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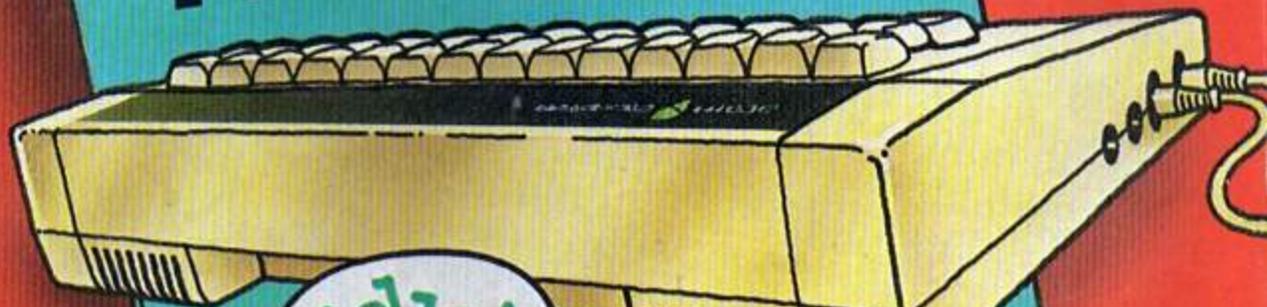
# electron

## user

Vol. 2 No. 1 October 1984 £1

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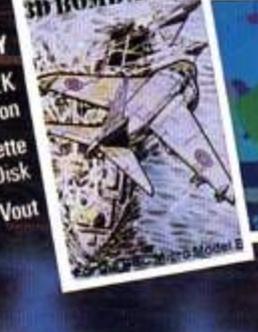
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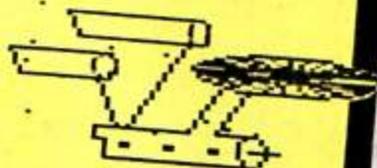
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# electron user NEWS

**Prestel  
modem  
is here**

THE race to bring out the first modem for the Electron has been won by Protek Computing.

With the modem, an Electron user will be able to explore the quarter of a million pages of Prestel, send electronic mail or swap software with other users.

The modem itself costs £59.95. But you also need to buy a £24.95 interface which plugs into the expansion socket at the back of the Electron.

## Copy stopper

ILLEGAL copying of games for home micros costs UK software companies £100 million a year in lost revenue according to the Guild of Software Houses (GOSH).

But now, Rising Edge Data (RED), has developed a system to prevent mass copying. It works on the Electron, BBC Micro and other popular micros.

## UP AND RUNNING

**AT least one software house has got round the problem of its Electron games not running when the Plus 1 is fitted.** (*Electron User* August 1984 issue).

**Micro Power reports that after some research by its boffins all its games will run.** See *Micro Messages*, Page 61.

# ELECTRON SET FOR XMAS BONANZA

**THE Electron has celebrated its first birthday with the news that 130,000 machines have been delivered to dealers since its launch.**

But Acorn officials remain reticent over revealing exactly how many have been sold.

"Sales figures take so long to filter through", a company spokesman told *Electron User*. "But we are very pleased with the indications to date".

The company now believes it is entering a

period of sustained growth in Electron sales leading up to a potential bonanza at Christmas.

"As long as the trend in giving home computers as Christmas presents continues we will be very happy," said the man from Acorn.

"The Electron falls exactly into the right price bracket".

Acorn is shortly to launch other add-ons for the Electron which, with the recently unveiled Plus One, will consolidate the machine's position in the market.

"We'll have a number

of new products out before December", said the spokesman.

"These will make the machine that much more valuable to the user.

"In fact we are going to see the Electron transformed into a serious little computer thanks to the new products, plus a lot of software which is on its way from Acornsoft".

The only possible black cloud which could ruin Christmas for the Electron is if another comparable machine – both in performance and

price – comes on the market before the festive season.

"This looks a bit unlikely at the moment", said the Acorn spokesman. "After all, the market has been very stable for the last six months, with the only new machine in this range coming from Oric.

"And this has offered very little in the way of competition.

"So unless a really competitive new machine is suddenly brought out and made available by December, there will be few worries for us".

# Business package lops the cost

**ANOTHER major step has been taken to turn the Electron into an inexpensive office tool.**

It comes with the launching by *Electron User* of Mini Office, a business package with a revolutionary pricing

policy.

It consists of four programs – word processor, database, spreadsheet and graphics. And it costs just £5.95.

"We are aiming at one man firms across the country who simply cannot afford to pay for the business software currently on the market with price tags of hundreds of pounds", says

Derek Meakin, managing director of Database Publications.

"It will also be well in the price range of housewives who wish to use it for domestic bookkeeping – or even for children wanting to monitor their pocket money".

Mini Office has been written as a serious introduction to using a home computer in a

working environment. It comes with a free 32 page easy-to-use operating guide.

"We have based our price on volume sales", says Derek Meakin, "for we are convinced that Mini Office will have a tremendous impact on the software scene.

"At this price home computers will no longer be restricted to games".

# Mode 7 for the Electron

**A LONG awaited giant leap forward for Electron users will take place this month.**

That's when the Mode 7 screen display gap between the Electron and BBC Micro is closed.

The latest add-on in the Electron range from Sir Computers of Cardiff is a Mode 7 adapter – a plug-in unit which bolts onto the back of the micro.

The Electron's expansion edge-connector is continued off the back of the Mode 7 device, allowing further modules to be attached.

Outputs are provided from the adapter to connect it to standard RGB and monochrome monitors.

Full colour teletext graphics are provided with 78 x 75 pixel resolution and up to eight colours on screen at once.

Flashing and double-height characters are supported.

The text-display allows 40 x 25 characters and only uses 1k of RAM – freeing 5k more RAM for Basic and OS commands.

Alun Preece, Sir Computers' marketing manager, says Electron Mode 7 "operates in every way like conventional BBC Mode 7 and is compatible with over 90 per cent of BBC Micro Mode 7 software".

Cost is expected to be under £100.



## Classic from Fortran

MELBOURNE House has converted one of its early text-only adventure games for the Electron.

Classic Adventure was first written in Fortran in the 1970s when it used more than 200k of memory. Now it has been reduced to 32k while still retaining its original features.

In the game, the micro acts as the player's eyes and hands, describing the immediate location and surroundings.

Using this information, the adventurer must find the hidden treasure guarded by dragons and trolls.

The game retails at £6.95.

# Go Forth and multitask!

THREE firsts in the field of Electron software have come from Skywave Software.

With the release of Multi-Forth 83 the Bournemouth firm has produced the first language ROM for the Electron. This software-on-a-chip plugs into a ROM box and is available instantly when required by the user, replacing the usual Basic.

Not only is it the first language chip, it is also the first Forth available for the Electron that can multitask, handling several programs at the same time.

And with their announcement that they intend to produce a plug in cartridge version for the Plus 1, Skywave have become the first

independent software house to utilise the official add-on's cartridge slots.

Using Multi-Forth 83 the user can have a number of Forth programs executing simultaneously and independently of each other. Each task is placed in a queue to a limit of 28.

The number of tasks the system can run is limited only by memory requirements, and can be expanded as required.

Each task has its own 32 bit clock so each can be scheduled to execute at a pre-determined

interval for real-time, robotics and control applications.

Any Forth word or program can be defined as a task. A command – DISPLAY – is provided to give instant screen read-out of all tasks, their position in the queue and their current status.

Tasks can be started and stopped at will, both by the user and from other tasks.

Multi-Forth 83 is compatible with the MOS and the user can even program the function keys. These can be set up with Forth words

and any other sequence of characters that may be desired.

It is vectored so that the more powerful features can be re-defined, enabling the user to reconfigure his system and also create closed applications. He can vector his own words if desired.

The output stream for each task can be redirected as required and new destinations defined to support other devices such as terminals and external displays.

● Acornsoft Forth reviewed – see Page 55.

# Le Box puts discs on tap

DISC drives and sideways ROMs can now be attached to the Electron.

The breakthrough was finally achieved by Pace with the launching of Le Box at the Electron & BBC Micro User Show.

It is supplied in a self-contained unit complete with its own power supply and one of the Pace 5¼in disc drives.

Commands provided by the advanced Amcom disc filing system are also available, and MOS commands may be used for loading and saving either Basic programs or blocks of machine code.

Also included on the board are sockets to accept 8k sideways ROMs, allowing instant access to powerful software packages which remain resident in the machine.

Le Box comes with all cabling for connection to the Electron's rear

edge connector. It has externally switchable drive select lines to enable copying to and from external disc drives.

Auxiliary data and power sockets allow connection of other accessories.

The unit is normally supplied with a single sided 40 track drive giving 100k of storage capacity per disc.

Other drives can be fitted by dealers, including 40/80 switchable units offering 400k capacity.



## Failed an exam? Then try again

ELECTRON users who failed their O-level and CSE exams will be able to study for their retakes at home using software programs launched by Acornsoft/Ivan Berg.

Four new revision programs — Maths 1 and 2, English Language and Biology — have been written by teachers for students who are part way through or have completed the appropriate syllabuses.

Each program has up to 150 pages of tutorial, divided into self-contained sections. In

English, for example, there are sections on grammar, spelling, comprehension, with on-screen diagrams to illustrate various points.

If a student has difficulty understanding certain parts of a section he can request an overlay giving explanatory text on the screen.

At any time the student can call up a "jotting pad" at the bottom of the screen to take notes or do sums on a built-in calculator.

After studying each section, the student answers a 10 question revision test. If there is a question he cannot answer he is automatically referred back to the relevant tutorial for further instruction.

When at least 75 per cent is scored in all sections, the student is ready to attempt the program's mock examination.

This consists of 30 multiple choice ques-

tions to be completed within half an hour.

Realistic exam conditions are simulated. Any question can be passed on if the student is unsure and returned to later. A clock displays the time remaining throughout and the program automatically ends when the half hour is up.

The micro then marks the exam and displays the percentage mark.

The exam is compiled from a database of 100 questions so it can be taken many times with a different "paper" every time.

The programs, which cost £12.65 each, have been written by specialists in their fields.

The mathematics and English programs were compiled by a group of teachers from University College School in London and the biology program by educational publishing house Hodder and Stoughton.

## Coming of age

DOESN'T time fly when you're enjoying yourself? We can't believe that *Electron User* is one year old this month!

And what a year. We've come from being a few pages hidden away in *The Micro User* to a magazine in our own right. And on our way we've made quite a few new friends and increased our team of regular writers.

It's not just the magazine that's grown. The *Electron*, after a slow start, has taken off and the pace of development is increasing.

On the hardware side there are four different printer interfaces, four joystick interfaces, ROM boxes and even the long awaited Mode 7 adapter.

Acorn has produced the amazing Plus 1 along with the ROM cartridges, Pace has produced a disc interface and there's lots more to come before Christmas.

Similarly, there's now a vast choice of software for the Electron.

Even ROM-based software is becoming available, a sure sign of the *Electron's* coming of age.

And with Christmas coming, *Electron* sales can be expected to boom as a more discriminating public realises its value.

So the first year of *Electron User* has been great and the second one promises to be even better.

It's been nice to have you with us.

### Teaching tools

THREE new educational programs to help children in maths, literacy and logic have been developed for the Electron by Applied Systems Knowledge.

Podd, Squeeze and Juggle Puzzle have been written by practising teachers working with professional programmers.

### Aid goes on database

A DATABASE of software for the handicapped is being established at Newcastle upon Tyne Polytechnic. Each entry contains a description of the program, the handicaps it is suitable for, the type of micro system required, name and

address of supplier and price.

*Electron User* readers who wish to contribute to the database are asked to contact Peter Curran at the Handicapped Persons Research Unit, 1 Coach Lane, Coach Lane Campus, Newcastle NE7 7TW.

## Part nine of PETE BIBBY's introduction to programming

Like the parts of a Russian doll, each loop must be completely contained by the other if your program is to work properly. So . . .



# Don't get your variables in a twist!

LAST month we extended our exploration of FOR . . . NEXT loops. We saw how two loops can be nested, one inside the other, and also how the control variable of the outer loop could be used to limit the inner loop.

We've also seen how the control variables can be used actually inside the loops, and showed this by producing triangles of asterisks.

This month we'll be continuing with our FOR . . . NEXT loops and asterisks, and seeing what happens when we get our control variables in a twist.

Last month I left you with the problem of creating the two triangles of asterisks shown in Figures I and II.



Figure I



Figure II

You could, if you'd wanted, have done it all with PRINT

```
10 REM PROGRAM I
20 CLS
30 FOR row=1 TO 5
40 FOR asterisk=1 TO row
50 PRINT
TAB(5-asterisk,5+row)*"
60 NEXT asterisk
70 PRINT
80 NEXT row
90 PRINT
```

Program I

and TAB statements, but it would have been a long job.

However, since the article was about FOR . . . NEXT loops, I hope you arrived at a solution that uses something like the method of Program I.

This produces one of the required triangles. A quick glance shows that it uses a pair of nested FOR . . . NEXT loops in the same way we used them last month.

The loop control variables *row* and *asterisk* will be familiar as well. What's different is line 50.

As you can see, it's a PRINT statement, the TAB determining the position of the asterisk in the triangle.

Each time line 50 is executed it places an asterisk on the screen at the point whose X and Y coordinates are determined by the result of the expression:

`5-asterisk,5+row`

The values of *row* and *asterisk* will vary just as in the previous examples from last month. The loops themselves are the same.

What's different is the way we use these values of *asterisk* and *row* to position the asterisk.

We don't just PRINT at the X and Y coordinates determined by *row* and *asterisk*, we use these values in an expression to calculate the coordinates of the positions we want.

Don't be put off. Like most

things in programming it's easier than it sounds.

The X position of an asterisk — in character spaces from the left edge of the screen — is given by the result of:

`5-asterisk`

while the Y position — down from the top of the screen — is given by:

`5+row`

This results in the desired triangle.

If you can't quite follow the maths, work through it with pencil and paper. Just figure out the value of the above expressions for each value of *row* and *asterisk*.

If you think about it, *row* varies in value from one to five so the Y coordinates will range from six to 10.

Similarly as *asterisk* ranges from one to whatever value of *row* is in force at that stage of the outer loop, the X coordinates will range from four to nought.

The first time round the outer loop, *row* is one. As *asterisk* varies from one to *row*, this means that the inner loop only cycles once. Only one asterisk is printed, at the position with coordinates (4,6).

Next time round, *row* is two, with the result that *asterisk* now ranges from one to two. The inner loop accordingly cycles twice and asterisks are printed at 4,7 and 3,7.

Carrying on like this results

in the whole triangle. By successively reducing the X coordinate while increasing the Y coordinate we've got our triangle of asterisks.

If figuring it out with pencil and paper seems too much like work try changing line 50 to something like:

```
50 PRINT "xpos
";(5-asterisk) "ypos
";(5+row)
```

and your Electron will do the work for you. Got it?

By now, you should be able to figure out what's happening in Program II, which produces the second of our problem triangles:

```
10 REM PROGRAM II
20 CLS
30 FOR row=1 TO 5
40 FOR asterisk=1 TO row
50 PRINT
TAB(10-asterisk,10-row)*"
60 NEXT asterisk
70 PRINT
80 NEXT row
90 VDU 30
```

Program II

It's the familiar structure of two nested loops with *row* and *asterisk* going through their usual paces. The result is a different triangle and, again, the reason lies in line 50.

It's in this line that the X and Y coordinates that position the asterisks are worked out. The values of *row* and *asterisk* vary in just the same way as before.

But the expression in line 50 is different, resulting in different X and Y coordinates.

The expression is:

```
(10-asterisk,10-row)
```

There's no particular magic in the value 10. I just used it so everything appeared on the screen.

Try eight, nine or 12 if you want. What's really different is that now *row* is subtracted whereas before it was added.

This means that as *row* increases and the rows have more asterisks in them, the Y coordinate decreases. The result is that each successive row is one space higher up the screen.

Again, work it out with pencil and paper. Or add a line like:

```
50 PRINT "xpos
";(10-asterisk) "ypos
";(10-row)
```

and you'll soon grasp how it works.

The main point is that while the loops themselves have more or less remained the same, it's the way the changing values of the loop control variables are used inside these loops that brings about the differing results.

And don't worry about the VDU 30. All it does is "home" the cursor to the top left of the screen. It's just there to keep

```
10 REM PROGRAM III
20 CLS
30 FOR row=1 TO 5
40 FOR asterisk=1 TO row
50 PRINT
TAB(10-asterisk,10-row)"*"
60 NEXT
70 PRINT
80 NEXT
90 VDU 30
```

Program III

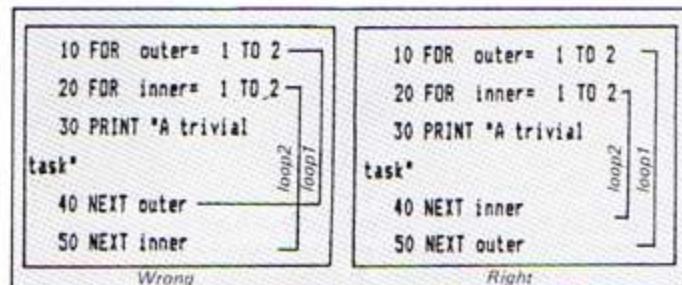


Figure IV: The rights and wrongs of nested loops

things tidy. Leave it out and see what happens.

Now have a look at Program III, which is very nearly the same as Program II, and see if you can spot the difference.

The difference is that lines 60 and 80 just have a NEXT by itself. There's no control variable.

Both *asterisk* and *row*, which were there in the previous program, are missing.

The Electron has no problems though. It keeps track of which is the inner and which is the outer loop.

However, if you can, always put in the control variable names with the corresponding NEXT. It can save an awful lot of time when you're debugging programs.

It doesn't help, though, if you do what I've done in Program IV. Run it and see what happens:

```
10 REM PROGRAM IV
20 CLS
30 FOR row=1 TO 5
40 FOR asterisk=1 TO row
50 PRINT
TAB(10-asterisk,10-row)"*"
60 NEXT row
70 PRINT
80 NEXT asterisk
90 VDU 30
```

Program IV

As you've no doubt found you get something like Figure III.

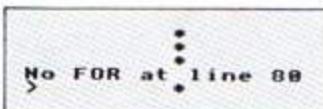


Figure III: Wrong!

This has happened because I've mixed up the control variables that I've used with the NEXTs.

It should be *asterisk* in line 60 and *row* in line 80. The Electron tries its best, but

there's no remedy for human stupidity.

It comes to the first FOR and sees there's a loop with control variable *row*.

Then, on coming to the second FOR, it realises there's a second loop with control variable *asterisk*.

However the next NEXT – if you see what I mean – is tagged with a *row* so the Electron goes back to line 30 and obeys the loop again.

In all it goes round five times, each time printing an asterisk. It then proceeds to line 80 and finds another NEXT, tagged with *asterisk*.

The trouble is, however, that the way the Electron works has meant the first FOR has overwritten all trace of the second FOR.

The Electron can't find any FOR to correspond with this latest NEXT and tells you so with the error message.

The moral is: Don't mix up your loops. For nested loops to work each loop has to be contained entirely within the others.

You can think of it like a Russian doll – one loop has to be completely contained by the other.

Any overlap and the program may work after a fashion but not like you intended.

Figure IV illustrates the point.

While we're looking at NEXT, have a go at Program V:

```
10 REM PROGRAM V
20 CLS
30 FOR row=1 TO 5
40 FOR asterisk=1 TO row
50 PRINT
TAB(10-asterisk,10-row)"*"
60 N.
70 PRINT
80 N.
90 VDU 30
```

Program V

You'll notice that in lines 60 and 80 the abbreviation N. has replaced NEXT.

You'll find that the program works perfectly well with the abbreviation. But again, while it may be acceptable to the Electron, it doesn't mean much to human beings.

I prefer typing in NEXT with the relevant variable name, even though it takes longer.

In fact, you'll find if you

enter a program using the abbreviation N., the Electron agrees with me and will show it as NEXT when you LIST it.

Program VI shows another slight variant on our original program:

```
10 REM PROGRAM VI
20 CLS
30 FOR row=1 TO 5
40 FOR asterisk=1 TO row
50 PRINT
TAB(10-asterisk,10-row)"*"
60 NEXT,
70 VDU 30
```

Program VI

If you run it you'll find it does the same job as the previous programs even though it only has one NEXT. This is because the solitary NEXT of line 60 is followed by a comma.

The Electron interprets this as meaning that there are two NEXTs there and so the program works.

So, using a comma after a NEXT allows one keyword to do the work of two and thus saves some typing. But I'd advise against your using it.

The trouble is that when you're typing in a long listing it's awfully easy to miss out that comma. And it's even worse trying to figure out what's gone wrong. Avoid it!

To return to FOR...NEXT loops proper, so far we've only covered two loops, one inside the other. You might have been wondering if it's possible to have more than two nested loops.

The answer is that you can, as Program VII shows:

```
10 REM PROGRAM VII
20 CLS
30 FOR outer=1 TO 10
40 FOR middle=1 TO 10
50 FOR inner=1 TO 10
60 PRINT "*";
70 NEXT inner
80 NEXT middle
90 NEXT outer
```

Program VII

It's not a very exciting program. It just prints a thousand asterisks on the screen.

However, you should be able to see from its structure that there are three loops,

## From Page 9

each one contained wholly inside the other.

Program VIII has exactly the same results, the only difference being that I have combined all the NEXTs – without control variable names – in a single multiple line:

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

### Program VIII

I hope you'll agree with me that Program VII is written in a much clearer manner than Program VIII.

By using meaningful variable names and making them appear in your programs even

where they are optional you'll save yourself a lot of problems as a beginner.

Take a look at Program IX:

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

### Program IX

This is supposed to have the same result as the previous programs but it produces only a hundred asterisks, not a thousand as intended.

Can you see what's gone wrong?

The answer is in line 70 where, to save typing, a lazy programmer has just used a NEXT followed by a comma.

While this may work for two FOR ... NEXT loops, Program IX actually has three. Hence

the program comes unstuck, requiring an extra NEXT to get it working properly.

Program IX supplies the lacking keyword.

```
10 REM PROGRAM X
20 CLS
30 FOR outer=1 TO 10
40 FOR middle=1 TO 10
50 FOR inner=1 TO 10
60 PRINT "*";
70 NEXT,
80 NEXT
```

### Program X

However, I still prefer Program VII. It not only does the job, but its listing shows *how* it does the job.

Any problems arising with it would be much easier to solve than with the other, more abbreviated versions.

And that argument for meaningful listings brings us to an end of our tour of FOR ... NEXT loops.

We've explored them pretty thoroughly and if you've understood the last few articles you've got the makings of a competent programmer.

There is one thing, however, we haven't mentioned about FOR ... NEXT loops.

How many loops can be nested inside one another? The most we've had is three.

I won't tell you the answer – you can find it out for yourself. I will give you a hint, though. Try expanding Program VII, one loop at a time.

And that's it for this month. Have a go at writing your own programs using FOR ... NEXT loops.

How about a polygon of asterisks or some other geometric pattern?

If you come up with anything good, send it in to Scrapbook for others to enjoy. And keep practising.

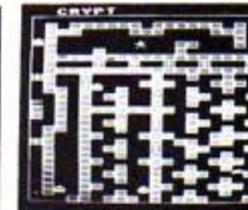
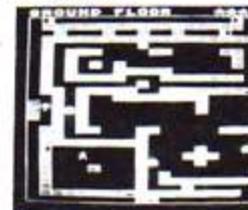
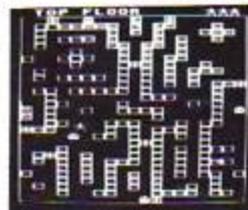
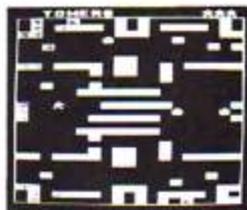
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- B) COLOUR BLOCKS bring sizes and colour into perspective.
- C) MERRY MUSIC turns the keyboard into a musical keyboard.
- D) FUNNY FACES presents a line up, which one is the suspect?
- E) FRED THE FROG needs co-ordinated help to get across the pond.

#### EARLY YEARS 2

- A) THE POND seems very active today.
- B) SPEED is required to keep the cake on the conveyor belt.
- C) DIRECTIONS seem to be needed by everyone in Orion village.
- D) ORDER the blocks.
- E) SID THE SPIDER needs some help to get out of the maze.

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# Notebook Part 9



ABLE WAS I  
ERE I  
SAW ELBA

PALINDROME Tester is a simple but interesting example of string handling using the LEN and MID\$ commands. The program asks you to input a word, tests it, and tells you whether or not it's a palindrome.

