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A Database Publication

electron user

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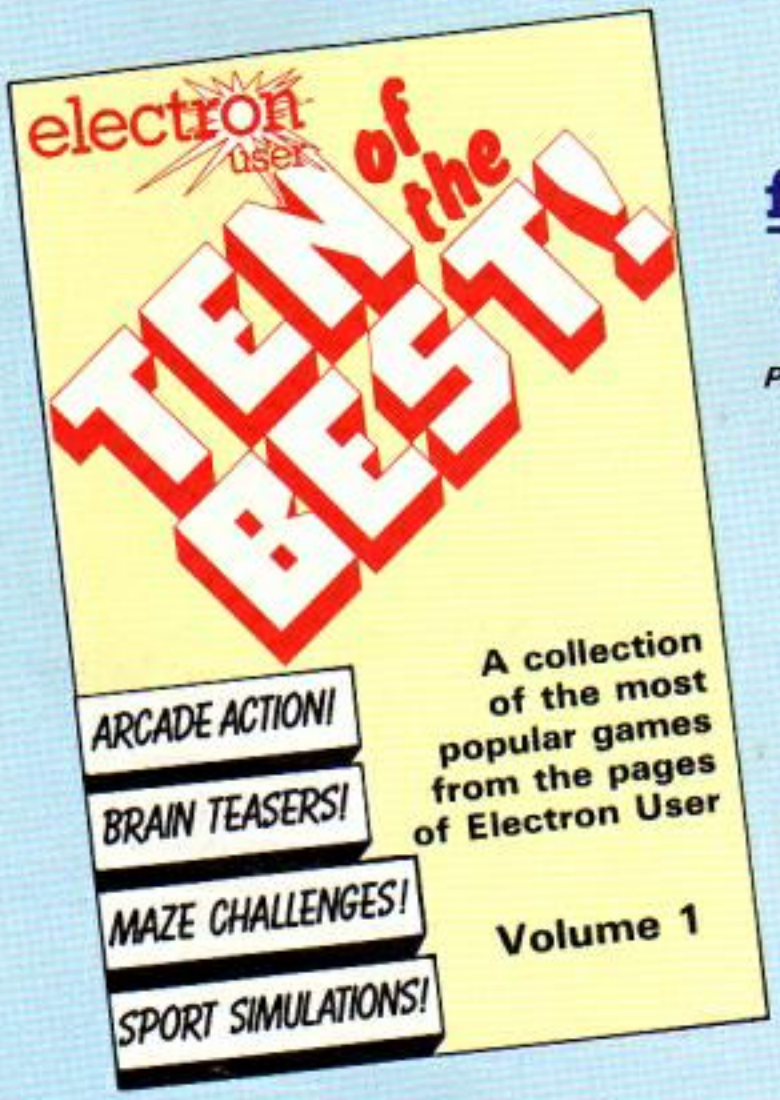

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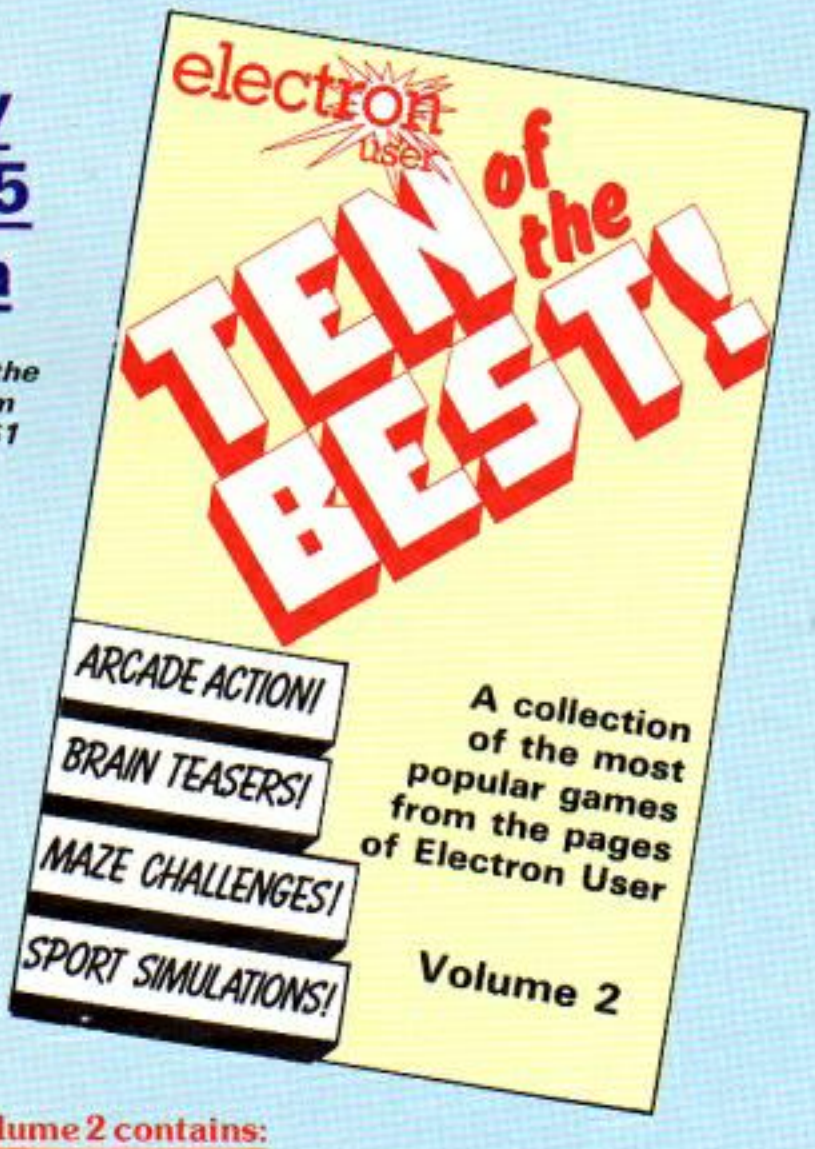

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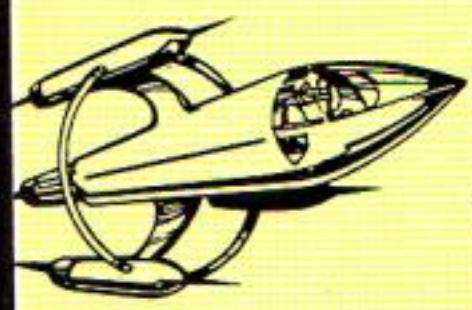

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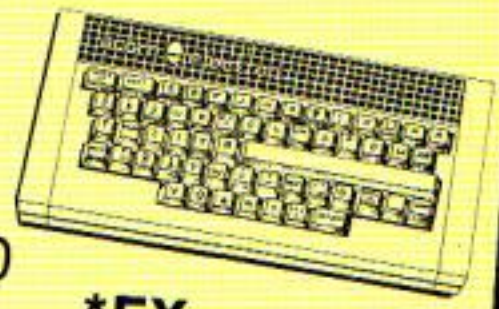

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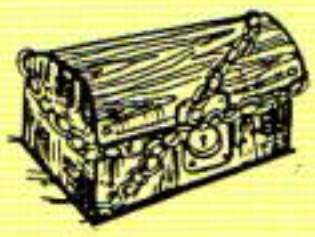

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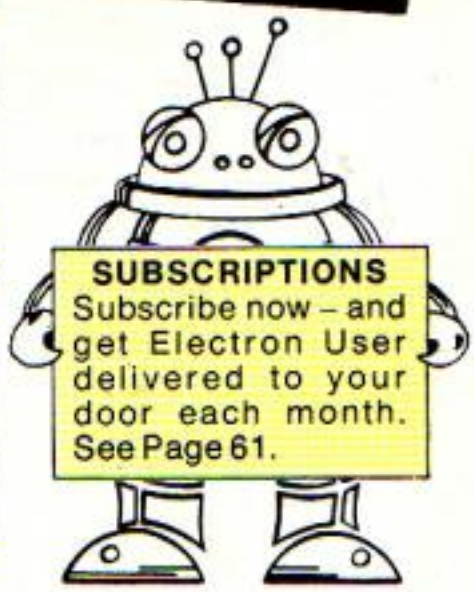

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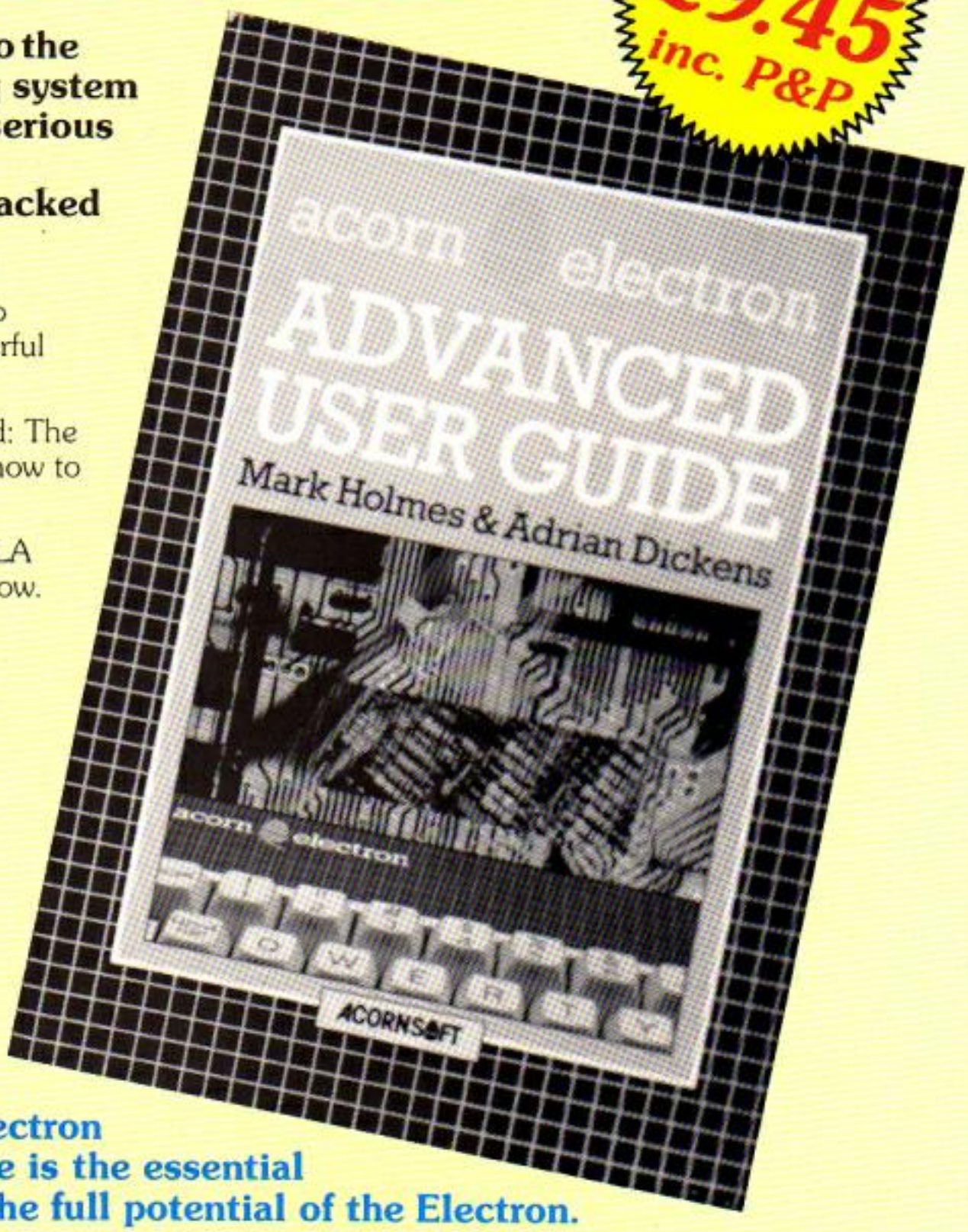

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electron user NEWS

Electron users go for Gold

WHEN Electron users can finally link their micro to the telephone they will be able to join one of the most ambitious communications developments of 1985.

MicroLink is a nationwide network of computer enthusiasts, set up by Database Publications in association with Britain's national electronic mail service, Telecom Gold.

Its members use a wide range of micros, from the Spectrum to sophisticated business machines – and they can all talk to each other via the Telecom Gold mainframe in London.

And because they use high-speed PSS, which has input points all over Britain, more than 90 per cent of them can do this at local call rates.

With MicroLink you will also be able to use your Electron as a telex terminal – which would cost you £2,000 to buy separately.

Watch for details of how to join MicroLink – and play your own part in the communications revolution – in future issues of *Electron User*.

Communications pack opens door to world

A REVOLUTIONARY communications package for the Electron is being tested behind locked doors in the heart of Yorkshire.

Developed jointly by Acorn and Pace Micro Technology of Bradford, the project – currently top secret – will enable Electron users for the first time to reap the benefits of the telecommunications explosion.

Electron User understands that the device is an interface card which has been designed to fit into a socket on the back of the Plus One.

The card has an eprom on board which contains the critical software, so eliminating the need to load the program from disc or tape.

Questioned about the hush hush work being undertaken at the company headquarters, a Pace spokesman admitted that the communications package is a reality.

"Yes we are working on it", he agreed. "But at the moment it is impossible to predict an exact date when it will be available or what the price tag will be".

However since then *Electron User* has learned that the communications package will almost certainly be on sale at the Electron and BBC Micro User Show to be held in Manchester in September.

"It will certainly be ready by then", a company source revealed.

It was apparently Acorn who approached Pace, already a major force in the communications field, to achieve the breakthrough for the Electron.

The company is well known for its bestselling Nightingale modem and Commstar communications software for the BBC Micro.

And Andy Hood, the author of Commstar and currently software development manager for Pace, was selected to write the communications program for the Electron.

"The end product will make the Electron behave like the BBC Micro with Commstar", claimed the Pace source. "And that will open up a whole new exciting on-line world for Electron users . . ."

DATABASE ON ROM

SLOGGER claims to be the first company to produce a database on ROM for the Electron.

Its newly-released StarStore allows the storage and retrieval of information, putting it into order, printing it selectively and producing mailmerge files.

The £29.95 database was written specifically for the Electron and to complement another Slogger product, the StarWord word processor.

NEW SOFTWARE LINK

A FURTHER disc interface has been brought out for the Electron which will allow access to a wider range of software.

The latest system, from Advanced Computer Products, is a ROM sideways adapter board and 1770 DFS.

Using them together the Electron will be able to access a range of programs intended for the BBC Micro and the new BBC+.

ACP does warn, however, that BBC programs which use Mode 7 will not run because the Electron has no facility for its use, although it will be possible to read the listings on screen.

The sideways ROM adapter board, which connects to the Acorn Plus 1, allows the user to plug in two eproms such as graphics or ACP's own Advanced Disc Toolkit.

This was not possible before because the Electron only has two cartridge slots.

The 1770 DFS, which will be supplied on eprom, can be put into the adapter board. Because the BBC+ uses the same chip its incorporation in the Electron will allow the user to gain access to BBC programs on disc.

At the time of going to print product names or prices had not been set although an ACP spokesman said the board was likely to cost under £15.

Add-on for the Plus 1

NEW from Solidisk, the STL-EFS for the Electron combines 16k sideways RAM, single and double density disc interface, running both BBC DFS format and Plus 3 ADFS discs with a socket for a Winchester drive.

It plugs into any slot on the Plus I and costs £59.

Solidisk also has a special disc pack offer consisting of a Mitsubishi 3½in 80 track double-sided drive with built-in PSU, the EFS card and four discs for £200.

MUTANT BATTLE

A COOL head is needed by Electron users wanting to pit their wits against Bevan Technology's latest creations.

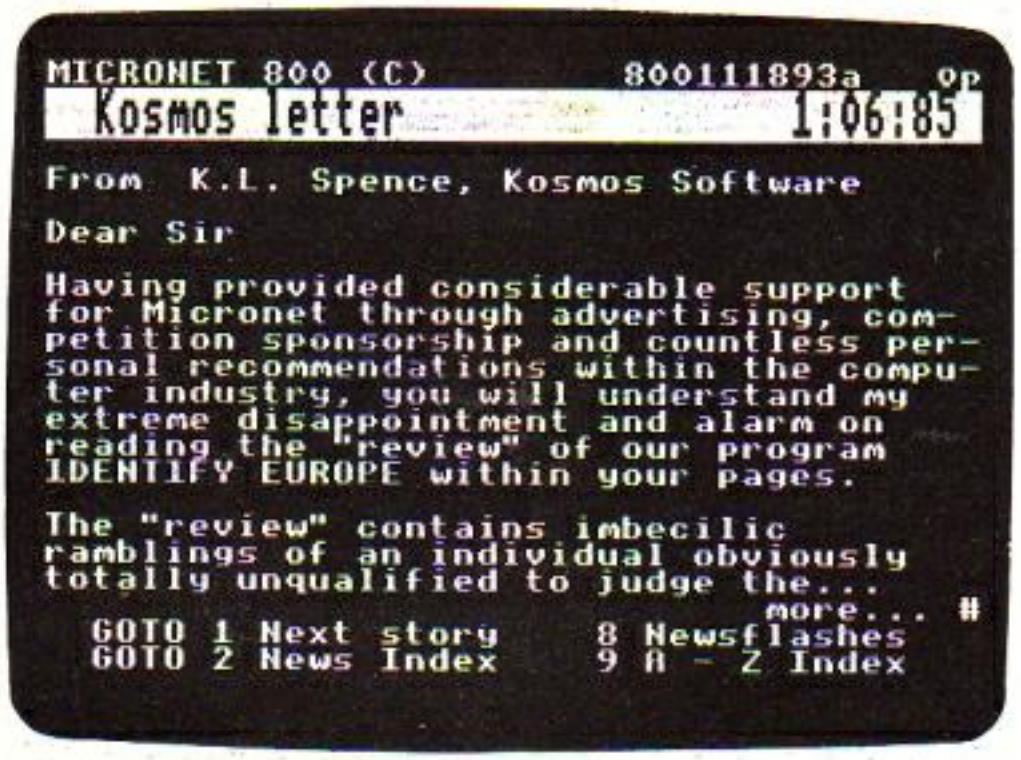
Harker, Septives, Invulnos and Vilox are just some of the mutants and alien beings featured on the company's Aabatron and One Last Game.

In Aabatron the beings from another world can only be shot while moving on some screens and on others only while stationary. One Last Game is similar but it is an advanced defender rather than attacker game.

Distributed by CBS, both cost £7.95.

Log-on and enjoy a king-sized barney

MODEMS have been on overtime during a heated row between Electron software publisher Kosmos and Micronet 800 that has been entertaining telecomputing enthusiasts in recent weeks.



What started as an argument about qualifications of educational software reviewers has spilled over into areas such as the standards of electronic journalism and the merits of multiple choice versus traditional methods of testing knowledge levels.

The dispute began when Micronet ran a review by T.D. Brovnik of the Kosmos geography quiz program "Identify Europe".

Brovnik's assessment included the comments "unimaginative" and "ineffective" and concluded: "But for its high resolution colour display, this program could have been written 15 years ago".

Kosmos boss Keith Spence was incensed by the review and complained to Micronet about "imbecilic ramblings of an individual obviously totally unqualified to judge the merits of educational software".

Spence said the review was "an insult to myself, my company, the author, and the educationalists involved in the program's formulation and design.

"Educational software reviews must be carried out by a responsible educationalist – not by someone whose capacities do not extend beyond steering colourful blobs around games software screens.

"The reviewer, while wallowing in his egotism, has even had the audacity to challenge the multiple choice answers technique and to suggest we were not capable of writing software incorporating direct response analysis.

"It is hard to believe your reviewer could publicly admit to such a fundamental ignorance of modern teaching and testing techniques".

Spence gave Micronet 24 hours to remove "this worthless and damaging "review" under threat of severing his association with the network, withdrawing his advertising – and cancelling his agreement to appear on Micronet's Celebrity Chatline.

Micronet responded by publishing Spence's views on the network along with the statement: "Our reviewer has been a lecturer in computer science for the past five years, and worked for three years at the Council for Educational Technology as a researcher in computer aided learning".

But Jeff Hughes of Liverpool SPS Advisory Centre mailboxed: "It seems that we continue to suffer the presumption that those who teach computer studies are experts in educational computing.

"The record of CET is nothing to write home about, most advances being made in spite of their influence rather than otherwise".

Barbara Conway of Starlight came to Micronet's defence with: "...a small bouquet over the way you reacted to the Kosmos attempt to force you to change an adverse review of one of their programs".

But Richard Ross-Langley, managing director of Mine of Information, mailboxed Keith Spence with: "While not commenting on your specific case, I support the principle to get Micronet to behave more responsibly.

"So many of their articles add flippancy and snap judgements that one hesitates to call it news".

At press time both Micronet and Kosmos were claiming strong support for their respective points of view. Meanwhile network subscribers were enjoying the battle of words from the sidelines.

Educational database

A SYSTEM to make selection of educational software as painless as possible for Britain's schools, colleges, universities and education authorities has come from distributor Vector Marketing. Educational establishments can now telephone 0933 79300 or write to Vector stating the subject, age group, type of computer and data system the software is required for.

Vector will then process this information through its database of more than 7,500 educational titles and supply a free printout showing the programs available, together with a brief description of the content, order code and price.

Electron joins the battle against tooth decay

GETTING its teeth into the sticky problem of tooth decay is Chester Health Authority.

The authority is hoping to improve dental health education with the aid of new technology – in this case an Electron.

"The use of the microcomputer in general education is well-proven and well established", said Mr Anthony Jenner, Chester's district dental officer.

"Its use in the context of health education in schools has however been much more circumscribed with little or no evaluation".

To help them decide Chester HA has given a place to the Electron in its converted ambulance "teaching" bus which tours local schools.

Included in the package is a home-produced program designed to use the computer's graphics and sound to full effect to attract attention and so teach children how to look after their teeth.

Fast and colourful animated characters, in a simulated fruit machine setting, react when a child answers a series of multiple choice questions on dental health.

The right or wrong choice makes the characters move and a jingle play accordingly.

A cumulative score is displayed, and is also memorised for later analysis by the Health Authority.

Mr Jenner said he hoped the use of new technology would prove to be both efficient and effective.

"Health authorities are manpower-intensive organisations, and quite clearly any use that can be made of technology in repetitive functions, providing that it is being properly evaluated, will have quite significant effects on resources.

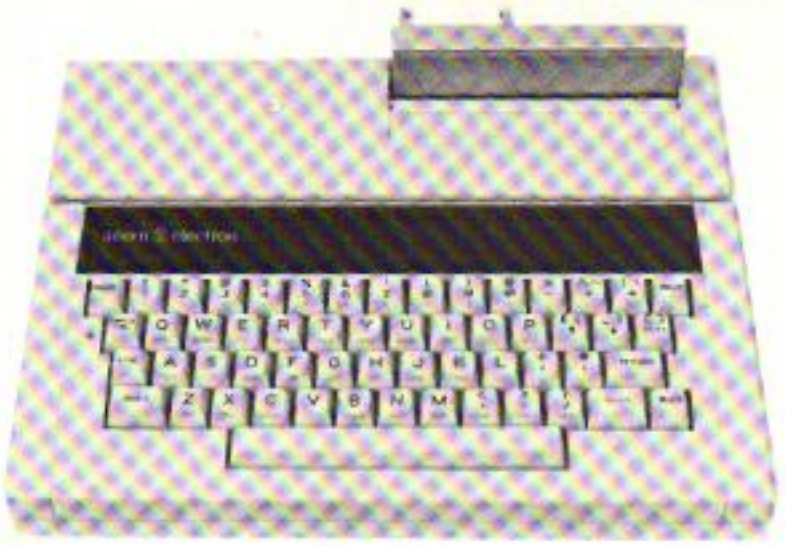
"When using new technology it is important to determine whether it produces knowledge gains greater or less than that produced by more conventional teaching.

"The current evaluation will, it is hoped, provide answers to this question".

Learning about healthy teeth – on an Electron

SOLIDISK EFS COMBINES DISC AND A SOCKET FOR THE WI

Solidisk Double Density DFS is now the ultimate in reliability and supported by the largest amount of software available for the Electron.
Solidisk relies on a good product and a large support network to win the heart of the user.
With over 75 Local Experts, covering England, Scotland and Wales, Solidisk can offer many users regional free fitting and advice.
With an ever increasing catalogue of free software, even users who are new to the Disc system can expect to build up a large library in a fairly short time.
Solidisk Software Support Service already has responsibility for over 50,000 BBC computer users and the ability to give you the best service matched only by the largest companies.
Solidisk Double Density DFS handles both BBC Discs and Electron Discs, in single and double density whereas the Acorn's PLUS 3 can only handle ADFS discs.
Solidisk ADFS has nice features such as automatic disc format sensing, built-in disc formatter and verifier and programmable disc speed.
It also has more than 20 disc utilities built into the ROM.
Standard features for both BBC DFS and ELECTRON ADFS implementations include:
1) Automatic Write Error Correction.
2) Automatic 40/80 track stepping, the ADFS 2.1 will let you read and write 40 trak discs if you have an 80 track drive.
3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER) rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.
4) Tape to disc facilities.
Direct transfer from tapes to disc (*TAPEDISC) will work with all unprotected programs. *TAPELOAD and *TAPESAVE will cope with more difficult ones. Only in some cases (multipart games cassettes) will you need Solidisk tape copier.
5) Wordprocessing facilities.
This facility allows *BOOT and other text tiles to be edited, saved and printed in any screen mode.
6) Automatic disc format sensing.
On Shift-Break, the STL ADFS 2.1 will detect the disc format and use the right BBC DFS or Electron ADFS to run.
On the Electron ADFS side, the 2.1 ROM also has some very nice features:
1) Extensive Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) are available to handle any disc drive.
2) Disc verifying facilities.
*VERIFIFY will check all disc sizes including Winchester for media defects.
3) Number of opened channels.



This is the star feature of Solidisk ADFS.
This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as on the Acorn ADFS.
It leaves PAGE at &1900 for most programs, gives more room to View and Viewsheet and avoids unnecessary conversion work for many programs originated for the BBC DFS to be run on your Electron.
On the BBC DFS side, the STL ADFS 2.1 handles both single and double density and in addition, it supports:
1) Unlimited catalogue entries.
2) Unlimited filesize.

THE SOLIDISK 16k SIDEWAYS RAM:

Solidisk Sideways RAM is an almost indispensible add-on for the Electron with disc drives.
The Sideways RAM occupies the same memory area as the BASIC or ADFS ROM in the micro's memory map. This means that Sideways RAM can run almost any ROM type software, including languages, utilities and games.
Sideways RAM is notably invaluable to run games and specially "MEGAGAMES".
Games and programs run at 2MHz clock speed in Sideways RAM, if loaded into the Electron RAM, they can only run at 1MHz clock speed, ie half the speed of Sideways based games.
Megagames are too large to be run on the unexpanded Electron. They use extensively 8 colour high resolution screen (mode 2), background music, sound and high speed sprites.
Solidisk supply free software to maximise the use of Sideways RAM on the Electron. These include Wordprocessor, Spreadsheet, Database, Toolkit, Machine Code Monitor, Printer Buffer, Sprites, Playtunes, Virtual Memory Processor, VDU Replay, Screen Effects, digitised pictures etc . . .

THE WINCHESTER SOCKET:

Solidisk has the most powerful Winchester system for the BBC computers and the Electron. The Winchester system can provide from 20 Megabytes to a theoretically possible 1300 Gigabytes of storage, directly on line with the Electron.
The same Winchester unit can be used on the BBC B, the BBC PLUS and the Electron without any change.
You can read more about it in BBC Micro User or in Acorn User Magazines. Price of a 20 Megabytes system is only £700.00+VAT (£805.00).

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

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— One software package containing four 3.5" discs, detailed below.
— Full one year guarantee and 2 manuals.

PRICE: £200.00

You can also order as many Megagame Packs at the same time as you like. Each Megagame Pack consists of three 3.5" discs and contains on average 20 games.

THE SOFTWARE:

The software contains everything to start a library: the big four (Database, Wordprocessor, Spreadsheet and Graphic), Utilities and Games.

Database:

Solidisk Database is very easy to understand and use. You are presented with a 15 option Menu. Each option will lead to a new Menu and so on. Mode 3, 80 column screen is used throughout so that what you see is what will be printed on paper. With Solidisk Database, you can create as many records as you like, each record can be up to 15 fields of up to 60 characters. You can sort, search, index, mailmerge, append, create subset, calculate etc. Solidisk use the same Database to process all your orders.

Wordprocessor:

Solidisk Wordprocessor is WYSIWYG type (What You See Is What You Get) and has all the commands of a professional tool. It features 80 column screen, on screen justification, page numbering, search and replace, word count, free space, Wordstar like editing commands: insert and overwrite, block mark, move, copy, delete, save, load to cursor, * commands etc..

Spreadsheet:

Solidisk Spreadsheet is also Menu driven and has the same file structure as Solidisk Database. You can have as many rows and columns as you like, each column can be as small as two characters wide or as big as 70 characters. All maths functions are

supported. Recalculate, Replicate, Print, Print If, Sort, Search, Define Zone, Mailmerge, Text Input/Output etc . . . are included.

Toolkit:

Solidisk Toolkit is almost indispensible for Electron programmers, it has 24 star commands (Status, Rwipe, LVAR, Move, Search and Replace, Expand, Salvage, Keyload etc . . .).

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Now let's refresh your memory...

PETE BIBBY reviews progress to date before venturing deeper into the less basic aspects of Basic programming

WE'VE come a long way in the 18 months since this beginners' series started. There've been a lot of programs written, from our early treatment of PRINT to last month's exploration of REPEAT...UNTIL loops.

In this article I intend to take a brief look at all we've done so far before we journey into less basic Basic in the months to come.

We started off way back in February, 1984, using PRINT to make things appear on screen in direct or command mode. We saw that:

```
PRINT "HELLO"
```

produced the HELLO onscreen and that we could put any message we wanted inside the inverted commas and it would be printed.

At the same time, however, we learnt that the Electron is very fussy and will only accept Basic keywords if they are spelt correctly and in upper-case letters.

Attempts such as:

```
print "HELLO"
```

and

```
PIRNT "HELLO"
```

only succeeded in producing the first of what was probably a long series of error messages!

However, we didn't just stick to displaying such exciting messages. We also had PRINT doing our sums for us with commands like:

```
PRINT 2*3
```

and

```
PRINT 4/2
```

Notice the computer's symbols for multiplication and division and remember the difference between:

```
PRINT 2+3
```

and

```
PRINT "2+3"
```

The next month saw us entering the world of programming with Program I.

```
10 REM PROGRAM I
20 PRINT "ELECTRON"
30 PRINT "USERS"
40 PRINT "ARE"
50 PRINT "BRILLIANT"
```

Program I

I hope that, with all you've learnt, you now find this program pretty painful. There are better ways of achieving the same result practically crying out to be used.

However, it was our first program and deserves a little respect. Also it did illustrate some important points when we used RUN to set it in motion.

Like all programs, it was executed by the Electron line by line.

It started at the lowest number – in this case 10 – and worked its way through lines 20, 30, 40 and 50 until there were no more lines for it to process.

Then the program ended and the Electron waited for further instructions. One of these, LIST, produced the aptly-named listing of the program.

We learnt we could alter the program, adding a line such as:

```
45 PRINT "VERY"
```

or completely erasing one by entering its number and pressing Return.

By now the screen was getting to be a bit of a mess, so finding that CLS cleared the display was a relief.

Only the display was cleared, however. The program remained in memory and could be inspected with a LIST. It was left to NEW to obliterate a program from the Electron's memory.

April 1984 had us entering the world of variables but not until we'd had another look at PRINT.

We saw that:

```
PRINT "HELLO"
PRINT "HELLO"
```

produced different output from:

```
PRINT "HELLO":
PRINT "HELLO"
```

or

```
PRINT "HELLO"
PRINT'"HELLO"
```

As we soon learnt, it's not only spelling that's vital in Basic – punctuation is important as well.

Going on from this we came to the REM command which allowed us to annotate programs with remarks.

These remarks are ignored by the micro but can be vitally important to humans trying to figure out what's happening – or, more likely, not happening – in a program.

Finally, we came to the idea of variables as labels for the messages in our PRINT commands.

We saw that we could use a string variable – such as *message$* – to hold a string and then use that variable to display the message.

It may not seem all that

much now, but assignments like:

```
LET message$="You don't
need the LET"
```

make up the basic building blocks of all worthwhile programs. Incidentally, when you:

```
PRINT message$
```

you'll be reminded that the Electron doesn't need the LET.

