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A Database Publication

electron user

Vol.2 No.12 September 1985 £1

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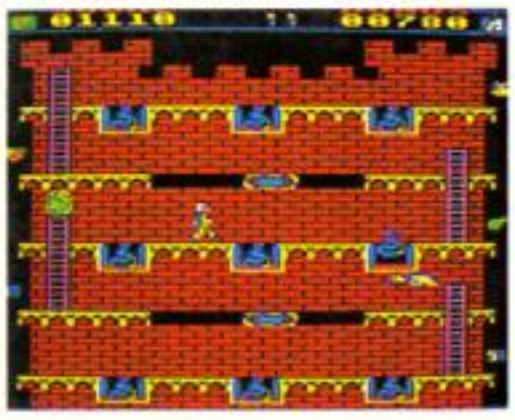

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Features Editor
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Heather Sheldrick
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John Riding
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Peter Brameld

Published by Database Publications Ltd
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DISC POWER

AT A NEW LOW PRICE!

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

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

It consists of an interface, electronics and software in a cartridge, a single $5\frac{1}{4}$in disc drive with lead and a utilities disc.

The interface slots into the Plus 1's cartridge port. Up to two $3\frac{1}{2}$in or $5\frac{1}{4}$in disc drives can be attached. The result is a whole new dimension of speed and reliability!

Its advanced features include:

- *Fast, reliable storage of programs, word processor files and databases.*
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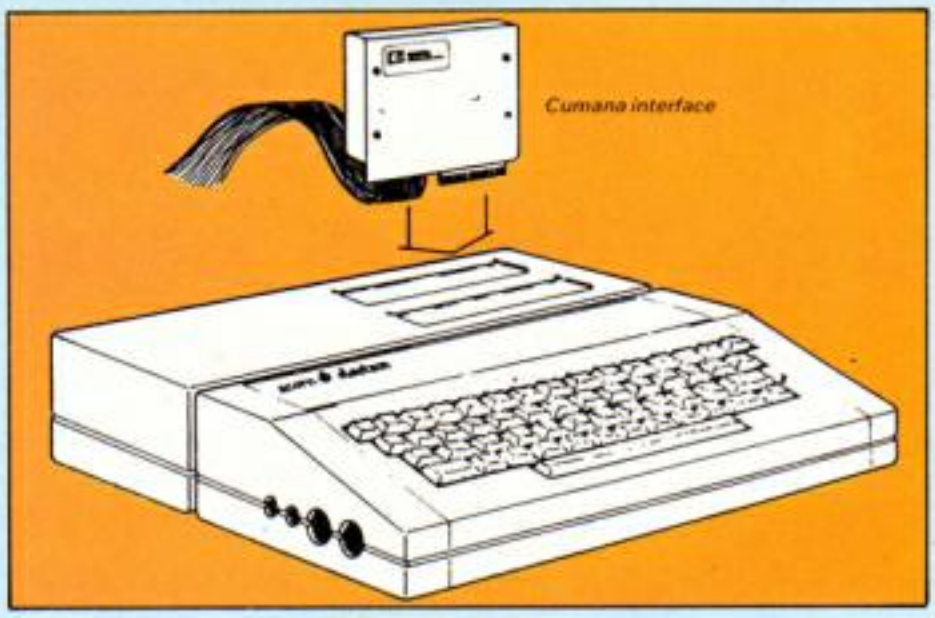
- *A utilities disc packed full of useful programs, including a verify routine, formatters, copy and backup routines and a powerful disc editor.*
- *A thorough, straightforward manual.*

When you add to this the fact that the cartridge has a built in real time clock and a ROM socket (for additional software on a chip) then you'll realise why the Cumana floppy disc system has been so warmly welcomed by Electron users.



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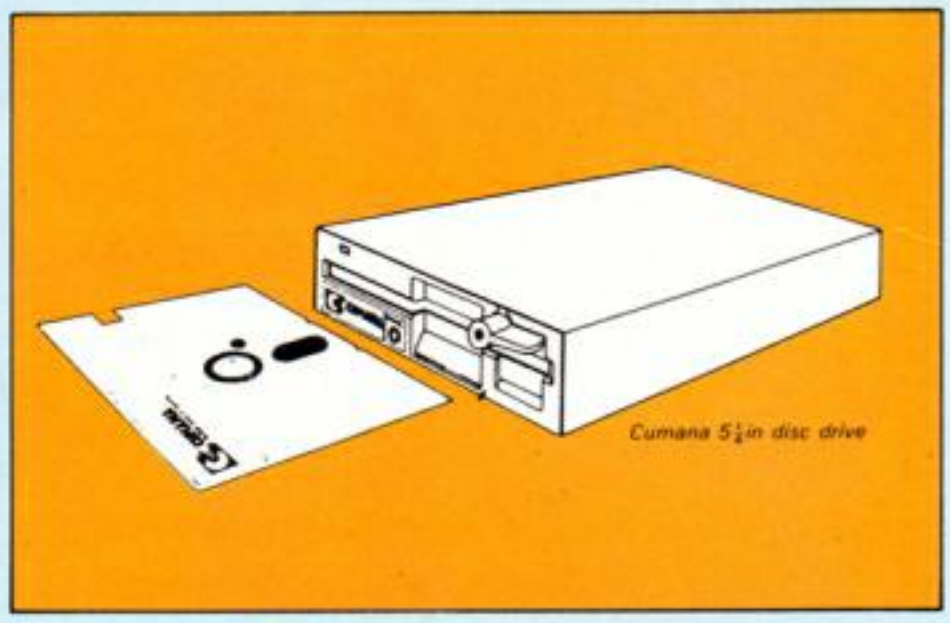

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electron user NEWS

Great sale is on

THE biggest Electron sale ever is under way as retailers, determined to clear shelf-space, have been drastically slashing the prices of old stocks.

An *Electron User* survey of major outlets has revealed that Electrons are selling for £100 and under at Macro, Laskys, Asda and Safeways – less than shops were paying distributors for the machines a few weeks ago.

At Rumbelows the price was £120.

However, W.H. Smith, Dixons and Boots were holding to the recommended retail price of £129 – at least for the time being.

Compete

Trade observers believe Smiths, Dixons and Boots will have to bring their prices down to compete against the "dumpers".

"They can't expect to sell Electrons for £30-plus above the price they can be bought in the next street", said one leading distributor.

The new low prices fixed by Macro, Laskys, Asda and Safeways have angered smaller retailers who are stuck with Electrons they paid more than £100 each for.

Software house raps soccer stars 'ransom'

A NUMBER of leading British "soccer heroes" are attempting to hold UK software houses to ransom, according to a publisher of Electron titles.

Footballing celebrities are said to be making extortionate demands for up to 75 per cent of all profits to allow their names to be used to promote games.

The claims come from Malcolm Howard of Qualsoft whose company has just released Mexico World Cup '86 for the Electron.

Nor is it simply a question of the stars requesting huge payments after they have been approached by software houses. It seems that famous players are actively touting for the business themselves.

Malcolm Howard revealed to *Electron User* that three well known footballers approached Qualsoft with propositions while the new game was being written.

"They were quite willing to sell their names to the game", he said. "I find this worse than prostitution".

"We spent 12 months producing the soccer management game and there was no way we were going to debase it in that way", insisted Malcolm Howard.

"These people aren't interested in computing. In fact I'm sure they wouldn't know which keys to press".

But the Qualsoft executive feels other less scrupulous software houses would be eager to take on the stars for the promotional value of their names.

"It is this lack of real involvement that leaves many football simulation programs resembling little more than arcade games", he said.

And football players are not the only celebrities eager to jump onto the software names game bandwagon. Malcolm Howard says that athletes, cricketers and pop stars are looking at it as an easy way of making money.

Meanwhile Mexico World Cup '86 is due to be launched this month in time for the qualifying rounds of the World Cup proper.

"We will be relying on the skills of our programmers to ensure that it is a winner – not the name of some money-hungry player", said Howard.

ACORNSOFT PLEDGE

ACORNSOFT has pledged that in future all its products will be brought out for both the Electron and the BBC machines.

The undertaking was made despite the fact Acorn is currently believed to be offering the software house for sale.

The new policy is not yet in evidence. Only two of four titles in the company's home education range – Workshop and Talkback – can run on both machines.

The reason, says Acornsoft's home education spokesman Don Clark, is that the programs were already in the pipeline before the policy decision was made.

The other two, Spooky Manor and ABC incorporate Mode 7, a facility not available on the Electron.

But he said Acornsoft plans to bring out a version of Spooky Manor for the machine.

Said Clark: "All the packs we are now working on will work on both the Electron and the BBC. But they will be designed, as far as possible, for the Electron's strengths – although they will behave differently on each machine."

COMMS INTERFACE SOON

A LEADING microelectronics company has confirmed that it is currently working on a top secret communications package for the Electron.

Pace Micro Technology of Bradford is about to launch the interface card exclusively forecast in the August *Electron User*.

This will enable Electron owners to be able to reap the benefits of the telecommunications revolution for the first time.

Electron updates

BUSINESS software for the Electron from Slogger Software is claimed to challenge similar facilities on offer to the BBC Micro.

The first ROM, Starword, is a word processor developed exclusively for the Electron using tape or disc. It allows documents up to 132 characters wide and any length – depending on the size of tape or disc – to be created and edited.

Its features include 40 or 80 column screen display, choice of text colours, word search and replace, electronic cut and paste, programmable function keys, mail and file merge.

Price is £34.50.

Starstore, the second ROM, is a database system costing £29.95.

Show exhibitor helps medical research

Mike Mahon and Jim Notman with the new freezer

A CHANCE encounter at an Electron & BBC Micro User show has led to a major advance in research into crippling diseases at Manchester University Medical School.

The meeting resulted in an exhibitor donating an ultra-low temperature freezer worth £4,000 to a specialist team working on muscular dystrophy and related problems.

It all started when two freelance reviewers – Jim Notman and Mike Mahon – bumped into Nazir Jessa, the boss of Watford Electronics.

At that time, Jim and Mike bemoaned the fact that their work at the North West Regional Neuromuscular Unit was suffering from the Government cutbacks.

Critical

In passing, they told the company boss that they were short of a critical piece of equipment – the freezer.

"It was only an off-the-cuff remark", insists Jim Notman. "So you can imaginge our surprise when Nazir Jessa took us up on it.

"Even though as a qualified optician he obviously has an interest in medical things, we have been overwhelmed by his generosity".

Now that the medical freezer has been installed, it is being used to store human muscle specimens at minus 80 degrees Centigrade.

"This is the critical temperature at which they must be kept for biopsy purposes", explained Jim Notman.

"As such, the freezer solves a major problem for us".

Breakthrough

Eventually the Manchester research team, which has to rely on grant aid and public donations for funding, hopes to build up a bank of diseased muscle to aid the attempt to make the long-awaited breakthrough in the field of muscular dystrophy.

One of the number of projects currently under way is a study of Duchenne muscular dystophy, a wasting disease which only effects small boys.

To analyse the progress of the disease in a quantitive way through muscle tissue BBC Micros are used.

"The machine – with its fast processing power, graphics and versatile interfacing, has a tremendous part to play in this area of research", says Jim Notman.

Products launch at micro spectacular

THE Electron and BBC Micro User Show, which broke all previous records in London last May, now moves to Manchester for the third year running.

It is to be held once again at UMIST from September 27 to 29 inclusive.

Such was the success of the show earlier this year among both exhibitors and public alike that the Manchester event was guaranteed to be a virtual sell-out several months ago.

Advance ticket sales for UMIST are reported to have never been heavier, and the scene is now set for a microcomputer spectacular.

"Once again we are about to see a demonstration of support for Acorn products which will convince everyone that the future of the company is assured", says Derek Meakin, head of Database, the show's organisers.

Early reports from exhibitors reveal that numerous new products will be launched for the Electron, ensuring its place as third most popular micro in the UK.

As a result of public demand, the Walk-In Forum will be repeated at UMIST. Here some of the leading experts on the BBC Micro and the Electron will be making guest appearances.

This year's distinguished line-up includes: Paul Beverley, Norwich Computer Services, taking an in-depth look at Wordwise; Peter Brameld, Database Publications, examining electronic mail and its potential for domestic use; Rob Mcmillan, Acornsoft, discussing the View family of products; Peter Davidson, Database Software, revealing how to create a bestselling software package; Andy Hood, Pace Micro Technology and author of Commstar, unravelling the mysteries of communications.

COMPETITION'S PRIZE IS

A COMPETITION for unemployed youngsters in the North West has been launched jointly by *Electron User* and its sister publication *The Micro User* with the star prize on offer . . . a secure job.

Database Publications is to provide full-time employment for the winner, who must be an out-of-work school-leaver aged between 16 and 20.

Participants are being asked to submit any program they have written – from a simple utility to an exciting game or business package. Full details of the contest and an entry form can be found on Page 22.

The position to be won is that of a trainee programmer with Database Software, a division of Database Publications.

A panel of judges will interview all the finalists before making the "appointment" during

Extracting charge

DESIGNED to take the pain out of calculating National Health Service charges for dentists is a new program for the Amstrad called the Charge Master from Dentron Computers.

Its cassette program calculates charges in seconds and allows professional estimates to be printed out.

Should there be any changes in NHS charges the company says it will provide low-cost updates.

Price of the system, which includes the Amstrad CPC464 Charge Master program and a printer, costs £399.85.

Education software gets a boost

THE *Electron User* campaign to get more educational software onto the shelves of computer retailers has been boosted by a new alliance of eight leading publishers.

This month sees the birth of British Educational Software Associates whose members are Applied Systems Knowledge, Bourne Educational Software, Calpac Computer Software, Collins Software, Griffin Software, Hill MacGibbon, Macmillan Software and Widgit Software.

The aim is to enourage retailers to stock educational software and help them sell it by aggressively promoting public awareness of the range of programs available.

"There is a strong but frustrated demand for educational software", says Roy Davey, marketing director of Collins Software and Hill MacGibbon, the leading figure in forming BESA.

"Would-be buyers have difficulty finding a retailer who offers a good choice and a fast ordering service.

"Educational software is not an impulse purchase. Customers want to know where they can find a good stock and see it demonstrated".

More than 200 specialist retailers will stock BESA's "core list" of 40 programs and will be able to meet orders for another 200-plus titles within 48 hours.

Distribution will be through Proteus Computing, which carries stocks of another 450 educational titles not included in the BESA scheme.

Martin Neild of Macmillan Software told *Electron User:* "Declining computer sales have led to almost a complete shut-out of educational software by retailers in recent months.

Awareness

"We have started BESA to make sure educational programs are represented in the shops, to heighten public awareness of the excellent software available, and to help people realise that micros are not toys but serious learning tools.

"We aim to change the attitudes of dealers and the public – to bring computers out of the cupboard if you like.

"Initially BESA will operate for a trial period until the end of this year. If it takes off we will have to think about opening it up to other educational software publishers who share our objectives".

Craig Thatcher of Proteus said: "This is not a software dumping exercise. We are offering dealers the very best titles from the BESA software houses.

"All schools and local education authorities will be informed what programs are available and where they can get them. There will be special competitions and promotions, and attractive inducements for dealers to stock our core list of educational titles".

Educational software publishers outside the BESA group have warmly welcomed the new initiative.

Kosmos Software boss Keith Spence said: "This is a very worthwhile idea and I wish BESA all the best of luck with it.

"Firms like mine will be following its progress with interest and will look forward to cooperating in this venture in the future".

A JOB IN COMPUTING

the first day of the Electron & BBC Micro User Show opening at UMIST, Manchester, on September 27.

"We want this to be a competition in which youngsters will be able to give full play to their imagination, says Derek Meakin, head of the Database Group. "It is being designed so that even those with limited computer skills can still participate".

But why a job as a prize?

"The North West is a blackspot for unemployed school-leavers", says Derek Meakin. "So what could be more attractive than the chance of a job?"

The lucky winner will be joining an elite team. Database Software has been responsible for a number of chart topping packages, including Mini Office which reached the finals of two categories in the British Microcomputing Awards 1985.

Budget packs

BUDGET packs of educational programs are being made available for the first time to Electron users.

Stell Software has released two double educational games packs at £2.50 although originally the individual games cost £7.95 each.

Included on the tapes are Stell's educational programs, Railroader and Maths Invaders, and Time and Identikit.

Sideways RAM

A NEW sideways RAM for the Electron from Advanced Computer Products allows users to write their own ROM-based software.

Priced £33, it comes with software support including loader, tape disc facilities and printer buffer.

Advanced has also brought out a disc filing system enabling the user to load and chain not only Electron software but also BBC disc-based software. It costs £20.

A fourth for bridge

MAKING a bid for part of the Acorn software market is Livewire Software, with its first games for the Electron, Bridge and Whist Challenge.

A contract bridge game, Bridge Challenge provides the player with a partner and opponents, makes bids for the opposition based on an analysis of their cards alone, and displays the cards and table on screen.

Whist Challenge is a partner whist game and features full scoring during play and screen of cards and table.

Both include auto and cheat-proof play and are provided with playing instructions or manual.

SOLIDISK EFS COMBINES DISC AND A SOCKET FOR THE WI

Solidisk Double Density DFS is now the ultimate in reliability and supported by the largest amount of software available for the Electron.
Solidisk relies on a good product and a large support network to win the heart of the user.
With over 75 Local Experts, covering England, Scotland and Wales, Solidisk can offer many users regional free fitting and advice.
With an ever increasing catalogue of free software, even users who are new to the Disc system can expect to build up a large library in a fairly short time.
Solidisk Software Support Service already has responsibility for over 50,000 BBC computer users and the ability to give you the best service matched only by the largest companies.
Solidisk Double Density DFS handles both BBC Discs and Electron Discs, in single and double density whereas the Acorn's PLUS 3 can only handle ADFS discs.
Solidisk ADFS has nice features such as automatic disc format sensing, built-in disc formatter and verifier and programmable disc speed.
It also has more than 20 disc utilities built into the ROM.
Standard features for both BBC DFS and ELECTRON ADFS implementations include:
1) Automatic Write Error Correction.
2) Automatic 40/80 track stepping, the ADFS 2.1 will let you read and write 40 trak discs if you have an 80 track drive.
3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER) rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC discs.
4) Tape to disc facilities.
Direct transfer from tapes to disc (*TAPEDISC) will work with all unprotected programs. *TAPELOAD and *TAPESAVE will cope with more difficult ones. Only in some cases (multipart games cassettes) will you need Solidisk tape copier.
5) Wordprocessing facilities.
This facility allows *BOOT and other text tiles to be edited, saved and printed in any screen mode.
6) Automatic disc format sensing.
On Shift-Break, the STL ADFS 2.1 will detect the disc format and use the right BBC DFS or Electron ADFS to run.
On the Electron ADFS side, the 2.1 ROM also has some very nice features:
1) Extensive Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) are available to handle any disc drive.
2) Disc verifying facilities.
*VERIFIFY will check all disc sizes including Winchester for media defects.
3) Number of opened channels.
This is the star feature of Solidisk ADFS.
This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as on the Acorn ADFS.
It leaves PAGE at &1900 for most programs, gives more room to View and Viewsheet and avoids unnecessary conversion work for many programs originated for the BBC DFS to be run on your Electron.
On the BBC DFS side, the STL ADFS 2.1 handles both single and double density and in addition, it supports:
1) Unlimited catalogue entries.
2) Unlimited filesize.

THE SOLIDISK 16k SIDEWAYS RAM:

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

THE WINCHESTER SOCKET:

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

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

UPGRADE, 16K SIDEWAYS RAM NCHESTER FOR ONLY £59.00

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This offer comprises:
— One 80 track Double Sided (640 kbytes) 3.5" Mitsubishi disc drive with its own PSU. Cased in beige.
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— One software package containing four 3.5" discs, detailed below.
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PRICE: £200.00

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

THE SOFTWARE:

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

Database:

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

Wordprocessor:

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

Spreadsheet:

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

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

Toolkit:

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

ORDER FORM

PRICE LIST and ORDER FORM.	Price	P&P
Diskettes.		
Verbatim 3.5" box of 10	£40.00	£1.00
Software Pack	£10.00	£1.00
Solidisk EFS	£59.00	£1.00
Disc Offers.		
640k Mitsubishi MF453 Disc Outfit	£200.00	£3.00
1.3 MB Fantastic Offer	£310.00	£3.00
20 MB Winchester system	£805.00	£10.00
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We reserve the right to change specifications and prices for improvements.

How to control your drinking habit – with the cursor!

WE looked last month at a few simple machine code routines to print a character on the screen. Now we're going to see how we can control our character using the cursor keys.

There's only one machine code program this time but it's fairly complicated so I'm going to go through it line by line.

It contains some useful routines that you can incorporate into your own programs.

Type in and run Program I first and see what it does. It's a cursor controlled pint of beer! You'll understand the explanation better once you've played around with this program.

Right, having had our little play we'll get down to business.

First the print routine. It's basically the same as the one we developed last time and is taken from Program VI in the August *Electron User*.

I'll develop it further in the next part, but for the moment I'll leave it as it is. You'll find it starting at line 1050 in our Program I this month.

The routine has been given the label *print* for obvious reasons. It expects the data for the character to be stored at &C00.

This page of memory is reserved for characters defined using VDU 23 but, as we aren't defining any, it won't be used, allowing us to place our data there.

Lines 60 to 90 read the character data and store it in page &C. It's the same as last time.

The routine *print* uses two zero page locations which are labelled *old* and *new*. It erases the character at *old* and prints it again at *new* using the EOR method.

Each item of data is collected from page &C, EORed with the screen memory and stored back in the screen memory. This allows it to pass over background objects without erasing them. If you're a bit fuzzy about EOR then have another look at August's article.

There's a short initialisation routine which sets the two bytes at *old* to &8000 and similarly *new* and *print* to &64C8. *Pint* is the address of the pint.

The reason for setting *old* to &8000 at the start is so that the first time the pint is printed it will EOR &8000 to erase it.

This is off the screen in the ROM, and as you know, ROM means Read Only Memory so writing to it has no effect. If you don't do this you'll get two pints.

Try setting *old* to &5800 in lines 200 and 220 and you'll see what I mean.

Unsurprisingly *start*, at line 250, is the start of the main section. It first loads the A register with 19 and calls *osbyte* at &FFF4.

This is the same as *FX19 reducing the flicker when moving characters about the screen. Immediately after this *print* is called to print the pint at the new position.

This is followed by a short delay loop. Without it the pint will whizz off the screen so fast when you touch a key you won't even see it.

Next come four routines to read the keyboard and calculate the new address of the character. They are all similar, so there's no need to go through each one.

The routine to move the pint right starts at line 350. Osbyte &81 is used to read the keyboard so the A register is loaded with &81.

Now the X register must be loaded with the two's compliment of the negative inkey number and the Y register with &FF.

The cursor right key is INKEY(–122) so we have to work out the two's compliment of –122. 122 in binary is 01111010. Now change all the 0s to 1s and the 1s to 0s to get the one's compliment. This is 10000101.

Finally add 1 to get the result, 10000110. In hexadecimal this is &86, the two's compliment of –122.

Surely there must be an easier way you're thinking. Well there is, just ask your Electron to work it out!

```
PRINT~-122
```

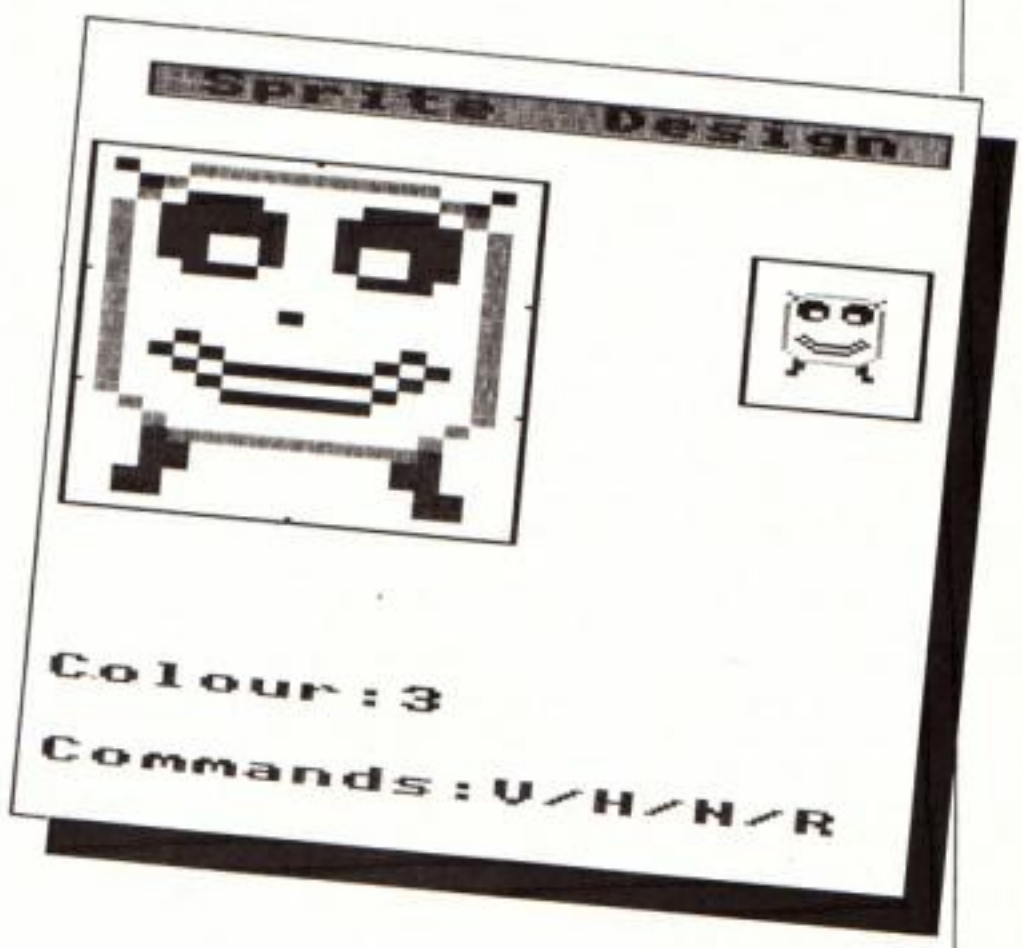
will give the result FFFFFF86. The Electron uses bigger numbers than we do, so ignore the first 6 Fs and use the last two digits.

Having loaded the A register with &81 to read the keyboard and the X and Y

```
10REM PROGRAM I
20REM By R.A.Waddilove
30REM (c) Electron User
40MODE 5
50VDU 23,1,0;0;0;0;.
60FOR byte=0 TO 15
70READ data
80byte?&C00=data
90NEXT
100old=&70:new=&72
110pint=&74
120osbyte=&FFF4
130FOR pass=0 TO 2 STEP 2
140P%=&900
150[ OPT pass
160
170.initialise
180LDA #&00:STA old
190LDA #&80:STA old+1
200LDA #&C8
210STA pint:STA new
220LDA #&64
230STA pint+1:STA new+1
240
250.start
260LDA #19 \*FX19
270JSR osbyte
280JSR print
290LDX #5 \delay loop
300LDY #0
310.here
320DEY:BNE here
330DEX:BNE here
340
350.right \INKEY(-122)
360LDA #&81
370LDX #&86
380LDY #&FF
390JSR osbyte
400TYA:BEQ left
410CLC
420LDA pint:STA old
430ADC #8
440STA pint:STA new
450LDA pint+1:STA old+1
460ADC #0
470STA pint+1:STA new+1
480JMP start
490
500.left \INKEY(-26)?
510LDA #&81
520LDX #&E6
530LDY #&FF
540JSR osbyte
550TYA:BEQ up
560SEC
570LDA pint:STA old
580SBC #8
590STA pint:STA new
600LDA pint+1:STA old+1
610SBC #0
620STA pint+1:STA new+1
630JMP start
640
650.up \INKEY(-58)
660LDA #&81
670LDX #&C6
680LDY #&FF
```

Program I

Part 3 of ROLAND WADDILOVE's series on programming graphics with arcade games in mind



registers with the two's compliment and &FF, *osbyte* is called. It returns with the Y register set to either TRUE or FALSE indicating whether the key was pressed or not.

```
PRINT~TRUE
```

and

```
PRINT~FALSE
```

to see the values returned. Y is either &FF, TRUE or 0, FALSE.

Y is transferred to the A register which sets the zero flag is Y was FALSE. So if the key isn't being pressed we skip to the next routine to test the left cursor key.

Alternatively, if the key is being pressed then &8 is added to the address stored in *pint*. At the same time *old* is set to the old value of *pint* and *new* set to the new value. A jump back to *start* follows this.

If you cast your mind back to the first article you'll remember that the Mode 5 screen is made up of 32 rows and that each row is made up of 40 columns, each 8 bytes deep.

One character is two columns or 16 bytes and &140 separates the start address of one row and the start address of the next.

The routines to test the other cursor keys are the same as for the right cursor key. The only difference, apart from the negative inkeys, is the amount *pint* is incremented or decremented by.

To move left 8 is subtracted, to move right 8 is added. Up is −&140 and down is +&140.

You're probably getting a bit fed up, or thirsty, looking at the same old character, so, as promised, I have included a sprite definer. This is Program II.

At the moment our print routine can only cope with normal size characters, so stick to designing characters 8 by 8 pixels.

Try making up a few multi coloured characters – space invaders and monsters – and substitute them for the pint of beer in Program I.

When designing a sprite make sure that it's in the top left corner of the box. This is because there are four pixels per byte and if the character is four pixels wide say, it might use two pixels in one byte and two in the next when it only needs one.

The sprite designer creates data statements which are *SPOOLed. To load them back *EXEC whatever you called the *SPOOLed file.

In the next article I'll list the full sprite print routine.

This can cope with any size sprite and can print it at any address, even when it's split over several lines – so get designing some sprites.

