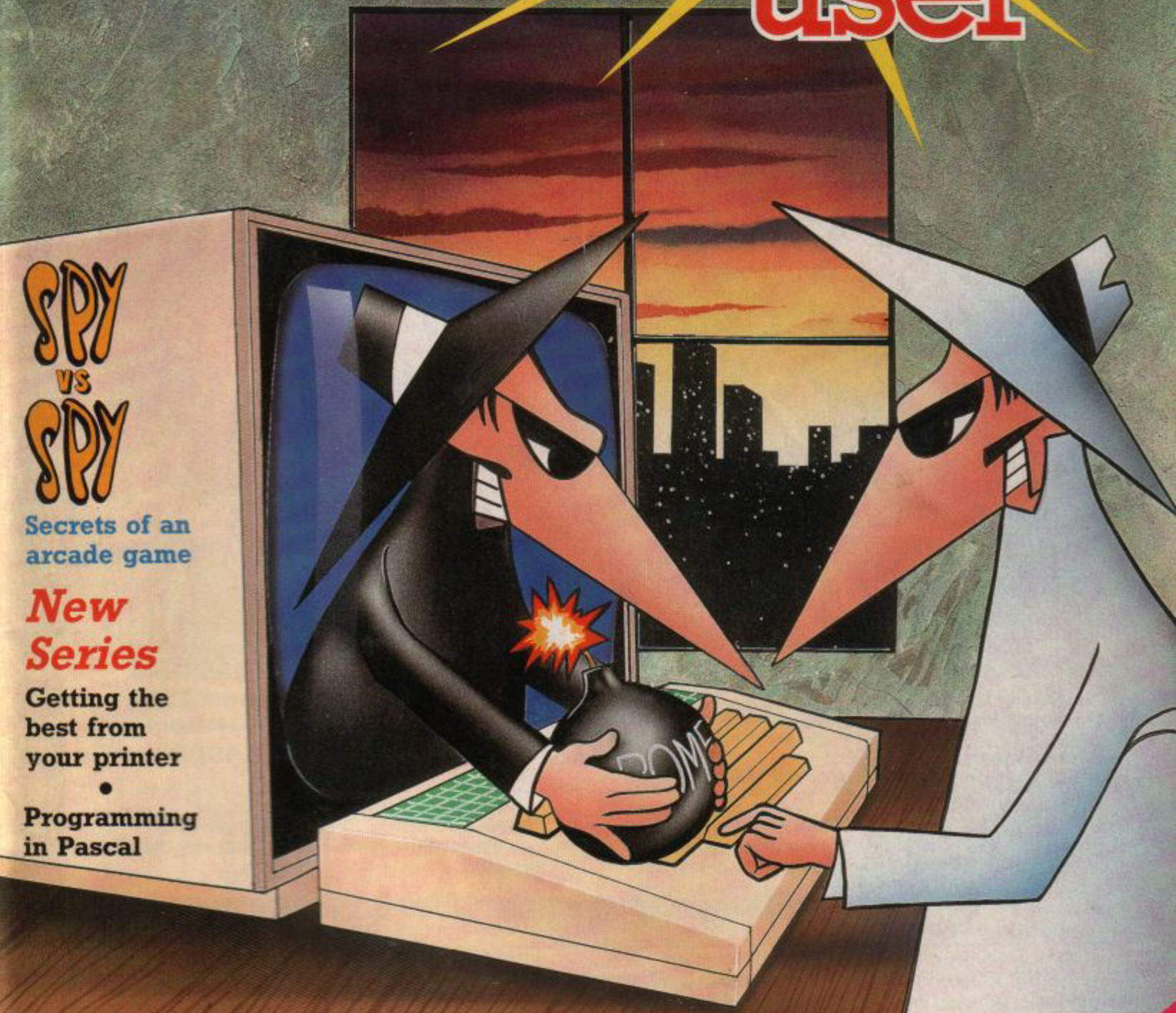
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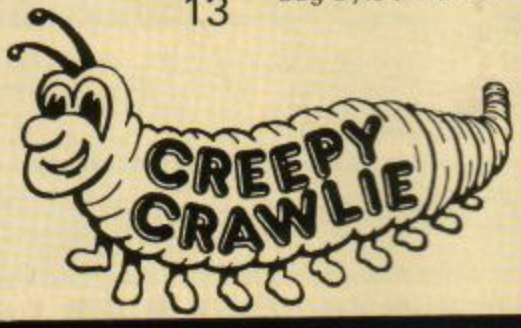
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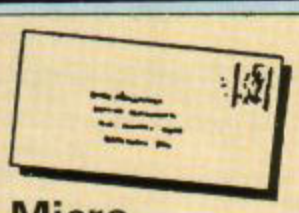
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electron user NEWS

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 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!

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.

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".



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.

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 "pefect 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.

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	SOCCER BOSS *Alternative*	1.99
2	1	AROUND THE WORLD IN 40 SCREENS *Superior*	6.95
3	6	PAPERBOY *Elite*	9.95
4	2	FOUR GREAT GAMES *Micro Value*	3.99
5	4	SUPERIOR COLLECTION VOL 2 *Superior*	9.95
6	5	CODENAME DROID *Superior*	9.95
7	7	TRIPLE DECKER *Alternative*	1.99
8	8	STRYKER'S RUN *Superior*	9.95
9	•	MICROPOWER MAGIC *Micropower*	7.95
10	•	DARTS *Blue Ribbon*	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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VIEW SHEET ROM (Spreadsheet)	~~£29.95~~ £14.95			*PACKAGE 1*		*PACKAGE 2*	
ACORN PLUS 1 now in stock	~~£59.95~~ £43.95			PLUS 1	£46.95	ELECTRON COMPUTER	£59.95
				VIEW	£14.95	PLUS 1	£49.95
				VIEW SHEET	£14.95	VIEW ROM	£14.95
					~~£79.95~~		~~£124.85~~
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Bumble Bee	~~£7.95~~	Jetpower Jack	~~£7.95~~
Gauntlet	~~£7.95~~	Cybertron Mission	~~£7.95~~
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Electron Invaders	~~£7.95~~	Bandits at 3 O'Clock	~~£6.95~~
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GAIN A LOT WITH OP AMPS

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

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 diagramatic 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 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 diagramatically 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:

```
Output volts=-Gain*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

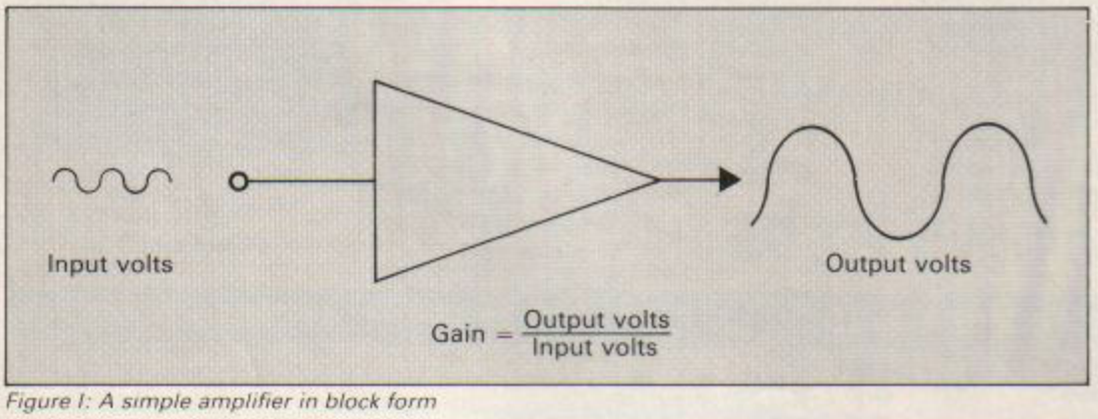


Figure I: A simple amplifier in block form

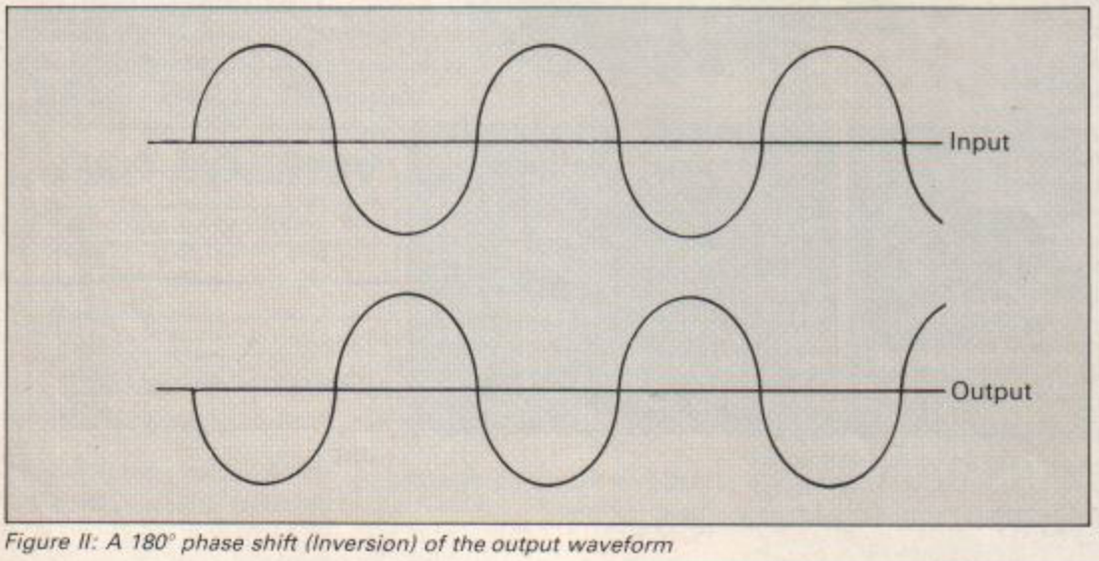


Figure II: A 180° phase shift (Inversion) of the output waveform

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:

```
gain=(R2+R3)/R3
```

and the value of resistor R1 is given by:

```
R1=(R2*R3)/(R2+R3)
```

To design an amplifier like this, first pick a value for R3, and a gain. R2 can be selected with the equation:

```
R2=(gain*R3)-R3
```

R1 can be picked using the R1 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 R3 until you get R1 and R2 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 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 ►

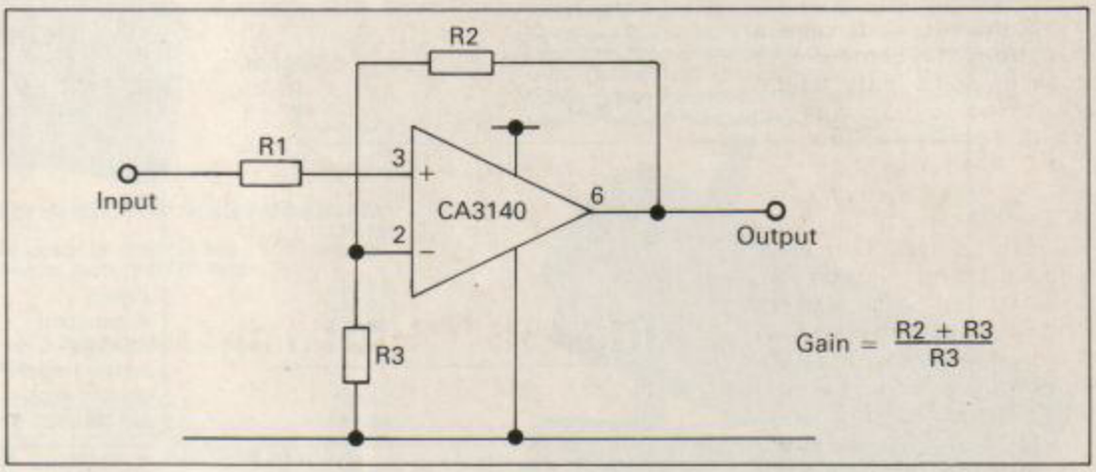


Figure III: A simple op amp circuit

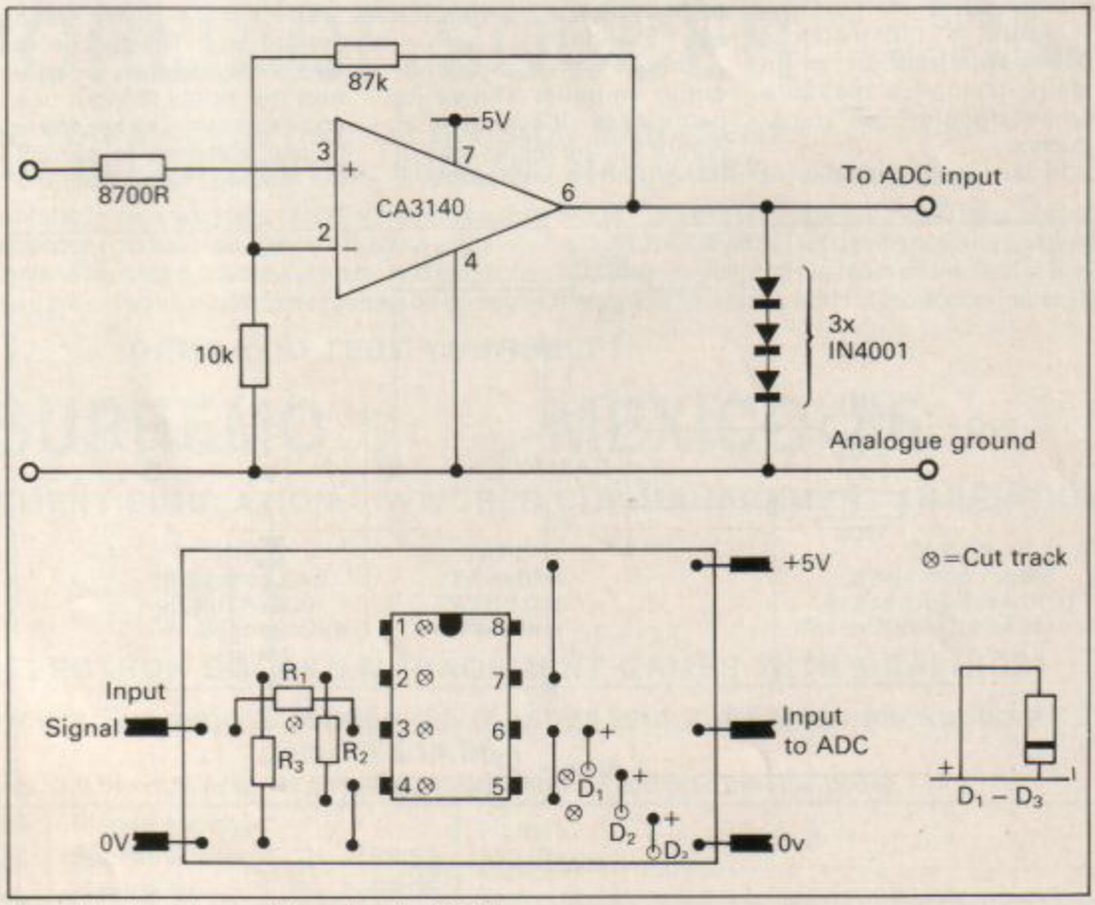


Figure IV: A simple amplifier using the CA3140

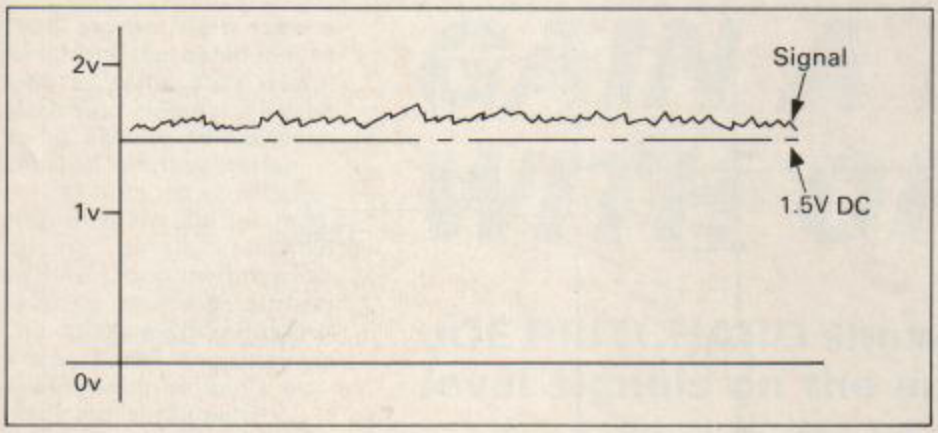


Figure V: A constant 1.5v dc superimposed on low level signal

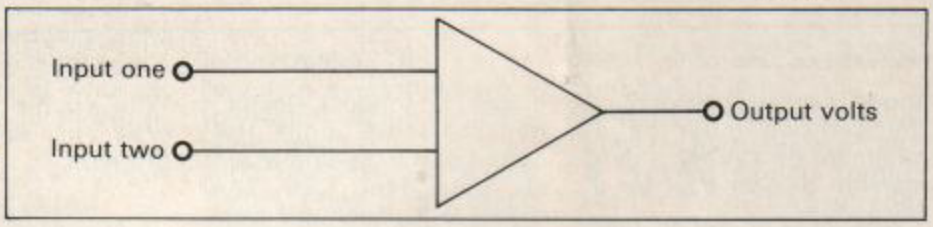


Figure VI: The block layout of the differential amplifier

◀ *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:

