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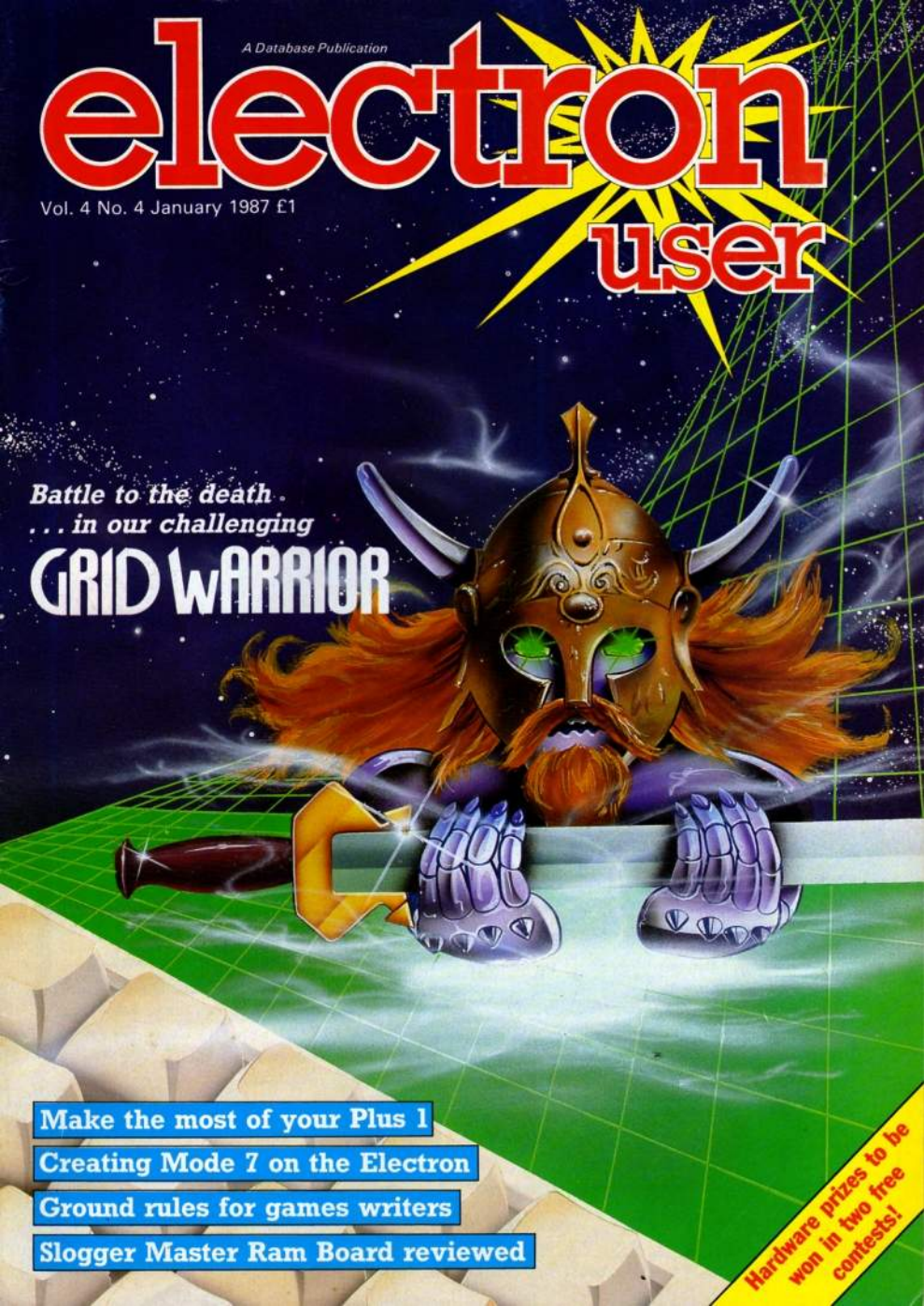

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Creating Mode 7 on the Electron

Ground rules for games writers

Slogger Master Ram Board reviewed

Hardware prizes to be won in two free contests!

The 5¼" disc version of Elite now includes:
- The standard Model B, B+ game
- The 6502 Second Processor version
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ELITE

BBC Micro Models B, B+

BBC Master Series

Elite, the widely acclaimed 3-D space game, is the highest-selling game ever published for the BBC Micro and Acorn Electron. It is now available in enhanced versions specially produced for the 6502 Second Processor and the Master 128 Series.

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Only the fittest will survive.

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

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

Trade with 2,000 planets in eight galaxies

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

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

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

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

Are you ready to accept the challenge?

The 5¼" disc version of Elite features a dual format design which allows Elite to be run under the following configurations:

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The most adventurous and original way to test your French ever devised.

FRENCH on the RUN!

The adventure game with a big difference.

£9.95 cassette

You're on your own in Occupied France — facing the toughest test that a British pilot has ever had to experience!

The year is 1943. As an RAF officer stranded in Occupied France you have one aim — to get back to Britain.

The only way to do this is to try to pass as a Frenchman, but if your French isn't good enough you risk capture and interrogation by the police or even the Gestapo.

Even the simplest tasks — from buying food to taking buses — place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you . . .

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence — you need the password from the last before attempting the next. The standard of French required is about O level, though on the last route it rises to just below A level.

And there's a chance for you to try out the French you'll learn in practice: We are offering a FREE WEEKEND IN PARIS as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

For teachers: *French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.*

DATABASE SOFTWARE

TO ORDER TURN TO THE FORM ON PAGE 53

electron user NEWS
January 1987

Traditional fireboat salute for the Sir Francis Raleigh as she enters Cairns harbour

£1 million show spending spree

A £1 MILLION plus spend by visitors to the Christmas Electron & BBC Micro User Show provided the biggest ever cash sales bonanza for the event.

Once again the Electron took centre stage, almost eclipsing the BBC Micro in the process.

"If only companies would appreciate just what the demand is like for Electron products, then there would be so many more firms in this sector", said John Huddlestone, managing director of leading supplier Advanced Computer Products.

The opening day set the trend when all previous attendance figures were broken as visitors took part in a mass pre-Christmas shopping spree.

Exhibitor after exhibitor reported demand at an all-time high as they were confronted by people eager to part with their money.

"When the doors opened you would have thought they were rushing in to take advantage of Harrod's sale", John Huddlestone told *Electron User*.

"They've come to look on this event as providing real bargains – and they obviously weren't disappointed".

In all almost 1,000 special offers were available during the course of the three day event. And of these almost half involved Electron products.

One customer alone – Craig Thomas, a teacher from Reading – spent more than £700 during a five hour visit on the Friday.

"I bought the Electron when it first came out and I've attended all the shows", he said.

"The beauty of them is that the bargains are such that they save you far more money than you spend.

"If you are an Electron user you just can't afford to miss the shows.

"Unless something drastic happens I'll be going up to the next one in Manchester in March".

Round the world Electron sails on

TO a traditional fire-boat welcome, the Sir Walter Raleigh steamed into the harbour at Cairns, Australia recently on the latest stage of its round-the-world adventure.

The ship had completed a 7,500 miles trans-Pacific journey from Southern Chile, undertaking scientific studies and community projects at a dozen islands on the way.

The 20 young men and women on board, between the ages of 17 and 24, are doing important scientific work for Operation Raleigh wherever the vessel stops.

But in their leisure time they can often be found at the keyboard of one of the Electrons with which the expedition has been equipped.

The venturers, as they are called, have taken a selection of Electron games and entertainment software with them to enjoy when off-duty.

Reports filtering back to *Electron User* say their favourite program is the one that allows them to use the micro as a chess partner.

In a more serious vein the venturers use the Electron to learn and practice morse code and for touchtyping self-tuition.

The Sir Walter Raleigh is currently anchored near the Great Barrier Reef where marine archaeologists from the Queensland Museum are diving to retrieve relics from a

→

Scouts troop runs on an Electron

SCOUT troop leader Dave Beckingham has good reason to be grateful for his daughter's Electron.

Borrowing the machine means he can spend one night a week less on his paperwork.

Keeping records is a major part of running the 1st Knutsford Scout Troop in Cheshire.

At any one time there are more than 20 boys aged 11 to 16 in pursuit of four different progress badges, each of which requires the completion of up to 18 items before it can be awarded.

In addition the same boys could be chasing any of the 80 or so proficiency badges open to them.

Keeping tabs on where each boy stands in the various categories could be a massive adminstrative headache for Dave if he didn't have the Electron.

"I used to spend half my time filling in little bits of paper, then trying to find them afterwards", he told *Electron User*.

"Now I have a complete up-to-date record on disc of what each boy has achieved and when he earned his qualifications.

"I'm thinking of extending the system to include records for the cubs also. And it's even portable – I can take the Electron and disc files to troop meetings and run the machine off a 12 volt car battery!"

Stand that says Thanks

WHEN tubular steel furniture manufacturers Roland Davies and Howard Bevan decided to produce their first computer workstation they chose an Electron to build it around.

It might seem an unusual selection, given the choice of any number of more celebrated machines, but the explanation is quite simple.

As Roland Davies says: "I've had an Electron myself for three years and it really got me interested in computing.

"Designing our MicroDesk with the Electron in mind was partly a way of saying thank you for all the pleasure the machine has given me.

"My Electron cost me nearly £200 – a vast sum compared to recent prices – but it has been worth every penny, both at home and in the office.

"I've written games and business accounting programs on it, and despite having been back and forward between my house and office like a yo-yo it has never let me down.

"Naturally I've upgraded the machine since my early computing days. I now have a Plus 1 expansion unit, a Quill utility for writing adventure games and a Turbo for increased speed.

"Our MicroDesk has been designed to provide plenty of space for a monitor, keyboard, cassette recorder or disc drive, printer and software – and at the same time leave enough room for your book and workpad.

"And because it is built to the same standards as our tubular steel contract furniture, it offers a level of quality and construction suitable for school or office as well as home use".

MicroDesk, from Davies & Bevan Furniture, costs £38.95.

RALEIGH

From Page 5

200-year-old ship lying 110 ft beneath the waves.

The wreck is that of HMS Pandora, sent by the Admiralty in 1779 to capture and bring back the Bounty mutineers to stand trial.

The divers themselves also need light entertainment when the day's work ends, so once again the Electrons play their part in the social life of the ship.

Back home, Operation Raleigh is coordinated from centres in London, Leeds and Hull.

One of the present tasks of the computer development workshop in Hull is to create a system for an Electron – currently used for training – to display a commentary on a series of projected slides.

Santa was really big attraction

FATHER Christmas's decision to go online for the festive season proved a major attraction for the kids – even for some rather big ones.

What else could account for the electronic requests for Porsches, pay rises, Swedish au pairs and Page Three girls which flooded into the North Pole?

Yet another first for MicroLink, the UK's leading electronic mail service, SantaLink attracted some 1,000 messages in the first week alone.

And of these more than one third are believed to have come from adults.

With Santa hooked up to the giant MicroLink central computer, all that was needed to contact him was any home or office micro.

"The response was quite incredible", says Derek Meakin, head of MicroLink. "It seems that adults enjoy sending messages to Father Christmas just as much as children do.

"Mind you, what he made of some of the more grown-up requests is beyond me . . ."

Learning on the Electron

THREE new learning programs for the Electron have been released by HS Software.

Entertaining English is a two program pack teaching language skills to children between 7 and 11.

The first part, Timeslip, displays sentences containing present tense verbs. A rocket collects each verb and travels back in time to an eerie cave.

The player then has to choose the past form of the verb and return to the present with it while avoiding a caveman and manic pterodactyl on the way.

The second part, Busy, performs a range of actions on the screen against a scrolling background.

The player has to type in a verb – at the higher skill level an adverb as well – to describe each of the actions shown.

If the child describes all the actions successfully they are replayed in sequence to a musical accompaniment with each description highlighted on the screen. Price £7.95.

Adventurous English is a game that helps children to develop grammar and language skills in an entertaining way.

Children gain an understanding of prepositions and develop their problem-solving skills by helping Ben discover treasures and avoid hazards on his dangerous journey. The price is £5.95.

Reading Pack 2a, for ages six to nine, is the latest addition to the Read-Right-Away series and contains two new games to boost reading skills.

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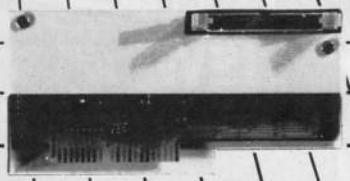
"Disc drive compatibility at long last".
ELECTRON USER, JUNE '86



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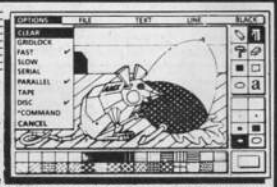

AMX MOUSE

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Hitch your wagon to a Blazing Star

THE festive season is now upon us and hopefully Santa has brought you the goodies you asked for.

This is also the period when software houses – like record companies – swamp the market with their most commercial (and sometimes their best) offerings.

Robico's Blazing Star should be bulging from a few stockings. If you haven't yet got it I really must recommend it.

If you have seen either Ghost Town or Pony Express, Blazing Star is in that vein but ten times better.

Any of you who have played Magus' What's Eeyore's or Locks of Luck – or better still seen Village of Lost Souls on a friend's BBC Micro – will realise what a marvellous adventure house it is.

However, news has it that they are thinking of pulling out of the Electron market because of lack of demand.

It is a small company which can't afford large national adverts. I would therefore suggest that unless you want to see another super producer of adventures disappear from the Electron scene, you should write to them to prove where the market is.

The address is: Magus, 4 Toronto Close, Durrington, Worthing, West Sussex. BN13 2TD.

Meanwhile at Melbourne House, Trevor Lever and Peter Jones have penned another spoof adventure called Dodgy Geezers. To date it is only available for the Commodore – let's hope an Electron conversion is forthcoming soon.

I have recently been sent a copy of Adventure Soft (UK) Scott Adams Hint book. At £2.99 it is a bargain and a must for any adventure fan.

Adventure Soft (UK) – formerly Adventure International – has also informed me that all 30 of its adventures, including 10 budget price titles, are now available for the Electron.

The most recent text adventure, Rebel Planet, is riveting. The new address is: Adventure Soft (UK), P.O. Box 786, Sutton Coldfield, West Midlands, B75 7SL.

Christmas is a wonderful time, even for Saxon kings such as I. I always feel humble at this time of year. Mind you, the quality of letters I am continually receiving from readers makes me feel quite servile for most of the year!

But letters such as those sent in by Graham Thompson banish that humility and make me comprehensively noble again.

He has an admirable habit of beginning his letters, "My Lord Pendragon," and signing off, "Pleb to the Court of King Arthur". It's refreshing to know that some subjects still know their place.

I have yet to receive a full solution to Philosopher's Quest, as requested last month. Don't forget there's a copy of Robico's Myorem waiting for the first solution I pull from my mail bag.

I've had to employ four more ravens this month to deal with all the outgoing mail.

As long as Galahad and Gawain don't ask for a Christmas bonus or something silly like a Holy Grail, I should clear the backlog soon.

Don't let that put you off writing in. I'm always pleased to read your letters, but if you have asked for a full solution to an adventure, please be patient.

I have already been inundated with names of adventures and their publishing companies. The database I am creating now contains more than 300 adventures available for the Electron.

Please keep sending in names of any obscure software house which publishes adventures for the Electron, but don't forget to include: Name of adventure and name and address of software house – Thanks!

Perhaps the most amusing letter I have read since I moved into the cave was sent by a Newcastle fireman, Austin Baird.

Apart from threatening to throw his Electron at the next passing cat, he makes a plea for help in this column to be specific rather than cryptic.

I will try to oblige, Austin. I will add that I don't think you are a "Sub-human cretin" – a tremendous number of people

→

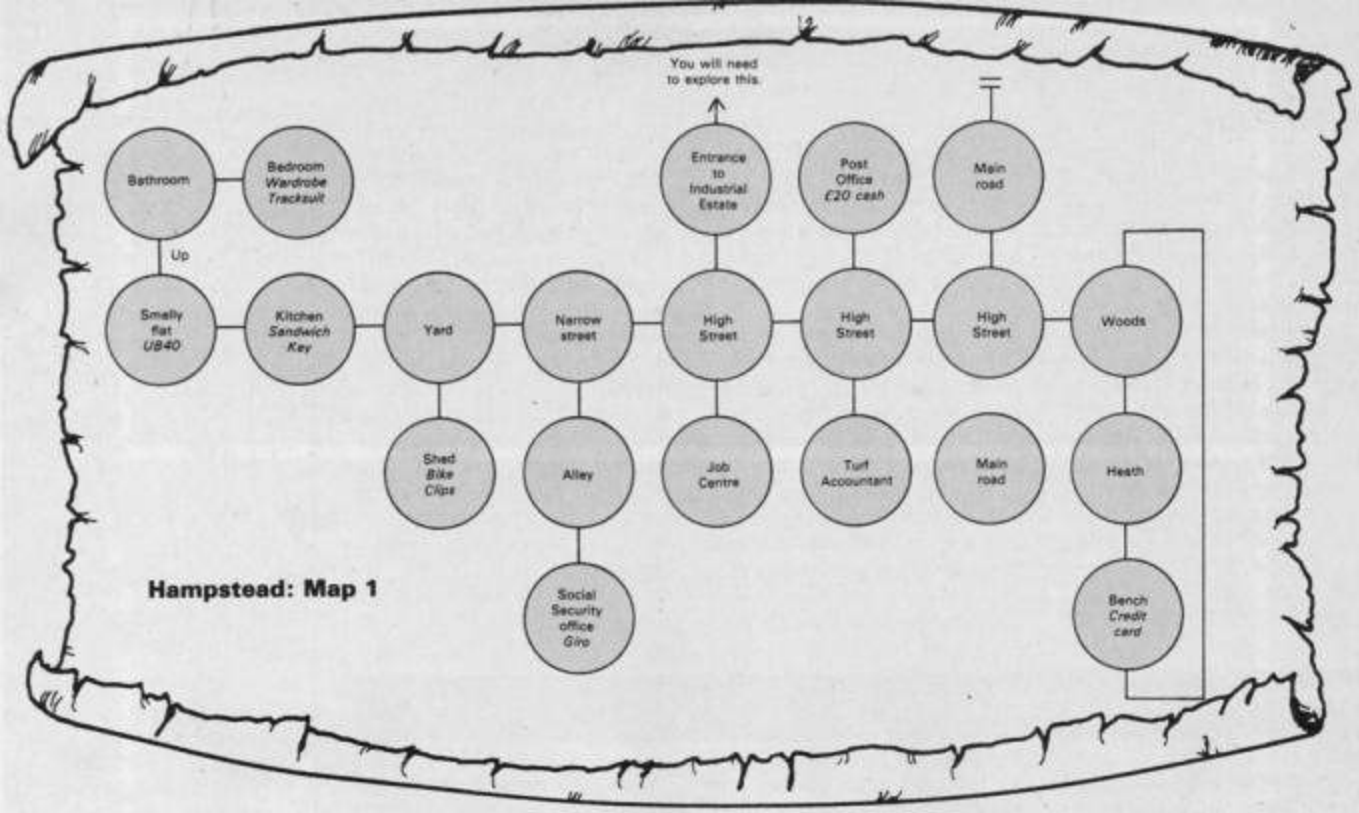
KNIGHTS OF THE ROUND TABLE

This section is devoted to readers who have offered specific help with a number of adventures. If you write to them please enclose an sae.

Kneel and rise: Sir P. Shackels of 29 Grosvener Gardens, Southgate, London N14 4TU who offers help with Hampstead, Gremlins, The Count, Twin Kingdom Valley, Spiderman, Terrormolinos, Stranded, Crown Jewels, Castle of Riddles, Ring of Time, Dracula Island, Sphinx Adventure, Voodoo Castle, Ten Little Indians, Arrow of Death and Gold Baton.

Sir John Tipper of, 7 Main Street, Newbold Verdon, Leicestershire LE9 9NL who can help with 23 adventures – Sphinx Adventure, Twin Kingdom Valley, Hampstead, Terrormolinos, Pirate Adventure, Wheel of Fortune, Wizard Arkyrz, Crown Jewels, The Count, Pettigrews Diary, Galilee, Gold Baton, Circus, Woodbury End, Ten Little Indians, Mystery Fun House, Adventure, Classic Adventure, Adventureland, Castle of Riddles, Philosopher's Quest (How about sending me a solution!), and Arrow of Death parts 1 and 2.

Don't forget to give a *full* description of your problem.



Hampstead: Map 1

PROBLEMS SOLVED

Despite the reams of help given by Merlin for Sphinx Adventure – including a Special and a full solution in Hall of Fame – I still receive many letters from readers who are experiencing problems.