In the meantime I think I'll have a look at a few more pints!

```
690JSR osbyte
700TYA:BEQ down
710SEC
720LDA pint:STA old
730SBC #&40
740STA pint:STA new
750LDA pint+1:STA old+1
760SBC #&1
770STA pint+1:STA new+1
780JMP start
790
800.down \INKEY(-42)
810LDA #&81
820LDX #&D6
830LDY #&FF
840JSR osbyte
850TYA:BEQ escape
860CLC
870LDA pint:STA old
880ADC #&40
890STA pint:STA new
900LDA pint+1:STA old+1
910ADC #&1
920STA pint+1:STA new+1
930JMP start
940
950.escape \INKEY(-113)
960LDA #&81
970LDX #&8F
980LDY #&FF
990JSR osbyte
1000TYA:BNE end
1010JMP start
1020.end
1030RTS
1040
1050.print
1060LDX #2
1070.loop1
1080LDY #15
1090.loop2
1100LDA &C00,Y
1110EOR (old),Y
1120STA (old),Y
1130DEY
1140BPL loop2
1150LDA new:STA old
1160LDA new+1:STA old+1
1170DEX
1180BNE loop1
1190RTS
1200]
1210NEXT
1220
1230*FX16
1240PRINT''"Press"
1250PRINT''"cursor"
1260PRINT''"keys..."
1270CALL &900
1280
1290REM Beer
1300DATA 136,248,143,143,1
43,143
1310DATA 143,119,136,170,2
21,153
1320DATA 221,170,136,0
```

From Page 11

Program II: Sprite Editor

```
  10REM Sprite-Ed (MODE 5)
  20REM By R.A.Waddilove
  30REM (c) Electron User
  40MODE 4:VDU 23,1,0;0;0;
0;
  50PROCinstructions
  60MODE 5:VDU 23,1,0;0;0;
0;
  70PROCinitialise
  80PROCscreen:PROCdesign:
PROCsave
  90*FX4,0
 100*FX12,0
 110END
 120
 130DEF PROCinitialise
 140*FX16,0
 150*FX4,1
 160VDU 23,224,&F0,&F0,&F0
,&F0,0,0,0,0
 170L%=9000:ink=1
 180color=&70:!color=&0703
0100
 190ENDPROC
 200
 210DEF PROCplot(C%)
 220GCOL 0,C%:MOVE 96+X%*3
2,848-Y%*16:VDU 5,224,4:PLO
T 69,960+X%*8,764-Y%*4
 230ENDPROC
 240
 250DEF PROCdesign
 260COLOUR 3
 270X%=0:Y%=0:*FX21,0
 280REPEAT
 290GCOL 3,3:MOVE 96+X%*32
,848-Y%*16:VDU5,224
 300K%=INKEY10:X%=X%-(K%=1
37 AND X%<15)+(K%=136 AND X
%>0):Y%=Y%-(K%=138 AND Y%<2
3)+(K%=139 AND Y%>0)
 310IF K%>47 AND K%<52 K%=
K%-48:color?K%=(color?K%+1)
MOD16:VDU 19,K%,color?K%;0;
 320VDU8,224,4
 330IF K%=67 ink=(ink+1)MO
D4:COLOUR ink:PRINT TAB(8,2
5);ink:COLOUR 3
 340IF K%=127 PROCplot(0)
 350IF K%=135 PROCplot(ink)
 360IF K%=78 VDU 24,920;63
6;1130;798;16,26,24,80;456;
630;856;16,26
 370IF K%=86 OR K%=72 PROC
mirror
 380IF K%=82 PROCrotate
 390UNTIL K%=13
 400ENDPROC
 410
 420DEF PROCrotate
 430LOCAL X%,Y%
 440PRINT TAB(1,21)"Rotati
ng...":VDU5
 450FOR Y%=0 TO 15
 460FOR X%=0 TO 15
 470GCOL0,POINT(960+X%*8,7
64-Y%*4):MOVE 96+(15-Y%)*32
,848-X%*16:VDU224
 480NEXT
 490NEXT
 500PROCprint
 510ENDPROC
 520
 530DEF PROCmirror
 540LOCAL X%,Y%
 550PRINT TAB(1,21)"Mirror
":VDU5
 560FOR X%=0 TO 15
 570FOR Y%=0 TO 23
 580GCOL0,POINT(960+X%*8,7
64-Y%*4)
 590IF K%=86 MOVE 96+(15-X
%)*32,848-Y%*16:VDU224 ELSE
 MOVE 96+X%*32,848-(23-Y%)*
16:VDU224
 600NEXT
 610NEXT
 620PROCprint
 630ENDPROC
 640
 650DEF PROCprint
 660FOR X%=0 TO 15
 670FOR Y%=0 TO 23
 680GCOL 0,POINT(96+X%*32,
848-Y%*16):PLOT 69,960+X%*8
,764-Y%*4
 690NEXT
 700NEXT
 710VDU4:PRINT TAB(1,21)SP
C(18):*FX21
 720ENDPROC
 730
 740DEF PROCscreen
 750GCOL 0,3:MOVE 0,0:DRAW
 0,995:DRAW 1246,995:DRAW 1
246,0:DRAW 0,0
 760COLOUR 3:COLOUR 129:PR
INT TAB(2,2)" Sprite  Desig
n ":COLOUR 128:COLOUR 2:PRI
NT TAB(1,28)"Commands:V/H/N
/R"TAB(1,25)"Colour:";:COLO
UR ink:PRINT;ink
 770 MOVE 64,864:DRAW 640,
864:DRAW 640,448:DRAW 64,44
8:DRAW 64,864
 780MOVE 912,800:DRAW 1136
,800:DRAW 1136,632:DRAW 912
,632:DRAW 912,800
 790GCOL 0,2:MOVE 128,962:
DRAW 1150,962:DRAW 1150,924
:DRAW 128,924:DRAW 128,962
 800GCOL 0,1:MOVE 32,1023:
MOVE 1280,1023:PLOT 85,32,1
000:PLOT 85,1280,1000:MOVE
1280,32:PLOT 85,1260,1000:P
LOT 85,1260,32
 810GCOL 0,3:MOVE 32,1000:
DRAW 32,1023:DRAW 1276,1023
:DRAW 1276,32:DRAW 1260,32
 820PLOT 69,352,860:PLOT 6
9,352,454:PLOT 69,72,720:PL
OT 69,634,720:PLOT 69,72,59
2:PLOT 69,634,592
 830ENDPROC
 840
 850DEF PROCsave
 860T%=0:FOR X%=0 TO 15:FO
R Y%=0 TO 23::T%=T%+POINT(9
60+X%*8,764-Y%*4):NEXT:NEXT
 870IF T%=0 ENDPROC
 880address=&62F0
 890T%=0:J%=FNlooky(1)
 900address=address+(J%MOD
8)+&140*(J%DIV8)
 910rows=FNlooky(-1)-J%
 920I%=FNlookx(1)
 930address=address+8*(I%D
IV4)
 940columns=FNlookx(-1)DIV
4-I%DIV4
 950T%=&A00
 960FOR X%=0 TO columns
 970A%=address+8*X%
 980FOR Y%=0 TO rows
 990?T%=?A%
 1000T%=T%+1:A%=A%+1-&138*(
(A% AND 7)=7)
 1010NEXT
 1020NEXT
 1030VDU 22,6
 1040T%=&A00
 1050INPUT''"Sprite's name
";name$
 1060OSCLI "SPOOL "+name$
 1070PRINT;L%;"REM ";name$:
L%=L%+10
 1080PRINT;L%;"REM rows=";r
ows+1;"/columns=";columns+1
:L%=L%+10
 1090data$=STR$L%+"DATA "
 1100FOR X%=0 TO columns
 1110FOR Y%=0 TO rows
 1120data$=data$+STR$?T%+",
 1130T%=T%+1
 1140IF LEN data$>35 OR (X%
=columns AND Y%=rows) PRINT
 LEFT$(data$,LEN data$-1):L
%=L%+10:data$=STR$L%+"DATA
 "
 1150NEXT
 1160NEXT
 1170*SPOOL
 1180ENDPROC
 1190
 1200DEF FNlooky(F%)
 1210Y%=-23*(F%=-1):T%=0
 1220REPEAT
 1230FOR X%=0 TO 15
 1240T%=T%+POINT(960+X%*8,7
64-Y%*4)
 1250NEXT
 1260Y%=Y%-F%*(T%=0)
 1270UNTIL T%
 1280=Y%
 1290
 1300DEF FNlookx(F%)
 1310X%=-15*(F%=-1):T%=0
 1320REPEAT
 1330FOR Y%=0 TO 23
 1340T%=T%+POINT(960+X%*8,7
64-Y%*4)
 1350NEXT
 1360X%=X%-F%*(T%=0)
 1370UNTIL T%
 1380=X%
 1390
 1400DEF PROCinstructions
 1410VDU19,1,6;0;
 1420COLOUR 129:COLOUR 0:PR
INT TAB(3,2)" S P R I T E
  D E S I G N E R "
 1430COLOUR 128:COLOUR 1:PR
INT''"Max size 16x24 pixels
 (2x3 chars)"
 1440PRINT''"Data statements
 are created starting at li
ne 9000 and are SPOOLed."
 1450PRINT''"Use curser key
s to move, COPY to plot a p
ixel,  DELETE to erase a pi
xel. RETURN saves current s
prite data."
 1460PRINT'''"###...redefin
e colours""*.....change co
lour""*.....horizontal mir
ror""*.....vertical mirror
""*.....rotate top 16x16 p
ixels""*.....end"
 1470COLOUR 129:COLOUR 0:PR
INT TAB(0,17)"0-3""C""H"'
"V""R""E"
 1480PRINT''TAB(9,28)" Pres
s space bar... ";:*FX21,0
 1490REPEAT UNTIL GET=32
 1500ENDPROC
```

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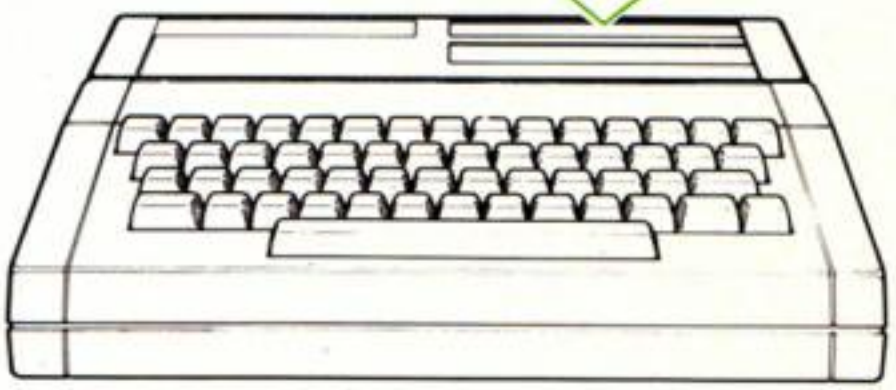

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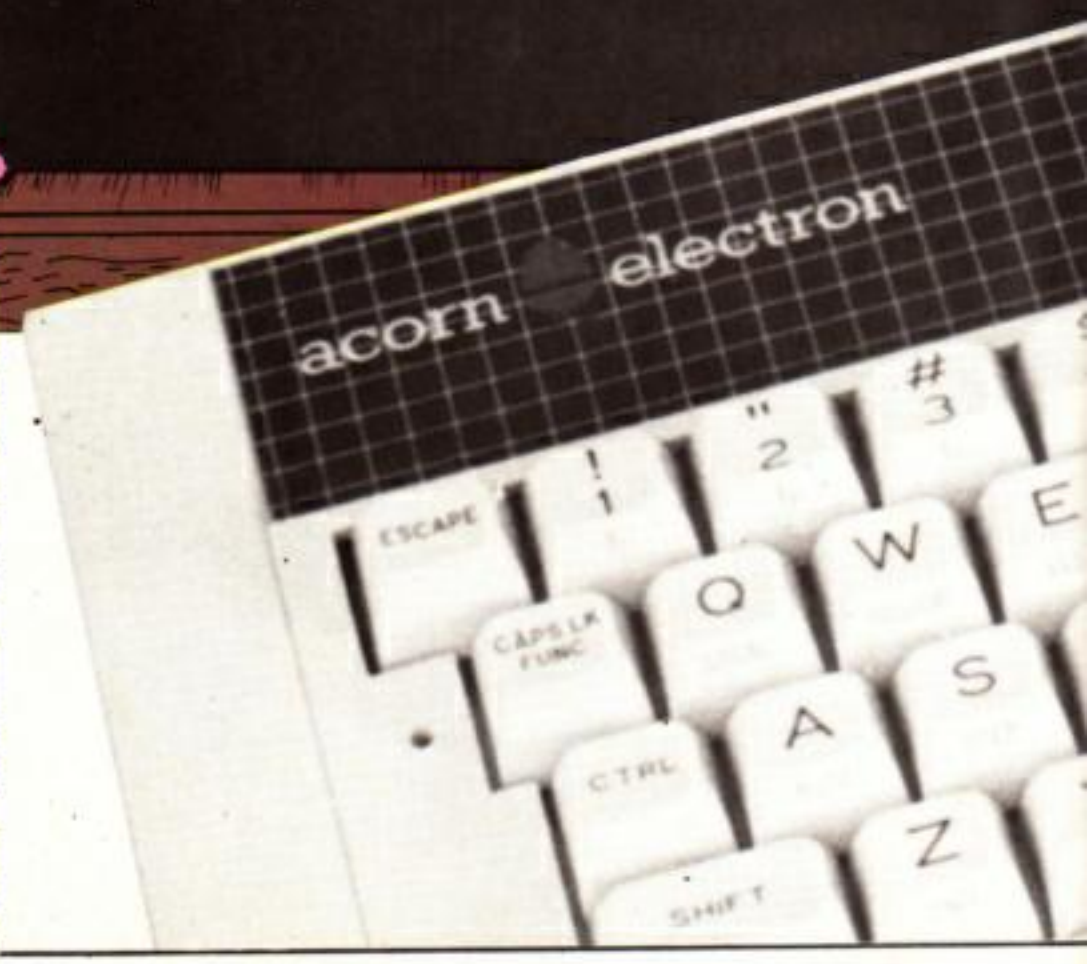

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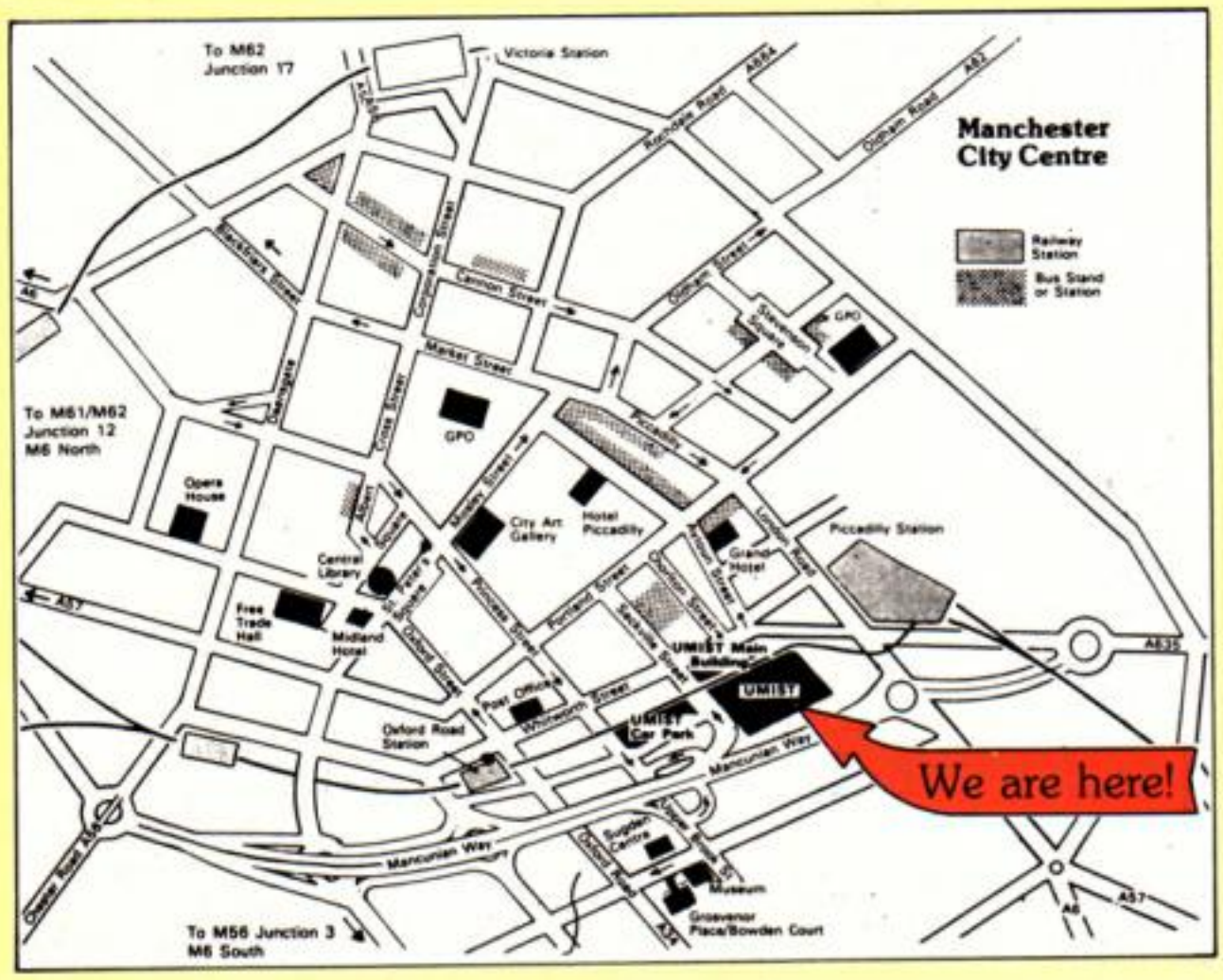

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THE THINGS THAT STRINGS ARE MADE OF..

PETE BIBBY look at string variables and how to use them to good effect

THIS month we're going to be taking a look at string variables and exploring some of the Basic commands used to create and manipulate them.

You'll remember that string variables are the ones that end in the dollar sign, $. They hold groups of letters, numbers, punctuation marks and spaces, all lumped together as one.

To be slightly formal, we can store the word CATS in the string variable *moggy$* using the following assignment statement:

```
LET moggy$="CATS"
```

After this, a quick

```
PRINT moggy$
```

will result in

```
CATS
```

appearing onscreen.

Of course, we don't need the LET, but we do need the inverted commas. These are the delimiters, the things that mark the beginning and the end of the string. Try entering:

```
moggy$=CATS
```

and see what you get.

Notice, though, that they didn't appear when we used

```
PRINT moggy$
```

We got CATS and not "CATS". The point is that the inverted commas are there to mark the ends of the string, not to be part of the string itself.

What if we had wanted them to appear? Could we do it by putting the whole thing in inverted commas? Try it and see. Unless your Electron's very different from mine, I think that you'll find that

```
moggy$=""CATS""
```

results in a syntax error message.

Don't despair though – there is a way of doing it making use of Basic's CHR$ function. But before we can do this we have to learn about something called the Ascii code.

As you probably know, your Electron works by numbers. Everything it does, from flashing an angry syntax error message to attacking Earth with aliens in an arcade game is done by numbers. Even when it's dealing with words, as in:

```
PRINT "CATS"
```

it does it by numbers. Every character has its own code number.

The code for A is 65, while a question mark is represented by the number 63.

All the letters, numerals 0-9 and punctuation marks have their own code numbers listed in a table known as the Ascii code. For what it's worth, Ascii – pronounced "askey" – stands for the American Standard Code for Information Interchange.

The full set of codes is shown in the table on page 285 of the User Guide. It's not exactly good reading, but browse through it sometime and get an idea of how it's laid out.

So, to recap, each character you see on the Electron's screen has a number that represents it. The capital letters have the Ascii codes 65 to 90. You can convert these codes to their characters using the Basic function CHR$ mentioned earlier. Try entering:

```
PRINT CHR$(65)
```

and you'll have a capital A on the screen. It will probably come as no surprise then to find that:

```
PRINT CHR$(66)
```

produces B or that:

```
PRINT CHR$(67)
```

gives C. Once you've grasped how the CHR$ function converts Ascii into alphabet, you'll be able to follow such masterpieces as Program I:

```
10 REM PROGRAM I
20 PRINT CHR$(67);
30 PRINT CHR$(65);
40 PRINT CHR$(84);
50 PRINT CHR$(83)
```

Program I

I hope that you're feeling outraged by the indiscriminate use of PRINTs in this last program. We don't have to use a separate PRINT for each CHR$, we can string them all together as in:

```
PRINT CHR$(67)CHR$(65)
CHR$(84)CHR$(83)
```

Now you see where the term string comes from!

So far, we've only used the Ascii codes ranging from 65 to 90. Program II uses a

```
10 REM PROGRAM II
20 FOR ascii=32 TO 126
30 PRINT CHR$(ascii);" "
;
40 NEXT ascii
50 PRINT
```

Program II

FOR . . . NEXT loop to show the characters whose codes go from 32 to 126.

Here we not only have capital letters, there are also punctuation marks, lower case letters, numbers and even a space – 32. All these are the

```
10 REM PROGRAM III
20 FOR upper=65 TO 90
30 PRINT CHR$(upper);" "
;
40 NEXT upper
50 PRINT
```

Program III

things that strings are made of. So using CHR$ and the relevant Ascii code we can

Each character you see on the Electron screen has its own number

From Page 19

create any string. However, for the moment, let's just look at the capital letters produced by Program III.

Each time round the FOR...NEXT loop, *upper* increases in value, ranging from 65 to 90. The result is

```
   10 REM PROGRAM IV
   20 offset=64
   30 FOR letter=1 TO 26
   40 PRINT CHR$(offset+let
ter);" ";
   50 NEXT letter
   60 PRINT
```

Program IV

that the CHR$ of line 30 prints out the whole of the alphabet in turn in capital letters.

Program IV does exactly the same thing but in a rather better way:

Here the loop control variable *letter* ranges from 1 to 26. In line 40 this is added to the value of *offset* to produce an Ascii code for the CHR$ to process. This will range from 65, when *offset* is 1, to 90, when *offset* is 26 and so the upper case letters appear. But, if the result is the same as in Program III, why bother to rewrite it?

The answer is that I find it much easier to grasp a loop

```
   10 REM PROGRAM V
   20 offset=96
   30 FOR letter=1 TO 26
   40 PRINT CHR$(offset+let
ter);" ";
   50 NEXT letter
   60 PRINT
```

Program V

going from 1 to 26 producing the alphabet, than one going from 65 to 90.

Also, look how easy it is to produce lower case letters using the offset method.

Notice how little Program V differs from Program IV, yet look at the difference in output. Here, having *offset* as 96 ensures that the values CHR$ works on go from 97 to 122. These are the Ascii codes for the lower case letters, hence the differing output.

Can you modify the program to produce the numbers 0 to 9? The codes range from 48 to 57.

To save yourself the bind of looking up the Ascii code for each character, Electron Basic has a very useful function, the aptly named ASC. This takes a character and returns its Ascii code. So:

```
PRINT ASC("A")
```

returns 65 while:

```
PRINT ASC("a")
```

gives 97. You can use string variables inside the brackets as:

```
inside$="x"
PRINT ASC(inside$)
```

will show. Also ASC clearly differentiates between numbers and strings as shown by the differing results of:

```
PRINT ASC(7)
```

and

```
PRINT ASC("7")
```

Bear in mind that ASC only works on the first letter of a string. While it's perfectly allowable to have something like:

```
PRINT ASC("CAT")
```

you only get the code returned for the first letter. In other words,

```
PRINT ASC("XYZ")
```

gives exactly the same result as:

```
PRINT ASC("X")
```

the Y and Z being left out in the cold.

However ASC is a lot more than just a quick way of getting an Ascii code. It can be useful in mugtrapping, as Program VI shows.

```
   10 REM PROGRAM VI
   20 INPUT "Enter an upper
case letter" TAB(30) entry$
   30 IF ASC(entry$)<65 OR
ASC(entry$)>90 THEN CLS:PRI
NT "I said an uppercase let
ter":PRINT:GOTO 20
   40 PRINT "Well done!"
```

Program VI

As you'll have found out if you've run it – and if you haven't, you should have – the program only accepts upper case letters.

Line 30 checks the Ascii value of *entry$*. Only values in the range 65 to 90 produce the upper case alphabet, so if ASC(entry$) is below or above this value there's been an erroneous input. This is another way of saying someone's made a mistake or is trying to crash your program.

The GOTO then sends the program back to line 20 for another try. Only when the Ascii code of *entry$* is in the upper case range does the program get to the final message.

Program VI is a bit fierce, however. After all, someone might have put in p when they meant P. Rather than have the micro point out their error – which might put someone off computers for life – why not have the Electron do it for them?

After all, it's only an offset of 32 to allow for the 32 characters between an upper case letter and its lower case counterpart. Program VII shows how it's done.

Here the Ascii value of *entry$* is held in *ascii*. Line 50 checks that entry$ is either upper or lower case. If it isn't the mugtrap has the user trying again.

By the time the program gets to line 70, *entry$* must be one or the other. Here it's tested and if it's lower case – a code greater than 90 – then 32 is taken away to make it upper case.

In effect, ASC is allowing your Electron to correct human errors.

```
   10 REM PROGRAM VII
   20 INPUT "Enter a letter
" TAB(30) entry$
   30 ascii=ASC(entry$)
   40 REM check if in lette
r range
   50 IF ascii<65 OR ascii>
122 OR (ascii>90 AND ascii<
97) THEN GOTO 20
   60 REM if lowercase subt
ract offset
   70 IF ascii>90 THEN asci
i=ascii-32
   80 entry$=CHR$(ascii)
   90 PRINT entry$
```

Program VII

Before we leave the Ascii code, I want to deal briefly with the codes in the range 0 to 31. These codes are rather different from the other codes we've used so far.

All the codes in the range 32 to 126 produce output on the screen when used with CHR$( ). The codes from 0 to 31 don't display the character set but they do affect the micro.

They're what are known as control codes, and that's what they do, they control the micro. Try:

```
PRINT CHR$(12)
```

and see, or rather, don't see what happens. As you'll have seen, or not, as the case may be, 12 is the control code for clearing the text screen. In effect it's the same as CLS.

Try:

```
PRINT CHR$(7)
```

and you'll hear what for tradition's sake is known as the bell. The table on page 285 of the User Guide gives all the control codes. Try them all and

Concatenating – being joined together

Rather than have the micro point out a user's error – which might put someone off computers for life – why not have the Electron do it for them?

see if you can figure out what's happening.

I particularly like codes 8, 9, 10 and 11 which move the text cursor backwards, forwards, down and up one character space respectively. You can have a lot of fun with them.

Try to explain what's happening with:

```
PRINT "CATS" CHR$(8);
```

and

```
PRINT "CATS"CHR$(8);CHR$(32)
```

You can even incorporate them inside string variables by adding – or rather, concatenating – them together just like normal strings. You can see what I mean by entering:

```
blank$="CATS"+CHR$(8)+
CHR$(8)+CHR$(8)+CHR$(8)
+CHR$(32)+CHR$(32)+
CHR$(32)+CHR$(32)
```

The string variable *moggy$* now contains four characters, four control codes and four spaces. Now when you:

```
PRINT blank$
```

you'll see nothing as the four backspaces overwrite CATS.

Don't worry too much if you don't grasp control codes straight away. Like everything else on the Electron, understanding comes with practice.

Just so long as you have the idea that numbers or Ascii codes can represent characters, that's all you need to know for the time being.

Before we leave CHR$ entirely, do you remember our problem with "CATS"? Ascii codes come in handy here. Enter:

```
moggy$=CHR$(34)+"CATS"
+CHR$(34)
```

and then:

```
PRINT moggy$
```

to get the sought-after

```
"CATS"
```

It should come as no surprise that the Ascii code for inverted commas is 34.

And now, how long is a piece of string? Actually, it's not such a silly question as it might seem.

LEN is fairly straightforward – but watch out for a couple of special cases . . .

As you'll find out in the next couple of months, we do cut our strings into pieces – they're known as string slices – and it's important to know their length. Because of this, Electron Basic has the function LEN.

It's not hard to use. If, for reasons I can't imagine, you wanted to find the length of the string ABC using your Electron you'd just enter:

```
PRINT LEN("ABC")
```

and 3 would be returned. ABC is three characters in length. It's hardly a shock, is it?

More realistically, you might want to know the length of a string variable which could be changing all the time during the running of a program. Set up a string variable with:

```
yourchoice$="whatever"
```

and

```
PRINT LEN(yourchoice$)
```

will tell you the number of characters it contains.

As I said, LEN is fairly straightforward but there are a couple of special cases to watch out for. The length of a space is 1, not 0 as you might think. If you don't believe me, enter:

```
PRINT LEN(" ")
```

and see for yourself. Remember, spaces count as one character, so:

```
gap$="Hello Mum"
PRINT LEN(gap$)
```

gives the answer 9, not 8.

Another special case is that of the null string, the string that contains nothing. Set one up with:

```
null$=""
```

and find its length with:

```
PRINT LEN(null$)
```

It makes sense that the answer is 0. After all, it contains no characters.

While it may seem a bit daft having a string that contains nothing, it comes in very handy as the end condition of a REPEAT . . . UNTIL loop when slicing strings.

But more of that next month.

```
  10 REM PROGRAM VIII
  20 REPEAT
  30 INPUT "Enter a four l
etter word ",entry$
  40 PRINT
  50 length=LEN(entry$)
  60 UNTIL length=4
  70 PRINT entry$
```

Program VIII

For the moment I leave you with Program VIII.

This is just a mugtrap using LEN to ensure that words of the right length are entered.

Until next time I'll leave you with it and this problem.

The program is satisfied with 1234 but this isn't a word. Can you do anything about that?

