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Vol. 4 No. 1 October 1986 £1

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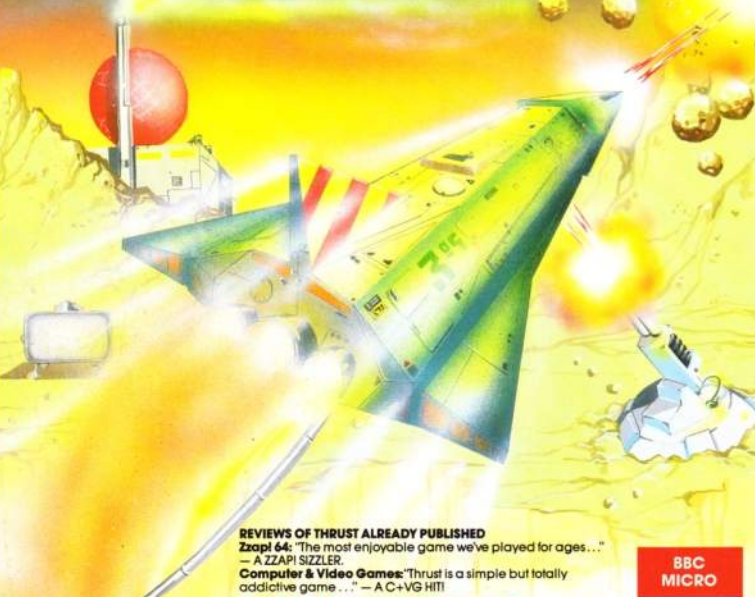
Retrieve the Pod and make your escape.



Collect the fuel and steer clear of the limpet guns.



Shoot the activator to open the sliding entrance door.



REVIEWS OF THRUST ALREADY PUBLISHED

Zzap! 64: "The most enjoyable game we've played for ages..."
— A ZZAPI SIZZLER.

Computer & Video Games: "Thrust is a simple but totally addictive game..." — A C+VG HIT!

Now available for the BBC Micro and Electron

The Commodore-64 version of Thrust (published by Firebird Software) shot immediately to No.1 in the software charts and was greeted with rave reviews throughout the computer press. Equally addictive and just as enjoyable, the BBC Micro and Electron versions of the game are set to emulate this performance.

Thrust is simple, fun-to-play, yet totally realistic and intensely challenging. Your mission is to visit 24 planets in turn collecting the Klystron Pods and, if possible, destroying each planet's reactor system. Your spaceship and the pods, which are heavier than the spaceship, move authentically subject to the laws of gravity, inertia and momentum — indeed the game's author, Jeremy Smith holds a First-Class Honours degree in Physical Careful planning of your manoeuvres is essential in order to prevent the pods swinging out of control and dragging your spaceship to destruction.

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.

PRICE: £7.95 (cassette), £11.95 (BBC disc)

COMPETITION COMPETITION COMPETITION COMPETITION

If you complete the mission by collecting the pods from all 24 planets, you can enter our competition. The prizes include the beautiful trophy (pictured on the right), £250 cash, and 3 copies of the captivating book "The New Atlas of the Universe" by Patrick Moore. Closing date: 31st January, 1987.



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MICRO
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News

All that's new in the ever expanding world of the Electron.

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Graphics

In which we join the invisible text and graphics cursors and say hello to VDU5.

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Software Surgery

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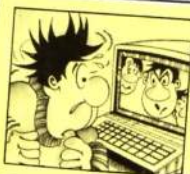
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You'll need quick thinking and nimble fingers in this fast action game.

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Bargains galore!

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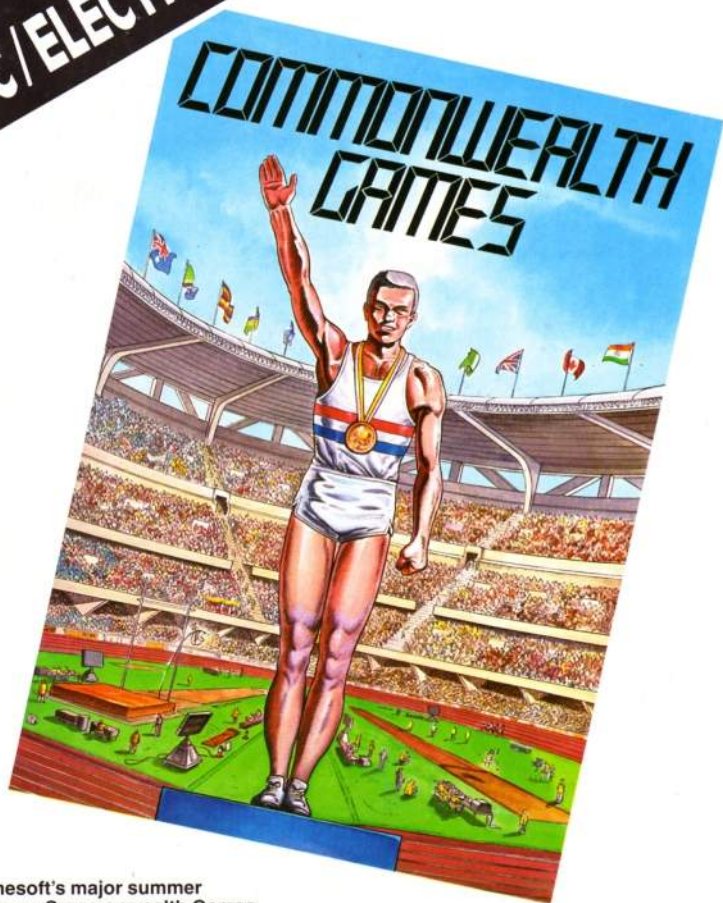
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electron user NEWS

Super Xmas Show

THE Show that broke all existing records in the spring is set to repeat the performance when it returns to the Royal Horticultural Hall, Westminster next month.

Pre-Christmas bargains and exciting new products will fill well in excess of 100 stands at the Electron & BBC Micro User Show from Friday to Sunday, November 7, 8 and 9.

All the major producers of software and peripherals for the Electron will be there again, their enthusiasm fuelled by the tremendous success of the spring show.

It is anticipated that more than half the exhibitors will be bringing with them new products and cut-price offers specifically for Electron owners.

ENTER THE COMPACT

THE new big brother for the Electron has duly been delivered by Acorn.

Named the Compact – not the Baby as had been originally forecast – it boasts 128k and a built-in 3.5in disc drive.

By endorsing the smaller disc format, Acorn has opened up new software horizons for Electron disc users in that it will result in a vast range of titles being made available.

It is being offered in three configurations.

Electron's big brother lacks one golden touch

The basic model carries a price tag of £399, bundled with a monochrome monitor it costs £469, and for a colour system the price is £599. All three packages include sophisticated software worth in the region of £150.

Acorn is known to be

relying on its name for quality to carry it through in what is becoming an increasingly competitive marketplace.

"Our market research has shown that quality is very important to the customer," Jeremy Preston, Acorn's marketing communications manager, told *Electron User*.

"We would like to see Electron users view this as their next logical step up in the market".

The Compact to date has been well received by the reviewers.

However, one expert has noted that it lags behind the Electron in at

least one specification.

Mike Cook, technical editor of *The Micro User*, was quick to point this out in his literary dissection of the Compact.

Examining the printed edge connector intended for further expansion, he wrote:

"This expansion method has been used on many other computers before but only once on an Acorn product – the Electron."

"On the Electron, however, the edge connector was gold plated – a valuable move in my opinion."

Problems

"Unfortunately the Compact's is only tinned."

"I know from my own personal experience that this can lead to reliability problems with whatever is plugged onto the connector due to oxidation of the tinning. This can be cured simply by unplugging the connector and wiping it with a solvent but gold plating circumvents the problem".

He later said: "It just goes to show that even a relatively much more expensive machine like the Compact still can learn a thing or two from the Electron".

Off to a good start

A LEADING supplier to the Acorn market insists that more than 40,000 Compacts had been sold before the official launch.

Nazir Jessa of Watford Electronics claims that the informa-

tion comes from "a completely reliable source".

He told *Electron User*: "I have no doubt that Acorn has already sold more than 40,000 – many to Europe – it's that good a micro".

NEW LINK TO US DATABASE

MICROLINK has achieved a world first by creating a permanent electronic link across the Atlantic.

It will allow owners of Electrons and other micros to log on in a matter of seconds to one of the most dynamic databases in the USA.

And the cost will be approximately half that of a conventional transatlantic telephone call.

The breakthrough

has come about as a result of a deal struck between MicroLink and Mnemetics, based at Sparkill, New York.

With the help of its US partner, MicroLink has set up a complex electronic gateway which will enable the exchange of messages between micros in the US and the UK.

The new service was officially opened when Derek Meakin, head of MicroLink, sent the first

message to his opposite number at Mnemetics, Gregg Squires.

Seated at the keyboard in his office in Stockport, he simply typed the letters MNE. Without any delay a welcome message from New York appeared on his screen. Then he typed: "Dear Gregg – This is a historic moment . . . the opening of the first-ever transatlantic gateway to enable micro users in the UK to talk to

their fellow enthusiasts in the USA.

"On behalf of many thousands of MicroLink subscribers in the UK, together with many others who have joined us from countries all round the world, I send greetings to you and everyone at Mnemetics."

"From now on we're all going to have lots to talk about".

The UK-USA com-

Turn to Page 6

NEW ELECTRON PRODUCTS IN LINE FOR NORTHERN SHOW

MOST of the manufacturers and suppliers exhibiting at the Electron & BBC Micro User Show at UMIST, Manchester, have confirmed that they will be bringing with them a host of new products and bargains galore.

And there will be no shortage of exciting hardware and software developments designed for the massive Electron user base.

Although the spotlight will tend to shine on Acorn's new machines, the Compact and the M19, the great Northern showcase will feature plenty to interest the increasingly sophisticated Electron owner.

Permanent Memory Systems has produced what it calls "the ultimate add-on for the Electron", the E2P 6502 Second Processor.

It claims a 300 per cent speed increase in Basic Mode 0, 3½ times more test storage in View Mode 3, and 30k Basic programs in all modes.

Basic and View have 45k of usable memory and 60k is available for machine code programs and data.

The E2P 6502 plugs into a Plus 1 slot, "runs

Acornsoft creative graphics at BBC speed", runs BBC rom-based languages from disc or tape, and works with the Slogger turbo. Price: £89.

Also new from PMS is the Multi-Font NLQ printer driver - rom based software for Electron owners with Epson RX/FX compatible printers - which will be sold at a special show price of £29.95.

Meedmore will be unveiling Whisker, its new analogue mouse which comes with drawing and painting software, costs £39.95, and can be used with AMX and Bitstik programs.