So, for Debbie Dell, Daniel Gilbert, Martin Forrer, Frances Atkinson, W.A. Smith and hundreds of others, this short listing may help.

It was kindly sent in by Simon Doyle of Taunton and enables you to program the function keys. It should be entered and run before chaining Sphinx. You can change the commands to suit your own needs.

```
10 REM  DEFINED KEYS
20 REM  FOR ACORNSOFT'S
30 REM  SPHINX ADVENTURE
40 REM  BY SIMON DOYLE
50 *KEY1"GO NORTH|M"
60 *KEY2"GO SOUTH|M"
70 *KEY3"GO EAST|M"
80 *KEY4"GO WEST|M"
90 *KEY5"TAKE "
100 *KEY6"KILL DWARF|M"
110 *KEY7"NO|M"
120 *KEY8"AXE|M"
130 *KEY9"GET AXE|M"
140 *KEY0"INVENTORY|M"
150 CHAIN "SPHINX"
```

While on the subject of Sphinx, there are only four locations in the Catacombs Frances, so drop things to help you map them.

Since its re-release on a budget label Twin Kingdom Valley appears to have shot up the popularity stakes again – if it ever left them.

Luke Adams, Stuart Kelly and Helen Knight have all asked where they can find the jug of gold. You should take the jug from the cabin and fill it at the River of Gold, which is beyond the rock fall in the sloping maze.

The treasure chest is in the south turret of the castle, Stuart.

Stuart Kelly and many others seem puzzled as to how to deal with the numerous creatures you meet in your journey through Twin Kingdom Valley.

Elves are always friendly, as is the giant who will carry things for you. Live and let live is a good maxim, but if they are carrying treasure you will have to bash them.

The most potent weapons are the mace, axe and sword, but save the wooden staff for dragons and witches.

Richard Milligan is having problems with the Forest King. Take him the big diamond – you can pinch it back later – wear the amulet and rescue his daughter to be rewarded with a silver key.

Compared to Ken Brown's dilemma (do you play golf, Ken?) most other readers' problems seem quite trivial. Ken is threatening an odd form of suicide using his version of Hampstead unless I help him finish this adventure.

To win myself a life-saving certificate, here goes:

Satisfy Chubby Fish as I hinted in last month's column then: N – GET CAR – N – W – S – S – S – DROP CAR – W – DROP SUIT – GET TRACKSUIT – WEAR TRACKSUIT – E – GET CLIPS – WEAR CLIPS – GET BIKE – RIDE BIKE – N – N – E – E.

I hope that's not too cryptic for you, Austin! I also hope that I have helped Jonathan Ewing (any relation?) and many other readers who were stuck at the end of this adventure.

I would like to thank Mr W.E. Trevelyan for his most informative and helpful letters, particularly his help with Woodbury End and The Ferryman Awaits.

For those of you who have experienced problems with the save/load facility in Woodbury End, he has sent me an excellent listing to overcome this hassle. I'll print it next month in this column. If you send me a list of your adventures, Mr Trevelyan, I'll return a top piece of software to you.

It certainly seems to be the month for listings. Nigel Kershaw has sent this super little cheat for all Adventure Soft games: Load the adventure as normal then quit and press NO when it asks if you want another game. Then type the following four-liner:

```
1 VDU 14
2 FOR X=&E00 TO &FFFF
3 IF ?X>31 AND ?X<127 THEN
PRINT CHR$ ?X;
4 NEXT
```

Hey Presto! Use Shift to scroll and see for yourself.

Finally, if anyone requires a full solution to Woodbury End or Stolen Lamp, please send an sae.

From Page 11

find adventures difficult to begin with.

J.Keighley has written in to say that he has completed Sphinx Adventure in 299 moves. Well done Mr Keighley – can anyone better that?

I would like to thank Ben Hughes of Hereford College of Art & Design for the superb graphic letter-heading he sent me. Thanks, too, to Sheila Beattie and Matthew Pyecroft for their mass of ideas for this column. I will consider them all and may even use a few – watch this space.

You will notice this month that the Lords of Adventure box has disappeared. Don't fret, it has simply been replaced by Knights of the Round Table – after all, we all end up going round in circles trying to solve these adventures.

A large number of readers have asked for help in mapping adventures. I have produced an adventure mapping grid which some readers may have already seen.

If you would like more details on how to obtain one of these grids, write to me, but don't forget to enclose an sae. Also watch my Beginners' section for more specific help in future issues.

I will also try to continue Merlin's habit of producing a map of a small part of an adventure each month.

As you can see, this month I begin with Hampstead, and you'll also find the following hints helpful:

- You ought to wear something.
- A UB40 isn't a pop group in this instance but a means of getting money.
- Don't risk spoiling your tracksuit with bicycle oil!
- Don't fritter your money away.
- A rest on a bench will do you good! ■

OVERTURE AND BEGINNERS

Last month I introduced this section by suggesting some things to look out for when buying your first adventure. This month I shall try to offer help now you have got that prized piece of software home.

It perhaps sounds obvious – but we all often miss the obvious – read the inlay card or enclosed information carefully before loading your adventure.

They often give vital information or important help to get you started.

For instance, the small card enclosed with Adventure Soft's Voodoo Castle is priceless to the novice adventurer.

It tells you to set page to &E00 before chaining the program.

This is especially important if you have a Plus 1 or DFS fitted and want to avoid the nuisance of waiting five minutes before discovering a Bad mode or No room message.

The card also informs you that the adventure only accepts one or two word input – usually in the form of verb-noun.

And it lists a sample of the vocabulary: Go, Take, Drop, Climb, Enter, Leave, Move, Quit, Wear, Read, Light, Pull, Push and Look.

Wave, Dig, Mix and Drink are other useful words which are worth trying.

My usual practice with any new adventure is to load it and then spend up to an hour just playing around, discovering opening locations and experimenting with vocabulary.

I do this purely to get the feel of the adventure and at this point make no attempts at mapping or making serious inroads into the game.

So with Voodoo Castle it soon becomes apparent that there is a coffin and the body of Count Cristo at the starting location and that magic is workable in this adventure.

Thus when you discover a sapphire ring and later a stone door with a sapphire set into it there appears to be an obvious magical link.

After a bit of examination and experimentation, WAVE RING reveals an interesting variation on OPEN SESAME.

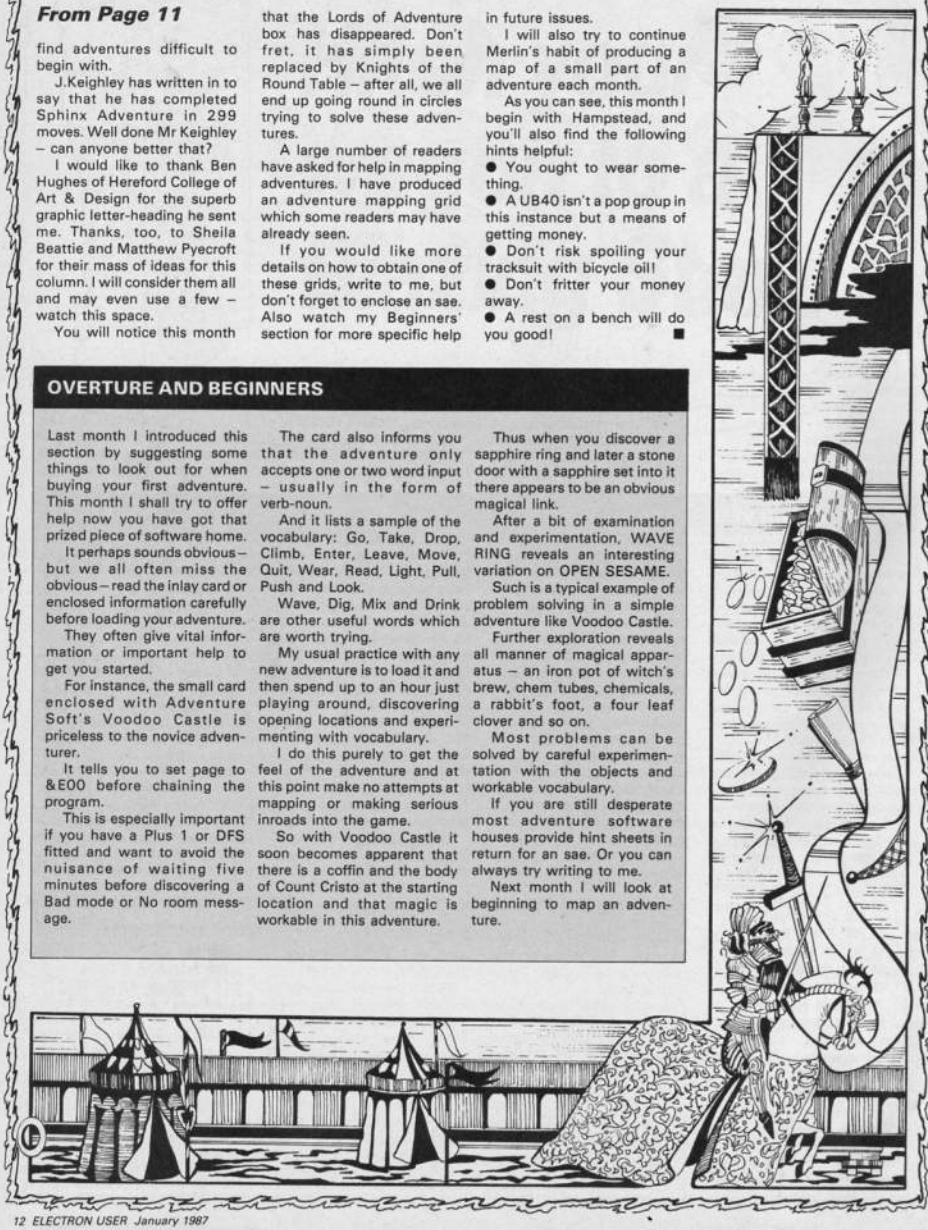
Such is a typical example of problem solving in a simple adventure like Voodoo Castle.

Further exploration reveals all manner of magical apparatus – an iron pot of witch's brew, chem tubes, chemicals, a rabbit's foot, a four leaf clover and so on.

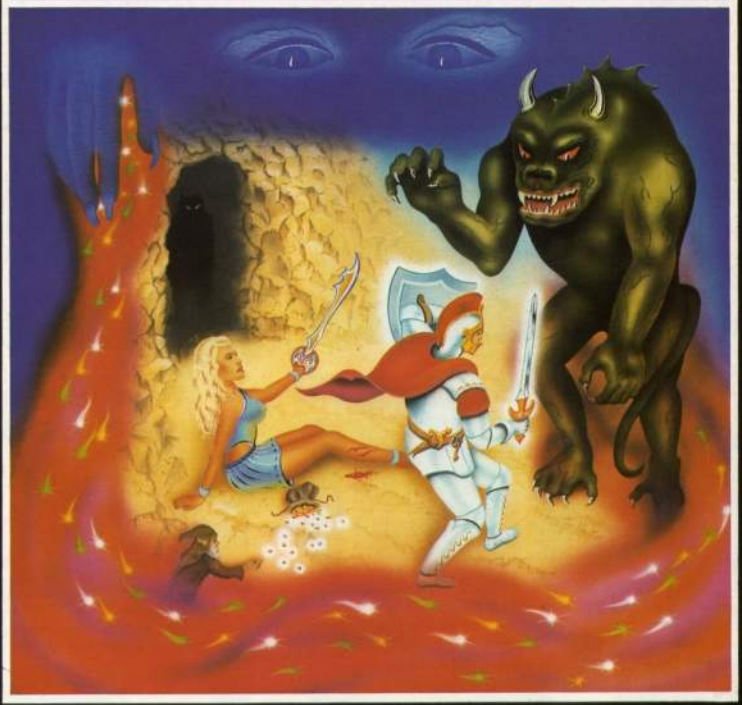
Most problems can be solved by careful experimentation with the objects and workable vocabulary.

If you are still desperate most adventure software houses provide hint sheets in return for an sae. Or you can always try writing to me.

Next month I will look at beginning to map an adventure.



THE ADVENTURE CREATOR



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Towers of Hanoi

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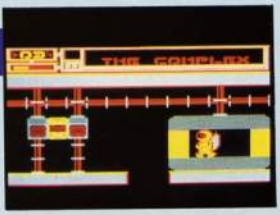
Improve your child's spelling with this fun version of the popular game

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 53

Nasties in the cavern



Program: Thunderstruck II (The Mindmaster)
Price: £7.95
Supplier: Audiogenic, PO Box 88, Reading, Berks.
Tel: 0734 303663

AS Thunderstruck II loads you are left watching quite a well drawn title screen, which is rather a blessing as it takes around seven minutes. However, your patience will be rewarded as the game is well worth waiting for.

In this arcade adventure you start complete with spacesuit and helmet in an underground cavern. You are immediately required to dodge the advances of something that bears a close resemblance to a berserk helicopter.

You then make your way through the various screens which present you with a whole host of evil nasties, all intent on reducing your life expectancy.

Your current state of health is shown on screen. If it falls to zero you will be whisked right back to the underground cavern as you only have the one life.

As you pass through the various rooms you will discover a number of items which can be picked up and used elsewhere to further your travels.

The problem that you have to work out is where, how and when each of the items should be used. And to add to your problems you are only allowed to carry one item at a time.

A score is shown on screen which represents your percentage achievement to date – mine remained depressingly low.

Approximately two thirds of the screen is used as the game area – the remainder is used for memory storage. This area does remain blank so you are not distracted by rippling colours.

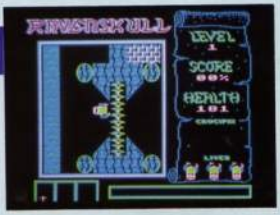
The graphics are excellent with big chunky sprites and very smooth movement. The sound effects were adequate but they could have been a little more imaginative. However, there is a facility to turn them off if they become too annoying.

My only reservation is whether the game may pall a little once all the problems are solved, but in my case that could take forever anyway. The game does use rather a lot of memory so Plus 1 and Plus 3 owners should ensure that these are disabled before this program is loaded.

I found the game extremely addictive and while it comes from the same software house that brought us Bug Eyes II, which has a similar style of graphics, I found this to be the more entertaining of the two. **Beejay**

Sound	6
Graphics	9
Playability	8
Value for money	8
Overall	8

A castle with style



Program: Ravenskull
Price: £9.95
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

THE evil Baron Strieg has stolen the silver crucifix. Without its protection the village of Austburg is powerless against the zombies which inhabit the local swamp.

To save the village you must enter Ravenskull castle and locate the four parts of the crucifix.

Before starting this arcade adventure you select whether you are to be an elf, wizard, warrior, or just an ordinary run-of-the-mill adventurer.

This appears to determine what sort of treasure you collect as you explore the castle. Wizards collect crystal balls, warriors get shields, and so on.

The screen display is divided into two main areas. The first is the status section, which shows your score, health rating, number of lives and what you are carrying.

The rest of the screen forms a large window into the castle and you are treated to an aerial view of yourself and your immediate surroundings.

As you walk in one of the four possible directions the screen scrolls smoothly in that direction revealing more of the castle. The graphics used are some of the best I have seen on the Electron.

The playing area is 64 times the size of the action window.

There are four levels to the castle with one quarter of the crucifix hidden in each and you can only pick up a piece of crucifix when you have collected every item of treasure on that level.

As you might expect the castle is constructed like a giant maze, with sections closed off by different types of door.

Some of these can be opened using keys, but although they all look the same each one will only open one specific door.

Every time you play the game the objects are in the same position so you quickly learn where to find them.

Apart from keys you will find magic scrolls and potions which will give you special powers – or poison you!

Some of the castle's nastier residents are the ravenbees. These follow specific routes along some of the corridors, and you will need split second timing to avoid these little beauties.

I loved Ravenskull – there is a genuine feeling of satisfaction when you guess the correct use for an object or gain access to a new section of the castle.

The puzzles are devious and the correct route is not always obvious but you know instinctively when you're on the right trail.

Steve Brook

Sound	4
Graphics	9
Playability	9
Value for money	9
Overall	9

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WORD PROCESSOR

This is the one designed for the two finger typist and has received rave notices over the past two years. It allows continuous typing, with no need to look at the screen, with line ends, margins and everything else automatically sorted out at the printing stage by the Embedded Control Characters – as used by professional word processors.

You can automatically move left margin, decrease characters per line, centre text, right flush, new line, new paragraphs, new page, underline, and enlarged, emphasised and condensed characters.

All main controls toggle on the function keys, which are: Add, Edit, Search, Replace, Save text, Load text, Inform, Exit processor, Enter processor, Delete text, Insert buffer, Clear buffer, Format.

It will do many other things, printing either continuous or single sheets, emphasised or draft copy, double or single spacing, adjustable page length and optional page numbering. Editing and insertion is simplicity itself and a buffer allows 255 characters to be moved anywhere.

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LOONY LOCO

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MOON BUGGY

Catalogue price £8.50

An ultra active arcade game which outsold everything when on display at the last Micro User exhibition. Needs no small amount of skill to get past the first level and there are seven of them! Manipulate the Buggy three different ways as the ground speeds by and at the same time use the different firing directions to splat or jump the many obstacles. There are craters, boulders, debris, mines, tanks and bridge traps. Spacecraft and rockets all add to the excitement. This is a very challenging one, with single hazards, multiple hazards and even combination hazards. Multiple scenes with fast fluid action.

PINBALL ARCADE

Catalogue price £10.35

The only game ever to achieve FIVE five star reviews in the Press! Now faithfully converted to the Electron, with all the original BBC features, and running at the correct speed. Build your own pinball tables from the many bumbers, targets, slings, etc., from the six pages of colourful shapes, moving or re-moving anywhere on the board. Adjust tilt, bounce and even alter the scores. A most realistic spring action and even the strength of the flippers are adjustable. After a board as been created, it can be saved to tape, played and even altered again.

THE FERRYMAN AWAITS

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There's never been anything like it before! An entirely new computer language—TOC—has resulted in cramming a virtual 60K Adventure into the normal Electron! Devised by the programmer, this has resulted in the most involved and devious Adventure ever to appear on the Electron, with literally around half a screen of text depicting each location and objects. Hundreds of real locations and countless objects and things take the adventurer onto a totally different plane.

It is the only Adventure to accept more than a two word command. Such as TAKE SKULL FROM SHELF OPEN DOOR is quite acceptable! It will even accept multiple commands. Set in the future, it is a magical quest in a wasteland populated only by fanactical devil worshippers and savage pirate hords, to which you are sold as sacrifice. Do not expect to complete this Adventure in a few evenings, it will take a long, long time. And you will need our Help! service...

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FIGHTER PILOT

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A true cockpit view of both the runway during take-offs and landings, and the enemy fighters which have to be blasted out of the sky. Graphics include an accurate radar system and a combined artificial horizon and turn and bank indicator. Information shown on fuel, speed, rate of climb, altitude and score. As the fuel gets low, you can switch to approach, land, re-fuel and take off again.

CAVEMAN

Catalogue price £9.50

Take the barrow down the lift into the many galleries of the mine, first to dig for diamonds and then for gold. Astute use of the lift and ladders and you might escape the monsters—or lead them to their destruction. Then go down for coal to re-fuel the furnace, which depletes as you use energy for the lift.

MANIAC MOWER

Catalogue price £8.50

Try to mow the grass in the park whilst avoiding the maniac mower, whose only aim is to cut you up! To make it harder there are lots of nasties lurking in the grass —all out to get you. To make it harder still there is a karate expert training in the park, who is very unfriendly indeed!

HARLEQUIN

Catalogue price £9.95

Played by one, two or four players. Harlequin is a very different sort of game—treasure hunting on the computer! Try to find which of the 14 treasure places the treasure is hidden, using the given clues. In addition to the information, there are lots of different tunes, very well done, with plenty of colour.

MUNCHMAN

Catalogue price £8.50

This is the one that started it all—a real live 'Packman' for the Electron. It is just like the original Arcade game with ghosties chasing you around as you devour, with all the facilities of the energisers which give limited time to zap the ghosties.

SNAKE

Catalogue price £7.50

Seven hectic levels with split screen and even double split screen make this very active indeed. The snake gets longer as the mushrooms are devoured, but avoid the toadstools at all costs. Ideal for young children, whilst by increasing the speed, active for adults and experts too.

REVERSI

Catalogue price £7.50

The Electron as your partner at Reversi—also known as Othello. Plays to all the rules with accepted black and white counters on a green board, and moves entered with very quick responses. All information and scores on the screen.