```
Output=-((input1-input2)*5)
      =-((1.5-1.6)*5)
      =-((-0.1)*5)
      =-(-0.5)
      =0.5 Volts
```

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

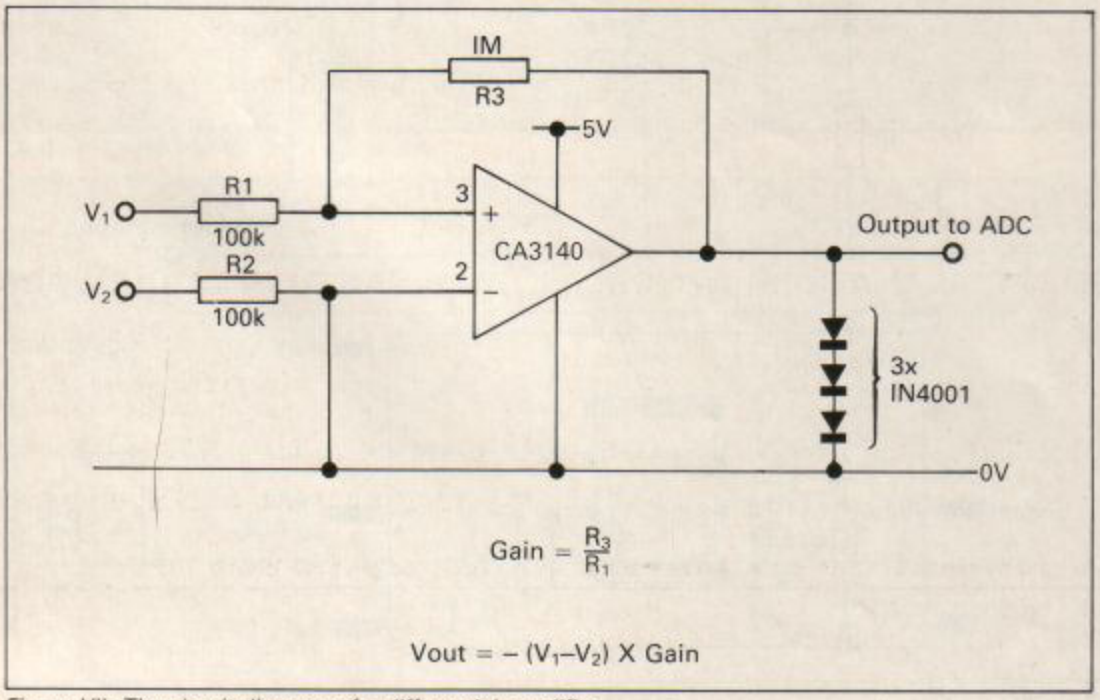


Figure VII: The circuit diagram of a differential amplifier

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.

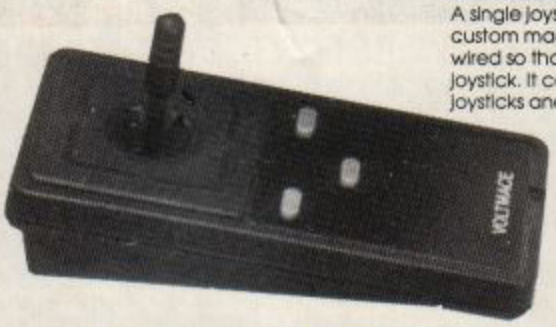
If all this seems a little complex, consider that a microphone is an input transducer and a loudspeaker is an output one.

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.

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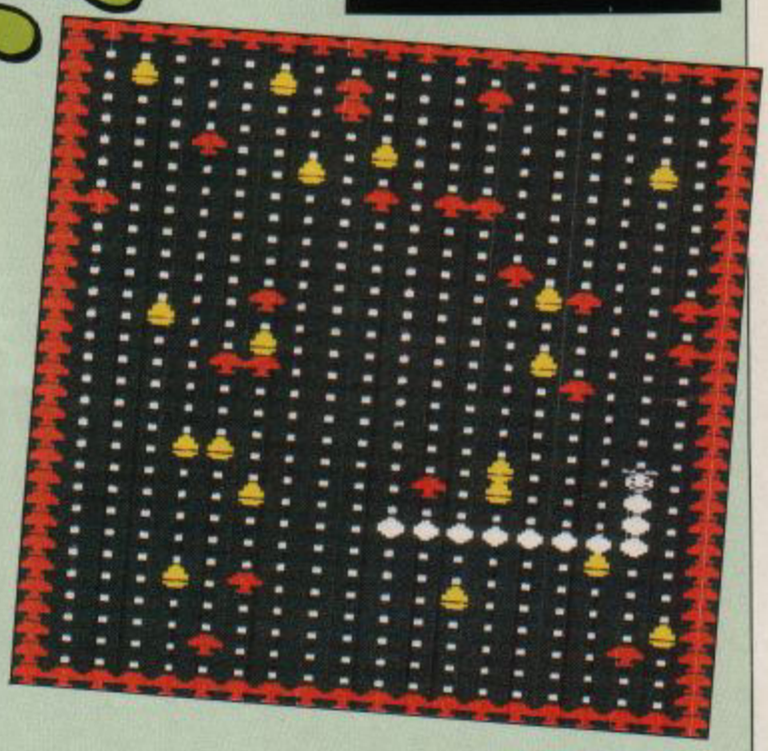
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Watch out for poisonous red toadstools – take a bite out of one of these and you're dead. The garden is surrounded by a ring of this deadly fungus so be careful not to wander too close to the edge. You should also avoid running into your ever-growing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

```
   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$226;
  400 NEXT
  410 FOR i%=1 TO 20
  420 COLOUR 1
  430 PROCrprt(226)
  440 COLOUR 2
  450 PROCrprt(227)
  460 NEXT
  470 p%=9
  480 COLOUR 3
  490 d%=2
  500 FOR i%=0 TO p%
  510 PROCpseg(i%,1)
  520 NEXT
  530 REPEAT
  540 IF (INKEY(-98) AND NOT
(d%=2)) d%=4 ELSE IF (INKEY(
-67) AND NOT(d%=4)) d%=2 ELS
E IF (INKEY(-105) AND NOT(d%
=1)) d%=3 ELSE IF (INKEY(-73
) AND NOT(d%=3)) d%=1
  550 nx%=posx%(p%)-(d%=2)+(
d%=4)
  560 ny%=posy%(p%)-(d%=3)+(
d%=1)
  570 c%=FNchr(nx%,ny%)
  580 p%=(p%+1)MOD len%
  590 PROCpseg(p%,0)
  600 posx%(p%)=nx%
  610 posy%(p%)=ny%
  620 PROCpseg(p%,1)
  630 IF c%=130ORc%=129dead%
=TRUE ELSE IF c%=131 PROCsco
re:IF (s%/20)=INT(s%/20) UNT
IL TRUE:UNTIL 0
  640 UNTIL dead%
  650 SOUND 0,-15,6,10
  660 *FX21,0
  670 A=INKEY(150)
  680 CLS
  690 COLOUR 1
  700 PRINT TAB(5,5)"Game Ov
er.";TAB(4,7)"You scored ";s
%
  710 COLOUR 2
  720 PRINT TAB(4,20)"Press
SPACE";TAB(3,22)"to play aga
in."
  730 REPEAT UNTIL GET
  740 RUN
  750 DEFPROCscore
  760 s%=s%+1
  770 posx%(len%)=1
  780 posy%(len%)=1
  790 len%=len%+1
  800 SOUND 1,-15,100,1
  810 ENDPROC
  820 DEFPROCrprt(A)
  830 LOCAL x%,y%
  840 REPEAT
  850 x%=RND(18)
  860 y%=RND(28)+1
  870 UNTIL FNchr(x%,y%)=ASC
"."
  880 PRINT TAB(x%,y%)CHR$A;
  890 ENDPROC
  900 DEFPROCpseg(j%,k%)
  910 PRINT TAB(posx%(j%),po
sy%(j%));
  920 IF j%=p%ANDk%=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 A%=135
  960 =(USR(&FFF4)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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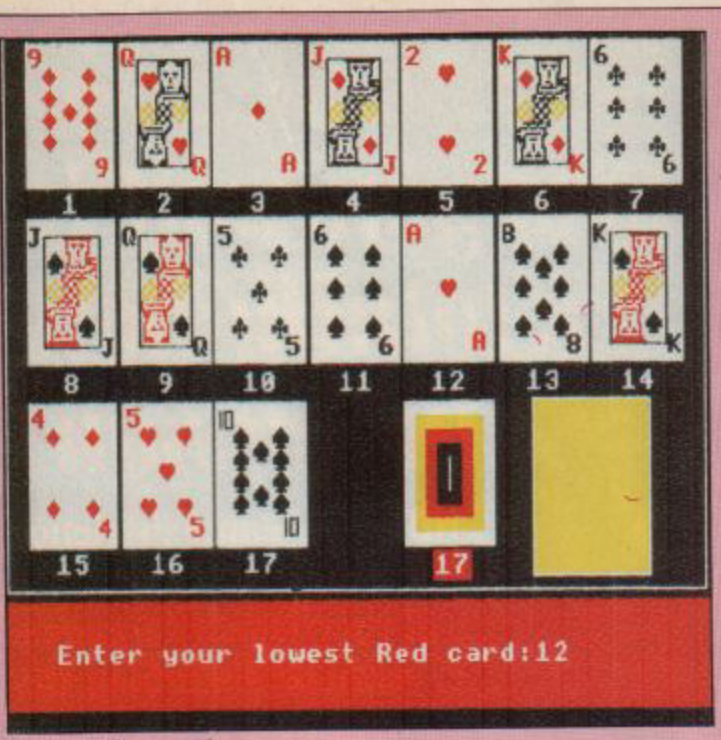


Figure I: The opening screen

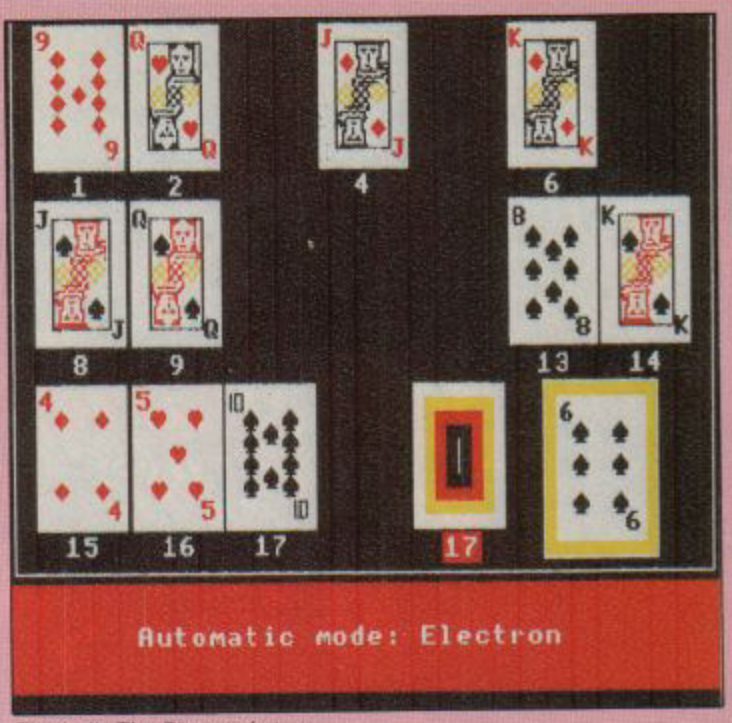


Figure II: The Electron's turn

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 *KEY10A%=0:ME%=0:MG%=0
:MF%=0:M
   50 PROCchars:IF E%=1GOTO1
00
   60 VDU21
   70 *KEY 0 DELETE220,260:M
RUN:F:M
   80 *FX138,0,128
   90 E%=1:END
  100 IF PAGE<=&E00 THEN 150
  110 VDU21
  120 *KEY 1 *TAPE:M FOR I%=
0 TO TOP-PAGE STEP 4:I%!&E00
=I%!PAGE:NEXT:M PAGE=&E00:M
OLD:M RUN:F:M
  130 *FX138,0,129
  140 END
  150 MODE1:VDU23,1,0;0;0;0;
  160 Z=RND(-TIME):Z=RND(12)
+40
  170 IF A%=1 Z=52
  180 DIM N%(Z),C(52),S(52)
  190 PROCinit:PROCrandom
  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
1,35,220,4,246,12,200,8,23,2
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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EU1