A palindrome is a word that reads the same backwards as forwards, such as rotor or madam.

Null string

FOR...NEXT loop

```

10 REM PALINDROME TESTER
20 REM TREVOR ROBERTS
30 reverse$=""
40 INPUT "Enter test word",word$
50 FOR position=1 TO LEN(word$)
60 letter$=MID$(word$,position,1)
70 reverse$=letter$+reverse$
80 NEXT position
90 IF word$=reverse$ THEN PRINT word$
  ;" is a palindrome." ELSE PRINT word$;"
  is not a palindrome."
100 IF word$(>)reverse$ THEN PRINT reve
  rse$;" is ";word$;" backwards."
    
```

string slicing

storing letters in  
in reverse order

Result announcement

- 10-20 The usual REM statements. Ignored by the Electron, they just give readers details of the program.
- 30 Sets up a string variable *reverse\$*, making it an empty or null string. Later in the program *reverse\$* will hold the letters of the test word in reverse order.
- 40 You are asked to enter the word to be tested which is held in *word\$*.
- 50,80 These form a FOR...NEXT loop with control variable *position*. The value of *position* varies from 1 to whatever is the length of *word\$*. LEN is a function which returns the number of characters in a string so the loop will go round as many times as there are letters in *word\$*.
- 60 Uses the function MID\$ to take one letter out of the test word. This letter is temporarily held in the string variable *letter\$*. Which letter is picked depends on the value of *position* at that stage of the loops. Eventually all the letters that make up *word\$* will have been "sliced" off by MID\$.
- 70 Adds the latest *letter\$* to the old string *reverse\$* and stores the resulting string as *reverse\$* again.
- 80 The NEXT sends the Electron round the loop again until *position* has taken all its values. In the process the intervening lines have taken a character at a time from one end of *word\$* and added them to the other end of *reverse\$*.
- 90 If *word\$* is equal to *reverse\$* then the word is a palindrome and the program tells you so. If this is not true then the word is not a palindrome.
- 100 If the test word isn't a palindrome, this line tells you what its reverse is.

Trevor Roberts

# SOUNDS EXCITING



BUILD up a library of exciting sounds to enhance your own programs with these listings. And many more in the months to come!



## Buzzy Bees

From Elizabeth Trice,  
Fleet, Hants

10 REM BUZZY BEES  
20 SOUND 2,4,RND(6),1  
30 GOTO 20

## Dentist's Drill

From Giovanni Maestri,  
London N8

10 REPEAT  
20 ENVELOPE 1,5,126,16,  
0,31,0,0,126,0,0,  
-126,126,126  
30 SOUND 1,1,30,200  
40 SOUND 234,65,67,46  
50 UNTIL FALSE

## Mistuned Television

From Scott Walker,  
Bolton, Lancs

SOUND 0,-12,100,34

## Trimphone

From S. Orme,  
Rotherham

10 ENVELOPE 1,1,18,0,  
0,2,0,0,126,0,0,  
-126,126,126  
20 SOUND 1,1,170,8  
30 SOUND 1,0,0,5  
40 SOUND 1,1,170,8

## Truck's horn

From Simon Jones,  
Beaumaris, Gwynedd

SOUND 0,-15,25,20

## Kangaroo with a Machine gun

From T.E. Clarke

10 ENVELOPE 2,1,1,-200,  
0,100,200,0,0,0,0,  
0,0,0  
20 SOUND 1,2,100,200  
30 GOTO 10

## A Mountain stream

From Adam Badland,  
Hall Green, Birmingham

10 A=RND(250)  
20 SOUND A,A,A,A  
30 GOTO 10

## Out of fuel

From Steven Rowland,  
Eynsford, Kent

ENVELOPE 3,1,-45,-67,  
-5,67,0,0,126,0,0,  
-126,126,126  
SOUND 1,3,56,-45



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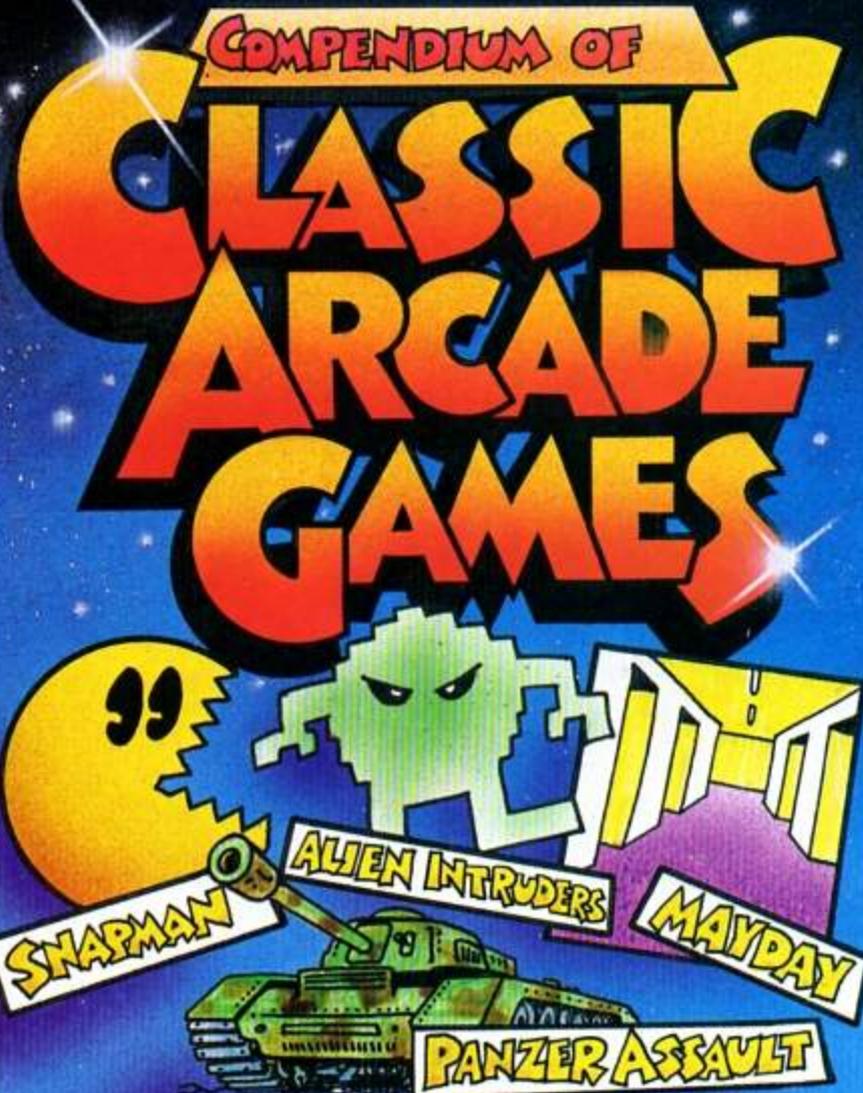
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| ● Bandits at 3 o'clock       | ● Galaxy Wars    | ● Daredevil Dennis |
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- |                 |            |            |                     |
|-----------------|------------|------------|---------------------|
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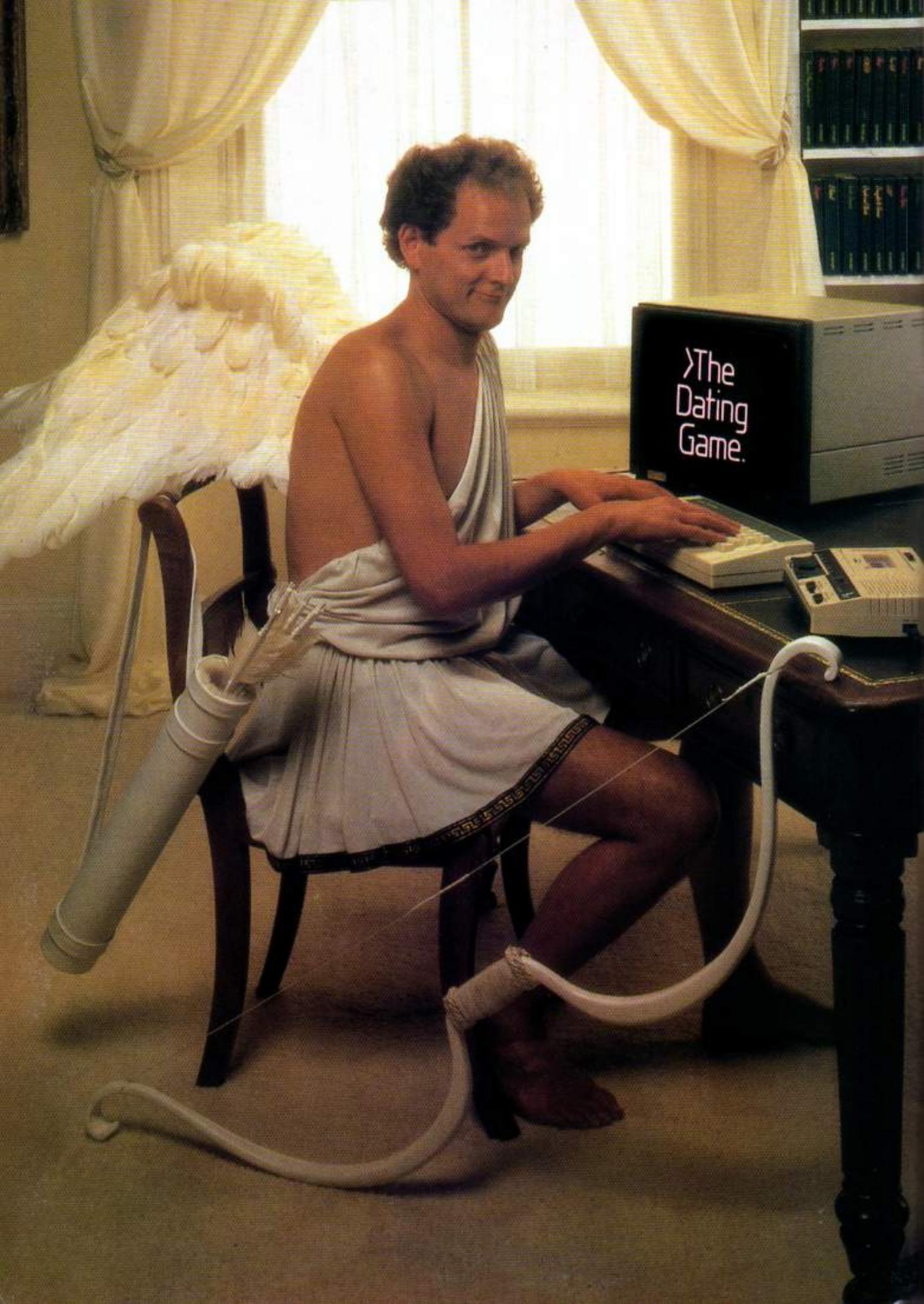
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**ACORNSOFT**

## Introducing a new series to help you put your Electron in good voice

ONE of the least used and most misused features of the Electron is its ability to produce noises via its sound generator.

Although limited in comparison with the BBC Micro, the Electron has quite a sophisticated sound system when compared with its rivals. And it all comes from just two Basic commands – SOUND and ENVELOPE.

For the time being we'll concentrate on the SOUND command and how it can be used to produce simple but pleasing notes and noises.

But, having said that we use SOUND and ENVELOPE, there are three ways we can get the Electron to break its silence without using either.

The first one is fairly obvious. We unplug the Electron and then plug it in again. The beastie beeps as it comes alive. (*Incidentally, has any enterprising person out there attached an on/off switch to their Electron?*)

The second, rather more practical, way is to enter:

VDU 7

and press Return. The result is another beep.

The third way is to hold down the Ctrl and G keys at the same time. This produces the now familiar beep.

Even though this sound is simple, don't despise it. Many a program could be enlivened and made more effective with a beep prompting the user to input data and so on.

If we want more than our pleasant but limited beep we must turn to the SOUND command.

SOUND is just a Basic keyword that tells the Electron to make a noise. It's followed by four numbers, separated by commas, which tell it what kind of sound it's going to make.

These four numbers, or parameters as they are called, control where the sound comes from, how loud it will be, how high or low the note will be pitched, and how long it will last.

Try entering:

```
SOUND 1,-15,20,100
```

and

```
SOUND 1,-15,80,10
```

to hear SOUND in action.

The structure of the command is:

```
SOUND channel,loudness,  
pitch,duration
```

As I said before, each of the parameters following the SOUND command is a number and each has its own range of values.

The *channel* parameter takes two values – either 0 or 1.

When *channel* is equal to 0 the Electron's sound generator produces special effects. We'll talk about this in a later article.

When *channel* is equal to 1 the Electron can produce a whole range of notes. What these notes sound like is determined by the remaining three parameters.

You can look on *channel* as a switch allowing you to choose between sound effects (when it is 0) and musical notes (when it is 1).

For the rest of this article we'll be looking at the musical

side of the sound generator.

For the sake of compatibility with the BBC Micro the Electron will accept the numbers 2 or 3 as *channel* parameters. It accepts them but then carries on as though they were 1.

The next parameter is the *loudness* parameter. I call it *loudness* but in fact all it does is decide whether there is a sound or not.

If *loudness* has a value of between -1 and -15 then the note sounds. If *loudness* is made equal to 0 then no sound is made.

Don't take my word for it. Try changing the -15 of the two sounds given earlier to 0 and you'll hear what's happened. Or rather, you won't hear!

It may seem rather daft having a SOUND command and then putting *loudness* equal to 0 so that it doesn't make a sound. But there is method in the madness.

Sometimes we may want a

note to sound only if a certain condition is met. If it isn't met then *channel* stays at 0 and there's no sound. If the condition is met then *channel* becomes, say, -15 and the noise is made.

This is shown in the lines:

```
100 IF lives>0 THEN  
channel=0  
ELSE channel=-15  
110 SOUND 1,channel,100,100
```

Here no sound will be made if there are still some lives left. However if there are none left the SOUND of line 110 will sing out loud and clear.

Incidentally, the *channel* parameter can have values between -1 and -15 but they all have the same effect of letting the SOUND play.

The range of values is a leftover from the BBC Micro which has -1 as a very quiet sound ranging up to -15 as the loudest.

On the Electron you have



By  
**NIGEL  
PETERS**

two choices – on or off – and that's your lot. For reasons of compatibility stick to -15 to turn the sound on.

The next parameter is the *pitch* parameter which determines whether the note is high or low.

```
SOUND 1,-15,10,10
```

is a lot lower in pitch than:

```
SOUND 1,-15,75,10
```

The rule is, the higher the *pitch* parameter the higher the note sounds. The *pitch* parameter ranges in value from 0 (the lowest note) to 255 (the highest).

If you exceed this range the Electron just MODs *pitch* with 255 to get a number that is in range. This means that:

```
SOUND 1,-15,275,10
```

will produce exactly the same sound as:

```
SOUND 1,-15,20,10
```

The first SOUND command is interpreted by the Electron as:

```
SOUND 1,-15,275 MOD 255,10
```

We'll be playing with the *pitch* parameter later on. But for the moment let's concentrate on the *duration* parameter.

This, as you might guess from the name, determines how long the note produced by the SOUND command will last. The units used are twentieths of a second, so the note produced by:

```
SOUND 1,-15,50,20
```

should last for one second while:

```
SOUND 1,-15,50,100
```

will last for five seconds.

The range is from 0 (no sound at all) to 254 (when it lasts for almost 13 seconds).

If *duration* is made equal to -1 or 255 the sound continues indefinitely, making you reach for the Escape key to shut it up.

As with *pitch*, *duration* uses MOD to bring excessive values into range.

And that is all there is to the SOUND statement. Or, rather, that's all I'm dealing with for the present.

By now you should be able to understand that:

```
SOUND 1,-15,52,40
```

will produce a note or channel one. This will last two seconds and its pitch will be 52 which, for the musical, is alleged to be middle C.

Now let's get down to using SOUND in programs. Take a look at Program I.

```
10 REM PROGRAM I
20 FOR pitch=1 TO 255
30 SOUND 1,-15,pitch,10
40 NEXT pitch
```

Not exactly inspiring music, is it? Still as the FOR...NEXT loop increases the value of *pitch* you do get an idea of the range of the Electron.

Apparently the notes above 100 aren't all that accurate, but you'd need better ears than mine to sort that out.

Program II works through part of *pitch*'s range but it does it in steps of eight at a time. The gap in pitch between the resulting sets of notes is known as a tone.

These tones are some of the natural building blocks of western music and we'll be using them a lot when we get around to creating tunes on our Electron.

```
10 REM PROGRAM II
20 FOR pitch=10 TO 90
STEP 8
30 SOUND 1,-15,pitch,20
40 NEXT pitch
```

Program III is exactly the same as Program II except that there is now another SOUND command in line 40.

```
10 REM PROGRAM III
20 FOR pitch=10 TO 90
STEP 8
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,10,1
50 NEXT pitch
```

This second SOUND has its *loudness* parameter set to 0 so it won't make a sound at all. So why, you may ask, bother having it in the first place?

The answer is that, even though it doesn't make a noise, the Electron takes a split second to process that command.

This results in a silent gap of one twentieth of a second between the notes produced

by the SOUND of line 30. This is supposed to make the notes sound crisper than in Program II.

That's the theory, anyway. But I'm really not all that convinced.

Program IV works through the *pitch* range in tones. Do the top notes sound wrong to your ears?

```
10 REM PROGRAM IV
20 FOR pitch=0 TO 255
STEP 8
30 SOUND 1,-15,pitch,10
40 SOUND 1,0,-15,1
50 NEXT pitch
```

We've already met one of the natural building blocks of western music in the form of a tone. Program V introduces us to the other one – the semitone. This, as you might guess, raises or lowers the pitch by only half the amount of the tones we met earlier.

This is reflected in the program, with STEP being equal to 4:

```
10 REM PROGRAM V
20 FOR pitch=10 TO 90
STEP 4
30 SOUND 1,-15,pitch,20
40 NEXT pitch
```

We're not just stuck with going up in pitch. Program VI has the scale going downwards in semitones – like someone going downstairs:

```
10 REM PROGRAM VI
20 FOR pitch=90 TO 10
STEP -4
30 SOUND 1,-15,pitch,20
40 NEXT pitch
```

Program VII has us going upstairs in steps of four:

```
10 REM PROGRAM VII
20 FOR pitch=10 TO 90
STEP 4
30 SOUND
1,-15,pitch,pitch
40 NEXT pitch
```

Notice that here the *duration* of the note depends on the value of *pitch*. So, as the note gets higher, it also lasts longer.

You can do the reverse and make the *pitch* dependent on the *duration* as in Program VIII:

```
10 REM PROGRAM VIII
20 FOR duration=1 TO 255
30 SOUND
1,-15,duration,duration
40 NEXT duration
```

So far we've just been going up and down in pitch in regular steps. How about some random Electron music? Program IX supplies it:

```
10 REM PROGRAM IX
20 REPEAT
30 SOUND
1,-15,RND(255),RND(25)
40 UNTIL FALSE
```

Here the music is produced by giving random values to *pitch* and *duration*. If you listen long enough it can get surprisingly soothing.

However I find Program X a little more interesting:

```
10 REM RANDOM MUSIC WITH
GAPS
20 REPEAT
30 SOUND
1,-15,RND(255),RND(25)
40 SOUND
1,0,RND(255),RND(25)
50 UNTIL FALSE
```

It's the silent bits, provided by line 40, that hold the interest!

Talking about silence, one final point is that you can switch off the Electron's sound with:

```
*FX 210,1
```

After you enter this the Electron goes silent, ignoring all SOUND commands, until you undo the spell with:

```
*FX 210,0
```

This can be very useful for taming noisy games with loud, irritating tunes.

And writing tunes – though, hopefully, not loud or irritating ones – is what we'll be covering in the next article.

Until then, \*FX 210.1 (the rest is silence).

# SUMMER SENSATION!

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E-0E

# What the Acorn Electron has been waiting for!

Latest version of Forth for the Electron (Not re-hashed Forth 79 Code)

Unique Stack Display Utility

16k Eprom type 27128



Available as a 'bare' ROM or a ROM Cartridge for the 'Plus I' interface

Multi-tasking operating system for Real Time use.

Here's another first from Skywave Software. A Forth Eprom for the Acorn Electron which can Multi-task. It's called Multi-Forth. It's the same Forth that has already revolutionised the BBC Micro and, since it follows hot on the heels of the ZX81-Forth ROM and Spectrum Forth-I/O Cartridge, you can probably guess that David Husband is the genius behind it.

Multi-Forth 83 is a 16k Eprom type 27128 which sits sideways in the ROM area along with any other ROMs in use. It then allows a number of Forth programs to run simultaneously and transparently of each other, placing each task in a queue, up to a maximum of twenty-eight!

Multi-Forth 83 is also compatible with the MOS and specially vectored to enable a system to be reconfigured. It contains a Standard 6502 Assembler, a Standard Screen Editor and a unique Stack Display Utility, too.

At a later date a Cartridge version for the Acorn 'Plus I' will be available, but for now Multi-Forth 83 is sold as a 'Bare' ROM which means an interface is needed for the Standard Acorn Electron.

This unique Eprom comes with an extensive Manual and, at £45 + VAT it is superb value. Order it using the coupon, adding £2.30 p&p (£5 for Europe, £10 outside) or, for more information, simply tick that box instead. Either way, you'll be one step ahead of the competition.

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Address \_\_\_\_\_

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Spectrum Forth-I/O Cartridge

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# MULTI-FORTH 83 FOR THE ACORN ELECTRON

## Tap your micro's inner power

*Electron Assembly Language*  
by Bruce Smith (Shiva)

**HAVE** you ever fancied learning machine code, but been repelled by the treatment it gets in the otherwise excellent User Guide?

Have you browsed through the books on assembler but found them too much like textbooks?

Well, if these early attempts haven't altogether discouraged you, I'd advise you to have a look at Bruce Smith's Electron Assembly Language.

It's just what you need to learn how to tap the inner power of your micro, showing you how to use the Electron's assembler to produce machine code programs.

Well written and thoroughly explained, by the time you've worked through its 200 pages, the book will have turned you from a boring old Basic programmer into an exciting, knowledgeable machine code programmer.

If you've ever tried explaining machine code to someone, you'll realise how hard it is.

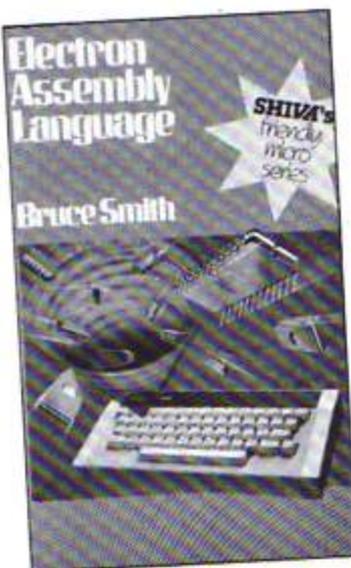
The author – and me, from now on – treats the subject from three approaches. The first is that of the 6502 chip itself and the instructions needed to get it to perform its electronic wizardry.

Along with this are examples of how to make use of these instructions in programs with many useful examples.

The final theme is one of the assembler and operating system routines and how we can use them in our own programs.

The three separate themes are treated in 23 short but detailed chapters. These ring the changes, a chapter on the assembler being followed by one of the status register of the 6502, and another on addressing modes.

There's always just enough on a subject to give you a feeling of learning something in depth, but never enough for boredom or despair to set in.



The example programs are excellent and well annotated. Particularly nice is the habit of showing the assembly listings the program is supposed to generate. Useful when you fall into error!

Another appealing feature of the book is that the diagrams aren't just there for decoration, they're really useful. They actually aid and add to the explanations, helping make the most abstruse points clear.

One thing that did worry me was that the book starts on a fairly mathematical note.

It didn't take me long to realise that these chapters quietly introduced some ideas that would be important later on, such as bits being set or cleared and the concepts of overflow and carry.

So don't be too put off by these chapters, they're very useful. If you really dislike them, you can always skip them and come back later if you need to.

It's an excellent book, certainly the best introduction to machine code for the Electron I've seen.

However I must point out one tiny flaw that might

otherwise have you worried. The book is a conversion of one for the BBC Micro and a very good one it is indeed.

Unfortunately, chapter six seems to feel that the Electron has a Mode 7. It doesn't, and instead of the expected A of Program 1 you get something resembling a colon on its side.

But even with this embarrassing error it's still a very, very good piece of work, likely to become the standard introduction to Electron assembly language programming.

Advised reading.