DRACULA ISLAND

Catalogue price £9.50

This Adventure has started countless people on adventures and provided a great deal of pleasure. The aim is to find and kill Count Dracula before he gets you. It is an ideal starter, needing plenty of effort to solve but not being too difficult to finish. Like all Kansas adventures, it is totally logical, which means things are always in the same place or where you leave them. Also like every Kansas adventure it has a game saving facility. And if you really get stuck, don't throw it away in disgust—give us a ring, for we operate a telephone Help? service!

RING OF TIME

Catalogue price £9.50

The sequel to Dracula, this is a little harder to solve, though still retaining all the features, including the split screen, which means the important information remains on the screen all the time. The object is to retrieve the elusive Ring of Time, going through many trials and tribulations.

REVENGE OF ZOR

Catalogue price £9.50

The long awaited sequel to Dracula and Ring of Time. Somewhat more difficult in this Adventure you have to escape the vortex and the revenge of the evil Zor. This is a natural progression, and the adventurer will find the programmer has become much more devious, thus requiring greater effort to solve.

Kansas

Kansas City Systems, Unit 3, Sutton Springs Wood, Chesterfield, S44 5XF. Tel. 0246 850357

Football for fanatics

Program: Goal!
Price: £6.95
Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE.
Tel: 091-414 4611

FOOTBALL relies on several individuals working together as a team, which is one of the main reasons why programmers find the game very difficult to reproduce on the computer screen.

Every football simulation I have ever played involves the player controlling one footballer and trying to score against a computer that knows exactly where you are going.

This program does nothing to break this tradition – it is no worse than the opposition but it isn't any better either.

Goal! is a five-a-side game which is played over 90 minutes: Fortunately this isn't in real time.

I doubt whether there is anyone out there who could play this game for an hour and a half without suffering permanent brain damage.

The game is played on three separate screens. Kick off occurs in the centre circle and as the ball moves to either side of the screen the display changes to show one of the two goal areas.

This three screen system is one of the game's weak points. You may make a break with the ball and pass all four opposition players while still in the central screen.

As the screen is re-drawn to show the goalmouth you will find that the blighters are waiting for you in their own goal area.

You control the player who is closest to the ball. Occasionally he will be tackled and the ball will bounce towards one of your other men.

However, this new player will not respond to the controls until you press the kick key, so don't forget!

You can tackle a player by getting yourself on the same horizontal plane as the man with the ball and then running at him.

If you're lucky you will emerge from this clash with the ball at your feet. Pounding away at the kick key has very little bearing on the outcome of the encounter.

The computer controlled players all move forwards together supporting the man with the ball.

Your players stand there like dummies as you race forwards. At least they reappear when you enter your opponent's goalmouth, not that they're much help.

The cassette inlay says that the computer team will adjust its level of play during the game to match your own. It never got down to my level!

If you are desperate to play football on your computer then this game is as good as any.

Steve Brook

Sound	7
Graphics	7
Playability	5
Value for money	5
Overall	6

Mazes to amaze

Program: Repton 3
Price: £9.95
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

JUST when you thought it was safe to go back down the mine Superior Software have released Repton 3.

The game features all the characters and graphics of Repton 2, but is closer to the original Repton in gameplay and objectives.

It comes with 24 challenging levels to complete, stored on tape as three separate files.

On successful completion of each level you are given the password for the next, which means that when you play the game on subsequent occasions you don't have to wade your way through it all again.

When playing the game only a small section of the overall map is visible at any one time.

Each level is laid out like a maze, constructed from boulders, earth, diamonds, giant eggs and many other devilish things.

To complete a level you must kill every monster and collect all the diamonds and a golden crown before a time bomb explodes.

The problems begin as you burrow your way beneath the boulders. As soon as the supporting earth has been removed the boulder falls, killing you or changing the shape of the maze by blocking off a passageway.

For this reason your route through the maze must be very carefully planned – one badly placed rock and you might as well start again.

As in Repton, you can call up a detailed map of the whole level to help you choose the correct path through a maze.

When I first played the game I thought the monsters were pretty tricky to deal with as they have to be lured beneath a precariously balanced boulder and then squashed.

Worse than the monsters are the spirits, Will-o'-the-wisps which whizz along the pathways at incredible speed. You must lure them into cages, where they turn into diamonds.

As if 24 mind-bogglingly difficult screens weren't enough Superior provides a screen designer too. This is a very classy piece of software which enables you to construct new screens in map form.

These can then be saved as data files and loaded by the main game. You could even challenge your friends to solve your latest devious masterpiece.

The game's graphics aren't the greatest I've ever seen but this minor niggle is soon forgotten as you wrap your mind around the puzzles. Repton 3 is a must for every Electron user.

James Riddell

Sound	6
Graphics	8
Playability	10
Value for money	9
Overall	9

Collection to collect

Program: Computer Hits 3
Price: £9.95
Supplier: Beau Jolly, 29a Bell Street, Reigate, Surrey RH2 7AD.
Tel: 07372 22003

COMPUTER Hits 3 is a compilation consisting of 10 games spread over two cassettes.

Tape one starts with Centibug where a segmented nasty dodges through the mushrooms intent on your destruction, while you and your laser attempt to serve him the same.

This is not one of the better versions of this game although it is fast enough to be a challenge. Graphics are smooth but the sound is unimaginative.

The next offering is Brian Jacks Superstar Challenge where you tackle the man himself in eight different events. Success is not dependent on pure key hammering but on your skill in manipulating the necessary keys.

Sound is almost non-existent but graphics are superb and rate a 9 in their own right. With events ranging from cycling to canoeing and from swimming to squat thrusts it could take some time to master. My only grouse is that events cannot be practiced but must be taken in order.

The third game is Snooker with options for one or two players and a choice of either 10 or 15 red balls.

Danger UXB

Snooker

Graphics are hard to fault and if two people have plenty of time and patience then it's great.

However, the game is slow and the movement of the balls is sometimes unrealistic. It should be noted that the one player option is not against the computer but one player taking all the shots.

I like Felix in the Factory, a ladders and levels game where your aim is to keep the generator topped up with oil despite the attentions of evil gremlins and a conveyor belt full of parcels to scramble over.

Graphics are great, sound is superb – but why such a terrible choice of keys? A for up and Z for down is quite normal but P for left and the up and down cursors for jump and right respectively seems a strange choice.

Tape one ends with Danger UXB where you cross blocks to defuse the bombs. The blocks disappear as you move so watch the route you take or the next bomb is harder to reach. Gain extra points on the way by collecting the flags but avoid the skulls or you will lose a life.

On higher levels you have a reduced time limit to clear the screen, and you are harassed by a pair of animated Doc Marten boots intent on stamping you flat. Sound and graphics are excellent and the game is most addictive. One of my favourites.

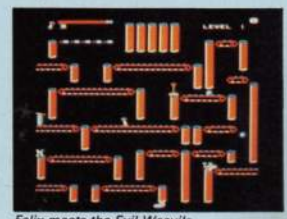
Tape two opens with Alien Dropout, an invaders style game with the variation of mutant moths. These settle in boxes at the top of the screen allowing you to shoot them from below and only escape to attack you when a particular box is full.

This might have been addictive once upon a time but it looks very dated nowadays. There are six different skill levels but they do little except speed up the action.

In the second game on this tape, Felix meets the Evil Weevils, our hero travels about his factory using aerosols against the mutating weevils

Stranded

Jungle Boy



Felix meets the Evil Weavils

and dodging ball bearings rolling down the chutes and conveyors. Excellent sound effects and nice chunky graphics give this game a very high rating.

The game Jungle Boy started life as Tarzan Boy and your task is to negotiate screens to rescue Jane. These screens are so packed with pitfalls and peril that the real Congo must seem tame by comparison.

There are cheetahs, rock dropping gorillas, a relative of Hissing Sid and, as a reminder of the original publishers, there's even a comparatively benign alligator. Colourful, well drawn graphics make this one of the best arcade games around.

In Mineshaft you move through screens of skeletal graphics collecting what are supposed to be lumps of coal while dodging various hazards. I've seen better games in magazine listings.

The last game is Stranded, a graphics adventure which starts with you stranded on a strange planet and looking for a way home. I have had this game in my collection since its original release and for anyone tempted to try a comparatively simple adventure game this is one of the best.

Despite the criticisms there are enough first class games on the two tapes to make this compilation very good value overall.

Beejay

Sound	6
Graphics	8
Playability	8
Value	9
Overall	8

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DEALER ENQUIRIES WELCOME

Now let's put the turtle to work

MIKE PLUMMER concludes his introduction to Pogo

LAST month I presented a turtle graphics compiler, which I hope you've entered by now. This time we'll look at Pogo – the language used – and see how to write simple programs.

Let me first say that it is not Logo, the language usually associated with turtle graphics, but it is very similar.

And it will give you a grounding in some of the structured programming techniques used.

When the compiler is run you'll see a start up message and the turtle – a triangle – in the middle of the screen. Pogo is now in immediate mode waiting for you to enter a command.

The first thing to do is type in a few commands and see their effect. Try:

```
CLS
```

There will be a slight delay as the command is compiled and then the compiled code is executed. The screen should clear and the turtle reappear.

The coordinates it uses are exactly the same as those used by Basic's MOVE and DRAW commands.

When the screen is cleared the turtle is moved to the centre of the screen – 640,512 – and its heading is set to 0 degrees – north. Now type:

```
FORWARD 200
```

and the turtle should go up the screen, draw a line and stop 200 screen units above where it started and:

```
RIGHT 90
```

will turn it through a right angle clockwise. Repeat the:

```
FORWARD 200
RIGHT 90
```

three more times and you should end up with a square.

Note that we've entered the same commands four times to draw the square. We can save a lot of typing using REPEAT. Enter:

```
CLS : REPEAT 4 [ FORWARD
200 : RIGHT 90 ]
```

all on one line and press Return. You'll see the same square drawn again.

Within the square brackets following the REPEAT are the commands to repeat. The number immediately after REPEAT is the number of times to repeat them.

In our example FORWARD 200, RIGHT 90 will be repeated four times.

Even this can be tedious if you want to draw several squares so we can define a new word to do this:

```
TO SQUARE
```

tells Pogo that we're defining a new word called SQUARE and Pogo acknowledges by changing the input prompt from – to @.

Next type in the actual definition:

```
CLS
REPEAT 4
[
 FORWARD 200 : RIGHT 90
]
```

To end the definition we naturally type:

```
END
```

You have now defined a new word which will clear the screen and draw a square, and SQUARE is now part of the Pogo language. To see it in action enter:

```
SQUARE
```

Of course this only draws a square with a side of 200 units. What if we want to draw different sizes?

Like Basic procedures Pogo enables parameters to be passed to defined words, so we can tell SQUARE what size square to draw.

Get rid of the old version of SQUARE with:

```
FORGET SQUARE
```

and type in the new one:

```
TO SQUARE #side
CLS
REPEAT 4
[
 FORWARD #side : RIGHT 90
]
END
```

This defines a word SQUARE with one parameter *side*. Note that parameter names and variables, as we'll see later, must start with a #.

You can now draw a small square with:

```
SQUARE 100
```

or a large one with:

```
SQUARE 400
```

Try defining a word to draw a rectangle. I'll start you off with:

```
TO RECTANGLE #L , #W
```

where *L* and *W* are the length and width. Test it with:

```
RECTANGLE 500 , 100
```

Unlike Basic all Pogo vari-

ables are integer and we need to declare them before referring to them.

MAKE is used to set up new variables and they can be used much as they would in Basic.

```
MAKE @number
@number = 100
PRINT @number
```

You can use any function that is available in Basic, although those like SIN and COS are not much use when using integers only.

Let's see how we can use such a variable. Type in the following, all on one line:

```
CLS : WHILE @number<500 [
SQUARE @number : @number =
@number + 100 ]
```

You should see a series of squares increasing in size. This example also introduces the WHILE/WEND loop.

The commands in square brackets are executed while the condition #number<500 is true.

This could be incorporated into a word definition:

```
TO MEGASQUARE
CLS
@number = 100
WHILE @number<500
[
 SQUARE @number
 @number = @number + 100
]
END
```

Now whenever Pogo comes across MEGASQUARE it will clear the screen and draw a set of squares. You can save the compiled code to tape or disc with:

```
SAVE Temp
```

which will save it under the name *Temp*. NEW will remove all of your defined words but they can be reloaded at any time with:

```
LOAD Temp
```

By now you should have a pretty good idea of how to

→

```
/* -------------------- */
/* Enter PICTURE to run */
/* -------------------- */

to arc @len
 repeat 18
 [
  forward @len
  right 5
 ]
end

to petal
 arc 20
 right 130
 arc 20
end

to flower
 repeat 13
 [
  petal
  right 20
 ]
end

to stem
  left 18
  back 400
  gpos 440 , 112
  right 90
  forward 400
end

to leaves
  gpos 640 , 112
  left 80
  arc 35
  right 130
  arc 35
  right 60
  arc 30
  right 130
  arc 30
end

to picture
  hide : cls
  flower : stem : leaves
  gpos 150 , 800
  type "A flower by
courtesy of POGO"
  end
```

Program I: Picture

WORD	FUNCTION
ACCEPT #var	Input from the keyboard.
CLS	Clear the screen and home turtle.
PRINT #var	Print the variable on a new line.
PRINT 'text'	Print the text on a new line.
TYPE #var	Print at the current position.
TYPE "text"	Print at the current position.
VDU expr	Only one expression allowed.
BACK expr	Move turtle back.
DOWN	Put the pen down.
FORWARD expr	Move turtle forward.
GPOS expr , expr	Move the turtle to expr,expr.
HIDE	Do not draw the turtle.
LEFT expr	Turn the turtle anti-clockwise.
RIGHT expr	Turn the turtle clockwise.
SHOW	Draw the turtle.
UP	Lift the pen up.
?	Print the turtle position and heading.
TO name	Define a new word, optional parameters.
END	End a definition.
MAKE #var	Declare an integer variable.
IF expr [words]	IF the expression is TRUE THEN execute all of the words in [ ].
ELSE [words]	Used with IF. IF expr [words] ELSE [words].
REPEAT expr [words]	Execute the words expr times.
WHILE expr [words]	Execute the words while expr is TRUE.
FORGET word	Remove all words after and including the named word.
LIST	List all defined words and variables.
NEW	Remove all defined words and variables.
SIZE	Print free memory and memory used.
EXEC filename	Take input from an Ascii file.
LOAD filename	Load a program.
SAVE filename	Save all defined words and variables.
SPOOL filename	Spool output to file.
BREAK	Return to immediate mode from any word.
OSCLI "text"	Operating system command.
QUIT	Return to Basic.
/* Text */	Comments, like rem statements.

Table I: Pogo reserved words – expr means a number, variable or an arithmetic expression, words is a list of words and var is a variable.

From Page 21

write Pogo programs. You'll find a complete list of commands in Table I along with a brief description of each.

These are Pogo's reserved words – that is, the ones provided by Pogo. Of course you can add to this list by defining your own as we've seen.

All input can be in upper or lower case. Pogo will convert everything to upper case except text between quotes.

All commands, whether defined or reserved words, must be separated by colons – except after a list of commands enclosed in square brackets.

Everything, including colons, must be separated by spaces. The only exception to this rule is when entering expressions in conditional or assignment statements.

Even the comment beginning and end markers /* and */ must be separated from the rest of the comment by spaces. If in doubt put a space in, it won't do any harm.

So far you have typed in reserved words completely. In fact you only need to type in as much of that word as will identify it. Thus the reserved word BACK can be referred to by B, BA, BAC or BACK.

However, if there is more than one word which begins with the same characters, and if you only type these in, the first reserved word Pogo finds will be used.

I have chosen the order so that the more frequently used commands come first in the list. Thus the command given by typing in FO will be FORWARD and not FORGET, and E will become ELSE and not EXEC.

On the other hand defined words must always be typed in full. You can edit the input using the usual line editing commands with the Copy and Delete keys.

Once you've hit Return, that is it as far as editing the source code is concerned. If there is an error FORGET it and enter it again.

However, you can edit source code programs using View. To help in this respect you can spool what you type in at the keyboard into a file.

Press Escape to stop spooling. Load the file into View using READ. Alternatively you can create the source code in the first place using View.

Once you have created a source file in this way you can compile it using Pogo's EXEC command.

Good luck with your Pogo programming. If you are in any doubt about how to use a word have a look at the three Pogo listings accompanying this article – Picture, Pattern and Stargame. These use most if not all Pogo's vocabulary. ■

```
/* ---------------------- */
/* Enter PATTERN number */
/* ---------------------- */

TO RECT #H , #L
 REPEAT 2
 [
  FORWARD #H
  RIGHT 90
  FORWARD #L
  RIGHT 90
 ]
END

TO PATTERN  #NUM
 CLS
 REPEAT 10
 [
  RECT #NUM , 200
  RIGHT 36
 ]
END
```

Program II: Pattern

```
/* ---------------- */
/* Guessing Game   */
/* Enter STARGAME  */
/* ---------------- */

to mode #num
  vdu 22 : vdu #num
end

to fancy
 vdu 19 : vdu 1
 vdu 7 : vdu 0
 vdu 0 : vdu 0
 vdu 19 : vdu 0
 vdu 4 : vdu 0
 vdu 0 : vdu 0
end

to wait #dummy
 print " "
 print "  Press RETURN to
continue"
 accept #dummy
end

to instruct
 mode 6 : fancy
 print " "
 print "    ******     STAR
GUESS    ******"
 print " "
 print "  Let us try a
simple guessing game."
 print "The computer will
think of a number"
 print "between 1 - 100.
You must guess what"
 print "the number is.
Every time you try the"
 print "computer will print
a number of stars"
 print "on the screen, the
nearer you are, the"
 print "more stars."
 print "  Answer -1 to
finish."
 print "  You are allowed
10 tries before you"
 print "are gonged out.
GOOD LUCK !!!"
 print " "
 wait 0
end
make #answer
make #guess
to try #lc
 print " "
 print "Attempt number :-"
 print #lc
 #guess = 1000
 while (#guess<1 or
#guess>100) and #guess<>-1
 [
  print "Guess a number
between 1 - 100"
  accept #guess
 ]
end

to display #lg
 #lg = 8 / ( (
abs(#lg-#answer)/5) +1)
 print " "
 repeat #lg [ vdu asc("*")
]
 if (#answer<>#guess) [
print "Sorry !!" ]
end

to stargame
 instruct
 while true [
  #count = 1
  #answer = rnd(100)+1
  while #count < 11 and
#answer<>#guess
  [
   try #count
   if #guess=-1 [ break ]
   display #guess
   #count = #count + 1
  ]
  if #guess<>#answer
  [
   print "The answer was "
   print #answer
  ]
  else
  [
   print "You are brilliant
!!"
  ]
  print
"======================"
  ]
end
```

Program III: Stargame

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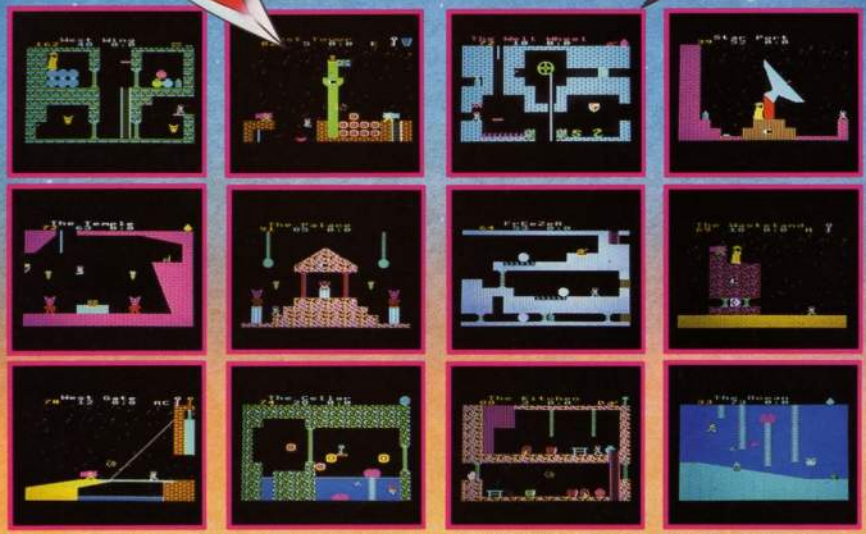

ACORN ELECTRON
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ACCESS

Go Mode 7 the software way

ROBIN NIXON shows how it's done with the aid of this powerful simulator

HAVE you ever envied BBC Micro owners because they have Mode 7? Some of you may have already bought a Mode 7 adaptor – but for those of you who haven't, and at no cost to you, *Electron User* presents its own software version.