Newmarket listing

◄ 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 2:N%(I%)=I%
:NEXT:FORI%=2 TO 2 STEP-1:D%
=RND(I%):T%=N%(D%):N%(D%)=N%
(I%):N%(I%)=T%:NEXTI%
  300 RESTORE:FORI=1TO52:REA
DC(I),S(I):NEXT
  310 ENDPROC
  320 DEFPROCcard:suit$=CHR$
(S+223):IFS=1ORS=3colour=1:G
C=0ELSEIFS=2ORS=4colour=0:GC
=1
  330 VDU5,24,X%;Y%-197;X%+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 MOVEX%+120,Y%-155:VDU6
5:PROC1:MOVEX%+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 MOVEX%+120,Y%-155:VDU2
29:PROC7:PROC8:MOVEX%+5,Y%:V
DU229:RETURN
  470 PROCj:RETURN
  480 PROCq:RETURN
  490 PROCk:RETURN
  500 RETURN
  510 DEFPROCc:MOVEX%+5,Y%:V
DU48+C:MOVEX%+123,Y%-160:VDU
48+C:ENDPROC
  520 DEFPROC1:MOVEX%+64,Y%-
80:PRINTsuit$:ENDPROC
  530 DEFPROC2:MOVEX%+64,Y%-
28:PRINTsuit$:MOVEX%+64,Y%-1
32:PRINTsuit$:ENDPROC
  540 DEFPROC3:MOVEX%+28,Y%-
28:PRINTsuit$:MOVEX%+28,Y%-1
32:PRINTsuit$:MOVEX%+98,Y%-2
8:PRINTsuit$:MOVEX%+98,Y%-13
2:PRINTsuit$:ENDPROC
  550 DEFPROC4:MOVEX%+28,Y%-
75:PRINTsuit$:MOVEX%+98,Y%-7
5:PRINTsuit$:ENDPROC
  560 DEFPROC5:MOVEX%+64,Y%-
48:PRINTsuit$:ENDPROC
  570 DEFPROC6:MOVEX%+64,Y%-
48:PRINTsuit$:MOVEX%+64,Y%-1
08:PRINTsuit$:ENDPROC
  580 DEFPROC7:T$=suit$+CHR$
8+CHR$10:t$=STRING$(4,T$):MO
VEX%+28,Y%-26:PRINTt$:MOVEX%
+100,Y%-26:PRINTt$:ENDPROC
  590 DEFPROC8:MOVEX%+64,Y%-
48:PRINTsuit$:MOVEX%+64,Y%-1
10:PRINTsuit$:ENDPROC
  600 DEFPROCj:MOVEX%+1,Y%:V
DU74:MOVEX%+131,Y%-160:VDU74
  610 MOVEX%+65,Y%-14:VDU18,
0,GC,253,231,8,8,10,239,240,
8,8,8,10,18,0,2,241,18,0,GC,
252,18,0,2,242,8,8,8,10,18,0
,GC,243,244,8,8,10,245,246:P
ROCdraw:ENDPROC
  620 DEFPROCq:MOVEX%+1,Y%:V
DU81:MOVEX%+131,Y%-160:VDU81
  630 MOVEX%+65,Y%-14:VDU18,
0,GC,247,248,8,8,10,249,250,
8,8,8,10,18,0,2,241,18,0,GC,
252,18,0,2,242,8,8,8,10,18,0
,GC,233,234,8,8,10,235,236:P
ROCdraw:ENDPROC
  640 DEFPROCk:MOVEX%+1,Y%:V
DU75:MOVEX%+131,Y%-160:VDU75
:GOTO610
  650 DEFPROCdraw:MOVEX%+32,
Y%-14:GCOL0,0:DRAWX%+130,Y%-
14:DRAWX%+130,Y%-171:DRAWX%+
32,Y%-171:DRAWX%+32,Y%-14
  660 GCOL0,colour:MOVEX%+36
,Y%-35:PRINT;suit$:MOVEX%+92
,Y%-130:PRINT;suit$: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.

```
  670 CLS:VDU19,2,2;0;4,28,1
,24,38,1,17,128,12,28,0,30,3
9,26,17,129,12:PRINTTAB(14,2
)"Newmarket":VDU5
  680 MOVE10,204:DRAW10,1020
:DRAW1270,1020:DRAW1270,204:
DRAW10,204:MOVE960,224:DRAW9
60,480:DRAW1170,480:DRAW1170
,224:DRAW960,224:GOTO710
  690 DEFPROCinit:swap%=0:p%
=1:b%=0:r%=0:z%=0:pc%=0:ec%=
0:cc%=34:cl%=18:go%=0:go2%=0
:c%=1:d%=3:da%=0:cg%=0:ENVEL
OPE1,1,-8,1,-1,14,7,1,126,0,
0,-126,126,126:ENDPROC
  700 DEFPROCwindow:VDU5:FOR
L=1TO10:VDU24,X%;Y%-197;X%+1
60;Y%+10;18,3,c%+129,16:SOUN
D1,-15,170,1:NEXT:VDU24,X%;Y
%-240;X%+160;Y%+10;18,0,128,
16:ENDPROC
  710 X%=-120:Y%=992:FORI=1T
017:X%=X%+170:IFX%>1070 ANDY
%=992 X%=50:Y%=734 ELSE IF X
%>1070 ANDY%=734 X%=50:Y%=46
8
  720 PROCdeal:NEXT:IFNOTswa
p% PROCswap:IFswap% da%=34:G
OTO710
  730 PROCcc:PROCnc:VDU24,96
4;228;1166;476;:GCOL0,130:CL
G:PROCplayer
  740 DEFPROCdeal:da%=da%+1:
C=C(N%(da%)):S=S(N%(da%)):IF
swap% C(N%(I))=C(N%(da%)):S(
N%(I))=S(N%(da%))
  750 PROCcard
  760 GCOL0,3:IFI<10 VDU24,X
%+60;Y%-240;X%+100;Y%-204;:M
OVEX%+64,Y%-212:PRINT;I ELSE
 VDU24,X%+40;Y%-240;X%+110;Y
%-204;:MOVEX%+48,Y%-212:PRIN
T;I
  770 ENDPROC
  780 DEFPROCswap:VDU4,12,7:
PRINTTAB(8,2)"Swap this hand
? Y/N";:W$=CHR$(GET AND &DF)
:CLS:IFW$="Y"swap%=TRUE
  790 ENDPROC
  800 DEFPROCcc:FORI=18TO34:
C=C(N%(I)):S=S(N%(I)):IFS=10
RS=3r%=r%+1 ELSE IFS=20RS=4b
%=b%+1
  810 NEXT:X%=730:Y%=468:SOU
ND0,-15,4,1:PROCback:ENDPROC
  820 DEFPROCblank(n%):IFn%<
8 Y%=992:X%=-120+(n%)*170 EL
SE IFn%>7ANDn%<15 Y%=734:X%=
-120+((n%)-7)*170 ELSE IFn%>
14 Y%=468:X%=-120+((n%)-14)*
170
  830 PROCwindow:X%=986:Y%=4
48:ENDPROC
  840 DEFPROCplayer
  850 IFc%=1 su$="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:GOTO8
90 ELSE GOTO900
  890 IFcg%=2 cg%=0:PROCchan
ge:GOTO940 ELSE GOTO940
  900 s%=S(N%(PC)):S=s%:C=C(
N%(PC)):IFs%<>c%ANDs%<>d% TH
EN 860
  910 PROCcheck:IF fault GOT
O860
  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%ANDNOTgo
2%:PROCchange:IFp%=1 GOTO850
  940 PROCcomp:ENDPROC
  950 DEFPROCchange:IFc%=1 c
%=2:d%=4ELSE IFc%=2 c%=1:d%=
3
  960 ENDPROC
  970 DEFPROCcomp
  980 IFc%=1 su$="Red" ELSE
su$="Black"
  990 FORK=18TO34:z%=0:IFS(N
%(K))=c% OR S(N%(K))=d% GOTO
1000 ELSE GOTO1030
 1000 FORJ=18TO34:IF C(N%(K)
)<=C(N%(J))AND(S(N%(J))=c%OR
 S(N%(J))=d%) z%=z%+1
 1010 IFc%=1ANDz%=r% OR c%=2
ANDz%=b% J%=K:J=34:K=34:NEXT
:NEXT:GOTO1050
 1020 NEXT
 1030 NEXT
 1040 cg%=cg%+1:IFcg%=2:cg%=
0:PROCchange:GOTO1090 ELSE G
OTO1090
 1050 VDU4,12:PRINTTAB(6,2)"
Electron's lowest ";su$;" ca
rd":VDU5:FORD=1TO1000:NEXT:s
%=S(N%(J%)):S=s%:C=C(N%(J%))
 1060 IFS=1ORS=3 r%=r%-1 ELS
E IFS=2ORS=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
Cp_cards:UNTILNOTgo%ANDNOTgo
2%:PROCchange:IF p%=2 GOTO 9
80
 1090 PROCplayer:ENDPROC
 1100 DEFPROCp_cards:go%=0
 1110 FORI=1TO17
 1120 IFS(N%(I))=s%ANDC(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:GOTO1110
 1130 NEXT:ENDPROC
 1140 DEFPROCc_cards:go2%=0
 1150 FORI=18TO34
 1160 IFS(N%(I))=s%ANDC(N%(I
))=C+1 go2%=TRUE:VDU4,12:PRI
NTTAB(7,2)"Automatic mode: E
lectron":VDU5:C=C(N%(I)):GOT
O1170 ELSE GOTO1190
 1170 IFs%=1ORs%=3 r%=r%-1 E
LSE IFs%=2ORs%=4 b%=b%-1
 1180 J%=I:p%=2:PROCcard:ec%
=ec%+1:PROCnc:S(N%(J%))=5:PR
OCwin(2):I=34:NEXT:GOTO1150
 1190 NEXT:ENDPROC
 1200 DEFPROCcheck:FORI=1TO1
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=1TO5:x%=x%+2
0:y%=y%+20:col%=col%-1:IFcol
%=-1 col%=3
 1250 VDU24,X%+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
,1,4,9,3,6,3,4,4,10,4,3,3,8,
4,5,4,12,3
 1280 DEFPROCwin(w%)
 1290 IFec%=17ORpc%=17 VDU4,
12:PRINTTAB(14,2)"Newmarket"
;:FORS=10TO50STEP2: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:GOTO1330
 1310 IFw%=2 AND ec%=17 MOVE
32,704:PRINT"Bad luck, the E
lectron has beaten you":F%=F
%+1:GOTO1330
 1320 GOTO1360
 1330 *FX 15,1
 1340 MOVE320,608:PRINT"Elec
tron's score=" ;F%: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.

Exploring printers Part 1

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

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 covered 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 do 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 enviroment.

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 recommended, 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 that 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 hexadecimal) 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 I 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 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 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.* ■

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

```
  10 REM Program II
  20 REM Not Electron Basic
  30 WIDTH "LPT1:",255
  40 OPEN "LPT1: AS #1
  50 PRINT #1,CHR$(27)+"D"+
CHR$(12)+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 requ
ired
  40 VDU 2
  50 VDU 1,27,1,ASC"D",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 VDU3
 130 END
```


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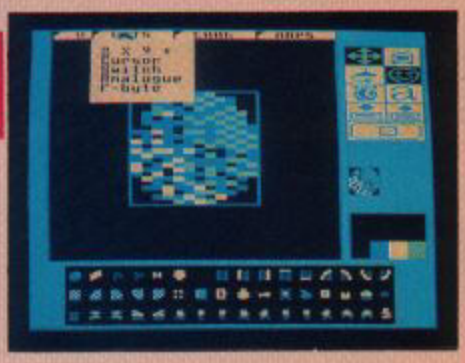
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It's a hard life . . .



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 guesswork. 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 conveyer 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 machanic 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.

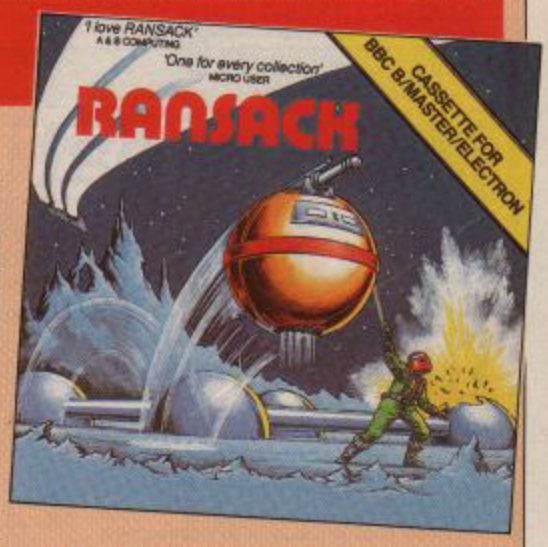
The game sticks to some quite strict adventuring rules – it is more a problem-solving graphical puzzle than a key-bashing exercise in dexterity.

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

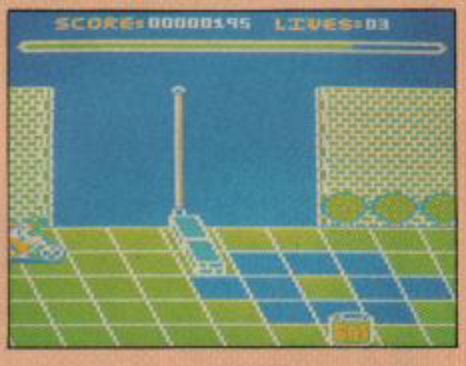
ASL provides a generous seven bikes which are lost through collisions and lack of fuel. Across the top of the screen is a fuel gauge and the bike is kept topped up by riding through barrels labelled gas.

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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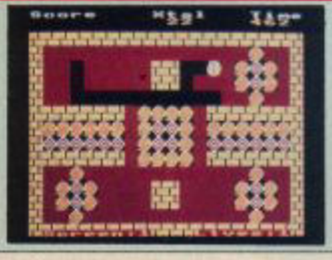
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Volume 4

NEW



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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 maxe 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.*

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 &4F80
```

to start the game.

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 &1900
RUN
```

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

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
```

Then enter:

```
?&254D=x :REM x=lives
?&2553=x :REM x=grenades
?&2EA9=&EA
?&2EAA=&EA
?&2EAB=&EA :REM faster game
```

Finally type:

```
CALL &2300
```

to start the game.

Plan B – *Bug Byte*

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

```
 10 !&900=&208D29A9:!&904=
&8D09A902
 20 !&908=&0EA90221:!&90C=
&F42004A2
 30 !&910=&A043A2FF:!&914=
&FFF72009
 40 !&918=&748DEAA9:!&91C=
&3F758D3F
 50 !&920=&8D3F828D:!&924=
&B34C3F83
 60 !&928=&8A48084C:!&92C=
&AD489848
 70 !&930=&FE2903CA:!&934=
&A903CA8D
 80 !&938=&03C78D00:!&93C=
&AA68A868
 90 !&940=&4C602868:!&944=
&414C502E
100 !&948=&000D424E
110 CALL &900
```

and type RUN.

