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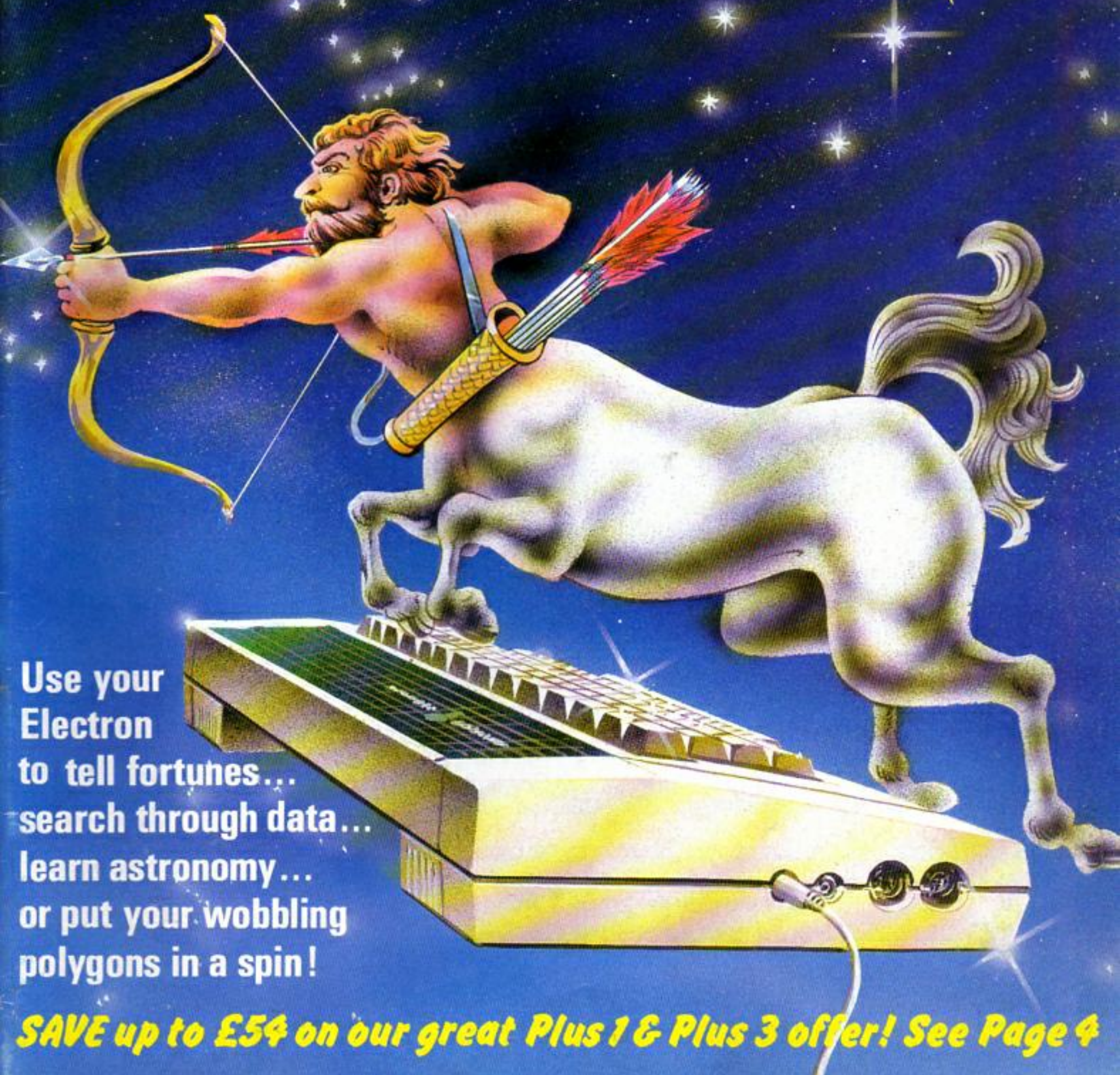

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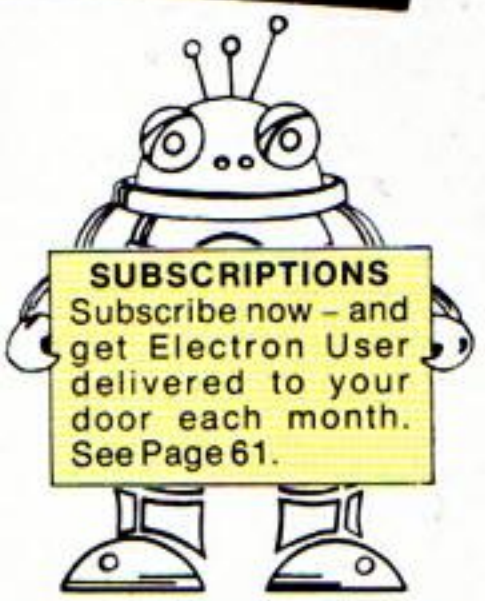

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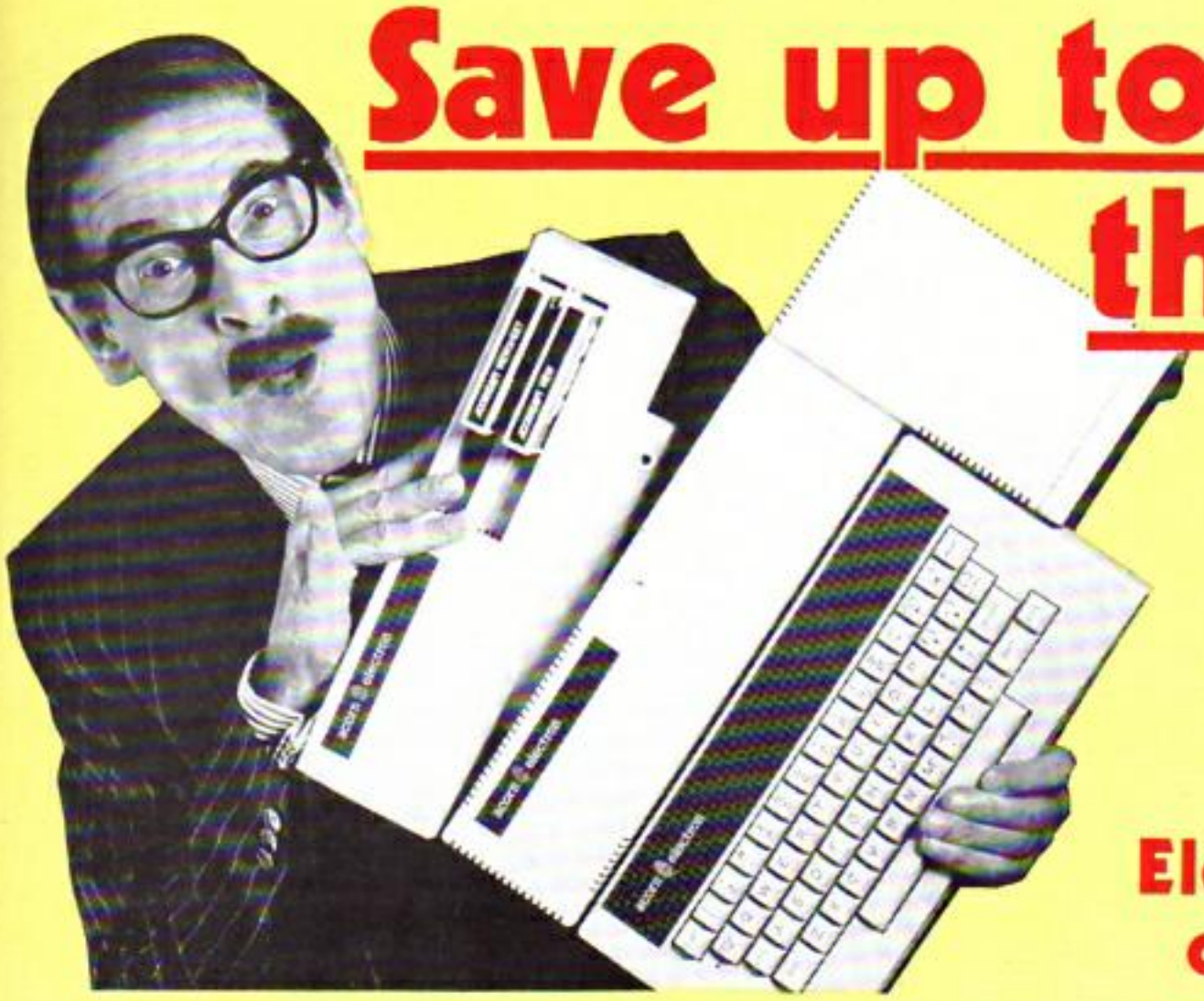

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It's a golden birthday!

A UNIQUE gold micro valued at £5,000 is to be given away to celebrate the second birthday of *The Micro User*, sister publication to the *Electron User*.

The Micro User offers the unique home computer as the star prize in a competition in its March issue.

A leading brokerage company has already insured the gold BBC Micro for in excess of £5,000.

Unique

"But as far as we are concerned it is priceless in that it is unique", says managing editor Derek Meakin.

Within its gold plated, streamlined processor and keyboard casings can be found the BBC keyboard and motherboard, a disc interface, two 1mbyte disc drives and an 85 watt power supply unit.

The gold micro – the most fabulous prize ever to be given away by a computer magazine – has been commissioned from the Universal Communications Company, based in Bradford, West Yorkshire.

Now the undisputed leader in the field of customised casings for the BBC Micro, UCC markets its products under the Oak label.

"Our only problem now is how we are going to top this when it comes time to celebrate Electron User's birthday", says Derek Meakin.

Good deed gamesters

COMPUTER enthusiasts who played a special motor racing game at Broadway Electronics' new Bedford showrooms helped provide youngsters at a local children's home with an Electron.

Broadway matched donations from customers taking part to buy the machine, which was collected from manager Alan Dumbers by youngsters from Spurgeons Homes.

The officer in charge of the home, David Fairman, said: "Everyone wants to use the Electron for games or school work. It will become a very important part of our activities".

● Pictured above are Alan Dumburs and youngsters from Spurgeons Homes.

New look network wins £6m orders

ACORN'S new "streamlined" distribution network has already brought in orders worth more than £6 million for Electrons and BBC Micros.

The number of distributors was recently cut from 17 to six in a move which the company maintains will introduce stability into the marketplace.

Acorn's distributor network for England and Wales now comprises 3SL, Eltec, Hugh Symons, Lightning, LVL and Micro Management.

Computerworld remains Acorn's distributor for Scotland, while CEM and Lendac will continue in Ireland.

Nearly all of Acorn's 2,000 independent dealers will now be serviced entirely by the new distributor network.

Chris Hall, Acorn's UK sales manager, said: "Independent dealers account for over half our sales, particularly in the business and education sectors.

"This new strengthened network, with its increased emphasis on support, will not only help independent outlets to compete on an equal footing with the multiples, but ensure that they can successfully handle the evolving product lines of Acorn's 1985 marketing strategy".

Acorn claims that improved margins will enable the remaining distributors to offer dealers "better support and in turn help them to improve customers service".

However not all dealers appear to be entirely happy with the new arrangements, with at least one claiming his profit margin had been effectively slashed to £6 for every Electron sold.

"This just isn't true", insisted an Acorn spokesman.

THE ACCENT ON SERVICE

THE Electron has proved to be one of the most reliable home computers on the market. However when something does go wrong you may find your dealer doesn't offer a repair service, or if he does you may have a long wait ahead.

Fortunately a number of firms have come along to meet this need for specialised servicing.

One of them is Rumbelows, which now has 40 service clinics – repair shops to most of us – throughout the country.

Training

Rumbelows' computer engineers undergo an extensive training period to develop their skills and are also qualified to install peripherals such as disc drives, Econet, word processors and printers.

Service engineers say the hardest part of their job is repairing a computer they can't communicate with.

To overcome this Rumbelows uses a range of equipment to locate the problem, including an oscilloscope which checks the signals present on each of the integrated circuits and a production inspective tester – a special diagnostic chip.

Once the fault is solved the engineer gives the Electron a comprehensive test using the Watch Dog, which is used for diagnosis before servicing and for final testing.

Media is blamed for micro industry panic

THE wave of panic which has swept over the UK home computer industry in recent weeks has been blamed on "seriously exaggerated" reports – including several! about the Electron – in the British Press.

And Martin Vlieland-Boddy, a leading figure in hi-tech circles, is convinced that the media has hounded Britain's manufacturers, particularly Acorn, to such an extent that it has almost handed the market over to the American competition.

"What they have done with rumours and innuendo is to destroy confidence in the market", he told *Electron User*.

"First the City boys get the jitters, then they are soon followed by the potential customers.

Exaggerated

"Acorn has suffered far more than most, for they exaggerated any problems the company had to the point that they were accelerated.

"As a result all the other British manufacturers have come under fire. They have kicked the home industry to such an extent that everyone is down".

The former boss of Torch singled out The Sunday Times as being mainly responsible for the current troubles.

Culprits

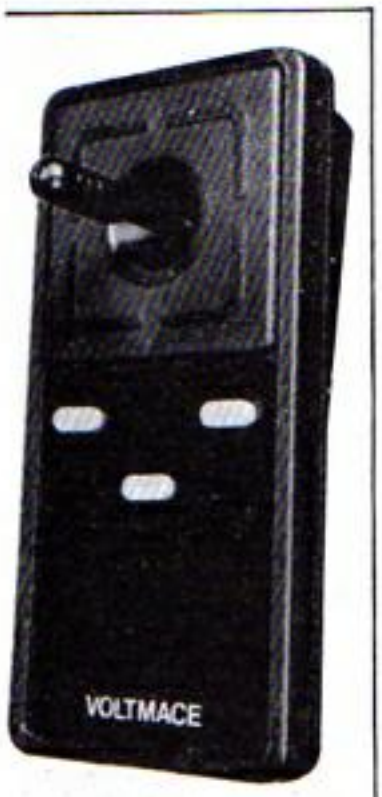
"This normally sensible newspaper has been one of the worst culprits", Vlieland-Boddy insists, "and computer writer Jane Bird must share a considerable degree of blame.

"After all, it was her articles going back to late last year which caused the rot to set in for Acorn.

"Because of them people began to lose that vital confidence in the company and, as a result, sales were lower at Christmas than they should have been.

"Suddenly a vicious circle has been created which is threatening to ensnare all the British micro manufacturers".

Martin Vlieland-Boddy is currently heading Active Technologies, a public company involved in the merger of successful companies to protect themselves against unstable market conditions.



Joystick that sees double

A SINGLE joystick that thinks it's two has been produced by Voltmace.

The firm's Delta 3B single has been modified to include connection to both pairs of analogue channels of the computer.

It will work with programs written for either a left or right joystick, and if a program has been designed for two players using different joysticks it can be played by passing the joystick from one player to the other.

The joystick costs £12 and operates on the Electron with any analogue interface.

Jane Bird . . . "must share a considerable degree of blame".

MORE SUPER SHOWS

DATABASE Publications is to organise three Electron & BBC Micro User Shows this year.

"Whereas some computer show organisers have been experiencing problems of late – IPC has even cancelled events – we expect once again to break previous attendance records", says Derek Meakin, head of Database.

Dates and venues:

May 9 to 12: New Horticultural Hall, London SW1.

September 27 to 29: UMIST, Manchester.

November 14 to 17: New Horticultural Hall, London SW1.

Show contacts: Christine Lees/Pam Goodwin, Database Publications. Tel: 061-429 8157.

Aid for handicapped

MINI Office, the chart topping business package for the Electron from Database Software, has been officially endorsed as an aid for the handicapped.

The software is specifically recommended in "Micros for Handicapped Users", a book published by Helena Press of Whitby Yorkshire. It carries a foreword by Baroness Masham of Ilton.

Revolutionarily priced at £5.95 – business packages can cost up to several hundred pounds – Mini Office is a suite of four programs.

All professionally written, they are made up of a word processor, database, spreadsheet and graphics.

The software package is singled out in the book in the chapter "Jobs for housebound people", which deals with the handicapped contemplating setting up their own businesses.

"We found Mini Office very useful", Peter Saunders of Helena Press told *Electron User*.

REWRITE THE HIGH SCORE TABLES

So, you've got an Electron. You've also got enemies. With the Gunshot, you'll have all the opposition cowering in corners. 8-directional action and an all-in-one moulded stem allows accurate annihilation and strength to survive those all-night sessions. Dual fire buttons for fading fingers (and a rapid fire version when they're really coming thick and fast). And, if you break it (and we know you'll try) our 12-month guarantee will prove invaluable. Only £8.95.

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Part 15 of PETE BIBBY's introduction to programming

Logically speaking AND THEN we come to EOR

IF you're a teenager AND not in love THEN you may as well read this . . .

Last month we saw how logical variables could be used to store the results of comparisons. These results always took the values 0 and −1, with 0 meaning that the condition was false while −1 indicated that the comparison was true.

These two values were held in the pseudovariables TRUE and FALSE.

Finally we saw how two conditions could be joined together to make up one larger condition using the AND logical operator.

Program I shows all these in action as it decides whether or not you are a teenager.

```
10 REM PROGRAM I
20 INPUT "Age",age
30 tooyoung= age<13
40 tooold= age>19
50 teenager=age>=13 AND
age<=19
60 IF teenager THEN
PRINT "You're a teenager!"
70 IF tooyoung THEN
PRINT "You'll be a teenager
when you're older."
80 IF tooold THEN PRINT
"You're past it!"
```

Program I

What happens depends on the value you put into the varible *age*. If *age* is less than 13 then line 30 notes this fact and it is recorded in the logical variable *tooyoung*.

Similarly if *age* is over 19 then line 40 gives *tooold* the value −1. (In passing, notice that if one is true the other must be false. You can't be both too young and too old to be a teenager.)

You can only be a teenager if your age is between 13 and 19. Hence the structure of line 50 which subjects *age* to two comparisons joined by AND.

Only if *age* is both 13 or more and also 19 or less can it be true that you are a teenager. Hence *teenager* is only true if *age>=13* AND *age<=19* is true.

The remaining lines of the program print out the appropriate message depending on which of the logical variables *tooold, tooyoung* or *teenager* is true.

As you can see, the choice of sensibly named logical variables make the last lines read almost like English.

Don't worry too much if line 50 looks a little odd. You can, if you want, make things clearer by enclosing the multiple condition in brackets as in:

```
50 teenager= (age>=13
AND age<=19)
```

Now you can see more clearly that it is the result of the ANDing of both comparisons that is stored in *teenager*.

The AND operator is again in action in Program II. This asks for the price of an item and then for how much money you can spend.

```
10 REM PROGRAM II
20 INPUT "Price", price
30 INPUT
"Money",spendingmoney
40 cheap=0
50 gotenough=0
60 IF price<50 THEN
cheap=-1
70 IF
spendingmoney>price THEN
gotenough=-1
80 IF cheap AND
gotenough THEN PRINT "Buy
it."
```

Program II

It then tells you that you can buy the item but only if it is both cheap and within your disposable income (credit card companies don't like this type of program).

```
10 REM PROGRAM III
20 INPUT "Price", price
30 INPUT
"Money",spendingmoney
40 cheap=FALSE
50 gotenough=FALSE
60 IF price<50 THEN
cheap=TRUE
70 IF
spendingmoney>price THEN
gotenough=TRUE
80 IF cheap AND
gotenough THEN PRINT "Buy
it."
```

Program III

Lines 40 and 50 set up two variables, *cheap* and *gotenough*, giving them both values of zero. Line 60 then sets *cheap* to −1 if *price* is less than 50.

Similarly, the next line gives *gotenough* the value −1 if your spending money covers the price.

Notice that *cheap* and *gotenough* are both being used as logical variables.

The final line ANDs *cheap* and *gotenough*. If, and only if, both are true, then the message will be printed.

It's no good if you have enough money but the item isn't cheap. Nor is it any good if the item is cheap but you don't have enough money.

Both conditions have to be true before the rest of the line after the THEN is obeyed.

Rather than use the values 0 and −1 in Program II we could have used TRUE and FALSE. Program III shows how this is done.

Notice how much clearer this is than the earlier program. However it can still be improved, as in Program IV.

This listing does away with lines 60 and 70 of the previous program. Instead lines 40 and 50 do the comparisons and store the results directly in the logical variables *cheap* and *gotenough*.

Not only does this save time and memory space, it makes the program even clearer.

As we've seen, the joint condition formed by two conditions linked by an AND is only true if both the subsidiary conditions are true.

```
10 REM PROGRAM IV
20 INPUT "Price", price
30 INPUT
"Money",spendingmoney
40 cheap=price<50
50
gotenough=spendingmoney>pri
ce
80 IF cheap AND
gotenough THEN PRINT "Buy
it."
```

Program IV

It's no good the first condition being true while the

→

EOR... a logical operator we don't meet so often

From Page 9

second is false. It's no good the second condition being true when the first is false. Both conditions have to be true for the overall condition formed by the AND to be true.

In many ways this is common sense. It's the way we use AND in our everyday life . . . "I won't go sunbathing unless it is sunny and warm".

Both subsidiary conditions have to be met before the total condition is fulfilled.

first condition	second condition	joint condition
TRUE	TRUE	TRUE
TRUE	FALSE	FALSE
FALSE	TRUE	FALSE
FALSE	FALSE	FALSE

Table I: AND truth table

If you think about it, you'll see that there are only four possible combinations in our AND condition.

Both minor conditions can be true, both can be false, the first can be true while the second is false or the first can be false while the second is true.

Table I sums up these possible minor conditions and the results they have on the major condition. It's called the AND truth table.

In real life, however, we don't just stick to conditions such as "If you're lucky and I've nothing better to do then I'll come with you".

We also use conditionals such as "If you're lucky or I've nothing better to do then I'll come with you".

Notice the difference between them. In the first case I'll only be coming if it's true that you're lucky and, at the same time, it's true that I've nothing better to do. Only if both conditions are true will you have the pleasure of my company.

The second case is very different. As before if both conditions are true (you're lucky and I've nothing better on) I'll be coming. There are, however, two other positive results.

It may be the case that while you aren't very lucky I have nothing better to do so I'm coming with you (There, your luck's changed!). Alternatively I may have better things to do but you're lucky, so I come.

```
   10 REM PROGRAM V
   20 INPUT "Age",age
   30 younger= age<13
   40 older= age>19
   50 teenager=age)=13 AND
age<=19
   60 IF younger OR older
THEN PRINT "You can come."
   70 IF teenager THEN
PRINT "Go away."
```

Program V

```
   10 REM PROGRAM VI
   20 INPUT "Coffee
temperature", temp
   30 INPUT "Coffee price",
price
   40 hot=temp>50
   50 cheap=price<40
   60 IF hot OR cheap THEN
PRINT "Drink it!"
```

Program VI

As you can see, using the "or" instead of the "and" in the above sentences makes a lot of difference. And, as you might have guessed, we can produce these sort of conditionals using Basic. In this case we used the aptly named OR logical operator.

Program V shows OR in action. This again tests *age* but, to make up for before, it's the teenagers who are left out.

Here the three logical variables *younger, older* and *teenager,* are used to store the results of the tests on *age.*

Line 60 introduces the OR operator. Now if either *younger* or *older* or both are true then the rest of the line after the THEN is performed.

Actually in this case it's impossible for both minor conditions to hold good, as you can't be both younger and older than a teenager.

The point to grasp is that only one of the two minor conditions has to be true for the whole major condition to be true.

If neither of these conditions is true then *teenager* has to be true, so the rude message is printed.

Program VI again shows OR in action.

If the temperature of the coffee is over 50 then the logical variable *hot* will be true. If the coffee costs less than 40 then *cheap* will be set to true.

The OR in the joint condition of line 60 allows the message to be printed out if either or both conditions is true.

You'll notice from this that the OR logical operator is much more generous than the AND.

Whereas an AND combination is only true for one of the four possible cases, the OR operator is true for three of the combinations. Table II shows the truth table for OR.

Try using it to figure out what's happening in Program VII which tests a list of data for numbers that are either 12 OR greater than 10.

Notice that only one of the conditions has to be true for the message to be printed.

There's one more logical operator to deal with, but before we come to that try swapping the ANDs and the ORs of the previous programs and see how they affect the results.

first condition	second condition	joint condition
TRUE	TRUE	TRUE
TRUE	FALSE	TRUE
FALSE	TRUE	TRUE
FALSE	FALSE	FALSE

Table II: OR truth table

So far the two logical operators we've come across have been reasonably familiar. Both the AND and the OR operators are more or less the same as we've met in our everyday life.

As ever, the computer treats them rather more strictly than we do but they do conform to common sense.

Now, however, we're going to meet another logical operator which we don't meet all that often. It's the exclusive-or or EOR operator.

```
   10 REM PROGRAM VII
   20 FOR loop=1 TO 5
   30 inrange=FALSE
   40 READ test
   50 IF test=12 OR test>10
 THEN inrange=TRUE
   60 IF inrange THEN PRINT
;test" is either equal to 1
2, greater than 10 or both"
   70 NEXT loop
   80 DATA 9,12,5,17,23
```

Program VII

Happily it's not all that difficult to understand. Table III shows its truth table.

In the case of two subsidiary conditions linked by an EOR the overall condition is only true if one but not the other of the two subsidiary conditions is true.

If both conditions are true then the overall condition is,

contrarily, false.

In other words, the joint condition is only true if one, and only one, of the minor conditions is true.

At first this seems a little unreal, but it does mirror everyday life. Consider the case of:

```
IF you're good looking
EOR you're rich
THEN I'll marry you
```

Here the marriage will only take place if the prospective spouse is good looking but not rich or, alternatively, rich but ugly. If the spouse is ugly and poor the nuptials are cancelled.

```
10 REM PROGRAM VIII
20 INPUT "Weight",weight
30 INPUT "Length",length
40 heavy= weight)=50
50 long= length)=60
60 IF long EOR heavy THE
N PRINT "I'll help you carr
y it."
```

Program VIII

first condition	second condition	joint condition
TRUE	TRUE	FALSE
TRUE	FALSE	TRUE
FALSE	TRUE	TRUE
FALSE	FALSE	FALSE

Table III: EOR truth table

Similarly if the spouse is good looking and rich the wedding is off (they'd be too bigheaded to live with!).

I agree that it's a strange example, but in computing we often come across cases wheren EOR is useful. Take a look at Program VIII.

Here I'm willing to carry the parcel if it's heavy but not too long. I'm even willing to carry it if it is cumbersome, so long as it's not too heavy.

If it's neither heavy nor cumbersome you can carry it yourself. And if it's heavy and cumbersome find someone else to do your dirty work.

Again, it's not the world's most likely example, but take my word for it, EOR is an extremely useful logical operator.

You'll come across it a lot in your computing career. See if you can figure out what it's doing in Program IX.

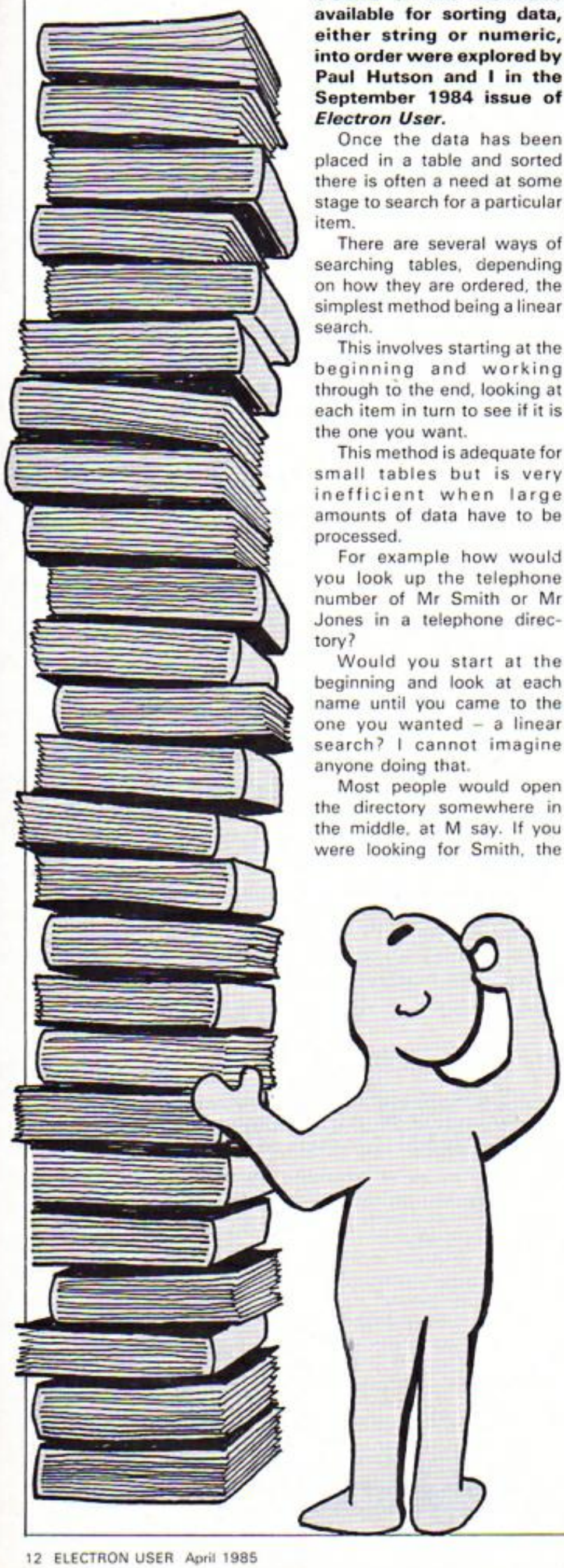
```
10 REM PROGRAM IX
20 FOR loop=1 TO 4
30 inrange=FALSE
40 READ first,second
50 IF first<10 EOR secon
d >20 THEN inrange=TRUE
60 IF inrange THEN PRINT
"Either ";first" is less th
an 10 or ";second" is great
er than 20 but not both at
the same time."
70 PRINT
80 NEXT loop
90 DATA 9,12,7,23,15,19,
16,25
```

Program IX

And that's it for this month. Next month we'll be looking at one more logical operator. What ELSE!

Doing things by halves

ROLAND WADDILOVE explains an efficient way to search ordered data



SOME of the methods available for sorting data, either string or numeric, into order were explored by Paul Hutson and I in the September 1984 issue of *Electron User*.

Once the data has been placed in a table and sorted there is often a need at some stage to search for a particular item.

There are several ways of searching tables, depending on how they are ordered, the simplest method being a linear search.

This involves starting at the beginning and working through to the end, looking at each item in turn to see if it is the one you want.

This method is adequate for small tables but is very inefficient when large amounts of data have to be processed.

For example how would you look up the telephone number of Mr Smith or Mr Jones in a telephone directory?

Would you start at the beginning and look at each name until you came to the one you wanted – a linear search? I cannot imagine anyone doing that.

Most people would open the directory somewhere in the middle, at M say. If you were looking for Smith, the first half up to M would be ignored.

You could then divide the remainder in half again, opening it at R or S. It is then relatively easy to find the person you are looking for.

This method of searching by repeatedly dividing the list or table into two is called a binary search. It is plainly a much superior method as far fewer steps are required.

How can this method be put in a form which the Electron can understand?

Suppose you had a simple telephone directory program. You would need three arrays to store the information – *name$(100), address$(100), number%(100).*

These would be dimensioned at the start of the program and the data loaded from disc or tape.

The address and telephone number would be required for any name entered. Listing I shows how this can be done using the binary search method.

Line 1010 sets the first and last names to be considered. Line 1020 sets found to be FALSE.

Line 1040 finds the middle of the list. A check is first made to see if the person has been found, line 1050.

If the name in the middle is greater than the person's name then the person must come before this, so *last* is set to *middle* – 1, line 1060.

If the middle name is less than the person's name, then ignore the first half by setting *first* to *middle* + 1, line 1070.

This process is repeated until the person's name is found.

What will happen if the name is not in the file? *found* will never be set to TRUE and the routine will loop forever. Some sort of check is needed.

If you follow through the routine you will see that every time lines 1040 to 1070 are repeated and the person's name is not found, either *last* is decreased to *middle* – 1, or *first* is increased to *middle* + 1.

Eventually *first* will become greater than *last*. This is when we need to stop.

Listing II shows how this is done. Another flag is used, *no-name*, which is set to TRUE when *first* becomes greater than *last*.

These programs are not complete, and the procedures could be coded more efficiently, but they show the method quite clearly.

Program I sets up an array containing 1,000 different strings. Ten random strings are placed in another array.

Linear and binary searches are carried out for the 10 strings and the average time taken is calculated.

The searches are carried out for different numbers of items and the results plotted on a graph.

Run the program several times and notice how sharply the time taken increases with a linear search. The time taken for a binary search seems almost independent of the number of items.

The linear search curve is anything but smooth. It all depends on where the string is in the table, near the start or the end.

The difference between the two methods is apparent from the graph.

The average number of steps for a linear search is n/2, where n is the number of items in the table.

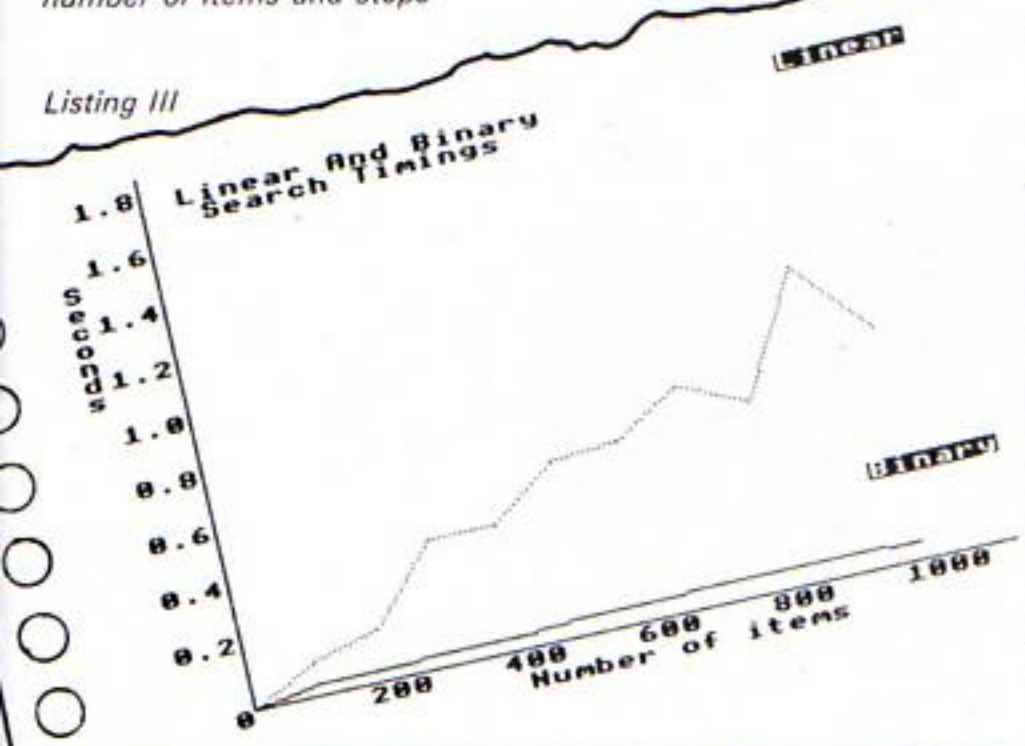
The average number of steps for a binary search is $\log_2 n$.

