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OS 1.2 and Basic II

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user

Vol. 2 No.11 August 1985 £1



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words and puzzles

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boy in Asteroydz

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in our arcade classic

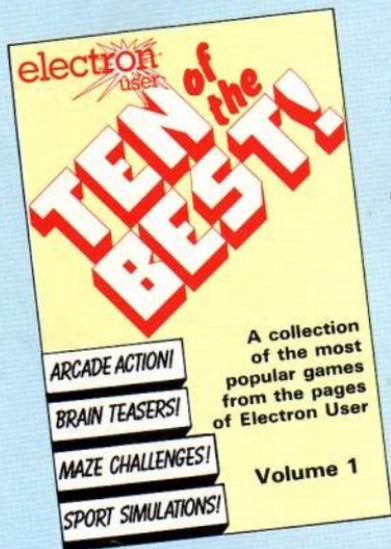
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Learn how to write
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All about discs

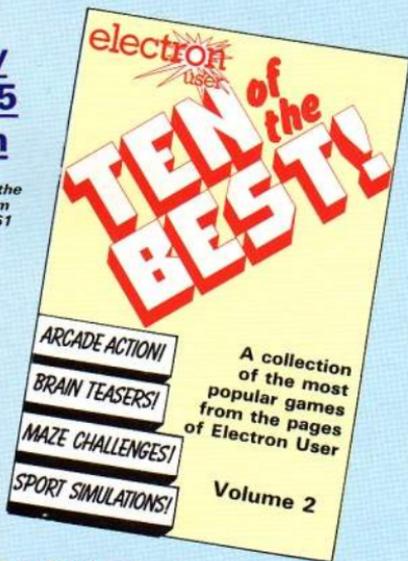
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Out of the many thousands of programs submitted to Electron User... out of the dozens that have been considered good enough to appear in these pages... we have selected 20 of the most outstanding to delight, intrigue - and frustrate! - Electron users everywhere.



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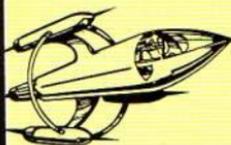
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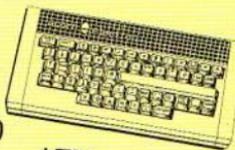
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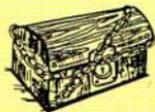
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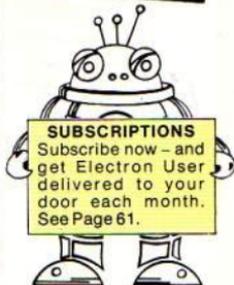
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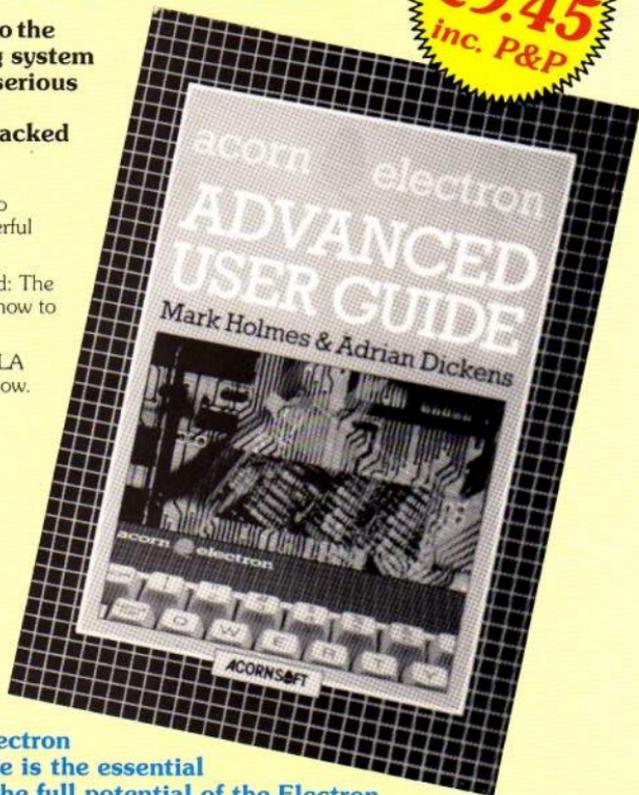
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electron NEWS

user

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 eeprom 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, how-

ever, 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 eeproms 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 eeprom, 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 1 and costs £59.

Solidisk also has a special disc pack offer consisting of a Mitsubishi 3½" 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 Miconet 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 Miconet 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 Miconet about "imbecilic ramblings of an individual obviously totally unqualified to judge the merits of educational software".

Spence said the

MICONET 800 (C) 800111893a op
Kosmos letter 1:06:85

From K.L. Spence, Kosmos Software

Dear Sir

Having provided considerable support for Miconet through advertising, competition sponsorship and countless personal recommendations within the computer industry, you will understand my extreme disappointment and alarm on reading the "review" of our program IDENTIFY EUROPE within your pages.

The "review" contains imbecilic ramblings of an individual obviously totally unqualified to judge the...

GOTO 1 Next story 8 Newsflashes #
GOTO 2 News Index 9 A-Z Index

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 incor-

porating 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 Miconet 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 Miconet's Celebrity Chatline.

Miconet 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 mailedbox: "It seems that we continue to suffer the presumption that those who teach computer studies are experts in edu-

cational 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 Miconet'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, mailedbox Keith Spence with: "While not commenting on your specific case, I support the principle to get Miconet 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 Miconet and Kosmos were claiming strong support for their respective points of view. Meanwhile network subscribers were enjoying the battle of words from the sidelines.

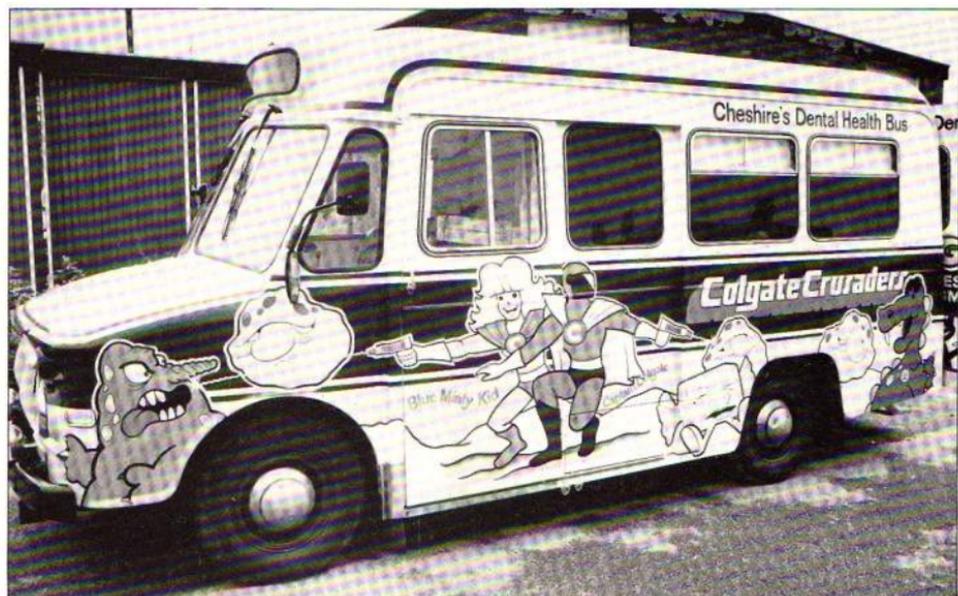
Educational database

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 cir-

cumscribed 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 track 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 files 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.

*VERIFY 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 Viewsheets 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 indispensable 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.

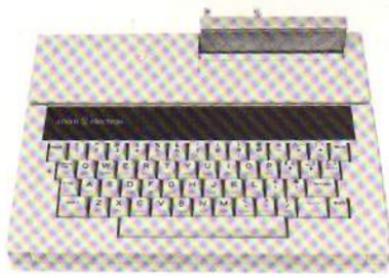
Solidisk supply free software to maximise the use of Sideways RAM on the Electron. These include Wordprocessor, Spreadsheet, Database, Toolkit, Machine Code Monitor, Printer Buffer, Sprites, Playtunes, Virtual Memory Processor, VDU Replay, Screen Effects, digitised pictures etc . . .

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).



UPGRADE, 16K SIDEWAYS RAM WINCHESTER FOR ONLY £59.00

SOLIDISK SPECIAL MITSUBISHI DISC OFFER:

This offer comprises:

- One 80 track Double Sided (640 kbytes) 3.5" Mitsubishi disc drive with its own PSU. Cased in beige.
- Solidisk EFS Disc Upgrade, 16K Sideways RAM and Winchester socket.
- 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 indispensable for Electron programmers, it has 24 star commands (Status, Rwipe, LVAR, Move, Search and Replace, Expand, Salvage, Keyload etc...).

ORDER FORM

PRICE LIST and ORDER FORM.

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Solidisk EFS	£59.00	£1.00
Disc Offers.		
640k Mitsubishi MF453 Disc Outfit	£200.00	£3.00
1.3 MB Fantastic Offer	£310.00	£3.00
20 MB Winchester system	£805.00	£10.00

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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  
PRINT "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 1.

```
10 REM PROGRAM 1  
20 PRINT "ELECTRON"  
30 PRINT "USERS"  
40 PRINT "ARE"  
50 PRINT "BRILLIANT"
```

Program 1

Now let's refresh your memory...

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

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	LETTERS = "a"	letter\$ = "a"

Table 1: Rules for naming variables

```
10 REM PROGRAM III
20 W=10
30 H=20
40 A=W*H
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), names(3)
30 FOR cycle=1 TO 3
40 counter(cycle)=cycle
50 PRINT "Enter name ";c
cycle
60 INPUT "names(cycle)";
70 NEXT cycle
80 CLS
90 FOR loop=3 TO 1 STEP
-1
100 PRINT;counter(loop),n
ames(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), names(3)
30 FOR cycle=1 TO 3
40 counter(cycle)=cycle
50 READ names(cycle)
60 NEXT cycle
70 CLS
80 FOR loop=3 TO 1 STEP
-1
90 PRINT;counter(loop),n
ames(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

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

Table 1: Logical operators

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 than
5"
50 NEXT loop
60 DATA 5,9,3,-1,0,100,8
,4,0.5,2
```

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.

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4	FUEL	81.28	81.28	78.28
5	RENTURE	25.00	25.00	25.00
6	OTHER	99.88	17.12	84.27
7	TOTAL SPENT	249.62	256.04	255.82
8	EARNINGS	121.25	121.25	121.25
9	EL FUEL	27.25	27.25	27.41
10	TELE SPEND	181.40	128.79	128.42
11	SPENT	208.66	215.99	214.88
12	REMAINING	0.00	109.66	111.94
13	DATE	0.00	82.25	85.22
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SURNAME: ANDREWS FIRST NAME: PETER ADDRESS: 12 ELF ROAD ADDRESS2: HEARFORD TELEPHONE: 721-622451 AGE: 19	SURNAME: ANDREWS FIRST NAME: PETER ADDRESS: 12 ELF ROAD ADDRESS2: HEARFORD TELEPHONE: 721-622451 AGE: 19
RECORD No. 3	RECORD No. 3
SURNAME: SMITH FIRST NAME: JANE ADDRESS: 42 HIGH STREET ADDRESS2: BULFORD TELEPHONE: 821-81421 AGE: 27	SURNAME: SMITH FIRST NAME: VIVIEN ADDRESS: 15 HILL ROAD ADDRESS2: WASHINGTON TELEPHONE: 851-80923 AGE: 20
RECORD No. 4	RECORD No. 4
SURNAME: YATES FIRST NAME: IAN ADDRESS: 177 FORD ROAD ADDRESS2: BULLHAM TELEPHONE: 452-496 76545 AGE: 25	SURNAME: BROWN FIRST NAME: IAN ADDRESS: 17 LEANWAD ADDRESS2: KNOXICH TELEPHONE: 811-74281 AGE: 21
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SURNAME: ANDREWS FIRST NAME: JAMES ADDRESS: 12 ELF ROAD ADDRESS2: HEARFORD TELEPHONE: 721-622451 AGE: 15	SURNAME: BROWN FIRST NAME: IAN ADDRESS: 8 ELA RCD ADDRESS2: KNOXICH TELEPHONE: 881-4587 AGE: 11