Once we'd started on variables there was no stopping us. The May instalment saw how variables could be used to store numbers as well as strings.

These numbers didn't need the dollar sign at the end of their names. Using them we could write programs such as Program II.

```
10 REM PROGRAM II
20 width=10
30 height=20
40 area=width*height
50 PRINT area
```

Program II

Notice that this program not only does its job, it can be seen to be doing its job because the variable names are meaningful.

It makes a lot more sense than Program III, which does exactly the same task.

Can I make a plea here for more use of meaningful variable names in programs? They

RULE	WRONG	RIGHT
No spaces in variable name	sleeping dogs = 3	sleeping_dogs = 3
Must not start with number	2nd time = 35	secondtime = 35
No punctuation marks in name	peter's = 9	peters = 9
No arithmetic operators included in name	night+day = 24	nightandday = 24
Must not begin with a Basic keyword	LETTER$ = "a"	letter$ = "a"

Table I: Rules for naming variables

```
10 REM PROGRAM III
20 W=10
30 H=20
40 A=H*W
50 PRINT A
```

Program III

may take a little more time to type in but they add enormously to a program's clarity. This can be a blessing when the time comes to alter or debug your masterpiece! Table I gives the rules for variable names.

June 1984 saw us using INPUT to get information into programs while they were actually running.

When the program came to an INPUT statement it waited patiently until a value was entered at the keyboard. This was then stored in the appropriate variable and the program carried on.

Program IV shows how much Program II can be improved using INPUT.

```
10 REM PROGRAM IV
20 INPUT "Width",width
30 INPUT "Height",height
40 area=width*height
50 PRINT area
```

Program IV

Now the program is much more general in its application. Notice how the message in inverted commas after the INPUT is printed. It's good practice to prompt the user as to what is wanted.

Can you remember what altering the program with lines like:

```
20 INPUT "Width"width
```

or

```
30 INPUT "Height"'height
```

does? Punctuation marks are just as important with INPUT as with PRINT.

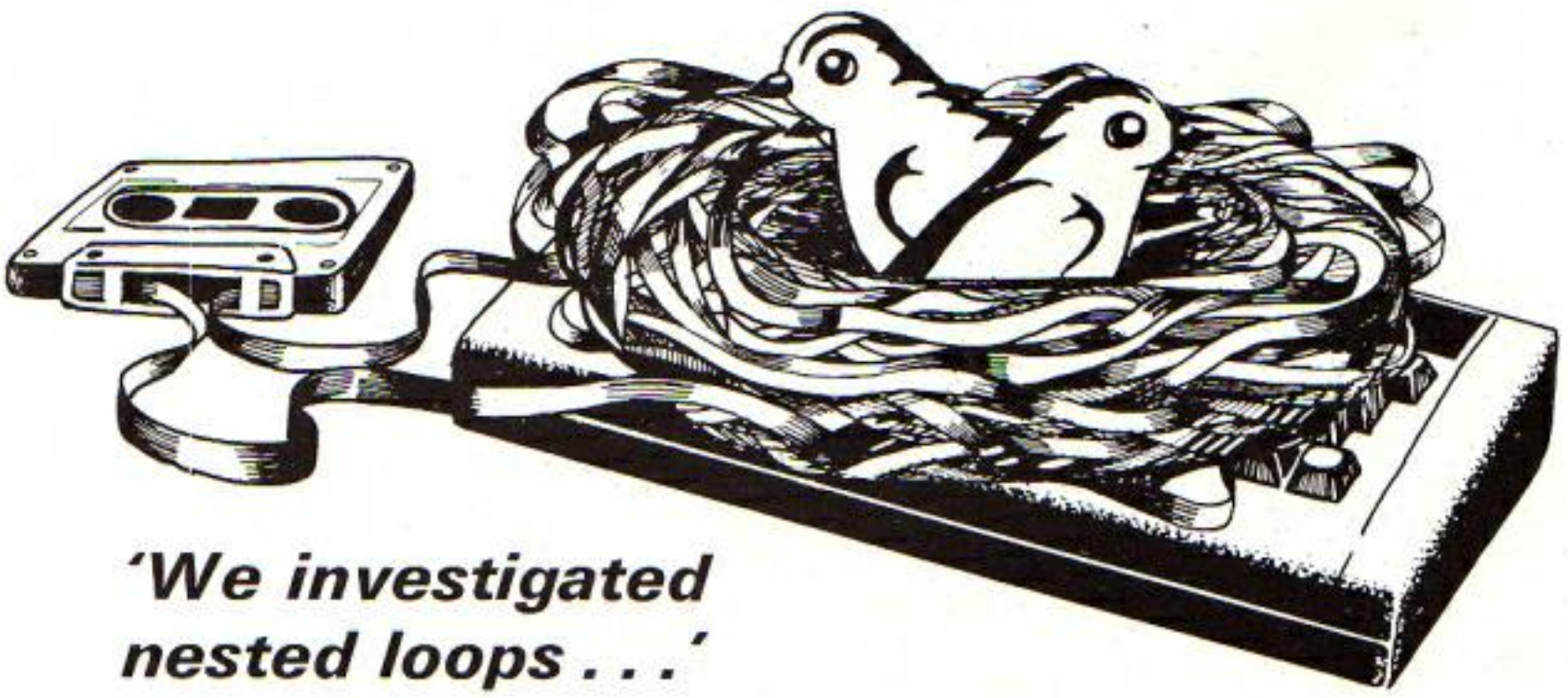
The next four months saw us exploring the intricate world of FOR . . . NEXT loops.

Combined with the INPUT command they can make even simple programs quite powerful. Program V shows what I mean.

```
10 REM PROGRAM V
20 FOR loop=1 TO 5
30 INPUT "Width",width
40 INPUT "Height",height
50 area=width*height
60 PRINT area
70 NEXT loop
```

Program V

Here our simple Program II



'We investigated nested loops . . .'

From Page 11

becomes much more general in application, allowing five different areas to be calculated.

This could easily be altered with lines such as:

```
20 FOR loop=1 to 10
```

or

```
FOR loop=10 TO 90
```

which show how flexible it is.

Can you figure out how many areas will be calculated with:

```
20 FOR loop=1 TO 10 STEP 2
```

If you find that puzzling, have a look at the August 1984 article.

In September we investigated nested loops, when one set of FOR . . . NEXT loops is totally enclosed in another. Program VI shows how it's done.

```
10 REM PROGRAM VI
20 FOR outer=1 TO 10
30 FOR inner=1 TO 10
40 PRINT "*";
50 NEXT inner
60 PRINT
70 NEXT outer
```

Program VI

When you think you've understood that, can you explain what's happening when line 30 becomes:

```
30 FOR inner=1 TO outer
```

And can you make the triangle go the other way around?

November and December had us looking at new ways of arranging data in the form of one and two-dimensional arrays.

Here a group of variables were linked together under a common name, each distinguished from the other by the number in brackets at the end of the name.

The joy of this arrangement is that you can get at a whole list of similar data just by changing the number at the end of the variable name. Program VII gives a simple example.

Here two arrays are set up by the DIM of line 20. Both the

```
10 REM PROGRAM VII
20 DIM counter(3), name$
(3)
30 FOR cycle=1 TO 3
40 counter(cycle)=cycle
50 PRINT "Enter name ";c
ycle
60 INPUT' name$(cycle)
70 NEXT cycle
80 CLS
90 FOR loop=3 TO 1 STEP
-1
100 PRINT;counter(loop),n
ame$(loop)
110 NEXT loop
```

Program VII

following FOR . . . NEXT loops use these arrays, the first to take in the data, the second to print it out in reverse.

From this you'll remember how powerful the combination of FOR . . . NEXT loops and arrays can be.

However, at this time we were still stuck to using INPUT to get information into a program. It wasn't until January of this year that we read about READ.

Using READ we can take, or read, information held in a DATA statement and use it in the program. Program VIII shows it in action, replacing the INPUTs of Program VII.

```
10 REM PROGRAM VIII
20 DIM counter(3), name$
(3)
30 FOR cycle=1 TO 3
40 counter(cycle)=cycle
50 READ name$(cycle)
60 NEXT cycle
70 CLS
80 FOR loop=3 TO 1 STEP
-1
90 PRINT;counter(loop),n
ame$(loop)
100 NEXT loop
110 DATA Bodger,Spot,Eile
en
```

Program VIII

Once we'd got used to using READ and DATA we were able to use them to explore the conditional IF . . . THEN statements.

Up until then, the program had obeyed every line it came to in order. Now, however, we were able to make conditions for the program. It was only to perform an action IF a particular condition was true.

In Program IX the condition is that *number* should be greater than 5 and the action performed is a simple message.

```
10 REM PROGRAM IX
20 FOR loop=1 TO 10
30 READ number
40 IF number >5 THEN PRI
NT number;" is greater then
 5"
50 NEXT loop
60 DATA 5,9,3,-1,0,100,8
,4,0.6,2
```

Program IX

Can you understand why the micro acts as it does? IF not, THEN have a look at last February's article. Table II shows all the conditional operators used in IF . . . THEN statements. Why not use a few in line 40 and try to predict the results?

Last Spring saw the beginners' series working its way through the various ramifications of the conditional statements.

Simple conditions were made into more complicated ones using the logical operators AND, OR, and EOR.

We saw the use of logical variables acting as flags and how:

```
PRINT TRUE, FALSE
```

produced numbers representing true and false.

Finally ELSE was dealt with. IF you remember all that THEN carry on ELSE you'd better re-read the relevant articles.

With summer came a rather bizarre feature on the use of GOTO which I went on at length about and then advised you never to use it.

And July saw the introduction of the REPEAT . . .UNTIL loop which allows a piece of code to be repeated over and over until a condition is met.

Program X, the final program this month, shows how flexible this is.

```
10 REM PROGRAM X
20 REPEAT
30 INPUT "Width",width
40 INPUT "Height",height
50 area=width*height
60 PRINT area
70 UNTIL area<=0
```

Program X

It's our old friend Program II again, but notice how much more powerful it is. Now it'll carry on until you give it a negative width, then stop.

And that's where I stop for this time.

I hope you've enjoyed this recap of what we've covered and that you'll look up any articles that you might not be too sure of.

It's amazing what we've learnt so far. Next month we'll be returning to our exploration of Basic.

Operator	Meaning
=	equals
<	less than
>	greater than
<>	not equal to
<=	less than or equal to
>=	greater than or equal to

Table I: Logical operators

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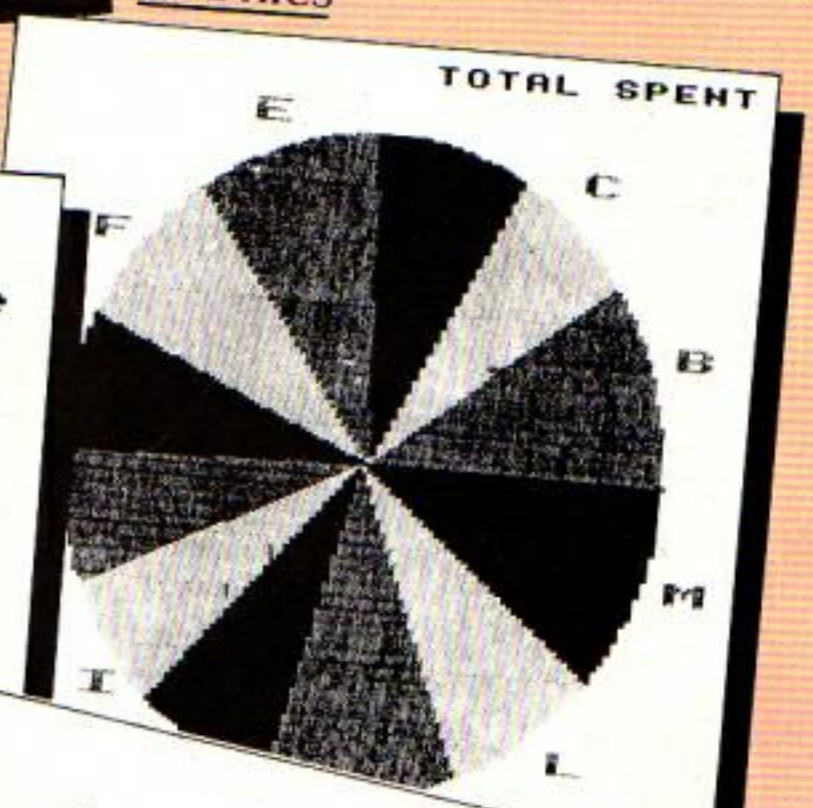
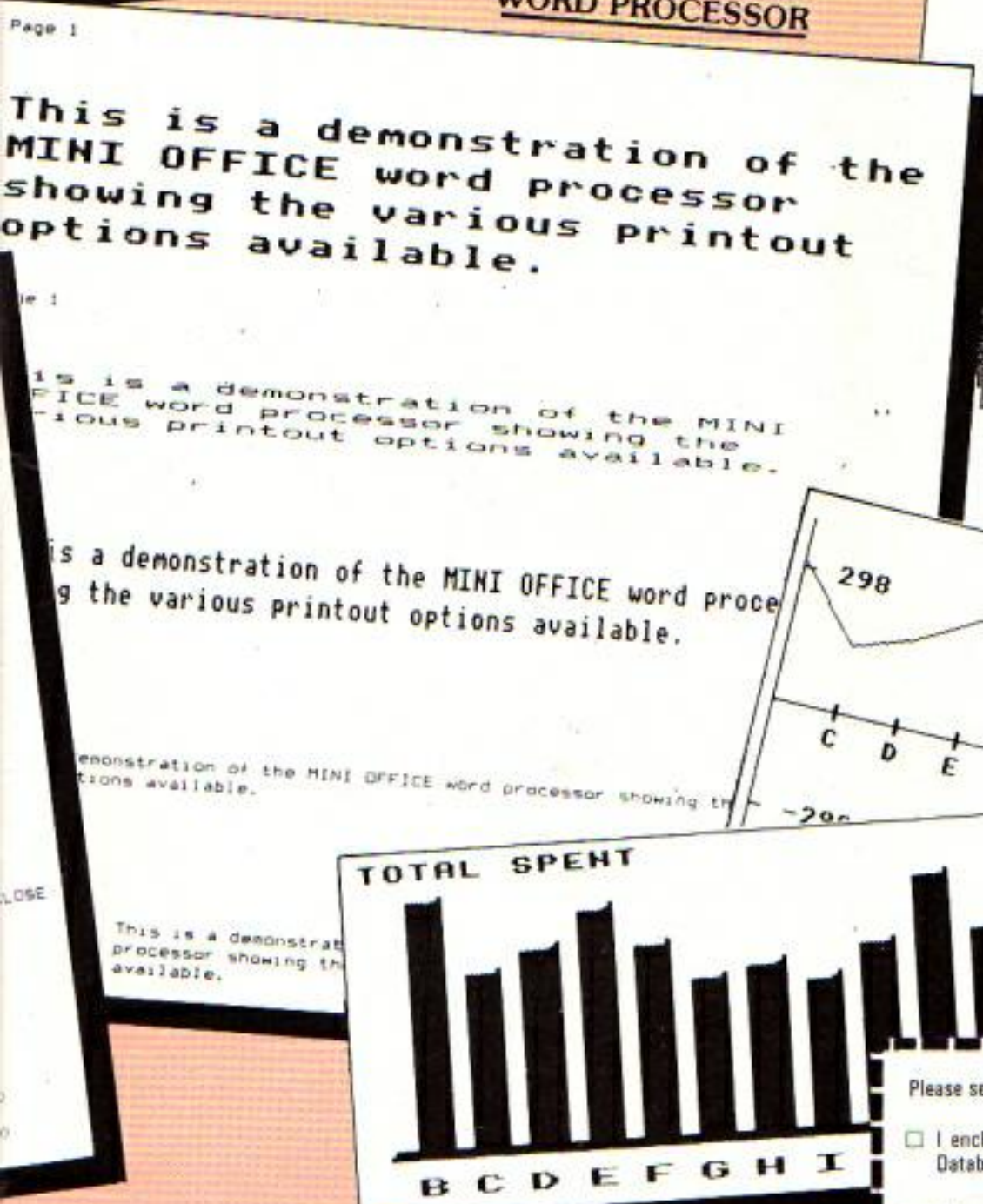
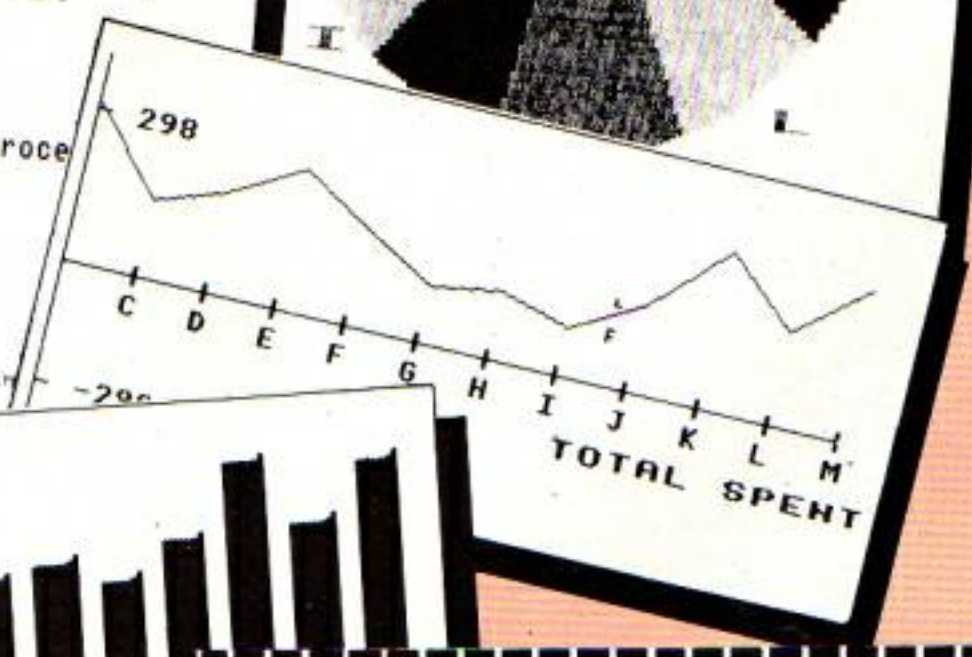
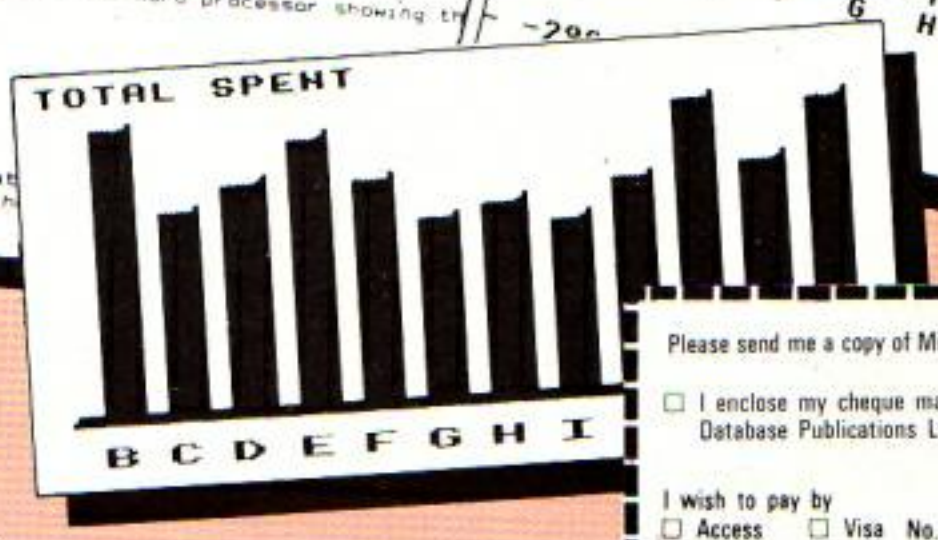


WORD PROCESSOR







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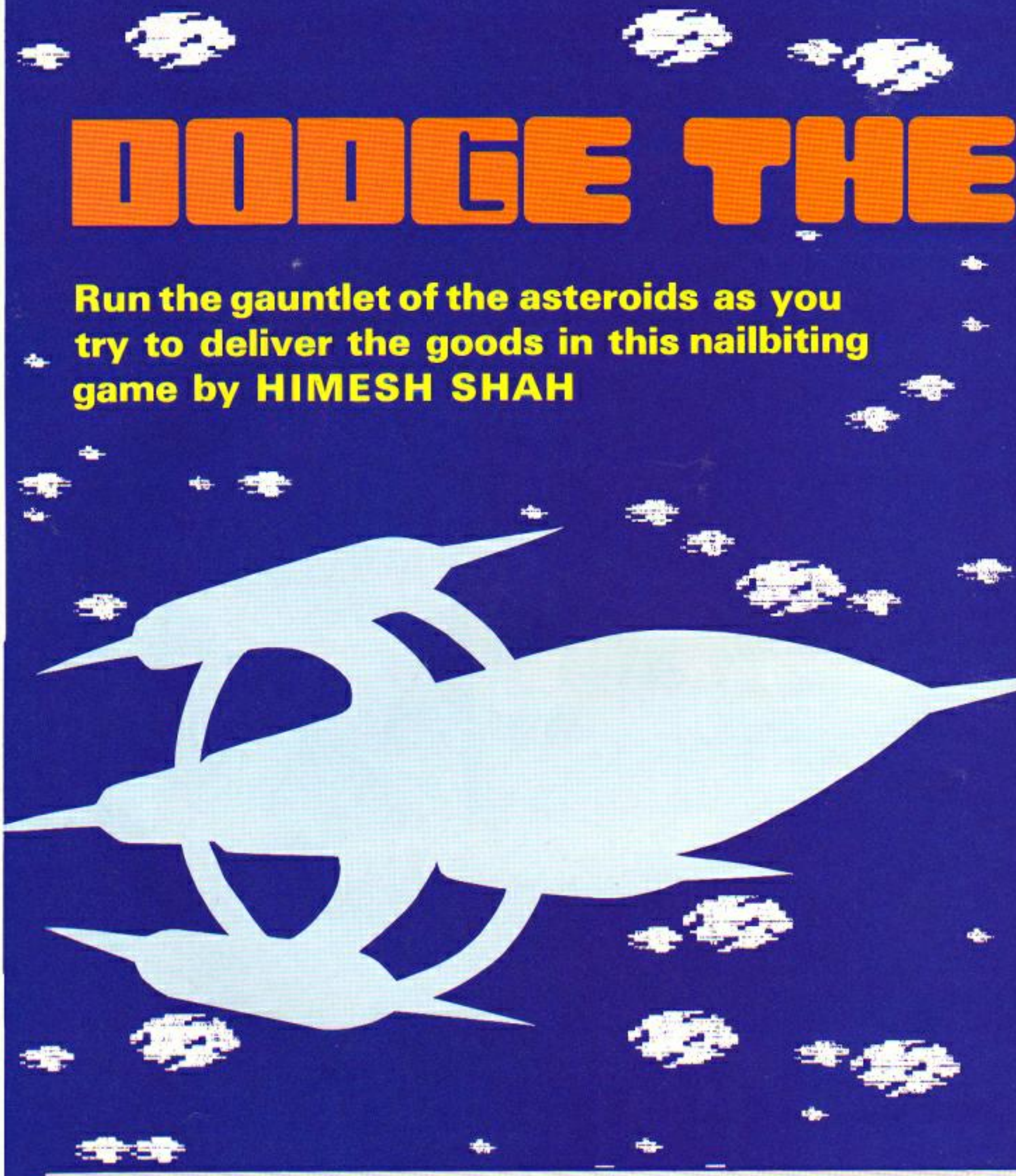
EU8

DODGE THE

Run the gauntlet of the asteroids as you try to deliver the goods in this nailbiting game by HIMESH SHAH



```
10REM(C)ELECTRON USER
20DIM rowX(7):DIM ast$(3
)
30PROCinit
40MODE5:VDU 23,1,0;0;0;0
;
50PROCsound
60PROCtitle
70MODE 1:VDU 23,1,0;0;0;
0
80PROCintro
90MODE 5:VDU 23,1,0;0;0;
0
100PROCcommands
110PROCrnd_screen
120PROClift_off
130TIME=0
140PROCgame
150END
160DEFPROCrnd_screen
170DIMastX3648
180FOR clearX=astX TO ast
X+3456 STEP 192
190$clearX=STRING$(192,"
")
200NEXT
210COLOUR3:VDU19,3,7,0,0,
0:COLOUR 128:VDU 19,0,0,0,0
,0
220FOR leX=2 TO 0 STEP -1
230lepX=leX*1216
240FOR linX=0 TO 63
250liX=linX*19
260SOUND 1,1,RND(250),1
270FOR pX=0 TO 18
280posX=(astX+lepX+liX+pX
)
290IF pX=18 THEN ?posX=13
:GOTO 360
300IF ?posX<>32 THEN 360
```

ASTEROYDZ

IT'S not easy being a space ferry pilot. Not only is deep space far less interesting than it's cracked up to be, it's also full of dangerous asteroids.

The trouble is that you don't have enough money to pay for your passage back to earth. To earn it you've got to run the gauntlet of the asteroids, delivering supplies.

Should you be successful as a cosmic errand boy you can get back to earth, but crash ten times and you get the sack. And as time goes on, things get harder.

As we said at the beginning, it's not easy being a space ferry pilot . . .

PROCEDURES

PROCrnd_screen Sets up the asteroids in their random positions and stores these locations in memory at *ast%*.

PROCgame This is the main procedure, responsible for the flow of the game.

PROCmove Responsible for the movements of the ship and checking to see if a bomb is to be dropped.

PROCcheck Checks to see if the ship has hit an asteroid or if either end of the screen was reached.

PROCsmash Called if you crash. It tells you how many ships you have left and displays an explosion.

PROCscroll Creates the moving asteroid effect.

PROCbomb If the space bar has been pressed this procedure displays the dropping bomb.

PROCupdate After every crossing this procedure tells you how much money you have in the bank and the total number of crossings you have made.

PROCend. As you might guess this is called at the end of the game. It tells you how much you've earned.

PROCinit Initialises all variables and defines the characters and envelopes.

PROCwin1
PROCwin2
PROCwin3 Called on completion of appropriate level.

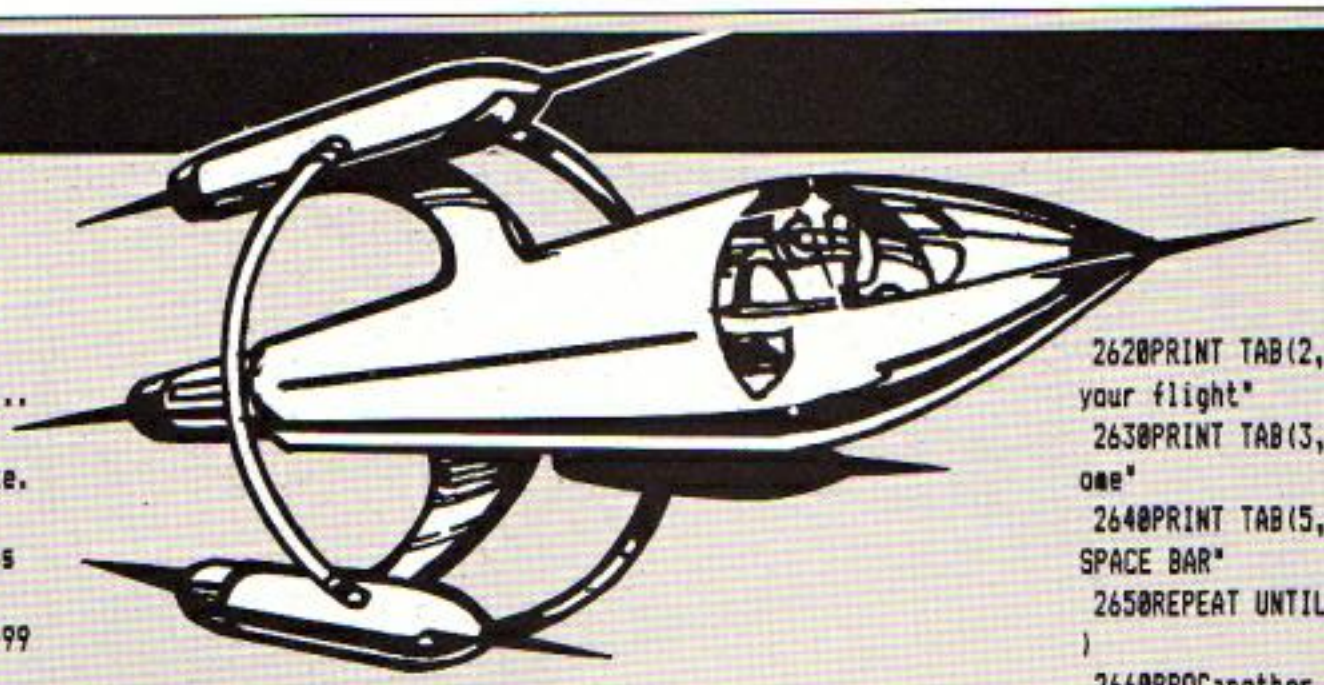
PROChiprint (xb%,yb%,word$,size%) Prints *word$* at text coordinates *xb%,yb%*, *size%* characters high.

