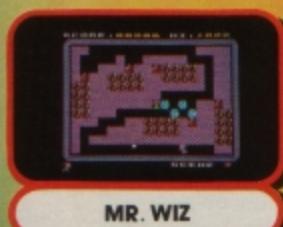
Voted
COMPUTER
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MICRO GAME
OF THE
YEAR 1985



KARATE COMBAT



DEATHSTAR



MR. WIZ



SMASH AND GRAB



OVERDRIVE

A New Concept in Compilations

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

Syncron 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%
Playability	95%
Graphics	100%
Value For Money	100%

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THE most complicated part of an expanded Electron is the Plus 3's 3.5in disc drive. And when errors occur, fortunately infrequently, the operating system's error messages are often less than helpful.

For instance, what on earth does:

Disc error 50 at :00/000010

mean? Probably very little to most people. In simple terms, this means sector zero could not be located on track one.

The most usual cause for an error such as this is physical damage to the disc. Data stored here is beyond recovery simply because the sector does not exist any more.

If this error occurs during a read operation, for example during a LOAD, valuable data will have been lost forever. Of course, because we all keep backups, this never happens. Or does it?

If the error happens during a write operation, for example SAVE, this is less serious, because you can usually save on to a different disc.

The program presented here relies on the theory that prevention is always better than cure. In other

DDT kills those bugs stone dead

**Check out your Plus 3 with
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words, eliminate problems before birth.

Not only does it test individual discs and supply information about them, it will also benchtest individual Plus 3 disc units for read/write and step speed.

Figure I shows the main menu. The functions available are:

- Display a window showing the current setting of osbyte 255 – the Break/ADFS options. These consist of the mode change after Break, the boot setting and the current step rate.

The defaults after switch on or a hard reset are: Mode 7 (actually Mode 6), !BOOT on Shift+Break and a step rate of 6ms. Pressing 1, 2 or 3 will allow any of these parameters to be altered.

- Display various information about the disc in the drive.

- Verify a disc. This works by first reading a sector from the disc and then writing it back. This is done for all 1280 sectors, so this test tends to be rather slow.

It is also vital to ensure the disc is not write protected or a disc error 40 will occur. The status of the write protect is shown on the information menu.

- Calculate step rate timing. Simply start and stop your watch when prompted. The actual time achieved will depend on the setting of the startup configuration.

- Test data transfer rate while writing. Before using this option ensure the disc mounted in the Plus 3 is

blank and formatted, not one with valuable data on since this option writes garbage to the first five tracks of the disc, excluding the root directory.

The test takes place in two stages: The first attempts to write one sector to the disc and calculate the transfer rate, the second does the same for five complete tracks.

- Test the data transfer rate while reading. This can be done on any disc.

- Remount the disc. This option should be selected if you wish to change the disc. Put the disc in the drive then press 7.

- Neatly exit the program. While typing in Program I,

Turn to Page 37 ►

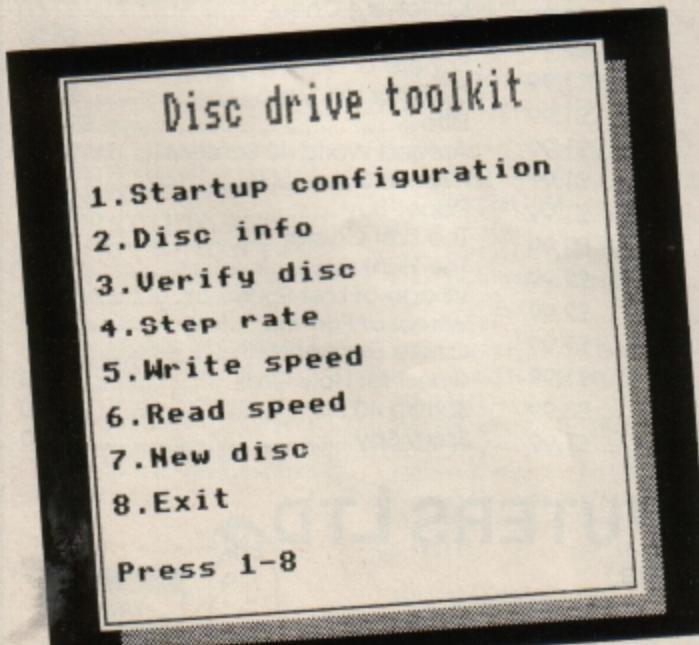


Figure I: The main menu

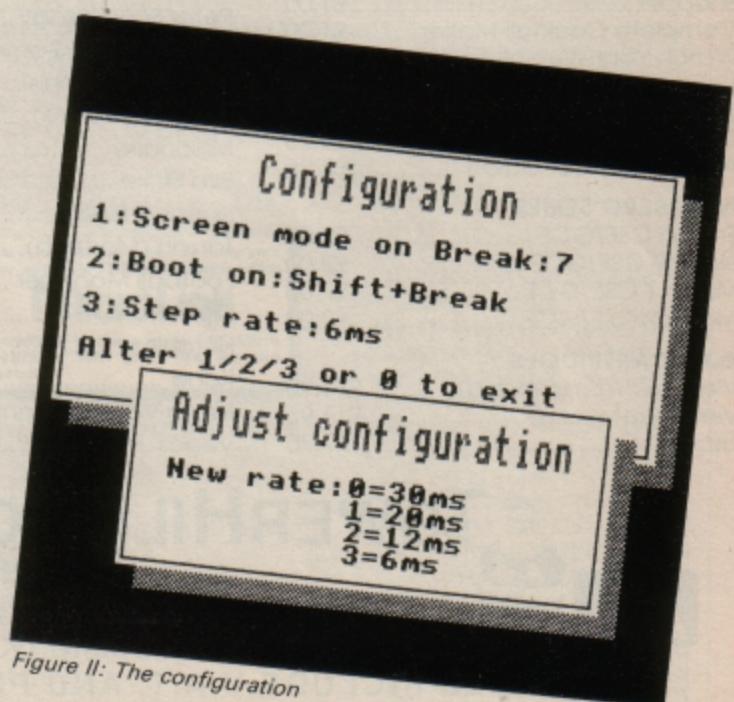


Figure II: The configuration

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DDT, ensure you do not add any extra spaces. The space between the line number and start of line has been included for clarity and should not be entered.

On running the program for the first time, ensure that a blank formatted disc is present in the drive and remains there during debugging. It is essential not to use a disc that contains valuable information.

When the program has

Rate selected	Rate Achieved
6ms	6.88ms
12ms	10.00ms
20ms	20.62ms
30ms	31.25ms

Table I: The drive step rate timings

Operation	Transfer speed
Write one sector	1280 bytes/sec
Read one sector	959 bytes/sec
Write five tracks	9309 bytes/sec
Read five tracks	9170 bytes/sec

Table II: Plus 3 data transfer rates

been fully tested, all options with the exception of the write test can be safely used on any disc.

Program II has been provided to create a simple chart on an 80-column printer to record the results of the benchmark timings for future reference. Each chart can hold six complete sets of data.

The timings shown in Tables I and II were achieved on the *Electron User* disc system consisting of a Plus 4 with ADFS (and DFS) with dual, double sided 80 track 3.5in drives with a total storage capacity of 1.2Mb.

Your system may have different timings, and the figures are provided for guidance only.

The importance of the results is that over a period

PROCEDURES

wind Draw a window
alter Change the drive configuration
getsek Read, write or seek sectors
error Report any disc errors

VARIABLES

scnds Time recorded in seconds
size Size of the free space map
blk The osword parameter block
C% Command sent to disc controller
S% Sector number
T% Track number
W% Start of workspace area

of time the values should never change appreciably. If say, the 6ms step rate timings start to get longer and longer this can indicate that a fault is developing long before it causes problems.

For example, if the 6ms step rate exceeded 12ms, the drive head will not be able to find the correct track because it would miss the stepping pulses, giving a "Sector not found" error. This kind of drive fault is

thankfully, extremely rare.

Similarly, the example drive timings for data transfer are for information only. Individual Plus 3s will all vary to some extent.

Most notable is the speed difference between reading/writing individual sectors or multiple tracks.

This is a feature of all disc drives, and is due to the way individual sectors are located by the disc controller. ■

Program I

```

10 REM DDT
20 REM (c) Electron User
30 MODE1:PROCmode(6):PROC
init
40 REPEATPROCmode(1)
50 PROCwind(6,27,32,3,"Di
sc drive toolkit")
60 RESTORE 150:PRINT
70 FOR N=1TO8:READn$:$PRIN
T;n$:.NEXT
80 PRINT:REPEAT
90 PRINT"Press 1-8"CHR$13
;:A$=GET-48
100 UNTIL A$>0 AND A$<9
110 IF A$=8 MODE6:END ELSEI
FAX=7RUN
120 IF A$=1 OR A$=2PROCmode
(1) ELSEPROCmode(4)
130 ON A$GOSUB 650,530,830
,170,280,270
140 UNTIL 0
150 DATA Startup configura
tion,disc info,Verify disc,S
tep rate,Write speed,Read sp
eed,New disc,Exit
160 :
170 PROCwind(4,20,29,7,"St
ep rate")
180 C%=11:*MOUNT
190 PROCclkon
200 FOR pass=1 TO 10:PROCG
etsek(79,0,1):PROCgetsek(0,0
,1):NEXT
210 scnds=FNclkoff
220 rate=((scnds/(pass-1))
/160)*1000
230 @X=&20202:PRINT"Step
rate:";rate;"ms":@X=&90A
240 PROCwait:C%=8
250 RETURN
260 :
270 n$="Read":PROCtest_sk
trs(1):PROCtest_sktrs(16*5):
RETURN
280 n$="Write":C%=10:PROC
test_sktrs(1):PROCtest_sktrs
(16*5):C%=8:RETURN
290 :
300 DEFPROCtest_sktrs(no)
310 PROCwind(2,20,32,5,"Tr
ansfer rate")
320 *MOUNT
330 PRINT"n$;no DIV16;" Tr
acks ";no MOD16;" Sectors"
340 PROCclkon
350 FOR pass=1 TO 30:PROCG
etsek(1,15,no):NEXT
360 scnds=FNclkoff:read_se
cts=scnds/((pass-1)*256*no)
370 PRINT;"Speed:"INT(1/r
ead_sects); " bytes per secon
d"
380 PROCwait
390 ENDPROC
400 :
410 DEFPROCinit

```

```

420 *MOUNT
430 DIM blk 15,rate(3):W$=
900
440 rate(3)=6:rate(2)=12:r
ate(1)=20:rate(0)=30
450 VDU 23,224,&AA,&55,&AA
,&55,&AA,&55,&AA,&55
460 C%=8:Q%=1:PROCgetsek(0
,15,1):C%=10
470 Q%=1:PROCgetsek(0,15,1
):Q%=2blk:C%=8:W$=&8000
480 XX=&75:Y%=0:AX=&71:CAL
L&FFF1
490 used=?&76+?277*256
500 size=?&FF:sktrs=1280:
570 PRINT"Storage used:";
(size-used*256)/1024;"k
580 PRINT"Storage free:";
used*256/1024;"k"
590 @X=&20202:PRINT"FS ma
p":";(size-3)/246*100;"% f
ull"
600 PRINT"Disc is ";(sktr
s-used)/sktrs*100;"% full":@
X=&90A
610 PRINT"Write protect:";
:IF Q$PRINT"0"ELSEPRINT"0
f"
620 PROCwait
630 RETURN
640 :
650 PROCwind(5,15,34,3,"Co
nfiguration")
660 AX=&FF:XX=0:Y%=&FF:sta
t=(USR&FFF4 AND &FF00)/&100
680 PRINT"1:Screen mode o
n Break:";stat AND 7
690 PRINT"2:Boot on:";:IF
stat AND 8 PRINT"Shift+Break"
700 PRINT"3:Step rate:";r
ate((stat AND &30)/16);ms"
720 PRINT"Alter 1/2/3 or
0 to exit":A=GET:IF A>48 PRO
Calter(A-48)
730 RETURN

```

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MicroLink

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```

disc_size=sktrs*256
510 ENDPROC
520 :
530 COLOUR1
540 PROCwind(7,26,31,5,"Di
sc Information")
550 PRINT"80 track single
sided""Number of sectors:
1280"
560 PRINT"Storage capacit
y:320k"

```

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From Page 37

```

740 :
750 DEFPROCalter(K)
760 PROCwind(9,22,32,14,"A
djust configuration"):PRINT
770 IF K=1PRINT"New screen
mode:";:A=GET-48:stat=(stat
AND 248)OR A
780 IF K=2PRINT" Boot opti
on toggled":stat=stat EOR 8
:PROCwait
790 IF K=3PRINT" New rate:
@=30ms"TAB(10)"=20ms"TAB(
10)"=12ms"TAB(10)"=6ms";:
A=GET-48:stat=(stat AND &CF)
OR(A*16)
800 AX=&FF:X%=stat:Y%=0:CA
LL&FFF4
810 ENDPROC
820 :
830 PROCwind(7,18,28,10,"V
erify Disc")
840 PRINT:WX=&800
850 FOR TX=0 TO 79:FOR SX=0
TO 15
860 PRINT "Track:";TX;" Se
ctor:";SX;" ";CHR$13;
870 CX=8:PROCgetsek(T%,SX,
1):CX=10:PROCgetsek(T%,SX,1)
880 NEXT:NEXT
900 PRINT:PROCwait:WX=&800
@:CX=8
910 RETURN
920 :
930 DEFPROCdouble(m$,X,Y)
940 XX=0:Y%=10:AX=10:D=&A
0
950 COLOUR 2
960 FOR NX=1 TO LEN m$
```