Graham Parr

## Don't be put off this treasure

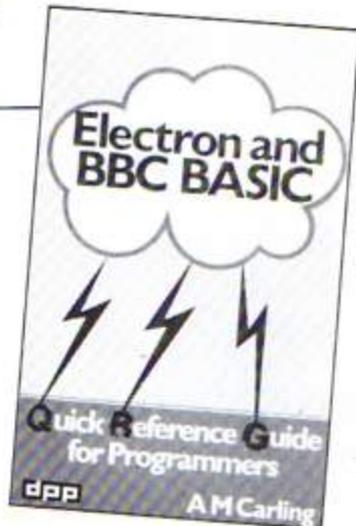
*Electron and BBC Basic: a quick reference guide for programmers* by A.M. Carling (DPP)

**THE first thing I noticed about this amazing little book was its price, a modest £2.25.**

Used to the ludicrously inflated prices that seem – with certain honourable exceptions – to be the norm in the micro world, this at first put me off. "If it's that cheap, it can't be much good" I thought.

I couldn't have been more wrong. It's cheap, but it's also excellent.

What you get for your money is an alphabetical guide to over 200 reserved words and operating system commands. Elaborating on these are some extremely useful



example programs and a brief note on the differences between the BBC Micro and the Electron.

The main part of the book is taken up with the directory of keywords – and what a treasure trove it is.

Whether used in the heat of programming or just for browsing through in an armchair, the guide is lucid, thorough and surprisingly readable.

All the usual Basic words are included, and there are also descriptions of such mysterious entities as "events" and Sheila, filing systems and significant bytes.

As you doze, you find yourself conjuring up sentences like: "In the event of anyone significantly byteing Sheila..."

It's not just entertaining, it's also useful with its summaries of the OSBYTE and OSWORD calls, the VDU codes and the operating system commands.

In fact, if I had to choose, I would prefer this by my side as I program rather than the User Guide.

It's not a book for complete beginners, though even those with a minimum of programming experience and a modicum of intelligence should find it informative and useful.

So, don't be put off by the low price, it's an excellent little book that every Electron owner should consider buying.

If you've found that the User Guide doesn't answer all your needs and that the BBC's Advanced User Guide might, if you could only understand it, then this is the book for you.

Thoroughly recommended.

Nigel Peters



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Since it was launched at the Electron & BBC Micro User Show the switched joystick interface from First Byte has been one of our top sellers. This plug-in cartridge takes standard Atari-style joysticks which are much more popular - and cheaper - than analogue joysticks. ....

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**ELECTRON PLUS 1** is a must for every user who wants to really make the most of his micro.

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# Quick to learn, easy to use, that's.

**MINI OFFICE** marks a long-awaited breakthrough in dramatically reducing the cost of personal computing.

For the first time it makes available to everyone an easy-to-operate version of four of the most popular business computing applications – and at a price anyone can afford.

Never before has a word processor been sold for anything as low as £5.95. Nor a database manager. Nor a spreadsheet. Nor a graphics program.

Yet Mini Office contains them all.

*So how was it done?*

It all started with a suggestion that we should prepare a package to give readers a gentle introduction to the kind of software that businesses were running on their computers.

At that stage there was no intention that it should be an ambitious package. Just a simple program that could be sold at a very low price.

We called in experts in

processing, database management, spreadsheets and graphics had been turned into a full scale suite of programs covering all four applications.

In fact the only part of the brief that remained was our original insistence that the package should be quick to learn and easy to use.

And despite all the extra sophistication that has been written into it, we decided that, as a service to our readers, the price should still be kept at the very low figure originally fixed.

*How does Mini Office operate?*

Using the **Word Processor** is simplicity itself. There are none of the cryptic coded instructions that had to be mastered by people learning the early word processors.

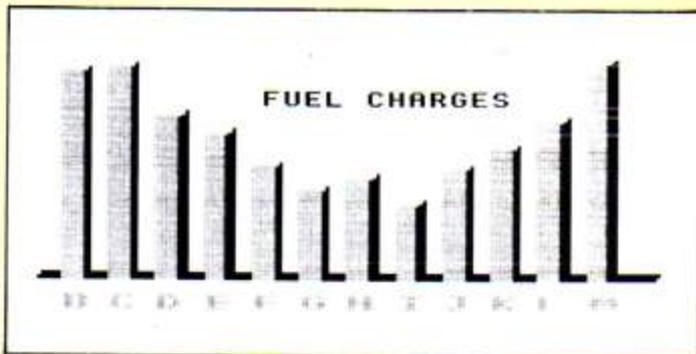
You start by selecting the size of type you prefer – either normal or double-size. The latter is a feature that you

people this could be the first time they can send out a perfectly typed letter without outside help.

Primary school teachers are also expected to make great

it again. It can also be printed out.

The **Database** program can be used to store a mass of information. It can be retrieved, in its entirety or just



Figures on the spreadsheet can produce a bar chart...

use of the double-size function, both on the screen and on hard copy printouts.

While you are using the word processor three useful pieces of information are displayed across the top of the screen.

They tell you how much time has elapsed since you started using it, the number of words you have written so far, and how many characters you can key in before the Electron's memory is full.

At any time you can press a key which tells you your typing speed. This is a most useful function, and can play an important part in increasing your efficiency at the keyboard.

You can also decide the size of the margin, the line length and the tab positions. Text can be moved from one part of the document to another.

At any time you can preview the text to see how it would look when printed out.

As with all the other programs in Mini Office, your work can be saved to tape and loaded when you want to use

the parts you require for a particular purpose, whenever you need it.

The operation is so simple that a useful database can be created in minutes rather than days – and you certainly don't need any computer experience to set it up.

The search facility is very easy to use. You can search for a particular word or part of a word. Or you can order a numeric search – such as telling the computer to find all the numbers greater or less than the one you provide.

You can carry out multiple searches. For instance, if you have built up a mailing list containing a list of names, addresses, telephone numbers, occupations and ages you can ask the database to provide you with a list of teachers living in Liverpool whose ages range from 25 to 30.

One powerful option allows you to replace anything on the database without having to go through the whole lot making amendments yourself. You could, for instance, instruct it

**A unique feature is the double size text option in both printer and edit mode – perfect for young children and people with poor vision.**

The word processor – with double size characters

business software programming, told them what we wanted and sat back to await results.

What happened next was totally unexpected. For they all came back with ideas that were to considerably expand our original brief.

In the end what had been planned as little more than a beginners' guide to word

cannot find on any other word processor.

It is particularly suitable for the partially sighted – in many cases giving them their very first opportunity to use a word processor.

This means they can use an Electron to compose a letter, using the double-size mode, and then print it out using normal size type. For many



to find each reference to "teacher" and replace it with "lecturer".

The **Spreadsheet** is our version of the program that marked a milestone in business computing - Visicalc.

It is often pointed out that this one program alone has helped to sell more personal computers than any other.

Certainly Visicalc and its derivatives have never been shaken from their position at the top of the list of best-selling business programs.

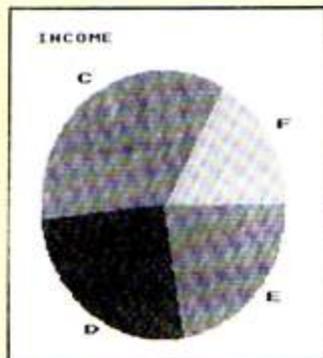
Yet the concept is very simple - a giant worksheet of rows and columns, only part of which can be seen on your screen at any one time. Into any position on the sheet you can put numbers, labels and mathematical formula.

And, when you alter any figure its effect ripples through the rest of the sheet, changing any totals as may be necessary.

The Mini Office version is ideal for home finance, provid-

ing you with an effortless means of keeping tabs on your income and expenditure - and enabling you to work out your own budget.

In our Spreadsheet program - as well as in the Database - we have provided



... or a pie chart

a sample file so that you can experiment with it before entering your own data.

One feature we have included which to our knowledge does not exist in any other spreadsheet is a warning device to prevent you

accidentally erasing formula - a very useful precaution.

The **Graphics** program uses the standard business graphics - line, bar and pie charts - in full colour. Which is something not always available on far more expensive graphics packages.

The program uses data you have already prepared on the spreadsheet. You have to identify which set of information you require to see in graph form - such as by indicating which row or column - and then which of the graphs you require.

The graph is then automatically configured exactly as you require it. If you have an Epson-compatible printer cap-

able of producing graphics you can also print out hard copies for a permanent record.

Because our original intention was to produce a package for people new to all these applications, we have produced a fully-detailed, easy to understand manual.

This 32 page free booklet gives clear instructions about how to use all four programs and in itself forms a concise introduction for first-time users.

If you want to start doing more with your Electron than just playing games, this package is your ideal introduction to the four most popular applications for professional computers.

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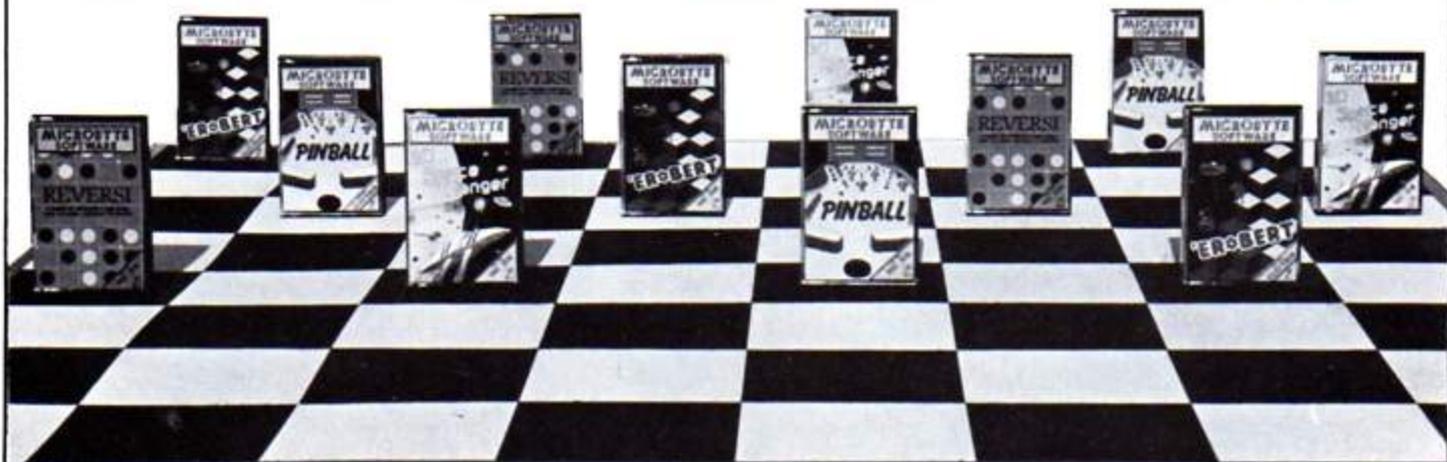
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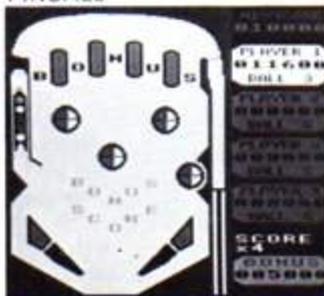
*Electron & BBC 32K*  
Join Erbert in his cubic domain – fast and funny. Avoid his unwelcome guests. Many features – alternative screen displays – addictive!  
MACHINE CODE GAME

3D SPACE RANGER



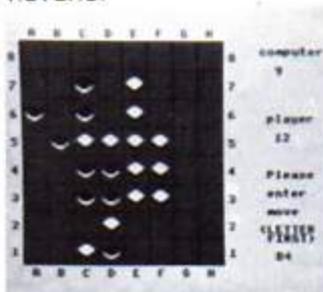
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# Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

## This Ape upgrade is a winner

**Killa**  
*Bit Twiddlers*

HAVING gone ape over Killer Gorilla, it was with keen anticipation that I received a copy of Killa, the upgrade produced by Bit Twiddlers.

The immediate impact of the upgrade is the ability to do varied jumping, with or without the hammer. The jumps featured are double, extended and double extended jumps.

However old habits die hard and it took me some time to familiarise myself with these before I stopped throwing myself off the platforms.

Once I had gained some experience of them I found them invaluable in avoiding multiple fire balls.

Jumping with the hammer only really comes into play on later levels where there are gaps in the platforms.

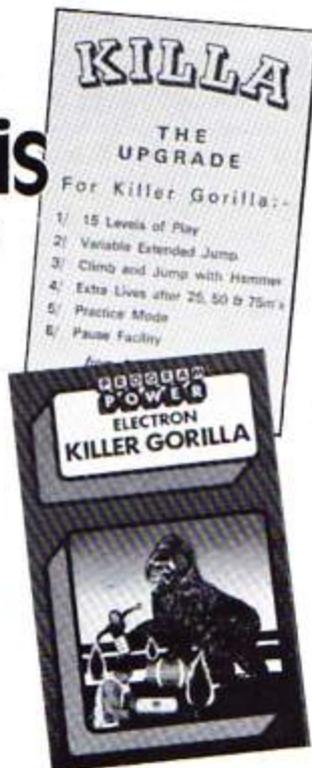
Climbing with the hammer is also useful and increases the point scoring potential, although I found myself in a dilemma on a few occasions when holding a hammer on a platform where another hammer was available.

Should I run with the first or wait and take the second? Initially, hesitation was my downfall.

While retaining the four stages within each level, the upgrade increases the number of levels to seven, these being basically increases in speed.

At level 7 the speed defeated my attempts to complete all the stages and provides a challenge which in the long term will probably prove irresistible.

The extra lives at each of the first three stages, while useful, can also prolong the game beyond the endurance of players waiting to take their



turn. My children were delighted while playing but frustrated while waiting.

There is also a practice mode, providing double the number of lives, which allows the selection of any stage within any of the levels. However, on successful completion of a stage the game moves to the next stage.

A shortcoming is that the practice mode must be selected before the loading of Killer Gorilla without any facility to switch between the practice and game modes other than by reloading the programs.

Apart from doubting the value of this practice mode, I also felt as if I were cheating by going directly to a stage without first completing previous stages.

Without doubt, the most useful facility of the upgrade is the pause. Which of us, on the way to a good score, hasn't been interrupted by a telephone call or a knock on the door?

Altogether, a welcome addition for the Killer Gorilla addicts among us with the pause facility alone being well worth the money.

F.J. Lancaster

## READ ALL ABOUT IT!

**Early Reading**  
*Cheshire Cat Educational Series (AmpalSoft)*

THIS rather smart video-type case includes a useful teacher's or parent's booklet and two cassettes containing a total of four related programs.

These are designed to help early readers with their vocabulary. The four topics have been well selected, and include transport and clothes, as well as sections on In My House and Building a House, all of which can lead to much useful activity at home or school to complement these attractively designed programs.

Each of the four sides loads identically, with two small loaders leading to the main file. There is then in each case an identical choice of activities to select from.

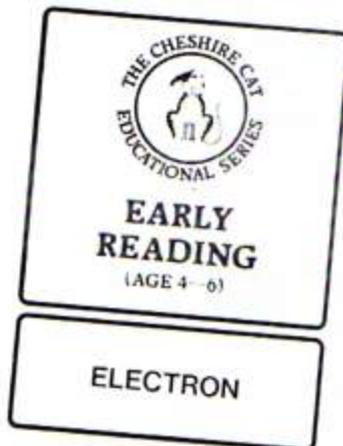
Learn Word does precisely that, and offers a menu of words which are involved in a particular topic. The arrow keys move an asterisk until it is opposite the required word, when pressing Space will show a simple but effective drawing of the object with the word written below.

This may not be the most stimulating part of the tape, but the initial messages have to be well received first.

More to most children's tastes will be Word Games, in which a series of six well-drawn pictures is drawn on screen in a grid.

A word appears below, and the cursor keys again control the movement until the child selects Space to indicate a choice. A correct answer brings a tick, another figure is added to replace the one just guessed, and on goes the child looking for six correct answers.

Actually, wrong answers are impossible for the program will only react to a correct input. This is fairly sound in the



early stages, as it gives the child greater confidence to try.

I was a little concerned at first to see the cursor keys used, but even the five-year-olds I tried this on showed no problems whatever.

Big/Little shows a big object, and the same object much smaller, and the child is then asked to say which shapes are big and which are little.

The last choice, slightly odd, shows lots of the same object all over the screen, it left me wondering why it was included. However, this minor criticism aside, it is a very useful and attractive program for young readers.

Phil Taylor

## Re-write history!

**Trafalgar**  
*Squirrel Software*

DO you know who won the battle of Trafalgar? The British? Wrong, it was the French.

Or at least it was when I chose to play against the

## From Page 27

computer in Squirrel Software's smashing little game Trafalgar.

It opens with an overhead view of the British and French fleets facing each other, ready for battle.

You can either play an opponent (which allows you to choose your side) or the Electron (when you are the British).

Then, as a pointer runs up and down the side of the screen, you pick out which pair of ships are to come alongside each other and let loose a

storm of broadsides.

As soon as a pair of warships has been selected, the scene changes. You see the two ships locked in mortal combat while a text window at the bottom of the screen gives the name of the combatants.

You control the elevation and firing of the guns (keep an eye on the wind speed) and the aim is to hit the enemy ships before they hit you.

Lose all your gun decks and you have to strike your flag and endure the ignominy of being boarded. Lose all your ships and you've lost the battle.

It's an interesting and amusing little game. The controls are easy to use and well explained and the graphics more than adequate.

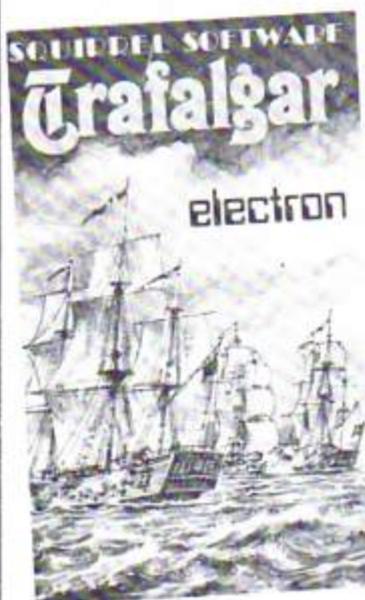
I particularly liked the way the ships show the damage incurred. I also liked the boarding parties – or, rather, my boarding parties.

Combining a war game and an action game – you have to be quick on the trigger – it makes a pleasant change from arcade games which strain your fingers and adventure games that strain your brain.

So if you're looking for something different which will appeal to all the family, Trafalgar fits the bill.

And what other game gives you the chance to rewrite history?

**Trevor Roberts**



## From teaboy to top nob

**Corporate Climber**  
Dynabyte Software

CORPORATE Climber takes you into the cut and thrust world of business.

Here you start as a lowly tea boy and propel yourself along various levels gaining promotion at the end of each until you earn the ultimate accolade – the key to the executive washroom!

Your screen displays a cross section of an office block. You start at the bottom (of course) and work your way across each level, avoiding the taxmen on the way.

The executive washroom is on the roof and it's here where you must end up.

As in real business, there

are pitfalls – this time in the shape of taxmen whizzing up and down in the lifts.

An encounter with one of these fellows sets you back to the beginning of the level you happen to be on at the time.

As all this is going on your bonus, displayed at the top of the screen, is quickly ticking away and when it reaches zero, up goes your blood pressure until you have a heart attack and snuff it. All good clean fun, plenty of colour and good sharp graphics.

There are three levels of skill – easy, suicidal and impossible. And they mean what they say! You also have a choice of sound on or off to preserve your sanity!

**Adam Young**

## Moth terror

**Alien Dropout**  
Superior Software

ALIEN Dropout is a pleasant variation on the space invaders theme. A variation with moths!

The idea is to blast the aliens as they descend from the top of the screen, the laser base moving in the familiar way, firing the familiar missiles.

What's different is the way the moth-like aliens move.

The master moth, who hovers in the centre, is indestructible until you've blasted some 200 of his minions.

This is easier said than done as events tend to catch up with you making life (for you) and death (for the moths) difficult.

On either side of the master moth are five boxes which act as staging posts for the minion moths. Here they collect on their downward journey, not pressing home an attack on your laser base until there are five in a box.

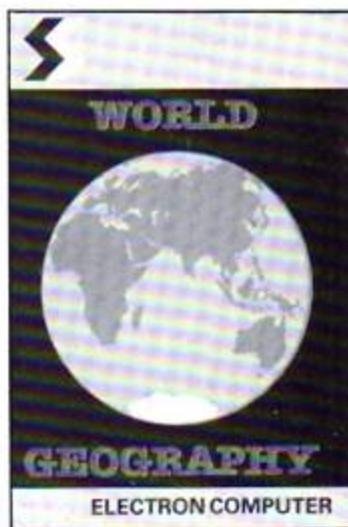
Your aim is to zap the moths before they fill the boxes.

It's not easy, especially as the boss moth is laying down a column of fire that makes moving from one side of the screen to the other a trifle difficult, to say the least.

Eventually the moths make a breakthrough and you become more involved in protecting the laser base than in hitting the moths.

With six levels of play, good clear instructions and easy to use controls, it's a nice variant on an old theme that should appeal to both young and old.

**Adam Young**



## Around the world

**World Geography**  
Superior Software

GEOGRAPHY – not the most exciting subject, is it?

That's what I thought before I began reviewing one of Superior Software's latest releases.

You are first presented with an accurate hi-resolution map of the world, filling the top two thirds of the screen. This is followed by the test at the bottom.

You begin by deciding what you want to be tested on – capitals, populations, or both. You then choose one of the eight levels, which, when put together, cover a massive 166 countries.

On the hardest level you get asked about small countries such as Djibouti, which I had certainly never heard of.

You will probably have wondered how the test on populations works – how accurate answers need to be? Well this program overcomes many problems by saying that any answer within a reasonable percentage is correct. So it will be accurate for many years to come.

While progressing through your test, the country in question is highlighted on the map with a small flashing

circle, enabling you to identify its position.

After being pelted with questions on about 20 countries, your ordeal ends and your percentage of correct answers is given.

It was here that I unearthed a definite bug in my copy of the program. Once you have been given your results, you are asked: "Do you want to try this again?". If your answer is Yes, the program just ends. This means you have to type RUN to carry on.

But overall, I believe this is a well written program. I found it both interesting and absorbing and think it has potential use in both school and home.

**Richard Tacagni**

holds and reel swapping. It also has some highly impressive, if a little slow, graphics such as spinning reels which bounce when they stop, and a coin pile that shows at a glance the state of your finances.

The program makes good use of sound and colour throughout, and includes a very comprehensive instruction program.

I was highly impressed by the quality of this program, which is by far and away the best adaptation I have seen on the fruit machine theme.

Congratulations to Simonsoft for an addictive program providing lots of fun, which at just under £6 has to be one of the best value games around for Electron owners.

**Andrew Oldham**

## Superb program aid

**Gamemaker 2**  
Holly Computers

ONE mark of the success of a home micro is the improvement in both the quantity and quality of the software produced for it.

This program confirms the Electron's place as a micro at the top of its class – a plaudit which can equally be extended to this marvellous program from Holly Computers.

A couple of months ago I reviewed a fairly similar tape which produced sprites for use in one's own programs. Gamemaker2 sets out to be a far more comprehensive aid to the serious games programmer and it succeeds to a most remarkable degree.

The animation which can now be achieved is almost truly professional in smoothness and speed, while the whole system of writing the game program itself is made into a (comparatively) easy affair.

Do not feel, however, that this tape is a magic carpet to success. The 40 page booklet requires a good deal of thought and much practice

will be needed before the process suddenly clicks.

However this approach is not only beneficial to programming development, but is also great fun!

A large number of images may be designed and drawn on screen using a technique that soon becomes straightforward, and it is then possible to assign one or more images to a sprite.

Sprites are the miracles of a computer game, allowing figures to be overlapped and to pass each other without one overwriting and therefore obscuring the other.

The point of assigning two images is that they can differ in the minor details which lead to smooth animation on screen. Obviously a whole series of these could be designed around one main character for the really smooth effects seen in commercial games.

These sprites could then be saved as a file on to tape and \*RUN when the actual game has been written and put on to tape.

A part of the Gamemaker2 program, USER2, remains active at Break, as it is hidden below the new PAGE, and this allows a wide range of new commands to be used during the game.

These additional commands rely on simple mnemonics, so that \*GMd 1 would move sprite number 1 down.

The program also allows for one main character to be driven from the keyboard while others may move in paths already described in the program – although there is even scope for random movement here for the adventurous programmer.

All the integer variables needed for updating, movement, collision detection or reply are clearly detailed and many examples are given of their use.

Holly is allowing games developed using this program to be sold commercially, provided that a simple acknowledgement clause is included.

Yes, for the Electron owner wishing to push the machine to near its limits, save up – or even mortgage the cat. This is a superb program which I thoroughly recommend.