PROCwait(pau%) Creates a pause. The larger the value of the parameter *pau%* the longer the pause.

```
  310rnd%=RND(55-(le%*10))
  320IF rnd%>5 THEN 360
  330IF rnd%=1 AND p%<>17 A
ND lin%<>63 THEN ?pos%=225:
?(pos%+1)=226:?(pos%+19)=22
7:?(pos%+20)=228
  340IF rnd%=2 OR rnd%=3 TH
EN ?pos%=224
  350IF rnd%=4 OR rnd%=5 TH
EN ?pos%=229
  360NEXT
  370PRINT" "+$(pos%-18)
  380NEXT
  390NEXT
  400le%=0:lep%=0
  410ENDPROC
  420DEFPROCgame
  430REPEAT
  440PROCmove
  450PROCscroll
  460UNTIL FALSE
  470ENDPROC
  480DEFPROCmove
  490IF INKEY(-104)=TRUE AN
D xs%<19 THEN xup%=1
  500IF INKEY(-103)=TRUE AN
D xs%>0 THEN xup%=-1
  510*FX 15,0
  520ox%=xs%:xs%=xs%+xup%:x
up%=0
  530VDU 31,xs%,hi%
  540chr%=(USR(&FFF4)AND&FF
00)DIV&100
  550c%=(c%MOD2)+1
  560COLOUR c%
  570VDU 19,c%,fcol%,0,0,0
  580*FX 19
  590VDU 31,xs%,hi%,sh%
```

From Page 17

```
  600VDU 31,ox%,hi%-1,32
  610PROCcheck
  620SOUND 1,1,100,1
  630IF INKEY(-99) THEN PRO
Cbomb
  640ENDPROC
  650DEFPROCcheck
  660IF chr%>127 AND chr%<1
34 THEN PROCsmash
  670IF coll% AND xs%=19 TH
EN st%=19:sh%=231:bomb%=234
:ret%=TRUE:coll%=FALSE
  680IF ret% AND xs%=0 THEN
  st%=0:sh%=230:bomb%=235:c
oll%=TRUE:ret%=FALSE:PROCup
date
  690ENDPROC
  700DEFPROCsmash
  710COLOUR 2:VDU 19,2,3,0,
0,0
  720SOUND 0,5,4,40
  730ship%=ship%-1
  740IF ship%=0 THEN 760
  750PRINT TAB(1,7);ship%;"
 more visits to":PRINT TAB(
1,9);"the repair bay and":P
RINT TAB(4,11);"you're FIRE
D!"
  760COLOUR 1
  770FOR crash%=1 TO 6
  780VDU 19,1,3,0,0,0
  790PRINT TAB(xs%,hi%);cra
sh1$
  800PROCwait(500)
  810VDU 19,1,exc%,0,0,0
  820PRINT TAB(xs%,hi%);cra
sh2$
  830PROCwait(500)
  840NEXT
  850IF ship%=0 THEN PROCen
d
  860xs%=st%
  870COLOUR 3
  880PROClift_off
  890ENDPROC
  900DEFPROCscroll
  910*FX 19
  920lin%=(lin%+1)MOD64:li%
=lin%*19
  930COLOUR 3
  940PRINT TAB(1,31)$(ast%+
li%+lep%)
  950VDU 19,c%,bcol%,0,0,0
  960ENDPROC
  970DEFPROCbomb
  980bab%=bab%-1
  990IF bab%<0 THEN bab%=0:
ENDPROC
 1000IF xs%=0 OR xs%=19 THE
N ENDPROC
 1010SOUND 0,1,20,10
 1020bc%=(c%MOD2)+1:VDU 19,
bc%,2,0,0,0:COLOUR bc%
 1030*FX19
 1040VDU 31,xs%-1,hi%+1,32,
bomb%,32,8,8,8:PROCwait(25)
 1050*FX19
 1060VDU 31,xs%-1,hi%+1,32,
32,32,8,8,8,10,31,xs%-1,hi%
+2,32,bomb%,32,8,8,8:PROCwa
it(25)
 1070*FX19
 1080VDU 31,xs%-1,hi%+2,32,
32,32,8,8,8,10,31,xs%-1,hi%
+3,32,bomb%,32,8,8,8:PROCwa
it(25):VDU 31,xs%-1,hi%+3,3
2,32,32
 1090ENDPROC
 1100DEFPROCupdate
 1110SOUND 1,2,4,78
 1120VDU 19,2,2,0,0,0
 1130VDU 31,xs%,hi%,32
 1140COLOUR 2
 1150cr%=cr%+1
 1160hi%=hi%+1:IF hi%=25 TH
EN hi%=24
 1170wage%=RND((le%+1)*200)
+((le%*2)+1)*1000-(TIME DIV
 50):mon%=mon%+wage%
 1180PRINT TAB(1,5)"No. of
crossings:";cr%
 1190COLOUR 1:VDU 19,1,fcol
%,0,0,0
 1200PRINT TAB(1,9)"Bonus f
or trip was"
 1210PRINT TAB(8,11)"£";wag
e%
 1220PRINT TAB(2,13)"You ha
ve £";mon%:PRINT TAB(4,15)
"in the Bank."
 1230PROCwait(2500)
 1240VDU 19,3,7,0,0,0:VDU 1
9,1,fcol%,0,0,0
 1250COLOUR 3
 1260IF mon%>10000 AND le%=
0 THEN PROCwin1
 1270IF mon%>50000 AND le%=
1 THEN PROCwin2
 1280IF mon%>50000 AND le%=
2 THEN PROCwin3
 1290TIME=0:PROClift_off
 1300ENDPROC
 1310DEFPROCtitle
 1320COLOUR 128:COLOUR 2:VD
U 19,2,4,0,0,0:VDU 19,0,7,0
,0,0:CLS:SOUND 0,5,15,970
 1330PROChiprint(5,8,"AsteR
oydZ",5)
 1340COLOUR 1:PROCwait(1000
)
 1350PROChiprint(6,15,"by",
2):PROChiprint(7,18,"Himesh
 Shah",2)
 1360PROCwait(4500)
 1370VDU 19,2,8,0,0,0:VDU 1
9,0,0,0,0:VDU 19,3,7,0,0,0:
COLOUR 3:VDU 19,1,0,0,0,0
 1380VDU5:FOR n%=1 TO 40:MO
VERND(1100),RND(900):PRINTa
st$(RND(3)):SOUND 1,1,RND(2
50),5:NEXT:VDU 4
 1390PROCwait(5000)
 1400ENDPROC
 1410DEFPROCsound
 1420COLOUR 3:COLOUR128:VDU
19,0,4,0,0,0
 1430PROChiprint(4,12,"Do
you  want",2):PROChiprint(5
,15,"sound...y/n",2)
 1440REPEAT
 1450IF INKEY(-69) THEN PRO
Csoundon:ENDPROC
 1460IF INKEY(-86) THEN PRO
Csoundoff:ENDPROC
 1470UNTIL FALSE
 1480ENDPROC
 1490DEFPROCsoundon
 1500*FX210,0
 1510ENDPROC
 1520DEFPROCsoundoff
 1530*FX210,1
 1540ENDPROC
 1550DEFPROCintro
 1560VDU 19,3,7,0,0,0:VDU 1
9,1,1,0,0,0:COLOUR 1:COLOUR
 131
 1570CLS:PROChiprint(10,5,"
your predicament.....",2)
 1580VDU 19,2,4,0,0,0:COLOU
R 2
 1590PRINT TAB(2,10)" Boy,
do  you  have problems! You
  are stranded on the plane
t Rockzz, a barren inhospit
able  planet, that  is  for
 all but a small supply bas
e."
 1600PRINT TAB(2,16)" Being
  extremely bored  and home
sick, you want to return to
 your home-planet, Earth. F
ortunately there  is a  mon
thly Rockzz-Earth  shuttle.
 Tickets are only £10,000..
.shame you've only got 10p.
"
 1610PRINT TAB(5,30)"Press
SPACE BAR"
 1620REPEAT UNTIL INKEY(-99
)
 1630VDU 28,0,31,39,0:CLS
 1640PRINT TAB(2,2)" Fortun
ately you've just got  your
self a job as  a supply  sh
uttle pilot, your job  bein
g  to  ferry supplies to st
ar- ships anchored in orbit
."
 1650PRINT TAB(2,8)" Simple
  huh? I'm  afraid  not. Un
for- tunately between you a
nd the ships lies a dense b
elt of asteroids."
 1660PRINT TAB(5,22)"Press
SPACE BAR"
 1670REPEAT UNTIL INKEY(-99
)
 1680CLS
 1690PRINT TAB(2,2)" If you
  collide  with an asteroid
 you must  return to the re
pair base  immed- iately. I
f you crash more than 10 ti
mes in level 1, you get the
 sack. Each time you  go up
 a  level, five bonus 'live
s' are given."
 1700PRINT TAB(2,10)" To he
lp  you  with your task you
  are given 10 bombs and yo
u get 10 more each time you
 go up a level. As you prog
ress through  the  levels t
he asteroid  belt gets dens
er. If you complete all  th
ree levels...you win!"
 1710PRINT TAB(5,22)"Press
SPACE BAR"
 1720REPEAT UNTIL INKEY(-99
)
 1730ENDPROC
 1740DEFPROCcommands
 1750COLOUR1:CLS:PROChiprin
t(6,5,"Controls",2)
 1760COLOUR2:PRINT TAB(3,10
```



```
)"<.....move left"
 1770PRINT TAB(3,14)">.....
move right"
 1780PRINT TAB(1,18)"space.
..drop a bomb"
 1790PRINT TAB(3,28)"Press
SPACE BAR"
 1800REPEAT:UNTIL INKEY(-99
)
 1810ENDPROC
 1820DEFPROCend
 1830CLS:SOUND 0,3,150,30:S
OUND 0,3,10,20
 1840PRINT TAB(3,4)"The bos
s wasn't"
 1850PRINT TAB(3,6)"too  ha
ppy with"
 1860PRINT TAB(3,8)"   your
 work   "
 1870PRINT TAB(3,11)" YOU'R
E FIRED!"
 1880PRINT TAB(1,14)"Howeve
r you earned"
 1890PRINT TAB(8,16)"£";mon
%+ext%
 1900PRINT TAB(2,19)"press
SPACE BAR"
 1910REPEAT UNTIL INKEY(-99
)
 1920PROCanother_go
 1930ENDPROC
 1940DEFPROCinit
 1950mon%=0:cr%=0:hi%=16:bc
ol%=0:fcol%=1:exc%=1:bmb%=1
0:le%=0:lep%=0
 1960sh%=230:coll%=TRUE:ret
%=FALSE:st%=0
 1970VDU 23,224,0,28,126,25
5,127,156,126,12
 1980c%=3:ship%=10:xs%=0:xu
p%=0:lin%=0:le%=0
 1990VDU 23,225,0,7,31,63,6
3,127,223,223
 2000VDU 23,226,0,224,136,1
24,252,254,254,223
 2010VDU 23,227,159,63,127,
63,60,9,3,6
 2020VDU 23,228,159,127,246
,248,252,240,224,0
 2030VDU 23,229,0,0,32,112,
120,48,0,0
 2040VDU 23,230,0,192,112,5
6,63,56,112,192
 2050VDU 23,231,0,3,14,28,2
52,28,14,3
 2060VDU 23,232,0,42,0,99,8
,42,0,0
 2070VDU 23,233,73,42,0,65,
0,42,73,0
 2080VDU 19,0,0,0,0,0
 2090crash1$=CHR$(232):cras
h2$=CHR$(233)
 2100ast$(1)=CHR$(224):ast$
(2)=CHR$(225)+CHR$(226)+CHR
$(8)+CHR$(8)+CHR$(10)+CHR$(
227)+CHR$(228):ast$(3)=CHR$
(229)
 2110VDU 23,234,1,59,120,25
5,255,120,59,1
 2120VDU 23,235,128,220,30,
255,255,30,220,128:bomb%=23
5
 2130TIME=0
 2140le%=0:lep%=0:ext%=0
 2150ENVELOPE 1,1,50,-100,5
0,1,1,1,126,0,0,-126,126,12
6
 2160ENVELOPE 5,6,2,20,16,1
6,0,0,126,0,0,-126,126,126
 2170ENVELOPE 2,2,6,0,0,255
,0,0,126,0,0,-126,126,126
 2180ENDPROC
 2190DEFPROCwin1
 2200SOUND 1,5,100,100
 2210CLS:COLOUR 2
 2220PRINT TAB(2,7)"Well do
ne! You've"
 2230PRINT TAB(1,9)"  earne
d  £10,000"
 2240PRINT TAB(1,11)"   How
ever, with"
 2250PRINT TAB(1,13)"inflat
ion as it is"
 2260PRINT TAB(0,15)"the ti
cket now costs"
 2270PRINT TAB(1,17)"
£50,000"
 2280COLOUR1
 2290PRINT TAB(4,27)"press
SPACE BAR"
 2300REPEAT UNTIL INKEY(-99
)
 2310COLOUR 3
 2320fcol%=3:bcol%=4:exc%=1
:VDU 19,0,4,0,0,0
 2330le%=1:lep%=1216:bmb%=b
mb%+10:hi%=16:ship%=ship%+5
 2340PROClift_off
 2350ENDPROC
 2360DEFPROCwin2
 2370CLS:COLOUR 2
 2380SOUND 1,5,80,80
 2390PRINT TAB(1,7)"Unfortu
nately  the"
 2400PRINT TAB(1,9)"Bank of
 Rockzz has"
 2410PRINT TAB(1,11)"collap
sed, and has"
 2420PRINT TAB(1,13)" taken
 your  hard"
 2430PRINT TAB(0,15)"earned
 cash with it!"
 2440PRINT TAB(0,17)"Anothe
r  £50,000 and"
 2450PRINT TAB(1,19)" you're
 homeward"
 2460PRINT TAB(1,21)"
bound"
 2470COLOUR 1
 2480PRINT TAB(4,25)"press
SPACE BAR"
 2490REPEAT UNTIL INKEY(-99
)
 2500COLOUR3
 2510fcol%=0:bcol%=1:exc%=4
:VDU 19,0,1,0,0,0
 2520ext%=mon%:le%=2:lep%=2
432:mon%=0:hi%=16:bmb%=bmb%
+10:ship%=ship%+5
 2530PROClift_off
 2540ENDPROC
 2550DEFPROCwin3
 2560COLOUR2:VDU 19,2,3,0,0
,0
 2570SOUND 1,5,150,120
 2580CLS:PRINT TAB(5,7)"Wel
l  done!"
 2590PRINT TAB(2,9)" Altoge
ther  you"
 2600PRINT TAB(3,11)"earned
 £";mon%+ext%
 2610PRINT TAB(3,13)"in ";c
r%;" crossings"
 2620PRINT TAB(2,15)"Enjoy
your flight"
 2630PRINT TAB(3,17)"     h
ome"
 2640PRINT TAB(5,27)"press
SPACE BAR"
 2650REPEAT UNTIL INKEY(-99
)
 2660PROCanother_go
 2670ENDPROC
 2680DEFPROCanother_go
 2690CLS:PROChiprint(2,10,"
Another go...y/n",2)
 2700REPEAT
 2710IF INKEY(-86) THEN END
 2720UNTIL INKEY(-69)
 2730PROCinit
 2740COLOUR 3
 2750VDU 19,3,7,0,0,0
 2760PROClift_off
 2770PROCgame
 2780ENDPROC
 2790DEFPROClift_off
 2800FOR lin%=0 TO 60:PRINT
" "+$(ast%+(lin%*19)+lep%):
SOUND 1,1,lin%+3.5,1:NEXT:l
in%=lin%-1
 2810ENDPROC
 2820DEFPROChiprint(xb%,yb%
,word$,size%)
 2830FOR let%=1 TO LENword$
 2840ch%=0:co%=-1:r%=0:let$
=MID$(word$,let%,1)
 2850A%=10:X%=&70:Y%=&0:?&7
0=ASC(let$):CALL &FFF1
 2860REPEAT
 2870co%=co%+1:r%=co%MOD8:r
ow%(co%MOD8)=?(&71+co%DIVsi
ze%)
 2880IF r%=7 THEN ch%=ch%+1
:VDU 23,236,row%(0),row%(1)
,row%(2),row%(3),row%(4),ro
w%(5),row%(6),row%(7):PRINT
 TAB(xb%+let%-1,yb%+ch%-1)C
HR$(236)
 2890UNTIL ch%=size%
 2900A%=135
 2910NEXT
 2920ENDPROC
 2930DEFPROCwait(pau%)
 2940FOR w%=1 TO pau%:NEXT
 2950ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 61.

The moving story of a pint of beer!

IN the first part of this series we looked at how the screen memory was organised. Now we are going to try a few short and simple machine code routines to print a multi-coloured character on the screen.

You'll remember that the Mode 5 screen is composed of 32 rows and that each row has 40 columns.

Each column is eight bytes deep in memory, a single character occupying 16 bytes of memory, being made up of two columns of eight bytes.

We saw how the bit pattern of each byte in the screen memory holds the information for four horizontal pixels.

To display a character on the screen, all that is necessary is to work out the data required and store it in two columns of eight bytes somewhere between &5800 and &8000. This is the section of memory that holds the Mode 5 screen display.

Program I displays a character by storing the 16 bytes of data in the screen memory. Lines 30 to 60 read the data and store it temporarily in page &C.

This area of memory is reserved for character definitions, so, as we aren't defining any, it'll be free for us to use.

Lines 90 to 140 contain the machine code. This is a simple loop which collects each item of data from page &C and stores it starting at &64C8, which is somewhere near the middle of the screen.

Indexed addressing is used to collect and store the data.

The actual character is a pint of beer – no particular reason, it just happened to be the first thing that came to mind as I was writing this.

The data statements were created using a sprite definer which will be listed later in the series.

Alternatively, you could define the character, print it in the top left corner of the screen and print out the contents of the first 16 bytes of screen RAM to get the required data.

It's difficult to get any idea of the fantastic speed advantage over Basic by printing a single character, so Program II completely fills the screen with pints of beer. Considering it's made up of three colours, it's incredibly fast.

There aren't any variables in machine code, so the routine uses memory locations &70/71 to store the address it's printing at.

This is initially set at &5800. Line 140 collects the data and 150 stores it in the screen RAM using post-

```
10 REM PROGRAM I
20 MODE 5
30 FOR byte=0 TO 15
40 READ data
50 byte?&C00=data
60 NEXT
70 P%=&900
80 [ OPT 2
90 LDY #15
100 .loop
110 LDA &C00,Y
120 STA &64C8,Y
130 DEY
140 BPL loop
150 RTS
160 ]
170 PRINT''"Press a key";
180 REPEAT UNTIL GET
190 CALL &900
200 REM Beer
210 DATA 136,248,143,143,
143,143
220 DATA 143,119,136,170,
221,153
230 DATA 221,170,136,0
```

Program I

```
10 REM PROGRAM II
20 MODE 5
30 FOR byte=0 TO 15
40 READ data
50 byte?&C00=data
60 NEXT
70 P%=&900
80 [ OPT 2
90 LDA #&00:STA &70
100 LDA #&58:STA &71
110 .loop1
120 LDY #15
130 .loop2
140 LDA &C00,Y
150 STA (&70),Y
160 DEY
170 BPL loop2
180 CLC
190 LDA &70:ADC #16:STA &
70
200 LDA &71:ADC #00:STA &
71
210 CMP #&80
220 BNE loop1
230 RTS
240 ]
250 PRINT''"Press a key";
260 REPEAT UNTIL GET
270 CALL &900
280 REM Beer
290 DATA 136,248,143,143,
143,143
300 DATA 143,119,136,170,
221,153
310 DATA 221,170,136,0
```

Program II

Part Two of ROLAND WADDILOVE's series on programming graphics with arcade games in mind

indexed indirect addressing.

Lines 180 to 210 increment the address at &70/&71 by 16 (as each character is 16 bytes wide). When the high byte is equal to &80 then the loop is finished.

As we saw last month, the start address of each line on the screen going down is &140 higher than the previous line and each character is &10 bytes wide.

So to print a multicoloured character at TAB(x,y) the address is &5800+&10*x+&140*y. I'm assuming that you haven't scrolled the screen at any time.

How can we make our character move? In Program II we printed it at successive character positions until the screen was full. If we delete the previous character before printing the next, then we'll have our moving pint of beer.

Program III moves our character while a key is held down. When it reaches the end of a line it moves on to the start of the next.

It doesn't check when it goes off the bottom of the screen, so you'll have to press Escape to end.

As before, the address it's printing at is stored in &70/&71. First the old character is deleted by storing zeroes in the screen memory, lines 80-130.

Then the address is incremented by 8, lines 140-160, and the character printed at the new address, lines 170-220.

The movement of the character when you tap a key appears to be almost instantaneous, with no flicker at all. If you hold down a key the pint moves so fast it starts to blurr.

An important point to notice is that the background is erased when the character passes over it. This isn't very sprite-like is it? Still it's surprising how many games have a plain black background.

Simply deleting the character by storing zeros in the memory is quite acceptable most of the time.

To allow a character to move over the background or any other character, what we do is to Exclusively OR the character data with the data in the screen memory. EORing once prints the character and EORing again removes it.

To see the EOR function in action, run Program IV. When a key is pressed the character data is EORed with the screen. It alternately prints and erases it.

Line 120 gets the character data, 130 EORs it with the

```
10 REM PROGRAM III
20 FOR byte=0 TO 15
30 READ data
40 byte?&C00=data
50 NEXT
60 P%=&900
70 [ OPT 2
80 LDY #15
90 LDA #&0
100 .loop1
110 STA (&70),Y
120 DEY
130 BPL loop1
140 CLC
150 LDA &70:ADC #8:STA &7
0
160 LDA &71:ADC #0:STA &7
1
170 LDY #15
180 .loop1
190 LDA &C00,Y
200 STA (&70),Y
210 DEY
220 BPL loop1
230 RTS
240 ]
250 MODE 5
260 VDU 23,1,0;0;0;0;
270 !&70=&5940
280 PRINT''"Press a key"
290 REPEAT
300 CALL &900
310 UNTIL GET=0
320 REM Beer
330 DATA 136,248,143,143,
143,143
340 DATA 143,119,136,170,
221,153
350 DATA 221,170,136,0
```

Program III

```
10 REM PROGRAM IV
20 MODE 5
30 VDU 23,1,0;0;0;0;
40 FOR byte=0 TO 15
50 READ data
60 byte?&C00=data
70 NEXT
80 P%=&900
90 [ OPT 2
100 LDY #15
110 .loop
120 LDA &C00,Y
130 EOR &64C8,Y
140 STA &64C8,Y
150 DEY
160 BPL loop
170 RTS
180 ]
190 PRINT''"Press a key"
200 REPEAT
210 CALL &900
220 UNTIL GET=0
230 REM Beer
240 DATA 136,248,143,143,
143,143
250 DATA 143,119,136,170,
221,153
260 DATA 221,170,136,0
```

Program IV

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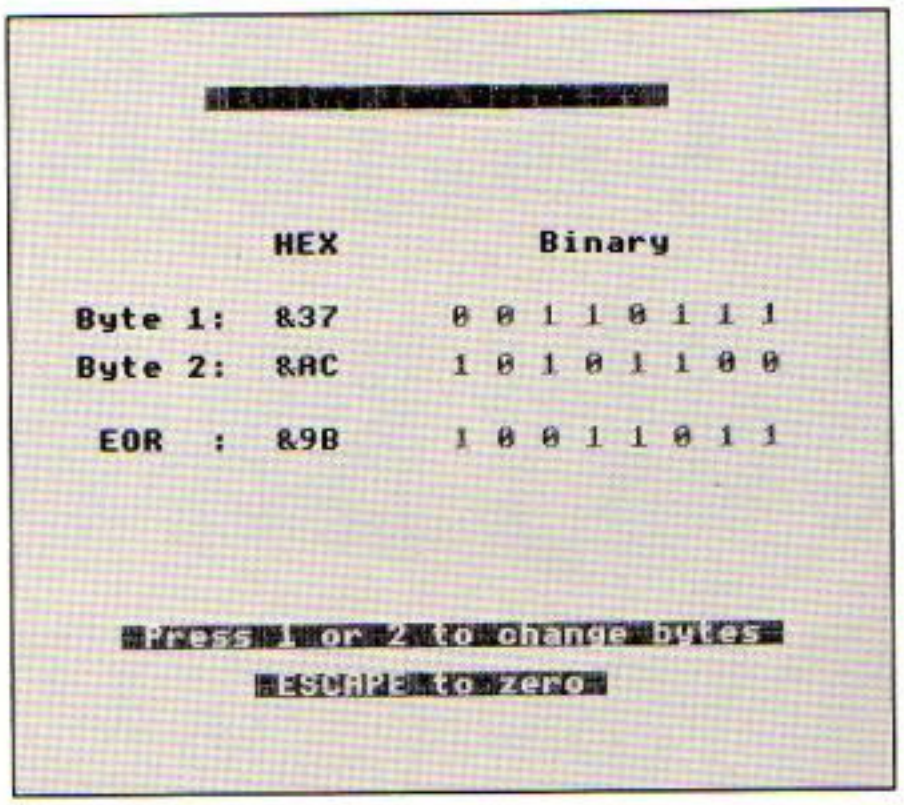

Program V in action

From Page 21

screen and 140 stores the result back in the screen memory. How does this work?

Program V shows exactly what the EOR function does. Two bytes are displayed in hex and binary and the EOR result displayed below.

The result is calculated by comparing each bit of the two bytes according to the following rules:

```
0 EOR 0 is 0
1 EOR 0 is 1
0 EOR 1 is 1
1 EOR 1 is 0
```

Suppose that the data for the background is &0F and the character data is &AA. When we EOR them to print the character we get &A5. Try it with Program V.

If &A5 is EORed again we end up with &0F again.

This means that by EORing the data with the screen the background isn't wiped out. It may be temporarily messed up, but when the character moves off it the background is restored.

In Mode 5 there's not much we can do about the weird effect when two characters meet.

However, in Mode 2 it's possible to arrange the colours using VDU 19 so that one character moves over the other while retaining its shape and colour. I'll leave this to you to work out if you're interested.

Program VI does exactly the same as Program II but using the EOR method to print the character. Notice the difference. The prompt is not erased when the pint passes over it. This can be an extremely useful technique.

The program uses two variables, *old* and *new* to store the old address of the character and the new address. It EORs the character data with the screen at *old* and then at *new*. *new* is then incremented by 8 ready for the next time round the loop.

And that's it for this month. next time we'll be exploring ways of controlling our machine code characters.

Yes, cursor controlled pints come to the Electron!

```
10 REM PROGRAM V
20 REM R.A.Waddilove
30 ON ERROR IF ERR<>17 R
EPORT:PRINT" at line ";ERL:
END
40 MODE 1:VDU 23,1,0;0;0
;0;
50 DRAW 0,1023:DRAW 1276
,1023:DRAW 1276,0:DRAW 0,0
60 PRINT TAB(3,12)"Byte
1:";TAB(3,14)"Byte 2:";TAB(
4,17)"EOR  :";TAB(12,9)"HEX
";TAB(24,9)"Binary"
70 COLOUR 129:PRINT TAB(
9,3)" EORing Two Bytes... "
80 COLOUR 0:PRINT TAB(5,
25)" Press 1 or 2 to change
 bytes ";TAB(11,27)" ESCAPE
 to zero ":COLOUR 128
90 COLOUR 128
100 byte1%=0:byte2%=0
110 PROCdata(12,byte1%)
120 PROCdata(14,byte2%)
130 REPEAT
140 K%=INKEY0:*FX21,0
150 PROCdata(17,byte1% EO
R byte2%)
160 IF K%=49 byte1%=(byte
1%+1)MOD256:PROCdata(12,byt
e1%)
170 IF K%=50 byte2%=(byte
2%+1)MOD256:PROCdata(14,byt
e2%)
180 UNTIL FALSE
190 END
200 DEF PROCdata(Y%,N%)
210 COLOUR 2
220 IF N%<16 PRINT TAB(12
,Y%)"&0";~N%;SPC(5); ELSE P
RINT TAB(12,Y%)"&";~N%;SPC(
5);
230 COLOUR 1:FOR I=1 TO 5
0:NEXT
240 IF INKEY-49 OR INKEY-
50 ENDPROC
250 FOR I%=7 TO 0 STEP -1
260 IF N% AND 2^I% PRINT"
1 "; ELSE PRINT"0 ";
270 NEXT
280 ENDPROC
```

Program V