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

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
```

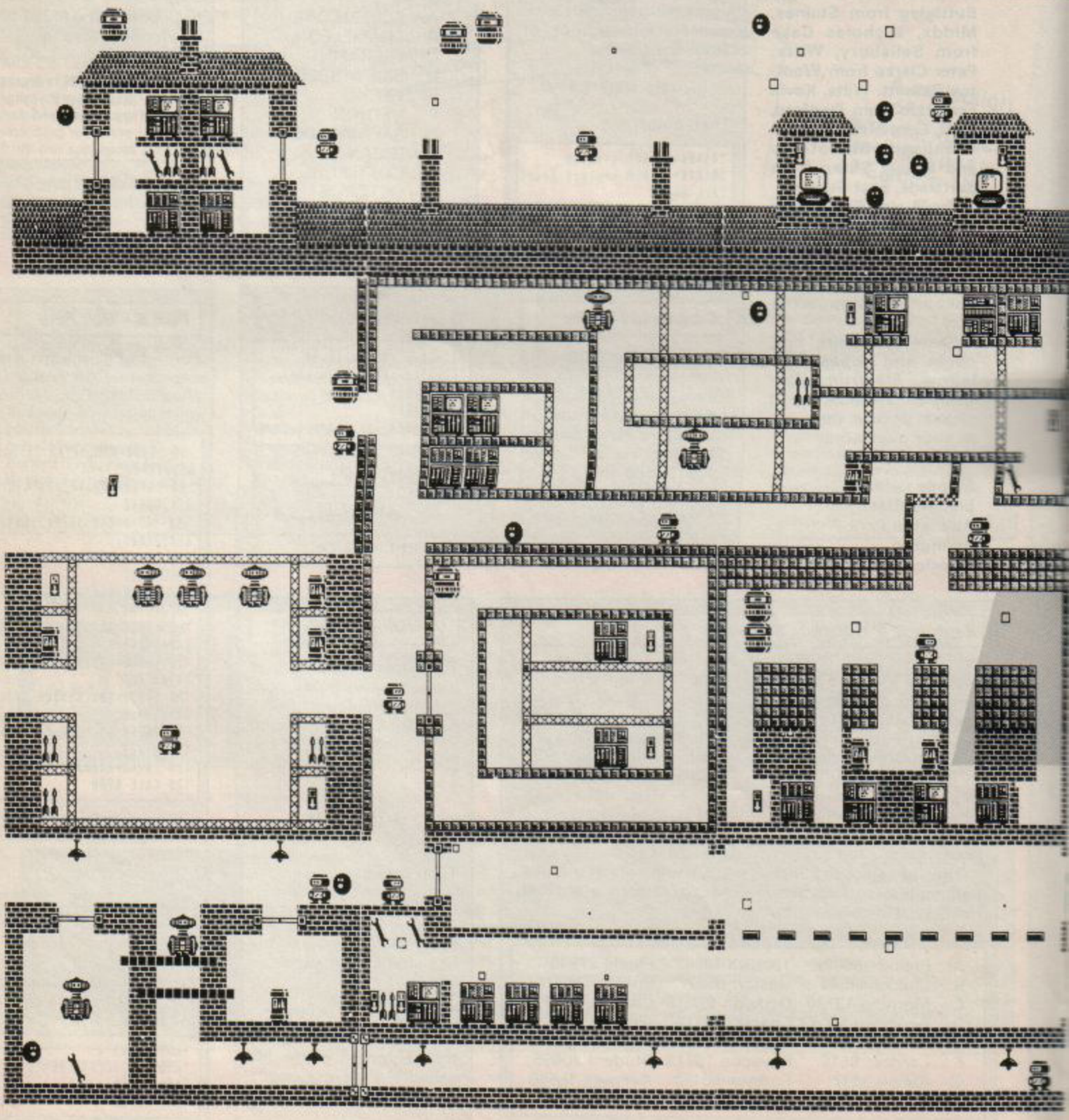
Electron Invaders – *Micro Power*

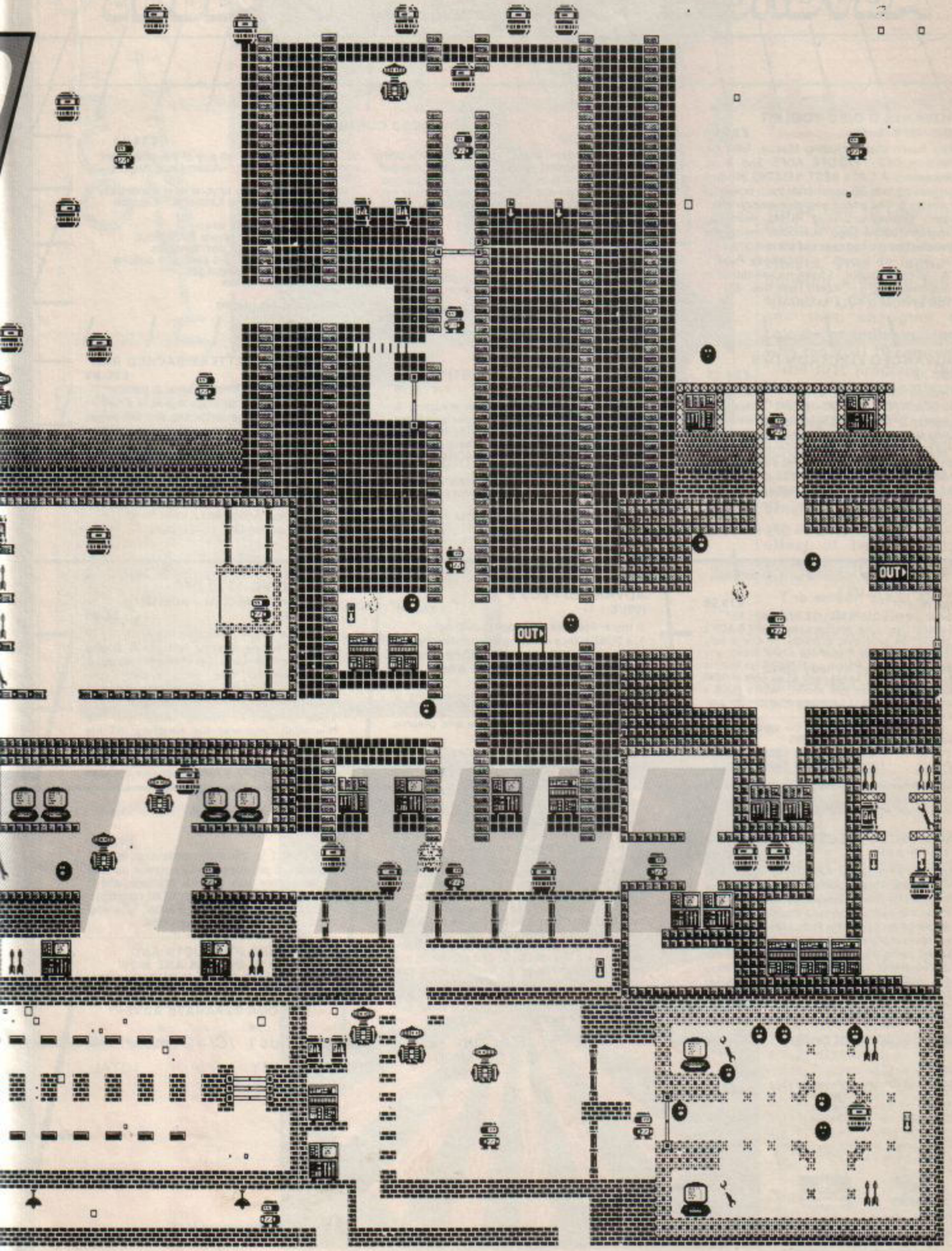
To obtain infinite lives on this simple Space Invaders clone:

```
*LOAD INV1
?&309E=&A9:?&3F19F=1:
?&30A0=&EA
CALL &3000
```

Bug-Byte

PLAN B MA




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ADVANCED ELECTRON DFS
(05) /E/ **£24.15**

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 5¼" 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
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(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.
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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 I/face & will accept any standard drive inc. PSU, runs 1770 DFS (as fitted in the B + & Master), keeps page &E00, utils 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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(09)/E + 1/ **£66.70**

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(14) /E+ASR/ **£19.99**

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(19) (M(ADM)/E+1(ADE)

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10 LINERS

DISCO LIGHTS



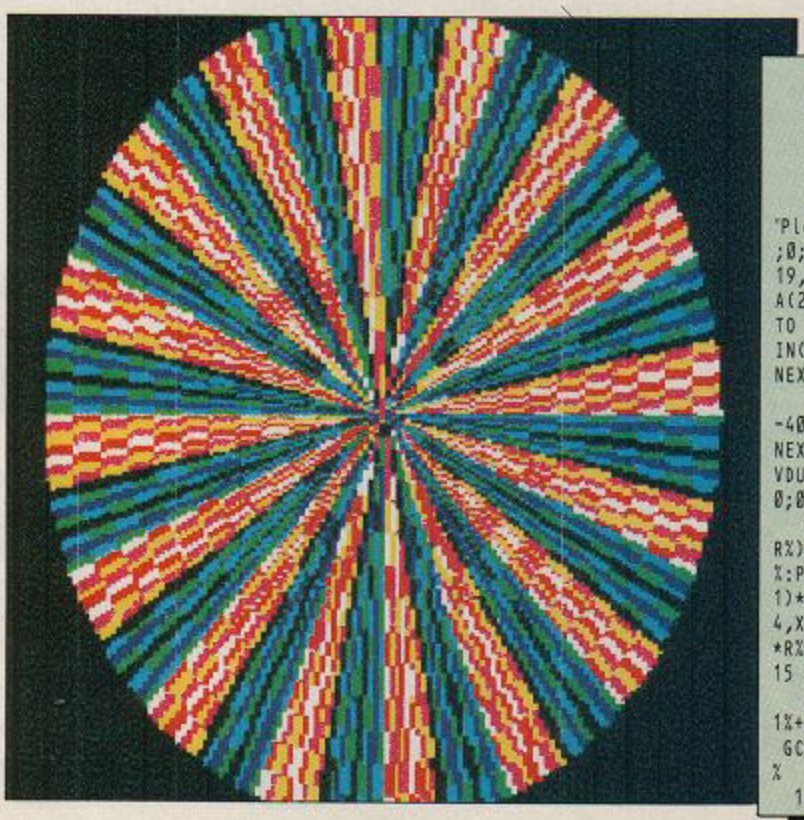
```
   10REM Disco Lights
   20REM By Robin Nixon
   30REM
   40REM (c) Electron User
   50REM
   60MODE 2:VDU 23;8202;0;0
;0;:FOR Y%=959 TO 0 STEP -1
92:FOR X%=63 TO 1215 STEP 1
20:READ C%:PROCcircle(X%,Y%
,64,C%):NEXT X%,Y%:FOR Y%=8
63 TO 128 STEP -192:FOR X%=
127 TO 1183 STEP 120:READ C
%:PROCcircle(X%,Y%,64,C%):N
EXT X%,Y%
   70REPEAT:FOR X%=1 TO 15:
VDU 19,X%,RND(7);0;0;0;:TIM
E=0:REPEAT UNTIL TIME>5:VDU
 19,X%,0;0;0;:VDU 19,RND(15
),RND(8)-1;0;0;0:NEXT:UNTIL
 0
   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 10,1,1,10,11,11,7
,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
```

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.

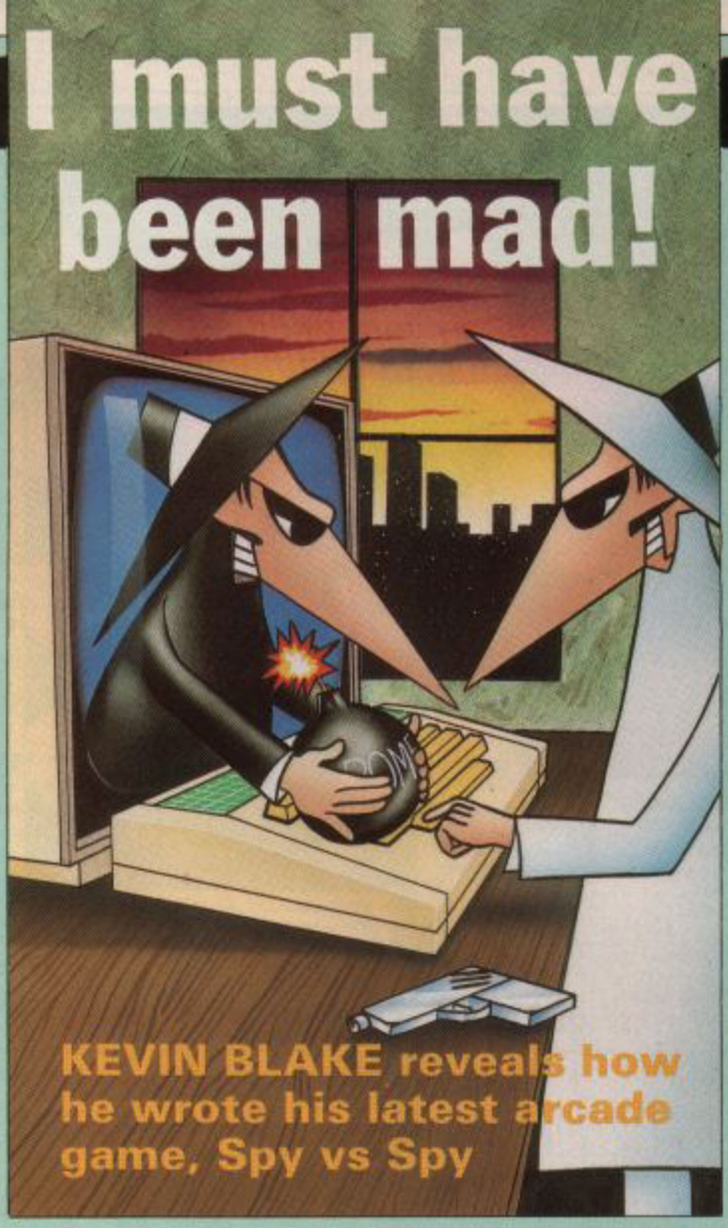
The screen takes 13 minutes to draw, but is well worth the wait. We suggest you grab a cup of coffee once you've typed it in, then sit back and watch the pattern grow.

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 N%=8 TO 15:VDU
19,N%,N%-8;0;0;0;:NEXT:DIM
A(240),B(240):C%=1:FOR Z=0
TO PI*2 STEP PI/120:A(C%)=S
IN(Z):B(C%)=COS(Z):C%=C%+1:
NEXT:CLS
   70FOR S%=500 TO 20 STEP
-40:PROCcircle(644,511,S%):
NEXT:REPEAT:FOR X%=1 TO 15:
VDU 19,X%,7;0;0;:VDU 19,X%;
0;0;0;:NEXT:UNTIL 0
   80DEFPROCcircle(X1%,Y1%,
R%):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%:D%=D% MOD
15 +1
   90PLOT 85,X1%+A(C%)*R%,Y
1%+B(C%)*R%:D%=D%+1:IF G%=1
 GCOL 0,D% ELSE GCOL 0,16-D
%
  100NEXT:ENDPROC
```

I must have been mad!



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

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 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.

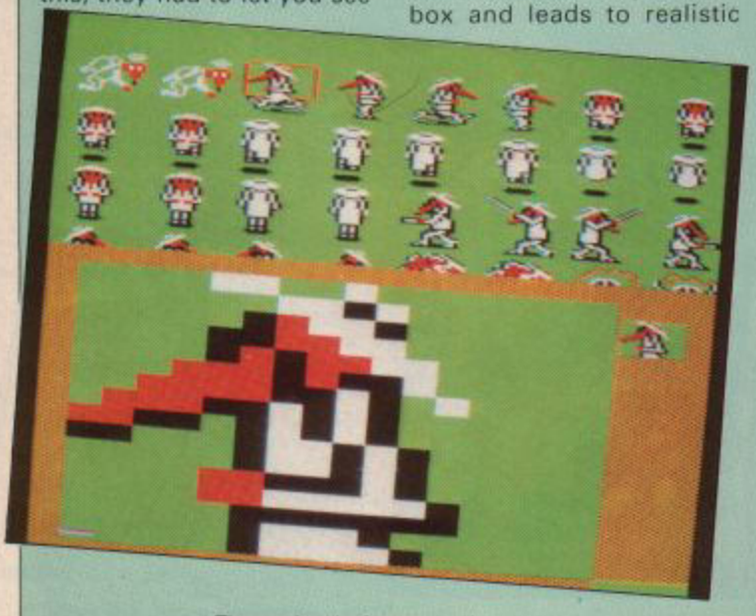
Spy vs Spy, being a conversion, had to have the same addictiveness and playability as the original versions. It had already been released on the CBM 64, Spectrum, Atari and Amstrad micros, all of which have at least 20k more memory than the Electron, which for various reasons, particularly speed, would 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.