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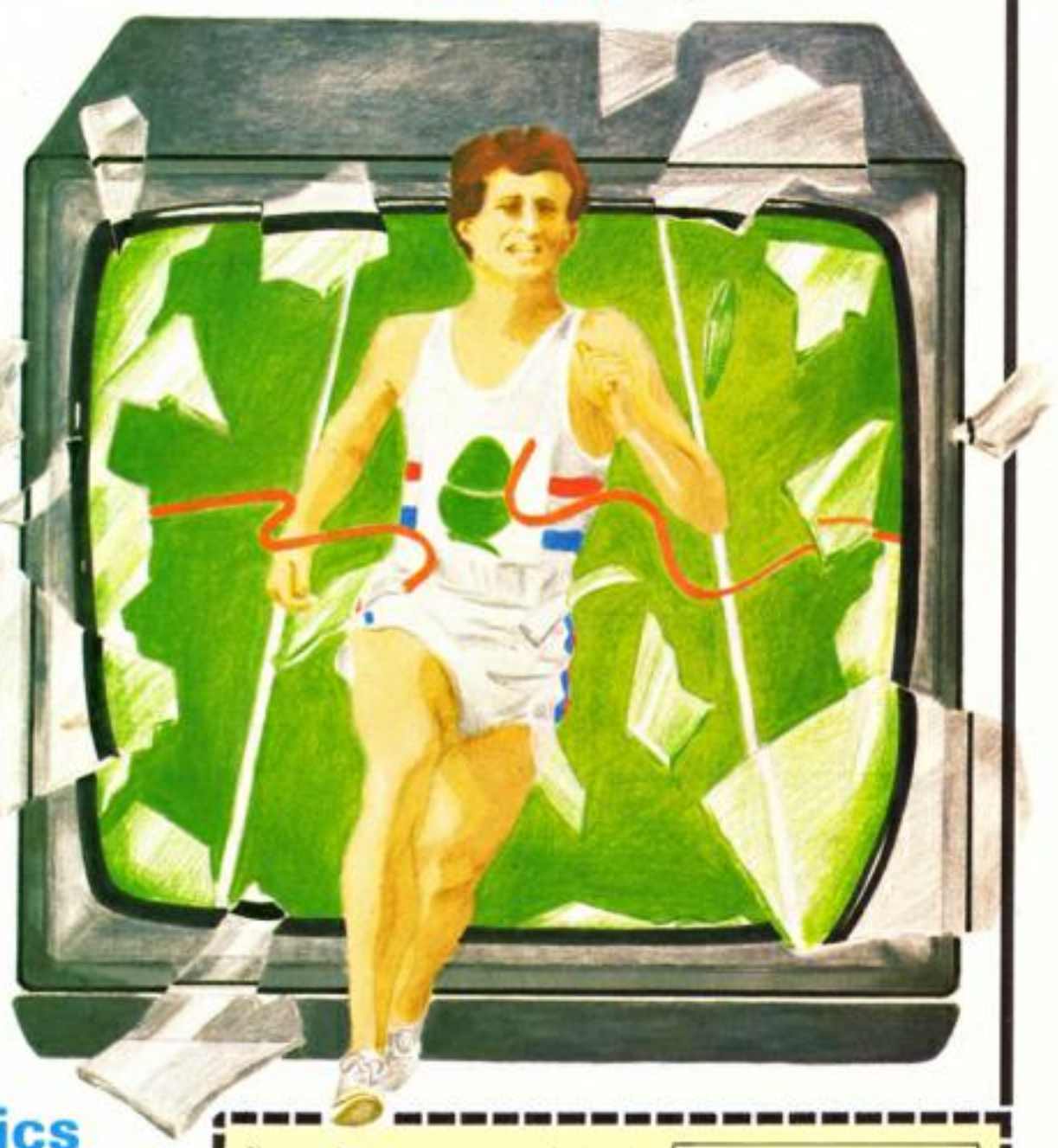

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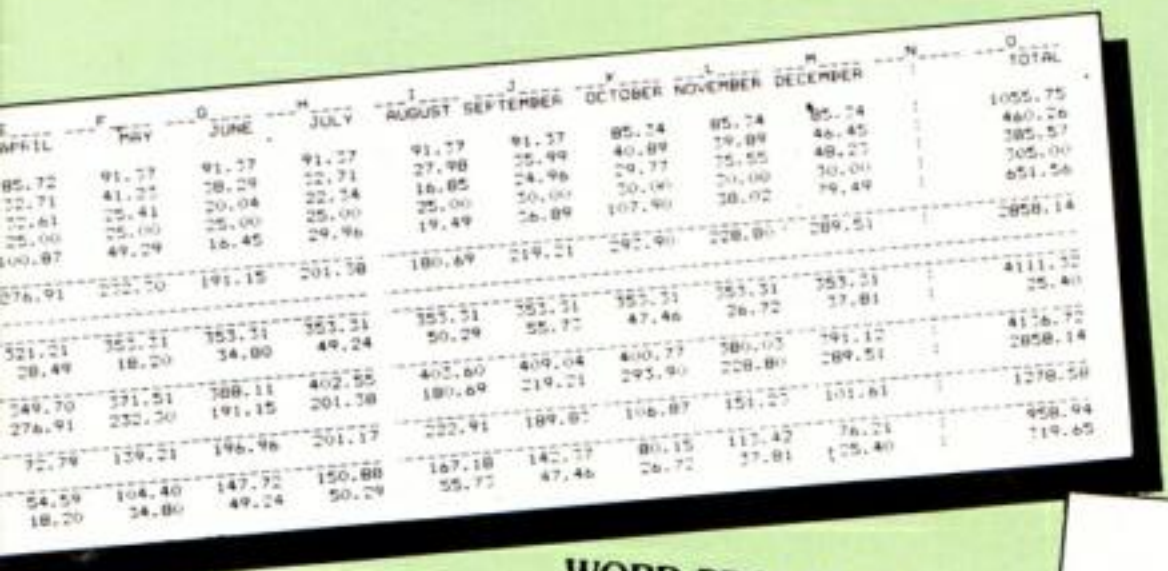

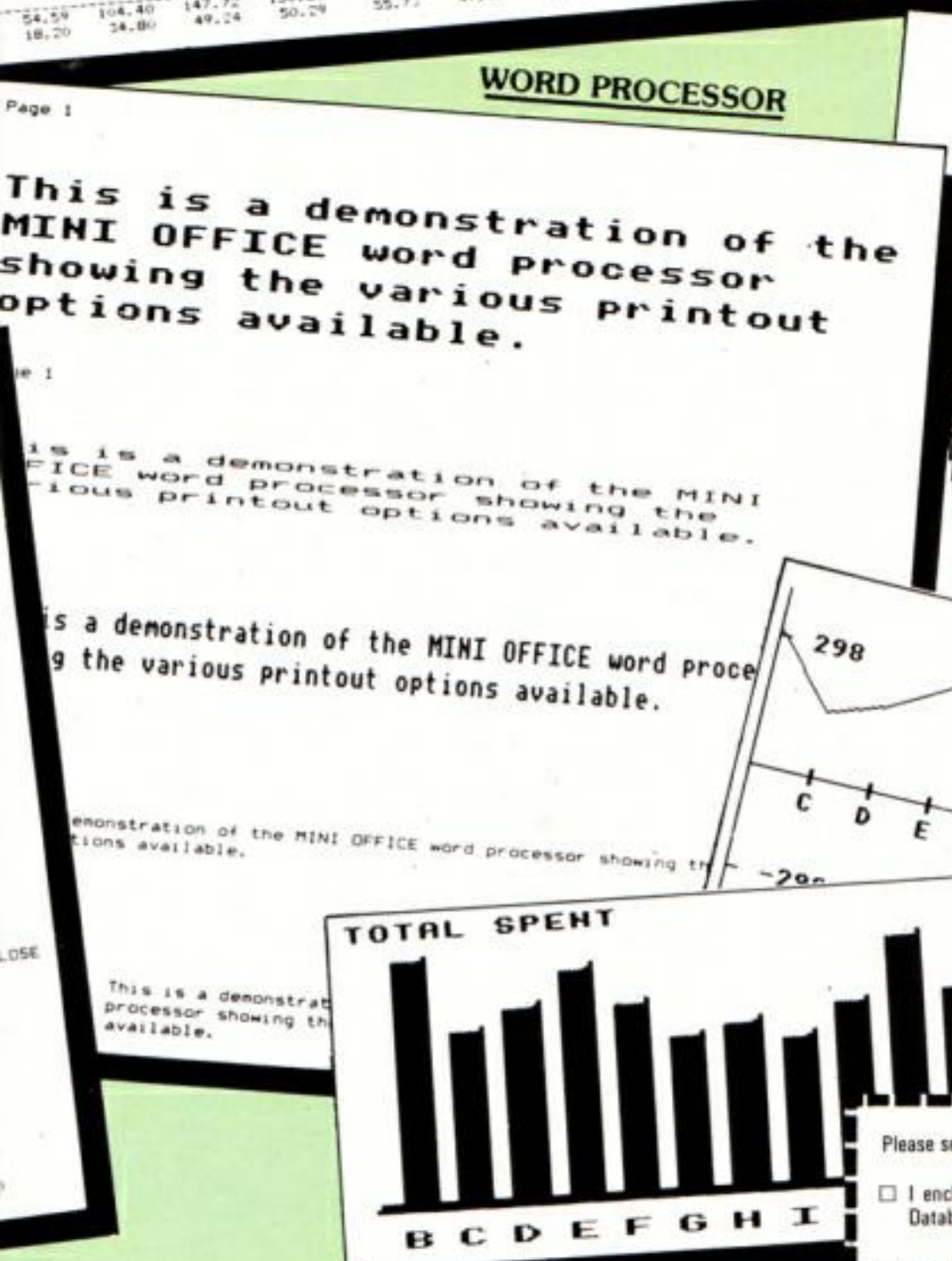

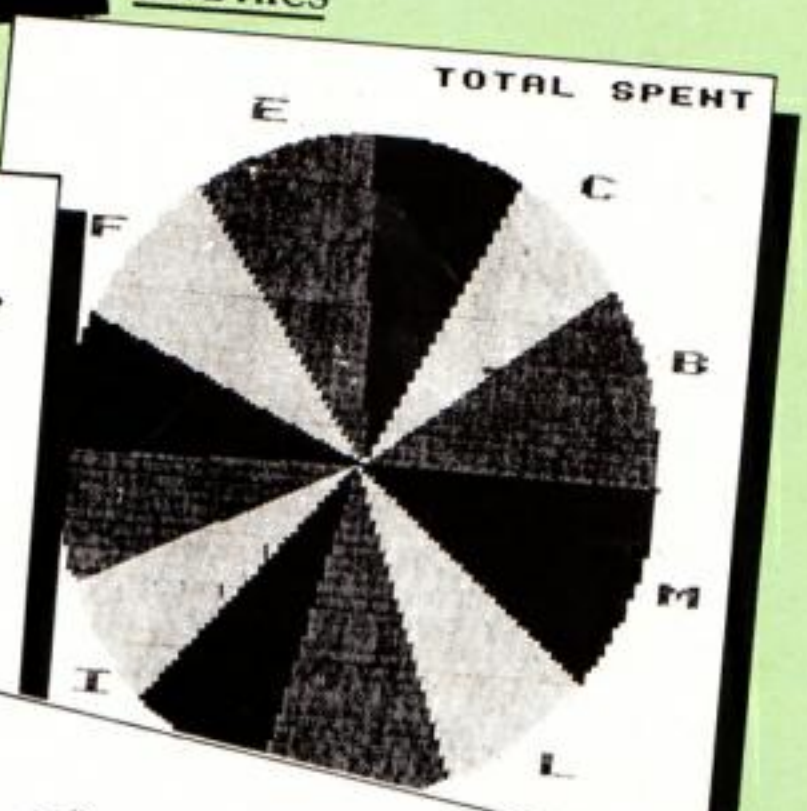

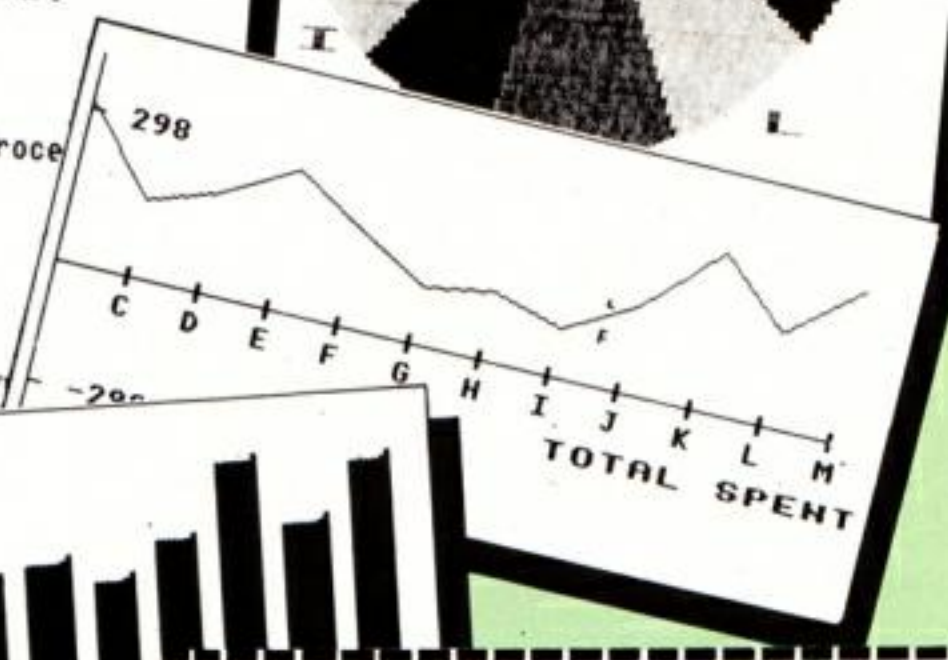

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MUSIC MICRO PLEASE

MIKE PLUMMER scores a hit with this music composition program

I WROTE this program to help my son, who was starting to learn music at school.

The idea is to use the computer as a simple way of entering musical script, hear how the music sounds and edit the tune in memory until it's what is wanted.

Also, the ability to save and load the tune to tape or disc is included.

All the program's actions are called from a master menu, which is returned to at any time by pressing Escape. The options available are:

- Set up and edit a tune by drawing notes on a musical stave.

It's possible to use all the notes between middle C and two Cs above middle or just the unsharpened notes – that is, the scale of C major.

Notes are selected by moving the current note up and down the stave using the cursor control keys.

You move to the last or next note using the left or right cursor keys, and notes can be inserted using Copy and erased using Delete. An arrow points to the current note.

To clear the tune altogether use Return and to change the title use T.

The length of the note can also be changed using digit keys 1-4 for minim, crotchet, quaver and semi-quaver respectively.

- Play the tune stored in the memory and control the tempo at which it is played.

A "tune", the scale of C major, is set up when the program is run.

The tempo can be speeded up using the right cursor key and slowed down using the left.

A figure of merit which represents the tempo is displayed but it has no meaning in terms of beat per minute. The note being played is pointed at by an arrow.

- Save the tune in memory to tape.
- Load a new tune into memory.
- For completeness it is also possible to turn the sound on or off, but this is of limited use in a music composing program.

The program uses byte arrays and byte indirection to provide maximum speed and compactness of code, and the variables are named, as far as possible, starting with a different letter, again to help speed of execution.

This means you must be very careful when typing the program in, as the variables names use mixed upper and lower case.

The notes are stored as user defined characters and plotted on the stave using VDU 5 and MOVE.

To draw a note requires a string of these characters and these are stored in the two dimensional string array *vnt$*.

The row dimension represents whether the note is a quaver, minim or so on, and the column whether the note is drawn on a stave line, between two, or above or below them.

The position of the notes on the stave are stored in byte array *ypos%* and indexed by the number of the note.

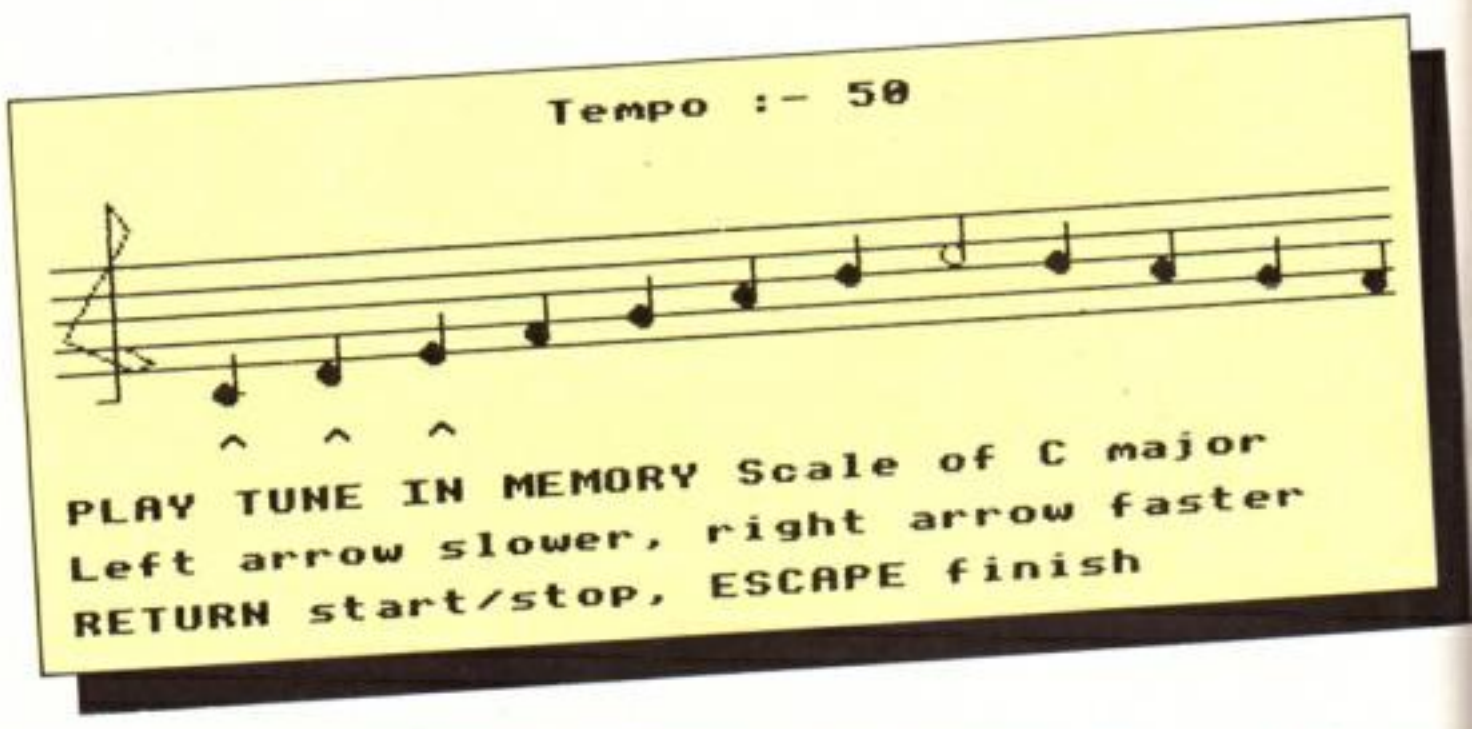
Middle C is 1 and two Cs above middle is 25.

The same indexing system is used for all arrays describing individual notes.

A tune is stored in the byte array *Tune%* and each note is represented by a single byte. The length of the note is stored in the corresponding byte of byte array *Len%*.

The notes are drawn 12 at a time on the stave and when playing a small delay as the next 12 are drawn means that the 12th note plays a little longer than is indicated. Also no time signature is displayed.

If you wanted to improve the program, you could draw the musical bars on the stave, and also change the key signatures. You could devise a way of drawing flattened notes very easily.



PROCEDURES

instructions	Displays main menu.
setup	Defines characters, initialises note positions, names and tune.
playnote (n%,l%)	Plays note number *n%* for time *l%*.
shownote (tnt%,llen%,xpos%)	Draws note *tnt%* at *xpos%* along the stave. Value of *llen%* determines whether minim, crotchet etc.
playmusic	Plays and displays the tune in memory.
editmusic	Creates and modifies a tune in memory.
getname(msg$)	Gets a file name using *msg$* as a prompt.
savetune	Saves the tune in memory to tape.
getune	Loads a new tune from tape.
FNchng (num%,inc%)	Returns new note number when going up and down the scale during editing. Skips sharpened notes if *all%* is FALSE.

VARIABLES

key$	Key presses.
sn%	TRUE if sound effects on.
all%	TRUE if sharpened notes are included.
Vtitle$	Title of tune.
ypos%	Byte array storing position of a note on stave.
ptr%	Byte array index.
byte%	General purpose byte.
mnm$,crt$,qvr$,sqv$	Strings storing characters for various length notes.
i%	General counter.
vnt$( )	Two dimensional array storing note type and length.
rnt$( )	Name of note.
bnt%	Byte array storing individual note type.
Tune%	Byte array storing notes of tune.
Len%	Byte array storing length of notes in tune.
Qlen%	Length of *Tune%* and *Len%*.
Tpt%	Marks last note in tune.
Utempo%	Set speed at which tune is played.
Alnote$	Holds note numbers for notes only used when sharps are being used.
lpt%,kpt%,jpt%	Local array offsets.
Xpos%,Mnote%,Lnote%	Local description of notes.
valkey$	Stores all valid key responses at a particular time.
Ec%	TRUE when moving up to next page of music.
Dn%	TRUE when going back to previous page of music.
lname$	Name of a file.
Gf	Input/output channel number.

Compose listing

```
  10REM COMPOSE
  20REM (c) Electron User
1985
  30REM by M.J.Plummer
  40*FX225
  50*FX4,1
  60MODE4:VDU 23,1,0;0;0;0
;19,0,7;0;19,1,0;0;:*FX11,0
  70PROCsetup
  80ONERROR GOTO 1960
  90REPEAT
 100PROCinstructions
 110REPEAT
 120*FX21,0
 130key$=CHR$(GET AND &5F)
 140UNTIL INSTR("LQPMISA",
key$)
 150VDU24,0;0;1279;1023;
 160IF key$="Q" sn%=FALSE:
*FX210,1
 170IF key$="L" sn%=TRUE:*
FX210,0
 180IF key$="P" PROCplaymu
sic
 190IF key$="M" PROCeditmu
sic
 200IF key$="S" PROCsavetu
ne
 210IF key$="I" PROCgetune
 220IF key$="A" all%=NOT a
ll%
 230UNTIL FALSE:END
 240:
 250REM -- Print instructi
on menu --
 260DEF PROCinstructions
 270CLS:PRINT ''TAB(5)"Mus
ic composer by M.J.Plummer"
'TAB(3)"----------------
--------------"'''
 280PRINT "M: set up music
al script to play a tune"''
 290PRINT "P: play the tun
e stored in memory"''
 300PRINT "S: save tune in
 memory on tape/disc"''
 310PRINT "I: input tune f
rom tape/disc"''
 320PRINT "L: ";:IF sn%=TR
UE THEN PRINT"SOUND ON"'' E
LSE PRINT "sound on"''
 330PRINT "Q: ";:IF sn%=FA
LSE THEN PRINT"SOUND OFF"''
 ELSE PRINT "sound off"''
 340PRINT "A: ";:IF all% T
HEN PRINT "ALL NOTES/no sha
rpened notes" ELSE PRINT "a
ll notes/NO SHARPENED NOTES
"
 350PRINT ''TAB(3)STRING$(
33,"-")''"Tune stored :- ";
Vtitle$;
 360ENDPROC
 370:
 380REM -- Define characte
rs and tune --
 390DEF PROCsetup
 400*OPT1,1
 410*FX210,0
 420VDU23,234,52,76,132,13
2,132,68,56,0
 430VDU23,235,52,124,252,2
52,252,124,56,0
 440VDU23,236,4,4,4,4,4,4,
4,4
 450VDU23,237,4,6,5,4,4,4,
4,4
```

→

From Page 27

```
  460VDU23,238,4,6,5,4,6,5,
4,4
  470VDU23,239,0,0,0,255,0,
0,0,0
  480VDU23,240,255,255,255,
255,255,255,255,255
  490DIM ypos% 26:ptr%=1:RE
STORE 510:?ypos%=0
  500REPEAT READbyte%:ypos%
?ptr%=byte%:ptr%=ptr%+1:UNT
ILptr%>26
  510DATA0,0,15,15,30,45,45
,60,60,75,75,90,105,105,120
,120,135,150,150,165,165,18
0,180,195,210
  520ana$=CHR$236+CHR$10+CH
R$8+CHR$234
  530crt$=CHR$236+CHR$10+CH
R$8+CHR$235
  540qvr$=CHR$237+CHR$10+CH
R$8+CHR$235
  550sqv$=CHR$238+CHR$10+CH
R$8+CHR$235
  560 DIMvnt$(6,3):FORi%=0T
O3:vnt$(0,i%)="":NEXT
  570vnt$(1,3)=ana$+CHR$8+C
HR$239
  580vnt$(1,2)=crt$+CHR$8+C
HR$239
  590vnt$(1,1)=qvr$+CHR$8+C
HR$239
  600vnt$(1,0)=sqv$+CHR$8+C
HR$239
  610vnt$(2,0)=vnt$(1,0)+CH
R$8+CHR$8+"#"
  620vnt$(2,1)=vnt$(1,1)+CH
R$8+CHR$8+"#"
  630vnt$(2,2)=vnt$(1,2)+CH
R$8+CHR$8+"#"
  640vnt$(2,3)=vnt$(1,3)+CH
R$8+CHR$8+"#"
  650vnt$(3,3)=ana$:vnt$(3,
2)=crt$:vnt$(3,1)=qvr$:vnt$
(3,0)=sqv$
  660vnt$(4,3)=ana$+CHR$8+C
HR$8+"#"
  670vnt$(4,2)=crt$+CHR$8+C
HR$8+"#"
  680vnt$(4,1)=qvr$+CHR$8+C
HR$8+"#"
  690vnt$(4,0)=sqv$+CHR$8+C
HR$8+"#"
  700vnt$(5,3)=ana$+CHR$8+"
_"
  710vnt$(5,2)=crt$+CHR$8+"
_"
  720vnt$(5,1)=qvr$+CHR$8+"
_"
  730vnt$(5,0)=sqv$+CHR$8+"
_"
  740vnt$(6,0)=vnt$(1,0)+CH
R$10+CHR$8+"-"
  750vnt$(6,1)=vnt$(1,1)+CH
R$10+CHR$8+"-"
  760vnt$(6,2)=vnt$(1,2)+CH
R$10+CHR$8+"-"
  770vnt$(6,3)=vnt$(1,3)+CH
R$10+CHR$8+"-"
```

```
  780DIM rnt$(25):DIM bnt%
26:RESTORE 800
  790ptr%=1:?bnt%=0:rnt$(0)
="None":REPEAT:READbyte%:bn
t%?ptr%=byte%:READrnt$(ptr%
):ptr%=ptr%+1:UNTILptr%=26
  800DATA 1,Middle C,2,C #,
3,D,4,D #,3,E,3,F,4,F #,3,G
,4,G #,3,A,4,A #,3,B,3,C ab
ove middle,4,C #,3,D,4,D #,
3,E,3,F,4,F #,3,G,4,G #,1,A
,2,A #,5,B,6,Two C's above
middle
  810Qlen%=500:DIM Tune% Ql
en%:DIM Len% Qlen%:Tpt%=0:U
tempo%=11:Vtitle$="Scale of
 C major":RESTORE850
  820REPEAT READ byte%:Tune
%?Tpt%=byte%:IFTpt%=7THENLe
n%?Tpt%=3ELSELen%?Tpt%=2
  830Tpt%=Tpt%+1:UNTILTpt%=
15:Tune%?Tpt%=0:Len%?Tpt%=2
  840FORi%=Tpt%TOQlen%-1:Tu
ne%?i%=0:Len%?i%=2:NEXT
  850DATA 1,3,5,6,8,10,12,1
3,12,10,8,6,5,3,1
  860all%=TRUE:sn%=TRUE
  870Alnote$="":RESTORE880:
REPEAT READ i%:Alnote$=Alno
te$+CHR$(i%):UNTIL i%=255
  880DATA 2,4,7,9,11,14,16,
19,21,23,255
  890ENDPROC
  900:
  910REM -- Play note n% fo
r time l% --
  920DEF PROCplaynote(n%,l%
)
  930SOUND &11,0,0,1:IF n%=
0 ENDPROC
  940SOUND 1,-15,n%+4+52,l%
  950ENDPROC
  960:
  970REM -- Draw treble sta
ve --
  980DEF PROCstave
  990VDU24,0;200;1279;570;:
CLG:MOVE0,300
 1000PLOT1,1279,0:PLOT0,0,3
0:PLOT1,-1279,0:PLOT0,0,30:
PLOT1,1279,0:PLOT0,0,30:PLO
T1,-1279,0:PLOT0,0,30:PLOT1
,1279,0
 1010PLOT0,-1240,-150:PLOT1
,20,0:PLOT1,0,225:PLOT1,20,
-35:PLOT1,-70,-120:PLOT1,65
,-40:PLOT1,20,10:PLOT1,-30,
20
 1020ENDPROC
 1030:
 1040:
 1050REM -- Show a note on
stave --
 1060DEF PROCshownote(tnt%,
llen%,xpos%)
 1070VDU5:MOVExpos%,(ypos%?
tnt%)+315
 1080PRINTvnt$(bnt%?tnt%,ll
en%);:VDU4
 1090ENDPROC
 1100REM:
 1110REM -- Play the tune i
n memory --
 1120DEF PROCplaymusic:LOCA
L lpt%,kpt%,jpt%
 1130CLS:*FX4,1
 1140PRINT TAB(15,8);"Tempo
 :- ";61-Utempo%
 1150PRINT TAB(0,27);"PLAY
TUNE IN MEMORY",Vtitle$;''"
Left arrow slower, right ar
row faster"''"RETURN start/
stop, ESCAPE finish";
 1160REPEAT
 1170PROCstave:PRINTTAB(10,
20);"Press a  key to start"
:key$=GET$:lpt%=0
 1180REPEAT CLG:PROCstave:j
pt%=lpt%:kpt%=0:REPEAT:PROC
shownote(Tune%?lpt%,Len%?lp
t%,kpt%*100+150):kpt%=kpt%+
1:lpt%=lpt%+1:UNTILkpt%=12
OR lpt%=Tpt%
 1190kpt%=0:REPEAT VDU5:MOV
E kpt%*100+150,220:PRINT "^
";:VDU4:PROCplaynote(Tune%?
jpt%,255):key$=INKEY$(2^(Le
n%?jpt%)*Utempo%):kpt%=kpt%
+1:jpt%=jpt%+1
 1200IFkey$=CHR$13 REPEAT U
NTIL GET$=CHR$13
 1210IFkey$=CHR$137 IF Utem
po%>1 Utempo%=Utempo%-1:PRI
NT TAB(15,8);"Tempo :-    "
+STRING$(3,CHR$8);61-Utempo
%
 1220IFkey$=CHR$136 IF Utem
```

```
po%<60 Utempo%=Utempo%+1:PR
INT TAB(15,8);"Tempo :-
"+STRING$(3,CHR$8);61-Utemp
o%
 1230UNTILkpt%=12 OR jpt%=T
pt%
 1240UNTIL lpt%=Tpt%
 1250TIME=0:REPEAT UNTILTIM
E=60:SOUND &11,0,1,1
 1260UNTILFALSE
 1270ENDPROC
 1280:
```

```
    Music composer by M.J.Plummer
    ------------------------------

M: set up musical script to play a tune

P: play the tune stored in memory

S: save tune in memory on tape/disc

I: input tune from tape/disc

L: SOUND ON

Q: sound off

A: ALL NOTES/no sharpened notes

    ------------------------------

Tune stored :- Scale of C major
```

```
 1290REM -- Edit the tune i
n memory --
 1300DEFPROCeditmusic
 1310LOCALXpos%,lpt%,jpt%,k
pt%,Mnote%,Lnote%
 1320lpt%=0
 1330CLS:PRINT TAB(10,27);"
EDIT TUNE ",Vtitle$;"''"   *
** See above for edit keys
 ***"''"RETURN clear tune,
 ESCAPE finish";:valkey$=CH
R$13+CHR$127+CHR$135+CHR$13
6+CHR$137+CHR$138+CHR$139+"
1234Tt"
 1340 PRINT CHR$30;"Up arro
w higher note, down arrow l
ower"''"Left arrow move to
previous note"''"Right arro
w move to next note"''"COPY
 insert a note at current p
oint"''"DELETE remove note
at current point"'
 1350PRINT "T  Change the t
itle of the tune"''"     1
       2          3
 4"''"semi-quaver  quaver
 crochet   minim":Dn%=FALSE
:Ec%=FALSE
 1360REPEAT:VDU24,0;200;127
9;570;:kpt%=lpt% MOD 12
 1370   IF Ec% OR(kpt%=0 AN
D NOT Dn%) OR(kpt%=11AND Dn
%) CLG:PROCstave:jpt%=lpt%:
lpt%=lpt%-(lpt% MOD 12):kpt
%=0:REPEAT:PROCshownote(Tun
e%?lpt%,Len%?lpt%,kpt%*100+
140):kpt%=kpt%+1:lpt%=lpt%+
1:UNTILkpt%=12 OR lpt%=Tpt%
:lpt%=jpt%
 1380kpt%=lpt%MOD12:Xpos%=k
pt%*100+140:VDU24,Xpos%-50;
200;Xpos%+35;550;:CLG:FORi%
=300TO430STEP30:MOVEXpos%-5
0,i%:DRAWXpos%+50,i%:NEXT
 1390Mnote%=Tune%?lpt%:Lnot
e%=Len%?lpt%:PROCshownote(M
note%,Lnote%,Xpos%)
 1400VDU5:MOVEXpos%,220:PRI
NT"^";:VDU4,31,19,14:PRINT
STRING$(20," ")+STRING$(20,
CHR$8)+rnt$(Mnote%)
 1410REPEAT:*FX21,0
 1420key$=GET$:UNTIL INSTR(
valkey$,key$)
 1430Ec%=FALSE:VDU5:MOVEXpo
s%,220:VDU240,4
 1440IF INSTR("1234",key$)
Len%?lpt%=EVAL(key$)-1
 1450IFkey$=CHR$139 IF Mnot
e%<25 Tune%?lpt%=FNchng(Mno
te%,1)
 1460IFkey$=CHR$138 IF Mnot
e%>0 Tune%?lpt%=FNchng(Mnot
e%,-1)
 1470IF key$=CHR$137 IF lpt
%<Qlen%-1 lpt%=lpt%+1:Dn%=F
ALSE:IF lpt%>Tpt% Tpt%=lpt%
 1480IFkey$=CHR$136 IF lpt%
>0 lpt%=lpt%-1:Dn%=TRUE
 1490IFkey$=CHR$135 THEN FO
Ri%=Qlen%-1TOlpt%STEP-1:Tun
e%?(i%+1)=Tune%?i%:Len%?(i%
+1)=Len%?i%:NEXT:Ec%=TRUE:T
une%?lpt%=0:Len%?lpt%=2
 1500IFkey$=CHR$127THEN FOR
i%=lpt%TOQlen%-1:Tune%?i%=T
une%?(i%+1):Len%?i%=Len%?(i
%+1):NEXT:Tpt%=Tpt%-1:Ec%=T
RUE
 1510IF INSTR("Tt",key$)=0
GOTO1540
 1520PRINT TAB(20,27);SPC(2
0);TAB(10,27);:INPUT" TITLE
 = "Vtitle$:IF LEN(Vtitle$)
>20 Vtitle$=LEFT$(Vtitle$,2
0)
 1530PRINT TAB(10,27);"EDIT
 TUNE ";Vtitle$;TAB(0,20);S
PC(40);
 1540UNTILkey$=CHR$13
 1550CLS:PRINT TAB(5,10);"A
re you sure you want to cle
ar"''TAB(10);Vtitle$;" (Y/N
)?"
 1560REPEAT key$=GET$:UNTIL
 INSTR("yYnN",key$):IF INST
R("nN",key$)GOTO1320
 1570FORi%=0TOQlen%-1:Tune%
?i%=0:Len%?i%=2:NEXT:Vtitle
$="":Tpt%=1:GOTO1320
 1580ENDPROC
 1590REM:
 1600REM -- Get file name f
rom keyboard --
 1610DEFPROCgetname(msg$)
 1620REPEAT
 1630CLS:PRINT TAB(15,10);m
sg$;TAB(5,12);
 1640INPUT"Type in file nam
e "lname$:PRINT:IF LEN(lnam
e$)>7 lname$=LEFT$(lname$,7
)
 1650UNTILLEN(lname$)>0
 1660ENDPROC
 1670:
 1680REM -- Save existing t
une to filing system --
 1690DEFPROCsavetune
 1700PROCgetname("SAVE TUNE
")
 1710Gf=OPENOUT lname$
 1720PRINT''"Saving ";Vtitl
e$;" in file ";lname$
 1730PRINT# Gf,Vtitle$:PRIN
T# Gf,Tpt%:PRINT# Gf,all%:P
RINT# Gf,Utempo%
 1740FORi%=0TOQlen%-1:BPUT#
 Gf,Tune%?i%:BPUT# Gf,Len%?
i%:NEXT
 1750CLOSE# Gf
 1760ENDPROC
 1770:
 1780REM -- Load a tune fro
m filing system --
 1790DEFPROCgetune
 1800PROCgetname("LOAD TUNE
")
 1810PRINT'TAB(10);"*** Sta
rt tape ***"
 1820Gf=OPENIN lname$
 1830INPUT# Gf,Vtitle$:INPU
T# Gf,Tpt%:INPUT# Gf,all%:I
NPUT# Gf,Utempo%
 1840PRINT''"Loading ";Vtit
le$;" in file ";lname$
 1850FORi%=0TOQlen%-1:Tune%
?i%=BGET# Gf:Len%?i%=BGET#
Gf:NEXT
 1860CLOSE# Gf
 1870ENDPROC
 1880:
 1890REM -- Move to next no
te on scale --
 1900DEF FNchng(num%,inc%)
 1910num%=num%+inc%
 1920IF INSTR(Alnote$,CHR$(
num%)) AND NOT all% THEN nu
m%=num%+inc%
 1930=num%
 1940REM:
 1950REM -- Return to menu
when ESC --
 1960IF ERR=17 THEN VDU 4,2
4,0;0;1279;1023;16:GOTO 90
ELSE MODE6:REPORT:PRINT " a
t line ";ERL:*OPT
 1970END
```

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

Notebook Part 19

THIS month our notebook contains a simple program that shows how data can be recorded in, and retrieved from, files.