The new AP4 disc interface from Advanced Computer Products opens up the Electron to a vast pool of software previously restricted to the BBC Micro.

It features a 1770 DFS as standard, running with Page at £600, and costs £69.95.

There should also be a chance to see the AP5 which effectively adds three more interfaces to the Electron. It combines a 1MHz bus - providing the same I/O as that on the BBC Micro - and a Tube interface for about £50.

The company has

also produced a user port for connections to the AMX Mouse and CAD/CAM applications.

Care Electronics is launching its Electron rom extension cartridges for use with word processing chips and toolkits, and will be selling them at special show prices.

On the entertainment front there will be the chance to buy all the new titles published for the Christmas season, along with many cut-price offers on existing games.

Tynesoft is launching Futureshock, a multi-screen arcade adventure for the Electron, and offering several recent releases at special show prices.

Shards Software is releasing its new spy adventure Operation Safra, a sequel to the

Rock at the theatre

THE most entertaining sessions in the Acorn Theatre at the Manchester Electron & BBC Micro User Show are likely to be those featuring Chart Challenge, a new quiz game package for the Electron, based on rock and pop music.

Published by Outlook Enterprises, Chart Challenge is a set of programs providing four different quiz games on a 700k database with more than 60,000 questions and answers.

It covers every record that has ever been a top 75 hit in the UK, and visitors to the Acorn Theatre will be able to test their knowledge of the rock and pop scene by playing Chart Challenge each afternoon between 2pm and 3pm.

popular Pettigrew's Diary, on cassette at a special introductory price.

In addition there will be the Acorn Theatre, where each day leading experts will be describing all the latest de-

velopments at Cambridge.

The show is open 10am to 6pm Friday and Saturday, September 26 and 27, and 10am to 4pm Sunday September 28, at the Renold Building, UMIST.

From Page 5

puter link opens up a host of new services for subscribers to MicroLink.

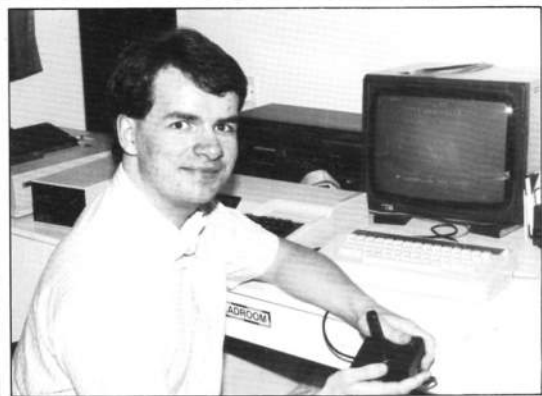
They will be able to choose from playing realtime games to participating in the activities of more than 40 special interest groups.

And with Associated Press providing a 24 hour global news service, there will be in-

stant access to news.

"We are just delighted that we at MicroLink are able to offer this first", says Derek Meakin. "It's going to transform the way we communicate with the States".

Now Gregg Squires hopes to open a reverse link - to allow micro users in the USA to share all the facilities of MicroLink.



A FORMER member of the Electron User editorial team has written what is being described as "the ultimate shoot-em-up game".

Kevin Edwards is the author of Galaforce for the Electron, the first

Shooting ahead

title offered under the Superior Software/Acornsoft label.

"Following negotiations between Superior and Acornsoft, this is the

first release to bear the joint logo," says general manager Steve Botterill.

"We confidently expect Galaforce to be a bestseller".

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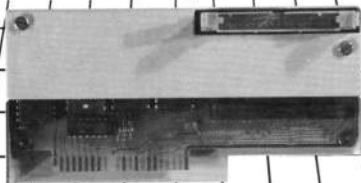
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ELECTRON USER, JUNE '86

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On the trail of that invisible graphics cursor

Part eight of the Electron graphics series by TREVOR ROBERTS

BY now you should be completely familiar with text and graphics windows. Somewhere deep inside your brain should lodge the knowledge that:

```
VDU 28,bottomx,bottomy,
topx,topy
```

defines a rectangular part of the screen in which all printed text is confined.

Not content with this, last time we also dealt with the subject of graphics windows. Again we used a VDU command to create them, but this time it was VDU 24. We saw that the format was:

```
VDU 24,bottomx;bottomy;
topx;topy;
```

and that the numbers following the VDU 24 are graphics coordinates. Make sure you get the semicolons correct as wrong punctuation in a VDU command can have weird results.

While we've been dealing with the two kinds of windows have you noticed that we've also mentioned two kinds of cursor? There's the text cursor and the graphics cursor.

The text cursor is the annoying flashing line that shows where the next text character is going to appear. It's the thing that we switch off with:

```
VDU 23,1,0;0;0;0;
```

and back on again with:

```
VDU 23,1,1;0;0;0;
```

Also we can position the text cursor anywhere on the screen using the TAB command, measuring in terms of character spaces and rows from the top left corner of the display or the bottom left of a text window if one is defined.

The graphics cursor is a completely different beast. For a start we can't see it, it's invisible.

However we know that it's there - we've too often seen the effect that MOVE and DRAW have on it to have any doubts.

The shy creature can be positioned using MOVE fol-

lowed by the appropriate graphics coordinates, measured from the bottom left corner of the display.

And even if there's a graphics window in force the graphics cursor still positions itself with reference to the bottom corner of the screen rather than to that of any window.

Table 1 sums up the differences between them, while Figure 1 shows the coordinate systems used to control them in Mode 5.

It's easy to see why there are two different types of cursor. The text cursor works on the text screen showing where text will go.

However the graphics cursor is confined to the graphics screen and shows where MOVE, DRAW and the other graphics commands will operate.

It makes sense that such very different screens should each have its own type of cursor. So it may come as some surprise when I inform you that at times it's very useful to be able to join the two.

In fact there's a specific VDU command, VDU 5, to do just that job. Put the Electron into a graphics mode with, say:

```
MODE 5
```

and give the text cursor something to do with:

```
PRINT "HELLO"
```

The greeting should appear two lines down the screen with the prompt > and the

flashing text cursor on the next line.

Now since we've just changed mode and haven't used VDU 24 to mess about with the graphics window the graphics cursor will be lurking transparently at the bottom left corner of the display. Move it to the centre of the screen with:

```
MOVE 640,512
```

Now use:

```
VDU 5
```

to join the text and graphics cursor. What happens?

The answer is that the text cursor joins the graphics cursor in the middle of the screen. It also shares the graphics cursor's cloak of invisibility.

However the fact that the prompt is there at the middle of the screen gives the game away. A text character, in this case >, has been printed at the place we moved the graphics cursor to.

If you now add some more text such as:

```
PRINT "Hello"
```

you'll see this command appear next to the mid-screen prompt. However once you've pressed Return the HELLO appears on the next line, back at the left side of the screen as usual.

So after a VDU 5 you can MOVE the graphics cursor to anywhere on the screen and have text appear there.

However a PRINT command, with its in-built carriage

Text cursor	Graphics cursor
Visible Positioned using rows and character spaces Measured from top left Positions relative to text window	Invisible Positioned using graphics coordinates Measured from bottom left Positions absolutely using bottom left as 0,0

Table 1: Text and graphics cursors - the differences

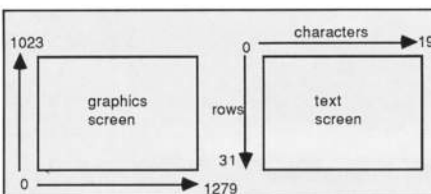


Figure 1: Mode 5 text and graphics screen



return and line feed, soon has the cursor on the beginning of the next line. Try:

```
MOVE 780,780:PRINT "HELLO"
```

and you'll see the familiar message at the top right of the screen. The prompt faithfully appears one line below, to the left of the screen.

Have a go moving the graphics cursor around the screen and printing text there. Once you've got the hang of it you'll be glad to know that you can "switch off" VDU 5 with VDU 4 or a mode change.

But what, you might ask, is the use of VDU 5? The answer is that it's got lots of uses, as we'll see later in the series.

However for the moment consider Program I which continues the friendly mood by writing 10 HELLOs on the screen.

```
10 REM Program I
20 MODE 5
30 FOR loop=1 TO 10
40 PRINT TAB(loop) "HELL
50 NEXT loop
```

Program I

There's nothing difficult about it, just a FOR...NEXT loop which produces one HELLO for each pass.

The only remotely interesting bit of the program is the way that the loop control variable, *loop*, is used in line 40.

Because *loop* is inside the

brackets following the TAB each time round the loop the H of HELLO is printed in a different place.

The first time round the loop *loop* is 1, so the H appears two character cells from the left. The next cycle *loop* is 2 and so the H appears in the third character cell along the line. This carries on throughout the loop.

The result is a set of 10 HELLOs, each indented by one space. And if you think I was one character space out on the above, then you've forgotten that TAB starts counting at 0.

Now suppose, for deep and meaningful aesthetic reasons of your own, you wanted to improve the layout of these 10 HELLOs.

To artistic temperaments, such as yours and mine, the sight of all those Hs, dutifully lined up under the E of the previous HELLO is an affront to art.

Suppose we wanted to have each successive H cen-

tered under both the H and the E of the previous HELLO? Can we do it?

Try it and see. You'll find that if you try to get half-character spaces with TAB you won't get very far! No, what you have to do is resort to VDU 5 as Program II shows.

```
10 REM Program II
20 MODE 5
30 VDU 5
40 FOR loop=32 TO 352 ST
50 MOVE loop,1023-loop
60 PRINT "HELLO"
70 NEXT loop
```

Program II

The structure of the program is similar to Program I's, but now there's a VDU 5 to ensure that the graphics cursor can be used to position text. The figures after the FOR

have changed but the loop still cycles 10 times printing HELLO. Only now the HELLOs are indented half a character space each time. How's this done?

The answer lies in the MOVE of line 50. This ensures that for each pass of the loop the graphics cursor is positioned correctly.

The first time round, *loop* is 32 so the MOVE takes the joint graphics and text cursor to 32,991. It's here – courtesy of VDU 5 – that the PRINT puts the message.

The next time round the loop, the MOVE sends the cursors to 64,959 and so on.

Each time round the H appears 32 graphics units to the left and 64 graphics units lower down the screen than the previous one. This just happens to be half a character space in, on the line below.

Suspicious readers may be wondering just where I got those figures from. The answer is that I used the information from Figure 1.

In Mode 5 there are 20 character spaces across the screen. Now these occupy the same space as 1280 graphics coordinates, so it's a simple bit of maths (1280 divided by 20) to see that one character takes up 64 graphics units across.