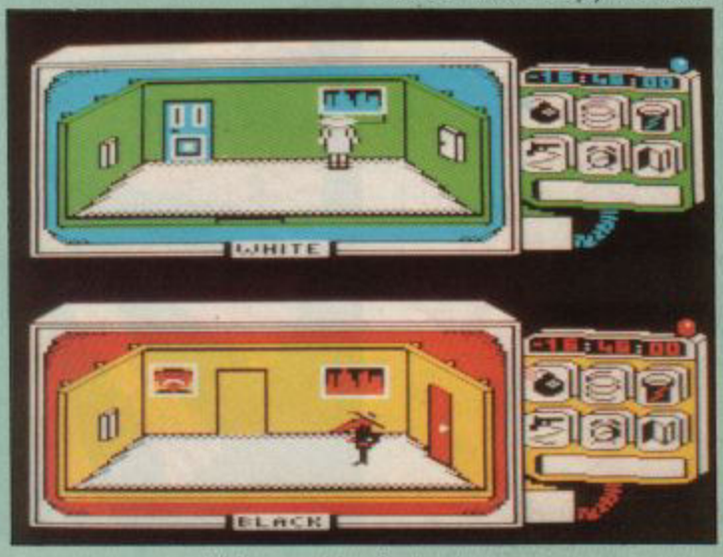
Without the simulvision the screen would look bland and this is often the trademark of a lot of Electron software. Really the desired effect is to imitate Mode 2 with eight individual colours and yet still have the speed of Mode 5.

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 wern'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.

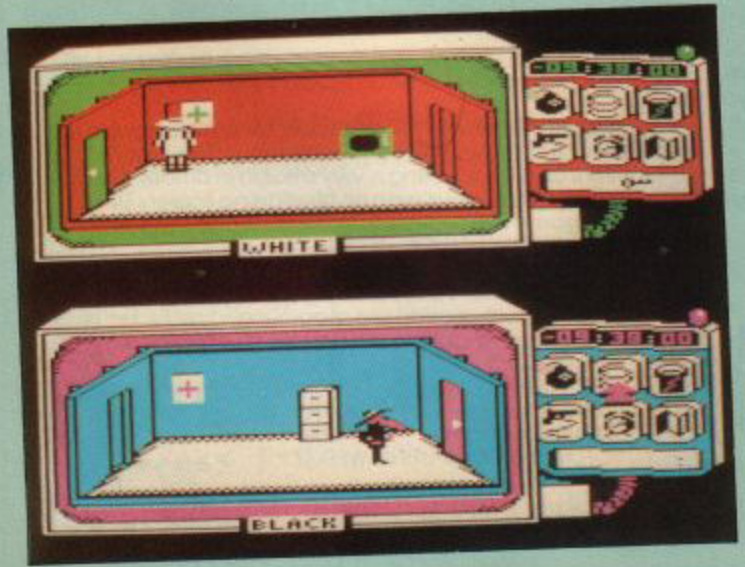
If you can compress your data enough, it is possible to squeeze in hundreds. However, this number is limited by the amount of memory you've got left after all your other routines are in and finished.

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.

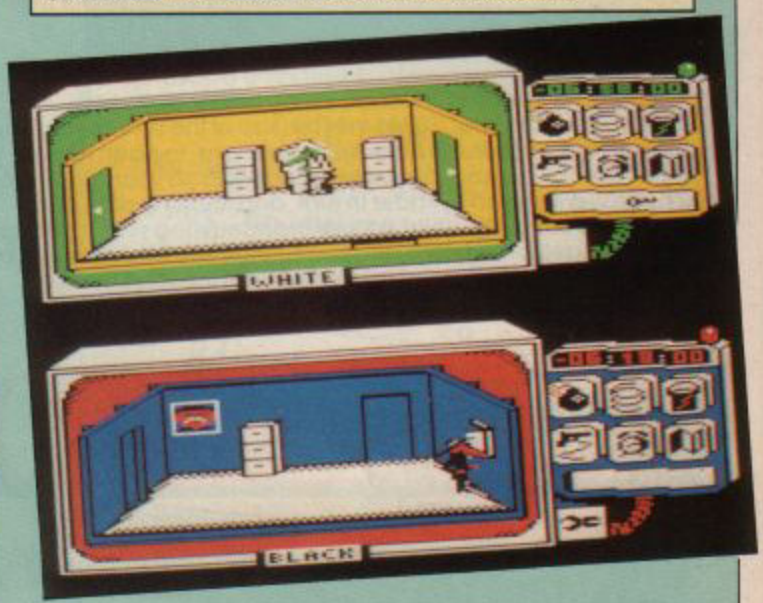
Well, what more can I say, except that I thoroughly enjoyed writing it and hope you have just as much fun playing it. ■

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

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DDT kills those bugs stone dead

Check out your Plus 3 with MARK SMIDDY's powerful disc drive toolkit

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 back-ups, 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 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

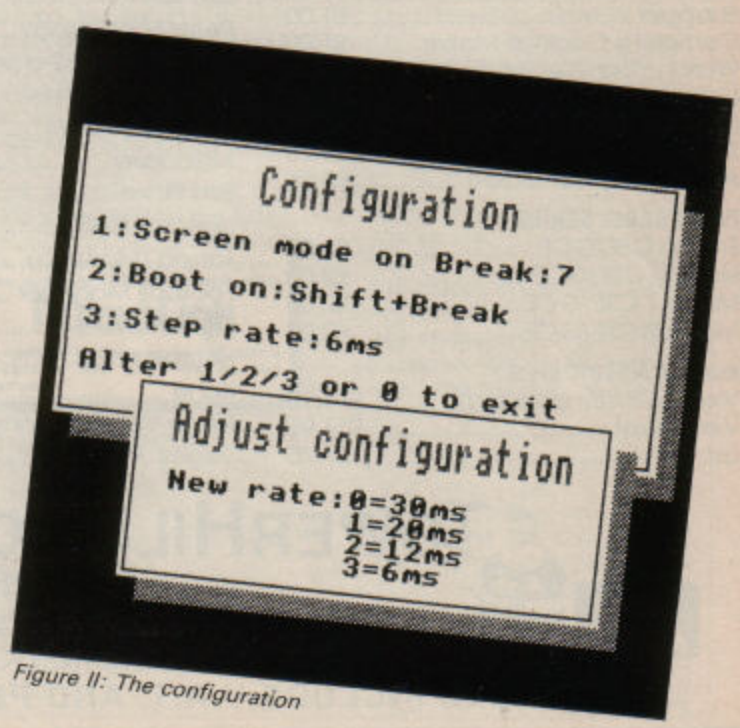


Figure II: The configuration

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◀ *From Page 35*

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 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 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. ■

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

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

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:READm$:PRIN
T;N;".m$:NEXT
  80 PRINT':REPEAT
  90 PRINT"Press 1-8"CHR$13
;:A%=GET-48
 100 UNTILA%>0 AND A%<9
 110 IFA%=8 MODE6:END ELSEI
FA%=7RUN
 120 IFA%=1 OR A%=2PROCmode
(1) ELSEPROCmode(4)
 130 ON A%GOSUB 650,530,830
,170,280,270
 140 UNTIL0
 150 DATA Startup configura
tion,Disc info,Verify disc,S
tep rate,Write speed,Read sp
eed,New disc,Exit
 160 :
 170 PROCwind(4,20,29,7,"St
ep rate")
 180 C%=11:*MOUNT
 190 PROCclkon
 200 FOR pass=1 TO 10:PROCg
etsek(79,0,1):PROCgetsek(0,0
,1):NEXT
 210 scnds=FNclkoff
 220 rate=((scnds/(pass-1))
/160)*1000
 230 @%=&20202:PRINT"Step
rate:";rate;"ms":@%=&90A
 240 PROCwait:C%=8
 250 RETURN
 260 :
 270 m$="Read:":PROCtest_sk
trs(1):PROCtest_sktrs(16*5):
RETURN
 280 m$="Write:":C%=10:PROC
test_sktrs(1):PROCtest_sktrs
(16*5):C%=8:RETURN
 290 :
 300 DEFPROCtest_sktrs(no)
 310 PROCwind(2,20,32,5,"Tr
ansfer rate")
 320 *MOUNT
 330 PRINTm$;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_secs);" 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%=?blk:C%=8:W%=&8000
 480 X%=&75:Y%=0:A%=&71:CAL
L&FFF1
 490 used=?&76+?&77*256
 500 size=?&FFE:sktrs=1280:
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"
 570 PRINT"Storage used:";
(disc_size-used*256)/1024;"k
"
 580 PRINT"Storage free:";
used*256/1024;"k"
 590 @%=&20202:PRINT"FS ma
p is ";(size-3)/246*100;"% f
ull"
 600 PRINT"Disc is ";(sktr
s-used)/sktrs*100;"% full":@
%=&90A
 610 PRINT"Write protect:"
;:IF Q%PRINT"On"ELSEPRINT"Of
f"
 620 PROCwait
 630 RETURN
 640 :
 650 PROCwind(5,15,34,3,"Co
nfiguration")
 660 A%=&FF:X%=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+Brea
k" ELSE PRINT"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
```

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

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

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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:
0=30ms"TAB(10)"1=20ms"TAB(
10)"2=12ms"TAB(10)"3=6ms";:
A=GET-48:stat=(stat AND &CF)
OR(A*16)
  800 A%=&FF:X%=stat:Y%=0:CA
LL&FFF4
  810 ENDPROC
  820 :
  830 PROCwind(7,18,28,10,"V
erify Disc")
  840 PRINT:W%=&900
  850 FOR T%=0 TO79:FOR S%=0
 TO 15
  860 PRINT "Track:";T%;" Se
ctor:";S%;" ";CHR$13;
  870 C%=8:PROCgetsek(T%,S%,
1):C%=10:PROCgetsek(T%,S%,1)
  880 NEXT:NEXT
  900 PRINT:PROCwait:W%=&800
0:C%=8
  910 RETURN
  920 :
  930 DEFPROCdouble(m$,X,Y)
  940 X%=0:Y%=10:A%=10:D=&A0
0
  950 COLOUR 2
  960 FOR N%=1 TO LEN m$
  970 VDU 31,X+N%-1,Y
  980 ?D=ASC(MID$(m$,N%,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=
&FFFF
 1080 blk!5=C%
 1090 blk?7=add DIV 256
 1100 blk?8=add
 1110 blk!9=no
 1120 A%=&72:X%=blk:Y%=blk D
IV 256
 1130 CALL&FFF1
 1140 IF?blk PROCerror
 1150 ENDPROC
 1160 :
 1170 DEFPROCerror
 1180 A%=&73:CALL&FFF1
 1190 address=?blk+blk?1*256
 1200 IFblk?3=64 AND 0%ENDPR
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$224:NEXT
 1270 PRINT TAB(LX+1,BY+1)ST
RING$(RX-LX+1,CHR$224)
 1280 VDU 28,LX,BY,RX,TY,12
 1290 GTY=((32-TY)*32)-8:GBY
=((31-BY)*32)+8:GLX=LX*32+8:
GRX=RX*32+16
 1300 MOVE GLX,GBY:DRAW GRX,
GBY:DRAW GRX,GTY:DRAW GLX,GT
Y:DRAW GLX,GBY
 1310 VDU 28,LX+1,BY,RX-1,TY
+1
 1320 PROCdouble(title$,((RX
-LX)-LEN(title$))/2,0)
 1330 width=RX-LX-2
 1340 ENDPROC
 1350 :
 1360 DEFPROCmode(mode)
 1370 VDU 22,mode
 1380 IF mode=4 VDU19,1,3;0;
:GCOL 0,0:ELSE VDU19,3,3;0;1
9,0,4;0;19,1,0;0;19,2,1;0;:G
COL0,1
 1390 VDU 23;8202;0;0;0;
 1400 ENDPROC
 1410 :
 1420 DEFPROCwait
 1430 PRINT TAB((width-10)/2
)"Hit a key";
 1440 *FX15
 1450 REPEATUNTILGET
 1460 ENDPROC
 1470 :
 1480 DEFPROCclkon
 1490 PRINT"Start watch/Pres
s Space"
 1500 *FX15
 1510 REPEATUNTILGET
 1520 ENDPROC
 1530 :
 1540 DEFFNclkoff
 1550 PRINT"Stop watch"CHR$
7
 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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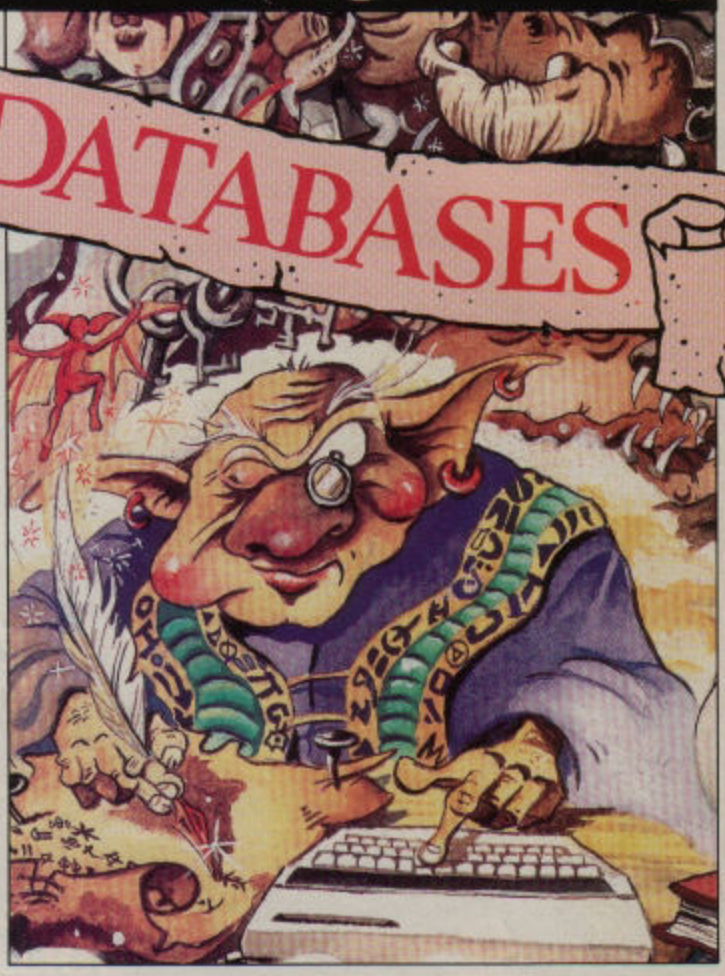
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DEMONIC DATABASES



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. Abreviations 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.