Jim uses it to keep records of the birds he's seen but, of course, it can be used for storing anything.

PROGRAM NOTES

40-100 Make up the part of the program that creates the data file. The routine will write to either tape or disc, the techniques being the same in either case.

50 The function OPENOUT creates a new file called Birds to be written to by whichever filing system is in use, tape or disc. This filing system allocates a channel which the Electron uses as a pathway for sending the data to be saved. The channel's number is stored in the aptly named variable *channel*. Add:

```
PRINT "Channel " channel
```

to see which channel is used.

60-90 Form a REPEAT . . . UNTIL loop which reads in successive versions of *specie$*. The loop ends when it comes up against the mythical roc.

70 Takes a bird from line 230's data statement. In practice the data would be more likely to come from the keyboard or another file.

80 The PRINT# sends the current contents of *specie$* to tape or disc via channel number *channel*.

100 Closes the channel, putting in an end of file marker, a sort of electronic full stop. It's important that files are closed when they are finished with. Try leaving this line out and see what happens. Entering:

```
CLOSE#0
```

which shuts down any and all open channels, will come to your rescue if you get tangled up in open files after this experiment!

120 Reminds cassette users that the tape will need rewinding before Birds can be read.

140-210 Read the previously created file and print out its contents.

150 Has the function OPENIN opening the file Birds for reading only. The data is to be transferred between the disc or cassette and the Electron via the pathway whose number is held in *channel*.

170-200 This REPEAT . . . UNTIL loop reads in the species names from the file. The loop ends when it comes across the End Of File marker on channel *channel*.

180 The INPUT# reads in the current identity of *specie$* from pathway number *channel*.

190 Displays the species.

```
10 REM SIMPLE FILES
20 REM JIM SIMPSON
30 REM ***********
40 REM RECORDING
50 channel=OPENOUT "Birds"
60 REPEAT
70 READ specie$
80 PRINT #channel,specie$
90 UNTIL specie$="roc"
100 CLOSE #channel
110 REM ***********
120 PRINT "Position tape"
130 REM ***********
140 REM READING
150 channel=OPENIN "Birds"
160 PRINT "This year I've seen:"
170 REPEAT
180 INPUT # channel,specie$
190 PRINT TAB(20) specie$
200 UNTIL EOF #channel
210 CLOSE #channel
220 REM ***********
230 DATA bluethroat, black tern,
    marsh harrier, roc
```

write file

Read file

Data

create a file called Birds accessed via channel channel

take species from 230 and send to Birds via channel

put in EOF marker close file

Open channel to existing file Birds

take in species from Birds via channel

stop loop + close channel when all file read

Trevor Roberts

Utilities

Title	Supplier	Description
S-Pascal	ACS	Pascal package designed for teaching by Nicholas Wirth, inventor of Pascal.
Sprite-Gen	DAL	Machine code multi-coloured graphics used from Basic to provide arcade-style sprite graphics.
Simonsoft Sprites Version Two	SIM	Comprehensive sprites package animation in user's Basic programs.
Turtle Graphics	ACS	Introduction package for teaching geometry, mathematics and graphics.

Suppliers of programs featured in this Guide:

ACS Acornsoft, Betjeman House, 104 Hills Road, Cambridge CB2 1LQ. *Tel: 0223 316039.*

AS Astrocalc, 67 Peascroft Road, Hemel Hempstead, Herts HP3 8EL. *Tel: 0442 51809.*

AVP AVP Computing, Hocker Hill House, Chepstow, Gwent NP6 5ER. *Tel: 02912 5439.*

BES Bourne Educational Software, Bourne House, The Hundred, Romsey, Hants SO5 8BY. *Tel: 0794 523301.*

BRS Bridge Software, 103 Hillside Road, Corfe Mullen, Winborne BH21 3SG. *Tel: 0202 602642.*

BTL Bell Tech Limited, St. Leonards Close, Bridgnorth, Shropshire WV16 6EW. *Tel: 07462 5420.*

CHL Chalksoft Ltd., PO Box 49, Spalding, Lincs PE11 1NZ. *Tel: 0775 69518.*

COM Comsoft, 67 Kent Road, Harrogate, N. Yorkshire HG21 2NH. *Tel: 0423 57464.*

DAL DACC Ltd, 23 Waverley Road, Hindley, Wigan, Lancs. *Tel: 061-88 57872.*

DAS Daco Software, 59 Mackenzie Road, Birmingham B11 4EP. *Tel: 021-449 2253.*

DEA Dean Associates, Provincial House, Sollys, Sheffield S1 4BA. *Tel: 0742 756666.*

EOS Educated Owl Software, 62 Airedale Avenue Tickhil, Doncaster, South Yorkshire DN11 9UM.

GAC Garland Computing, 35 Dean Hill, Plymouth. *Tel: 0752 41287.*

GOL Golem Ltd, 77 Qualitas, Bracknell, Berks. *Tel: 0344 50720.*

HC Hewson Consultants, Hewson House, 56b Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX. *Tel: 0235 832939.*

HOC Holly Computers Limited, PO Box 17, Bingley, West Yorkshire BD16 3JQ.

HST HaiKu Software Technology, Dragon Gate, 77 St Johns Street, Hayle, Cornwall. *Tel:: 0736 754845.*

DCS Kingfisher Computing Services, 16 Martock Road, Keynsham, Bristol BS18 1XA.

KSL Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds LU5 6LX. *Tel: 05255 3942.*

LCL Ludinski Computer-Assisted Learning, 26 Avondale Avenue, Staines, Middlesex. *Tel: 0784 58771.*

LID Linkword, 41 Water Lane, Swansea. *Tel: 0992 295281.*

LGL Longman Group Ltd, Longman House, Burnt Mill, Harlow, Essex CM20 2JE. *Tel: 0279 26721.*

MIS Mirrorsoft, Mirror Group Newspaper, Holborn Circus, London EC1. *Tel: 01-822 3800.*

SES Serin Software, PO Box 163, Slough SL2 3YY. *Tel: 02814 3180.*

SHA Shards Software, 189 Eton Road, Ilford, Essex. *Tel: 01-514 4877.*

SIL Silversoft Ltd, London House, 271-273 King Street, London W6 9LZ. *Tel: 01-748 4125.*

SIM Simonsoft 25 Tatham Road, Abingdon, Oxon OX14 1QB.

SL Slogger, 215 Beacon Road, Chatham, Kent. *Tel: 0634 41622.*

SOP Software Projects, Unit 1, Bear Brand Complex, Allerton Road, Woolton, Liverpool L25 7SF. *Tel: 051-428 9393.*

SS Squirrel Soft 4 Bindloss Avenue, Eccles, Manchester M30.

STE Stella Enterprise, 84 Dudsbury Road, Ferndown, Wimborne, Dorset BH22 8EG. *Tel: 0202 575234.*

SUM Summerfield Software, 141 Worcester Road, Malvern, Worcs. *Tel: 06845 61230.*

SUS Superior Software Ltd, Regent House, Skinner Lane, Leeds LS7 1AX. *Tel: 0532 459453.*

TBS Total Business Services, 29 Holloway Lane, Amersham, Bucks. *Tel: 02403 21702.*

UNS University Software, 29 St Peters Street, London N1 8JP. *Tel: 01-359 0978.*

WIS Wida Software, 2 Nicholas Gardens, London W5 5HY. *Tel: 01-567 6941.*

NEXT MONTH: *Guide to Games software for the Electron*

electron user

Guide to Electron Software

PART ONE

Educational programs

Utility programs

Educational

Title	Supplier	Description
Animated Arithmetic	LCL	Teaches using moving colour pictures. Ages 3 to 8.
Astrotutor (5 programs)	AS	Self-teaching of astrological keywords.
Answer Back Junior. General Knowledge.	KSL	Combines a compelling game with 15 immense quizzes. Fully re-programmable. Includes multiple-choice, True-False? modes. Ages 6 to 11.
Answer Back Senior. General Knowledge.	KSL	Combines a compelling game with 15 immense quizzes. Fully re-programmable. Includes multiple-choice, True-False? modes. Ages 12+.
Bridgemaster	SES	A tutor for the beginner at Bridge, prepared with world expert Terence Reese.
Business Games	ACS	Two educational games designed for economics, finance, general studies and general interest.
Children From Space	ACS	The player has to help the children from Space with spelling and word selection.
Choicemaster English	WIS	Authoring program allowing the user to input multiple-choice questions including distractor error messages.
Choicemaster French	WIS	As above but with French accented characters on screen.
Choicemaster German	WIS	As above but with German accented characters on screen.
Choicemaster Spanish	WIS	As above but with Spanish accented characters on screen.
Clozemaster English	WIS	Authoring package allowing the user to write in long texts for "Cloze" deletion and filling-in.
Constellation	SUS	View 455 stars in 50 constellations, from anywhere on Earth at any date and time.
Countries of the World	HC	Displays full-colour map of the world indicating position and listing details of each country.
Count with Oliver	MIS	Beginning shape and number work for children aged 4 to 7 with cheeky young Oliver.
Cranky	ACS	Cranky the crazy calculator allows children to explore relationships between numbers.
Early Maths	TWI	Teaches basic numeracy. Animated routines help understanding of addition/subtraction/multiplication/division. Ages 4 to 8.
Early Words	TWI	A package of six colourful programs to teach early spelling. Ages 3 to 6.
Educational 1	GOL	Hours of fun and learning for young children. Includes Math 1, Math 2, Cubecount, Shapes, Spell and Clock.
Educational 2	GOL	Similar to Educational 1 but more advanced. Includes Math 1, Math 2, Area, Memory, Cubecount, Spell.
Eiffel Tower	CHL	Two programs help brush up your French. Correct answers build the Eiffel Tower. Age 9-adult.
Face Maker	ACS	You can build up one of over a million possible identikit faces.

Educational

Title	Supplier	Description
Wordgram	DAS	Helps older children to understand word classifications (nouns, adjectives) by using words from selected groups.
Wordhang	BES	Word guessing game helps children to spell. 250-word list, plus make your own list. Age 5+.
Word Sequencing	ACS	Helps young students develop an awareness of sentence structure.
Word Spot	KCS	Three reading games in one. Graded vocabulary – 500+ words – matches the Ladybird reading scheme. Ages 5 to 12.
Words, Words, Words	ACS	Stimulating game which uses fantasy to help young children with their reading and spelling.
World Geography	SUS	Test your knowledge on over 165 countries, with a high-resolution screen map of the world.

Utilities

Title	Supplier	Description
Astrology	AS	Calculations of natal charts, progressions transits, midpoints, harmonies, synastry solar and lunar returns.
Bel Gen (Genealogy)	BTL	Menu-driven utility for tracing ancestors and keeping family records.
Creative Graphics	ACS	A spectacular range of pictures in full colour including animation.
Disassembler	SUS	Allows disassembled source code to be output to memory, then modifies and re-assembles.
Elkman	SL	ROM manager for Slogger ROMbox. Switches ROMS in-out to avoid clashing commands with other ROMs.
Forth	ACS	Complete implementation of the Forth language to 1979 specification.
Gamemaker 2	HOC	A superb sprite generator with simple links to Basic for beginners – Mode 2 version.
Gamemaker 5	HOC	As above, Mode 5.
Graphs and Charts	ACS	Build up graphics routines which can be incorporated into your programs.
Lisp	ACS	Fundamental language of artificial intelligence research.
Money Care	SS	Superb money management utility.
Picture Maker	ACS	Complete graphics system for preparing on screen diagrams, design or simple pictures.
Project Graphics	SOP	Simple graphics language, very easy to use.
Starmon	SL	Sophisticated machine code monitor in 8k ROM. Debug machine code programs, disassemble ROMs.

Educational

Title	Supplier	Description
Sentence Sequencing	ACS	Consists of two programs designed to test students' ability to order material in a logical sequence.
Serpents Lair	COM	Graphical adventure with many geographical locations and animals in correct habitat. Very interesting program.
Sir Francis Drake Adventure	LCL	Authentic, historical, graphics adventure game.
Sky-Baby	STE	Astronomy package for students and professionals. Plots and calculates Sun, Moon, planets and 469 stars.
Spanish Tutor Level A	KSL	Re-programmable Spanish learning aid including 16 extensive vocabulary lessons covering common nouns.
Spanish Tutor Level B	KSL	Re-programmable Spanish learning aid including 16 extensive vocabulary lessons covering common verbs, adjectives, adverbs.
Speaking French Speaking German Speaking Italian Speaking Spanish	TBS	Applies to each program. While looking at the phrases on the screen they can be heard at the same time – 90-min. speech cassette supplied. Contains revision tests and a letter-writing section.
Squeeze	ACS	Graphic, entertaining way of introducing children to geometrical concepts and problem-solving, using unusual shapes.
Star Seeker	MIS	Track planets, plot constellations, and follow the path of Halley's Comet.
Storyboard English	WIS	Authoring program in which the teacher inputs texts. The students have to "rebui' 4" it.
Storyboard French	WIS	As above but with French accented characters on screen.
Storyboard German	WIS	As above but with German accented characters on screen.
Storyboard Spanish	WIS	As above but with Spanish accented characters on screen.
Storyline	DAS	Helps children to make up entertaining stories. Two levels.
Table Adventures	ACS	Helps young children with their tables through facktorisation.
Talkback	ACS	Educational game which allows the creating of computer characters to carry out a conversation with human beings.
Timeman One	BES	Enables children – 4 to 9 – to tell the time – hours, then minutes, then hours and minutes.
Timeman Two	BES	Enables children – 4 to 10 – to understand the 24-hour clock, minutes to the hour, quarter and half hours.
Tank Tracks	SUM	Game of logic – Drive the tank across the battlefield and learn to program.
Tree of Knowledge	ACS	An interactive program that builds up a branching data program by answering and asking questions.
Treasure Hunt	KCS	Follow the clues to find the treasure. Teaches logic and the main compass points. Ages 6-12.
Word Games with the Mr Men	MIS	Opposites, comparatives, and positional adverbs in two fun games for children aged 5 to 8.

Educational

Title	Supplier	Description
First Moves	LGL	An introduction to Chess for eight-year-olds and over.
First Steps with the Mr Men	MIS	Pre-reading and other early learning skills – ages 4 to 7.
French on the Run	SIL	An exciting adventure game to test your knowledge of French.
French Revision for 16+ 'O' Level and CSE	DEA	Provides extensive revision for students preparing for the 16+ French examinations.
French Mistress Level A	KSL	A fully re-programmable French learning aid including 16 extensive vocabulary lessons covering common nouns.
French Mistress Level B	KSL	A fully re-programmable French learning aid including 16 extensive vocabulary lessons covering common verbs, adjectives, adverbs.
Fun With Numbers	GOL	Age range 4 to 7. Includes Count, Add, Subtract, Rocket, Maths.
Fun With Words	GOL	Age range 5 to 12. Includes Alpha, Vowels, There, Suffixes, Hangman.
German Master Level A	KSL	A fully re-programmable German learning aid including 16 extensive vocabulary lessons covering common nouns.
German Master Level B	KSL	A fully re-programmable German learning aid including 16 extensive vocabulary lessons covering common verbs, adjectives, adverbs.
Happy Numbers	BES	Teaches children to recognise numbers and introduces them to counting. Ages 3 to 5.
Happy Letters	BES	Helps children recognise letters and practise matching upper and lower case letters (3 to 6 years).
Happy Writing	BES	Helps children to write upper and lower case letters and numbers and practise words.
Here and There with the Mr Men	MIS	Early directional skills for those aged 5 to 8.
Hide and Seek	ACS	Designed to develop reading skills. The player has to remember where objects are hidden.
Hotel Fire	SUM	Put out the fires before they reach the basement. Includes an educational version (maths test).
Identify Europe.	KSL	A fascinating way of discovering and learning the geography of Europe, including seas. All ages
Introduction to Economics	UNS	An interactive course in 'A' Level economics.
Invisible Man	CHL	Ages 7-14. Draws and labels a 10 x 15 Cartesian grid, then hides a 'man' on it, you find with compass point clues.
Jiglet	EDS	Pattern recognition program aimed at primary age range. Four levels of difficulty.
Juggle Puzzle	ACS	Jigsaw puzzle of a special kind. A challenging game designed to exercise and increase mental agility.
Jigsaw Puzzles	GOL	Age range 4-12. Tape includes five jigsaw and sliding puzzles.

Educational

Title	Supplier	Description
Let's Count	ACS	Provides an introduction to the numbers 1-9 and the fundamental concepts of counting.
Logifrench I	WIS	A "fill-in" program on the forms and use of the Imperfect and Perfect.
Logifrench II	WIS	A "fill-in" testing program on the forms and use of the Future and Conditional.
Linkword French	LID	Teaches 350 words and a basic grammar in about 10 hours.
Linkword German	LID	Teaches 350 words and a basic grammar in about 10 hours.
Linkword Italian	LID	Teaches 400 words and a basic grammar in about 10 hours.
Linkword Spanish	LID	Teaches 400 words and a basic grammar in about 10 hours.
Look Sharp!	MIS	Sharpen observational and memory skills down on the farm or out in space. Age 6 up.
Map Rally	BES	Helps children understand coordinates and compass directions through a "car rally". Ages 7 to 13.
Make Sam Smile – Counting	GAC	Early learning – age 4+ – program featuring delightful graphics and positive educational rewards.
Make Sam Smile – Spelling	GAC	Early learning program – age 4+. Three levels of difficulty.
Make Same Smile – Word Matching	GAC	Early learning program – age 4+. Utilises spacebar and Return keys only.
Masterkey	LGL	Simple, logical, stress-free typing course, which can be completed in under ten hours.
Measuring Temperature	EDS	Teaches the use of thermometers with realistic, clear graphics. Pupil exercises and performance is monitored.
Micro English	LCL	Complete English Language 'O' Level course of 24 programs. Programs incorporate real speech (no extras required).
Micro Maths	LCL	24 program self-tuition or revision course taking beginners to 'O' Level standard.
Missing Signs	ACS	This program ,will serve as an introduction to simple equations.
Monster Maze	KCS	Answer arithmetic questions to defeat monsters as you find your way out of the maze. (Ages 6-12).
Mr Wolf	KCS	Tell the time by setting hands or "reading" the clock face. Appealing graphics. Ages 6 to 10.
Music Theory Tutor	AVP	Structured learning packages for individual or classroom use to 'O' Level.
Music Theory Tutor 1	AVP	Nine linking programs including staves, clefs, sharps and flats, pitch, note values and names, tests.
Music Theory Tutor 2	AVP	Nine linking programs including time signatures and bar lines, demonstration tune, key signatures, major scales, tests.
Music Theory Tutor 3	AVP	Eight linking programs including minor scales. Hints, intervals, tests.

Educational

Title	Supplier	Description
Music Theory Tutor 4	AVP	Twelve linking programs including major and minor chords, bass clef, pentatonic scales, dynamics, Italian terms, ornaments, tests.
Music Theory Tutor Games	AVP	Three games to reinforce skills learnt. Notedown 1 and 2, and Checker.
Night Sky	BRS	Enables the astronomer, beginner or old hand, to create starcharts for any date, any place.
Note Invaders	CHL	Two programs which teach note recognition with a challenging Invaders-type game. Age 7-adult.
Number Chaser	ACS	Provides children with the opportunity to practise estimation with an exciting race game.
Number Gulper	ACS	A gripping and fast-moving game that helps develop arithmetic skills.
Number Puzzler	ACS	Four games are an exciting way of improving your ability at addition and subtraction.
Osprey!	BES	Exciting game produced in conjunction with RSPB introducing the challenge of wildlife conservation. Age 8+.
Peeko-Computer	ACS	Simulates the operation of the simplified micro in order to demonstrate fundamentals of machine code.
Playbox	COM	Three programs on one cassette, Hangman, Memory and Bricksmash. Excellent graphics and very user-friendly.
Podd	ACS	Ask Podd to perform an action such as run or jump. Podd knows 120 words.
Profile Utility	EOS	A program to produce pupil profiles by computer. Profiles may be printed or stored.
Puncman 1 & 2	CHL	Three programs to help children with puctuation via a 'Pac'-type figure called Puncman. Age 7+.
Pye Charts	SUM	Educational program to check understanding of Pye charts with reference to block graphs.
Questionmaster English	WIS	Authoring program allowing the user to input questions and the learner to fill-in answers.
Questionmaster French	WIS	As above but with French accented characters on screen.
Questionmaster German	WIS	As above but with German accented characters on screen.
Questionmaster Spanish	WIS	As above but with Spanish accented characters on screen.
Quick Thinking	MIS	Speed up mental arithmetic in two Space Age arcade games for age 7 and up.
Reading Scales	EDS	To teach the reading of scales on balances. Realistic graphics. Pupils' performance monitored.
Readright	DAS	A systematic reading program using regular phonic words.
Science 1	SHS	Comprehensive science 'O' Level revision.

REVERSI

By RUSSELL THICKINGS

TAKE a rest from blasting nasties and being chased round mazes and take on your Electron at Reversi.

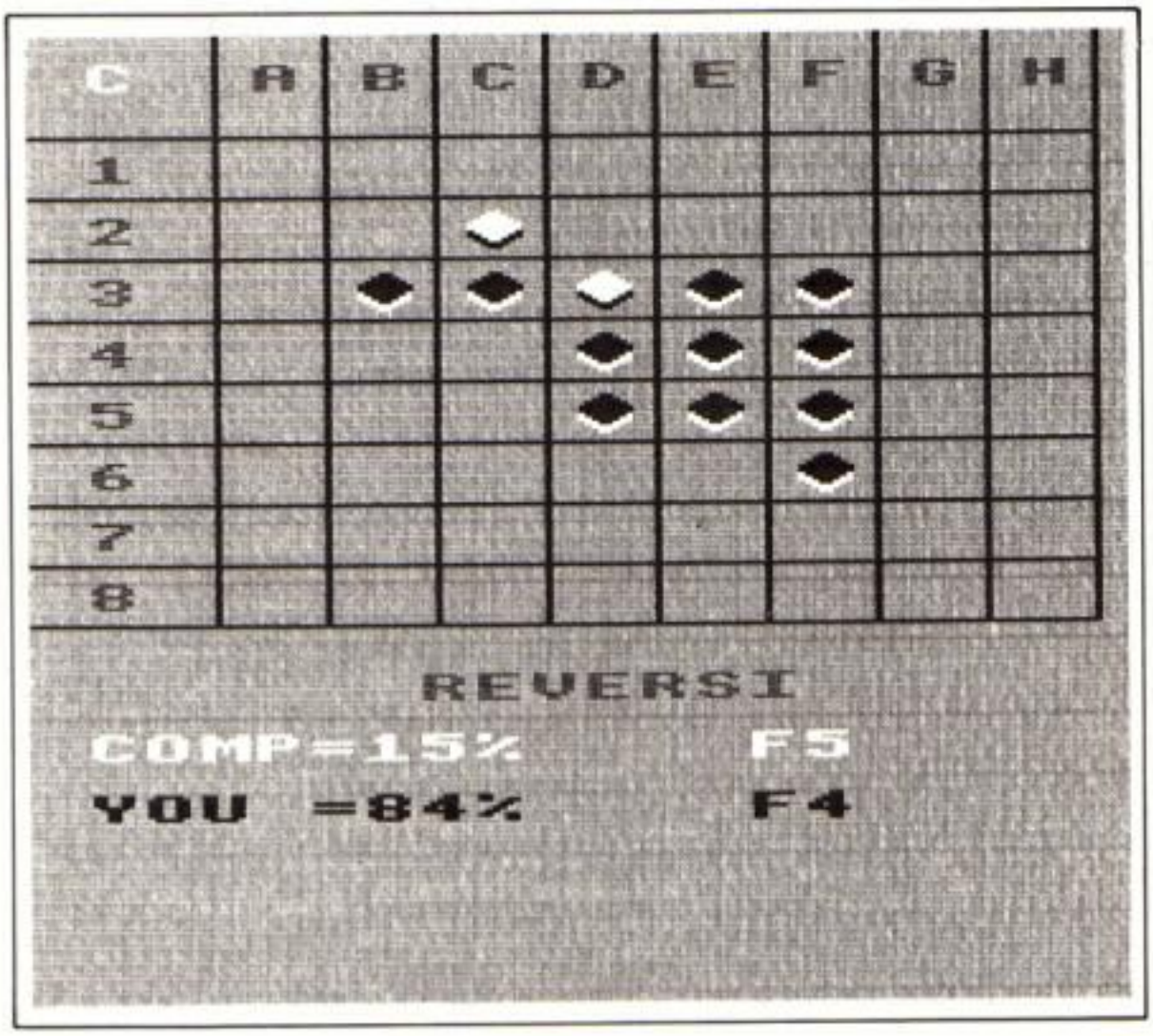
Exercise your mind and give your fingertips a rest as you ponder your stategy. You'll find your Electron a formidable adversary.

The program works on a grid system with 64 squares. Each square contains a number and the lower the number the better the square.

When it's the computer's turn it checks all 64 squares to see if it can turn over any of the player's counters and find the best legal move. If it can't go then the player has won.

When it is the player's turn it checks that the move is legal. If you can't go then Escape must be pressed and the computer wins.

The data at the end makes the computer play for the corners. Altering this will alter the computer's style of play.



PROCEDURES

instructions	Prints the instructions.
err	Report error or computer wins.
set	Set the variables, characters and envelopes.
grid	Draws the board.
win	Checks to see if anyone has won.
play	Player's move.
comp	Computer's move.
turn	Check computer's move.
check	Check player's move.
turnover	Place new counter and turn over the others.

VARIABLES

position%(8,8)	Grid of squares.
counter1%	Player's counter number.
counter2%	Computer's counter number.
colour1%	Player's colour.
colour2%	Computer's colour.
win%	Shows whether anyone has won.
key%	Key pressed.
x%,y%	Position of counter.
bestgo%	Computer's best go.