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01.01																1000.00
05.02	01	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	91.57	1091.57
12.03	01	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	81.27	1081.27
15.04	05	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	25.41	305.41
22.05	05	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	300.00
29.06	01	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	49.76	597.76
06.07	01	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	252.75	3033.75
13.08	01	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	363.51	4363.51
20.09	01	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	55.72	668.91
27.10	01	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	476.88	5745.68
03.11	01	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	219.21	2631.21
10.12	01	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	169.87	2038.58
17.01	01	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	142.59	1718.59
24.02	01	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	104.40	1253.40
03.03	01	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	48.24	580.92
10.04	01	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	50.29	603.29
17.05	01	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	18.20	219.20

GRAPHICS

Page 1
WORD PROCESSOR

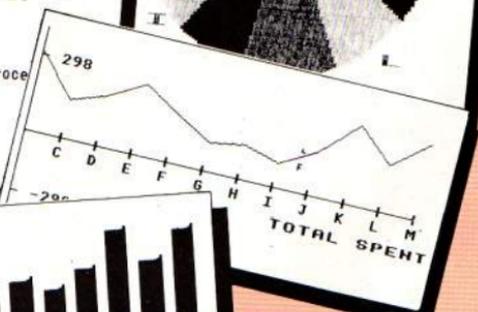
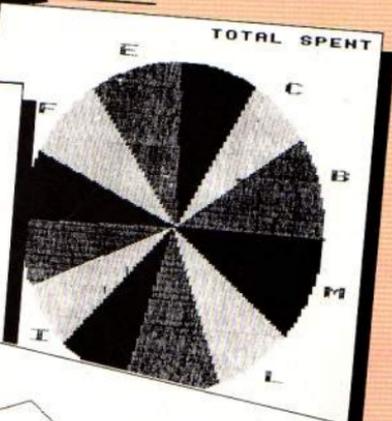
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```
10REM(C)ELECTRON USER          80PROCIntro                    170DIMastX3648                230lepX=leX+1216
20DIM rowX(7):DIM ast*(3)      90MODE S:VDU 23,1,0;0;0;    180FOR clearX=astX TO ast    240FOR linX=0 TO 63
)                         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

ASTEROID2

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
PROCchiprint
(*xb%,yb%,word\$,size%*)
PROCwait(pau%) Called on completion of appropriate level.
Prints *word\$* at text coordinates *xb%,yb%*, *size%* characters high. Creates a pause. The larger the value of the parameter *pau%* the longer the pause.

```
310rndI=RD(55-(1eX+10))
320IF rndI>5 THEN 360
330IF rndI=1 AND pI<>17 A
ND linX<63 THEN ?posI=225:
?(posI+1)=226:?(posI+19)=22
7:?(posI+20)=228
340IF rndI=2 OR rndI=3 TH
EN ?posI=224
350IF rndI=4 OR rndI=5 TH
EN ?posI=229
```

```
360NEXT
370PRINT* **$(posI-18)
380NEXT
390NEXT
400eX=0:lepX=0
410ENDPROC
420DEFPROCgame
430REPEAT
440PROCmove
450PROCscroll
```

```
460UNTIL FALSE
470ENDPROC
480DEFPROCmove
490IF INKEY(-104)=TRUE AN
D xsI(19 THEN xupI=1
500IF INKEY(-103)=TRUE AN
D xsI>0 THEN xupI=-1
510#FX 15,0
520oxI=xsI:xsI=xsI+xupI:x
upI=#
```

```
530VDU 31,xsI,hiX
540chrI=(USR(&FF4)AND&FF
00)DIV&100
550cI=(cIMOD2)+1
560COLOUR cI
570VDU 19,cI,fc0I,0,0,0
580#FX 19
590VDU 31,xsI,hiX,shI
```

Asteroydz listing

From Page 17

```

600VDU 31,ox%,hi%-1,32
610PROCcheck
620SOUND 1,1,100,1
630IF INKEY(-99) THEN PROC
Cboom
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%:=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
sh%
800PROCwait(500)
810VDU 19,1,exc%,0,0,0
820PRINT TAB(xs%,hi%);cra
sh%
830PROCwait(500)
840NEXT
850IF ship%=0 THEN PROCen
d
860xs%=st%
870COLOUR 3
880PROClift_off
890ENDPROC
900DEFPROCscroll
910=FX 19
920in%=(lin%+1)MOD64:li%
=in%+19
930COLOUR 3
940PRINT TAB(1,31);(ast%+
li%+lep%)
950VDU 19,c%,bcoll%,0,0,0
960ENDPROC
970DEFPROCboom
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%,32,0,0,0:PROCwait(25)
1050=FX19
1060VDU 31,xs%-1,hi%+1,32,
32,32,0,0,0,10,31,xs%-1,hi%
+2,32,bomb%,32,0,0,0:PROCwa
it(25)
1070=FX19
1080VDU 31,xs%-1,hi%+2,32,
32,32,0,0,0,10,31,xs%-1,hi%
+3,32,bomb%,32,0,0,0:PROCwa
it(25):VDU 31,xs%-1,hi%+3,3
2,32,32
1090ENDPROC
1100DEFPROCupdate
1110SOUND 1,2,4,70
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%=RAND((1%+1)*200)
+(1%+2)+1)*1000-(TIME DIV
50):mon%=mon%+wage%
1180PRINT TAB(1,5)"No. of
crossings:"cr%
1190COLOUR 1:VDU 19,1,fcoll
%,0,0,0
1200PRINT TAB(1,9)"Bonus if
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,fcoll%,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
1330PROCprint(5,0,"AsteR
oydz",5)
1340COLOUR 1:PROCwait(1000
)
1350PROCprint(6,15,"by",
2):PROCprint(7,18,"Hiaesh
Shah",2)
1360PROCwait(4500)
1370VDU 19,2,0,0,0,0:VDU 1
9,0,0,0,0:VDU 19,3,7,0,0,0:
COLOUR 3:VDU 19,1,0,0,0,0
1380VDUS: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
1430PROCprint(4,12,"Do
you want",2):PROCprint(5
,15,"sound...y/n",2)
1440REPEAT
1450IF INKEY(-69) THEN EN
DCsound: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:PROCprint(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 hoas
e sick, you want to return to
your home-planet, Earth. F
ortunately there is a won
thly Rockzz-Earth shuttle.
Tickets are only '10,000..
.shame you've only got 100.
"
1610PRINT TAB(5,30)"Press
SPACE BAR"
1620REPEAT UNTIL INKEY(-99
)
1630VDU 20,0,31,39,0: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(2,0)" Simple
huh? I'm afraid not. Un
fortunately 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 y
ou get 10 more each time yo
u 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:PROCchirp
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)"":son
+ext:z
1900PRINT TAB(2,19)"press
SPACE BAR"
1910REPEAT UNTIL INKEY(-99
)

```

```

1920PROCanother_go
1930ENDPROC
1940DEFPROCinit
1950monX=0:crX=0:hiZ=16:bc
0:leX=0:colZ=1:excZ=1:bbZ=1
0:leX=0:lepZ=0
1960shX=230:collX=TRUE:ret
X=FALSE:stX=0
1970VDU 23,224,0,28,126,25
5,127,156,126,12
1980c=3:shipZ=10:xsX=0:xu
pZ=0:linZ=0:leZ=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,
128,48,0,0
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 23,232,0,42,8,99,8
,42,0,0

```

```

2070VDU 23,233,73,42,0,65,
0,42,73,0
2080VDU 19,0,0,0,0,0,0
2090crashZ=CHR$(232):cras
hZ=CHR$(233)
2100ast$(1)=CHR$(224):ast$(
2)=CHR$(225)+CHR$(226)+CHR
$(8)+CHR$(9)+CHR$(10)+CHR$(
227)+CHR$(228):ast$(3)=CHR$(
229)
2110VDU 23,234,1,59,120,25
5,255,120,59,1
2120VDU 23,235,120,220,30,
255,255,30,220,120:bombZ=23
5
2130TIME=0
2140leX=0:lepZ=0:extZ=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 '0,000"
2240PRINT TAB(1,11)" How
ever, with"
2250PRINT TAB(1,13)"inflat
ion as it is"
2260PRINT TAB(8,15)"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
2320colZ=3:bc0L=4:excZ=1
:VDU 19,0,4,0,0,0

```

```

2330leX=1:lepZ=1216:bbZ=b
bbZ+10:shX=16:shipZ=shipZ+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
Rockz has"
2410PRINT TAB(1,11)"collap
sed, and has"
2420PRINT TAB(1,13)" taken
your hard"
2430PRINT TAB(8,15)"earned
cash with it!"
2440PRINT TAB(8,17)"Anothe
r '50,000 and"
2450PRINT TAB(1,19)" you'r
e homeward"
2460PRINT TAB(1,21)"
bound"
2470COLOUR 1
2480PRINT TAB(4,25)"press
SPACE BAR"
2490REPEAT UNTIL INKEY(-99
)
2500COLOUR3
2510colZ=0:bc0L=1:excZ=4
:VDU 19,0,1,0,0,0
2520extZ=monX:leZ=2:lepZ=2
432:monX=0:shX=16:bbZ=bbZ+
10:shipZ=shipZ+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
":monX+ext:z
2610PRINT TAB(3,13)"in 'jcr
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
)

```

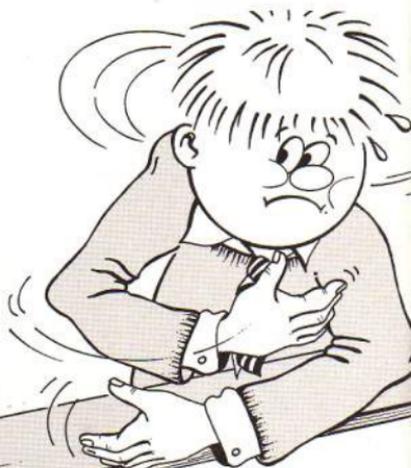
```

2660PROCanother_go
2670ENDPROC
2680DEFPROCanother_go
2690CLS:PROCchprint(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 linZ=0 TO 60:PRINT
" "+(ast$(linZ+19)+lepZ):
SOUND 1,1,linZ*3.5,1:NEXT:l
inZ=linZ-1
2810ENDPROC
2820DEFPROCchprint(xbZ,ybZ
,word$,sizeZ)
2830FOR letZ=1 TO LENword$
2840chZ=0:colZ=-1:rZ=0:let$
=MID$(word$,letZ,1)
2850AZ=10:XX=b70:YX=b87:k7
0=ASC(let$):CALL $FF1F
2860REPEAT
2870colZ=colZ+1:rZ=colZMOD8:r
owZ=(colZMOD8)*7+(k7+colZ)vi
zeZ)
2880IF rZ=7 THEN chZ=chX+1
:VDU 23,236,rowZ(0),rowZ(1)
,rowZ(2),rowZ(3),rowZ(4),ro
wZ(5),rowZ(6),rowZ(7):PRINT
TAB(xbZ+letZ-1,ybZ+chZ-1)C
HR$(236)
2890UNTIL chZ=sizeZ
2900AZ=135
2910NEXT
2920ENDPROC
2930DEFPROCwait(pauZ)
2940FOR wZ=1 TO pauZ: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

```
10 REM PROGRAM I
20 MODE 5
30 FOR byte=0 TO 15
40 READ data
50 byte%800=data
60 NEXT
70 PX=k%900
80 ( OPT 2
90 LDY #15
100 .loop
110 LDA &C00,Y
120 STA &64C8,Y
130 DEY
```

Program I

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

```
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
```

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 II
20 MODE 5
30 FOR byte=0 TO 15
40 READ data
50 byte%800=data
60 NEXT
70 PX=k%900
80 ( OPT 2
90 LDA &000:STA &70
100 LDA &458: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 #600
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 blur.

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.

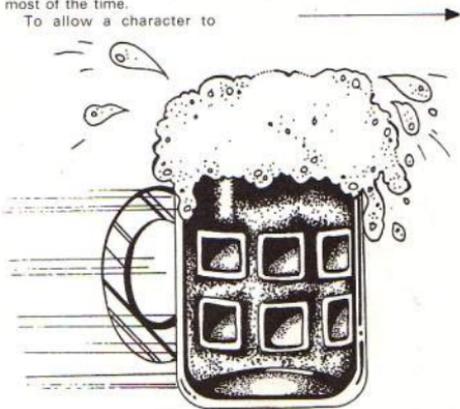
Simply deleting the character by storing zeros in the memory is quite acceptable most of the time.

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 P1=&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
143,143
160 LDA &71:ADC #0:STA &7
340 DATA 143,119,136,170,
221,153
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 P1=&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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HEX: 0000000000000000

	HEX	Binary
Byte 1:	&37	0 0 1 1 0 1 1 1
Byte 2:	&AC	1 0 1 0 1 1 0 0
EOR :	&9B	1 0 0 1 1 0 1 1

Press 1 or 2 to change bytes

ESC to zero

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 &OF and the character data is &AA. When we EOR them to print the

```
10 REM PROGRAM V
20 REN 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 120
90 COLOUR 120
100 byte1:=0:byte2:=0
110 PROCdata(12,byte1)
120 PROCdata(14,byte2)
130 REPEAT
140 KX=INKEY0:#FX21,0
150 PROCdata(17,byte1) EO
R byte2)
160 IF KX=49 byte1X:=byte
1X+1)MOD256:PROCdata(12,byt
e1X)
170 IF KX=50 byte2X:=byte
2X+1)MOD256:PROCdata(14,byt
e2X)
180 UNTIL FALSE
190 END
200 DEF PROCdata(YX,NX)
210 COLOUR 2
220 IF NX<16 PRINT TAB(12
,YX)"&0;"*NX;SPC(5); ELSE P
RINT TAB(12,YX)"&";NX;SPC(
5);
230 COLOUR 1:FOR I=1 TO 5
0:NEXT
240 IF INKEY=49 OR INKEY=
50 ENDPROC
250 FOR IX=7 TO 0 STEP -1
260 IF NX AND 2^IX 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:=672
90 P1:=6900
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 @0:STA ne
w
260 LDA new+1:ADC @0:STA
new+1
270 RTS
280 ]
290 old:=@000:'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

character we get &A5. Try it with Program V.