So doubling the number of entries will require only one more step with this method. Table I shows some sample values.

Number of items	Linear search	Binary search
n	Average number of steps = n/2	Average number of steps = $\log_2 n$
4	2	2
8	4	3
16	8	4
32	16	5
64	32	6
128	64	7
256	128	8

Table I: Relationships between number of items and steps

Listing III




```
 999 REM LISTING I
 1000 DEF PROCfind_number(p
erson$)
 1010 first=1 : last=number
_of_names
 1020 found=FALSE
 1030 REPEAT
 1040 middle=(first+last) D
IV 2
 1050 IF name$(middle)=pers
on$ THEN found=TRUE
 1060 IF name$(middle)>pers
on$ THEN last=middle-1
 1070 IF name$(middle)<pers
on$ THEN first=middle+1
 1090 UNTIL found
 1100 PRINT'person$;addres$
(middle);number%(middle)
 1120 ENDPROC
```

Listing I

```
 999  REM LISTING II
 1000 DEF PROCfind_number(p
erson$)
 1010 first=1 : last=number
_of_names
 1020 found=FALSE : no_name
=FALSE
 1030 REPEAT
 1040 middle=(first+last) D
IV 2
 1050 IF name$(middle)=pers
on$ THEN found=TRUE
 1060 IF name$(middle)>pers
on$ THEN last=middle-1
 1070 IF name$(middle)<pers
on$ THEN first=middle+1
 1080 IF first>last THEN no
_name=TRUE
 1090 UNTIL found OR no_nam
e
 1100 IF found THEN PRINT'p
erson$;addres$(middle);numb
er%(middle)
 1110 IF NOT found THEN PRI
NT'person$;" not in file."
 1120 ENDPROC
```

Listing II

```
  10 REM Linear/Binary
  20 REM Search Timings
  30 REM By R.A.Waddilove
  40  REM LISTING III
  50 MODE 4
  60 PROCinitialise
  70 FOR maxI=100 TO 1000
STEP 100
  80 PROCrandom_words
  90 PROClinear_search
 100 PROCbinary_search
 110 PROCplot_times
 120 NEXT
 130 VDU 7
 140 END
 150
 160 DEF PROCinitialise
 170 *FX16,0
 180 PRINT TAB(15,15);"Thi
nking..."
 190 VDU 23,1,0;0;0;0;
 200 VDU 19,1,3;0;
 210 DIM word$(1000),find$
(10)
 220 FOR I%=1 TO 1000
 230 word$(I%)=STR$(I%+100
0000)
 240 NEXT
 250 CLS:VDU 28,0,30,1,5
 260 PRINT "S e c o n d s"
 270 VDU 26
 280 PRINT TAB(6,1);"Linea
r And Binary";TAB(7,2);"Sea
rch Timings"
 290 COLOUR 129:COLOUR 0
 300 PRINT TAB(34,1);"Line
ar";TAB(34,24);"Binary":VDU
30
 310 COLOUR 1:COLOUR 128:V
DU 29,140;70;
 320 MOVE 0,1000:DRAW 0,0:
DRAW 1200,0
 330 VDU 5
 340 @%=&02010A
 350 FOR i=100 TO 900 STEP
 100
 360 MOVE -100,i+32:PRINT;
i/500
 370 NEXT
 380 @%=&00090A
 390 FOR I%=200 TO 1000 ST
EP 200
 400 MOVE I%-32,-8:PRINT;I
%
 410 NEXT
 420 MOVE 400,-46
 430 PRINT "Number of item
s"
 440 MOVE -32,0:PRINT "0"
 450 VDU 4
 460 oldlintime=0:oldbinti
me=0
 470 ENDPROC
 480
 490 DEF PROCrandom_words
 500 FOR I%=1 TO 10
 510 find$(I%)=STR$(RND(ma
x%)+1000000)
 520 NEXT
 530 ENDPROC
 540
 550 DEF PROClinear_search
 560 TIME=0
 570 FOR I%=1 TO 10
 580 J%=0
 590 REPEAT J%=J%+1
 600 UNTIL word$(J%)=find$
(I%)
 610 NEXT
 620 lintime=TIME DIV 10
 630 ENDPROC
 640
 650 DEF PROCbinary_search
 660 TIME=0
 670 FOR I%=1 TO 10
 680 F%=1:L%=max%
 690 REPEAT M%=(F%+L%)DIV2
 700 IF word$(M%)>find$(I%
) L%=M%-1
 710 IF word$(M%)<find$(I%
) F%=M%+1
 720 UNTIL word$(M%)=find$
(I%)
 730 NEXT
 740 bintime=TIME DIV 10
 750 ENDPROC
 760
 770 DEF PROCplot_times
 780 MOVE max%-100,5*oldli
ntime
 790 PLOT 21,max%,5*lintim
e
 800 MOVE max%-100,5*oldbi
ntime
 810 DRAW max%,5*bintime
 820 oldlintime=lintime
 830 oldbintime=bintime
 840 ENDPROC
```

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

Program I

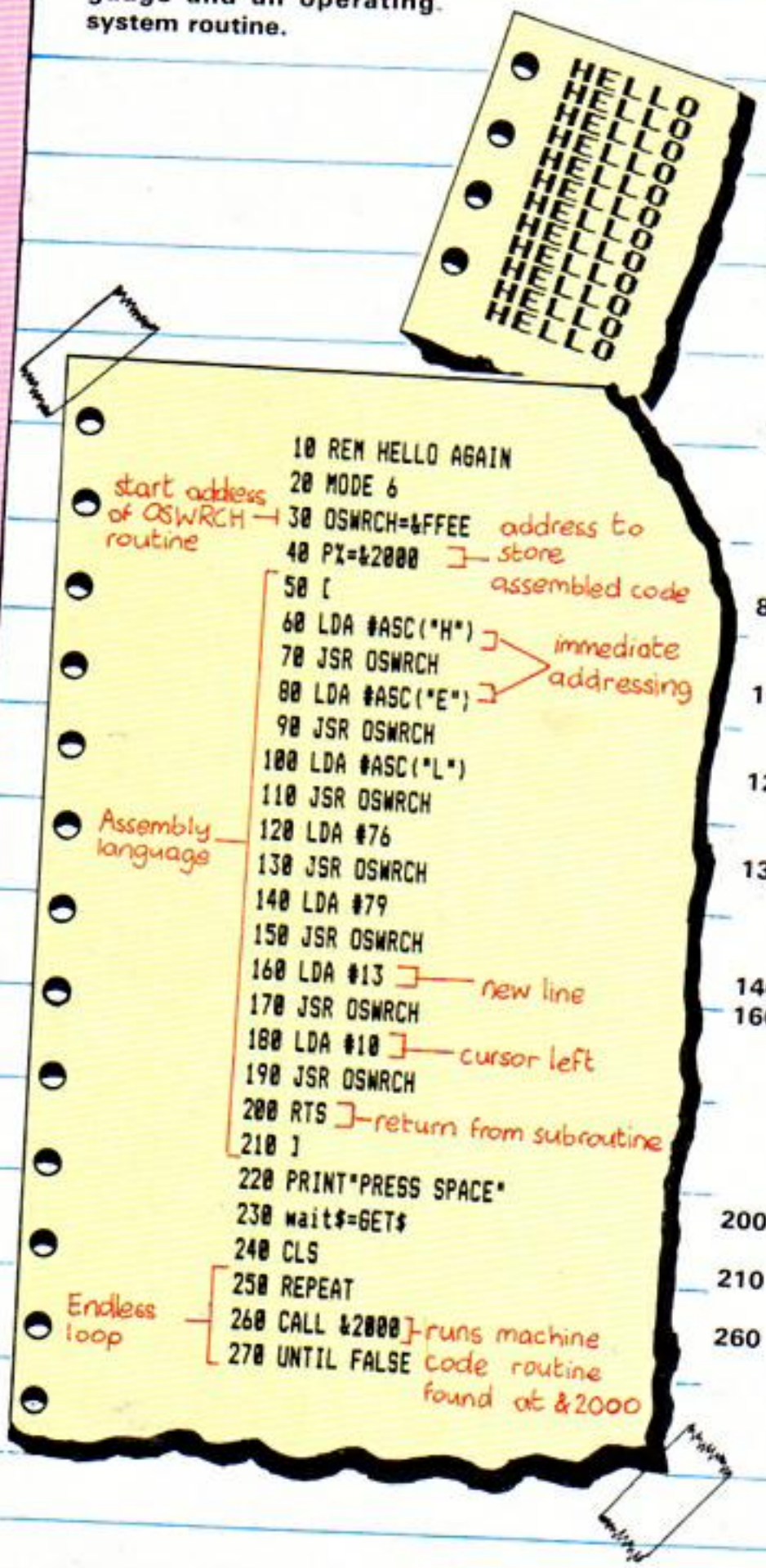
Notebook Part 15

Hello — what have we here?

DO you remember the first Basic program that you ever wrote? It was probably something like:

```
10 PRINT "HELLO"
20 GOTO 10
```

This month's notebook looks at a program that does exactly the same thing but using assembly language and an operating system routine.



PROGRAM EXPLANATION

10,20 Give the program title and put the micro into Mode 6.

30 The variable *OSWRCH* holds the address of the operating system routine that will be used to display out the Ascii equivalents of the contents of the accumulator.

40 The machine code generated by the assembler is to be stored at consecutive addresses starting at &2000.

50 The square bracket informs the Electron that what follows is assembly language, not Basic.

60 The LDA tells the 6502 microprocessor at the heart of the Electron to load the accumulator with the Ascii code for the letter H. Lines 80 and 100 do the same for E and L. This is known as immediate addressing, the number to be put into the accumulator coming straight after the operation code (LDA).

70 This jumps (JSR) to the address held in *OSWRCH*. In effect this starts up a routine which looks at the number in the accumulator and prints its Ascii character on the screen. When it's done this the program carries on from the next instruction.

80,90 The code for E is put into the accumulator and the operating system routine at &FFEE prints it out.

100,110 As above, L is put into the accumulator and the Operating System WRite CHaracter routine displays it.

120 Here the number 76 is loaded directly into the accumulator. Notice that there is no use of ASC() as before.

130 A jump to the same routine prints out the Ascii character of the accumulator's contents. In this case as the accumulator holds 76, so the letter printed is L.

140,150 Put 79 into the accumulator and print out O.

160-190 Use the same techniques as before to put numbers into the accumulator and print the corresponding Ascii characters on screen. These, however, aren't letters, they're the control codes for cursor down and start of line. They keep things tidy. Leave them out and see what happens.

200 RTS returns to Basic at the end of the machine code routine generated by the assembler.

210 The square bracket marks the end of the assembly language.

260 CALLs the machine code that has been assembled at the address &2000. Since this is in an endless REPEAT ... UNTIL loop the routine is performed until you press EScape.

Trevor Roberts

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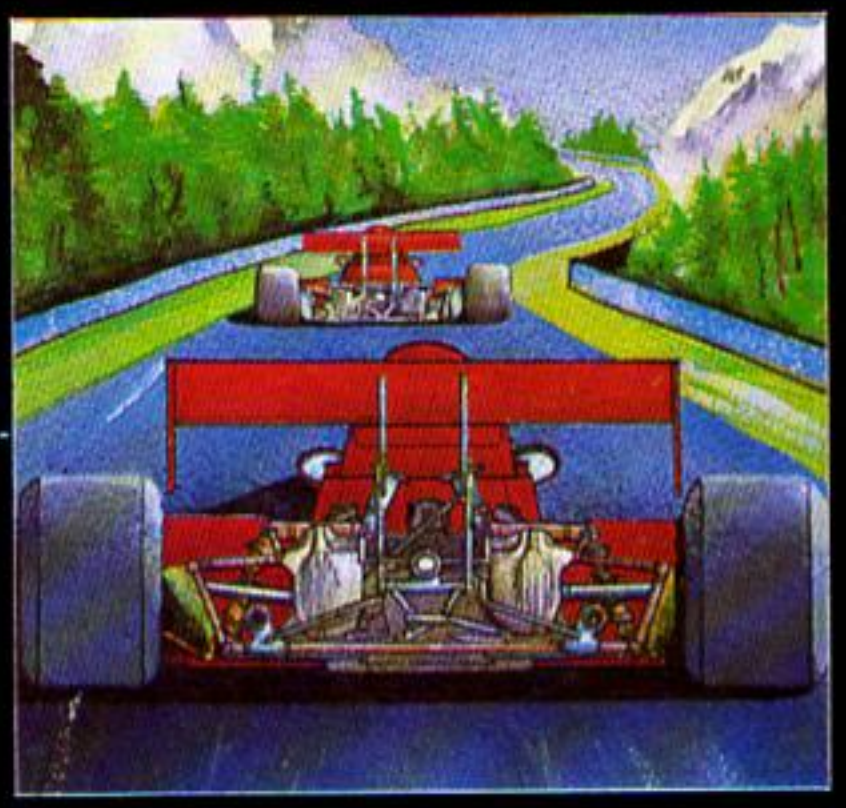

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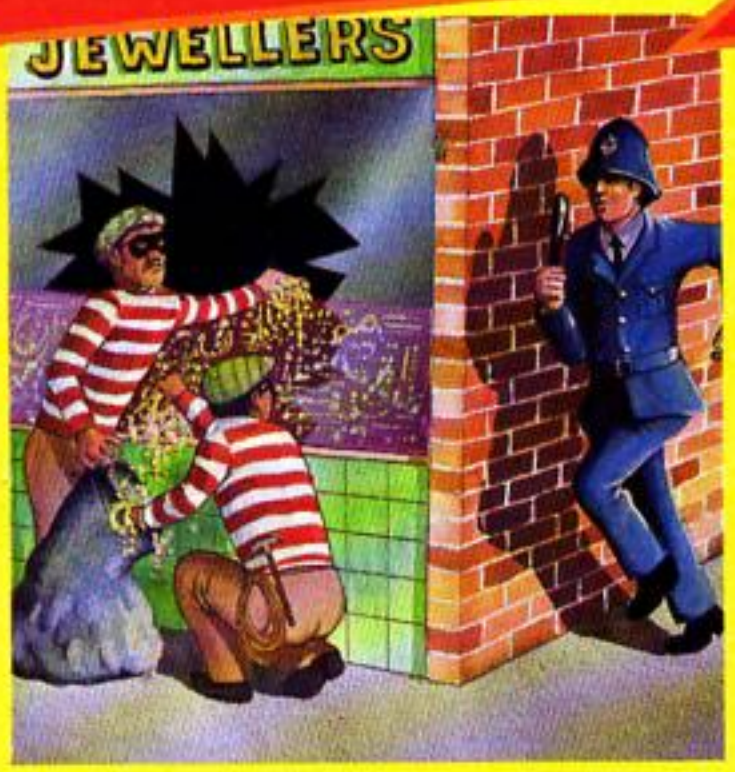

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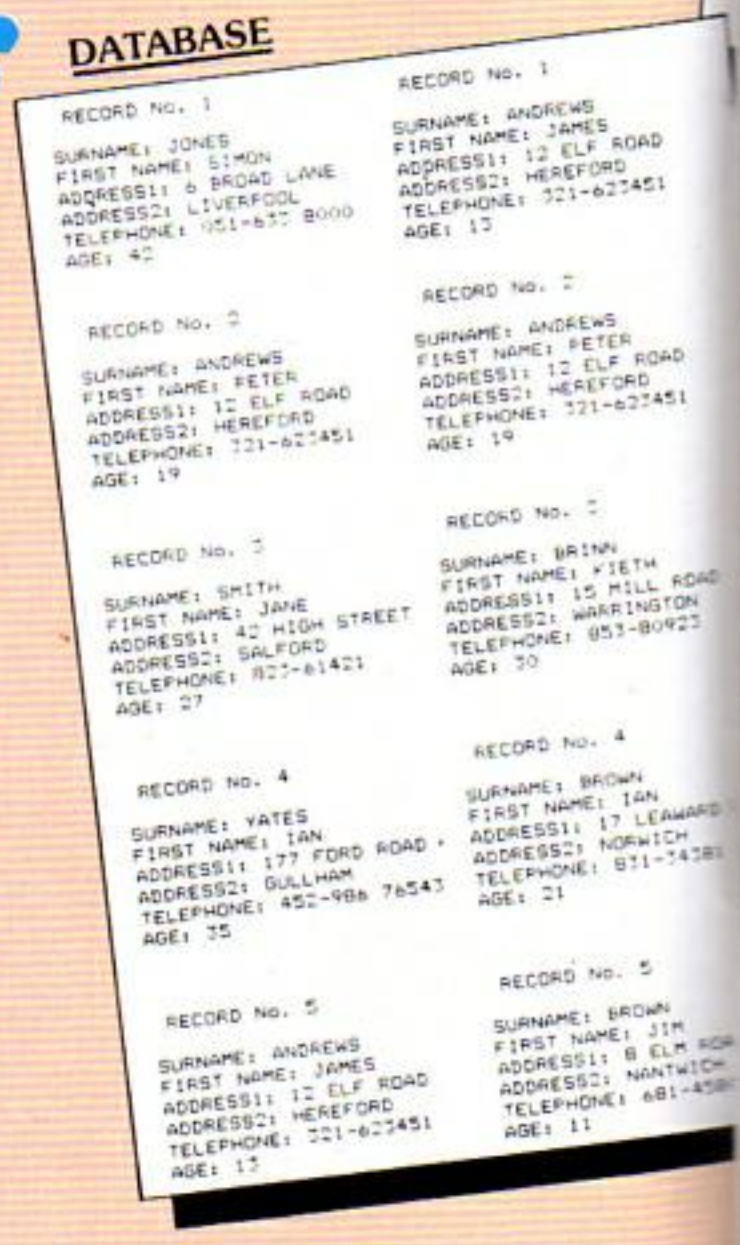

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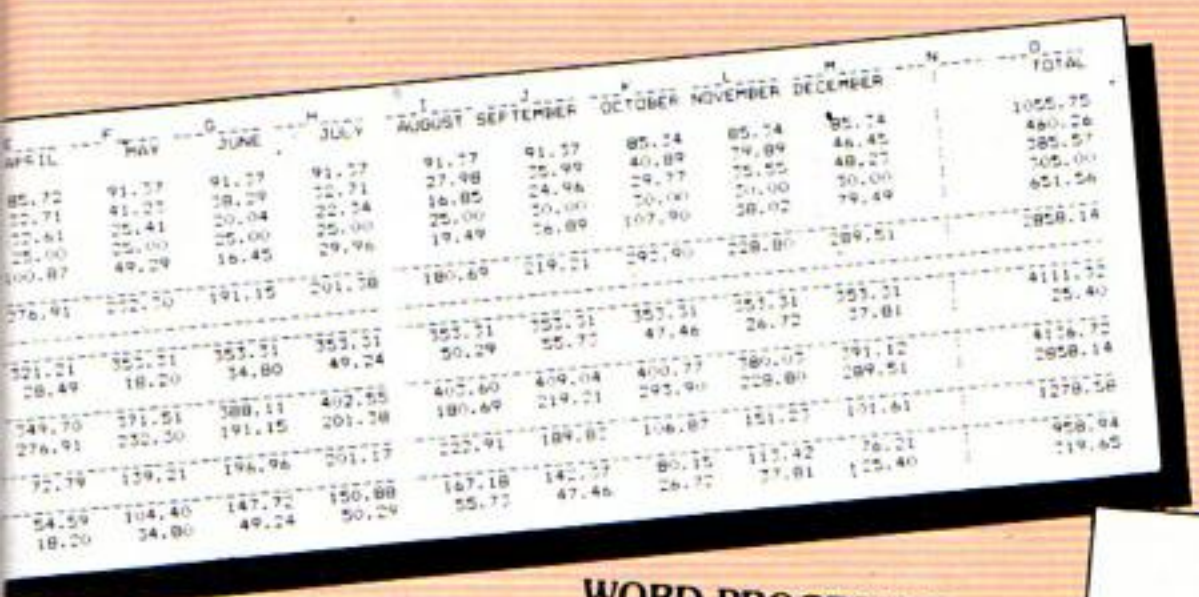
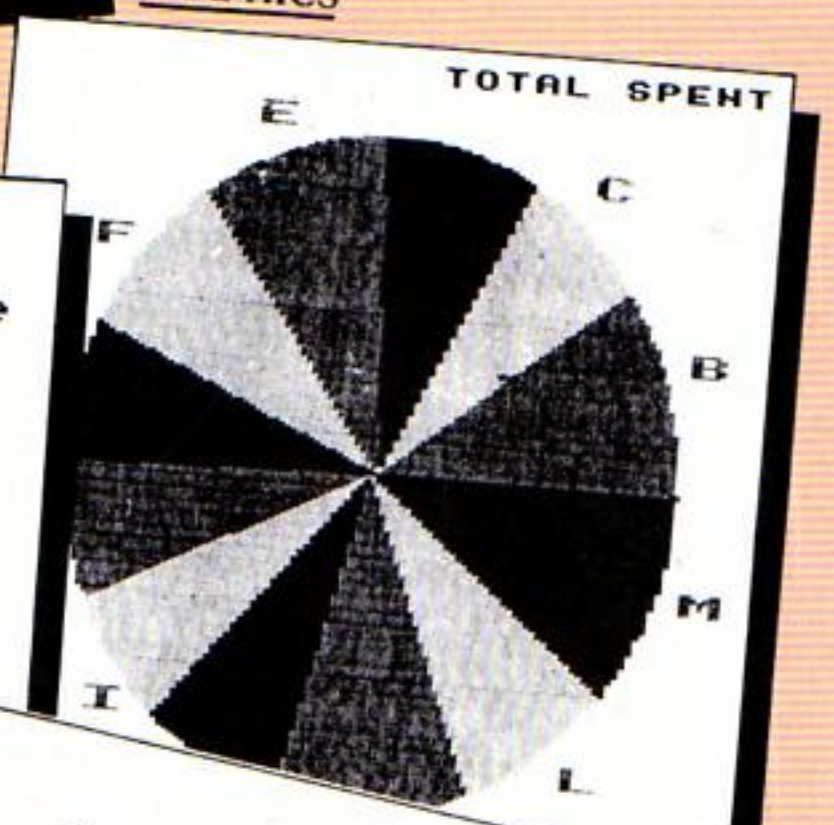
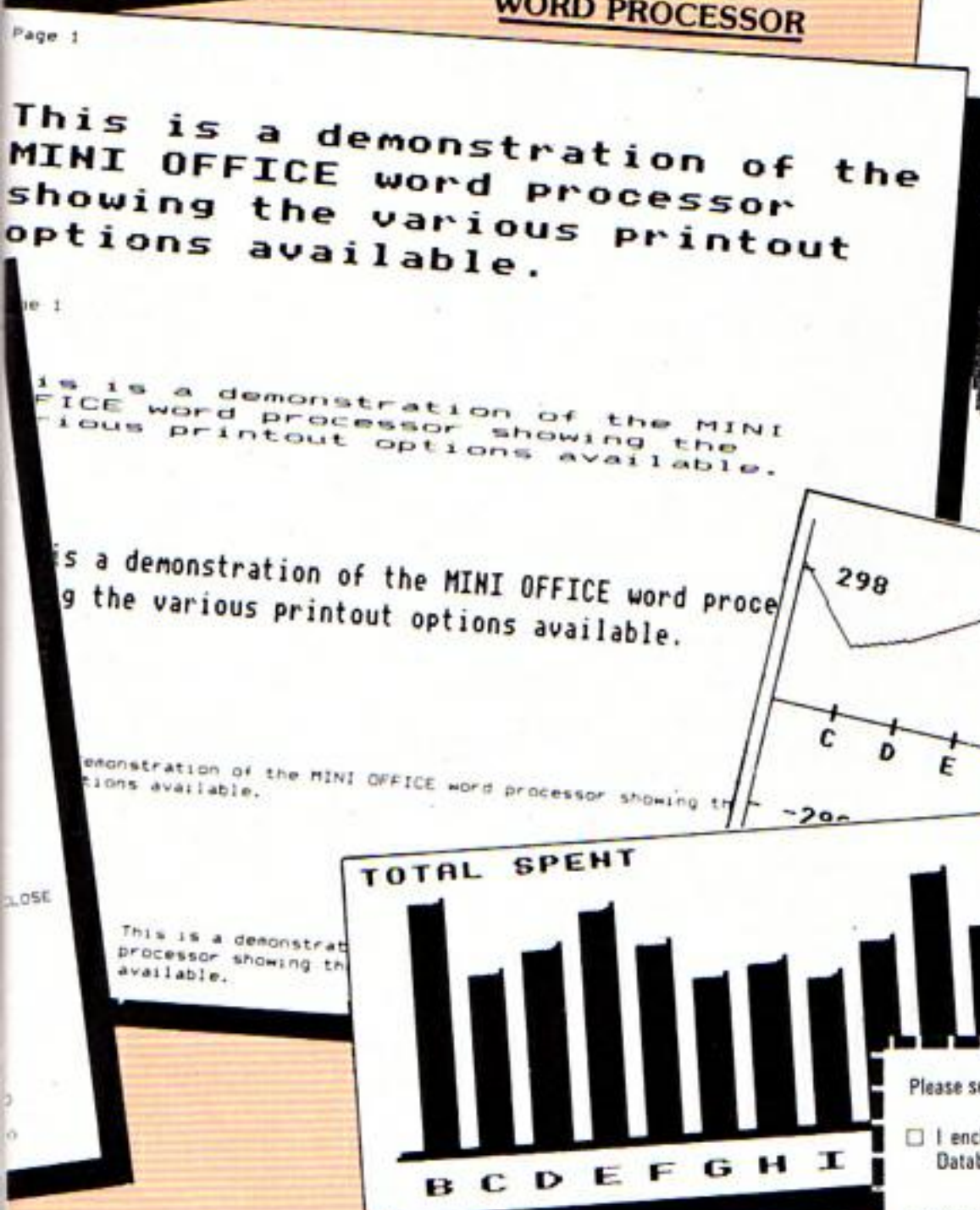
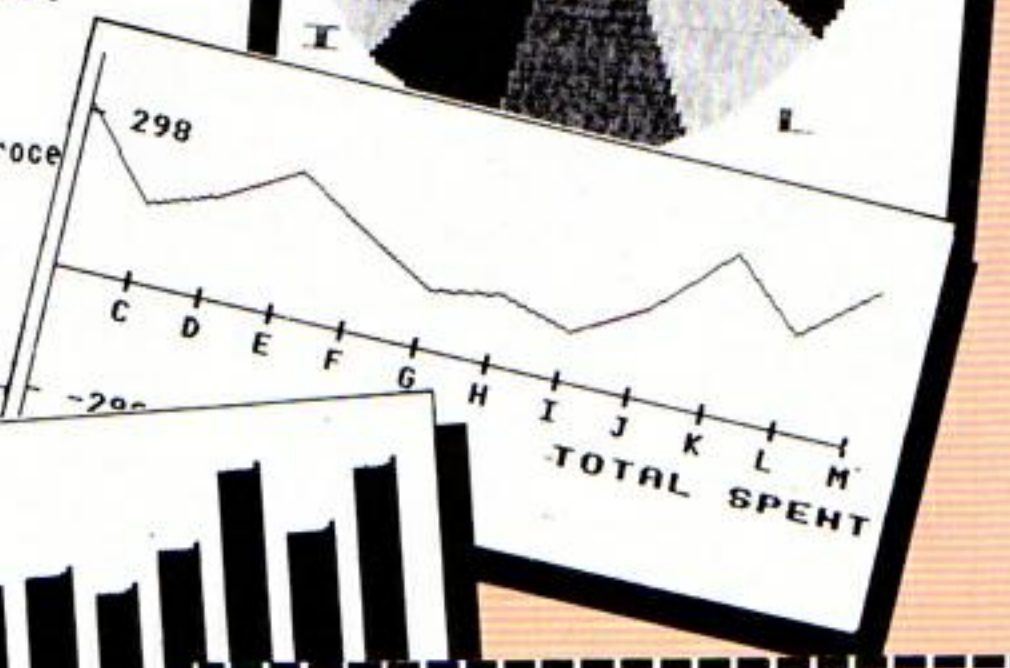


GRAPHICS



WORD PROCESSOR





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E4

Close encounters

By NIGEL PETERS

HAVE you ever wondered how computer games work? We've already seen how to make an alien hurtle round the screen in the September 1984 Program Probe, which featured Program I.

It's nice, but juist moving an alien around the screen soon gets boring.

What's missing are things to bump into or, rather, things to avoid bumping into. We need a way of detecting collisions.

One way of doing this is to use the Basic function POINT. What this does is to tell you the logical colour number of any point on the screen.

This may not seem very relevant, but all will be made clear. First, however, we'll investigate POINT a little more deeply. Run Program II.

```
  10 REM PROGRAM II
  20 MODE 1
  30 FOR loop=1 TO 4
  40 READ leftx,lefty,righ
tx,righty
  50 PROCwindow(leftx,left
y,rightx,righty,loop)
  60 NEXT loop
  70 VDU 26
  80 DATA 100,100,900,900
  90 DATA 200,200,800,800
 100 DATA 300,300,700,700
 110 DATA 400,400,600,600
 120 END
 130 DEFPROCwindow(a,b,c,d
,loop)
 140 VDU 24,a;b;c;d;
 150 GCOL 0,128+loop-1
 160 CLG
 170 ENDPROC
```

Program II

```
  10 REM PROGRAM I
  20 REM BY IAN RODGERS
  30 REM use cursor keys
  40 MODE1
  50 VDU23,1,0;0;0;0;
  60 VDU23,224,24,60,126,2
19,126,36,66,129
  70 X=0
  80 Y=0
  90 REPEAT
 100 PRINTTAB(X,Y)CHR$224
 110 FOR delay=1 TO 100:NE
XT
 120 IF INKEY(-122) THEN X
=X+1:PRINTTAB(X-1,Y)" ":IF
X=39 THEN X=38
 130 IF INKEY(-26) THEN X=
X-1:PRINTTAB(X+1,Y)" ":IF X
=-1 THEN X=0
 140 IF INKEY(-42) THEN Y=
Y+1:PRINTTAB(X,Y-1)" ":IF Y
=31 THEN Y=30
 150 IF INKEY(-58) THEN Y=
Y-1:PRINTTAB(X,Y+1)" ":IF Y
=-1 THEN Y=0
 160 SOUND 1,-15,X,1
 170 SOUND 1,-15,32-Y,1
 180 UNTIL FALSE
```

Program I

All this does is use VDU24 to set up and clear four screen windows, each to a different colour. If you don't follow this then refresh your memory with the May 1984 Program Probe.

The outer window is black, the next is red, followed by yellow and, finally, the centre is white. All four colours allowed in Mode 1 are displayed on the screen. Figure I shows the coordinates of the windows.

As you know, the Electron deals with everything as a number. Each of these four colours is referred to by a code number known as its logical colour number.

As there are four logical colours available in Mode 1, so the logical colour numbers range from 0 to 3.

0 is black, 1 is red, 2 is yellow and 3 is white.

You can change these default colours with a cunning VDU19, but the numbers remain the same. There can only be four colours on screen at once and each is referred to by a number between 0 and 3.

As I said before, we can use POINT to give us the logical colour number of any point on the screen.

```
PRINT POINT (x,y)
```

will return the logical colour number of the screen at graphics coordinates x,y. Try using it on the screen set up by Program II.

```
PRINT POINT(150,150)
```

should give you the figure 0 as POINT points to a point in the black part of the screen (if you take my point). The logical colour of black is 0 so 0 is duly returned. Similarly:

```
PRINT POINT(250,250)
```

and

```
PRINT POINT(350,350)
```

should return 1 and 2 respectively.

```
PRINT POINT(450,450)
```

is examining part of the white square, so 3 is returned. I leave it to you to find out what POINT (x,y) returns when the x and y coordinates are outside the screen range of 1023 and 1279.

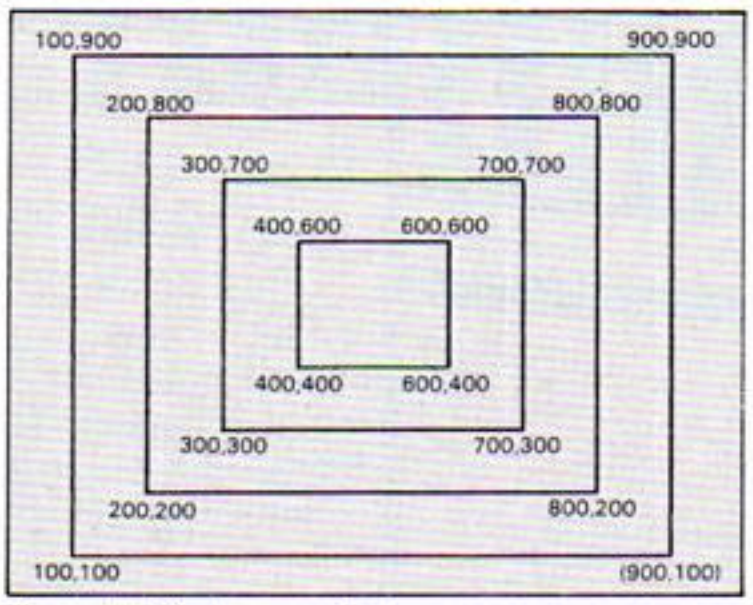


Figure I: Window coordinates

Now that we're familiar with what POINT does, let's see how it can be used to detect collisions.

Going back to Program I, you'll remember that our little alien was buzzing around on a Mode 1 screen. The alien appeared in white, the background was black.

Thinking about it, if we POINTed at the alien we should get 3 returned. If we did the same for the black background 0 should be returned.

Mode 1 has four colours available. At the moment Program I is ignoring logical colours 1 and 2.

Now suppose we drew some obstacles on the screen in, say, yellow, logical colour 2.

The alien would have to avoid these yellow objects. If it tried to move onto a part of the screen that was yellow, not black, there'd be a collision.

Put another way, if the alien's next move tries to put it on a bit of screen of logical colour 2 instead of logical colour 0 there's a collision.

You can probably see where this is leading to. To know if the next move is going to result in a collision we have to know the logical colour of the next position of the alien.

And that is what POINT does. It looks at the screen and tells us what logical colour is there.

So when we want to move our alien we calculate the new values of x and y and use POINT (x,y) to see what colour the screen is at x,y.

If 0 is returned the screen is black, so the alien can safely move there. If the result is 2 then the screen is yellow and the alien will collide with an obstacle.

So detecting collisions is quite simple. If you think about it, the objects have to be a different colour from the back-

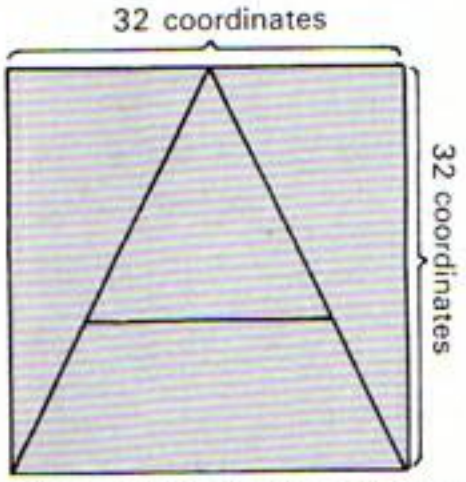


Figure IV: Mode 1 relationship between character and graphics coordinates

ground or else you wouldn't see them.