**Phil Tayler**

# BOX OF TRICKS

**Playbox**  
Comsoft

THIS superb tape, containing three separate programs, will be a valuable and popular addition in many schools and homes.

I would certainly have spent my money on it even with only two of the three games – the third is the icing on the cake!

Hangman must have been played in every home and school as it's a superb way of stimulating young children to think about their spelling vocabularies without it ever appearing to be work.

The trouble with some implementations I've seen for micros is that the graphics tend to either be very poor or to emphasise the gory ending of the game.

Here the graphics are bold, colourful and friendly – not even the youngest child would be frightened by them.

There are a variety of vocabularies built into the program, sorted either by age or by subject category.

There is also a most useful option, in which the teacher could input words for the child (perhaps related to a reading scheme or current topic), or two or more children could try to outwit each other.

Although many educationalists frown on competition, children revel in it and the competitive angle is a strong stimulus for some.

The second game is called Memory and is a version of the old but enjoyable game of pairs, played with playing cards.

Here two children play against each other, turning over two cards to reveal pictures and shapes.

When a pair is matched, that child scores a point, the cards are left revealed and the game continues.

The method of entering the chosen cards is simple and fairly young children will soon grasp the idea. Although the graphics are less impressive than in Hangman, they are quite presentable and clear.

**Phil Tayler**



## Fruity but fun

**Superfruit**  
Simonsoft

ARE you the sort of person who takes pleasure in emptying your pockets of hard-earned cash to feed the slot machines on holiday?

If so, you'll love this program from Simonsoft which will soon have you believing you're back on the pier at Eastbourne – except that the money can stay in your pocket.

The game has all the features expected of a real fruit machine including nudges,

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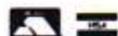
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THE first thing you notice about the new Electron printer interface from First Byte is that it looks attractive.

An eight centimetre square white plastic cartridge, one and a half centimetres thick, it gives off an air of solidity and efficiency. And it lives up to it in practice.

The interface fits snugly on to the Electron's edge connector and stays there. At the back of the cartridge is a 26-way centronics type printer port. The ribbon cable from the printer is attached here.

The Electron is powered on, the printer is brought on line and suddenly your micro can write! It's as easy as that. There's no loading a tape or typing in programs - the interface is ready to go.

The instructions on how to fit the interface and attach the cable are excellent. A model of clarity, they even remind you to take the plastic cover off the edge connector.

# First Byte's printer interface lives up to the small print

By TREVOR ROBERTS

They then tell you how to use the interface, again making something that can seem complicated appear simplicity itself.

You can turn the printer on and off using Ctrl+B and Ctrl+C or, from inside a program, using VDU2 and VDU3.

From then on you can have printouts of all your listings. Until you've used it, you won't believe how much simpler it is to debug a program using hard copy.

This alone would make the printer interface a worthwhile investment. But the advent of

word processors for the Electron will be the main reason people will be looking for printer interfaces.

You're not just stuck with normal printing either as the interface allows you to send control or "escape" characters to the printer.

These are Ascii codes which tell the printer to do such things as italic, bold and condensed printing.

Which code does which depends on the printer being used. Be warned - printer manuals are usually appallingly difficult to understand.

In fact, the instructions on

how to use the interface are some of the best explanations of how to use a printer that I've come across. And the interface lives up to the instructions.

We use all sorts of control codes to get all sorts of printing effects on *Electron User*. Until now we've had to use a BBC Micro, but with the arrival of this interface I've been able to use them all on the Electron and had no problems.

Simple to fit and even simpler to use, well made and well packaged and with its own self-contained software, the First Byte printer interface looks set to emulate the success of the previous joystick interface.

A very good product indeed.

## ELECTRON EDUCATIONAL SOFTWARE

Our educational software is used in thousands of schools and homes throughout Great Britain. Now available on Electron.

**EDUCATIONAL 1** £8.00  
Hours of fun and learning for children aged 5 to 9 years. Animated graphics will encourage children to enjoy maths, counting, spelling and telling the time. The tape includes MATH1, MATH2, CUBECOUNT, SHAPES, SPELL and CLOCK.  
... 'An excellent mixture of games' ...  
Personal Software - Autumn 1983.

**EDUCATIONAL 2** £8.00  
Although similar to Educational 1 this tape is more advanced and aimed at 7 to 12 year olds. The tape includes MATH1, MATH2, AREA, MEMORY, CUBECOUNT and SPELL.

**FUN WITH NUMBERS** £8.00  
This program will teach and test basic counting, addition and subtraction to 4 to 7 years olds. The tape includes COUNT, ADD, SUBTRACT and ROCKET MATHS an arcade type game to exercise addition and subtraction. With sound and visual effects.

**FUN WITH WORDS** £8.00  
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. Complete with sound and graphics. The tape includes ALPHA, VOWELS, THERE, SUFFIXES and HANGMAN.  
... 'Very good indeed' ... A&B Computing - Jan/Feb 1984.

**JIGSAW AND SLIDING PUZZLES** £7.95  
There are 2 jigsaws and 4 sliding puzzles on a 3 x 3 and 4 x 4 grid. Each program starts off at an easy level to ensure initial success but gradually becomes harder. It helps children to develop spatial imagination and in problem solving. The tape includes 6 programs: OBLONG, JIGSAW, HOUSE, NUMBERS, CLOWN and LETTERS.

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# Breakfree!

**BREAKFREE**, written by **JONATHAN CHURCH**, is an Electron version of the arcade classic, and it's a must for action game freaks.

With its 80-brick, multi-coloured advancing wall, changing ball speed, three levels of difficulty and constant onscreen scoring, it's enough to test anyone's wits and reflexes.

You control a yellow bat at the foot of the screen. A red ball darts around, bouncing off anything it encounters.

You must attempt to bounce the ball against every brick in the wall. Unfortunately the ball does not always leave the wall at the same speed that it hit it, so you have to be able to react quickly.

You start the game with three bats but you get a bonus bat every time a wall is totally cleared, along with an extra 500 points and a small tune.

When a wall is cleared a new one will be built lower down the screen - giving you less time to manoeuvre your bat into a position where it is possible to hit the ball.

And to make things even

more difficult the speed of the ball will increase.

Lives are lost when you fail to hit the ball with the bat. When all lives have been lost, you will be played the first few bars of the Death March.

If your score is high enough you will be asked to place your name in the high score Hall of Fame table.

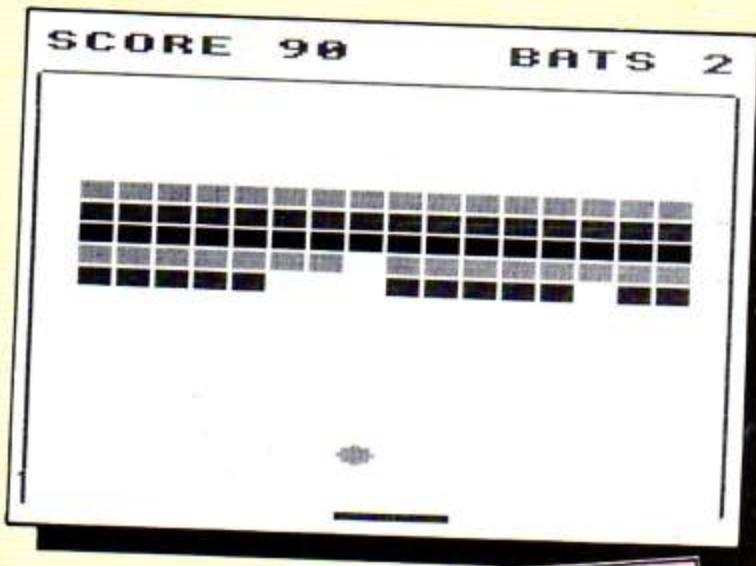
When the program starts you will be given some brief instructions which tell you what keys to press to move the bat, and how many points the different coloured bricks score.

You will then be asked what sound options are required. There are four of these - total sound on, total sound off, game effects only and tunes only.

As well as being able to choose the sound at the start of the game it is also possible to change it during actual play by pressing the relative key - 1, 2, 3 or 4.

Then you will be asked for the ball speed - fast, medium or slow.

During play you can halt the action by pressing Return. The game will resume from where it stopped by pressing any other key.



## SUGGESTED EXTENSIONS

THE wall can be made to move further down when a screen is cleared by increasing the value of *WA%* in line 170.

By changing the string value of *k\$* in line 1170 any keys can be used to move the bat left and right.

The initial speed of the ball can be increased by changing the value of *bdelay%* in line 2080. The smaller the value, the

quicker the action.

Also the responsiveness of the bat can be altered by changing the values of the \*FX calls in lines 830 and 840.

\*FX11 sets the auto-repeat delay on the key, and \*FX12 sets the period of auto-repeat.

For more information on these \*FX calls, see Appendix D on Page 281 of the Electron User Manual.

## PROCEDURES

### PROCinitialise

Produces high score table. Defines graphics and envelopes.

### PROCsetup

Switches cursor off and changes logical colour 3 to actual colour 6. Also sets number of bricks in wall, the score and number of bats left. Sets coordinates for bat and draws it, and redefines key auto-repeat.

### PROCinstructions

Prints instructions. Sets initial speed of ball and sound options.

### PROCnewball

Sets coordinates of ball and initial direction it will take. Also empties input buffer.

### PROCmovebat

Checks whether necessary keys have been pressed to move bat. If they have, the bat is moved one position in correct direction. Also checks whether keys 1, 2, 3 or 4 have been pressed to change the sound options.

### PROCmoveball

Moves ball one position in correct direction. Checks whether ball has hit side of screen, or top or bottom of screen. Also checks whether ball has missed the bat or hit the wall.

### PROCdraw\_wall

Draws wall!

### PROCrestart

Resets speed of ball and position of bat.

### PROCsppedup

Increases speed of ball, checks wall is not too far down the screen, and that ball is not too fast. Also increases amount of bats by one and adds 500 points to score.

### PROCtryhit

### PROCdirection

Checks whether ball has hit the bat. Decides which direction ball will take after hitting the bat.

### PROChitwall

Changes direction of ball. Increases score and changes speed of ball if necessary.

## VARIABLES

**HI%(A)** The Ath high score.  
**HI\$(A)** Name of the Ath highest scorer.  
**SC%** Current score.  
**BRICK%** Number of bricks left in wall.  
**W%** Y coordinate of wall.  
**X%** X coordinate of wall.  
**WA%** Amount to be added to Y coordinate of wall.  
**A%** Colour of a row of bricks.  
**SO%** Volume of tunes.  
**SO1%** Volume of sound effects.  
**C%** Volume and envelope number of a sound statement.  
**P%** Pitch of a note.  
**D%** Duration of a note.  
**del** Delay loop.  
**A\$** Contains the words GAME OVER.  
**Z\$** One of characters of A\$.  
**L%** Position of character Z\$ selected by MIDS in A\$, and its colour.  
**bx%** X coordinate of ball.

**by%** Y coordinate of ball.  
**nx%** X coordinate of space which deletes ball.  
**ny%** Y coordinate of space which deletes ball.  
**WALL%** Logical colour of point the ball is travelling over.  
**btx%** X coordinate of bat.  
**bty%** Y coordinate of bat.  
**BATLEFT%** Number of bats left.  
**missed%** TRUE if ball is below the bat and FALSE if it is above it.  
**ball\$** The ball.  
**bat\$** The bat.  
**xdir%** X direction of ball.  
**ydir%** Y direction of ball.  
**k\$** The time the computer waits for you to press a key.  
**bdelay%, btime%, BTIME** } Delays to stop ball's speed increasing when bat is not being moved.

```

10 REM BREAKFREE
20 REM by J.R.Church
30 REM (C)ELECTRON USER
40 ON ERROR IF ERR=17 TH
EN 80 ELSE MODE6:REPORT:PRI
NT" at line ":ERL:END
50 #FX4,1
60 DIM HI$(10),HIX(10)
70 PROCinitialise
80 MODE 1
90 PROCinstructions
100 MODE 5
110 PROCsetup
120 REPEAT
130 PROCnewball
140 REPEAT
150 PROCmovebat
160 PROCmoveball
170 IF BRICK%=0 THEN MAX=
MAX+2:PRINT TAB(nx%,ny%):"
":PROCdraw_wall
180 UNTIL missed%
190 BATLEFT%=BATLEFT%-1
200 IF SO%=0 OR BATLEFT%=
0 THEN 220
210 FOR P%=80 TO 20 STEP-
4:SOUND 1,-15,P%,1:NEXT
220 COLOUR 2
230 IF BATLEFT%(>0 THEN P
ROCrestart
240 UNTIL BATLEFT%=0
250 PRINT TAB(18,0):BATLE
FT%
260 IF SO%=0 THEN 280
270 FOR del=1 TO 500:NEXT
:RESTORE 2160:FOR NX=1 TO 1
1:READ PX,D%:SOUND 1,-15,PX
,D%:NEXT
280 A$="GAME OVER"
290 FOR LX=1 TO 9
300 Z%=MID$(A$,LX,1)
310 COLOUR LX
320 IF LX=4 OR LX=8 THEN
COLOUR 2
330 FOR del=0 TO 100:NEXT
340 PRINT TAB(15+LX,4):Z%:
350 NEXT LX
360 FOR del=1 TO 3000:NEX
T
370 MODE 1
380 #FX12,0
390 B=10:B$=""
400 FOR A=1 TO 10
410 IF SC%>HIX(A) THEN B=
A:A=10
420 NEXT A
430 FOR A=10 TO B STEP-1:
HIX(A)=HIX(A-1):HIX(A)=HIX(
A-1):NEXT A
440 HIX(B)=SC%:HIX(B)=""
450 VDU 19,2,11,0,0,0
460 COLOUR 1
470 CLS:PRINT" BREA
KFREE hall of fame"
480 PRINT" Today'
s greatest"
490 COLOUR 3
500 FOR A=1 TO B:PRINT TA
B(4,2*A+6):A:":
510 PRINT HIX(A):"... ":H
IX(A):NEXT A
520 IF B>8 THEN PRINT TAB
(5,28):"Press SPACEBAR to p
lay again":GOTO 600
530 COLOUR 2
540 PRINT TAB(7,3):"Pleas
e enter your name"
550 COLOUR 3
560 #FX15,1
570 INPUT TAB(20,2*B+6):HI
$(B)
580 HI$(B)=LEFT$(HI$(B),2
0)
590 PRINT TAB(7,3):SPC(22
):TAB(6,26):"Press SPACEBAR
to play again"
600 #FX15,1
610 REPEAT:A$=GET$:UNTIL
A$=""
620 GOTO 80
630 DEF PROCinitialise
640 FOR IX=1 TO 10:HIX(IX
)="J.R.C.":HIX(IX)=1500:NEX
T
650 VDU 23,225,0,127,127,
127,127,127,127,127
660 VDU 23,226,24,126,126
,255,255,126,126,24
670 VDU 23,227,1,1,1,1,1,
1,1,1
680 VDU 23,228,128,128,128,12
8,128,128,128,128,128
690 VDU 23,229,255,255,25
5,0,0,0,0,0
700 ENVELOPE 2,3,3,-6,3,1
,1,1,126,0,0,-126,126,126
710 ENDPROC
720 DEF PROCsetup
730 VDU 19,3,6,0,0,0
740 VDU 23,1,0,0,0,0,0
750 BRICK%=80:SC%=0:BATLE
FT%=3
760 COLOUR 2
770 PRINT TAB(1,0):"SCORE
":SC%:TAB(13,0):"BATS ":BA
TLEFT%
780 PRINT TAB(1,1):"_____
"
790 FOR VX=2 TO 28:PRINT
TAB(0,VX):CHR$(227):TAB(19,
VX):CHR$(228):NEXT
800 ball%=CHR$(226):btime
%=bdelay%:BTIME=bdelay%:TIM
E=0:btx%=8:bty%=29:bat$=""
+STRING$(3,CHR$(229))+""
810 COLOUR 2
820 PRINT TAB(btx%,bty%):
bat$:
830 #FX11,8
840 #FX12,9
850 PROCdraw_wall
860 ENDPROC
870 DEF PROCnewball
880 PRINT TAB(18,0):BATLE
FT%:TAB(7,0):SC%
890 #FX15,1
900 COLOUR 1
910 PRINT TAB(2,3):"HIT 5
PACEBAR FOR":TAB(4,4):" NE
XT BALL "
920 REPEAT:A$=GET$:UNTIL
A$=""
930 PRINT TAB(2,3):SPC(16
):TAB(6,4):SPC(9)
940 bx%=RND(18):by%=28:xd
ir%=RND(3)-2:ydir%=-1:nx%=b
x%+xdir%:ny%=by%+ydir%:miss
ed%=FALSE
950 COLOUR1
960 PRINT TAB(bx%,by%):ba
ll%
970 ENDPROC
980 DEF PROCmoveball
990 COLOUR 1
1000 IF TIME<btime% THEN E
NDPROC
1010 btime%=TIME+bdelay%
1020 IF by%=30 THEN PRINT

```

**Turn to Page 53**

# ALPHASWAP

THE Electron becomes a brain-teasing machine with Alphaswap, a solo logic game from PETER HART.

When you run the program the first 16 letters of the alphabet are displayed – in order – on the screen.

Then the micro mixes them up, leaving you the job of getting them back to the original alphabet.

But it's not as easy as it might seem. To get them back into order you have to pick groups of four letters at a time and rotate them in an anticlockwise direction.

This is done by telling the

Electron the top left letter of the four you want to move.

And that's all there is to it. The rules are simple – the

game itself isn't!

If you fancy yourself as a mental athlete, then Alphaswap is the game for you.



10

60  
70

80  
90

100

110-200

220-260

280-510

530-640

660-710

730-770

790-900

920-1060

1080-1140

1160-1270

1290-1620

1640-1720

1730-1790

1810-2070

Programs function key 0 to play the game again.

Sets background colour to blue.

Defines a text window in which the Electron can comment on the player's actions.

Says goodbye to the flashing cursor!

Sets the graphics operations such that any colour plotted will invert the colour already there. Since it is in Mode 4 (two colours), it will first plot the desired letter by inverting the background to the foreground colour. Then, by plotting the same letter in the same place, it will invert the colour back to the background colour, making it disappear.

Dimensions arrays to hold letters and their positions. *R* holds the rows. *C* the columns. *LS* the present letters. *FS* holds correct positions of letters for checking.

Main program segment. Initialises arrays and sets up screen. It then muddles up the letters and enters the game loop which repeats until letters are correctly positioned.

Gets a letter from the keyboard. \*FX15.1 clears the buffer.

Joins text and graphics cursors. The first loop assigns a letter to each element of *LS* and then repeats for each element of *FS*. *G* is the gap between each letter, with *X*, *Y* being the position of first letter plotted. The others are plotted relative to this (lines 420-480) and their positions are "remembered" with the arrays *C* and *R*.

Moves the relevant four letters.

Plots these four letters.

Forms a delay, used throughout the program.

Gives introduction to game.

Steps letters anticlockwise by continually plotting and unplotting them.

Checks whether player has returned all letters to their original positions by comparing *LS* and *FS*.

Plays a tune and congratulates player.

Muddles up letters, the amount of muddle depending on level chosen.

Decides whether letter is on the bottom or righthand edge.

Sets up sounds used throughout the program.

Gives player instructions and choice of difficulty.

```

1REM*****
*****
2REM**
**
3REM**   ALPHASWAP
**
4REM**
**
5REM**   BY PETER HART
**
6REM**
**
7REM** (C) ELECTRON USE
R **
8REM**
**
9REM*****
*****
10*KEY0 CLEAR IM GOTO 20
IM
20MODE6
30PROCintro
40PROCinstructions
50MODE4
60VDU19,0,4;0,0,0
70VDU28,0,28,25,26
80VDU23;B202;0;0;0;
90GCQL4,1
100DIM R(4),C(4),L$(4,4),
F$(4,4)
110PROCinit
120PROCmuddle(level$)
130REPEAT
140PROCinput
150PROClegalmove
160PROCcheckfinished
170UNTIL flag>=16
180MODE6
190PROCfinished
200END
210REM*****
*****
220DEF PROCinput
230PRINT " Ready "
240*FX15,1
250key$=GET$
260ENDPROC
270REM*****
*****
280DEF PROCinit
290VDU5
300FOR F=1 TO 4
310FOR L=1 TO 4
320READ L$(F,L)
330NEXT L
340NEXT F
350RESTORE
360FOR F=1 TO 4
370FOR L=1 TO 4
380READ F$(F,L)
390NEXT L
400NEXT F

```

```

4106=150:X=450:Y=850
420FOR J= 1 TO 4
430FOR I=1 TO 4
440C(I)=X+(I-1)*6
450R(J)=Y-(J-1)*6
460MOVE C(I),R(J):PRINT L
$(J,I)
470NEXT I
480NEXT J
490DATA A,B,C,D,E,F,G,H,I,
J,K,L,M,N,O,P
500VDU4
510ENDPROC
520REM*****
*****
530DEF PROCmove(J,I,T)
540VDU5
550PROCdraw(J,I)
560DUM#=L$(J,I)
570L$(J,I)=L$(J,I+1)
580L$(J,I+1)=L$(J+1,I+1)
590L$(J+1,I+1)=L$(J+1,I)
600L$(J+1,I)=DUM#
610IF T=0 THEN PROCwalkie
$(J,I)
620PROCdraw(J,I)
630VDU4
640ENDPROC
650REM*****
*****
660DEF PROCdraw(J,I)
670FOR Z=0 TO 1
680FOR W=0 TO 1
690MOVEC(I+W),R(J+Z):PRIN
TL$(J+Z,I+W)
700NEXTW,Z
710ENDPROC
720REM*****
*****
730DEF PROCdelay(seconds)
740TIME=0
750REPEAT
760UNTIL TIME>=50*(second
s)
770ENDPROC
780REM*****
*****
790DEF PROCintro
800 VDU 23;8202;0;0;0;
810PRINTTAB(12,3)"ALPHASW
AP"
830REMROCDelay(3):CLS
840PRINT"" The game
commences with a square
of letters in alphabeti
cal order. They will
then be rearranged."
850PRINT"" The object
is simple:"
860PRINT"" Put the sq
uare back in order!"
870 PRINTTAB(4,20)"PRESS
SPACE BAR TO CONTINUE."
880 D=GET
890CLS
900ENDPROC
910REM*****
*****
920DEF PROCwalkies(J,I)
930PROCSOU(2)
940FOR LOOP =0 TO 4
950step=LOOP*30
960MOVE C(I),(R(J)-step):
PRINTL$(J+1,I)
970MOVE C(I+1)-step),R(J
):PRINTL$(J,I)
980MOVE C(I+1),(R(J+1)+st
ep):PRINTL$(J,I+1)
990MOVE C(I)+step),R(J+1
):PRINTL$(J+1,I+1)
1000REMPROCDelay(1)
1010MOVE C(I),(R(J)-step):
PRINTL$(J+1,I)
1020MOVE C(I+1)-step),R(J
):PRINTL$(J,I)
1030MOVE C(I+1),(R(J+1)+st
ep):PRINTL$(J,I+1)
1040MOVE C(I)+step),R(J+1
):PRINTL$(J+1,I+1)
1050NEXT LOOP
1060ENDPROC
1070REM*****
*****
1080DEF PROCcheckfinished
1090flag=1
1100FOR rx=1 TO 4
1110FOR cx=1 TO 4
1120IF F$(rx,cx)=L$(rx,cx)
THEN flag=flag+1
1130NEXT cx
1135NEXT rx
1140ENDPROC
1150REM*****
*****
1160DEF PROCfinished
1170SOUND 1,-15,97,10
1180SOUND 1,-15,105,10
1190SOUND 1,-15,89,10
1200SOUND 1,-15,41,10
1210SOUND 1,-15,69,20
1220 FOR T=0 TO 8
1230 VDU 23,1,0;0;0;0;PRI
NTTAB(RND(10),RND(18))"CONG
RATULATIONS"
1240PRINT:PROCdelay(0.5):C
LS:NEXT T
1250 PRINTTAB(3,19)"
Press f0 to play again."
1260VDU23;8202;0;0;0;
1270ENDPROC
1280REM*****
*****
1290 DEF PROCmuddle(level$)
1300 VDU5:MOVE30,1000
1310PRINT"" Level:";level
$:VDU4
1320PRINT"" wait";
1330 PROCdelay(5)
1340PROCmove(1,1,0)
1350PROCmove(3,1,0)
1360PROCmove(1,3,0)
1370PROCmove(3,3,0)
1380IF level$="1" THEN END
PROC
1390PROCmove(2,2,0)
1400IF level$="2" THEN END
PROC
1410PROCmove(2,2,1)
1420PROCmove(1,1,1)
1430PROCmove(2,2,1)
1440PROCmove(1,3,0)
1450PROCmove(2,3,0)
1460PROCmove(3,3,1)
1470IF level$="3" THEN END
PROC
1480PROCmove(1,2,0)
1490PROCmove(2,2,0)
1500PROCmove(2,1,0)
1510PROCmove(1,3,0)
1520PROCmove(2,1,0)
1530PROCmove(2,2,0)
1540IF level$="4" THEN END
PROC
1550PROCmove(2,2,1)
1560PROCmove(1,1,1)
1570PROCmove(1,3,1)
1580PROCmove(2,3,1)
1590PROCmove(3,1,1)
1600PROCmove(2,2,1)
1610VDU4
1620 ENDPROC
1630REM*****
*****
1640 DEF PROClegalmove
1650legal=0
1660FOR row=1 TO 3
1670FOR col=1 TO 3
1680IFkey=L$(row,col)THEN
legal=1:J=row:I=col
1690NEXT col
1700NEXT row
1710IF legal=0 THEN PRINT'
"ILLEGAL MOVE-TRY AGAIN":P
ROCSOU(1):PROCdelay(2) ELSE
PROCmove(J,I,0)
1720ENDPROC
1730REM*****
*****
1740DEF PROCSOU(T)
1750ENVELOPE 1,1,3,4,2,2,3
,3,26,-4,0,-4,126,126
1760ENVELOPE 2,1,38,5,3,3,
2,3,56,-1,0,-1,126,126
1770IF T=1 THEN SOUND 1,1,
63,6
1780IF T=2 THEN SOUND 2,2,
35,4
1790ENDPROC
1800REM*****
*****
1810DEF PROCinstructions
1820PRINTTAB(2,10)"DO YOU
WANT INSTRUCTIONS ( Y ( N"
1830I$=GET$
1840IF I$="N" OR I$="n" T
HEN GOTO 1960
1850IF I$(">)"Y" OR I$="y" T
HEN 1820
1860CLS
1870PRINT"" The squar
e will be displayed in the
correct order for a sho
rt time. It will th
en be rearranged."
1880PRINT"" The only a
ovement possible is to
rotate a square of four
letters anticlockwise."
1890PRINT"" This is ac
hieved by pressing the
top left letter of the c
hosen four."
1900PRINT"" e.g. By
pressing A."
1910PRINT"" A B C
B E C"
1920PRINT " D E F be
comes A D F"
1930PRINT " G H I
G H I"
1940PRINT"" PRESS SPA
CE BAR TO CONTINUE"
1950 D$=GET$
1960CLS
1970PRINTTAB(18,5)"LEVEL"
1980PRINTTAB(12)"
"
1990PRINT' TAB(13)"1 - BEG
INNER"
2000PRINT' TAB(13)"2 - EAS
Y"
2010PRINT' TAB(13)"3 - HAR
D"
2020PRINT' TAB(13)"4 - EXP
ERT"
2030PRINT' TAB(13)"5 - IMP
OSSIBLE"
2040PRINT""TAB(5)"Which
level?"
2050level$=GET$
2060IF(level$("<)"1" OR level
$(">)"5") GOTO 2050
2070ENDPROC