Before I continue I must stress that any BBC Micro programs you have which do not work on the Electron still won't work using this simulator.

However, those that do and make use of Mode 7 will be improved by the addition of proper Mode 7 double height characters and graphics.

To show how powerful this simulator is Figure I is a dump of a Mode 7 teletext screen display created on a BBC Micro, saved to disc and loaded into an Electron.

Program I shows the routine used to load and display this and can be used for any saved Mode 7 screen.

```
 10 REM Program I
 20 MODE 7
 30 INPUT "Filename:"scr$
 40 CLS
 50 FX=OPENIN scr$
 60 FOR X%=1 TO 25*40-1
 70 C%=BGET #FX
 80 PRINT CHR$(C%);
 90 NEXT
100 CLOSE #0
110 GOTO 110
```

Program I

An even tougher test would be to try and run a program that uses Mode 7.

Alien Invasion – published in the February 1984 issue of *The Micro User* – is the classic arcade game Space Invaders, written entirely in Mode 7 using teletext graphics.

The game runs on the Electron and produces quite a reasonable display. Figure II shows a dump of the game taken from an Electron.

The game does use illegal methods to move the bombs – it tries to poke the Mode 7 screen directly – and this of course fails.

Please note that programs must use legal methods to create the display or the simulator will not work.

Mode 7 is completely different from the other seven modes and the programming techniques used are rather special.

I haven't the space here to fully explain all the teletext control codes – try and borrow a friend's manual for his BBC Micro – but here's a taster.

Double height text is produced by preceding the string with CHR$(141) and printing it twice like:

```
PRINT CHR$(141);"Hello"
PRINT CHR$(141);"Hello"
```

Lowercase characters can be replaced with graphics by preceding the string with CHR$(145):

```
PRINT CHR$(145);"abcde"
```

You can still print uppercase characters though.

Try experimenting and have a look at the listings in *The Micro User* as the games often have Mode 7 title screens.

The simulator is quite

Figure I: A Mode 7 teletext screen display

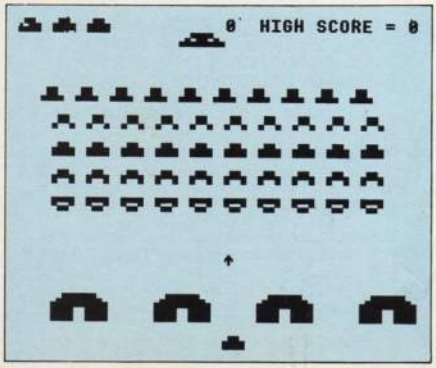

Figure II: Alien Invasion – Mode 7 Space Invaders

complex and again I haven't the space explain in detail how the program works.

Briefly though, the simulator works by interrupting the Electron when it changes mode.

If the new mode selected is 7 then the program will select Mode 4 and handle all output directed to the screen. Of course you can still use Mode 4 in the normal way.

The lower 25 lines of the Mode 4 screen become the new Mode 7 display. The top few lines are used as workspace and a dummy Mode 7 screen is stored here.

When characters are output to the screen they are stored in the dummy.

The program then looks at the dummy to see if there are any control codes to be taken into account before sending the characters to the new Mode 7 display.

The program could have been designed to use Mode 2 allowing all eight Mode 7 colours to be displayed.

However, this would involve totally redesigning the character set and would take up too much memory.

Many Mode 7 programs are quite long and simply wouldn't fit in the space left, particularly if you have a Plus 3.

So, although all text and graphics are printed correctly unfortunately they are only monochrome.

Enter and save the simulator. Before you run it PAGE must be greater than &1300 as the machine code is stored between &E00 and &1300.

Change PAGE and reload the program if necessary.

Plus 3 users will find that they can't use discs after running the program. If this is essential alter *P%* in line 170 so that the code is assembled to a different address.

Now you can create impressive teletext displays with ease. Have fun with your new Mode 7. ■

Mode 7 listing

```
10 REM MODE 7 Simulator
20 REM By Robin Nixon
30 REM (c) Electron User
40 MODE 6:*TAPE
50 screen@=&78
60 offset =&72
70 cursor =&74
80 oldvect=&80
90 wrchvct=&20E
100 char255=&CF8
110 buffer =&5800
120 table3 =&5C2D
130 oswrch =&FFEE
140 osword =&FFF1
150 osbyte =&FFF4
160 FOR PASS=0 TO 2 STEP2
170 P%=&E00
180 [OPT PASS
190 .init
200 LDA wrchvct+1
210 CMP @start DIV &100
220 BEQ initend
230 STA oldvect+1
240 LDA wrchvct
250 STA oldvect
260 LDA @start MOD &100
270 STA wrchvct
280 LDA @start DIV &100
290 STA &20F
300 LDA @blankout MOD&100
310 STA &220
320 LDA @blankout DIV&100
330 STA &221
340 \
350 .initend
360 JMP restore
370 \
380 .start
390 STA char
400 LDA flag:BNE quit
410 LDA on2:BEQ start@
420 JMP cont
430 \
440 .start@
450 LDA char
460 CMP @22
470 BNE start1
480 LDA @1
490 STA on1
500 \
510 .quit
520 LDA char:JMP(oldvect)
530 \
540 .start1
550 LDA on1:BEQ quit
560 LDA char
570 AND @7
580 CMP @7
590 BCC reset
600 BNE quit
610 LDA @1
620 STA on2
630 STA flag
640 \
650 .start1a
660 LDA @4:JSR oswrch
670 TXA:PHA
680 LDA @14
690 LDX @4
700 JSR osbyte
710 PLA:TAX
720 LDA @buffer MOD &100
730 STA &6:STA &4
740 LDA @buffer DIV &100
750 STA &7:STA &5
760 LDA @8:STA &D0
770 LDA @29:STA &309
780 LDA @5:STA &308
790 LDA @12:JSR oswrch
800 LDA @0:STA flag
810 JMP (oldvect)
820 \
830 .reset
840 TXA:PHA
850 LDA @13
860 LDX @4
870 JSR osbyte
880 PLA:TAX
890 LDA @0
900 STA on1
910 STA on2
920 JMP quit
930 \
940 .cont
950 LDA &26A:BNE quit
960 TYA:PHA:TXA:PHA
970 LDA char
980 CMP @22
990 BNE cont1
1000 LDA @0:STA on2
1010 JMP exit
1020 \
1030 .cont1
1040 LDA &D0
1050 AND @64
1060 BEQ notsep
1070 LDX &364
1080 LDY &365
1090 JMP curdone
1100 \
1110 .notsep
1120 LDX &318
1130 LDY &319
1140 \
1150 .curdone
1160 STX cursor
1170 STY cursor+1
1180 LDA cursor
1190 BEQ notf12
1200 JSR restore
1210 \
1220 .notf12
1230 LDA char
1240 CMP @12
1250 BNE notlf3
1260 LDA @1:STA flag
1270 LDA @22:JSR oswrch
1280 LDA @13
1290 LDX @4
1300 JSR osbyte
1310 PLA:TAX:PLA:TAY
1320 JMP start1a
1330 \
1340 .notlf3
1350 CMP @10
1360 BNE notlf
1370 LDA cursor+1
1380 CMP @29
1390 BNE notlf
1400 JSR scroll
1410 \
1420 .notlf
1430 CMP @32
1440 BCS notlf1
1450 JMP exit
1460 \
1470 .notlf1
1480 LDA cursor+1
1490 SEC
1500 SBC @5
1510 TAY
```

From Page 27

```
1520 LDA table1,Y
1530 STA offset
1540 LDA table2,Y
1550 STA offset+1
1560 LDY cursor
1570 LDA char
1580 CMP #127
1590 BNE notfl1a
1600 LDA #0
1610 \
1620 .notfl1a
1630 STA (offset),Y
1640 LDA cursor
1650 CMP #39
1660 BNE noscroll
1670 LDA cursor+1
1680 CMP #29
1690 BNE noscroll
1700 JSR scroll
1710 \
1720 .noscroll
1730 LDA char
1740 CMP #127
1750 BNE noscroll1
1760 JMP exit
1770 \
1780 .noscroll1
1790 LDA char
1800 CMP #128
1810 BCC notcode
1820 CMP #160
1830 BCS notcode
1840 LDA #32:STA char
1850 JMP exit
1860 \
1870 .notcode
1880 LDY #0
1890 \
1900 .lookback
1910 LDA (offset),Y
1920 CMP #128
1930 BCC next
1940 CMP #160
1950 BCS next
1960 SEC
1970 SBC #128
1980 TAX
1990 LDA table4,X
2000 BEQ next
2010 CMP #1:BNE code2
2020 LDA #0:STA graph
2030 JMP next
2040 \
2050 .code2
2060 CMP #2:BNE code3
2070 LDA #0:STA double
2080 JMP next
2090 \
2100 .code3
2110 CMP #3:BNE code4
2120 LDA #1:STA double
2130 LDX cursor+1
2140 SEC
2150 SBC #5
2160 LDA table3,X
2170 BNE code3a
2180 INX
2190 LDA #1
2200 STA table3,X
2210 LDA #0:STA topbot
2220 JMP next
2230 \
2240 .code3a
2250 LDA #1:STA topbot
2260 JMP next
2270 \
2280 .code4
2290 CMP #4:BNE code5
2300 LDA #1:STA graph
2310 JMP next
2320 \
2330 .code5
2340 CMP #5:BNE code6
2350 LDA #0:STA sepcont
2360 JMP next
2370 \
2380 .code6
2390 LDA #1:STA sepcont
2400 \
2410 .next
2420 INY
2430 CPY cursor
2440 BNE lookback
2450 LDA graph
2460 BEQ next1
2470 LDA char
2480 CMP #35:BEQ next1
2490 CMP #64:BCC gc
2500 CMP #95:BCC next1
2510 CMP #192:BCC gc
2520 CMP #224:BCC next1
2530 \
2540 .gc
2550 LDA cursor
2560 BEQ next1
2570 JSR graphics
2580 LDA #&FF:STA char
2590 JMP notspecial
2600 \
2610 .next1
2620 LDA char
2630 CMP #223
2640 BNE next1a
2650 LDA #35:STA char
2660 \
2670 .next1a
2680 CMP #&FF
2690 BNE next1b
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
2700 JSR graphics
2710 LDA #&FF:STA char
2720 JMP notspecial
2730 \
2740 .next1b
2750 AND #&7F:STA char
2760 CMP #91:BCC next2
2770 CMP #96:BCS next2
2780 CLC
2790 ADC #155
2800 STA char
2810 JMP notspecial
2820 \
2830 .next2
2840 CMP #123
2850 BCC notspecial
2860 CMP #127
2870 BCS notspecial
2880 CLC
2890 ADC #128
2900 STA char
2910 \
2920 .notspecial
2930 LDA double:BEQ exit
2940 LDA cursor:BEQ exit
2950 LDA char:STA buffer
2960 LDX #buffer MOD &100
2970 LDY #buffer DIV &100
2980 LDA #&A:JSR osword
2990 LDX #0:LDY #0
3000 LDA topbot:BEQ udc
3010 LDY #4
3020 \
3030 .udc
3040 LDA buffer+1,Y
3050 STA char255,X
3060 INX
3070 STA char255,X
3080 INX:INY
3090 CPX #8:BNE udc
3100 LDA #&FF:STA char
3110 \
3120 .exit
3130 PLA:TAX:PLA:TAY
3140 LDA char
3150 JMP (oldvect)
3160 \
3170 .graphics
3180 LDY #8
3190 LDA #0
3200 \
3210 .clear
3220 STA char255-1,Y
3230 DEY
3240 BNE clear
3250 LDA char
3260 AND #&7F
3270 SEC
3280 SBC #32
3290 CMP #32
3300 BCC bit1
3310 SEC
3320 SBC #32
3330 \
3340 .bit1
3350 STA char
3360 LDA #1
3370 BIT char
3380 BEQ bit2
3390 LDA char255
3400 ORA #&F0
3410 STA char255
3420 LDA char255+1
3430 ORA #&F0
3440 STA char255+1
3450 LDA char255+2
3460 ORA #&F0
3470 STA char255+2
3480 \
3490 .bit2
3500 LDA #2
3510 BIT char
3520 BEQ bit3
3530 LDA char255
3540 ORA #&F
```

```
3550 STA char255
3560 LDA char255+1
3570 ORA #&F
3580 STA char255+1
3590 LDA char255+2
3600 ORA #&F
3610 STA char255+2
3620 \
3630 .bit3
3640 LDA #4
3650 BIT char
3660 BEQ bit4
3670 LDA char255+3
3680 ORA #&F0
3690 STA char255+3
3700 LDA char255+4
3710 ORA #&F0
3720 STA char255+4
3730 \
3740 .bit4
3750 LDA #8
3760 BIT char
3770 BEQ bit5
3780 LDA char255+3
3790 ORA #&F
3800 STA char255+3
3810 LDA char255+4
3820 ORA #&F
3830 STA char255+4
3840 \
3850 .bit5
3860 LDA #16
3870 BIT char
3880 BEQ bit6
3890 LDA char255+5
3900 ORA #&F0
3910 STA char255+5
3920 LDA char255+6
3930 ORA #&F0
3940 STA char255+6
3950 LDA char255+7
3960 ORA #&F0
3970 STA char255+7
3980 \
3990 .bit6
4000 LDA #32
4010 BIT char
4020 BEQ separated
4030 LDA char255+5
4040 ORA #&F
4050 STA char255+5
4060 LDA char255+6
4070 ORA #&F
4080 STA char255+6
4090 LDA char255+7
4100 ORA #&F
4110 STA char255+7
4120 \
4130 .separated
4140 LDA sepcont
4150 BNE sep1
4160 RTS
4170 \
4180 .sep1
4190 LDY #8
4200 \
4210 .seploop
4220 LDA char255-1,Y
4230 AND #&77
4240 STA char255-1,Y
4250 DEY
4260 BNE seploop
4270 LDA #8
4280 STA char255+2
4290 STA char255+4
4300 STA char255+7
4310 RTS
4320 \
4330 .scroll
4340 TYA:PHA:TXA:PHA
4350 LDA #&31
4360 STA scroll1+1
4370 LDA #&89
4380 STA scroll1+4
4390 LDA #&58
4400 STA scroll1+2
4410 STA scroll1+5
4420 LDX #4
4430 LDY #8
4440 \
4450 .scroll1
4460 LDA &5831,Y
4470 STA &5889,Y
4480 INY
4490 BNE scroll1
4500 INC scroll1+2
4510 INC scroll1+5
4520 DEX
4530 BNE scroll1
4540 LDY #40
4550 \
4560 .scroll2
4570 LDA #8
4580 STA &5BF1,Y
4590 DEY
4600 BNE scroll2
4610 LDX #1
4620 LDY #8
4630 \
4640 .tabloop
4650 LDA table3,X
4660 STA table3,Y
4670 INX:INY
4680 CPY #40
4690 BNE tabloop
4700 PLA:TAX:PLA:TAY
4710 \
4720 .restore
4730 LDA #8
4740 STA graph
4750 STA double
4760 STA sepcont
4770 RTS
4780 \
4790 .blankout
4800 PHP:PHA:TXA:PHA:TYA:P
HA
4810 LDA #&FF
4820 STA &FE08
4830 STA &FE09
4840 LDX #178
4850 \
4860 .bpause
4870 LDY #5
4880 \
4890 .bloop
4900 DEY:BNE bloop
4910 DEX:BNE bpause
4920 LDA #16:STA &FE08
4930 LDA #17:STA &FE09
4940 PLA:TAY:PLA:TAX:PLA:P
LP
4950 RTS
4960 \
4970 .char EQUB 8
4980 .sepcont EQUB 8
4990 .on1 EQUB 8
5000 .on2 EQUB 8
5010 .flag EQUB 8
5020 .graph EQUB 8
5030 .double EQUB 8
5040 .topbot EQUB 8
5050 .table1
5060 OPT FNt1data
5070 .table2
5080 OPT FNt2data
5090 .table4
5100 OPT FNt4data
5110 ]
5120 NEXT
5130 DATA 0,24,48,126,126,
48,24,0,64,64,64,76,82,4,8,
30,0,24,12,126,126,12,24,0,
0,24,60,126,90,24,24,0,0,0,
0,254,254,0,0,0,32,32,32,34
,38,10,15,2,40,40,40,40,40,
40,40,0,96,16,96,16,102,10,
15,2,0,16,0,124,124,0,16,0
5140 RESTORE 5130
5150 FOR X%=&CB00 TO &CF7
5160 READ ?X%
5170 NEXT
5180 CALL init
5190 MODE7
5200 END
5210 DEF FNt1data
5220 RESTORE 5270
5230 FOR X%=1 TO 25
5240 READ ?P%:P%=P%+1
5250 NEXT
5260 =PASS
5270 DATA &31,&59,&81,&A9,
&D1,&F9,&21,&49,&71,&99,&C1
,&E9,&11,&39,&61,&89,&B1,&D
9,&01,&29,&51,&79,&A1,&C9,&
F1
5280 DEF FNt2data
5290 RESTORE 5340
5300 FOR X%=1 TO 25
5310 READ ?P%:P%=P%+1
5320 NEXT
5330 =PASS
5340 DATA &58,&58,&58,&58,
&58,&58,&59,&59,&59,&59,&59
,&59,&5A,&5A,&5A,&5A,&5A,&5
A,&5B,&5B,&5B,&5B,&5B,&5B,&
5B
5350 DEF FNt4data
5360 RESTORE 5410
5370 FOR X%=1 TO 32
5380 READ ?P%:P%=P%+1
5390 NEXT
5400 =PASS
5410 DATA 0,1,1,1,1,1,1,1,
0,0,0,0,2,3,0,0,0,4,4,4,4,4
,4,4,0,5,6,0,0,0,0,0
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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The game is now almost three times the size of the original, using two tapes plus the multiple datafiles. But .....

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TITION..COMPETITION..COMPE

2 ways for you to Win

Advanced Computer Products, a major hardware and software producer, has generously provided over £500 worth of prizes for readers of Electron User - with two great competitions in one!

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1st prize: *AP4 interface plus a 40/80 switchable double-sided Cumana disc drive*

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Just answer the following five questions:

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4 How many buttons are there on the AMX mouse?
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RULES

- Cut out or photocopy the entry form, fill in all the details and send to the address below to arrive no later than January 31, 1987.
- You can enter one or both competitions at the same time. Winning one competition does not make your entry void for the other.
- The judges' decision is final. The results will appear in the April issue of Electron User.

NB: You will need a Plus 1 interface to use most of these prizes.

Answers

1 _____

2 _____

3 _____

4 _____

5 _____

My suggestion for a new product is: _____

_____

Name _____

Address _____

_____

Postcode _____ Age _____

Send to: ***ACP Competition, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

BACK TO BASICS

Part five of TREVOR ROBERTS down-to-earth series

A number of facts about strings

BY now you should have no trouble with string variables such as:

```
LET letter$="a"
```

and:

```
LET name$="Bodger"
```

It should be easy to see how they differ from the numeric variables we can create with assignments such as:

```
LET number=23
```

or:

```
LET total=188
```

It takes a little more insight to see that:

```
LET number$="123"
```

creates a string variable even though the string itself is made up of numbers. In fact when the numbers are put in a string like this they stop being treated as numbers by the Electron and are just dealt with as characters like a or f or &.

In that case you might ask why bother, but as you get further into the world of programming you'll see that putting figures into strings and the reverse are important techniques.

Sum more facts about strings

LET'S stick to putting numbers in string variables with:

```
LET aNumber$="5"
LET anotherNumber$="10"
```

Now it should come as no surprise that after this:

```
PRINT aNumber$
PRINT anotherNumber$
```

results in 5 and 10 appearing. However don't be fooled, they're not numeric variables, they're strings as the dollar sign – $ – at the end of the variable names tells you. So you can't do maths with them, though no doubt you'll try it many times during your programming career!

If you don't believe me try:

```
PRINT aNumber$*anotherNumber$
```

If you thought that you'd get 50 (5*10) then think again. As the:

```
Type mismatch
```

message points out, you've made a mistake. You're trying to get strings to do something that they can't do. Stick to numerics for your sums and you'll be all right.

Test out your understanding of the difference between string and numeric variables by trying to explain what happens when you enter the following commands:

```
LET one$="1"
LET two$="2"
PRINT one$+two$
LET one="1"
LET two="2"
LET one=1
LET two=2
PRINT one+two
```

Con+cat+e+nation

HAVING said that you can't do sums with strings, you can do something very like it. Set up a couple of string variables with:

```
LET one$="1"
LET two$="2"
```

and see what happens when you try subtraction with:

```
PRINT one$-two$
```

or division using:

```
PRINT one$/two$
```

As you might expect, the Electron doesn't like it. However, when you use:

```
PRINT one$+two$
```

you do get a result, 12. But although we've used a plus sign, it's fairly obvious that the two strings haven't been added. After all 1+2 is 3, not 12.

What's happened is that the strings have been joined together or concatenated.

While we won't do more than introduce it here, concatenation comes into its own as you deal with the more advanced part of programming known as string handling. For now just content yourself with seeing that:

```
PRINT one$+two$
```

has a very different result from:

```
PRINT two$+one$
```

Getting the message

WE can use string variables to save us an awful lot of typing. Suppose, for reasons best known to ourselves, we decided to have our Electron give us three cheers. We could do this with the simple program:

```
10 PRINT "Hip hip hooray"
20 PRINT "Hip hip hooray"
30 PRINT "Hip hip hooray"
```

If you've typed it in and are wondering why nothing is happening, remember that the program lurks in memory waiting for a RUN to bring it to life. Once you've given this word of power our micro obliges with the cheers.

As you typed the program in, it may have occurred to you that most of it is exactly the same. And you might have wondered if you could save yourself a bit of work. Go to the top of the class if you came up with a program like:

```
10 hip$="Hip hip hooray"
20 PRINT hip$
30 PRINT hip$
40 PRINT hip$
```

By using a string variable to hold a long string we can save ourselves a lot of typing. And that will come in handy as we explore how programs work next month.

More strings attached

ONE nice use of concatenation is to join two strings together to form a more meaningful third string. Suppose you'd created two strings with:

```
firstname$="Trevor"
surname$="Roberts"
```

You could then create my full name with:

```
fullname$=firstname$+surname$
```

There's one problem with this, as you'll see if you try to display *fullname$* using:

```
PRINT fullname$
```

You get:

```
TrevorRoberts
```

— that is, my name without a space between. This can be remedied by including a space after the final letter of Trevor or before the first character of Roberts. Or, since we've just learnt about concatenation, we could use:

```
fullname$=firstname$+" "+surname$
```

or even:

```
space$=" "
fullname$=firstname$+space$+surname$
```

While you've been marvelling over the joys of concatenation, have you noticed something? We've stopped using LETs in our assignments. Some Basics won't allow this but the Electron has enough sense to figure out what's happening without a LET. So from now on you're let off LET.

Painting by numbers

Part eleven of the Electron graphics series by TREVOR ROBERTS

CASTING your mind back to last month you'll remember – I hope! – that we looked into the origin of the axes, the part of the screen that the Electron takes as 0,0.

Until then this had always been the bottom left corner of the screen but it was too simple to stay like that for long.

Undeterred by complexity we learnt how to move the graphics origin around the screen using VDU 29.

This takes the form:

```
VDU 29,xorigin;yorigin;
```

where *xorigin* and *yorigin* are the coordinates of the point we wish to be the new centre of the screen.

Using this we saw that the punctuation was vital – confuse a semicolon with a comma at your peril!

And we also came across negative coordinates for our DRAW and MOVE commands. Figure I should refresh your memory.

Once that's been done, Program I should cause you no problems. It just draws a series of vertical bars up the screen.

But how does the program do it? Not by using DRAW and MOVE with different coordinates, that would be too easy. Fiendishly, it uses VDU 29.

Line 20 puts the Electron into Mode 5, the four colour graphics mode that we've used for most of our programs.

```
  10 REM Program I
  20 MODE 5
  30 FOR loop=0 TO 1000 ST
EP 100
  40 VDU 29,loop;loop;
  50 MOVE 0,0
  60 DRAW 0,100
  70 NEXT loop
```

Program I

Then the program enters a FOR . . . NEXT loop. The body of the loop is made up of a solitary VDU 29, a MOVE to the origin (0,0) and a DRAW which paints a line from 0,0 to 0,100.

Nothing remarkable about that, you might think.

The cunning bit lies in the fact that each time round the loop, the origin is moved by the VDU 29 command of line 40.

And as this takes the form:

```
VDU 29,loop;loop;
```

and *loop* increases by 100 each time round, so the origin creeps up the screen from left to right.

At first it sits at 0,0 but the second time round the loop *loop* has the value 100 and so the VDU 29 of line 40 has an effective value of:

```
VDU 29,100;100;
```

The following MOVE and DRAW now take this point as the origin for the new line.

As the loop cycles, *loop* increases in value, the origin moves up the screen and with it the position of the line that's drawn.

There's one point about the program that you might have missed – I did and I wrote it!

Notice that the VDU 29 always works with the bottom left corner taken as 0,0.

In other words the VDU 29 command ignores any new origin that might have been created by a previous VDU 29.

If this wasn't the case successive lines would be

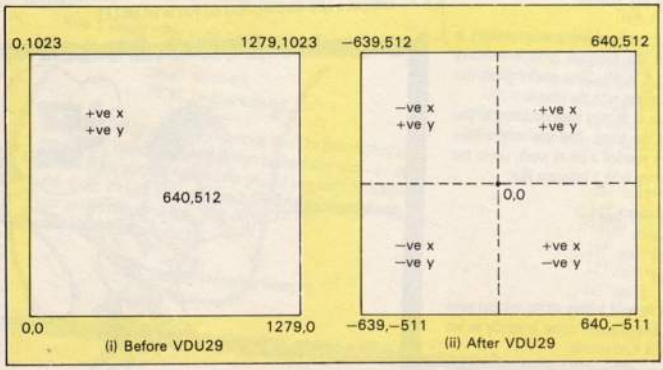


Figure I: The effect on the screen coordinates of VDU29,640;512;

```
  10 REM Program II
  20 MODE 5
  30 VDU 5
  40 FOR loop=0 TO 1000 ST
EP 100
  50 VDU 29,loop;loop;
  60 MOVE 0,0
  70 PRINT "HI!"
  80 NEXT loop
  90 VDU 4
```

Program II

drawn with progressively larger gaps between them.

Program II uses the same method but it now has VDU 5 linking the text and graphics cursors. Once this is done, the wandering origin technique is used to send a series of greetings up the screen.

If you cast your mind back to our "Hello" program of last October you'll see that this might be a better way of doing it.

Once you've got over the glories of all that, have a look at Program III which takes most of what we've done so far and uses it to create a pattern or mandala.

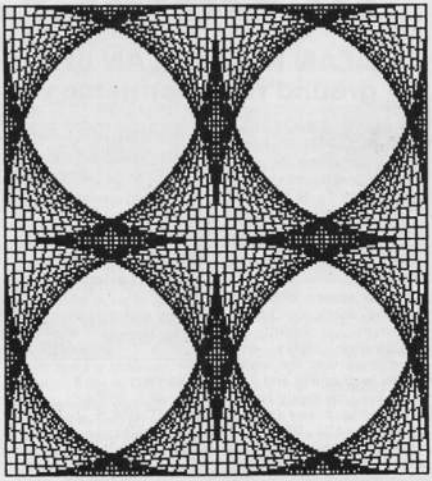
I won't go into it in detail but leave it to you to figure out. There's nothing strange about the graphics commands used though you might need a pencil and paper to work out exactly what PROCtwoSides does.

Once you've cracked that you should be able to see how PROCtwoSides is called four times to make up PROCsquare which is itself called four times to make up PROCfourSquare.

And once you've got Program III up and running you can indulge in that great pastime, mucking about.

It's amazing how much you can learn by simply messing around with a program (making sure that you've got a copy of the original safely saved to tape or disc).

Why not add a touch of recursion with the following:



```
25 time=0
95 time=time+1:GCOL 0,time:
IF time<3 THEN PROCfourSqua
re(length/2,gap/2,beginx/2,
beginy/2)
```

As well as being more colourful, you get a 3D effect.

If you want more colours why not add:

```
255 GCOL 0,loop MOD 4
```

to the original program or even:

```
20 MODE 2
255 GCOL 0,loop MOD 8
```

for a more colourful pattern.

And if you want to see something odd try:

```
20 MODE 2
255 GCOL 0,loop MOD 8 + 8
```

The mandala seems to pulse, doesn't it? Why?

And, as a final touch, why not have mandalas inside a mandala with:

```
35 PROCfourSquare(90,10,836
,704)
36 PROCfourSquare(90,10,436
,704)
37 PROCfourSquare(90,10,436
,304)
38 PROCfourSquare(90,10,836
,304)
```

What about creating a graphics window for the mandala and a text window for appropriate titles? You could even use VDU 5 to label the patterns.

● *By the time you've finished playing around with the program you should thoroughly understand the graphics commands we've covered so far. More next month.*

"Undeterred by complexity we learn how to move the graphics origin around the screen . . ."

```
  10 REM Program III
  20 MODE 1
  30 PROCfourSquare(400,20
,640,512)
  40 END
  50 DEF PROCfourSquare(le
ngth,gap,beginx,beginy)
  60 PROCsquare(length,gap
,beginx,beginy)
  70 PROCsquare(length,gap
,beginx,beginy-length)
  80 PROCsquare(length,gap
,beginx-length,beginy-lengt
h)
  90 PROCsquare(length,gap
,beginx-length,beginy)
 100 ENDPROC
 110 DEF PROCsquare(length
,gap,cornerx,cornery)
 120 PROCtwoSides(length,g
ap,cornerx,cornery,1,-1)
 130 PROCtwoSides(length,g
ap,cornerx+length,cornery,-
1,-1)
 140 PROCtwoSides(length,g
ap,cornerx+length,cornery+l
ength,-1,1)
 150 PROCtwoSides(length,g
ap,cornerx,cornery+length,1
,1)
 160 ENDPROC
 170 DEF PROCtwoSides(leng
th,gap,startx,starty,signx,
signy)
 180 LOCAL x1,y1,x2,y2,rep
eats
 190 repeats=INT(length/ga
p)+1
 200 x1=startx
 210 y1=starty-signy*lengt
h
 220 x2=startx
 230 y2=starty
 240 FOR loop=1 TO repeats
 250 MOVE x2,y2
 260 DRAW x1,y1
 270 x2=x2+signx*gap
 280 y1=y1+signy*gap
 290 NEXT
 300 ENDPROC
```

Program III

Making more of Smileys

ALAN McLACHLAN offers more ground rules for game writers

IF you followed last month's session with the Smileys you should have a listing which matches Program I identically.

We can now progress further and make the game a little more interesting.

We need to put in the numbers 0-9 for the X and Y coordinates, over the columns and down the right hand side. We do this with two FOR . . . NEXT loops that use the variables *numx* and *numy* to position the numbers, and print them by subtracting 4 and 7 from them respectively, to create the digits 0-9. The reason I avoided the number 10 here is because it has two digits and would have made the screen untidy.

By the way you can't use PROCwindow because the parameter you wish to print is a numeric variable rather than a string, and you would generate an "arguments" error.

Lines 430 and 440 use PROCwindow to print an x and y along the horizontal and vertical axes.

To complete DEFPROC-grid therefore, you need to add lines 410-450.

```
  410 FOR numx=4 TO 13:COLO
UR 3:PRINTTAB(numx,5);numx-
4:NEXT numx
  420 FOR numy=7 TO 16:PRIN
TTAB(15,numy);numy-7:NEXT n
umy
  430 PROCwindow(2,2,9,3,"x
")
  440 PROCwindow(2,2,17,12,
"y")
  450 PROCdelay(2)
```

Listing II

Run the program as you have it now and you should see on the screen, in addition to 100 yellow boxes, the numbers 0 to 9 running across the top of the columns, and also down the right-hand side, with a small x and y showing the axes, as in Figure I.

If your screen differs in any way, check your typing for errors, including all punctuation marks, and most important the semi-colons in lines 410 and 420.

We are now ready to put in the hidden happy smilers. Line 60 calls DEFPROC smileys starting at line 470 which uses the random number generator to hide 10 Smileys within our array *box ( )*.

A FOR . . . NEXT loop first of all places random numbers in the coordinates *smileyx* and *smileyy*. Then using line 520 we place 1s in those elements in our array. Line 510 checks to see whether any selected element already has a 1 in it, and if so, sends the program back until an array element is encountered with a 0.

You can check whether

```
  470 REM******************
  480 DEFPROCsmileys
  490 FOR tally=1 TO 10
  500 smileyx=RND(9):smiley
y=RND(9)
  510 IF box(smileyx,smiley
y)=1 THEN GOTO 500
  520 box(smileyx,smileyy)=
1
  530 NEXT tally
  540 ENDPROC
```

Listing III

your Smiley generator has worked by first of all removing line 55 and replacing it with "dummy" line 65.

```
65 GOTO 65
```

Now type in line 525, which is a temporary line and will be removed later.

```
525 PROCwindow(2,1,smileyx+
4,smileyy+7,"*")
```

If you run the program you should find 10 red asterisks in the grid boxes showing the locations of the "hidden" Smileys. You can leave this line in for a while as it will be useful later for testing purposes.

OK, we've drawn the grid, initialised it, and hidden the Smileys. We are now ready for the input routine.

Remove line 65 and type in the next procedure.

```
  550 REM******************
  560 DEFPROCinput
  570 PROCwindow(1,0,0,0,""
):COLOUR129:CLS
  580 PROCwindow(1,0,2,1,"G
uess nuaber!"):PRINTTAB(15,
1):turns:PRINTCHR$(7)
  590 PROCdelay(1)
  600 PROCwindow(1,3,2,3,"I
nput x,y -")
  610 REPEAT:guessx=GET-48:
UNTIL guessx>=0 AND guessx<
=9
  620 PRINTTAB(14,3);guessx
;",";
  630 REPEAT:guessy=GET-48:
UNTIL guessy>=0 AND guessy<
=9
  640 PRINTTAB(16,3);guessy
)
  650 turns=turns+1
  660 ENDPROC
```

Listing IV

This deals solely with your input to the computer.

It prints two lines of text

```
   10 REM  Al's Smiley Hunt
   20 MODE 5
   30 PROCinit
   40 PROCtitle
   50 PROCgrid
   55 GOTO 55
   60 PROCsmileys
   70 REPEAT
   80 PROCinput
   90 PROCcheck
  100 UNTIL smileys>9
  110 PROCfinished
  120 PROCresults
  130 REM******************
  140 DEFPROCinit
  150 DIM box(9,9)
  160 VDU23;8202;0;0;0;
  170 VDU23,224,0,126,126,1
26,126,126,126,0
  180 VDU23,225,126,255,153
,255,189,195,255,126
  185 ENVELOPE 1,1,50,-50,0
,1,1,0,126,0,0,-126,126,126
  190 ENDPROC
  200 REM******************
  210 DEFPROCwindow(W,col,w
x,wy,A$)
  220 COLOUR col
  230 IF W=1 THEN VDU28,0,4
,19,0
  240 IF W=2 THEN VDU28,0,3
1,19,5
  250 PRINTTAB(wx,wy);A$
  260 ENDPROC
  270 REM******************
  280 DEFPROCtitle
  290 PROCwindow(1,0,0,0,""
):COLOUR129:CLS
  300 turns=1:smileys=0
  310 PROCwindow(1,3,2,2,"A
l's Smiley Hunt")
  320 PROCdelay(2)
  330 ENDPROC
  340 REM******************
  350 DEFPROCgrid
  360 PROCwindow(2,0,0,0,""
):COLOUR128:CLS
  370 FOR boxx=4 TO 13:FOR
boxy=7 TO 16
  380 PROCwindow(2,2,boxx,b
oxy,CHR$224)
  390 box(boxx-4,boxy-7)=0
  400 NEXT boxy:NEXT boxx
  460 ENDPROC
  980 REM******************
  990 DEFPROCdelay(nuaber)
 1000 FOR delay=1 TO (numbe
r*1000)
 1010 NEXT delay
 1020 ENDPROC
```

Listing I

using PROCwindow at lines 580 and 600, then uses the GET command to await your input. Lines 610 to 640 first of all validate your input, only accepting numbers between 0 and 9 and then having assigned the resultant number to variables *guessx* and *guessy* prints them out with a comma already between.

Line 650 simply adds 1 to the variable *turns* to keep tabs on how many attempts you've had. We'll use this later to print out a result.

Unfortunately you can't really check whether this routine is working correctly at this stage without a routine to process the information that you are inputting. Therefore, let's continue by typing in the next two procedures DEFPROCcheck and DEFPROCright.

```
  670 REM******************
  680 DEFPROCcheck
  690 COLOUR128
  700 IF box(guessx,guessy)
=2 THEN PROCwindow(2,3,0,20
,"You've had that one!"):PR
OCdelay(2):PRINTTAB(0,20);S
PC(20):ENDPROC
  710 flagx=0:flagy=0
  720 IF box(guessx,guessy)
=1 THEN PROCright ELSE PROC
window(2,0,guessx+4,guessy+
7," "):FOR snd=50 TO 0 STEP
 -5:SOUND 1,1,snd,1:NEXT sn
d
  730 FOR column=0 TO 9:IF
box(column,guessy)=1 THEN f
lagy=1
  740 NEXT column
  750 FOR row=0 TO 9:IF box
(guessx,row)=1 THEN flagx=1

  760 NEXT row
  770 IF flagx=1 AND flagy=
0 THEN PROCwindow(2,1,0,20,
"Right column")
  780 IF flagy=1 AND flagx=
0 THEN PROCwindow(2,1,0,20,
"Right row")
  790 IF flagy=1 AND flagx=
1 THEN PROCwindow(2,1,0,20,
"Right column & row")
  800 PROCdelay(3):PRINTTAB
(0,20);SPC(20)
  810 ENDPROC
```

Listing V

```
  900 REM******************
  910 DEFPROCright
  920 PROCwindow(2,1,guessx
+4,guessy+7,CHR$(225)):FOR
snd=0 TO 255 STEP2:SOUND 1,
-15,snd,0:NEXT:smileys=smil
eys+1:box(guessx,guessy)=2:
ENDPROC
```

Listing VI

The first DEFPROCcheck scans our input to see whether we have found a Smiley or not and line 720 does quite a lot here. It starts by checking to see if there is a 1 in the array element chosen.

If we have a bullseye, we go immediately to DEFPROC right at line 900 where a Smiley face, CHR$(224) is printed at the location, and a suitably triumphant noise is generated.

Then *smileys* is incremented by one, and finally a 2 is placed in the array element to show that this particular location has been used. Line 700 checks for this number 2 and displays a message to that effect.

Should we fail to find a Smiley, a blank space is printed at the location and the line and column of that guess are checked to see if either contains a Smiley, in order to facilitate clues.

The clues are selected by setting *flagx* or *flagy* to 1 according to whether a column, or row, or both actually hold an undiscovered Smiley. These clues are intended to remove the guesswork, and from their content you should be able to plan your next choice.

We can now check that the game is running correctly so far. Enter line 105.

```
105 STOP
```

Now you can test out your input and detection routines by running the program again. Once the Smiley target figure in line 100 is reached, the program stops with a Break at line 105.

When you are happy that everything is working all right, remove line 105 and type in the next procedure DEFPROCfinished.

```
  930 REM******************
  940 DEFPROCfinished
  950 PROCwindow(1,0,0,0,""
):COLOUR129:CLS
  960 PROCdelay(3):PROCwind
ow(1,2,2,2,"That's the lot
!"):PROCdelay(3)
  970 ENDPROC
```

Listing VII

This detects the last Smiley and prints a message on the screen to that effect.

The final procedure DEFPROCresults is entered via line 120.