If &A5 is EORed again we end up with &OF 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 round loop.

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

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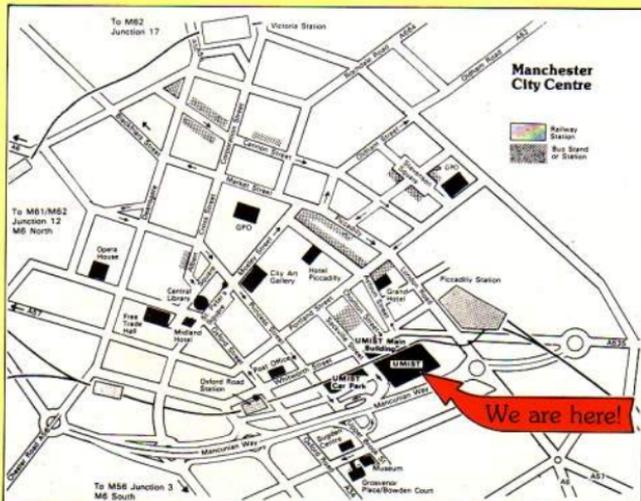
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THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

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 pooton 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 pooton (in the game pooton, 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



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

the programs are very simple to use and, as well as the booklet, instructions are given throughout 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 pooton 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 offen-

sive 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 coordinates indicator which relates directly to the intelligence map.

You can preset the coordinates 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 has 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 strong 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, Con-

nect 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 1) 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 spell 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 would 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 mit 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. Two flippers you have to stop the silver ball falling out of play at the bottom of the table.

By skillfully 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 quest

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 find

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 right in the drive fo

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

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

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

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

track or, more flexibly, able to read from both at the flick of a switch.

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

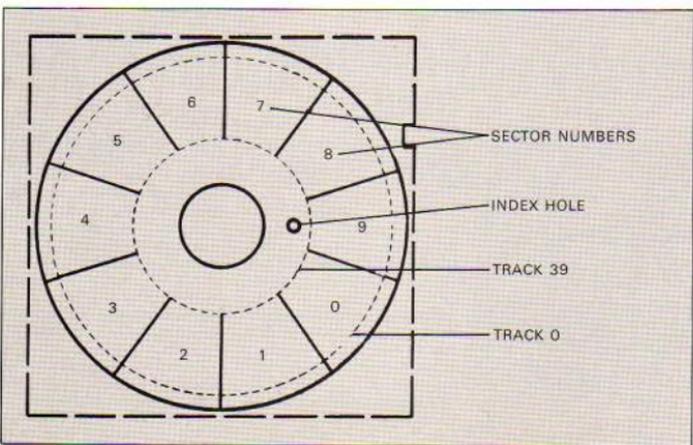


Figure 1: Showing the 10 sector single density format (the sectors are laid out during the format process). With thanks to Cumana.

ht track r discs

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 1 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.

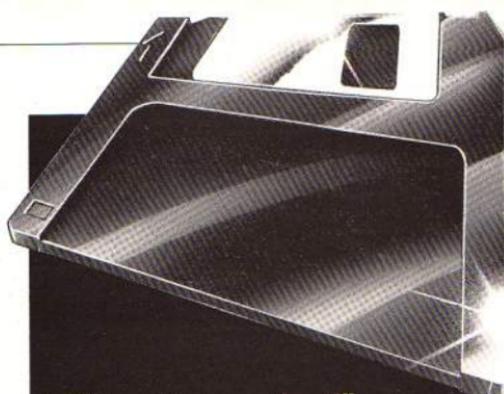
Systems that use such packing techniques are known as double-density DFSs.

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 1.

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.



All about discs

Part One



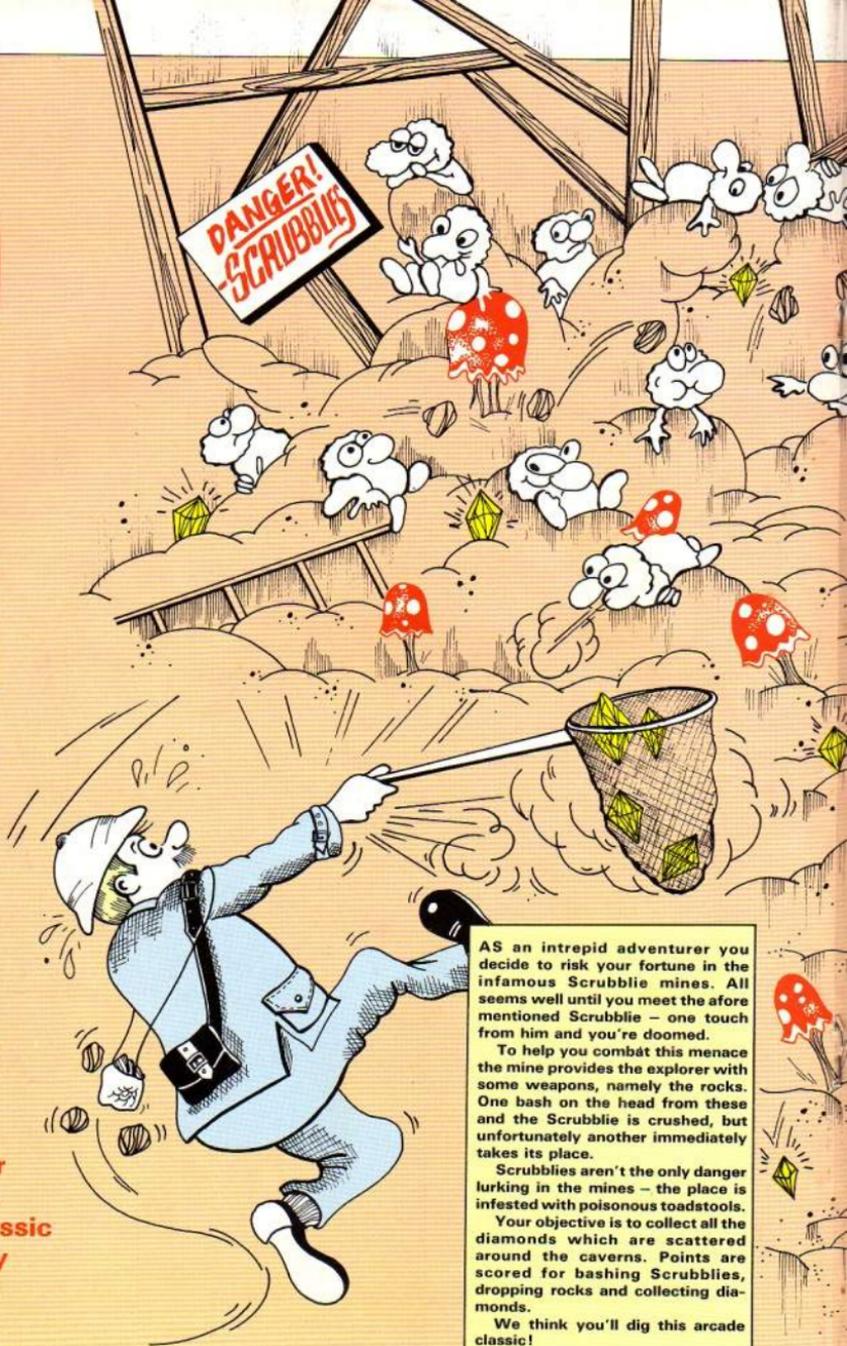
Cumana disc drive which attaches to the Plus 1



The Electron with the Plus 3 attached

DIGGA

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



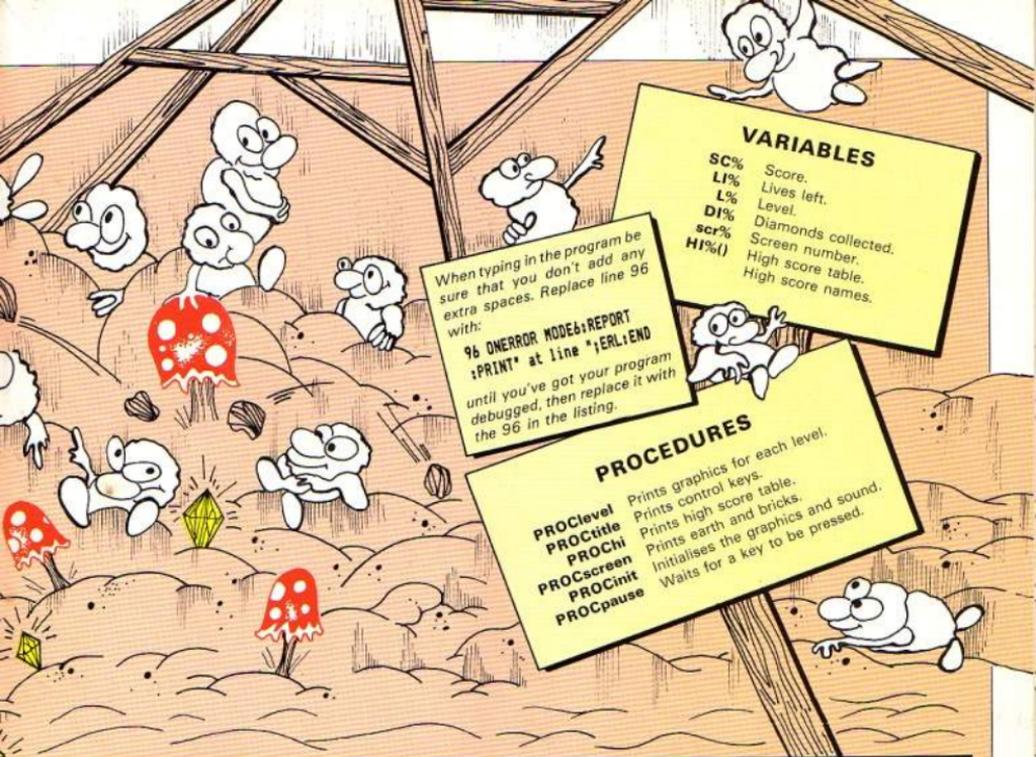
AS an intrepid adventurer you decide to risk your fortune in the infamous Scrubblie mines. All seems well until you meet the afore mentioned Scrubblie — one touch from him and you're doomed.