Reversi listing

From Page 35

```
  10 REM  Reversi
  20 REM by Russell Thicki
ngs
  30 REM (c) Electron User
  40 MODE1
  50 VDU23;8202;0;0;0;
  60 PROCinstructions
  70 MODE5
  80 ONERRORPROCerr:END
  90 DIMposition%(8,8)
 100 PROCset
 110 REM continue until no
 more games
 120 REPEAT
 130 PROCgrid
 140 PROCdata
 150 PROCwin
 160 REM continue game unt
il some one wins
 170 REPEAT
 180 PROCplay
 190 PROCwin
 200 PROCcomp
 210 PROCwin
 220 UNTILwin%<>0
 230 PROCrestart
 240 UNTIL32<>GET
 250 END
 260 REM store best positi
ons of play
 270 DEFPROCdata
 280 FORloop%=1TO8
 290 FORloop2%=1TO8
 300 READ read%
 310 position%(loop%,loop2
%)=read%
 320 NEXT:NEXT
 330 RESTORE
 340 ENDPROC
 350 REM see if any one ha
s WON,and print all counter
s.
 360 DEFPROCwin
 370 counter1%=0:counter2%
=0
 380 FORloop%=1TO8
 390 FORloop2%=1TO8
 400 IFposition%(loop%,loo
p2%)>=0THEN450
 410 IFposition%(loop%,loo
p2%)=computer%THENcolour1%=
0:colour2%=3:counter2%=coun
ter2%+1
 420 IFposition%(loop%,loo
p2%)=player%THENcolour1%=3:
colour2%=0:counter1%=counte
r1%+1
 430 VDU5,18,0,colour1%,25
,4,(2+loop%*2)*64;1024-(2+l
oop2%*2)*32;224
 440 VDU18,0,colour2%,25,4
,(2+loop%*2)*64;1016-(2+loo
p2%*2)*32;225,4
 450 NEXT:NEXT
 460 COLOUR0:PRINTTAB(1,23
)"COMP=";INT((counter2%*100
)/(counter1%+counter2%));"%
";
 470 COLOUR3:PRINTTAB(1,25
)"YOU =";INT((counter1%*100
)/(counter1%+counter2%));"%
";
 480 IFcounter1%+counter2%
=64ANDcounter1%>counter2%TH
ENwin%=player%
 490 IFcounter1%+counter2%
=64ANDcounter1%<counter2%TH
ENwin%=computer%
 500 IFcounter1%+counter2%
=64ANDcounter1%=counter2%TH
ENwin%=-3
 510 IFwin%=computer%THENP
RINTTAB(7,27)"I WIN !!"
 520 IFwin%=player%THENPRI
NTTAB(7,27)"YOU WIN !!"
 530 IFwin%=-3THENPRINTTAB
(7,27)"A DRAW ??"
 540 ENDPROC
 550 REM input players go,
and position
 560 DEFPROCplay
 570 x%=-16:y%=0:SOUND1,1,
120,3
 580 PRINTTAB(1,1);"Y";
 590 REPEAT
 600 REPEAT
 610 key%=INKEY(3000)
 620 IFkey%=-1THENSOUND1,1
,200,3
 630 UNTIL(key%>48ANDkey%<
58)OR(key%>64ANDkey%<73)
 640 IFkey%>48ANDkey%<58TH
ENy%=key%-48ELSEx%=key%-64
 650 PRINTTAB(13,25);CHR$(
x%+64);y%;
 660 UNTILx%<>-16ANDy%<>0
```

```
  670 IFposition%(x%,y%)=co
mputer%ORposition%(x%,y%)=p
layer%THENPROCmessage:GOTO5
70
  680 whosgo%=player%:PROCt
urn
  690 IFbestgo%<>whosgo%THE
NPROCmessage:GOTO570
  700 x%=-16:y%=0
  710 ENDPROC
  720 REM computer chooses
it best position
  730 DEFPROCcomp
  740 x%=0:y%=0:bestgo%=50
  750 COLOUR0
  760 PRINTTAB(1,1);"C";
  770 FORloop%=1TO8
  780 FORloop2%=1TO8
  790 IFposition%(loop%,loo
p2%)<>computer%THEN850
  800 FORacross%=-1TO1
  810 FORdown%=-1TO1
  820 IFloop%+across%<0ORlo
op%+across%>8ORloop2%+down%
<1ORloop2%+down%>8THEN840
  830 IFposition%(loop%+acr
oss%,loop2%+down%)=player%T
HENPROCcheck
  840 NEXT:NEXT
  850 NEXT:NEXT
  860 IFbestgo%=50THENwin%=
player%:ENDPROC
  870 COLOUR0:PRINTTAB(13,2
3);CHR$(64+x%);y%;:whosgo%=
computer%:PROCturn
  880 ENDPROC
  890 REM check the counter
s to be turned over
  900 DEFPROCturn
  910 IFwhosgo%=computer%TH
ENother%=player%ELSEother%=
computer%
  920 bestgo%=position%(x%,
y%):position%(x%,y%)=whosgo
%
  930 FORacross%=-1TO1
  940 FORdown%=-1TO1
  950 IFx%+across%<1ORx%+ac
ross%>8ORy%+down%<1ORy%+dow
n%>8THEN970
  960 IFposition%(x%+across
%,y%+down%)=other%THENPROCt
urnover
  970 NEXT:NEXT
  980 position%(x%,y%)=best
go%
  990 ENDPROC
 1000 REM turn the right co
unters over
 1010 DEFPROCturnover
 1020 horiz1%=0:vert1%=0
 1030 horiz1%=horiz1%+acros
s%:vert1%=vert1%+down%
 1040 IFx%+horiz1%<1ORx%+ho
riz1%>8ORy%+vert1%<1ORy%+ve
rt1%>8THENENDPROC
 1050 best%=position%(x%+ho
riz1%,y%+vert1%)
 1060 IFbest%=other%THEN103
0
 1070 IFbest%<>whosgo%THENE
NDPROC
 1080 horiz2%=0:vert2%=0
 1090 REPEAT
 1100 horiz2%=horiz2%+acros
s%:vert2%=vert2%+down%
 1110 position%(x%+horiz2%,
y%+vert2%)=whosgo%
 1120 UNTILhoriz2%=horiz1%A
NDvert2%=vert1%
 1130 bestgo%=whosgo%
 1140 ENDPROC
 1150 REM looks to see if c
an turn over a counter
 1160 DEFPROCcheck
 1170 horiz1%=0:vert1%=0
 1180 horiz1%=horiz1%+acros
s%:vert1%=vert1%+down%
 1190 IFloop%+horiz1%<1ORlo
op%+horiz1%>8ORloop2%+vert1
%<1ORloop2%+vert1%>8THENEND
PROC
 1200 best%=position%(loop%
+horiz1%,loop2%+vert1%)
 1210 IFbest%=player%THEN11
80
 1220 IFbest%=computer%ORbe
stgo%<best%THENENDPROC
 1230 x%=loop%+horiz1%:y%=l
oop2%+vert1%
 1240 bestgo%=position%(x%,
y%)
 1250 ENDPROC
 1260 REM display message i
f invalid move made
 1270 DEFPROCmessage
 1280 COLOUR3
 1290 PRINTTAB(13,25)"  "TA
B(0,27)CHR$(x%+64);y%;" IS
AN ILEGAL MOVE"TAB(2,29)"Pl
ease try again"
 1300 key%=INKEY(500)
 1310 PRINTTAB(0,27)"
                    "TAB(2,29)"
                    "
 1320 ENDPROC
 1330 REM set up screen dis
play
 1340 DEFPROCgrid
 1350 CLS:GCOL0,3
 1360 COLOUR2:PRINTTAB(7,21
);"REVERSI";
 1370 FORloop%=1TO8:PRINTTA
B(2+loop%*2,1);CHR$(64+loop
%);TAB(1,2+loop%*2);loop%;:
NEXT
 1380 FORloop%=219TO1279STE
P128:MOVEloop%,400:DRAWloop
%,1023:NEXT
 1390 FORloop%=400TO960STEP
64:MOVE0,loop%:DRAW1240,loo
p%:NEXT
 1400 ENDPROC
 1410 REM define all variab
les,sound,etc
 1420 DEFPROCset
 1430 computer%=-1:player%=
-2:win%=0
 1440 VDU23;8202;0;0;0;
 1450 VDU23,224,24,60,126,2
55,255,126,60,24
 1460 VDU23,225,0,0,0,129,1
95,102,60,24
 1470 VDU19,2,6;0;
 1480 ENVELOPE1,6,16,9,-5,2
,2,2,126,0,0,-126,126,126
 1490 COLOUR129
 1500 ENDPROC
 1510 REM to restart the ga
me
 1520 DEFPROCrestart
 1530 PRINTTAB(5,29)"Press
SPACE"
 1540 SOUND1,-15,50,10:SOUN
D1,1,120,20:SOUND1,1,70,5:S
OUND1,-10,40,20
 1550 win%=0
 1560 *FX15,1
 1570 ENDPROC
 1580 REM what to do on err
or
 1590 DEFPROCerr
 1600 IFERR<>17THENREPORT:P
RINT" at line ";ERL:ENDPROC
 1610 COLOUR3:PRINTTAB(7,27
);"I WIN !!";
 1620 PROCrestart
 1630 REPEAT
 1640 key%=GET
 1650 UNTILkey%=32
 1660 RUN
 1670 ENDPROC
 1680 REM instructions
 1690 DEFPROCinstructions
 1700 COLOUR1:PRINTTAB(15,0
)"REVERSI"
 1710 COLOUR3
 1720 PRINT'"  The rules to
REVERSI are identical to t
hose of the board game."
 1730 COLOUR2
 1740 PRINT'"  The player m
ust,to lay a counter,trap h
is/her opponents counter(s)
 between twoof his/her own.
"
 1750 PRINT'"  The trapped
counter(s)  then become , h
is/her own. This continues
between the players taking
 alternate goes to lay a co
unter."
 1760 PRINT'"  Play continu
es until  all the squares a
re taken up , in which case
 the player with the most c
ounters wins.A percentageof
 the number of  counters  y
ou have is shown through ou
t the game."
 1770 PRINT'"  Alternately
one of the players cannot l
ay a counter , in which cas
e the other player wins."
 1780 COLOUR3
 1790 PRINT'"  You are whit
e counters , the computer b
lack.  Enter co-ordinates
using keys  A to H and 1 to
 8."
 1800 COLOUR1
 1810 PRINT'"If you cannot
go press 'ESCAPE' to start
       'NEW GAME'.You go FI
RST !                      P
RESS ANY KEY"
 1820 key%=GET
 1830 ENDPROC
 1840 REM best position dat
a
 1850 DATA 0,22,3,5,5,3,22,
0
 1860 DATA 22,29,1,5,5,1,29
,22
 1870 DATA 3,1,2,4,4,2,1,3
 1880 DATA 5,6,4,-1,-2,4,6,
5
 1890 DATA 5,6,4,-2,-1,4,6,
5
 1900 DATA 3,1,2,4,4,2,1,3
 1910 DATA 22,29,1,5,5,1,29
,22
 1920 DATA 0,22,3,5,5,3,22,
0
```

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

Listings galore!

Save yourself the chore of typing in listings by sending for our monthly tapes, packed with games, utilities, graphics and other programs from the pages of *Electron User*.

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On the September 1985 tape:
TEXNDAN 3D Wild West shootout. **PINTCURSOR** Machine code graphics. **SPRITE/ED** Sprite editor. **COMPOSE** Writing music simplified. **REVERSI** Cunning strategy game. **SIMPLEFILE** Save and read data. **BOUNCEBALL** Two player action. **ROTATE** Animation in a spin.

On the August 1985 tape:
DIGGA Exciting arcade action beneath the earth. **DODGE THE ASTEROIDS** Fun deep in space among the asteroids. **M/CODE GRAPHICS** Sliding pints of beer! ***FX** The OS explored. **MOVEIT** An intriguing sliding puzzle. **HEXGRAM** An educational game to increase your word power.

On the July 1985 tape:
MANIC MOLE Machine code action at its best. **HIGHER OR LOWER** Guess the card. **TIME BOMB** Carefully collect TNT. **M/CODE GRAPHICS** Two demonstrations. **FX1/2** The OS on call. **PIRATE MATHS** Sum fun. **NOTEBOOK** Password Generator.

On the June 1985 tape:
QUASIMODO Bellringing classic. **DISASSEMBLER** Machine code utility. **ACTIVITIES** Educational fun. **REFLECT** Aggressive aliens. **ENGINE** Animation. **DODGE** Race track action. **STRINGALONG** Scrolling fun. **CASTLE** Medieval graphics. **MATHS CURVE** Angles and art. **NOTEBOOK** Trees.

On the May 1985 tape:
SKRAMBLE! Compulsive arcade action. **SHEEPNIM** The logic game. **TEXTWRITER** Screen utility. **LIFE** A cultured classic. **CEDRIC** Educational fun. **THREE-D** Outstanding utility. **SPOKES** Fascinating graphics. **MOONORBIT** Heavenly displays. **BLAZON** Heraldic devices. **FLOWERS** A Basic bouquet. **NOTEBOOK** Annotated animation.

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.

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** Fying bacon. **NOTEBOOK** Display formatting.

On the February 1985 tape:
CRAAL The mystifying maze adventure. **BOUNCY** Addictively annoying action. **PAIRS** Can you remember the cards? **BASE** A Binary/he xadecimal 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 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 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 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 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 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 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. **FLYING PIGS** Bacon on the wing.

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

Use the order form on Page 61

Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

Strange, but there's fun down drains

Drain Mania
Icon Software

WHEN I first loaded this game into my computer, I wasn't particularly impressed. It appeared to have shades of Killer Gorilla, although in a novel setting.

Since then, however, playing it and getting the hang of it rather better, I have rapidly become hooked on this game.

It has that fatal quality of all super games – it becomes truly addictive, being easy to play yet difficult to master.

The rather unusual scenario is a system of underground sewers, in which our hero, Theodore, has to counter the attentions of such noxious creatures as Inky, Dinky and Pinky.

There are platforms on to and from which Theo can leap with either a small or a large leap.

Movement is also possible to the left or right, and these keys may be selected once only during the loading of the game.

Moving from the initial platform, which promptly vanishes, Theo has a habit of moving continuously. But with practice his speed can be adjusted, and he can even come to rest.

As the creatures bounce their way from the top to the bottom of the screen, there are two courses of action open to the player.

You can merely avoid them, or gain points and sweet revenge by jumping up and knocking the creature above off its feet. But some need rather more persuasion than others to topple.

If Theo can then leap on to that level and kick the stranded creature off, there are bonus points to to had. But too long a delay brings a metamorphosis into an even more deadly beast.

The authors have also kindly included a Zap button which on being head-butted has the effect of scoring for all the animals currently on the screen, and also any coins.

These tend to appear in the oddest places and bring you further points.

However, this little kindness on their part is countered by the malign water balls, which bounce strangely around on the more difficult stages.

It's a little strange to begin with, but it will soon become a favourite in your collection.

Phil Tayler

Neat package

Bumper Bundle
Alligata Software

Bumper Bundle is a tape collection of four programs: Bugblaster, Lunar Rescue, Hell Hole and Crown Jewels.

Bugblaster is an action-packed arcade game with the sole object of blasting everything that moves – and those things that sit still!

You control the left and right motion of the zapper which fires vertically.

You can push it up and down, but the window of movement is limited to the bottom five lines of the screen.

At the start, the display contains randomly-placed mushrooms. Immediately a centipede begins crawling left then right across the screen and slowly descending.

As you fire and hit the bug, it breaks into separate sections, each with a life of its own.

Falling vertically down the screen and moving from left to right are various other creatures – snails, spiders, scorpions, dragonflies and snails. Each of these scores points if zapped.

If you come into contact with any of the bugs there's an explosion and one of your three lives is lost.

Your Lunar Rescue mission is to descend from an orbiting station, carefully avoid asteroids, and land.

After a man has boarded your craft, it ascends. On the way up you have to avoid or destroy the aliens.

Eventually, you dock the rescue vehicle on the mother ship.

You have three attempts in each game. Scoring is based upon the number of aliens zapped and the difficulty of the landing site chosen.

Hell Hole is definitely a more intellectual arcade game. I've spent many hours working at it, but I still haven't sussed how to trap or capture the fiend. Please let me know if you have the answer.

Like the two other arcade games, the graphics and sound are very good. All three are quality software.

The fourth program of the suite is an adventure game based upon the unlikely event that a joker has stolen the Crown Jewels and then hidden them at various locations in London.

The graphics are not outstanding but, as far as I could tell not having finished it, the adventure is well worth pursuing.

I was really impressed with this collection of programs. All four proved to be of a high standard of presentation and content. This is truly a Bumper Bundle.

John Woollard

Good value

Ring Of Time
Kansas

THIS is the first Kansas adventure I've managed to get a look at and I'm quite impressed.

Although written in Basic, the responses are excellent and a peek at the listing shows that a lot of work has gone into producing the program.

Right. Now for the plot.

Legend tells of a "time-ring" belonging to Zor, an evil magician of the Middle Ages. Your task is to search for and find the ring. No easy task, I can assure you.

I won't reveal too much about the game. There is one

→

From Page 39

problem, however, that is likely to stump you – how to get past the crocodiles.

This is a bit nasty, but man's best friend should come in handy here.

The other problems are totally logical (in retrospect).

A good atmosphere is generated by wise use of room descriptions, but don't try TAKEing the things you are told about, most of them aren't recognised.

Incidently, Kansas gives a lifetime guarantee on its cassettes. This along with the reasonable price of the game seems quite good value to me.

There is a superb puzzle involving a locked door and a piece of parchment that isn't all it seems. But I'll leave the pleasure of finding out exactly what I mean for you to discover.

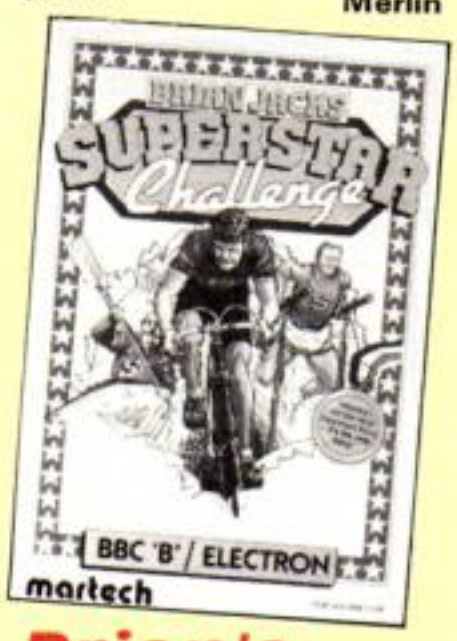
The program itself is a bit frustrating in that it doesn't recognise GET and all the verbs I tried had to be typed in in full.

For instance, you have to type in EXAMINE, EXAM isn't recognised. Possibly I'm just getting lazy.

The actual level of the adventure is aimed at the average player. However, I think beginners will find it interesting, though the more-experienced player shouldn't take all that long to solve it.

Overall, a well-linked plot that's very nice to play, and a well-priced product that's good value for money. More please.

Merlin



Brian's hard to beat

Brian Jacks Superstar Challenge
Martech

THE object of this game is to challenge and try to beat Brian Jacks in a series of eight activities.

The skill of play is entirely dependent upon your ability to manipulate five keys of the keyboard or use a joystick and fire button.

The instructions for each event are very brief and it takes several attempts before a good technique can be developed.

The first challenge is a 50-metres swim. Using X and Z you have to coordinate your stokes to keep a straight line.

Periodically you have to take a breath by tapping the Return key.

On the earlier rounds it's relatively easy to beat Brian.

Still in, or on, water, canoeing follows. Although you still use the X and Z keys to paddle, the technique is subtly different.

The archery section that follows requires you to hit a moving target by predicting its movement and judging correct elevation of the bow. The wind speed is given as a guide.

This challenge certainly needs practice.

A cycle race makes up the fourth section. This time the keys are used to drive the pedals.

Careful use of the gears has to be made to enable a fast speed to be accomplished.

The next event, the 100-metres sprint, is the simplest of the activities.

The superb graphics of many of the sections are highlighted in the squat thrust competition.

Using the familiar X and Z keys you move the body through four stages between being stretched fully out and the squat position.

Again, the technique requires practice and development before a high score can be achieved.

The arm dips have equally impressive graphics. To lower the body the Return key is tapped once. Raising it requires several taps of X and Z which are also used to arrest the fall of the body.

The final section is a football challenge. I found this most difficult to understand. The instructions with the package are extremely limited and non-existent in the program.

You first have to collect the ball, dribble it between the cones and then into the red semi-circle.

I didn't realise when I fell over the first cone that I'd lost the ball.

Then I tried to move the ball to the centre of the screen and not go into the semi-circle. Once in the semi-circle you have only a few seconds to aim your kick and fire.

Be warned – the goalkeeper is very good!

At the end of each event the

They're booting maths around

Bert Boot
Highlight Software

WITH Bert Boot, Highlight have attempted to brighten up straightforward multiplication and division practice.

The star of the program is a boot called Bert.

Bert's passion in life is squashing insects. You can choose whether they are flies, wasps or beetles.

If you choose to practice multiplication, you are told how many insects Bert can crush in one second.

You then watch him do it – and afterwards you are asked how many he can squash in a certain number of seconds.

If you have opted for Easy, you are given help with how to tackle the problem. With Medium you get less help, and on Hard you're on your own.

The same options are available for division, except that now you are told how many seconds it takes Bert to squash a number of insects.

You're job is to find out how many he can squash in one second.

To make the "work" more palatable, there is a reward in the form of a game if you get at least 80 per cent of your answers right.

Now to the drawbacks. When it's said that Bert squashes eight flies in one second, he actually takes more than two seconds.

This is not only wrong, it can also be very tedious. Watching the demise of 90 insects takes over 40 seconds.

Another problem concerns the division part of the program.

The computer "beeps" every time Bert has done one second's worth of crushing. To successfully answer the division questions, you need only remember the number at which you heard the first "beep".

The reward game is based on the charming notion that the insects should have a chance of outwitting streams of boots and helping themselves to some jam.

It is in fact a version of Frogger.

It's a nice idea, but made very frustrating by the fact that the keyboard buffer isn't cleared.

This means that when you get your first insect to the jam, the second one starts, out of control, and probably commits suicide.

Also, the keyboard delay time and auto-repeat need setting, so that your insect doesn't start, stop and then start again.

The keys you have to use are the cursor keys. You are expected to discover this for yourself.

These are bad keys on the Electron, being right by Break, and are better avoided in children's programs.

These faults could very easily be put right and I hope that Highlight will amend them in future and perhaps provide an upgrade for existing customers.

If that were done, I could recommend this educational program for home and school use. As it stands, the idea is good and the graphics appealing, but it is too frustrating for children to use.

Rog Frost

scores for you and Brian are shown and the running totals displayed before the next challenge.

Overall, this program meets the high standard set by other Martech programs I've used.

While there's a great emphasis upon key-tapping, I was pleased to see that there were considerably different techniques to be adopted for tackling the various challenges.

John Woollard

A must of a ROM

Advanced Disc Toolkit
Advanced Computer Products

ADT is a ROM compatible with both the Electron and BBC micros and designed to be used with either an ordinary disc filing system or the advanced disc filing system.

The ROM adds 32 new * commands which are available from within a program or directly from the keyboard.

Most of these commands use the disc filing system, but several don't, although I wouldn't really recommend it if you haven't yet upgraded to discs.

ADT is available as a ROM cartridge which plugs into the Plus 1 or as a bare ROM. This could be plugged into something like Slogger's Rombox, tested in the August issue of *Electron User*.

*HELP ADT reveals all the extra commands and their syntax.

Several commands, *BACKUP, *BUILD, *FORM, *TYPE and *CATCALL should be familiar. These have been included in the ROM as they aren't in the ADFS but are on the Welcome disc supplied with the Plus 3.

*BACKUP copies the contents of one disc to another. *BUILD creates a file, usually text, which can be executed when the disc is booted with Shift+Break.

*CATALL catalogues the whole disc and *FORM formats a new disc. *TYPE displays a text file without line numbers.

There are several useful search commands. *DFIND searches a disc, *MFIND searches the memory and *BFIND searches a Basic program, printing the address of all occurrences of a given string. The search can be for a hex or Ascii string.

Programs can be loaded and run at any address, relocation is automatic.

*MLOAD loads a program while *MRUN loads, relocates and runs a program. This saves a lot of fiddling about with programs that have to run with PAGE set to &E00 for example.

Memory contents can be examined in hex, Ascii or assembly language with *MEX.

The disassembler is excellent and is the best I have seen so far on the Electron. It allows you to follow subroutines and branches by pressing the Return key when one is encountered. It even disassembles backwards.

A disc can be examined and edited with *DEX and sectors loaded and saved with *SECTORS. *DUMP displays the contents of a file.

I didn't realise how important these commands were until I accidentally saved one file with the same name as another.

By examining the disc I found the old program and used *SECTORS to load it back to PAGE and OLD to restore it.

*LIST lists a text file like *TYPE but adds line numbers. *VERIFY checks that a disc is OK.

*FCOMP compares two files to see if they are the same and *DCOMP compares two discs.

*SETADR changes the load and execution addresses of a file and *FCOPY makes a copy of a file.

Several commands act on ROMs. *ROMS prints all the ROMs present and *UNPLUG turns off a particular ROM.

This is necessary if one ROM is interfacing with the operation of another and can happen if two ROMs have the same name for two entirely different commands. Simply *UNPLUG the one you don't want.

*FREE displays the amount of free space on a disc and *MAP displays a map of the free space.

*FSN tells you which filing system is active and *XFER will copy a file from one filing system to another.

I've only briefly mentioned each command and given an indication of what it does.

Many of the commands have several options and functions which are invoked by passing parameters and I haven't the space to explain in detail the full capability of such a comprehensive toolkit.

Suffice it to say that it has just about every utility you're likely to need.

None of the utilities is new – they're all old hat on the BBC Micro. It is new on the Electron, however.

The big plus point for this toolkit though is that it's compatible with an ordinary DFS, the ADFS, the Electron, BBC Micro, and most commands work across the Tube.

One point worth mentioning though is that for some of the utilities to work in Modes 0 to 3 a link may need soldering inside the Plus 3 on the circuit board.

However, all the commands work in Mode 6 whether the link has been made or not, so it's not that important.

I found the ADT an invaluable tool. It saved time and effort and helped save the day on several occasions.

If you have discs, then you'll need a toolkit. Take a close look at ADT – it's superb.

Roland Waddilove

Arcade you must enter

Repton
Superior Software

REPTON is the latest, and claims to be the best, release from Superior Software, one of the leading Electron software houses.

In short, it is.

It's one of those arcade-style adventure games with you playing the part of our hero, Repton.

His mission is to retrieve all the diamonds from a series of twisting underground caves.

Unfortunately, the caverns are also full of precariously-balanced rocks that tend to drop on you if you dig under them.

They're often arranged so that if you loosen some before others, they fall in the wrong order and seal off the passage to certain diamonds forever.

In later caverns the diamonds lie underneath giant eggs which fall and hatch into ferocious reptiles when you take the diamond.

Needless to say, they then spend all their time chasing after you.

In even later caverns you have to open a safe using a special key that you must find.

Now for the technical side. The entire screen acts as a window on to the area of the cavern you're in, so that you can only see a sixteenth of the cavern.

As you move, the view through the window scrolls very smoothly in the appropriate direction.

Repton is a colourful green-headed character and is beautifully animated. If you don't move him, he starts looking round of his own accord.

Not to be outdone, the reptiles strike a fearsome pose with their webbed feet and yellow bellies.

At any time during play you can look at a map of the entire cavern to see where the remaining diamonds are.

After completing each screen you're given a password enabling you to skip that screen in future.

There are 12 caverns in all, getting progressively harder.

This is an astounding game reaching new heights in Electron arcade adventures.

So if you feel that you're an Indiana Jones type then go out and buy it today.

Philip Tudor

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This detailed guide to the Electron's operating system is a must for every serious Electron user.
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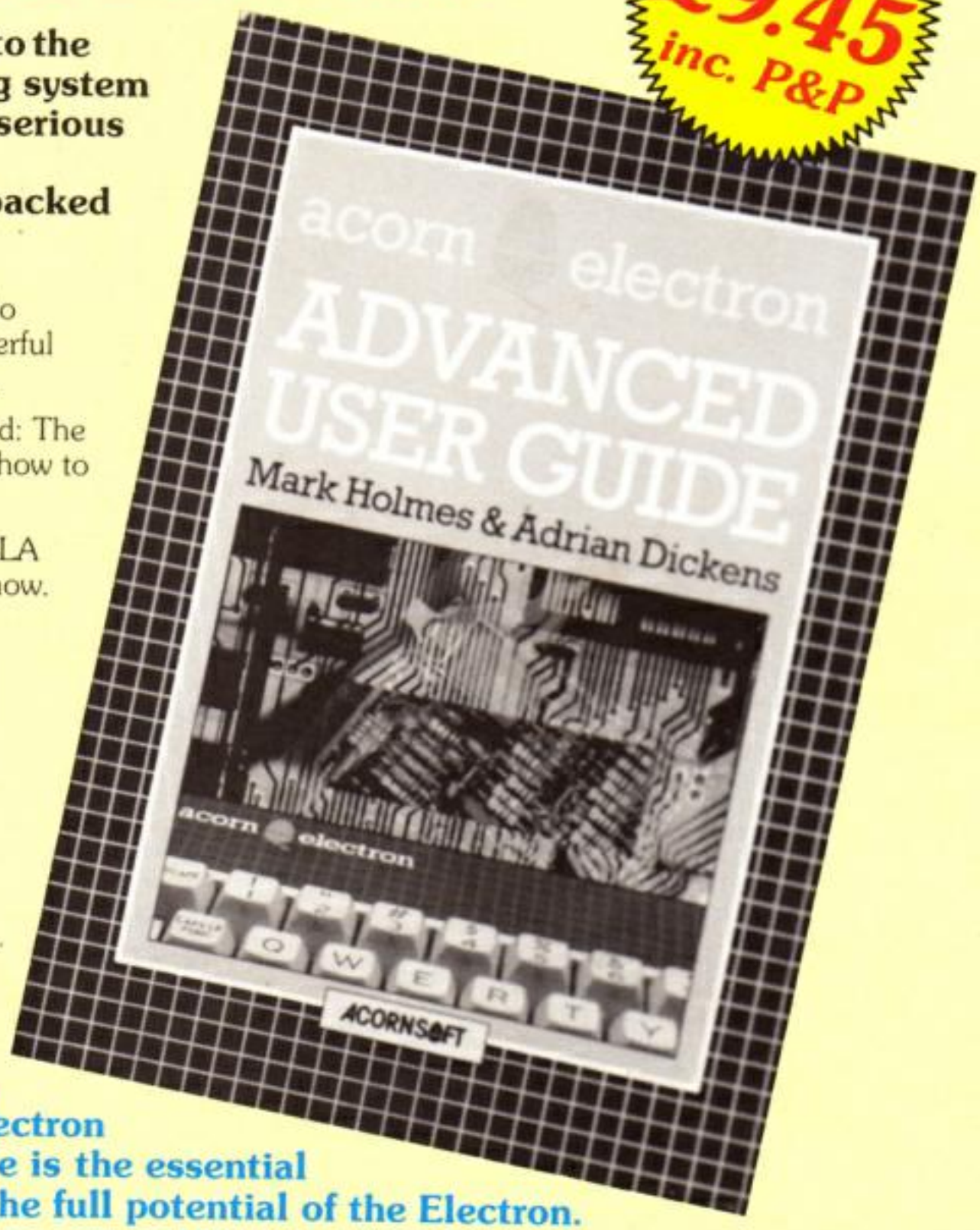

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E&OE

Micron User

BOUNCE BALL

FEEL like a ball game but can't be bothered to go out?

Well get your opponent and let your Electron provide the court with Bounce Ball.

Written by Ian Kirby, it's a two player game that harks back to the earliest days of video games but is still as much fun as ever.

VARIABLES

ang% Contains angle of ball.
bx% Contains across position of ball.
by% Contains position of ball down screen.
sa% Position of player one across screen.
sb% Position of player two across screen.
ua% Position of player one up screen.
ub% Position of player two up screen.
turn% Contains number of player who must hit ball next.
num% Contains number of player who hit ball last.
pl_a% Player number one's score.
pl_b% Player number two's score.