So if your alien is trying to move onto part of the screen that's not in the background colour then it has collided with something.

POINT simply allows you to check the next bit of screen. It's easy to use and almost foolproof.

There is one small problem with its use. If you look at Program I you'll see that we're happily displaying and erasing the alien using PRINT. This means that we're using the Mode 1 text screen, as shown in Figure II.

POINT, however, uses the graphics screen, as shown in Figure III.

As you can see, they're completely different. The text screen uses the top left corner as 0,0 and is measured in character positions (40 by 32).

The graphics screen has the bottom left corner as 0,0 and has 1280 times 1024 coordinates. There has to be a little bit of maths to sort things out.

The main thing to remember is that whichever system of measurement is used, they both refer to the same thing, the screen. The 1280 horizontal units of the graphics screen correspond to the 40 characters across of the text screen.

Simple division tells you that each character is 32 graphics units across (1280/32). Similarly the fact that the 32 characters down of the Mode 1 screen correspond to 1024 graphics points means that each character has a depth of 32 graphics points (1024/32).

Knowing this, it's easy to work out the graphics coordinates referring to a particular character space. Remember that each character will occupy 1024 (32 times 32) graphics coordinates.

Figure IV shows the relationship between a Mode 1 text character and its graphics coordinates.

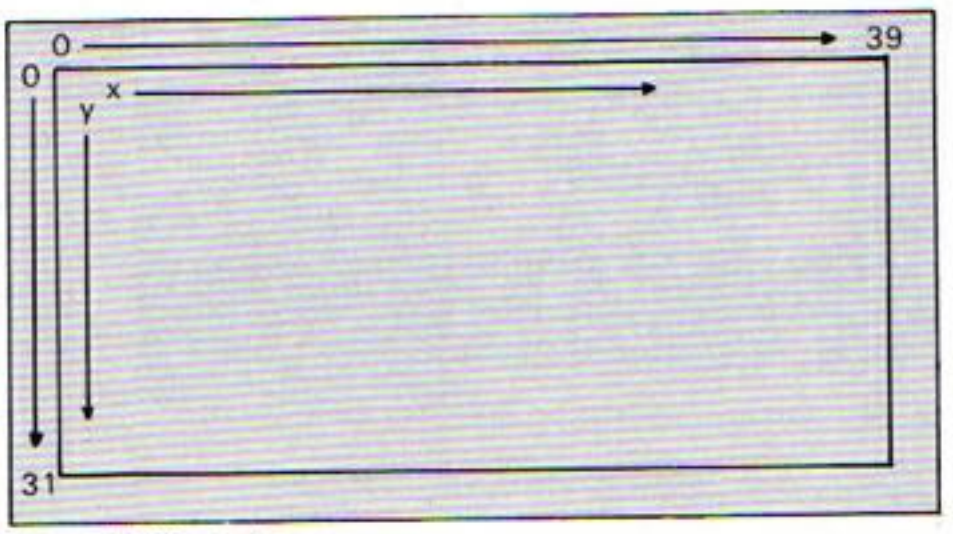


Figure II: Mode 1 text screen

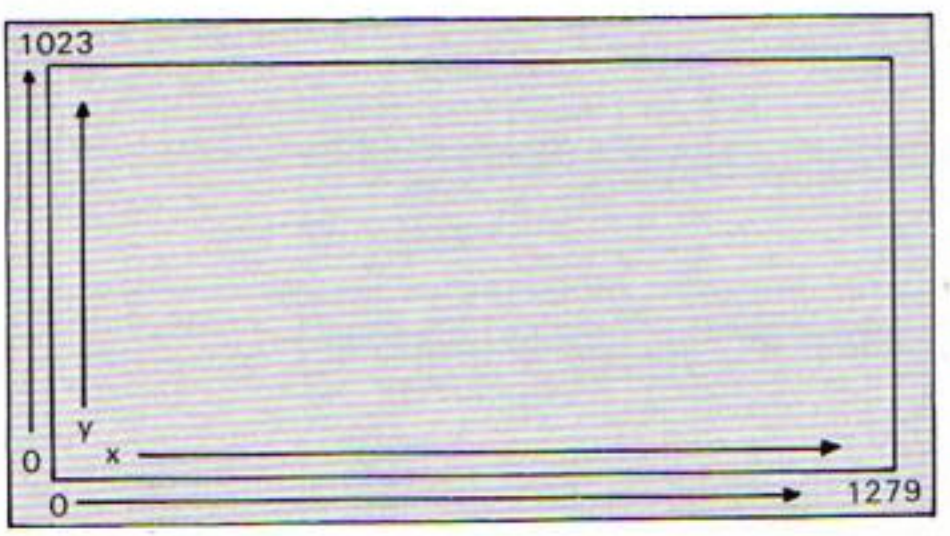


Figure III: Mode 1 graphics screen

Program ProObe

Have a look at Program III, which mixes both types of coordinates. It draws two lines which pinpoint the coordinates of the top left hand of the space printed by line 60.

From this you should be able to see that the graphics coordinates of the top left hand corner of a character printed at TAB (x,y) are (x*32), (1023–y*32).

However, we don't always want to look at the top left corner of a character. It's usually better to look at its middle.

This is because some of the characters we're checking up on may be odd shapes where the corners aren't used and are still in the background colour.

Figure V shows this. If we just POINTed at the top left corner we'd get 0 returned as it is still black. We'd miss the yellow character altogether.

To find the middle of the character we add 16 to the x coordinate and take 16 from the y coordinate. Our formula now becomes (x*32+16), (1007–y*32). Program IV shows the suitably adjusted lines going through the centre of the space.

So now we not only know how to look for a particular

→

```
   10 REM PROGRAM III
   20 MODE 1
   30 MOVE 0,863:DRAW 1279,
863
   40 MOVE 96,0:DRAW 96,102
3
   50 COLOUR 130
   60 PRINT TAB(3,5) CHR$(3
2)
   70 REPEAT UNTIL FALSE
```

Program III

```
   10 REM PROGRAM IV
   20 MODE 1
   30 MOVE 0,847:DRAW 1279,
847
   40 MOVE 112,0:DRAW 112,1
023
   50 COLOUR 130
   60 PRINT TAB(3,5) CHR$(3
2)
   70 REPEAT UNTIL FALSE
```

Program IV

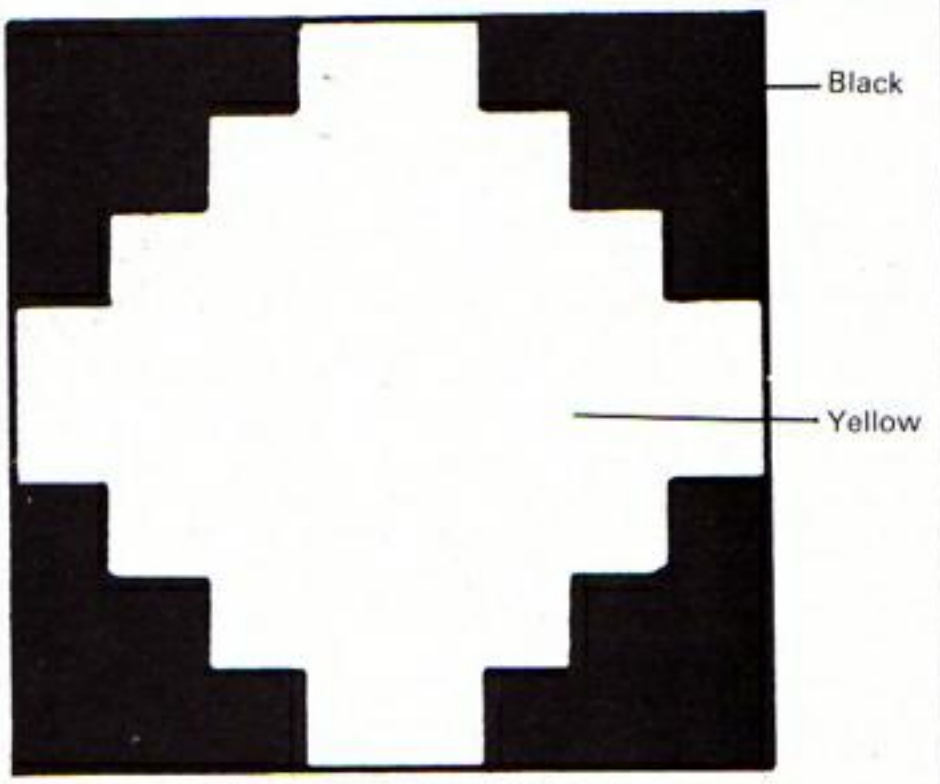


Figure V: Top left corner still background.

From Page 19

colour on the screen, we can also convert text coordinates to graphics coordinates. This allows us to POINT at the right place.

Let's see it all in practice with Collision Detection.

This is the same old alien program with a few extras added. For a start there's PROCobstacle which uses the window technique of Program II to create a big yellow block.

PROCgame is practically the same as lines 100 to 170 of Program I. What is different is that now line 270 checks the colour of the screen that the alien is about to move to.

It POINTs to the centre of the next space and puts the result in the variable *check*.

The next line prints the alien, but only on condition that *check* is not equal to 2. That is, it only prints it if the alien is moving onto a black background, not the yellow obstacle.

If *check* is 2 then the alien isn't printed and the REPEAT...UNTIL loop of lines 140 and 160 ends. The program then comes to PROCbang, performs it, encounters an endless loop and goes no further.

And that's all there is to collision detection. It's not hard once you've decided on what logical colours to use and where you're looking.

As you can see, the last program is much more a game than Program I. Why not improve it even further?

Obviously PROCobstacle could be changed to provide more yellow blocks. And they could appear or disappear with time.

And why not have some red objects which the alien has to collect? These would be logical colour 1 so you could have a line like:

```
If check=1 THEN
score=score+1
```

There's lots you can do, and it's not that hard. All it needs is someone to POINT it out.

```
  10 REM COLLISION DETECTI
ON
  20 REM BY NIGEL PETERS
  30 REM BASED ON A PROGRA
M BY IAN RODGERS
  40 REM use cursor keys
  50 MODE1
  60 VDU23,1,0;0;0;0;
  70 VDU23,224,24,60,126,2
19,126,36,66,129
  80 X=0
  90 Y=0
 100 PROCobstacle
 110 COLOUR 128
 120 REPEAT
 130 PROCgame
 140 UNTIL check=2
 150 PROCbang
 160 REPEAT UNTIL FALSE
 170 DEFPROCbang
 180 CLS
 190 SOUND 0,-15,6,40
 200 PRINT TAB(20,15)"BANG
"
 210 ENDPROC
 220 DEFPROCobstacle
 230 VDU 24,416;800;608;99
2;
 240 GCOL 0,130:CLG
 250 ENDPROC
 260 DEFPROCgame
 270 check=POINT((X*32+16)
,(1023-Y*32-16))
 280 IF check<>2 THEN PRIN
TTAB(X,Y)CHR$224
 290 FOR delay=1 TO 100:NE
XT
 300 IF INKEY(-122) THEN X
=X+1:PRINTTAB(X-1,Y)" ":IF
X=39 THEN X=38
 310 IF INKEY(-26) THEN X=
X-1:PRINTTAB(X+1,Y)" ":IF X
=-1 THEN X=0
 320 IF INKEY(-42) THEN Y=
Y+1:PRINTTAB(X,Y-1)" ":IF Y
=31 THEN Y=30
 330 IF INKEY(-58) THEN Y=
Y-1:PRINTTAB(X,Y+1)" ":IF Y
=-1 THEN Y=0
 340 SOUND 1,-15,X,1
 350 SOUND 1,-15,32-Y,1
 360 ENDPROC
```

Collision detection program

ELECTRON ADDICTS

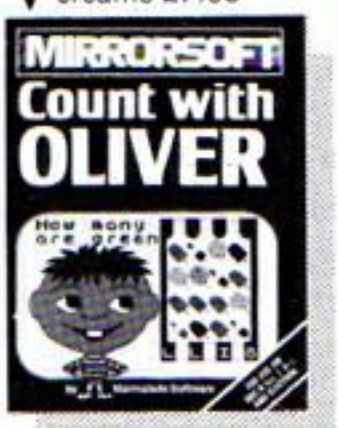
Hungry for something different? Then feast your eyes on this little lot!

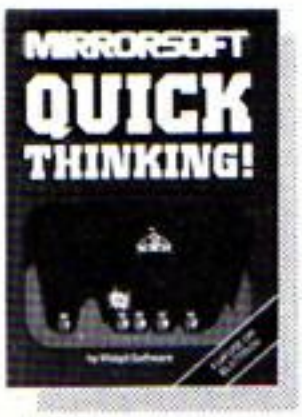
For the kids...

First fun steps on the computer for early ▼ learners £8.95

▲ Those Mr. Men are here, there, and everywhere! £7.95

Get your sums right to get those toys and ice-creams £7.95 ▼





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...and for the rest of the family

Family fun with the quizzes provided, or you can write your own with the Quizmaster pack ▼ BBC Mastermind £9.95 Quizmaster £5.95 ▼

▲ Your personal diet and exercise adviser for a healthier life £9.95

Survey the heavens and track Halley's Comet from your armchair ▼ £9.95

▲ Discover, test, and develop hidden psychic powers £9.95

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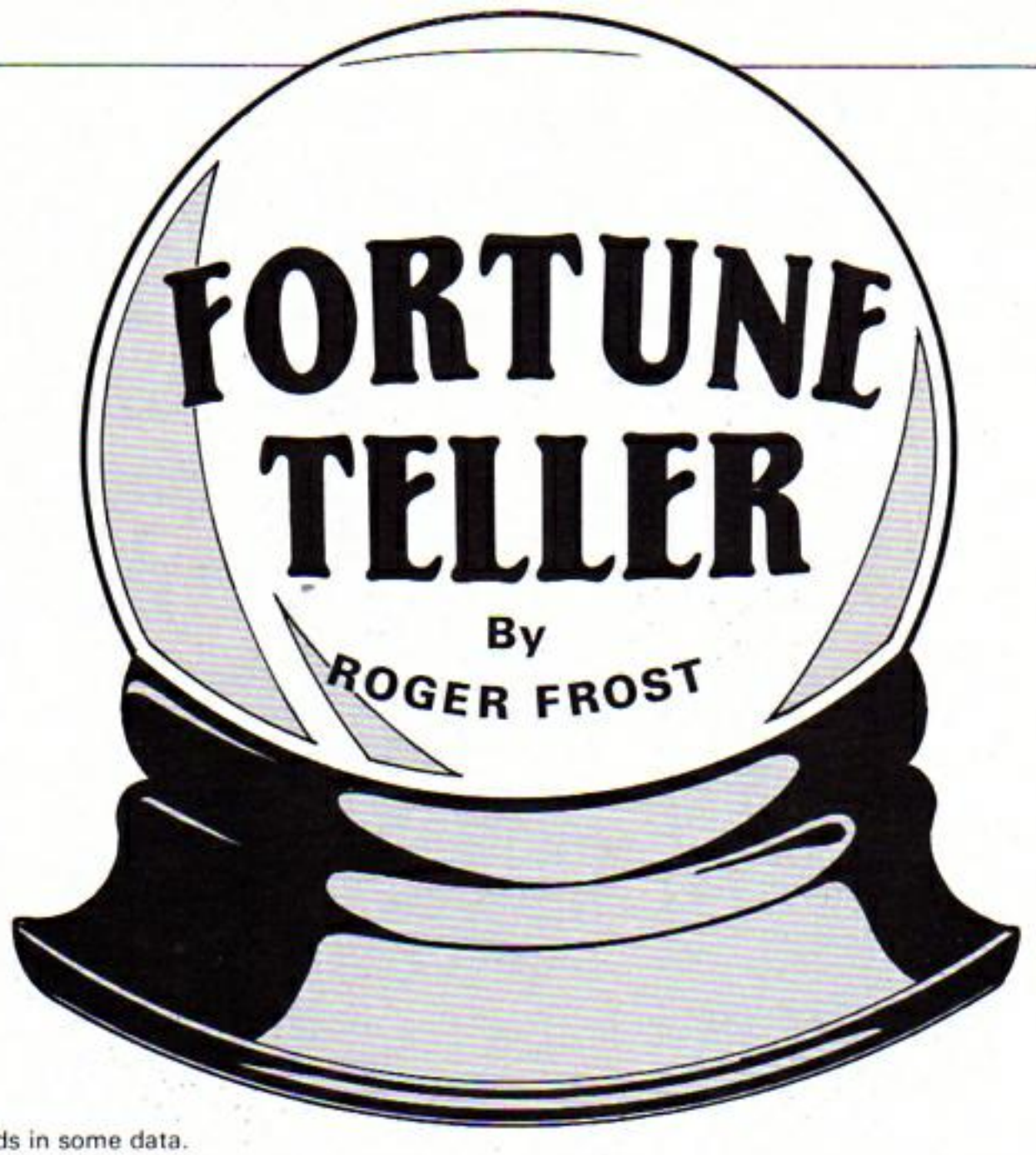


THIS program is a sure-fire money spinner for fêtes and shows, or it could add to the fun at a party.

If you have a printer, the customers can be given a hard copy of their fortune.

Fortune Teller produces a set of sentences concerning a person's future. They are, in fact, completely random and a disclaimer appears on the printout to avoid upsetting the astrologers and the faint-hearted among your clientele.

The program asks for your name, sex and date of birth. It will tell you the day on which you were born, with a relevant line from the "Monday's child is fair of face" ditty and also your star sign.

You are then given seven sentences of fortune on topics ranging from work and money to love, travel and leisure. There are 20 million possible combinations.

PROCEDURES

PROCinit Dimensions arrays and reads in some data.

PROCenter Requests various bits of information about the client.

PROCday Works out the day of the week on which the person was born.

PROCsign Works out the person's zodiac sign.

PROCfortune Reads in all the fortune data. As the program is less than 6k there is scope here for much extension. The data for fortunes is stored in various categories. Variable names will give some idea of what they are about.

PROCdisplay Clears the input screen and displays the fortune. The love fortune depends on the sex of the person and is chosen out of 20 possibilities. The other fortunes are chosen out of 10 variables.

Line 190 checks for mistakes in entering dates of birth. If you want to use the program with people over 100 years or babies born after 1985, you will need to alter the value of Y%.

When you are ready to leave one fortune and start the next you have to press the space bar. This instruction is not on the screen to keep the display uncluttered for the client, but the operator will need to know it.

The addition of a hard copy adds interest for the customers. Three more short lines are needed for this:

```
375 VDU 2
515 VDU 3
535 REM *FX call to set u
p printer.
```

Go seek your fortune, and may the stars shine favourably upon you.

```
  10 REM Fortune Teller
  20 REM by Rog Frost
  30 REM (C) ELECTRON USER
  40 MODE6
  50 VDU19,0,4,0,0,0
  60 PRINTTAB(13,3)"FORTUN
E TELLER"TAB(13,4)"*********
*******":FOR delay%=0TO1000:
NEXT
  70 error$="I think you h
ave made a mistake.
Try again"
  80 PROCinit
  90 PROCenter
 100 PROCday
 110 PROCsign
 120 PROCfortune
 130 PROCdisplay
 140 REPEATUNTILGET=32:CLE
AR:RUN
 150 DEFPROCenter
 160 PRINTTAB(0,6);"Please
 enter and then press the R
ETURN  key:"
 170 *FX15,0
 180 INPUT''"The year of yo
ur birth (4 figures) e.g. 1
977  ",Y%
 190 IF Y%<1884 OR Y%>1985
 PRINT'error$:FOR up=1TO5:V
DU11:NEXT:FOR delay=0TO3000
:NEXT:PRINT SPC(255):FORup=
1TO8:VDU11:NEXT:GOTO170
 200 *FX15,0
 210 INPUT''"The month of y
our birth as a number.   E
.g. April is 4  ",M%
 220 IF M%<1 OR M%>12 PRIN
T'error$:FOR up=1TO5:VDU11:
NEXT:FOR delay=0TO3000:NEXT
:PRINT SPC(255):FORup=1TO8:
VDU11:NEXT:GOTO200
 230 *FX15,0
 240 INPUT''"The date of yo
ur birth as a number.    E
.g. 14  ",D%
 250 IF( D%<1 OR (M%=2 AND
 D%>29) OR(M%=(4 OR 6 OR 9
OR 11) AND D%>30) OR  D%>31
) PRINT'error$:FOR up=1TO5:
VDU11:NEXT:FOR delay=0TO300
0:NEXT:PRINT SPC(255):FORup
=1TO8:VDU11:NEXT:GOTO230
 260 *FX15,0
 270 INPUT''"Your name  ",n
ame$
 280 *FX15,0
 290 INPUT''"Your sex (M/F)
  ",sex$
 300 IF sex$="M" OR sex$="
F" THEN 310 ELSE GOTO290
 310 ENDPROC
 320 DEFPROCday
 330 IF M%<=2 THEN M%=M%+1
2:Y%=Y%-1
 340 N%=D%+2*M%+INT(.6*(M%
+1))+Y%+INT(Y%/4)-INT(Y%/10
0)+INT(Y%/400)+2
```

```
  350 N%=INT((N%/7-INT(N%/7
))*7+.5)
  360 IF N%>6 THEN N%=N%-7
  370 IF M%>12 THEN M%=M%-1
2:Y%=Y%+1
  380 ENDPROC
  390 DEFPROCdisplay
  400 VDU23,1,0;0;0;0;
  410 CLS
  420 PRINT''"Name: ";name$;
"       SEX: ";sex$
  430 PRINT''"Date of birth:
 ";D%;"/";M%;"/";Y%
  440 PRINT''"Day of birth:
";DAY$(N%)'MESSAGE$(N%)
  450 IF DAY$(N%)="Sunday"
VDU11
  460 PRINT''"Star sign: ";s
ign$
  470 IF sex$="M" THEN R%=1
0 ELSE R%=0
  480 PRINT'LOVE$(RND(10)+R
%)
  490 PRINT'LIFE$(RND(10))
  500 PRINT'TRAVEL$(RND(10)
)
  510 PRINT'MONEY$(RND(10))
  520 PRINT'HAPPY$(RND(10))
  530 PRINT'WORK$(RND(10))
  540 PRINT'LEISURE$(RND(10
))
  550 VDU21:PRINT"Please do
 not take this too seriousl
y.":VDU6
  560 ENDPROC
  570 DEFPROCinit
  580 *FX11,0
  590 DIM DAY$(6),MESSAGE$(
6),LOVE$(20),TRAVEL$(10),MO
NEY$(10),WORK$(10),LIFE$(10
),HAPPY$(10),LEISURE$(10)
  600 FOR N%=0 TO 6
  610 READ DAY$(N%)
  620 NEXT
  630 FOR N%=0TO6:READ MESS
AGE$(N%):NEXT
  640 ENDPROC
  650 DATA Saturday,Sunday,
Monday,Tuesday,Wednesday,Th
ursday,Friday
  660 DATASaturday's child
 works hard for a living,The
  child that is born on the
Sabbath   day is bonny and
blithe and good and gay,Mon
day's child is fair of face
,Tuesday's child is full of
 grace
  670 DATAWednesday's child
 is full of woe,Thursday's
child has far to go,Friday'
s child is loving and givin
g
  680 DEFPROCsign
  690 IF M%=12 AND D%>22 OR
 M%=1 AND D%<21 sign$="CAPR
ICORN"
  700 IF M%=1 AND D%>20 OR
M%=2 AND D%<20 sign$="AQUAR
IUS"
  710 IF M%=2 AND D%>19 OR
M%=3 AND D%<21 sign$="PISCE
S"
  720 IF M%=3 AND D%>20 OR
M%=4 AND D%<21 sign$="ARIES
"
  730 IF M%=4 AND D%>20 OR
M%=5 AND D%<21 sign$="TAURU
S"
  740 IF M%=5 AND D%>20 OR
M%=6 AND D%<21 sign$="GEMIN
I"
  750 IF M%=6 AND D%>20 OR
M%=7 AND D%<21 sign$="CANCE
R"
  760 IF M%=7 AND D%>20 OR
M%=8 AND D%<21 sign$="LEO"
  770 IF M%=8 AND D%>20 OR
M%=9AND D%<23 sign$="VIRGO"
  780 IF M%=9 AND D%>22 OR
M%=10 AND D%<23 sign$="LIBR
A"
  790 IF M%=10 AND D%>22 OR
 M%=11 AND D%<23 sign$="SCO
RPIO"
  800 IF M%=11 AND D%>22 OR
 M%=12AND D%<23 sign$="SAGI
TTARIUS"
  810 ENDPROC
  820 DEFPROCfortune
  830 FOR A%=1TO10:READTRAV
EL$(A%):NEXT
  840 DATAYou are the stay
at home type.,Your travels
will be of a local nature.,
The world will be your oyst
er.,The sky will be your li
mit.,Your journeys could be
 into space.,You will explo
re your home area.
  850 DATAYou could travel
to other continents.,You ma
y travel far by sea.,There
may be unusual journeys for
 you.,Beware of travels. Th
ey hold danger.
  860 FOR A%=1TO10:READMONE
Y$(A%):NEXT
  870 DATAYou may become ve
ry rich.,Money will always
cause you worries.,You will
 have no cares regarding mo
ney.,You can expect lucky m
oney to come.,You will be p
oor but honest.,Money suppl
ies could be a problem.
  880 DATAYou will have a n
eed for much money.,You wil
l have to work hard for mon
ey.,Do not expect to be ric
h.,You may inherit a fortun
e.
  890 FORA%=1TO10:READ HAPP
Y$(A%):NEXT
  900 DATAYour life will be
 very happy.,Life may be a
struggle for you.,You will
face many problems in life.
,You will lead a glorious l
ife.,You will overcome life
's problems.,You will lead
a cheerful life.
  910 DATAYour life could b
e a bit of a misery.,You wi
ll enjoy life to the full.,
Life could be very good to
you.,You should enjoy life
to the full.
  920 FOR A%=1TO10:READWORK
$(A%):NEXT
  930 DATAYou should enjoy
your work.,You will find yo
ur job a problem.,Work will
 cause you no worries.,Any
job you get will prove taxi
ng.,You should enjoy workin
g life.,Your work will brin
g you satisfaction.
  940 DATASeek jobs for hap
piness not for money.,Do no
t let work rule your life.,
Workmates could be good fri
ends.,Work hard! Make money
! Enjoy life.
  950 FORA%=1TO20:READLOVE$
(A%):NEXT
  960 DATAYour winning smil
e can charm the  men.,Bewar
e of a tall dark stranger.,
A holiday romance may come
your way.,Consider the char
m of a local lad.,Somewhere
 somebody loves you.,Love i
s a many splendour'd thing.
  970 DATABeware of men. Th
ey can hurt.,Choose your me
n friends with care.,You co
uld get on well with a Leo
man.,A Libra man would suit
 you well.
  980 DATABeware the charms
 of a pretty blonde.,You ma
y meet a pretty girl this s
ummer.,Your love may end up
 like her mother.,A homely
lass is the one for you.,Ar
ies girls will treat you ri
ght.
  990 DATATry a Scorpio las
s. They are good fun.,Be st
eady with the girl you love
.,Don't rush. Miss Right ex
ists.,The girls all love yo
u. Lucky fellow!,A happy ma
rriage will be yours.
 1000 FORA%=1TO10:READLIFE$
(A%):NEXT
 1010 DATAYour life should
be long and happy.,With car
e expect a long life.,Take
care of yourself; you have
value.,You should be active
 for years to come.,Your he
alth may cause minor proble
ms.
 1020 DATAKeep active to en
joy a long life.,Life may b
e long if you keep off fags
.,You should keep fairly he
althy.,A healthy body will
mean a long life.,You shoul
d reach a ripe old age.
 1030 FORA%=1TO10:READLEISU
RE$(A%):NEXT
 1040 DATAYou will find it
easy to make friends.,Avoid
 physical activities.,Your
hobby could make you famous
.,Sporting activities could
 provide fun.,Look out for
an unexpected talent.,Your
hobby could earn you much m
oney.
 1050 DATAA new hobby may b
ring romance.,A pastime may
 land you on the rocks.,Wid
en your circle of friends.,
Certain hobbies could be a
danger.
 1060 ENDPROC
```

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

Will you be the first Earthling to win a pla

Acornsoft are issuing a nationwide challenge to all Acorn Electron and BBC Micro users.

It's the challenge to join a new and exclusive group of computer games players: The Elite.

With 3-dimensional graphics, Elite is a game which is light years ahead of any other.

It strictly defines the rank of each and every player.

As your prowess improves, you move into higher ranks.

But make no mistake, to reach the top rank, your performance must become exceptional.

Then, and only then, will you qualify to call yourself a member of The Elite.

From harmless, you must become lethal.

In Elite, all players start as equals.

With the initial rank of "Harmless," you will embark upon an experience unlike any that you have known before.

You will be a space trader who roams the universe, making your living from buying and selling the cargo in your Cobra space craft.

On your travels, you will encounter aggressors who are eager to put an end to your dealings.

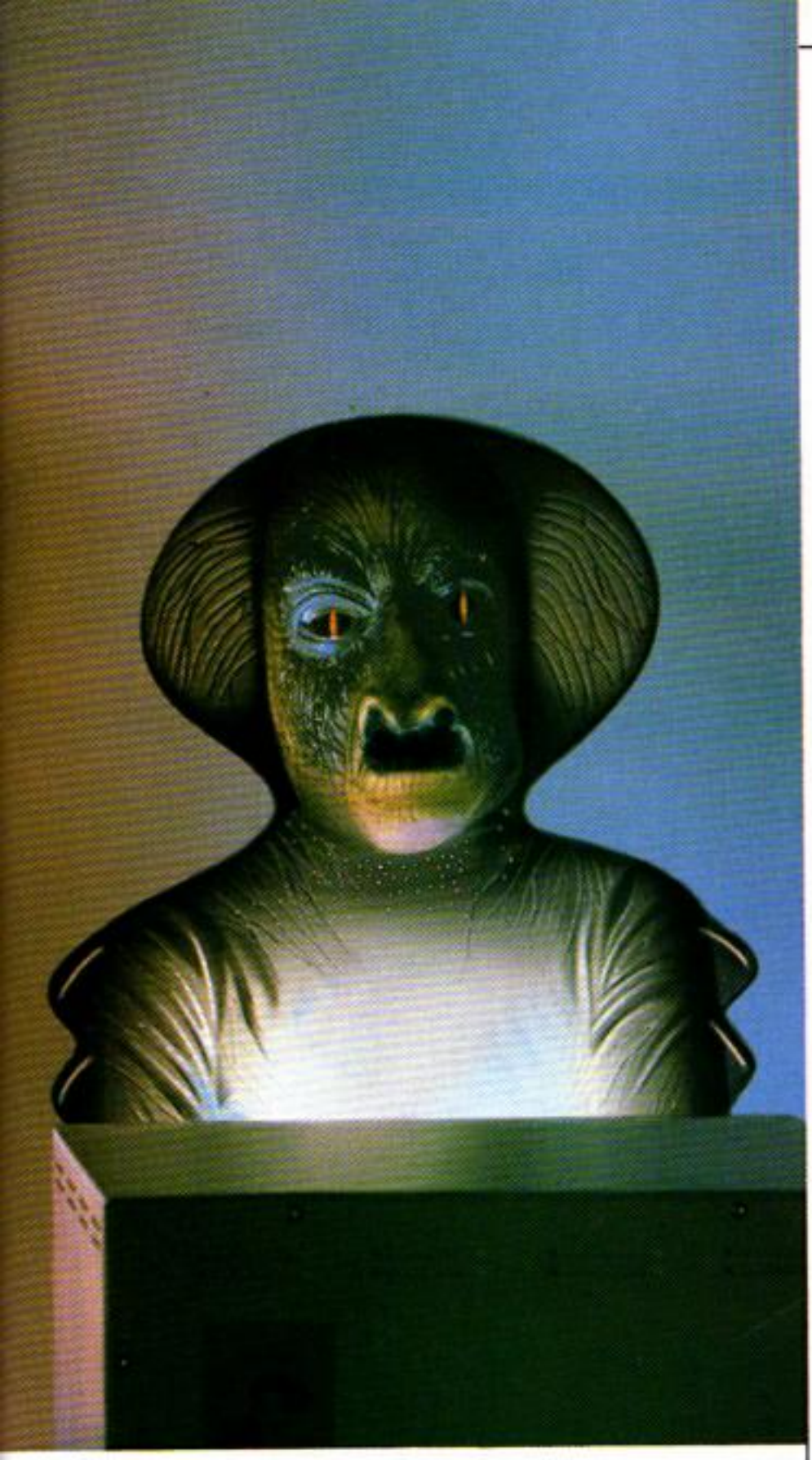
Only the fittest will survive.

As you establish yourself as a survivor, you will win the right to a higher rank.

In all, there are nine, from "Harmless" to "Elite." And your computer will continually tell you where you stand.

Trade with 2,000 planets in eight galaxies.

Besides survival, your success also depends on the rewards you reap from the cargo that you carry.



ce among the Elite?

That cargo can be anything from foodstuffs to contraband. If you decide to trade in contraband, the rewards will certainly be higher. But so will the risks you take.

To ply your trade, you can dock at any of 2,000 planets in eight galaxies.

However, before you dock, you must use your wits to assess the planet's political climate and the perils which may be waiting for you.

Also, in any of the eight galaxies, you may find yourself being asked to perform acts of considerable heroism and selfless courage.

Although these will bring you into danger, they can bring considerable rewards too.

We're waiting to recognize your skills.

Achieving higher status in Elite will tax your skills to the limit. Which is why you must download your game onto cassette or disc each time you take a break from play.

When you reach the rank of "Competent" or higher, you should send us the secret code number revealed to you by your computer.

We will send you in return a special document which certifies your achievement. And you stand to win a valuable prize.

Are you ready to accept the challenge?

Elite is available on both disc and cassette for the BBC Micro and on cassette for the Acorn Electron.

With either, you will get "Elite: The Dark Wheel," a compelling novel which sets the whole mood of your adventure. You'll also get a flight training manual which will get you fit to roar into the unknown in your Cobra spacecraft.

Your Acornsoft dealer now has the entire package at £14.95 on cassette, or £17.65 on disc (for the BBC Micro) and £12.95 for the Electron.

Credit card holders can simply telephone 0933 79300 during office hours.

Alternatively, you can order by post from: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL.

You can also get a free Elite poster by ringing 0933 79300.