```
10 REM PROGRAM VI
20 MODE 5
30 VDU 23,1,0;0;0;0;
40 FOR byte=0 TO 15
50 READ data
60 byte?&C00=data
70 NEXT
80 old=&70:new=&72
90 P%=&900
100 [ OPT 2
110 LDX #2
120 .loop1
130 LDY #15
140 .loop2
150 LDA &C00,Y
160 EOR (old),Y
170 STA (old),Y
180 DEY
190 BPL loop2
200 LDA new:STA old
210 LDA new+1:STA old+1
220 DEX
230 BNE loop1
240 CLC
250 LDA new:ADC #8:STA ne
w
260 LDA new+1:ADC #0:STA
new+1
270 RTS
280 ]
290 !old=&8000:!new=&5940
300 PRINT''"Press a key"
310 REPEAT
320 CALL &900
330 UNTIL GET=0
340 REM Beer
350 DATA 136,248,143,143,
143,143
360 DATA 143,119,136,170,
221,153
370 DATA 221,170,136,0
```

Program VI

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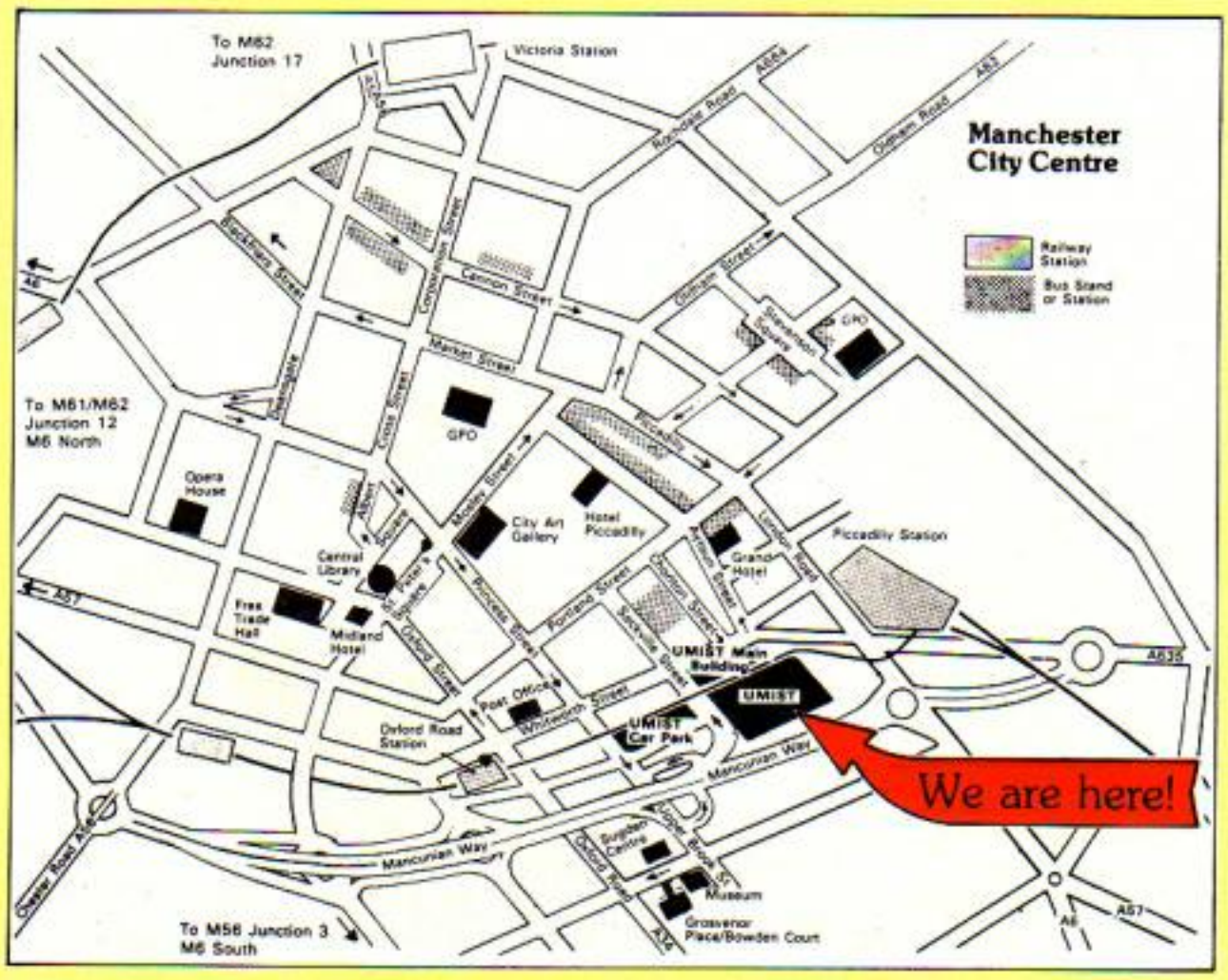

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Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

Fancy a game of cards? You have the choice of four

Aces High
Oasis Software

ACES High is a compilation package of four card games. These can be played either against the computer or between up to five opponents, depending on the game selected.

Draw poker and stud poker are played by the user against as many as five computer opponents. You are allocated £1,000 to start with, and the game ends when one player has accumulated all the money.

The computer is always dealer and always deals to the same player first, which detracts a little from the reality of the game.

You are given the opportunity to fold, check, call or raise, depending on your hand.

Don't worry if you don't understand these terms, or even if you don't know how to play poker, because all is adequately explained in a very handy, explicit booklet which is incorporated in the package.

Blackjack and pontoon are very similar, but have subtle differences which become clear when you use Aces High.

You win the chance to become banker if you get pontoon (in the game pontoon, that is) or a natural (in blackjack).

Again you are given £1,000 to start, and again play continues until one player has accumulated all the cash. All the programs are very simple to use and, as well as the booklet, instructions are given thoughout the games.

They couldn't really go wrong with the graphics, but the cards are well depicted and the layouts good.

The games, as you would expect, are aimed at the more mature market, but kids from about ten years old upwards will enjoy the simpler pontoon and blackjack.

As it is, Aces High gives all the family the chance to enjoy losing their shirts without really noticing it.

Adam Young

Fly off to war...

Combat Lynx
Durrell Software

IN Combat Lynx, Durrell Software have come up with a unique and exciting war game.

As the pilot of a fully-armed and potentially-lethal Lynx helicopter, you are required to provide air support for four bases. These are constantly under threat of attack by enemy ground forces.

You have a whole arsenal of weapons at your disposal, including landmines, wire-guided anti-tank missiles, air-to-air missiles, and gun pods.

You can select any mix of weapons systems or a standard load.

Your defence can be offensive or defensive, and to help you in this you've access to a constantly updated intelligence map.

This shows the ground contours, the positions of your bases and the dispositions of enemy forces.

From this you can decide where best to lay your mines and where to find the enemy vehicles which you can then strafe with your guns or destroy with your missiles.

While this is going on, you're constantly under attack by enemy missiles. Luckily these aren't guided, and can be easily avoided once you get the hang of the controls.

They're not the only hazards, however – because, like any flying machine, you have a limited range and need to keep a watchful eye on the fuel and temperature gauges.

The instrument panel also incorporates an airspeed indicator, altimeter, compass, and a very useful map co-ordinates indicator which relates directly to the intelligence map.

You can preset the co-ordinates of a particular target and then watch as your position winds down to coincide with them as you guide your machine towards it.

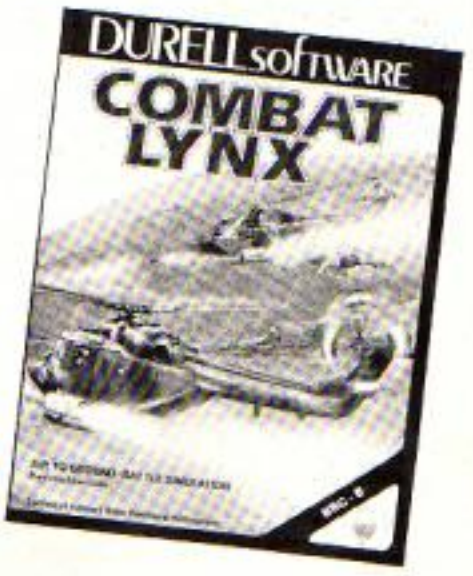
Don't do as I do and become so interested in this that you fly into a hillside!

There's more to the game than merely zapping the enemy.

Your bases sustain damage and casualties occur in the defence. The wounded have to be taken to hospital (Base No 1) and movements of fresh troops are undertaken by means of your helicopter.

Equally inevitable is the fact that just as you get airborne with a helicopter full of wounded, a desperate call for help comes through from a base under heavy attack. What do you do?

It's not for the young or slow of reflex, as flying the



helicopter, avoiding missiles and firing the weapons takes a great deal of acquired skill.

There are at least 15 separate keys to use, some having dual and triple functions depending on the situation. But I do feel that some of these could have been situated in a slightly more convenient way.

The graphics are highly detailed, extremely colourful and very well defined, and I was particularly impressed with the realistic way in which the weapons systems worked.

There are four levels. The

→

From Page 27

"easy" still required a great deal of skill and the "hardest" was, for me, virtually impossible.

Together with the very professional packaging, this all adds up to a superb game, thoroughly recommended.

Adam Young

Hints for all

Starter Pack
Beebugsoft

LET'S face it, the User Guide that comes with the Electron isn't the easiest of books to understand. Many people get frustrated if they find programming a problem and can't find the answer in it.

Beebug have attempted to help them with their Starter Pack.

What you get in the pack is a slim, but well-written booklet, explaining how to use the features of the micro that beginners most often want – graphics and sound.

There is a stong emphasis on the structured approach to programming, with not a GOTO in sight.

The booklet also has a hotch-potch of hints, which almost everybody should find interesting.

These cover features of Basic, the operating system and memory, as well as books to read and where to find help if you have a problem.

The pack is aimed at both the BBC Micro and the Electron. One chapter is concerned solely with Mode 7. However, it's clearly marked BBC only, so should not cause any problem.

It also contains a cassette

of programs (described in the book). There are eight games programs and six utilities.

The utilities include a "Bad Program" aid and a character definer.

In theory these are useful, but the other utilities – a function key editor, a memory display, a utility editor and a sound wizard – are rather poor.

Having two different programs in memory is never easy.

The games are a varied and tidy selection of arcade-type and strategy games.

Old favourites are there such as Life, Galaxians, Connect 4, Reversi and Marslander. There is a version of Zombies and a football game.

The pick of the bunch is Blockblitz, which provides all the irritation and frustration to make you play it again and again.

To complete the pack you also get a screen planning sheet, some character planning sheets and a function key strip.

The trouble with the package is that the cassette and booklet don't complement one another.

If you are a real beginner, the booklet may be beyond you, but then the tape provides a selection of good magazine-type games to keep you occupied.

However, if you wish to dabble in programming, then the booklet is useful, and, if you want the programs as well, the whole package represents good value.

Rog Frost

Learning to read...

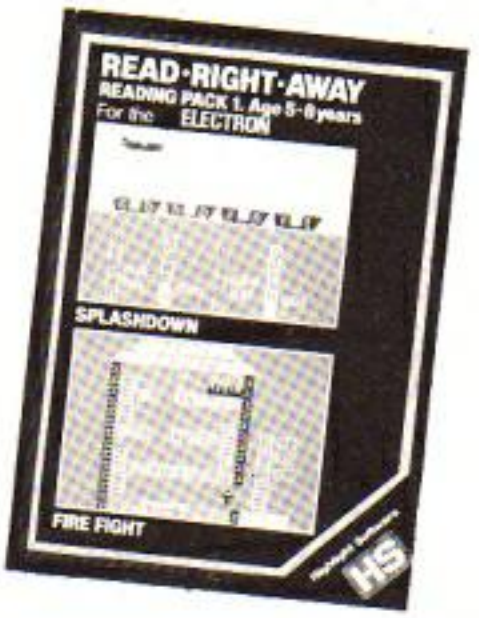
Read Right Away (Reading Pack I)
Highlight Software

HIGHLIGHT Software aims this pack at five-to-eight year-olds and it's designed to help develop reading skills.

There are two programs on the tape, and each can be played by an individual or by up to four people in competition.

The first game is called Splashdown and the idea is to collect a letter to complete a three-letter word.

You have a boat with two letters already in it. When an aeroplane flies over, flashing in



your colour, you must press a letter that will complete a word.

If correct, the letter drops into the boat, which then sinks. Sink five boats and you are the winner.

Any player who completes five words in the same round is a winner, and is rewarded by having a submarine pull a "win" banner to his name.

This program is well constructed and seems to have a good vocabulary. Different skill levels refer to the number of permitted mistakes.

There is also an option to give each player the same two letters – all of which make a different word when completed.

One other very useful option is the choice of which of the three letters is missing from a word.

The graphics are pleasing and good use is made of double-sized lettering. A good program.

The second program, Firefight, is probably aimed at the eight-year-olds rather than the fives.

You play the part of a fireman who must rescue a girl from a burning house. To reach her you must cross some burning gaps.

These can be bridged by selecting the appropriate two letters to complete a word.

There are four gaps to fill, and then the fireman can reach the girl and carry her to safety.

As in the first game, there

Colourful game for the young

Ultron
Icon Software

ULTRON is another game of the Space Invaders school.

Although highly colourful and with a certain variety in that the aliens sometimes move across the screen instead of down, sadly there isn't a lot of originality in it.

There are four stages in the game, each one slightly harder than the previous one.

Your laser base moves along the bottom, knocking off the aliens and avoiding the bombs.

The third screen has a 3D effect in that the Space Invaders seem to appear out of the distance in ones and twos, and the fourth has one huge alien with a smaller alien inside.

You have to chip your way through the thick outer skin to get at the points inside. If you manage to do this, you are given an opportunity to earn a bonus.

While the average arcade game fan has long since left this sort of thing behind, I feel that Ultron may appeal to the younger user.

Certainly the keys are easily manageable and the screen layouts simple, with explicit instructions on an accompanying leaflet.

It's one for young beginners, not experts.

Adam Young

are good graphics and double-height text and a useful range of consonant blends to practice with.

One gripe with this program is the use of cursor keys, which are too near Break. This is a bad mistake in software designed for young children.

A problem with both programs is that the auto repeat is left on. Again, youngsters are inclined to be heavy-handed on the keyboard and this little bug can cause frustration.

Overall, though, this is a good package.

It appeals to children, and people looking for educational software could well consider this one, especially as there are three more packs in this series. These aim to develop word-building skills with six-to-11-year-olds.

Rog Frost

Bouncing back

Pinball
Microbyte Software

YOU don't have to be a wizard to play the latest pinball.

This is a simulation of the classic pre-electronic arcade game known to millions.

I dimly remember spending my school lunch hours battling forth, pitting my wits against machine. The ring of bells and beep of buzzers . . . oh memories!

Since then I've grown old on bar billiards, then Space Invaders, and lately the dreaded adventure game – but mention pinball and my eyes mist over.

If you don't remember pinball or if you're of the Space Invader generation, then here's the problem:

A silver ball bounces its way around obstacles on the top of a tilted table. Using two flippers you have to stop the silver ball falling out of play at the bottom of the table.

By skilfully controlling them you can guide it towards the high-scoring areas. Lights, buzzers and bells show when and where the points are made.

This program has excellent graphics that bring alive the thrill of the game. The ball moves realistically from buffer to buffer with that element of randomness always present in the original machines.

Unfortunately the sounds don't reflect the true pinball. I suppose that is the price of progress.

Gone are the solenoids and bells, buzzers and bumpers, and in return we have electronic noise.

My great enthusiasm for this game was slightly marred by the apparent slowness of its response. However, I feel that the computer is truly reflecting the pinball machine.

I regret to say that the first pinball was slow compared to our electronic entertainers.

I guess it must have been the endurance of our concentration over spans of inactive observation that made it a challenge.

There's no tilt to the game, so key-bashing won't be penalised. There's no need for joysticks but it would've been better if the two fire buttons were used to operate the flippers.

Generally this is a good game, certainly different from the usual arcade action. Disappointing to my sensitive memories, but entertaining all the same.

John Woollard

Bags of bugs

Bug Eyes
Icon Software

IT'S amazing how much Icon have improved since their early days. Bug Eyes is their best yet.

It's described on the rather smart cassette case as a fantasy arcade adventure. I wouldn't agree with the adventure part, but it's certainly a good arcade game.

Your objective is to reach the master power generator at the heart of a giant spaceship. This must be destroyed to prevent the Bug Eyes from reaching Earth.

There are 10 different levels to be negotiated within the ship.

At first it's quite easy with just a few bits of machinery to avoid. But on later screens there are various bugs and monsters bouncing up and down and flying around.

There are expanding and contracting platforms and disappearing walkways. If you're too slow they're gone and you'll fall on to rows of deadly spikes.

It's a fairly simple game with only two keys to control the man, left and right. The main difficulty is timing your run across the platforms and under the machinery so that you're not squashed or hit by flying bugs.

The graphics are superb, and although it's in Mode 1 with only four colours they're very sharp and move smoothly.

The demonstration mode, which flicks through all the screens, is quite nice to watch.

Bug Eyes is a simple but enjoyable game which will keep you amused for quite a while. Arcade addicts may think it a bit too easy, but I found it just about my level.

Roland Waddilove

Treasure guest

Sphinx Adventure
Acornsoft

SPHINX Adventure was the first adventure to be released by Acornsoft and is, to my knowledge, still the only one available on cassette for the Electron.

It's modelled very generally on the original Crowther and Woods Colossal Caves.

You'll meet some familiar characters in it, though, to be fair, it is nothing like Colossal Caves and is a very worthy adventure in its own right.

Your task is to search an underground complex to add yet more treasure to the pile you have built up from previous adventures.

You start your quest on a well-trodden road and a quick search of the surrounding countryside should find you equipped for the start of your quest.

Then it's off to the Valley of Doom and down to the Hall of Spirits for the start of your perils.

You'll soon come across a pirate and a dwarf who will leave you an axe.

Your first major problem is likely to be in getting past the

fiery passage – this is where you find out whether you have the bottle for this adventure!

Later you'll need to escape from a sea-serpent – match that if you can!

The troll shouldn't prove to be much of a problem. You should be able to discover where he puts his loot.

If you manage to satisfy the crocodile's appetite you'll find something useful – but be careful not to rub it up the wrong way.

Right! That's enough clues!

One thing I couldn't discover was whether there was any meaning to the graffiti in the Inner Sanctum. I'm sure there are more locations to be discovered here. Please let me know if you have figured it out.

I've managed to map more than 100 locations so it is a big adventure. In fact I must confess that it is one of those games that keeps you up until the small hours. Five o'clock in my case.

Overall, an extremely good adventure and one that I can wholeheartedly recommend. Let's hope Acornsoft do conversions for their other adventures. Excellent stuff.

Merlin

Get on the rig

in the drive fo

Feeling a little dense about densities? Lost track of
BIBBY guide you through the Electron disc system

OVER the next few months we'll be taking a look in depth at the disc systems available for the Electron. Roland Waddilove will be exploring the Plus 3, while I'll be trying out the Cumana filing system.

Before we get down to specific products, however, we thought that we should just cover a few simple features of disc systems in general.

I lost the toss – the disc landed label side down – so I'm writing the preliminary article.

To begin. Two things are needed for a micro to work with discs. The first is, fairly obviously, a disc drive. This corresponds to the familiar cassette recorder. The cassette recorder uses tapes, the disc drive uses discs.

The second, less obvious, requirement is for a piece of software to actually get the micro and the disc drive working in unison.

Without this program linking the computer and the disc drive, arranging when and how data is to be transferred between one and the other, the disc drive would be so much junk.

The drive may be physically interfaced to the micro but it won't work without the software interface supplying the intelligence. This piece of software, always on a ROM chip, is known as the Disc Filing System or DFS.

However, with something like the Plus 3 the division becomes a little blurred as both the DFS – in this case the Acorn Advanced Disc Filing System or ADFS – and a disc drive come together in one package.

The split is easier to see in the Cumana filing system.

Here the software is contained in the cartridge that plugs into the Plus 1. The disc drive is attached to this cartridge by a length of ribbon cable.

Whichever system is used, however, will have both the software and the hardware.

The disc drives themselves are fairly standard, usually being one of two types known as 5.25in and 3.5in drives. These figures refer to the actual dimensions of the floppy discs that the drives use.

The larger 5.25in discs have been the usual size but now the smaller, more robust discs are becoming the industry standard.

Despite their reduced size they can hold just as much information.

Staying with the hardware side of things, information can be stored on one or both sides of a disc.

If only one side is used, then the drive is known as a single-sided drive. If both sides are used it's called a double-sided drive.

With a double-sided drive the DFS looks on each side of the disc as a separate drive. This may seem odd, but it's a useful fiction.

When you consider that most DFSs allow two disc drives to be used in tandem – has anyone done this with a Plus 3? – you can see that if double-sided drives are joined the DFS thinks it has four drives.

So a drive may be double or single-sided. It may also be what is known as 40 or 80 track or, more flexibly, able to read from both at the flick of a switch.

'Each particular filing system has its own way of formatting the disc'

And to understand what that means, we have to go back to the software.

When you first get a new disc – 3.5 or 5.25, it makes no matter – it's completely blank. In that state it's useless to the DFS, which expects the disc to have certain magnetic markings on its surface.

It needs these to find its way around the disc, organising the data and programs that the micro has told it to load or save.

The point to grasp is that the disc's surface has to be

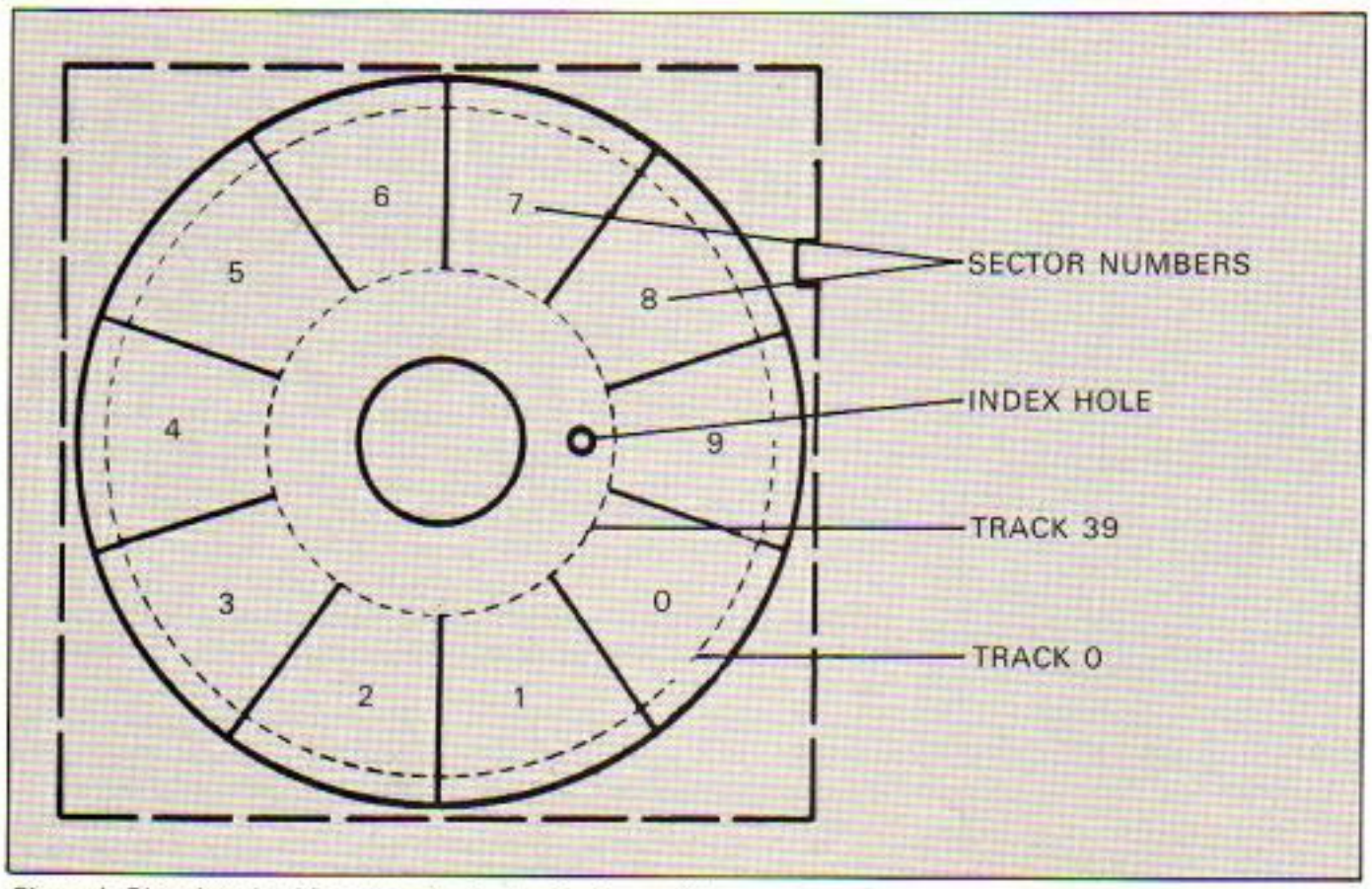
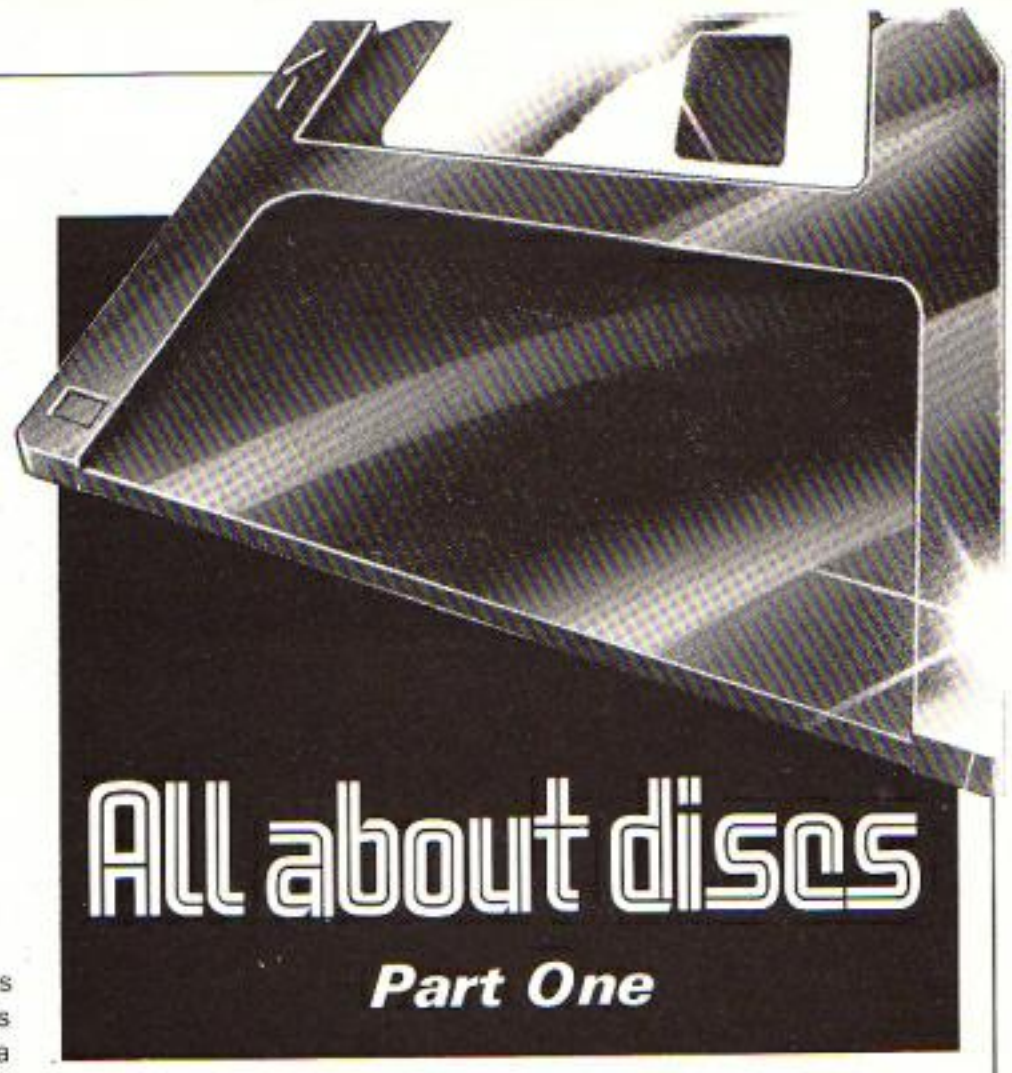


Figure I: Showing the 10 sector single density format (the sectors are laid out during the format process). With thanks to Cumana.

ht track r discs



All about discs

Part One

your floppies? Then let PETE in the first of a new series

marked out in a specific electromagnetic pattern for the DFS to make sense of it.

A special program, called a formatter, is used to mark out or format these discs. So when you buy a blank disc it will have to be formatted.

Happily, you get formatting programs when you buy your DFS.

Unhappily, the format used differs from DFS to DFS. This means that while my Cumana system uses 3.5 discs that will physically fit into Roland's Plus 3, that's where it ends. Neither DFS can read the other's discs as the formatting is different.

What the formatter does is to arrange the face of the disc into a series of concentric tracks. The number of these tracks varies but is usually either 40 or 80.

These tracks are further subdivided into what are known as sectors, usually 8, 9, 10 or 16 of them to a track.

Figure I shows a 40 track disc (0 to 39) with 10 sectors (0 to 9) in each track. We've used a BBC Micro disc so as not to be accused of favouritism!

Discs for the Plus 3 have 80 tracks and each of these tracks is divided into 16 sectors.

With the Cumana disc you have the choice of either 40 or 80 tracks. Each of these tracks is divided into nine sectors.

From this you can see why the formats of the varying discs are incompatible.

One other major difference is how much information can be held in one of these sectors.

A Plus 3 sector can hold 256 bytes while the Cumana packs in 512 bytes of data. As you can see, there's twice as much information stored in a Cumana sector.

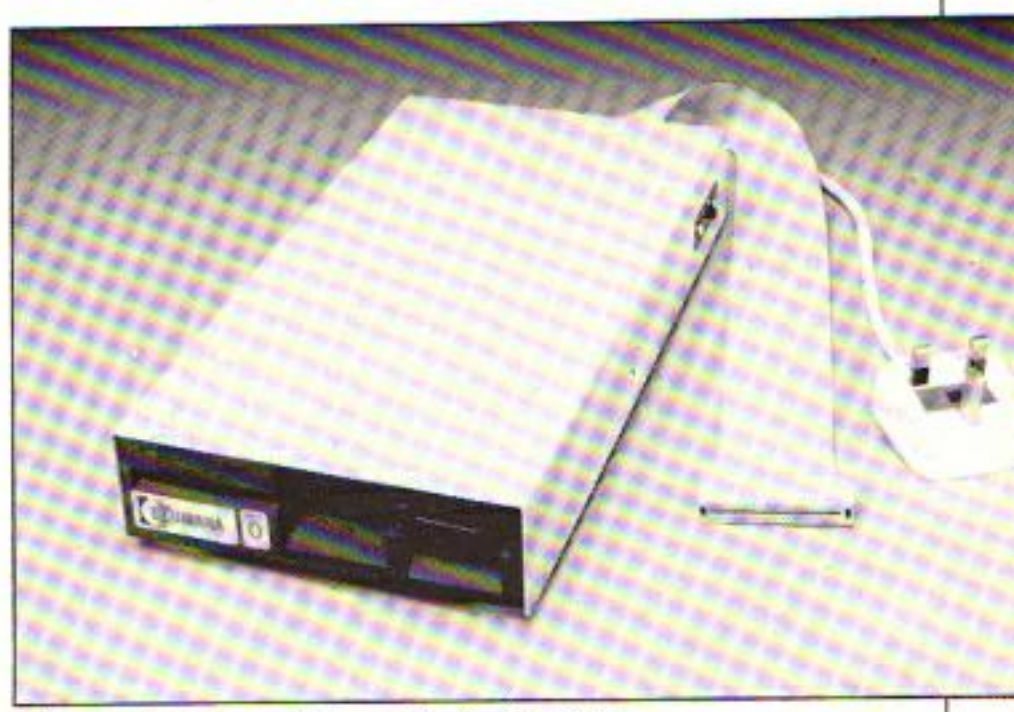
Systems that use such packing techniques are known as double-density DFSs.

However, nothing in life is that simple. If you look at the number of sectors on the Plus 3 disc you'll see that there are practically twice as many as on the Cumana disc or the BBC Micro disc in Figure I.

And that's where we'll leave discs for now.

The main point to grasp is that each particular filing system has its own way of formatting the disc. Tracks, sectors and bytes in a sector vary from one to the other.

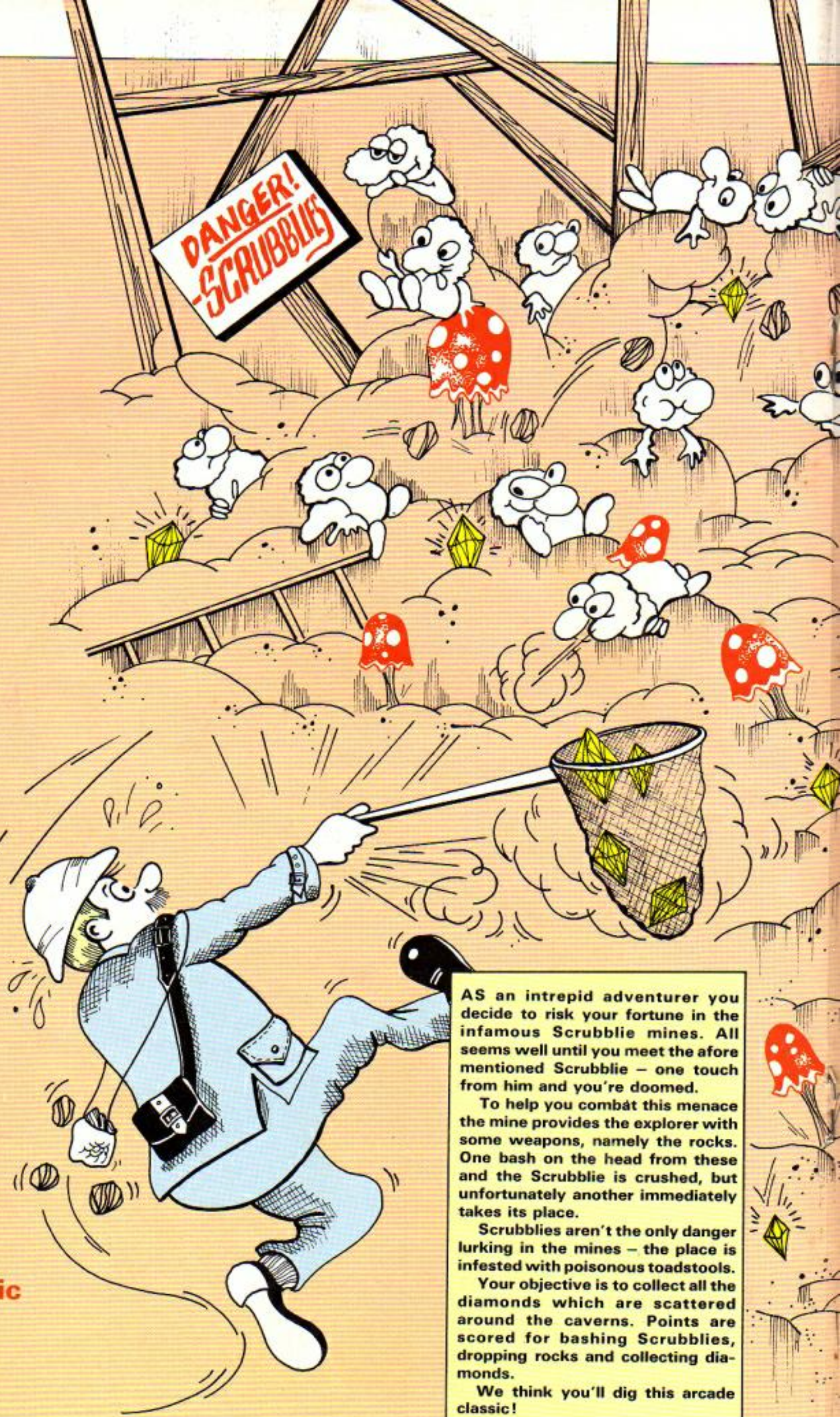
However, if you stick to just your own DFS you should have no problems.



Cumana disc drive which attaches to the Plus 1

The Electron with the Plus 3 attached

DIGA



Dig for diamonds – and dear life in this arcade classic devised by STEPHEN MARTIN

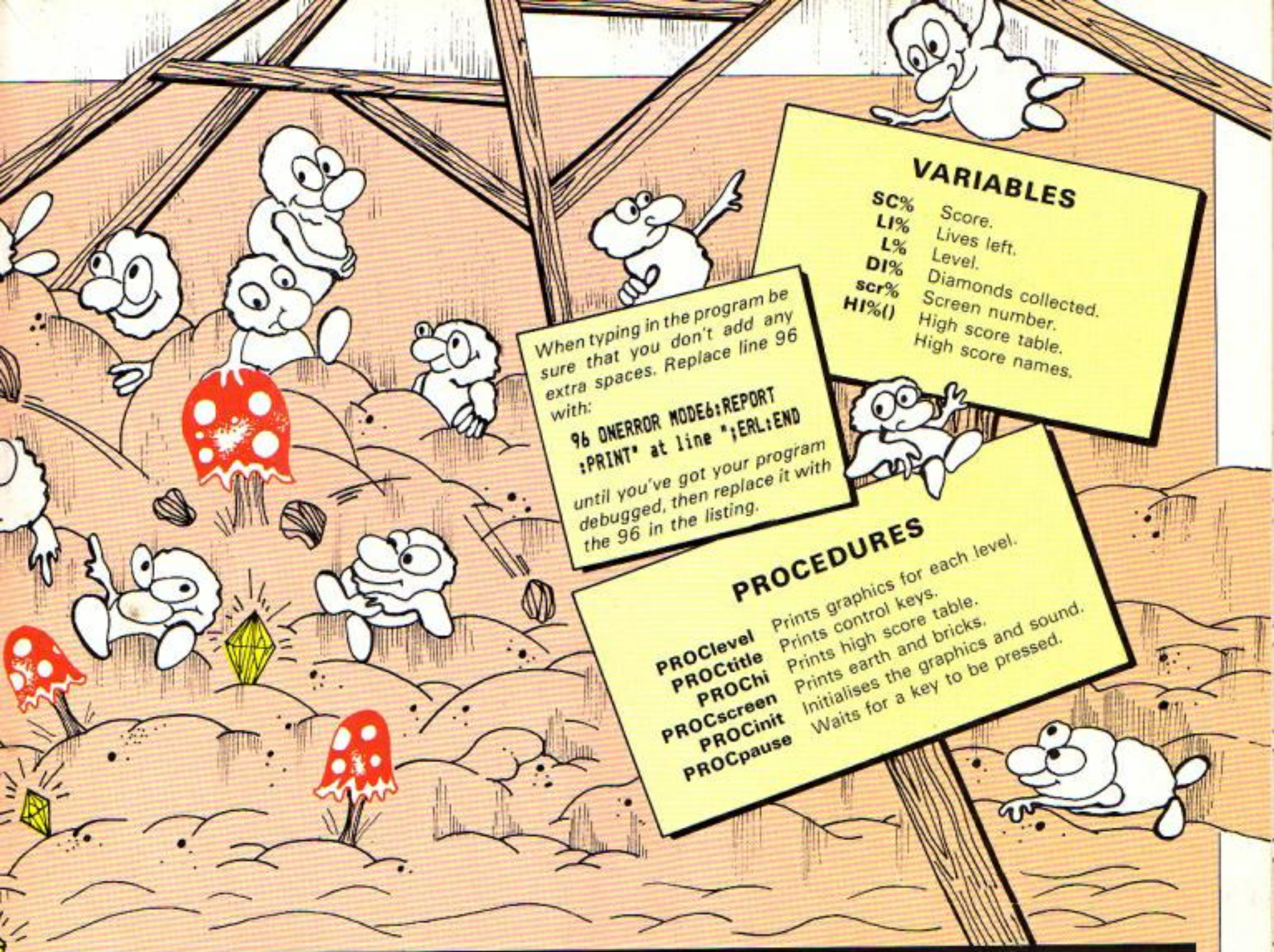
AS an intrepid adventurer you decide to risk your fortune in the infamous Scrubblie mines. All seems well until you meet the afore mentioned Scrubblie – one touch from him and you're doomed.

To help you combat this menace the mine provides the explorer with some weapons, namely the rocks. One bash on the head from these and the Scrubblie is crushed, but unfortunately another immediately takes its place.

Scrubblies aren't the only danger lurking in the mines – the place is infested with poisonous toadstools.

Your objective is to collect all the diamonds which are scattered around the caverns. Points are scored for bashing Scrubblies, dropping rocks and collecting diamonds.

We think you'll dig this arcade classic!



VARIABLES

SC%	Score.
LI%	Lives left.
L%	Level.
DI%	Diamonds collected.
scr%	Screen number.
HI%()	High score table.
	High score names.

When typing in the program be sure that you don't add any extra spaces. Replace line 96 with:

```
96 ONERROR MODE6:REPORT
:PRINT" at line ";ERL:END
```

until you've got your program debugged, then replace it with the 96 in the listing.

PROCEDURES

PROClevel	Prints graphics for each level.
PROCtitle	Prints control keys.
PROChi	Prints high score table.
PROCscreen	Prints earth and bricks.
PROCinit	Initialises the graphics and sound.
PROCpause	Waits for a key to be pressed.

Digga listing

```
   1 REM DIGGA
   2 REM BY STEPHEN MARTIN
   3 REM (C) 1984/85
   4 REM FOR ELECTRON USER
   5 MODE5:*FX15,0
   6 INPUTTAB(0,0)"SPEED (
1-3)";?&84
   7 DIM Q% 630:FORT=0TO2S
TEP2:P%=Q%
   8 [OPTT
   9 .CONROL LDA&84:CMP#1:
BEQFAST:CMP#2:BNENORMAL
   10 .SLOW JSRKEY:JSRN:JSR
N:JSRR:RTS
   11 .FAST JSRKEY:JSRKEY:J
SRN:JSRR:RTS
   12 .NORMAL JSRKEY:JSRN:J
SRR:RTS
   13 .KEY
   14 LDX#&9E:JSR inkey:BNE
 LLLL:LDX#&BD:JSR inkey:BNE
 RRRR:LDX#&97:JSR inkey:BNE
 DDDD:LDX#&C8:JSR inkey:BNE
 PAUSE:LDX#&AE:JSR inkey:BN
E NOISE:LDX#&CD:JSR inkey:B
NE QUIET
   15 LDX#&B7:JSR inkey:BEQ
 MAN
   16 LDA#4:STA&72:JMP MAN
   17 .LLLL
   18 LDA#1:STA&72:JMP MAN
   19 .inkey PHA:TYA:PHA:LD
Y#&FF:LDA#&81:JSR&FFF4:PLA:
TAY:PLA:CPX#&00:RTS
   20 .PAUSE
   21 JSR&FFE0
   22 JMP KEY
   23 .NOISE
   24 LDA#210
   25 LDX#0:JSR&FFF4:JMP KE
Y
   26 .QUIET
   27 LDA#210
   28 LDX#10:JSR&FFF4:JMP K
EY
   29 .RRRR
   30 LDA#2:STA&72:JMP MAN
   31 .DDDD
   32 LDA#3:STA&72
   33 .MAN
   34 LDA#17:JSR&FFEE:LDA#3
:JSR&FFEE
   35 LDA&72:CMP#0:BEQpman
   36 LDA#31:JSR&FFEE:LDA&7
0:JSR&FFEE:LDA&71:JSR&FFEE:
LDA#32:JSR&FFEE
   37 LDA&72:CMP#1:BEQup:CM
P#2:BEQdo:CMP#3:BEQri:CMP#4
:BEQle
   38 .pman
   39 LDA#31:JSR&FFEE:LDA&7
0:JSR&FFEE:LDA&71:JSR&FFEE:
LDA#135:JSR&FFF4
   40 TXA:CMP#128:BEQn
   41 CMP#131:BEQn
   42 CMP#133:BEQs
   43 CMP#134:BEQt
   44 CMP#132:BEQt
   45 .A
   46 LDA#226:JSR&FFEE:RTS
   47 .up DEC&70:JMPpman
   48 .do INC&70:JMPpman
   49 .ri INC&71:JMPpman
   50 .le DEC&71:JMPpman
   51 .n LDA&72:CMP#1:BEQdo
:CMP#2:BEQup:CMP#3:BEQle:CM
P#4:BEQri
   52 .s LDA#1:STA&8C:JMPA
   53 .t LDA#1:STA&85:JMPA
   54 .N
   55 LDA#17:JSR&FFEE:LDA#2
:JSR&FFEE
   56 LDA&86:CMP#134:BNE EA
RTH:LDA#17:JSR&FFEE:LDA#1:J
SR&FFEE
   57 .EARTH
   58 LDA&73:CMP#1:BEQ SKIP
   59 LDA#31:JSR&FFEE:LDA&7
E:JSR&FFEE:LDA&7F:JSR&FFEE:
LDA&86:JSR&FFEE:LDA&8F:CMP#
1:BEQu:CMP#2:BEQd:CMP#3:BEQ
r:CMP#4:BEQl
   60 LDA&86:CMP#133:BNE EA
RTH:LDA#17
   61 .p
   62 LDA#17:JSR&FFEE:LDA#3
:JSR&FFEE
   63 LDA#31:JSR&FFEE:LDA&7
```

From Page 33

```
E:JSR&FFEE:LDA&7F:JSR&FFEE:
LDA#135:JSR&FFF4:TXA
  64 CMP#128:BEQb1
  65 CMP#133:BEQb1
  66 CMP#131:BEQb1
  67 CMP#130:BEQq
  68 STA&B6
  69 LDA#228:JSR&FFEE:RTS
  70 .SKIP JMPR
  71 .u DEC&7E:JMPp
  72 .d INC&7E:JMPp
  73 .r INC&7F:JMPp
  74 .l DEC&7F:JMPp
  75 .b1 LDY&8F:LDA&8D:STA
&8F:TYA
  76 CMP#1:BEQd:CMP#2:BEQu
:CMP#3:BEQl:CMP#4:BEQr
  77 .q LDA#1:STA&85:LDA#2
28:JSR&FFEE:JMPR
  78 .R
  79 LDA#17:JSR&FFEE:LDA#3
:JSR&FFEE
  80 LDX#4
  81 .rocks
  82 LDA#31:JSR&FFEE:LDA&7
4,X:JSR&FFEE:LDA&79,X:JSR&F
FEE:LDA#32:JSR&FFEE:LDA#10:
JSR&FFEE:LDA#8:JSR&FFEE:STX
&87:LDA#135:JSR&FFF4:STX&88
:LDX&87:LDA&88
  83 CMP#132:BEQ SQUASHED
  84 CMP#32
  85 BNEprint
  86 .FALL
  87 INC&79,X
  88 LDA&79,X:CMP#27:BEQJ
  89 .print
  90 LDA#31:JSR&FFEE:LDA&7
4,X:JSR&FFEE:LDA&79,X:JSR&F
FEE:LDA#227:JSR&FFEE:DEX:BN
Erocks
  91 RTS
  92 .J LDA#1:STA&8A:LDA#7
:JSR&FFEE:JMPprint
  93 .SQUASHED LDA#1:STA&7
3:LDA#32:STA&86:JMP FALL
  94 ]
  95 NEXT
  96 ON ERROR SOUND&11,3,2
55,5:GOTO102
  97 *FX214,4
  98 *FX213,5
  99 *FX211,0
 100 DIMN$(10),HI%(10)
 101 VDU19,2,2;0;:FORT=1TO
10:N$(T)="STEPHEN":HI%(T)=1
500:NEXT:VDU23,1;0;0;0;0;
 102 PROCinit
 103 PROCbegin
 104 ?&85=0:?&73=0:SC%=0:L
I%=3:L%=1
 105 PROCinit
 106 PROCscreen
 107 PROClevel
 108 PROCobjects
 109 ?&8D=RND(4)
 110 IFRND(5)<2THEN?&8F=RN
D(4)
 111 CALL 0%
 112 IF?&85=1THEN?&85=0:PR
OCdead
 113 IF?&73=1THENSC%=SC%+2
00:SOUND&11,1,200,5:?&73=0:
?&7E=9:?&7F=8
 114 IF?&8C=1THEN?&8C=0:SC
%=SC%+50:SOUND&11,1,255,5:D
I%=DI%+1:IFDI%=5THENPROCgot
 115 IF?&8A=1THEN?&8A=0:SC
%=SC%+100
 116 L=LEN(STR$(SC%)):PRIN
TTAB(12-L,4);SC%
 117 GOTO109
 118 DEFPROCtitle:CLS:COLO
UR3:PRINTTAB(7,3)"DIGGA":CO
LOUR2:PRINTTAB(6,10)": UP":
PRINTTAB(6,12)"/ DOWN":PRIN
TTAB(6,14)"Z LEFT":PRINTTAB
(6,16)"X RIGHT";TAB(6,18)"P
 PAUSE";TAB(6,20)"S SOUND";
TAB(6,22)"D SILENCE";TAB(5,
24);"ESCAPE EXIT"
 119 COLOUR3:PRINTTAB(2,28
)"ANY KEY TO START"
 120 K=INKEY(500):ENDPROC
 121 DEFPROChi:CLS:COLOUR3
:PRINTTAB(3,3)"HISCORE  TAB
LE":COLOUR1:PRINT''':FORT=1
TO9:PRINTTAB(2);T;". ";N$(T
);TAB(14);HI%(T):PRINT:NEXT
:PRINTTAB(1);"10. ";N$(10);
TAB(14);HI%(10):COLOUR3
 122 IFQ=TRUE THEN FORT=1T
O5000:NEXT:Q=FALSE:ENDPROC
ELSE PRINTTAB(2,30)"ANY KEY
 TO START":K=INKEY(500):END
PROC
 123 DEFPROCbegin
 124 PROCtitle
 125 IFK=-1THEN126ELSEENDP
ROC
 126 PROChi
 127 IFK=-1THEN128ELSEENDP
ROC
 128 scr%=1
 129 PROCscreen:PROClevel
 130 PRINTTAB(1,29)" ANY K
EY TO START"
 131 K=INKEY(250)
 132 IFK=-1THEN133ELSEscr%
=1:ENDPROC
 133 scr%=scr%+1:IFscr%=12
THENscr%=1:GOTO124
 134 GOTO129
 135 DEFPROCwelldone:CLS:C
OLOUR3:PRINTTAB(1,10)"LEVEL
 ";L%;" COMPLETED":PRINTTAB
(5,17)"ENTERING":PRINTTAB(4
,19)"NEXT STAGE":SOUND&11,2
,255,25:FORY=1TO4000:NEXT:E
NDPROC
 136 DEFPROCpause
 137 *FX15,1
 138 A=GET:ENDPROC
 139 DEFPROCgot
 140 ?&73=0
 141 PROCwelldone
 142 L%=L%+1:scr%=scr%+1:I
Fscr%=13THENscr%=1
 143 PROCscreen:PROClevel:
PRINTTAB(15,4);LX:DI%=0:?&7
2=0:PRINTTAB(3,4);LI%
 144 GOTO108
 145 DEFPROCnewhi:IFSC%<=H
I%(10)THENENDPROC
 146 CLS:COLOUR3:PRINTTAB(
3,2)"TOP TEN SCORE";TAB(2,9
)"ENTER YOUR NAME";TAB(5,17
)"--------";TAB(5,17);:SOUN
D&11,2,255,25
 147 VDU23,1,1;0;0;0;0;
 148 *FX21,0
 149 X%=&80:Y%=&A:A%=0
 150 !&A80=&A00:?&A82=8:?&
A83=32:?&A84=128
 151 CALL&FFF1:A$=$&A00
 152 VDU23,1;0;0;0;0;
 153 slot=0
 154 REPEAT:slot=slot+1:UN
TIL SC%>HI%(slot)
 155 FORP=9TOslot STEP-1
 156 HI%(P+1)=HI%(P):N$(P+
1)=N$(P):NEXT
 157 HI%(slot)=SC%:N$(slot
)=A$
 158 Q=TRUE:PROChi:ENDPROC
 159 DEFPROCscreen
 160 COLOUR1
 161 CLS:PRINTTAB(0,1):PRI
NTSTRING$(19,CHR$224):PRINT
CHR$224;SPC(17);CHR$224:PRI
NTCHR$224;SPC(17);CHR$224:P
RINTSTRING$(19,CHR$224):PRI
NTCHR$224;SPC(17);CHR$224:P
RINTCHR$224;SPC(17);CHR$224
:FORT=1TO20:PRINTCHR$224;SP
C(17);CHR$224:NEXT
 162 PRINTSTRING$(19,CHR$2
24)
 163 PRINTCHR$224;SPC(17);
CHR$224:PRINTSTRING$(19,CHR
$224):PRINTTAB(0,9);:FORT=1
TO20:COLOUR2
 164 PRINTTAB(1,7+T);STRIN
G$(17,CHR$225):NEXT:COLOUR3
:PRINTTAB(2,3)"MEN";SPC(2);
"SCORE";SPC(2);"LEV";PRINTT
AB(3,4);"3";SPC(3);"00000";
SPC(3);"1"
 165 ENDPROC
 166 DEFPROCobjects
 167 ?&70=9:?&71=8:VDU31,9
,8,226
 168 FORT=1TO4
 169 X=RND(16)+1:Y=RND(10)
+10:C=FNscrn(X,Y):IFC<>129T
HEN169
 170 T?&74=X:T?&79=Y:VDU31
,T?&74,T?&79,227:NEXT
 171 FORT=1TO5
 172 X=RND(16)+1:Y=RND(10)
+10:C=FNscrn(X,Y):IFC<>129T
HEN172
 173 VDU31,X,Y,229:NEXT
 174 FORT=1TO5:COLOUR1
 175 X=RND(16)+1:Y=RND(10)
+10:C=FNscrn(X,Y):IFC<>129T
HEN175
 176 VDU31,X,Y,230:NEXT
 177 X=RND(16)+1:Y=RND(10)
+10:C=FNscrn(X,Y):IFC<>129T
HEN177
 178 ?&7E=X:?&7F=Y
 179 ENDPROC
 180 DEFPROCinit
 181 VDU23,224,0,253,253,2
53,0,239,239,239:VDU23,225,
255,255,255,255,255,255,255
,255:VDU23,226,24,24,0,60,9
0,24,36,102:?&72=0
 182 VDU23,227,0,28,62,110
,122,86,124,56:VDU23,228,24
,60,126,153,153,255,165,153
:VDU23,229,64,224,72,28,72,
226,71,2:VDU23,230,60,110,1
87,255,24,24,24,24
 183 DI%=0:scr%=1:?&8F=RND
(4):X=RND(-TIME):ENVELOPE1,
129,-122,-54,-94,97,22,21,1
26,0,0,-126,126,126:ENVELOP
E2,129,15,-123,110,233,84,4
8,126,0,0,-126,126,126:ENVE
LOPE3,129,-84,42,-70,247,23
0,156,126,0,0,-126,126,126
 184 Q=FALSE:ENDPROC
```

```
  185 DEFFNscrn(Q%,W%)
  186 A%=135
  187 VDU31,Q%,W%
  188 =(USR(&FFF4)AND&FF00)
DIV&100
  189 DEFPROCdead
  190 ?&73=0
  191 VDU19,0,3;0;:SOUND&11
,3,255,5:FORY=1TO500:NEXT:V
DU20:VDU19,2,2;0;
  192 *FX15,1
  193 LI%=LI%-1
  194 IFLI%=0THEN195ELSE143
  195 PRINTTAB(4,14)"
    "
  196 PRINTTAB(4,15)" GAME
OVER "
  197 PRINTTAB(4,16)"
    "
  198 FORY=1TO6000:NEXT:PRO
Cnewhi:GOTO103
  199 DEFPROClevel
  200 ONscr%GOTO201,202,204
,205,206,207,208,209,210,21
1,212,213
  201 COLOUR3:PRINTTAB(1,29
)"THE MINE ENTRANCE":ENDPRO
C
  202 FORX=1TO9STEP8
  203 COLOUR1:PRINTTAB(4+X,
15);CHR$224:PRINTTAB(4+X,16
);CHR$224:PRINTTAB(2+X,17);
CHR$224;CHR$224;CHR$224;CHR
$224;CHR$224:PRINTTAB(4+X,1
8);CHR$224:PRINTTAB(4+X,19)
:CHR$224:NEXT:COLOUR3:PRINT
TAB(1,29)"   MAIN TUNNEL":E
NDPROC
  204 BLOCK$=CHR$224+CHR$22
4+CHR$10+CHR$8+CHR$8+CHR$22
4+CHR$224:COLOUR1:FORX=0TO1
2STEP11:PRINTTAB(3+X,12)BLO
CK$:PRINTTAB(3+X,22)BLOCK$:
NEXT:COLOUR3:PRINTTAB(1,29)
" SECONDARY SHAFT":ENDPROC
  205 CROSS$=CHR$224+CHR$10
+CHR$8+CHR$8+CHR$224+CHR$22
4+CHR$224+CHR$10+CHR$8+CHR$
8+CHR$224:COLOUR1:FORX=0TO1
1STEP10:PRINTTAB(4+X,12);CR
OSS$:PRINTTAB(4+X,22);CROSS
$:NEXT:COLOUR3:PRINTTAB(1,2
9)"THE CREATURE CAVE":ENDPR
OC
  206 COLOUR1:VDU31,9,14,22
4,8,10,224,8,10,224,8,10,22
4,10,8,8,8,8,224,224,224,22
4,224,224,224,8,8,8,8,10,22
4,8,10,224,8,10,224,8,10,22
4:COLOUR3:PRINTTAB(1,29)" S
CRUBBLY CAVERN":ENDPROC
  207 COLOUR1:PRINTTAB(8,16
);STRING$(3,CHR$224);:PRINT
TAB(8,17);STRING$(3,CHR$224
);:PRINTTAB(8,18);STRING$(3
,CHR$224);:PRINTTAB(8,19);S
TRING$(3,CHR$224);:COLOUR3:
PRINTTAB(1,29)"  THE ROCK R
OOM":ENDPROC
  208 COLOUR1:FORX=0TO12STE
P11:PRINTTAB(3+X,22)BLOCK$:
NEXT:COLOUR3:PRINTTAB(1,29)
"FORGOTTEN  CAVERN":ENDPROC
  209 COLOUR1:PRINTTAB(9,18
);CROSS$:FORX=0TO11STEP10:P
RINTTAB(4+X,16);CROSS$:NEXT
:PRINTTAB(9,22);CROSS$:COLO
UR3:PRINTTAB(1,29)"NOTRADA
ENTRANCE":ENDPROC
  210 COLOUR1:PRINTTAB(8,18
);BLOCK$;CHR$224;CHR$8;CHR$
11;CHR$224:FORX=1TO11STEP9:
PRINTTAB(3+X,16);BLOCK$:NEX
T:PRINTTAB(8,22);BLOCK$;CHR
$224;CHR$8;CHR$11;CHR$224:C
OLOUR3:PRINTTAB(1,29)"   N
OTRADAMA":ENDPROC
  211 COLOUR1:PRINTTAB(4,18
);CROSS$:PRINTTAB(14,22);CR
OSS$:COLOUR3:PRINTTAB(1,29)
"  THE GRAVEYARD":ENDPROC
  212 COLOUR1:PRINTTAB(4,18
);BLOCK$:PRINTTAB(13,22);BL
OCK$:COLOUR3:PRINTTAB(1,29)
" THE  TOADSTOOLS":ENDPROC
  213 COLOUR1:PRINTTAB(9,18
);CROSS$:FORX=0TO11STEP10:P
RINTTAB(4+X,22);CROSS$:NEXT
:COLOUR3:PRINTTAB(1,29)"  T
HE MINE EXIT":ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 61.

EPIC ADVENTURES...EPIC ADVENTURES...EPIC ADVENTURES...EPIC ADVENTURES...EPIC ADVENTURES

EPIC ADVENTURES

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.....qty	THE WHEEL OF FORTUNE	£9.95	£11.95
.....qty	CASTLE FRANKENSTEIN	£7.95	£9.95
.....qty	THE QUEST FOR THE HOLY GRAIL	£7.95	£9.95
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STATE: BBC/ ELECTRON (Delete) No Graphics on Electron

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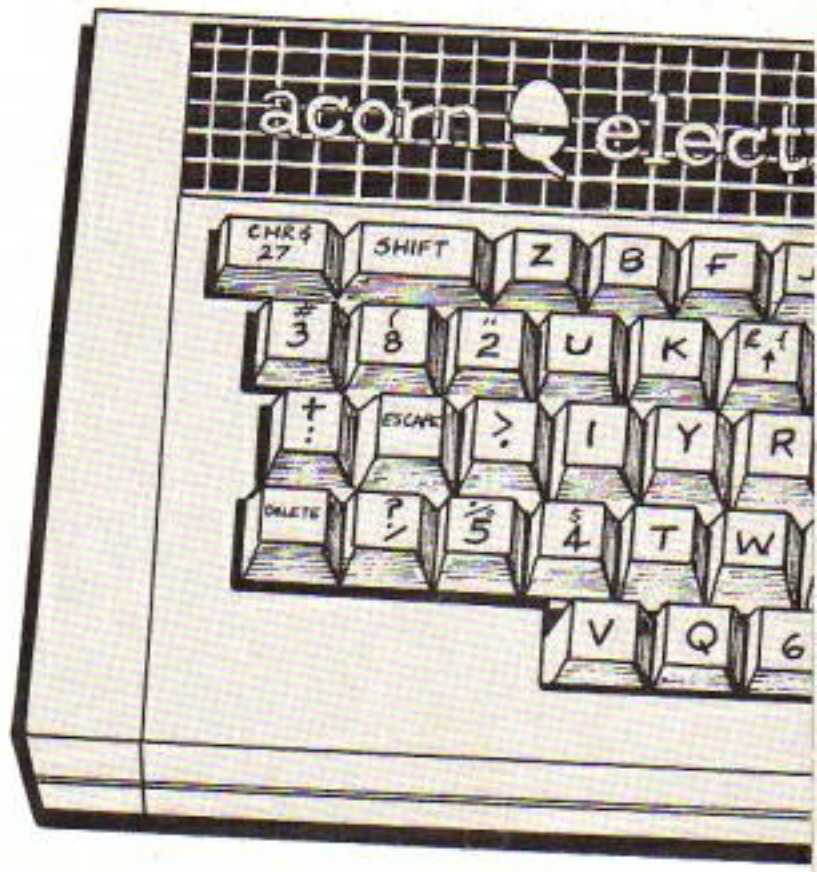
★★★ NEW: FREE HELP SHEETS NOW AVAILABLE. EACH CONTAINS 100's OF CLUES – JUST SEND SAE ★★★

Suppose you could alter your micro's keyboard...



JOHN WOOLLARD can be done with

THE way a particular type of computer behaves, the instructions it understands and the screen display it produces, is dependent upon the hundreds of short machine code routines that make up its Operating System.

By changing these routines and the values they use we can change the way the micro works. *FX calls have been specifically designed to help us change these subroutines and the values used by them.

This month we'll be looking at the keyboard, the way it operates and how using *FX can change its actions.

On power up each key of the keyboard has a particular action. There are lots of *FX calls that can be used to change the action of each and every key.

These changes are necessary to make some programs work more efficiently. Others wouldn't work at all without them.

Calls can also be used to protect a program written in Basic from corruption and interruption by a user.

I'll show how each of the calls can be used in a variety of programs and procedures.

The procedures are designed to be incorporated into Basic programs. They can be typed and SAVEd in the usual way or they can be recorded as *EXEC files which allow them to be easily merged into existing Basic programs.

Let's start our look at the keyboard with the Break key. I'm frequently infuriated by this key. It fouls up arcade games, destroys all the inputted data and, at best, makes programs start again from the beginning.

As you've probably found by experience, pressing the Break key physically and irreversibly interrupts processing by the computer.

The trouble is that its action can't be prevented by the use of software. The best we can hope for is that a program can be restarted without losing vital information. Unfortunately that, too, is difficult to achieve.

One useful technique is to define the Break key so that if it is pressed then OLD and RUN are automaticlaly enacted and the program restarts immediately.

```
*KEY1 OLD|MRUN|M
```

does the job. As well as this, there are a few *FX calls that affect the Break key and have some programming value.

*FX200 is the ultimate form of program protection. By using *FX200,2 the pressing of Break causes the permanent destruction of the program in memory. Even the use of OLD fails to recover it!

Empty the micro's memory with:

```
NEW
```

and then enter Program I and try it for yourself:

If you press Break then enter OLD and LIST, you'll find that the program can be seen.

Now type *FX200,2 and press Break. Entering OLD will

FOLLOW these instructions to merge a procedure into your own programs.

1. Type the procedure into your computer.
2. Check that it works!
3. Renumber it from 32000 in steps of 1.
4. Decide on a name for the tape file such as PROC1.
5. Type *SPOOL PROC1 then press Return.
6. Rewind a blank cassette, then press Play and Record.
7. Press Return again.
8. Type LIST, Return.
9. Type *SPOOL, Return.

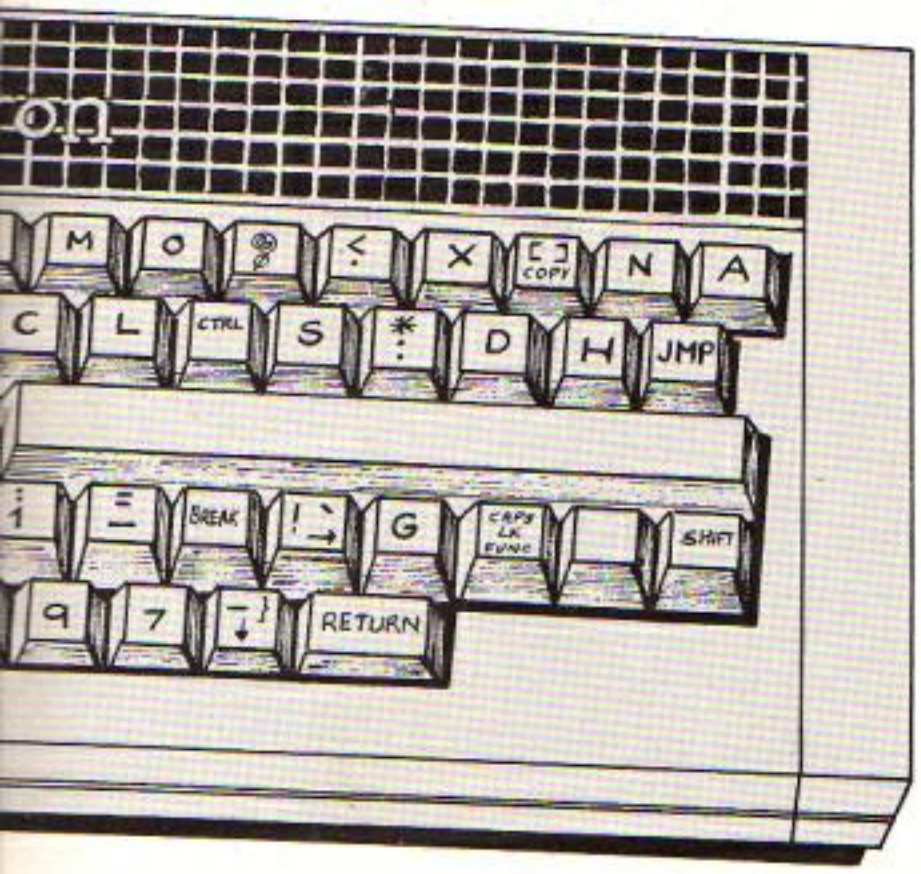
You'll have a SPOOLed copy of the procedure on cassette.

Now you need to merge it into your own program:

1. Load program.
2. You may need to RENUMBER your own program (if it uses lines 32000 onward).
3. Type *EXEC PROC1, Return.
4. Put the cassette with the procedure in the player, rewind it and then press Play.
5. Ignore the Syntax errors that appear!
6. When the procedure has loaded check that it is in place by LISTing your program.

The procedure will now be at the end. It may be moved by RENUMBERing the individual lines.

*Box I: Merging programs using *EXEC and *SPOOL*



*FX OS CALLS

Part Two

explains how it *FX commands

always give Bad Program!

There is a set of three *FX calls that can be used to modify the action of the Break key. However, their use requires a little knowledge of machine code programming.

When the Break key is

```
10 REM PROGRAM I
20 REM This prograa does
nothing
30 REM
40 REM
```

Program I

pressed the computer looks to a location in memory. Normally it contains zero (equivalent to machine code BRK). When it finds this, the computer carries out its normal Break routine.

However, the use of *FX247,76 changes the BRK instruction to JMP. *FX248,lsb and *FX249,hsb set the location to which the micro jumps.

That location is the start of your own machine code routine. It may recover all the data entered and then allow the original program to continue.

Program II contains a procedure that can be placed in any of your own programs. A machine code routine is created which comes into action straight after the Break key has been pressed.

You determine what the program does by entering a message in line 20. The format of that message is exactly the same as if you were programming the Break key directly by using *KEY10.

For example:

```
OLD¦MRUN¦M
```

would make the computer restart the program whereas:

```
1REM¦M
```

would irreversibly corrupt the program!

*FX253 is used to discover what type of Break was made previously. The two types are soft Break – simply tapping the Break key – and hard Break (pressing Ctrl + the Break key).

*FX255 has several functions.

It can be used to determine the screen mode that appears after Break has been pressed – normally Mode 6. It's also used to cause the micro to auto boot or not to auto boot after Break has been pressed.

This is only relevent to users of a cartridge system – Acorn Plus 1 – or disc users – for example, Acorn Plus 3. We'll deal with these in future months.

To change the mode of your Electron after Break has been pressed, enter *FX255,x where x is the number of the mode you want.

Last time we saw how the Escape key could be disabled using the *FX229 call.

*FX229,0 makes the Escape key interrupt the action of a program. *FX229,1 causes the Escape key to

→

Address		lsb	hsb
denary	hex		
32	&20	20	0
257	&101	1	1
2048	&800	0	8
32767	&FFFF	FF	FF

Box II: My address has two bytes!

```
  10REM PROGRAM II
  20PROCbreakkey("CLS¦MOLD
¦MRUN¦M")
  30END
  40DEFPROCbreakkey(aessag
e$)
  50IFaessage$="BREAK"THEN
!&287=0:ENDPROC
  60*FX247,76
  70*FX248,0
  80*FX249,9
  90lenX=LEN(aessage$)
  100FORchrX=1TOlenX
  110byteX=byteX+1
  120byteX?&70=ASC(MID$(aes
sage$,chrX))
  130IFMID$(aessage$,chrX,1
)="¦"THENchrX=chrX+1:byteX?
&70=ASC(MID$(aessage$,chrX)
)-64
  140NEXT
  150lenX?&71=&FF
  160FORoptX=0TO2STEP2
  170PX=&900
  180[OPToptX
  190BCCrts
  200LDX#1:LDY#0:LDA#229:JS
R&FFF4
  210LDA#138:LDX#1
  220.loop
  230LDY&70,X:CPY#&FF:BEQrt
s
  240INX:STX&70:LDX#0
  250JSR&FFF4:LDX&70
  260JMPloop
  270.rts RTS
  280]
  290NEXT
  300ENDPROC
```

Program II

From Page 37

produce CHR$27 when pressed, leaving the program running.

There are several other *FX calls that affect the action of the Escape key.

*FX124 resets the Escape flag, *FX125 sets the Escape flag and *FX126 is used to acknowledge the detection of Escape. These calls are used in machine code programs and are not necessary in Basic.

*FX200 is the best method of nullifying the action of the Escape key, *FX200,1 causing it to have no action whatsoever.

*FX220,x makes another key act as the Escape key. For example *FX220,65 causes the A key to become Escape. Pressing A now stops the listing and working of a program.

*FX220,x affects the key with Ascii value x.

Try typing *FX220,13 and finding which key is then acting as the Escape key.

When the Escape key is pressed all processing stops and buffers such as the keyboard and sound buffers are emptied.

It is possible to change the action of the Escape key so that the buffers are not emptied. To show this type:

SOUND1,–15,25,255

The noise produced will continue indefinitely. Press Escape and the note stops.

Enter *FX230,1 and then SOUND1,–15,25,255. Now the Escape key will not stop it!