```

970 VDU 31,X+NX-1,Y
980 ?D=ASC(MIDS(m$,NX,1)):
CALL&FFF1
990 VDU23,225,D?1,D?1,D?2,
D?2,D?3,D?3,D?4,D?4
1000 VDU23,226,D?5,D?5,D?6,
D?6,D?7,D?7,D?8,D?8
1010 VDU 225,10,8,226
1020 NEXT:COLOUR?&355+4:PRI
NT
1030 ENDPROC
1040 :
1050 DEFPROCgetsek(track,sk
tr,no)
1060 add=track*16+sktr
1070 ?blk=0:blk!1=W%:blk!3=
&FFF
1080 blk!5=CX
1090 blk?7=add DIV 256
1100 blk?8=add
1110 blk!9=no
1120 AX=&72:X%=blk:Y%=blk D
IV 256
1130 CALL&FFF1
1140 IF?blk PROCerror
1150 ENDPROC
1160 :
1170 DEFPROCerror
1180 AX=&73:CALL&FFF1
1190 address=?blk+blk?1*256
1200 IFblk?3=64 AND QXENDPR
OC
1210 PRINT"Error:","blk?3"
"Track:";address DIV 16;" S
ector:address MOD 16
1220 ENDPROC
1230 :
1240 DEFPROCwind(LX,BY,RX,T
Y,title$)
1250 VDU26:COLOUR131:COLOUR
?&355+4
1260 FOR N=TY+1 TO BY:PRINT
TAB(RX+1,N)CHR$224:NEXT
1270 PRINT TAB(LX+1,BY+1)ST
RINGS$(RX-LX+1,CHR$224)
1280 VDU 28,LX,BY,RX,TY,12
1290 GTY=((32-TY)*32)-8:GBY
=((31-BY)*32)+8:GLX=LX*32+8:
GRX=RX*32+16
1300 MOVE GLX,GBY:DRAW GRX,
GBY:DRAW GRX,GTY:DRAW GLX,GT
Y:DRAW GLX,GBY
1310 VDU 28,LX+1,BY,RX-1,TY
+
1320 PROCdouble(title$,((RX
-LX)-LEN(title$))/2,0)
1330 width=RX-LX-2
1340 ENDPROC
1350 :
1360 DEFPROCmode(mode)
1370 VDU 22,mode
1380 IF mode=4 VDU19,1,3,0;
:COL0 0,0:ELSE VDU19,3,3,0;1
9,0,4,0;19,1,0;0;19,2,1,0;0:G
COL0,1
1390 VDU 23,8202,0,0,0;
1400 ENDPROC
1410 :
1420 DEFPROCwait
1430 PRINT"TAB((width-10)/2
)Hit a key";
1440 *FX15
1450 REPEATUNTILGET
1460 ENDPROC
1470 :
1480 DEFPROCclkon
1490 PRINT"Start watch/Pre
ss Space"
1500 *FX15
1510 REPEATUNTILGET
1520 ENDPROC
1530 :
1540 DEFPROCclkoff
1550 PRINT"Stop watch"CHR$7
1560 INPUT"Enter time:tim
e"
1570 INPUT"Enter time:tim
e"
1580 =time
```

Program II

```

10 REM Program II
20 MODE 0:VDU 2:A$=STRING
$(79,"-"):PRINT"A$"
30 PRINT CHR$124;" Elect
ron User ";CHR$ 124;TAB(41)
;"DATE RECORDED"TAB(78)CHR$1
24"A$"
40 FOR N=0 TO 8:READ m$:P
RINTCHR$124;" ";m$:TAB(18)CH
R$124;
50 FOR T=28 TO 78 STEP 10
:PRINTTAB(T);CHR$124;;NEXT:P
RINT"A$"
60 NEXT
70 VDU 3
80 DATA " OPERATION",6m
s step,12ms step,20ms step,3
0ms step,Write 1 sector,Read
1 sector,Write 5 tracks,Rea
d 5 tracks
```

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

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DEMONIC DATABASES

Julia Battle presents a mini adventure fantasy . . .

The Golden Crown

THE Golden Crown is a short program which demonstrates how to write intriguing chaining puzzles in your own home-grown adventure games.

It is in fact a complete adventure game in its own right and can be played as such, though it would be better incorporated within a much larger program. Seasoned adventurers will find the solution fairly straightforward and should not take too long to work it out, but novices may find it an interesting and stimulating brain teaser.

Chaining puzzles are quite common in text and arcade adventures and involve a central problem whose solution requires several logical steps which must be performed in a set sequence.

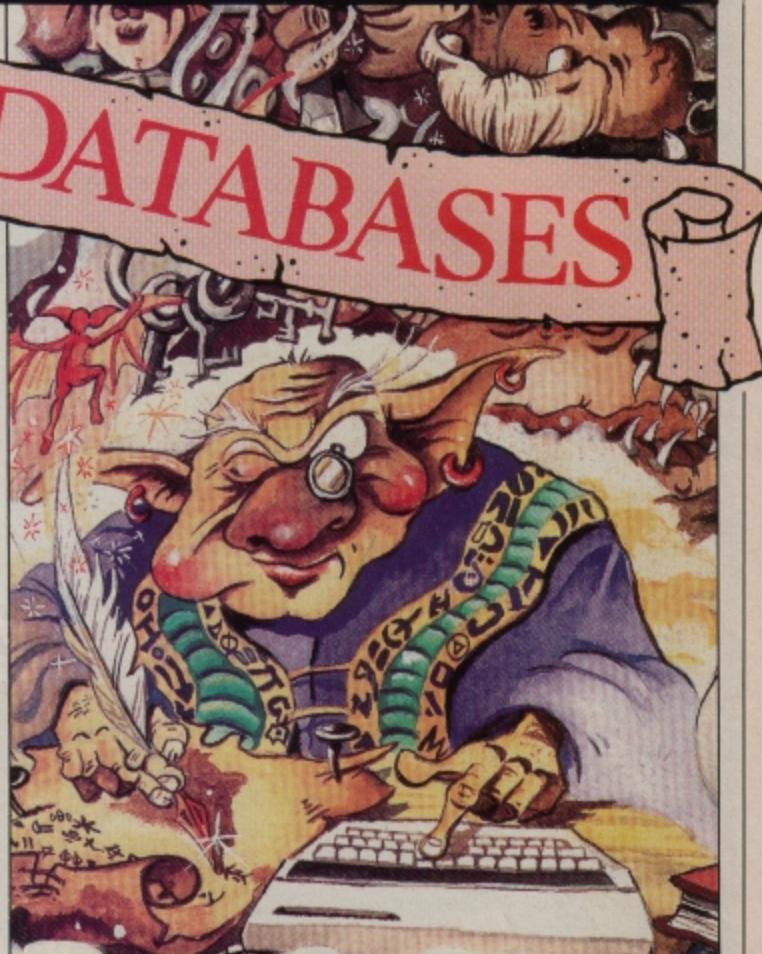
For instance, suppose you want to have a drink from a

well, but can't reach the water.

A possible solution to this problem may be to dig for gold dust in the mountains nearby, take it to town and exchange it for money in order to buy a rope and bucket. The bucket can be tied to the rope and lowered down into the well to fetch the water. Now you can have a drink.

So you have a series or chain of linked puzzles which must be solved in order: You need a bucket to get the water and rope to lower it down the well, but require money to buy them both and some valuable object to trade to get the money.

There are just 16 separate locations in The Golden Crown and the adventure is based in the far-away land of Karnia. The King's crown has been stolen by one of



his enemies and it is your task to recover it.

In return for this favour, the King will knight you and great wealth will be yours.

The command parser, although rudimentary, will understand instructions like: NORTH, SOUTH, EAST, WEST, TAKE, UNLOCK, KILL, EXAMINE and so on. Abbreviations may confuse it so don't try any. The vocabulary of words understood by the program is stored in v\$.

The location descriptions

are in r\$(), the exits in e\$(), objects in ob() and messages in m\$().

When an object is taken its location number stored in L() is set to 16. If it needs to be removed from the game it is set to 32. Your current location is held in p.

That just about rounds up this adventure programming series. You should now have enough information and techniques at your fingertips to start writing your own adventures - so get cracking.

```

10 REM The Golden Crown
20 REM A mini adventure
30 REM By Julia Battle
40 REM (c) Electron User
50 MODE 6:PRINT
60 PROCinitialise
70 PRINT"Welcome to Karnia"
80 PRINT"Your task is to
find the King's
90 PRINT"stolen crown and
return it to him."
100 PRINT "Please type in
UPPER case..."
110 INPUT "Enter your name:";name$
120 REPEAT
130 PRINT "You are in ";
r$(p);"
140 IF p=11 AND f(1)=0 PRI

```

Turn to Page 40 ►

```

Welcome to Karnia.
Your task is to find the King's
stolen crown and return it to him.
Please type in UPPER case...
Enter your name:JULIA
You are in the King's palace.
A King is here.
What now?EAST
You are in the main street.
What now?NORTH
You are in a shop.
A shopkeeper is here.
A red identity pass is here.
A cloak is here.
What now?

```

The Golden Crown listing

From Page 39

```

260 UNTIL finished
270 IF p<>6 OR L(13)<>16 TH
EN END
280 PRINT "The King takes t
he crown..."
290 PRINT "You are knighted
- arise sir ";name$
300 END
310
320 IF p<>4 OR L(6)<>16 PR
INT"Eh?":RETURN
330 L$="n open ":L(13)=4
340 RETURN
350 IF p<>1 OR L(10)<>16 P
RINT"Ok?":RETURN
360 PRINT "A hidden door sl
ides open"
370 e$(1)="WESSOUAEAS"
380 RETURN
390 IF L(10)=16 PRINT m$(1
0) ELSE PRINT "Seems ordinary
...
400 RETURN
410 IF p=6 PRINT m$(9):fin
ished=1:RETURN
420 IF L(7)<>16 PRINT m$(9
):finished=1:RETURN
430 PRINT "You stab him wit
h the knife...he's dead."
440 IF p=8 L(3)=32
450 IF p=9 L(4)=32
460 RETURN

```

```

470 IF p<>11 OR f(2)<>1 OR
L(11)<>16 PRINT m$(7):RETUR
N
480 PRINT m$(3):PRINT m$(4
)
490 L(12)=16:L(11)=32:f(1)
=1
500 RETURN
510 IF L(9)=16 PRINT "Ok":f
(3)=1 ELSE PRINT "Eh?"
520 RETURN
530 IF L(11)=16 AND p=12 P
RINT"Ok":f(2)=1 ELSE PRINT m
$(6)
540 RETURN
550 IF p=3 AND L(12)<>16 P
RINT m$(2):RETURN
560 IF p=9 AND L(4)=9 PRIN
T m$(2):RETURN
570 FOR i=6 TO 13
580 IF L(i)=p L(i)=16
590 NEXT
600 IF p=3 L(12)=32:PRINT
m$(8)
610 RETURN
620 d=INSTR(e$(p),c$)
630 IF d<1 OR d>10 PRINT "C
an't go that way":RETURN
640 IF p<>8 OR i<>1 THEN 6
60
650 IF f(3)=0 PRINT m$(2):
RETURN
660 p=p+4*(i=1)-4*(i=3)+(i
=4)-(i=2)

```