So half a character is 32 graphic coordinates wide. And since Mode 5 has 32 lines down the screen, each character is 32 graphics units deep.

Figure II shows the dimensions of one character.

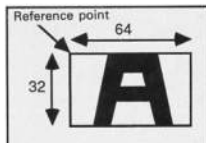


Figure II: Character cell measured in graphics unit

Once you've seen how Program II works can you modify it so the indentation is, say, a quarter or three-quarters of a character space?

● That should keep you busy until next time when we'll be taking a further look at VDU 5.

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Get your pulse rate racing

Program: US Drag Racing

Price: £6.95

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THE scene is the Clifton Center, Arizona. Your dragster is ready on the track and so is that of your opponent Pete Piston. Out comes the track marshal who waves you forward. Your support team of mechanics gives you the required push and Pete's crew does the same for him. Then comes the instruction to start engines. You build up the revs, slip her into gear and you're off, hurtling down the track in hot pursuit of Pete.

Your aim is to beat Pete to the winning post one quarter of a mile down the track. Success will up your rating from novice to rookie and you can then try your skill against Tex Turbo.

Beat him and you become a pro and face Clint Clutch, and then on to Sam Servo who is demonically fast. If you get past him, you're a faster driver than me.

Your accelerator pedal consists of the greater than and less than keys. These

must be hit alternately as fast as you can. The spacebar serves as the gear change and as far as I can discover you can only change up through the gears.

If you go into top gear too early, the car's lack of torque will mean a loss of acceleration and certain defeat. It all means that you need not only really nifty fingers, but also a good sense of timing.

As is so often the case in this type of game, both cars stay still and together in the centre of the screen while the background, in this case white lines, scrolls past.

The display gives no indication of who is winning, which means it is essential to read the distance indicators as well as your rev counter and speedometer. It's a game that will keep your eyes and fingers busy.

Sadly, winning a single race may not be enough. You take part in three races against each opponent and you only win if your fastest time is better than his. I developed a policy of really going for it in the first race and sauntering through the other two to give my fingers a rest.

The graphics are neat and tidy, as they should be with so little on-screen



movement. My favourite feature is the parachute that slows you down at the end of the race. The sound gives you a good idea of the speed you are travelling, but is rather unimaginative.

My main concern is that this type of game is bad for keyboards. My Plus 1 joystick interface didn't work with it, so it is almost impossible to avoid hammering the poor keys. If you are prepared to risk it, Drag Racing will get the adrenalin pumping as you desperately try to beat the opposition.

Rog Frost

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

Compete at the Games

Program: Commonwealth Games

Price: £7.95 (cassette) £9.95 (disk)

Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE. Tel: 091 414 4611

AS so many athletes boycotted this year's Commonwealth Games in Edinburgh you have been given the opportunity to enter eight of the events. Have you got what it takes to compete with the world's greatest athletes?

The events are stored on one side of a cassette and must be loaded in strict sequence – there is no menu allowing you to load individual events. You compete in hammer throwing, swimming, cycling, 400 metres, long jump, steeplechase, rowing and weight lifting. Pressing the Z and X keys alternately determine power or speed, while the spacebar initiates a throw.

The graphics are drawn on a grand scale – none of these weedy little stick

men running around. In the hammer throwing you only see the top half of the athlete as he turns in the circle. After his third turn a meter displaying an angle bursts into life. Hit the spacebar when it reaches the angle you desire and away soars the hammer to an incredible distance – about five metres in my case.

The cycling is another graphically pleasing and original event. The action takes place in three separate screen windows, the top displaying a plan of the circuit and indicating your position. The next one provides a sideways view of you on the bike, and the third a head-on view.

Great care must be taken not to enter the bends too quickly or you will find yourself rolling down the track ahead of the bike.

In the events which are completed quickly, such as the hammer, the ability to re-run would have been helpful. Likewise with the long boring events such as the 400 metres.

It would also have been nice to have



had an abort key which allowed you to skip one or two of the heats if you so wished.

Commonwealth Games is a fine example of an athletics program, but could have been even better with a little more forethought.

Steve Brook

Sound	4
Graphics	9
Playability	7
Value for money	8
Overall	8

Hassle in the classroom

Program: *Mikie*

Price: £9.95

Supplier: *Imagine, 6 Central Street, Manchester M2 5NS. Tel: 061-835 1353*

THIS game, set in an American high school, stars an all-American schoolboy Mikie who is trying desperately to get a message to his sweetheart. You have just volunteered to help him.

The first screen provides an aerial view of a classroom. There are nine desks with pupils sat at each one, and beneath five of their stools are little red hearts. As you collect each one they change into letters to form a message to his girlfriend.

When you collect the fifth heart the classroom door opens allowing you on to the next level.

Collecting the hearts isn't quite as easy as it could be as your fellow pupils won't stand up to let you at them so you have to bump them off their seats using your

hip-zap technique.

On top of this you receive a great deal of hassle from the teacher who doesn't like you disturbing the class. If things begin to get too hairy you can always find yourself a vacant stool and sit down for a while – but not for too long, otherwise the teacher's false teeth will fly towards you.

Having escaped the classroom you must negotiate the hallway to reach the next room. The hall is patrolled by a teacher and a mad janitor, so nimble footwork is required.

Screen two is set in the locker room with several lockers containing three hearts. You stand in front of the locker and press the "shout" key three times to release the hearts. This time you are being chased by the teacher, janitor and chef.

The same sort of thing is repeated in the canteen, gymnasium and schoolyard.

I found survival has a high random factor. Sometimes the teacher will plod around in a corner and you sail through



the screen. On other occasions he will be hot on your heels and you will lose all three lives on the first screen.

The graphics are crude and the animation not much better. Mikie was never destined to be a blockbuster, but a little more care on the graphics side would have been greatly appreciated.

Jon Revis

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

A classic from Robico

Program: *Myorem (Rick Hanson 3)*

Price: £9.95

Supplier: *Robico, 3 Fairland Close, Llanstrisant, Mid Glamorgan CF7 8QH. Tel: 0443 227354*

DURING the past 15 months Wheel of Fortune, Woodbury End and Rick Hanson have been battling it out for the honour of being the number one adventure program available for the Electron. Now there is a new pretender to that crown.

You begin the adventure in the now familiar role of super spy Rick Hanson and in a strange predicament: "Gazing around, you see that you are in the south-east corner of a large dusty arena, bound to a sturdy post by thick ropes. "Smooth stone walls, ancient and yellowing, surround you, reflecting the sunlight into your eyes. You are choked by the gag pushed into your mouth minutes before. You can say nothing. You can do nothing. You only have your thoughts".

You can't move, shout, twitch or even smoke a last cigarette – all you can do is think. That is the crux of your success or

failure. "You close your eyes and the memories come streaming back to you ... your mission to lead a coup against a South American junta ... that abhorrent prison ... your evasion of the soldiers and eventually your leap for cover into the gaping blackness of the ditch."

The atmosphere created by these memories is such that it will transport you into Rick's psyche. I won't give away any more of the plot as Robico is offering a £100 cash prize to the first person to complete this adventure. So if you want that prize you will have to earn it.

The program accepts multiple statements such as: "Get all the pens except the red one and write with the black one." This is a welcome relief from the all too common "Get pen" maximum allowed by most adventures.

As with all Robico adventures, Myorem is packaged in a professional manner with full game details, an Adventure's Notebook, and an envelope for obtaining limited hints from Robico for the less intrepid adventurer.

Myorem is definitely the best text adventure I have yet seen for the Electron. Its evocative descriptions and



superb plot must make it a classic addition to any discerning collection – and you don't need to have played its predecessors to enjoy its richness.

Buy it – you won't find better.

Pendragon

Presentation	10
Atmosphere	10
Frustration Factor	9
Value for money	9
Overall	10

Not currying favour

Program: *Vindaloo*

Price: £7.95

Supplier: Tynesoft, Addison Industrial Estate, Blaydon, Tyne and Wear NE21 4TE. Tel: 091-414 4611

HOW on earth can you make a game out of a curry? The clue lies in the last three letters of the title, and your aim is to become "flushed" with success.

The storyline concerns Raj, who runs an Indian take-away, but has eaten one curry too many and is now in urgent need of relief. The vital facility he requires is deep in the cellar under the shop and your job is to guide him to it.

Finding the route is not too difficult. You start at the top of each screen and work your way to the bottom. Your controls are just left and right – you fall from one floor to the next.

To make the journey you have to cross bridges which vanish quickly and, in some cases, unpredictably. You also have

to cope with lifts. You can fall on to them while they are moving downwards, but you will lose a life if you fall on to a lift which is rising to meet you.

Apart from having to judge the moving platforms, you have to steer Raj through collections of animals that bounce up and down on elastic threads. Fortunately they move in a well-ordered manner and you soon learn how to avoid them.

If you load the game but don't start playing it straight away you'll get a display of each of the 20 rooms in turn. It is well worth the time looking through all of the screens so that you can learn the hazards before you are plunged into them.

You will also be able to enjoy the good quality scenery, the pleasing plinky-plonk sounds and the humour in the room names.

Vindaloo is a nice idea and most of the programming is good, but playing it proved something of a disappointment.

It could be that Raj, who looks like an



Egyptian mummy with a rucksack, flickers horribly, or it could be that the dissolving pathways just have me beat. Or perhaps it is that the whole game is too slow – Raj moves at the right speed, but you have to spend too long waiting for the bridges, lifts or elasticated animals to be in the correct places. Whatever it is, Tynesoft's Vindaloo is not for me.

Rog Frost

Sound	7
Graphics	7
Playability	4
Value for money	3
Overall	5

Why talk when you can fire?

Program: *Psycastris*

Price: £7.95

Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Station Road, Theale, Berks RG7 4AA. Tel: 0734 303663

YES folks it's time once again for some good old zap and blast. Why communicate with alien life forms when you can incinerate them? The alien command bases are located on land, at sea, on the moon and in space. Your task is to decimate all four.

Play is limited to a narrow window in

the middle of the screen, best described as Zaxxon viewed from directly above the ship. This provides you with a bird's eye view of the buildings and weapons which constitute the enemy base.

Your ship, always positioned mid-screen, is allowed to move from side to side in order to avoid buildings. The screen scrolls continuously from right to left or vice versa, depending on which way you are facing. Scenery and enemy forces are drawn using good detail and are animated faultlessly.

You begin your attack from the left of the command base, flying at ground level dodging to each side, shooting tanks and ammo dumps.

If you haven't destroyed everything by the time you reach the right of the base your ship flips over automatically and you return to destroy the remaining defences.