There are two ways of causing the sound to cease – tapping the Break key or entering *FX230,0 and then pressing Escape.

If a program is under development then using these calls to change the action of the Escape key can cause problems. They prevent the programmer stopping it to list it or discover the value of the variables that are being used.

If these calls are to be incorporated, then it is best to write them so that they don't

Default or inactive call	Active call
*FX200,0	*FX200,1 disables the Escape key
*FX220,27	*FX220,x moves the Escape key action to key number x
*FX229,0	*FX229,1 causes Escape to generate CHR$27
*FX230,0	*FX230,1 Escape does not flush buffers

Table I: Active and Inactive Calls

Call	Action
*FX4,0	cursor keys have usual function
*FX4,1	cursor keys generate ASCII characters 135 to 139
*FX4,2	cursor keys are definable *KEY11 onward...
*FX21	clears keyboard buffer
*FX124 *FX125 *FX126	used in connection with the Escape key but are only important in machine code work
*FX200,1	disables Escape key action
*FX200,2	causes Break action to corrupt the program
*FX200,3	gives combined action of *FX200,1 and *FX200,2
*FX220,x	causes key with ASCII value x to act as the Escape key
*FX229,0	pressing Escape interrupts the processing of the computer
*FX229,1	causes the Escape key to generate the ASCII number 27
*FX230,0	the Escape key action includes flushing buffers
*FX230,1	the Escape key action does not include flushing buffers of their contents
*FX247 *FX248 *FX249	used together to change the action of Break by directing the computer to a machine code routine immediately after Break has been pressed
*FX253	used to determine the previous type of Break action
*FX255,x	used to determine the mode the computer automatically goes into after Break.

*Table II: *FX Calls discussed this month*

```
10REM PROGRAM III
50MODE2
60*FX4,1
70*FX229,1
80xpos%=500
90ypos%=500
100MOVExpos%,ypos%
110speed%=10
120REPEAT
1216COL0,RND(16)
130inkey%=INKEY(1)
140IFinkey%=136THENxpos%=
xpos%-speed%
150IFinkey%=137THENxpos%=
xpos%+speed%
160IFinkey%=138THENypos%=
ypos%-speed%
170IFinkey%=139THENypos%=
ypos%+speed%
180DRAWxpos%,ypos%
190UNTILinkey%=27
200*FX229,0
210*FX4,0
```

Program III

```
10REM PROGRAM IV.
20MODE2
30colour=RND(16)
40GCOL0,colour
50GCOL0,136-colour/2
60COLOUR128+colour
70COLOUR17-colour
80CLG
90*FX229,1
100A$="Electron User"
110xpos%=500
120ypos%=500
130diameter%=200
140MOVExpos%,ypos%
150MOVExpos%,ypos%
160FORangle=0TO6.6STEP.2
170sin%=SIN(angle)*diamet
er%
180cos%=COS(angle)*diamet
er%
190PLOT81,sin%,cos%
200MOVExpos%,ypos%
210PRINTTAB(2,7)LEFT$(A$,
2*angle);
220NEXT
230*FX229,0
240COLOUR0
250COLOUR135
260PRINTTAB(2,29);
```

Program IV

affect the key.

When the program has been thoroughly debugged, then the calls can be put into the active mode. Table I shows what I mean.

We can now turn our attention to the other keys on the keyboard.

The Caps Lk/Func key can be switched on and off without touching it. *FX202,0 switches the Caps Lock on – the default position and *FX202,48 switches the Caps Lock – and the light – off. Pressing the letter keys now produces lower case letters.

The cursor keys can be programmed in the same way as the other User Defined keys. However, their normal function of moving the copy cursor around the screen has to be switched off using *FX4,2.

Try entering these commands and then pressing the cursor keys:

```
*FX4,2
*KEY12LEFT
*KEY13RIGHT
*KEY14DOWN
*KEY15UP
*KEY11COPY
```

Pressing the Copy key will produce the word COPY.

*FX4,1 causes the Copy and cursor keys to produce Ascii codes from 135 to 139 – See page 280 of the Electron User Guide for further details.

‘It’s good programming practice to empty the keyboard buffer before all INPUT, INKEY and GET statements’

This is an extremely useful technique for games and graphics programs.

Program III shows how the keys can be used to guide an object around the screen.

If a program is running, say drawing shapes on the screen, and the keys on the keyboard are pressed, then the computer stores the value of each key in an area of memory known as the keyboard buffer.

When the program ends or when it reaches an INKEY, INPUT or GET statement, then these previously-typed characters will be entered into the program or be displayed on the screen.

Sometimes this can cause a problem. For example, on a Space Invader-type game you may have entered five fire presses – the letter A – and then, before the computer has had time to use them, you're zapped. The Hall of Fame display will come up with those As at the beginning of your name.

In commercial applications the error may be more critical and irreversible. The extra A may direct the computer to Axe files from memory!

It's good programming practice to prevent the situation by first emptying the keyboard buffer before all INPUT, INKEY and GET statements. It's particularly important when there is a risk that errors of input could occur.

*FX21 clears the keyboard buffer of all previously entered characters. Program IV demonstrates this.

The computer draws a circle on the screen, the process taking several seconds. Try running the program. While the circle is being drawn tap a selection of keys.

When it has finished the characters you typed will appear at the bottom of the screen. Now add this line to the end of the program:

```
900 *FX21
```

This causes the keyboard buffer to be cleared after the circle has been drawn. Any characters that are typed during the drawing will be lost.

And that's about it for this month. We've seen how we can change the actions of the Break, Escape and Cursor keys. Table II sums it all up.

Next time, we'll look at the *FX calls that affect the actions of the User Defined keys. We'll also investigate those *FX calls that are used with a printer. They'll be of special interest to Plus 1 owners.

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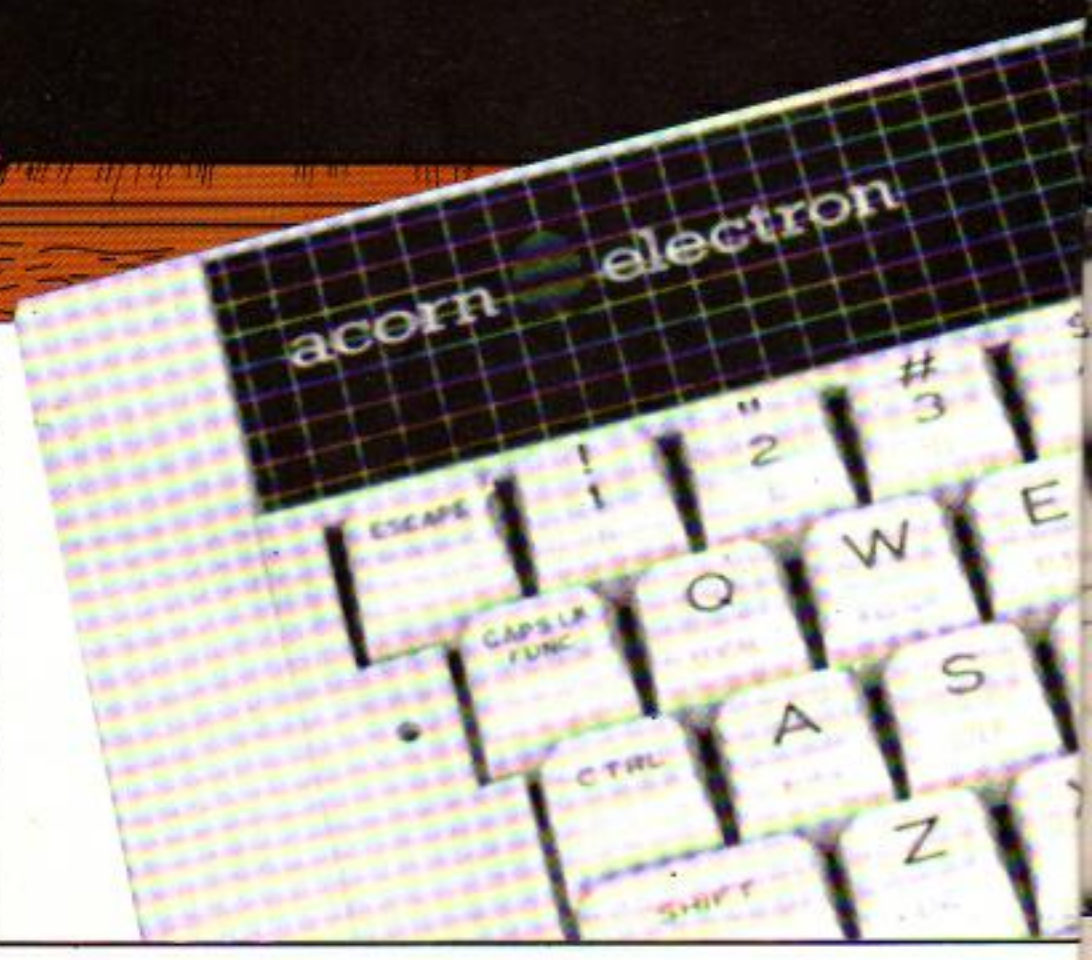

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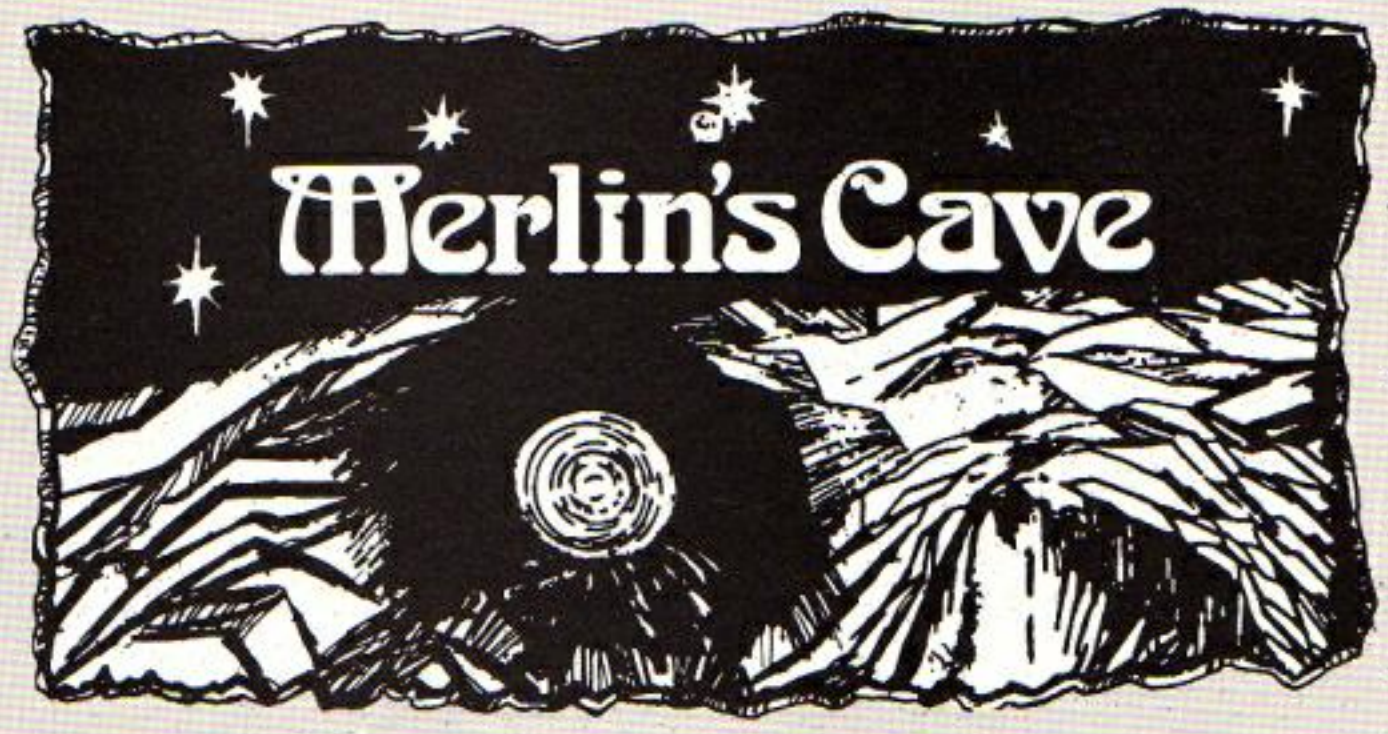


THIS month sees the first of our Adventure Top Tens. All the marks that you've sent in have been averaged out to produce a list of adventures that you think are the best. The result is shown below.

As you can see, Epic Software has done extremely well, deservedly so in my opinion.

Sphinx Adventure, Twin Kingdom Valley and Classic Adventure are the three programs that I get asked the most questions about, so I'm not surprised to see them do well.

One thing that did surprise me was that very few people wrote in with marks for any Scott Adam's games. Maybe that's because they're too engrossed in them to put pen to paper.

Later in the year we'll publish another Top Ten, so keep those marks coming in.

I've had numerous requests for a list of the adventures available for the Electron and so I have compiled one of all those that I have reviewed.

This list is available to anyone on request, provided they send an sae.

Now on to the problems. Dougie Crouch wants to know whether there is any significance to the description "You are in a wide LANE" after getting the stake in ***Sphinx Adventure.*** I think this is one part of an anagram, DAVE KNEW being the other part.

Turning to ***Castle Frankenstein,*** Phillip Dawson wants to know how to attach the rope to the ground after climbing down the castle steps. Also how to get into the room above the sulphur pits.

I don't think he can do either. Does anybody know different?

D. Turner can't befriend Josh or get Eno to read the map in ***Suicide Island.*** I would like to know who Suicide Island is by – I haven't heard of it.

Richard Neuten can't get past the troll in ***Classic Adventure.*** Give the golden eggs to get across and free the bear to get back. He's also having problems with the clam. Use the trident.

Charles Place wants to know where the matches are in ***Five Stones of Anadon.*** Look in the bag in the wizard's bedroom.

Pettigrew's Diary has M.A. Evans wanting some help. To get the combination to the House of Phun, read the diary and examine the book titles.

The Barry Manilow room number can be found if you listen to the shady lady's story.

Philip Jong wants to know if there is anyway of saving your position in ***Sphinx Adventure.***

I seem to remember that a way of doing it on the BBC was described in a recent issue of *The Micro User* but I have not heard of a way of doing it on the Electron. Anyone got the answer?

Still on Sphinx Adventure, Alistair Grammer can't get across the troll's bridge without it collapsing. You are not alone!

Darren Marks can only find the lockpick and fuel capsule in ***Stranded.*** Climb a tree, Darren!

Zalacio the Great (sic) wants to know where the dungeons lead to in ***Quest for the Holy Grail.*** Only one dungeon is safe to use. Find it and then push the wall.

He also wants to know how to open the safe in ***Kingdom of Klein.*** Use a key.

R. Gande and Adam Badland are having problems with the dragon and the monastery in ***Quest for the Holy Grail.*** The dragon dislikes oil and the dungeons are definitely worth exploring.

G.R. Hobson has some questions about ***Blue Dragon.*** Can you get into the cottage? No. How do you get up the rickety staircase? You can't.

Where is the dragon? A long way away! Use the galley, the boat, then cross the desert and explore the fort.

Adam Badland and Arif Ali are both still having trouble with that well in ***Wheel of Fortune.*** Arif seems to be more confused than ever since he read my hints in April's column!

Go down beggars walk, making sure that you pick up everything, then go north to one location past the crossroads and drop the truncheon.

If the policeman finds you with it you'll go to jail and have to restart the game.

Go west for the ladder, then wait one location north of the vending machine. The beggar will walk past you eventually on his way to the machine.

When he comes back north from the machine, give him the penny then go south.

Empty the cup to get the penny, then insert it for a box of matches. Then let the beggar put his penny in the machine and when he has tell him to follow you.

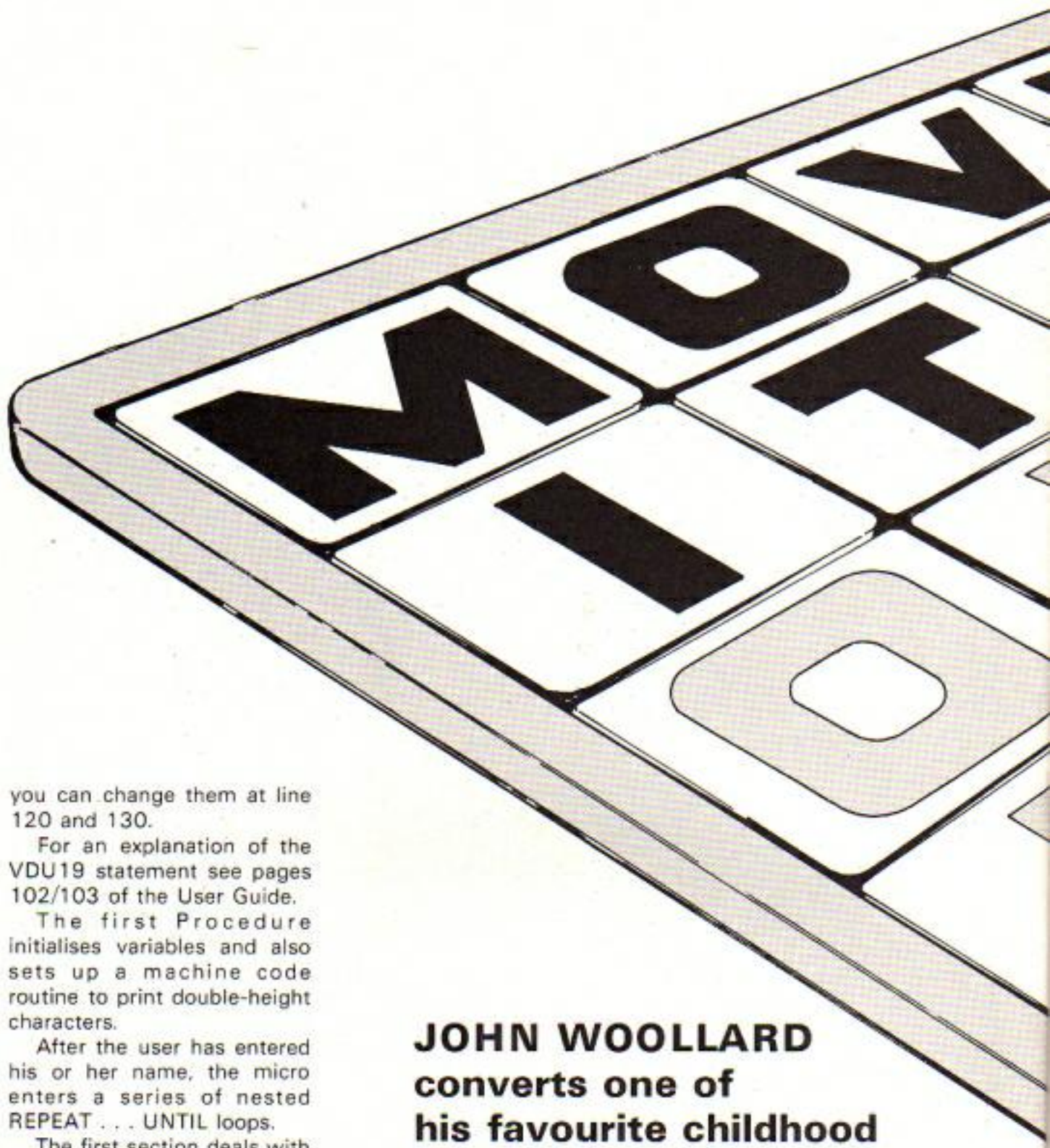
Go to the well and get into the bucket, then the beggar will lower you if you ask him.

Finally, I would like to give a very big thank you to John and Eve Thompson for the maps and solutions they kindly sent in.

ADVENTURE TOP 10

1.	**Wheel of fortune**	*Epic Software*
2.	**Kingdom of Klein**	*Epic Software*
3.	**Castle Frankenstein**	*Epic Software*
4.	**Sphinx Adventure**	*Acornsoft*
5.	**Twin Kingdom Valley**	*Bug-byte*
6.	**Quest for the Holy Grail**	*Epic Software*
7.	**Classic Adventure**	*Melbourne House*
8.	**Sadim Castle**	*M&P Software*
9.	**Five Stones of Anadon**	*Softek*
10.	**Valley of the Kings**	*M&P Software*

● **If you want Merlin's help write to:**
Merlin, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.
– and enclose an SAE if you would like a reply.



JOHN WOOLLARD converts one of his favourite childhood games for the Electron

MANY years ago I remember having a little plastic puzzle made of squares with letters on each one. The object was to move the tiles around until the letters were in the correct sequence.

Now I've brought it up to date with a program that takes all the hard work out of the job.

The puzzle starts with the 15 pieces in a random order on the 4 by 4 grid.

A title has to be moved into the vacant space, thus creating a new space. A piece can then be moved into that space, and so on until the letters are all returned to their correct position and the space is at the bottom right-hand corner.

The program has been written in a structured way which gives it two benefits.

First, it's easier to understand how it works. The sequence of events is outlined in the first 37 lines.

Second, it's simpler to debug when copying from the page of the magazine as each section of program has a single, identifiable task to complete.

Lines 10 to 370 make up the "control module" which calls all the major procedures and functions. All variables and procedure/function names are given in lower case letters. All number variables are followed by a percent sign, such as *move%*.

Lines 90, 140 and 280 shouldn't be typed in until your program has been thoroughly tested. Line 90 makes sure that the program is not lost if Break is pressed, while line 140 prevents the Escape key from stopping the program.

If Escape is pressed while the puzzle is being played, then the micro plays the moves for you.

Although Mode 1 could have given a greater variety of colours on the screen, Mode 4 had to be used for this puzzle because there's a shortage of memory. The computer will remember up to 4000 moves – that is nearly 4k of memory.

Only two colours are permitted on the screen at any one time in Mode 4. If the chosen colours of black upon red aren't to your liking, then you can change them at line 120 and 130.

For an explanation of the VDU19 statement see pages 102/103 of the User Guide.

The first Procedure initialises variables and also sets up a machine code routine to print double-height characters.

After the user has entered his or her name, the micro enters a series of nested REPEAT . . . UNTIL loops.

The first section deals with how the computer sets the problem that the user has to solve. The second part deals with how the user solves the problem.

The micro starts with the grid in its final – solution – position and moves pieces in a random way, destroying the pattern.

As it does so, it remembers the moves it is making. The computer therefore knows how to move back to the final solution at any time by making these same moves but in reverse order.

Pieces can be moved into a space in up to four different ways – left, right, up and down. However, if the vacant space is on the top line it's not possible to move a piece down into it.

The Function FNlegal checks to see if a proposed move is legal. It's used both in the first section, when the computer is setting up the problem, and in the second part, when the user is trying to solve the problem.

The number of moves the computer makes when setting up the problem is proportional to the level of play as shown in Table I.

The grid is stored in a string variable *grid$* and the final solution stored in *home$*. This final solution is where all the letters are in the correct order and the space is in the last position on the grid. In other words:

```
home$="abcdefghijklmno "
```

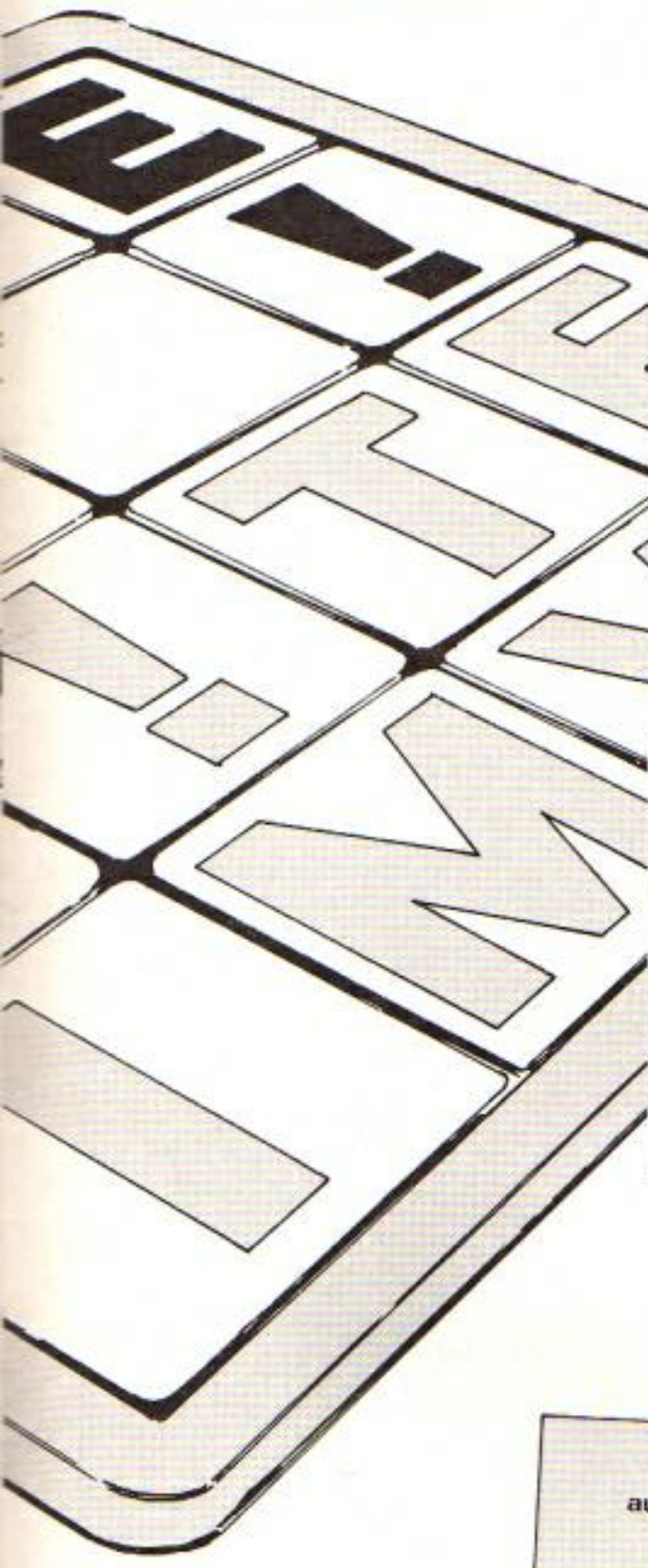
The computer knows when the user has reached this position because the contents of *grid$* will equal the contents of *home$*.

After a legal move has been chosen – by the computer in the first part when it is setting the problem, or by the user in the second part – the Electron then operates upon *grid$*, to make it represent the new position.

This is carried out in the procedure PROCupdategrid. The new grid is then displayed by the procedure PROCgrid-display.

The program contains three utilities that you may wish to add to your own programs. They are:

- PROCprint which prints double-height characters in all the graphic modes.
- FNinput which is the same as an INPUT statement in



```
Electron User's MoveIt!
BODGER's problem on level 3

   a  c  d  h
   e  b  g
   i  f  k  l
   m  j  n  o

Press an arrow key
```

Level	0	1	2	3	4	5	6	7	8	9
Moves	1	2	4	8	16	32	64	128	256	512

Table I: Moves and levels

Basic but the characters entered are printed in double height.

- FNyesno which waits for the key Y or the key N to be pressed.

The procedure that prints double-height characters has a machine code call in it. This machine code program, fully explained in the July 1984 *Electron User,* is set up in the initialisation procedure.

Finally, if you wish to personalise your copy of the program try changing the title that is displayed. Line 400 contains that string.

You may wish to add sound cues on illegal moves or perhaps a tune when the user succeeds in getting the final solution.

PROCEDURES/FUNCTIONS

autoplay Called if Escape is pressed. It directs the computer to play all the moves to reach the solution.

endmessage After the solution has been found the user is given the choice to carry on or to stop the program. If the user carries on then they may choose to move the the next level of difficulty.

FNgetmove The computer waits for one of the arrowed (cursor) keys to be pressed.

griddisplay Prints the present grid on the screen by interpreting *grid$*.

FNinput This is a double-height INPUT statement.

print Prints a string in double-height characters at a specified location on the screen.

FNrndmove This function returns a random number from 1 to 4 inclusive. It checks that it is not the complement of the previous number. That is, if the last move was down then this move will not be up.

sound Causes a beep of a random sound. The sounds are true musical notes.

updategrid Changes the string *grid$* to reflect the new position of the pieces.

FNyesno Waits for Y or N to be pressed and returns the value 1 for yes and 0 for no.