```

670 IF p=6 AND L(13)=16 fi
nished=1
680 RETURN
690 '
700 DEF PROCinitialise
710 DIM r$(15),e$(15),ob$(1
3),L(13),m$(10),f(10)
720 v$="***NOREASSOUWESTAK
FILWEATHRKILEASHAUNL"
730 LS=" Locked "
740 FOR i=0 TO 15
750 READ a$,e$(i):r$(i)=M1
D$(a$,4)+LEFT$(a$,3)
760 NEXT
770 FOR i=1 TO 13
780 READ a$,L(i):ob$(i)=M1
D$(a$,4)+LEFT$(a$,3)
790 NEXT
800 FOR i=1 TO 10
810 READ a$:n$(i)=MID$(a$,
4)+LEFT$(a$,3)+"!"
820 NEXT
830 p=6:finished=0
840 f(1)=0:f(2)=0:f(3)=0
850 ENDPROC
860
870 DATA ooma secret r,EAS
,larthe cel,EASSOU,urythe ar
mo,WES,hopa s,SOU
880 DATA allthe main h,EAS
SOU,henthe kitc,WESNORSOU,ac
ethe King's pal,EASSOU,eetth
e main str,NORSOUWES
890 DATA ncethe castle ent

```

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

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A full-scale GRAPHIC adventure with 400 locations

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ELECTRON USER - MAY 1987

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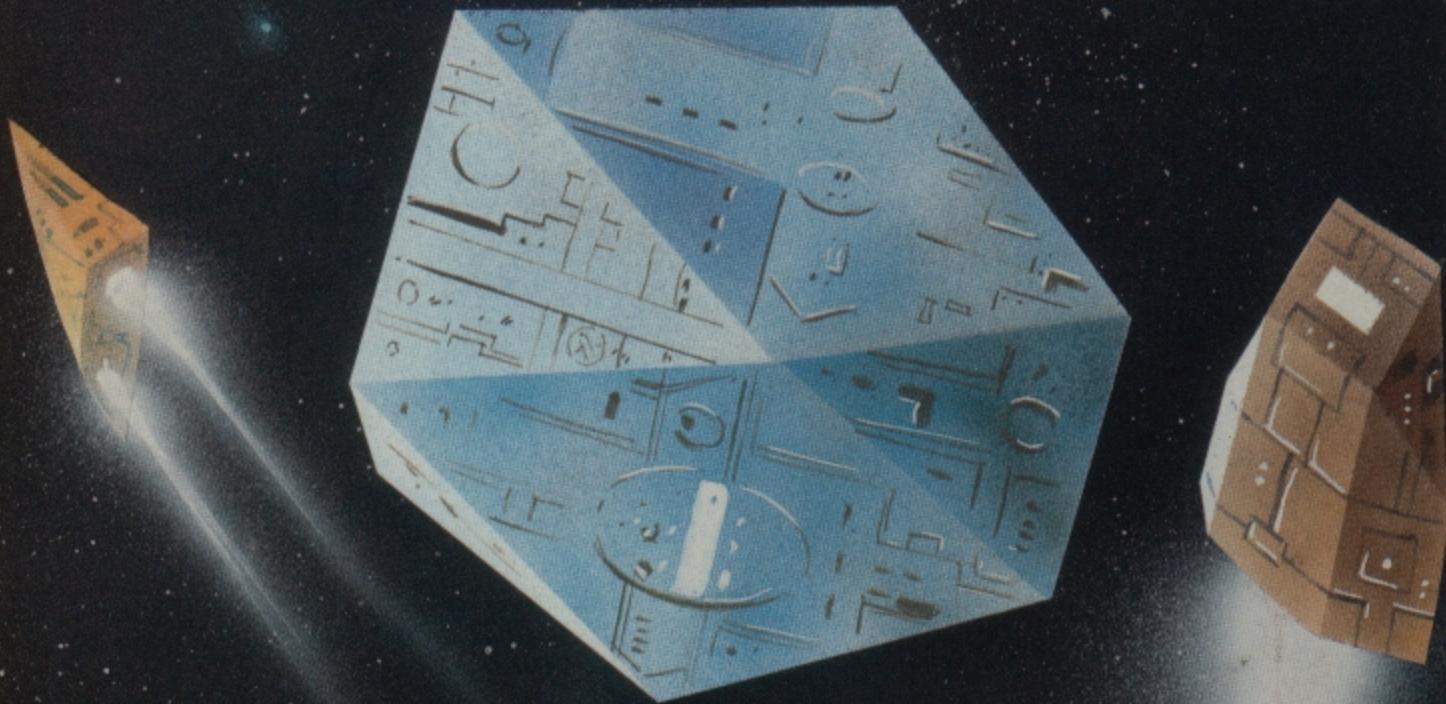
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Cosmic Guerrillas

Just when you thought it was safe to holster your laser ANDREW PILLIGE reveals a new threat to mankind

Pick up your laser and fasten your seatbelt for an ultra-fast ride in this brilliant game of galactic conquest.

For a long time the planetary system of Sirius VII has been used as a storage facility for cosmic battle weapons for use against the Jelquon invaders, but the war against the marauding hoardes has not been going too well recently.

The aliens have found ways of using captured weapons against the interplanetary defence force, and civilisation as we know it is threatened with annihilation once more.

One night you are left to watch over the depot of picowave laser generators and pion energy storage drums.

At first everything seems peaceful, your eyelids are beginning to sag when suddenly, thousands of Jelquon marsh creepers drop out of hyperspace to try to steal the laser guns.

With lightning reflexes you leap to the controls of your laser generator and start to defend the stores against the relentless waves of hideous beings.

Fortunately they have to get through the storage drums to reach the lasers, but how long can you hold them off?

After four waves of attackers have been destroyed, reinforcements will arrive in the form of another laser.

The action is fast and furious so you'll have to work quickly. The future of mankind rests in your hands.

Cosmic Guerrillas is without doubt, one of the fastest shoot-'em-up games seen on the Electron.

As is usual with listings that contain machine code, it is essential to save the program before running it.

A typing error when entering the listing could cause a crash (which won't do any harm, but you'll have to switch off for a second or two).

VARIABLES

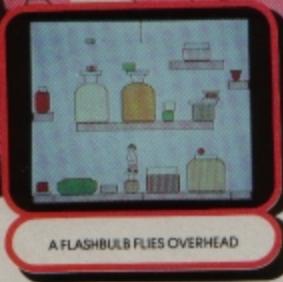
sc% Current score
hi% Top ten scores
screen% Current attack wave
lives% Number of lives left

PROCEDURES

assemble Assembles the machine code
initvar Initialises the game
table Displays high score table
instruct Prints instructions
endgame Displays end screen

Turn to Page 43 ►

Elixir



A FLASHBULB FLIES OVERHEAD



CLIMBING UP A STRAND OF COTTON



CLOCK-WATCHING



KEEP CLEAR OF THE BUNSEN BURNER FLAME

Help Poor Old Cyril to Find the Magic Elixir

Imagine the scene:

You are Cyril, a likeable old gentleman — the proprietor of a small but busy chemist's shop. One evening, after a hard day's work, you accidentally take a swig of a potent liquid: a strong reducing agent.

Within minutes you have shrunk down to the size of a bottle of aspirins. Frightened and alone, at first you panic... then you remember the magic elixir which is stored at the back of the shop on the top shelf.

BBC Micro Cassette £9.95 Acorn Electron Cassette £9.95
 BBC Micro 5 1/4" Disc £11.95 Acorn Electron 5 1/4" Disc £11.95
 BBC Master Compact 3 1/2" Disc £14.95 Acorn Electron 3 1/2" Disc £14.95

(Compatible with the BBC B, B+ and Master Series computers).

The screen pictures show the BBC Micro version of the game.
 The graphics of other versions may vary.

The elixir just might restore you to your normal size... it's your only hope. But can you possibly reach it; you'll have to work out a suitable route by climbing up and down and across the shelves.

A fascinating, humourous game packed with strategical puzzles and problems. Keep clear of the lipstick missiles, leap over the exploding flash-bulbs, dodge the dripping acid, and watch out for the curious "circulasaurus" creature!

PRIZE COMPETITION

If you complete Elixir (by restoring Cyril The Chemist to his normal size), you can enter our competition. Prizes include an impressive trophy, 10 chemistry sets, and signed certificates for runners-up.

Closing Date: 30th June, 1988.

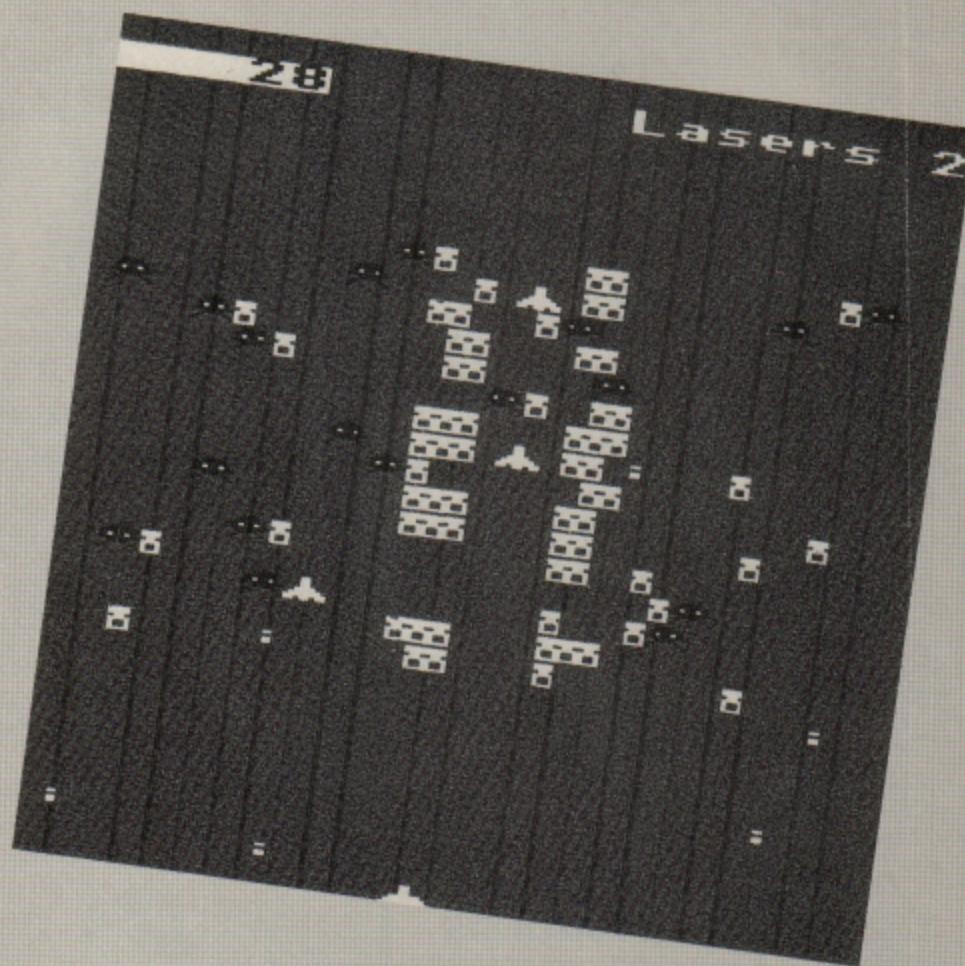
Cosmic Guerrillas listing

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```

10 REM Cosmic Guerrillas
20 REM By Andrew Pillidge
30 REM (c) Electron User
40 REM
50 IF PAGE>&E00 GOTO 5830
60 MODE5
70 HIMEM=85700
80 *FX9,5
90 *FX10,5
100 VDU23,1,0,0,0,0;
110 sc%:0::m%:0
120 DIM ctrl%(8,5),hi%(10)
,hi$(10)
130 ENVELOPE 1,1,-4,-3,-2,
10,10,10,126,0,0,-126,126,12
6
140 FOR NX=0 TO 7:READ NX?
&900:NEXT
150 DATA 812,0,1,0,160,0,5
,0
160 FOR NX=1 TO 10:hi%(NX)
=(11-NX)*25:hi$(NX)='Electro
n User':NEXT
170 FOR NX=1 TO 8:FOR JX=1
TO 5:READ ctrl%(NX,JX):NEXT
:NEXT
180 DATA1,3,2,255,30
190 DATA1,3,2,180,25
200 DATA5,1,3,150,20
210 DATA5,1,3,120,16
220 DATA4,0,4,100,13
230 DATA4,0,5,90,10
240 DATA2,0,6,80,8
250 DATA2,0,7,70,6
260 PROGassembly
270
280 PROGinstruct
290 A=INKEY(700)
300 IF A=32 THEN GOTO370
310 IF A=83 THEN *FX210,0
320 IF A=81 THEN *FX210,1
330 PROGtable
340 A=INKEY(500)
350 IF A=32 THEN GOTO370 E
LSE GOTO280
360
370 screen%:0:lives%:3
380 PROGcolours(1,3,6):CLS
:PROGinitvar:PROGinitchurns:
PROGinitlasers
390 MOVED,0:GCOL3,3:DRAW12
79,0
400 COLOUR2:PRINTTAB(12,1)
"Lasers":TAB(19,1):lives%
410 screen%:screen%+1
420 IF screen%>8 THEN scre
en%:8
430 VDU19,1,ctrl%(screen%,
1),0,0,0
440 ?&83:ctrl%(screen%,2)
450 ?hitscore=ctrl%(screen
%,3)
460 PROGrandstarts(ctrl%(s
creen%,4)):?timer=0
470 ?bombrate=ctrl%(screen
%,5)
480 ?cycle=0:PROGinitguer:
CALLscreenquer
490 ?&74=0
500 COLOUR130:COLOUR1:m%:5
510 REPEAT
520 CALLstartpoint
530 sc%=?&80+?&81*256:VDU3
1,0,1:PRINTscx
540 SOUND 802,-15,0,1
550 UNTIL ?&74=99 OR ?&77>

```



```

=32
560 COLOUR128:m%:0
570 IF ?&77<32 GOTO600
580 IF screen%:4 THEN live
s%:lives%+1:SOUND1,-15,180,5
:COLOUR2:PRINTTAB(19,1):lives
%
590 GOTO410
600 SOUND0,-15,7,40
610 VDU19,2,11,0,0,0:TIME=
0:REPEAT:UNTIL TIME>=200:VDU
19,2,3,0,0,0
620 lives%:lives%-1
630 COLOUR2:PRINTTAB(19,1)
lives%
640 IF lives%:0 THEN PROG
ndgame:GOTO280
650 *FX21
660 TIME=0:REPEAT UNTIL TI
ME>=300
670 GOTO490
680 END
690
700 DEFPROGassembly
710 cycle=&7B:counter=&7C:
timer=&7D:tempx=&7E:bombrate
=&82:hitscore=&84
720 bolthi=&88:bolthi=&8C
:bflag=&910
730 pos=&5700:nov=&5740:ca
rry=&5741:lside=&5780:rside=
&57A0
740 Las=&57C0:bombloc=&57D
0
750 temp1=&57C2:temp2=&57C
3:temp3=&57C4:temp4=&57C5
760 DIM codespace 1600
770 FOR pass=0 TO 2 STEP 2
780 P%:codespace
790 L OPT pass

```

```

800 \TIMING CYCLE
810 .startpoint
820 INCcycle
830 JSRlasermove
840 JSRboltmove \SHOOT
850 LDAcycle:AND#3:CMP#3:B
NEnfire
860 JSRfire
870 .nfir
880 LDAcycle:AND#7:CMP#7:B
NEnguer
890 JSRGuerrilla:JMPcollec
t2 \GUERS
900 .nguer:LDA#2:STAcounte
r:JSRdelay
910 .collect2
920 LDAcycle:AND#83:CMP#83
:BNEnbmb
930 JSRbombs:JMPcollect3 \
BOMBS
940 .nbmb:LDA#1:STAcounter
:JSRdelay
950 .collect3
960 LDAcycle:AND#7:CMP#7:B
NEstartpoint
970 \
980 INCtimer
990 LDX#62
1000 .r
1010 LDAC50,X:CMPTimer:BNE
r1
1020 LDAnov,X:CMPTimer:BNE1
1030 LDAnov,X:STA&70
1040 LDAnov+1,X:STA&71
1050 LDY#11
1060 LDA(&70),Y:CMPTimer:BNE
r2
1070 LDAC51,X:STAmov,X:JMP
r1
1080 .r2:INC&C50,X

```

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Cosmic Guerrillas listing

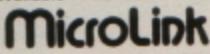
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```

blft
1410 RTS
1420 .lsbifft \MOVE LEFT
1430 JSRlaserprint
1440 SEC
1450 LDAlas:SBC=8:STA las:BC
S nocarry2
1460 DEC Las+1
1465 .nocarry2
1470 JSRlaserprint
1480 .rtn:RTS
1490
1491 .testkey
1492 LDA#129:LDY#255:JSR&FF
F4:CPY#0:RTS
1500 .fire
1510 LDX#&B6:JSR testkey
1520 CPY#0:BNEntryfire
1530 RTS
1540 .tryfire
1550 LDX#3:.nfb:LDAbf1ag,X:
CMP#0:BEQfireok:DEX:BPLnfb:R
TS
1560 .fireok
1570 SEC
1580 LDAlas:SBC#&38:STA bolt
Low,X:STA&72
1590 LDAlas+1:SBC#1:STA bolt
hi,X:STA&73
1600 LDA#99:STA flag,X
1610 JSRprintbolt
1620 LDY#89:LDX#0:LDA#7:JSR
&FFF1
1630 RTS
1640 \
1650 .laserprint
1660 LDAlas:STA&70
1670 LDAlas+1:STA&71
1680 LDY#23
1690 .rept
1700 LDA(&70),Y
1710 EOR&C30,Y:STA(&70),Y
1720 DEY:BPLrept
1730 RTS
1740 \
1750 .boltmove
1760 LDA#4:STA&78
1770 .lasloop:DEC&78:LDX&78
1780 LDAbf1ag,X:BEQnexas
1790 SEC
1800 LDAb1low,X:STA&72:SB
C#40:STA b1low,X:STA temp1
1810 LDAb1hi,X:STA&73:SBC
#&01:STA b1hi,X:STA temp2
1820 SEC:LDA temp1:SBC#8:STA
temp3:LDA temp2:SBC#0:STA temp
4
1830 JSRprintbolt
1840 LDA temp2:CMP#85F:BM1bb
b
1850 LDY#7:LDA(&72),Y
1860 CMP#&FF:BEQbbb
1870 LDX#62
1880 .loopg
1900 LDA mov,X:BEQnextg
1910 CMP#3:BEQnextg
1920 LDA temp1:CMP pos,X:BNEh
|
1930 LDA temp2:CMP pos+1,X:BE
Qhit
1940 .hl
1950 LDA pos,X:CMP temp3:BNEn
extg
1960 LDA pos+1,X:CMP temp4:BE
Qhit
1970 .nextg:DEX:DEX:BPL loo

```

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



In addition to these many BBC Micro programs will also run on the Electron.