```
  820 REM******************
  830 DEFPROCresults
  840 PROCwindow(2,3,0,0,""
):COLOUR128:CLS
  850 PRINTTAB(0,9);"That t
ook ";turns;" guesses"
  860 PRINTTAB(0,12);"Try a
gain Y/N ?"
  870 REPEAT:A=GET AND &DF:
UNTIL A=89 OR A=78
  880 IF A=89 THEN CLS:PROC
delay(2):GOTO 40 ELSE END
  890 ENDPROC
```

Listing VIII

This prints out the end result of your efforts. It simply takes the variable *turns* and prints it as part of a message. It then prompts to see if you wish to play another scintillating game. Once more it uses the GET command to await your key press. Note also how I've ANDed the resultant key press with &DF to catch both upper and lower case entries of Y or N.

A positive response takes you back to line 40 carefully avoiding the arrays which must not be re-DIMmed, as mentioned last month.

A negative response throws you unceremoniously out of the program, and quite rightly, too. It's not every day you get the chance to play something as exciting as Smiley Hunt. You know, I think I'll translate it for the Plectrum, it might make me a mint.

If having played the game a few times you are happy that it is working correctly, you can remove line 525. You'll find it's a different game altogether now.

It may not be the most sparkling program in the world, but it does contain some interesting techniques. For example, the input routines could be used in any program – they probably already have – and the checking routines could always prove useful. The important thing to me, though, is that you should have been able to follow it through line by line, procedure by procedure, and see how it was put together.

I'm going to stick my neck out now and say that it's absolutely bug-free, but I'm always prepared to be contradicted. After all, learning to de-bug programs is all part of the game, and I might have been crafty enough to have slipped one in for you to find. ■

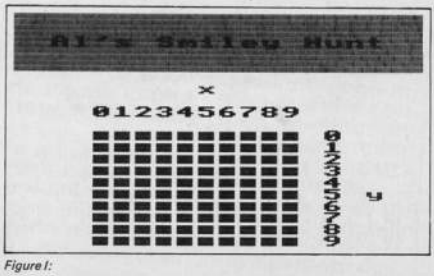
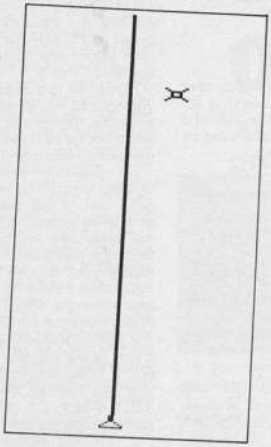


Figure I:

Space Zap



ZAP the alien ships before they land or it's curtains for the human race! There may be only one alien intruder in this simple game by John Graley but there are 50 levels of difficulty ranging from super slow to furiously fast to make it a challenging shoot 'em up. Use Z to move left, X to move right and N to fire.

```
   1MODE6:VDU19,0,4;0;:OSC
LI"FX21":OSCLI"FX12":INPUTT
AB(10,5)"*** Space Zapp ***
"TAB(8,10)"Enter dificulty
1-50 ";DX:MODE5:*FX11,10
   2AX=10:BX=5:CX=RND(18):
HX=0:CLS:VDU23,240,24,24,24
,24,36,66,129,255,23,241,12
9,66,68,36,36,68,66,129,19,
1,5,8,8,8,19,2,2,8,8,8,23;8
202;0;0;0;
   3EX=AX:FX=BX:GX=CX:HX=H
X+1:IF HX MOD (100/DX)<>0 G
OTO 6
   4AX=AX+RND(3)-2:IF AX<1
OR AX>19 CLS:PRINT'''*the
eneay crashed":END
   5BX=BX+1:IF BX>30 PRINT
CHR$30"The eneay landed!":F
ORIX=0TO5000:NEXT:RUN
   6A$=INKEY$(0):IF A$="X"
AND CX<17 CX=CX+1
   7IF A$="Z" AND CX>1 CX=
CX-1
   8IF A$="N" MOVE CX*64+3
2,32:PLOT2,0,1000:PLOT2,0,-
1000:IF AX=CX PRINTTAB(0,0)
CHR$7"HIT!!":FORIX=0TO5000:
NEXT:GOTO2
   9COLOUR 1:VDU 31,GX,31,
32,31,CX,31,240:COLOUR 2:VD
U31,EX,FX,32,31,AX,BX,241
   10COLOUR 3:GOTO 3
```

```
   1 DIM hi$(11),hiX(11):F
ORAX=1 TO 10:hi$(AX)="Neil
Hoggarth.":hiX(AX)=(11-AX)*
100:NEXT:REPEAT:MODE6:PRINT
TAB(0,4)STRING$(41,"*");SPC
(38);"**";SPC(13);"Space Do
dge";SPC(14);"**";SPC(11);"B
y Neil Hoggarth";SPC(11);"*
*";SPC(38);
   2 PRINTSTRING$(41,"*")'
"Dodge the asteroids for as
long as you'''can, the lon
ger you last the higher you
score.''''TAB(14)"Controls
 :-'''TAB(5)"Z -- left";TAB
(24)"X -- right.";TAB(10,24
)"Press SPACE to start.";
   3 REPEAT UNTIL GET=32:C
LS:VDU23,224,255,255,126,12
6,60,60,24,24,23,1,0;0;0;0;
:XX=20:scoreX=0:crashX=FALS
E:REPEAT:PX=RND(40)-1:PRINT
TAB(PX,24)"*":VDU31,XX,0:AX
=135:IF((USR(&FFF4)AND&FF00
)DIV&100)<>32 crashX=TRUE
   4 PRINTTAB(XX,0)CHR$(22
4);:scoreX=scoreX+1:IF INKE
Y(-98) XX=XX-1:ELSE IF INKE
Y(-67) XX=XX+1
   5 IFXX=-1XX=0ELSEIFXX=4
0 XX=39
   6 UNTILcrashX:SOUND0,-1
5,6,10:CLS:PRINTTAB(15,9)"G
ame Over";TAB(13,10)"You sc
ored ";scoreX:IF scoreX<hiX
(10)GOTO9 ELSE PRINTTAB(0,1
2)"Your score puts you in t
he top ten.":OSCLI"FX21,0":
INPUT"Enter your name";N$
   7 BX=0:FORAX=1 TO 10:IF
 hiX(AX)<scoreX AND BX=0 TH
EN BX=AX:NEXT ELSE NEXT
   8 FOR AX=10 TO BX STEP-
1:hiX(AX+1)=hiX(AX):hi$(AX+
1)=hi$(AX):NEXT:hi$(BX)=N$:
hiX(BX)=scoreX:IF N$=""hi$(
BX)="Mr Return"
   9 PRINTTAB(0,23)"Press
SPACE to continue.":REPEAT
UNTIL GET=32:CLS:PRINTTAB(1
0,1)"Todays Top Ten Scores.
"'STRING$(40,"-");FORAX=1TO
10:PRINThi$(AX);TAB(30);hiX
(AX):NEXT:PRINT'STRING$(40,
"-")
   10 PRINTTAB(0,23)"Do you
 want to play again (Y/N)";
:REPEAT:A$=GET$:UNTILA$="Y"
OR A$="N":IF A$="Y" UNTIL F
ALSE ELSE MODE6:PRINT"Thank
 you for playing.":END
```

Space Dodge

```
**********************************************
*                                            *
*              Space Dodge                   *
*          By Neil Hoggarth                  *
*                                            *
**********************************************

Dodge the asteroids for as long as you
can, the longer you last the higher you
score.

                Controls :-

     Z -- left                X -- right.


              Press SPACE to start.
```

CAN you navigate through the asteroid belt? Neil Hoggarth's fast arcade game has full instructions and a high score table all crammed into 10 lines of Basic – amazing!

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To add to the challenge, the planets have different gravity rates and, as you progress through the game, some have "reverse gravity" or "invisible landscapes". They are defended by automatic limpet guns strategically placed to protect the pods and fuel tanks — the only source of replenishment for your limited fuel supply. The smooth screen-scrolling, which is exemplary, and the realistic action gives the player a fascinating feeling of floating through space.

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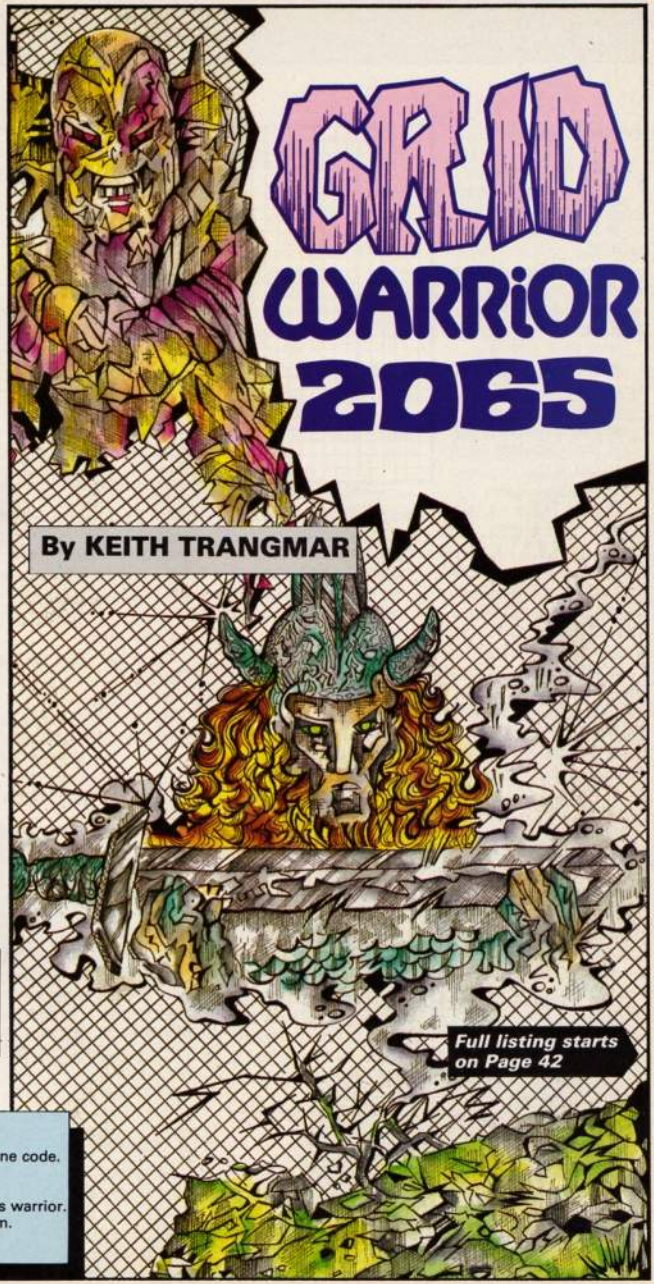
GRID WARRIOR 2065

By KEITH TRANGMAR



IT'S the year 2065 and Earth is in the midst of an inter-planetary war. Negotiations with Alpha Centuri have broken down and they have threatened to reduce our planet to dust.

However, to prevent unnecessary destruction each planet has agreed to choose a supreme warrior. These will battle to the death on a massive energy grid constructed between the galaxies – the champion gains complete domination over the opposing planet.

You have been chosen to represent Earth and the fate of the planet lies in your hands. To lose will mean slavery for the whole human race.

The battleships start on opposing sides of the energy grid and can move forwards, backwards, left and right but not diagonally and they can't leave the grid. The powerful hyper-space drives leave an ion trail in the craft's wake which must be avoided at all costs.

To destroy your opponent you must either force him off the grid or into your or his own ion trail.

Unfortunately Alpha Centuri have cheated and have sent a whole tribe of warriors. You must defeat them all – the whole population of Earth is counting on you.

Your Electron controls the Alpha Centurian grid warrior and there are ten levels of difficulty. You'll need to keep your wits about you if you are to survive in this challenging arcade game.

Full listing starts on Page 42

CONTROLS

Z = Left
X = Right
? = Down
* = Up

PROCEDURES

code	Assemble the machine code.
title	Print the title page.
human	Move your warrior.
comp	Move the computer's warrior.
relocate	Relocate the program.
col	End of game.

From Page 41

```
  10 REM Grid Warrior
  20 REM By Keith Trangmar
  30 REM (c) Electron User
  40 IF PAGE>&E00 PROCrelocate:END
  50 humanX=7:screenX=4:capX=2
  60 deadX=0:skill%=8:dmaxX=0:timeX=0
  70 ON ERROR GOTO180
  80 DIMBX(500,1),IX%(4),IY%(4)
  90 *FX4,1
 100 DATA0,1,1,0,0,-1,-1,0
 110 FORA%=1TO4:READ IX%(A%),IY%(A%):NEXT
 120 PROCcode
 130 VDU23,70,0,0,0,0,0,15,0,8,0,23,74,0,0,0,0,255,136,136,136,23,78,0,0,0,0,0,248,136,136,136,23,81,0,0,0,0,0,15,0,0,0,23,85,136,136,136,136,136,255,136,136,136,23,86,136,136,136,136,248,136,136,136,136,23,91,0,0,0,0,0,15,0,0,0
 140 VDU23,92,136,136,136,136,255,0,0,0,23,93,136,136,136,136,248,0,0,0,23,64,0,28,34,73,93,73,34,28
 150 ENVELOPE1,129,0,0,-1,0,0,200,126,0,0,-126,126,126
 160 ENVELOPE?,1,-1,1,15,30,15,126,2,0,-126,126,126
 170 ENVELOPE3,1,2,4,1,16,8,32,126,0,0,-126,126,126
 180 MODE6
 190 PROCtitle
 200 MODE5
 210 VDU19,2,screenX;0;19,3,compX;0;12,23,1,0;0;0;0;
 220 COLOUR131:COLOUR0:PRINTTAB(4,1)"Grid Warrior"
 230 CALL WARRIOR
 240 IF deadX>9 PROCblocks:FORA%=0TO1000:NEXT
 250 *FX13,6
 260 PX%=64+(RND(33)*32):IF FNtest(PX%,111,32)=FALSE THEN 260 ELSE PY%=111:PIX%=0:PIY%=32:DIR2%=1:PROCcross(PX%,PY%,1):MX=1-2*(deadX>4):BX(0,1)=PX%:BX(1,1)=PY%
 270 CX%=64+(RND(29)*32):IF FNtest(CX%,879,-32)=FALSE THEN 270 ELSE CY%=911:CIX%=0:CIY%=-32:DIR%=3:PROCcross(CX%,CY%,3):BX(0,0)=CX%:BX(1,0)=CY%
 280 LT=0:MX=2:TIME=0
 290 PROChuman:MX=MX+1
 300 PROCcomp:GOTO290
 310 :
 320 DEFPROChuman:MOVEPIX,PY%:BX(MX,1)=DIR2%:GCOL0,1:IF POINT(PX%+PIX%,PY%+PIY%)<>2 THEN580
 330 PIX=PX%+PIX%:PY%=PY%+PIY%:DRAWPX%,PY%:IF INKEY(-106) OR (ADVAL(0)AND3)>0 REPEAT:UNTIL (INKEY(-98)OR INKEY(-67) OR INKEY(-73) OR INKEY(-105))
 340 D2%=DIR2%:J1%=ADVAL(1)DIV256:J2%=ADVAL(2)DIV256:IF J1%<5 AND J2%<5 THEN J1%=128:J2%=128
 350 IF INKEY(-98) OR J1%>150 PIX=-32:PIY%=0:DIR2%=4
 360 IF INKEY(-67) OR J1%<100 PIX%=32:PIY%=0:DIR2%=2
 370 IF INKEY(-73) OR J2%>150 PIX%=0:PIY%=32:DIR2%=1
 380 IF INKEY(-105) OR J2%<100 PIX%=0:PIY%=-32:DIR2%=3
 390 IF DIR2%<>D2% SOUND&11,3,80,5
 400 ENDPROC
 410 DEFPROCcomp:MOVECX%,CY%:BX(MX,0)=DIR%:GCOL0,3:IF POINT(CX%+CIX%,CY%+CIY%)<>2 GOTO680
 420 DX=DIR%:CX%=CX%+CIX%:CY%=CY%+CIY%:DRAWCX%,CY%:aX=POINT(CX%,CY%+32):bX=POINT(CX%+32,CY%):cX=POINT(CX%,CY%-32):dX=POINT(CX%-32,CY%):eX=SGN(CX%-PX%):fX=SGN(CY%-PY%):gX=(deadX+RND(7)>7):IF (eX<>0 OR fX<>0) AND gX=TRUE THEN 450
 430 ON DIR% GOSUB 500,530,500,530
 440 GOTO560
 450 IF eX=1 AND dX=2 DIR%=4:CIX%=-32:CIY%=0:GOTO560
 460 IF eX=-1 AND bX=2 DIR%=2:CIX%=32:CIY%=0:GOTO560
 470 IF fX=1 AND cX=2 DIR%=3:CIX%=0:CIY%=-32:GOTO560
 480 IF fX=-1 AND aX=2 DIR%=1:CIX%=0:CIY%=32:GOTO560
 490 GOTO430
 500 IF bX=2 AND ((aX<>2 AND DIR%=1) OR (cX<>2 AND DIR%=3)) DIR%=2:CIX%=32:CIY%=0:RETURN
 510 IF dX=2 AND ((aX<>2 AND DIR%=1) OR (cX<>2 AND DIR%=3)) DIR%=4:CIX%=-32:CIY%=0
 520 RETURN
 530 IF aX=2 AND ((bX<>2 AND DIR%=2) OR (dX<>2 AND DIR%=4)) DIR%=1:CIX%=0:CIY%=32:RETURN
 540 IF cX=2 AND ((bX<>2 AND DIR%=2) OR (dX<>2 AND DIR%=4)) DIR%=3:CIX%=0:CIY%=-32
 550 RETURN
 560 IF DIR%<>D% SOUND&11,3,80,5
 570 ENDPROC
 580 PROCcol(1,PX%+PIX%,PY%+PIY%):PROCprint(" Tough Luck Human, you were de-rezzed",8,15):S$=" second.":IF timeX>1 S$=" seconds."
 590 PROCprint("after only ",5,17):PROCprint(STR$timeX+S$,5,18):GOSUB620:PROCprint("You defeated",4,20):PROCprint(STR$(deadX-skill%)+" Grid "+W$+".",3,21):FORT%=0TO10000:NEXT:GOTO180
 600 LT=-1:PROCcol(0,CX%+CIX%,CY%+CIY%):deadX=deadX+1:PROCprint("Well done,human.",2,5,11):GOSUB620:PROCprint(STR$(deadX-skill%)+" "+W$,6,13):PROCprint("de-rezzed so far.",2,15):FORT%=0TO10000:NEXT:GOTO210
 610 GOTO290
 620 W$="Warrior":IF deadX-skill%<1 W$="Warriors"
 630 RETURN
 640 DEFPROCcol(WX,XX,YX)
 650 DRAWXX,YX
 660 SOUND0,-15,4,30
 670 timeX=INT((TIME+50)/100)
 680 IFdeadX-skill%>dmaxXdmaxX=deadX-skill%
 690 SOUND1,1,125+25*WX,25
 700 GCOL0,2:XX=BX(0,WX):YX=BX(1,WX):MOVEXX,YX:FORNX=2TOMX:PROCerase(BX(NX,WX)):NEXT
 710 COLOUR3
 720 ENDPROC
 730 DEFPROCprint(A$,B,C)
 740 MOVE64+B,1024-32*C:VDU5:GCOL0,1
 750 FORA=1TOLEN(A$):PRINTMID$(A$,A,1);:SOUND2,-15,50,1:FORG=1TO50:NEXT:NEXT
 760 VDU4
 770 ENDPROC
 780 DEFPROCblocks
 790 LOCAL A,B,C
 800 FOR AX=10 TO deadX
 810 SOUND&12,2,50,10
 820 BX=RND(18):CX=RND(26)
```

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```
+2:IF FNch=FALSE THEN 820
  830 VDU31,8%,C%,92,10,8,8
,86,32,10,8,74
  840 NEXT
  850 ENDPROC
  860 DEFPROCcross(X,Y,Z)
  870 GCOL0,1:GOSUB930
  880 FORV=1TO15:VDU19,1,V;
0;:SOUND&11,-5,10*V,3:FORW=
0TO15:NEXT:NEXT
  890 VDU19,1,human%;0;
  900 GCOL0,2:GOSUB930
  910 GCOL0,Z:PLOT69,X,Y
  920 ENDPROC
  930 MOVEX-30,Y:PLOT5,X+30
,Y:MOVEX,Y-30:PLOT5,X,Y+30:
RETURN
  940 DEFFNtest(X,Y,INC):T%
=TRUE:FORA%=0TO3:IF POINT(X
,Y+A%*INC)<>2 T%=FALSE
  950 NEXT:=T%
  960 DEFPROCerase(D%):X%=X
%+32*I%(D%):Y%=Y%+32*I%(D
%):DRAWX%,Y%:ENDPROC
  970 DEFFNch:LOCAL A%:CH%=
TRUE:A%=135:FORX%=-1 TO 1:F
ORY%=0 TO 2:VDU31,8%+X%,C%+
Y%:IF (USR(&FFF4)AND &FF00)
DIV256<>85 CH%=FALSE
  980 NEXT:NEXT:=CH%
  990 DEFPROCtitle
 1000 *FX14,6
 1010 VDU12,20,23,1,0;0;0;0
;:PRINT''"HISCORE:";dmax%;TA
B(18);"TIME:";time%;TAB(32)
;"SCORE:";dead%-skill%
 1020 PRINTTAB(13,3)"@@  @@
  @ @@"'TAB(12);"@    @ @ @
  @ @"'TAB(12)"@ @@ @@  @ @
@"'TAB(12)"@  @ @ @ @ @ @"'
TAB(13)"@@  @ @ @ @@"
 1030 PRINT'TAB(6)"@   @  @
  @@  @@  @  @  @@"'TAB(6)"
@   @ @ @ @ @ @ @ @ @ @ @
"'TAB(6)"@   @ @@@ @@  @@
@ @ @ @@"'TAB(6)"@ @ @ @ @
@ @ @ @ @ @ @ @ @"'TAB(6)"
@ @  @ @ @ @ @ @ @ @ @ @
@"
 1040 PRINT'"          By
Keith Trangmar."
 1050 PRINT''"   'Z' moves
left,   'X' moves right,"''
"   '*' moves up,     '?' m
oves down."''TAB(7);"'COPY'
freezes the game."
 1060 *FX21,0
 1070 PRINT'TAB(6);:PROCpri
nt("Enter Skill level - 0 t
o 9.",3,30)
 1080 REPEAT:VDU19,1,RND(15
);0;:GX=INKEY(15):UNTIL GX>
47 AND GX<58
 1090 dead%=GX-48:skill%=de
ad%
 1100 ENDPROC
 1110 DEFPROCcode:FOR PASS=
0TO2STEP2:P%=&900:E=&FFEE:[
OPT PASS
 1120 .WARRIOR LDA#17:JSRE:
LDA#2:JSRE:LDA#17:JSRE:LDA#
128:JSRE:LDA#30:JSRE:JSRE-7
:JSRE-7:LDA#70:JSRE:LDA#74:
LDX#18
 1130 .A JSRE:DEX:BNE A:LDA
#78:JSRE:LDY#26
 1140 .B LDA#81:JSRE:LDA#85
:LDX#18
 1150 .C JSRE:DEX:BNE C:LDA
#86:JSRE:DEY:BNE B:LDA#91:J
SRE:LDA#92:LDX#18
 1160 .D JSRE:DEX:BNE D:LDA
#93:JSRE:RTS
 1170 ]:NEXT
 1180 ENDPROC
 1190 DEFPROCrelocate:VDU7,
12,21:OSCLI"K.0 *TAPE!MFORA
%=0TO TOP-PAGE STEP4:A%!&E0
0=A%!PAGE:NEXT!MPAGE=&E00!M
?&DF4=&9C!MRUN!F!M":OSCLI"F
X138,0,128":ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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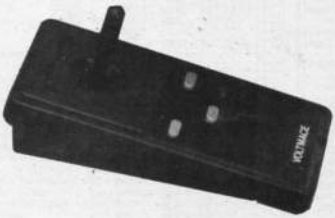

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Micro Messages

Printer codes — and solutions

I REFER to the letter from S. Thompson in the November 1986 issue of Electron User *regarding View printer drivers.*

I purchased a copy of Acornsoft's View printer driver from a dealer in Stanstead, Essex. The first cassette I received would not work on my Electron, though it did work on a friend's BBC B.

I returned this cassette and received another one which carries the reference number SBB16/C.

This cassette works perfectly on my Electron and allows me to produce very versatile printer drivers for use with my Epson LX80 printer.

One problem I found with the first drivers I produced was that if the SHEETS command was used on long documents, all the printer highlight commands set at the top of the first page were deleted from page 2 onwards.

I solved this problem by answering No to the question "Include printer initialisation?" when compiling the drivers.

The LX80 does have an initialisation code – ESC @ – and I had put this in to the first drivers I had produced.

However, this code resets the printer to the power-on state and is sent when Return is pressed to start printing, hence the loss of the highlight codes.

It would of course be possible to repeat the highlight codes at the top of each page, but this is tedious.

The LX80 does not need this code to start printing and a highlight code is included in the printer driver program which allows all previous codes to be reset.

I hope this information will be of help to other Electron users. – **J.A. Terry, Basingstoke, Hampshire.**

Batting technique

I AM writing in response to Andrew Warriner's plea for help with Ian Botham's Test Match in the November 1986 issue of Electron User.

I too had problems until I went to the Electron and BBC Micro User show at UMIST. I asked the man at the Tynesoft stand if it was possible to bat and he revealed the secret. This is how it is done:

As the bowler is running up, hold down the desired direction key and when the ball reaches the wicket after its delivery, it will stop dead.

Hit the Return key as soon as the ball has stopped and the batsman will swing his bat.

If the Return key is hit at exactly the right moment, the batsman will hit the ball in the appropriate direction.

I hope this is of some help but be warned – the game is not easy!

I have never beaten the computer yet and I think Tynesoft could have made the game a little easier. — **Debbie Kirkman, Leyland, Lancs.**

Disc options

I HOPE to buy a disc system for my Electron but without specialist knowledge of disc technology it is difficult to choose between the various manufacturer's products.

Could you consider running an article which weighs up the pros and cons of each system?

I am attracted to the Plus 3 largely because it is cheap – about half the cost of an AP4 + disc drive.

But I am put off because you all people appear to ignore it as a piece of hardware and hardly anybody seems to sell software for it.

As the official Acorn product, how about a regular article on it?.

Your June 1986 review of the AP4 interface talked about "Disc drive compatibility at long last". What is the problem with compatibility with the Plus 3?

I would certainly opt for a Plus 3 if 3.5in disc software for the BBC Micro and the new Acorn Compact will run on the Electron. – **C. Talbot, Pitlochry.**

● We have published reviews of three disc systems for the Electron – the Plus 3, (March 1985), Cumana interface (July 1985) and ACP's Plus 4 (June 1986).

These articles discuss in detail the pros and cons of each system.

A 10 part series devoted entirely to the Plus 3 ran from October 1985 to July 1986.

This covered topics such as libraries and directories, sector editors, automatic menus, extra commands and random access filing.

There isn't much disc software available but you can swap discs with Compact owners and try their software – not all of it will run of course but it's worth experimenting.

The Compact drive is double sided but if the discs are formatted single sided there shouldn't be any problems.

All BBC B software is on DFS format discs and the ADFS can't access these.

Demand and supply

HAVING bought a Plus 3 some years ago, I have been dismayed at the support the unit has received from the major software houses.

The astonishing fact is that companies feel that the demand for Electron disc software is too low to justify a special version.

This fact was further

→

Faster database

SOME time ago I took advantage of your offer of the Data Manager pack including the Plus 3 and Acorn Electron Database.

I find it very useful but slow when using a large number of fields and records as it needs to frequently access the disc.

I have recently bought Advanced Computer Products sideways ram. Do you know if I can load all or part of the database programs into sideways ram and run it as if it were a disc to speed up operations?

If this is possible I would be very grateful if you could tell me how as I find the ASR instructions a little difficult to follow. — **Jeffrey Lee, Plumstead Common, London.**

● You can put the database in sideways ram but you would be unable to run it and the ram can't be used as a ram disc.

From Page 47

supported by Steve Botterill of Superior Software who stated: "If the demand is there we'll supply it. If we get say 500 letters then that will justify it."

So Electron disc users the ball is in our court. Let's put pen to paper and show them that there is a demand way above anything they may have anticipated. – **Y. Mwanza, Isleworth, Middx.**

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

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

Here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So tear yourself away from your Electron keyboard and drop us a line.

The address is:

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

Boxing clever

REGARDING Simon Smith's letter in the October 1986 issue of Electron User concerning the quality of Electron games, I find it hard to believe that he expected to become an ace at Boxer within ten minutes of playing it for the first time.

It took my brother and myself nearly two hours to even reach the second screen.

I would have been more cross with Acornsoft if they had made the game easier than if they had made it harder.

A year ago I would have been inclined to agree with him about the games being poor quality.

But with software like Citadel, Way of the Exploding Fist, Rick Hanson and so on, it is extremely unfair on software companies to call some of their recent products poor.

Admittedly, Jam Butty is not the easiest of games to play, although with a bit of patience it soon becomes possible and quite enjoyable.

Another thing that people often write in about is the graphics with Electron games.

Surely they do not expect to keep up with something like the Commodore 64, when the Electron has only half the memory. Personally I would prefer a good game with average graphics, rather than vice versa.

Finally, thanks for the debugging sections, they are very much appreciated. – **John Tipper, Newbold Verdon, Leics.**

Keyword functions

I HAVE subscribed to your excellent magazine for over a year now and enjoy typing in programs and debugging my attempts.

Even though the Electron has access to 29 complete Basic keywords by using the Func key and one other, there still remain quite a lot of Basic words common to most listings, such as MOVE, SOUND and ENVELOPE, which are not defined.

The following short program uses the user-definable keys f0 – f9 for most of the other common words and commands not already defined.