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%(I) 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 *;ERLIEND
```

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.
 PROCI 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..9)"SPEED (
1-3)";?8B4
7 DIM QX 630:FORT=0T02S
TEP2:PX=QX
8 OPTT
9 .CONROL LDA#4:CMF#1:
BEQFAST:CMF#2:BNENORMAL
10 .SLOW JSRKEY:JSRN:JSR
N:JSRN:RTS
11 .FAST JSRKEY:JSRKEY:J
SRN:JSRN:RTS
12 .NORMAL JSRKEY:JSRN:J
SRN:RTS
13 .KEY
14 LD#09E:JSR inkey:BNE
LLLL:LD#8D:JSR inkey:BNE
RRRR:LD#97:JSR inkey:BNE
DDDD:LD#ACB:JSR inkey:BNE
PAUSE:LD#8AE:JSR inkey:BN
E NOISE:LD#8CD:JSR inkey:B
NE QUIET
15 LD#8B7: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:LD#8B1:JSR#FFF4:PLA:
TAY:PLA:CPX#00:RTS
20 .PAUSE
21 JSR#FF0
22 JMP KEY
23 .NOISE
24 LDA#210
25 LD#0:JSR#FFF4:JMP KE
Y
26 .QUIET
27 LDA#210
28 LD#10:JSR#FFF4:JMP K
EY
29 .RRRR
30 LDA#2:STA#72:JMP MAN
31 .ODDD
32 LDA#3:STA#72
33 .MAN
34 LDA#17:JSR#FEE:LD#3
:JSR#FEE
35 LDA#72:CMF#0:BEQman
36 LDA#31:JSR#FEE:LD#7
0:JSR#FEE:LD#71:JSR#FEE:
LD#32:JSR#FEE
37 LDA#72:CMF#1:BEQup:CM
P#2:BEQ0:CMF#3:BEQr:CMF#4
:BEQ1e
38 .man
39 LDA#31:JSR#FEE:LD#7
0:JSR#FEE:LD#71:JSR#FEE:
LD#135:JSR#FFF4
40 TXA:CMF#12B:BEQn
41 CMF#131:BEQn
42 CMF#133:BEQe
43 CMF#134:BEQt
44 CMF#132:BEQt
45 .A
46 LDA#226:JSR#FEE:RTS
47 .up DEC#70:JMPman
48 .do INC#70:JMPman
49 .ri INC#71:JMPman
50 .le DEC#71:JMPman
51 .n LDA#72:CMF#1:BEQ0o
:CMF#2:BEQup:CMF#3:BEQ1e:CM
P#4:BEQr
52 .s LDA#1:STA#8C:JMPA
53 .t LDA#1:STA#8E:JMPA
54 .N
55 LDA#17:JSR#FEE:LD#02
:JSR#FEE
56 LDA#86:CMF#134:BNE EA
RTH:LD#17:JSR#FEE:LD#01:J
SR#FEE
57 .EARTH
58 LDA#73:CMF#1:BEQ SKIP
59 LDA#31:JSR#FEE:LD#7
E:JSR#FEE:LD#7F:JSR#FEE:
LD#86:JSR#FEE:LD#8F:CMF#
1:BEQup:CMF#2:BEQ0:CMF#3:BEQ
r:CMF#4:BEQ1
60 LDA#86:CMF#133:BNE EA
RTH:LD#17
61 .p
62 LDA#17:JSR#FEE:LD#03
:JSR#FEE
63 LDA#31:JSR#FEE:LD#7

```

Digga listing

From Page 33

```

182 PROCinit
183 PROCbegin
132 JSR&FFEE:LD&A7F:JSR&FFEE:
LDA#135:JSR&FF4:TXA
64 CMP#128:BEQ#1
65 CMP#133:BEQ#1
66 CMP#131:BEQ#1
67 CMP#130:BEQ#0
68 STA&B6
69 LDA#228:JSR&FFEE:RTS
70 .SKIP JMPR
71 .u DEC&7E:JMP#0
72 .d INC&7E:JMP#0
73 .r INC&7F:JMP#0
74 .l DEC&7F:JMP#0
75 .bl LDY&F:LD&A&D:STA
76 .b1 TYA
76 CMP#1:BEQ#0:CMF#2:BEQ#0
:CMF#3:BEQ#1:CMF#4:BEQ#0
77 .a LDA#1:STA&B5:LD&A#2
28:JSR&FFEE:JMPR
78 .R
79 LDA#17:JSR&FFEE:LD&A#3
:JSR&FFEE
80 LD&A#4
81 .rocks
82 LDA#31:JSR&FFEE:LD&A#7
4.X:JSR&FFEE:LD&A#79.X:JSR&F
FEE:LD&A#32:JSR&FFEE:LD&A#10:
JSR&FFEE:LD&A#0:JSR&FFEE:STX&B8
&B7:LD&A#135:JSR&FF4:STX&B8
:LDX&B7:LD&A#0
83 CMP#132:BEQ SQUASHED
84 CMP#32
85 BNEprint
86 .FALL
87 INC&79.X
88 LDA#79.X:CMF#27:BEQ#0
89 .print
90 LDA#31:JSR&FFEE:LD&A#7
4.X:JSR&FFEE:LD&A#79.X:JSR&F
FEE:LD&A#227:JSR&FFEE:DEX:BN
Erocks
91 RTS
92 .J LDA#1:STA&A:LD&A#0
:JSR&FFEE:JMPprint
93 .SQUASHED LDA#1:STA#7
3:LD&A#32:STA&B6:JMP FALL
94 )
95 NEXT
96 ON ERROR SOUND&11.3,2
55.5:GOTO102
97 #FX124,4
98 #FX123,5
99 #FX211,0
100 D1M#(10).H1X(10)
101 VDU19,2,2,0:;FORT=1T0
10:;N#(T)="STEPHEN":H1X(T)=1
500:NEXT:VDU23,1,0;0;0;0;
182 PROCinit
183 PROCbegin
132 JSR&FFEE:LD&A7F:JSR&FFEE:
LDA#135:JSR&FF4:TXA
64 CMP#128:BEQ#1
65 CMP#133:BEQ#1
66 CMP#131:BEQ#1
67 CMP#130:BEQ#0
68 STA&B6
69 LDA#228:JSR&FFEE:RTS
70 .SKIP JMPR
71 .u DEC&7E:JMP#0
72 .d INC&7E:JMP#0
73 .r INC&7F:JMP#0
74 .l DEC&7F:JMP#0
75 .bl LDY&F:LD&A&D:STA
76 .b1 TYA
76 CMP#1:BEQ#0:CMF#2:BEQ#0
:CMF#3:BEQ#1:CMF#4:BEQ#0
77 .a LDA#1:STA&B5:LD&A#2
28:JSR&FFEE:JMPR
78 .R
79 LDA#17:JSR&FFEE:LD&A#3
:JSR&FFEE
80 LD&A#4
81 .rocks
82 LDA#31:JSR&FFEE:LD&A#7
4.X:JSR&FFEE:LD&A#79.X:JSR&F
FEE:LD&A#32:JSR&FFEE:LD&A#10:
JSR&FFEE:LD&A#0:JSR&FFEE:STX&B8
&B7:LD&A#135:JSR&FF4:STX&B8
:LDX&B7:LD&A#0
83 CMP#132:BEQ SQUASHED
84 CMP#32
85 BNEprint
86 .FALL
87 INC&79.X
88 LDA#79.X:CMF#27:BEQ#0
89 .print
90 LDA#31:JSR&FFEE:LD&A#7
4.X:JSR&FFEE:LD&A#79.X:JSR&F
FEE:LD&A#227:JSR&FFEE:DEX:BN
Erocks
91 RTS
92 .J LDA#1:STA&A:LD&A#0
:JSR&FFEE:JMPprint
93 .SQUASHED LDA#1:STA#7
3:LD&A#32:STA&B6:JMP FALL
94 )
95 NEXT
96 ON ERROR SOUND&11.3,2
55.5:GOTO102
97 #FX124,4
98 #FX123,5
99 #FX211,0
100 D1M#(10).H1X(10)
101 VDU19,2,2,0:;FORT=1T0
10:;N#(T)="STEPHEN":H1X(T)=1
500:NEXT:VDU23,1,0;0;0;0;
EY TO START*
131 K=INKEY(250)
132 IFK=-1THEN133ELSEscr#
=1:ENDPROC
133 scr#=scrX+1:IFscr#=12
THENscrX=1:GOTO124
134 GOTO129
135 DEFPROCwelldone:CLS:CO
LOUR3:PRINTTAB(1,10)"LEVEL
":LX;" COMPLETED":PRINTTAB
(5,17)"ENTERING":PRINTTAB(4
,19)"NEXT STAGE":SOUND&11,2
,255,25:;FORY=1T04000:NEXT:E
NDPROC
136 DEFPROCpause
137 #FX15,1
138 A=GET:ENDPROC
139 DEFPROCopt
140 %73=0
141 PROCwelldone
142 LX=LX+1:scr#=scrX+1:
FscrX=13THENscrX=1
143 PROCscreens:PROClvel:
PRINTTAB(15,4):LX:DX=0:747
2=0:PRINTTAB(3,4):LX
144 GOTO100
145 DEFPROCnewhi:IFSCX<H
1X(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 #FX12,0
149 X=#0:Y=#A:AX=0
150 #&A0=#A00:7&A2=0:7&
A03=32:7&A04=120
151 CALL&FFF1:A#=#A00
152 VDU23,1;0;0;0;0;
153 slot#0
154 REPEAT:slot=slot+1:UN
TIL SCX=H1X(slot)
155 F0R#9T0slot STEP-1
156 H1X(P+1)=H1X(P):N#(P+
1)=N#(P):NEXT
157 H1X(slot)=SCX:N#(slot
)=A#
158 Q=TRUE:PROCh1: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=1T020: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
T020:COLOUR2
164 PRINTTAB(1,7+T):;STRIN
G#(17,CHR#225):NEXT:COLOUR3
:PRINTTAB(2,3)"MEM":SPC(2):
"SCORE":SPC(2):"LEV":PRINTT
AB(3,4):;3":SPC(3):"0000":
SPC(3):;1"
165 ENDPROC
166 DEFPROCobjects
167 %70=9:7&1=8:VDU31,9
,8,226
168 FORT=1T04
169 X=RND(16)+1:Y=RND(10)
+10:C#FNscrn(X,Y):IFC<129T
HEN169
170 7&74=X:7&79=Y:VDU31
,7&74,7&79,227:NEXT
171 FORT=1T05
172 X=RND(16)+1:Y=RND(10)
+10:C#FNscrn(X,Y):IFC<129T
HEN172
173 VDU31,X,Y,229:NEXT
174 FORT=1T05: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:7&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
0,24,36,102:7&72=0
182 VDU23,227,0,20,62,110
,122,86,124,56:VDU23,228,24
,60,126,153,153,255,165,153
:VDU23,229,64,224,72,20,72,
226,71,2:VDU23,230,60,110,1
87,255,24,24,24,24
183 DX=0:scrX=1:7&B#RND
(4):X=RND(-TIME):ENVELOPE1,
129,-122,-54,-94,97,22,21,1
26,0,0,-126,126,126:ENVELOP
E,129,15,-123,110,233,84,4
8,126,0,-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(QX,WX))"THE MINE ENTRANCE":ENDPROC
 186 AX=135 C
 187 VDU31,QX,WX 202 FORX=1TO9STEP8
 188 =(USR(&FFF4)&AND&FFF0) 203 COLOUR1:PRINTTAB(4+X,
 DIV&100 15);CHR#224:PRINTTAB(4+X,16
 189 DEFPROCdead);CHR#224:PRINTTAB(2+X,17);
 190 %733=0 CHR#224:CHR#224:CHR#224:CHR
 191 VDU19,8,3,0; SOUND&11 #224:CHR#224:PRINTTAB(4+X,1
 ,3,255,5;FORX=1TO500:NEXT:V 8);CHR#224:PRINTTAB(4+X,19)
 DU20:VDU19,2,2;0;);CHR#224:NEXT:COLOUR3:PRINT
 192 *FX15,1 TAB(1,29)" MAIN TUNNEL":E
 193 LIX=LIX-1 NDPROC
 194 IFLIX=0THEN19SELSE143 204 BLOCK#=#CHR#224+CHR#22
 195 PRINTTAB(4,14)" 4+CHR#10+CHR#8+CHR#8+CHR#22
 " 4+CHR#224:COLOUR1:FORX=0TO1
 196 PRINTTAB(4,15)" GAME 25STEP11:PRINTTAB(3+X,12)BLO
 OVER " CK#;PRINTTAB(3+X,22)BLOCK#;
 197 PRINTTAB(4,16)" NEXT:COLOUR3:PRINTTAB(1,29)
 " " SECONDARY SHAFT":ENDPROC
 198 FORX=1TO4000:NEXT:PRO 205 CROSS#=#CHR#224+CHR#10
 Cnewh1:GOTO103 +CHR#8+CHR#8+CHR#224+CHR#22
 199 DEFPROClevel 4+CHR#224+CHR#10+CHR#8+CHR#
 200 Dnschr%GOTO201,202,204 8+CHR#224:COLOUR1:FORX=0TO1
 ,205,206,207,208,209,210,21 1STEP10:PRINTTAB(4+X,12);CR
 1,212,213 OSS#;PRINTTAB(4+X,22);CROSS
 201 COLOUR3:PRINTTAB(1,29 #;NEXT:COLOUR3:PRINTTAB(1,2

9)"THE CREATURE CAVE":ENDPR
 OC
 206 COLOUR1:VDU31,9,14,22
 4,8,10,224,8,10,224,9,10,22
 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
 CRUBBLE 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(9,10
);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(8,10
);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(4,10
);CROSS#;PRINTTAB(14,22);CR
 OSS#;COLOUR3:PRINTTAB(1,29)
 " THE GRAVEYARD":ENDPROC
 212 COLOUR1:PRINTTAB(4,10
);BLOCK#;PRINTTAB(13,22);BL
 OCK#;COLOUR3:PRINTTAB(1,29)
 " THE TOADSTOOLS":ENDPROC
 213 COLOUR1:PRINTTAB(9,10
);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.

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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 automatically enacted and the program restarts

immediately.

***KEY|BOLD|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 1 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.

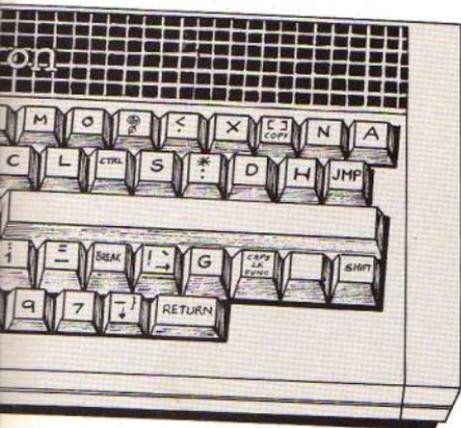
Now you need to merge it into your own program:

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.

*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 program 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. *FX248,1sb 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:IM
```