The enemy is present in the form of numerous fast moving UFOs which come screaming in trying to ram or shoot you down. Owing to their high speed you cannot wait to see the whites of their eyes before firing. Adopt the age old technique of continual rapid firing whether the enemy are on the screen or not.

While on the subject of the enemy



craft, do watch out for the tail gunner. On several occasions I nipped into an alien's slipstream only to receive a laser salvo from its rear end.

An annoying feature is that when your ship is destroyed you are returned to the start and all the enemy tanks and ammo dumps are replaced.

This means that the only way you are going to reach screen two is to wipe out the enemy using a single ship. There is no way you are going to achieve this in your first few minutes: The aliens come thick and fast, and their aim is deadly.

Psycastris is a very good arcade game let down by rather difficult play.

James Riddell

Sound	6
Graphics	9
Playability	7
Value for money	8
Overall	8

We are looking for TWO top quality writers. If you are aged 18 or over, own a printer, and would like to review Electron software, please send a sample 400 word review together with a brief CV to: The Reviews Editor, Electron User, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. The successful applicants will be paid at the standard contributors' rate, and will be allowed to keep the software.

A matter of appearance

AS they've pounded away at their Electron's keyboard, keen and eager readers may have noticed the difference between:

```
PRINT "a"
```

and:

```
PRINT 1
```

(besides the fact that one is used to display a string while the other is a number). It's all to do with the screen's appearance. While letters and messages are printed at the left edge of the screen, numbers are treated differently — they're shown inset from the left. The rule is that the rightmost figure of the number, the units column if you like, is 10 character spaces in from the left. This means that:

```
PRINT 123
PRINT 12
PRINT 1
```

will have the 3, 2 and 1 all lined up under each other, ten spaces in from the left of the screen as like this:

```
123
 12
  1
```

When you switch on, your 40 column display is divided into four fields, each of 10 characters. Strings are printed aligned to the left of the display field, numbers to the right. This will be made clearer if you enter:

```
PRINT 1,2,3,4
PRINT "one","two","three","four"
```

From these lines you'll see that PRINT can have one or more items after it, separated by commas. These lists of things after the PRINT are known, logically, as the print list. And you don't have to have commas, there can be spaces, semi-colons or even apostrophes. And each acts differently. See if you can figure out the rules from the results of:

```
PRINT 1,2,3
PRINT 1;2;3
PRINT 1;2;3;
PRINT 1 2 3
PRINT 1'2'3
PRINT !
PRINT
PRINT "a" "b" "c"
PRINT "a","b","c"
PRINT "a"'"b"'c"
PRINT "a"'"b"'c"
```

To summarise, a comma separates the print list into the screen fields, a semicolon "glues" them together, while an apostrophe starts on a new line for each item.

Don't worry too much about the different fields at the moment, as you need them they'll make more sense.

BACK TO BASICS

TREVOR ROBERTS
does some more
down-to-earth talking

Let your micro show you

A good question is what if an item in a print list exceeds 10 characters in length? Try it and see with:

```
PRINT "abcdefghijk1"
PRINT "abcdefghijk1","abcdef",3
```

We've seen that PRINT can be used in two ways, to display messages and do sums. Can we have it working in both ways at once? Again the micro is willing to answer your question in response to:

```
PRINT 1+2,"a sum"
PRINT "a string" number
```

As a basic Basic rule, if you want to know "what happens if..." try it out on your micro. You won't learn Basic just by reading about it, you'll have to try it for yourself.

You'll find that your micro makes a first class "teacher", immediately reacting to any nonsense you've sent it. Mind you, it's lacking a little in tact. Notice that in the first case:

```
PRINT 1+2,"is a sum"
```

had the 3 next to the i of is. In this case it's obvious and easily remedied with:

```
PRINT 1+2," is a sum"
```

but it can lead to problems when using print lists such as:

```
PRINT 2+4,"111"
```

where the two pieces of output join together on screen. By now you should be able to distinguish between:

```
PRINT "3+4"
```

and:

```
PRINT 3+4
```

and be able to get the micro to tell lies with lines like:

```
PRINT "1+1=",3
```

No such variable

You know that entering:

```
PRINT "a"
```

and pressing the Return key produces an a on the screen while:

```
PRINT 3
```

will produce the number 3. Also, PRINT can be used for displaying strings and doing sums with numbers (in the case of PRINT 3 there were no other numbers so 3 was the result). Now try:

```
PRINT a
```

and see what you get. You get an error message – in this case:

No such variable

This is as it should be, as a is neither a number nor a string (which has to be enclosed in quotes). But why that particular message? What's a variable?

**Don't forget
the Return
key!**



Various variable uses

Once you've created a variable with a LET you can use it just as though it was a number. After making sure that you've created the variable with:

```
LET a=5
```

(technically known as an assignment statement) you can use it in sums as the lines:

```
PRINT a+3
```

```
PRINT 2*a
```

```
PRINT a+a
```

show. And you're not just stuck with one variable. Set up another with:

```
LET b=12
```

and see it in action with:

```
PRINT b*b
```

```
PRINT a*b
```

```
PRINT a+b
```

Try making up your own variables, LETting them have the values of your choice. And if the screen gets untidy wipe it clean with a quick CLS. Notice, however, that CLS only clears the screen, it doesn't do anything else to the micro. The variable a is still there as a quick:

```
PRINT a
```

will show.

That's all for this month. Next time we'll find out how usefully variables can vary.

Let such variables be

To show what a variable is we have to learn another Basic keyword, LET. Try entering:

```
LET a=5
```

and see what happens. From the looks of things nothing, but don't let appearances fool you (no pun intended). Below the surface of the micro, the operating system is beavering away all the time and when it comes across the command LET it leaps into action. Just what it does is shown by getting the micro to:

```
PRINT a
```

when, magically, 5 appears.

The LET statement has arranged things so that the letter a now stands for 5. That's why there's no nasty:

No such variable

message when you:

```
PRINT a
```

this time. It's because the LET has created a variable named a. When the Electron comes across the a, it knows that it's not a string (no quotes), it's certainly not a number, so it must be a variable. It then looks up an internal list of all the variables, if any, that have been created by LETs to see what value a should have. If it can't find one it tells you, quite rightly, that it's never heard of it.

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Odd Man Out
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HANGMAN

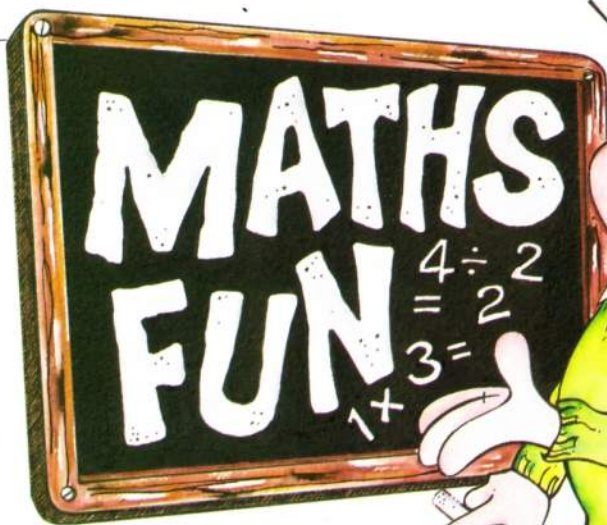
Improve your child's spelling with this fun version of the popular game



ODD MAN OUT

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

TO ORDER TURN TO THE FORM ON PAGE 53



By TIM PARFITT

MATHS FUN is a short and simple program to test youngsters' mental arithmetic.

There is a choice of four types of question, addition, subtraction, multiplication and division.

There are also four levels of difficulty ranging from very easy to quite hard, so you should be able to find a level to suit most children.

There are 10 questions to answer and you are allowed three attempts at

each. If you answer correctly first time you are awarded 10 points.

Six points are awarded for a correct answer on the second attempt and two for the third.

If you don't know the answer you'll be told after three attempts.

After answering all 10 questions you'll be informed of your percentage score for the test.

You can abandon a test at any time and return to

the main menu by pressing Escape. You can then select a different class of question.

Full listing starts on Page 22



VARIABLES

type\$	Multiplication, addition, subtraction or division.
level	Skill level - 1 to 4.
question	Loop counter for 10 questions.
points	Points awarded for each answer.
score	Total score so far.
question\$	The question.
num1	First number of question.
num2	Second number of question.
ans	Correct answer.
answer\$	Inputted answer.

PROCEDURES

instr	Prints instructions.
double (word\$,x,y)	Prints word\$ in double height at x,y.
space (x,y,col)	Waits for spacebar to be pressed.
error	Reruns game if Escape has been pressed, or prints error message.
levels	Gets level and type of question.
questions	Prints questions and checks answers, prints current score.
numbers	Sets numbers for questions.

From Page 21

```

10 REM Maths Fun
20 REM by Tim Parfitt
30 REM (c) Electron User
40 ON ERROR MODE%:PROCERR
FOR:END
50 *FX16
60 MODE 1:PROCINSTR
70 REPEAT
80 PROCLEVELS
90 PROCQUESTIONS
100 UNTIL FALSE
110 END
120 :
130 DEF PROCINSTR
140 CLS
150 VDU 23,1,0;0;0;0;23,2
26,0,0,0,127,0,0,0,23,227
,0,34,20,0,20,34,0,0
160 PROCTITLE
170 VDU 19,3,4;0;COLOUR 3
180 PRINT "This is a
the game designed for diff-
erent ages. There are four
skill levels" "With lev-
el one being the easiest and
4 "level four the hardest
t. In each level"
190 PRINT "you can choose
between multiplication,"
"division, addition and sub-
traction." "When answerin-
g the questions you will"
"be given three tries. If y-
ou answer"
200 PRINT "correctly the
first time you will be""a-
warded ten points. If you a-
nswer""correctly the seco-
nd time you will be""awar-
ded six points."
210 PROCSPACE(6,30,1);CLS
220 PROCTITLE : COLOUR 3
230 PRINT "If you answer
correctly the third time"
"you will be awarded two p-
oints. If you""do not get
the right answer the corre-
ct""result will be displa-
yed. You will be"
240 PRINT "asked ten ques-
tions and your score out""
of one hundred will be disp-
layed at the""end."
250 PRINT "To re-run this
s game just press Escape."
260 COLOUR 1:PRINT "" Pr