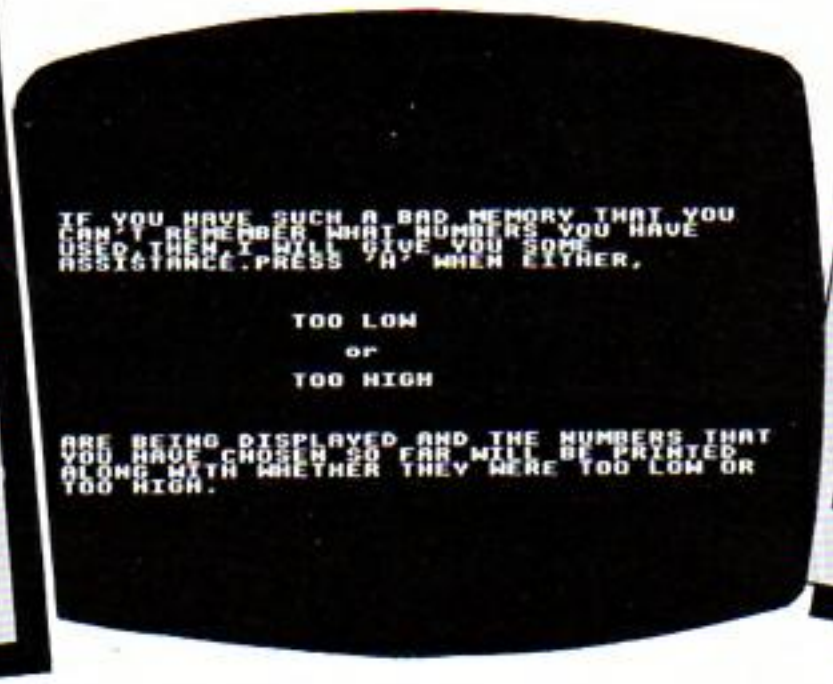
ACORNSOFT

HILO

SIMPLE but fun, Hilo by ANDREW LORD has the Electron testing your powers of mental arithmetic.

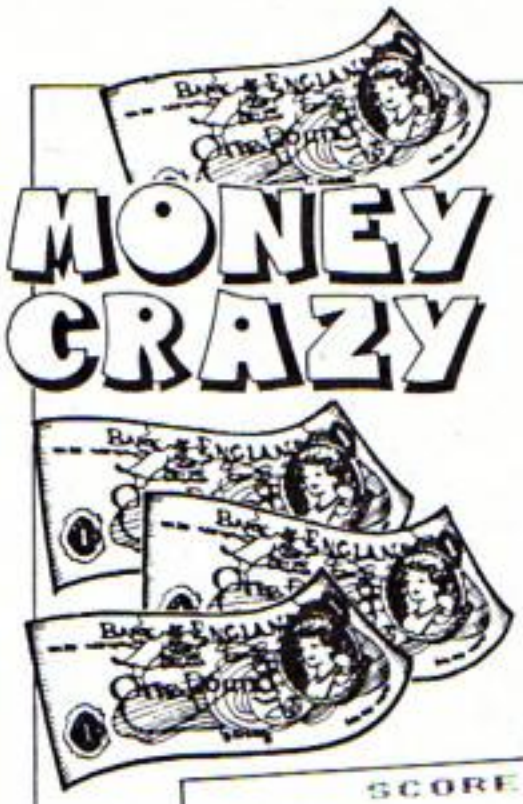
The micro "thinks" of a number and you have to try and guess what it is. After each guess, if you're wrong, you're told if the number you picked was higher or lower than the correct one.

Using this information you can then guess again. The process continues until you arrive at the right answer.




```
  10 REM HILO
  20 REM ANDREW LORD
  30 REM (C) ELECTRON USER
  40 DIM Z$(10),A$(10),A(1
00),T$(100):FOR X=1 TO 10:Z
$(X)="LORD---SOFT":NEXT X:C
LS:VDU23,1,0;0;0;0
  50 PRINT'''"HELLO MY NAM
E IS FRANK,WHAT'S YOURS":IN
PUT A$(1):CLS:PRINT'''"WELL
 HELLO THERE "A$(1)" DO YOU
 WANT TO   PLAY A GUESSING
 GAME Y/N":INPUT B$:IF B$="Y
" THEN GOTO 60 ELSE GOTO 12
0
  60MODE6:VDU23,1,0;0;0;0:
PRINT'''"IF YOU HAVE SUCH A
 BAD MEMORY THAT YOU  CAN'T
 REMEMBER WHAT NUMBERS YOU
 HAVE    USED,THEN,I WILL GI
VE YOU SOME          ASSIST
ANCE.PRESS 'H' WHEN EITHER,
":PRINT'''"                TOO
 LOW"
  70PRINT'"
 or":PRINT'"               TO
O HIGH":PRINT'''"ARE BEING
DISPLAYED AND THE NUMBERS T
HATYOU HAVE CHOSEN SO FAR W
ILL BE PRINTED  ALONG WITH
WHETHER THEY WERE TOO LOW O
R TOO HIGH.":TIME=0:REPEATU
NTILTIME=1500:GOTO220
  80 VDU23,1,0;0;0;0:CLS:A
$=INKEY$250:IF A$="H" THEN
GOSUB 350
  90 CLS:PRINT TAB(5,3)"CH
OOSE ANOTHER NUMBER":C5=C5+
1:INPUT A(C5)
 100 C=C+1:IF A(C5)<N THEN
 GOTO 110 ELSE IF A(C5)>N T
HEN GOTO 120 ELSE IF A(C5)=
N THEN 140 ELSE STOP
 110 COLOUR 3:PRINT TAB(10
,13)"TOO LOW":COLOUR 1:SOUN
D 1,-15,4,7:SOUND 1,-15,0,7
:T$(C5)="was TOO LOW":GOTO8
0
 120 COLOUR 3:PRINT TAB(10
,13)"TOO HIGH":COLOUR 1:SOU
ND 1,-15,156,7:SOUND 1,-15,
160,7:T$(C5)="was TOO HIGH"
:GOTO80
 130 CLS:VDU 23,1,0;0;0;0:
PRINTTAB(0,0)" ",TAB(4,10)"
GOODBYE THEN ";A$(1);" HOPE
 ",TAB(4,12)"TO TALK TO YOU
 AGAIN":REPEAT UNTIL GET$="
"
 140 SOUND 1,2,100,100:ENV
ELOPE 2,1,4,-4,4,10,20,10,0
,0,0,0,0,0:IF C<=10 THEN GO
TO 160 ELSE GOTO 320
 150 C1=0:C1=C+C+6:INPUTTA
B(11,C1);SPC(29):INPUTTAB(1
1,C1);T$:Z$(C)=T$:IFLEN(T$)
>25THEN150ELSEPRINTTAB(4,30
);SPC(24):PRINTTAB(7,30)"PR
ESS SPACE TO CONTINUE":REPE
ATUNTILGET$=" ":CLG:CLS:GOT
O 220
 160 COLOUR 1:COLOUR 130:C
LS:PRINT TAB(4,8)"Congratul
ations you've guessed",TAB(
4,10)"that the no. was  ";N
;"  in ";C;" goes",TAB(4,14
)"Your name can now be ente
red into",TAB(4,16)"the  El
ectron User's Honours Table
"
 170TIME=0:REPEATUNTILTIME
=1000
 180MODE 1:COLOUR 2:COLOUR
 129:CLS
 190 PRINT TAB(12,2)"Elect
ron User's",TAB(11,3)"-----
----------",TAB(13,4)"Hon
ours Table",TAB(12,5)"-----
----------"
 200 R=0:FOR Q=8 TO 26 STE
P 2:R=R+1:IFR=10THEN360ELSE
GOTO210
 210PRINT TAB(6,Q);R;"....
.";Z$(R):NEXT Q
 220 MODE 1:COLOUR 1:COLOU
R 130:CLS
 230 PRINT TAB(9,4)"ENTER
THE LEVEL THAT",TAB(9,5)"YO
U WISH TO PLAY AT"
 240 COLOUR 0:PRINT TAB(10
,10)"LEVEL.....1",TAB
(10,12)"LEVEL.....2",
TAB(10,14)"LEVEL.....
3",TAB(10,16)"LEVEL.....
....4",TAB(3,18)"VIEW INSTRU
CTIONS.....5",TAB(3,20)"VI
EW HONOURS TABLE.....6"
 250PRINT TAB(3,22)"EXIT F
ROM PROGRAM.....7":COLOUR
1:PRINT TAB(8,26)"(ONLY TYP
E IN NUMBER)"
 260 ON ERROR GOTO 220
 270 INPUT L%:COLOUR 1:COL
OUR 128:CLS:ON L% GOTO 280,
290,300,310,60,370,130
 280 N=RND(100):PRINT'''"I
NPUT A NUMBER BETWEEN 1 AND
 100":GOTO 340
 290 N=RND(200):PRINT'''"I
NPUT A NUMBER BETWEEN 1 AND
 200":GOTO 340
 300 N=RND(300):PRINT'''"I
NPUT A NUMBER BETWEEN 1 AND
 300":GOTO 340
 310 N=RND(400):PRINT'''"I
NPUT A NUMBER BETWEEN 1 AND
 400":GOTO 340
 320 COLOUR 1:COLOUR 130:C
LS:PRINT TAB(4,4)"Congratul
ations you've quessed",TAB(
4,6)"that the no. was  ";N:
"  in ";C;" goes",TAB(18,8)
"BUT",TAB(9,10)"you need mo
re practise",TAB(13,13)"on
level 1":PRINTTAB(7,29)"PRE
SS SPACE TO CONTINUE"
 330 REPEAT UNTIL GET$=" "
:GOTO220
 340 C=0:C5=1:INPUT A(C5):
PRINT:GOTO100
 350 CLS:VDU23,1,0;0;0;0:P
RINT'''"WHAT A TERRIBLE MEM
ORY YOU HAVE!":PRINT''':COL
OUR 3:FOR P=1 TO C5:PRINT'A
(P),"  ";T$(P):NEXT:COLOUR
 1:TIME=0:REPEAT UNTIL TIME
=C5*200:RETURN
 360PRINTTAB(5,Q);R;".....
";Z$(R):PRINT TAB(6,30)"Ple
ase enter your name":GOTO 1
50
 370COLOUR 2:COLOUR 129:CL
S:PRINT TAB(12,2)"Electron
User's",TAB(11,3)"---------
----------",TAB(13,4)"Honours
 Table",TAB(12,5)"---------
----------":R=0:FOR Q=8 TO 26 S
TEP 2:R=R+1:IFR=10THEN390EL
SEGOTO380
 380PRINT TAB(6,Q);R;"....
.";Z$(R):NEXT Q
 390PRINTTAB(5,Q);R;".....
";Z$(R);PRINTTAB(4,30)"PRES
S SPACE TO CONTINUE":REPEAT
UNTILGET$=" ":GOTO220
 400END
```

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

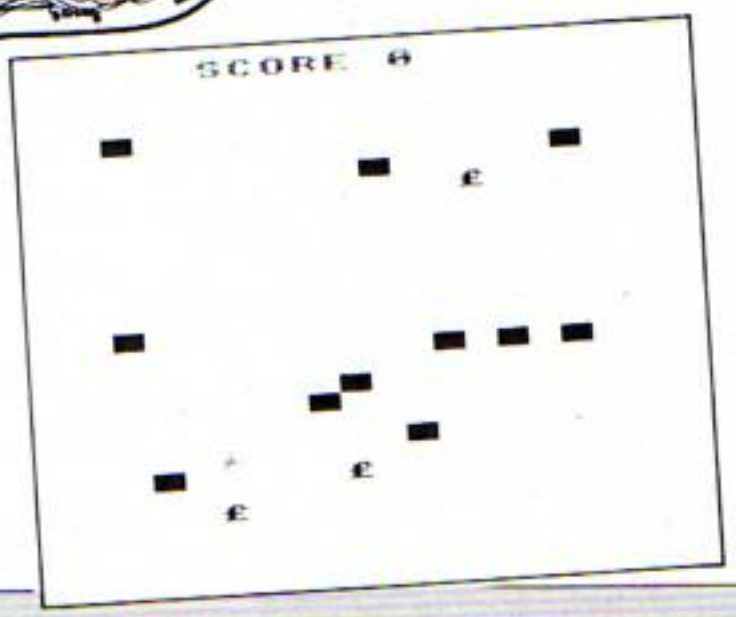


FEELING short of money? Well have a go at ANDREW LOGAN's Moneycrazy.

You are in control of a man who runs around the screen trying to collect pound notes that are scattered about.

However, like life, nothing is ever that simple and in his rush to get rich quick the little man has to avoid blocks that start appearing all over the place.

It's not easy, but it is fun.



PROCEDURES

PROCtitle	Displays title and instructions
PROCinit	Sets up the arrays and picks the first position and the direction of the man.
PROCmove	Checks the keys to see if a change of direction is desired and prints the man in his new position.
PROCobstacles	Prints either a block or a pounds sign. If RND(1) is less than 0.22 a pound sign appears otherwise it's a block.
PROCcheck	Sees whether you have hit a block or collected some money.
PROCnewgame	Asks if you want another game.
PROCscore	Displays the score.
PROCdead	Happens when you hit a block!
PROCdel (D%)	A delay procedure. The program is delayed for the parameter D%.

```
10REM **MONEYCRAZY**
20REM BY ANDREW LOGAN
30REM (C) ELECTRON USER
40MODE2
50ON ERROR GOTO 790
60PROCtitle
70PROCinit
80REPEAT
90PROCobstacles
100PROCmove
110PROCcheck
120PROCscore
130UNTIL DEAD
140PROCdel(200)
150PROCnewgame
160MODE6:END
170DEF PROCtitle
180CLS:COLOUR128:COLOUR1:
CLS
190VDU23,1,0;0;0;0;
200PRINT''TAB(4);"MONEYCR
AZY"
210PRINT TAB(4);"========
=="
220COLOUR7:PRINT''"YOU MUS
T COLLECT THE"''"MONEY BUT A
VOID THE"''"YELLOW OBSTACLE
S"''"AND THE SIDES.WATCH"''
"OUT FOR THE MONEY"''"WHICH
 CHANGES INTO"''"BLOCKS!GOO
D LUCK!!"
230PRINT''TAB(3)"MOVE USI
NG:-"''" 'Z'...LEFT"''" 'X'
...RIGHT"''" ':'....UP"''"
'/'...DOWN"''"PRESS SPACE T
O BEGIN"
240REPEAT UNTIL GET$=" "
250ENDPROC
260DEF PROCinit
270DIM OBJ(20,29)
280VDU23,1,0;0;0;0;
290DEAD=FALSE
300VDU23,230,255,255,255,
255,255,255,255,255
310VDU23,231,16,56,16,124
,186,186,40,108
320X%=RND(14)+3:Y%=RND(20
)+6:SC%=0:Z%=RND(4)
330COLOUR 128:CLS
340COLOUR12:FOR V%=4 TO 2
9:PRINT TAB(0,V%);CHR$230;T
AB(19,V%);CHR$230:NEXT
350FOR O%=0 TO 19:PRINT T
AB(O%,4);CHR$230;TAB(O%,30)
;CHR$230:NEXT
360COLOUR1:PRINT TAB(X%,Y
%);CHR$231
370PROCdel(100)
380ENDPROC
390DEF PROCmove
400SOUND1,-15,20,1
410N%=X%:M%=Y%
420IF INKEY-98 Z%=1:GOTO4
70
430IF INKEY-67 Z%=2:GOTO4
70
440IF INKEY-73 Z%=3:GOTO4
70
450IF INKEY-105 Z%=4:GOTO
470
460PROCdel(3)
470IF Z%=1 X%=X%-1 ELSE I
F Z%=2 X%=X%+1 ELSE IF Z%=3
 Y%=Y%-1 ELSE IF Z%=4 Y%=Y%
+1
480IF X%>18 THEN PROCdead
490IF Y%>28 THEN PROCdead
500IF X%<1 THEN PROCdead
510IF Y%<4 THEN PROCdead
520PRINT TAB(N%,M%);SPC1
530COLOUR1:PRINT TAB(X%,Y
%);CHR$231
540ENDPROC
550DEF PROCobstacles
560IF RND(1)<.22 THEN 590

570P%=1+RND(16):Q%=4+RND(
23):IF (P%(=X%+1 AND P%)=X%
-1 AND Q%(=Y%+1 AND Q%)=Y%-
1)THEN 570
580OBJ(P%,Q%)=-1:COLOUR3:
PRINT TAB(P%,Q%);CHR$230:EN
DPROC
590K%=1+RND(16):L%=4+RND(
23):IF(K%=X% AND L%=Y%)THEN
 590
600OBJ(K%,L%)=3:COLOUR6:P
RINT TAB(K%,L%);"*"
610ENDPROC
620DEF PROCcheck
630 IF OBJ(X%,Y%)=0 THEN
ENDPROC
640IF OBJ(X%,Y%)=-1 THEN
PROCdead:ENDPROC
650IF OBJ(X%,Y%)=3 THEN V
DU7:SC%=SC%+50:OBJ(X%,Y%)=0
:ENDPROC
660ENDPROC
670DEF PROCnewgame
680CLS:PROCscore
690PRINT''''''''TAB(4);"A
NOTHER(Y/N)"
700*FX15,1
710G$=GET$
720IF G$="Y" THEN CLEAR:G
OTO70 ELSE IF G$="N" THEN E
NDPROC ELSE 710
730ENDPROC
740DEF PROCscore
750COLOUR2:PRINT TAB(5,1)
;"SCORE ";SC%
760ENDPROC
770DEF PROCdead:COLOUR9:P
RINT TAB(X%,Y%);CHR$231:SOU
ND0,-15,30,30:DEAD=TRUE:END
PROC
780DEF PROCdel(D%):TIME=T
%:REPEAT UNTIL TIME>T%+D%:E
NDPROC
790MODE6:IF ERR<>17 THEN
REPORT:PRINT" at line ";ERL
800END
```

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

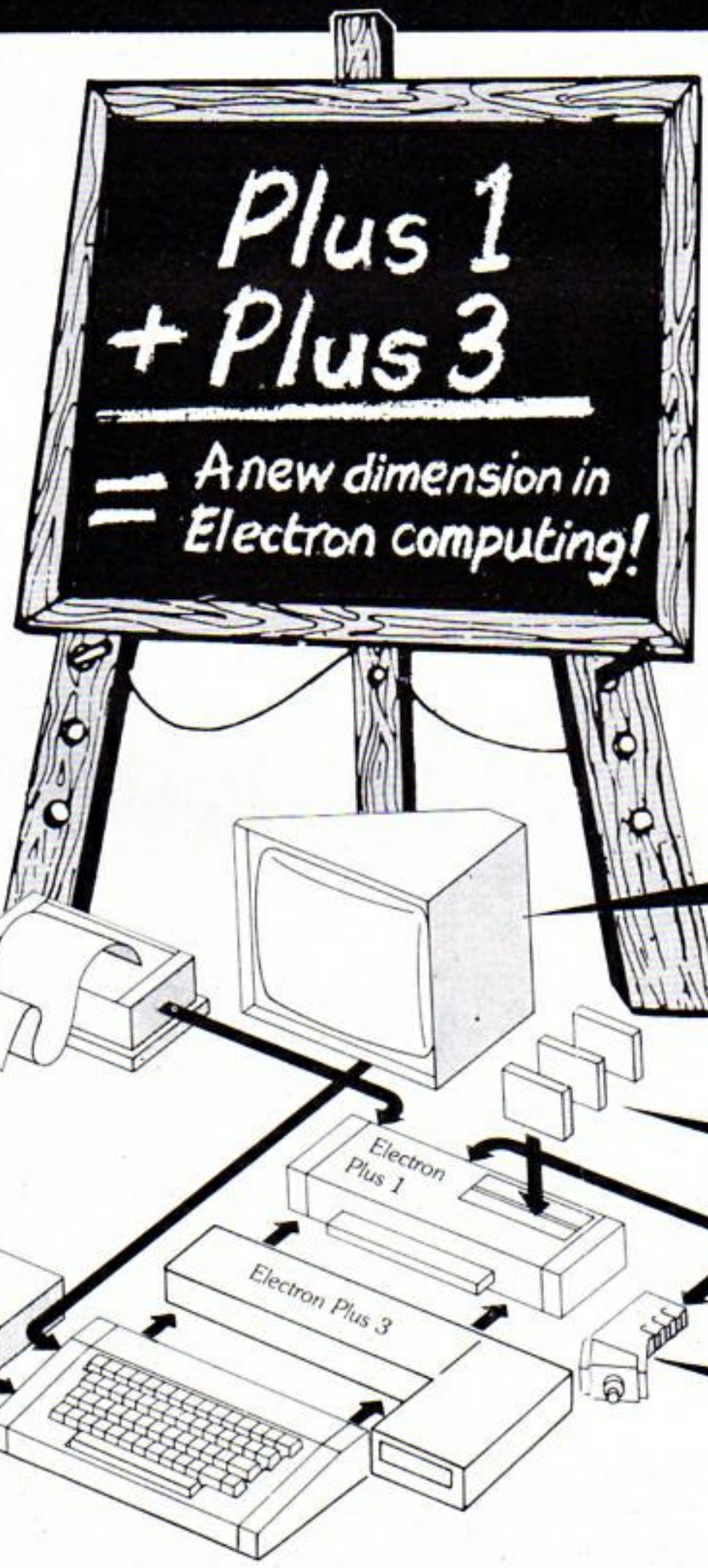
National Micro

Electron price DOWN £70!

– and lots more cuts that make Electron computing the biggest bargain there's ever been!

Never before has there been such an opportunity to move into serious computing at such a low, low price. With your new Electron you'll find all you need to get you started – an introductory cassette of 15 programs, a fully-detailed User Guide, an easy-to-understand book on programming – **PLUS** a free dust cover that comes with the compliments of National Micro Centres

£129
Carriage £7



BIG SAVINGS ON PRINTERS

	Old price	New price
Brother HR5	~~£170.95~~	£165.00
RX80	~~£272.00~~	£260.00
RX80FT	~~£315.00~~	£295.00
Silver Read Typewriter/Printer		
EX43 only	~~£286.90~~	£279.00
EX43+I/F	~~£394.25~~	£383.00

Carriage £7

DATA RECORDER

From a wide selection of cassette recorders we recommend the Pye Data Cassette Recorder, which is a perfect match for the Electron. With it comes a FREE power pack and Electron lead.

£38.00
Carriage £1

Call in for a demonstration from our friendly sales staff at:

National Micro Centres
36-38 St. Petersgate
Stockport SK1 1HL
or 'phone on:
061-429 8080/8074

Centres

MAIL ORDER DIVISION

Phone your order on 061-429 8080

24 hours answering service outside office hours. Or use the order form below
You can also order via Prestel. Mailbox number 614298080

● At last the Electron comes into its own with the release of the PLUS 3 disc expansion unit. It provides up to 300k of fast, reliable and easy-to-use disc storage space. And it finally takes the Electron into the world of serious computing with a disc filing system that is twice as powerful as that of the BBC Micro.

The L-shaped PLUS 3 consists of the powerful Acorn Advanced Disc Filing System ADFS and one 3.5 inch drive. It attaches easily and quickly onto the Electron's expansion bus.

It comes complete with a comprehensive manual and utilities disc. So Electron users can be using the power of the PLUS 3 disc system within minutes of fitting it.

● The capabilities of the Electron can also be increased by the PLUS 1 interface. This can be attached to the expansion bus on the back of the Electron or it can be coupled directly to the PLUS 3. The PLUS 1 allows the use of centronics printers, ROM cartridges and analogue joysticks.

By themselves both the PLUS 1 and the PLUS 3 expand the versatility of the Electron enormously. Together they make the Electron unbeatable!

The Electron PLUS 1 and PLUS 3 – the unbeatable combination for much more computing power!

PLUS 1 £56.90

PLUS 3 £229

Selling well . . . First Byte's switched joystick interface

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

Now only **£19.95**
Carriage £1

These will take Kempston & Sureshot joysticks.

MONITORS

You can happily operate your Electron with your domestic TV set. But more and more users are finding that for a really crisp picture you need a special monitor. We offer two monochrome and three colour monitors:

Zenith 12" (green screen) **£81.00**
Microvitec (14" colour – low res) **£217.41**
Microvitec (14" colour – med res) **£289.00**
Microvitec (14" colour – hi res) **£480.70**

For the best of both worlds there is also the 14" Nordmende, which can double as a monitor and normal TV, at a very attractive price **£238.00**
(with remote control **£251.00***)*
Carriage £7

The Monitor you've been waiting for

ONLY £65.00

The Philips V7001 12" green screen high resolution computer monitor.
Carriage £7

ROM CARTRIDGES

JOYSTICKS

Use a joystick to play arcade games and watch your score increase dramatically! For serious games a joystick really is a must – and we have two we specially recommend. Both provide twin fire buttons.

Sureshot (self-centering action) .. **£15.67**
Clares (non self-centering) .. pair **£19.50**
Carriage £1

ALL PRICES GIVEN HERE INCLUDE VAT

ORDER FORM

Post to:
NATIONAL MICRO CENTRES,
36 St. Petersgate,
Stockport SK1 1HL

Please supply the following:

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Attractive credit terms
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Please indicate method of payment:

☐ Cheque payable to National Micro Centres

☐ Access/Barclaycard No.

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Name .....
Address .....
.....
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Tel. No. .....
Signed EU/4

Please allow up to 28 days for delivery

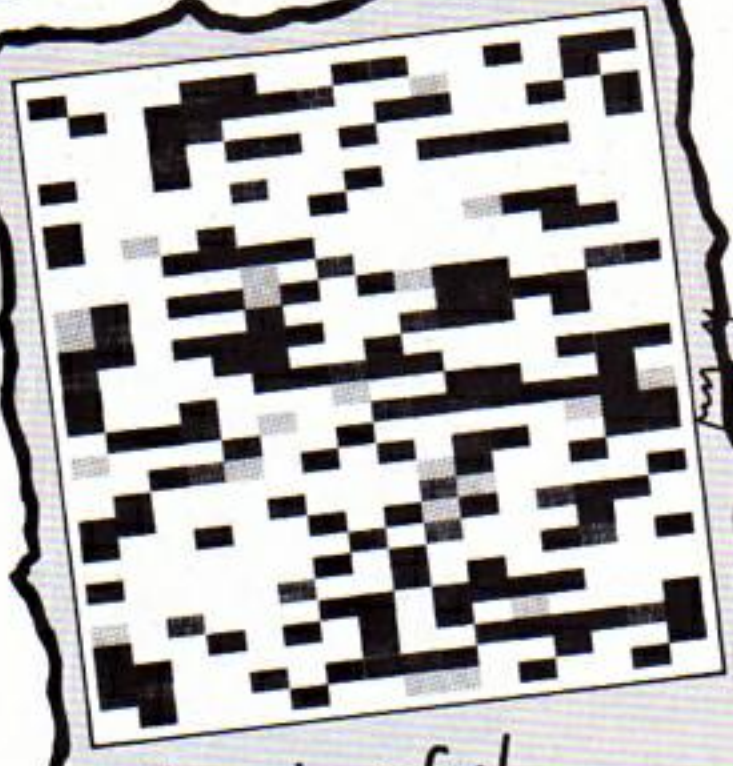
SCRAPBOOK

SCRAPBOOK is the feature that contains a selection of all the short, simple programs sent in by our readers.

It's where we keep a record – our scrapbook – of all the interesting little routines that don't end up in the Notebook or in Program Probe but are too good for us not to share.

This month it's very much a graphics show. Next month – who knows? It's up to you.

So if you enjoy messing about with your Electron and want to share your discoveries with other Electron users, send them in to us.



A colourful collection from Nicholas Gale

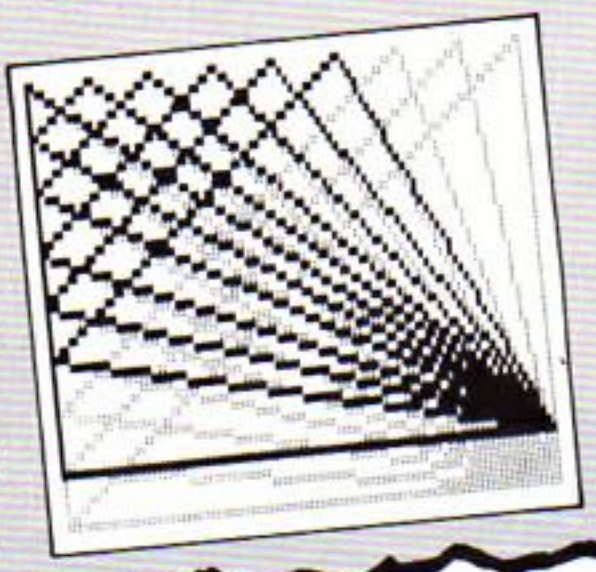
```
10 REM DOTTY
20 REM NICHOLAS GALE
30 REM ENFIELD
40 MODE 2
50 VDU 23,1,0;0;0;0;
60 A=RND(16)
70 B=RND(30)
80 COLOUR RND(144)
90 PRINT TAB(A,B)" "
100 GOTO 60
```

Fun factionals from M. Sumner

```
10 REM *Factors*
20 REM M.Sumner
30 REM Herne Bay
40 INPUT A:B=A
50 IF A MOD B=0 THEN PRI
NT B
60 B=B-1:IF B=0 THEN GOT
O 80
70 GOTO 50
80 PRINT "**END**":GOTO
10
```

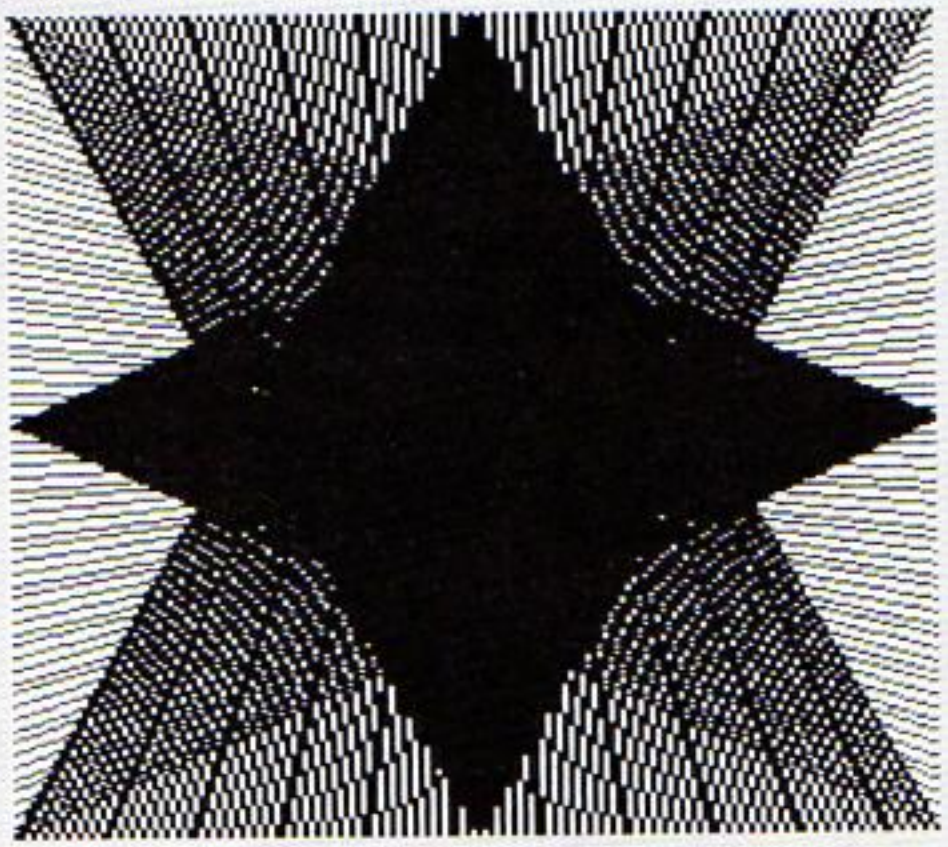
```
?72
 72
 36
 24
 18
 12
  9
  8
  6
  4
  3
  2
  1
**END**
```

More graphics action from Nicholas Gale



```
10 REM SQUARE
20 REM NICHOLAS GALE
30 REM ENFIELD
40 MODE 2
50 VDU 23,1,0;0;0;0;
60 REPEAT
70 FORA=300 TO 700 STEP
50
80 GCOL0,RND(6)
90 MOVE A,300
100 DRAW A,700
110 FOR B=700 TO 300 STEP
-50
120 DRAW B,700
130 DRAW 700,B
140 DRAW A,300
150 NEXT B,A
160 UNTIL FALSE
```

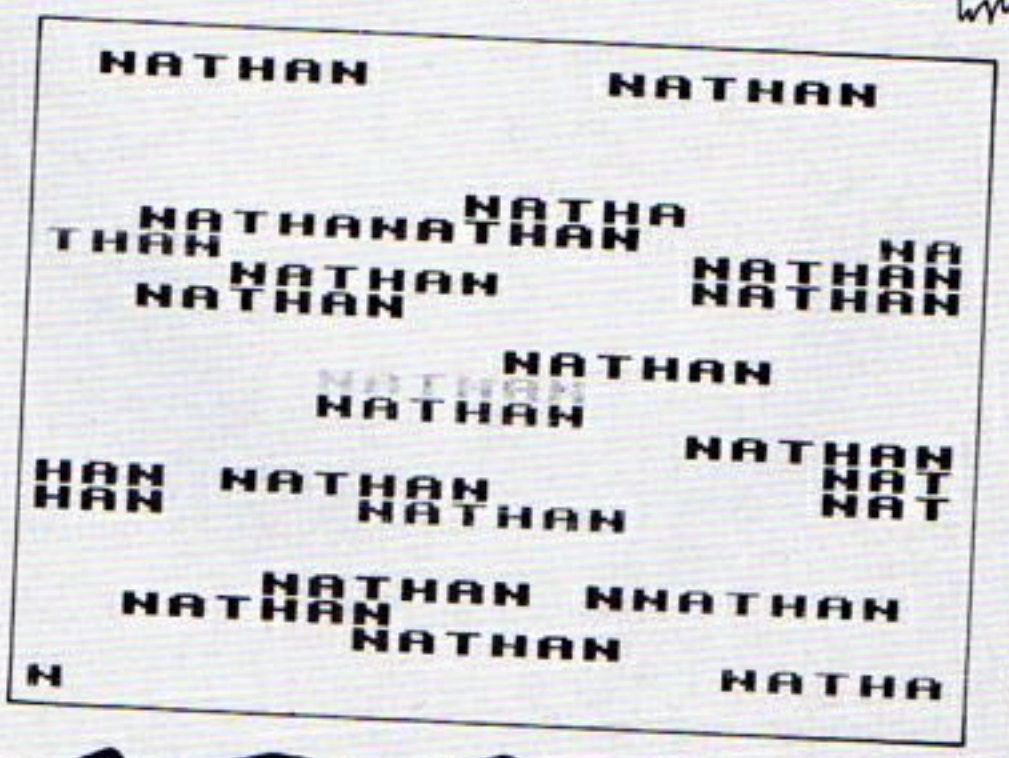
A star program from David Ballard



```
10 REM"STAR"
20 REM DAVID BALLARD
30 REM LEEK,STAFFS
40 B=1
50 MODE2
60 REPEAT
70 GCOL0,B
80 FORA=0TO1280STEP15
90 MOVE640,0
100 DRAWA,1024
110 NEXT
120 FORA=0TO1280STEP15
130 MOVE640,1024
140 DRAWA,0
150 NEXT
160 FORA=0TO1024STEP15
170 MOVE1280,512
180 DRAW0,A
190 NEXT
200 FORA=0TO1024STEP15
210 MOVE0,512
220 DRAW1280,A
230 NEXT
240 B=B+1
250 UNTILB=0
```

How to get your name in lights – Nathan Walton

```
 10  REM NAMES
 20  REM BY NATHAN WALTON
 30  REM LICHFIELD, STAFF
S
 40  CLS
 50  PRINT TAB(7,14)"WHAT
 IS YOUR NAME?"
 60  INPUT NAME$
 70  MODE 2
 80  VDU 23,1,0;0;0;0;
 90  REPEAT
100  PRINT TAB(RND(18),RN
D(27))NAME$
110  COLOUR RND(16)
120  UNTIL FALSE
```



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

super archer

Use your Electron to get right on target


```
  10 REM 'Super Archer'
  20 REM
  30 REM Written  for the
  40 REM ACORN ELECTRON
  50 REM      by
  60 REM Ian M. Brown
  70 REM
  80 REM (C) ELECTRON USER
  90 REM
 100 :
 110 MODE 1
 120 PROCinit
 130 PROCtitle
 140 IF INSTR("Yy",key$) P
ROCinstruct
 150 PROCinput
 160 FOR play=1 TO players
 170 PROCwindsetup
 180 FOR arrow=1 TO 3
 190 MODE 5
 200 PROCscreen
 210 PROCfactors
 220 REPEAT PROCarrow
 230 UNTIL height<0 OR dis
p>=dist
 240 SOUND 17,0,0,0
 250 IF FNxyz(dev,height)S
OUND 0,-1,5,2
 260 arrowheight(play,arro
w)=height:arrowdev(play,arr
ow)=dev
 270 VDU 28,0,31,19,31:PRI
NTTAB(3)"Press any key";:ke
y=GET
 280 NEXT arrow
 290 PROCassess
 300 IF NOT allmiss PROCta
rget
 310 NEXT play
 320 PROCcompare
 330 IF INSTR("Yy",ans$) R
UN
 340 PRINT'"Byee!"'
 350 PROCmusic
 360 END
 370 :
 380 DEF PROCinit
 390 ON ERROR MODE6:REPORT
:PRINT" at line ";ERL':END
 400 ENVELOPE 1,2,2,-2,0,1
,1,0,0,0,0,0,0,0
 410 VDU 23,223,255,255,25
5,255,255,255,255,255
 420 VDU 23,224,24,24,24,2
4,255,126,60,24:REM  down-a
rrow
 430 VDU 23,225,24,60,126,
255,24,24,24,24:REM  up-arr
ow
 440 VDU 23,226,0,0,56,58,
56,0,0,0:REM  man (top-view
)
 450 VDU 23,227,58,57,17,2
55,57,41,42,40:REM  man (si
de-view)
 460 VDU 23,228,24,24,24,2
4,24,24,24,24:REM  target (
top-view)
 470 VDU 23,229,24,24,24,2
4,24,24,36,66:REM  target (
side-view)
 480 VDU 23,230,129,66,36,
24,24,36,66,129:REM  cross
 490 DIM col%(10)
 500 DIM arrowheight(4,3)
 510 DIM arrowdev(4,3)
 520 DIM score(4)
 530 ENDPROC
 540 :
 550 DEF PROCwindsetup
 560 f=1040/dist
 570 IF wind windvel=RND(2
0) ELSE windvel=0
 580 windang=RND(360)
 590 ENDPROC
 600 :
 610 DEF PROCscreen
 620 VDU 23,1,0;0;0;0;:GCO
L 0,1
 630 MOVE 0,136:DRAW 1279,
136:DRAW 1279,504:DRAW 0,50
4:DRAW 0,136
```

EVER fancied yourself as a budding Robin Hood? Do you think using a longbow is easy?