```

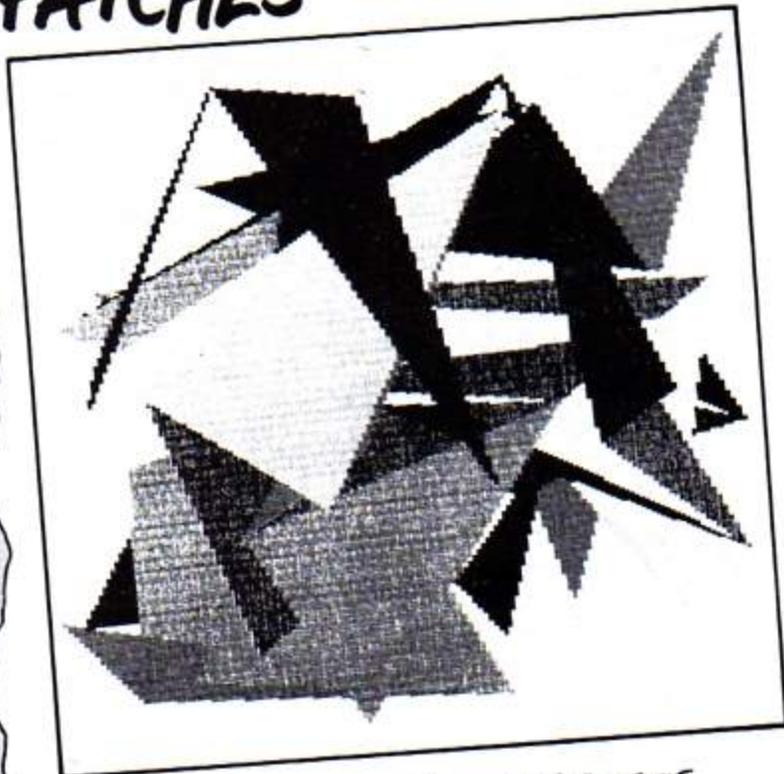
*This listing is included in this month's cassette tape offer. See order form on Page 47.*

SCRAPBOOK is where we display some of the many interesting routines sent in by readers.

Each month we'll share graphics programs, utilities, maths programs or simple games. So don't be shy - send in yours now!

# SCRAPBOOK

## PATCHES

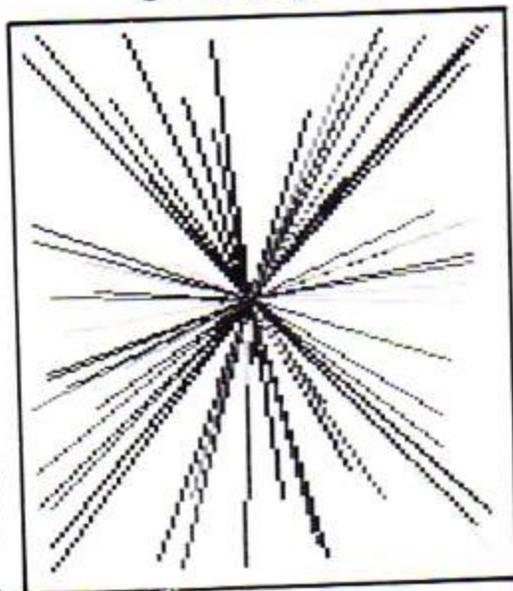


ALAN BAINBRIDGE'S use of PLOT 85

```

10 REM PATCHES
20 REM ALAN BAINBRIDGE
30 REM THACKLEY, BRADFORD
40 MODE 2
50 REPEAT
60 VDU 23,1,0;0;0;0;
70 FOR X=1 TO 25
80 GCOL 0,RND(7)
90 MOVE RND(1200),RND(1000)
100 PLOT 85,RND(1200),RND(1000)
110 NEXT X
120 V=INKEY(500)
130 VDU 7
140 CLG
150 UNTIL 0
    
```

## SPOKES



A BARTLETT and ROLFE production

```

10 REM SPOKES
20 REM A.BARTLETT
30 REM M.ROLFE
40 MODE 2
50 VDU 23,1,0;0;0;0;
60 COLOUR 135
70 CLS
80 FOR Z=0 TO 360
90 GCOL 0,RND(7)
100 X=400*SIN(RND(100))
110 Y=400*COS(RND(100))
120 MOVE 650,500
130 DRAW 650+X,500+Y
140 NEXT
    
```

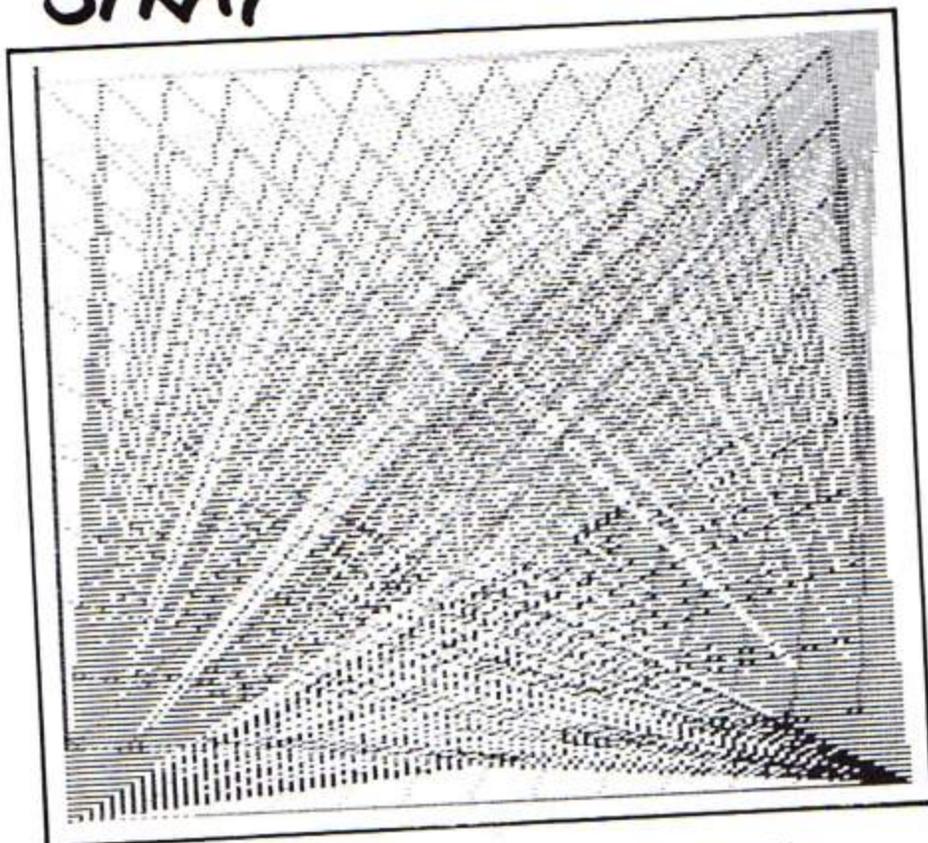
## RADAR

Graphics action from PETER O'BRIEN

```

10 REM RADAR
20 REM PETER O'BRIEN
30 REM MOLD, CLWYD
40 MODE 2
50 MOVE 639,511
60 GCOL 0,RND(7)
70 DRAW RND(1279),RND(1023)
80 SOUND 1,-5,150,1
90 GOTO 40
    
```

# SPRAY



BARTLETT, ROLFE  
and lots and  
lots of lines

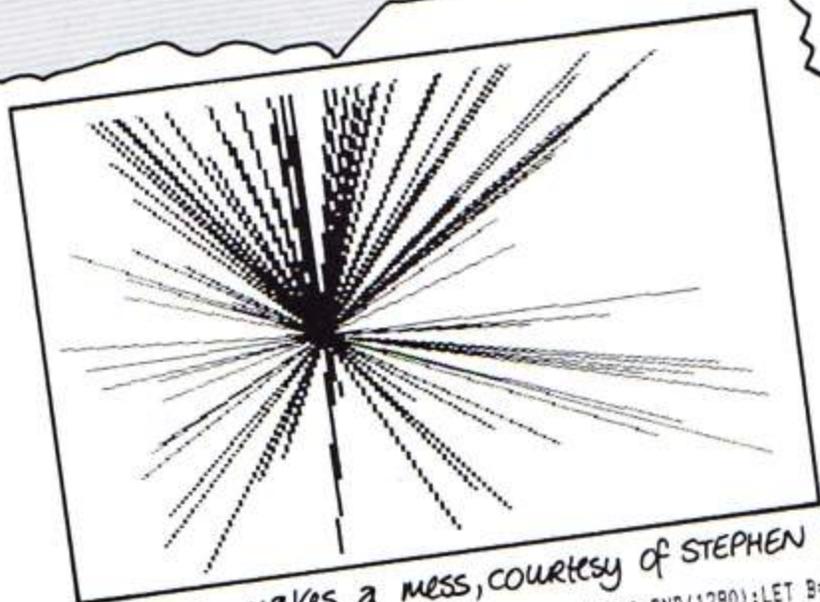
```
10 REM SPRAYS
20 REM A.BARTLETT
30 REM M.ROLFE
40 MODE 2
50 VDU 23,1,0;0;0;0;
60 COLOUR128:CLS
70 GCOLO,RND(7)
80 FOR X=1 TO 1279 STEP 100
90 FOR Y=1 TO 1023 STEP 100

100 MOVE 1279,1023
110 PLOT 21,X,Y
120 NEXT:NEXT
130 GCOLO,RND(7)
140 FOR X=1 TO 1279 STEP 100
150 FOR Y=1 TO 1023 STEP 100

160 MOVE 0,0
170 PLOT 21,X,Y
180 NEXT:NEXT
190 GCOLO,RND(7)
200 FOR X=1 TO 1279 STEP 100
210 FOR Y=1 TO 1023 STEP 100

220 MOVE 1279,0
230 PLOT 21,X,Y
240 NEXT:NEXT
250 GCOLO,RND(7)
260 FOR X=1 TO 1279 STEP 100
270 FOR Y=1 TO 1023 STEP 100

280 MOVE 0,1023
290 PLOT 21,X,Y
300 NEXT:NEXT
```



Your Electron makes a mess, courtesy of STEPHEN MARTIN

# BLOT

```
10 REM BLOT
20 REM STEPHEN MARTIN
30 REM NORWOOD LONDON
40 MODE 5
45 VDU23,1,0;0;0;0;
50 FOR X=0 TO 100 STEP 1
60 LET A=RND(1280):LET B=RND(1280)
70 MOVE 500,500
80 DRAW A,B
90 NEXT
100 REPEAT UNTIL FALSE
```

Send your programs to  
Scrapbook, *Electron*  
User, 68 Chester Road,  
Hazel Grove, Stockport  
SK7 5NY.

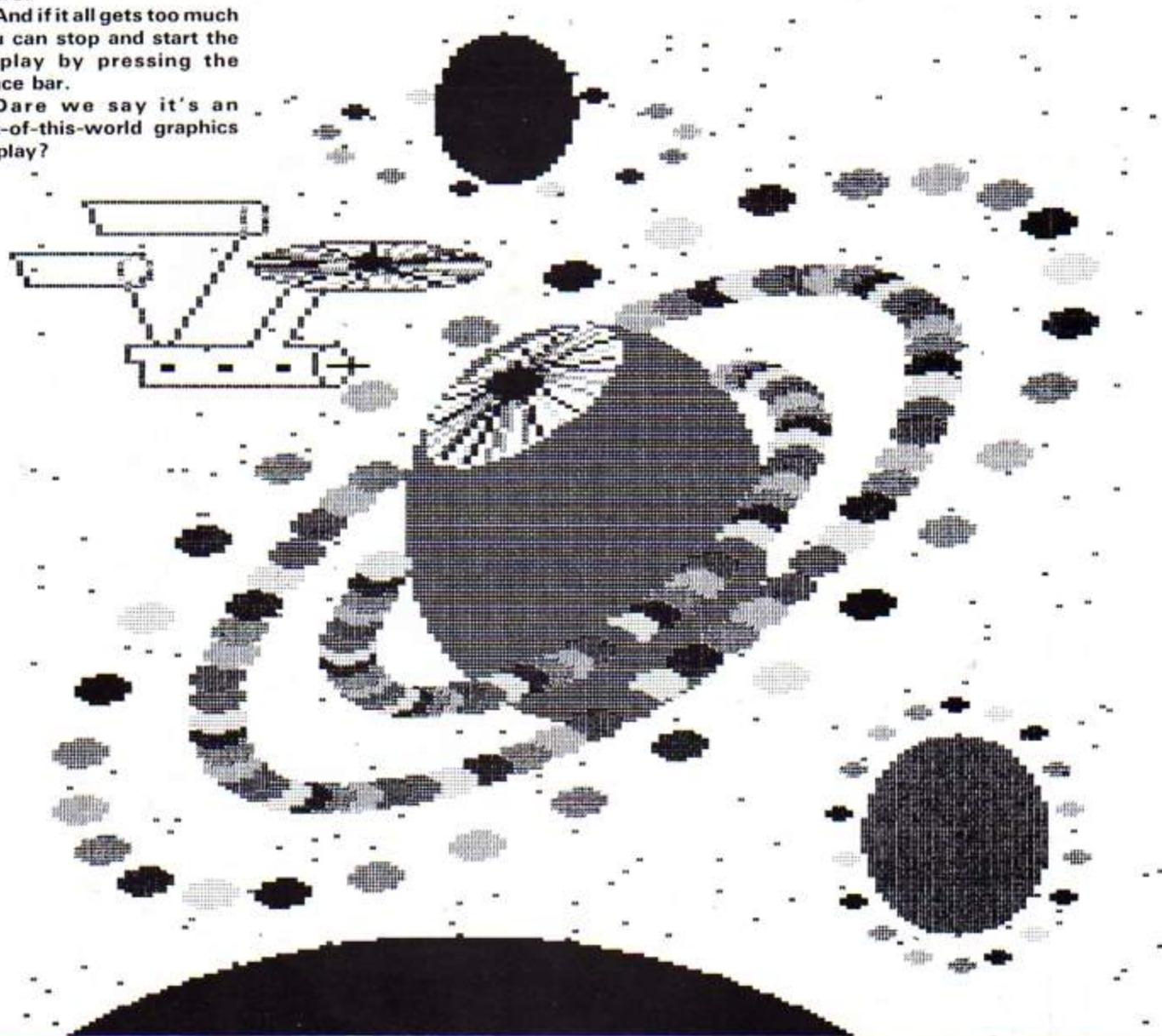
THE Electron enters outer space with this stunning display of palette switching from KEN GOODACRE of Sheffield.

Type in the program, run it and be amazed by the graphics power of your micro.

And if it all gets too much you can stop and start the display by pressing the space bar.

Dare we say it's an out-of-this-world graphics display?

# RIGEL 5



## Rigel 5 listing

```

10REM THE RIGEL 5 GALAXY
20REM PALETTE SWITCHING
30REM BY K.GOODACRE
40REM (C)ELECTRON USER
50MODE1
60ON ERROR MODE6:PRDCerr
or:END
70VDU23,1;0;0;0;0
80PROCtitle
90MODE2
100VDU23,1;0;0;0;0
110PROCinit
120PROCstars(14)
130PROCworld(640,512,200,
13)
140PROCworld(500,-900,100
0,15)
150PROCworld(1050,200,100
,14)
160PROCsat(1050,200)
170PROCworld(550,925,75,1
5)
180PROCmoons(550,925)
190PROCcap
200PROCtwirl
210PROCcenterprise
220PROCouter(550,600,512,
0,360)
230PROCorbit(400,600,512,
0,2,330)
240PROCorbit(250,600,512,
0,8,305)
250PROCspin
260END
270DEF PROCtitle
280COLOUR1
290PRINT TAB(10,10)*THE R
IGEL 5 GALAXY?*
300PRINT TAB(10,12)*^^^ ^
^^^ ^ ^^^^^^^
310COLOUR2
320PRINT TAB(13,16)*BY K.
GOODACRE*
330PROCstars(3)
340CLB
350ENDPROC
360DEF PROCinit
370COLOUR4
380PRINT TAB(4,15)*initia
lising*
390VDU23,225,28,126,127,2
55,255,254,126,56
400VDU23,226,0,0,0,0,96,2
40,240,96
410*FX11,0
420VDU5
430AX=4 :REM Colour Of La
rge Planet
440BX=3 :REM Colour Of Sm
all World And Stars