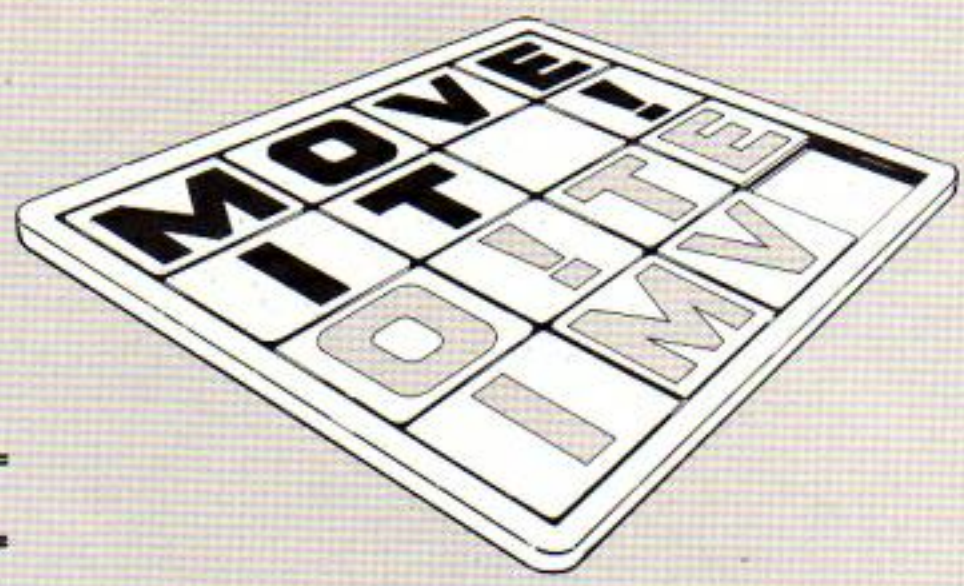
```
   10REM   MoveIt!
   20REM   a game of strate
gy
   30REM   (C) Electron Use
r 1985
   40REM
   50REM   W.J.Woollard
   60REM
   70REM
   80REM
   90*KEY10OLD|MRUN|M
  100MODE4
  110VDU23,1,0;0;0;0;0
  120VDU19,0,1;0;0
  130VDU19,1,0;0;0
  140ONERRORRUN
  150PROCinitialise
  160PROCnamein
  170REPEAT
  180PROCprint(4,5,name$+"'
s problem on level "+STR$(l
evel%))
  190go%=0
  200PROCgriddisplay
  210PROCprint(10,29,"Pleas
e wait !")
  220REPEAT
  230REPEAT:rndmove%=RND(4)
  240UNTILFNlegal(rndmove%,
0)
  250PROCupdategrid(rndmove
%)
  260UNTILgo%>=2^level%
  270PROCprint(10,29,STRING
$(13,CHR$32))
  280ONERRORPROCautoplay
  290REPEAT

  300PROCgriddisplay
  310REPEAT:move%=FNgetmove
  320UNTILFNlegal(move%,1)
  330PROCupdategrid(move%)
  340UNTILINSTR(grid$,home$
)
  350PROCgriddisplay
  360PROCendmessage
  370UNTILFALSE
  380DEFPROCinitialise
  390DIMgoes%4000,dblp%&FF
  400program$="Electron Use
r's MoveIt!"
  410grid$="abcdefghijklmno
"
  420rowofhole%=4:colofhole
%=4
```

Move It listing

From Page 45

```
  430home$="abcdefghijklano
"
  440*FX4 1
  450FOROpt=0TO2STEP2
  460P%=dblp%
  470q=&FFEE
  480[OPT Opt
  490STA&70:STX&79:STY&7A
  500LDA#10:LDX#&70:LDY#0:J
SR&FFF1
  510LDA#23:JSRq
  520LDA#&FF:JSRq
  530LDA&71:JSRq:JSRq
  540LDA&72:JSRq:JSRq
  550LDA&73:JSRq:JSRq
  560LDA&74:JSRq:JSRq
  570LDA#31:JSRq
  580LDA&79:JSRq
  590LDA&7A:JSRq
  600LDA#&FF:JSRq
  610LDA#23:JSRq
  620LDA#&FF:JSRq
  630LDA&75:JSRq:JSRq
  640LDA&76:JSRq:JSRq
  650LDA&77:JSRq:JSRq
  660LDA&78:JSRq:JSRq
  670LDA#31:JSRq
  680LDA&79:JSRq
  690LDA&7A:ADC#1:JSRq
  700LDA#&FF:JSRq
  710RTS:]
  720NEXT
  730ENDPROC
  740DEFPROCnamein
  750PROCprint(4,2,program$
)
  760PROCprint(4,5,"Please
type your name: ")
  770name$=FNinput
  780PROCprint(4,5,STRING$(
35," "))
  790PROCprint(4,5,"Type le
vel 0 to 9: ")
  800REPEAT:level%=ABS(GET-
48)
  810UNTILlevel%<10
  820PROCprint(4,5,STRING$(
35," "))
  830ENDPROC
  840DEFPROCautoplay
  850REPEAT
  860PROCupdategrid(5-(goes
%?(go%-1)))
  870PROCgriddisplay
  880UNTILgo%<1
  890PROCendmessage
  900RUN
  910DEFFNrndmove
  920REPEAT
  930x%=RND(4)
  940UNTILx%+goes%?(go%-1)
<>5
  950=x%
  960DEFFNlegal(x%,rogue%)
  970legal%=1
  980IF(rowofhole%=1)ANDx%=
2THENlegal%=0
  990IF(rowofhole%=4)ANDx%=
3THENlegal%=0
 1000IF(colofhole%=1)ANDx%=
1THENlegal%=0
 1010IF(colofhole%=4)ANDx%=
4THENlegal%=0
 1020IFlegal%=0ANDrogue%THE
NPROCprint(4,22,"That's not
 legal !"):inkey%=INKEY(99)
 1030IFx%=0THENlegal%=0
 1040=legal%
 1050DEFPROCupdategrid(x%)
 1060space%=INSTR(grid$," "
)
 1070IFx%=1THENgrid$=LEFT$(
grid$,space%-2)+" "+MID$(gr
id$,space%-1,1)+MID$(grid$,
space%+1)
 1080IFx%=2THENgrid$=LEFT$(
grid$,space%-5)+" "+MID$(gr
id$,space%-3,3)+MID$(grid$,
space%-4,1)+MID$(grid$,spac
e%+1)
 1090IFx%=3THENgrid$=LEFT$(
grid$,space%-1)+MID$(grid$,
space%+4,1)+MID$(grid$,spac
e%+1,3)+" "+MID$(grid$,spac
e%+5)
 1100IFx%=4THENgrid$=LEFT$(
grid$,space%-1)+MID$(grid$,
space%+1,1)+" "+MID$(grid$,
space%+2)
 1110colofhole%=INSTR(grid$
," ")MOD4
 1120IFcolofhole%=0THENcolo
fhole%=4
 1130rowofhole%=(INSTR(grid
$," ")-1)DIV4+1
 1140IFgoes%?(go%-1)=5-x%TH
ENgo%=go%-1ELSEgoes%?go%=x%
:go%=go%+1
 1150ENDPROC
 1160DEFPROCgriddisplay
 1170FORcounter%=1TO16
 1180LOCALh%,v%
 1190h%=counter%MOD4:IFh%=0
THENh%=4
 1200v%=(counter%-1)DIV4
 1210PROCprint(4+h%*4,9+v%*
3,MID$(grid$,counter%,1))
 1220NEXT
 1230PRINTTAB(36,30);go%;"
";
 1240ENDPROC
 1250DEFFNgetmove
 1260*FX21
 1270move%=0
 1280REPEAT
 1290PROCprint(4,22,"Press
an arrow key")
 1300get%=INKEY(999)
 1310IFget%=136THENmove%=4
 1320IFget%=137THENmove%=1
 1330IFget%=138THENmove%=2
 1340IFget%=139THENmove%=3
 1350IFmove%=0THENVDU7
 1360PROCprint(4,22,STRING$
(19," "))
 1370UNTILmove%
 1380=move%
 1390DEFPROCendmessage
 1400PROCprint(4,22,"That's
the end; play again? Y/N")
 1410IFFNyesno=0THENCLS:END
 1420PROCprint(4,22,"Will y
ou try a harder problem ? Y
/N")
 1430IFFNyesno=1THENlevel%=
level%+1
 1440PROCprint(4,22,STRING$
(35," "))
 1450ENDPROC
 1460DEFPROCprint(x,y,a$)
 1470IFa$=""THENENDPROC
 1480FORK=1TOLEN(a$)
 1490A%=ASC(MID$(a$,K,1))
 1500X%=x+K-1
 1510Y%=y
 1520CALLdblp%
 1530IFA%=10ITHENPROCsound
 1540NEXT
 1550ENDPROC
 1560DEFFNinput
 1570*FX21
 1580z$="":get$=""
 1590h%=POS:v%=VPOS-1
 1600REPEAT
 1610IFLEN(z$)>11THENVDU7:q
et$=""
 1620IFget$=CHR$127THENz$=L
EFT$(z$,LEN(z$)-1):get$=""
 1630z$=z$+get$
 1640PROCprint(h%,v%,z$+" "
)
 1650get$=GET$
 1660PROCsound
 1670UNTILget$=CHR$13
 1680=z$
 1690DEFPROCsound
 1700LOCALx%,scale$,note%
 1710x%=RND(8)
 1720scale$="ACEFHJLM"
 1730note%=4+(ASC(MID$(scal
e$,x%))-52)
 1740SOUND1,-15,note%,1
 1750ENDPROC
 1760DEFFNyesno
 1770yesno%=-1
 1780REPEAT
 1790IFINKEY(-86)THENyesno%
=0
 1800IFINKEY(-69)THENyesno%
=1
 1810UNTILyesno%<>-1
 1820=yesno%
```



This listing is included in this month's cassette tape offer. See order form on Page 61.

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EU8

Micro Messages

Disc drive on a mission impossible

COULD you please solve this frustrating puzzle for me. It's driving me mad. When I press Shift and Break together it comes up with the message:

Acorn Electron
Searching
File not found
Basic

What does this mean? If it is a kind of boot then could you please tell me how to set it up so it does find something.

I also have an answer to Paul Godley's query about Micro Power's Ghouls. To get to the power jewels you have to stand on the block nearest to the jewels and then go as near to the left of the block as you can without falling off.

Then you press "Jump" and "Left" at the same time. This should put you next to the power jewels and then you should go on to the next level.

Thank you Electron User for a top quality magazine that I really look forward to getting every month. – **David Bociek, Marston, Beds.**

● When Shift + Break are pressed with a disc drive attached the disc is searched for a file called !BOOT.

If it finds it, it is *EXECed, *RUN or *LOADed depending on the option set up.

If it can't find it, it reports "File not found".

More tips for Ghouls

HERE are some tips to help Paul Godley get at the Ghouls treasure.

Screen 1: Stand on the ledge nearest the treasure, with your left leg overhanging the ledge. JUMP and move RIGHT. Hey presto, you've got the treasure!

Screen 2: Jump over to the left of the moving platform. When the platform is returning from under the treasure take a RUNNING JUMP on to the platform then on to the treasure (timing is critical). Success again!

I haven't succeeded yet getting out of Screen 3, but my highest score is 1,238 points. – **Steven Paul Taylor, age 5, Timperley, Cheshire.**

P.S. I asked my daddy to write this letter for me.

● Thanks for the help Steven.

Surprise package

REGARDING the paragraph in Micro Messages December, 1984 headed "View into the ROM", I carefully typed out the program shown, but to my surprise I got a screenful of information under the heading "Acorn acknowledges" and a long list of names of people etc associated with the Acorn's development.

Fair enough, but I was staggered to see that this information was full of spelling errors, even Acorn was wrongly spelt. Practically every word had some spelling error.

Obviously this has not happened by accident. I wonder what the reason is for this peculiar display? – **Fred T. Wenborn, Romford, Essex.**

● &FC00 to &FEFF is a memory mapped input/output area for hardware devices. If you have anything plugged in to the Electron then data will be read from this, not the OS ROM.

Case of hunt the bug

I VERY much enjoyed Roland Waddilove's Skramble, it took a lot of typing and debugging, but I feel you can learn a lot from typing other people's programs.

I have recently obtained a Plus 3 disc drive and find that Skramble will not run with the Plus 3 fitted, nor will programs with DIM statements, but there is a program to download this type of program.

I have tried to download Skramble but it does not work. Could you advise me on this problem?

As more and more people buy disc drives for the Electron the problem of programs not working with the Plus 3 fitted will be more common.

You often ask in your excellent magazine what would we like to read about. My choice would be more information on machine code, which I find very hard to understand. – **P.M. Marsh, Leamington Spa, Warwickshire.**

● Skramble does work with the Plus 3. We suspect there's still a bug or two lurking somewhere in your listing. Please check it carefully.

Our machine code series has now started and part II is contained in this issue.

Battle in good order

SKRAMBLE is excellent and well worth the effort of typing in and debugging. Please keep including longer machine code listings such as Mr Freeze and Space Battle.

I do not understand assembly language, but find that using REM statements and subroutine names it is not hard to find the part of the listing where the error lies.

By the way, shouldn't January's Space Battle program have a line 4760 RTS?

Until I added it the base blew up as soon as the first alien was hit. – **D. Goodwin, Cardiff.**

● Space Battle is correct. We suspect you've put a JSR in line 4750 instead of JMP.

Disabling the Plus 1

*I AM writing in reply to David Thompson's letter in the June edition of Electron User in which he says he cannot *SAVE or *LOAD his version of Twin Kingdom Valley.*

This, as I have found from the same experience, is because he has a Plus 1 fitted. If he removes his Plus 1 he will be able to execute the commands. – **Nigel King, Biggin Hill, Kent.**

● There's no need to remove the Plus 1. It can be disabled quite easily – see Micro Messages in the October 1984 issue of *Electron User*, where there is a short listing from Micro Power.

Touch of the blues

STEPHEN Harrop (Micro Messages, June 1985) has a good idea for listing programs in Mode 6 with a blue background and paged mode on, but for this to work you still have to type LIST or L.

My method of doing this is even easier and involves the Break key. All you do is program the Break key with the functions that you want and then press Break when

→

From Page 49

you want the program listed.

To do what Stephen did you just type:

```
*K.1B0.!M!S84000!NL.!M
```

This will then list the program on a blue Mode 6 screen with paged mode on and because of the Acorn Electron message the top line is not used.

!S is the same as VDU19, which changes the background colour. !N is the same as VDU14 which puts the display in paged mode and !M is the same as pressing Return. – **Matthew Lavender, Radyr, Cardiff.**

● Thanks for the tip Matthew.

A little bit off the top . . .

*WHEN I play games on my Electron I can't see the top of the screen. I tried to use *TV 255 but this didn't work.*

Have you any suggestions? – **Daniel Wells, Blisworth, Northampton.**

● Yes, ask a TV engineer to adjust your TV. It's actually very simple and only takes a couple of seconds with a screwdriver, but I wouldn't recommend you do it yourself.

Positron hot shot

I HAVE not been sure about whether to write or not as I have been using a Quickshot II joystick to get my highest score on Positron. My best so far is 546,780.

The secret is to put the joystick on auto-fire and press Return rapidly at the same time. This gives really fast firing.

Also, one day I tried to load Inheritance for the BBC-B on my Electron. In hexadecimal it went up to 67. The Electron just seemed to overload.

The program wouldn't run and when I tried to list it the computer replied: "No room".

I presume this meant that it had no room left in its RAM to list the program. Why was this? Was it because of the Electron's lack of Mode 7? – **Andrew Kerr, Dumfries.**

● The BBC has about 7k more RAM available as Mode 7 takes up a measly 1k against the Electron's 8k Mode 6.

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

What tips have you picked up that could help other readers?

Now's here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So tear yourself away from your Electron keyboard and drop us a line. And please, if you want a reply, enclose an SAE. The address is:

Micro Messages
Electron User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.

Round up that memory

I OWN an Electron and Plus 3 expansion and find that I run out of memory very easily when using mode 2.

If possible I would like to increase the memory of my machine to overcome this problem.

I know this can be achieved by adding a second processor, but I don't think I can afford one (and as yet there is no tube interface to fit into the Plus 1).

Is there an expansion board (like the Raven 20 upgrades BBC to 52k computer)? – **C. Smith, Middlesbrough.**

● When the disc interface is fitted PAGE is reset to &1D00 so nearly 4k of memory is lost. The solution is to relocate the program after loading. Function key 0 can be defined to do this when pressed.

```
*KEY0 *TAPE!MFORI%=0 TO TOP
 STEP4:I%!&E00=I%!&1D00:NEX
T:PAGE=&E00!MOLD!MRUN!M
```

Suspect tapeheads

PLEASE help! During the last year I have had two tapes, with my own typing of your programs, load perfectly OK – then, after three or four months' use, without reason will not load.

*Data?;**!?!* etc. messages appear on screen.*

Thank goodness I have back-ups.

Why does this happen? – **D.L. Cutting, Stowmarket.**

● Try cleaning the tape heads and check their alignment by adjusting them with a small screwdriver while listening to the sound. It should be crisp and clear. The adjusting screw is by the tape head.

Calling OSWORD

COULD somebody please tell me how you can get sound out of the Electron using Assembly language.

I have tried to take bits out of other programs but I have had no success. – **Adam Hamilton, Cricklade, Swindon.**

● You need to call OSWORD at &FFF1 with the accumulator set to 7 and the X and Y registers pointing to a parameter block.

Look up OSWORD in the manual for a description of the parameter block.

Cube root riddle

FOR months I have been trying to find a formula to cube root a number on the Electron, but I haven't succeeded in finding one.

There is a way of finding the square root of a number in the Electron User Guide, but no mention of cube roots. – **Paul Musson, Woodbridge, Suffolk.**

● Are there any mathematitions out there who can help?

Superstars super scores

WE thought you would like to see some of our high-scores on the highly recommended Brian Jacks Superstar Challenge.

Swimming	*14.7 secs.*
Canoeing	*19.6 secs.*
Archery	*380 points.*
Cycling	*12.0 secs.*
Running	*16.6 secs.*
Squat thrusts	*79.*
Arm dips	*106.*
Football	*4 goals (level 4).*

Our overall high score is 29,895 (level 6).

We have also obtained 100,000 on Overdrive because after this it goes back to 0.

Everybody seems to be asking "Where are the software charts for the Electron", so we have compiled one ourselves.

1. *Elite (Acornsoft).*
2. *Tempest (Superior Software).*
3. *Brian Jacks Superstar Challenge (Martech).*
4. *Zalaga (Aardvark).*
5. *Mineshaft (Durell).*
6. *Micro Olympics (Database).*
7. *Mr Wiz (Superior Software).*
8. *Killer Gorrilla (Micropower).*
9. *Gauntlet (Micropower).*
10. *Blockbusters (Machen Soft).*

– **Paul Rudd and Jamie Pizey, Norwich, Norfolk.**

Missing the miner

I ONCE owned a Spectrum, but after a while I found out that it was just a large pocket calculator with tiny bits of sponge glued on to it for keys. So I turned to the most magnificent computer around today, that is the Electron.

But I must say that there was one Spectrum game that really interested me and that was Manic Miner, by Software Projects.

I knew that sooner or later there would be a version for the Electron. How wrong I was.

Since then there have been

copies made for other computers like the Amstrad 64k, Oric Atmos, Commodore 64, the BBC Micro and even the Memotech (whatever that is).

I feel the Electron is being left out. Can this be true? – **K. Majeuadia, London.**

● We think you're being a bit hard on the Spectrum, it was excellent value for money in its day. Since the Electron's price reduction it doesn't look so hot.

Alligator's Blagger is better than Manic Miner.

Racing tips

I HAVE found a way of starting at any stage in Superior Software's Overdrive and to go to the next stage even if your bonus has not reached the blue rectangle.

First type:

```
LOAD"OVERDRIVE"
```

Scrap lines with:

```
*FX200,2
```

or

```
*FX200,0,2
```

(I'm not giving the lines because you can do a bit of detective work for fun!)

Don't load part 2. Type:

```
LOAD "OVER2"
```

List and find the line that says:

```
IF ?BONUS>49 THEN
?STAGE=?STAGE+1
```

49 means the number of cars you have to pass to get to the next stage. Lower the number to something like 10.

At the beginning of the program you should find:

```
?STAGE=1
```

If you want to start at snow change it to:

```
?STAGE=3
```

After all these changes, save it a "OVER 2" on a blank tape.

Now turn the computer off and on. Load parts 1 and 2 then load the saved program and after all that then load part 4.

Happy racing! – **David M. Molyneux, Chelmsford, Essex.**

Bleeping routine

I WAS messing about with machine code routines on my Electron and I wondered if I could come up with one to make the keys bleep every time I touched them. I came up with this:

```
 1REM BLEEP
 2REM Tony Remmer
10P%=&70
20?&220=P% MOD 256
30?&221=P% DIV 256
40[
50LDA #&07
60JSR &FFEE
70RTS
80]
```

*After typing it in, you next type in these *FX commands: *FX 214,1, *FX 213,200, *FX 14,2.*

When you run the program a bleep will occur every time you press a key. – **Tony Remmer.**

Understanding Plus 3

I AM the owner of a Plus 1 and a printer and am also lucky enough to have the new Plus 3. But this is causing me a few headaches.

Having a reasonable grasp of Basic, I hoped to be able to use the Plus 3 with reasonable ease. Alas not. Well written the User Guide may be, but I regret I cannot fully understand it, nor use the disc drive properly.

I have also come across problems with programs I previously had on tape – both shop bought and copied from your magazine.

The main problem is the page space that the Plus 3 chip takes up. I have read and reread the handbook but cannot find how to alter the page.

Am I looking in the right direction? Perhaps you would be good enough to advise me.

Also, are there any books that could help in my understanding the disc drive and its operating system?

My final problem, and one you may not wish to print is one of copying the shop bought tapes I have. I am against pirating but is there any way to transcribe the tapes on to discs, as it seems rather pointless having a Plus 3 if I have to load all my games by cassette. I would be quite willing to send the tapes to a firm or anyone who could assist me. – **C.P. Brown, Orpington, Kent.**

● To load and run long programs on disc you may need to relocate them lower down in the memory.

Skramble in the May issue of *Electron User* is a perfect example.

Copy PROCrelocate, lines 3340-3380 and use it in your own programs if they're too long.

To load software from tape, disable the Plus 3. Put the Welcome disc in the drive, hold down Ctrl+A+Break and then type *NoADFS. This resets PAGE to &E00.

Software companies would be very upset if we published a tape to disc copier that copied all their software. We'll be covering unprotected software in our disc series which starts in this issue.

Nice one, Matthew

IN READING your March issue featuring the Plus 3 on page 34 you state that with tape it could literally take hours to copy the screen contents.

I have come up with a method which works like Spectrum screen $. You type in the graphics program – I drew a wine bottle – then:

```
*SPOOL "name"
RUN
```

The program is saved as a file.

To run it, type;

```
*EXEC name
```

My program took two seconds to load. The program took 30 seconds to load normally.

Could you give me some details of printers under £200. I am looking at the Brother HR-5 and Mannesman Tally. – **Matthew Laycock, Stocksfield, Northumberland.**

● Thanks for the screen saving tip. It's so simple it's brilliant. Everyone's kicking themselves for not thinking of it.

The Brother HR-5 is a good printer if you simply want to list programs and produce screen dumps.

We haven't tried the other so we can't say what it's like.

Find a shop which sells both and compare a sample of their printing if possible.

Accent on education

I HAVE read with great interest your articles on educational software.

I am mid-30s and that was the sole purpose of buying the Electron – to further my education from home via my computer, but as the articles say, we can't get hold of any.

I enquired about ordering it at Boots but they won't do it. The games they stock are on a sale or return basis and the educational ones have to be bought outright.

Looking back through 12 months Electron Users every now and again there is a mention of an educational program.

You have Classroom Computing in this months which we can send for (and I have), so what I would like to know is why on earth can't you use Electron User to promote and sell educational programs?

Or at least give us information on what is available for all ages and names and addresses of firms willing to do mail-order. – **Miss S. Robinson, Hinckley, Leics.**

● We'll be publishing a list of educational software fairly soon. Electron User probably publishes more educational programs for the Electron than any other magazine.

DISC POWER AT A NEW LOW PRICE!

NOW it's cheaper than ever to add the power of discs to your Electron Plus 1 – with the Cumana floppy disc system.

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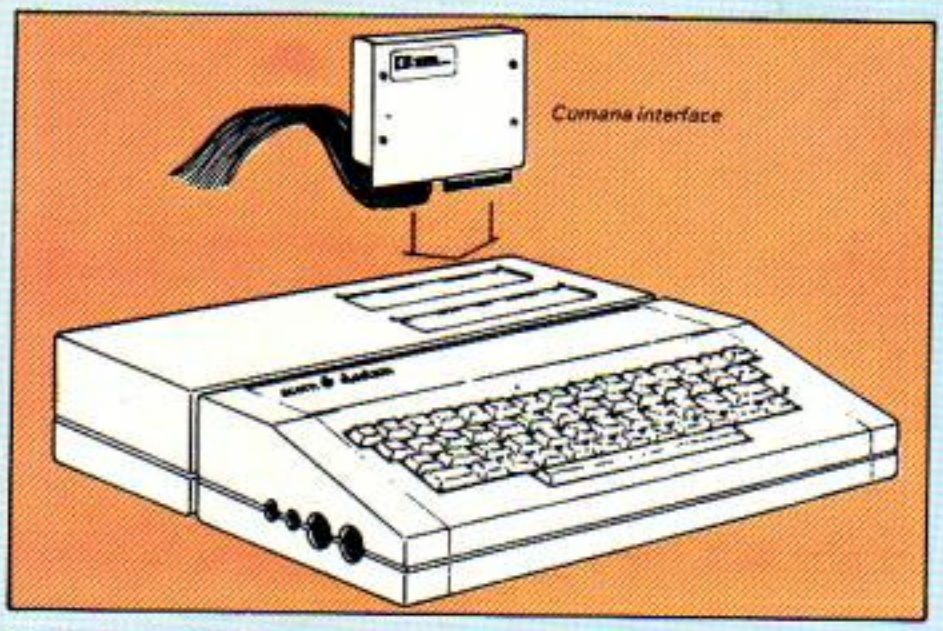

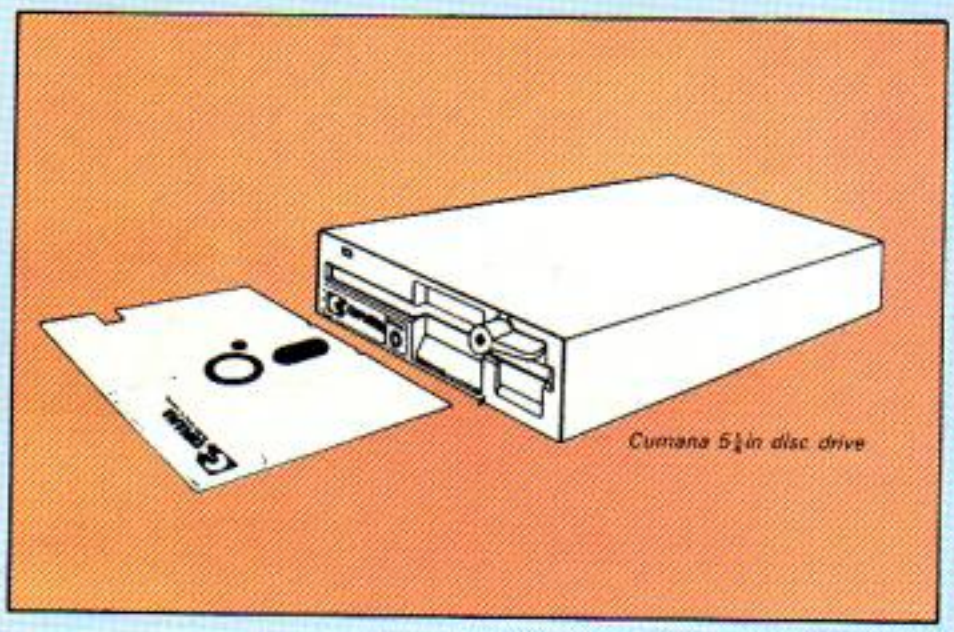

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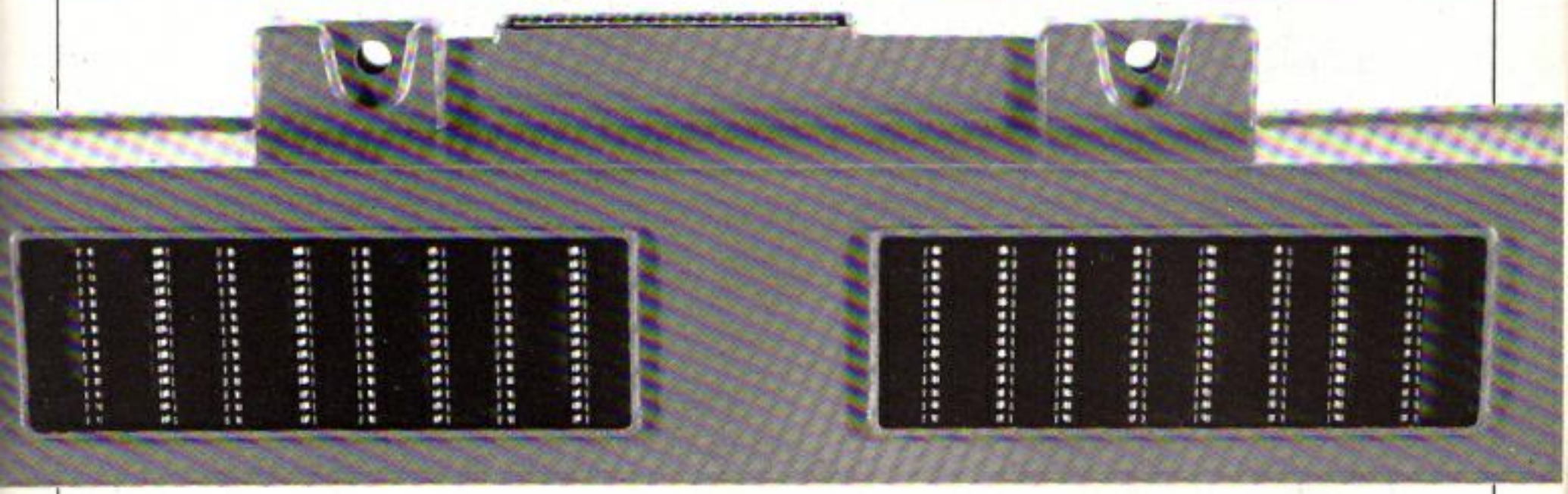


Using all the Plus 1's slots?

The Rombox gives you room for eight more ROMs

By ROLAND WADDILOVE

THE Electron's operating system, like its big brother the BBC Micro, is capable of managing up to 16 sideways ROMs.

These ROMs can contain a variety of software such as word processors, games, languages, tools and utilities.

Plus 1 owners will be familiar with this facility as two sockets are provided beneath the spring-loaded flaps on top of the expansion unit for ROM cartridges.

These are fine, but what about the other 14 sockets? Where are they and can we use them? Unfortunately Acorn haven't provided space for more than two ROMs to be plugged in at once.

The BBC had the very same problem when it came out. It was solved by the addition of ROM boards, either internal or external, which provided space for the extra ROMs.

Now Slogger has produced a Rombox for the Electron that enables owners to plug in up to eight additional ROMs. This will allow firmware (software in ROM), written specifically for the Electron, and some BBC ROMs to be used.

The unit is constructed of fairly tough plastic, not quite the same creamy colour as the Electron. It's the same height and width, but only one third as deep.

Installation is a piece of cake. It simply plugs into the back of the Electron in the same way as the Plus 1. Two plastic screws are provided to secure it firmly.

If you already have a Plus 1 and/or a Plus 3 there's no need to worry. The expansion bus is continued at the back of the Rombox for them to plug into.

The unit is compatible with both expansion units and I've had no trouble with either.

In fact the only problem is that with the Rombox, Plus 3 and Plus 1 the Electron is nearly one and a half feet deep.

Those stories about it getting so big it's falling off the back of the desk are true!

As I said earlier, the operating system can manage up to 16 ROMs, which it numbers 0-15. But not all these are available to the user, as some are already taken up.

Basic occupies 10 and 11, and the keyboard, strangely, is treated as sideways ROMs 8 and 9. The Plus 1 operating system is 12, and the ROM cartridge sockets are 0 and 1. The ADFS in the Plus 3 is number 4. So what does this leave?

With both Plus 1 and 3 attached there is room for eight more ROMs, exactly the number of places available on the Rombox.

However it's not that simple. The ROMs are in two banks of four. The left four are fixed as ROMs 4-7. So if you have a Plus 3 then the first ROM position, 4, is unavailable, although 5, 6 and 7 are OK.

The right bank of four can be set as 0-3 or 12-15. As 0 and 1 are for ROM cartridges it seemed best to have them set up as 12-15. This left 13, 14 and 15 free, as 12 is the Plus 1.

So, with an unexpanded Electron all eight ROM positions are available. But with both Plus 1 and 3 only six are free.

I have three ROMs in use at present – Vine Micros' Addcomm and Slogger's own Starmon and Elkman. All work perfectly with no apparent bugs or hiccups.

It's surprising just how many ROMs are available now for the Electron. You could easily fill all the sockets.

An added bonus with the Rombox is the option to use the rightmost ROM position as a sideways RAM socket.

The extra RAM available would not increase the amount of memory available for running programs, but it would allow data to be stored there.

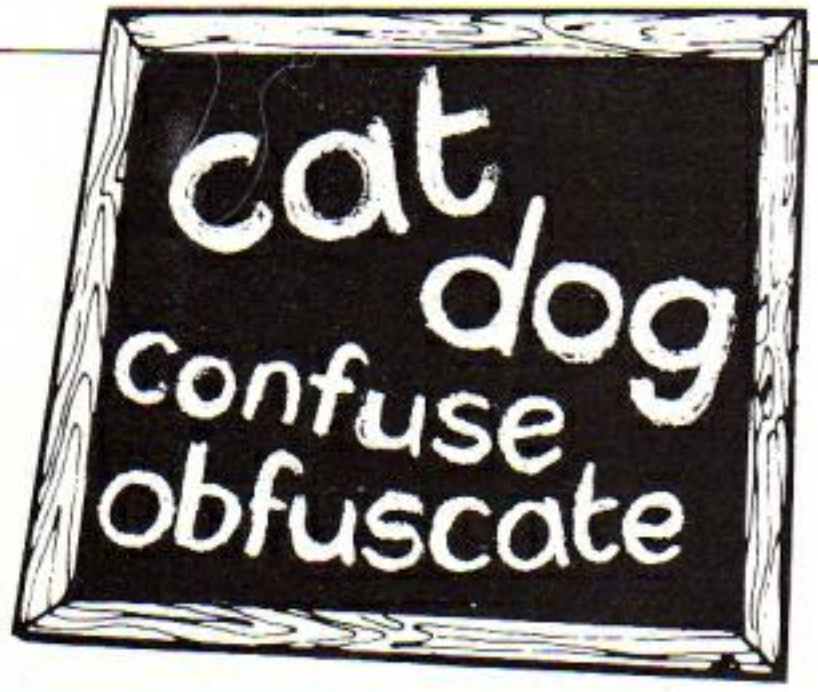
It would even be possible to save ROMs to disc and load them into the sideways RAM as and when needed, thus freeing ROM sockets.

Slogger has produced a valuable piece of hardware which enables the Electron to use its ability to access sideways ROMs to the full.

The Rombox fits in nicely with the Plus 1 and Plus 3, or can be used on its own.

My only criticism is that the ROMs are rather exposed. I would have preferred them to be under some sort of cover, but this is a minor point and I can't really find fault with its operation.

Test your word power



A compulsive educational board game by ANDREW KANE

HEXAGRAM was written originally for children. I had earlier written one or two educational programs for my young son but he quickly tired of them because there was no game element in them.

Hexagram now overcomes this by producing anagrams coupled to a board game which suits both child and adult players.

Two levels of play allow children to play adults as well as other combinations. The game helps with word recognition, spelling and vowel/consonant sequence.

A 4 x 4 grid of hexagons appears on the screen, each containing a letter. The players are coded blue and white. The text appears in these colours alternately to indicate the sequence of play.

The player selects a letter. A word starting with that letter appears in anagram form.

A clock starts the countdown from 60 seconds, during which time the anagram must be solved.

For a correct answer the hexagram containing the selected letter changes to the player's colour.

The first player to create a path across the screen – the blue player – or down the screen – the white player – is the winner. Blocking tactics can be employed.

The words are rearranged in memory during play so that they can only be encountered again after five selections of the same letter.

The text remains on screen for several seconds at each stage of the game so that children – and adults! – can read and learn the correct answers.

If instead of the Electron the game is played on a BBC Micro you may need to change PROCwait(J%) to increase the time span. Also VDU 23,1,0;0;0;0; must be switched to VDU 23;8202;0;0;0;

The data is plentiful. A total of 230 words are used, but this ensures an interesting competitive game. The words can be changed readily.