would make the computer restart the program whereas:

```
IREM:IM
```

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 relevant 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		1sb	hsb
denary	hex		
32	&28	20	0
257	&101	1	1
2048	&800	0	0
32767	&FFFF	FF	FF

Box II: My address has two bytes!

```
10REM PROGRAM II
20PROCbreakkey("CLS:MOLD
:MRUN:IM")
30END
40DEFPROCbreakkey(message$)
50IFmessage$="BREAK"THEN
!&287=0:ENDPROC
60*FX247,76
70*FX248,0
```

Program II

```
80*FX249,9
90lenX=LEN(message$)
100FORchrX=1TOlenX
110byteX=byteX+1
120byteX?&70=ASC(MID$(message$,chrX,1)
)=1*THENchrX=chrX+1:byteX?
&70=ASC(MID$(message$,chrX,1)
)-64
```

```
140NEXT
150lenX?&71=&FF
160FORoptX=0TO2STEP2
170P1=&900
180COPToptX
190BCOrts
200LDA#1:LDY#0:LDA#229:JS
R&FFF4
210LDA#139:LDX#1
220:loop
```

```
230LDY&70,X:CPY#&FF:BEQrt
5
240INX:STX&70:LDX#0
250JSR&FFF4:LDX&70
260JMP:loop
270.rts RTS
280)
290NEXT
300ENDPROC
```

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	used in connection with the Escape key but are only important in machine code work
*FX125	
*FX126	
*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	used together to change the action of Break
*FX248	by directing the computer to a
*FX249	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
20MODE2
30*FX4,1
40*FX229,1
50xpos=500
60ypos=500
70MOVE xpos, ypos
80speed=10
90REPEAT
100GCOL, RND(16)
110inkey=INKEY(1)
120IF inkey=136 THEN xpos=

```

```

xpos-speed%
150IF inkey=137 THEN xpos=
xpos+speed%
160IF inkey=138 THEN ypos=
ypos-speed%
170IF inkey=139 THEN ypos=
ypos+speed%
180DRAW xpos, ypos
190UNTIL inkey=27
200*FX229,0
210*FX4,0

```

Program III

```

10REM PROGRAM IV.
20MODE2
30colour=RND(16)
40GCOL, colour
50GCOL, 136-colour/2
60COLOUR128+colour
70COLOUR17-colour
80CLG
90*FX229,1
100As="Electron User"
110xpos=500
120ypos=500
130diameter=200
140MOVE xpos, ypos
150MOVE xpos, ypos

```

```

160FOR angle=0 TO 6.28 STEP .2
170sin=SIN(angle)*diameter
180cos=COS(angle)*diameter
190PLOT, sin, cos
200MOVE xpos, ypos
210PRINT TAB(2,7) LEFT$(A$,
2*angle);
220NEXT
230*FX229,0
240COLOUR0
250COLOUR135
260PRINT TAB(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.

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

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
```

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

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

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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Calculator: Sums at a stroke! We turn your micro's screen into an easy-to-use calculator.

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Snap: Practice vital pre-reading skills with this letter and number recognition game. Also helps develop coordination.

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Hidden Answers: Designed to help primary school children understand a maths learning technique called mapping maths. It explores the ideas of mapping with the use of simple number bonds.

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On the June 1985 tape:

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STAR ARCHER Target practice. **BINARY SEARCH** Search data efficiently. **JOYPLUS** Switched joystick. **FOUNTO** Odd one OUT. Educational fun. **POLYGOONS** 3D rotation. **MONEY CRAZY** Arcade action. **STARSHOOT** The eight sky. **FORTUNE TELLER** Horoscope. **COLLISION DETECTION** Alien navigation. **HO** Guessing game. **NOTEBOOK** Hello to assembler!

On the March 1985 tape:

MR. FREEZE Ice cube arcade action. **SCREENDUMP** Two procedures for printer dumps.

FILLER The machine code fill routine. **FRED'S WORD GAME** Educational fun. **MIG LETTERS** Large text utility. **PERCY** Beat the burning fuse. **ANIMATION** Two sample programs. **PIGS** Firing bacon. **NOTEBOOK** Display formatting.

On the February 1985 tape:

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SPACE BATTLE See the deadly descending aliens! **NEW YEAR** A sound and graphics greeting. **ESCAPE FROM SCARBOW** Misfield action. **PIE CHART** Statistics made simple. **CLAYPIGION** An Electron birds'noo. **ORGAN** Music maestro please! **NOTEBOOK** An original program. **RANDOM NUMBERS** Or not so random! **SNAKES** Reptilian arcade action. **CHEESE RACE** Beat rival mice.

On the December 1984 tape:

CHRISTMAS BOX Align the presents logically. **SILLY SANTA** Sort out the muddy snow. **SNAP** Watch the Xmas pictures. **RECOVERY** The Bad Program message format. **AND!** Interrupt driven music. **AUTODATA** A program that grows and grows. **NOTEBOOK** Simple string handling.

On the November 1984 tape:

STAR FIGHTER Anti-alien missions. **SCROLLS** Wrap around machine code. **URBAN SPRAWL** Environmental action game. **SPELL** Alphabetic education. **JUMPER** Level headed action. **CASBAR** Card breaking broken. **KEYBOARD** Typing game.

On the October 1984 tape:

BREAKFREE Classic arcade action. **ALPHASWAP** A logic game to strain your brain. **SOUND GENERATOR** Tame the Electron's sound channels. **MULTI CHARACTER GENERATOR** Complex characters made simple. **RIGEL 8** Out of this world graphics. **MAYDAY** Help with your mouse code. **NOTEBOOK** Algorithms and string handling.

On the September 1984 tape:

HAUNTED HOUSE Arcade action in the spirit world. **SPLASH** A logic game. **NON-OVERLAPPER**. **SORT SHOWS** How sorting algorithms

work. **SORT TIME** The time they take. **CLASSROOM INVADERS** Multicoloured characters go to school. **SAILOR** Nautical antics. **MATHS TEST** Try out your mental powers.

On the August 1984 tape:

SANDCASTLE The Electron seaside outing. **KNOCKOUT** Bouncing balls batter brick walls. **PARACHUTE** Keep the skydivers dry. **LETTERS** Juggle letters for your scores. **A SUPER-SPELL** Test your spelling. **ON YOUR BIKE** Pedal power comes to your Electron. **SCROLLER** Sliced strings slide sideways. **FLYING PIGS** Bacon on the wing.

On the July 1984 tape:

SOFT A dry and the links with your Electron. **SOLITAIRE** The classic solo logic game. **TALL LETTERS** Characters that are a little smaller. **BANK ACCOUNT** Keep track of your money. **CHARTIST** 3D graphs. **FORMULAE** Aves, volumes and angles.

On the June 1984 tape:

MONEY MAZE Avoid the ghosts to get the cash. **COLOUR** More aliens to annihilate. **CODER** Secret messages made simple. **FRUIT MACHINE** Spin the wheels to win. **CHASER** Avoid your opponent to survive. **TIC-TAC-TOE** Electron. **BOUNCE** and **CRIBS**. **ELECTRON DRAUGHTSMAN** Create and save. **ELECTRON** masterpieces.

On the May 1984 tape:

RALLY DRIVER High speed car control. **SPACED** More aliens to annihilate. **CODER** Secret messages made simple. **FRUIT MACHINE** Spin the wheels to win. **CHASER** Avoid your opponent to survive. **TIC-TAC-TOE** Electron. **BOUNCE** and **CRIBS**. **ELECTRON DRAUGHTSMAN** Create and save. **ELECTRON** masterpieces.

On the April 1984 tape:

SPACEHIKE A hopping arcade classic. **FRIEZE** Electron wallpaper. **PELICAN** Cross roads safely. **THE TIME** Clocks and moves. **ASTEROID** Space is a minefield. **LIMERICK** Automatic rhymes. **ROMAN** Numbers in the ancient way. **BUNNYBLITZ** The Easter program. **DOGGDUC** The classic logic game.

On the March 1984 tape:

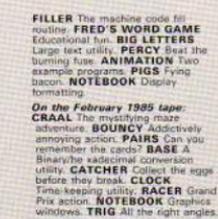
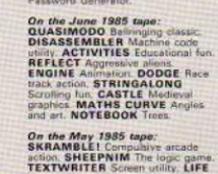
CHICKEN Let dangerous drivers test your nerve. **COFFEE** Antislippery word game from Down Under. **PARKY'S PERIL** Parky's lost in an invisible maze. **REACTION TIME** How fast are you? **BRAINEASTER** A puzzling program. **COUNTER** Mental arithmetic can be fun. **PAPER, SCISSORS, STONE** Out-guess your Electron. **CHARACTER GENERATOR** Create viruses with this utility.

On the February 1984 tape:

NUMBER BALANCE Test your power of mental arithmetic. **CALCULATOR** Make your Electron a calculator. **DOLLIES** Multi-coloured patterns galore. **TOWERS OF HANOI** The age old puzzle. **LUNAR LANDER** Test your skill as an astronaut. **POSITRON INVADERS** A version of the old arcade favourite.

On the introductory tape:

ANAGRAM Sort out the jumbled letters. **DOODLE** Multi-coloured graphics. **EUROMAP** Test your geography. **KALEIDOSCOPE** Electron graphics fun. **CAPITALS** New upper case letters. **ROCKET, WHEEL, CANDLE** Three fireworks programs. **BOBBER** Drop the bombs before you crash. **DUCK** Simple animation. **METEORS** Collisions in space.



Use the order form on Page 61

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 stick 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 told 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.

● 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.

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

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 tile 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.

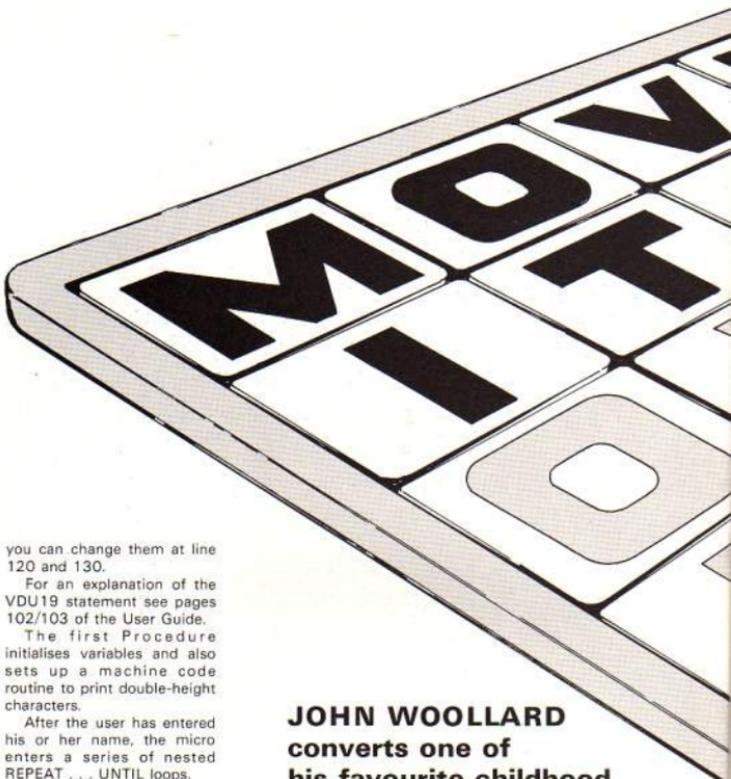
The first section deals with how the computer sets the problem that the user has to solve. The second part deals with how the user solves the problem.

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



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

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 1.

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$="abcdefghijklmnop "
```