```

```

ess S for sound or Q for qu-
iet":REPEAT K1=GET AND &OF
:UNTIL K1=83 OR K1=81:IF K1
=81 THEN OSCIL1*FX210,0"
E OSCIL1*FX210,0"
270 ENDPROC
280 DEF PROCDOUBLE(word$,
x,y)
290 AX=10 : X1=X*70 : Y1=Y*
300 FOR I1=1 TO LEN word$
310 SOUND 1,-15,ASC(MID$(
word$,I1,1))-20,2
320 *%70=ASC(MID$(word$,I
X,1))
330 CALLAFF1
340 VDU 23,224,7&71,7&71,7
&72,7&72,7&73,7&73,7&74,7&7
4,23,225,7&75,7&75,7&76,7&7
6,7&77,7&77,7&78,7&78
350 PRINTTAB(X1,Y1);CHR$
224;TAB(X1+Y1);CHR$225
360 NEXT:ENDPROC
370 DEF PROCSPACE(x,y,col
): *FX21
380 COLOUR col : PRINTTAB(
x,y)"Press Space to continu-
e..." : REPEAT UNTIL GET=32
:SOUND 1,-15,50,2 : ENDPROC
390 DEF TITLEPROC
400 COLOUR 2:PROCDOUBLE("
+""CHR$(226)+CHR$(227)+"" MATHS
FUN ""CHR$(227)+CHR$(226)+""
,9,1)
410 COLOUR 1:PRINT TAB(12,
3)"By Tim Parfitt"
420 ENDPROC
430 DEF PROCERR
440 IF ERR=1 THEN RUN EL
SE PRINT "REPORT: PRINT "
at line ";ERL
450 ENDPROC
460 DEF PROCLEVELS
470 TYPE=0 : TYPE$="" : LEV
EL=0 : LEVEL$=""
480 VDU 26 : CLS:PROCTITLE
490 COLOUR 3:PRINTTAB(2,6
)"Which type?"
500 COLOUR 1:PRINT "SPC(6
)"1.....multiplication":PR
INT "SPC(6)"2.....division"
:PRINT "SPC(6)"3.....additio-
n":PRINT "SPC(6)"4.....subtr-
action."
510 REPEAT :TYPE$=GET$:UN
TIL INSTR("1234",TYPE$)
520 SOUND 1,-15,100,2
530 IF TYPE$="1" THEN typ

```

```

e$="Multiplication" : type=1
540 IF TYPE$="2" THEN typ
e$="Division" : type=2
550 IF TYPE$="3" THEN typ
e$="Addition" : type=3
560 IF TYPE$="4" THEN typ
e$="Subtraction" : type=4
570 COLOUR 3:PRINTTAB(2,1
8)"Enter level ( 1 - 4 ).."
580 REPEAT :LEVEL$=GET$:U
NTIL INSTR("1234",LEVEL$) :
LEVEL$=VAL(LEVEL$)
590 SOUND 1,-15,100,2
600 SOUND 2:PRINT TAB(2,
21)"LEVEL ";LEVEL$;TAB(2,23
);TYPE$
610 COLOUR 1:PRINTTAB(3,2
6)"Is this correct ( Y/N )
?"
620 IF GET$="Y" THEN SOUND
D 1,-15,75,2 : ENDPROC ELSE
630 480
640 DEF PROCQUESTIONS
650 SCORE=0
660 CLS:COLOUR 3:PROCDOUB
LE("LEVEL ""LEVEL$""", *typ
e$""",4,1)
670 VDU 28,0,30,39,6
680 FOR question=1 TO 10
690 COLOUR 1 : PROCDOUBLE(
"Total score = ""STR$(score
),1,0)
690 PROCNUMBERS
700 COLOUR 1 : PROCDOUBLE(
STR$(question)+""",1,6)
710 COLOUR 2 : PROCDOUBLE(
question$,6,6)
720 points=10
730 PRINTTAB(LEN(question
$)+6,6);SPC(3);CHR$(10);STR
ING$(3,CHR$(8));SPC(3)
740 COLOUR 3 : answer$=""
:REPEAT :GET$=GET$ : answer$=a
nswer$+GET$
750 PROCDOUBLE(6$,LEN(que
stion$)+6+LEN(answer$),6)
760 UNTIL LEN(answer$)=LE
N(STR$(ans))
770 SOUND 1,-15,75,2
780 IF answer$=STR$(ans)
THEN COLOUR 2 : SOUND 1,-15,
150,5:PRINT ""CORRECT",
you score : *points: score
=score+points : 60T0820
790 IF answer$(STR$(ans))
THEN COLOUR 3 : SOUND 1,-15
,20,5 : PRINT ""WRONG" :
points=points-4

```

```

800 IF points =2 OR point
s=6 GOTO 730
810 COLOUR 2 : PRINT ""Th-
e correct answer is ""ans
820 PROCSPACE(6,20,2) : CL
S : NEXT
830 CLS : COLOUR 2 : PROCDOUB
LE("You scored "" + STR$(s-
core)"" out of 100.",1,2)
840 COLOUR 1 : PRINT TAB(6
,20)"Press Space to play ag-
ain.."
850 REPEAT UNTIL GET=32
860 SOUND 1,-15,100,2
870 ENDPROC
880 DEF PROCNUMBERS
890 question$=""
900 ON type GOTO 920,960,
1000,1040
910 REM multiplication
920 num1=RND(5)*level:n
um2=RND(5)*level : ans=num
1*num2
930 question$=STR$(num1)+
"" +CHR$(227)+"" +STR$(num2)+
"" =
940 ENDPROC
950 REM division
960 num2=RND(5)*level:n
um1=num2*(RND(5)*level) : an
s=num1/num2
970 question$=STR$(num1)+
"" +CHR$(226)+"" +STR$(num2)+
"" =
980 ENDPROC
990 REM addition
1000 IF type=3 THEN num1=(
level+4)*2+5:num1=num1-RND(
num1) : num2=(level+4)*2+5:n
um2=num2-RND(num2) : ans=num
1+num2
1010 question$=STR$(num1)+
"" + ""STR$(num2)+"" =
1020 ENDPROC
1030 REM subtraction
1040 IF type=4 THEN num1=(
level+3)*2+10 : num1=num1-RN
D(num1) : num2=num1-RND(num1
) : ans=num1-num2
1050 question$=STR$(num1)+
"" - ""STR$(num2)+"" =
1060 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 50.

Mistake at line 100

No such variable at line 324

Bad MODE at line 210

REMs can help pin down some listing puzzles

I'VE already had some very nice letters from people who have benefited from the debugging tips we've looked at so far.

One delighted young man said that he'd given up the ghost on eight of his listings but has since managed to resurrect every single one, all thanks to my simple hints.

I was quite chuffed and it encouraged me to look for additional ways to help you with any listing problems you may still have.

In the August issue of *Electron User* we looked at methods of moving progressively through your program using the STOP command to narrow down the location of a typing error.

There are a couple more similar ideas that you could use in circumstances where you don't want the "STOP at line" message printed on the screen.

The command END inserted in the same way as STOP will result in only the > prompt appearing to the screen.

If you want to avoid any message at all the method to use is to insert a dummy line in the form:

```
20 GOTO 20
```

This literally suspends the program at line 20 until you

press Escape, assuming the Escape key has not been disabled with a *FX229 or *FX200 or used in an ON ERROR trap. Check the listing again if the Escape key has no effect.

I used this hint recently to find a well hidden mistake in a simple maze game my young son had been trying to write.

If I take you briefly through the procedure it may help if you encounter similar problems.

Once the screen had initialised, but before the actual game got under way,

the maze scrolled up one character, and the resulting screen display was just about recognisable, but rubbish.

From a quick read through his listing the appropriate procedure appeared to be typed in correctly - I mentioned last month the advantage of being able to read through any part of a listing and know what was going on.

Here I didn't have to read through the whole program because I was able to find the procedure that he used to initialise the screen. It was in the listing between lines 900 and 980.

I first tried the STOP idea that I showed you. This, of course, printed the "STOP at line ..." message and scrolled the screen anyway, so it didn't help in this case.

The way I found the bug was to type in the dummy line:

```
985 GOTO 985
```

and check to see if the offending scroll had occurred. It hadn't, so I deleted line 905 and replaced it with:

```
915 GOTO 915
```

and so on until I had just used:

```
945 GOTO 945
```

and knew that this was just

after the instant that the screen scrolled.

I re-checked by putting in the dummy line again just before - in line 935 - to make sure.

To cut a long story short I then listed what appeared to be the offending line and found in fact two lines, 930 and 940, joined together as one.

How could this happen? Very easily when you are using the Copy key for editing. I'm sure you know what I mean, but I'll show you an example. If:

LIST 20

results in the following being displayed:

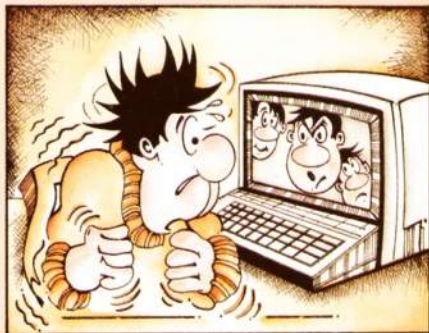
```
20 MODE 1: PROCIntri:  
PROCIntri: PROCvar  
30 PRINT "Al's Game"
```

line 30 must have been copied on to the end of line 20, otherwise it could not be seen on screen with the command LIST 20.

This won't happen often, but it's happened to me more than once and, in the way of things I've no doubt it will turn up again. It's certainly worth bearing in mind.

Another useful hint for finding an error without destroying any part of your program is to REM the particular line that you think is causing the trouble.

As you should know by now, anything following a REM statement (short for REMark, or REMinder if you like) is ignored by the program. (Sometimes when I'm talking



"...the maze scrolled up one character, and the resulting screen display was just about recognisable, but rubbish".

From Page 23

to the kids I get the feeling that everything I say begins with a REM.)

So inserting a REM at the start of a line results in all the commands in that line being ignored.

You could achieve the same effect by deleting the line completely, but by using REM you still have the line intact on-screen.

Returning things to the original state is simply a matter of deleting the REM rather than typing in the line again.

You can insert the REM in any part of the line after a colon. You can even bypass a whole procedure by REMing the line which contains the PROC. This is a useful way of avoiding screens of instructions at the start of a game.

But be careful that no variables are set up in the routine, or you'll get some annoying results.

You can, of course, use a REM to negate the effects of disabling the Escape key, as mentioned earlier.

Sometimes you get strange results on the screen, but because things happen so fast it's often difficult to establish exactly where in the program a certain action is taking place.

For example, in another of my young son's programs I recently looked at there were all sorts of weird shapes dotted about the screen. None resembled the shapes that should have been there.

In order to solve this apparent disaster it was



"Sometimes when I'm talking to the kids I get the feeling that everything I say begins with a REM".

necessary to pinpoint when these "things" were being put on screen.

Finding this exact moment can be a bit hit and miss, even using the STOP hint we've discussed.

The following routine should narrow down the areas of trouble by putting control of the whole screen display literally under your finger tips, a frame at a time.

It's very important that you follow these steps exactly or else you're going to have even weirder results than the ones you had in the first place.

Make sure that the Escape key gets you out of the program and that your listing is numbered in 10s, even if you have to renumber it yourself.

You achieve this by typing in the command RENUM. Now type in the following in direct mode, in other words

without a line number:

```
*KEY1AA=GETIM
```

This line sets up function key 1 with the command AA=GET, which is used to make the program wait for any key to be pressed before it continues.

Next type in:

```
AUTO 5
```

and when the line number 5 is displayed keep your finger on f0. You will see the AA=GET line being automatically entered in every alternate line of the program, those ending in the number 5.

Continue until you reach a line number higher than the final one of your original program. At this point in the proceedings if you list the program you will see every alternate line containing the new instruction.

Now run the program, and providing you have done everything right, you should be able to single step through the program at your own speed and watch for something on the screen that you want to trap.

As soon as you see it pressing Escape will jump out of the program at a line number very close to your mistake. It can't be the exact line number of course because you will always stop at a line ending in a 5.

While this routine may not pinpoint the error exactly, at least it will stop you in the procedure that is causing the problem.

When you've finished, removing the odd line num-

bers is a simple matter. Just type:

```
AUTO 5
```

and keep your finger on the Return key until you have entered blank lines in all those odd number lines ending in a 5.

Well I think you've had enough practical tips to be going on with but I'll end with a word of warning.

Armed with your newfound knowledge, there may be a great temptation to burn the midnight oil hammering away trying to find that "one last bug".

This is great if things work out well, but not so great if you're having a rough time. The programmer's bible states: "In every program there is always one more bug".

You want to hear our editor after a late night de-bugging session: "Got that darn program working at last lads. Took me till 3 this morning, but I finally cracked it", he mumbles, propping eyelids open with two matchsticks.

"Super", thinks I, "but we know we're going to pay for it later in the day when he's shattered".

Don't do it unless you are really under pressure. Give yourself a break. Make a cuppa, throw stones at next door's dog or get another program out and tinker with that for a bit.

But don't be too insistent on finishing it all in one session.

Programming is fun and the results can be very rewarding.

Let's try and keep it that way. See you soon.



"Armed with your new found knowledge, there may be a great temptation to burn the midnight oil".



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If you have ever been in the middle of editing a line with the Copy key and the line you were on has just scrolled off the screen, or if you have ever wanted to be able to list backwards through a program, then BOS (Basic On Screen editor) is your answer.

BOS is a full on-screen editor, allowing you to scroll backwards and forwards through a program looking for the line you want to edit.

When you reach it you can move the cursor, inserting and deleting at will, while the rest of the line shunts backwards and forwards, automatically keeping step with you.

If BOS is present in your Electron — it will co-exist with most lengths of Basic programs — typing *LINE followed by a line number enters the editor with the specified line displayed on screen ready for editing.

If you just type *LINE with no following number BOS will default to the first line of your program.

If you supply a non-existent line number as the parameter BOS searches for the next smallest number or defaults to the first line of the program — for example, if the first line number is 100 and you type *LINE 2, BOS will place you at line 100.

How is it done? Well the program has to co-exist with a Basic program without interfering with it in any way. To achieve this on Electrons with the Plus 1 or Plus 3 fitted I have used locations &900-&CFF.

The only side effects of this are the loss of function keys and user-defined characters.

On tape-based machines I have used the first four pages of the Basic program area &E00-&1200, as pages &900 and &A00 are used as the cassette input/output buffers.

BOS uses several Basic rom routines shown in Table I where possible to save space.

The only notable exception to this is scanning backwards

through a Basic program when the up arrow is pressed, looking for the preceding line.

This is more difficult than it first seems because, contrary to my first assumption, you can't simply go backwards and stop at the first carriage return character (&OD) you come to, assuming it marks the start of the preceding line, because both the high and low bytes of the line number and the line length byte can be &OD.

To overcome this problem I first used the Basic rom routine for finding a line by setting up a non-existent ever-decrementing line number, and testing it with this routine until an existing one was stumbled across.

Needless to say the further away from PAGE the current line happened to be at the time the more sluggish this method became.

So I eventually decided to write my own routine, which searches from PAGE forwards until it finds the line directly before the current line. This brought me precariously close to the end of my available memory.

Another meaty problem was discovered when I first attempted to copy a line from

a Basic program into a buffer for editing.

I soon found that there is no rom routine for de-tokenising a line. The only similar routine is one that prints A as a character or token, but only on the screen.

I managed to use this routine by revectoring OSWRCH to point to my editing buffer instead of the screen, and then replace the old vector afterwards.

Although long-winded it is the only solution I have to date. Improvements will be gratefully accepted.

The third main problem was memory space. There are only four mostly unused pages available to disc-based Electrons, &900-&CFF, and none in tape-based machines.

By deciding that tape users would have to set PAGE to &1200 for editing with BOS and therefore lose 1k, and by drastically cutting down on-screen messages, the program was shortened to 990 bytes.

The program also had to be flexible enough to permit users to access the Electron's own editing facilities as well, so I implemented *LINE line number to enter BOS at the desired line, and Escape to

re-enter Basic.

The program assembles the code from &900 to &D00 — &E00 to &1200 on tape based machines — and saves the object code as BOS.

To load the editor at any time type *RUN BOS and you are ready to load in and edit your Basic programs.

Unfortunately BOS cannot reside in the same area on tape-based Electron's as this is the cassette input/output buffer, and would result in BOS being corrupted upon the next load or save.

Therefore the first thing to prompt the program does is to prompt you with the question "Disc or cassette?".

If the answer to this is C for cassette it assembles the code from &E00 to &1200, the program having already relocated itself to &1200 to allow for this.

It then saves the code to tape as BOS, with a load address of &E00 and an end address of &11FF. This means that you must have PAGE set to &1200 or higher if you are using tapes while editing your Basic programs with BOS.

Operation is the same for both disc and tape versions. Once BOS has been *RUN, the screen changes to Mode 6 and the message OK appears at the top of the screen. BOS is now ready to use.

To edit a Basic line type *LINE. BOS will then clear the screen and print the requested line in the centre of the screen between two horizontal borders, with the line number separate and above the first border. Table II contains a

Put the BOS in charge of your programs

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getina	Get tokenised line number at PTR.	&97DF
ptoken	Print A as character or token.	&B50E
plnum0	Print line number in INTA (no spaces).	&991F
plnum5	Print line number in A (field width 5).	&9823
cston	Convert string to a number.	&AC34
schlin	Search for a Basic line.	&9970
inslin	Insert tokenised line in Basic program.	&8C8D
tlne0	Tokenise line (all line numbers).	&8951

Table I: Basic rom routines and entry points used by BOS

complete list of the control keys for editing.

The only drawbacks with BOS are that only one Basic line is visible on-screen at a time and new lines cannot be created from within BOS.

For these reasons it is best to use BOS mainly as a debugging tool. So when you are presented with an error just jump into BOS at the line

in question. Then you can quickly correct, enter it and exit back to Basic to carry on.

Finally remember to save the program before running it for the usual reasons — corrupted programs, bruised keyboards and smashed key-boards.

I hope you enjoy this new addition to your repertoire of *Electron User* utilities. ■

Left arrow: Moves the cursor one character to the left through the line.
Right arrow: Moves the cursor one character to the right through the line.
Up arrow: Moves one line backwards through the Basic program.
Down arrow: Moves one line forwards through the Basic program.
Delete: Deletes the character at cursor position and shunts all following text one character to the left.
Return: Re-enters current line into the Basic program.
Any other key: Inserts character at cursor position and shunts all following text one character to the right.

Table II: Control keys

10 REM BOS Editor	430 STA %200	890 .mainloop	1380 JSR %FF00
20 REM By Chris Nixon	440 LDA %B0S DIV 256	900 JSR edit	1390 BCC notescape
30 REM (c) Electron User	450 STA %201	910 JMP mainloop	1400 .escape
40 IF PAGE%411FF GOT080	460 LDA %ess3 MOD 256	920 .screen	1410 LDA %126:JSR %FFF4
50 %KEYB FOR%1=TOP TO PA	470 STA %50	930 LDA %ess1 MOD 256	1420 LDA%4:LDX%0:JSR%FFF4
60 STEP-1:7(%1200+X1-PAGE)=	480 LDA %ess3 DIV 256	940 STA %50	1430 BRK
7%1:NEXT:PA=%1200:MOLD:MRU	490 STA %51	950 LDA %ess1 DIV 256	1440 EQUB 17
NIM	500 JSR message	960 STA %51	1450 EQUB 22
60 %F138,0,128	510 JMP escape	970 JSR message	1460 EQUB 6
70 END	520 .BOS	980 LDY %9:JSR border	1470 EQUB "Ok"
80 MODE 6	530 CMP %1:BQ% bos	990 LDY %17:JSR border	1480 EQUB 0
90 linenum=%70	540 JMP (%230)	1000 LDA %ess2 MOD 256	1490 .notescape
100 key=%72:char=%73	550 .bos	1010 STA %50	1500 STA key
110 ptr=%74:len=%75	560 STX line:STY line+1	1020 LDA %ess2 DIV 256	1510 CMP %136
120 xpos=%76:ypos=%77	570 LDA %0:TAY:STA page	1030 STA %51	1520 BCC notcursorkeys
130 new=%78:line=%8	580 LDA %10:STA page+1	1040 JSR message	1530 JMP cursorkeys
140 temp=%52:page=%54	590 LDA (page+1),Y:BPL ok	1050 LDA %10:JMP window	1540 .notcursorkeys
150 getline=%97DF	600 RTS	1060 .message	1550 CMP %13
160 ptoken=%850E	610 .ok	1070 LDY %0	1560 BNE notreturn
170 plnum=%991F	620 LDA (line),Y:CMP %00D	1080 .messloop	1570 JMP return
180 plnum5=%9923	630 BNE loop1	1090 LDA (%50),Y	1580 .notreturn
190 cston=%AC34	640 INY:STA (line),Y:DEY	1100 CMP %42:BQ% exitmess	1590 CMP %127
200 schline=%9970	650 LDA %48:STA (line),Y	1110 JSR %FF03	1600 BNE wasinsert
210 inslin=%0C0D	660 .loop1	1120 INY	1610 JMP delete
220 tline=%08951	670 LDA (line),Y	1130 JMP messloop	1620 .wasinsert
230 PRINT"(D)isc or (C)a	680 STA %000,Y	1140 .exitmess	1630 JMP insert
ssette "?":REPEAT:0=GET AND	690 CMP %00D:BQ% convert	1150 RTS	1640 .getline
223:UNTIL0=60 OR 0=67	700 INY:JMP loop1	1160 .border	1650 JSR copyline
240 IF 0=60 STARTX=%990 E	710 .convert	1170 LDX %0:JSR tab	1660 LDA %12:JSR %FF0E
LSE STARTX=%000:TAPE	720 STY %36	1180 LDX %39	1670 JSR printline
250 PRINTCHR%6'	730 JSR cston	1190 .borderloop	1680 LDA %5:JSR window
260 FOR PASS=0 TO 2 STEP	740 JSR schlin	1200 LDA %255:JSR %FF0E	1690 LDX%23:LDY%0:JSR tab
2	750 LDA %3D:STA line	1210 DEX	1700 LDY %1
270 PX=STARTX	760 LDA %3E:STA line+1	1220 BPL borderloop	1710 LDA (line),Y
280 (OPT PASS	770 BCS notfound	1230 RTS	1720 STA linenum+1
290 SEI	780 SEC:LDA line:SBC %3:5	1240 .window	1730 STA %20
300 LDA %0C	TA line:LDA line+1:SBC %0:5	1250 PHA	1740 INY
310 STA %F4:STA %F05	TA line+1	1260 LDA %20:JSR %FF0E	1750 LDA (line),Y
320 LDA %10	790 JMP restofprog	1270 LDA %0:JSR %FF0E	1760 STA linenum
330 STA %F4:STA %F05	800 .notfound	1280 LDA %16:JSR %FF0E	1770 STA %2A
340 LDA %200	810 JSR find	1290 LDA %39:JSR %FF0E	1780 JSR plnum5
350 CMP %B0S MOD 256	820 .restofprog	1300 PLA	1790 LDA %10:JMP window
360 BNE notchanged	830 LDA %22:JSR %FF0E	1310 JMP %FF0E	1800 .copyline
370 JMP escape	840 LDA %6:JSR %FF0E	1320 .tab	1810 LDA %20E:STA %232
380 .notchanged	850 LDA %214:LDX %2:LDY %	1330 LDA %31:JSR %FF0E	1820 LDA %20F:STA %233
390 STA %230	0:JSR %FFFF4	1340 TXA:JSR %FF0E	1830 LDA %newsrch MOD256
400 LDA %201	860 JSR screen	1350 TYA:JMP %FF0E	1840 STA %20E
410 STA %231	870 LDA%4:LDX%1:JSR%FFF4	1360 .edit	
420 LDA %B0S MOD 256	880 JSR getline	1370 LDA%21:LDX%0:JSR%FFF4	

From Page 29