```

```

450CX=1 :REM Colour Of As
teriods
460DX=1 :REM Colour Of RI
GEL 5
470EX=7 :REM Colour Of Sa
telites
      And Moons
480FX=4 :REM Colour Of Ri
ngs
490TX=0 :REM Speed Of rot
ation
500TILT=0.5
510PITCH=0.5
520VDU19,13,AX,0,0,0
530VDU19,14,BX,0,0,0
540VDU19,15,DX,0,0,0
550FOR A=7 TO 12
560VDU19,A,A-6,0,0,0
570NEXT
580FOR B=2 TO 6
590VDU19,B,4,0,0,0
600NEXT
610FOR T=0 TO 2000:NEXT

620CL6
630ENDPROC
640DEF PROCorbit(XIZE,XPO
S,YPOS,START,FINISH)
650C=0
660FOR A=START TO RADFINI
SH STEP0.1
670C=C+1:IF C>6 THEN C=1

680XX=XPOS+XIZE*SIN(A)
690YY=YPOS+XIZE*(COS(A)*S
IN(TILT)+SIN(A)*COS(TILT)*P
ITCH)
700MOVEXX,YY
710GCOLOR,C
720VDU225
730NEXT
740ENDPROC
750DEF PROCspin
760*FX15,1
770N=0:M=6
780N=N+1:M=M+1
790IF N>6 THEN N=1
800IF M>12 THEN M=7
810VDU19,N,CX,0,0,0
820VDU19,M,EX,0,0,0
830FOR T=0 TO TX:NEXT
840X=INKEY(0):IF X=32 THE
N 880 ELSE 850
850VDU19,N,FX,0,0,0
860VDU19,M,0,0,0,0
870GOTO 780
880X=INKEY(0):IF X=32 THE
N 900 ELSE 890
890GOTO 880
900FOR A=1 TO 6:VDU19,A,F
%,0,0,0:NEXT

910FOR B=7 TO 12:VDU19,B,
0,0,0,0:NEXT
920GOTO 780
930ENDPROC
940DEF PROCworld(X,Y,R,C)
950GCOLOR,C
960FOR I=Y+R TO Y-R STEP-
4
970IF I<0 THEN 1030
980J=SQR(ABS(R*(R-(I-Y)*(I
-Y))))
990MOVE X-J,I
1000DRAW X+J,I
1010NEXT
1020MOVE X,Y
1030ENDPROC
1040DEF PROCstars(C)
1050HX=0
1060REPEAT
1070GCOLOR,C
1080PLOT69,RND(1279),RND(1
023)
1090HX=HX+1
1100UNTIL HX>300
1110ENDPROC
1120DEF PROCtwirl
1130C=6
1140FOR A=RAD360 TO 0 STEP
-0.21
1150C=C+1:IF C>12 THEN C=7

1160XX=570+100*SIN(A)
1170YY=640+100*(COS(A)*SIN
(TILT)+SIN(A)*COS(TILT)*PIT
CH)
1180MOVE560,660
1190GCOLOR,C
1200DRAWXX,YY
1210NEXT
1220GCOLOR,15
1230MOVE535,665
1240VDU225
1250ENDPROC
1260DEF PROCcap
1270GCOLOR,0
1280MOVE640,710
1290FOR A=0 TO RAD360 STEP
0.1
1300XX=570+105*SIN(A)
1310YY=640+105*(COS(A)*SIN
(TILT)+SIN(A)*COS(TILT)*PIT
CH)
1320MOVE540,670
1330PLOT85,XX,YY
1340NEXT
1350ENDPROC
1360DEF PROCouter(XIZE,XPO
S,YPOS,START,FINISH)
1370C=6
1380FOR A=RADFINISH TO STA
RT STEP-0.21
1390C=C+1:IF C>12 THEN C=7
1400XX=XPOS+XIZE*SIN(A)
1410YY=YPOS+XIZE*(COS(A)*S
IN(TILT)+SIN(A)*COS(TILT)*P
ITCH)
1420MOVEXX,YY
1430GCOLOR,C
1440VDU225
1450NEXT
1460ENDPROC
1470DEF PROCmoons(X,Y)
1480C=6
1490FOR A=0.5 TO RAD340 ST
EP0.48
1500C=C+1:IF C>12 THEN C=7
1510XX=X+200*SIN(A)
1520YY=Y+50*COS(A)
1530GCOLOR,C
1540MOVEXX-10,YY-5
1550VDU226
1560NEXT
1570ENDPROC
1580DEF PROCsat(X,Y)
1590C=6
1600FOR A=RAD360 TO 0 STEP
-0.35
1610C=C+1:IF C>12 THEN C=7

1620XX=X+130*SIN(A)
1630YY=Y+130*COS(A)
1640MOVEXX-10,YY+25
1650GCOLOR,C
1660VDU226
1670NEXT
1680ENDPROC
1690DEF PROCenterprise
1700GCOLOR,14
1710PROCsaucer(400,770,130
,25)
1720PROCsaucer(360,670,20,
20)
1730PROClights(400,770,125
,20)
1740GCOLOR,14
1750PROCbody
1760GCOLOR,15
1770PROCparts
1780PROCengine(140,765)
1790PROCengine(272,817)
1800ENDPROC
1810DEF PROCsaucer(X,Y,XL,
YL)
1820MOVEX,Y+25
1830FOR A=0 TO RAD370 STEP
0.4
1840XX=X+XL*SIN(A)
1850YY=Y+YL*COS(A)
1860DRAWXX,YY
1870NEXT
1880ENDPROC
1890DEF PROClights(X,Y,XL,
YL)
1900C=6
1910FOR A=0 TO RAD360 STEP
0.21
1920C=C+1:IF C>12 THEN C=7
1930XX=X+XL*SIN(A)
1940YY=Y+YL*COS(A)
1950GCOLOR,C
1960MOVEX,Y
1970DRAWXX,YY
1980NEXT
1990ENDPROC
2000DEF PROCparts
2010MOVE370,785:PRINT"*"
2020MOVE150,690:PRINT*".";"
".";"*"
2030MOVE350,683:PRINT*"-*
"
2040ENDPROC
2050DEF PROCengine(X,Y)
2060C=0
2070FOR A=0 TO RAD360 STEP
0.21
2080C=C+1:IF C>6 THEN C=1

2090XX=X+15*SIN(A)
2100YY=Y+17*COS(A)
2110GCOLOR,C
2120PLOT69,XX,YY
2130NEXT
2140ENDPROC
2150DEF PROCbody
2160FOR A=1 TO 20
2170READ P,X,Y
2180PLOT P,X,Y
2190NEXT
2200DATA 4,310,745 ,5,270,
690 ,5,130,690 ,5,130,675 ,
5,150,675 ,5,150,650
2210DATA 5,350,650 ,4,350,
745 ,5,310,690 ,5,350,690 ,
4,180,690 ,5,260,800
2220DATA 5,100,800 ,5,80,8
35 ,5,260,835 ,4,160,690 ,5
,130,750 ,5,20,750 ,5,0,780
2230DATA 5,130,780
2240ENDPROC
2250DEF PROCerror
2260REPORT:PRINT" at line
";ERL
2270*FX12,0
2280VDU14
2290FOR S=252 TO 0 STEP-7
2300SOUND#0011,-15,S,1
2310NEXT
2320SOUND0,-15,4,4
2330ENDPROC

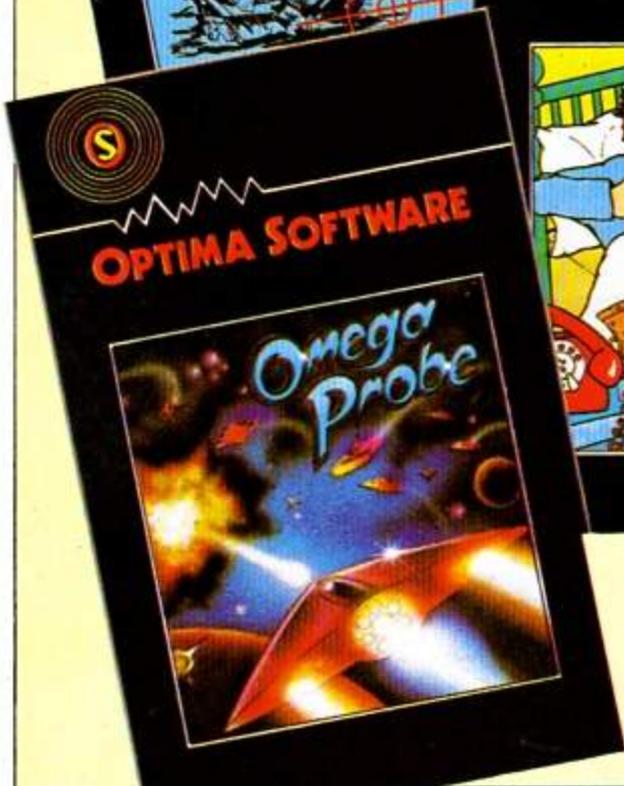
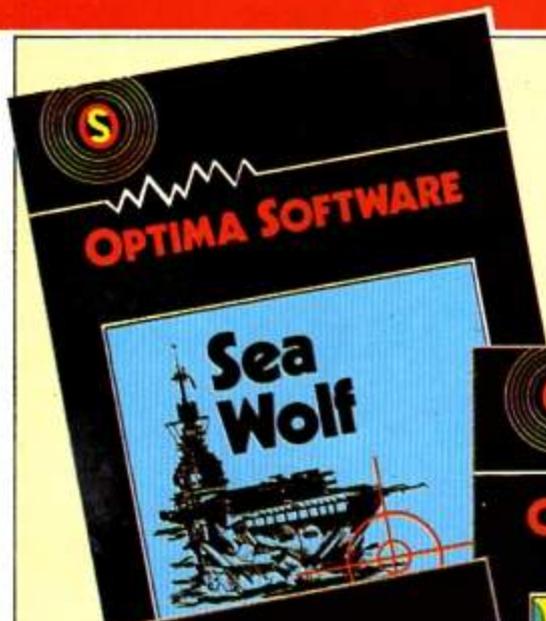
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# Make light work of listings

To save your fingers most of the listings in *Electron User* have been put on tape.

## On the October tape:

**BREAKFREE** Classic arcade action. **ALPHASWAP** A logic game to strain your brain. **SOUND GENERATOR** Tame the Electron's sound channels. **MULTICHARACTER GENERATOR** Complex characters made simple. **RIGEL 5** Out of this world graphics. **MAYDAY** Help with your morse code. **NOTEBOOK** Palindromes and string handling.

## On the September tape:

**HAUNTED HOUSE** Arcade action in the spirit world. **SPLASH** A logic game for non-swimmers. **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. **MOVER** Keep that alien under control. **NOTEBOOK** Sound and graphics action.

## On the August tape:

**SANDCASTLE** The Electron seaside outing. **KNOCKOUT** Bouncing balls batter brick walls. **PARACHUTE** Keep the skydivers dry. **LETTERS** Large letters for your screen. **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. **FAST ELLIPSE** Speedy graphics. **NOTEBOOK** Lines and patterns explained.

## On the July tape:

**GOLF** A day on the links with your Electron. **SOLITAIRE** The classic solo logic game. **TALL LETTERS** Large characters made simple. **BANK ACCOUNT** Keep track of your money. **CHARTIST** 3D graphs. **FORMULAE** Areas, volumes and angles.

## On the June tape:

**MONEY MAZE** Avoid the ghosts to get the cash. **CODE BREAKER** A mastermind is needed to crack the code. **ALIEN** See little green men - the Electron way! **SETUP** Colour commands without tears. **CRYSTALS** Beautiful graphics. **LASER SHOOT OUT** An intergalactic shooting gallery. **SMILER** Have a nice day!

## On the May tape:

**RALLY DRIVER** High speed car control. **SPACE PODS** 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 noughts and crosses. **ELECTRON DRAUGHTSMAN** Create and save Electron masterpieces. **SHEEP** A program for insomniacs. **MATHS HIKE** Mental arithmetic.

## On the April tape:

**SPACEHIKE** A hopping arcade classic. **FRIEZE** Electron wallpaper. **PELICAN** Cross roads safely. **CHESSTIMER** Clock your moves. **ASTEROID** Space is a minefield. **LIMERICK** Automatic rhymes. **ROMAN** Numbers in the ancient way. **BUNNYBLITZ** The Easter program. **DOGDUCK** The classic logic game.

## On the March tape:

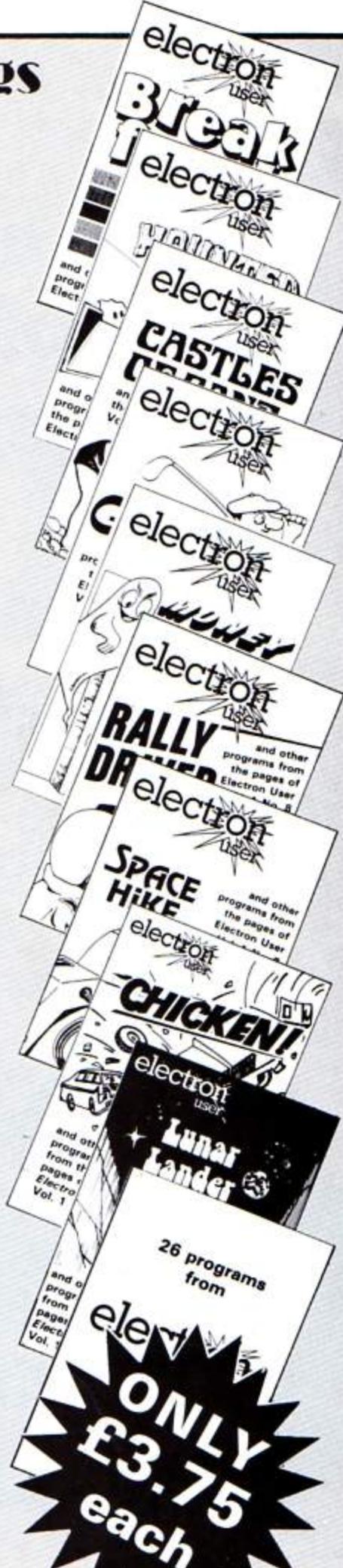
**CHICKEN** Let dangerous drivers test your nerve. **COFFEE** A tantalising word game from Down Under. **PARKY'S PERIL** Parky's lost in an invisible maze. **REACTION TIMER** How fast are you? **BRAINTEASER** A puzzling program. **COUNTER** Mental arithmetic can be fun! **PAPER, SCISSORS, STONE** Out-guess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

## On the February tape:

**NUMBER BALANCE** Test your powers of mental arithmetic. **CALCULATOR** Make your Electron a calculator. **DOILIES** 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. **MOON RESCUE** Avoid the asteroids and save the spacemen.

## On the introductory tape:

**ANAGRAM** Sort out the jumbled letters. **DOODLE** Multicoloured graphics. **EUROMAP** Test your geography. **KALEIDOSCOPE** Electron graphics run riot. **CAPITALS** New upper case letters. **ROCKET, WHEEL, CANDLE** Three fireworks programs. **BOMBER** Drop the bombs before you crash. **DUCK** Simple animation. **METEORS** Collisions in space. **COMBINATIONS** Crack the code.



## HOW TO ORDER

Please send me the following *Electron User* cassette tapes:

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# Make a note of this handy sound generator

ROLAND WADDILOVE's Sound Generator is a handy utility for designing sounds to be used in other programs.

The parameters of the envelope statement can be manipulated and its effect on the sound can be heard.

On the Electron some of the parameters have no effect - if in doubt see the chapter on sound in the manual.

When playing a sound make sure you have set it to the right envelope.

ENVELOPE	
Envelope number.....	1
Length of each step.....	6
Change in pitch-section 1.....	13
Change in pitch-section 2.....	24
Change in pitch-section 3.....	12
Number of steps-section 1.....	2
Number of steps-section 2.....	4
Number of steps-section 3.....	126
Rate of attack.....	8
Rate of decay.....	126
Sustain rate of change.....	126
Release rate of change.....	126
Attack target level.....	126
Decay target level.....	126

**SOUND GENERATOR**  
Envelope and sound parameters can be manipulated to allow you to experiment and produce new effects.

## CONTROLS:

E : select envelope. I : increase parameter.  
S : select sound. D : decrease parameter.  
P : play sound.  
Arrow Down/up : select parameter.  
RETURN : return to this page.  
ESCAPE : end program.

SOUND	
Press a key...	1
Channel number.....	1
Volume/Envelope number.....	11
Pitch.....	11
Duration.....	58

## PROCEDURES

160 PROCinitialise	Switches off the cursor, Escape, redefines Break and sets up the arrays.
1220 PROCinstructions	Prints the instructions.
430 PROCenv titles	Prints what each parameter is for.
680 PROCenvelope	Prints the parameters of the envelope, alters the parameters, calls PROCplay if P is pressed.
870 PROCsound	Prints sound parameters and descriptions, alters parameters, calls PROCplay if P is pressed.
1170 PROCplay	Defines envelope, plays sound.
1370 PROCend	Restores cursor and Escape keys.

## VARIABLES

ev%(14)	Envelope parameters.
so%(4)	Sound parameters.
emax%(14)	Maximum value of each parameter.
emin%(14)	Minimum value of each parameter.
smax%(4)	Maximum value of each parameter.
smin%(4)	Minimum value of each parameter.
item%	Position of pointer.
key\$	Key pressed.

```

10REM SOUND GENERATOR
20REM By R.A.Waddilove
30
40MODE 1
50PROCinitialise
60REPEAT
80IF key$=CHR$13 PROCinstru
ctions
90IF INSTR("Ee",key$) PROCe
nvelope
100IF INSTR("Ss",key$) PROCs
ound
110UNTIL key$=CHR$27
120MODE 6
130PROCend
140END
150
160DEF PROCinitialise
170*FX4,1
180*FX12,1
190*FX229,1
200*KEY10,"OLD:MRUNIM"
210VDU 23,1,0;0;0;0;
220DIM ev$(14),so$(4)
230DIM emax$(14),emin$(14)
240DIM smax$(4),smin$(4)
250FOR i%=9 TO 14
260READ ev$(i%)
270NEXT
280FOR i%=1 TO 14
290READ emax$(i%),emin$(i%)
300NEXT
310FOR i%=1 TO 4
320READ smax$(i%),smin$(i%)
330NEXT
340ev$(1)=1 : K$=CHR$13+CHR$
27
345key$=CHR$13
350ENDPROC
360
370DATA 126,0,0,-126,126,126
380
390DATA 16,1,255,0,127,-128,
127,-128,127,-128,255,0,255,0,
255,0,126,-126,126,-126,126,-1
26,126,-126,126,-126,126,-126
400
410DATA 3,0,16,-15,255,0,255
,1
420
430DEF PROCenv_titles
440CLS : COLOUR 3 : RESTORE
530
450PRINT TAB(15);"ENVELOPE"
460FOR i%=1 TO 14
470READ name$
480COLOUR 3 : PRINT"" ;na
me$;

```

```

490COLOUR 1 : PRINT STRING$(
35-POS, ".")
500NEXT
510ENDPROC
520
530DATA Envelope number
540DATA Length of each step
550DATA Change in pitch-sect
ion 1
560DATA Change in pitch-sect
ion 2
570DATA Change in pitch-sect
ion 3
580DATA Number of steps-sect
ion 1
590DATA Number of steps-sect
ion 2
600DATA Number of steps-sect
ion 3
610DATA Rate of attack
620DATA Rate of decay
630DATA Sustain rate of chan
ge
640DATA Release rate of chan
ge
650DATA Attack target level
660DATA Decay target level
670
680DEF PROCenvelope
690PROCenv_titles
700COLOUR 2
710FOR i%=1 TO 14
720PRINT TAB(35,2*i%);ev$(i%
)->"
730NEXT
740item%=1 : PRINT TAB(0,2);
"->"
750REPEAT
760IF key$=CHR$138 PRINT TAB
(0,2*item%);" " : item%=item%
+(item%>1) : PRINT TAB(0,2*ite
m%);"->"
770IF key$=CHR$139 PRINT TAB
(0,2*item%);" " : item%=item%
+(item%>1) : PRINT TAB(0,2*ite
m%);"->"
780IF INSTR("Ii",key$) ev$(i
tem%)=ev$(item%)-(ev$(item%)<e
max$(item%))
790IF INSTR("Dd",key$) ev$(i
tem%)=ev$(item%)+(ev$(item%)>e

```



```

min$(item%))
800PRINT TAB(35,2*item%);ev$
(item%);" "
810IF INSTR("Pp",key$) PROCp
lay
820key$=GET$
830*FX21,0
840UNTIL INSTR("Ss"+K$,key$)
850ENDPROC
860
870DEF PROCsound
880CLS : COLOUR 3 : RESTORE
1120
890PRINT TAB(15);"SOUND"
900FOR i%=1 TO 4
910READ name$
920COLOUR 3 : PRINT"" ;na
me$;
930COLOUR 1 : PRINT STRING$(
35-POS, ".")
940NEXT
950COLOUR 2
960item%=i : PRINT TAB(0,2);
"->"
970FOR i%=1 TO 4
980PRINT TAB(35,i%*2);so$(i%
)
990NEXT
1000REPEAT
1010IF key$=CHR$138 PRINT TAB
(0,2*item%);" " : item%=item%

```

```

1110
1120DATA Channel number
1130DATA Volume/Envelope numb
er
1140DATA Pitch
1150DATA Duration
1160
1170DEF PROCplay
1180ENVELOPE ev$(1),ev$(2),ev
$(3),ev$(4),ev$(5),ev$(6),ev$(
7),ev$(8),ev$(9),ev$(10),ev$(1
1),ev$(12),ev$(13),ev$(14)
1190SOUND so$(1),so$(2),so$(3
),so$(4)
1200ENDPROC
1210
1220DEF PROCinstructions
1230COLOUR 3 : CLS
1240PRINT TAB(10);"SOUND GENE
RATOR"
1250PRINT TAB(9);"-----
-----"
1260COLOUR 2
1270PRINT"Envelope and sound
parameters can be""manipula
ted to allow you to experiment
""and produce new effects."
1275COLOUR 3 : PRINT""CONTRO
LS:" : COLOUR 2
1280PRINT"E : select envelop
e.""S : select sound.""I :
increase parameter.""D : de
crease parameter.""P : play
sound.""Arrow Down/up : sele
ct parameter."
1290PRINT"RETURN : return to
this page.""ESCAPE : end pr
ogram."
1300COLOUR 1
1310PRINT""Press a key...";
1320REPEAT key$=GET$
1330IF INSTR("Pp",key$) PROCp
lay
1340UNTIL INSTR("EeSs"+CHR$27
,key$)
1350ENDPROC
1360
1370DEF PROCend
1380PRINT""SOUND GENERATOR w
as""by R.A.Waddilove ";
1390*FX12,0
1400*FX4,0
1410*FX229,0
1420ENDPROC

```

*This listing is included in this month's cassette tape offer. See order form on Page 47.*

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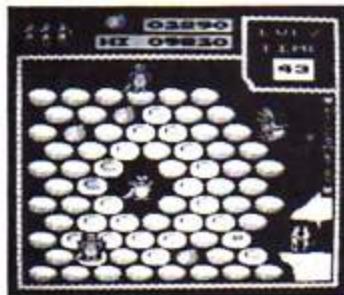
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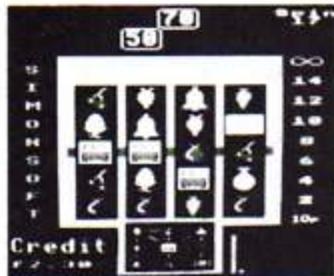
Og is in a calamity. His territory has been taken over by dinosaurs that lay eggs at a really hectic rate. Og must crush the brood before they hatch by jumping on to each and every egg. Og's problems are compounded by a pack of slaving dinosaurs hungry for his blood – and on higher levels by grand old Ma dinosaur herself. Og can use his magic staff to set a trap, but time is precious as Og knows all too well. Big bonuses can be scored for jumping on fruit, and an even bigger bonus for snatching a kiss from his waiting cavewife.



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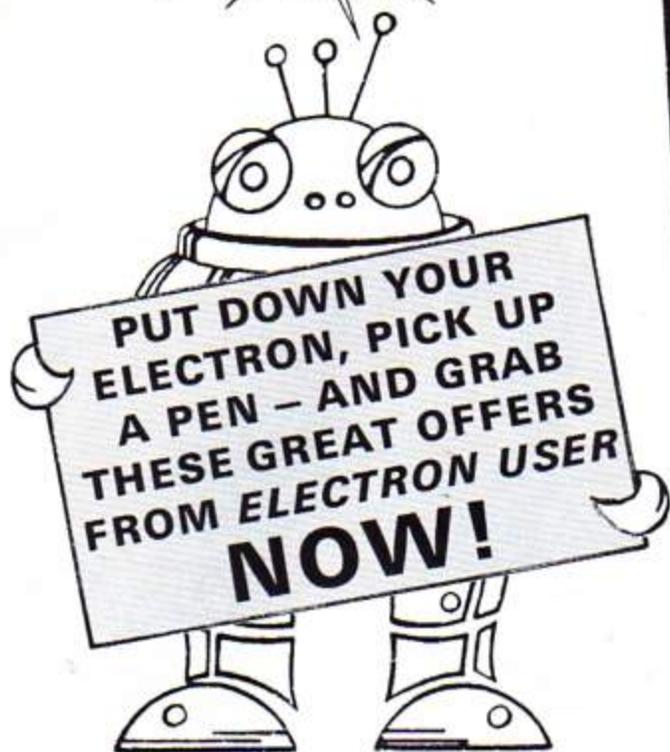
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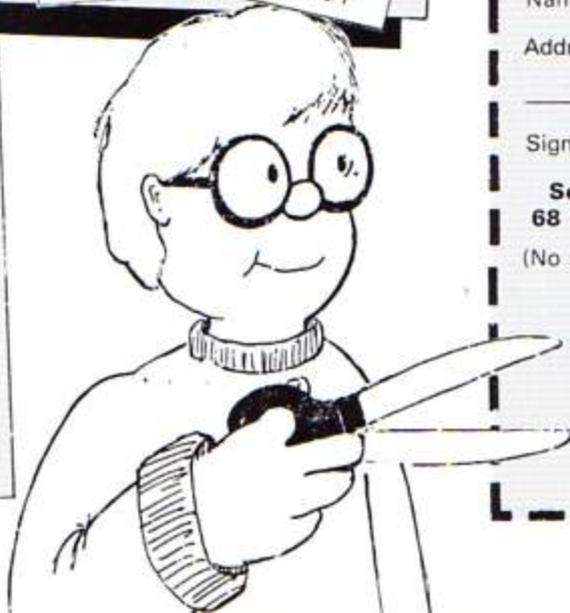
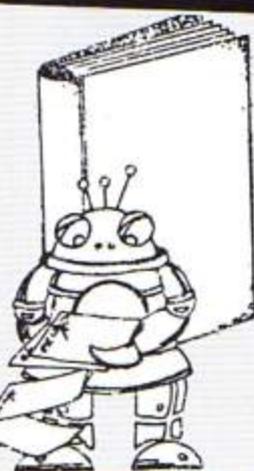
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# MAYDAY MAYDAY!

MORSE CODE INTERPRETER

ENTER THE PITCH OF THE MORSE(1 TO 10)?1  
 ENTER THE GAP BETWEEN LETTERS IN SECS?1

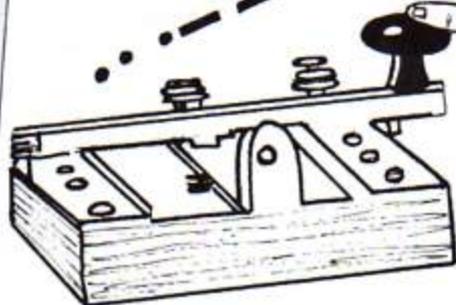
NOW TYPE IN YOUR WORD/SENTENCE AND  
 IN BETWEEN THE HIGH PITCHED NOTES YOU  
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HAVE you ever fancied becoming a radio ham? If you do, then you'll have to pass a test in Morse code. But never fear, your Electron will help you.

Mayday Mayday by C. Vaughan-Williams turns your micro into a Morse code generator. It will give you lots of practice in listening to letters or words and numbers repeated as a sentence.

You can adjust the pitch of the note and also the time gap between the letters.

This allows you to start slowly and work your way up to proficiency.