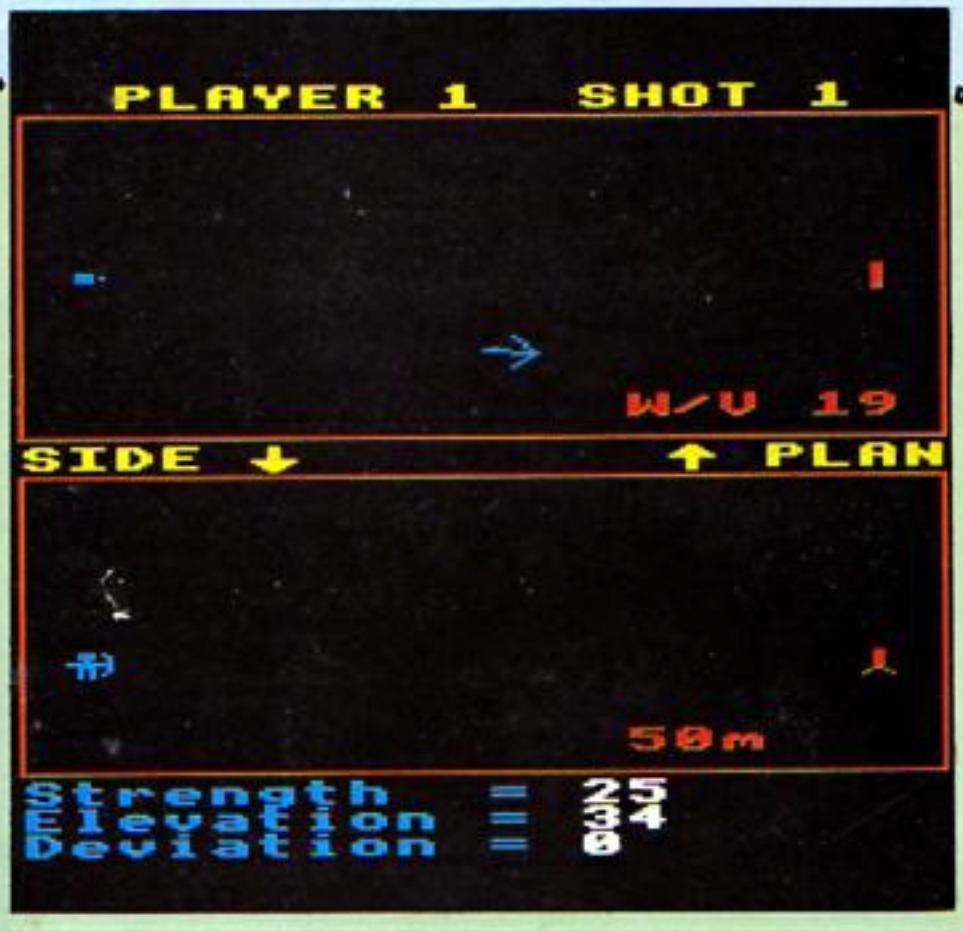
Put yourself to the test with IAN BROWN's Super Archer, a game for one to four players.

You must try to hit a target with an arrow at four different ranges.

And if that isn't difficult enough the real toxophilites among you have the choice of combatting side winds.

All the instructions are in the program and the controls are simplicity itself. However it may be easy to play but it's not easy to hit the target.

Super Archer is just like the real thing — but you don't have to keep retrieving the arrows.



VARIABLES

players	Number of players.
play	Current player.
arrow	Current arrow of current player.
dist	Distance from player to target: 25/50/75/100m.
windvel	Prevailing wind velocity in m/s.
windang	Prevailing wind direction in degrees.
strength	Strength of shot (relative)
elev	Elevation of shot from ground in degrees.
angle	Horizontal angle of shot in degrees.
velh	Horizontal velocity of arrow.
velv	Initial vertical velocity of arrow.
dev	Current deviation of arrow (in metres from straight line from player to target).
disp	Current distance of arrow from player.
height	Current height of arrow from ground.
time	Artificial time function.
x,y,z	Variables for calculation of accuracy of shot.
ra%,i%,j%	Variables for plotting of circular target.
lim	Variable for calculation of score gained by arrow.
note	Current note being played in PROCmusic.
pitch	Pitch of note.
duration	Duration of note.

ARRAYS

arrowheight(play,arrow)	Final height of particular arrow above ground.
arrowdev(play,arrow)	Final deviation of particular arrow.
col%(r%)	Colour of ring r% of target.
score(play)	Score of particular player.

FLAGS

allmiss	TRUE if all arrows of a particular player have missed target.
wind	TRUE if wind effects have been selected.

```
  640 MOVE 0,552:DRAW 1279,
552:DRAW 1279,952:DRAW 0,95
2:DRAW 0,552
  650 COLOUR 2
  660 PRINTTAB(2,1)"PLAYER"
TAB(12,1)"SHOT"
  670 PRINTTAB(0,15)"SIDE "
CHR$224;TAB(14)CHR$225" PLA
N"
  680 COLOUR 3
  690 PRINTTAB(9,1);play;TA
B(17,1);arrow
  700 COLOUR 1
  710 PRINTTAB(13,26);dist;
"m"
  720 COLOUR 2
  730 VDU 31,1,8,226
  740 VDU 31,1,23,227
  750 COLOUR 1
  760 VDU 31,18,8,228
  770 VDU 31,18,23,229
  780 ENDPROC
  790 :
  800 DEF PROCfactors
  810 IF wind PROCwindinfo
  820 REPEAT VDU 28,0,29,19
,28,12,7:COLOUR 2:PRINT"Str
ength =";:COLOUR 3:INPUTTA
B(12)strength:UNTIL strengt
h>4 AND strength<41
  830 REPEAT VDU 28,0,30,19
,29,12,7:COLOUR 2:PRINT"Ele
vation =";:COLOUR 3:INPUTTA
B(12)elev:UNTIL elev>-1 AND
 elev<61
  840 REPEAT VDU 28,0,31,19
,30,12,7:COLOUR 2:PRINT"Dev
iation =";:COLOUR 3:INPUTTA
B(12)angle:UNTIL angle>-31
AND angle<31
  850 GCOL 0,3
  860 velh=strength*COSRADe
lev
  870 velv=strength*SINRADe
lev
  880 height=1.5
  890 disp=0
  900 dev=0
  910 time=0
  920 SOUND 1,1,25,4
  930 SOUND 1,-1,255,-1
  940 ENDPROC
  950 :
  960 DEF PROCarrow
  970 time=time+.05
  980 disp=velh*time
  990 height=1.5+velv*time-
5*time*time
 1000 dev=dev+(windvel*SINR
ADwindang+velh*SINRADangle)
/100
 1010 PLOT 69,128+f*disp,75
2-dev*16
 1020 PLOT 69,128+f*disp,25
2+height*16
 1030 ENDPROC
 1040 :
 1050 DEF PROCcompare
 1060 VDU 19,0,4;0;
 1070 VDU 26:CLS:PRINT''''
 1080 FOR play=1 TO players
 1090 PRINT''"Player ";play;
": Score ";score(play)
 1100 NEXT play
 1110 PRINT'''"Another game
(Y/N)? ";
 1120 REPEAT ans$=GET$
 1130 UNTIL INSTR("YyNn",an
s$)
 1140 ENDPROC
 1150 :
 1160 DEF PROCassess
 1170 allmiss=TRUE
 1180 FOR arrow=1 TO 3
 1190 IF FNhit(play,arrow)
allmiss=FALSE
 1200 NEXT arrow
 1210 ENDPROC
 1220 :
```

Super Archer listing

From Page 33

```
 1230 DEF PROCtarget
 1240 CLG:VDU 26
 1250 VDU 19,0,4;0;
 1260 VDU 29,640;512;
 1270 RESTORE 1430
 1280 FOR r%=1 TO 10
 1290 READ col%(r%)
 1300 IF col%(r%)<>col%(r%-
1) PROCcircle(r%)
 1310 NEXT
 1320 GCOL 4,0
 1330 VDU 5
 1340 FOR arrow=1 TO 3
 1350 IF FNhit(play,arrow)
MOVE x*640-32,y*640+16:VDU
230:PROCscore(z)
 1360 NEXT arrow
 1370 VDU 4
 1380 GCOL 0,3
 1390 PRINTTAB(0,30)"Player ";play
;": Score ";score(play)
 1400 PRINTTAB(3,30)"Press
any key";:key=GET
 1410 ENDPROC
 1420 :
 1430 DATA 2,2,3,3,3,0,0,1,
1,0
 1440 :
 1450 DEF PROCcircle(r%)
 1460 ra%=(11-r%)*32
 1470 GCOL 0,col%(r%)
 1480 FOR i%=-ra% TO ra% ST
EP 8
 1490 j%=SQRABS(ra%*ra%-i%*
i%)
 1500 MOVE i%,-j%
 1510 DRAW i%,j%
 1520 NEXT
 1530 ENDPROC
 1540 :
 1550 DEF PROCwindinfo
 1560 GCOL 0,1
 1570 MOVE 640,660
 1580 PLOT 1,COSRADwindang*
80,-SINRADwindang*80
 1590 PLOT 1,-40*SINRAD(60-
windang),40*COSRAD(60-winda
ng)
 1600 PLOT 0,40*SINRAD(60-w
indang),-40*COSRAD(60-winda
ng)
 1610 PLOT 1,-40*COSRAD(win
dang-30),40*SINRAD(windang-
30)
 1620 COLOUR 1
 1630 PRINTTAB(13,13)"W/V "
;windvel
 1640 ENDPROC
 1650 :
 1660 DEF FNhit(play,arrow)
 1670 x=arrowdev(play,arrow
 1680 y=arrowheight(play,ar
row)-1.5
 1690 z=SQR(x*x+y*y)
 1700 IF z<=.5 =TRUE ELSE =
FALSE
 1710 :
 1720 DEF FNxyz(dev,height)
 1730 x=dev
 1740 y=height-1.5
 1750 z=SQR(x*x+y*y)
 1760 IF z<=.5 =TRUE ELSE =
FALSE
 1770 :
 1780 DEF PROCscore(z)
 1790 lim=0
 1800 REPEAT lim=lim+.05
 1810 UNTIL lim=.5 OR z<=li
m
 1820 IF z<=lim score(play)
=score(play)+11-INT(lim*20)
 1830 ENDPROC
 1840 :
 1850 DEF PROCtitle
 1860 VDU 23,1,0;0;0;0;::COL
OUR 1
 1870 PRINTTAB(0,1)STRING$(
40,CHR$223)
 1880 FOR yy%=2 TO 29
 1890 VDU 31,0,yy%,223,31,3
9,yy%,223
 1900 NEXT yy%
 1910 PRINTTAB(0,30)STRING$
(40,CHR$223);
 1920 COLOUR 3
 1930 PRINTTAB(14,4)"SUPER
ARCHER"
 1940 COLOUR 2
 1950 PRINTTAB(14,5)"*******
*******"
 1960 VDU 31,12,4,227,31,27
,4,227
 1970 COLOUR 1
 1980 PRINTTAB(12,7)"by  Ia
n M. Brown"
 1990 VDU 28,3,27,36,18
 2000 PROCmusic
 2010 COLOUR 2
 2020 PRINT''"Instructions
(Y/N)? ";
 2030 REPEAT key$=GET$:UNTI
L INSTR("YyNn",key$):PRINT
key$
 2040 ENDPROC
 2050 :
 2060 DEF PROCinput
 2070 PRINT''"How many play
ers (1-4)? ";
 2080 REPEAT key$=GET$:UNTI
L INSTR("1234",key$)
 2090 PRINT key$:players=VA
L(key$)
 2100 PRINT''"Crosswind eff
ects? ";
 2110 REPEAT key$=GET$:UNTI
L INSTR("YyNn",key$)
 2120 PRINT key$:IF INSTR("
Yy",key$) wind=TRUE ELSE wi
nd=FALSE
 2130 REPEAT VDU 28,2,22,37
,21,12
 2140 INPUT"Enter distance
(25/50/75/100m): "dist
 2150 UNTIL dist=25 OR dist
=50 OR dist=75 OR dist=100
 2160 ENDPROC
 2170 :
 2180 DEF PROCinstruct
 2190 CLS
 2200 PRINT"   This game
 simulates (rather''"loos
ely) a game of archery
for''"one to four player
s."
 2210 PRINT"   Each playe
r takes turn to fire''"thre
e arrows at a target f
rom''"between 25 and 100 me
tres away."
 2220 PROCcontinue
 2230 PRINT''"   The playe
r selects each time''"the
 strength of the shot,
 the''"angle from the grou
nd in degrees,"
 2240 PRINT"and its horizon
tal deviation."
 2250 PROCcontinue
 2260 PRINT"For example:"''
"  Strength = 25"''"  Elev
ation = 8"''"  Deviation =
-5"
 2270 PRINT''"means strengt
h of shot (5*40) is"''25,
its elevation (8*60) is ei
ght''"degrees, and the sh
ot is aimed''"five degree
s to the left (-30*30)."
 2280 PROCcontinue
 2290 PRINT"   The arrow i
s then automatically''"fire
d, and its path is shown f
rom''"above and from the si
de."
 2300 PRINT"   This is rep
eated for all  three''"shot
s. If any hit the target, t
hen''"the target is shown
after all the''"arrows have
 been fired."
 2310 PROCcontinue
 2320 PRINT"   The winnin
g shots are shown as''"cros
ses on the target. The  poi
nts''"scored are then calcu
lated."
 2330 PRINT"   The whole
process is  repeated''"for
all the players,  and  fina
lly''"the scores printed at
 the end."
 2340 PROCcontinue
 2350 PRINT"   If crosswin
ds  are selected at''"the
beginning  of  the  game, t
he''"random  wind speed  an
d  direction''"are displaye
d in  the  top half of''"th
e screen."
 2360 PRINT"   These stay
 constant throughout''"one
player's turn, but will cha
nge''"for the next player."
 2370 PROCcontinue
 2380 ENDPROC
 2390 :
 2400 DEF PROCcontinue
 2410 COLOUR 1
 2420 PRINTTAB(11,17)"Press
Space";
 2430 REPEAT UNTIL GET=32
 2440 CLS
 2450 COLOUR 2
 2460 ENDPROC
 2470 :
 2480 DEF PROCmusic
 2490 RESTORE 2570
 2500 FOR note=1 TO 11
 2510 READ pitch,duration
 2520 SOUND 1,-1,pitch,dura
tion
 2530 SOUND 1,0,0,0
 2540 NEXT note
 2550 ENDPROC
 2560 :
 2570 DATA 100,4,100,4,100,
8,100,4,100,4,100,8,100,4,1
00,4,100,6,92,2,84,8
```

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

Merlin's Cave

● This month: Wheel of Fortune, Stranded, Ring of Time, Adventureland, Quest for the Holy Grail.

I'VE had a lot of letters (well, eight actually) from readers who can't get started with Epic's Wheel of Fortune. So this month I shall try and tell you how to do it – without *telling* you how to do it – if you know what I mean.

But first let me repeat something I said last month. Please enclose an s.a.e. if you want an immediate answer.

It takes time to get a magazine on the stands, time that you will spend waiting if you don't enclose an s.a.e.

Many readers have written in asking about Countdown to Doom. Although I have managed to get a couple of hours playing it, I have not yet received a review copy. Never fear, I shall review it as soon as it arrives.

Other things to look out for are reviews of all the Scott Adams' adventures, including the one that started it all, Adventureland.

Back to Wheel of Fortune. To tell you exactly how to get down the well would require more space than I have available. I shall have to be brief and let you fill in the gaps.

The main thing to remember is that the characters move independently of you – but only to a point.

Search everywhere, collect everything but make sure you leave the gilded truncheon north of the crossroads before going west for the ladder.

You'll have to befriend the beggar because you need help to get down the well once you have got the bucket.

Give the beggar the coin on his return trip from the machine. Once he has gone, get the coin from the cup, get the matches then get the beggar to follow you.

Use the ladder to get the bucket and go to the well.

To go down the well get the beggar to help you but then be very PATIENT. The exact sequence is: Get coin, befriend beggar, get matches, search everywhere, collect everything, go to the well and you are off. Hope that helps.

Incidently, I haven't been able to do very much down the well so I'd appreciate any tips, maps or advice that you'd care to offer.

Right. Problem corner now – see you next month!

S. Lurie can't get into the spaceship in Superior's Stranded: *Get the parachute in the forest, find a place to use it, get the rifle and shoot the robot. You should have four objects by now – if you have you can get in and also finish the game.*

T. Reay cannot get past the crocodiles in Kansas's Ring of Time: *Ugh! Kill, then mutilate the dog.*

M. Byrom wants to know where the keys are in Adventureland: *Have you been up the tree?*

P. Murtogh wants to know if the swamp leads anywhere in Epic's Quest for the Holy Grail: *Yes! You PLANK.*

If you want Merlin's help write to:
Merlin, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

Ultimate Electron arcade action

Zalaga
Aardvark

MY first reaction to this excellent game was "I'm not sure what's happening but it's fast". And that's my considered opinion as well.

The reason I'm not sure what's happening is that neither the cassette insert nor the program instructions give you any idea of the scenario.

Having said that, it doesn't take a lot of K to realise that the amazingly animated, ferociously fast objects swirling and swooping down from the top of the screen are nasties.

And any arcade novice should be able to realise that the laser base at the bottom of the screen can be moved from

side to side, avoiding bombs and replying in kind with lasers.

No, there's no problem with the game itself, a really fast example of ultimate Electron arcade action. It's just that the instructions are a bit of a puzzle.

You can have the sound on or off, decide whether you want the one or two player game, keyboard or joystick.

You can pick the start screen, whether you want automatic fire or not or even set the reload speed.

But you have to discover for yourself what such things as automatic fire and the reload speed actually mean.

Not that you have much time to spend trying to find out, the game is too good for that.

It's entrancing. The graphics are superb, fast and effective. The control keys are easy to use and (remarkably) well explained and the game concept simple but appealing.

The idea of aliens dropping from the sky may be old fashioned but in Zalaga it reaches the state of the art.

It's a superb action game, flawed only by the lack of explanation. Even so it's thoroughly recommended.

Keith Young

Cue for action

Superpool
Software Invasion

HAVE you ever sneered when Steve Davis missed a shot and announced to all and sundry "Even I wouldn't have missed that"? I know I have.

Well here's your chance to put your cue where your mouth is, because Software Invasion is giving you the opportunity to play Superpool.

Although not quite in the style or atmosphere of the Crucible Theatre, the game represents a pretty accurate simulation of a game of pool, with six balls, coloured and numbered, and a plan view of a pool table.

All these go to make an attractive and uncomplicated display, with the scoreboard along the top edge of your screen.

You sight your cue ball by moving an indicator along the cushion, and this is where the ball will strike, provided, of course, that there is not a ball in between, which in fact is your aim.

You select the strength of your shot, press Fire and, if you're like me, the white ball then goes into a pocket. Of course a coloured ball should go in, but then I don't need to explain the rules to you, I'm sure.

In the first frame it's made easy, and you can pot any ball in any order. In the second frame you have to pot the balls in number order.

In both these frames it doesn't matter if you hit any

other ball, but in the third frame you may only hit and pot the balls in number order.

There are keyboard or joystick options, and your shot is on a timed basis – run out of time and you lose a life.

All in all this is a very good game, but some things I found offputting. I would have liked the option to remove the timer, because it is not always appreciated, especially in the beginner's game.

I was also a bit dubious about where the balls ended up when certain strengths were selected, and they also have a tendency to suddenly speed up when no other balls

→

Frustrating but fun...

Spaceman Sid
English Software

AS Spaceman Sid you're sent to the planet Tribos to attempt to recapture the Martian-occupied dilithium crystal mines which are essential for Earth's defence.

Your only protection on this barren landscape is your XRS laser-armed Combat Rover.

As you proceed cautiously, jumping over pits, you are confronted by endless hazards – drones and enemy scout ships are only two of the Martian dangers.

Land mines abound too, and there's nothing so unnerving as seeing your wheels dance into the air with gay abandon as you trip over an innocent-looking explosive.

And just wait until you get into the further sectors, where you're finally confronted by the dreaded bases of your fiery enemy

Tempted? You should be. Any potential Sids out there will be positively riveted by this tricky little game.

The keys are easy to use. X speeds you forward, Z slows you down, while Shift certainly makes you jump. You tend to use Shift a lot.

Return releases the laser beam to burn the nasty green machines from Mars.

The three progressive levels of play and five sectors, combined with convincing graphics which give a 3D effect to the heavens, produce a fascinating and frustrating game which can keep the family amused for hours.

Keith Young

From Page 37

are involved.

Taking everything into consideration the pros outweigh the cons, and if you want a game that will keep you interested for hours on end you have to go far to find one better than this.

Adam Young

Cut to the quick

Sadim Castle
MP Software

IT'S three in the morning and I've just had my throat cut for the umpteenth time.

I've said before that these MP adventures are getting better, and they are.

How the notting hill do I get through these gates? Why can't I get the shotgun off the farmer? Why don't I just give up and go to bed.

NEXT DAY: Aah . . .That's how it's done! What? Not again. Right. This time I give up. If anyone out there can solve this adventure – tell me how!

A long time ago Lady Leonara was left at home while her husband went off to war.

While he was gone she took a lover. But, alas, she was caught by Lord Sadim upon his return.

The enraged lord sealed her in her room and left her to die.

Many years later Lord Sadim is killed in an accident. As he lies dying a woman in white is seen laughing over his corpse.

Frequent sightings of this mysterious woman over the ensuing years convince the locals that she is the ghost of the Lady Leonara.

Seeing as how you flunked out with the Blue Dragon the locals offer you one final chance – redeem yourself or retire.

Can you enter the castle, overcome the dangers and give the lady her final peace? Probably not, but at least you can have fun trying.

You find yourself outside the west gate of the castle and your nightmare begins . . .

The game follows the usual MP style of coloured messages and long descriptions. A departure from the norm is the use of real-time and character interaction.

If you sit pondering what to do you invariably see a "time passes . . ." message. This instils a feeling of panic.

The first time the monk "smiles sadly, blesses you and moves on" you'll be racing after him to try and find out what you should have done!

Two things I found while nosying through the program were the two commands VERSION and MODE. VERSION gave, "Version 1.1 MP software". MODE was a funny one, but it seems to switch between Mode 6 and Mode 7. Yes, I know we don't have Mode 7! Makes you think though, doesn't it?

I'm not sure I can give a valid verdict on this game as I didn't get far enough.

It seems quite hard and is therefore worth recommending but, and it's a big but, you get your throat slit far too often for my liking.

At any rate it compares very well with similar types of adventures and, on balance, is a worthwhile addition to the collection.

Overall, MP adventures are always reasonably priced and as such, are definitely worth buying. Recommended.

Merlin

Real ego buster

Guardian
Alligata

BE warned – to play this game you need keen eyesight, quick fingers and lots of luck because here's a program that's determined to bust your ego. Mine went with a bang.

In possession of a fast moving spaceship you've got to stop the alien landers grabbing humans from the planet surface. If they manage to get back into outer space they mutate into pods, swarmers and baiters and come for you.

There's wave after wave of the nasties and you need every one of your three lives as well as the three smart bombs to

ELITE - THE ABSOLUTE 'MUST'

Elite
Acornsoft

IT would be an understatement to say that this game has aroused a lot of interest in the computer world. It has already become Acornsoft's best-selling game and it is fast becoming a cult.

So much so that it has left owners of certain other machines wondering when they will be able to get their hands on it!

It comes in the most comprehensive packaging I have seen for a piece of software. Apart from the tape itself, there is a 64 page manual giving details of the game, a summary of the game keys (there are 47), and a short novella, "The Dark Wheel", which is meant to whet your appetite for the game.

There is even a ship identification wall chart! All this makes the somewhat expensive price look quite reasonable.

Elite has all the addictive qualities of an arcade space battle plus the intellectual challenge of a strategy game.

You play the part of a space trader roaming the galaxy selling your wares from planet to planet with the view of making as much money (credits) as you can.

These credits can then be used to equip your Cobra MkIII space ship. Things to buy include an extra large cargo bay, an extra energy unit and docking computers (essential as manual docking is very long and difficult).

You can also gain credits by shooting down pirate ships and the many asteroids that float aimlessly about.

Shooting down innocent traders or dealing in illegal items (narcotics and slaves) reaps you large profits.

Unfortunately it also brings you to the attention of the police Viper ships.

The kills contribute to your rating, which ranges from harmless through mostly harmless, poor, average, above average and competent.

As your bag grows next comes dangerous, then deadly and finally, after a lot of shooting, you become one of the elite.

Fortunately there is a save game option, enabling you to rest your aching fingers.

You may think that having to use 47 keys in its playing makes controlling the program complex and difficult. This is not so, as many keys are only used on certain occasions.

Having said that, I must admit that at first I found flying my ship quite difficult.

The 3D graphics are stunning and the sound well above average.

The game has an addictive quality which keeps you at the keyboard for hours in the hope of achieving elite status.

No software collection is complete without it.

Ian Critchley

survive for any length of time.

The more aliens you get the more you score – sadly they seem to be on the same bonus scheme.

It's a fast moving space game with striking graphics and excellent sound effects. Kids of all ages will love it.

Keith Young

Untidy but tempting

Staff of Law
Potter Programs

STOP! Hands up those of you who have never heard of Thomas Covenant.

Right! I heareby banish you from this review. Read the next one. It's about frogs or gorillas or something.

As the rest of you are aware, Stephen Donaldson is the best writer of the century and the Thomas Covenant books are the greatest work of fiction ever.

Who? Tolkien? Never heard of him.

Anyway, take another look at the title of this adventure. Ring any bells? Correct. Well, the bad news is that although the story-line originates from the Unbeliever series, it is not about him.

You will meet Mhoram, or Moram as he is called here, and the Despiser, but Hile Troy, Elena, the Forestals, Ravers and the rest are missing.

You play the part of the "Chosen" (minus ring). You've been summoned by the high council where you're informed that you are the only one who can defeat the Despiser and return the Staff of Law to Andelain, I mean, Arda.

Here all similarities between the books and this game end. You're now faced with an extremely fiendish adventure during which you'll learn to wire-walk and dive from great heights.

I won't give you any clues, but you will need to know what a dumb waiter is.

There were, however, several things I didn't like. Mode 4 for example. What's wrong with Mode 6?

Also there's no save game facility, surely a definite must for an adventure? And you have to type in nouns in full, for example DRAWBRIDGE. Try typing that in a few times.

Also there are spelling mistakes. Suddenly "You hear a LOAD crash"! Mind you, the way my cassette recorder's been playing up recently, they could be right.

If it seems that I've pulled this adventure to bits, rest assured that, considering the complexity of the plot, these criticisms are a minor consideration.

Also the program is written in Basic and therefore fairly easy to change anyway.

On the plus side is the skill and inventiveness shown by the programmers. Solving this game requires a great deal of thought, as most of the problems will be new to you.

Happily, Potter Programs offers a help service for this and their other adventures – one that I expect will be much used.

An excellent adventure that, although it would benefit from tidying up, is still well worth buying.

Merlin

Flexible quiz

Answer Back Quiz Junior version
Kosmos Software

THIS series of programs was first designed for the over-twelves. This latest version is for 6 to 11-year-olds and contains a completely new range of topics.

On the cassette are the master program and 15 files of questions, each containing 50 programs on the particular topic.

Topics included on the tape include: nature, music and nursery rhymes, lucky dip, famous people, science, the British Isles, word fun, around the world, brain strainers, games and sport, books and poetry, fun-sums, TV, films and theatre, spelling and take your chance.

The master program not only presents the questions on file but enables the user to create their own files.

This is an excellent piece of software for the home and school. It can be modified and expanded to meet the needs of the individual user.

The various options have very clear and specific instructions and can be used by someone not familiar with the inner workings of a computer.

They offer a flexibility not often found in such programs.

The child user also experiences a well constructed screen format with a variety that continues to stimulate.

All questions are stored in the file with four answers – one answer correct, the others wrong. This enables the computer to present three different types of questions:

- Multiple choice – the user presses A, B, C or D.
- True or false – one answer appears, the user says whether it is correct or not.
- Complete the answer – the user has to fill in missing letters.

In a fourth option the computer presents a selection of different types of questions.

If an answer is correct then the user has the opportunity of saving the princess by dropping from the hot air balloon a sandbag to land on top of the dragon.

This encourages children who don't like answering questions alone.

My experience has been that the killing of dragons is not necessary but it does not distract from the quiz itself.

This is an excellent package and it should find its way into many homes and schools.

John Woollard

Let's go crock a Krackat

Rubble Trouble
Micro Power

HAVE you ever felt the irresistable urge to pick a fight with a Krackat? No? Then for a new experience, try this game for size.

The world's a mess after a nuclear holocaust and things aren't made any better by mutant flesh-eating turtles called Krackats.

As seems to be the way of things in computer games, you find yourself in a maze, the walls of which are made of boulders.

Your only hope of survival is to use them to crush the little nasties and so gain points.

As if this wasn't enough, a little gauge at the top of your screen tells you the background radiation level. When this gets too high, it's curtains for you. Time is of the essence.

You can push a boulder unless it's blocked by another. In which case, the boulder itself will be crushed. Beware if you miss a Krackat, as the boulder will bounce back and crush your frail bones.

Also avoid boulders marked D, as these contain a bomb and don't like being pushed around. Should you survive all this a bonus life is given at 6,000 points.

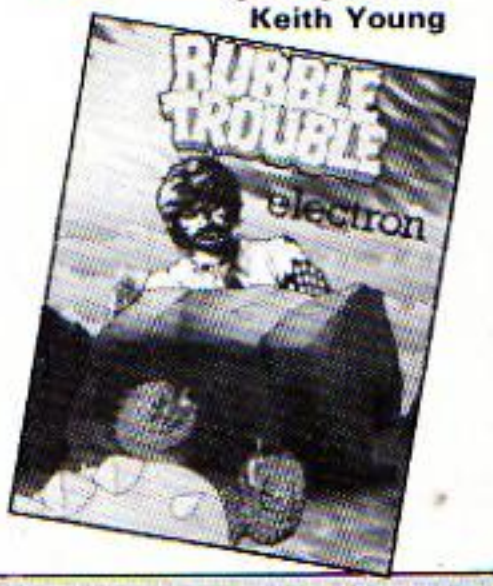
The keys are standard – Z and X are for left and right, / and : for up and down. To push a boulder, just stand next to it and hit your Return key.

There are three levels, one of which is ominously entitled the Vanishing Maze.

It's a game to keep all ages amused for hours on end. The first rate graphics really enhance its enjoyment and the sound effects are particularly good as is the music accompanying the instructions.

Despite the dreadful scenario it's a great game.