```

1850 LDA #newsrchr DIV256
1860 STA &20F
1870 LDA #4:STA &A
1880 LDA #0:STA len
1890 .copyloop
1900 LDY &A
1910 LDA (line),Y
1920 CMP #&0D
1930 BEQ exitcopy
1940 CMP #&0D
1950 BEQ unpack
1960 JSR ptoken
1970 INC &A
1980 JMP copyloop
1990 .unpack
2000 JSR getlna
2010 JSR plnum0
2020 JMP copyloop
2030 .exitcopy
2040 JSR &FFEE
2050 LDA &232:STA &20E
2060 LDA &233:STA &20F
2070 LDA #0
2080 STA ptr
2090 STA xpos
2100 STA ypos
2110 .newsrchr
2120 STA char
2130 PHP:TXA:PHA:TYA:PHA
2140 LDA char
2150 LDX len
2160 STA &600,X
2170 INC len
2180 PLA:TAY:PLA:TXA:PLP
2190 LDA #0:JMP (&232)
2200 .printline
2210 LDX xpos:LDY ypos:JSR
tab
2220 LDX ptr
2230 .ploop
2240 LDA &600,X:CMP #&0D
2250 BEQ exitploop
2260 JSR &FFEE
2270 INX:JMP ploop
2280 .exitploop
2290 LDA &32:JSR &FFEE
2300 LDX xpos:LDY ypos:JMP
tab
2310 .insert
2320 LDA len:CMP #253
2330 BCC okinsert
2340 JMP beep
2350 .okinsert
2360 LDX #&FE
2370 LDY #&FF
2380 .shuntup
2390 LDA &600,X:STA &600,Y

```

```

2400 DEX:DEY
2410 CPY ptr
2420 BNE shuntup
2430 LDX ptr
2440 LDA key
2450 STA &600,X
2460 INC ptr:INC len
2470 LDA key:JSR &FFEE
2480 JSR storetab
2490 JMP printline
2500 .delete
2510 LDA ptr
2520 BNE okdelete
2530 JMP beep
2540 .okdelete
2550 LDX ptr
2560 STX temp
2570 DEC temp
2580 LDY temp
2590 .shutdown
2600 LDA &600,X:STA &600,Y
2610 CMP #&0D
2620 BEQ exitdelete
2630 INX:INX
2640 JMP shutdown
2650 .exitdelete
2660 DEC ptr:DEC len
2670 LDA #0:JSR &FFEE
2680 JSR storetab
2690 JMP printline
2700 .storetab
2710 LDA #134:JSR &FFFF4
2720 STX xpos:STY ypos
2730 RTS
2740 .cursorkeys
2750 CMP #136
2760 BNE checkright
2770 LDA ptr
2780 BNE okleft
2790 JMP beep
2800 .okleft
2810 LDA #0:JSR &FFEE
2820 DEC ptr
2830 RTS
2840 .checkright
2850 CMP #137
2860 BNE checkdown
2870 LDX ptr
2880 LDA &600,X
2890 CMP #&0D
2900 BNE okright
2910 JMP beep
2920 .okright
2930 LDA #9:JSR &FFEE
2940 INC ptr
2950 RTS
2960 .checkdown
2970 CMP #138:BNE up
2980 CLC:LDY #3:LDA (line)
,Y:ADC line:STA temp:LDA li

```

```

ne+1:ADC #0:STA temp+1
2990 LDY #1
3000 LDA (temp),Y
3010 BPL okdown
3020 JMP beep
3030 .okdown
3040 LDA temp:STA line
3050 LDA temp+1:STA line+1
3060 JMP getline
3070 .up
3080 JSR find
3090 BCC doup
3100 JMP beep
3110 .doup
3120 JMP getline
3130 .find
3140 LDA line+1
3150 CMP page+1
3160 BNE okup
3170 LDA line
3180 CMP page

```

```

3510 .quitreplace
3520 LDA #0
3530 PHA
3540 TAY
3550 STA &37
3560 LDA #7
3570 STA &38
3580 JSR tline0
3590 PLA:TAY:TXA
3600 LDA linenum:STA &2A
3610 LDA linenum+1:STA &2B
3620 JSR inslin
3630 LDA#213:LDX#198:LDY#0
:JSR&FFFF4
3640 JSR beep
3650 LDA #213:LDX #100:LDY
#0:JSR &FFFF4
3660 LDA #138
3670 JMP checkdown
3680 .beep
3690 LDA #7:JMP &FFEE
3700 .mess1
3710 EQU $81110011
3720 EQU $4200091F
3730 EQU "OS EDITOR VERSI
ON 1.0"
3740 EQU $80110111
3750 EQU $2
3760 .mess2
3770 EQU $2082001F
3780 EQU "c) Electron Use
r"
3790 EQU $4C05081F
3800 EQU "line number:"
3810 EQU $4315041F
3820 EQU "SR KEYS Move:"
3830 EQU "CR Enter:ESC Qu
it"
3840 .mess3
3850 EQU &FF17
3860 EQU &FFFFFFF
3870 EQU $2A0000
3880 J
3890 NEXT
3900 OSCI ("SAVE BOS "+ST
R:"STARTX+" "+STR:"PX)
3910 PRINT"NB-If you are
using this utility to edit"
;
3920 PRINT"programs on cas
sette, PAGE must be set"
3930 PRINT"to &1200 or hig
her (e.g. PAGE=&1200)"
3940 END

```

This is one of hundreds of
programs now available
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MicroLink