```

2230 LDA bombloc,X:ADC#&40:S
TABombloc,X:STA&70
2240 LDA bombloc+1,X:ADC#&01
:STA bombloc+1,X:STA&71
2250 LDY#5:LDA(&70),Y:CMP#&
9F:BEQhitlsb
2260 CMP#&FF:BEQ bombend
2270 JSRprintbomb
2280 .nextbomb
2290 DEX:DEX:CPX#4:BNEbmb:R
TS
2300 .hitlsb:LDA#99:STA&74
2310 .bombend:TXA:TAY
2320 .downshift
2330 INY:INY
2340 LDA bombloc,X:STA bomblo
c-2,Y
2350 LDA bombloc+1,Y:STA bomb
loc-1,Y
2360 TYA:CMP#42:BNEdownshif
t
2370 DEC&76:DEC&76:JMP nextb
omb
2380 .printbomb:LDY#4
2390 .nbl
2400 LDA(&70),Y
2410 EOR&C2C,Y:STA(&70),Y
2420 DEY:BPLnbl:RTS
2430 \
2440 .guerrilla
2450 LDX#64
2460 .repeat
2470 DEX:DEX
2480 LDA mov,X
2490 CMP#3:BNEnotdd:JMPdead
2500 .notdd
2510 CMP#0:BEQstill

```

```

2520 TXA:STA tempx
2530 LDA#0:STA&2B:STA&2C:ST
A&20
2540 LDA bombrate:STA&2A:JSR
&AF12
2550 LDX tempx:LDA&2A:CMP#1:
BNEorl
2560 LDY#5
2570 LDA pos,X:STA&70
2580 LDA pos+1,X:STA&71
2590 LDA(&70),Y:CMP#&03:BNE
rrol
2600 LDA&76:CMP#40:BPLrrol
2610 LDY#76:INY:INY:STY#76
2620 CLC
2630 LDA pos,X:ADC#2:STA bomb
loc,Y:STA&70
2640 LDA pos+1,X:ADC#0:STA bo
mbloc+1,Y:STA&71
2650 JSRprintbomb
2660 .rrol:LDA mov,X:CMP#1:B
EQright
2670 .notright:CMP#2:BNEnstil
l:JMP lft
2680 .still
2690 JSRwpquer:JSRprtquer:J
MPcont
2700 \
2710 .right \RIGHT MOVERS
2720 LDA carry,X
2730 CMP#0:BEQmvright
2740 CMP#1:BNEnotmrc:JSRmrc
:JMPcont
2750 .notmrc:JSRmrls:JMPcon
t
2760 .mvright \ALONE
2770 LDA pos,X:STA&70
2780 LDA pos+1,X:STA&71
2790 LDY#11:LDA(&70),Y:CMP#&4A:BNEbot
2800 LDY#21:LDA(&70),Y
2810 CMP#&99:BNEnchr
2820 LDA#2:STA mov,X
2830 LDA#1:STA carry,X
2840 JSRmlc:JMPcont
2850 .nchr
2860 CMP#&70:BNEbot
2870 LDA#2:STA mov,X
2880 LDA#2:STA carry,X
2890 JSRmrls:JMPcont
2900 .bot
2910 JSRngr
2920 LDA pos,X:CMP#&F0:BEQbo
t:JMPcont
2930 .bot1
2940 LDA pos+1,X:CMP#&75:BEQ
bot2:JMPcont
2950 .bot2
2960 JSRprtquer
2970 LDA#80:STA pos,X
2980 LDA#85F:STA pos+1,X
2990 JSRprtquer:JMPcont
3000 \
3010 .mgr
3020 JSRwpquer:CLC
3030 LDA pos,X:ADC#8:STA pos,
X:BCC nocarry4
3040 INC pos+1,X
3045 .nocarry4
3050 JSRprtquer:RTS
3060 .nrc \WITH CHURN
3070 JSRngr:SEC
3080 LDA pos,X:SBC#16:STA&70
3090 LDA pos+1,X:SBC#0:STA&7
1
3100 JSRprtch
3110 CLC
3120 LDA&70:ADC#8:STA&70:BC

```

```

C nocarry5
3130 INC &71
3135 .nocarry5
3140 JSRprtch
3150 LDA pos,X:STA&72
3160 LDA pos+1,X:STA&73
3170 LDY#30
3180 .rep
3190 LDA side,Y
3200 CMP#2:BNEnextB
3210 LDA side+1,Y:CM&73:BE
Qhtsrtch
3220 .nextB:DEY:DEY:BPLrep
3230 RTS
3240 .htsrtch
3250 JSRprtch
3260 LDA#2:STA mov,X:LDA#0:S
TAcarry,X
3270 RTS
3280 .mrls \WITH LASER
3290 JSRngr
3300 SEC
3310 LDA pos,X:SBC#24:STA&70
3320 LDA pos+1,X:SBC#0:STA&7
1
3330 JSRprtlsb
3340 CLC
3350 LDA&70:ADC#8:STA&70:BC
C nocry1
3360 INC &71
3365 .nocry1
3370 JSRprtlsb
3380 LDA pos,X:STA&72
3390 LDA pos+1,X:STA&73
3400 LDY#30
3410 .repl
3420 LDA side,Y
3430 CMP#2:BNEnextC
3440 LDA side+1,Y:CM&73:BE
Qhtsrtlsb
3450 .nextC:DEY:DEY:BPLrepl
:RTS
3460 .htsrtlsb
3470 JSRprtlsb
3480 LDA#2:STA mov,X:LDA#0:S
TAcarry,X
3490 LDA#99:STA&74:RTS
3500 \
3510 .lft \LEFT MOVERS
3520 LDA carry,X
3530 CMP#0:BEQmvlt
3540 CMP#1:BNEnmlc:JSRmlc:J
MPcont
3550 .nmlc:JSRmrls:JMPcont
3560 .mvlt \ALONE
3570 SEC
3580 LDA pos,X:SBC#8:STA&70
3590 LDA pos+1,X:SBC#0:STA&7
1
3600 LDY#11:LDA(&70),Y:CMP#&25:BNEnop
3610 LDY#5:LDA(&70),Y
3620 CMP#&99:BNEnchl
3630 LDA#1:STA mov,X
3640 LDA#1:STA carry,X
3650 JSRmrc:JMPcont
3660 .nchl
3670 CMP#&E0:BNEnop
3680 LDA#1:STA mov,X
3690 LDA#2:STA carry,X
3700 JSRmrls:JMPcont
3710 .top
3720 JSRmgl
3730 LDA pos,X:CMP#&80:BEQto
p1:JMPcont
3740 .top1
3750 LDA pos+1,X:CMP#&5F:BEQ
top2:JMPcont

```

```

3760 .top2
3770 JSRprtguer
3780 LDA#&F0:STApos,X
3790 LDA#&75:STApos+1,X
3800 JSRprtguer:JMPcont
3810 .mgl
3820 JSRwpguer:SEC
3830 LDApos,X:SBC#8:STApos,
X:BCS nocarry6
3840 DEC pos+1,X
3845 .nocarry6
3850 JSRprtguer:RTS
3860 .mlc \WITH CHURN
3870 JSRmgl
3880 CLC
3890 LDApos,X:ADC#24:STA&70
3900 LDApos+1,X:ADC#0:STA&7
1
3910 JSRprtch
3920 CLC
3930 LDApos,X:ADC#16:STA&70
3940 LDApos+1,X:ADC#0:STA&7
1
3950 JSRprtch
3960 LDApos,X:STA&72
3970 LDApos+1,X:STA&73
3980 LDY#30
3990 .repA
4000 LDAlside,Y
4010 CMP#72:BNEnextA
4020 LDAlside+1,Y:CM#73:BE
qhtslftch
4030 .nextA:DEY:DEY:BPLrepA
:RTS
4040 .htslftch
4050 JSRprtch
4060 LDA#1:STAmov,X
4070 LDA#0:STAcarry,X
4080 RTS
4090 .mls \WITH LASER
4100 JSRmgl
4110 CLC
4120 LDApos,X:ADC#24:STA&70
4130 LDApos+1,X:ADC#0:STA&7
1
4140 JSRprtlsb
4150 SEC
4160 LDA&70:SBC#8:STA&70:BC
$ nocarry7
4170 DEC#71
4175 .nocarry7
4180 JSRprtlsb
4190 LDApos,X:STA&72
4200 LDApos+1,X:STA&73
4210 LDY#30
4220 .repl
4230 LDAlside,Y
4240 CMP#72:BNEnextD
4250 LDAlside+1,Y:CM#73:BE
qhtslftch
4260 .nextD:DEY:DEY:BPLrepI
:L:JMPcont
4270 .htslftch
4280 JSRprtlsb
4290 LDA#1:STAmov,X:LDA#0:S
TAcarry,X
4300 LDA#99:STA&74:JMPcont
4310 \
4320 .dead
4330 JMPcont
4340 \
4350 .prtch
4360 LDY#7
4370 .ch
4380 LDA(&70),Y
4390 EOR&C20,Y:STA(&70),Y
4400 DEY:BPLch:RTS
4410 \
4420 .prtlsb
4430 LDY#15
4440 .lsb
4450 LDA(&70),Y
4460 EOR&C10,Y:STA(&70),Y
4470 DEY:BPLlsb
4480 RTS
4490 \
4500 .prtguer
4510 LDApos,X:STA&70
4520 LDApos+1,X:STA&71
4530 LDY#15
4540 LDAcycle:AND#8:CM#8:B
NEguer
4550 .guer
4560 LDA&C00,Y
4570 EOR(&70),Y:STA(&70),Y
4580 DEY:BPLguer
4590 RTS
4600 .wguer
4610 LDApos,X:STA&70
4620 LDApos+1,X:STA&71
4630 LDY#15
4640 LDAcycle:AND#8:CM#8:B
NEguer
4650 .wguer
4660 LDA&C90,Y
4670 EOR(&70),Y:STA(&70),Y
4680 DEY:BPLwguer
4690 RTS
4700 .cont
4710 CPX#0:BEQend:JMPrepeat
4720 .end:RTS
4730 \
4740 .screenguer
4750 LDX#62
4760 .cyc:JSRwpguer:DEX:DEX
:BPLcyc
4770 RTS
4780 \
4790 NEXT
4800 ENDPROC
4810
4820 DEFPROCinitvar
4830 RESTORE#4860
4840 REM Guerrilla data
4850 FOR NX#&C00 TO &C0F:RE
AD data:#?NX#data:#NEXT
4860 DATA#00,&03,&07,&25,&0
F,&03,&04,&08,&00,&0C,&0E,&4
A,&0F,&0C,&02,&01
4870
4880 FOR NX#&C90 TO &C9F:RE
AD data:#?NX#data:#NEXT
4890 DATA#00,&03,&0F,&25,&0
7,&03,&02,&02,&00,&0C,&0F,&4
A,&0E,&0C,&04,&04
4900 REM Laser base data
4910 FOR NX#&C10 TO &C1F:RE
AD data:#?NX#data:#NEXT
4920 DATA#00,&10,&10,&10,&3
0,&70,&F0,&D0,&00,&80,&80,&8
0,&C0,&E0,&F0,&B0
4930
4940 FOR NX#&C30 TO &C47:RE
AD data:#?NX#data:#NEXT
4950 DATA#00,&00,&00,&00,&1
0,&80,&70,&60,&00,&60,&60,&6
0,&F0,&F0,&F0,&60,&00,&00,&0
0,&80,&80,&C0,&B0,&60
4960 REM Milk churn data
4970 FOR NX#&C20 TO &C27:RE
AD data:#?NX#data:#NEXT
4980 DATA#00,&FF,&FF,&66,&F
F,&99,&99,&FF
4990 REM Bomb and Laserbolt
data
5000 FOR NX#&C28 TO &C2F:RE
AD data:#?NX#data:#NEXT
5010 DATA#22,&44,&22,&44,&6
6,&00,&66,&66
5020 ?&74=0:&76=4:&bf=0
5030 ?&80=0:&881=0:&84=0
5040 ENDPROC
5050
5060 DEFPROCinstruct
5070 CLS:PROColours(1,3,7)
:FX21
5080 COLOUR0:COLOUR129:PRIN
TTAB(0,2)STRINGS(20,":TAB
(0,3)" Cosmic Guerrillas
;TAB(0,4)STRINGS(20,":COL
OUR128
5090 COLOUR3:PRINTTAB(0,10)
Controls: :COLOUR1:PRINTTAB
(0,14)SPC6Z - Left"SPC6X
- Right" Return - Fire"
5100 COLOUR2:PRINTTAB(0,22)
SPC6Q - Quiet SPC6'S - So
und on"
5110 COLOUR3:PRINTTAB(5,30)
'Press Space'
5120 ENDPROC
5130
5140 DEFPROCinitguer
5150 FOR NX#0 TO 63:N#mov=
0:NEXT
5160 M#0
5170 FOR NX#&60C0 TO 87380
STEP #14:MX#pos=N#MOD256:MX
?(pos+1)=N#DIV256:MX#Lside=N
%MOD256:MX#(Lside+1)=N#DIV25
6:MX#M#2:NEXT
5180 FOR NX#&61F0 TO 87480
STEP #14:MX#pos=N#MOD256:MX
?(pos+1)=N#DIV256:MX#Lside=N
%MOD256:MX#(Lside+1)=N#DIV25
6:MX#M#2:NEXT
5190 ?&77=0
5200 ENDPROC
5210
5220 DEFPROCinitchurns
5230 FOR row#&86140 TO 87400
STEP 8140
5240 FOR side#0 TO 56 STEP
56
5250 FOR column#0 TO 16 STE
P 8
5260 CH#=row%+column%+side%
5270 FOR K#&07:K#CH#=K#?&
C20:NEXT
5280 NEXT column%
5290 NEXT side%
5300 NEXT row%
5310 ENDPROC
5320
5330 DEFPROCinitlasers
5340 FOR row#&62A0 TO 871A0
STEP 8780
5350 FOR K#&015:K#row#=K#
?&C10:NEXT
5360 NEXT row%
5370 FOR K#&023:K#?&7F60=K
?&C30:NEXT
5380 ?Las=&60:?(las+1)=&7F
5390 ENDPROC
5400
5410 DEFPROCrandstarts(strt
%)
5420 FOR NX#0 TO 62 STEP 2:
NX#&C50=RND(strt%):NX#&C51=N
%DIV32+1:NEXT
5430 ENDPROC
5440
5450 DEFPROCendgame
5460 TIME#0:REPEATUNTILTIME
>=300
5470 CLG
5480 PROColours(2,3,4)
5490 COLOUR2:PRINTTAB(3,10)
You scored ;STR$(sc%):COL0
UR1
5500 IF sc%>hi%(10) THEN PR
INT" which is one of the "
ten best scores" ELSE GOTO
5590
5510 *FX15,0
5520 A=INKEY(300)
5530 hi%(10)=sc%:hi%(10)=
5540 FOR NX#9 TO 1 STEP-1
5550 IF hi%(NX)<hi%(NX+1) P
ROCswap
5560 NEXT
5570 GCOL3,129:CLG:GCOL0,12
8:CLG:PROTable
5580 VDU23,1,1;0;0;0;0;COL
OUR2:INPUTTAB(6,cc%):hi$(num%
):hi$(num%)=LEFT$(hi$(num%),
14):COLOUR3:PRINTTAB(6,cc%):h
i$(num%):VDU23,1,0;0;0;0;
5590 *FX15,0
5600 A=INKEY(400)
5610 ENDPROC
5620
5630 DEFPROCswap
5640 hi%#hi%(NX):hi%(NX)=hi
%(NX+1):hi%(NX+1)=hi%
5650 hi#=hi$(NX):hi$(NX)=hi
$(NX+1):hi$(NX+1)=hi%
5660 ENDPROC
5670
5680 DEFPROCtable
5690 CLS
5700 PROColours(5,3,1)
5710 COLOUR3:COLOUR130:PRIN
TTAB(0,2)STRINGS(20,":TAB
(0,3)" High Score Table
;TAB(0,4)STRINGS(20,":COL
OUR128
5720 FOR NX#1 TO 10:col%#6+
NX#2
5730 COLOUR1:PRINTTAB(0,col%
):LEFT$(00000,5-LEN(STR$hi
%(NX))):hi%(NX):TAB(5,col%)"-
:COLOUR3:PRINTTAB(6,col%):hi
$(NX):IF hi%(NX)=sc% THEN cc
%#col%#num%#NX
5740 NEXT
5750 ENDPROC
5760
5770 DEFPROCcolours(c1%,c2%
,c3%)
5780 VDU19,1,c1%,0,0,0
5790 VDU19,2,c2%,0,0,0
5800 VDU19,3,c3%,0,0,0
5810 ENDPROC
5820
5830 *KEY# *T:IMD%#PAGE-&E0
0:FOR NX#PAGE TO TOP STEP 4:
!(NX-D%)!=NX:NEXT:!TOP-D%)=
&FFDD:PAGE#E0:IMOLD:MRUN:M
5840 *FX138,0,128

```

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

HAVE you ever wondered how much you still owe on your bank loan? You know how much you borrowed, the interest rate and how much you are paying but the amount outstanding is often a mystery.

This program gives a rough guide to the answer. It can only be approximate because of the different ways interest is added — monthly, quarterly, half-yearly or annually.

It is based on the interest being calculated added on quarterly with the first addition one month after the loan was taken out. This gives quite accurate results when the results of the program are compared with bank loan figures.

When you run the program you have to enter four values:

- The total amount borrowed.
- The interest rate.
- The amount of repayment.
- The month of the first payment.

The amount borrowed should be expressed in pounds, the interest (not the APR) as a percentage, the repayment in pounds and pence and the month of the first repayment as a number from one to twelve.

Sample figures for you to

Loan calculator

BARRY WOOD presents a program to help keep track of your loan repayments

try are £1000, 12.5, £33.39 and 4 (for April). The loan will be paid in 3 years. Because of the constraints of the Electron's 40 column screen the program can only deal with loans up to about £9999.

Once you've entered the figures you will be presented with data for the first year.

You are reminded how much you borrowed, the rate and the amount you are paying each month together with the following information:

Interest shows the amount added to what you owe. It's added each quarter and you'll notice that providing you've entered realistic figures, it is less each time. This is because the interest is calculated on what you owe and you're paying some off all the time.

Repaid lets you know how much you've paid all together. *Tot Int* gives the figure for the total interest you've paid to date. The dif-

ference between this and *Repaid* shows how much of your money has gone towards actually paying off the loan. *Balance* indicates the sum you still owe.

Once you've studied the figures for the first year, pressing any key will take you to the second and you can continue until the bal-

ance falls below zero which means that the loan has been paid off.

The real use of this program is for checking the "What if . . ." possibilities of different repayments and interest rates since even the slightest changes can alter the time required for pay-off dramatically. ■

Loan Calculator				
Year: 2 Borrowed: £1000 at 12.5% Payment: £33.39				
	Apr	May	Jun	Jul
Interest	0.00	21.34	59.00	0.00
Repaid	131.87	122.43	122.43	0.00
Tot Int	131.87	122.43	122.43	0.00
Balance	678.36	651.82	651.82	0.00
	Aug	Sept	Oct	Nov
Interest	12.37	9.33	5.28	0.00
Repaid	127.63	117.85	117.85	0.00
Tot Int	127.63	117.85	117.85	0.00
Balance	579.42	546.83	546.83	0.00
	Dec	Jan	Feb	Mar
Interest	0.00	0.00	13.33	0.00
Repaid	781.19	734.38	767.97	811.36
Tot Int	781.19	734.38	767.97	811.36
Balance	461.87	428.49	400.19	375.18

Press any key to continue

Figure 1: The second year of an example loan