```
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?
```

```
   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 Karni
a..."
   80 PRINT"Your task is to
find the King's"
   90 PRINT"stolen crown and
 return it to him."
  100 PRINT ' "Please type i
n UPPER case..."
  110 INPUT ' "Enter your na
me:"name$
  120 REPEAT
  130 PRINT ' "You are in ";
r$(p);"."
  140 IF p=11 AND f(1)=0 PRI
NT m$(1)
  150 IF p=4 PRINT"A";L$;"sa
fe is here."
  160 FOR i=1 TO 13
  170 IF L(i)=p PRINT"A ";ob
$(i);" is here."
  180 IF L(i)=16 PRINT"You h
ave a ";ob$(i);"."
  190 NEXT
  200 INPUT "What now";c$
  210 IF c$="" THEN 200
  220 c$=LEFT$(c$,3)
  230 i=INSTR(v$,c$) DIV 3
  240 IF i=0 PRINT"Eh?":GOTO
 200
  250 ON i GOSUB 620,620,620
,620,550,530,510,470,410,390
,350,320
```

Turn to Page 40 ▶

The Golden Crown listing

◀ From Page 39

```
  260 UNTIL finished
  270IF 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)="WESSOUEAS"
  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$(15),ob$(
13),L(13),m$(10),f(10)
  720 v$="***NOREASSOUWESTAK
FILWEATHRKILEXASHAUNL"
  730 L$=" locked "
  740 FOR i=0 TO 15
  750 READ a$,e$(i):r$(i)=MI
D$(a$,4)+LEFT$(a$,3)
  760 NEXT
  770 FOR i=1 TO 13
  780 READ a$,L(i):ob$(i)=MI
D$(a$,4)+LEFT$(a$,3)
  790 NEXT
  800 FOR i=1 TO 10
  810 READ a$:m$(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
ra,NOREASSOU,ndsthe castle g
rou,NORWES,estthe for,NORSOU
EAS,agean elf's cott,NORSOUW
ES
  900 DATA eama shallow str,
NOREAS,hesthick bus,NOREASWE
S,estthe for,NOREASWES,heda
small s,WESNOR
  910
  920 DATA pershopkee,3,ingK
,6,ardcastle gu,8,ollgiant t
r,9,"elfsmall ",11
  930
  940 DATA "keysilver ",0,ge
rlong dag,2,assred identity
p,3,oakcl,3,ollbattered scr,
9,ketlarge buc,15,oldbag of
g,32,owncr,32
  950
  960 DATA ireIt's on f,"you
He won't let ","outThe fire
is ",oldThe elf gives you a
bag of g,wayIt gets swept a,
ithWhat w,oodThat won't do a
ny g,oldHe takes your bag of
 g,eadHe stabs you with a kn
ife...you're d,ZAMIt says SH
A
```

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

"This must be the best adventure ever for the Electron"
ELECTRON USER – MAY 1987

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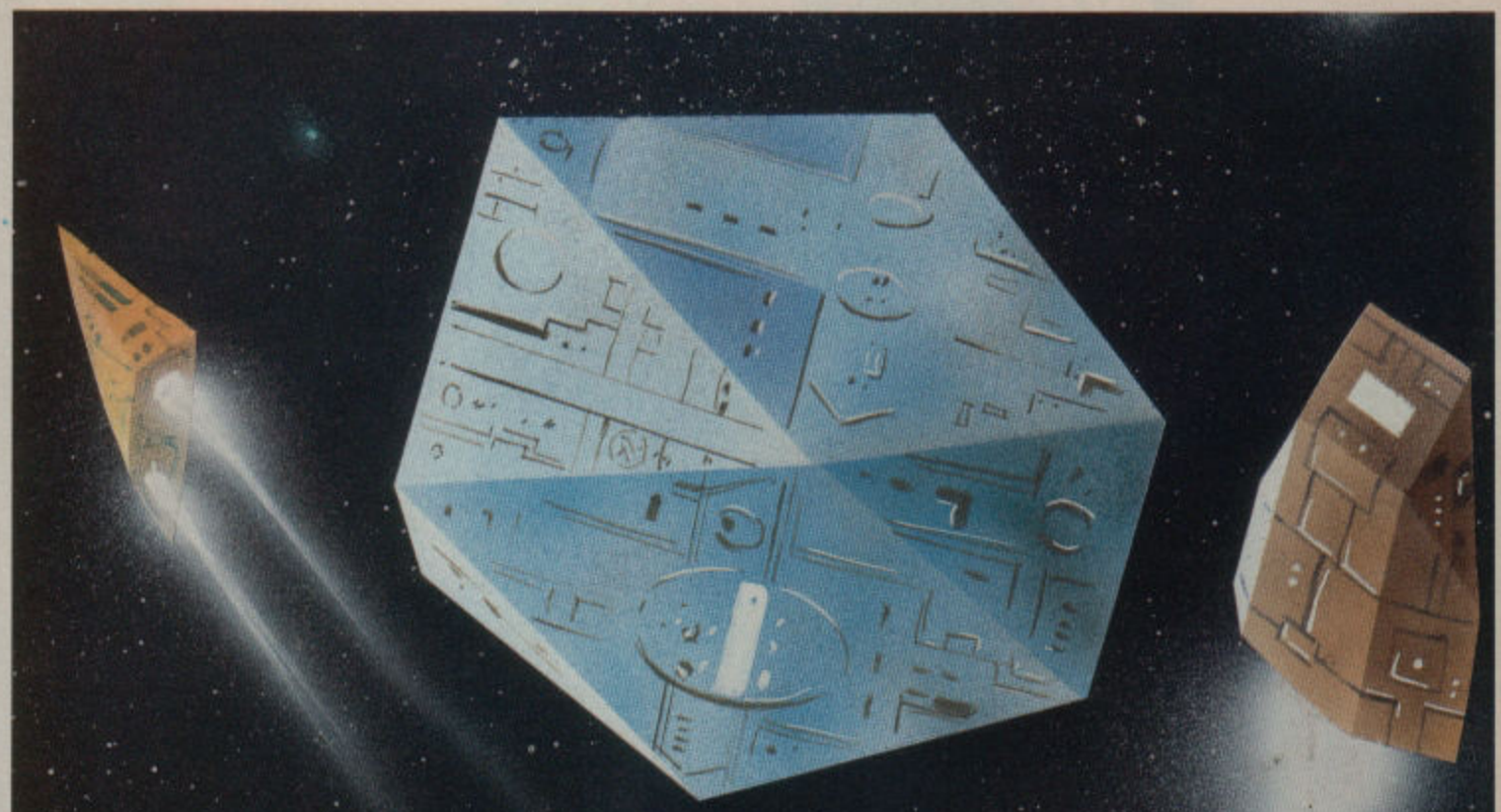
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Cosmic Guerrillas

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	Display 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 accidently 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.

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!

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(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.

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.

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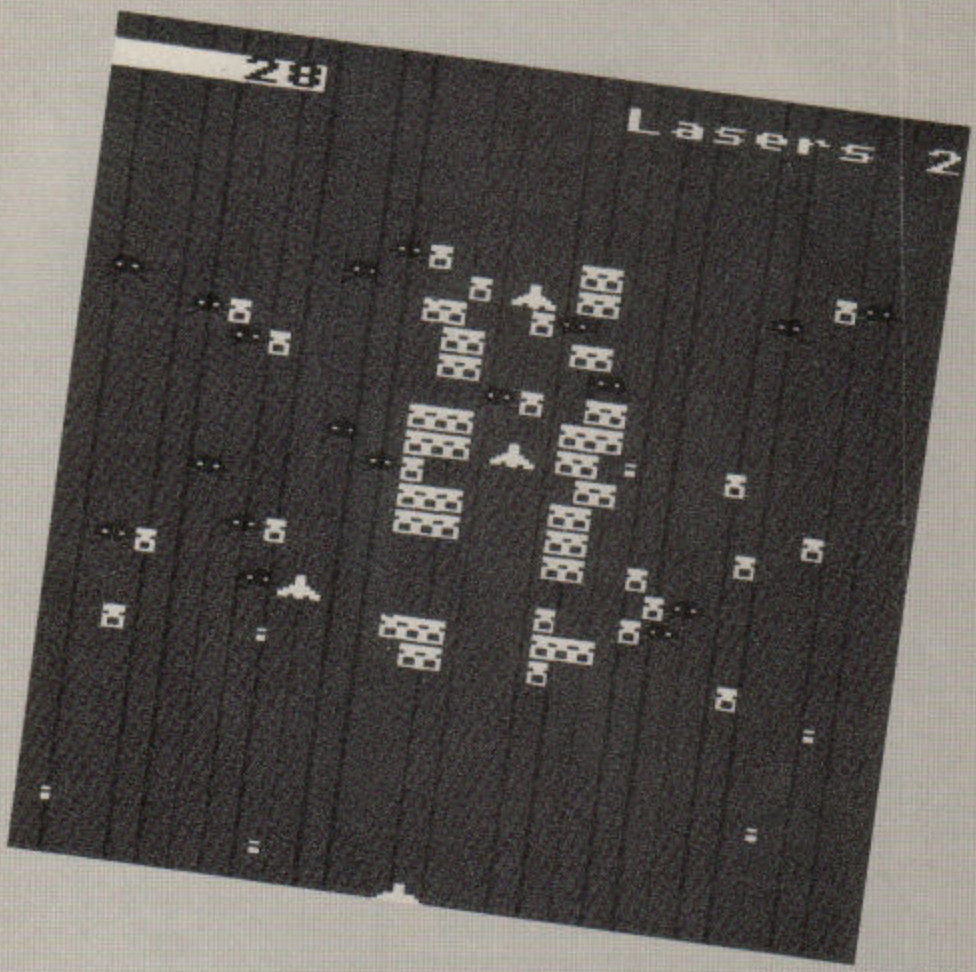
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Cosmic Guerrillas listing

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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=&5700
  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$(10)
 130 ENVELOPE 1,1,-4,-3,-2,
10,10,10,126,0,0,-126,126,12
6
 140 FOR N%=0 TO 7:READ N%?
&900:NEXT
 150 DATA &12,0,1,0,160,0,5
,0
 160 FOR N%=1 TO 10:hi%(N%)
=(11-N%)*25:hi$(N%)="Electro
n User":NEXT
 170 FOR N%=1 TO 8:FOR J%=1
TO 5:READ ctrl%(N%,J%):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 PROCassemble
 270
 280 PROCinstruct
 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 PROCtable
 340 A=INKEY(500)
 350 IF A=32 THEN GOTO370 E
LSE GOTO280
 360
 370 screen%=0:lives%=3
 380 PROCcolours(1,3,6):CLS
:PROCinitvar:PROCinitchurns:
PROCinitlasers
 390 MOVE0,0: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 PROCrandstarts(ctrl%(s
creen%,4)):?timer=0
 470 ?bombrate=ctrl%(screen
%,5)
 480 ?cycle=0:PROCinitguer:
CALLscreenguer
 490 ?&74=0
 500 COLOUR130:COLOUR1:m%=5
 510 REPEAT
 520 CALLstartpoint
 530 sc%=?&80+?&81*256:VDU3
1,0,1:PRINTsc%
 540 SOUND &02,-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 PROCe
ndgame:GOTO280
 650 *FX21
 660 TIME=0:REPEAT UNTIL TI
ME>=300
 670 GOTO490
 680 END
 690
 700 DEFPROCassemble
 710 cycle=&7B:counter=&7C:
timer=&7D:tempx=&7E:bombrate
=&82:hitscore=&84
 720 boltlow=&88:bolthi=&8C
:bflag=&910
 730 pos=&5700:mov=&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 [ 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 .nfire
 880 LDAcycle:AND#7:CMP#7:B
NEnguer
 890 JSRgu&rrilla: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 LDA&C50,X:CMPtimer:BNE
r1
1020 LDAmov,X:CMP#0:BNEr1
1030 LDApos,X:STA&70
1040 LDApos+1,X:STA&71
1050 LDY#11
1060 LDA(&70),Y:CMP#&4A:BNE
r2
1070 LDA&C51,X:STAmov,X:JMP
r1
1080 .r2:INC&C50,X
1090 .r1:DEX:DEX:BPL r
1100 RTS \BACK TO BASIC
1110 \
1120 .delay
1130 .loop1
1140 LDA#149
1150 .loop2
1160 SBC#1:BPLloop2
1170 DECcounter
1180 BPLloop1
1190 RTS
1200 \
1210 .lasermove
1220 LDX#&BD:JSRtestkey
1230 BEQlsbl
1240 \ HIT RIGHT SIDE?
1250 LDAlas:CMP#&E0:BNElsbr
ght
1260 LDAlas+1:CMP#&7F:BNEls
brght
1270 RTS
1280 .lsbrght \MOVE RIGHT
1290 JSRlaserprint
1300 CLC
1310 LDAlas:ADC#8:STAlas:BC
C nocarry1
1320 INC las+1
1325 .nocarry1
1330 JSRlaserprint
1340 RTS
1350 .lsbl
1360 LDX#&9E:JSR testkey
1370 BEQrtn
1380 \ HIT LEFT SIDE?
1390 LDAlas:CMP#&C8:BNElsbl
ft
1400 LDAlas+1:CMP#&7E:BNEls
```

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```
blft
 1410 RTS
 1420 .lsblft \MOVE LEFT
 1430 JSRlaserprint
 1440 SEC
 1450 LDAlas:SBC#8:STAlas: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:BNEtryfire
 1530 RTS
 1540 .tryfire
 1550 LDX#3:.nfb:LDAbflag,X:
CMP#0:BEQfireok:DEX:BPLnfb:R
TS
 1560 .fireok
 1570 SEC
 1580 LDAlas:SBC#&38:STAbolt
low,X:STA&72
 1590 LDAlas+1:SBC#1:STAbolt
hi,X:STA&73
 1600 LDA#99:STAbflag,X
 1610 JSRprintbolt
 1620 LDY#&9: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 LDAbflag,X:BEQnexlas
 1790 SEC
 1800 LDAboltlow,X:STA&72:SB
C#&40:STAboltlow,X:STAtemp1
 1810 LDAbolthi,X:STA&73:SBC
#&01:STAbolthi,X:STAtemp2
 1820 SEC:LDAtemp1:SBC#8:STA
temp3:LDAtemp2:SBC#0:STAtemp
4
 1830 JSRprintbolt
 1840 LDAtemp2:CMP#&5F:BMIbb
b
 1850 LDY=7:LDA(&72),Y
 1860 CMP#&FF:BEQbbb
 1870 LDX#62
 1880 .loopg
 1900 LDAmov,X:BEQnextg
 1910 CMP=3:BEQnextg
 1920 LDAtemp1:CMPpos,X:BNEh
l
 1930 LDAtemp2:CMPpos+1,X:BE
Qhit
 1940 .hl
 1950 LDApos,X:CMPtemp3:BNEn
extg
 1960 LDApos+1,X:CMPtemp4:BE
Qhit
 1970 .nextg:DEX:DEX:BPL loo
pg
 1980 LDAtemp1:STA&72:LDAtem
p2:STA&73
 1990 JSRprintbolt
 2000 .nexlas
 2010 LDA&78:BEQfin:JMPlaslo
op:.fin:RTS
 2020
 2030 .hit:JSRwpguer:INC&77:
CLC:LDA&80:ADChitscore:STA&8
0:LDA&81:ADC#0:STA&81
 2040 LDA#3:STAmov,X:LDA#0:S
TAcarry,X
 2050 .bbb:LDY&78:LDA#0:STAb
flag,Y
 2060 JMPnexlas
 2070
 2080 .printbolt
 2090 LDY#3
 2100 .bolt
 2110 LDA(&72),Y
 2120 EOR&C28,Y:STA(&72),Y
 2130 DEY:BPLbolt
 2140 RTS
 2150 \
 2160 .bombs
 2170 LDX&76:CPX#4:BNEbmb:RT
S
 2180 .bmb
 2190 LDAbombloc,X:STA&70
 2200 LDAbombloc+1,X:STA&71
 2210 JSRprintbomb
 2220 CLC
```

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

MicroLink

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