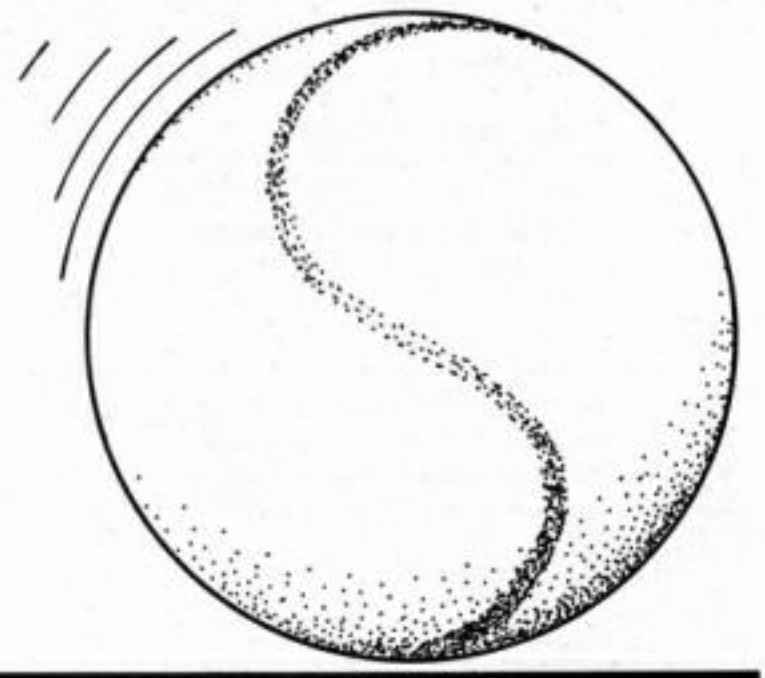
Bounce Ball listing

```
10 REM Bounce_Ball
20 REM by Ian Kirby
25 REM (C) ELECTRON USER
30 REPEAT
40 MODE1
50 PROC_init
60 PROC_inst
70 REPEAT
80 PROC_re_set
90 PROC_draw_screen
100 COLOUR7
110 REPEAT
120 PROC_move_man_a
130 PROC_move_ball
140 PROC_move_man_b
150 UNTILpoint%=1
160 PROC_score
170 UNTILwinner>0
180 MODE2:PROC_winner
190 UNTILFALSE
200 END
210 DEFPROC_move_man_a
220 A$=INKEY$(0)
230 VDU19,3,1,0,0,0
240 IFua%=1THENua%=ua%+2:
PRINTTAB(sa%,1);" ";
250 IFua%=29THENua%=ua%-2
:PRINTTAB(sa%,29);" ";
260 IFsa%=0THENsa%=sa%+2:
PRINTTAB(0,ua%);" ";
270 IFsa%=38THENsa%=sa%-2
:PRINTTAB(38,ua%);" ";
280 COLOUR3
290 PRINTTAB(sa%,ua%);CHR
$241
300 IFINKEY-66THENua%=ua%
-2:PRINTTAB(sa%,ua%);CHR$24
1:PRINTTAB(sa%,ua%+2);" ";:
ENDPROC
310 IFINKEY-98THENua%=ua%
+2:PRINTTAB(sa%,ua%);CHR$24
1:PRINTTAB(sa%,ua%-2);" ";:
ENDPROC
320 IFINKEY-67THENsa%=sa%
-2:PRINTTAB(sa%,ua%);CHR$24
1:PRINTTAB(sa%+2,ua%);" ";:
ENDPROC
330 IFINKEY-83THENsa%=sa%
+2:PRINTTAB(sa%,ua%);CHR$24
1:PRINTTAB(sa%-2,ua%);" ";:
ENDPROC
340 ENDPROC
350 DEFPROC_move_ball
360 COLOUR1
370 VDU19,1,7,0,0,0
380 IFang%=1ANDby%=1THENa
ng%=2
390 IFang%=0ANDby%=1THENa
ng%=3
400 IFang%=1ANDbx%=39THEN
ang%=0
410 IFang%=2ANDbx%=39THEN
ang%=3
420 IFang%=3ANDbx%=0THENa
ng%=2
430 IFang%=0ANDbx%=0THENa
ng%=1
440 IFby%=29THENGOTO570
450 IFang%=0THENbx%=bx%-1
:by%=by%-1:GOTO490
460 IFang%=1THENbx%=bx%+1
:by%=by%-1:GOTO490
470 IFang%=2THENbx%=bx%+1
:by%=by%+1:GOTO490
480 IFang%=3THENbx%=bx%-1
:by%=by%+1:GOTO490
490 PRINTTAB(bx%,by%);CHR
$240
500 IFang%=0THENPRINTTAB(
bx%+1,by%+1);" ";
510 IFang%=1THENPRINTTAB(
bx%-1,by%+1);" ";
520 IFang%=2THENPRINTTAB(
bx%-1,by%-1);" ";
530 IFang%=3THENPRINTTAB(
bx%+1,by%-1);" ";
540 IFbx%=0THENSOUND2,-15
,87,2ELSEIFbx%=39THENSOUND2
,-15,87,2ELSEIFby%=1THENSOU
ND2,-15,87,2ELSEIFby%=29THE
NSOUND2,-15,87,2
550 IFbx%=sa%ANDby%=ua%-1
THENnum%=1:PROC_hit
560 IFbx%=sb%ANDby%=ub%-1
THENnum%=2:PROC_hit
570 IFby%>=29THENPROC_off

580 ENDPROC
590 DEFPROC_move_man_b
600 IFub%=1THENub%=ub%+2:
PRINTTAB(sb%,1);" ";
610 IFub%=29THENub%=ub%-2
:PRINTTAB(sb%,29);" ";
620 IFsb%=0THENsb%=sb%+2:
PRINTTAB(0,ub%);" ";
630 IFsb%=38THENsb%=sb%-2
:PRINTTAB(38,ub%);" ";
640 COLOUR2
650 PRINTTAB(sb%,ub%);CHR
$241
660 IFINKEY-73THENub%=ub%
-2:PRINTTAB(sb%,ub%);CHR$24
1:PRINTTAB(sb%,ub%+2);" ";:
ENDPROC
670 IFINKEY-105THENub%=ub
%+2:PRINTTAB(sb%,ub%);CHR$2
41:PRINTTAB(sb%,ub%-2);" ";
:ENDPROC
680 IFINKEY-103THENsb%=sb
%-2:PRINTTAB(sb%,ub%);CHR$2
41:PRINTTAB(sb%+2,ub%);" ";
:ENDPROC
690 IFINKEY-104THENsb%=sb
%+2:PRINTTAB(sb%,ub%);CHR$2
41:PRINTTAB(sb%-2,ub%);" ";
:ENDPROC
700 ENDPROC
710 DEFPROC_init
720 *FX11,1
730 *FX12,1
740 VDU23;8202;0;0;0;
750 VDU23,240,0,0,0,60,60,6
0,60,0,0
760 VDU23,241,255,255,255
,255,255,255,255,255
770 VDU23,250,126,126,126
,0,0,231,231,231
780 wall$=STRING$(39,CHR$
250)
790 ang%=1:bx%=10:by%=10:
```

PROCEDURES

PROC_move_man_a Allows player one to move his man.
PROC_move_ball Moves ball across the screen.
PROC_move_man_b Allows player two to move his man.
PROC_init Defines the programs variables, etc.
PROC_inst Prints instructions on the screen.
PROC_hit Takes action if player hits the ball.
PROC_draw_screen Draws the screen.
PROC_score Calculates the score.
PROC_re_set Sets the variables for a new game.
PROC_off Takes action if the ball goes off the screen.
PROC_winner Shows the winner.



```
lengthX=1:acrossX=24:uaX=15
:saX=10:ubX=15:sbX=30:pl_bX
=0:pl_aX=0:winner=0:turnX=1
:numX=2
  800 ENVELOPE2,2,RND(255)-
128,RND(255)-128,RND(255)-1
28,RND(255)-128,RND(255)-12
8,RND(255)-128,126,0,0,-126
,126,126
  810 pointX=0
  820 word$="BOUNCE_BALL"
  830 VDU19,3,1,0,0,0
  840 ENDPROC
  850 DEFPROC_inst
  860 SOUND2,2,25,254
  870 REPEAT
  880 VDU19,1,RND(7),0,0,0:
COLOUR1
  890 long$=LEFT$(word$,len
gthX)
  900 PRINTTAB(acrossX,4);l
ong$
  910 lengthX=lengthX+1:acr
ossX=acrossX-1
  920 *FX21,0
  930 A$=INKEY$(100)
  940 UNTILlengthX=12
  950 VDU19,1,7,0,0,0:COLOU
R1
  960 PRINTTAB(2,6);"The id
ea of BOUNCE_BALL is to hit
 the ball to the top of the
 screen.This is  done by u
sing the keys shown below."
  970 PRINTTAB(0,9);"Each p
layer should take his/her t
urn.  Points are awarded a
gainst you if you  hit the
 ball out of turn or let th
e ball"
  980 PRINTTAB(0,12);"go of
f of the bottom of the scre
en when it is your turn."
  990 PRINTTAB(4,15);"Playe
r 1 (Red)";TAB(20,15);"Play
er 2 (Green)";
 1000 PRINTTAB(6,17);"A=up"
;TAB(6);"Z=down";TAB(6);"X=
left";TAB(6);"C=right"
 1010 PRINTTAB(22,17);"*=up
";:PRINTTAB(22,18);"?=down"
;:PRINTTAB(22,19);"<=left";
:PRINTTAB(22,20);">=right";
 1020 PRINTTAB(8,25);"First
 Player to score 8 wins!"
 1030 PRINTTAB(8,26);"Playe
r one to go first"
 1040 *FX21,0
 1050 A$=GET$:CLS
 1060 ENDPROC
 1070 DEFPROC_hit
 1080 IFnumX=2ANDturnX=1THE
NpoX=2:pointX=1:ENDPROC
 1090 IFnumX=1ANDturnX=2THE
NpoX=1:pointX=1:ENDPROC
 1100 IFnumX=1ANDturnX=1THE
NturnX=2:GOTO1120
 1110 IFnumX=2ANDturnX=2THE
NturnX=1:GOTO1120
 1120 IFangX=0THENangX=1
 1130 IFangX=1THENangX=0
 1140 IFangX=2THENangX=1
 1150 IFangX=3THENangX=0
 1160 SOUND2,-15,87,2
 1170 ENDPROC
 1180 DEFPROC_draw_screen
 1190 VDU19,2,2,0,0,0:COLOU
R2
 1200 PRINTTAB(0,0);CHR$250
+wall$
 1210 ENDPROC
 1220 DEFPROC_score
 1230 SOUND2,2,87,100
 1240 pointX=0
 1250 IFpoX=1THENpl_aX=pl_a
X+1
 1260 IFpoX=2THENpl_bX=pl_b
X+1
 1270 IFturnX=1THENturnX=2
 1280 IFturnX=2THENturnX=1

 1290 IFpl_bX=8THENwinner=1
ELSEIFpl_aX=8THENwinner=2:E
NDPROC
 1300 CLS:PRINTTAB(4,4);"Pl
ayer 1";TAB(20,4);"Player 2
";TAB(6,8);pl_bX;TAB(22,8);
pl_aX
 1310 PRINTTAB(20,20);"Pres
s 'Y'.";:PRINTTAB(20,22);"P
layer ";turnX;" to go first
"
 1320 A$=GET$:IFA$="Y"THEN
CLS ELSE1320
 1330 ENDPROC
 1340 DEFPROC_re_set
 1350 angX=1:bxX=10:byX=10:
lengthX=1:acrossX=21:uaX=15
:saX=10:ubX=15:sbX=30:numX=
2
 1360 COLOUR3:PRINTTAB(10,1
5);CHR$241:COLOUR2:PRINTTAB
(30,15);CHR$241
 1370 ENDPROC
 1380 DEFPROC_off
 1390 IFbyX)=29ANDnumX=2THE
NpoX=1:pointX=1:ENDPROC
 1400 IFbyX)=29ANDnumX=1THE
NpoX=2:pointX=1:ENDPROC
 1410 ENDPROC
 1420 DEFPROC_winner
 1430 VDU23;8202;0;0;0;
 1440 COLOUR0:COLOUR140:CLS

 1450 FORPX=0TO200STEP4:SOU
ND2,-15,PX,2:NEXT:SOUND2,2,
25,100
 1460 PRINTTAB(5,10);"Playe
r ";winner;" wins"
 1470 *FX21,0
 1480 PRINTTAB(5,15);"Anoth
er go?":A$=GET$:IFA$="N"THE
N CLS :END
 1490 ENDPROC
```

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

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Micro Messages

Wrong? No, just memory trouble...

I AM so frustrated with the programs in your July issue. Either I have a bad copy or there is something wrong with the listings.

I would very much appreciate your help.

For instance:

Time Bomb comes up all squiggly. If I take out the $data, I get the screen up then I get no room at line 2210.

In Manic Mole I get Bad Dim at line 50.

Higher Lower comes up Bad Mode at line 40. If I change the mode from one to five the game works, but the cards are a bit distorted.

I have been through all the games several times and there are no errors. – **Marilyn Rodger, Kircaldy, Fife.**

● It sounds as if you're running out of memory. Have you recently bought a Plus 3 disc drive? This grabs nearly 4k of precious RAM.

Luckily it can be retrieved after loading a program. There's a routine in the Plus 3 manual and one in Micro Messages in the August issue of *Electron User*.

A riddle is solved

JUST a quick note for the very simple solution of the cube root riddle in the August edition of Electron User.

$x^y = x^2, x^3, x^4$ *and so on . . .*

$x^{1/y} = x^{\frac{1}{2}}, x^{\frac{1}{3}}, x^{\frac{1}{4}}$ *and so on . . .*

but also $x^{1/y} = \sqrt[y]{x} = 2\sqrt{x}, 3\sqrt{x}, 4\sqrt{x}$

So on the Electron:

3 cubed=3↑3=27

cube root of 27=27↑(⅓)=3

Here's a suggestion for anyone having big problems saving and loading programs on tape.

The signal from the computer sometimes is larger in amplitude than one the tape recorder can handle.

It can be attenuated (reduced) by adding a 100k Ω resistor in series with the centre wire of the tape recorder's microphone input.

More assembly language programming, please. – **Neil Rollins, Keighley, W. Yorks.**

● This is just one of many letters we've had. Every one used a different method. Here's a short program using Neil's method of calculating cube roots.

```
   10INPUT "Number ";N
   20PRINT "Cube root is ";
N^(1/3)
   30GOTO 10
```

Which system should I buy?

THE article by Nigel Peters on the Cumana floppy disc system for the Electron was extremely interesting and informative.

I note that Solidisk Technology also produce an Electron disc interface, which plugs into the Plus 1, but is much cheaper.

Can you please help with a comparison, as I would like to purchase a disc system but do not want to waste my money. – **D. Elliott, Ballymoney, N. Ireland.**

● By the time you read this we should have a Solidisk system. A review will appear as soon as possible.

Plus 3 Mini Office

I AM very interested in interfacing with the Electron and read the review in the November, 1984, issue on Mushroom's printer/user port.

However, I noticed that in Micro Messages of February, 1985, you said that Electron User *might be starting an interfacing series based on the Plus 1.*

Does this mean that there is going to be a user port peripheral, plugging in to a cartridge slot Plus 1?

In July's Micro Messages you mentioned that Mini Office is likely to be on Plus 3 disc soon. Is this still in the pipeline?

Also in July's issue was an advert for Superior Software's Repton with a £100 prize for the first person to complete it successfully.

Surely an Electron user with Slomo from Cambridge Computing Research could use this to win the competition? – **G.J. Lord, Munster.**

● We haven't got round to doing an interfacing article yet – we've been snowed under with work. Can anyone help us out?

The Mini Office team are still working on the Plus 3 disc version. They've had a few problems but reckon they'll have it licked soon.

The Slomo isn't much help in a game like Repton. It's not a fast shoot-'em-up – it requires a bit of thought and planning.

Yes, Repton can be done

WE have received enquiries from several customers regarding our new game Repton asking whether it is possible to complete all 12 screens.

We have had a letter from one customer who was so sure that the game could not be completed that he thought there was a bug in the program.

Could I assure Repton fans that all 12 screens can be completed without losing a life?

Screen J seems to cause the most problems. Some lateral thought is required to complete this screen.

Incidentally, the prize of £100 has now been won, but look out for Repton 2 . . . coming soon. – **Richard Hanson, Superior Software, Leeds.**

● Thanks for the reassurance, Richard. Some of us haven't got past Screen 1 . . .

Hunt for those bugs

I AM writing to complain about the programs in your magazine. They do not work.

Yesterday me and my dad programmed in Quasimodo but it would not run past the title page. Can you help me, please? After all I spent my pocket money on it and I am only 11. – **Christopher Brammall, Ashton-under-Lyne.**

● Typing in programs is easy. Debugging them is very difficult. The problem is that it's next to impossible to type in a long listing without making a few slips.

It's easy to misread or mistype something, so afterwards go through it line by line, looking for simple typing errors. It gets easier and quicker with practice.

Just a typing error

CAN you help me with Mark Johnson's program Quasimodo in the June issue of Electron User?

When I had finished typing it in, I ran it and the instructions came up on the screen.

But when I had pressed the

→

From Page 47

number of which screen I wanted, it printed "Get ready" and played a little tune and then went back to the instructions.

What have I done wrong? – **Wesley Hall, Milton Keynes.**

● The problem is ON ERROR in line 20. If you remove this you'll be able to see where you've gone wrong. It's probably a simple typing error somewhere.

When the Electron discovers it, it starts the program again because the ON ERROR sends it to line 30.

Search is in vain

I HAVE an Electron and the Plus 3. I also have lots of games on tape and no games on disc.

I have been into every computer shop in Kidderminster for a tape-to-disc copier but no one has one.

If you know of a tape-to-disc copier for the Electron, could you please send me details? – **Russell Crowe, Kidderminster, Worcs.**

● We don't know of any tape-to-disc copiers for the Electron. Such a program might infringe copyright so it should be used with care.

Problems with Sim

HERE is my personal view on your publication. It has come of age. Being a regular reader I can honestly say that Electron User *is now more interesting and more helpful.*

After reading Micro Messages in the July issue, in particular your comments on "long machine code arcade games" well if you do only publish short and simpler listings, I'll have to cancel my regular order.

It may interest you to know I am married with three children. We all use the Electron which I bought over a year ago.

My two eldest children use an Electron at school, and my wife and I always type in your educational listings – Counting, Combinations, Euromap, Balance, Australian Coffee, Pelican, Fred's word game.

I also type in many of your games, and must say what a very good game Mr Freeze is.

I sometimes buy other computer magazines, I'll look one over see what it's got in for the Electron. If it's a game I look at the length of the listing.

If it's a long one I buy it. This I find is good practice.

I say don't spoil the magazine with 50 line listings.

I'm having problems with Sim. Somebody help, please. – **D. Wynne, Sherburn-in-Elmet, Yorks.**

● Has anyone completed Sim? It seems to be causing problems.

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.

. . . and more

AFTER reading your July issue I was glad to hear that other people had problems with the game Sim.

I have had many problems. It is difficult enough just getting into the first cave let alone past "Wot no adverts".

I would recommend anyone buying it to be ready with lots of patience. – **R. Hudson, Chorley, Lancs.**

A tricky one this

I WOULD be extremely grateful if you could inform me of a way of disabling the combined effect of Ctrl and Break during the execution of a Basic program.

*I own an Electron and have scoured the pages of magazines and books looking for the solution, whether it be a *FX command or an assembly language routine.*

*I can disable the Break key alone by using *KEY10 to re-run the program but would be over this world if I could find out how to prevent the program being halted and everything reset to normal by Ctrl and Break* – **Lawrence Fereday, Camborne, Cornwall.**

● This is quite a tricky problem which requires a bit of machine code. John Woollard will be covering this in his series on *FX calls.

Just keep practising

I FIND it hard to make up games. I can produce fairly good graphics and sound, but find it hard to combine them.

I also find it very hard knowing which line goes where in a program. Perhaps if I knew this I could write a game that works.

I read through all your programs until I can understand them and then have a go myself at programming, and always end up copying pieces out of other programs.

But in my mind I feel a cheat. Am I the only Electron user who can't program yet? If not, this is for all you other Electron users too embarrassed to put pen to paper.

Don't get me wrong. Every month I read all your excellent tips on graphics, sound, etc, and they really help me to get a grip on the Electron.

Your programs are fantastic too. But could you tell me how your programmers learn to write such ace games?

Does this gift come to only certain people such as R. Waddilove or does it take long hard hours sitting at the keyboard?

I do hope you could answer this for me and fellow Electron users. – **Charles Gilmour, Higham Ferrers, Northants.**

● Everyone starts off by copying other people's programs and techniques.

It's not cheating, it's all part of the learning process that we all went through. Keep on programming.

Remember the old saying: "Practice makes perfect".

Wanted – a bright spark

I AM in anguish! I have a copy of Alligata's Blagger but cannot get past the fourth screen (Loco Park). I cannot even get on to this screen very often.

I would appreciate it if you could tell me a code or program that I could enter so that when I pressed "4" on my Electron it would go to screen four and the same for the other 19 screens.

I would get more enjoyment out of Blagger if I could go to any screen. – **Simon Andrews (age 15), Gosport, Hants.**

● Can any bright spark tell us how to cheat at Blagger?

Verdict on the Plus 1

EVER since the Plus 1 became available the magazine correspondence columns seem to have been littered with complaints and enquiries highlighting loading problems, speed reductions, joystick option differences and so on.

Many have offered solutions varying in approach and complexity, but so far no official words from Acorn themselves.

The same can be said for the ROM cartridges. So far no articles of explanation, reviews, or user list of available titles.

And for the Acorn-produced analogue joystick, again no articles, reviews or user adverts.

Are Acorn so unconcerned

with customer relations?

If you can supply any further words of wisdom on the uses and abuses of the Plus 1, I would be most grateful. – **R. Burley, Hull.**

● The Plus 1, although there are one or two problems associated with it, is actually very good.

The joysticks and ROM cartridges are excellent. The trouble is this tends to be taken for granted and we only hear about the bugs.

My screen went black

I WAS playing about with one of my games when I accidentally pressed Break. The screen went black and nothing I did made the computer print Acorn Electron, etc.

So I loaded up my game again and noticed these lines:

```
10 ?&287=&4C
20 ?&288=&87
30 ?&289=&02
```

at the start of the program. When I added them to one of my programs I noticed that when I pressed Break the same thing happened again.

I give this valuable information so that anybody who wants to protect their Basic programs can do so in safety. – **Ieuan Watkins, Usk, Gwent.**

PS. To disable the Escape key, use:

```
*FX200,1
```

We just can't tell . . .

WHILE playing Smash'nGrab, I decided to have a look at the program.

I loaded the first part and then when I tried to load the second part, the computer displayed the message "Locked". Why is this?

Could you also show how this is done, please. – **Liam Ruddock, Laxey, Isle of Man.**

● The Locked message means that the program has been protected so it can't be copied.

We cannot explain or publish a routine to lock and unlock programs as this would make the protection system useless.

Increasing the RAM

WITH 32k of RAM on board, the Electron sounds like it has plenty of memory to work with.

However Modes 0, 1 and 2 use 20k of RAM to store the screen display, and if you have a Plus 3 it also uses 3.5k of precious RAM.

A programmer using Mode 0 with a Plus 3 attached would have only 8.5k of RAM free for his program – not much room for a complex Basic one.

Is there then no way of expanding the RAM available via the cartridge ports on the Plus 1?

There are as yet virtually no cartridges, perhaps a RAM pack could be made to plug in. – **Stephen Arnold, Finchley, London.**

● The only way of increasing the amount of RAM would be to have a second processor similar to the BBC's 6502 and Z80 second processors.

Simply plugging RAM into a ROM socket will not work.

No Mode 7

HAS any company that you know of brought out Mode 7 for the Electron, or is any company thinking of doing so? – **M. Milner, Ossett.**

● There isn't a Mode 7 adaptor available for the Electron and we haven't heard of anyone who is making one.

A follow-up, please

THANK you very much for the screen dump routine in the April Electron User. As a follow-up, could you please have a second article on screen dumps showing how to use different dot-densities to imitate the different colours of the screen on the printer?

Secondly, concerning Mini Office, is it possible to achieve an 80-column display on the word processor to make it easier to set addresses on letters?

Also, with my Brother HR-5, when using "double height" characters, a line of spaces appears between letters (see example given). Is there any way round this? – **Ben Still, Bushey Heath, Herts.**

● The double line feed problem can be cured by setting the appropriate dip switch in the HR-5. As yet you can't have 80 columns on the Mini Office screen but you can, of course, on the printer.

New games on the way

HAVING spend a lot of money on the Acorn Electron, I was horrified to hear today at H.M.V., Oxford Street, that new games for this computer are no longer being made. Please would you clarify? – **Nathaniel Baroukh (13), London.**

● Don't panic – there are several new games coming out soon for the Electron.

Going round in circles

I GET completely baffled when it comes to drawing circles on the Electron.

I have had my computer since last November and started trying to draw circles a couple of days later, but I just can't do it.

I have tried all different theories but none of them works. Could you help me? – **Steve Peters, Swansea.**

● You need to use a bit of maths to draw a circle as there isn't a built-in circle function on the Electron.

It isn't that hard, though. Try this short program which draws random coloured circles in Mode 2:

```
10 REM Circles
20 MODE 2
30 FOR circle=1 TO 20
40 GCOL 0,RND(7)
50 x=RND(1280)
60 y=RND(1023)
70 radius=RND(300)
80 MOVE x+radius,y
90 FOR angle=0 TO 360 ST
EP 20
100 DRAW x+radius*COS(RAD
(angle)),y+radius*SIN(RAD(a
ngle))
110 NEXT angle
120 NEXT
130 END
```

Electron is a winner!

MOST of my friends have Spectrums.

They say theirs is better as they have a much wider range of software, but I say the Electron is better because it has a much better keyboard compared to the Spectrum's rubber keys.

Without being biased, could you tell us which you think is better? – **J.P. Forbes, Weymouth.**

● This argument often comes up, but there's really nothing to compare – the Electron is much better by far.

Strange calls...

*WHILE messing about on my Electron I discovered some strange *FX calls not mentioned in the manual.*

**FX 214 changes the duration of the note played when the Copy key is pressed. It is normally 5. Try *FX 214,1.*

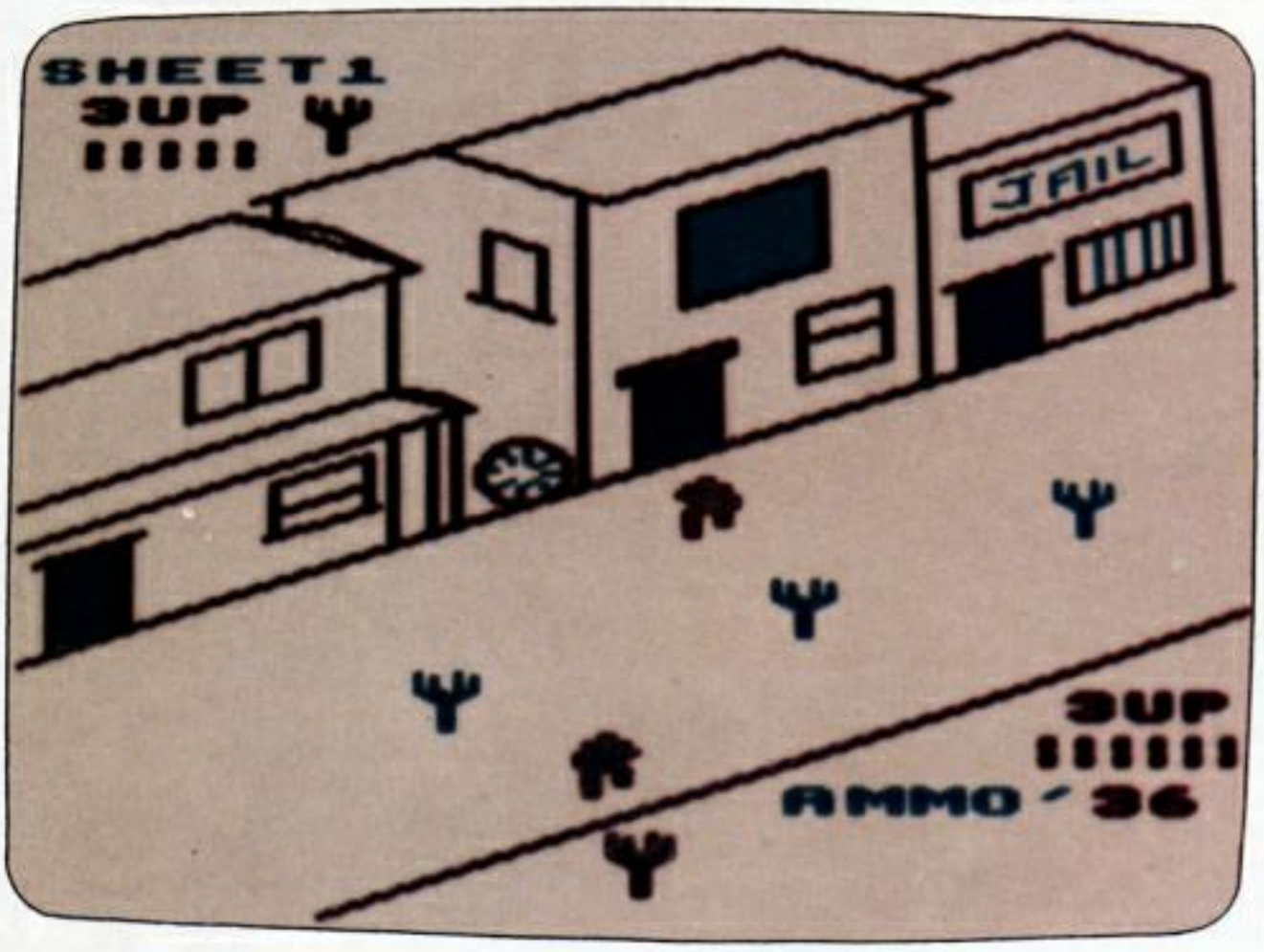
**FX 213 changes the pitch of the note. Try *FX 213,200.*

FX 212,5 switches the note on Copy off altogether.* – **C. Morrison (13), Long Eaton, Notts.

● Thanks for the *FX calls. Have a look at John Woolard's series for more information on *FX.

Ride out West with KEN GOODACRE and do what a man's got to do

TE



TIRED of arcade action but don't want to hurt your brain with logic games? Well, why not go back to the days when a man was a man and do what a man has to do way out West?

Despicable Dan has ridden into town and the scene is set for a showdown between Dan and Tex the sheriff (you).

Tex has six shots in his gun, which is reloaded when Dan has used his six shots.

Each player has three lives, and when Dan has lost all his lives the game moves on to the next level.

On each progressive level the number of shots Tex starts with is reduced.