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

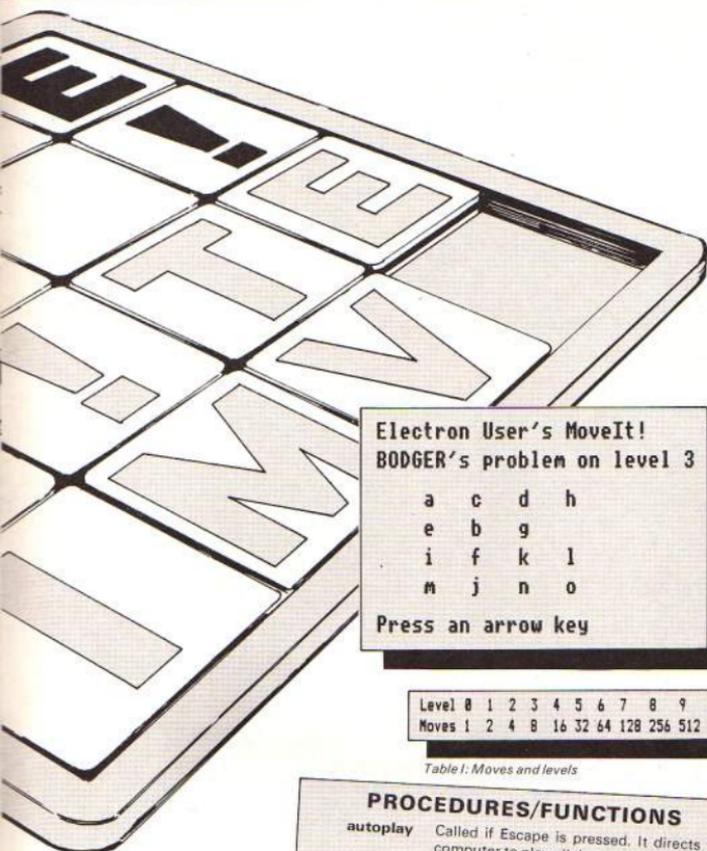
After a legal move has been chosen - by the computer in the first part when it is setting the problem, or by the user in the second part - the Electron then operates upon *grid\$*, to make it represent the new position.

This is carried out in the procedure PROCupdategrid. The new grid is then displayed by the procedure PROCgriddisplay.

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 1: Moves and levels

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*s.
- FNinput print** This is a double-height INPUT statement. 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*s 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.

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.

```

10REM MoveIt!
20REM a game of strate
9Y
30REM (C) Electron Use
r 1985
40REM
50REM W.J.Wooliard
60REM
70REM
80REM
90+KEY10OLDIMRUNIM
100MODE4
110VDU23,1,0;0;0;0
120VDU19,0,1;0;0
130VDU19,1,0;0;0
140NERRORRUN
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%#ND(4)
240UNTILFNlegal(rndmove%,
0)
250PROCupdategrid(rndmove
%)
260UNTILgo%#2%#level%
270PROCprint(10,29,STRING
$(13,CHR#32))
280NERRORPROCautoplay
290REPEAT
300PROCgriddisplay
310REPEAT:move%#FNgetmove
320UNTILFN!equal(move%,1)
330PROCupdategrid(move%)
340UNTILINSTR(grid%#home$
)
350PROCgriddisplay
360PROCendmessage
370UNTILFALSE
380DEFPROCinitialise
390DIMgoes%4000,dbl%1&FF
400program$="Electron Use
r's MoveIt!"
410grid$="abcdefghijkln0
"
420rowofhole%#4:colofhole
%#4

```

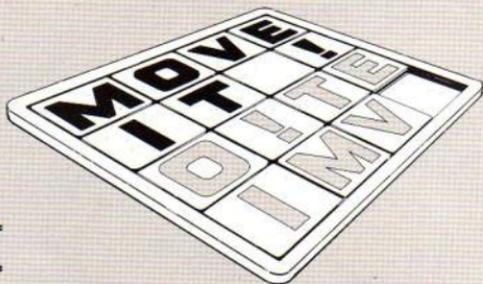
Move It listing

From Page 45

```

43#home$="abcdefghijklno
44#FX4 1
45#FORopt=0TO2STEP2
46#PI=dbloX
47#q=#FFEE
48#OPT Opt
49#STA#78:STX#79:STY#7A
50#LDA#10:LDX##70:LDY#0:J
SR#FFF1
51#LDA#23:JSRq
52#LDA#FF:JSRq
53#LDA#71:JSRq:JSRq
54#LDA#72:JSRq:JSRq
55#LDA#73:JSRq:JSRq
56#LDA#74:JSRq:JSRq
57#LDA#31:JSRq
58#LDA#79:JSRq
59#LDA#7A:JSRq
60#LDA#FF:JSRq
61#LDA#23:JSRq
62#LDA#FF:JSRq
63#LDA#75:JSRq:JSRq
64#LDA#76:JSRq:JSRq
65#LDA#77:JSRq:JSRq
66#LDA#78:JSRq:JSRq
67#LDA#31:JSRq
68#LDA#79:JSRq
69#LDA#7A:ADC#1:JSRq
70#LDA#FF:JSRq
71#RTS:J
72#NEXT
73#ENDPROC
74#DEFFPROCnaein
75#PROCprint(4,2,program#
)
76#PROCprint(4,5,"Please
type your name: ")
77#name$=FINinput
78#PROCprint(4,5,STRING$(
35," "))
79#PROCprint(4,5,"Type le
vel 0 to 9: ")
80#REPEAT:levelY=ABS(GET-
48)
81#UNTILlevelX(10
82#PROCprint(4,5,STRING$(
35," "))
83#ENDPROC
84#DEFFPROCautoplay
85#REPEAT
86#PROCupdategrid(5-(goes
X?(goX-1))
87#PROCgriddisplay
88#UNTILgoX(1
89#PROCendmessage
90#RUN
91#DEFFNrndmove
92#REPEAT
93#x1=RD(4)
94#UNTILx1+goesX?(goX-1
)>5)
95#=#X
96#DEFFNlegal(x1,roqueX)
97#legalX=1
98#IF(rowofholeX=1)ANDx1=
2#THENlegalX=0
99#IF(rowofholeX=4)ANDx1=
3#THENlegalX=0
100#IF(colofholeX=1)ANDx1=
1#THENlegalX=0
101#IF(colofholeX=4)ANDx1=
4#THENlegalX=0
102#IFlegalX=0ANDroqueX#THE
N#PROCprint(4,22,"That's not
legal !"):inkeyX=#INKEY(99)
103#IFx1=#0#THENlegalX=0
104#=#legalX
105#DEFFPROCupdategrid(x1)
106#spaceX=#INSTR(grid$, "
")
107#IFx1=#1#THENgrid$=#LEFT$(
grid$,spaceX-2)+"*#MID$(gr
id$,spaceX-1,1)+MID$(grid$,
spaceX+1)
108#IFx1=#2#THENgrid$=#LEFT$(
grid$,spaceX-5)+"*#MID$(gr
id$,spaceX-3,3)+MID$(grid$,
spaceX+4,1)+MID$(grid$,spac
eX+1)
109#IFx1=#3#THENgrid$=#LEFT$(
grid$,spaceX-1)+MID$(grid$,
spaceX+4,1)+MID$(grid$,spac
eX+1,3)+"*#MID$(grid$,spac
eX+5)
110#IFx1=#4#THENgrid$=#LEFT$(
grid$,spaceX-1)+MID$(grid$,
spaceX+1,1)+"*#MID$(grid$,
spaceX+2)
111#colofholeX=#INSTR(grid$,
" ")#MOD4
112#FcolofholeX=#0#THENcolo
fholeX=#4
113#rowofholeX=#INSTR(grid
$, " ")#1#DIV4+1
114#IFgoesX?(goX-1)=5-x1#TH
ENgoX=goX-1ELSEgoesX?goX=#X
goX=#goX+1
115#ENDPROC
116#DEFFPROCgriddisplay
117#FORcounterX=#1TO16
118#LOCALhx,vX
119#hx=counterX#MOD4:IFhx=#0
THENhxX=4
120#vX=(counterX-1)#DIV4
121#PROCprint(4+hX*4,9+vX*
3,MID$(grid$,counterX,1))
122#NEXT
123#PRINTTAB(36,30);goX;"
":
124#ENDPROC
125#DEFFNgetmove
126#FX21
127#moveX=#0
128#REPEAT
129#PROCprint(4,22,"Press
an arrow key")
130#getX=#INKEY(999)
131#IFgetX=#136#THENmoveX=4
132#IFgetX=#137#THENmoveX=1
133#IFgetX=#138#THENmoveX=2
134#IFgetX=#139#THENmoveX=3
135#IFmoveX=#0#THENV0U7
136#PROCprint(4,22,STRING$(
19," ")
137#UNTILmoveX
138#=#moveX
139#DEFFPROCendmessage
140#PROCprint(4,22,"That's
the end; play again? Y/N")
141#IF#YESno=#0#THENCLS:END
142#PROCprint(4,22,"Will y
ou try a harder problem? Y
/N")
143#IF#YESno=#1#THENlevelX=
levelX+1
144#PROCprint(4,22,STRING$(
35," "))
145#ENDPROC
146#DEFFPROCprint(x,y,a#)
147#IFa#=#" #THENENDPROC
148#FORk=#1TOLEN(a#)
149#AX=#ASC(MID$(a#,k,1))
150#BX=#x+k-1
151#Y=#y
152#CALLDblbX
153#IFAX=#10#THENPROCsound
154#NEXT
155#ENDPROC
156#DEFFNinput
157#FX21
158#=#:"#get$=""
159#hxY=#POS:vX=#VPOS-1
160#REPEAT
161#IFLEN(z#)>1#THENV0U7:co
et$=""
162#IFget$=#CHR$(127)#THENz#=#L
EFT$(z#,#LEN(z#)-1):get$=""
163#z#=#z#+get$
164#PROCprint(hX,vX,z#;" "
)
165#get$=#GET$
166#PROCsound
167#UNTILget$=#CHR$(13)
168#=#z#
169#DEFFPROCsound
170#LOCALxX,scale#,noteX
171#BX=#RD(8)
172#scale#=#"ACEFHJLM"
173#noteX=#+(ASC(MID$(scal
e#,xX)-52)
174#SOUND1,-15,noteX,1
175#ENDPROC
176#DEFF#YESno
177#yesnoX=#1
178#REPEAT
179#IF#INKEY(-86)#THENyesnoX
=#0
180#IF#INKEY(-69)#THENyesnoX
=#1
181#UNTILyesnoX(1)-1
182#=#yesnoX

```



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

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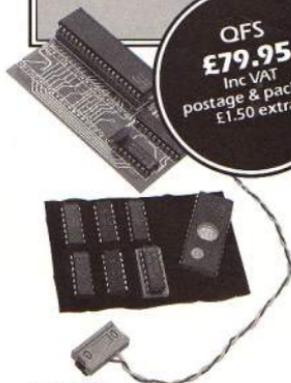
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Please tick box

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Post to: Micro Olympics offer, Database Publications,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

EUB

Micro Messages

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 Ghoul. 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 IBOOT.