```
 2230 LDAbombloc,X:ADC#&40:S
TAbombloc,X:STA&70
 2240 LDAbombloc+1,X:ADC#&01
:STAbombloc+1,X:STA&71
 2250 LDY#5:LDA(&70),Y:CMP#&
9F:BEQhitlsb
 2260 CMP#&FF:BEQbombend
 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 LDAbombloc,Y:STAbomblo
c-2,Y
 2350 LDAbombloc+1,Y:STAbomb
loc-1,Y
 2360 TYA:CMP#42:BNEdownshif
t
 2370 DEC&76:DEC&76:JMPnextb
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 LDAmov,X
 2490 CMP#3:BNEnotdd:JMPdead
 2500 .notdd
 2510 CMP#0:BEQstill
 2520 TXA:STAtempx
 2530 LDA#0:STA&2B:STA&2C:ST
A&2D
 2540 LDAbombrate:STA&2A:JSR
&AF12
 2550 LDXtempx:LDA&2A:CMP#1:
BNErorl
 2560 LDY#5
 2570 LDApos,X:STA&70
 2580 LDApos+1,X:STA&71
 2590 LDA(&70),Y:CMP#&03:BNE
rorl
 2600 LDA&76:CMP#40:BPLrorl
 2610 LDY &76:INY:INY:STY&76
 2620 CLC
 2630 LDApos,X:ADC#2:STAbomb
loc,Y:STA&70
 2640 LDApos+1,X:ADC#0:STAbo
mbloc+1,Y:STA&71
 2650 JSRprintbomb
 2660 .rorl:LDAmov,X:CMP#1:B
EQrght
 2670 .notrght:CMP#2:BNEstil
l:JMPlft
 2680 .still
 2690 JSRwpguer:JSRprtguer:J
MPcont
 2700 \
 2710 .rght \RIGHT MOVERS
 2720 LDAcarry,X
 2730 CMP#0:BEQmvrght
 2740 CMP#1:BNEnotmrc:JSRmrc
:JMPcont
 2750 .notmrc:JSRmrls:JMPcon
t
 2760 .mvrght \ALONE
 2770 LDApos,X:STA&70
 2780 LDApos+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:STAmov,X
 2830 LDA#1:STAcarry,X
 2840 JSRmlc:JMPcont
 2850 .nchr
 2860 CMP#&70:BNEbot
 2870 LDA#2:STAmov,X
 2880 LDA#2:STAcarry,X
 2890 JSRmlls:JMPcont
 2900 .bot
 2910 JSRmgr
 2920 LDApos,X:CMP#&F0:BEQbo
t1:JMPcont
 2930 .bot1
 2940 LDApos+1,X:CMP#&75:BEQ
bot2:JMPcont
 2950 .bot2
 2960 JSRprtguer
 2970 LDA#&80:STApos,X
 2980 LDA#&5F:STApos+1,X
 2990 JSRprtguer:JMPcont
 3000 \
 3010 .mgr
 3020 JSRwpguer:CLC
 3030 LDApos,X:ADC#8:STApos,
X:BCC nocarry4
 3040 INC pos+1,X
 3045 .nocarry4
 3050 JSRprtguer:RTS
 3060 .mrc \WITH CHURN
 3070 JSRmgr:SEC
 3080 LDApos,X:SBC#16:STA&70
 3090 LDApos+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 LDApos,X:STA&72
 3160 LDApos+1,X:STA&73
 3170 LDY#30
 3180 .rep
 3190 LDArside,Y
 3200 CMP&72:BNEnextB
 3210 LDArside+1,Y:CMP&73:BE
Qhtsrtch
 3220 .nextB:DEY:DEY:BPLrep
 3230 RTS
 3240 .htsrtch
 3250 JSRprtch
 3260 LDA#2:STAmov,X:LDA#0:S
TAcarry,X
 3270 RTS
 3280 .mrls \WITH LASER
 3290 JSRmgr
 3300 SEC
 3310 LDApos,X:SBC#24:STA&70
 3320 LDApos+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 LDApos,X:STA&72
 3390 LDApos+1,X:STA&73
 3400 LDY#30
 3410 .repl
 3420 LDArside,Y
 3430 CMP&72:BNEnextC
 3440 LDArside+1,Y:CMP&73:BE
Qhtsrtlsb
 3450 .nextC:DEY:DEY:BPLrepl
:RTS
 3460 .htsrtlsb
 3470 JSRprtlsb
 3480 LDA#2:STAmov,X:LDA#0:S
TAcarry,X
 3490 LDA#99:STA&74:RTS
 3500 \
 3510 .lft \LEFT MOVERS
 3520 LDAcarry,X
 3530 CMP#0:BEQmvlft
 3540 CMP#1:BNEnmlc:JSRmlc:J
MPcont
 3550 .nmlc:JSRmlls:JMPcont
 3560 .mvlft \ALONE
 3570 SEC
 3580 LDApos,X:SBC#8:STA&70
 3590 LDApos+1,X:SBC#0:STA&7
1
 3600 LDY#11:LDA(&70),Y:CMP#
&25:BNEtop
 3610 LDY#5:LDA(&70),Y
 3620 CMP#&99:BNEnchl
 3630 LDA#1:STAmov,X
 3640 LDA#1:STAcarry,X
 3650 JSRmrc:JMPcont
 3660 .nchl
 3670 CMP#&E0:BNEtop
 3680 LDA#1:STAmov,X
 3690 LDA#2:STAcarry,X
 3700 JSRmrls:JMPcont
 3710 .top
 3720 JSRmgl
 3730 LDApos,X:CMP#&80:BEQto
p1:JMPcont
 3740 .top1
 3750 LDApos+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:CMP&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 .mlls \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
S nocarry7
4170 DEC&71
4175 .nocarry7
4180 JSRprtlsb
4190 LDApos,X:STA&72
4200 LDApos+1,X:STA&73
4210 LDY#30
4220 .replL
4230 LDAlside,Y
4240 CMP&72:BNEnextD
4250 LDAlside+1,Y:CMP&73:BE
QhtslftlsD
4260 .nextD:DEY:DEY:BPLrepl
L:JMPcont
4270 .htslftlsb
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:CMP#8:B
NEwguer
4550 .guer
4560 LDA&C00,Y
4570 EOR(&70),Y:STA(&70),Y
4580 DEY:BPLguer
4590 RTS
4600 .wpguer
4610 LDApos,X:STA&70
4620 LDApos+1,X:STA&71
4630 LDY#15
4640 LDAcycle:AND#8:CMP#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 RESTORE4860
4840 REM Guerrrilla data
4850 FOR N%=&C00 TO &C0F:RE
AD data%:?N%=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 N%=&C90 TO &C9F:RE
AD data%:?N%=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 N%=&C10 TO &C1F:RE
AD data%:?N%=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 N%=&C30 TO &C47:RE
AD data%:?N%=data%:NEXT
4950 DATA&00,&00,&00,&00,&1
0,&30,&70,&60,&00,&60,&60,&6
0,&F0,&F0,&F0,&60,&00,&00,&0
0,&00,&80,&C0,&E0,&60
4960 REM Milk churn data
4970 FOR N%=&C20 TO &C27:RE
AD data%:?N%=data%:NEXT
4980 DATA&00,&FF,&FF,&66,&F
F,&99,&99,&FF
4990 REM Bomb and Laserbolt
data
5000 FOR N%=&C28 TO &C2F:RE
AD data%:?N%=data%:NEXT
5010 DATA&22,&44,&22,&44,&6
6,&00,&66,&66
5020 ?&74=0:?&76=4:!bflag=0
5030 ?&80=0:?&81=0:?&84=0
5040 ENDPROC
5050
5060 DEFPROCinstruct
5070 CLS:PROCcolours(1,3,7)
:*FX21
5080 COLOUR0:COLOUR129:PRIN
TTAB(0,2)STRING$(20," ");TAB
(0,3)" Cosmic Guerrillas
";TAB(0,4)STRING$(20," "):COL
OUR128
5090 COLOUR3:PRINTTAB(0,10)
"Controls:":COLOUR1:PRINTTAB
(0,14)SPC6"Z - Left"SPC6"X
- Right" Return - Fire"
5100 COLOUR2:PRINTTAB(0,22)
SPC6"Q - Quiet "SPC6"S - So
und on"
5110 COLOUR3:PRINTTAB(5,30)
"Press Space"
5120 ENDPROC
5130
5140 DEFPROCinitguer
5150 FOR N%=0 TO 63:N%?mov=
0:NEXT
5160 M%=0
5170 FOR N%=&60C0 TO &7380
STEP &140:M%?pos=N%MOD256:M%
?(pos+1)=N%DIV256:M%?lside=N
%MOD256:M%?(lside+1)=N%DIV25
6:M%=M%+2:NEXT
5180 FOR N%=&61F0 TO &74B0
STEP &140:M%?pos=N%MOD256:M%
?(pos+1)=N%DIV256:M%?lside=N
%MOD256:M%?(lside+1)=N%DIV25
6:M%=M%+2:NEXT
5190 ?&77=0
5200 ENDPROC
5210
5220 DEFPROCinitchurns
5230 FORrow%=&6140 TO &7400
STEP &140
5240 FOR side%=0 TO 56 STEP
56
5250 FORcolumn%=0 TO 16 STE
P 8
5260 CH%=row%+column%+side%
5270 FORK%=0TO7:K%?CH%=K%?&
C20:NEXT
5280 NEXT column%
5290 NEXT side%
5300 NEXT row%
5310 ENDPROC
5320
5330 DEFPROCinitlasers
5340 FORrow%=&62A0 TO &71A0
STEP &780
5350 FORK%=0TO15:K%?row%=K%
?&C10:NEXT
5360 NEXT row%
5370 FORK%=0TO23:K%?&7F60=K
%?&C30:NEXT
5380 ?las=&60:?(las+1)=&7F
5390 ENDPROC
5400
5410 DEFPROCrandstarts(strt
%)
5420 FOR N%=0 TO 62 STEP 2:
N%?&C50=RND(strt%):N%?&C51=N
%DIV32+1:NEXT
5430 ENDPROC
5440
5450 DEFPROCendgame
5460 TIME=0:REPEATUNTILTIME
>=300
5470 CLG
5480 PROCcolours(2,3,4)
5490 COLOUR2:PRINTTAB(3,10)
"You scored ";STR$(sc%):COLO
UR1
5500 IF sc%>hi%(10) THEN PR
INT"which is one of the
ten best scores" ELSE GOTO
5590
5510 *FX15,0
5520 A=INKEY(300)
5530 hi%(10)=sc%:hi$(10)="
5540 FOR N%=9 TO 1 STEP-1
5550 IF hi%(N%)<hi%(N%+1) P
ROCswap
5560 NEXT
5570 GCOL3,129:CLG:GCOL0,12
8:CLG:PROCtable
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$(num%):VDU23,1,0;0;0;0;
5590 *FX15,0
5600 A=INKEY(400)
5610 ENDPROC
5620
5630 DEFPROCswap
5640 hi%=hi%(N%):hi%(N%)=hi
%(N%+1):hi%(N%+1)=hi%
5650 hi$=hi$(N%):hi$(N%)=hi
$(N%+1):hi$(N%+1)=hi$
5660 ENDPROC
5670
5680 DEFPROCtable
5690 CLS
5700 PROCcolours(5,3,1)
5710 COLOUR3:COLOUR130:PRIN
TTAB(0,2)STRING$(20," ");TAB
(0,3)" High Score Table ";
TAB(0,4)STRING$(20," "):COLO
UR128
5720 FOR N%=1 TO 10:col%=6+
N%*2
5730 COLOUR1:PRINTTAB(0,col
%)LEFT$("00000",5-LEN(STR$hi
%(N%)))hi%(N%);TAB(5,col%)"-
":COLOUR3:PRINTTAB(6,col%)hi
$(N%):IF hi%(N%)=sc% THEN cc
%=col%:num%=N%
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 *KEY0 *T.|MD%=PAGE-&E0
0:FOR N%=PAGE TO TOP STEP 4:
!(N%-D%)=!N%:NEXT:!(TOP-D%)=
&FF0D:PAGE=&E00|MOLD|MRUN|M
5840 *FX138,0,128
```

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

Loan calculator

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

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 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 difference 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 balance 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. ■

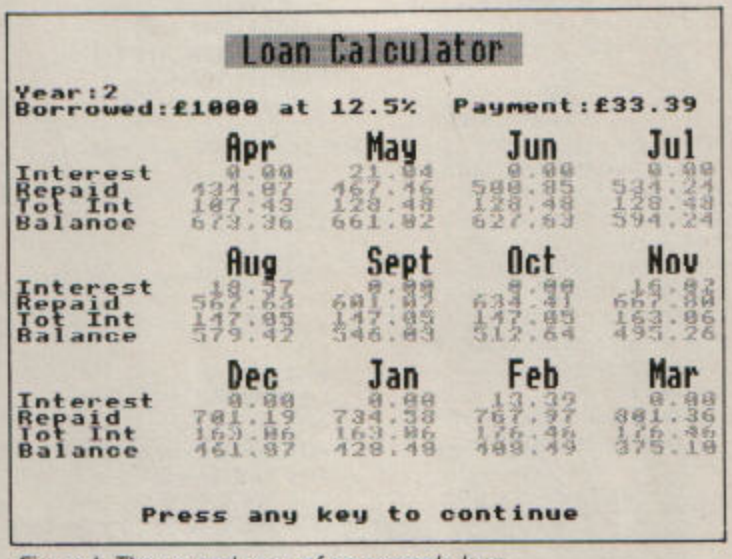


Figure I: The second year of an example loan

```
   10 REM Loan Calculator
   20 REM by Barry Wood
   30 REM (c) Electron User
   40 MODE1:@%=&20208
   50 PRINT:PRINTTAB(12,0);:
PROCbig(" Loan Calculator ",
2,1)
   60 PRINT':INPUT"How much
are you borrowing? £"princip
al:bal=principal
   70 PRINT:INPUT"What is th
e annual interest rate? "rat
e
   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
T"Answer 1 (Jan) to 12 (Dec)
."start
  120 IFstart<10Rstart>12 TH
EN 110 ELSE start = 12-start
  130 VDU 23,1,0;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(month$
(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"
;:*FX 15,1
  430 A=GET
  440 UNTIL bal<0
  450 PRINTTAB(5,24)SPC(25)T
AB(14,24)"LOAN REPAID";: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 B$=MID$(m$,K%)
  580 ?&6F=ASCB$:A%=10:X%=&6
F:Y%=0:CALL&FFF1
  590 VDU23,228,?&70,?&70,?&
71,?&71,?&72,?&72,?&73,?&73
  600 VDU23,229,?&74,?&74,?&
75,?&75,?&75,?&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

No better cheats can be found . . .

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 use the embedded command HT 1 8.

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 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 t
o change discs (Y/N)?"
 1100 x$=GET$
 1110 IF x$="N" or x$="n" E
NDPROC
 1120 IF x$="Y" or x$="y" P
RINT "Change discs and pre
ss 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, Littlehampton, West Sussex.**

Word of warning

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

Turn to Page 48 ►

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 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 gen up on the Electron and they are helping me enormously. – **Paul Dobson, Knottingly, 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.

◀ 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 accomodation 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? 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.

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.

Fun with Felix

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

```
CALL &1235
```

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

```
CALL &1234
```

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 do 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

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 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 mnemonics 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 transfered 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 decenders.

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 0 and Return. Do this again on the following line but replace the TM with HM. 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, Bilsbarrow, 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*.