To make things a little more difficult, Tex can only fire straight, or at a preset angle, left or right depending on his proximity to Dan. Points also

PROCEDURES

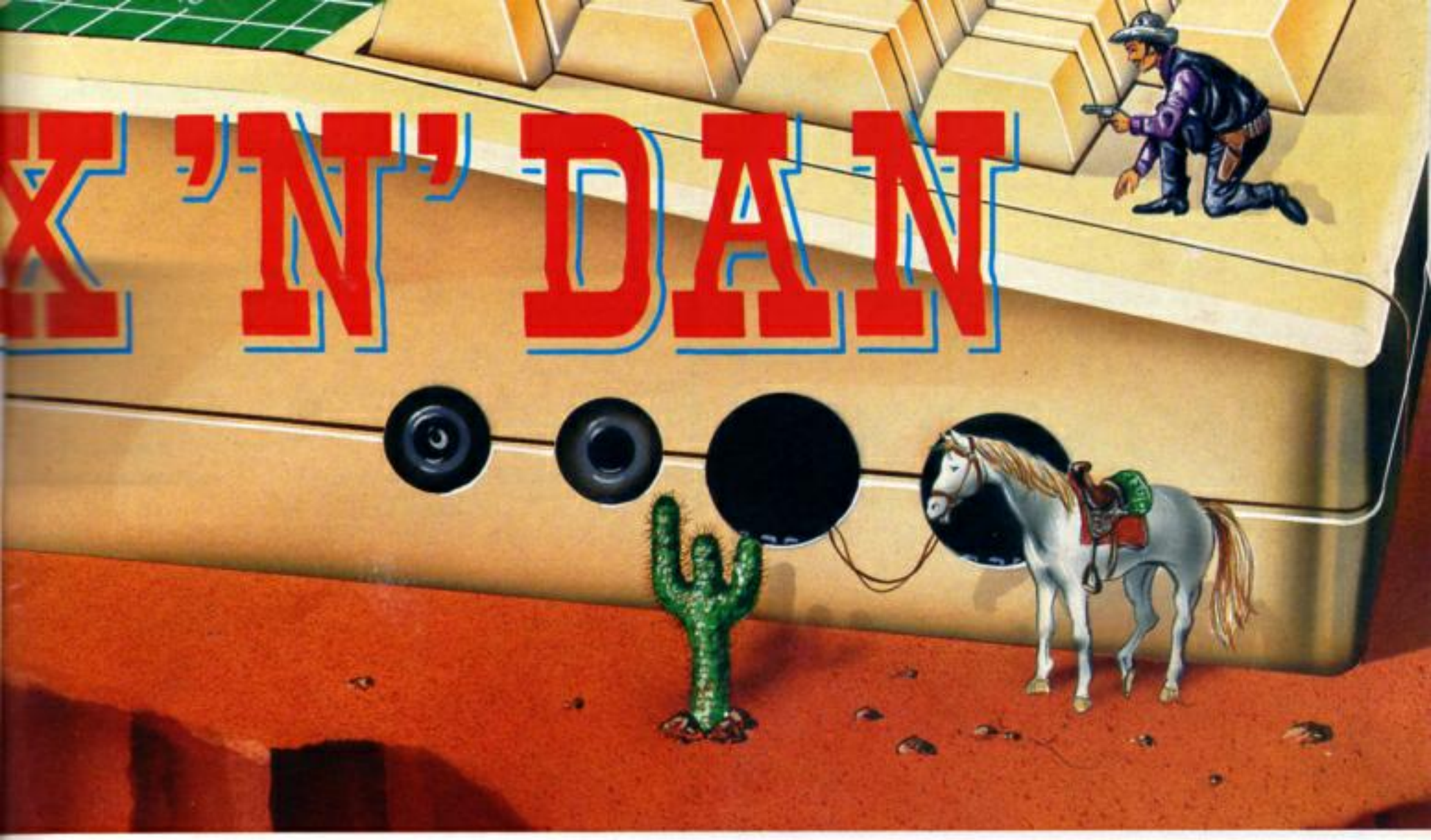
auto	Main loop on one-player game.
test2	Main loop on two-player game.
jmp1	Tex jumps.
jmp2	Tex alights.
mR	Moves Tex and Dan.
sh	Tex fires.
sh2	Dan fires.
chek	Has anybody hit a cactus?
rico	Cactus has been hit.
del	Progressively deletes a cactus.
DGR	Tex and Dan dodge about.
turn_dan	Dan turns to face Tex.
at	Computer fires at Tex.
snake	Moves snake.
bite	Snake has bitten Tex!
run_on	Let battle commence!
over	Game over or next level.
advance	Advance to next level.
cac1/2/3	Draws a cactus.
w	Waiting loop.
up	Blind goes up.
shut	Shut that door!
carry	Undertaker carries Tex off.
run	Prints undertaker.
ask	How many players are there?
load	Loads a gun.
spent	Deletes a bullet.

MAIN VARIABLES

A%	Tex's ammo in one-player game.
B%/b%	Number of shots in respective gun.
ca1/2/3%	Piece of cactus.
D%/d%	Holds value for leg animation.
DIF%	Difference in Ypos of Tex and Dan.
E%/e%	Holds value for body animation.
ER%/er%	Error of Dan.
GM%/gm%	Number of games won.
P%/PP%	Number of players.
SC%/sc%	Score.
UP%/up%	Number of lives left.
u%	Timing of jump.
UX%	Xpos of undertaker.
UY%	Ypos of undertaker.
SN%	Type of snake, left or right facing.
SX%	Xpos of snake.
SY%	Ypos of snake.
X%/x%	Xpos of Tex or Dan.
Y%/y%	Ypos of Tex or Dan.

FLAGS

O%=1	If a cactus has been hit.
ov%=1	During play.
U%=1	If Tex jumps.



are awarded for shooting pieces off the cacti, which can only be hit when firing straight up.

On the third screen, one of Dan's gang throws a rattlesnake onto Tex's side of the road. This snake proceeds to chase Tex for the rest of the game.

Tex can jump over the snake by pressing the spacebar. But if he comes into contact with the snake he loses a life.

On the third level onwards, Dan's accuracy improves.

If Tex loses all his lives, an undertaker will come out and carry him off. As you might guess, the game is then over.

As well as this one player versus the micro, there's a two-player option in which both players are evenly matched.

The game will also demonstrate itself.

```
  10REM Tex'n'Dan
  20REM By K.Goodacre
  30REM (C) ELECTRON USER
  40REM
  50REM DO NOT RENUMBER!
  60REM SAVE BEFORE RUNNIN
G!
  70*KEY10 OLD|MRUN|M
  80MODE6:VDU19,1,2,0,0,0
  90RESTORE200:FORA=224TO2
55
 100READ B,C,D,E,F,G,H,I
 110VDU23,A,B,C,D,E,F,G,H,
I:NEXT
 120RESTORE340:FORA=1TO4
 130READ B,C,D,E,F,G,H,I,J
,K,L,M,N
 140ENVELOPEA,B,C,D,E,F,G,
H,I,J,K,L,M,N
 150NEXT
 160*KEY0 DELETE10,340|MRU
N|M
 170PRINTTAB(14,2)"TEX'N'D
AN"
 180PRINTTAB(6,5)"*** One
Player Controls ***"
 190PRINTTAB(2,7)"J=Left :
 K=Shoot : L=Right : SPC=Ju
mp"
 200PRINTTAB(6,9)"*** Two
Player Controls ***"
 210PRINTTAB(4,11)"+=Left
: *=Shoot : return=Right"
 220PRINTTAB(5,13)"ctrl=Le
ft : A=Shoot : S=Right"
 230PRINTTAB(5,15)"*******
**********************"
 240PRINTTAB(5,17)"Sound O
ff=Y";SPC(3);"***";SPC(3);"
Sound On=U"
 250PRINTTAB(3,20)"Press F
unction Key-0 & Please Wait
"
 260END
 270REM CHARACTERS
 280DATA60,126,255,255,219
,231,255,255 ,24,24,126,24,
126,255,189,189 ,60,102,102
,102,102,102,36,102 ,60,102
,102,38,102,6,4,6 ,60,102,1
02,100,102,96,32,96 ,24,60,
153,219,255,126,60,60
 290DATA8,16,16,24,4,120,1
29,126 ,24,24,126,24,190,12
7,61,61 ,24,24,126,24,125,2
54,188,188 ,3,54,124,121,63
,111,207,159 ,1,14,56,224,1
92,192,224,240 ,23,55,99,49
,24,12,4,4
 300DATA240,248,205,199,19
5,232,120,24 ,0,0,0,24,24,3
2,0,0 ,72,242,103,71,135,2,
15,23 ,0,1,18,20,34,64,128,
0 ,39,71,47,13,12,6,6,3 ,0,
0,128,128,192,96,96,48 ,0,1
42,138,142,138,234,0,0
 310DATA0,238,132,228,36,2
28,0,0 ,0,234,138,238,42,23
4,0,0 ,0,238,164,164,164,22
8,0,0 ,24,24,126,24,189,126
,60,60 ,32,80,136,136,136,8
0,32,0 ,119,69,117,21,119,0
,0,0 ,132,165,165,165,165,2
47,126,60
 320DATA24,24,24,24,24,24,
24,24 ,128,128,128,128,128,
192,64,0 ,0,1,1,1,1,3,2,0 ,
0,32,32,32,32,48,48,48 ,4,4
,4,4,4,4,12,12 ,16,8,8,24,3
2,30,129,126
 330REM ENVELOPES
 340DATA1,0,0,0,0,0,0,126,
-1,0,-3,100,126 ,128,-2,-1,
-1,5,10,10,127,-1,-1,-1,100
,0 ,128,-1,-1,-1,20,20,20,2
0,0,-127,-5,126,126 ,2,4,4,
4,25,25,25,100,100,-1,-5,12
6,126
 350 ON ERROR MODE6:PROCer
ror:END
 360PROCinit:MODE5:VDU23,1
,0;0;0;0;
 370VDU5:PROCtitle:PROCpla
y:END
 380:
 390DEFPROCplay:ov%=1
 400PROCask:IFPP%>0GOTO420
 410PROCdemo
 420PROCscreen:PROCw(100)
 430COL3,3:MOVE550,410:PR
INT"DRAW!"
 440PROCclang:PROCw(50):P%
=PP%
 450MOVE550,410:PRINT"DRAW
!"
 460IFPP%=1PROCauto
 470IFPP%=2PROCtest2
 480ENDPROC
 490:
 500DEFPROCauto
 510G%=RND(30)
 520IFB%>5ANDb%>5B%=0:b%=0
:PROCload(0,850,3):PROCload
```

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Tex 'n' Dan listing

From Page 51

```
(1020,180,2)
  530IFca1%>254PROCcac1
  540IFca2%>254PROCcac2
  550IFca3%>254PROCcac3
  560IF6%>5ANDG%<15PROCdgr
  570IF6%>10ANDG%<20ANDGM%<
2PROCsh2
  580IF6%>10ANDG%<20ANDGM%>
=2PROCat
  590IF6%>15ANDG%<25PROCdgl
  600IF6%>20ANDGM%>1PROCsna
ke
  610PROCtest:GOTO510:ENDPR
OC
  620:
  630DEFPROCtest
  640IFINKEY-69s%=0:*FX210,
1
  650IFINKEY-54s%=1:*FX210,
0
  660IFINKEY-87PROCaR
  670IFINKEY-70PROCaL
  680IFINKEY-71PROCsh
  690IFU%=1u%=u%+1
  700IFu%=3PROCjmp2
  710IFINKEY-99ANDGM%>1ANDU
%=0PROCjmp1
  720IFPOINT(SX%,SY%)=2PROC
bite
  730ENDPROC
  740:
  750DEFPROCtest2
  760IFB%>5ANDb%>5B%=0:b%=0
:PROCload(0,850,3):PROCload
(1020,180,2)
  770IFca1%>254PROCcac1
  780IFca2%>254PROCcac2
  790IFca3%>254PROCcac3
  800IFINKEY-69s%=0:*FX210,
1
  810IFINKEY-54s%=1:*FX210,
0
  820IFINKEY-74PROCaR
  830IFINKEY-88PROCaL
  840IFINKEY-73PROCsh
  850IFINKEY-82PROCar
  860IFINKEY-2PROCal
  870IFINKEY-66PROCsh2
  880GOTO760:ENDPROC
  890:
  900DEFPROCjmp1:PROCtex(E%
,D%)
  910Y%=Y%+50:PROCtex(E%,D%
)
  920SOUND&01,4,80,1
  930U%=1:ENDPROC
  940:
  950DEFPROCjmp2:PROCtex(E%
,D%)
  960Y%=Y%-50:PROCtex(E%,D%
)
  970U%=0:u%=0:ENDPROC
  980:
  990DEFPROCaR:PROCtex(E%,D
%)
 1000X%=X%+30:IFX%>1140X%=1
140:GOTO1020
 1010Y%=Y%+10:D%=D%+1:IFD%>
228D%=227
 1020PROCtex(E%,D%):ENDPROC
 1030:
 1040DEFPROCar:PROCdan(e%,d
%)
 1050x%=x%+30:IFx%>1140x%=1
140:GOTO1070
 1060y%=y%+10:d%=d%+1:IFd%>
228d%=227
 1070PROCdan(e%,d%):ENDPROC
 1080:
 1090DEFPROCaL:PROCtex(E%,D
%)
 1100X%=X%-30:IFX%<290X%=29
0:GOTO1120
 1110Y%=Y%-10:D%=D%+1:IFD%>
228D%=227
 1120PROCtex(E%,D%):ENDPROC
 1130:
 1140DEFPROCal:PROCdan(e%,d
%)
 1150x%=x%-30:IFx%<290x%=29
0:GOTO1170
 1160y%=y%-10:d%=d%+1:IFd%>
228d%=227
 1170PROCdan(e%,d%):ENDPROC
 1180:
 1190DEFPROCtex(E%,D%):GCOL
3,2
 1200MOVEX%-32,Y%+20:VDUE%,
10,8,D%
 1210ENDPROC
 1220:
 1230DEFPROCdan(e%,d%):GCOL
3,3
 1240MOVEx%-32,y%+20:VDUe%,
10,8,d%
 1250ENDPROC
 1260:
 1270DEFPROCsh:IFB%>5ENDPRO
C
 1280PROCspent(1020+B%*40,1
80,2)
 1290B%=B%+1:J%=X%:j%=Y%+DI
F%+30
 1300IFP%=2THEN1330
 1310GCOL3,2:MOVE1090,130:P
RINTA%
 1320A%=A%-1:MOVE1090,130:P
RINTA%
 1330IFov%=0ENDPROC
 1340PROCturn_tex:PROCturn_
dan
 1350IFE%=232J%=J%+420:j%=j
%+140
 1360IFE%=231J%=J%-420:j%=j
%-140
 1370IFE%=231GX%=70ELSEGX%=
0
 1380IFE%=225GY%=16ELSEGY%=
0
 1390IFJ%>1200J%=1200
 1400IFJ%<210J%=210
 1410IFj%>400+DIF%j%=400+DI
F%
 1420IFj%<70+DIF%j%=70+DIF%

 1430GCOL3,1:MOVEX%-GX%,Y%+
26-GY%:VDU46
 1440SOUND&10,1,4,2:GCOL3,2
:O%=0
 1450PROCchek(X%,Y%,E%)
 1460IFO%=1SC%=SC%+50:GOTO1
520
 1470MOVEX%,Y%:PLOT21,J%,j%
:PROCw(2)
 1480MOVEX%,Y%:PLOT21,J%,j%
 1490GCOL3,1:MOVEX%-GX%,Y%+
26-GY%:VDU46
 1500IFA%=1PROCup
 1510IFPOINT(J%,j%)=3PROChi
tdan:ENDPROC
 1520IFA%<1:WIN$="DAN WINS!
":PROCover
 1530ENDPROC
 1540:
 1550DEFPROCsh2:IFb%>5ANDPP
%=1GOTO1580
 1560IFb%>5ENDPROC
 1570PROCspent(b%*40,850,3)
:b%=b%+1
 1580J%=x%:j%=y%-DIF%-40
 1590IFov%=0ENDPROC
 1600PROCturn_dan:PROCturn_
tex
 1610IFe%=232J%=J%+420:j%=j
%+140
 1620IFe%=231J%=J%-420:j%=j
%-140
 1630IFJ%>1200J%=1200
 1640IFJ%<210J%=210
 1650IFj%>400j%=400
 1660IFj%<70j%=70
 1670IFe%=231GX%=70ELSEGX%=
0
 1680IFe%=225GY%=16ELSEGY%=
0
 1690GCOL3,1:MOVEx%-GX%,y%+
26-GY%:VDU46
 1700SOUND&10,1,5,2:GCOL3,3
:O%=0
 1710PROCchek(x%,y%,e%)
 1720IFO%=1sc%=sc%+50:ENDPR
OC
 1730MOVEx%,y%:PLOT21,J%,j%
:PROCw(2)
 1740MOVEx%,y%:PLOT21,J%,j%
 1750GCOL3,1:MOVEx%-GX%,y%+
26-GY%:VDU46
 1760IFPOINT(J%,j%)=2PROChi
tex
 1770ENDPROC
 1780:
 1790DEFPROCchek(K%,k%,EE%)
 1800IFPOINT(K%,230)=1ANDEE
%=225PROCrico(260,K%,k%):EN
DPROC
 1810IFPOINT(K%,330)=1ANDEE
%=225PROCrico(360,K%,k%):EN
DPROC
 1820IFPOINT(K%,440)=1ANDEE
%=225PROCrico(470,K%,k%):EN
DPROC
 1830ENDPROC
 1840:
 1850DEFPROCrico(R%,XR%,YR%
):O%=1
 1860J%=RND(1279):j%=RND(30
0)+N%
 1870MOVEXR%,YR%:PLOT21,XR%
,R%:PROCw(2)
 1880MOVEXR%,YR%:PLOT21,XR%
,R%
 1890MOVEXR%,R%:VDU247,248
 1900MOVEXR%,R%:PLOT21,J%,j
%:PROCw(2)
 1910MOVEXR%,R%:PLOT21,J%,j
%
 1920MOVEXR%,R%:VDU247,248:
GCOL3,1
 1930MOVEXR%-GX%,YR%+26-GY%
:VDU46
 1940IFR%=260PROCdeL
 1950IFR%=360PROCdeM
 1960IFR%=470PROCdeR
 1970SOUND1,2,200,1:ENDPROC
 1980:
 1990DEFPROCdeL:IFca1%>254E
NDPROC
 2000MOVE410,255:VDUca1%
 2010IFca1%>253MOVE410,255-
32:VDU250
 2020ca1%=ca1%+1:ENDPROC
 2030:
 2040DEFPROCdeM:IFca2%>254E
NDPROC
 2050MOVE770,355:VDUca2%
 2060IFca2%>253MOVE770,355-
```

→

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```
32:VDU250
 2070ca2%=ca2%+1:ENDPROC
 2080:
 2090DEFPROCdeR:IFca3%>254E
NDPROC
 2100MOVE1070,465:VDUca3%
 2110IFca3%>253MOVE1070,465
-32:VDU250
 2120ca3%=ca3%+1:ENDPROC
 2130:
 2140DEFPROChitdan:SOUND1,3
,220,5
 2150PROCdan(e%,d%)
 2160MOVE50,900:PRINTup%:up
%=up%-1
 2170MOVE50,900:PRINTup%
 2180MOVEx%,y%+50:PRINTD$:P
ROCw(40)
 2190MOVEx%,y%+50:PRINTD$
 2200MOVEx%,y%+30:PRINTK$
 2210IFup%<1PROCdandead
 2220IFPP%=1ANDA%=0PROCover
 2230PROCw(100):MOVEx%,y%+3
0:PRINTK$
 2240x%=RND(850)+290:y%=x%/
3+(DIF%)
 2250PROCdan(e%,d%):ENDPROC
 2260:
 2270DEFPROCdandead:a%=A%:A
%=A%+1
 2280GCOL3,2:MOVEx%+32,y%+1
6:VDU237
 2290PROCw(100):GCOL3,1:j%=
y%
 2300FORS%=200TO0STEP-10
 2310SOUND1,-15,S%,1:j%=j%-
30:*FX19
 2320MOVEx%,j%:VDU226,8,11,
229
 2330MOVEx%,j%:VDU226,8,11,
229:NEXT
 2340WIN$="Tex Wins!"
 2350IFPP%=1MOVE320,950:PRI
NTGM%+1
 2360GM%=GM%+1
 2370IFPP%=1MOVE320,950:PRI
NTGM%+1
 2380PROCover:ENDPROC
 2390:
 2400DEFPROCDGR:REPEAT:PROC
eR
 2410UNTILX%>=RND(850)+290:
ENDPROC
 2420:
 2430DEFPROCdgr
 2440PROCar:PROCtest
 2450IFx%>=RND(850)+290:END
PROC
 2460GOTO2440:ENDPROC
 2470:
 2480DEFPROCDGL:REPEAT:PROC
aL
 2490UNTILX%<=RND(850)+290:
ENDPROC
 2500:
 2510DEFPROCdgl
 2520PROCal:PROCtest
 2530IFx%<=RND(850)+290:END
PROC
 2540GOTO2520:ENDPROC
 2550:
 2560DEF PROCturn_dan
 2570IFx%>X%+100PROCdan(e%,
d%):e%=231:PROCdan(e%,d%)
 2580IFx%<X%-100PROCdan(e%,
d%):e%=232:PROCdan(e%,d%)
 2590IFx%<X%+100ANDx%>X%-10
0PROCdan(e%,d%):e%=225:d%=2
26:PROCdan(e%,d%)
 2600ENDPROC
 2610:
 2620DEFPROCturn_tex
 2630IFX%>x%+100PROCtex(E%,
D%):E%=231:PROCtex(E%,D%)
 2640IFX%<x%-100PROCtex(E%,
D%):E%=232:PROCtex(E%,D%)
 2650IFX%<x%+100ANDX%>x%-10
0PROCtex(E%,D%):E%=225:D%=2
26:PROCtex(E%,D%)
 2660ENDPROC
 2670:
 2680DEFPROCat:IFb%>56GOTO27
00
 2690PROCspent(b%+40,850,3)
:b%=b%+1
 2700ER%=RND(er%):I%=X%+ER%
 2710PROCturn_dan:PROCturn_
tex:PROCtest
 2720IFe%=231GX%=70ELSEGX%=
0
 2730IFe%=225GY%=10ELSEGY%=
0
 2740GCOL3,1:MOVEx%-GX%,y%+
26-GY%:VDU46
 2750SOUND&10,1,5,2:GCOL3,3
:GX%=0
 2760PROCchek(x%,y%,e%)
 2770IFGX%=1sc%=sc%+50:ENDPR
OC
 2780MOVEx%,y%:PLOT21,I%,Y%
:PROCw(2)
 2790MOVEx%,y%:PLOT21,I%,Y%
 2800GCOL3,1:MOVEx%-GX%,y%+
26-GY%:VDU46
 2810IFPOINT(I%,Y%)=2PROChi
tex
 2820ENDPROC
 2830:
 2840DEFPROChitex:SOUND1,3,
200,5
 2850PROCtex(E%,D%)
 2860MOVE1070,230:PRINTUP%:
UP%=UP%-1
 2870MOVE1070,230:PRINTUP%
 2880MOVEX%,Y%+50:PRINTD$:P
ROCw(40)
 2890MOVEX%,Y%+50:PRINTD$
 2900MOVEX%,Y%+35:PRINTK$:U
%=0:u%=0
 2910IFUP%<1PROCtexdead
 2920PROCw(100):MOVEX%,Y%+3
5:PRINTK$
 2930X%=RND(850)+290:Y%=X%/
3-36
 2940PROCtex(E%,D%):ENDPROC
 2950:
 2960DEFPROCtexdead
 2970GCOL3,3:MOVEX%+32,Y%+2
1:VDU237
 2980PROCw(100):GCOL3,2:j%=
Y%
 2990FORS%=0TO200STEP8
 3000SOUND1,-15,S%,1:j%=j%+
40:*FX19
 3010MOVEX%,j%:VDU229,8,10,
226
 3020MOVEX%,j%:VDU229,8,10,
226:NEXT
 3030WIN$="Dan Wins!"
 3040IFP%=1PROCcarry
 3050gaX=gaX+1:PROCover:END
PROC
 3060:
 3070DEFPROCsnake:GCOL3,3
 3080MOVESX%-36,SY%-12:VDUS
N%
 3090IFSX%<=X%SN%=230:PROCs
nrt:ENDPROC
 3100IFSX%>X%SN%=255:PROCsn
lt:ENDPROC
 3110:
 3120DEFPROCsnrt:SX%=SX%+30
 3130IFSX%>X%SX%=X%:GOTO315
0
 3140SY%=SY%+10
 3150MOVESX%-36,SY%-12:VDUS
N%:ENDPROC
 3160:
 3170DEFPROCsnlt:SX%=SX%-30
 3180IFSX%<X%SX%=X%:GOTO320
0
 3190SY%=SY%-10
 3200MOVESX%-36,SY%-12:VDUS
N%:ENDPROC
 3210:
 3220DEFPROCbite:SOUND0,3,0
,20
 3230PROCw(50):PROCtex(E%,D
%)
 3240SOUND1,3,100,5
 3250MOVE1070,230:PRINTUP%:
UP%=UP%-1
 3260MOVE1070,230:PRINTUP%
 3270MOVEX%,Y%+35:PRINTK$:U
%=0:u%=0
 3280IFUP%<1PROCtexdead:END
PROC
 3290PROCw(150):MOVEX%,Y%+3
5:PRINTK$
 3300X%=RND(850)+290:Y%=X%/
3-36
 3310PROCtex(E%,D%):ENDPROC
 3320:
 3330DEF PROCinit
 3340C$=CHR$249+CHR$10+CHR$
8+CHR$250
 3350D$=CHR$238+CHR$239+CHR
$10+CHR$8+CHR$8+CHR$240+CHR
$241
 3360K$=CHR$233+CHR$234+CHR
$10+CHR$8+CHR$8+CHR$235+CHR
$236
 3370L$=CHR$242+CHR$243+CHR
$8+CHR$8+CHR$10+CHR$244+CHR
$245
 3380W$=CHR$10+CHR$3+CHR$1+
CHR$225+CHR$10+CHR$3+CHR$2+
CHR$10+CHR$8+CHR$228
 3390A%=36:DIF%=210:GM%=0:g
a%=0:PP%=0
 3400SC%=0:sc%=0:s%=1:0%=0:
WIN$=" "
 3410UP%=3:up%=3:ov%=1:ENDP
ROC
 3420:
 3430DEFPROCscreen:B%=0:b%=
0:CLG
 3440FORL%=1TO2:VDU19,L%,0,
0,0,0:NEXT
 3450VDU19,3,2,0,0,0:GCOL3,
3
 3460MOVE350,350:PRINT"PLAY
ERS="PP%
 3470IFPP%=0MOVE440,250:PRI
NT"'DEMO'"
 3480GCOL0,2:RESTORE6430:FO
RL%=1TO112
 3490READP,X,Y:PLOTP,X,Y:NE
XT:GCOL0,1
 3500RESTORE6530:FORL%=1TO1
7:READP,X,Y
 3510PLOTP,X+60,Y:NEXT:REST
ORE6560
 3520FORL%=1TO8:READP,X,Y:P
LOTP,X,Y:NEXT
 3530IFPP%=1MOVE0,950:PRINT
"SHEET"GM%+1:MOVE770,130:PR
INT"AMMO'"
```

```
 3540PROCopen(600,0,200,0):
PROCopen(0,0,0,0):PROCopen(
0,330,0,110):MOVE160,390
 3550PRINTW$:MOVE740,580:PR
INTW$
 3560PROCwheel(1,1,0.8)
 3570GCOL0,0:MOVE495,485:VD
U42
 3580PROCwheel(0,2,0.4)
 3590PROCload(1020,100,2):M
OVE300,900
 3600PRINTC$:MOVE600,80:PRI
NTC$
 3610IFPP%<2MOVE1090,130:PR
INTA%
 3620MOVE1070,230:PRINTUP%"
UP":GCOL3,3
 3630MOVE350,350:PRINT"PLAY
ERS="PP%
 3640IFPP%=0MOVE440,250:PRI
NT"'DEMO'"
 3650VDU20:VDU19,3,2,0,0,0
 3660PROCload(0,850,3):MOVE
1060,610
 3670VDU255:MOVE940,570:VDU
230
 3680MOVE50,900:PRINTupX"UP
":PROCw(50)
 3690PROCcac1:PROCcac2:PROC
cac3
 3700PROCrun_on:PROCw(50)
 3710MOVE160,390:PRINTW$
 3720PROCopen(600,0,200,0):
PROCshut(600,0,200,0)
 3730SOUND&10,1,6,1:PROCw(2
5)
 3740MOVE740,580:PRINTW$
 3750PROCopen(0,0,0,0):PROC
shut(0,0,0,0)
 3760SOUND&10,1,6,1:PROCw(2
5)
 3770GCOL3,3:MOVE1060,610:V
DU255
 3780MOVE940,570:VDU230
 3790PROCopen(0,330,0,110):
PROCshut(0,330,0,110)
 3800SOUND&10,1,6,1:PROCw(5
0)
 3810PROCdown(0):PROCw(50)
 3820PROCnoon:PROCw(100):EN
DPROC
 3830:
 3840DEFPROCwheel(beq,C,inc
)
 3850MOVE520,475+35:GCOL0,C

 3860FORA=0TORAD370STEPinc
 3870X=520+45*SIN(A):Y=475+
35*COS(A)
 3880IFbeq=1THENMOVE520,475
 3890DRAWX,Y:NEXT:ENDPROC
 3900:
 3910DEFPROCrun_on:X%=1140:
Y%=X%/3-35
 3920x%=290:y%=x%/3+(DIF%)
 3930E%=225:e%=225:D%=226:d
%=226
 3940PROCtex(E%,D%):REPEAT:
PROCmL
 3950FORS%=220TO130STEP-15:
SOUND&11,-15,S%,1:NEXT:UNTI
LX%<=600
 3960PROCdan(e%,d%):REPEAT:
PROCmr
 3970FORS%=200TO110STEP-15:
SOUND&11,-15,S%,1:NEXT:UNTI
Lx%>=850:ENDPROC
 3980:
 3990DEFPROCerror:VDU19,1,2
,0,0,0
 4000REPORT:*FX15,1
 4010PRINT" at line ";ERL:V
DU14:ENDPROC
 4020:
 4030DEFPROCtitle2:GCOL3,1
 4040MOVE0,970:PRINT"TEX'N'
DAN"
 4050MOVE750,130:PRINT"PRES
S"
 4060MOVE600,85:PRINT"SPACE
 BAR"
 4070MOVE740,40:PRINT"TO PL
AY":ENDPROC
 4080:
 4090DEFPROCover:ov%=0
 4100IFA%=1PROCdown(1)
 4110IFA%>0ANDUP%>0ANDPP%=1
PROCadvance:ENDPROC
 4120IFPP%=0PROCtitle2
 41306COL0,1:MOVE600,85
 4140PRINT"GAME OVER":PROCj
ohn
 4150IFPP%=0PROCw(150):RUN