Keith Young



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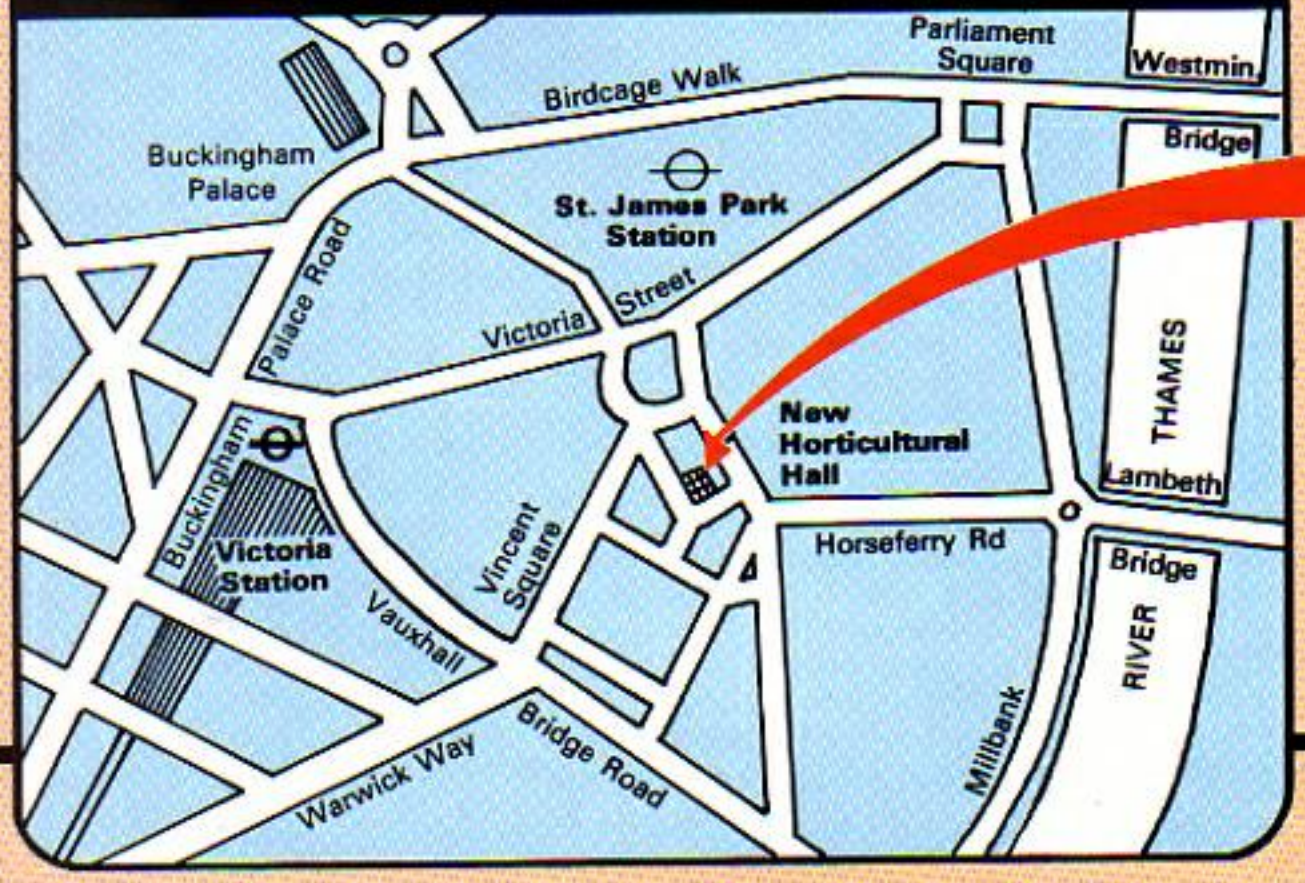

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EU4

STARCHART

By
ROG FROST

IF you are interested in Astronomy this program is for you. It draws stars – about 200 in all – that are visible in Great Britain.

It is set for Birmingham's latitude but it will be reasonably accurate for anywhere in the British Isles. The stars are grouped in 29 constellations.

Because of the earth's movement around the sun and its spinning rotation we cannot, of course, see all the stars at the same time.

The program draws a second, smaller, circle to include the stars visible at the time and date entered.

A list of constellations is put on the screen, and by using a moving symbol any constellation name can be selected and its stars made to flash.

Incidentally, it is the normal convention for star charts to have North at the bottom because star charts are viewed from below.

Most variables have been given appropriate names and explain themselves.

offset% is set by *day%* and *time%*. It is an angle used to rotate the stars to a position suitable for that day and time. 90 is added as a "fiddle factor" to get the stars in the right place.

The variable *day%* is calculated on the basis of 12 months of 30 days. Real astronomy purists might like to remove that minor source of error.

DELAY% at line 590 is set to loop up to 200. This program was written on an Electron. Users of BBC Micros might find a value of 500 easier to manage.

X% and *Y%* at lines 450/460 are multiplied by 4.5 because the radius of the chart the information was taken from is 100mm and the radius of the computer chart is 450 screen units.

There is one problem with typing in the program. RESTORE numbers are stored as DATA in the program and the renumber command cannot cope with this.

Therefore on no account renumber the program.

PROCEDURES

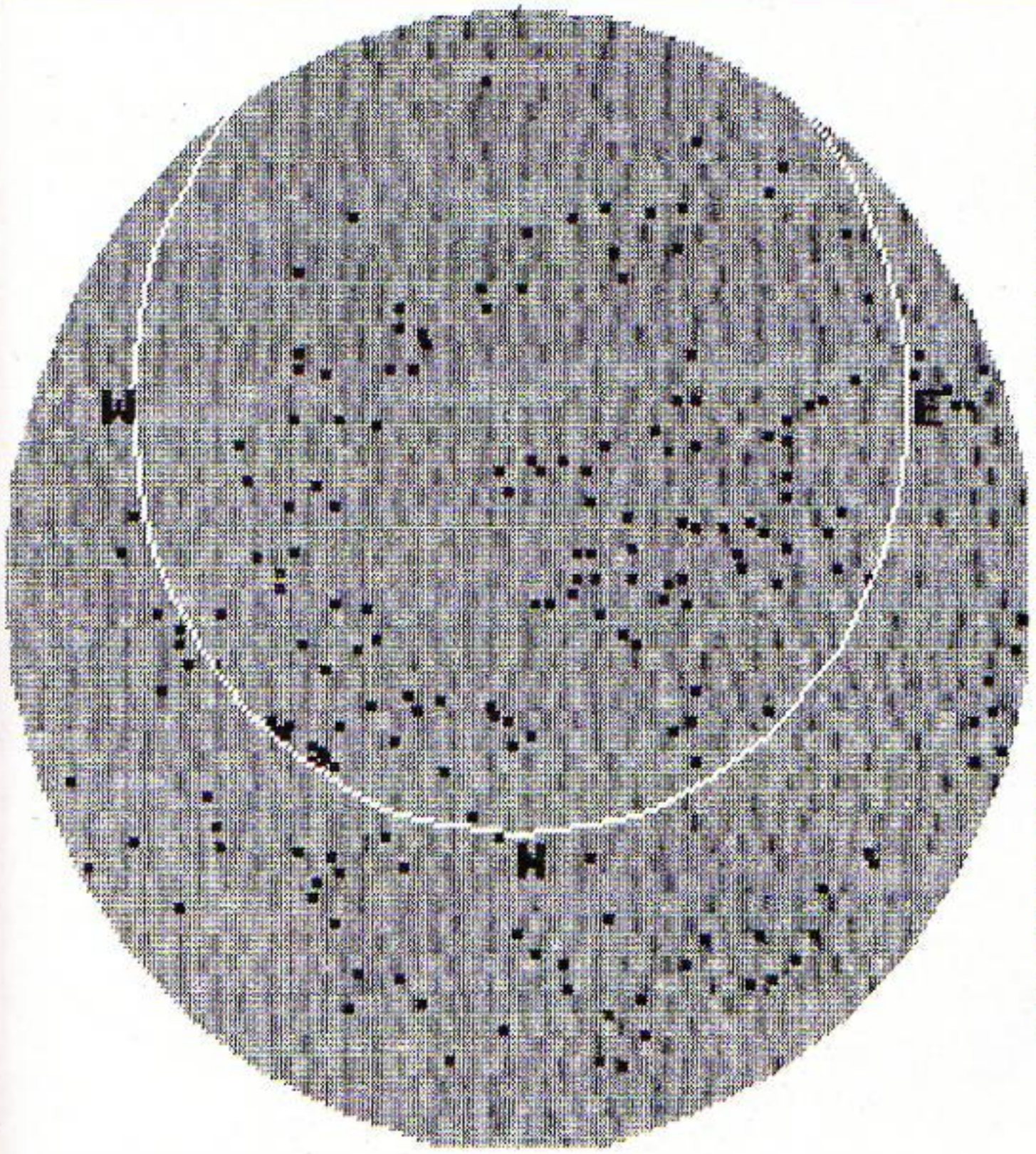
PROCintro	Sets up arrays and reads in data of constellation names, number of stars in constellations and at which line number star data is held. It also prints up instructions and accepts day and date inputs to work out the value of *offset%*.
PROCcircle	Draws the blue circle.
PROCconst	Collects the data to place each star in the constellation.
PROCstar_place	Converts the polar coordinates for each star into screen coordinates and plots each star.
PROChorizon	Draws the horizon line.
PROCselect	Allows a chosen constellation to flash.
PROCdelay	Keeps stars flashing for five seconds.

ARRAYS

names$	Name of constellation.
no%	Number of stars in constellation.
restore%	Program line at which DATA is stored.

Star Chart listing

```
  10 REM STAR CHART
  20 REM By Rog Frost
  30  REM (C) ELECTRON USE
R
  40 REM
  50 MODE6
  60 PROCintro
  70 MODE1
  80 PROCcircle
  90 FOR const%=1TO29
 100 PRINTname$(const%)
 110 PROCconst(3,no%(const
%),restore%(const%),name$(c
onst%))
 120 NEXT
 130 PROChorizon
 140 PROCselect
 150 END
 160 DEFPROCconst(col%,no%
(const%),restore%(const%),n
ame$(const%))
 170 RESTORE restore%(cons
t%)
 180 GCOL0,col%
 190 FOR star%=1TOno%(cons
t%):READradius%,angle%
 200 PROCstar_place(radius
%,angle%)
 210 NEXT
 220 ENDPROC
 230  DEFPROCcircle
 240 VDU23;8202;0;0;0;
 250 VDU19,1,4,0,0,0
 260 VDU19,2,11,0,0,0
 270 VDU28,28,31,39,0
 280 VDU29,450;550;
 290 R%=450
 300 PRINT
 310  GCOL0,1
 320 MOVE0,R%
 330 FORrotate%=0TO360STEP
10
 340 X%=SINRAD(rotate%)*R%
:Y%=COSRAD(rotate%)*R%
 350 MOVE0,0:PLOT85,X%,Y%
 360 NEXT
 370 VDU29,450;555;
 380 MOVE0,0
 390 ENDPROC
 400 DEFPROCdelay
 410 TIME=0:REPEATUNTILTIM
E>500
 420 ENDPROC
 430 DEFPROCstar_place(rad
ius%,angle%)
 440 VDU5
 450 X%=SINRAD(angle%+offs
et%)*radius%*4.5
 460 Y%=COSRAD(angle%+offs
et%)*radius%*4.5
 470 MOVEX%,Y%:PRINT"."
 480 VDU4
 490 ENDPROC
 500 DEFPROCselect
 510 ypos%=1
 520 REPEAT
 530 COLOUR0:PRINTTAB(11,y
pos%)"*"
 540 IF INKEY(-1) ypos%=yp
os%+1
 550 IF ypos%>29 ypos%=1
 560 COLOUR2:PRINTTAB(11,y
pos%)"*"
 570 *FX15,0
 580 IF INKEY(-74)PROCcons
t(2,no%(ypos%),restore%(ypo
```




```
s%),name$(ypos%)):PROCdelay
:PROCconst(3,no%(ypos%),res
tore%(ypos%),name$(ypos%))
  590 FOR DELAY%=0TO200:NEI
T
  600 UNTIL0
  610 ENDPROC
  620 DEFPROChorizon
  630 GCOL0,0
  640 VDU29,450;690;
  650 MOVE0,340
  660 FOR horizon%=0TO360ST
EP5
  670 X%=SINRAD(horizon%)*3
40
  680 Y%=COSRAD(horizon%)*3
40
  690 DRAWX%,Y%
  700 NEXT
  710 VDU5:GCOL0,3:MOVE-4,-
350:PRINT"N":MOVE-368,8:PRI
NT"W":MOVE342,8:PRINT"E":VD
U4
  720 VDU29,450;555;
  730 ENDPROC
  740 DEFPROCintro
  750 DIMno%(30),restore%(3
0),name$(30)
  760 FOR N%=1TO29:READno%(
N%),restore%(N%),name$(N%):
NEXT
  770 DATA8,920,Sagittarius
,7,930,Ursa Major,7,940,Urs
a Minor,7,950,Pegasus,9,960
,Leo,9,970,Aquarius,5,980,C
ygnus,6,990,Capricorn
  780 DATA11,1000,Draco,7,1
010,Gemini,5,1020,Taurus,7,
1030,Orion,6,1040,Scorpio,9
,1050,Virgo,11,1060,Hercule
s,5,1070,Cassiopeia,12,1080
,Persius
  790 DATA3,1090,Libra,3,11
00,Pisces,2,1110,Aries,7,11
20,Eridanus,6,1130,Bootes,6
,1140,Auriga,4,1150,Canis,7
,1160,Hydra,6,1170,Serpens,
4,1180,Ophiuchus,4,1190,Can
cer,12,1200,Cetus
  800 VDU19;4;0;
  810 PRINTTAB(15,1)"STAR C
HART"TAB(15,2)"**********
  820 PRINT" This program w
ill draw stars which"'" are
 visible in the Northern"'"
 Hemisphere."'" You must e
nter the time on the 24 hr"
'" clock as Greenwich Mean
Time. If it"'" is British S
ummer Time subtract one"'"
hour to obtain G.M.T.";
  830 PRINT" You must also"
'" enter the month (1-12) a
nd the date     in that mon
th. After all stars are"'"
drawn a horizon is added. T
his has"'" north at the bot
tom, west at the"'" left an
d east at the right."
  840 PRINT'" A list of con
stellation names will"'" ap
pear at the right with a fl
ashing"'" star at the side.
 Press Return to see  that
```

→

Star Chart listing

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```
 constellation. Press Shift
 to      move the star down
wards."
  850 PRINTTAB(3,23)"PRESS
SPACE TO CONTINUE":REPEATUN
TILGET=32:CLS
  860 INPUT''''"What is the
 time to the nearest hour?
"time%
  870 INPUT''"What month is
 it ?"month%
  880 INPUT''"What date is
it ?"date%
  890 day%=(month%-1)*30+da
te%
  900 offset%=-(time%*15+da
y%+90)
  910 ENDPROC
  920 DATA90,286,94,284,88,
282,91,280,89,277,97,274,94
,273,95,270
  930 DATA20,161,24,161,25,
176,23,180,25,190,25,200,30
,204
  940 DATA0,0,3,270,7,255,1
2,246,9,241,14,230,12,222
  950 DATA35,29,40,16,42,0,
50,2,46,0,46,345,57,344
  960 DATA50,143,47,147,55,
149,58,150,50,152,52,152,52
,167,56,167,55,175
  970 DATA75,310,73,321,60,
329,70,333,73,342,79,342,83
,346,74,347,81,349
  980 DATA49,291,35,295,37,
303,42,310,35,309
  990 DATA70,302,80,303,80,
315,81,319,81,323,79,326
 1000 DATA20,209,23,220,21,
242,19,254,13,270,10,280,21
,280,25,267,29,260,26,260,2
9,260
 1010 DATA50,91,50,94,55,96
,40,90,51,107,43,111,47,113
 1020 DATA55,62,54,63,56,64
,53,64,56,66
 1030 DATA75,76,63,70,69,79
,70,82,70,84,62,86,74,86
 1040 DATA96,243,91,246,89,
245,80,243,84,240,86,230
 1050 DATA65,176,60,184,70,
189,63,192,59,195,72,196,75
,200,60,202,85,210
 1060 DATA32,242,54,244,34,
246,52,247,39,249,44,249,46
,253,40,256,50,257,40,260,4
7,264
 1070 DATA24,0,26,0,22,13,2
2,20,20,25
 1080 DATA26,45,37,47,30,49
,49,52,51,53,30,55,49,55,52
,55,50,56,37,50,44,50,51,50
 1090 DATA80,221,84,229,80,
232
 1100 DATA62,350,64,353,60,
353
 1110 DATA53,27,51,33
 1120 DATA80,50,75,53,74,56
,89,60,73,60,99,60,96,69
 1130 DATA53,213,30,216,45,
216,47,220,37,223,41,227
 1140 DATA43,72,36,75,32,76
,46,79,33,85,39,87
 1150 DATA82,94,80,99,60,10
9,64,113
 1160 DATA62,129,63,131,74,
139,76,150,92,172,86,199,90
,210
 1170 DATA50,235,64,235,54,
235,66,236,73,236,56,230
 1180 DATA62,253,50,256,59,
262,65,264
 1190 DATA57,122,50,127,44,
132,57,132
 1200 DATA75,3,82,10,74,16,
71,20,80,25,74,26,69,33,61,
37,60,30,65,39,60,40,64,45
```

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

More joy on Plus 1

Are you a Plus 1 owner who wants to expand the number of programs available to you? PAUL JOHNSON of Micro Power comes to your aid

AS the majority of commercial games programs for the Electron were written before the release of the Plus-1, many fail to use it to its full potential.

Most of these programs only work from the keyboard and don't take advantage of the joystick option.

Also, the effect of the Plus-1 can slow down the Electron, which has caused some loading difficulties in the past.

It was to help solve these problems that the program listed here – Joyplus – was written.

It has data for 20 out of the 23 Micro Power games that use joysticks and it can be used for other software houses' games as well.

The missing three MP games – Swag, Frenzy and Cybertron Mission – have had to be omitted owing to one or more of the following reasons:

- The game doesn't leave enough memory for the machine code.
- The game doesn't scan for a key using INKEY.
- The game already works with the Plus-1.

To use the program simply CHAIN it before loading the game you are about to use. That is, you enter:

CHAIN"JOYPLUS"

and press the Return key.

You'll then be presented with a menu consisting of 20 program titles. Simply type the number relating to the game you want to play.

The program will then set up the appropriate code within the machine and ask you to load the game in the normal way.

One other option presented along with the menu allows you to define your own keys for a game not listed in the menu.

To use this option type D followed by Return. You'll then be requested to enter a location for the machine code. If in doubt type in 110 followed by Return.

The next request for information relates to the way in which the program scans for a key. The most common method is using negative INKEY, so type N followed by Return.

You'll then be asked to type in the keys of your choice. If a key is not used, type in -, that is, a hyphen.

This ensures that the code will not scan for the unwanted movements on the joystick, saving memory and giving the program a better chance of working first time.

Should the options you have entered not work satisfactorily then you will have to re-load the conversion program and try alternative memory locations.

Failing this, type P instead of N as the method of scanning for a key. If, after all this, the game still does not work then it will probably not be compatible with the Plus-1.

When using games it is necessary to start as if you were about to play the game using the keyboard.

You will find that the keys have no effect and that the relevant movements now correspond to the joystick movements.

Some of the more recent Micro Power games ask you if you wish to use joysticks. This refers to switch type interfaces only, so answer no to this question and then the game will load as normal.

Any type of joystick, potentiometer or switch type, may be used providing that it is compatible with the Plus-1.

This is how the program works:

All games need input of some kind from the user. The most common way is to scan the keyboard using the INKEY command (equivalent to *FX129) or OSBYTE with A=&81.

When an INKEY command is executed the machine will automatically jump to a location in ROM.

The address is stored as two bytes in locations &20A and &20B.

If a new address is entered into these bytes it can point to the start of a piece of machine code in memory rather than a location in ROM.

Instead of scanning the keyboard for a keypress, this new code scans the joystick port for a reading.

When it's got a reading it is treated as if it were a key being pressed rather than the joystick being moved.

The program gets round the effect of the Plus-1 slowing the machine down by disabling the Plus-1 and reading the value of joystick directly from the operating system.

This leaves the Electron's speed unaltered.

Plus 1 listing

```
  10 REM        JOYPLUS
  20 REM Plus-1 Joystick C
onverter
  30 REM        Version II
  40 REM  Written by Paul
Johnson
  50 REM
  60 DIMneg(5),key(5),A$(5
),p(5)
  70 MODE1
  80 VDU19,0,4;0;23,208,25
5,129,129,129,129,129,129,2
55:PROCsetscreenup:FORJ%=1T
020:RESTORE(1530+(J%*10)):R
EADA$
  90 PRINTTAB(5,4+J%);J%;"
)":PRINTTAB(10,4+J%);A$;".
":NEXT
 100 PRINTTAB(5,26);"D to
define keys."
 110 INPUTTAB(5,28);"Pleas
e choose 1-20 ",A$
 120 IFA$="D"THENPROCdefin
e:GOTO200
 130 IFVAL(A$)<1ORVAL(A$)>
20THENVDU7:GOTO110
 140 RESTORE(1530+(VAL(A$)
*10)):READA$
 150 FORI%=1TO5
 160 READkey(I%),neg(I%)
 170 NEXT
 180 READaddress
 190
 200  REM **** Disable Plu
s-1 ****
```

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```
  210
  220 ?&212=&D6
  230 ?&213=&F1
  240 ?&2AC=0
  250
  260  REM **** Main loop *
***
  270
  280 MODE4
  290 FORIZ=0TO2STEP2
  300 b1=key(1):b2=key(2):b
3=key(3):b4=key(4):b5=key(5
)
  310 PROCinitiate(neg(1),n
eg(2),neg(3),neg(4),neg(5),
key(1),key(2),key(3),key(4)
,key(5))
  320 PROCcheckjoystick
  330 NEXTIZ
  340
  350  REM ** Re-Point wher
e OSBYTE is **
   ** indirected. **
  360
  370 ?&20A=START MOD256:?&
20B=START DIV256
  380 VDU19,1,2;0;:IF A$=""
THEN 390 ELSE PROCdouble(A$
+":-",0,2)
  390 PROCdouble("Now load
the game as normal.",0,5):P
RINT':END
  400
  410
  420
  430
  440 DEFPROCinitiate(A1,B1
,C1,D1,E1,A,B,C,D,E)
  450 IFaddress=110THENPZ=&
151 ELSEPZ=EVAL("&"+STR$(ad
dress))
  460 ordinary=?&20A+(?&20B
*256)
  470
  480 START=PZ
  490 [OPT IZ:.START:CMP#&8
1:BNE continue:TXA:PHA:.xx1
:JMP NEG:.continue:JMP ordi
nary:.NEG:]
  500 IFA1<>255THEN[OPT IZ:
CPX#&100-A1:BNE N1:JSR u:JM
P negpos:.N1:]
  510 [OPT IZ:.OD2:]:IFb2<>
255THEN[OPT IZ:JSR u:CMP#&F
F:BEQ cheker:]
  520 IFB1<>255THEN[OPT IZ:
CPX#&100-B1:BNE N2:JSR r:JM
P negpos:.N2:]
  530 [OPT IZ:.OD1:]:IFb3<>
255THEN[OPT IZ:JSR r:CMP#&F
F:BEQ cheker:]
  540 IFC1<>255THEN[OPT IZ:
CPX#&100-C1:BNE N3:JSR d:JM
P negpos:.N3:]
  550 [OPT IZ:.OD3:]:IFb1<>
255THEN[OPT IZ:JSR d:CMP#&F
F:BEQ cheker:]
  560 IFD1<>255THEN[OPT IZ:
CPX#&100-D1:BNE N4:JSR l:JM
P negpos:.N4:]
  570 [OPT IZ:.OD:]:IFb4<>2
55THEN[OPT IZ:JSR l:CMP#&FF
:BEQ cheker:]
  580 IFE1<>255THEN[OPT IZ:
CPX#&100-E1:BNE N5:JSR fire
:JMP negpos:.N5:]
  590 IFb5<>255THEN[OPT IZ:
JSR fire:CMP#&FF:BNE OOF:LD
Y#0:CLC:JMP OD4:.OOF:JMP no
rmal:]
  600 [OPT IZ:JMP normal:.c
heker:JMP OD4:]:IFaddress=1
10THENPZ=&7F0
  610 [OPT IZ:.negative:LDX
#0:LDY#0:.Jxx1:PLA:LDA#&81:
RTS:.positive:LDY#&FF:LDX#&
FF:BNE Jxx1
  620 .negpos:CMP#0:BEQ neg
ative:BNE positive:]
  630 ENDPROC
  640
  650
  660
  670
  680 DEFPROCcheckjoystick
  690 IFaddress=110THENPZ=&
380
  700 [OPT IZ
  710 .fire:LDX#b5:LDA&FC72
:AND#16:CMP#0:BNE OO:BEQ FF
  720 .r:LDA#4:JSR calcjoys
tik:LDX#b2:CMP#85:BCS OO:BC
C FF
  730 .l:LDA#4:JSR calcjoys
tik:LDX#b4:CMP#170:BCC OO
  740 .FF:LDA#&FF:RTS:.OO:L
DA#0:RTS
  750 ]:IFaddress=110THENPZ
=&880
  760 [OPT IZ
  770 .d:LDA#5:JSR calcjoys
tik:LDX#b3:CMP#85:BCS OO1:B
CC FF1
  780 .u:LDA#5:JSR calcjoys
tik:LDX#b1:CMP#170:BCC OO1:
BCS FF1
  790 .calcjoystik:STA&FC70
:.L:LDA&FC72:AND#64:BNE L:L
DA&FC70:RTS
  800 .FF1:LDA#&FF:RTS:.OO1
:LDA#0:RTS
  810 ]:IFaddress=110THENPZ
=&120
  820 [OPT IZ:.normal:PLA:T
AX:LDA#&81:JMP ordinary:.OD
4:LDY#0:CLC:PLA:RTS:]
  830 ENDPROC
  840
  850
  860
  870
  880 DEFPROCsetscreenup
  890 CLS:COLOUR2:PROCdoubl
e("Electron User",13,2):COL
OUR1:COLOUR130:FORIZ=0TO39:
VDU31,IZ,0,200,31,IZ,30,200
:NEXT:FORIZ=0TO30:VDU31,0,I
Z,200,31,39,IZ,200:NEXT:COL
OUR128:COLOUR3:ENDPROC
  900
  910
  920 DEFPROCdouble(A$,X,Y)
  930 FORIZ=1TOLEN(A$):AZ=&
A:XZ=0:YZ=&2F:?&2F00=ASC(MI
D$(A$,IZ,1)):CALL&FFF1:VDU2
3,224,?&2F01,?&2F01,?&2F02,
?&2F02,?&2F03,?&2F03,?&2F04
,?&2F04,23,225,?&2F05,?&2F0
5,?&2F06,?&2F06,?&2F07,?&2F
07,?&2F08,?&2F08:PRINTTAB((
X+IZ)-1,Y);CHR$224
  940 PRINTTAB((X+IZ)-1,Y+1
);CHR$225:NEXT:ENDPROC
  950
  960
  970 DEFPROCdefine
  980 CLS:PROCsetscreenup
  990 INPUTTAB(5,7);"Type i
n where to locate the code"
;TAB(8,9);"(i.e. 110,900,55
00)",address
 1000 INPUTTAB(5,12);"Does
the program scan for a key"
;TAB(7,14);"using -ve INKEY
 or ordinary";TAB(15,16);"I
NKEY (N,P)",I$:IFI$<>"N"AND
I$<>"P"THEN1000
 1010 GOSUB1100
 1020 IFI$="N"THENFORIZ=1TO
5:neg(IZ)=p(IZ):key(IZ)=255
:NEXT
 1030 IFI$="P"THENFORIZ=1TO
5:neg(IZ)=255:key(IZ)=p(IZ)
:NEXT
 1040 A$=""
 1050 ENDPROC
 1060
 1070
 1080
 1090
 1100 IFI$="N"THENPROCnegin
key
 1110 IFI$="P"THENPROCnorak
ey
 1120 RETURN
 1130
 1140
 1150
 1160 DEFPROCneginkey
 1170 PROCsetscreenup
 1180 RESTORE1260:PRINTTAB(
2,7);"Define your keys:-":F
ORIZ=1TO5:READA$(IZ):NEXT:F
ORJZ=1TO5:PRINTTAB(2,8+(JZ+
2));"Press the key to use f
or ";A$(JZ);TAB(31);:FORIZ=
1TO1000:NEXT
 1190 FORIZ=-1TO-122STEP-1
 1200 IFINKEYIZTHENAZ=IZ:IZ
=-122:NEXT:GOTO1220
 1210 NEXT:GOTO1190
 1220 p(JZ)=-(AZ):RESTORE12
70:FORIZ=1TO-(AZ):READAA$:N
EXT:IFAA$=""THEN1190ELSEPRI
NTAA$:IFAA$="-"THENp(JZ)=25
5
 1230 NEXT
 1240 *FX15,1
 1250 PRINTTAB(6,25);"Are t
hese keys correct (Y/N)?":A
$=GET$:IFA$="N"THEN1170
 1260 DATA Up,Right,Down,Le
ft,Fire
 1270 DATA Shft,Ctrl,,,,,,,
,,,,,,,
 1280 DATA @,3,4,5,f4,8,f7,
-,^,Left
 1290 DATA ,,,,,,f0,W,E,T,7
,I,9,0
 1300 DATA _,Down,,,,,,,[
 1310 DATA 2,D,R,6,U,O,P,[,
Up
 1320 DATA ,,,,,,Caps,A,X,F
,Y
 1330 DATA J,K,@,:,Ret,,,,,
 1340 DATA ,Lock,S,C,G,H,N,
L,;,]
 1350 DATA Del,,,,,,,Tab,Z,
```

```
Spce
 1360 DATA V,B,M,',.,/,Copy
,,,
 1370 DATA ,,,Escape,f1,f2,
f3,f5,f6,f8
 1380 DATA f9,\,rght,
 1390 ENDPROC
 1400
 1410
 1420
 1430 DEFPROCnormkey
 1440 PROCsetscreenup
 1450 RESTORE1490:PRINTTAB(
2,7);"Define your keys:-":F
ORI%=1TO5:READA$(I%):NEXT:F
ORJ%=1TO5:PRINTTAB(2,8+(J%*
2));"Press the key to use f
or ";A$(J%);TAB(31);:FORI%=
1TO1000:NEXT
 1460 A$=GET$:PRINTA$:IFA$=
"-"THENp(J%)=255:NEXTELSEp(
J%)=ASC(A$):NEXT
 1470 *FX15,1
 1480 PRINTTAB(6,25);"Are t
hese keys correct (Y/N)?":A
$=GET$:IFA$="N"THEN1440
 1490 DATA Up,Right,Down,Le
ft,Fire
 1500 ENDPROC
 1510
 1520  REM **** Data for ga
mes ****
 1530
 1540 DATA "Bandits at 3 O'
clock",255,66,255,255,255,9
8,255,255,255,67,110
 1550 DATA "Bumble Bee",255
,73,255,67,255,105,255,98,2
55,255,110
 1560 DATA "Croaker",65,255
,77,255,90,255,78,255,255,2
55,900
 1570 DATA "Danger UXB",255
,73,255,67,255,105,255,98,2
55,255,110
 1580 DATA "Electron Invade
rs",255,255,255,67,255,255,
255,98,255,1,110
 1590 DATA "Escape from Moo
nbase Alpha",255,73,255,67,
255,105,255,98,255,56,110
 1600 DATA "Felix and the E
vil Weevils",255,73,255,67,
255,105,255,98,255,74,110
 1610 DATA "Felix and the F
ruit Monsters",255,66,255,4
2,255,98,255,56,255,58,900
 1620 DATA "Felix in the Fa
ctory",255,66,255,42,255,98
,255,56,255,58,900
 1630 DATA "Galactic Comman
der",255,255,255,51,255,255
,255,66,255,74,110
 1640 DATA "Gauntlet",255,6
6,255,1,255,98,255,99,255,7
4,900
 1650 DATA "Ghouls",255,255
,255,67,255,255,255,98,255,
74,110
 1660 DATA "Jet Power Jack"
,255,255,255,66,255,255,255
,2,255,74,900
 1670 DATA "Killer Gorilla"
,255,73,255,67,255,105,255,
98,13,255,900
 1680 DATA "Moonraider",255
,82,255,104,255,67,255,103,
255,66,110
 1690 DATA "Positron",255,2
55,255,66,255,255,255,2,13,
255,2900
 1700 DATA "Rubble Trouble"
,255,73,255,67,255,105,255,
98,255,74,5500
 1710 DATA "Stock Car",255,
17,255,67,255,66,255,98,255
,255,110
 1720 DATA "Swoop",255,255,
255,67,255,255,255,98,255,1
,110
 1730 DATA "The Mine",255,7
3,255,67,255,105,255,98,255
,74,110
```

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

Now No. 1 BBC game on Micro Deal Top Fifty chart

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Micro Messages

Don't knock Elite and the Electron

I REALLY must complain about D. Fiveash's letter in the February issue which warns of the Electron Elite.

Firstly, how can anybody expect a computer such as the Electron to have the same capabilities as a computer twice its price, such as the BBC B?

This point has annoyed me constantly. Why can't people, magazines mainly, see that the Electron is a computer, not a cut down BBC B?

Secondly, the Electron version of Elite is magnificent, addictive, including fantastic 3D graphics which would only be expected on a machine with a much larger memory.

No colour is needed, and actually makes the control panel easier to read – which is the only part coloured on the BBC B version anyway.

I don't have flashing on my version and there still is a lot of ships considering the 3-dimensional effects which are unreal.

As to the faulty hyper-drive, Acornsoft will replace old copies for the new one without the bug, as reported in the news section of the February issue.

Even so, the one galaxy available because of the bug is so large, with so many planets, that another galaxy is not really necessary anyway.

Elite is the best graphic/arcade/adventure game available on the Electron, and probably all other home computers (apart from the Beeb, of course). Worth every penny. – **Mark Turner, Melton, North Humberside.**

● You don't happen to have a relation at Acornsoft, do you?

Super battle in space

I FELT I must write to congratulate you on your excellent listing of Space Battle in January's edition of Electron User and feel that this game, used in conjunction with "Plus I" and joystick is as good if not better than many commercially available tapes.

So please let's have more listings compatible with Plus I and if possible a listing to enable joystick control of some of your programs from earlier editions.

I feel longer listings are worth all the late nights or early mornings if the end result is as good as Space Battle. For people who dislike typing in long listings your monthly cassette offer must represent excellent value for money.

Keep up the good work – **B. Matthews, Wrexham.**

Loading snag solved

I BELIEVE I have found a solution to Roland Waddilove's problem of not being able to load programs in Modes 1 and 2 with the Plus 1 fitted, without turning off the joystick option.

*The solution is to generate a *FX16,4 call after the program is loaded and running, by using an interrupt:*

```
   5 ?&220=0:?&221=9:*FX14
,2
  10 FOR I% = 0 TO 3 STEP
3
  20 P%=&900
  30 [
  40 OPT I%
  50 CLD
  60 PHA:TXA
  70 PHA:TYA:PHA:PHP
  80 CMP #74
  90 BNE end
 100 LDA #16:LDX #4:LDY #0
:JSR &FFF4 \*FX16,4
 110 .end PLP:PLA:TAY:PLA:
TAX:PLA
 120 RTS
 130 ]
 140 NEXT
 150 PRINT"Press 'J' after
 program loaded and running
":*FX16,0
 160 CHAIN""
```

Line 5 of the program changes the interrupt vector and enables the 'key pressed' event.

This program should be run before chaining the software. The J key must be pressed to enable the joysticks after the software has been chained. – **Sandesh Alavani, Harrow, Middx.**

Shifty tactics

IN your February edition somone asked how to beat the long jump in Micro Olympics.

I've found if Return, Delete and Shift are depressed when the computer is running, his motion is stopped.

So if you press then depress in quick succession (so the motion is almost frame by frame) then stop doing this when he is near the line he only jumps 3 or 4 metres, so you can beat him. It works great – **Alan Berry, Alexandria, Scotland.**

● Cheats never prosper! Having said that, any other tips?

Translating for the Silver Reeds

REFERRING to the letter from J. Platt regarding the Silver Reed printer EXP500 (Electron User, January 1985), I experienced similar difficulties for the first few days after my recent purchase but after some experiment I have overcome the problems.

Having put the printer in serial mode the sample basic programs in the printer manual (page 18 to 21) require "translation".