Young children may need three and four-letter words. Do not exceed eight letters or problems of screen layout may occur.

Try to avoid anagrams with more than one solution – such as one for QUITE which could be QUIET.

The most complex aspect of the program is the routine to check for a winning line.

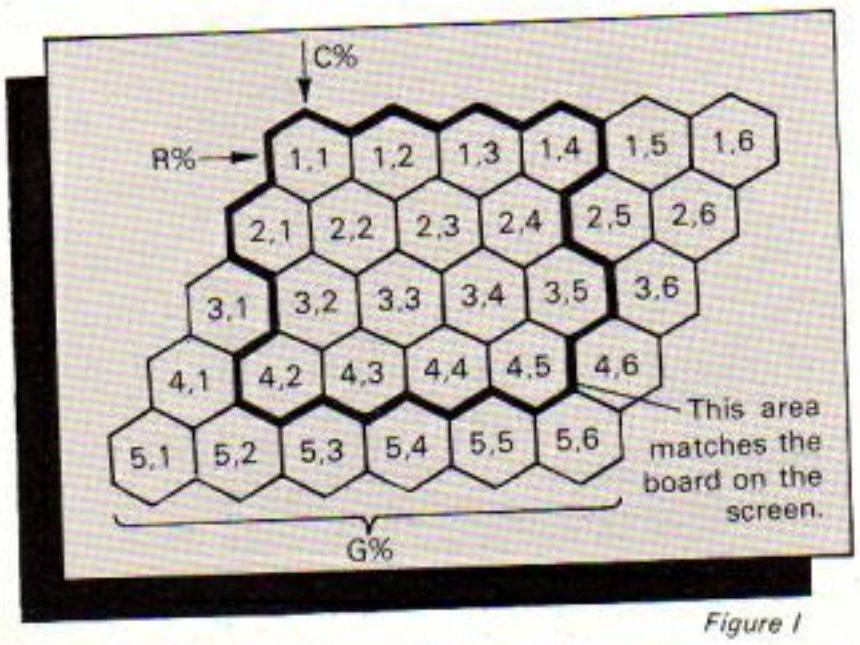


Figure I

Initially I was tempted to allow the players to determine if there was a winner, but I felt this was ducking the issue.

The outcome is about 60 lines of program split into seven procedures.

There are scores of winning paths, some being very serpentine, so a complicated analysis routine was required.

METHOD OF CHECKING FOR WINNING LINE

A TWO-dimensional grid is stored in memory. Imagine it to look like Figure I.

Before the game starts some locations outside the playing area are filled with value 1 (line 970) to assist the checking routine.

Each correct reply from the players is placed on the grid as value 1 or 3, depending on the colour of the player.

The computer, when checking vertically for a winning line, searches row 1 for a 3 and drops down to row 2 if successful. If unsuccessful it aborts the routine.

It then looks either side of that column which in row 1 contained a 3. It continues to do this until row 5 is reached, whereupon it declares a winning line.

If a dead end is found it changes the numbers in the grid leading to the dead end – and restores their values after completing the check.

The routine is now repeated, without that dead end, until a route is found or not found.

Extra routines are required when checking vertically since a winning line may move down, up and down a series of columns between rows 1 and 5 – hence PROCup.

The horizontal checking routine is similar. Column 1 is checked for a 1 and then the adjoining rows are scrutinised as described earlier.

PROCdiag checks for unusual winning lines by the BLUE player.

Hexagram listing

```
  10 REM Hexagram
  20 REM By Andrew Kane
  30 REM (c) Electron User
  40 ON ERROR GOTO3100
  50 IF PAGE>&E00 PROCrelo
cate:END
  60 *KEY10 OLDIM RUNIM
  70 *FX11,0
  80 *FX4,1
  90 *FX202,176
 100 *FX210,0
 110 MODE1
 120 PROCintro
 130 MODE5
 140 PROCinit
 150 PROClink
 160 PROCscreen
 170 A%=RND(2):G%=A%+2-1:R
EM player to start
 180 REPEAT
 190 PROCchoose
 200 UNTIL W%=1
 210 GOTO150
 220 END
 230 DEFPROCinit
 240 VDU23,1,0;0;0;0;
 250 ENVELOPE1,0,9,25,17,2
46,68,60,126,0,0,-126,126,1
26
 260 ENVELOPE2,0,1,102,42,
159,176,87,126,0,0,-126,126
,126
```

PROCEDURES

init Sets up user defined characters, sets aside memory for words and variables and stores these.

screen Draws the game board, fills hexagons with random letters.

edge Draws game board back ground.

hex( ) Draws hexagons at specified coordinates in specified colour.

randlet Randomly fills hexagons with 16 of first 23 letters of alphabet.

choose Asks for letter choice, finds a word in memory beginning with that letter, determines order of play.

scramble Forms anagram of word, ensures it is an anagram, shows the clock, accepts reply, reorders words in memory to prevent immediate repetition if reply wrong.

checkver, branch, linear, up, checkhor, across, diag Seven procedures to check for the winning line.

right Declares correct reply, changes colour of hexagon.

wrong Declares wrong reply, gives correct reply.

timeup Declares time up, gives correct answer.

win Declares a winner, causes colour flash on game board.

wait(J%) Delays game to allow reading time.

intro Describes the game, asks for levels of play.

link Summarises instructions before and between games.

VARIABLES

xpos%,ypos% Coordinates of hexagon centres.

let% Numbers for letters used in game 1-23 (not x,y,z).

G%(R%,C%) Two-dimensional grid in memory only to check for winner.

cos%,sin% Values to enable hexagons to be drawn in segments.

int%,seg%, num%,loop% Sequential integers used in FOR . . . NEXT loops.

col% Colour of hexagon.

store% Temporary store for num%.

word$ Words used in the game.

chr$ Individual letter store of word to be scrambled.

let$ Letter chosen by player.

store$ Stores the answer one letter at a time.

file$ Stores letters previously selected to check illegal moves.

reply$ Stores player's answer.

keep$ Stores letters in hexagons to check for illegal choice.

T$ Temporary store for letters during scrambling routine.

W% Takes value 1 when winning line occurs.

Q% Colour of current player.

A% Determines order of play at start.

I% Sequential integers in FOR . . . NEXT loops.

L% Temporary store for C%, also used as sequential integer.

T% Flag to cause changes in checking routine.

F%,E% Codes for whether easy or hard words selected.

R% Row number of grid for checking for winning line.

C% Column number of grid for checking for winning line.

S% Flag to indicate a successful search around one hexagon.

```
  270 ENVELOPE3,0,122,96,77
.7,243,236,126,0,0,-126,126
,126
  280 VDU23,249,0,0,16,56,1
24,16,16,16
  290 VDU23,250,8,12,6,127,
6,12,8,0
  300 DIMword$(230)
  310 DIMchr$(8)
  320 DIMxpos%(16),ypos%(16
)
  330 DIMlet%(23)
  340 DIM G%(5,6)
  350 DIMcos%(6),sin%(6)
  360 FORseg%=1TO6
  370 cos%(seg%)=COS(PI/3*s
eg%)*100
  380 sin%(seg%)=SIN(PI/3*s
eg%)*100
  390 NEXT
  400 FORint%=1TO16
  410 READxpos%(int%),ypos%
(int%)
  420 NEXT
  430 DATA386,800,578,800,7
70,800,962,800
  440 DATA290,640,482,640,6
74,640,866,640
  450 DATA386,480,578,480,7
70,480,962,480
  460 DATA290,320,482,320,6
74,320,866,320
  470 FORnum%=1TO230:READwo
rd$(num%):NEXT
  480 DATAanimal,angry,acro
ss,again,alive
  490 DATAbarrel,before,beg
in,blood,bottle
  500 DATAcastle,circus,cor
ner,crumb,cream
  510 DATAdenger,decide,don
key,during,double
  520 DATAearth,empty,expec
t,engine,eight
  530 DATAfamily,father,fin
ger,flash,flower
  540 DATAgarage,giant,glas
s,greedy,grape
  550 DATAhandle,horse,hung
ry,heavy,hatch
  560 DATAigloo,insect,isla
nd,invite,indeed
  570 DATAjacket,jolly,juic
e,jumper,jail
  580 DATAkettle,knife,kitt
en,knee,kitchen
  590 DATAladder,large,laug
h,learn,little
  600 DATAmagic,music,march
,middle,mother
  610 DATAnarrow,night,nort
h,nurse,never
```

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Although similar to Educational 1 this tape is more advanced and aimed at seven to twelve year olds. The tape includes MATH 1, MATH 2, AREA, MEMORY, CUBECOUNT and SPELL.

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Hexagram listing

From Page 55

```
  620 DATAoffice,organ,other,object,order
  630 DATApaint,parcel,pencil,picnic,please
  640 DATAquart,quill,quote,quarter,quest
  650 DATArabbit,ready,right,round,rubber
  660 DATAscarf,school,sense,shake,sister
  670 DATAtable,teacher,there,tiger,tulip
  680 DATAugly,uncle,unkind,upon,useful
  690 DATAvoice,value,view,vacant,vase
  700 DATAwagon,weary,weigh,whale,world
  710 DATAabstract,abandon,adjust,admire,arrive
  720 DATAbelieve,bacteria,bungalow,boundary,boredom
  730 DATAchalice,calendar,cistern,collide,cabinet
  740 DATAdetonate,daughter,doleful,diagonal,describe
  750 DATAencircle,educate,eminent,exclaim,eternal
  760 DATAflexible,festival,fountain,finger,finance
  770 DATAgenuine,generate,gallery,govern,glisten
  780 DATAhorizon,historic,harmony,hypnotic,herald
  790 DATAimprison,ignorant,incident,industry,idealist
  800 DATAjeopardy,joinery,jeweller,journey,junction
  810 DATAknapsack,kilogram,kitchen,kangaroo,kingdom
  820 DATAlinament,leather,liberal,lecturer,listener
  830 DATAmystery,molecule,material,mischief,mortgage
  840 DATAnuisance,nervous,nickname,notable,netball
  850 DATAordinary,obligate,official,operate,oriental
  860 DATApamphlet,particle,practise,pheasant,peculiar
  870 DATAquotient,question,quantity,quiver,quarter
  880 DATArelent,restful,reason,riddle,rainbow
  890 DATAsardine,sackful,section,separate,sharpen
  900 DATAteenager,terminal,theatre,torpedo,tactless
  910 DATAunkempt,umbrella,uniform,urgent,useful
  920 DATAviaduct,vaccine,valiant,vehicle,victory
  930 DATAwithout,window,weather,whisker,welcome
  940 ENDPROC
  950 REM sets up game board
  960 DEFPROCscreen
  970 G%(1,5)=1:G%(2,5)=1:G%(3,1)=1:G%(4,1)=1
  980 W%=0:file$=""
  990 PROCedge
 1000 FORint%=1TO16:PROChex(xpos%(int%),ypos%(int%),2):NEXT
 1010 PROCrandlet
 1020 ENDPROC
 1030 REM draws background
 1040 DEFPROCedge
 1050 VDU19,1,6,0,0,0:GCOL0,1
 1060 COLOUR2:PRINTTAB(6,1)"HEXAGRAM"
 1070 MOVE114,950:MOVE290,850:PLOT85,114,170:MOVE290,220:PLOT85,290,850
 1080 MOVE1148,950:MOVE962,750:PLOT85,1148,170:MOVE962,270:PLOT85,962,750
 1090 GCOL0,3:MOVE114,950:MOVE290,850:PLOT85,1148,950:MOVE1048,850:PLOT85,290,850
 1100 MOVE114,170:MOVE376,270:PLOT85,1148,170:MOVE962,270:PLOT85,376,270
 1110 ENDPROC
 1120 REM hexagon created
 1130 DEFPROChex(xpos%(int%),ypos%(int%),col%)
 1140 VDU29,xpos%(int%);ypos%(int%);
 1150 MOVE0,100
 1160 GCOL0,col%
 1170 FORseg%=1TO6
 1180 MOVE0,0
 1190 PLOT85,sin%(seg%),cos%(seg%)
 1200 NEXT
 1210 VDU26,28,0,31,19,28
 1220 ENDPROC
 1230 REM fills hexs with letters
 1240 DEFPROCrandlet
 1250 FOR I%=1TO23:let%(I%)=I%:NEXT:FOR I%=23TO2STEP-1:C%=RND(I%):T%=let%(C%):let%(C%)=let%(I%):let%(I%)=T%:NEXT
 1260 VDU5:GCOL0,0:keep$=""
 1270 FOR num%=1TO16:MOVExpos%(num%)-20,ypos%(num%)+10:PRINTCHR$(let%(num%)+96):keep$=keep$+CHR$(let%(num%)+96):NEXT
 1280 VDU4
 1290 ENDPROC
 1300 REM letter chosen & word found
 1310 DEFPROCchoose
 1320 COLOUR0%
 1330 *Fx15,1
 1340 INPUT"Choose a letter ..."let$
 1350 IF LEN(let$)>1THEN CLS:GOTO1340
 1360 IF INSTR(keep$,let$)=0THEN CLS:GOTO1340
 1370 IF INSTR(file$,let$)<>0THEN CLS:GOTO1340
 1380 IF Q%=3AND E%=1OR Q%=1AND F%=1THENnum%=1
 1390 IF Q%=3AND E%=2OR Q%=1AND F%=2THENnum%=116
 1400 FOR int%=num%TO230
 1410 IF ASC(word$(int%))=ASC(let$)THEN num%=int%:PROCscramble:int%=230
 1420 NEXT
 1430 Q%=(Q%*-1)+4
 1440 REM words in memory rearranged
 1450 store$="":store$=word$(num%)
 1460 word$(num%)=word$(num%+1)
 1470 FORint%=1TO3:word$(num%+int%)=word$(num%+int%+1):NEXT
 1480 word$(num%+4)=store$
 1490 ENDPROC
 1500 REM letters of word rearranged
 1510 DEFPROCscramble
 1520 CLS:store$=""
 1530 FOR L%=1TO LEN(word$(num%))
 1540 chr$(L%)=MID$(word$(num%),L%,1)
 1550 NEXT
 1560 FOR L%=LEN(word$(num%))TO2STEP-1
 1570 C%=RND(L%):T$=chr$(C%):chr$(C%)=chr$(L%):chr$(L%)=T$:NEXT
 1580 FOR L%=1TO LEN(word$(num%)):store$=store$+chr$(L%):NEXT
 1590 IFstore$=word$(num%)THEN GOTO1520ELSE PRINTstore$
 1600 FORloop%=1TO LEN(store$):IF MID$(store$,loop%,1)=let$THEN VDU31,loop%-1,1,249:loop%=LEN(store$)
 1610 NEXT
 1620 VDU31,11,0,250
 1630 REM clock routine
 1640 reply$="":TIME=0
 1650 REPEAT
 1660 store%=INKEY(96)
 1670 PRINTTAB(7,3);INT(61-TIME/100);"sec ";
 1680 IFstore%=13ORstore%=-1THEN GOTO1740
 1690 IFstore%=127THENreply$=MID$(reply$,1,LENreply$-1):GOTO1720
 1700 IFstore%<97ORstore%>122THEN GOTO1730
 1710 reply$=reply$+CHR$(store%)
 1720 IF LEN(reply$)>8THENreply$=MID$(reply$,1,8)
 1730 PRINTTAB(11,0);reply$;" "
 1740 UNTILstore%=13OR TIME>6000
 1750 IF TIME>6000THEN CLS:PROCtimeup:CLS:GOTO1770
 1760 IFreply$=word$(num%)THEN CLS:PROCright ELSE CLS:PROCwrong
 1770 FOR L%=1TO8:chr$(L%)="":NEXT
 1780 ENDPROC
 1790 REM 7 PROCS to check for winner
 1800 DEFPROCcheckver
 1810 R%=1:L%=0:W%=0:S%=1:T%=1:M%=G%(2,2)
 1820 REPEAT
 1830 IF S%=0THEN R%=1:L%=0:T%=0
 1840 IF R%<>1THEN1900
```

→

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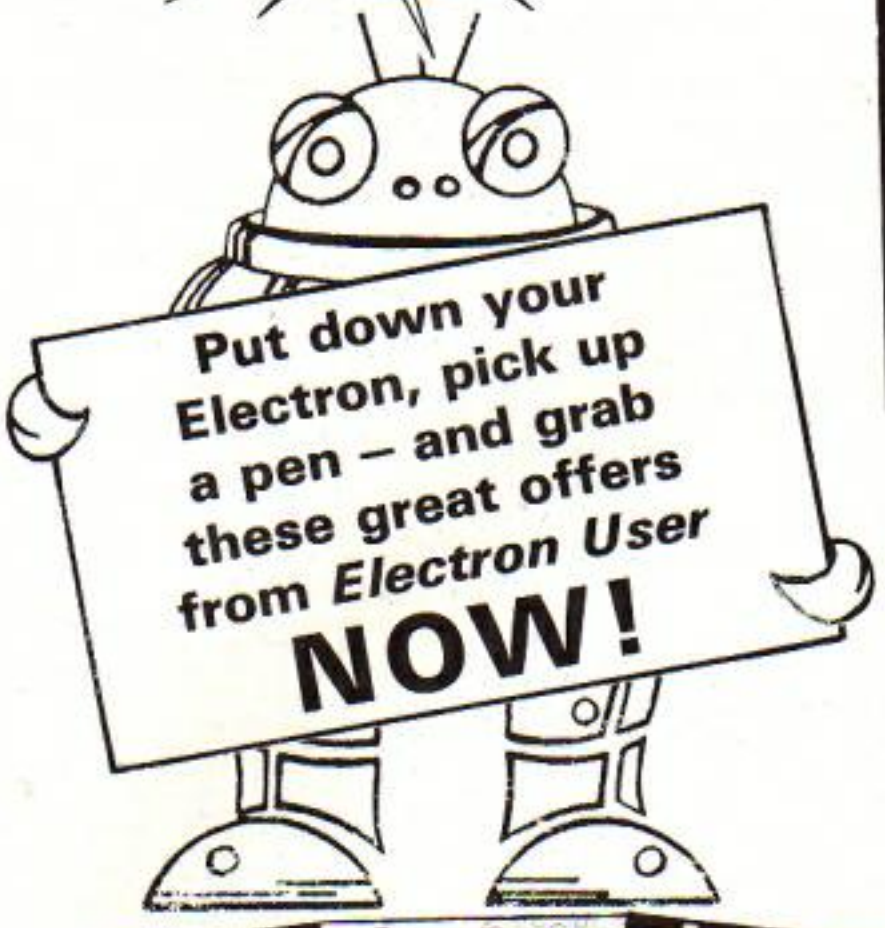
Hexagram listing

From Page 57

```
 1850 FOR C%=4TO1STEP-1
 1860 IF G%(R%,C%)=3THEN L%
=C%
 1870 NEXT
 1880 IF L%=0THEN W%=2:GOTO
1910
 1890 C%=L%
 1900 PROCbranch
 1910 UNTIL W%>0
 1920 IF W%=1THEN PROCwin
 1930 FOR R%=1TO4
 1940 FOR C%=1TO6
 1950 IF G%(R%,C%)=2THEN G%
(R%,C%)=3
 1960 NEXT:NEXT
 1970 G%(2,2)=M%
 1980 ENDPROC
 1990 DEFPROCbranch
 2000 R%=R%+1:S%=0:L%=C%
 2010 IF G%(R%,L%)=3THEN S%
=1
 2020 IF G%(R%,L%+1)=3THEN
S%=1:C%=L%+1
 2030 IF R%=4AND G%(R%,L%)=
3OR R%=4AND G%(R%,L%+1)=3TH
EN S%=1:W%=1
 2040 IF S%=0THEN PROClinea
r
 2050 IFS%=0THEN PROCuo
 2060 IF S%=0THEN G%(R%-1,L
%)=2
 2070 ENDPROC
 2080 DEFPROClinear
 2090 IF R%=2THEN ENDPROC
 2100 IF T%=1GOTO2120
 2110 IF T%=2GOTO2130
 2120 IF G%(R%-1,L%+1)=3THE
N S%=1:C%=L%+1:T%=1:R%=R%-1
:ENDPROC
 2130 IF G%(R%-1,L%-1)=3THE
N S%=1:C%=L%-1:T%=2:R%=R%-1
:ENDPROC
 2140 ENDPROC
 2150 DEFPROCup
 2160 IF R%<>4AND L%<>3THEN
ENDPROC
 2170 IF G%(3,3)=3AND G%(2,
3)=3THEN G%(2,2)=3
 2180 ENDPROC
 2190 DEFPROCcheckhor
 2200 C%=1:L%=1:W%=0:S%=1
 2210 REPEAT
 2220 T%=0
 2230 IF S%=0THEN C%=1:L%=0
 2240 IF C%<>1THEN GOTO2300
 2250 FOR R%=1TO4
 2260 IF G%(R%,C%)=1THEN L%
=R%
 2270 NEXT
 2280 IF L%=0THEN W%=2:GOTO
2310
 2290 R%=L%
 2300 PROCacross
 2310 UNTIL W%>0
 2320 FOR R%=1TO4
 2330 FOR C%=1TO5
 2340 IF G%(R%,C%)=2THEN G%
(R%,C%)=1
 2350 NEXT:NEXT
 2360 IF W%=1THEN PROCwin
 2370 ENDPROC
 2380 DEFPROCacross
 2390 L%=R%:S%=0
 2400 IF G%(L%+1,C%+1)=1THE
N S%=1:R%=L%+1:C%=C%+1:GOTO
2430
 2410 IF G%(L%,C%+1)=1THEN
S%=1:C%=C%+1:GOTO2430
 2420 IF C%<>1AND G%(L%-1,C
%)=1THEN S%=1:R%=L%-1:PROCd
iag
 2430 IFC%=5AND G%(R%,C%)=1
OR C%=5AND G%(R%+1,C%)=1THE
N S%=1:W%=1
 2440 IF S%=0THEN G%(R%,C%)
=2
 2450 IF T%=1AND G%(R%,C%)=
2THEN G%(R%,C%)=1
 2460 ENDPROC
 2470 DEFPROCdiag
 2480 IF R%=3AND C%=3OR R%=
3AND C%=4THEN GOTO2500
 2490 GOTO2510
 2500 IF G%(R%-1,C%-1)=1THE
N S%=1:G%(R%,C%)=2:C%=C%-1:
R%=R%-1:T%=1
 2510 ENDPROC
 2520 DEFPROCright
 2530 SOUND1,2,100,20
 2540 file$=file$+let$
 2550 PRINT"That is ";:COLO
UR2:PRINT"CORRECT":PROCwait
(3000):CLS
 2560 int%=INSTR(keep$,let$
)
 2570 PROChex(xpos%(int%),v
pos%(int%),0%)
 2580 loop%=0:FOR R%=1TO2:F
OR C%=1TO4:loop%=loop%+1:IF
loop%=int%THEN G%(R%,C%)=0%
 2590 NEXT:NEXT
 2600 FOR R%=3TO4:FOR C%=2T
O5:loop%=loop%+1:IFloop%=in
t%THEN G%(R%,C%)=0%
 2610 NEXT:NEXT
 2620 IF 0%=3THEN PROCcheck
ver ELSE PROCcheckhor
 2630 ENDPROC
 2640 DEFPROCwrong
 2650 SOUND1,-15,12,10:SOUN
D1,-15,0,10
 2660 PRINT"That is ";:COLO
UR2:PRINT"WRONG.":PROCwait(
5000):CLS
 2670 COLOUR0%:PRINT"The wo
rd is ";:COLOUR2:PRINTword$
(num%):PROCwait(10000):CLS
 2680 ENDPROC
 2690 DEFPROCtimeup
 2700 SOUND1,3,100,20
 2710 PRINT"TIME UP!":PROCw
ait(3000):CLS
 2720 PRINT"The word is ";:
COLOUR2:PRINTword$(num%):PR
OCwait(10000):CLS:COLOUR0%
 2730 ENDPROC
 2740 DEFPROCwin
 2750 SOUND1,1,100,100
 2760 IF 0%=1PRINT"BLUE is
the winner.":PROCwait(3000)
:VDU19,1,14,0,0,0:PROCwait(
10000):CLG:VDU20,19,1,6,0,0
,0
 2770 IF 0%=3PRINT"WHITE is
 the winner.":PROCwait(3000
):VDU19,3,15,0,0,0:PROCwait
(10000):CLG:VDU20
 2780 FOR R%=1TO5:FOR C%=1T
O5:G%(R%,C%)=0
 2790 NEXT:NEXT
 2800 ENDPROC
 2810 DEFPROCwait(J%):FOR I
%=1TO2*J%:NEXT:ENDPROC
 2820 DEFPROCintro
 2830 VDU19,1,6,0,0,0
 2840 COLOUR2:PRINTTAB(14,1
)"HEXAGRAM"TAB(14)"*******
*":COLOUR3:PRINT"..is a ga
me for 2 players.Unscramble
 the""anagram within the t
ime allowed.The""first le
tter is the one in the hexa
gon."
 2850 PRINT""   Try to ma
ke a pathway..."""  ACROSS
 the board if you are blue
or""  DOWN the board if y
ou are white."
 2860 COLOUR2:PRINT""
Type 1 for easy words""
   Type 2 for harder words"
 2870 COLOUR1:PRINT""   BL
UE PLAYER....what level?
";:F%=GET-48:PRINT;F%
 2880 IF F%<>1AND F%<>2THEN
 CLS:GOTO2840
 2890 COLOUR3:PRINT""   WH
ITE PLAYER...what level?
";:E%=GET-48:PRINT;E%
 2900 IF E%<>1AND E%<>2THEN
 CLS:GOTO2840
 2910 VDU23,1,0;0;0;0;
 2920 COLOUR2:PRINT""
Do you want sound? (Y/N)":R
EPEAT:get$=GET$:UNTIL INSTR
("YyNn",get$)<>0
 2930 IFget$="N"ORget$="n"T
HEN*FX210,1
 2940 CLS
 2950 ENDPROC
 2960 REM summary of instru
ctions
 2970 DEFPROClink
 2980 VDU26
 2990 *FX15,0
 3000 CLS:PRINTTAB(0,5)"Ens
ure CAPS LK off."""Text c
olour is same"""as colour
of player."""Press RETURN
 after"""typing in an answ
er."""Use ESCAPE to chang
e""levels."
 3010 COLOUR2:PRINTTAB(2,28
)"Press any key"'TAB(3)"to
 continue":wait=GET
 3020 CLS
 3030 ENDPROC
 3040 DEFPROCrelocate
 3050 VDU21
 3060 *KEY0"*TAPE|MO%=PAGE-
&E00:FORI%=PAGE TO TOP STEP
4:!(I%-O%)=!I%:NEXT:?(TOP-O
%)=255|MPAGE=&E00|MOLD|MRUN
|F|M"
 3070 *FX21,0
 3080 *FX138,0,128
 3090 ENDPROC
 3100 MODE6
 3110 *FX12,0
 3120 *FX4,0
 3130 REM omit next line un
til debugged
 3140 IF ERR=17THEN RUN
 3150 REPORT:PRINT" at line
 ";ERL
```

This listing is included in this month's cassette tape offer. See order form on Page 61.

electron user



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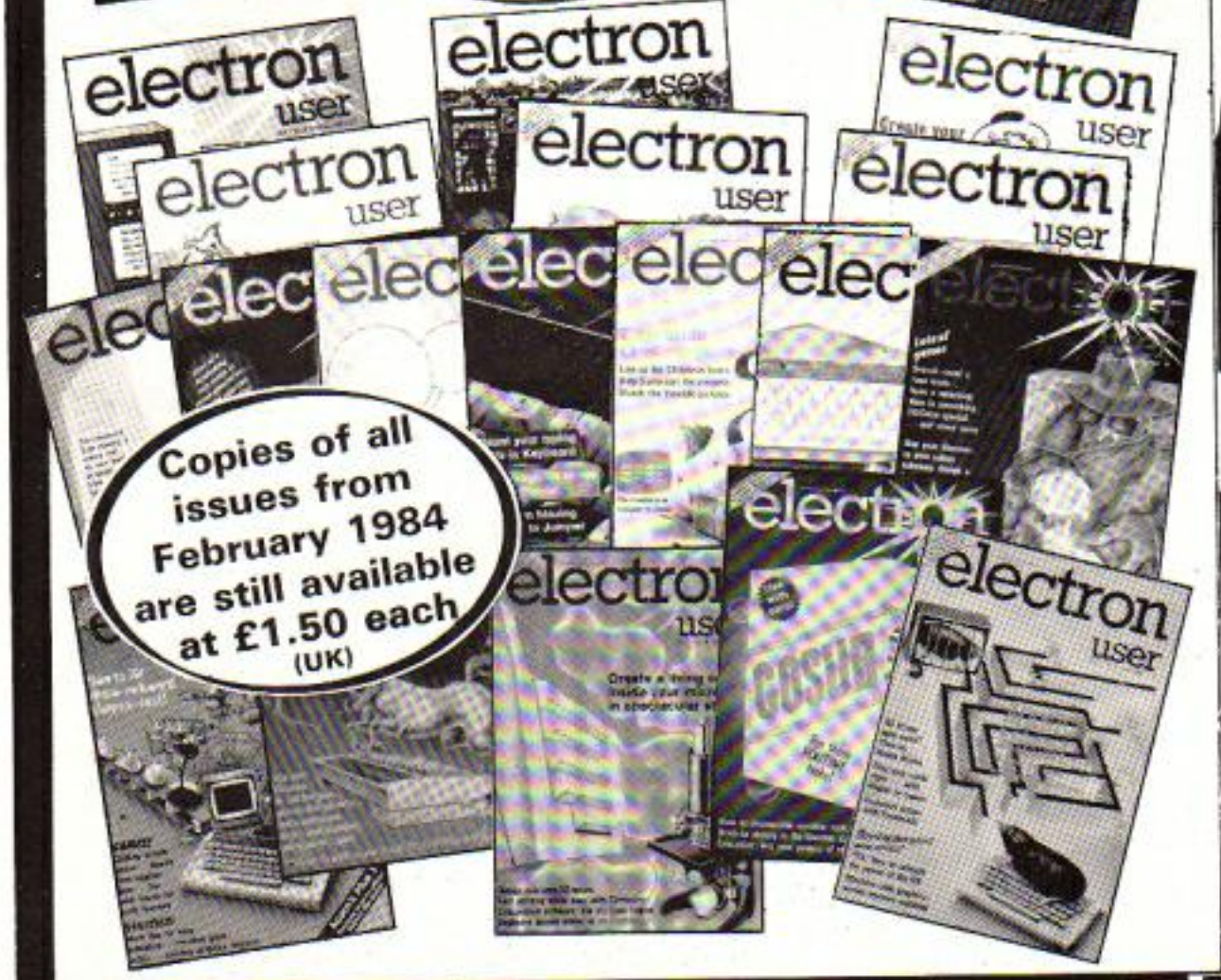

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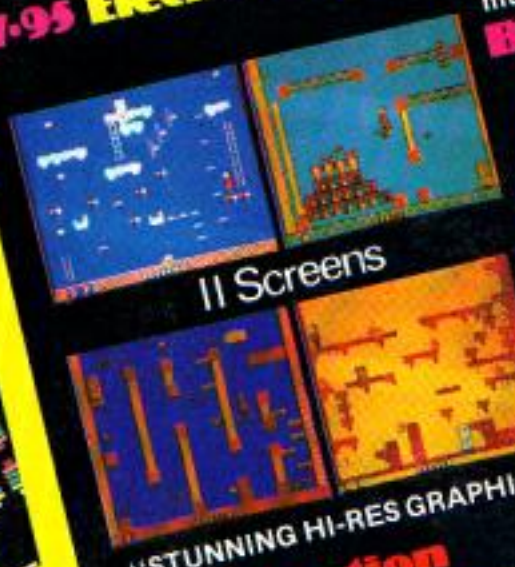

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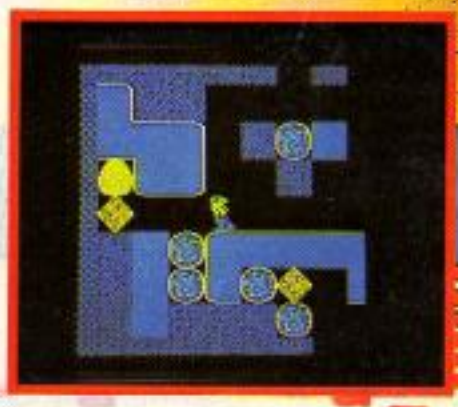

AN EGG ABOUT TO HATCH

THE MAP (SCREEN H)

SCREEN L

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