```

10 REM -----
20 REM MAYDAY MAYDAY
30 REM By
40 REM C.Vaughan-Williams
50 REM -----
60 REM (C)ELECTRON USER
70 MODE 1
80 VDU 19,3,2;0;
:COLOUR 3
90 PRINT TAB(13,3)"MAYDAY
MAYDAY"TAB(13,4)"=====
:COLOUR 1
110 PRINT "'MORSE CODE
INTERPRETER'"
:COLOUR 2
120 COLOUR 2
130 INPUT "'ENTER THE PITCH
OF THE MORSE(1 TO 10)"
,PITCH%
140 INPUT "'ENTER THE GAP
BETWEEN LETTERS IN SECS"
,GAP%
150 INPUT "'NOW TYPE IN
YOUR WORD/SENTENCE AND"
"'IN BETWEEN THE HIGH
PITCHED NOTES YOU"
"'WILL HEAR YOUR WORDS
IN MORSE."',E$
160 PROCDEL(1)
170 FOR SX=1 TO LEN E$
180 RESTORE 350
190 REPEAT
:READ A$,B$
:UNTIL A$=MID$(E$,SX
,1)
:IF A$=" " SOX=0
ELSE SOX=-15
200 FOR NX=1 TO LEN B$
210 SOUND 1,SOX,PITCH%*10
,EVAL (MID$(B$,NX,1))
220 F=INKEY (9+EVAL (
MID$(B$,NX,1)))
230 NEXT
240 PROCDEL(GAP%)
250 NEXT
260 SOUND 1,-15,200,3
270 PRINT "'PRESS ANY KEY
TO TRY AGAIN."
280 *FX15,1
290 WAIT=GET
300 GOTO 70
310 END
320 DEF PROCDEL(D%)
330 FOR N=1 TO 500*D%
:NEXT
,D,522,E,2,F,2252,6
,552,H,2222,I,22,J,2555
,K,525,L,2522,M,55,N
,52,O,555,P,2552,Q,5525
,R,252,S,222,T,5,U,225
,V,2225,W,255,X,5225
,Y,5255,Z,5522," ",1
360 DATA 1,25555,2,22555
,3,22255,4,22225,5,22222
,6,52222,7,55222,8,55522
,9,55552,0,55555
    
```

This listing is included in this month's cassette tape offer. See order form on Page 47.



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- Program 1
- 10 VDU2
- 20 PRINT "This is an example program"
- 30 PRINT "using the Signpoint Electron"
- 40 PRINT "centronics print port"
- 50 VDU3

- This is an example program using the Signpoint Electron centronics print port

## From Page 33

```
TAB(bx%,by%); " :missed%=T
RUE:ENDPROC
1030 IF bx%=1 THEN xdir%=1
ELSE IF bx%=18 THEN xdir%=
-1
1040 IF by%=2 THEN ydir%=1
1050 nx%=bx%+xdir%:ny%=by%
+ydir%
1060 WALL%=POINT(nx%*64+32
,(31-ny%)*32+16)
1070 IF WALL%=1 OR WALL%=2
OR WALL%=3 THEN PROCHitwal
l
1080 IF ny%=bty% THEN PROC
tryhit
1090 PRINT TAB(bx%,by%); "
":TAB(nx%,ny%);ball%
1100 bx%=nx%:by%=ny%
1110 ENDPROC
1120 DEF PROCmovebat
1130 COLOUR 2
1140 k%=INKEY$(0)
1150 IF k%=CHR%13 THEN REP
EAT:k%=GET%:UNTIL k%(>)CHR%1
3
1160 IF k%="1" THEN SOX%=-1
5:SO1%=-15 ELSE IF k%="2" T
HEN SOX%=0:SO1%=0 ELSE IF k%
="3" THEN SOX%=0:SO1%=-15 EL
SE IF k%="4" THEN SOX%=-15:S
O1%=0
1170 IF k%="Z" OR k%="z" T
HEN btx%=btx%-1 ELSE IF k%="
/" THEN btx%=btx%+1 ELSE E
NDPROC
1180 IF btx%(<0 THEN btx%=0
ELSE IF btx%(>15 THEN btx%=
15
1190 PRINT TAB(btx%,bty%);
bat%:
1200 ENDPROC
1210 DEF PROCtryhit
1220 IF btx%(<nx% AND btx%+
4>nx% THEN PROCdirection
1230 ENDPROC
1240 DEF PROCdirection
1250 SOUND &11,SO1%,50,3
1260 IF nx%=btx%+1 AND xdi
r%=1 THEN xdir%=0 ELSE IF n
x%=btx%+1 AND xdir%=0 THEN
xdir%=-1
1270IF nx%=btx%+3 AND xdir
%=-1 THEN xdir%=0 ELSE IF n
x%=btx%+3 AND xdir%=0 THEN
xdir%=1
```

```
1280 IF nx%=btx%+2 THEN xd
ir%=RND(3)-2
1290 ydir%=-1:ny%=bty%+ydi
r%
1300 ENDPROC
1310 DEF PROCdraw_wall
1320 IF BRICK%(>0 OR SOX%=0
THEN 1350
1330 FOR del=1 TO 600:NEXT
1340 RESTORE 2170:FOR NX=1
TO 8:READ P%,D%:SOUND 1,-1
5,P%,D%:NEXT
1350 AX=1
1360 FOR WX=8+WAX TO 12+WA
X:COLOUR AX:FOR XX=2 TO 17:
PRINT TAB(X%,WX%);CHR%(225)
:NEXT XX
1370IF AX=1 THEN AX=2 ELSE
IF AX=2 THEN AX=3 ELSE IF
AX=3 THEN AX=1
1380 NEXT WX
1390 IF BRICK%=0 PROCspeed
up
1400 BRICK%=80
1410 ENDPROC
1420 DEF PROCHitwall
1430 SOUND &11,SO1%,(WALL%
+40)*2,2
1440 SCX=SCX+10*WALL%
1450 COLOUR 2
1460 PRINT TAB(7,0);SCX
1470 COLOUR 1
1480 BRICK%=BRICK%-1
1490 IF WALL%=1 THEN bdela
y%=bdelay%-1
1500 IF WALL%=2 THEN bdela
y%=bdelay%-3
1510 IF WALL%=3 THEN bdela
y%=bdelay%+3
1520 IF bdelay%(<BTIME-3 TH
EN bdelay%=BTIME-3
1530 IF bdelay%(>BTIME THEN
bdelay%=BTIME
1540 ydir%=-ydir%
1550 ENDPROC
1560 DEF PROCspeedup
1570 BTIME=BTIME-1
1580 IF BTIME(<6 THEN BTIME
=6
1590 bdelay%=BTIME:btime%=
bdelay%
1600 IF WAX%(>8 THEN WAX%=8
1610 BATLEFT%=BATLEFT%+1:S
CX=SCX+500
1620 PRINT TAB(6,3);"BONUS
BAT":TAB(4,4);"+ 500 POINT
5"
1630 FOR del=1 TO 3000:NEX
```

```
T
1640 PROCnewball
1650 ENDPROC
1660 DEF PROCrestart
1670 PRINT TAB(btx%,bty%);
" "
1680 btx%=8:bty%=29:bdelay
%=BTIME
1690 COLOUR 2
1700 PRINT TAB(btx%,bty%);
bat%
1710 ENDPROC
1720 DEF PROCinstructions
1730 VDU19,3,6,0,0,0,23,1,
0;0;0;0;
1740 COLOUR 1
1750 PRINT TAB(10);"B R E
A K F R E E"
1760 COLOUR 3
1770 PRINT TAB(2,3);"You m
ust deflect the ball agains
t themulticoloured wall, w
ith the aid of your bat
."
1780 PRINT" When a wall h
as been cleared the speedwi
ll increase and the wall wi
ll be movedfuther down the
screen."
1790 PRINT TAB(2,11);"SCOR
E TABLE:"
1800 COLOUR 1
1810 PRINT TAB(10);"RED br
ick - 10 pts"
1820 COLOUR 2
1830 PRINT TAB(10);"YELLOW
brick - 20 pts"
1840 COLOUR 3
1850 PRINT TAB(10);"CYAN b
rick - 30 pts"
1860 PRINT""The bat is co
ntrolled using the following
keys:"
1870 COLOUR1:PRINT""Z' -
left '/' - right"
1880 COLOUR 2:PRINT""TAB(
6);"Press SPACEBAR to conti
nue"
1890 *FX15,1
1900 REPEAT:A%=GET%:UNTIL
A%=" "
1910 CLS
1920 VDU 19,2,7,0,0,0
1930 PRINT TAB(1,2);"Sound
Options: 1) Total sound
ON":TAB(18,4);"2) Total sou
nd OFF":TAB(18,6);"3) Game
effects only":TAB(18,8);"4)
```

```
Tune effects only"
1940 PRINT"" Enter 1 ,2 ,
3 or 4"
1950 PRINT TAB(2,18);"Soun
d can also be changed durin
g a game by pr
essing keys:"
1960 PRINT""TAB(2);"1 , 2
,3 or 4"
1970 PRINT TAB(2);"as expl
ained above"
1980 REPEAT:B=GET:UNTIL B=
49 OR B=50 OR B=51 OR B=52
1990 IF B=49 THEN SOX%=-15:
SO1%=-15 ELSE IF B=50 THEN
SOX%=0:SO1%=0 ELSE IF B=51 T
HEN SOX%=0:SO1%=-15 ELSE IF
B=52 THEN SOX%=-15:SO1%=0
2000 FOR del=1 TO 200:NEXT
2010 CLS
2020 PRINT TAB(2,3);"Enter
speed: 1) FAST"
2030 PRINT TAB(18);"2) MED
IUM"
2040 PRINT TAB(18);"3) SLD
W"
2050 PRINT TAB(2,15);"RET
URN" = PAUSE"
2060 *FX15,1
2070 REPEAT:B=GET:UNTIL B=
49 OR B=50 OR B=51
2080 IF B=49 THEN bdelay%=
7 ELSE IF B=50 THEN bdelay%
=9 ELSE IF B=51 THEN bdelay
%=11
2090 WAX%=51-B
2100 IF SOX%=0 THEN ENDPROC
2110 RESTORE 2150
2120 FOR NX=1 TO 6:READ CX
,P%,D%:SOUND 1,CX,P%,D%:NEX
T
2130 FOR del=1 TO 2000:NEX
T
2140 ENDPROC
2150 DATA -15,84,12,-15,88
,4,-15,91,9,-15,113,10,2,11
3,26,-15,111,10
2160 DATA 52,7,0,0,52,7,0,
0,52,4,52,4,68,5,60,7,52,7,
48,4,52,7
2170 DATA 81,3,101,3,117,3
,129,5,117,4,129,5,117,4,12
9,10
```

*This listing is included in this month's cassette tape offer. See order form on Page 47.*

BBC



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# Open up a whole new world with Forth

**Forth**  
Acornsoft

FORTH was invented in 1969 by Charles H. Moore who worked on an IBM 1130 – a third generation computer.

He believed his language to be the next step forward and considered it a fourth generation computer language. However the language he was developing for the IBM 1130 only permitted five character identifiers so instead of being called Fourth it became Forth.

It has become the second most popular language on home micros after Basic. So if you have mastered the art of programming the Electron in Basic and are looking for something new then take a look at Acornsoft's Forth.

There are two main versions of this language – Forth-79 set out by the Forth Standards Team, and fig-Forth put forward by the Forth Interest Group in America.

Acornsoft's version follows the Forth-79 standard. All the words in the required word set are present plus a few others added by Acornsoft such as >VDU to send a byte to the VDU drivers.

Forth is neither an interpreted language like Basic nor a true compiled language like Pascal. It's a sort of intermediate language, compiling the definitions to a code close to machine language which is then interpreted when the program is run.

Forth is known as an interpretive threaded language – the instructions which make up the application are compiled to give a list of addresses which point to previously defined machine code routines.

The result of this is that it runs quite fast as much of the interpretation has already been carried out.

The Electron takes more than 22 seconds to count from 0 to 30,000 in Basic using an ordinary variable and about 7½ seconds using one of the

resident integer variables as the loop counter.

The same loop in Forth takes about four seconds, making it nearly twice as fast as Basic.

Forth programs are usually, but not always, faster than their Basic equivalents. So if you are interested in fast arcade type games and find Basic too slow or machine code incomprehensible, try Forth as an alternative. It might just have that extra bit of speed you are looking for.

The cassette has four programs. These include a Forth dictionary and compiler, an editor, a Forth assembler and a high resolution graphics demonstration.

The dictionary and compiler take about 4½ minutes to load and consist of several files which relocate when finished. A copyright message appears and the heading:

**Acornsoft FORTH  
OK**

is printed. The OK is not a sort of *Jimmy rules OK* message but one of the features of Forth – it simply means that the task set has been completed.

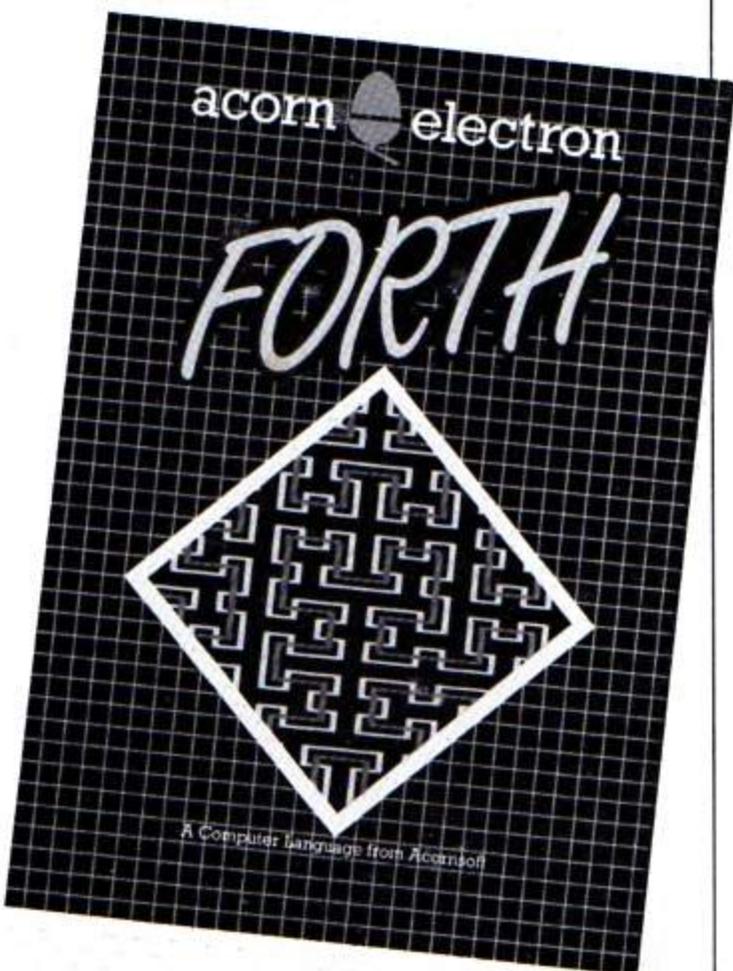
Modes 4, 5 and 6 are available and there is more than 6k of memory free for your application. Graphic displays are also possible in Modes 4 and 5.

The manual, which is available separately, shows how to draw triangles, rectangles and how to animate simple characters.

Acornsoft Forth does not support floating point arithmetic but this is not the great handicap it might at first seem.

Floating point numbers are not needed all that often but when they are, Forth is such a flexible language that you can define your own words to handle them.

Since Forth applications – programs – are compiled as they are entered, the original form of the definitions are lost and only the compiled form remains.



Acornsoft uses the standard Forth method of storing a copy of the source code in a number of screens.

There are initially two screens on loading but this number can be increased – with a corresponding decrease in the memory left for the dictionary.

Each screen is divided into 16 lines of 64 characters and is identified by a number. A Forth application can use as many screens as it needs and interpretation continues with the next.

Screens can be loaded, saved and edited with the editor supplied.

The editor seems a bit complicated and a bit bewildering at first but is quite powerful and becomes easier to use with practice.

There are commands for putting text on to a line, deleting a line, inserting text, spreading lines, deleting text and many more.

The manual with the cassette is actually called Forth On The BBC Microcomputer but there is no difference between the two versions. The manual is an absolute necessity and pushes the total price of the package to more than £20.

The manual is excellent, covering topics such as arithmetic (single and double precision), defining new words and vocabularies, loops, input and output, creating arrays, assembly language, graphics and sound.

At the back is a glossary which lists all the Forth words in the dictionary and gives a brief description of their function.

To sum up then, Acornsoft's Forth is an excellent implementation of the language. It is very powerful, encourages structured programming techniques and is faster than Basic for many applications.

If you are interested in programming and want something different and are prepared to put a bit of effort in then Forth would be a good investment and would open up a whole new world that you never knew existed.

If, however, you are just interested in fast machine code arcade games and zapping various nasties of assorted sizes and shapes, then I would not recommend it. But you would be missing out on something far more interesting, exciting and rewarding.

**Roland Waddilove**

**THIS program allows you to construct a character made from up to 16 sub-characters arranged on a 4x4 grid.**

These are entered in a similar way to a VDU 23 statement except that only the last eight numbers are typed in. So:

**VDU 23,228,6,54,23,  
127,65,243,1,98**

would be entered as:

- Row 1-6**
- Row 2-54**
- Row 3-23**
- Row 4-127**
- Row 5-65**
- Row 6-243**
- Row 7-1**
- Row 8-98**

These numbers are known as the bit patterns of each row of the defined sub-characters. There are eight rows in all.

After entering all your

# Multi-character generator

By IAN BROWN

sub-characters they will be displayed, together with a space, at the top of the screen. Using the left and right cursor keys and space bar you can then select one of them.

Now - using all four cursor keys - you can move the cursor about on a 4x4 grid displayed in the middle of the screen, pressing the space bar when the cursor lies at the

required position for your chosen sub-character.

This procedure is repeated until your new character is complete, using the space (displayed at the top of the screen with the other sub-characters) to delete mistaken sub-characters from the grid.

The definitions of the new character and its constituent sub-characters are then dis-

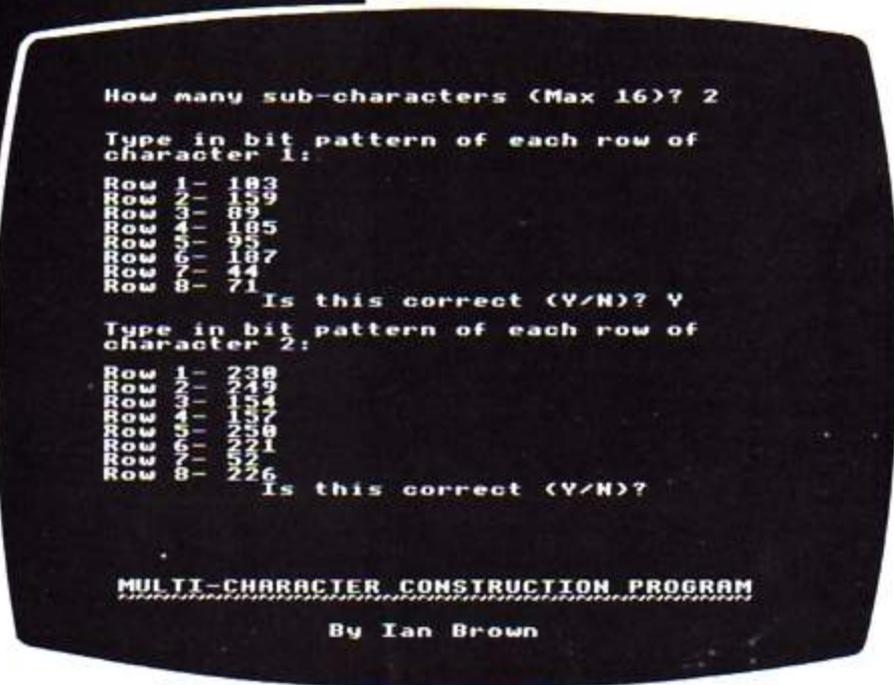
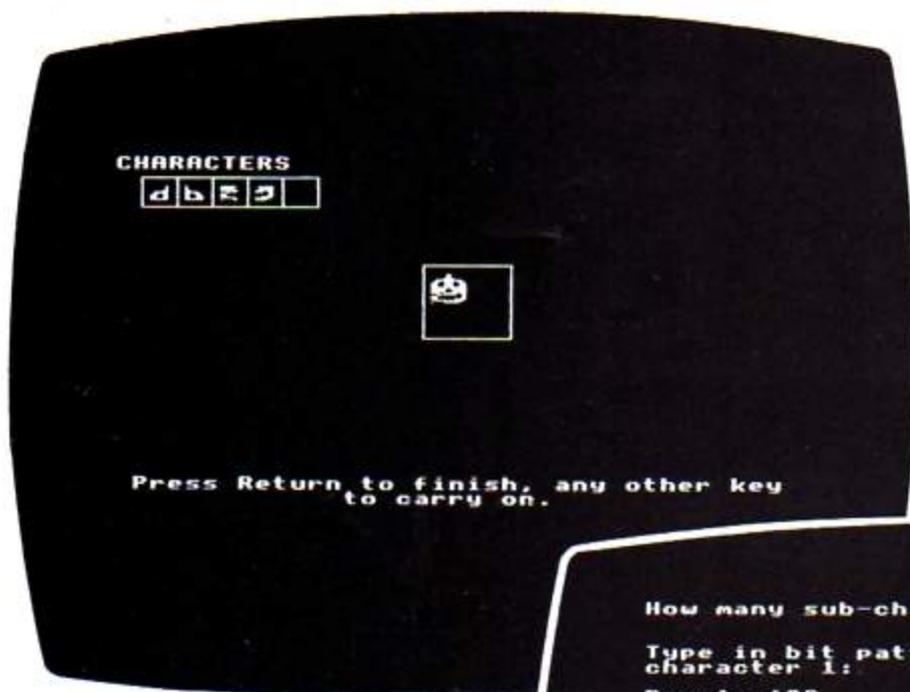
played and you have the option of saving these on tape.

If this option is taken, to add the definitions to the end of one of your own programs first load it into the computer in the normal way.

Having RENUMBERed your program so that none of its lines exceed 19999, type **\*EXEC\*\*\*** and play back the recorded file into the computer. The definitions will appear on the screen as Basic lines of a procedure, which can be called from your program in the normal way.

Of course, the best way to understand the capabilities of this program is to try it out. The program gives short prompts where necessary.

Try constructing some of the Casting Agency characters on Page 45, entering the last eight numbers of each sub-character definition in turn, and arranging the sub-characters on the grid to achieve the desired result.



## VARIABLES

<b>subnumber</b>	Number of sub-characters to be defined.
<b>answer</b>	Y/N response to various prompts.
<b>xpos</b>	Current horizontal position of cursor when selecting sub-character.
<b>key</b>	Keyboard GET used throughout the program.
<b>subcode</b>	CHR\$ code of sub-character selected.
<b>X,Y</b>	Column, row - position of cursor on character construction grid.
<b>X\$</b>	String containing character definition.
<b>D\$</b>	String containing character and sub-character definitions for display.
<b>B\$</b>	String containing character and sub-character definitions for file saving.
<b>line</b>	Current line number being written into file.
<b>channel</b>	Communication channel to file.
<b>shift</b>	Tests if Shift key has been pressed during display of character definitions.

## PROCEDURES

<b>340 init</b>	Sets up variables, arrays and arrow character, and sets cursor keys to generate Ascii codes.
<b>520 enter</b>	Allows user to enter up to 16 sub-characters by their definitions.

<b>710 print</b>	Displays defined sub-characters together with a workgrid on which the new character is to be constructed.
<b>860 choose</b>	Allows user to select one of the sub-characters.
<b>1060 move</b>	Allows user to position selected sub-character on grid, then returns to PROCchoose to repeat the procedure until new character is complete.
<b>1300 define</b>	Puts newly-constructed character into memory.
<b>1450 display</b>	Displays new character and all definitions on the screen, and gives option of saving definitions.
<b>1780 save</b>	Saves all definitions as a file on tape.
<b>2140 bput</b>	Called from PROCsave to write assembled strings into the file.
<b>2240 shift</b>	Paging routine used when displaying character definitions.
<b>2360 title</b>	Displays introductory title.

## ARRAYS

<b>bit(S,T)</b>	Bit pattern of row T of character S.
<b>subchar(S,T)</b>	CHR\$ code of sub-character at row T, column S of character construction grid.