```

10 REM Loan Calculator
20 REM by Barry Wood
30 REM (c) Electron User
40 MODE1:@X=&20208
50 PRINT:PRINTTAB(12,0);:
PROCbig(" Loan Calculator ",2,1)
60 PRINT:INPUT"How much
are you borrowing? £"principal
al:bal=principal
70 PRINT:INPUT"What is th
e annual interest rate? "rate
80 REPEAT
90 PRINT:INPUT"How much a
re you paying a month? £"rep
ay
100 UNTIL repay>0
110 PRINT:PRINT"Which mont
h did the loan start? ":INPU
TAnswer 1 (Jan) to 12 (Dec)
120 IFstart<10Rstart>12 TH
EN 110 ELSE start = 12-start
130 VDU 23,1,0;0;0;
140 PROCsetup

```

```

150 PRINTTAB(12,0);:PROCbi
g(" Loan Calculator ",2,1)
160 VDU 28,0,31,39,3
170 REPEAT
180 COLOUR 3
190 CLS:PRINT"Year:"STR$(y
ear):PRINT"Borrowed:£"STR$(p
rincipal)" at "STR$(rate)"%
Payment:£"STR$(repay):year=
year+1
200 COLOUR 2
210 FORcount=1 TO 3
220 PRINTTAB(0,count*7-2)"Interest"
230 PRINT"Repaid":PRINT"To
t Int":PRINT"Balance"
240 NEXT
250 across=1:down=3
260 FORcount=1 TO 12
270 IF count=2 OR count=5
OR count=8 OR count=11 int=b
al*(rate/400) ELSE int=0
280 totint=totint+int
290 total=total+repay
300 bal=bal-repay+int
310 COLOUR 3:PRINTTAB(8*ac
ross+4,down);:PROCbig(months
(count),3,0)
320 PRINT:COLOUR1
330 PRINTTAB(8*across,down
+2)int
340 PRINTTAB(8*across,down
+3)total
350 PRINTTAB(8*across,down
+4)totint
360 PRINTTAB(8*across,down
+5)bal
370 across=across+1
380 IF count=4 across=1:do
wn=10
390 IF count=8 across=1:do
wn=17
400 IFbal<0 count=15
410 NEXT
420 COLOUR 3:PRINTTAB(7,26
)"Press any key to continue"
430 :FX 15,1
440 A=GET
450 UNTIL bal<0
460 PRINTTAB(5,24)SPC(25)T
AB(14,24)"LOAN REPAYD"::VDU7
:A=GET

```

```

460 END
470 DEFPROCsetup
480 DIMmonth$(12)
490 FORcount=1 TO 12
500 READmonth$((count+star
t)MOD12+1)
510 NEXT
520 totint=0:total=0:year=
1
530 ENDPROC
540 DEFPROCbig(m$,f,b)
550 COLOUR 128+b:COLOUR f
560 FOR K%1 TO LEN(m$)
570 BS=MOD(m$,K%)
580 ?&6F=ASCBS:AX=10:X%=&
F:Y%=&:CALL&FFF1
590 VDU23,228,2870,2870,28
71,2&71,?&72,2&72,?&73,2&73
600 VDU23,229,?&74,?&74,?&
75,2&75,?&75,2&76,?&77,?&77
610 VDU 228,8,10,229,11
620 NEXT:VDU 10,13,20
630 ENDPROC
640 DATAJan,Feb,Mar,Apr,Ma
y,Jun,Jul,Aug,Sept,Oct,Nov,D
ec

```

Micro Messages

I HAVE been reading Electron User for the last six months and think it is great. I bought my Electron in 1984 and used it sparingly until 1986 when I started an O-level course in computer studies.

I had thought the Electron was obsolete and as dead as a dodo until I bought your magazine. I couldn't have been more wrong. I now have my sights set on a Slogger disc system and hope to get it shortly.

Could you tell me if Cholo by Firebird is available for the Electron? If not, is it likely to be converted?

I also wondered if you could start a regular feature like the Hacman column in The Micro User. — Gordon Moar, Linlithgow, West Lothian.

● Unfortunately, Cholo is not available for the Electron and we are unaware of any conversion in the pipeline.

There is a feature like Hacman in Electron User — it's called Arcade Corner. And it has bigger and better hints, pokes, ideas and cheat modes than you'll find anywhere else.

French fix

I HAVE discovered a way of printing French characters, such as the circumflex, above characters from within View. To do this you

Hanging on those add-ons

HAVING recently become the owner of an Electron with a Plus 3, Plus 1, Slogger expansion Rom 2.0 and other add-ons, and also being new to the computer field, I was wondering if the Plus 3 and Plus 1 have to be fitted directly into the back of the Electron, or are there any leads that can be bought or made to prevent the unit falling off the back

use the embedded command HT 18.

This assigns character eight, which is the Ascii code for a backspace, to highlight one. Thereafter, when you need a circumflex above a letter you enter the highlight code immediately following it.

The result is clearer when printing in near letter quality, as the circumflex sits more symmetrically over the character. This trick should work with most printers. — Daniel Margolius, Bow Lane, London.

Spelling correction

CONGRATULATIONS on your View Spelling Checker published in the May 1987 issue of Electron User, it has turned out to be a really useful addition to the otherwise excellent View package.

I wanted to keep the dictionary on a separate disc to those I keep work and personal items on, so I tried the additional lines suggested by another reader in the July 1987 issue. However I

of my desk?

I only have a small room and I need to maximise use of the space. With leads I would be able to place the Plus 3 and Plus 1 where I need them and not on the back of the desk.

In closing I must say congratulations on a superb magazine. I recently bought most of your back issues to get up on the Electron and

couldn't get them to work correctly. So I wrote a small additional procedure called at lines 215, 275 and 475 by PROCchange and defined at line 1080 as follows:

```
1080 DEFPROCchange
1090 PRINT "Do you want to change discs (Y/N)?"
1100 x$=GET$ 
1110 IF x$="N" or x$="n" ENDPROC
1120 IF x$="Y" or x$="y" PRINT "Change discs and press any key" ELSE GOTO 1100
1130 x$=GET$ 
1140 *MOUNT
1150 ENDPROC
```

I have been buying Electron User since it first came out and find it a tremendous source of revision, often items I don't understand or which I don't appreciate the significance of at first become clear as I read more articles. Keep up the good work. — B.A. Haines, Little-Hampton, West Sussex.

Word of warning

I NOTE your reply to my letter in the November 1987 issue of Electron User. I also

they are helping me enormously. — Paul Dobson, Knottingley, West Yorkshire.

● There are no leads available for connecting up your add-ons. If there were, they would probably have to be rather short to minimise loss of signal strength. We would be pleased to hear from any readers who have succeeded in separating all their equipment in this way.

note Nic Outterside's review of educational software for the Electron and am not very impressed!

The underlying thought seems to be that it is best tailored to local requirement and in that case we will stick to Apples — which are at least something like what the pupils will use when they leave school.

Turning to wider issues, for many years we in the computing profession have been saying that when the breakthrough came, when computers became so cheap that even the smallest businesses would have one, the second industrial revolution would begin.

Further, that unless we all, and particularly the educational system, were geared up to jump in at the earliest possible moment, there would be heavily reduced employment opportunities for school leavers.

This I, and others in the profession — many more influential than me — was preaching on our recruitment visits to schools, and during local school visits to our ADP set-up which is based on main frames and minis.

But everyone knew the Pet was coming, at least two years before its official launch. And on the day it arrived I was hammering on the doors of my children's school demanding to know what they were doing about it.

It seems a pity that some educationalists ignored the message. Luckily some did not and it is their ex-pupils that my firm is recruiting.

We cannot get enough of them, especially in our

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From Page 47

London and North of England offices - we are actually recruiting in Northern Ireland for London. This means we have the added expense of footing their hotel bills as there is a shortage of accommodation in London.

I have phoned half a dozen schools and must say that four micros per class of 20 is nearer the mark than your one or two out of a class of 30. But this doesn't seem to matter, so long as all of them are in one class room, so one class can use them.

You would not have one drive and one printer per micro, surely? I certainly could not afford such luxury in a business environment; what's wrong with networking?

As to raising money, appeals to parents, local businesses and industry - not forgetting that it is they who will eventually recruit the "product" - old boys' associations, jumble sales, car boot sales and so on, all bring in surprising amounts of money. I heard of one school which got all the profits from one dog race meeting!

Of course, all these schemes demand imagination and determination, and the types of event will vary from area to area and school to school. But I find it difficult to believe, as you say, that "many schools can't afford it".

Do they really believe that they are condemning many of their pupils to tenth-rate jobs and some, possibly, to unemployment for life? Or don't they care once the children have left the premises?

MAKING A PROPER # OF IT

A PROBLEM appears to have crept into your listing of Gunpowder Plot in the November 1987 issue of Electron User. In the machine code starting at line 470 several hash signs have been replaced with colons.

This is most confusing as the colon is used as the

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.

ises? I should be grateful my children's school likes to keep in touch with ex-pupils for life.

The next major advance in computing will be artificial intelligence. How ready are the schools now for this? I estimate that it is now very close, perhaps between five and twelve years - and a child starting out at school now will still be there in 12 years' time.

I continue to preach the message at schools and get hopeful reactions. But what about Nic Outterside's colleagues? It seems to have taken them three years or more to hear about micro computers. - R. H. Hill, Woodford Green, Essex.

● You have raised some important questions here, though perhaps you are being a bit unfair with your comment on whether schools care for pupils once they have left.

Anyway, we are sure your points will be noted by our readers and having mentioned your recruitment drive don't blame us if you are inundated with job applications.

statement separator. - C. Reeve, Ashford, Kent.

● Oops! You're quite correct. In the process of transferring the program to our typesetting machine the hash signs became transposed.

You can easily fix the program by going through and looking for the three letter

Fun with Felix

IF while playing Felix in the Factory you accidentally press Break, the game can be recalled by:

CALL 81235

Although this gets the game back the graphics may be a little corrupted. Also, changing mode and typing:

CALL 81234

produces some weird effects! - Mark Kilbourne, Saxilby, Lincoln

Full marks

I AM an avid reader of your magazine and in every aspect but one I have nothing but praise. My only criticism is of Software Surgery. I rely on this section to choose my software and this choice is made difficult when so many games receive 10 out of 10.

Please could you refine

your scoring system and only leave full marks for something special? - Jonathon Page, Ross-on-Wye, Herefordshire.

● Space in the magazine is limited so we only review the best games - that's why so many receive high marks.

Good concept

MY current system consists of an Electron fitted with Slogger's Master Ram Board, Plus 1, Plus 3 and an Epson RX-80.

I would like to attach a numeric keypad to this. Can you tell me which I should get? - Terry Stevens, Andover, Hants.

● The Concept Keyboard would be a versatile solution, enabling you to define which keys do what. But you would also need a user port, as do many add-ons. ACP's Plus 5 should be suitable.

Operation Caretaker

IN his excellent article on tape recorders in the August 1987 issue of Electron User, Mark Smiddy describes an interesting method of setting the azimuth angle of a tape deck by ear.

While this is fine for those with acute hearing, for others there is an alternative method.

A kit called Operation Caretaker was produced in 1985 by Global Software. It comprised two cassettes and a small screwdriver. One cassette contained a cloth ribbon and a magnet to clean and demagnetize the heads, the other contained a program to be loaded and run.

A display is produced on the screen, the main feature of which is three horizontal bars which change colour as the azimuth setting is altered. When all of the bars have changed colour completely, then the azimuth is spot on. I'm not sure whether this kit is still available though.

One further point, some

mnenomics such as LDA, STA or LDX. If any of these are immediately followed by a colon it should be replaced with a hash sign.

If you still have problems after doing this, write to us enclosing a stamped, self addressed envelope and we'll return a correct copy of the offending lines.

Spelling problem solved

IN the October issue of Electron User you said you doubted that the Master Compact version of Viewspell would run on the Electron. The disc, as you say, is most probably double sided and would not work in the Plus 3's single sided drive.

However, I have discovered the BBC Master 128

version of Viewspell works perfectly.

The dictionary disc is supplied on 5.25in, 80 track DFS disc so this will need to be transferred onto a single sided, 3.5in ADFS disc if you are using a Plus 3.

I bought my copy of this excellent package from Beebug and they copied it onto a 3.5in disc I supplied

them with.

After using the package for some time, I have discovered what seems to be a bug in the system when it is used with a single drive. This can be overcome by using the PREFIX command to indicate the text, master and user dictionaries are all on drive zero. — David Walton, via Prestel.

months ago you stated in Micro Messages that true lower case descenders were only available on printers costing many hundreds of pounds.

My printer is an Ibico, a simple machine with a single typeface on a revolving head, which cost no more than £140. I cannot find any fault with the descenders. — Alan R. Smith, Wimbledon Common, London.

● We've never heard of Operation Caretaker and no one we know knows where we can obtain one. Perhaps one of our readers can help with the address of a supplier.

The Ibico printer is a new one on us too. It sounds like a daisy wheel type, which is ideal for word processing but too slow for producing listings. Most good dot matrix printers, some retailing at less than £200, now produce true descenders.

You should now have:

TM 0
HM 0

at the start of the document.

Also, can you help me with a problem? I cannot get my Electron to output an escape code using the control key. In the manual it tells you that pressing Control+[will output an Escape. However, it does not appear to work.

I must thank you for the fantastic printer driver in the August 1987 issue: Even at the new price of £1.25, Electron User is worth every penny. — Eamon McIntosh, Deacon Way, London.

● On a BBC Micro you can indeed force an Escape by pressing Control+[. However, due to the way the keyboard is laid out this is not possible on an Electron. If you look at Page 105 of the user manual you will see that the Control+[combination is reserved.

Art for art's sake

AS I am interested in art, I was wondering if there are any good art programs for the Electron. So far I have only seen AMX Art, which does look very good to me.

— Raymond Whittle, Bilsborrow, Lancashire.

● The AMX art package is quite good, but to run it you need Advanced Computer Products' Plus 5. You will be interested to know that we will be publishing a powerful art program next month in the February issue of Electron User.

Marginal improvement

I HAVE a solution to Mr Mama's problem in Micro Messages November 1987. To stop the printer from printing four lines at the start of View documents, the top and header margins must be changed.

This is done by pressing Function+O and typing TM followed by Return then O and Return. Do this again on the following line but replace the TM with HM.

should turn the cassette over and rewind it to the start to load the game screens. The problem is how do you start loading? Surely you must type CHAIN or something similar.

Oddly enough the game itself appears at the start of each side of the tape, which must mean the data for the screens is missing.

I have tried writing to Bug Byte, who have been as helpful as possible, but I can't help feeling they don't understand our problem. Could our Plus 1 be causing trouble? — M. L. Chippington, Twyford, Berks.

● Frankly, we're not surprised Bug Byte don't understand your problem, because the instructions are very clear. The problem is they are wrong — everyone makes mistakes after all.

The game screens on Dunjunz start immediately after the program itself has loaded — not, as the instructions clearly state, on the other side of the cassette — so just leave the tape running. It will probably help to disable your Plus 1 as well by typing the following:

*FX163,128,1
?&212=&D6:?:&213=&F1:?:&2AC=0

Unrecognised code

I FOUND the View Printer Driver II from the August 1987 issue of Electron User very useful.

I have just bought View and an Acorn/Olivetti JP-101 spark jet printer. Printer Driver II is an ideal utility for this, but I have come across a couple of annoying problems. The driver does not seem to recognise the codes for double-height characters or any of the three styles of underlining.

When I try to use these styles I get a printout as if I hadn't entered them. All the other styles work perfectly.

I would be most grateful if you could help me out with this small problem. — Greg Cassar, London, SW16

● Not having a JP-101 we cannot give you an exact answer. However, we assume that your printer is just not equipped to handle the styles you mention. If any readers have an answer we'd be grateful to hear from them.

Dunjunz duzn't load

MY SON has been immensely frustrated over the past few months by Bug Byte's Dunjunz. The problem is he can't find the game screens on the tape.

The insert supplied states that when the player selection screen has loaded, you

Repton revealed

I HAVE managed to complete the America data file from Repton Around the World in 40 Screens. The passwords are: America, Curtain, Vampire, Created, Lunatic, Maximum, Compose and Colours.

Now a question: My television is equipped with a teletext receiver and through this I have become interested in downloading telesoftware. Could you tell me if there is a teletext adapter available for the Electron and how much it costs. — Simon Volett, Huddersfield, West Yorkshire.

● Thanks for the Repton passwords. As far as we know there isn't a teletext adapter available for the Electron. If someone comes up with one we will be the first to review it.

Learning CAN be fun

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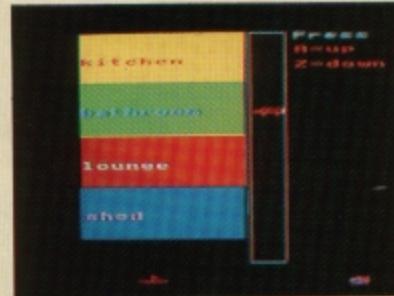
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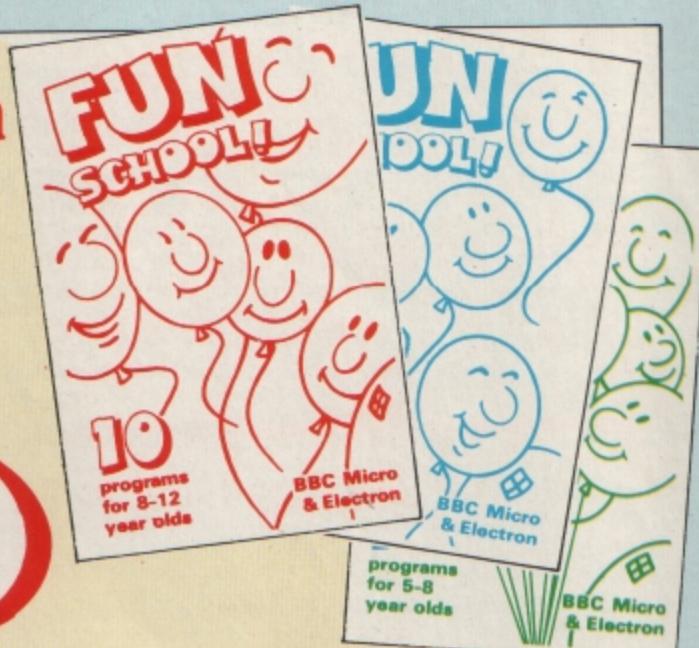
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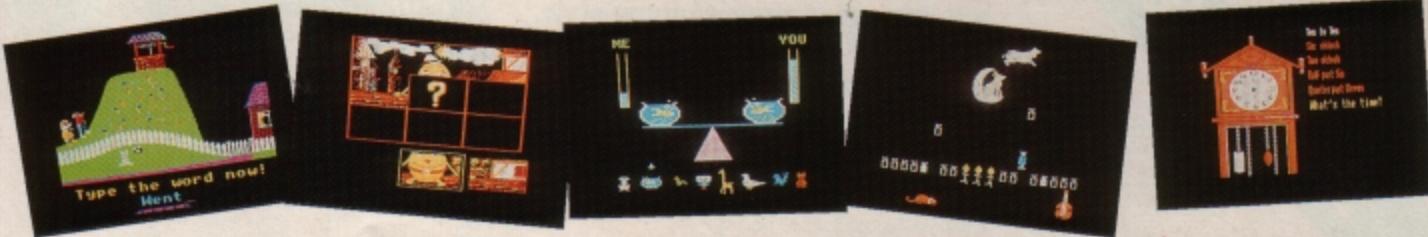
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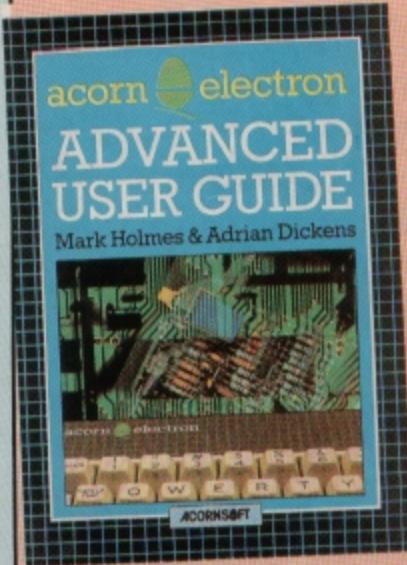
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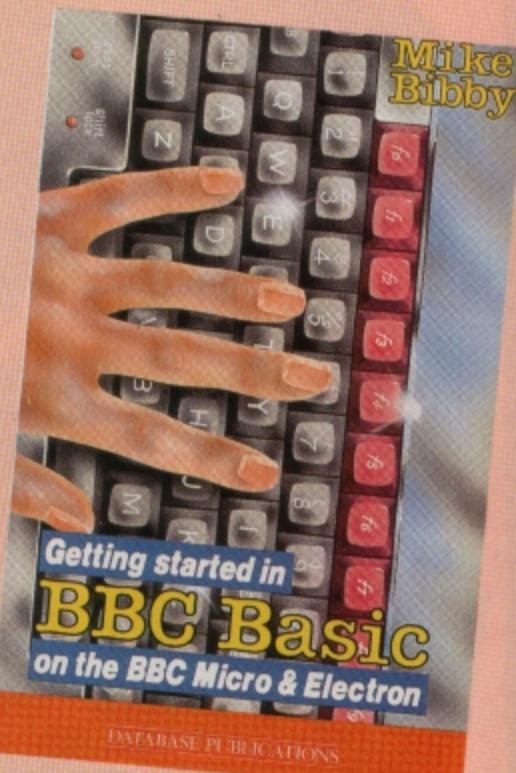
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PASCAL was devised by Professor Niklaus Wirth around about 1970, as a means of teaching the principles of language design to students.

The language derives its name from the French mathematician and philosopher Blaise Pascal.

This first article will deal with the basics of Pascal, although later on we'll see the various facilities available within the language.

Pascal can be a bit pedantic at times, but nonetheless it is still widely used throughout the world of computers.

It's a structured language, and because BBC Basic shares many similar features, it should not be difficult for anyone used to Basic on the Electron to program in Pascal.

Acornsoft's Pascal is supplied on cartridge with two meaty manuals, and where this short series aims to do no more than whet your appetite, these books will explain the language at a much deeper level.

One of the main differences between Pascal and Basic is that it is compiled. With an interpreted language like Basic, every time an instruction is met it has to be decoded and the appropriate rom routine invoked.

A compiler on the other hand is a program which takes the original source code, interprets it and produces a new type of code which executes directly without further decoding.

This can either be machine code itself or a much simpler code which is run by a run-time interpreter.

Acornsoft's ISO-Pascal is of the latter variety. This means the Pascal cartridge must be in place even when running compiled code. This type of code however, is usually more compact than

Pedantic perhaps, but powerful

MIKE PLUMMER introduces that elegant programming language, **Pascal**

native machine language.

The compiled program, normally referred to as the object code, will be more compact and faster running than an interpreted program.

As well as having these advantages, Pascal is about the only language that is both available on the Electron and used in mainstream computing. Therefore, anyone considering a career in computing would be well advised to buy Pascal and learn the language.

Most other mainstream languages are similar to Pascal and can be easily picked up by the Pascal programmer.

Since Acornsoft's Pascal adheres closely to the standard defined by the International Standards Organisation, it is normally easy to transfer a Pascal program written on an Electron to another machine and vice versa.

The first thing to note is Pascal, unlike Basic, doesn't have its own built-in editor. This means that before a program can be written, the programmer must familiarise himself with an editor - one is supplied with Acornsoft Pascal.

This is not difficult to use

and once mastered is a very powerful text editor which could even be used for word processing, albeit at a simple level.

To write a simple program, plug in the cartridge and switch on. You should get the display:

Acorn Electron 32K

Pascal

%

The per cent sign is the Pascal command prompt. If we have another cartridge at higher priority we must type *PASCAL to get the prompt. Now type EDIT and the display will change to the editing screen.

Type in Program I:

```
PROGRAM hello(OUTPUT);
BEGIN
  WRITELN('Hello world');
  WRITELN('=====');
END.
```

This is the source code for our first Pascal program. It can be saved to disc or tape by pressing Func+R while editing, though at this stage it is not really necessary. Before we can run this program, we must first compile it to object code.

Return to command mode by pressing Func+5 then type COMPILE. As the

compiler converts source to object code, a listing appears on the screen.

If the compiler finds an error, compilation will stop and give an error number. The meaning of this can be found in either the manual or quick reference card supplied with the cartridge.

Once the compilation has finished without errors, we will have a runnable program in memory which can be executed by typing GO. If all is well the following display should appear:

```
%GO
Hello world
=====
%
```

The per cent symbol is the Pascal prompt for the next command. The object code generated in memory can be saved on tape or disc by typing SAVE HELLO.

This compiled code can now be loaded at any time using the LOAD command and run directly from tape or disc using the RUN command. With small programs like this one, both the source and object code can be held in memory.

For larger programs this is not always possible. We'll see how to get around this

Turn to Page 56 ▶

New Series

From Page 55

limitation later in the series. Once we've learnt how to enter and compile Pascal programs we can discover more about the language itself.

One of the big differences between Basic and Pascal is that everything we use; variables, functions and procedures must be declared before they are used. In Basic, only arrays need to be declared first with the DIM statement.

Now enter Program II, compile and run it as before using the EDIT, COMPILE and GO commands.

As can be seen from the

listing, Pascal can be very verbose. This makes it easier to ensure variable values are kept within bounds and data is of the correct type.

It is possible to write Pascal programs which ignore all of these constructs. Indeed, most compilers will allow you to switch off a lot of checking, but this is removing one of the main advantages for the experienced programmer.

Let's analyse the source code. Firstly, apart from inside quoted text, it does not matter whether upper or lower case letters are used for Pascal's keywords.

All constants, type, vari-

able, function and procedure names must begin with a letter but after that may contain any number of letters or digits.

The PROGRAM statement is used to introduce the code to the operating system and a name after it is required.

The parameters after the name define various input and output channels – in this case INPUT means the keyboard and OUTPUT means the screen.

Notice that there are no line numbers. Next we can see the two types of comments bracketed either by:

(* This is a comment *)

or

(This is also a comment)

Comments are like REM statements in Basic, except they may span many lines. Both are valid although the (*....*) variety are normally easier to pick out in a listing.

We now come across the declarations. Firstly the CONST statement, this is used to assign a constant numerical value to a constant identifier.

These are useful because if we use this identifier throughout our program and decide to change the value of the constant later on, we only need to change it in the CONST statement and not at every occurrence where the value is used.

The TYPE statement is very important because it allows us to define our own data types.

We will look at this in more detail in a later article, but in the meantime, using these data types, the compiler will only allow numbers in the range from one to 12 and from one to 144, to be assigned to them respectively.

Also, any attempt to assign a value outside these ranges while running the

program, say from the keyboard, an error will result. That is why we use an integer to enter the data in the repeat loop until we have checked it.

Variables declared in the following VAR statement are available to all parts of the program, whereas variables declared within functions are only used within them, rather like Basic's local variables.

The function itself is declared in a similar way to a Basic DEF FN statement, except the type returned must be declared, as well as the type of the parameters. (There's a further complication with parameters which we'll investigate later in the series).

The value is returned from the function by assigning a value to the name of it. Note that variable assignment is performed by := in Pascal and not = which is used in conditional statements.

All of the code within the function is contained within a BEGIN and an END. These keywords are used to indicate the limits of any block of code.

The main program starts with a BEGIN and finishes with an END. statement. Notice the use of a full stop, not a semi-colon.

Pascal's semi-colon acts in a very similar way to the colon in Basic, except the end of a series of statements is marked by an END, rather than the end of a line.

Semi-colons must be placed between statements and at the end of lines, except where there is an END.

If in doubt, it is all right to put a semi-colon at the end of every statement apart from loops, although this isn't very neat programming practice.

● Next month, we'll take a detailed look at the syntax and structure of Pascal programs.

```
PROGRAM timetable (INPUT,OUTPUT);
(* A simple example *)
{Print out the times table for numbers up to 12}

CONST small = 12;
      max = 144;

TYPE factor = 1..small;
      results = 1..max;

VAR num : integer;
    mpcd : factor;
    mltp : factor;
    ans : results;

FUNCTION mult(num1,num2 : factor) : results;

VAR ans : results;

BEGIN
  mult:=num1*num2
END;

(* The main program *)
BEGIN
  REPEAT
    WRITE('Type in a number between 1-12 :-');
    READLN(num)
    UNTIL (num>0) AND (num<small+1);
    mltp:=num;
    WRITELN('The ',mltp:2,' times table');
    WRITELN;
    FOR mpcd:=1 TO small DO
      BEGIN
        ans:=mult(mltp,mpcd);
        WRITELN(mpcd:2,' x ',num:2,' = ', ans:3)
      END
  END.
END.
```

KEEPING track of time is an essential part of all of our lives, because if we don't we'll miss our meals, appointments, favourite television programmes and so on.

This is a problem I expect many Electron owners come across from time to time, especially when they're typing in the latest game from *Electron User*. It's possible to become so engrossed that your eyes never leave the screen.

By way of a solution, this program constantly displays a 24 hour clock in the top right hand corner of the screen in Mode 0, 3, 4 and 6.

It remains there even when using View, which can be useful if you are engrossed in preparing a long document.

When listing or printing out a long program the clock display will occasionally vanish because it is only updated once a second.

This effect is due to the hardware scrolling, and should not be a problem, if it is you could always define a text window. For instance in Mode 6:

VDU 28,0,24,39,1

TIME FOR THOUGHT

GUY TURLEY solves the age-old problem of timekeeping

will prevent hardware scrolling.

The utility works by redirecting the event vector and enabling the start of frame flyback, event four. Since this occurs 50 times each second it is easy to count up in seconds.

The time is printed on the screen by poking the character data directly into memory. This avoids using

the operating system during an interrupt, and although the multicolour modes can't be used, this simplifies the code immensely.

To use the program simply save and run it and enter the time when prompted in 24 hour format. The program can now be deleted from memory and the Electron used as normal. The clock will keep running

until the Break key is pressed.

At any time the clock display can be turned off from Basic by entering:

?&9F=1

and re-enabled by entering:

?&9F=0

Now there's no excuse for missing your appointments.

```

10 REM Digital Clock
20 REM by Guy Turley
30 REM (c) Electron User
40 MODE 6
50 PROCASSEMBLE
60 PROCGETTIME
70 END
80 :
90 DEFPROCASSEMBLE
100 M=&90:H=&93:COUNTER=&9
5:S=&92:X=&8E:Y=&8F
110 FOR I%=&0 TO 2 STEP 2
120 PX=&B00
130 L0PT I%
140 .ISR
150 PHP:PHA:TXA:PHA:TYA:PH
A
160 LDA &355
170 CMP #1:BEQ EXIT:CMP #2
:BEQ EXIT:CMP #5:BEQ EXIT
180 INC COUNTER:LDA COUNT
R:cmp #50
190 BMI EXIT
200 JMP CLOCK
210 .EXIT
220 PLA:TAY:PLA:TAX:PLA:PL
P
230 RTS
240 .CLOCK
250 LDA #0:STA COUNTER
260 SED:CLC:LDA S:ADC #1:S

```

```

TA S
270 SED:CM#&60:BNE print
280 LDA #0:STA S
290 LDA M:CLC:ADC #1:STA M
300 LDA M:CM#&60:BNE pri
nt
310 LDA #0:STA M:LDA H:CLC
:ADC #1:STA H:CM#&24:
320 BNE print
330 LDA #0:STA H
340 .print
350 CLD
360 LDA &9F:BNE EXIT
370 LDA H:LSR A:LSR A:LSR
A:LSR A
380 TAX
390 LDA &355:BEQ zrothr:CM
P #3:BEQ zrothr
400 LDA #0:STA Y:LDA #&F8:
STA X
410 JMP displ
420 .zrothr
430 LDA #2:STA Y:LDA #&38:
STA X
440 .displ
450 LDA &350:CLC:ADC X:STA
896
460 LDA &351:ADC Y:STA &97
470 LDY #0:LDA #0:L3 STA
(&96),Y:INY:CPY #8:BNE L3:LD
A &96:CLC:ADC #8:STA &96:LDA