 4160PROCw(150):PROCplay:EN
DPROC
 4170:
 4180DEFPROCadvance:A%=a%:G
COL3,1
 4190IFGM%<36OTO4210
 4200er%=er%-25:IFer%<0er%=
0
 4210FORL%=1TO12:PROCdeL:PR
OCdeM:PROCdeR:SOUND&11,1,15
0,1:NEXT
 4220FORL%=1TO6:PROCsh:PROC
w(2):NEXT
 4230PROCload(1020,100,2):B
%=0
 42406COL3,3:MOVEx%,y%+30:P
RINTK$:MOVE50,900:PRINTupX:
up%=3:MOVE50,900:PRINTupX:G
COL3,2:MOVEx%+32,y%+16:VDU2
37
 4250MOVE1090,130:PRINTA%:A
%=36
 4260A%=A%-6*GM%:IFA%<6A%=6
 4270MOVE1090,130:PRINTA%
 4280x%=RND(850)+290:y%=x%/
3+(DIF%)
 4290MOVE1070,230:PRINTUP%:
UP%=UP%+1
 4300IFUP%>5UP%=5
 4310MOVE1070,230:PRINTUP%:
ov%=1
 4320PROCw(50)
 4330IFGM%<>26OTO4430
 4340SX%=100:SY%=200
 4350PROCshut(600,0,200,0):
PROCopen(600,0,200,0)
 4360MOVE150,300:PRINTW$
 43706COL3,3:MOVESX%-32,SY%
-12:VDUSN%
 4380PROCw(30):MOVESX%-32,S
Y%-12:VDUSN%
 4390SX%=270:SY%=SX%/3-36
 4400MOVESX%-32,SY%-12:VDUS
N%
 4410MOVE150,300:PRINTW$
 4420PROCopen(600,0,200,0):
PROCshut(600,0,200,0)
 4430PROCdan(e%,d%):PROCaut
o:ENDPROC
 4440:
 4450DEFPROCdemo:P%=1
 4460PROCscreen:PROCtitle2:
PROCw(100)
 44706COL3,3:MOVE550,410:PR
INT"DRAW!"
 4480PROCclang:PROCw(50)
 4490MOVE550,410:PRINT"DRAW
!":*FX15,1
 45006%=RND(30):M%=RND(30):
a%=RND(30)
```

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```
 4510IFINKEY-69sX=0:*FX210,
1
 4520IFINKEY-54sX=1:*FX210,
0
 4530IFBX>5ANDbX>5BX=0:bX=0
:PROCload(0,850,3):PROCload
(1020,180,2)
 4540IFcaX>254PROCcac1
 4550IFca2X>254PROCcac2
 4560IFca3X>254PROCcac3
 4570IF6X>5AND6X<15PROCsh
 4580IF6X>15AND6X<25PROCsh2

 4590IFMX>20PROCD6R
 4600IFaX>20PROCdgr
 4610IFMX<10PROCD6L
 4620IFaX<10PROCdgl
 4630X=INKEY(0):IFX=32PROCp
lay:ENDPROC
 4640GOTO4500:ENDPROC
 4650:
 4660DEFPROCcac1:caX=251:G
COL3,1
 4670FORLX=1TO4:PROCdeL:SOU
ND&10,1,0,1
 4680PROCw(3):NEXT:caX=251
:ENDPROC
 4690:
 4700DEFPROCcac2:ca2X=251:G
COL3,1
 4710FORLX=1TO4:PROCdeM:SOU
ND&10,1,1,1
 4720PROCw(3):NEXT:ca2X=251
:ENDPROC
 4730:
 4740DEFPROCcac3:ca3X=251:G
COL3,1
 4750FORLX=1TO4:PROCdeR:SOU
ND&10,1,2,1
 4760PROCw(3):NEXT:ca3X=251
:ENDPROC
 4770:
 4780DEFPROCw(t):TIME=0
 4790REPEAT UNTIL TIME>=t:E
NDPROC
 4800:
 4810DEFPROCup:GCOL3,1:SOUN
D0,2,2,6
 4820FORLX=668TO764STEP8:MO
VE690,LX
 4830DRAW820,LX+45:NEXT
 4840GCOL3,3:MOVE700,766:PR
INTL$
 4850ENDPROC
 4860:
 4870DEFPROCdown(beq):SOUND
0,2,2,6
 4880IFbeq=0THEN4900
 4890GCOL3,3:MOVE700,766:PR
INTL$
 4900GCOL3,1:FORLX=764TO668
STEP-8
 4910MOVE690,LX:DRAW820,LX+
45
 4920NEXT:ENDPROC
 4930:
 4940DEFPROCshut(A,B,C,D):G
COL3,1
 4950RESTORE6580:FORLX=1TO5
:READP,X,Y
 4960PLOTP,X-A+B,Y-C+D:NEXT
:ENDPROC
 4970:
 4980DEFPROCopen(A,B,C,D):G
COL3,1
 4990RESTORE6590:FORLX=1TO5
:READP,X,Y
 5000PLOTP,X-A+B,Y-C+D:NEXT
:ENDPROC
 5010:
 5020DEFPROCcarry:UXX=645:U
YX=566
 5030PROCshut(0,0,0,0):PROC
open(0,0,0,0)
 5040IFXX>=UXXPROCgoR:ENDPR
OC
 5050IFXX<UXXPROCgoL:ENDPRO
C
 5060:
 5070DEFPROCgoR:PROCrun(225
,DX)
 5080REPEAT:PROCw(1):PROCru
n(225,DX)
 5090IFUXX>=XXGOTO5110
 5100UXX=UXX+20
 5110IFUYX<=YX+110GOTO5130
 5120UYX=UYX-10
 5130DX=DX+1:IFDX>228DX=227
 5140PROCrun(225,DX)
 5150UNTILUXX>=XX AND UYX<=
YX+110
 5160PROCrun(225,DX):PROCru
n(225,226)
 5170PROCopen(0,0,0,0)
 5180PROCshut(0,0,0,0):PROC
noon
 5190PROCshut(0,330,0,110):
PROCopen(0,330,0,110):GCOL3
,3:MOVEXX+32,YX+21:VDU237
 5200GCOL3,2:MOVEXX,YX+35:P
RINTK$
 5210MOVEXX,YX+35:VDU224
 5220PROCrun(225,226):PROCr
un(246,226)
 5230PROCw(100):uxX=1000:uy
X=650
 5240IFXX>1000PROCretL(0):E
NDPROC
 5250PROCretR:ENDPROC
 5260:
 5270DEFPROCgoL:PROCrun(225
,DX)
 5280REPEAT:PROCw(1):PROCru
n(225,DX)
 5290IFUXX<=XXGOTO5310
 5300UXX=UXX-10
 5310IFUYX<=YX+110GOTO5330

 5320UYX=UYX-10
 5330DX=DX+1:IFDX>228DX=227

 5340PROCrun(225,DX)
 5350UNTILUXX<=XX AND UYX<=
YX+110
 5360PROCrun(225,DX):PROCru
n(225,226)
 5370PROCopen(0,0,0,0)
 5380PROCshut(0,0,0,0):PROC
noon
 5390PROCshut(600,0,200,0):
PROCopen(600,0,200,0):GCOL3
,3:MOVEXX+32,YX+21:VDU237
 5400GCOL3,2:MOVEXX,YX+35:P
RINTK$
 5410MOVEXX,YX+35:VDU224
 5420PROCrun(225,226):PROCr
un(246,226)
 5430PROCw(100)
 5440uxX=48:uyX=349:PROCret
L(1):ENDPROC
 5450:
 5460DEFPROCretR:MOVEXX,YX+
35:VDU224
 5470PROCrun(246,226):PROCr
un(224,DX)
 5480PROCw(100)
 5490REPEAT:PROCw(1):PROCru
n(224,DX)
 5500IFUXX>=uxXGOTO5520
 5510UXX=UXX+10
 5520IFUYX>=uyXGOTO5540
 5530UYX=UYX+10
 5540DX=DX+1:IFDX>228DX=227
 5550PROCrun(224,DX)
 5560UNTIL UXX>=uxX AND UYX
>=uyX
 5570PROCrun(224,DX):PROCop
en(0,330,0,110):PROCshut(0,
330,0,110):ENDPROC
 5580:
 5590DEFPROCretL(beq)
 5600MOVEXX,YX+35:VDU224
 5610PROCrun(246,226):PROCr
un(224,DX)
 5620PROCw(100)
 5630REPEAT:PROCw(1):PROCru
n(224,DX)
 5640IFUXX<=uxXGOTO5660
 5650UXX=UXX-20
 5660IFUYX>=uyXGOTO5680
 5670UYX=UYX+10
 5680DX=DX+1:IFDX>228DX=227
 5690PROCrun(224,DX)
 5700UNTIL UXX<=uxX AND UYX
>=uyX
 5710IFbeq=0PROCrun(224,DX)
:PROCopen(0,330,0,110):PROC
shut(0,330,0,110):ENDPROC
 5720PROCrun(224,DX):PROCop
en(600,0,200,0):PROCshut(60
0,0,200,0):ENDPROC
 5730:
 5740DEFPROCrun(EX,DX):GCOL
3,2
 5750MOVEUXX,UYX:VDUEX,10,8
,DX:ENDPROC
 5760:
 5770DEFPROCclang
 5780SOUND&11,1,81,6:ENDPRO
C
 5790:
 5800DEFPROCtitle:CLG:DX=22
7:EX=225
 5810GYX=10:NX=650:YX=150:G
COL0,1
 5820MOVE150,750:PRINTC$
 5830MOVE1100,750:PRINTC$:G
COL0,2
 5840MOVE285,745:PRINT"TEX
'N' DAN"
 5850MOVE155,755:PRINTC$
 5860MOVE1105,755:PRINTC$:G
COL0,1
 5870MOVE290,750:PRINT"TEX
'N' DAN"
 5880MOVE375,585:PRINT"from
the":GCOL0,3
 5890MOVE380,590:PRINT"from
the"
 5900PROCw(100):RESTORE6610
 5910FORLX=300TO1050 STEP12
5
 5920XX=LX:DX=DX+1:IFDX>228
DX=227
 5930PROCtex(EX,DX):GCOL3,3
 5940GXX=0:PROCrico(750,LX,
150)
 5950SOUND&10,1,4,2:PROCw(2
)
 5960MOVELX,166:VDU46:GCOL0
,2:READV,U
 5970MOVELX-75,425:PRINTCHR
$V+CHR$U
 5980GCOL0,1:MOVELX-70,430

 5990PRINTCHR$V+CHR$U:GCOL3
,3
 60006XX=70:PROCrico(425,LX
```

```
,150)
 6010SOUND&10,1,5,2:PROCw(2
)
 6020MOVEL%-70,166:VDU46:PR
OCtex(E%,D%)
 6030NEXT:MOVEX%,Y%:PRINTK$
:GCOL0,1
 6040MOVEX%+32,Y%-12:VDU237
:NX=300
 6050PROCjohn:PROCw(200):EN
DPROC
 6060:
 6070DEFPROCask:CLG:GCOL0,1
:IFP%=1PP%=0
 6080MOVE430,850:PRINT"<GAM
ES>"
 6090MOVE430,200:PRINT"<SCO
RE>"
 6100MOVE360,670:PRINTWIN$:
GCOL0,2
 6110IFA%<1ANDup%>0MOVE150,
570:PRINT"TEX OUT OF AMMO'"

 6120MOVE1000,850:PRINT"TEX
":MOVE1000,750:PRINTGM%:MOV
E1000,200:PRINTSC%
 6130GCOL0,3:MOVE100,850:PR
INT"DAN":MOVE100,750:PRINTg
a%:MOVE100,200:PRINTsc%
 6140GCOL3,2:MOVE50,400:PRI
NT"ONE OR TWO PLAYERS?":*FX
15,1
 6150TIME=0:REPEAT
 6160IFINKEY-69s%=0:*FX210,
1
 6170IFINKEY-54s%=1:*FX210,
0
 6180IFINKEY-40PP%=0:TIME=4
00
 6190IFINKEY-49PP%=1:TIME=4
00
 6200IFINKEY-50PP%=2:TIME=4
00
 6210UNTIL TIME)=400
 6220er%=100:UP%=3:up%=3:U%
=0:u%=0
 6230IFPP%<2GM%=0:ga%=0:SC%
=0:sc%=0
 6240A%=36:SX%=0:SY%=0:SN%=
230:ENDPROC
 6250:
 6260DEFPROCload(X,Y,C):GCO
L3,C
 6270FORL%=X TO X+200 STEP4
0
 6280MOVEL%,Y:PRINT"!":NEXT
:ENDPROC
 6290:
 6300DEFPROCspent(X,Y,C):GC
OL3,C
 6310MOVEX,Y:PRINT"!":ENDPR
OC
 6320:
 6330DEFPROCnoon:IFs%=0ENDP
ROC
 6340RESTORE6630:*FX15,0
 6350FORL%=1TO29:READA,P,D

 6360SOUND2,A,P-39,D:NEXT:E
NDPROC
 6370:
 6380DEFPROCjohn:IFs%=0ENDP
ROC
 6390RESTORE6650:*FX15,0
 6400FORL%=1TO15:READA,P,D
 6410SOUND2,A,P+41,D:NEXT:E
NDPROC
 6420REM BUILDINGS
 6430DATA4,0,264 ,5,1279,69
0 ,4,312,0 ,5,1279,322 ,4,3
84,394 ,5,384,520 ,5,456,54
4 ,5,0,392 ,4,456,544 ,5,38
4,566 ,5,384,698 ,5,408,706
 ,5,0,570 ,4,408,706 ,5,222
,766 ,5,0,692
 6440DATA4,384,566 ,5,0,438
 ,4,453,542 ,5,453,413 ,4,4
26,532 ,5,426,406 ,4,216,76
5 ,5,327,750 ,5,411,705 ,4,
387,565 ,5,435,562 ,5,465,5
47
 6450DATA4,270,753 ,5,270,7
89 ,5,246,781 ,5,426,841 ,5
,600,783 ,4,426,841 ,5,789,
962 ,5,963,904 ,5,600,783 ,
4,576,791 ,5,576,458 ,4,930
,894 ,5,930,576
 6460DATA4,1257,680 ,5,1257
,932 ,5,930,823 ,4,1257,932
 ,5,1098,985 ,5,912,923
 6470DATA4,39,278 ,5,39,382
 ,4,114,304 ,5,114,406 ,4,1
6,372 ,5,128,410 ,4,264,462
 ,5,363,495 ,5,363,435 ,4,2
70,428 ,5,366,460 ,4,261,40
1 ,5,372,438 ,4,267,460 ,5,
267,406
 6480DATA4,177,601 ,5,306,6
44 ,5,306,575 ,5,180,533 ,5
,180,602 ,4,240,622 ,5,240,
553 ,4,486,670 ,5,486,745 ,
5,540,727 ,5,540,649 ,4,550
,646 ,5,468,673
 6490DATA4,636,477 ,5,636,5
82 ,4,717,502 ,5,717,684 ,4
,621,572 ,5,735,611 ,5,735,
623 ,5,621,585 ,5,621,572 ,
4,681,769 ,5,825,817 ,5,825
,709 ,5,681,661 ,5,681,769
 6500DATA4,884,653 ,5,888,6
81 ,5,888,606 ,5,807,579 ,5
,807,654 ,4,807,621 ,5,888,
648 ,4,1230,782 ,5,1095,737
 ,5,1095,671 ,5,1230,716 ,5
,1230,782 ,4,981,747 ,5,121
8,826 ,5,1218,889 ,5,981,81
0 ,5,981,747
 6510DATA4,975,588 ,5,975,6
87 ,4,1050,613 ,5,1050,716
,4,1068,721 ,5,954,683
 6520REM JAIL SIGN
 6530DATA4,959,805, 5,992,8
18, 4,980,809, 5,980,785, 5
,953,782, 4,1014,818, 5,104
4,833, 5,1044,800
 6540DATA4,1014,818, 5,1014
,794, 4,1014,809, 5,1032,81
2, 4,1071,812, 5,1071,836,
4,1098,848, 5,1098,827, 5,1
128,839
 6550REM BARS
 6560DATA4,1203,769 ,5,1203
,712 ,4,1176,761 ,5,1176,70
7 ,4,1149,753 ,5,1149,696 ,
4,1122,744 ,5,1122,687
 6570REM DOORS
 6580DATA4,639,574 ,5,639,4
84 ,85,711,596 ,5,639,484 ,
85,711,586
 6590DATA4,678,585 ,5,678,5
22 ,85,711,596 ,5,678,522 ,
85,711,586
 6600REM TITLE
 6610DATA69,108,101,99,116,
114,111,110,39,85,115,101,1
14,46
 6620REM MUSIC
 6630DATA1,101,3 ,0,0,1 ,1,
121,3 ,0,0,1 ,1,129,3 ,0,0,
1 ,1,137,3 ,0,0,1 ,1,121,3
,0,0,1 ,1,141,2 ,0,0,1 ,1,1
37,3 ,0,0,1 ,1,129,3 ,0,0,1
 ,1,121,16 ,0,0,2 ,1,121,3
,1,129,3 ,0,0,1 ,1,137,4 ,0
,0,1
 6640DATA1,129,3 ,0,0,1 ,1,
121,3 ,0,0,1 ,1,109,7 ,1,12
9,17
 6650DATA1,53,4 ,0,0,2 ,1,5
3,4 ,0,0,2 ,1,41,4 ,1,53,2
,1,73,4 ,1,81,2 ,1,89,4 ,0,
0,0 ,1,89,2 ,0,0,0 ,1,89,4
,1;81,2 ,1,73,12
```

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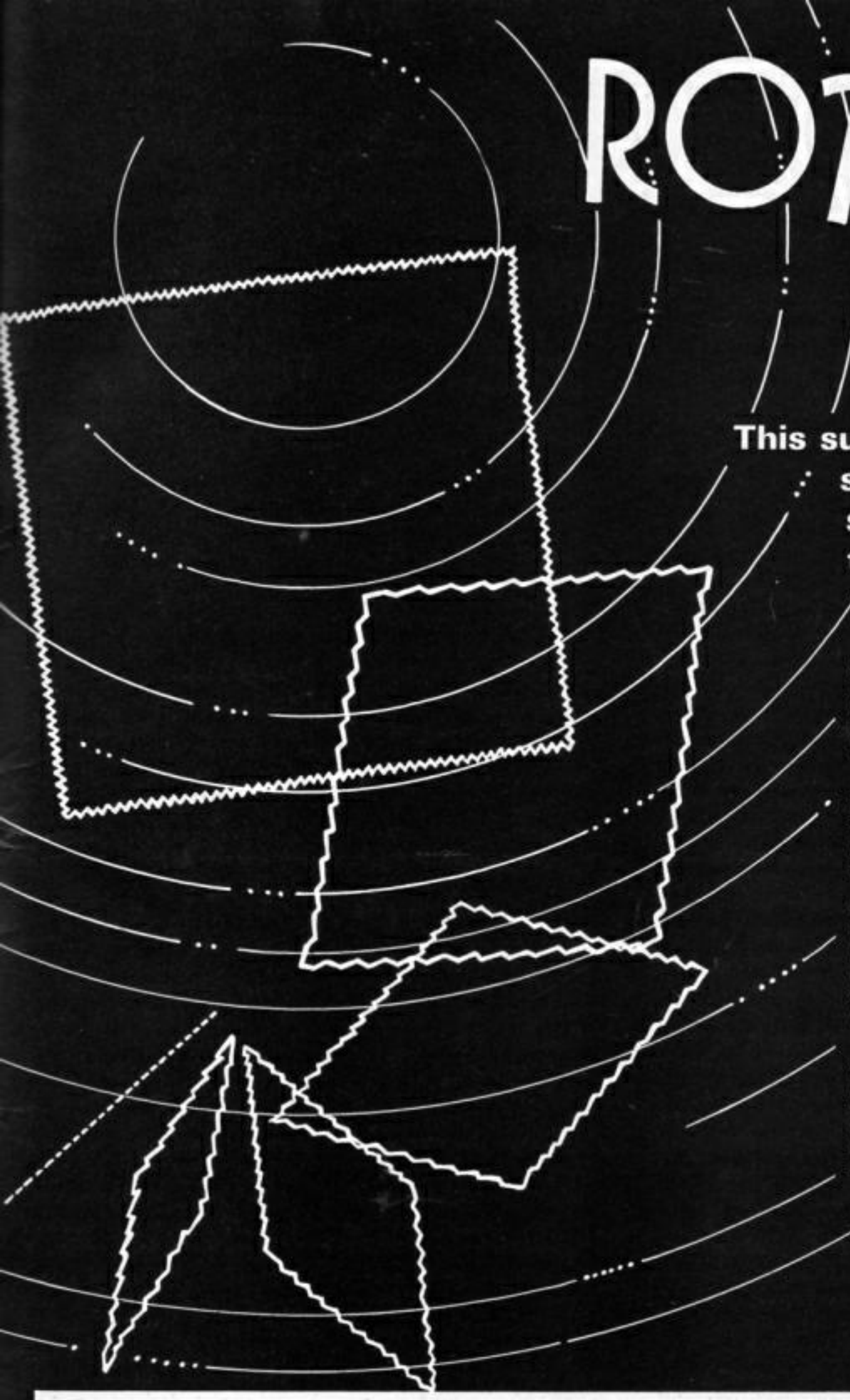

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Consisting of four "distortions" of a square, it's amazing how much action there is in such a short program.

The REPEAT . . . UNTIL loop of lines 130-220 contains the main workings of the program. Inside this, the FOR . . . NEXT loop draws the square in white and then black.

The program then jumps out of the loop to change the values of the square's coordinates by calling the relevant procedure. The result is the apparent motion of the square.

```
  10 REM**ROTATE**
  20 REM**By Paul Heath**
  30 REM
  40 REM
  50 MODE6
  60 PROCmenu
  70 IF A<1 OR A>4 THEN PR
INT TAB(0,5);SPC(50):GOTO60

  80 ON ERROR GOTO290
  90 MODE4
 100 VDU23;8202;0;0;0;
 110 X1=400:X2=400:X3=700:
X4=700
 120 Y1=400:Y2=700:Y3=700:
Y4=400
 130 REPEAT
 140 FOR N=1 TO 0 STEP -1
 150 GCOL0,N
 160 MOVEX1,Y1:DRAWX2,Y2:D
RAWX3,Y3:DRAWX4,Y4:DRAWX1,Y
1
 170 NEXT N
 180 IF A=1THENPROCROT1
 190 IF A=2THENPROCROT2
 200 IF A=3THENPROCROT3
 210 IF A=4THENPROCROT4
 220 UNTILX4<400ORY4>700
 230 GOTO110
 240 DEF PROCmenu:PRINT TA
B(0,0)"Press Escape at any
time to restart":INPUT TAB(
0,5)"Please enter a number
(1 to 4)",A:ENDPROC
 250 DEF PROCROT1:X2=X2+15
:X4=X4-15:Y2=Y2-15:Y4=Y4+15
:ENDPROC
 260 DEF PROCROT2:X1=X1+9:
X2=X2+10:X3=X3-9:X4=X4-10:Y
1=Y1+9:Y2=Y2-10:Y3=Y3-9:Y4=
Y4+10:ENDPROC
 270 DEF PROCROT3:X1=X1+10
:X2=X2+10:X3=X3-10:X4=X4-10
:ENDPROC
 280 DEF PROCROT4:Y1=Y1+10
:Y2=Y2-10:Y3=Y3-10:Y4=Y4+10
:ENDPROC
 290 IF ERR=17 THEN RUN EL
SE MODE6:REPORT:PRINT" at l
ine"ERL
```

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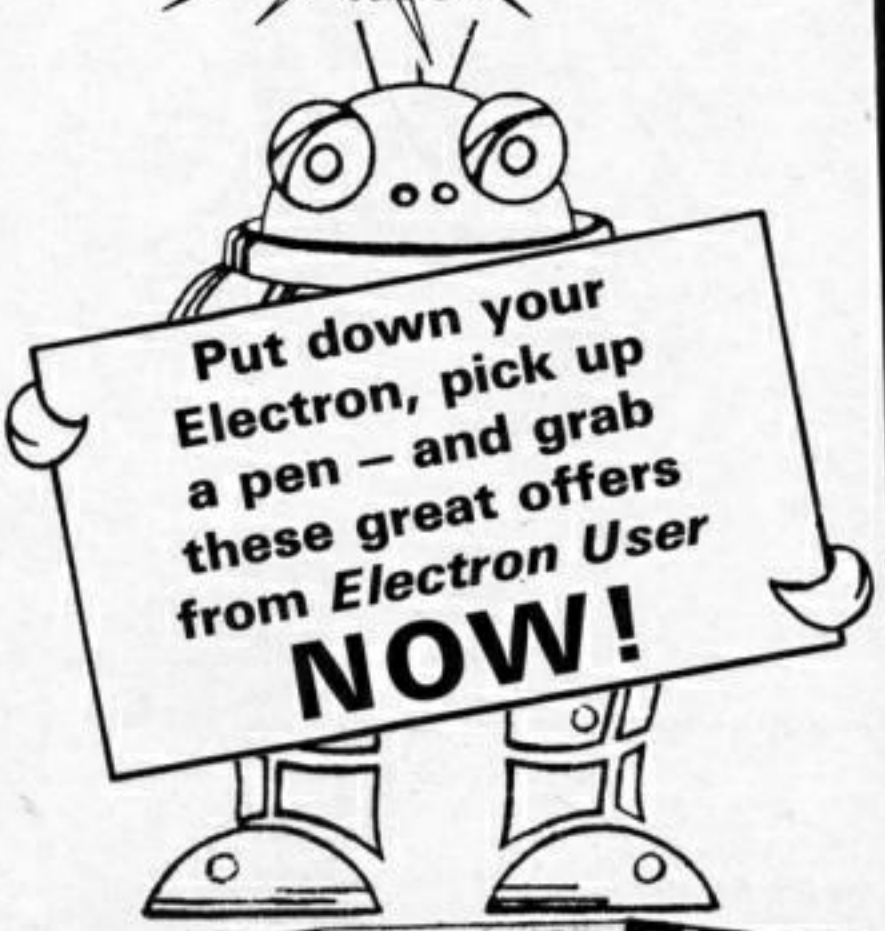
electron user



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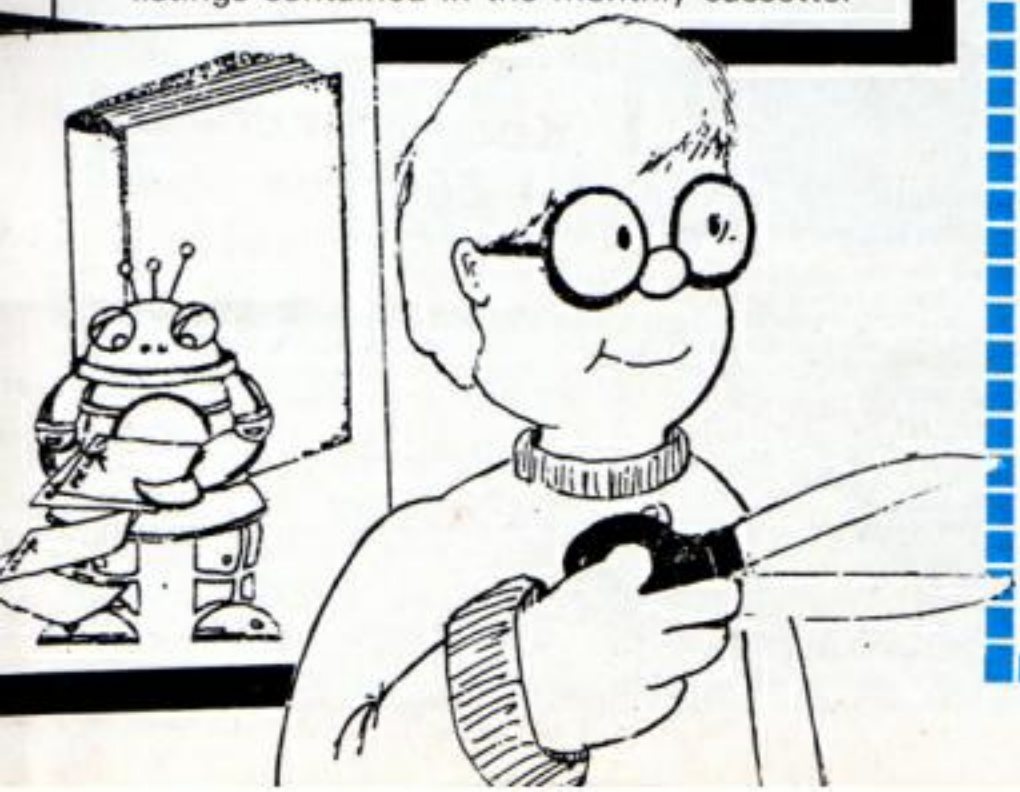

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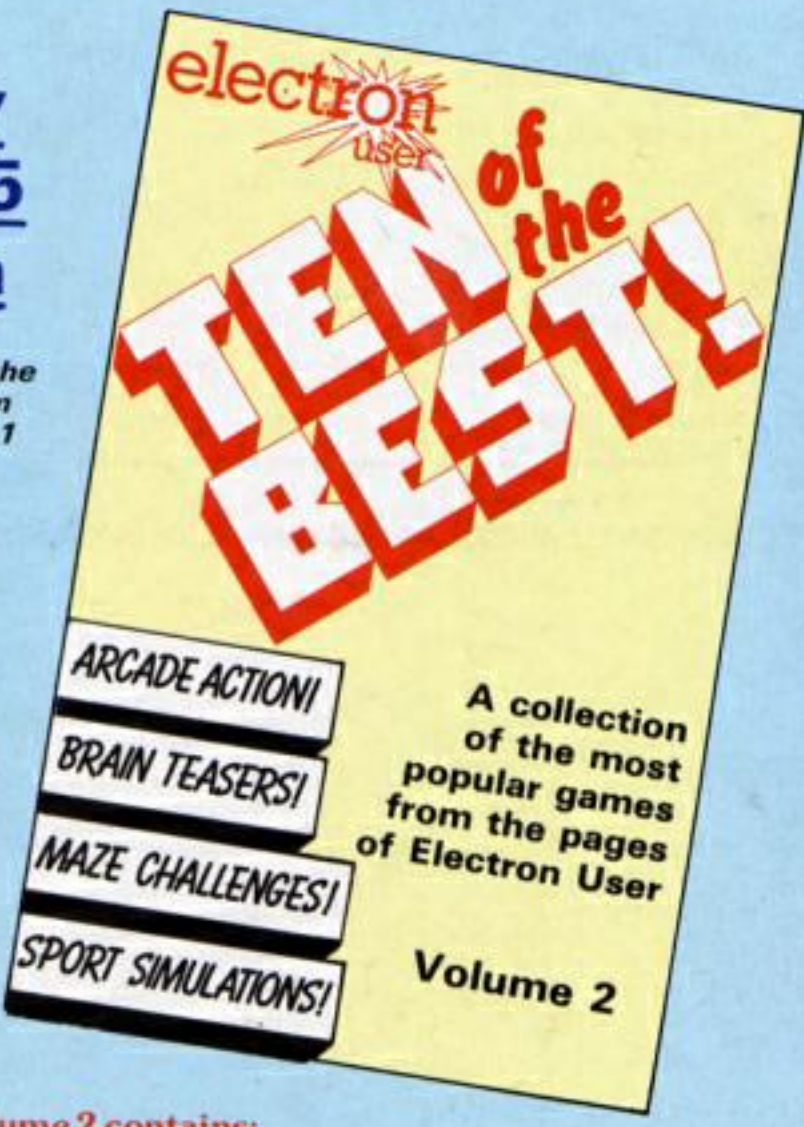

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