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 Ghoul's

HERE are some tips to help Paul Godley get at the Ghoul's 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

Disc drive on a mission impossible

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.100.1M:50400:NL.1M
```

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.

IS is the same as VDU19, which changes the background colour. IN is the same as VDU14 which puts the display in paged mode and IM is the same as pressing Return. — **Matthew Laverder, 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? —

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.

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.

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.

```
*KEYB *TAPE:MFOR:Y=0 TO TOP  
STEP4:1Z:4E00=1X:&1D00:NEX  
T:PAGE=4E00:MOLD:NRUN:IM
```

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? **I? 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 mathematicians 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 Gorilla (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 Blegger 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%=470  
20?%220=P% MOD 256  
30?%221=P% DIV 256  
40C  
50LDA #607  
60JSR @FFEE  
70RTS  
80J
```

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

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 S. 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

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 &EOC.

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.

normally.

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

Easy to fit and simple to use, the Cumana system has the latest and most flexible DFS for the Electron – and much more besides.

It consists of an interface, electronics and software in a cartridge, a single 5¼in disc drive with lead and a utilities disc.

The interface slots into the Plus 1's cartridge port. Up to

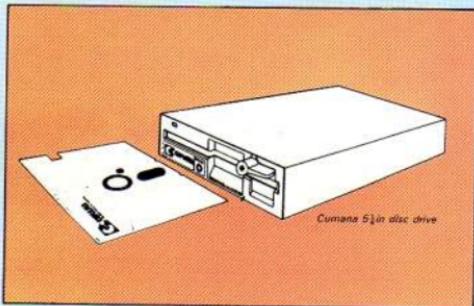
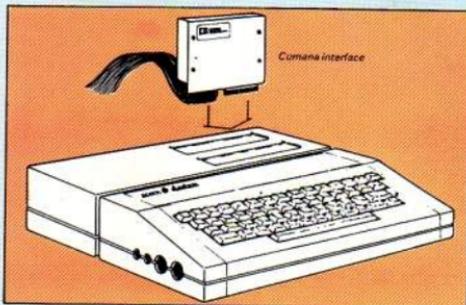
two 3½in or 5¼in disc drives can be attached. The result is a whole new dimension of speed and reliability!

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- *Random access files for more advanced data storage.*

- *The ability to read programs from both BBC Micro single density discs and from the Plus 3 ADFS discs.*
- *A utilities disc packed full of useful programs, including a verify routine, formatters, copy and backup routines and a powerful disc editor.*
- *A thorough, straightforward manual.*

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Using all the Plus 1's slots?

The Rombox gives you room for eight more ROMs

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 Ekman. 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.

By ROLAND WADDILOVE

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.

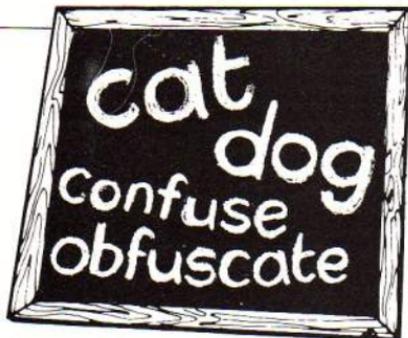
If instead of the Electron the game is played on a BBC Micro you may need to change PROCwait(J%) to increase the time span. Also VDU 23,1,0,0,0,0; must be switched to VDU 23,8202,0,0,0;

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.



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 split 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 1.

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>END PROCcreate:
cate:END
60 *KEY10 OLD1M RUNIM
70 *FX11,0
80 *FX4,1
90 *FX202,176
100 *FX1210,0
110 MODE1
120 PROCIntro
130 MODE5
140 PROCInit
150 PROClink

160 PROCscreen
170 A2=AND(2):O7=A2*2-1:R
EM player to start
180 REPEAT
190 PROCchoose
200 UNTIL W2=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
    
```

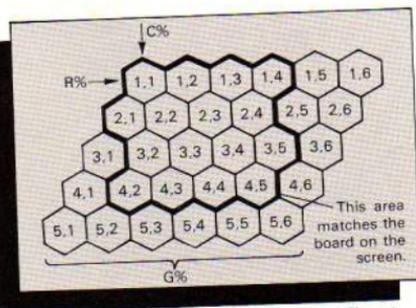


Figure 1

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.
- checker
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%** Sequential integers used in FOR ... NEXT loops.
- 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 ENVELOPES,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 VDU23,250,0,12,6,127,
 6,12,8,0
 300 DIMword\$(230)
 310 DIMchr\$(8)
 320 DIMxpos%(16),ypos%(16)
 330 DIMlet\$(23)
 340 DIM G%(5,5)
 350 DIMcos%(6),sin%(6)
 360 FORseq%=1TO6
 370 cos%(seq%)=COS(PI/3*seq%)

eg%*100
 380 sin%(seq%)=SIN(PI/3*seq%)
 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 DATA290,640,402,640,6
 74,640,866,640
 450 DATA386,400,578,400,7
 70,400,962,400
 460 DATA290,320,402,320,6
 74,320,866,320

470 FORnum%=1TO230:READwo
 rd\$(num%):NEXT
 480 DATAanimal,angry,acro
 ss,again,alive
 490 DATAbarrel,before,bag
 in,blood,bottle
 500 DATAcastle,circus,cor
 ner,crumb,cream
 510 DATAdanger,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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... An excellent mixture of games'... Personal Software - Autumn 1983.

EDUCATIONAL 2 BBC/ELECTRON Tape £8.00 Disc £10.00
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.

FUN WITH NUMBERS BBC/ELECTRON Tape £8.00 Disc £10.00
These programs will teach and test basic counting, addition and subtraction skills for four to seven year olds. The tape includes COUNTING, ADDING, SUBTRACTION and an arcade type game called RACKET MATHS which will exercise addition and subtraction. With sound and visual effects.

These are excellent programs which teachers on the project have no hesitation in recommending to other teachers... Computers in Classroom Project.

FUN WITH WORDS BBC/ELECTRON Tape £8.00 Disc £10.00
Start your fun with alphabet puzzle, continue your play with VOWELS, learn the difference between THERE and THEIR, have games with SUFFIXES and reward yourself with a game of HANGMAN.
... Very good indeed'... A&B Computing - Jan/Feb 1984

JIGSAW AND SLIDING PUZZLES by P. Warner BBC/ELECTRON Tape £7.95 Disc £9.95
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Hexagram listing

From Page 55