```

10REM                               260PROCdisplay
20REM                               270UNTIL answer<>13
ter                                280GOTO2460
30REM                               290:
Construction P                    300REM
rogram                             310REM Initiation routin
40REM                               e
50REM                               320REM
Written for                        330:
the                                 340DEF PROCinit
60REM                               350DIM bit(16,8),subchar(
ACORN ELECT                       4,4)
RON                                 360FOR pY=1 TO 4
70REM                               370FOR pX=1 TO 4
80REM                               380subchar(pX,pY)=32
Ian M. Bro                         390NEXT pX
mn                                  400NEXT pY
90REM                               410*FX4,1
(C)ELECTRON                        420VDU23,224,24,60,126,24
USER                                24,24,24,24
100REM                              430COLOUR0:COLOUR129:PRIN
110:                                TTAB(8,17)* Press Space to
120NERROR GOTO2440                Start ":COLOUR1:COLOUR129
130MODE 6                          440REPEAT UNTIL GET=32
135VDU 23,1,0;0;0;0;VDU1         450ENDPROC
9,0,4,0,0,0                       460:
140PROCtitle                       470REM
150PROCinit                        480REM Defined sub-chara
160PROCcenter                      ctors
170MODE 4:VDU19,1,4,0,0,0        490REM input routin
:VDU 23,1,0;0;0;0;0;             e
180PROCprint                        500REM
190REPEAT                          510:
200PROCchoose                      520DEF PROCcenter
210PROCmove                        530CLS
220UNTIL key=13
230PROCdefine
240REPEAT
250MODE 4:VDU 19,1,4,0,0,
0:VDU 23,1,0;0;0;0;
540INPUTTAB(0,2);"How man
y sub-characters (Max 16)?
"subnumber
550IF subnumber<1 OR subn
umber>16 OR subnumber<>INT(
subnumber) THEN VDU7:GOTO54
0
560FOR p0=1 TO subnumber
570PRINT""Type in bit pa
ttern of each row of""char
acter ";p0:""
580FOR p8=1 TO 8
590PRINT"Row ";p8:"INPUT"
-bit(p0,p8):v=VPOS
600IF bit(p0,p8)<0 OR bit
(p0,p8)>255 OR bit(p0,p8)<>
INT(bit(p0,p8)) THEN VDU7:P
RINTTAB(10,v-1);" (- ERROR
":GOTO590
610NEXT p8
620PRINT" Is this
correct (Y/N)? ":answer=6
ET:VDUanswer,13:IF answer=7
860TO 570 ELSE IFanswer<>89
THEN GOTO620
630VDU23,224+p0,bit(p0,1)
,bit(p0,2),bit(p0,3),bit(p0
,4),bit(p0,5),bit(p0,6),bit
(p0,7),bit(p0,8)
640NEXT p0
650ENDPROC
660:
670REM
680REM Sets up work grid
690REM
700:
710DEF PROCprint
720PRINTTAB(0,1);"CHARACT
ERS"
730MOVE48,880:DRAW48,944
740DRAW(subnumber+1)*64+4
3,944:DRAW(subnumber+1)*64+
48,880:DRAW48,880
750FOR p1=112 TO subnumbe
r*64+48 STEP 64:MOVEp1,880:
DRAWp1,944:NEXT p1
760MOVES60,592:DRAW720,59
2:DRAW720,752:DRAW560,752:D
RAW560,592
770FOR p2=1 TO subnumber
780VDU31,p2*2,3,224+p2
790NEXT p2
800ENDPROC
810:
820REM
830REM Sub-character cho
ice routine
840REM
850:
860DEF PROCchoose
870VDU23,1,0;0;0;0;
880PRINTTAB(2,18);"Press
Space to Select Sub-charact
er"
890xpos=2
900REPEAT
910VDU31,xpos,5,224

```

## Multi-character listing

### From Page 57

```

920key=GET
930IF key=136 AND xpos>2
THEN VDU31,xpos,5,32:xpos=x
pos-2
940IF key=137 AND xpos<su
bnumber*2+2 THEN VDU31,xpos
,5,32:xpos=xpos+2
950UNTIL key=32
960PRINTTAB(2,18);SPC10;"
Character chosen:";SPC8
970IF xpos=subnumber*2+2
THEN subcode=32:PRINTTAB(17
,20);"SPACE" ELSE subcode=2
24*xpos/2;VDU31,19,20,subco
de
980VDU23,1,1;0;0;0;
990ENDPROC
1000:
1010REM
1020REM Character constru
ction
1030REM routine
1040REM
1050:
1060DEF PROCmove
1070PRINTTAB(1,23);"Press
Space to Position Sub-chara
cter"
1080X=1:Y=1
1090REPEAT
1100VDU31,X+17,Y+8
1110key=GET
1120IF key=136 AND X>1 THE
N X=X-1
1130IF key=137 AND X<4 THE
N X=X+1
1140IF key=138 AND Y<4 THE
N Y=Y+1
1150IF key=139 AND Y>1 THE
N Y=Y-1
1160UNTIL key=32
1170VDU31,xpos,5,32:VDU 23
,1,0;0;0;0;
1180subchar(X,Y)=subcode
1190VDU31,X+17,Y+8,subcode
:VDU23,1,0;0;0;0;
1200PRINTTAB(0,18);SPC39TA
B(17,20);SPC5
1210PRINTTAB(1,23);"Press
Return to finish, any other
key"" to carr
y on."
1220key=GET
1230PRINTTAB(0,23);SPC80
1240ENDPROC
1250:
1260REM
1270REM Character definit
ion routine
1280REM
1290:
1300DEF PROCdefine
1310X$=""
1320FOR pY=1 TO 4
1330FOR pX=1 TO 4
1340X$=X$+CHR$(subchar(pX,
pY))
1350NEXT pX
1360IF pY<4 THEN X$=X$+CHR
$10+CHR$8+CHR$8+CHR$8+CHR$8
1370NEXT pY
1380ENDPROC
1390:
1400REM
1410REM Character and c
haracter
1420REM definition displa
y routine
1430REM
1440:
1450DEF PROCdisplay
1460shift=FALSE
1470PRINTTAB(0,1);"Your ch
aracter is:"TAB(18,3);X$''
1480FOR p3=1 TO subnumber
1490D$=""
1500FOR p4=1 TO 8
1510D$=D$+" "+STR$(bit(p3,
p4))
1520NEXT p4
1530D$="VDU23,"+STR$(224+p
3)+D$
1540PRINT'D$
1550IF VPOS>27 AND shift=F
ELSE THEN PROCshift
1560NEXT p3
1570shift=FALSE
1580IF VPOS>20 AND shift=F
ELSE THEN PROCshift
1590D$="X$="
1600FOR pY=1 TO 4
1610FOR pX=1 TO 4
1620D$=D$+CHR$"+STR$(subc
har(pX,pY)):IF pX<>4 OR pY<
>4 THEN D$=D$+"+"
1630NEXT pX
1640IF pY<>4 THEN D$=D$+"C
HR$10+CHR$8+CHR$8+CHR$8+CHR
$8+"
1650NEXT pY
1660PRINT'D$''''
1670PRINTTAB(0,29);"Do you
want to save your characte
r (Y/N)";:answer=GET
1680IF answer=89 THEN PROC
save ELSE IF answer<>78 GOT
01670
1690PRINTTAB(0,29);"Press
Return to re-view definitio
ns, or any other key to exi
t program:";
1700answer=GET
1710ENDPROC
1720:
1730REM
1740REM Saves character d
efinitions
1750REM as a file
1760REM
1770:
1780DEF PROCsave
1790VDU22,6:VDU 23,1,0;0;0;
;0;VDU19,1,4,0,0,0
1795 VDU 23,1,0;0;0;0;VDU
19,1,4,0,0,0
1800OPT1,1
1810PRINT''''''''Wind to a
blank section of tape";COL
OURO:COLOUR129
1820channel=OPENOUT("CHARA
CTER")
1830COLOUR1:COLOUR128:PRIN
T''Saving character as file
....."
1840B$="20000DEF PROCchara
cters"
1850PROCbput
1860line=20000
1870FOR p5=1 TO subnumber
1880B$=""
1890line=line+10
1900FOR p6=1 TO 8
1910B$=B$+" "+STR$(bit(p5,
p6))
1920NEXT p6
1930B$=CHR$13+STR$(line)+"
VDU23,"+STR$(224+p5)+B$
1940PROCbput
1950NEXT p5
1960B$=CHR$13+"20200X$="
1970FOR pY=1 TO 4
1980FOR pX=1 TO 4
1990B$=B$+CHR$"+STR$(subc
har(pX,pY)):IF pX<>4 OR pY<
>4 THEN B$=B$+"+"
2000NEXT pX
2010IF pY<>4 THEN B$=B$+"C
HR$10+CHR$8+CHR$8+CHR$8+CHR
$8+"
2020NEXT pY
2030PROCbput
2040B$=CHR$13+"20210ENDPRO
C"+CHR$13
2050PROCbput
2060CLOSE#channel
2070PRINT''''CHARACTER'' f
ile saved."
2080ENDPROC
2090:
2100REM
2110REM File write routin
e
2120REM
2130:
2140DEF PROCbput
2150FOR p7=1 TO LEN(B$)
2160BPUT#channel,ASC(MID$(
B$,p7,1))
2170NEXT p7
2180ENDPROC
2190:
2200REM
2210REM Paging routine
2220REM
2230:
2240DEF PROCshift
2250PRINT
2260COLOUR0:COLOUR129:PRIN
TTAB(7,30);" Press Shift to
continue ";COLOUR1:COLOUR1
28
2270REPEAT UNTIL INKEY=1=-
1
2280PRINTTAB(7,30);SPC25
2290shift=TRUE
2300ENDPROC
2310:
2320REM
2330REM Title
2340REM
2350:
2360DEF PROCtitle
2370PRINTTAB(1,8);"MULTI-C
HARACTER CONSTRUCTION PROGR
AM"TAB(1,9);"*****
*****TAB(
13,11);"By Ian Brown"
2380ENDPROC
2390:
2400REM
2410REM Error handler
2420REM
2430:
2440MODE 6:PRINT''
2450REPORT:PRINT" at line
";ERL
2460*FX4,0
2470VDU14
2480PRINT':END

```

*This listing is included in this month's cassette tape offer. See order form on Page 47.*

# Send yourself round the bend

STRING handling reaches new heights with ROLAND WADDILOVE's latest program, Round.

Inspired by Adam Wortley's Scroller (page 30, *Electron User*, August, 1984), Roland has produced a program that not

only scrolls a message from side to side but also up and down.

The main work is done in PROCscroll and this can easily be added to your programs to display your own banner headlines. Just call the procedure with a

line like line 40 or 50, substituting your message for ours.

It's fun to run, useful, and also a challenge as you try to figure out how it works. Now all we need is a program for 3D scrolling. Any offers?

d  
t  
h  
e  
b  
e  
n  
d

```

10REM Round The Bend
20REM By R.A.Waddilove
30CLS:VDU 23,1,0;0;0;0;
40PROCscroll(12,3,"Electron User",2)
50PROCscroll(10,5,"Roland Waddilove",2)
60PROCscroll(15,7," DK ",5)
70REPEAT UNTIL FALSE
80END
90DEF PROCscroll(X,Y,Z,message$,times)
100top$=message$
110right$=STRING$(LEN message$, " ")
120bottom$=right$
130left$=bottom$
140FOR J%=1 TO times*4+LE N message$
150temp$=left$
160left$=MID$(left$,2)+LEFT$(bottom$,1)
170bottom$=MID$(bottom$,2)+RIGHT$(right$,1)
180right$=RIGHT$(top$,1)+LEFT$(right$,LENmessage$-1)
190top$=LEFT$(temp$,1)+LEFT$(top$,LENtop$-1)
200PRINT TAB(X,Y%);top$;$(right$,IX,1);
230NEXT
240PRINT TAB(X-1,Y%+LEN message$);bottom$;TAB(X-1,Y%);
250FOR I%=1 TO LEN message$
260PRINT MID$(left$,IX,1);CHR$8;CHR$10;
270NEXT
280NEXT
290ENDPROC
    
```

*This listing is included in this month's cassette tape offer. See order form on Page 47.*

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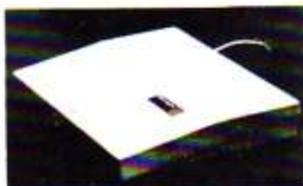
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# Micro Messages

## Your Micro Power games and the Plus 1

ALL of Micro Power's titles can be made to work with the Acorn Plus 1 Interface. The majority of the programs work with no modification at all. *Adventure, Bandits at 3 O'clock, Chess, Croaker, Cybertron Mission, Danger UXB, Draw, Electron Invaders, Ghouls, Intergalactic Trader, Killer Gorilla and Positron.*

However they will run more slowly than before, so \*FX 163,128,1 needs to be typed. This call disables all I/O servicing of the Plus 1.

The remaining six programs do not work at all if certain commands aren't typed in before loading. These are: *Escape from Moonbase Alpha, Felix in the Factory, Felix and the Fruit Monsters, Galactic Commander, Moonraider and Swoop.*

Sadly, *Killer Gorilla*, which the author Adrian Stephens expected to work with the interface, doesn't. It will however work with the many switch-type joystick interfaces.

To get these to work properly the following three lines must be entered:

```
?&212=&D6
?&213=&F1
*FX163,128,1
```

It seems a great shame that Acorn didn't inform the software houses during the development of the Plus 1, or before, as all the Acornsoft programs work without any problems.

I must thank Peter Staniforth (Technical Manager) and Alan Butcher (Software Manager) for their efforts in getting this matter sorted out. — **Christopher Payne, Micro Power, Leeds.**

● Many thanks for the tip, Chris. However, there are still games that will not work with a Plus 1 connected to the Electron, even after the suggestions made by Micro Power are implemented. Micro Olympics is one such program.

The following SHOULD

work for any software:

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

Don't forget to press Return after every line.

The \*FX call disables Input/Output servicing of the Plus 1, and therefore returns the Electron to full speed.

The first two memory changes are a vector used by Load etc.

The final memory change "switches off" the Plus 1. This is because the Plus 1 is treated as a ROM fitted to socket 11 (try \*HELP to see which ROMs are fitted).

```
?&2AC=0
```

stops the micro recognising that the Plus 1 is fitted.

### Message from an escapee

IN the March issue of the *Electron User* Trevor Roberts did a review on Pharaoh's Tomb by A&F.

In it he said: "And if you do manage to escape, let me know how".

Well, I have — twice.

To start with you must get to know all the words.

You can do this by killing yourself, saying "no" to another go and listing the program.

Then you must start the game.

First you must collect at least 250 coins by going down passages left and right and buying yourself 10 or more swords, five rations and one cross.

Then you should get another 206 coins.

Go forward until you come

to the tomb room. Try to get the mask and get out of that room as soon as possible.

Then go all the way back to the entrance hall. If you haven't got 500 coins take the left or right turnings until you have and then leave.

Good luck, Trevor! — **Neil Hayward, Windsor, Berks.**

● Trevor sends his thanks but asks: "Isn't listing the program cheating?"

### CPD 8300 the tops!

I FIND that although I am a registered blind person (with a small amount of residual sight) I can manage to read your magazine with the help of a magnifying glass, and with the same aid, use my Electron.

The letter page is of great interest to me, and I was interested to see that a large amount of letters in the August issue was on the subject of cassette recorders.

I have used four or five computers, usually with either a Hitachi or a Thorn.

But since I have had my Electron, my recorder has been the WH Smith computer program recorder model CPD 8300, and I have found that

since it was set on position 2½ I have not had one case of non-save or load. I would recommend this recorder to anyone. — **H. Grimley, Paignton, Devon.**

### Impatience pays off

WHEN I bought my Electron I wanted to buy the BBC data recorder which at that time was in very short supply.

Being anxious to try out my new machine, and too impatient to wait the fortnight or so that I was quoted for the BBC recorder, I bought a Lloytron, Model V171 on the advice of a local computer dealer.

This, with a 7 din to split mic, earphone, remote control lead has worked perfectly.

It is important that the earphone and mic jacks are not put into the wrong sockets — as they are the same size this was easy to do, despite their being of different colours.

Once I'd established which was which, I marked them to avoid future confusion and have had no problems at all. — **Yvonne Wilkin, Alveley, Shropshire.**

● Thanks for the tip about

**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.

The address is:

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

# Micro Messages

## From Page 61

marking the mic and ear leads. Lots of the trouble people have with their recorders stem from this.

## A question of brackets

RECENTLY I tried typing in a BBC Micro assembly language verification routine. Line 5 read:

```
5 [OPT F1*2
```

I repeatedly got a syntax error message. For the [ symbol I used Ctrl and the up cursor key. Is this where my problem is? — D. Cohen, Westcliff-on-Sea, Essex.

● What you want is the square bracket [ that is found on the Copy key. This tells the Electron that assembly language is coming up.

## Broadcasting Electrons!

HAVING read T. Skinner's letter in July's Micro Messages I would like to say my Electron does the same.

One day while playing Killer Gorilla my sister shouted from downstairs that she could hear the game's sound effects on the radio.

After hearing the sound effects for myself I was amazed to hear my Electron actually broadcasting.

In fact all my other games seem to register sound effects on the radio. — Neil Wright, Pogmoor, Barnsley.

● We must admit we thought the original letter was a joke but we've been inundated with letters about broadcasting Electrons. But we can't get it to happen with ours. Any answers?

## Where 1.0 equals 1.2

HAVING read that my Electron was fitted with the latest operating system which I

assumed was 1.2 OS I typed in \*HELP.

To my amazement, the computer replied:

```
OS 1.00
```

Shouldn't it reply:

```
OS 1.2 ?
```

Or has somebody not told me something. — Nicholas Haigney, Sheldon, Birmingham.

● This one never seems to go away. The Electron is OS 1.0 which is, to all intents and purposes, equivalent to the BBC Micro's 1.2 OS.

## Pirate hits the rocks

I MUST admit I have pirated a few games and I always record and play back on the same cassette recorder.

This was fine until the tape recorder went wrong and I purchased a new one, a Kisho.

When I got home I tried it out. It saved well and loaded proper games, but didn't load any pirated games.

All that happened was that it just said "data-rewind tape" or "block".

I tried every combination of volume, but to no avail.

Please print this letter to warn other pirates that cheats don't prosper.

Do you know why? — CHR\$ 68, 65, 78, 78, 89; CHR\$ 89, 65, 75, 69.

● If we did we wouldn't tell you. Pirating is theft!

## Moving down the line

I TYPED in the Lines and Patterns program in the August 1984 issue of Electron User and found that, like almost every other thing you want to see, the top line was

hiding away again on my television.

So I looked in the User Guide at the Ctrl codes and found out that if you inserted VDU 11 (Ctrl K) into a program which has a screen full then it moves the display down a line. So I inserted this line:

```
165 VDU 11,7
```

The 7 is just to create a short beep.

This line has now moved the screen down one line when the pattern has been drawn.

If the program needs two lines brought down then just place another 11 after the 11 already there.

```
165 VDU 11,11,7
```

for 2 lines down.

```
165 VDU 11,11,11,7
```

for 3 lines down, etc. — Kevin Sharkey, Stanley, Co. Durham.

● Many thanks for your tip which lots of Electron users will find useful.

# Shape filling solved

IN the July issue of Electron User a correspondent asked for a method of filling in shapes.

My program does this for a contrived shape, the upper case M.

The method illustrated could be adapted to any shape within which a series of straight lines can be determined.

The cursor is driven along the lines by a series of loops with the space being filled via the PLOT instruction.

I have used the vertical loop, 70-80 and 150-160, to fill in narrow white areas on the Union Jack and to draw the white stripes on the US flag.

The other loops, 90-140, take the cursor up and down at an angle. In the diagonal loops the value of Y changes by 620 and that of X by 410.

$X/Y = 410/620 = 0.66$  and gives the value for the increment at 100 and 130.

A similar calculation within

whatever shape you may choose would give the appropriate angle of travel for the cursor.

The use of loops does make the program slower than, say, triangle plotting.

In the example in the program it was necessary to flatten the central point of the M because the slight sawtooth produced by drawing diagonals on a TV screen did allow the cursor to get outside the enclosed figure at the extreme tip.

Variations of this method would fill spaces between figures but it would obviously become much more complicated if the figures and spaces were produced by a random process, as used in the polygons program in the book that comes with the computer.

— R Easever, Hungerford, Berks.

● As you say, the loops do slow it down. Of course machine code would be faster — hint, hint.

```

10 REM "FILLING SHAPES"
20 REM BY R.EASENER
30 MODE 1
40 DRAW 0,800:DRAW 110,800:
DRAW 500,320:DRAW 890,800:
DRAW 1000,800:DRAW 1000,0:
DRAW 900,0:DRAW 900,650:
DRAW 510,180:DRAW 490,180:
DRAW 100,650:DRAW 100,0:DRAW 0,0
50 GCOL 0,1
60 X=90
70 FOR Y=0 TO 800
80 PLOT 77,X,Y:NEXT Y
90 FOR Y=800 TO 180 STEP -1
100 X=X+0.66
110 PLOT 77,X,Y:NEXT Y
120 FOR Y=180 TO 800
130 X=X+0.66
140 PLOT 77,X,Y:NEXT Y
150 FOR Y=800 TO 0 STEP -1
160 PLOT 77,X,Y:NEXT Y

```

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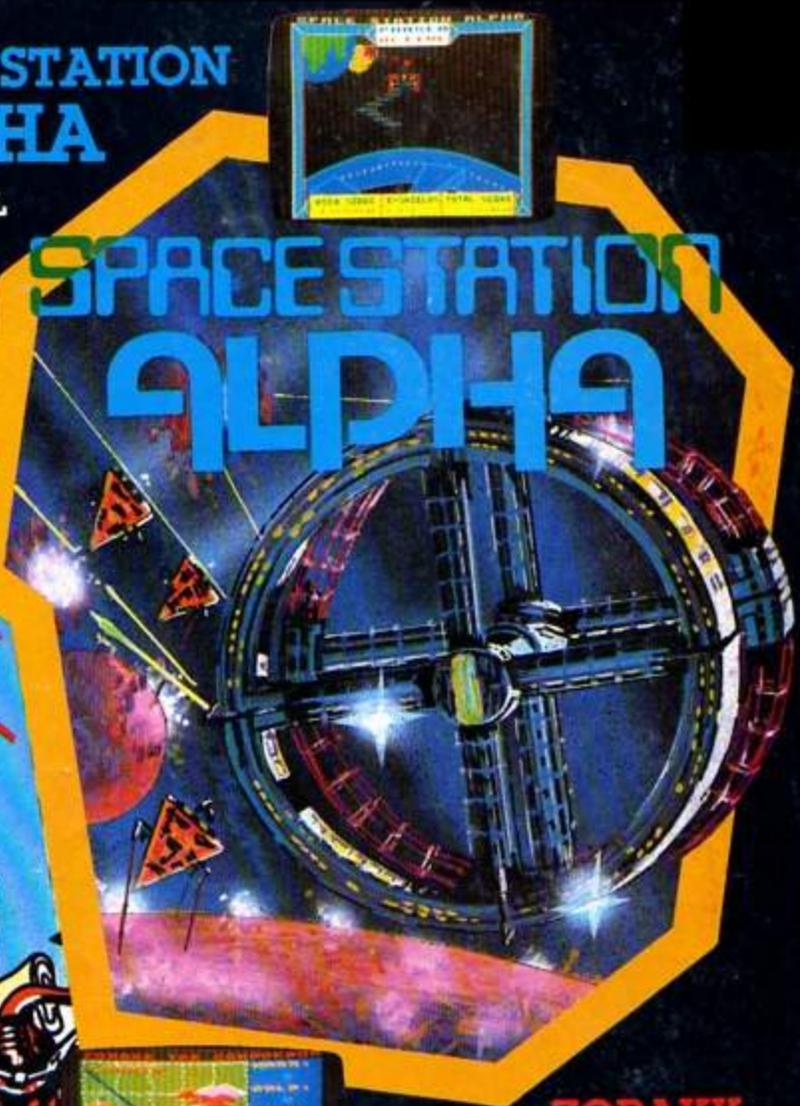
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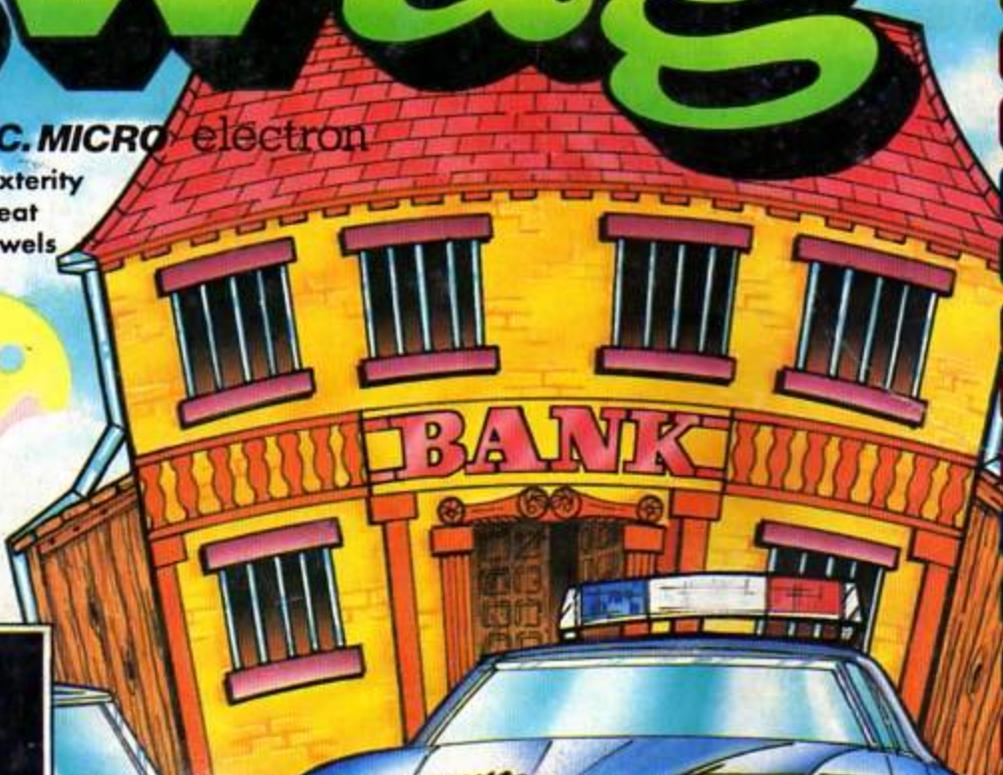
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