```
10 REM Function Keys
20 *KEY0 "TAB"
30 *KEY1 "DEF"
40 *KEY2 "MOVE "
50 *KEY3 "SOUND "
60 *KEY4 "ENVELOPE "
70 *KEY5 "DATA "
80 *KEY6 "READ "
90 *KEY7 "GCOL "
100 *KEY8 "STRING$"
110 *KEY9 "CHR$"
```

Run the program, type NEW and enter your own listing. – **SSGT Ray Haydock,BFPO 15.**

Keeping the score straight

YOU may like to hear of the latest use I have found for my Electron. Having read your magazine since its start, I have not read of anything similar.

I am reasonably competent with the basics of Basic but am by no means an expert.

However, I was able to create a program that allows me to conduct meetings with my staff using an Electron and 26in colour TV instead of a flip chart.

The main reason for my writing, however, is the program for my employer's product knowledge competition.

Visionhire hold a competition every year sponsored by Philips and Pye. The final was on the 21st of October 1986 at the Forum Hotel in London with John Motson (BBC Sport) as quiz master.

All the Visionhire directors were present plus marketing executives from Philips, Pye and Toshiba.

An audience of 150 watched the competition, the prizes being a week in Portugal for the top team – three people and their spouses.

My part was first a welcome message then a scoreboard, keeping everyone updated via two 37in Philips colour TVs (yes 37in), and John Motson via a 12in monitor on his desk.

I used an aerial amplifier and splitter to feed the Electron signal the three ways.

As well as keeping score and sorting into the new order after every points input, my program also gave the six round numbers in colourful screen Mode 2.

I pinched part of a listing from Electron User that enlarged any letters or figures up to full screen size.

To be honest, I also used bits of other listings from Electron User for certain jobs – like the bubble sort and double height letters.

Also I learned about VDU5 and VDU4 to produce 3D text and the end result looked rather good (modesty not being my strong point!).

However, other parts were all my own work including scrolling contestants' names across the bottom of the welcome screen and the design of the scoreboard layout – that being drawn once – with the teams and scores reprinted each time in a text window.

The final result was about the tenth version of the original and I had to break it into three programs to save memory – intro, semi, and final.

A simpler version was used for the area and regional heats – I sent a copy to my counterpart on each region via a cassette plus written instructions.

It was more trouble to make it workable by a third party than to write in the first place!

For instance the training officer on region four suddenly found a score of 2 became 22 or even 222! I had to disable auto repeat in the next version!

The winners in the final were the team from Tyne and Wear – now off to Portugal in May 1987.— **I.B. Wiggs, Lincoln.**

Stocks and shares

I WONDER how many Electron owners became interested in stocks and shares through buying Telecom and Britoil shares.

Or put another way, I wonder how many first-time

buyers of shares went out and bought themselves an Electron to evaluate their portfolio or their tax liability, or even to assess their liability to capital gains tax. I know I did.

At the same time I was fortunate enough to find a night school course running an elementary computer programming course.

Unfortunately it was for ten weeks only but by that time I was getting used to writing simple programs in Basic.

And indeed I did progress to writing structured programs covering portfolio evaluation and my personal tax liability. But then I came to a full stop!

As you know, one of the things a computer can do speedily is produce graphs, charts and histograms.

These are very useful to an active investor in the evaluation and comparison of company shares using both historical and current share price information.

My night school could not get sufficient people together to warrant running a higher level course and so I couldn't enlist the aid of the tutor in helping me to understand and write charting programs.

I've searched in every book on the Electron that I've been able to get my hands on but though one or two cover graphics none appear to cover the subject of charts.

Can you recommend any publication that covers this subject in sufficient depth to aid me in programming the Electron to produce charts and histograms?

Alternatively would it be possible for one of your contributors to publish a series of articles on this subject? — **J.E.Howarth, Penwortham, Preston.**

● We have published many programs to produce various graphs in the past and you should be able to adapt one of these.

You'll find a graph in the April 1985 issue and a pie chart in the January 1985 issue of *Electron User*.

There are also multi-coloured three dimensional bar charts in the January 1985 and July 1984 issues.

ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly tested.

However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Heavy calibre

I AM just writing to congratulate Superior Software and Acornsoft on their fabulous game, Galaforce.

I have had it since October and have so far reached zone 25. I think it's brilliant and I hope for more games of the same calibre in the future.

I also think your magazine is excellent, keep it up. From a great fan. — **Paul Twigg, Irvine, Scotland**

Stored commands

I AM a long standing reader of Electron User and I was wondering if you could help me with a problem I have with View.

Everything seems to work fine until I try to use some stored commands.

After these are entered and the document printed out on my Amstrad DMP 2000, the entire line where the command is situated is deleted from the text.

This affects HT in particular, used with your View printer driver in the August 1986 issue, although I have also noticed it happens with other commands such as LM.

I have followed the instructions in the View manual and the printer driver article to the letter.

I have checked and double checked the printer driver program and I am convinced that there is nothing wrong with the printer or printer lead.

I would be most grateful if you could suggest where I may be going wrong as I am beginning to think there is something wrong with View itself. — **D.A. Colclough, Styvechale,Coventry**

● There is nothing wrong with View or your equipment but you may not be using it correctly.

Stored commands should be on a line by themselves with no other text. When the file is printed the commands are executed and the rest of the line is skipped.

The text is printed as normal and you won't see the blank line on paper.

Screen scrolling

I THINK your magazine is great reading and terrific value. My favourite parts are Software Surgery and Micro Messages. Could one of your resident programmers write a program that scrolls the screen one bit at a time in any direction? I had a go, but failed dismally. — **Matthew Rowley, Tamworth, Staffs.**

● Scrolling the screen one bit at a time is both complicated and slow. We would advise avoiding it if possible.

Here's a short routine and a demonstration showing how to scroll a Mode 6 screen left one byte at a time. This is much easier and faster.

```
  10 REM Screen Scrolling
  20 MODE 6
  30 VDU23,1,0;0;0;0;
  40 PROCassemble
  50 FOR i=0 TO 48
  60 PRINT "Scrolling in M
ODE 6!";
  70 NEXT
  80 FOR i=1 TO 100
  90 CALL &900
 100 NEXT
 110 END
 120
 130 DEF PROCassemble
 140 counter=&72
 150 FOR i=0 TO 2 STEP 2
 160 P%=&900
 170 [OPT i
 180 LDA 00:STA old+1:LDA
&60:STA old+2:STA new+2:LD
A 00:STA new+1
 190 LDA &31:STA counter
 200 LDY 00
 210 .loop
 220 .old LDA &6000,Y
 230 .new  STA &6000,Y
 240 INY:BNE loop
 250 INC old+2:INC new+2
 260 DEC counter:BNE loop
 270 RTS
 280 ]
 290 NEXT
 300 ENDPROC
```

Chess problem

I AM a relative newcomer to the computer world and find your magazine a great help, particularly the advice on Basic and bug problems.

Recently I got a copy of Acornsoft Chess and find it impossibly slow. Is there any way I can speed it up?

Failing this can you recommend a program that is fast enough and difficult enough to give a reasonable game? — **D.J. Gormley, Weston Coyney, Staffs.**

● Acornsoft's Chess is rather slow and the only way to speed it up is to upgrade your Electron by adding Slogger's Turbo Driver.

Have any of our readers come across a particularly good chess program?

If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers. All the programs have been designed for simplicity, so even a child can use them. Yet they include advanced features not yet available on programs costing many times as much!

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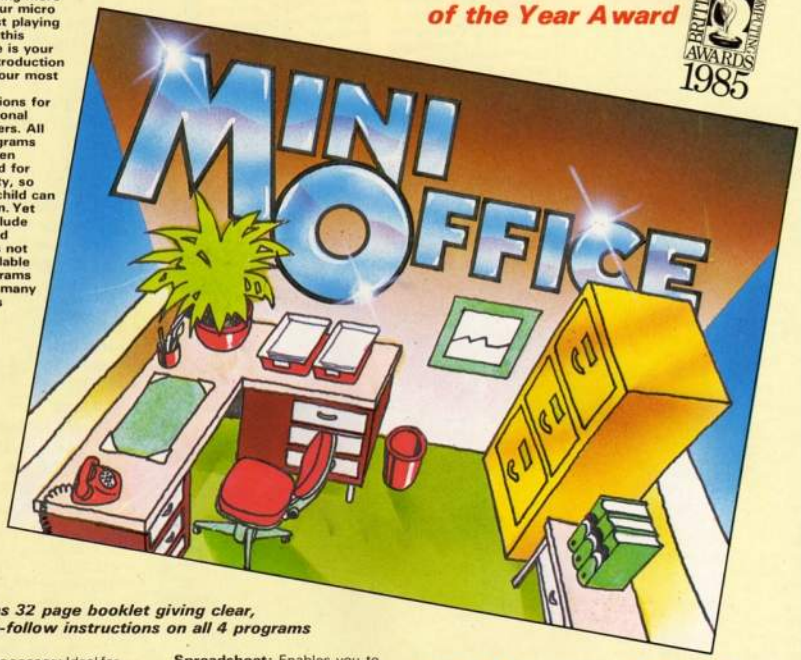

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Graphics: Part of the spreadsheet section, it lets you draw bar charts, pie charts and histograms to give a graphic presentation of your statistics. Helps to give life and colour to the dullest figures!

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More great Electron games

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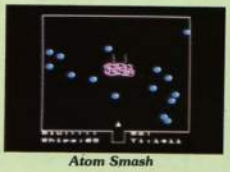

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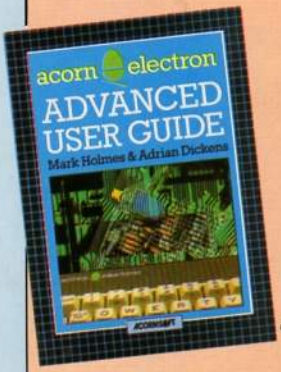

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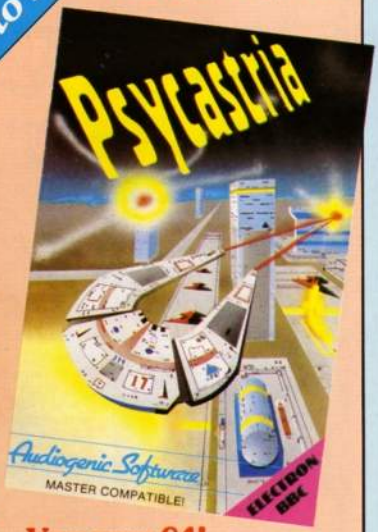

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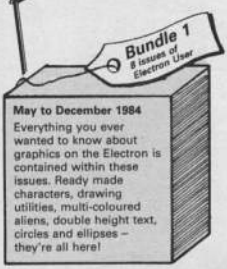

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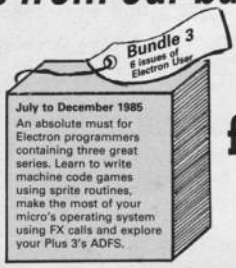

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Programs from back issues of Electron User – on tape!

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December 1986

Santa's Sleigh Help Father Christmas fill his sleigh with presents in this fast arcade game. **Yule Spell** Spelling can be fun with this seasonal variation on the old favourite hangman. **Pogo** A Logo turtle graphics compiler. **Function Key Lister** Keep track of your function key definitions with this helpful utility. **10 Liners** Two short but impressive graphics demonstrations.

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RAT CATCHER Try your hand at pest control with this fast action arcade game. **MATHS RUN** Put your powers of mental arithmetic to the test with this educational program. **BOS** This on screen editor will take the tedium out of debugging listings and sort out your typing slips. **CROSSWORD** Two programs for crossword lovers – one to design crosswords and the other to help you solve them. *+ **BONUS game:*** **QUASIMODO'S QUEST** Rescue Esmerelda in this colourful version of the all time favourite.

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June 1986

FISHING Enjoy a quite day by the river, and maybe catch your tea as well! **TACTICAL PURSUIT** A two player strategy game played with pawns on a chess board. **MINIBASE** Create an electronic telephone directory. **EXTRA COMMANDS** Add more commands to Basic. **SCREEN DUMP** Multi-tone screens dumps for Epson compatible printers.

May 1986

MISSILE JAMMER Defend the city of Pezina from a missile invasion. **VECTOR LETTERS** Use *LINE to create double height text. **DEGREES** Convert from Centigrade to Fahrenheit and vice-versa. **CROCODILE TEARS** Spell well or end up as a crocodile's dinner. **ZAP** Blast the marauding aliens. **EXTRA COMMANDS** Adding new keywords to Basic.

April 1986

INVASION FORCE Exciting zap 'em space game. **EASTER EGG HUNT** Seasonal game using compass points. **BACH TO BASICS** Music tutor. **NOTICE BOARD** Text scrolling utility. **SEARCH and RECOVER** Two routines from the disc article. **NOTEBOOK** Recursion backwards.

March 1986

GRAND PRIX Exciting race game. **DICER** A clever test of strategy. **MARCHING ORDER** Counting and ordering numbers. **FIND AND REPLACE** Useful editing program. **SECTOR EDITOR** Excellent disc utility. **TIMEPIECE** Superb graphics demonstration. **OXO** Game of cunning. **TRICIRC** A circle of triangles.

February 1986

NECROMANCER Superb text adventure. **GREBIT** Arcade action. **FAST BACKUP** Disc utility. **MACHINE CODE** How to write an arcade game. **TAPEDISC** More software transferring techniques. **SIDEWAYS RAM** Example program.

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FRUIT WORM An arcade classic. **HELICOPTER RESCUE** Pilot an air sea rescue helicopter. **MACHINE CODE** Detect collisions between sprites. **TAPEDISC** Transfer your software to disc. **MODE012** Multi-Mode screens.

December 1985

GET SET SANTA Christmas fun collecting presents. **MISSILE ATTACK** Save your cities! **PROGRAM PROBE** Using joysticks. **SPACE COUNT** Counting for youngsters. **CHRISTMAS CARD** Cards and carols for all. **DISC MENU** Disc Menu creator.

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KARATE WARRIOR Electrifying combat. **ULA** Mode 6 Mode 7! **PAINT ROLLER** Colourful arcade action. **DEFUSE** Beware the bombs. **SPRITE PRINT** Machine code graphics utility. **TRAIN** Far from stationery graphics.

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IAN JONES offers a fast cribbing utility to help you develop Basic programs

DURING the course of developing programs in Basic I often encounter programming problems to which I have already found solutions in previous programs.

But one of the bugbears of writing large programs in BBC Basic is the lack of any substantial facility for transferring macros, snippets of programs or routines from tape or disc into memory.

Sections of programs can be saved to disc or tape by *SPOOLing them. Later they can be *EXECed back into another program.

To some extent the use of *SPOOL/*EXEC helps.

But this is quite long winded if the routine you want is very short or you just want to check one line of a program to see how you solved a particular programming problem.

The trouble is that you must save the program you're writing and load the program you want to crib from.

Then you must either print or write by hand the routine you're after, reload the program under development and type in the additional lines.

Lister is essentially a fast cribbing utility which enables you to list a program directly from tape or disc without corrupting the program in memory.

Enter and run Lister to set up the machine code. It is assembled to page &C so save it with:

```
*SAVE LISTER C00 D00
```

To use Lister:

```
*LOAD LISTER
CALL &C00
```

and enter the filename of the program you want to list.

Don't forget you can freeze the display with Control+Shift and you can enable paged mode before calling Lister with Control+N.

You can escape at any time but if you do you'll need to close the file with:

```
*CLOSE
```

If you're using user-defined characters you'll need to load Lister each time you want to use it.

If you're not, load it before you start a programming session and it's there whenever you need it – just call &C00.

Lister occupies page &C and to make it as compact as possible the utility uses many built in Basic rom routines.

To ensure that Basic is paged in the rom number (10 or 11) is stored in the ram copy at &F4 and rom paging register at &FE05.

This enables the utility to run directly from disc by typing *LISTER since in this case the ADFS or DFS rom would still be paged in. Tape owners must *RUN LISTER.

Having ensured that the Basic rom is paged in it then prompts you for a filename.

A routine at &BFCF prints the prompt string and osword is used with the accumulator set to zero to input the name. The resulting string is stored at *INBUFF*.

The file is opened and read one byte at a time using osbget. If the byte is &0D the routine *line* is entered to print the line number which follows.

The routine at &991F is used which expects the two byte line number in the two least significant bytes of the Basic integer accumulator INTA which comprises the four bytes &2A to &2D.

If the byte read from the file is greater than &80 it must be a tokenised Basic keyword. The rom routine at &B50E is used to expand and print a token.

If the byte is &8D this indicates that a tokenised line number follows and is found following GOTOs and GOSUBs.

The subroutine *linetoken* takes the three byte tokenised line numbers converts them to a two byte form and calls &991F to print it.

All other bytes are assumed to be Ascii characters and are printed as normal.

Lister is an invaluable utility which will speed up program development.

It's so useful you'll wonder how you ever managed without it. ■

Lister listing

```
10REM Lister
20REM By Ian Jones
30REM (c) Electron User
40MODE 6
50PROCasseable
60*SAVE LISTER C00 D00
70END
80DEF PROCasseable
90lsb=&2A
100msb=&2B
110osfind=&FFCE
120osbget=&FFD7
130oswrch=&FFEE
140osword=&FFF1
150printmess=&BFCF
160FOR I%=0 TO 2 STEP 2
170P%=&C00
180[OPT I%
190.page_in_basic
200 LDA#10
210 STA&F4
220 STA&FE05
230.openfile
240 JSRprintmess
250 EQUS"FILENAME:"
260 NOP
270 LDA#0
280 LDX#INPARAM MOD256
290 LDY#INPARAM DIV256
300 JSRosword
310 BCCopenin
320 RTS
```

Lister listing

From Page 55

```
330.openin \open file
340 LDA&40
350 LDX#INBUFF MOD 256
360 LDY#INBUFF DIV 256
370 JSRosfind
380 STAchan
390.read \main loop
400 LDYchan
410 JSRosbget
420 STAchar
430 CMP#&0D \new line
440 BNEnoline
450 JMPline
460.noline
470 LDAchar
480 CMP#&80 \token?
490 BMIvdu
500 LDAchar
510 CMP#&8D \number?
520 BNEnottoken
530 JMPlinetoken
540.nottoken
550 LDAchar
560 JSR&B50E \print token
570 JMPread
580.vdu \print Ascii
590 LDAchar
600 JSRoswrch
610 JMPread
```

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```
620.line \line number
630 JSR&BC25 \CR
640 LDYchan
650 JSRosbget
660 STAmsb
670 CMP#&FF \end?
680 BNEokline
690 JSRendoffile
700 RTS
710.okline
720 LDYchan
730 JSRosbget
740 STAlsb
750 JSR&991F
760 LDYchan
770 JSRosbget
780 JMPread
790.endoffile \close
800 LDA#0
810 LDY chan
820 JSRosfind
830 RTS
840.linetoken
850 LDYchan
860 JSRosbget
870 STAbyte1
880 LDYchan
890 JSRosbget
900 STAbyte2
910 LDYchan
920 JSRosbget
930 STAbyte3
940 ASLbyte1:ASLbyte1
950 LDAbyte1:AND#&C0:EORb
yte2:STAlsb
960 ASLbyte1:ASLbyte1
970 LDAbyte1:EORbyte3:STA
msb
980 JSR&991F
990 JMPread
1000.INPARAM
1010 EQUW INBUFF
1020 EQUB 10
1030 EQUB 32
1040 EQUB 255
1050.INBUFF
1060 EQUS STRING$(10," ")
1070.chan EQUB 0
1080.char EQUB 0
1090.byte1 EQUB 0
1100.byte2 EQUB 0
1110.byte3 EQUB 0
1120]
1130NEXT
1140ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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Get the most out of your Plus 1

JOE PRITCHARD starts a new series on the multitude of jobs this analogue interface can handle

MANY Electron owners, having hammered the living daylights out of the keyboard of their machine playing yet another game of "zap the green things" no doubt bought a Plus 1 to use joysticks and help preserve the keyboard.

However the Plus 1 is more than a simple joystick port and in this short series I'll explain in simple terms this aspect of its hardware.

We'll look at some of the many different devices we can plug into it, the software needed to access it and also provide a few ideas for applications.

For those of you who've read things like "minimum impedance of 10k ohms" or "heat sensitive transducers" in the Plus 1 User Guide and have given up in disgust, don't worry – we start off this month with a beginners guide to the world of analogue and digital systems, volts and ohms.

The joystick port on the Plus 1 is also known as an analogue interface and as we'll see, provides us with a means of sensing what's going on in the world.

You might be aware that your Electron only understands two things – yes and no, true and false, 0 and 1, call them what you will.

Everything that the Electron does can be thought of as ultimately involving a chain of these yes/no decisions.

Indeed, the actual electrical signals that whizz around the Electron's innards are also of two values, 5V, which we often call high or 1, and 0V, which we often call low or 0.

The term digital computer is given to machines that carry out their work using these digital signals. The Electron therefore understands only two levels of electrical voltage – 0V and 5V.

Of course the real world isn't like this at all. For instance, it doesn't change from bright sunshine to darkest night whenever a cloud passes over the sun; we have a gradual fall in the light level and a gradual increase as the cloud passes.

A further example is the gradual increase in the speed of a car as you press the accelerator. The speed increases smoothly from 0 to 60 rather than suddenly jumping.

Such systems, in which properties change smoothly over a range of values, are called analogue systems.

A digital system will have a finite number of allowable values, whereas an analogue one can have an infinite number of values, each slightly different from the others.

The analogue port of the Plus 1 provides us with a means of getting the Electron to look at these smoothly changing quantities in the world.

An analogue quantity must be converted into an electrical signal – a voltage. This can be read and converted by the analogue port into a digital quantity – a number that represents it. For this reason the circuit in the Plus 1 that performs this feat is called an Analogue to Digital Converter or ADC.

The ADC takes an input in the form of a voltage and outputs a number corresponding to its size. The larger the voltage the bigger the number the ADC outputs. Figure 1 shows this diagramatically.

Any quantity in the real world such as pressure, temperature, light, sound and so on can be converted into an electrical signal and can be measured using an ADC.

In a perfect world the conversion of an analogue quantity to its digital equivalent would occur instantaneously. But in reality the conversion takes a finite period called the conversion time.

Thus the output from the ADC can be seen as a series of snapshots of the input, each separated from the

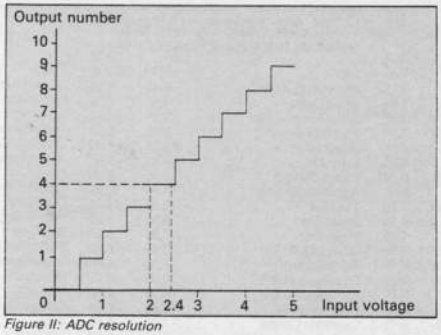

Figure II: ADC resolution

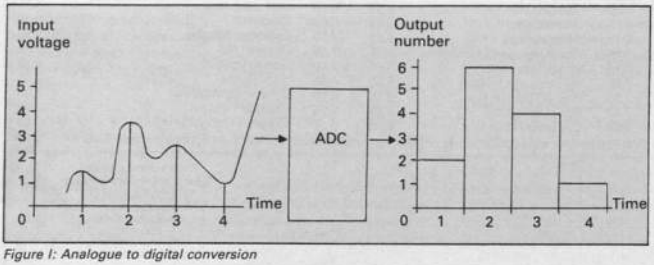

Figure I: Analogue to digital conversion

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next by the conversion time.

This varies depending on the type of ADC and for our Plus 1's converter it's about 10 mS. That is one conversion every one hundredth of a second.

This might sound fast, but in fact it's quite slow when we think of some ADCs that gallop along at tens or hundreds of thousands of conversions per second.

ADCs usually give their output as 8 or 12 bit integers. The number of bits in the output is called the resolution of the ADC.

The resolution is simply a measure of the fine detail that an ADC can see in the input.

For example, let's say we've got an input signal of one unit to an ADC with four bit resolution – it doesn't matter what this unit is.

This ADC can output 2^4 different numbers in the range 0 to 15. Suppose our input signal gives an ADC output of 15, and if we input 0 units we get 0 at the output.

This gives us, between 0 and 1 unit, 16 different output values. Figure II shows the analogue input and the digital output.

You can see that slightly different input voltages will therefore give the same output number. The values 2.0 and 2.4 will both give an output of 4.

To ensure that input signals of different magnitudes are distinguishable by this chip they have to be at least 1/16 of a unit apart. The resolution is therefore 1/16 of a unit.

If the input quantity is in volts, and 10 volts gives the maximum output, we'd say that the resolution is 10/16ths of a volt.

If we increase the resolution of the ADC we decrease the size of the steps and allow the ADC to register inputs with smaller changes as different.

It's a bit like the difference between a Mode 2 and a Mode 0 screen. Think of the screen pixel as the step size or resolution. The smaller the pixel is the more detail we can see on the screen.

The Plus 1's ADC outputs an 8 bit integer, thus it provides 2^8 or 256 different numbers.

A low input voltage will give a zero digital output and the highest input voltage allowed will give a digital output of (2^n)–1, where n is the number of bits of resolution that the ADC has.

Going outside the permissable voltage range can damage the ADC, so take care. The input range for the Plus 1's ADC is 0V to 1.8V maximum.

After all this talk about ADCs we still have to provide a means of converting the real world quantity of interest into a voltage for the ADC to convert. This is done by a device called a transducer.

This is an electronic component which converts a physical quantity like motion, pressure, weight or light level into an electrical signal.

For instance a heat sensitive transducer converts changes in temperature into a changing voltage. This can then be fed into an ADC. We'll look at some transducers in future parts of the series.

● *Armed with this information next month we'll take a look at the Plus 1's ADC in detail.*

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Ramming home more memory

JOE PRITCHARD tries out the Slogger Master Ram Board and enjoys having 28k of memory in any screen mode

THE Electron is a great little micro and it's amazing what can be done with it. However, nothing is perfect and it has its faults.

Apart from being a bit slow the Electron is also rather short on memory. The BBC Micro is much better off, being both faster and – when using the very memory efficient teletext Mode 7 – having around 7k more ram free.

The memory available on the Electron is further decreased when using high resolution and multicolour graphics modes.

And in Mode 0 with a Plus 3 (which also grabs a huge chunk of ram), you can just about fit a program in to print your name on the screen!

Admittedly I'm exaggerating, but the problem is there. Now Slogger has put an end to the days of "No room" and "Bad MODE" with its Master Ram Board.

This provides the Electron with a staggering 28k of memory in any screen mode and a few other goodies besides.

But first of all, how's it done?

The Master Ram Board adds 32k of shadow ram and is essentially the same as found in the BBC B+.

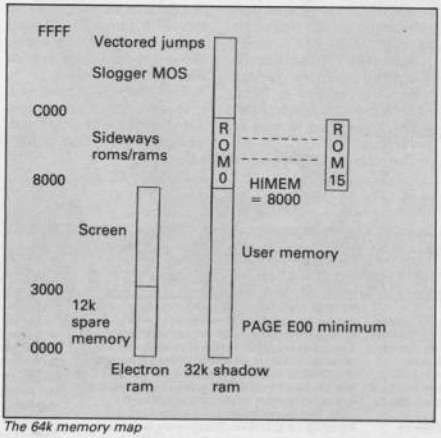
The operating system is patched and the Electron uses this extra ram rather than the built-in memory for your programs.

What this means is that the micro doesn't use any of the memory allocated for your program to store the screen display.

So, HIMEM is set to &8000 regardless of mode and whatever the operating system needs for the screen is taken from the built-in ram.

There are both advantages and disadvantages to this system as we'll see later.

An additional bonus is that Slogger's Turbo Driver is built-in with the shadow ram. This speeds up the Electron by as much as 300 per cent depending on the screen mode.



The 64k memory map

When it's on you can't access the shadow ram but it is useful for speeding up games and breathes new life into old software. You'll find a full review of this in the July 1986 issue of *Electron User*.

The Master Ram Board is fitted by Slogger; simply post your Electron to them and back it comes with the only visible change being a small three-way toggle switch on the left of the case.

This can be used at any time, even with the machine turned on, to change the operating mode of the Electron.

However, doing so crashes the computer and Control+Break is needed to reset the micro. This is quite normal.

The positioning of the switch gave rise to a small criticism of the board, in that I was working with the Electron on a crowded desk and all of a sudden it froze up.

Nothing at all wrong with the board, I'd just knocked something against the switch and accidentally changed the operating mode.

In the first position the Electron behaves as normal, in the second the shadow ram is switched in and in the third the turbo is switched on.

With the switch in normal mode there is nothing untoward noticeable. The Electron acts as it always has.

Switching to shadow mode and pressing Control+Break produces the start up message Acorn Electron 64k.

HIMEM in all screen modes is then &8000 giving a maximum of 28k of ram free. The extra memory can be used by word processors, databases, spreadsheets, languages and so on.

For instance, word processors could have text files of up to 28k resident in memory and use either 40 or 80 column screen modes.

All legally written software will work but programs which use illegal methods – such as directly accessing the screen memory – will not run.

In both turbo and shadow ram modes there is quite a significant increase in performance.

Table I shows the timings for some simple programs running on the BBC Micro, standard Electron and Electron in either shadow or turbo mode – the speed is the same.

Test 1 was run in Mode 6 and calculated and printed the SIN, COS and TAN of the numbers 0 to 100. Test 2 was Test 1 carried out in Mode 0 to see the effect of changing mode.

Test 3 dimensioned and filled a 1000 element array in Mode 6, and Test 4 did the same in Mode 0. Finally, Test 5 drew 100 random

→

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triangles in Mode 2.

As can be seen, as well as adding extra memory shadow mode also speeds up the Electron and is directly comparable to the BBC Micro.

In addition, there are no significant variations in the execution time of programs running in different modes, unlike the standard Electron.

The days of changing to Mode 6 to do your number crunching, then back to Mode 2 to display the results are gone with the Slogger board.

In shadow mode the Electron's built-in ram is used for the screen display while your program is in shadow ram.

Of course the screen memory doesn't take up all 32k of ram and the built-in ram that isn't being used for the screen from address 0 up to the screen start is free for your use. It can be used as a printer buffer or for data storage for instance.

Test	Electron	Turbo	BBC
1	20.19	14.37	13.77
2	41.44	14.99	13.68
3	3.07	2.32	2.28
4	5.98	2.32	2.28
5	24.37	8.99	8.86

Table I. Speed Tests in seconds.

This memory will be at least 12k and its actual size depends on the screen mode selected. With Mode 0, there is 12k to play with and with other modes that consume less ram there can be up to 20k free.

Basic can't make use of this extra memory, except indirectly. Access is by a new operating system call which allows you to read or write to it.

The fact that programs run in shadow ram and that the screen memory is in the old Electron ram gives rise to the one unavoidable drawback with most shadow ram systems, not just this one.

Programs that access the screen memory directly will not work in shadow ram. So for some games you'll need to run the Slogger board in either turbo mode or normal Electron mode.

The Slogger board will give you more space and extra speed, but won't turn your Electron into a BBC Micro.

Finally, the board provides a new operating system rom replacing the old. This has the same legal entry points as the Electron OS, and adds the new OS call mentioned above.

On the whole I liked it very much. It's a good piece of equipment which will no doubt find much use.

The increase in speed provided by the shadow ram will also be extremely valuable and the additional feature of the turbo mode for speeding up games is great.

I can thoroughly recommend it. ■

Product: Master Ram Board
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The guardians of the castle, the vicious Ravenbees have to be avoided or, in some cases, destroyed — but there is only one way to kill them; you must discover how as you venture through the dank passages of the castle. Your quest is not an easy one — only with time, experience and a little luck will you unravel all the mysteries within Ravenskull Castle.

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Last Christmas saw the release of Repton 2, larger and much more challenging than before. Acorn User's Technical Editor Bruce Smith wrote: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!"

Now, completely rewritten and improved for the Commodore, Amstrad, BBC Micro and Electron, we proudly present Repton 3. For the first time, a screen-designer is included: try to devise screens that will perplex your friends, then see if you can solve their newly-designed screens. Another innovation is the character-designer which enables you to design your own monsters, rocks, eggs, spirits, diamonds . . . any or all of the game's characters can be redefined as you wish.

Repton 3 is much larger than its predecessors — it has 24 fascinating screens, and players who are skilful enough to complete them all can enter our prize competition described below. All the favourite Repton characters have been retained, together with several new features: a creeping poisonous fungus which grows at an alarming rate; time bombs and time capsules (for puzzles in the 4th dimension); and golden crowns as well-deserved rewards for your endeavours. **Can YOU complete Repton 3?**

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