I found that substituting the character commands with VDU commands not only worked but were easier to write (reference to the top of page 265 of the User Guide will help Mr Platt).

It is important to precede the VDU codes in the range 0 to 31 by VDU 1 as described at the bottom of page 14 of the Plus 1 guide. Failure to do this will result in odd printouts.

I have enclosed a sample translation of one of the programs in the printer manual (No.7 – bold face print). So far I have not run into any other problems with the printer and the print quality is superb. – **David H. Piper, Watford, Herts.**

● Many thanks for your letter, Mr Piper.

```
 10 VDU2
 20 VDU1,27,1,13,88;
 30 PRINT"SAMPLE OF ";
 40 A$="BOLDFACE"
 50 FOR N= 1 TO LEN(A$)
 55 FOR M= 1TO 3
 60 VDU1,27,1,31,1,2;
 70 PRINT MID$(A$,N,1);
 75 NEXT M
 80 VDU1,27,1,31,1,12;
 90 PRINT MID$(A$,N,1);
100 NEXT
110 VDU3
120 END
```

Joystick conversion

FOR all those who are sensitive about their Electron's keyboard, here's a joystick conversion program that allows you to use joysticks via a First Byte interface with Micro Olympics. – **C. Dunkley, Nottingham.**

● Thanks for the listing. The guys who wrote the program feel that it makes things a little too easy.

They also point out that there's no such thing as a standard joystick, so the game will vary in difficulty from player to player.

```
  10 MODE6
  20 REM
  30 REM 'MICRO OLYMPICS'-
'FIRST BYTES JOYSTICK' conv
erter.
  40 REM by C.Dunkley
  50
  60 FORN=0TO1
  70 P%=&110
  80 [OPT0:PHA:TYA:PHA:TXA
:PHA
  90 LDA&FCC0
 100      CMP#123:BNEn1:LDY
#49:JMPnn
 110 .n1 CMP#119:BNEnr:LDY
#50:JMPnn
 120 .nr CMP#111:BNEnd:LDY
#51
 130 .nn LDX#0:LDA#138:JSR
&FFF4
 140 .nd PLA:TAX:PLA:TAY:P
LA:RTS:]
 150 NEXT
 160
 170 REM If 'BREAK' is pre
ssed lines 170 & 180 will h
ave to be re-entered,
 180 REMin order to re-ini
tialise the convertion rout
ine.
 190
 200 ?&220=&10:?&221=&01
 210 *fx14 4
 220 STOP
```

My choice

HERE's my list of BBC software which works on the Electron:

Frogger (A&F), Dare Devil (Denis-Vision), Meteors (Acorn Soft), Cybertron Mission (Micropower), Moonraider (Micropower) and Cowboy Shootout (Micropower).

All these games need no alterations to run successfully on the Electron. – **Glen Morgan, Midhurst, Surrey.**

. . . and mine

I AM writing to tell other Electron users of games for the BBC Micro which run on the Electron.

Versions of Dare Devil Dennis, Vortex, 3D Bomb Alley, Arcadians, Planes, Croaker, Aviator, Database, Birdie Barrage, Snooker, Danger UXB, Overdrive and Felix in the Factory all work.

They are all slower and the sound is not as good but they are playable.

Does anyone know of any Electron user groups in Bristol? I would like to boast some of my high scores on some popular games. They are as follows:

Positron 405,385
Overdrive 22,485
Mr Whiz 5,028
Cylon Attack 2,028
Guardian 59,528

You may not believe the score on Positron but it is true – well almost because I have a Power Software joystick interface and have redefined the fire key on method 2 which makes it rapid fire. – **J.A. Gooding, Filton Park, Bristol.**

Base error

CAN I point out that there are a number of errors in the Base program of February's Electron User. I should know, because I wrote it.

Wherever there should be an OSCLI statement such as OSCLI "FX15" this is printed as "FX15" without the OSCLI. This may possibly be because you printed the program from a BBC with Basic I. – **Mark Fenton, Bury.**

● You're right, Mark, the OCLIs are missing from the listing. We must have used a Basic I BBC, but for the life of us we can't remember how or why.

Our apologies. The correct lines are given below:

```
 490PROCdbl("NUMBER ?",1,V
POS+2,1):OSCLI"FX15":INPUTL
INE""A$
 850CLS:PROCdbl("Decimal T
o Hexadecimal",1,1,1):PROCd
bl("NUMBER ?",1,4,1):OSCLI"
FX15":INPUTLINE""A$
 910CLS:PROCdbl("Decimal T
o Binary",1,1,1):SUM=0:PROC
dbl("NUMBER ?",1,4,1):OSCLI
"FX15":INPUTLINE""A$
1070CLS:PROCdbl("Hexadecim
al To Decimal",1,1,1):PROCd
bl("HEX NUMBER WITH '&' ?",
1,3,1):OSCLI"FX15":INPUTLIN
E""A$
1130CLS:PROCdbl("Hexadecim
al To Binary",1,1,1):PROCdb
l("HEX NUMBER WITH '&' ?",1
,3,1):OSCLI"FX15":INPUTLINE
""A$
```

Interesting effects

BECAUSE of the lack of the 6845 video controller on the Electron, it is impossible to use hardware scrolling.

Despite this, something must be doing the job. I wondered if there are any VDU 23 commands or memory locations which can be used to produce interesting effects, as described in the BBC Advanced User Guide.

I have only managed to turn the cursor on or off but not alter the height or Hash rate. Could you give me any details on this subject?

Also I would be interested to know why the Electron slows down as the size of a Basic program increases. – **S. Roberts, Wolverhampton.**

Acorn's answer

I WROTE to Acorn before Christmas about the Plus-1 I purchased and its incompatibility with existing software on the market.

If it was not for Electron User I would have kept having to remove my Plus-1 when certain games were loaded.

Anyway they sent me a short program, different to the one you published, which can be saved and loaded before these games.

```
 10 *FX163,128,1
 20 A%=&AA:X%=&00:Y%=&FF
 30 !&80=USR&FFF4:A%=&81
    :A%?12=0
```

I would also like to say I agree with D. Fivearch of Tolsworth, Surrey about his comments on Elite which on the Electron with the same 32k memory as the BBC B is far inferior.

There is no colour, the planets look like a 50 pence piece and the most upsetting of all no Thargoids.

The game is also rather difficult because of lack of the joystick option that is offered on the BBC.

No galactic hyperdrive means that the game is only an eighth of the size it should be. Let's hope Acorn listens to our comments. After all we are the people who buy the software and hardware. – **D.M. Bell, Manchester.**

With evil intent . . .

PAGE 6 of Acorn's Electron User Guide says: "Then press any keys you like on the keyboard – as many as you like – you cannot damage the computer whatever you press!"

As some unfortunate user will have found accidentally this is wrong. Type in the

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

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

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

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

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

following program, and just before you run it be ready to press Esc.

```
10 *MOTOR 1
20 *MOTOR 0
30 GOTO 10
```

I'm sure many are glad to have been near Esc – the horrible noise is the cassette filing system's motor control switch bashing on and off very quickly.

Clearly a violent action in such a delicate piece of equipment. There must be some other instances of harmless commands pressed in that are supposedly safe, but will not "damage the computer whatever you press!" – **James Barclay, Doncaster, S. Yorks.**

● In point of fact what the guide talks about is pressing any key, not typing in a diabolically designed program. Anyway, it's the cassette that would suffer, not the computer itself!

Only two Pluses

IN the news section of your February edition of Electron User it shows a picture and a write up of the Plus 3.

Does this interface fit around the Plus 1 so you can have both printer and disc interface? Also is there such a thing as the Plus 2 interface? – **Ian Arrowsmith, Brentwood, Essex.**

● The Plus 3 comes between the Plus 1 and the Electron, so you can still use the printer. If there is a Plus 2 on the way we haven't heard of it.

Right on the ball

I HAVE recently purchased an Electron and I have one question to ask – "where are all the peripherals?"

How on earth do Acorn expect the Electron to keep up with competition – Sinclair and Commodore – when there isn't a disc drive, modem or even speech synthesiser for the Electron?

I have seen the Electron Plus 1 and would like to think that this is a sign of things to come. – **Jo Castle, Nuneaton, Warks.**

● Where have you been Jo? There is a disc drive (the Plus 3), and there's going to be an RS232 to allow modems to be used. You'd be better off asking when the Sinclair and Commodores are going to have a built-in assembler or structured Basic.

Wasted hours

AS a relative newcomer to programming I am actively trying to absorb as much as I can in the limited spare time that I have available.

This often means working into the early hours of the morning on my son's Electron – it's the only time he will let me on it!

I have been using your listings to improve my input skills and to try and learn something of how the programs work.

However my success rate in getting them to run is fairly low. This often leads to complete frustration around 2 o'clock in the morning because of some error message that I cannot untangle.

My youngest son would very much like to play the Farmyard Fun game listed on pages 33/56 of the February issue of Electron User, but I have come to a grinding halt with an error message informing me of a missing) at line 470.

I have checked the typing and that looks OK, and not knowing what the longer instruction means, I cannot fathom it logically.

I have tried inserting brackets on a less scientific basis, but that has not helped.

I know that typing errors on your part do creep in from time to time, and I wonder if this is the cause. Can you help please?

If this is the case, then I am going to be very reluctant to spend hours typing in listings in future in view of the risk of having to abort due to a typing error that I cannot resolve.

Could you not publish directly from a printer output, instead of re-typing? – **J.L. Young, Billericay, Essex.**

● First of all Mr Young, our listings **are** taken directly from a printer output and have been since the magazine was first published.

Having said that we know that it's very frustrating when a listing doesn't work but it's nearly always caused by a typing error. On the (touch wood) rare occasions when there is a listing error you'll find the amendments in Micro Messages.

Top scores

AFTER reading about the Killer Gorilla high-score I set about beating it. No chance!

So taking out the flagship of my software collection Cyberton Mission by Program Power, I decided to try and achieve a good enough score to warrant tearing myself away from my Electron and writing to you, and at last I think I've done it.

Can anyone beat 29,570 – that's on the fourth level – also I have managed to clear 2.41 metres on the high jump in Micro Olympics. I have beaten the runner in the 100m by a clear second.

Other hopefully notable achievements include 5,060 on Swoop (P.P.) and 11,520 on Croaker (P.P.). So how about a Hall of Fame just for Electron users? – **Andrew Clark, Farnborough, Hants.**

No conversions

COULD you tell me if there is such a thing as a Spectrum to Electron converter with which you can run Spectrum software on the Electron. – **Richard Ousey, Leicester.**

● It's a nice idea but alas the answer is – no. There are enough problems converting BBC Micro programs to run on the Electron!

User port information

COULD you find it in your hearts to print an article on machine code, and also what about following The Micro User's example and putting on a bodybuilding course?

That brings me to my question. I want to build a robot to plug into the back of my Electron, but know nothing about the user port except it has an 18 volt power supply. Any information would be welcome. – **Scott Mitchell, Glasgow.**

● We are told that Acorn Customer Services can supply an application sheet on the Electron expansion socket.

The best way at the moment would seem to be to use a Plus 1 interface and plug into the ROM expansion sockets. Commercial devices will be available to do this.

Rotating circle

I HAVE been searching high and low in books and magazines for a program in which a large circle will rotate.

Please can any genius out there work out a program to help me? – **Mark Frost, Weston-Super-Mare.**

● We are not sure exactly what you mean, but have little doubt that either Allen Plume's second animation article in February's *Electron User* or Roland Waddilove's Polygram in this issue will solve your problem.

Confusion reigns

I SWITCHED my Electron on and was about to write a program. I typed OLD and pressed Return. I then typed 10 MODE 2 and pressed Return.

The cursor went to the next line but there was no "More Than" sign. I pressed Escape and nothing happened. I then pressed all the other keys and the only one that did anything was Break.

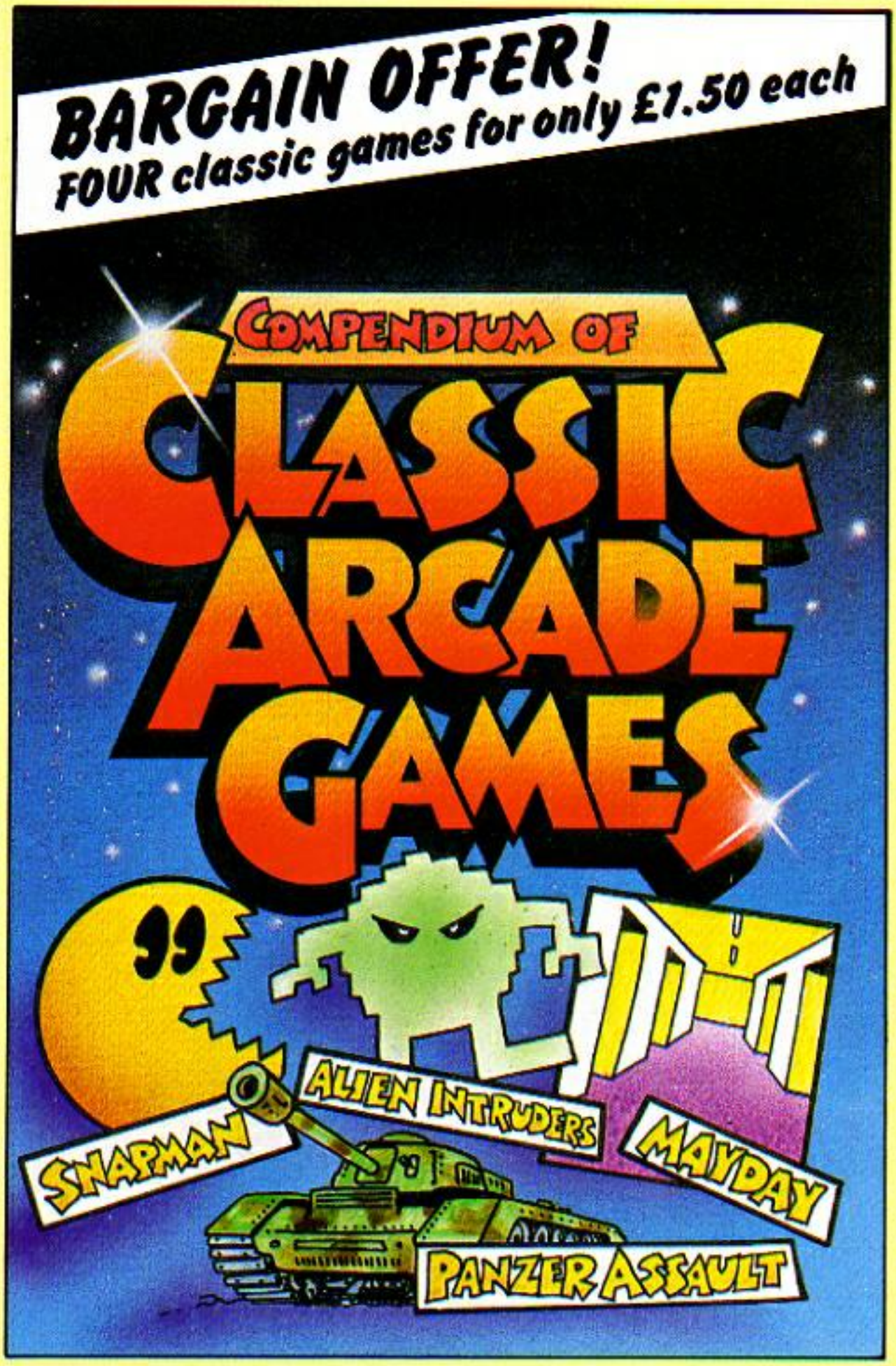
Why did the computer do this? – **Richard Taylor, Crowborough, East Sussex.**

● We suspect that after OLD you got a "Bad program" message that you haven't told us about.

What's happened is that you've confused the poor beast. You've said that there was a program in it but there isn't. Try NEW between OLD and 10 MODE 2 and you'll find things are OK.

Here's something SPECIAL from

electron user



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On the February 1984 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.

On the March 1984 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 April 1984 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 May 1984 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.

On the June 1984 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 July 1984 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 August 1984 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.

On the September 1984 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.

On the October 1984 tape:
BREAKFREE Classic arcade action. **ALPHASWAP** A logic game to strain your brain. **SOUND GENERATOR** Tame the Electron's sound channels. **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 November 1984 tape:
STAR FIGHTER Anti-alien missions. **SCROLLER** Wrap around machine code. **URBAN SPRAWL** Environmental action game. **SPELL** Alphabetic education. **JUMPER** Level headed action. **CAESAR** Code breaking broken. **KEYBOARD** Typing game.

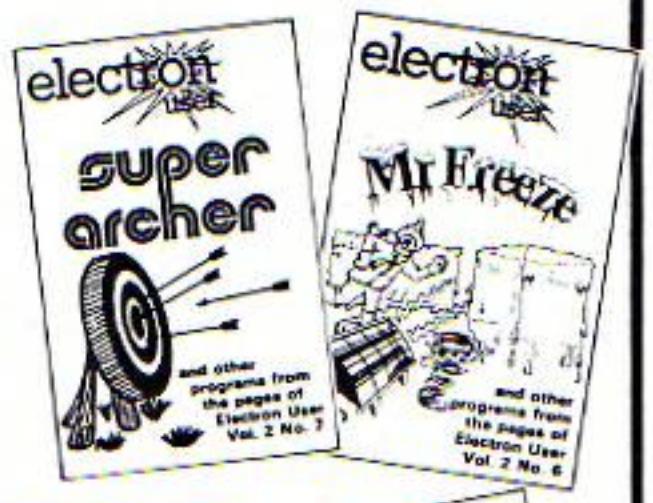
On the December 1984 tape:
CHRISTMAS BOX Align the presents logically. **SILLY SANTA** Sort out the muddle. **SNAP** Match the Xmas pictures. **RECOVERY** The Bad Program message tamed. **CAROL** Interrupt driven music. **AUTODATA** A program that grows and grows. **NOTEBOOK** Simple string handling.

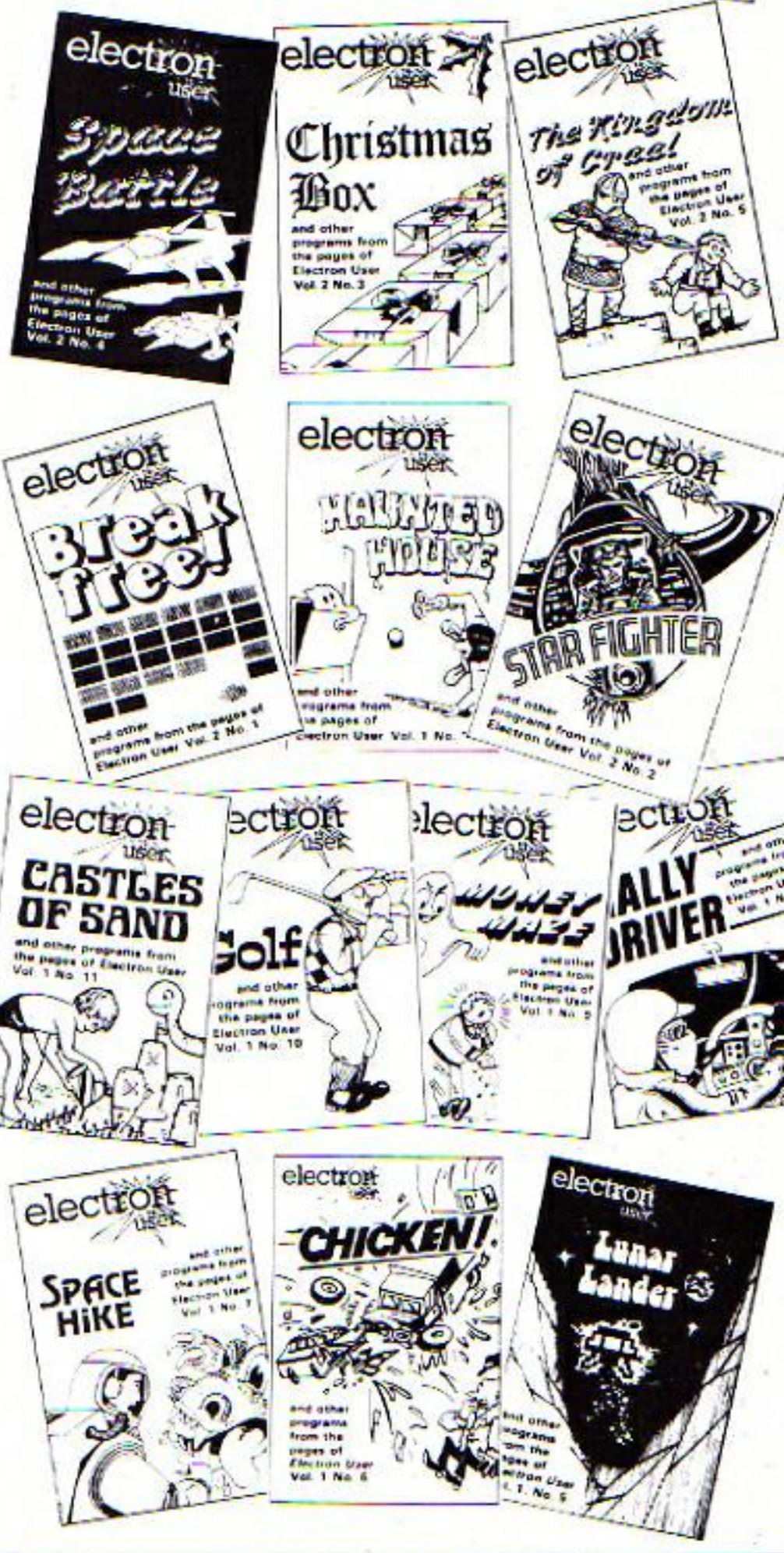
On the January 1985 tape:
SPACE BATTLE Destroy the deadly descending aliens! **NEW YEAR** A sound and graphics greeting. **ESCAPE FROM SCARGOV** Minefield action. **PIE CHART** Statistics made simple. **CLAYPIGEON** An Electron birdshoot. **ORGAN** Music maestro please! **NOTEBOOK** An original program. **RANDOM NUMBERS** Or not so random! **SNAKES** Reptilean arcade action. **CHEESE RACE** Beat rival mice.

On the February 1985 tape:
CRAAL The mystifying maze adventure. **BOUNCY** Addictively annoying action. **PAIRS** Can you remember the cards? **BASE** A binary/hexadecimal conversion utility. **CATCHER** Collect the eggs before they break. **CLOCK** Time-keeping utility. **RACER** Grand Prix action. **NOTEBOOK** Graphics windows. **TRIG** All the right angles.

On the March 1985 tape:
MR. FREEZE Ice cube arcade action. **SCREENDUMP** Two procedures for printer dumps. **FILLER** The machine code fill routine. **FRED'S WORD GAME** Educational fun. **BIG LETTERS** Large text utility. **PERCY** Beat the burning fuse. **ANIMATION** Two example programs. **PIGS** Flying bacon. **NOTEBOOK** Display formatting.

On the April 1985 tape:
SUPER ARCHER Target practice. **BINARY SEARCH** Search data efficiently. **JOYPLUS** Switched joystick routine. **ODD ONE OUT** Educational fun. **POLYGONS** 3D rotation. **MONEY CRAZY** Arcade action. **STARCHART** The night sky. **FORTUNE TELLER** Horoscope. **COLLISION DETECTION** Alien encounters. **HILO** Guessing game. **NOTEBOOK** Hello to assembler.





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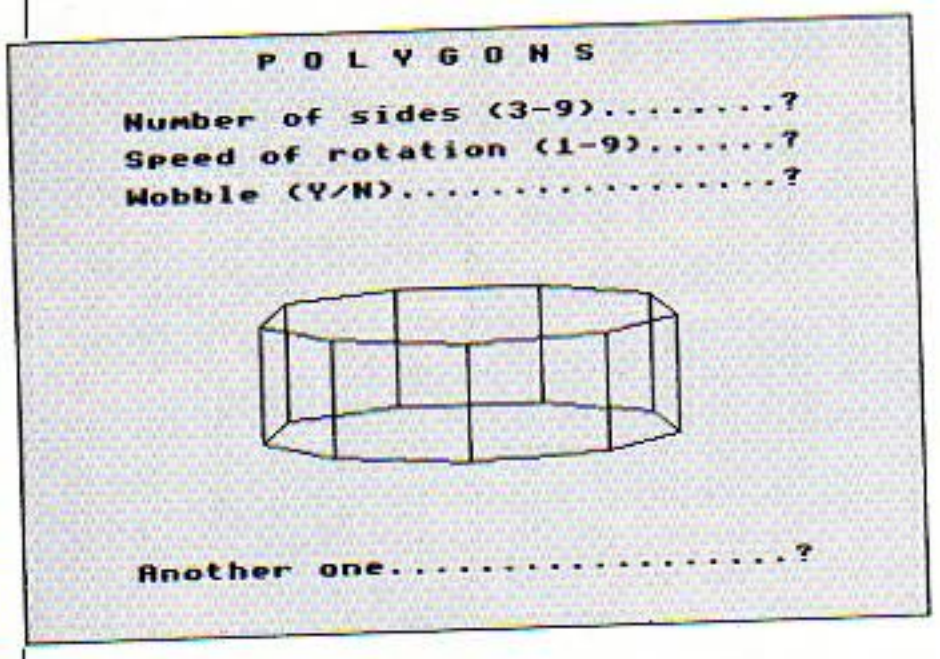

Give your graphics the poly-wobbles

Making a polygon wobble by ROLAND WADDILOVE

HAVE you seen the spinning, tumbling spaceship in Acornsoft's Elite when the program has loaded? Amazing isn't it?

It was this that inspired me to write Polygons, a short program that can spin and wobble any regular solid polygon.

It's not a patch on the routine that Elite authors David Bell and Ian Braben have written, but for simple polygons is actually faster.

The program, although it may look very complicated, is actually quite simple and is based on an ellipse.

A cube when viewed end on looks like a square as the other five sides cannot be seen.

If you now rotate the cube the four corners will describe a circular path, see Figure I. In fact a circle can be drawn through the corners of any regular polygon.

Now try to imagine a circle at an angle – it will appear to be an ellipse. Draw a circle on a piece of paper and tilt it and you will see what I mean.

The four corners of the top face of the cube when rotated now travel an elliptical path, as in Figure II.

So to draw a 3D perspective view of a cube all that is necessary is to pick four equidistant points on the circumference of one ellipse for the top face, and join them to four identical points on another ellipse for the bottom.

Thinking back to my school days, I dimly recalled that any point x, y on the circumference of an ellipse can be calculated using a bit of trigonometry, see Figure III.

I'll call the length of the major axis major, and the minor axis minor.

The equations are:

x=major*COS (theta)
y=minor*SIN (theta)

Program I plots every point for theta=0 to 360 degrees.

If you try it you will find that it is tucked away in the bottom left hand corner of the screen and only one quarter is visible. This is because it is drawn around the origin 0,0.

We need it in the centre of the screen so either the origin could be moved using VDU 29 or a constant could be added to the x and y coordinates.

Program II uses this second method to place the ellipse at 640,600.

By altering the two constants in lines 50 and 60 the ellipse can be placed anywhere on the screen.

See for yourself. Just edit 50 and 60, replacing the two constants 640 and 600 with your own values.

As you have probably noticed, plotting every point is painfully slow.

Don't worry. As we progress it will get faster.

Program III draws the same ellipse but using DRAW rather than PLOT.

It is necessary to move to

```
  10 REM PROGRAM I
  20 MODE 4
  30 major=200:minor=50
  40 FOR theta=0 TO 360
  50 x=major*COS(RAD(theta
))
  60 y=minor*SIN(RAD(theta
))
  70 PLOT 69,x,y
  80 NEXT
```

Program I

```
  10 REM PROGRAM II
  20 MODE 4
  30 major=200:minor=50
  40 FOR theta=0 TO 360
  50 x=640+major*COS(RAD(t
heta))
  60 y=600+minor*SIN(RAD(t
heta))
  70 PLOT 69,x,y
  80 NEXT
```

Program II

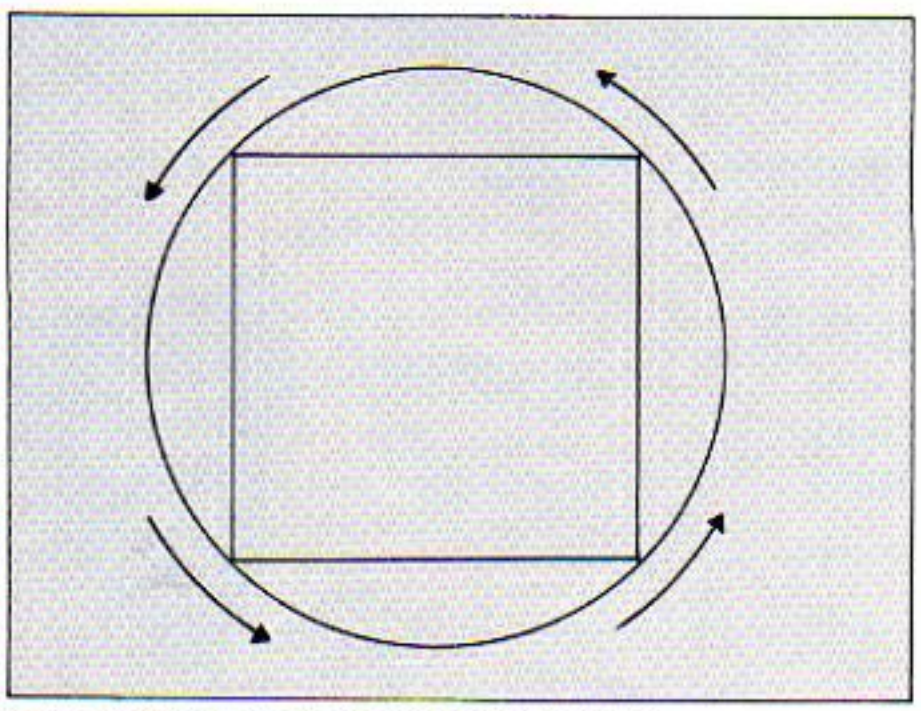

Figure I: Circular path of a cube's far corners

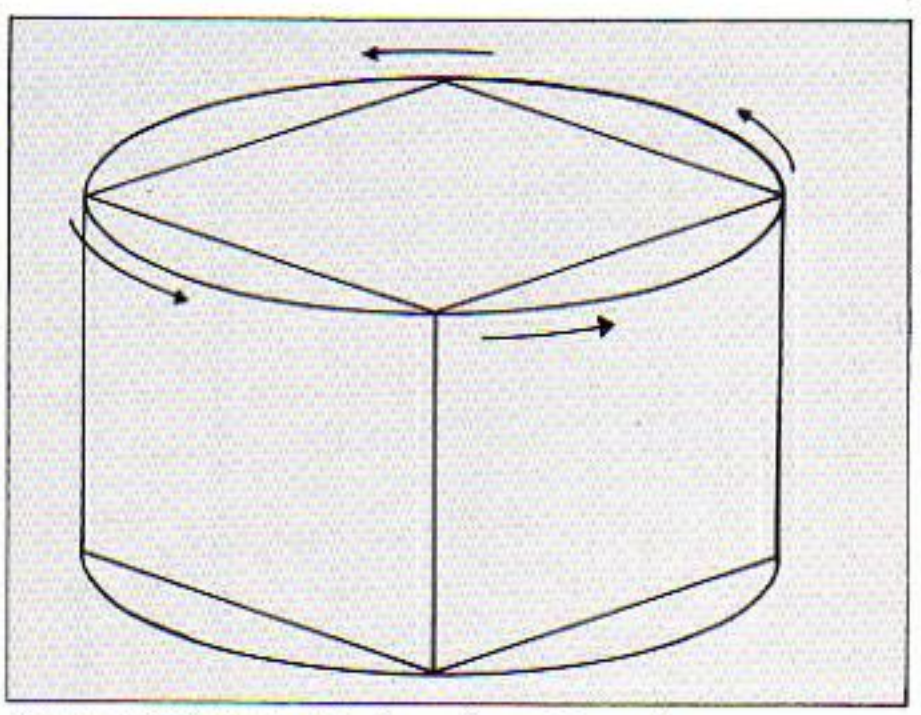

Figure II: Elliptical path when viewed from above

```
10 REM PROGRAM III
20 MODE 4
30 major=200:minor=50
40 MOVE 840,600
50 FOR theta=0 TO 360
60 x=640+major*COS(RAD(t
heta))
70 y=600+minor*SIN(RAD(t
heta))
80 DRAW x,y
90 NEXT
```

Program III

```
10 REM PROGRAM IV
20 MODE 4
30 major=200:minor=50
40 MOVE 840,600
50 FOR theta=0 TO 360 ST
EP 72
60 x=640+major*COS(RAD(t
heta))
70 y=600+minor*SIN(RAD(t
heta))
80 DRAW x,y
90 NEXT
```

Program IV

```
10 REM PROGRAM V
20 MODE 4
30 major=200:minor=50
40 FOR theta=0 TO 288 ST
EP 72
50 x1=640+major*COS(RAD(
theta))
60 y1=600+minor*SIN(RAD(
theta))
70 x2=640+major*COS(RAD(
theta+72))
80 y2=600+minor*SIN(RAD(
theta+72))
90 MOVE x1,y1:DRAW x2,y2
100 NEXT
```

Program V

```
10 REM PROGRAM VI
20 MODE 4
30 major=200:minor=50
40 FOR theta=0 TO 288 ST
EP 72
50 x1=640+major*COS(RAD(
theta))
60 y1=600+minor*SIN(RAD(
theta))
70 x2=640+major*COS(RAD(
theta+72))
80 y2=600+minor*SIN(RAD(
theta+72))
90 x3=640+major*COS(RAD(
theta+72))
100 y3=450+minor*SIN(RAD(
theta+72))
110 x4=640+major*COS(RAD(
theta))
120 y4=450+minor*SIN(RAD(
theta))
130 MOVE x1,y1:DRAW x2,y2
140 DRAW x3,y3:DRAW x4,y4
150 NEXT
```

Program VI

```
10 REM PROGRAM VII
20 MODE 4
30 major=200:minor=50
40 FOR angle=0 TO 72 STE
P 6
50 FOR theta=angle TO 28
8+angle STEP 72
60 x1=640+major*COS(RAD(
theta))
70 y1=600+minor*SIN(RAD(
theta))
80 x2=640+major*COS(RAD(
theta+72))
90 y2=600+minor*SIN(RAD(
theta+72))
100 x3=640+major*COS(RAD(
theta+72))
110 y3=450+minor*SIN(RAD(
theta+72))
120 x4=640+major*COS(RAD(
theta))
130 y4=450+minor*SIN(RAD(
theta))
140 MOVE x1,y1:DRAW x2,y2
150 DRAW x3,y3:DRAW x4,y4
160 NEXT
170 key=INKEY(100):CLS
180 NEXT
```

Program VII

the first point before drawing anything. To see why leave out line 40 and watch what happens.

The FOR/NEXT loop that we have used so far has 360 steps with theta being incremented by 1, the default STEP, each time round (actually 0 to 360 is 361 but the first is the same as the last).

What would happen if there were only five steps – STEP 72, (360/5)? Only five lines would be drawn, a pentagon. Edit line 50 in Program III to produce Program IV, which draws a pentagon viewed at an angle.