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 greatful 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 greatful 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 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
```

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.

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Nim
Odd Man Out
Pelmanism
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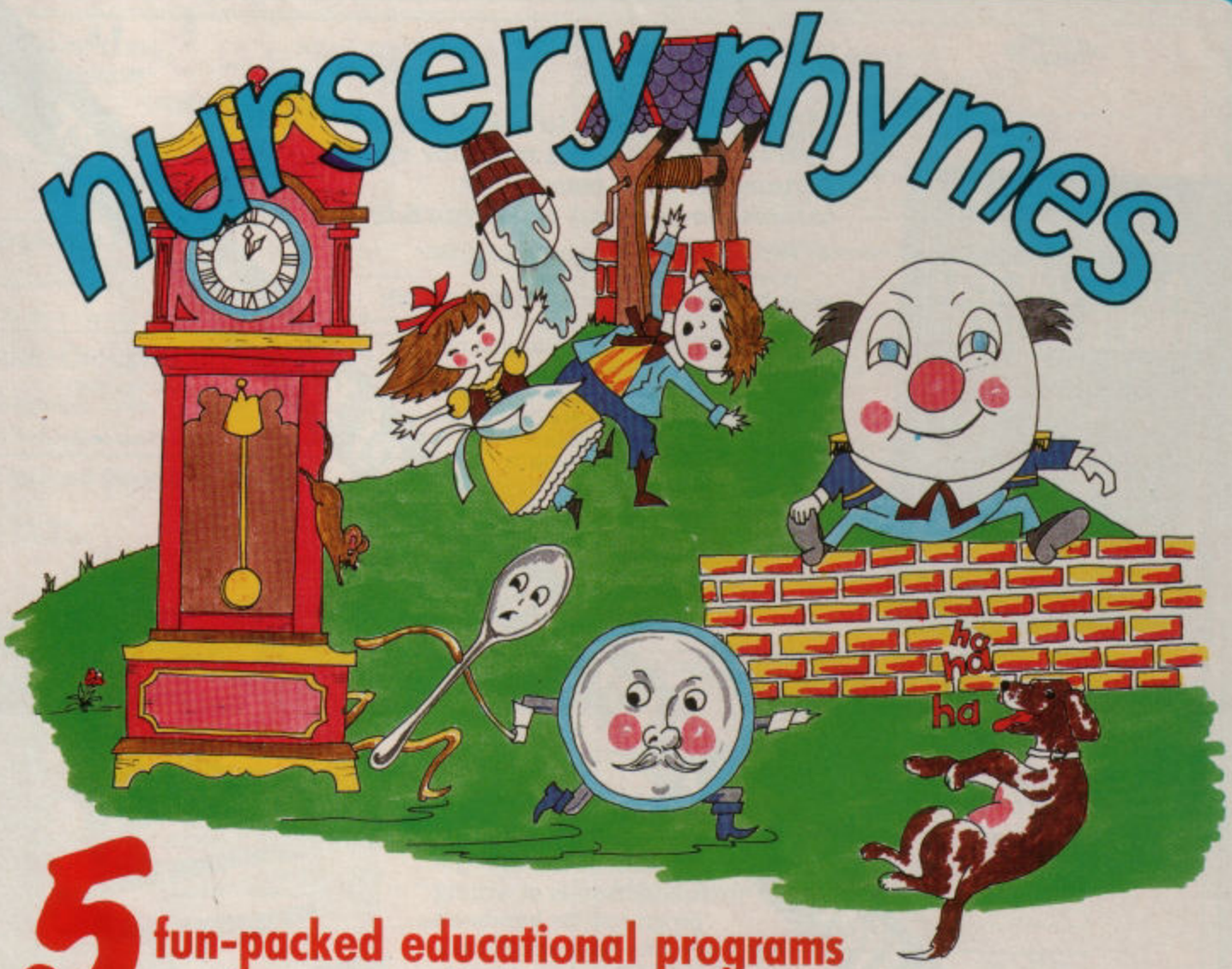
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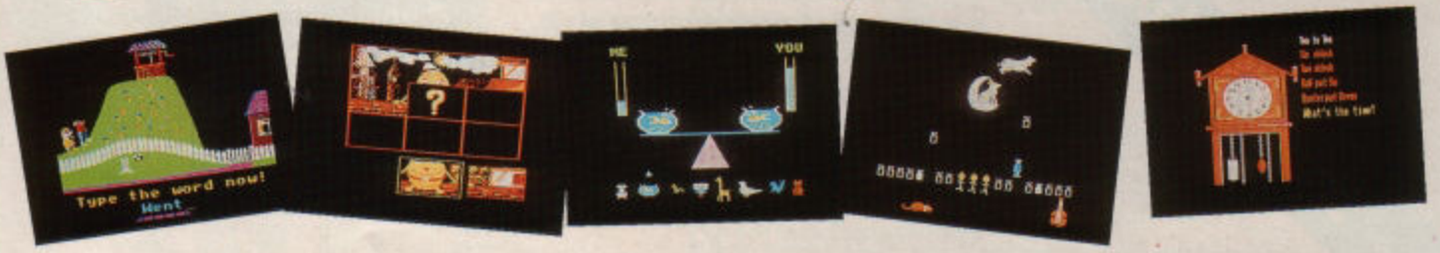
ODD MAN OUT
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TO ORDER PLEASE USE THE FORM ON PAGE 53

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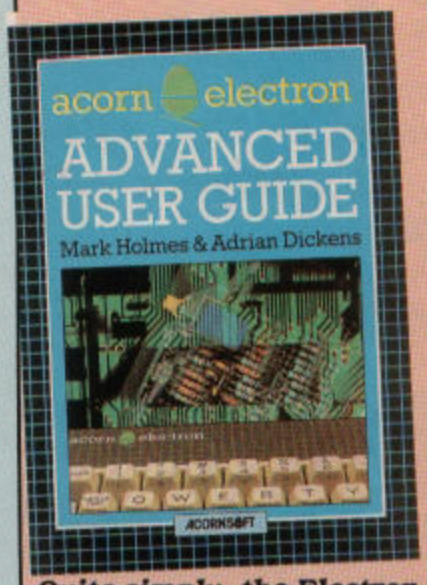
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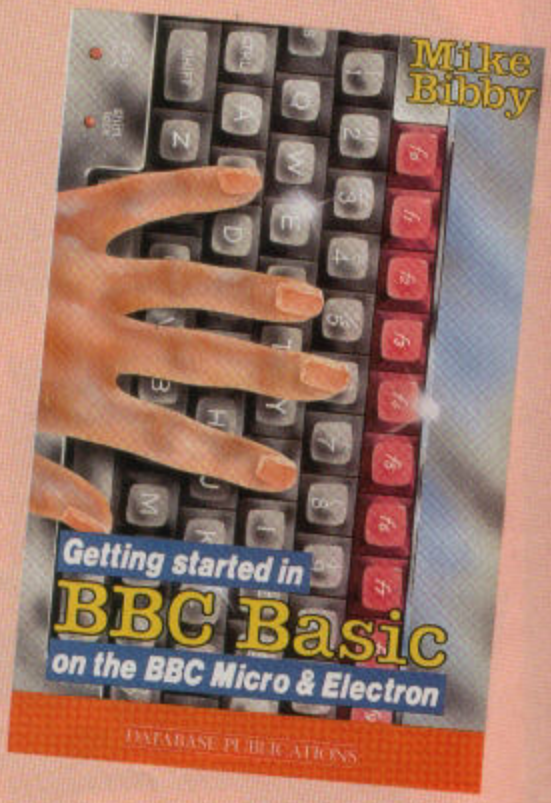
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Pedantic perhaps, but powerful

MIKE PLUMMER introduces that elegant programming language, Pascal

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 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 everthing 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, variable, 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 timestable (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;

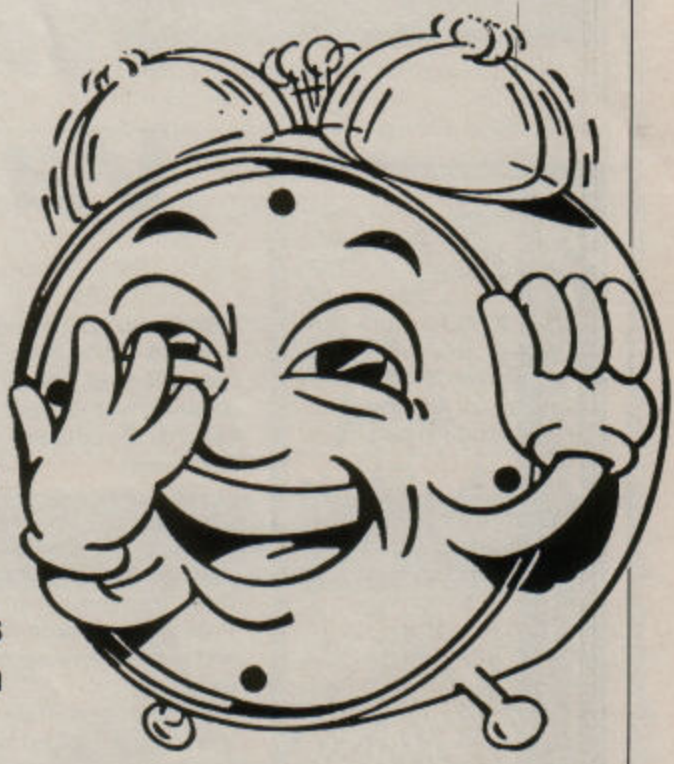
BEGIN
 mult:=num1*num2
END;

(* 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.
```

Program II

TIME FOR THOUGHT

GUY TURLEY solves the age-old problem of timekeeping



KEEPING track of time is a 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
```

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=&95:S=&92:X=&8E:Y=&8F
 110 FOR I%=0 TO 2 STEP 2
 120 P%=&B00
 130 [OPT I%
 140 .ISR
 150 PHP:PHA:TXA:PHA:TYA:PHA
 160 LDA &355
 170 CMP #1:BEQ EXIT:CMP #2:BEQ EXIT:CMP #5:BEQ EXIT
 180 INC COUNTER:LDA COUNTER:CMP #50
 190 BMI EXIT
 200 JMP CLOCK
 210 .EXIT
 220 PLA:TAY:PLA:TAX:PLA:PLP
 230 RTS
 240 .CLOCK
 250 LDA #0:STA COUNTER
 260 SED:CLC:LDA S:ADC #1:STA S
 270 SED:CMP #&60:BNE print
 280 LDA #0:STA S
 290 LDA M:CLC:ADC #1:STA M
 300 LDA M:CMP #&60:BNE print
 310 LDA #0:STA M:LDA H:CLC:ADC #1:STA H:CMP #&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:CMP #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 &96
 460 LDA &351:ADC Y:STA &97
 470 LDY #0:LDA #0:.L3 STA (&96),Y:INY:CPY #8:BNE L3:LDA &96:CLC:ADC #8:STA &96:LDA &97: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 LOOP
 680 LDA &96:CLC:ADC #8:STA &96
 690 LDA &97:ADC #0:STA &97
 700 .return RTS
 710 .colon LDX #0
 720 LDY #0
 730 .L2 LDA &C0D0,X:INX:EOR #&FF:STA (&96),Y
 740 INY:CPX #8:BNE L2
 750 LDA &96:CLC:ADC #8:STA &96
 760 LDA &97:ADC #0:STA &97
 770 JMP return
 780 ]
 790 NEXT
 800 ENDPROC
 810 DEFPROCGETTIME
 820 CLS
 830 INPUT'"ENTER HOURS "A$:?H=EVAL("&"+A$)
 840 INPUT"ENTER MINUTES "A$:?M=EVAL("&"+A$)
 850 INPUT"ENTER SECONDS "A$:?S=EVAL("&"+A$)
 860 PRINT"PRESS A KEY...":A=GET
 870 ?&220=ISR MOD 256
 880 ?&221=ISR DIV 256
 890 *FX14,4
 900 ENDPROC
```

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

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 promisses 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 Dribble 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 consule.

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, 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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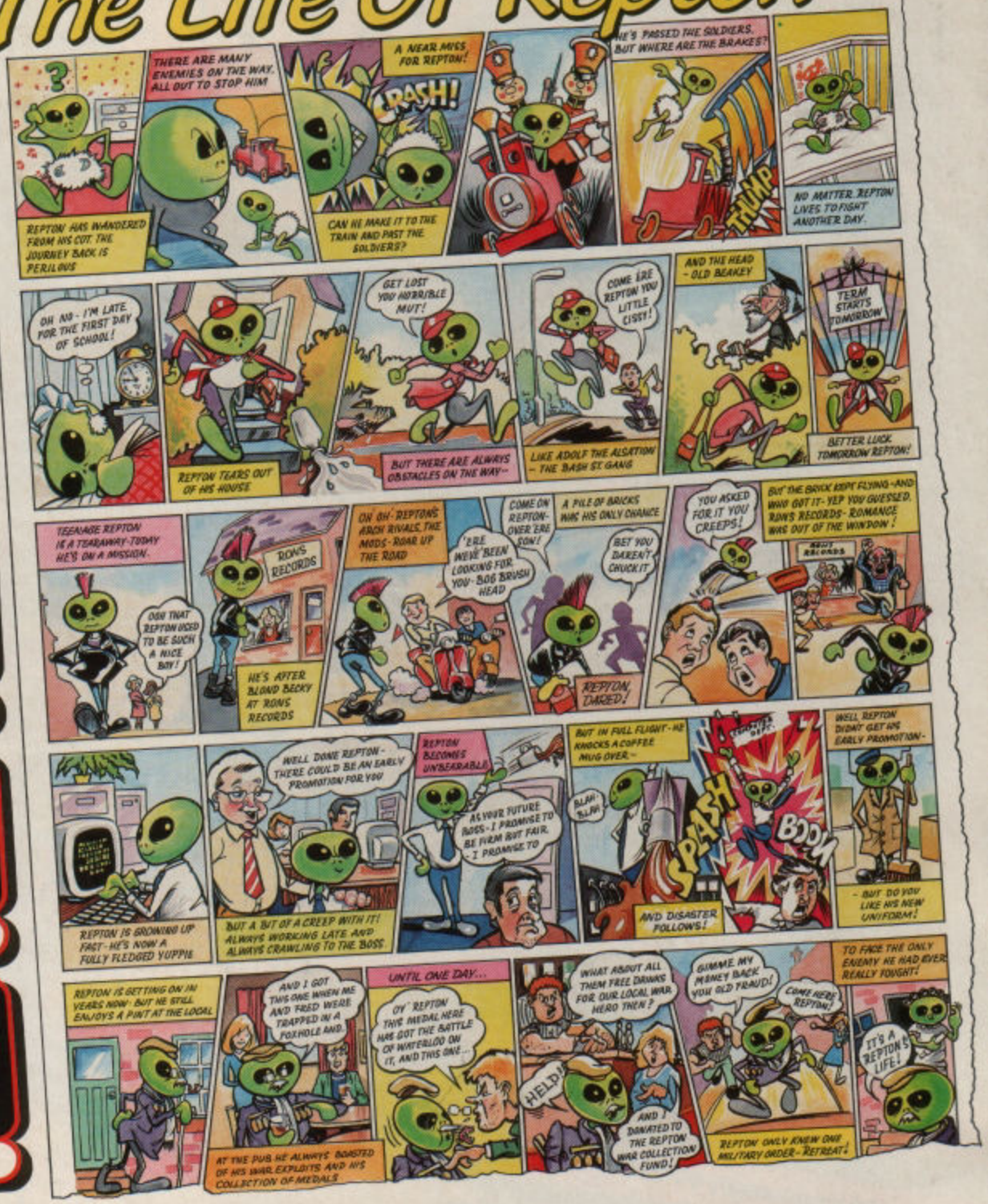
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