```

620 DATAoffice,organ,other,
object,order
630 DATApaint,parcel,pencil,
clinic,please
640 DATAquote,quill,quote,
quarter,quest
650 DATArabbit,ready,rightround,
rubber
660 DATAscarf,school,sense,shake,
sister
670 DATAtable,teacher,theatre,
tiger,tulip
680 DATAugly,uncle,unkind,upon,
useful
690 DATAvoice,value,view,vacant,
vase
700 DATAwagon,wear,weigh,whale,
world
710 DATAabstract,abandon,adjust,
admire,arrive
720 DATAbelieve,bacteria,bungalow,
boundary,boredom
730 DATAchalice,calendar,cistern,
collide,cabinet
740 DATAdestitute,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,joineer,jeweller,
journey,junction
810 DATAknapsack,kielogram,kitchen,
kangaroo,kingdom
820 DATAinament,leather,liberal,
lecturer,listener
830 DATAmystery,molecule,material,
mischief,mortgage
840 DATAmisance,nervous,nickname,
notable,netball
850 DATAordinary,obligate,official,
operate,oriental
860 DATApanphlet,particle,practise,
pheasant,peculiar
870 DATAquotient,question,quantity,
quiver,quarter
880 DATArelent,restful,reason,
riddle,rainbow
890 DATAserene,sackful,saction,
separate,sharpen
900 DATAteenager,terminal,theatre,
torpedo,tactless
910 DATAunkept,umbrella,uniform,
urgent,useful
920 DATAviaduct,vaccine,valliant,
vehicle,victory
930 DATAwithout>window,weather,
whiskier,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:files=""
990 PROCedge
1000 FORint=1TO16:PROChex(xpos% (int),ypos% (int),2):NEXT
1010 PROCrandlet
1020 ENDPROC
1030 REM draws background
1040 DEFPROCedge
1050 VDUI9,1,6,0,0,0:GCOLOR.1
1060 COLOUR2:PRINTAB(6,1)"HEXAGRAM"
1070 MOVE114,950:MOVE290,650:PLOT185,1140,170:MOVE290,280:
PLOT185,290,850
1080 MOVE1140,950:MOVE962,750:PLOT185,1140,170:MOVE962,270:
PLOT185,962,750
1090 GCOLOR,3:MOVE114,950:MOVE290,850:PLOT185,1140,950:
MOVE1048,850:PLOT185,290,850
1100 MOVE114,170:MOVE376,270:PLOT185,1140,170:MOVE962,270:
PLOT185,376,270
1110 ENDPROC
1120 REM hexagon created
1130 DEFPROChex(xpos% (int),ypos% (int),col)
1140 VDUI29,xpos% (int),ypos% (int):
1150 NEXT
1160 MOVE0,100
1160 GCOLOR,col
1170 FORseg=1TO6
1180 MOVE0,0
1190 PLOT185,sin% (seg% (2)),cos% (int% (2))
1200 NEXT
1210 VDUI26,28,0,31,19,28
1220 ENDPROC
1230 REM fills hexs with letters
1240 DEFPROCrandlet
1250 FOR i=1TO23:let% (iX)=i% (NEXT):FOR i=23TO2STEP-1:
CX=RND (iX):TX=let% (CX):let% (CX)=let% (iX):let% (iX)=TX:
NEXT
1260 VDUI=GCOLOR,0:keep% =""
1270 FOR num=1TO16:MOVExpos% (numX)-20,ypos% (numX)+10:
PRINTCHR$(let% (numX)+96):keep% =keep%+CHR$(let% (numX)+96):
NEXT
1280 VDUI4
1290 ENDPROC
1300 REM letter chosen & word found
1310 DEFPROCchoose
1320 COLOURGX
1330 +FX15,1
1340 INPUT"Choose a letter..."lets
1350 IF LEN(lets):1THEN CLS:GOTO1340
1360 IF INSTR(keep%,lets)=0THEN CLS:GOTO1340
1370 IF INSTR(+lets,lets)<>0THEN CLS:GOTO1340
1380 IF Q%&AND EX=10R Q%&AND FX=1THENnum=1
1390 IF Q%&AND EX=20R Q%&AND FX=2THENnum=16
1400 FOR int=numTO230
1410 IF ASC(word% (intX))=ASC(lets)THEN num=int:PROCscrabble:int=230
1420 NEXT
1430 Q%=(Q%+1)+4
1440 REM words in memory rearranged
1450 store%="" :store% =word% (numX)
1460 word% (numX)=word% (numX+1)
1470 FORint=1TO3:word% (numX+int% (2))=word% (numX+int% (2)+1):
NEXT
1480 word% (numX+4)=store%
1490 ENDPROC
1500 REM letters of word rearranged
1510 DEFPROCscrabble
1520 CLS:store%=""
1530 FOR i=1TO LEN(word% (numX))
1540 chr% (iX)=MID$(word% (numX),i,1)
1550 NEXT
1560 FOR i=LEN(word% (numX)):2STEP-1
1570 CX=RND(LX):T% =chr% (CX):chr% (CX)=chr% (LX):chr% (LX)=T%:
NEXT
1580 FOR i=1TO LEN(word% (numX)):store% =store%+chr% (LX):
NEXT
1590 IF store% =word% (numX)THEN GOTO1520ELSE PRINTstore%
1600 FORloop=1TO LEN(store%):IF MID$(store%,loop%,1)=let% THEN VDUI,loop%,1,1,249:loop% =LEN(store%):
1610 NEXT
1620 VDUI3,11,0,250
1630 REM clock routine
1640 reply%="" :TIME=0
1650 REPEAT
1660 store% =INKEY(96)
1670 PRINTAB(7,3):INT(61-TIME/100):"sec ";
1680 IF store% =130Rstore% =170THEN GOTO1740
1690 IF store% =127THENreply% =MID$(reply%,1,LEN(reply%)-1):
GOTO1720
1700 IF store% =970Rstore% =2270THEN GOTO1730
1710 reply% =reply%+CHR$(store%)
1720 IF LEN(reply%):0THENreply% =MID$(reply%,1,8)
1730 PRINTAB(11,0):reply%
1740 UNTILstore% =130R TIME>6000
1750 IF TIME>6000THEN CLS:PROCtimeup:CLS:GOTO1770
1760 IF reply% =word% (numX)THEN CLS:PROCright ELSE CLS:
PROCwrong
1770 FOR i=1TO8:chr% (iX)="":
NEXT
1780 ENDPROC
1790 REM 7 PROCs to check for winner
1800 DEFPROCchecker
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

```

FOR CONNOISSEURS OF ACTION, LEISURE OR LEARNING

BBC Electron

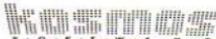
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Hexagram listing

From Page 57

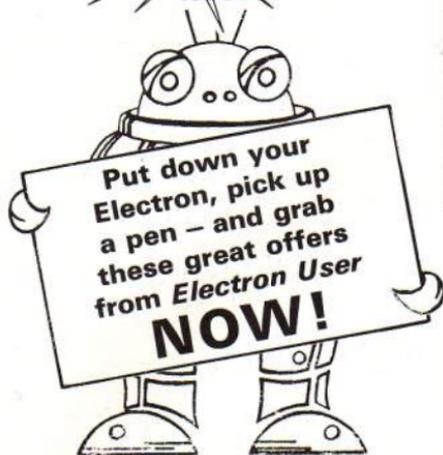
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1850 FOR CX=4TO1STEP-1
1860 IF GZ(RX,CX)=3THEN LX=CX
1870 NEXT
1880 IF LX=0THEN WX=2:GOTO 1910
1890 CX=LX
1900 PROCbranch
1910 UNTIL WX=0
1920 IF WX=1THEN PROCwin
1930 FOR RX=1TO4
1940 FOR CX=1TO6
1950 IF GZ(RX,CX)=2THEN GX(RX,CX)=3
1960 NEXT:NEXT
1970 GX(2,2)=WX
1980 ENDPROC
1990 DEFPROCbranch
2000 RX=RX+1:GX=0:LX=CX
2010 IF GZ(RX,LX)=3THEN GX=1
2020 IF GZ(RX,LX+1)=3THEN SX=1:CX=LX+1
2030 IF RX=4AND GX(RX,LX)=3OR RX=4AND GX(RX,LX+1)=3THEN SX=1:WX=1
2040 IF SX=0THEN PROClinea
r
2050 IF SX=0THEN PROCuo
2060 IF SX=0THEN GX(RX-1,LX)=2
2070 ENDPROC
2080 DEFPROClinea
r
2090 IF RX=2THEN ENDPROC
2100 IF TX=16TO2120
2110 IF TX=26TO2130
2120 IF GZ(RX-1,LX+1)=3THEN SX=1:CX=LX+1:TX=1:RX=RX-1:ENDPROC
2130 IF GZ(RX-1,LX-1)=3THEN SX=1:CX=LX-1:TX=2:RX=RX-1:ENDPROC
2140 ENDPROC
2150 DEFPROCup
2160 IF RX<4AND LX>3THEN ENDPROC
2170 IF GZ(3,3)=3AND GX(2,3)=3THEN GX(2,2)=3
2180 ENDPROC
2190 DEFPROCcheckhor
2200 CX=1:LX=1:WX=0:GX=1
2210 REPEAT
2220 TX=0
2230 IF SX=0THEN CX=1:LX=0
2240 IF CX<1THEN GOTO2300
2250 FOR RX=1TO4
2260 IF GZ(RX,CX)=1THEN LX=RX
2270 NEXT
2280 IF LX=0THEN WX=2:GOTO 2310
2290 RX=LX
2300 PROCacross
2310 UNTIL WX=0
2320 FOR RX=1TO4
2330 FOR CX=1TO5
2340 IF GZ(RX,CX)=2THEN GX(RX,CX)=1
2350 NEXT:NEXT
2360 IF WX=1THEN PROCwin
2370 ENDPROC
2380 DEFPROCacross
2390 LX=RX:GX=0
2400 IF GZ(LX+1,CX+1)=1THEN SX=1:RX=LX+1:CX=GX+1:GOTO 2430
2410 IF GZ(LX,CX+1)=1THEN SX=1:CX=GX+1:GOTO2430
2420 IF CX<4AND GX(LX-1,CX)=1THEN SX=1:RX=LX-1:PROCDiag
2430 IF CX=5AND GX(RX,CX)=1OR CX=4AND GX(RX+1,CX)=1THEN SX=1:WX=1
2440 IF SX=0THEN GX(RX,CX)=2
2450 IF TX=1AND GX(RX,CX)=2THEN GX(RX,CX)=1
2460 ENDPROC
2470 DEFPROCdiag
2480 IF RX=3AND CX=3OR RX=3AND CX=4THEN GOTO2500
2490 GOTO2510
2500 IF GZ(RX-1,CX-1)=1THEN SX=1:GX(RX-1,CX)=2:CX=CX-1:RX=RX-1:TX=1
2510 ENDPROC
2520 DEFPROCright
2530 SOUND1,2,100,20
2540 files=files+lets$
2550 PRINT"That is 'i:COLOUR2:PRINT"CORRECT":PROCwait(3000):CLS
2560 intX=INSTR(keep$,lets$)
2570 PROChex(xpos$(intX),vpos$(intX),GX)
2580 loopZ=0:FOR RX=1TO2:FOR CX=1TO4:loopZ=loopZ+1:IF loopZ=intXTHEN GX(RX,CX)=GX
2590 NEXT:NEXT
2600 FOR RX=3TO4:FOR CX=2TO5:loopZ=loopZ+1:IF loopZ=intXTHEN GX(RX,CX)=GX
2610 NEXT:NEXT
2620 IF GX=3THEN PROCcheckver ELSE PROCcheckhor
2630 ENDPROC
2640 DEFPROCwrong
2650 SOUND1,-15,12,10:SOOND1,-15,0,10
2660 PRINT"That is 'i:COLOUR2:PRINT"WRONG.":PROCwait(5000):CLS
2670 COLOURGX:PRINT"The word is 'i:COLOUR2:PRINTword$(numX):PROCwait(10000):CLS
2680 ENDPROC
2690 DEFPROCtimeup
2700 SOUND1,3,100,20
2710 PRINT"TIME UP!":PROCwait(3000):CLS
2720 PRINT"The word is 'i:COLOUR2:PRINTword$(numX):PROCwait(10000):CLS:COLOURGX
2730 ENDPROC
2740 DEFPROCwin
2750 SOUND1,1,100,100
2760 IF GX=1PRINT"BLUE is the winner.":PROCwait(3000):VDU19,3,15,0,0,0:PROCwait(10000):CLG:VDU20,19,1,5,0,0,0
2770 IF GX=3PRINT"WHITE is the winner.":PROCwait(3000):VDU19,3,15,0,0,0:PROCwait(10000):CLG:VDU20
2780 FOR RX=1TO5:FOR CX=1TO5:GX(RX,CX)=0
2790 NEXT:NEXT
2800 ENDPROC
2810 DEFPROCwait(JX):FOR I=1TO2+JX:NEXT:ENDPROC
2820 DEFPROCintro
2830 VDU19,1,5,0,0,0,0
2840 COLOUR2:PRINTTAB(14,1)"HEXAGRAM" TAB(14)*****
*:COLOUR3:PRINT".,is a game for 2 players.Unscramble the" "anagram within the time allowed.The" "first letter is the one in the hexagon."
2850 PRINT"., Try to make a pathway..." ACROSS the board if you are blue or" " DOWN the board if you are white."
2860 COLOUR2:PRINT"., Type 1 for easy words"
Type 2 for harder words"
2870 COLOUR1:PRINT"., BL
UE PLAYER...what level?
'i:FX=GET-48:PRINT:FX
2880 IF FX<1AND FX<2THEN CLS:GOTO2840
2890 COLOUR3:PRINT"., WH ITE PLAYER...what level?
'i:GX=GET-48:PRINT:GX
2900 IF EX<1AND EX<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 ("Yn",get#)<0
2930 IFget#"N"ORget#"n" THEN#FX210,1
2940 CLS
2950 ENDPROC
2960 REM summary of instructions
2970 DEFPROClink
2980 VDU26
2990 *FX15,0
3000 CLS:PRINTTAB(0,5)"Ens ure CAPS LK off. ....Text colour is same" "as colour of player. ....Press RETURN after" "typing in an answer. ....Use ESCAPE to change" "levels."
3010 COLOUR2:PRINTTAB(2,2)"Press any key" TAB(3)"to continue"wait=GET
3020 CLS
3030 ENDPROC
3040 DEFPROCrelocate
3050 VDU21
3060 *KEY#*TAPE:MOX=PAGE-#E00:FORIX=PAGE TO TOP STEP 4:(IX-0)=1X:NEXTI?(TOP-DX)=255:MPAGE=#E00:MOLD:MRUN IFM"
3070 *FX12,0
3080 *FX138,0,128
3090 ENDPROC
3100 MODE6
3110 *FX12,0
3120 *FX14,0
3130 REM omit next line until debugged
3140 IF ERR=17THEN RUN
3150 REPORT:PRINT" at line "i:ERL

```

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

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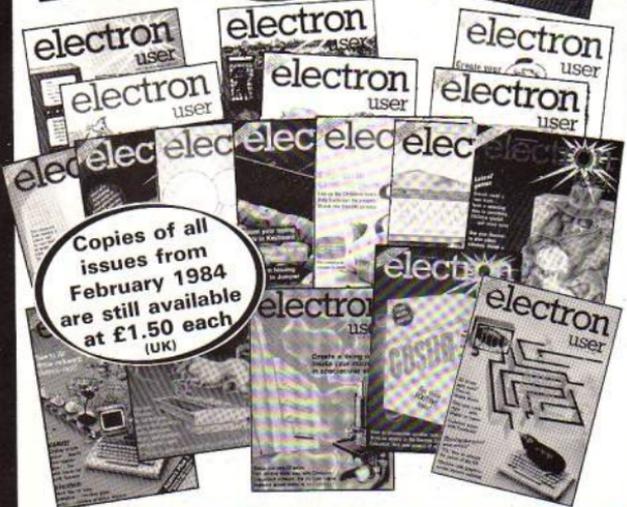
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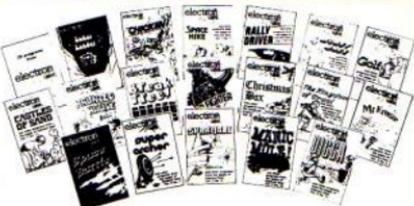
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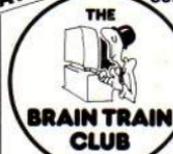
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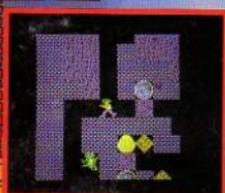
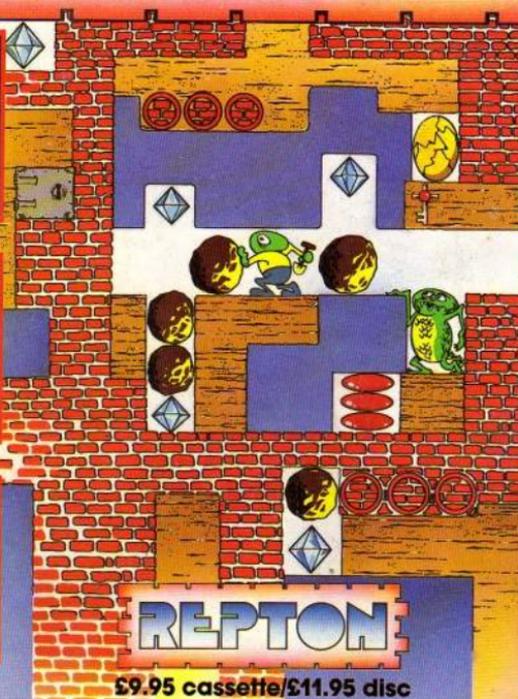
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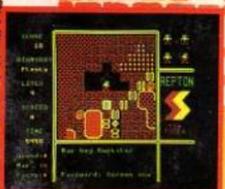
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