If we wanted a square then the step would be 360/4 or 90 since it has four sides.

Program V draws the same pentagon but in a different way. The coordinates of the first corner are calculated, x1,y1, then the coordinates of the next corner x2,y2.

The two corners are joined with a MOVE and DRAW in line 90. The loop limit is 288 as 288+72=360.

So we can now draw any polygon as if seen at an angle to the horizontal. Simply alter the size of the step in line 40.

For an n sided polygon the STEP is 360/n and the limit is 360-n.

A solid polygon has a top and bottom joined by straight sides. We can draw our pentagon anywhere on the screen by altering the constants added to the x and y coordinates, so if we draw two, one beneath the other, and join the corners then we will have our solid, Figure IV. Program VI does this.

To spin the polygon all that is necessary is to move the first corner a little further round the ellipse, so instead of theta starting at 0 we could start at 5 or 10 or 15.

Each time it is drawn it will have moved round by that

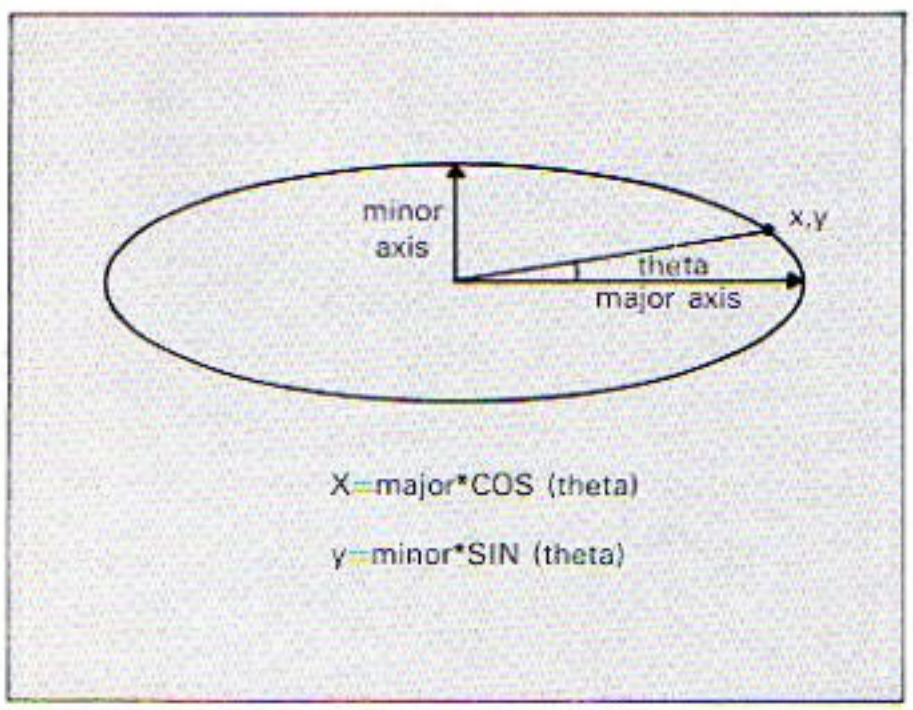

Figure III: How ellipses can be calculated

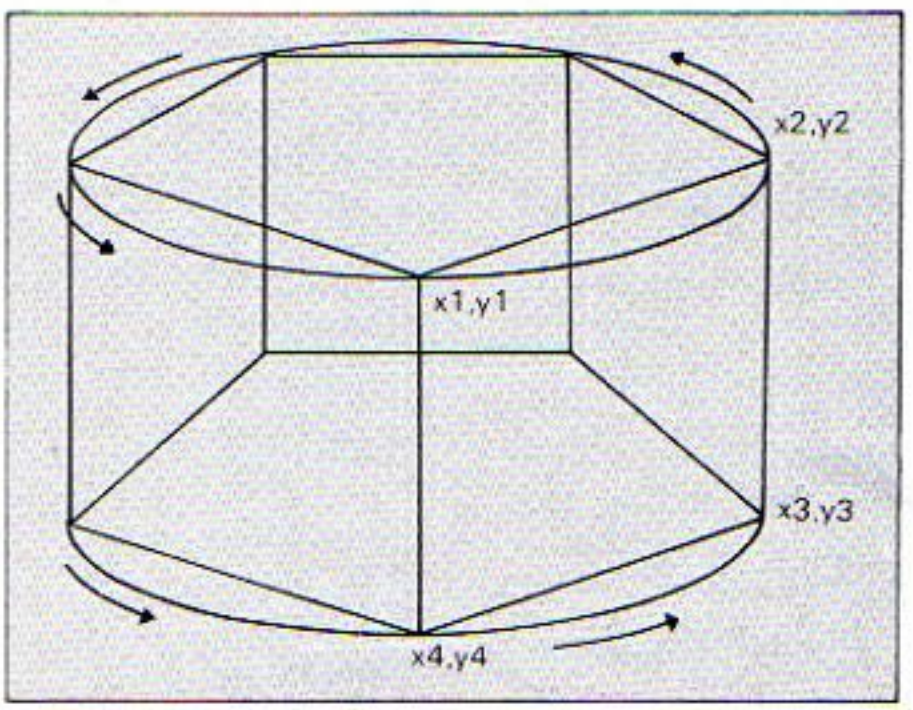

Figure IV: A solid pentagon

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amount. Program VII will spin the pentagon slowly in an anti-clockwise direction.

It can easily be altered to spin any polygon by altering the value of STEP and the limit.

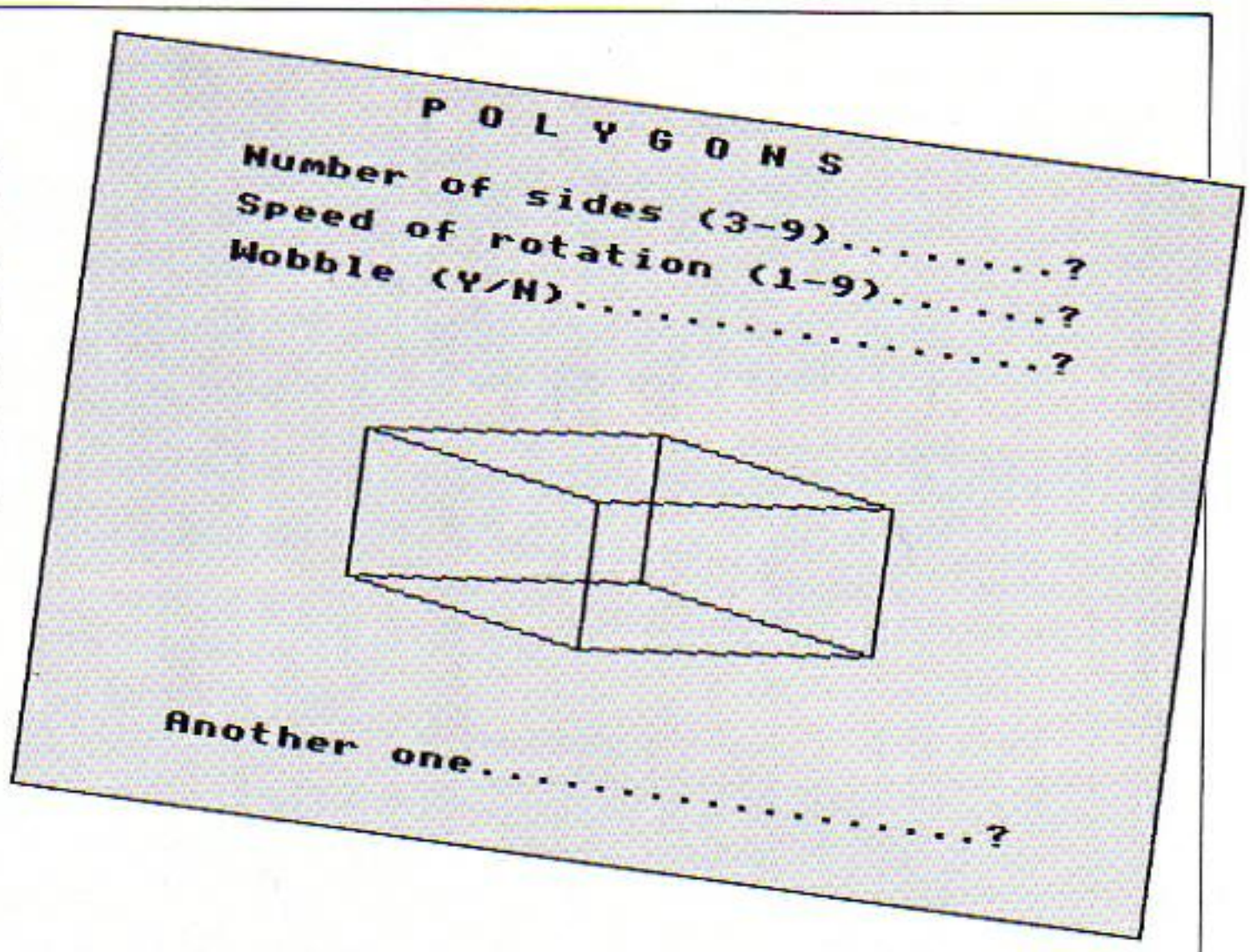
The program as it stands is quite neat but far too slow. What we need is a bit of machine code to speed it up.

The final program uses Basic to calculate all the coordinates which are stored in a table starting at &3000.

The machine code then runs through this table, picking up the coordinates and uses VDU 25 to move and draw the lines.

The technique that Polygon uses is identical to program VII except that the minor axis is varied if the wobble option is selected.

I'll leave you to puzzle out how it works.




```
   10 REM **** POLYGONS ***
**
   20 REM *By  R.A.Waddilov
e*
   30 REM *For Electron Use
r*
   40 MODE 4
   50 PROCinitialise
   60 REPEAT
   70 PRINT TAB(5,4)"Number
 of sides (3-9)";FNdots;
   80 PROCkey("3456789")
   90 sides=VAL key$
  100 angle=360/sides
  110 ?data1=360/sides/6
  120 ?data2=4*sides
  130 PRINT TAB(5,6)"Speed
of rotation (1-9)";FNdots;
  140 PROCkey("123456789")
  150 ?speed=VAL key$
  160 PRINT TAB(5,8)"Wobble
 (Y/N)";FNdots;
  170 PROCkey("yn")
  180 PRINT TAB(16,17)"Thin
king..."
  190 A%=&3000:Y%=50
  200 PROCdata(-sides)
  210 PROCdata(-sides)
  220 PROCdata(sides)
  230 PROCdata(sides)
  240 PRINT TAB(5,28)"Press
 a key (and wait) to end ":
*FX21,0
  250 VDU 28,10,23,29,13
  260 CALL &900
  270 PRINT CHR$(26);TAB(5,
28)"Another one";FNdots;
  280 PROCkey("yn")
  290 UNTIL key$="n"
  300 END
  310
  320 DEF PROCdata(V%)
  330 FOR J%=0 TO (360/side
s)-6 STEP 6
  340 Y%=Y%+(V% AND key$="y
")
  350 FOR I%=J% TO 360-angl
e+J% STEP angle
  360 cos=640+300*COS(RADI%
)
  370 sin=SIN(RADI%)
  380 cos1=640+300*COS(RAD(
I%+angle))
  390 sin1=SIN(RAD(I%+angle
))
  400 ?A%=4:A%!1=cos:A%!3=5
36+Y%*sin:A%=A%+5
  410 ?A%=5:A%!1=cos1:A%!3=
536+Y%*sin1:A%=A%+5
  420 ?A%=5:A%!1=cos1:A%!3=
336+Y%*sin1:A%=A%+5
  430 ?A%=5:A%!1=cos:A%!3=3
36+Y%*sin:A%=A%+5
  440 NEXT
  450 NEXT
  460 ENDPROC
  470
  480 DEF PROCinitialise
  490 *FX229,1
  500 *FX11,0
  510 *FX16,8
  520 VDU 19,0,4;0;23,1,0;0
;0;0;
  530 DRAW 0,1023:DRAW 1276
,1023
  540 DRAW 1276,0:DRAW 0,0
  550 PRINT TAB(11,1)"P O L
 Y G O N S"
  560 address=&70:counter=&
72
  570 count2=&73:temp=&74
  580 count3=&76:speed=&77
  590 data1=&80:data2=&81
  600 oswrch=!&20E AND &FFF
F
  610 osbyte=!&20A AND &FFF
F
  620 P%=&900
  630 [ OPT 2
  640 .code
  650 LDA #&00:STA address
  660 LDA #&30:STA address+1
  670 LDA #4:STA count2
  680 .loop3
  690 LDA data1::STA counter
  700 .loop1
  710 LDA speed:STA count3
  720 .wait
  730 LDA #19:JSR osbyte
  740 DEC count3:BNE wait
  750 LDA #12:JSR oswrch
  760 LDX data2
  770 .loop2 LDY #0
  780 LDA #25:JSR oswrch
  790 LDA (address),Y:JSR o
swrch
  800 INY:LDA (address),Y:J
SR oswrch
  810 INY:LDA (address),Y:J
SR oswrch
  820 INY:LDA (address),Y:J
SR oswrch
  830 INY:LDA (address),Y:J
SR oswrch
  840 CLC
  850 LDA address:ADC #5:ST
A address
  860 LDA address+1:ADC #0:
STA address+1
  870 DEX:BNE loop2
  880 DEC counter:BNE loop1
  890 DEC count2:BNE loop3
  900 LDA #129:LDX #0:LDY #
0:JSR osbyte
  910 TYA:BNE code
  920 RTS
  930 ]
  940 ENDPROC
  950
  960 DEF FNdots=STRING$(34
-POS,".")+"?"+CHR$(8)+CHR$(
7)
  970
  980 DEF PROCkey(a$)
  990 REPEAT key$=CHR$(GET
OR 32)
 1000 UNTIL INSTR(a$,key$)
 1010 PRINT key$;
 1020 ENDPROC
```

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

Can you spot a word that's the odd-one-out before the yacht sails across the screen? STEVE LUCAS sets the challenge

THIS game was written with the aim of being both educational and at the same time being fun to play.

It was originally intended for children from 7 to 11 years of age, but can be used by students of all ages if the words held in the data lines are changed.

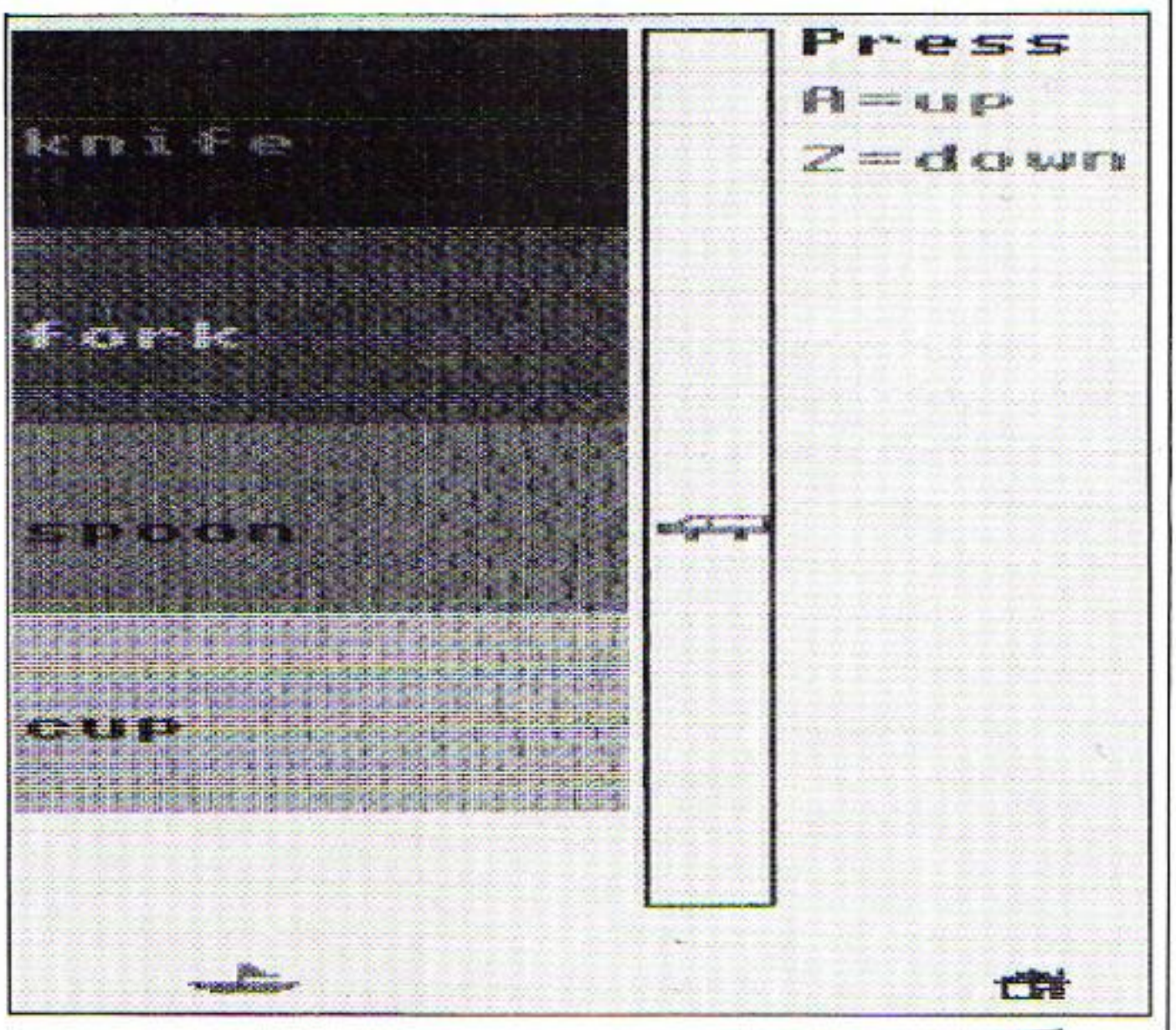
In it you are shown a series of questions, each consisting of four words displayed in boxes.

Three of these words are connected in some way and you must try to find the "odd man out".

To make life more difficult you must make your selection before a yacht sails right across the screen.

In case you think this is easy, each question you get right makes the yacht travel a little bit faster.

In order to select the out-of-place word move the lorry using the keys A for up and Z for down until it is next to the word you select. Then press the space bar.



PROCEDURES

PROCinstructions	Gives instructions.
PROCcurof	Turns cursor off.
PROCtitle	Prints title graphics.
PROCguess	Guess word.
PROCa,PROCb, PROCc,PROCd, PROCe,PROCf, PROCg,PROCh, PROCi	Print graphics.
PROClose	Get question wrong.
PROCtime	Used for time limits.
PROCwin	Get question right.
PROCerror	Error reports.

VARIABLES

A$	Keyboard input.
X%,Y%	Coordinates for graphics.
S%	Score.
Z%	Graphics colour.
F$,B$,C$,D$	Words in each question.
B%	Number of correct answer.
AA$	Keyboard input to move graphics characters.
YY%,YZ%	Check for previous graphics position.
T%	Set time limit.

Full listing starts on Page 58

Odd One Out listing

From Page 57

```
  10 REM ** Odd Man Out ve
rsion 2 **
  15 REM (C) Electron User
  20 *FX210,0
  30 MODE 6
  40 VDU19,0,4,0,0,0
  50 ON ERROR MODE6:PROCer
ror
  60 PROCinstructions
  70 PROCcurof
  80 CLS:PRINT''"Do you wa
nt sound <Y/N> ?"
  90 REPEAT: A$=GET$:UNTIL
 A$="Y" OR A$="N"
 100 *FX11,1
 110 IF A$="N" THEN *FX210
,1
 120 T%=100
 130 PROCcurof
 140 REM ** DEFINE CHARACT
ERS **
 150 VDU23,233,255,255,255
,255,255,255,255,255
 160 VDU23,234,0,0,1,15,25
5,123,63,31
 170 VDU23,235,0,27,128,22
4,255,110,252,248
 180 VDU23,236,0,15,25,241
,255,255,12,12
 190 VDU23,237,0,255,1,1,2
55,255,24,24
 200 VDU23,238,130,195,193
,255,255,1,3,3
 210 VDU23,239,0,0,128,248
,255,199,128,0
 220 VDU23,240,0,3,15,31,8
,8,8,15
 230 VDU23,241,136,232,248
,252,152,248,216,216
 240 VDU23,242,1,1,1,1,1,2
55,127,31
 250 VDU23,243,128,192,224
,248,0,255,254,248
 260 VDU23,244,0,28,8,15,1
0,9,28,28
 270 VDU23,245,48,12,12,25
0,59,72,156,28
 280 VDU23,246,32,112,121,
127,63,125,120,32
 290 VDU23,247,0,120,252,2
46,255,255,230,120
 300 VDU23,248,255,144,255
,255,255,56,124,56
 310 VDU23,249,255,9,255,2
54,255,28,62,28
 320 VDU23,250,7,9,23,19,2
6,19,1,1
 330 VDU23,251,224,144,232
,200,88,200,128,128
 340 VDU23,252,0,15,15,12,
12,12,12,12
 350 VDU23,253,0,240,240,4
8,48,48,48,48
 360 VDU23,254,28,28,12,12
,60,124,0,0
 370 VDU23,255,56,56,48,48
,60,62,0,0
 380 REM ** DEFINE ENVELOP
ES **
 390 ENVELOPE 3,4,90,-15,-
15,10,20,20,126,0,0,-126,12
6,126
 400 ENVELOPE2,1,-7,7,0,10
,10,0,126,0,0,-126,126,126
 410 ENVELOPE1,1,1,0,0,200
,0,0,126,0,0,-126,126,126
 420 MODE 2
 430 PROCcurof
 440 PROCtitle
 450 A%=0:S%=0:B%=0:C%=0
 460 *FX11,0
 470 RESTORE
 480 PROCguess
 490 END
 500 DEFPROCa
 510 A$="Boat": VDU5: GCOL
0,I%
 520 MOVEX%,Y%: VDU234,235
,4
 530 ENDPROC
 540 DEFPROCb
 550 A$="Van": VDU5
 560 GCOL0,I%:MOVEX%,Y%: V
DU236,237,4
 570 ENDPROC
 580 DEFPROCc
 590 A$="Plane":VDU 5
 600GCOL0,I%: MOVEX%,Y%: V
DU238,239,4
 610 ENDPROC
 620 DEFPROCd
 630 A$="House":VDU5:GCOL0
,I%:MOVEX%,Y%:VDU240,241,4:
ENDPROC
 640 DEFPROCe
 650 A$="Yacht"
 660 VDU5: GCOL0,1: MOVEI%
,40
 670 VDU242,243: ENDPROC
 680 DEFPROCf
 690 A$="Bike": VDU5
 700 GCOL0,I%:MOVEX%,Y%: V
DU244,245,4
 710 ENDPROC
 720 DEFPROCg
 730 A$="Fish": VDU5
 740 GCOL0,I%:MOVEX%,Y%:VD
U246,247,4
 750 ENDPROC
 760 DEFPROCh
 770 A$="Bus": VDU5
 780 GCOL0,I%: MOVEX%,Y%:V
DU248,249,4
 790 ENDPROC
 800 DEFPROCi
 810 A$="Fido":VDU5
 820 GCOL0,I%:MOVEX%,Y%
 830 VDU250,251,10,8,8,252
,253,10,8,8,254,255
 840 ENDPROC
 850 DEFPROCtitle
 860 PROCcurof
 870 CLS:FOR X%=100 TO 100
0 STEP 150:I%=X%/150+1:Y%=1
00:PROCi:Y%=900:PROCi
 880 PROCcurof
 890 NEXT X%
 900 PROCcurof
 910 VDU5: GCOL 0,3:MOVE30
0,700:PRINT"Odd man out"
 920 GCOL 0,1: MOVE 5,550:
PRINT" Steve Lucas  1984"
 930 GCOL 0,6: MOVE 100,40
0:PRINT"for Electron User"
 940 GCOL 0,2: MOVE 5,300:
PRINT"Press (space bar) to
      start."
 950 VDU 5
 960 PROCcurof
 970 REPEAT UNTIL GET=32 :
CLS:ENDPROC
 980 REM ** turn off curso
r ... for Electron and BBC
with O.S. 1.2 **
 990 DEFPROCcurof
1000 VDU23,1,0;0;0;0;::ENDP
ROC
1010 DEFPROCguess
1020 REPEAT
1030 CLS: A%=RND(20):FORX=
1TOA%:READA$,B$,C$,E$,F:NEX
T:REPEAT
1040 READ F$,B$,C$,D$,B%:I
F F$="X"THEN RESTORE: GOTO
1040
1050 GCOL0,1: MOVE0,400 :M
OVE700,400: PLOT85,0,600: P
LOT85,700,600
1060 GCOL0,2: MOVE0,600: M
OVE700,600: PLOT85,0,800: P
LOT85,700,800
1070 GCOL0,3: MOVE0,800: M
OVE700,800: PLOT85,0,1000:
PLOT85,700,1000
1080 GCOL0,4: MOVE0,200: M
OVE700,200: PLOT85,0,400: P
LOT85,700,400
1090 VDU5: GCOL0,1:
1100 MOVE10,900: PRINTF$
1110 GCOL0,4: MOVE10,700:
PRINTB$
1120 GCOL0,6: MOVE10,500:
PRINTC$
1130 GCOL0,5: MOVE10,300:
PRINTD$
1140 VDU 5
1150 MOVE 1100,35:VDU240,2
41
1160 I%=0:PROCe
1170 GCOL0,6:MOVE720,100:D
RAW870,100:DRAW870,1000:DRA
W720,1000:DRAW720,100
1180 X%=740:Y%=150
1190 TIME=0
1200 MOVE 900,1000: PRINT"
Press"
1210 GCOL0,1: MOVE 900,940
: PRINT"A=up"
1220 MOVE900,880: PRINT"Z=
down"
1230 REPEAT:AA$=INKEY$(0)
1240 YY%=Y% :YZ%=Y%: GCOL0
,1
1250 IF AA$="A" AND Y%> 30
0 THEN Y%=Y%+195 ELSE IF AA
$="A" THEN Y%=Y%+160
1260 IF Y%>895 THEN Y%=895
1270 IF AA$="Z" THEN Y%=Y%
-195: IF Y%<260 THEN Y%=100
1280 IFY%<150 THENY%=150 E
LSEIFY%>970THENY%=970
1290 IFYY%<>Y% THEN GCOL0,
0:VDU8,8,233,233: GCOL0,1
1300 MOVEX%,Y%:VDU236,237
1310 IF TIME>T% THEN TIME=
0: PROCmove
1320 UNTIL INKEY(-74) OR I
%>1000
1330 IF I%>1000 THEN PROCt
ime :GOTO1370
1340 A%=0:IF Y%>800 THEN A
%=1 ELSE IFY%>600 THEN A%=2
 ELSE IFY%>400 THEN A%=3 EL
SE IFY%>200 THENA%=4
1350 IF A%=B% THEN PROCwin
:GOTO1370
```

```
 1360 PROClose
 1370 UNTIL FALSE
 1380 DEFPROCmove
 1390 MOVEI%,40:GCOL0,0:VDU
233,233
 1400 I%=I%+40:GCOL0,1:PROC
e :MOVE870,Y%:SOUND1,3,100,
10
 1410 ENDPROC
 1420 REM ** set the questi
ons **
 1430 REM ** add extra ques
tions here if required **
 1440 DATA pen,pencil,chalk
,window,4
 1450 DATA cod,herring,toad
,salmon,3
 1460 DATA box,tin,room,pac
ket,3
 1470 DATA rake,plane,kite,
helicopter,1
 1480 DATA cheese,chalk,egg
s,milk,2
 1490 DATA boat,yacht,bus,s
hip,3
 1500 DATA glove,hat,helmet
,hood,1
 1510 DATA knife,fork,spoon
,cup,4
 1520 DATA pillow,sheet,war
drobe,blanket,3
 1530 DATA kitchen,bathroom
,lounge,shed,4
 1540 DATA boot,head,arm,le
g,1
 1550 DATA book,jug,magazin
e,newspaper,2
 1560 DATA car,bicycle,lorr
y,van,2
 1570 DATA oak,oar,ash,elm,
2
 1580 DATA sparrow,thrush,b
at,magpie,3
 1590 DATA hutch,rabbit,ken
nel,stable,2
 1600 DATA pipe,tap,tank,sl
ide,4
 1610 DATA duck,egg,hen,ost
rich,2
 1620 DATA swim,paddle,bath
,build,4
 1630 DATA bag,loaf,briefca
se,suitcase,2
 1640 DATA coat,scarf,glove
s,swimsuit,4
 1650 DATA fry,roast,grill,
eat,4
 1660 DATA orange,lemon,tan
gerine,red,4
 1670 DATA doctor,brother,s
ister,father,1
 1680 DATA port,airport,sta
tion,plank,4
 1690 DATA rake,spade,shove
l,paint,4
 1700 DATA soap,oil,water,v
inegar,1
 1710 DATA pint,gallon,poun
d,litre,3
 1720 DATA lion,snake,tiger
,leopard,2
 1730 DATA nine,four,three,
pounds,4
 1740 DATA leaf,branch,loaf
,trunk,3
 1750 DATA jupiter,saturn,m
ars,moon,4
 1760 DATA board,bench,stoo
l,chair,1
 1770 DATA wheel,chair,chai
n,handlebar,2
 1780 DATA boat,lake,sea,oc
ean,1
 1790 DATA boat,helicopter,
jet,plane,1
 1800 DATA cup,glass,goblet
,box,4
 1810 DATA circle,square,ch
air,triangle,3
 1820 DATA calf,cow,cat,bul
l,3
 1830 DATA France,Germany,B
elgium,China,4
 1840 DATA tulip,tree,daffo
dil,rose,2
 1850 DATA letter,post,stam
p,hand,4
 1860 DATA lake,pond,sea,sa
nd,4
 1870 DATA lamp,switch,torc
h,headlight,2
 1880 DATA slow,fast,quick,
help,4
 1890 DATA oar,sail,swim,he
lm,3
 1900 DATA fir,oak,tulip,la
rch,3
 1910 DATA gas,oil,coal,pip
e,4
 1920 DATA USA,Canada,Mexic
o,Cheshire,4
 1930 DATA yellow,pen,green
,blue,2
 1940 DATA man,sailor,pilot
,driver,1
 1950 REM *** add extra dat
a itemm here ***
 1960 DATA X,X,X,X,1
 1970 DEFPROCtime
 1980 CLS: VDU5: GCOL0,2
 1990 MOVE 5,1000: PRINT"Yo
u ran out of time":T%=T%+10
 2000 PROCcurof
 2010 GCOL 0,5: MOVE 50,50:
PRINT"Press <Space Bar>"
 2020 PROCcurof
 2030 *FX15,0
 2040 Z%=0:Y%=500:FOR X%=1
TO 1200 STEP 200:Z%=Z%+1:PR
OCc :NEXT :SOUND1,2,136,50
 2050 PROCcurof
 2060 REPEAT UNTIL GET=32
 2070 CLS:ENDPROC
 2080 DEFPROCwin
 2090 *FX15,0
 2100 CLS:Z%=0
 2110 VDU 5: FOR X%=1 TO 12
00 STEP 200:Z%=Z%+1:Y%=1000
: PROCi
 2120 Y%=100:PROCi
 2130 NEXT
 2140 GCOL 0,5
 2150 MOVE 250,750
 2160 PRINT" You win !!!"
 2170 SOUND 1,1,0,40
 2180 GCOL 0,6
 2190 MOVE 10,270 :PRINT"Pr
ess <Space Bar>"
 2200 REPEAT UNTIL GET=32
 2210 T%=T%-10: IF T%<10 TH
EN T%=10
 2220 CLS: ENDPROC
 2230 DEFPROCIose
 2240 VDU4
 2250 PROCcurof
 2260 *FX15,0
 2270 CLS:COLOUR1:PRINT"YOU
 LOSE !!!"
 2280 COLOUR 2: PRINT'''F$
 2290 COLOUR 3: PRINT''B$
 2300 COLOUR 5: PRINT''C$
 2310 COLOUR 6: PRINT''D$
 2320 COLOUR 5:IF B%=1 THEN
 X$=F$ ELSE IF B%=2 THEN X$
=B$ ELSE IF B%=3 THEN X$=C$
 ELSE IF B%=4 THEN X$=D$
 2330 COLOUR 7:PRINT'''"The
 odd one out is "'X$''
 2340 COLOUR 2
 2350 PRINT"Press <Space Ba
r>":PROCcurof
```

```
 2360 SOUND1,2,130,50
 2370 REPEAT UNTIL GET=32
 2380 T%=T%+10:CLS:ENDPROC
 2390 DEFPROCerror
 2400 PRINT''';:REPORT: PRI
NT" at line ";ERL
 2410 REM ** turn off keybo
ard repeat **
 2420 *FX12,0
 2430 END
 2440 DEFPROCinstructions
 2450 PROCcurof
 2460 CLS:PRINT TAB(14,1);"
ODD MAN OUT"
 2470 PRINT''"    Steve Luc
as   for Electron User"
 2480 PRINT''"In this game
you will be shown a series
of questions. Each question
 consists of four words and
 you must try ";
 2490 PRINT"to find the 'Od
d Man Out' before the yach
t reaches the right hand si
de of the screen."
 2500 PRINT''"You must then
 move your lorry until it i
s next to the word you want
 to select  and press <RETU
RN>."
 2510 PRINT"Use the followi
ng keys :-"
 2520 PRINT''"A  = up"
 2530 PRINT"Z  = down"
 2540 PRINT''"If you get it
 right, the yacht moves   f
aster !"
 2550 PRINT''"Press the <Spa
ce Bar> to start the game";
 2560 REPEAT UNTIL GET =32
 2570 ENDPROC
```

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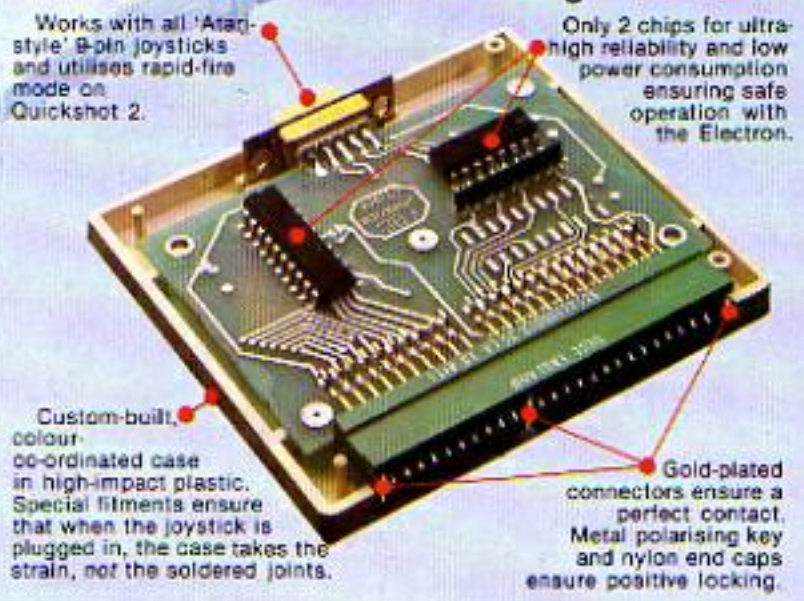

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