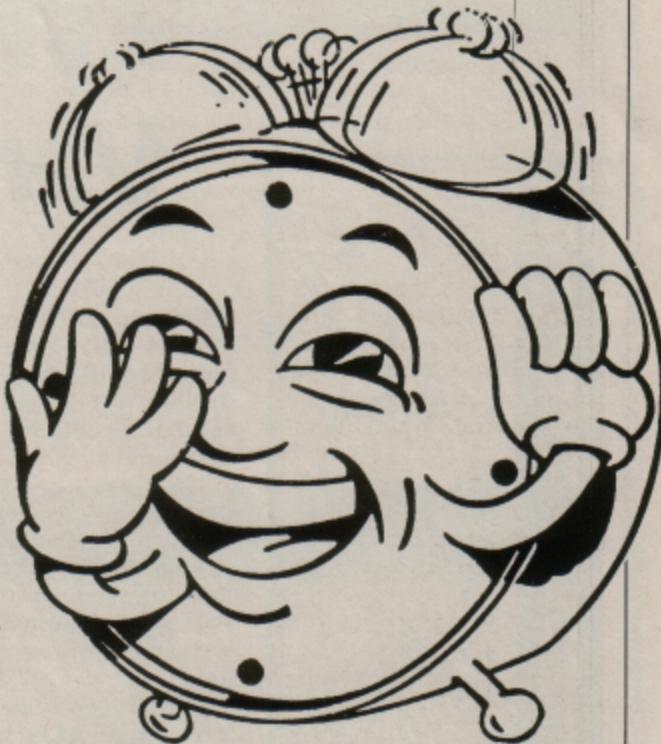
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897:ADC #0:STA &97
480 TXA:JSR PUT
490 LDA H:AND #&0F:JSR PUT
500 JSR colon
510 LDA M:LSR A:LSR A:LSR
A:LSR A
520 JSR PUT
530 LDA M:AND #&0F:JSR PUT
540 JSR colon
550 LDA S:LSR A:LSR A:LSR
A:LSR A
560 JSR PUT
570 LDA S:AND #&0F:JSR PUT
580 JMP EXIT
590 .PUT
600 ASL A:ASL A:ASL A
610 TAX
620 LDY #0
630 .LOOP
640 LDA &C080,X
650 EOR #&FF
660 STA (&96),Y
670 INY:INX:CPY #8:BNE L00
P
680 LDA &96:CLC:ADC #8:STA
896
690 LDA &97:ADC #0:STA &97
700 .return RTS
710 .colon LDY #0
720 LDY #0
730 .L2 LDA &C080,X:INX:EO

```

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





By Pendragon

Twin Kingdom Valley solved

FIRST of all, Happy New Year to all regular readers and also to those whose insanity has caused them to read this column for the first time!

1987 was an exceptional year for new adventures for the Electron, and with promises of even greater things from the stables of **Robico**, **Epic** and **Larsoft**, this year will reveal greater joys for us all.

Rumour is also abroad that Rob O'Leary, Glen McCauley, Martin Moore and Geoff Larsen have joined forces to produce an absolute blockbuster adventure for the Electron and BBC Micro this year.

Also, don't forget to look out for **Realm of Chaos Part 2** and **Blazing Star**, which are due for release

sometime in the near future.

Some months ago I mentioned the superb set of maps I received from James Elson, of that all-time classic adventure **Twin Kingdom Valley**.

Although this adventure is now over three years old and Merlin did offer some extended help for TKV sufferers in the July 1985 issue of *Electron User*, my mailbag still includes a vast number of letters from readers who are stuck at various points in this graphic wonderland.

I have decided, therefore to dedicate most of this month's column to this game, and to begin serialising James's maps next month.

TKV includes over 35 creatures – other than

yourself – which are allowed to make one move each time you do something.

Hence the seeming random nature of these movements make establishing the exact location of all objects impossible.

However, I have done my best to give enough help to enable even a novice to make enormous headway through the 175 locations.

The general strategy is to drink at every opportunity and to refill your lamp with oil every time you are in the desert castle.

When you have achieved the maximum score you can wander about slaughtering anybody you meet, but it won't make you any richer.

● Until the flags stop waving, happy adventuring.

Twin Kingdom Valley

TREASURES

Three Bags of Gold: (One must be given to the Forest King): One is in the mountains to the North East, one is at the bottom of the stairs, not far from the grating and one is behind the silver door below the Hall of the Forest King.

Three Bags of Silver: You will have to fight the castle guards and the Sandlurker for these.

Crown: Worn by the Desert King in the castle.

Ball of Gold: In the Upper levels of the castle.

Staff of Gold: Held by the witch in the East turret.

Treasure Chest: This is very heavy and prevents you from carrying anything else, it is in the South turret.

Diamond: In the cave near Watersmeet.

Diamond Ring: Carried by the dwarf, near to the second bag of gold.

Secret of Life: At the River of Gold behind the Rock Fall.

Jug of Gold: Fill the jug at the River of Gold.

Silver Key: Given by the Forest King for rescuing the Princess.

Gold Key: In the kitchen.

OTHER OBJECTS

Jug: For carrying water and filling with gold.

Flint: Required to light the lamp.

Beer: Drinking it will sap your strength!

Crystal Ball: Give to witch to get the Bronze Key.

Amulet: Identifies you as a friend and must be carried when you rescue the Princess.

Short Rod: Wave at the fissure to create a bridge. Unnecessary.

Master Key: Opens any door.

Wooden Staff: Used as a weapon it is deadly, but excessive use will break it. Ideal for killing dragons and witches.

Treasure Chest: Needed to gain access to the River of Gold.

The ill Giant: Free him and lead him to Watersmeet. He is slow following you, so wait for him to catch up or he will get lost. He will carry anything you give him and give you anything you ask for.

Oil: Fill lamp.

Lamp: If you light the lamp while it is in the holdall it will destroy it.

Holdall: Fill and empty to increase carrying ability.

Uniform: Gives a slight advantage when moving around the castle.

Princess: If you have the amulet when you rescue her, you can return to the Forest King and receive the silver key.

Watersmeet: Swim to regain lost strength. Drink to gain access to the secret doors.

Weapons: Only a couple of daggers available to begin with. Most potent weapons are: Mace, axe and sword.

Adventurer's Glossary (continued from last month)

Cabin: An important location in most adventures which will need entering and exploring thoroughly.

Candle: An important light source.

Cauldron: For brewing.

Caves: Where all good adventures take place.

Case: Usually a means of carrying items.

Cask: Usually contains liquor of some description, which can be drunk or used for bartering.

Chain: There is bound to be a weak link, so try breaking it.

Chair: Sit in it, unless it belongs to the Bogle.

Chasm: Needs to be traversed, so try making a bridge or even waving a wand.

Chest: Bound to contain treasure, though opening it

could cause problems. Try using a key or a magic word; and watch out for Pirate Pete.

Clam: Can be a nasty leg trap but equally could contain a treasure. A hydraulic jack is sometimes useful for getting the clam open.

Cloak: Worn for identification, warmth or disguise. Sometimes has the power to turn the wearer invisible.

Coffin: Not a place to hang around by, especially if it belongs to a vampire.

Coins: Few adventures are without this important means of buying equipment or access.

Crown: A treasure or perhaps for someone's coronation.

Crystal Ball: For looking into.

Cup: A treasure or sometimes for drinking from.

Readers' Hall of Fame

Kayleth – Robert Henderson (continued from last month)

Go to the elevator and remove any cartridge which you may be carrying. Press M2 and go out. Talk to Yagmok and he will respond with some important advice. Return to the elevator and go outside when you reach ground level.

Find the arch and GO ARCH. Read the manual, take the qhuts and search the radiation zone. Take the nodule and search the ash; finally take the ball.

Now return to the Yagmok and ask Yagmok for the key. He will give you a key badge which should be worn. Insert your plasma firing cartridge and return to the city.

Go to the stairs and FIRE BEAM AT DOOR. Enter the doorway and search the shelf. Get the suit and wear it.

When you find the skimmer you must insert the fuse then board the vehicle. Wait for the tide and journey to the island. Once there, examine the rubble to discover a trap door which can be opened using the key badge.

Give the qhuts to Dibble and keep going until you are swallowed by the rock gullet. THROW NODULE and find the AZAP code and the Corona coat.

RIDE RING to escape through the trap door. Board the skimmer which will take you back to the tunnel. Remove the suit and wear the coat.

Go to the guard dome and the plate. You should now be able to see with the light of the coat. Examine the slime pool and get the cutter to cut some ore.

Return to the plate and it will ascend. Leave the dome, swap your cartridge and go back to the dome. Travel to the processing machine, insert the ore and press the button. You will be rewarded with a tube of C-ezms. Now go to the steel dome and insert the tube.

Enthar Seven – The Boss (continued from last month)

Before entering the next part of this adventure you should equip yourself with only the torch and sticking plaster which can now be removed from the vacuum cleaner bag.

Enter the teleport cubicle and press S2. You are now in the street outside the Lorvox residence. If you ring the bell at the top of the steps, a Valetdroid will allow you to enter the house.

The residence is similar in many ways to the mansion in Myorem, but the puzzles are far more complex. The kitchen has a pantry which needs to be explored and the crunchy biscuit should be taken.



The dining room seems harmless enough, until you try standing on the table and a trap door in the ceiling becomes visible. The trap must be opened and the small attic explored. The worn wire can then be mended with the sticking plaster which you thoughtfully brought along.

If you sit down in the living room you will notice a cubbyhole under the coffee table. In the cubbyhole you will find a manual for the teleport bracelet which you will unearth later in the game.

The study is an important place to search as a document and a diary await your discovery.

Upstairs you will find a crayon in the nursery which can be used to colour over the impressions in the diary and provide a clue to the memomatic which is essential to concluding this adventure.

In the basement you should TYPE YARRYL – a clue from the document – on the computer keypad and then enter the transportation console.

You can have fun exploring the mountains and the tunnel, but will be stymied by the brick wall and the mountain maze. You must now venture to sectors 3 and 5 of this mega-romp to solve these perplexing puzzles and find your way home.

The Puppet Man – Geoff Liversey (continued from last month)

Go east and talk to the muse. Then go SOUTH, SOUTH, SOUTH, WEST then NORTH and get the cleaver. Now go SOUTH, EAST, EAST and enter the manor. Go south into

Turn to Page 60 ►

Readers' Hall of Fame

From Page 59

the dining room and examine the table. Get the salmon then travel NORTH, UP, NORTH, examine the shelf to find the glove.

Then go SOUTH, DOWN and leave. Enter the marquee and enter the ring. Now open the cage, enter it and drop the salmon before leaving the cage. Next open the cage which has slammed shut behind you.

Go NORTH then EAST and drop the ladder then climb it, so that you are on top of the cage. Open the cage – the bear will lumber out and smelling the salmon will be tempted by it. Go DOWN then WEST and enter the marquee and close the cage, thus trapping the bear.

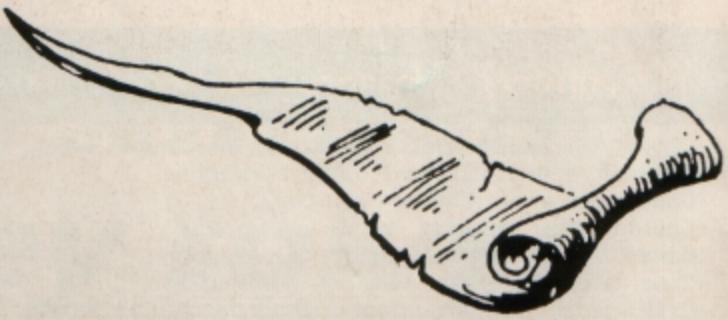
Next go NORTH, WEST and UP into the living wagon and talk to the man. Now go DOWN, EAST, EAST and enter the cage, inside the wooden box you will discover some netting. Get the netting and leave the cage.

Now go west and enter the marquee then go SOUTH, SOUTH, WEST, SOUTH, SOUTH, SOUTH, EAST then throw the netting, thus trapping the attacking owl.

Now journey east to examine the chains and use the cleaver to break the weak links. Enter the building and go up. Examine the nest to find the clown's stolen eggshell.

Finally go down then leave and go WEST, NORTH, NORTH, NORTH, NORTH, EAST and enter the marquee. Now enter the ring and go NORTH, WEST, UP then give the egg to the man and go DOWN.

Harlequin will now appear and you will be transported to section three of the game.



Savage Island 1

You'll find a complete map in the September to December 1987 issue of Electron User.

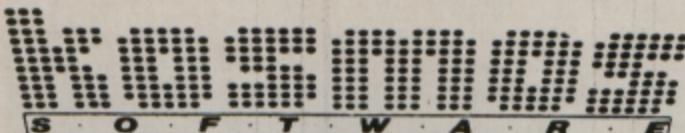
Ocean: Locations 33, 34, 35 and 36 are random locations accessible by paddling the raft. The atoll can be reached from location 34, the tidepool from 35 and the beach with the cave from 36. The latter can take hours to reach.

Maze of caves: Contains only five locations, the important ones being 18, which must be avoided, and

17 where the guano, wire and exit are found. Beware of the bear.

In conclusion: The plan which has been outlined during the past few months assumes the random elements are working in your favour.

In reality, however, you are in for a very frustrating time. The bear, the wind, the logs, the seawater and the raft will probably drive you to despair long before you conclude this migraine of an adventure.



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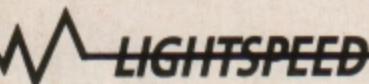
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The Life Of Repton



REPTON AS A BABY



Repton fans have begged, cajoled and pleaded with us to release another set of screens for our Repton 3 game. How could we refuse? Our lovable hero returns again to star in 40 new screens that vividly depict Repton's life-story.

The Five Ages of Repton:— At first we see Repton as a baby: a mewling infant surrounded by teddy-bears, humpty-dumpty, and aggressive clockwork toy-soldiers. Then Repton is a whining school-boy, creeping like snail unwillingly to school, with his pens, his calculator, and a bundle of homework. And then Repton

during his teenage years becomes a spiky-haired punk armed with a ghetto-blaster and a collection of records. Then Repton goes to work: we see a harried office-manager amidst computers, photocopiers, and endless cups of coffee. Last scene of all, that ends this strange eventful history, is Repton as an old-age pensioner searching for his false-teeth, his spectacles, his "pint of stout", and his well-polished war-medals.



THE SCREEN EDITOR



THE CHARACTER EDITOR

Each copy of The Life Of Repton includes:

- the Repton 3 main program
- the Repton 3 editor and
- the 40 new game screens

BBC Micro Cassette £6.95
BBC Micro 5 1/4" Disc £7.95
BBC Master Compact 3 1/2" Disc £9.95

Acorn Electron Cassette £6.95
Acorn Electron 5 1/4" Disc £7.95

(Compatible with the BBC B, B+ and Master Series computers).
The screen pictures show the BBC Micro version of the game.

PRIZE COMPETITION
If you complete all 40 screens of The Life of Repton, you can enter our competition. Prizes include £200 in cash, with Repton mugs, badges, pens and certificates for runners-up.

Closing Date: 30th June 1988.

Please make
all cheques
payable to
"Superior
Software Ltd."



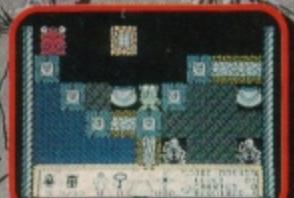
24 HOUR TELEPHONE
ANSWERING SERVICE FOR ORDERS



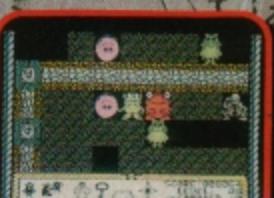
OUR GUARANTEE
• All mail orders are despatched within 24 hours by first-class post.
• Postage and packing is free.
• Faulty cassettes and discs will be replaced immediately.
(This does not affect your statutory rights.)

**SUPERIOR
SOFTWARE
Limited**

ACORN SOFTWARE



Bono takes the skeletons to a cauldron



Bono's partner Fozzy restrains a monster

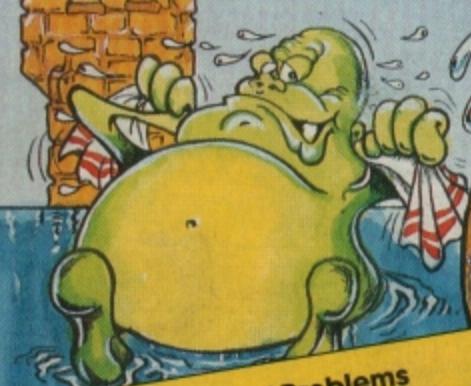
BONE CRUNCHER

A PRIZE FOR EVERYONE WHO COMPLETES THE GAME

Buy Bonecrusher and see if you can complete all the game screens!

All successful players will receive a superb portable radio with headphones (illustrated on the right), a colourful Bono's Bathing Co. badge, and a signed certificate.

Closing Date: 30th April, 1988



• Full of Strategic Puzzles and Problems

• Over 20 Increasingly Difficult Caverns

• Password Feature helps you to Progress

• Prize Competition for Skilled Players

• Humorous, Witty, a Barrel of Laughs



Bono The Dragon and his Flourishing Business

You are Bono, a friendly dragon residing in a picturesque sea-castle. As a shrewd business-dragon, keen on "nice little earners", you make your living by selling soap to the giant monsters who bathe in the sea surrounding the castle.

With the aid of your business partner, named Fozzy, you produce the soap by collecting skeletons amongst the castle caverns and then boiling the bones in a cauldron.

However, the castle caverns are fraught with danger: there are monsters who will kill you, spiders who will eat you alive, and glocks who will block your path. It will pay you dividends to also avoid the perilous trapdoors and hidden volcanoes.

A soap-opera not to be missed!

COMMODORE 64/128 • COMMODORE AMIGA
BBC MICRO • ACORN ELECTRON

Cassettes: £9.95 (C64, BBC Electron)
5½" Discs: £11.95 (C64, BBC Electron)
3½" Discs: £14.95 (Amiga, BBC Master Compact)

SUPERIOR SOFTWARE
Limited

Dept. BC6, Regent House, Skinner Lane,
Leeds LS7 1AX.
Telephone: (0532) 459453



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