```

3190 BNE okup
3200 SEC:RTS
3210 .okup
3220 LDA page:STA new
3230 LDA page+1:STA new+1
3240 .findloop
3250 LDA new:STA temp
3260 LDA new+1:STA temp+1
3270 LDY #3
3280 LDA (temp),Y
3290 CLC
3300 ADC temp
3310 STA new
3320 LDA temp+1
3330 ADC #0
3340 STA new+1
3350 LDA new:CMP line
3360 BNE findloop
3370 LDA new+1:CMP line+1
3380 BNE findloop
3390 LDA temp:STA line
3400 LDA temp+1:STA line+1
3410 CLC
3420 RTS
3430 .return
3440 LDX #0
3450 .replaceloop
3460 LDA &600,X:STA &700,X
3470 CMP #&0D
3480 BEQ quitreplace
3490 INX
3500 JMP replaceloop

```

*This listing is included in
this month's cassette
tape offer. See order
form on Page 50.*

Two shows Electron users shouldn't miss

Renold Building
UMIST
Sackville Street
Manchester

26-28
SEPTEMBER

10am-6pm, Friday September 26
10am-6pm, Saturday September 27
10am-4pm, Sunday September 28

**ELECTRON &
BBC MICRO
USER SHOW**

New Royal
Horticultural Hall
Westminster
London SW1

7-9
NOVEMBER

10am-6pm, Friday November 7
10am-6pm, Saturday November 8
10am-4pm, Sunday November 9

Now in its fourth year, this big Northern autumn show will be the showcase for the whole range of new-season products being produced for the Electron & BBC Micro.

**Cut out
your
discount
tickets
and save
50p
per head!**

Strategically timed to coincide with the peak pre-Christmas buying period, this is the premier show for everyone involved in the Electron and BBC Micro world.

**Your discount ticket
for the Manchester Show**



*Hand this voucher in at the door and save
50p off the normal admission price of
£3 adults, £2 children.*

10am-6pm, Friday September 26
10am-6pm, Saturday September 27
10am-4pm, Sunday September 28

Renold Building, UMIST,
Sackville Street, Manchester

*Valid for a maximum
of 14 people.*

**Your discount ticket
for the London Show**



*Hand this voucher in at the door and save
50p off the normal admission price of
£3 adults, £2 children.*

10am-6pm, Friday November 7
10am-6pm, Saturday November 8
10am-4pm, Sunday November 9

New Horticultural Hall,
Westminster, London SW1

*Valid for a maximum
of 14 people.*



Never before have there been such money-saving offers for readers of a computer magazine!

EXPAND your Electron

... for much, much less than the price you'd normally pay

NEW STOCKS NOW IN!

How the Plus 1 helps you make the most of your Electron

With the Plus 1, you and your Electron enter a whole new computing dimension. The Plus 1 turns your Electron into a fully fledged micro capable of using printers, joysticks and cartridge ROMs – the software that comes on a chip. In addition, the Plus 1's analogue to digital port gives access to the outside world – while the slots for the ROM cartridges allow the Electron to take advantage of the latest, most exciting hardware developments yet to be released.

If you want to use your Electron to the full, then it's essential you get a Plus 1.

Normal price

Special for readers of Electron

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Inc. Free ROM

EXPAND - with the Electron Wordprocessor

Convert your Electron into a sophisticated word processing machine. The package consists of the Viewbeam wordprocessor together with View, Acorn's custom designed word processing cartridge and the many powerful capabilities of Viewbeam. Whether you're writing a simple letter or your first novel – the Plus 1 make an unbeatable combination.

Normal price £82.80

Electron Users

EXPAND - with the Electron Workstation

Now you can transform your Electron into a serious micro Workstation. This package consists of a Plus 1 and a wordprocessor and Viewsheets spreadsheet system. The Workstation makes the Electron a hard working yet inexpensive machine. From business letters to a set of invoices, from cash flow crises, it can take them all in its stride.

Normal price £119.80

Electron Users

All prices include VAT and carriage. All offers subject to availability.

Please use the order form on page 10



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e acclaimed View
artridge ROMs. The
ensive tool for home
home economics to

er price £59.95

on Page 53

EXPAND - with the under-£100 Plus 3!

The Plus 3 expansion unit provides you with a disc drive and disc interface in one compact unit. It consists of a single sided 80 track drive and ADFS, and can store up to 320k of data on each 3 1/2 in disc with no limit to the number of files. Expansion ports at the rear of the unit enable a Plus 1 to be added and a second drive can be attached which can be either 5 1/4 in or 3 1/2 in, 40 or 80 track.

The Plus 3 comes complete with a Welcome disc packed full of games, demonstrations, utilities and help files, plus a 111 page manual containing everything you need to get you started right away.

Normal price £219.00

Electron User price £99.95

... or a Plus 3 PLUS Database!

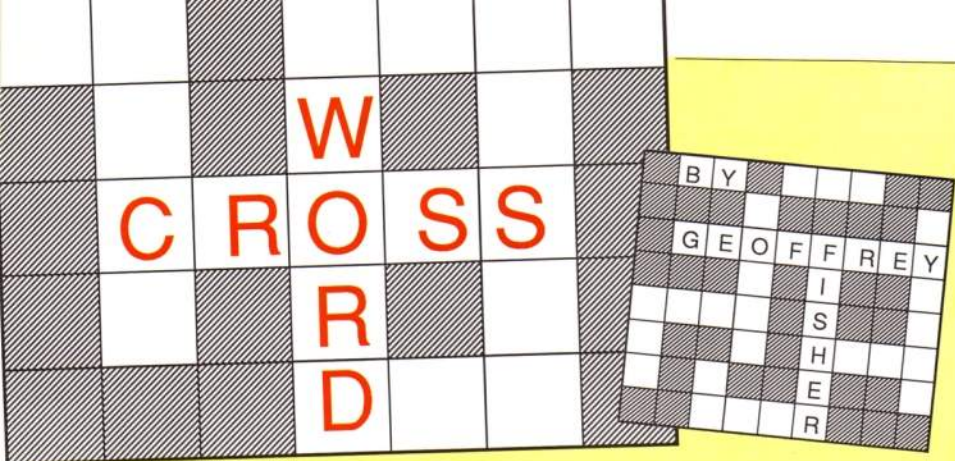
Bring the speed of discs and the organised memory of a powerful database to your Electron with the Electron Database combined with the Plus 3 disc drive, this dynamic duo should provide the answer to all your dataprocessing needs.

The database has all the facilities any normal user, home or business, would need. Yet - thanks to its menu-driven structure, it's simplicity itself to use. Records can be as varied as you require: You can have up to 32 fields ranging from 2 to over 200 characters in size. Once you've entered the records, information can be recovered with the minimum of fuss, sorting and searching over any number of fields. And when you've created your record structure you're not stuck with it: Field sizes can be changed at will. So, if you're interested in keeping records, do yourself a favour: Upgrade to the Electron Database and let your micro do the work.

Normal price £248.95

Electron User price £114.95





CROSSWORD consists of two programs, **Setter** and **Solver**. The first can be used to create a grid for a puzzle of your own design, along with suitable clues.

This can then be saved as a file and loaded into **Solver** which, as its name suggests, is an on-screen aid to working out the answers.

On entering **Setter** the first decision is whether to load a previously saved crossword file or to create a new one.

Any file loaded must have been originally created using **Setter**. Type the filename when asked and press **Return**.

The data will be loaded in similar fashion to a **Basic** program and the name must conform to the general filename rules.

To create a puzzle from scratch the first piece of

information required is the size of the crossword grid. The minimum size is two squares by two and the maximum 14 by 14, although a perfectly square grid is not compulsory.

When the prompt "Across =" appears type the number of squares equal to the grid width and after the prompt "Down =" the number of squares equal to the grid height pressing **Return** after each.

If the figures given are out of range **Return** will be ignored and you will be forced to use the **Delete** key.

When prompted "Satisfied (Y/N)" press **Y** to continue and **N** or any other character to cancel and re-enter.

A crossword grid will be drawn in accordance with the parameters and filled with filler squares. Letters are

printed both underneath and down the lefthand side of the grid but these need not concern you at the moment. We'll return to them later.

On the prompt "Build crossword now" design the grid which need not be the symmetrical design of most professional ones. The keys used are shown in Figure 1.

When **Control + F** is typed the computer counts the number of clues required both across and down.

If either of these figures is zero you will be sent, accompanied by a raspberry, to the start menu.

Another error causing a rude interruption at this point might be an isolated letter. It would be a strange crossword indeed with single letters scattered around and it would also cause havoc in the solving program.

However you are allowed to build two or more crosswords separately in the same grid. Again strange, but this time acceptable.

If the **Electron** is satisfied that both the above rules have been satisfied it will highlight the entries one by one and request a clue for each.

Any character may be typed for a clue, but there must be at least one which is not a space and no more than 114

characters in all. Press **Return** when satisfied with each clue.

Before doing so press **Control + W**, which is more important than first appears.

It is assumed that the clue just typed is one long chunk of text and that the end of a line is not to be taken as the end of a word.

After **Control + W** the line will be organised – it may be all right as it stands – so that no words are split between lines. The end of a line is now taken to be the end of a word and in the print option it will be.

If there are odd spaces in the printer output of the clues the blame probably lies in failure to press **Control + W** at the clue entry stage.

When all the clues are entered, or alternatively after a file has been loaded, a second menu is presented. It has the following four options:

- **EXIT**: The program is terminated.
- **SAVE**: Crossword information is stored on tape or disc. For this purpose a name is required to identify it, which must consist of between one and 10 characters.
- Type the name and press **Return**. The process then continues as for recording a **Basic** program.
- **PRINT**: First select whether

Key

Letters A to Z

Action

Prints that letter in the grid at the cursor position overwriting what is already there. The cursor will skip one square if it is not at the edge of the grid. Lower case letters will be changed to capitals.

Space
Cursor keys

As above except prints filler square. The cursor inverts the contents of the square in which it is present. It is made to skip one square in the direction of the cursor arrow and cannot be forced off the grid.

Control + A

After a letter is typed the cursor skips one square right if it is not already at the extreme right of the grid – default. A half arrow beside the grid always points in the skip direction.

Control + D

After a letter is typed the cursor skips one square down if it is not already at the bottom of the grid. If the direction of skip is changed the half arrow will be repositioned.

Control + F

Enter this when the design is complete.

Key

Control + F

Return

Control + R

Action

Quit this section.

Show next clue. If last, show first again.

Redo clue showing. Enter new clue as before.

Figure 1: Control keys for crossword creation

Figure 2: Control keys for check routine

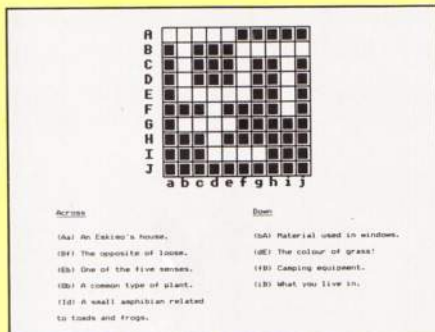


Figure IV: Sample printout created with Setter

the crossword is to be printed with the answers still in place or with only filler squares. Press Y for the latter. Ready the printer, press Return and then wait.

● **CHECK:** The three main keys available here are shown in Figure II.

Finally a note on how the clue lettering system works. Each clue is represented by a capital and a lower case letter. The capital precedes the lower

case for an across clue, and the lower case the capital for a down clue – for example, Aa or bG.

Each row and column of the crossword has been given a letter which is printed outside the grid. Rows have capitals and columns lower case letters.

Look at the first letter of the required clue's answer and note its row and column. Follow that row across to

Key	Action
Control + F	Checks whether crossword is complete.
Escape	Prints answers for baffled solver.
Cursor keys	The cursor, an open square box, is manipulated by these keys in the direction of the key's arrow. It cannot be forced off the grid.
Control + A	After a letter is typed the cursor will skip one square right if it is not already at the extreme right of the grid – default.
Control + D	After a letter is typed the cursor will skip one square down if it is not already at the bottom of the grid.
Letters A to Z	Prints that letter in the grid at the cursor position overwriting what is already there – except over filler squares where nothing happens. The cursor will skip according to Control + A/D. Small letters will be changed to capitals before entry on to the grid.
Control + cursor	Manoeuvres the down clues in the right-hand text window.
Shift + cursor	Manoeuvres the down clues in the left-hand text window.

Figure III: Control keys for Solver

obtain the capital and that column down to obtain the lower case letter. These letters label the clue.

To use Solver select a crossword saved from Setter, type its name when asked and press Return. The data will be loaded in similar fashion to a Basic program.

A grid is printed according to the parameters input and you can try out your answers by moving the cursor to the

appropriate place on the grid and then typing them in. The keys used are shown in Figure III.

The Electron does not continually check for a completed crossword, so it is important to press Control + F if you think it complete.

The correspondence of a clue to the grid is given by the clue letters. See Setter's instructions for an explanation of the clue letter system.

CROSSWORD SETTER

```

10 REM Crossword Setter
20 REM By G.Fisher
30 REM (c) Electron User
40 MODE6:ONERRRGOTO160
50 VDU19,1,2;0:DIM SSX
196:OSCL1"FX4,1"
60 PROCMenu1:IFoptX=1THE
NPROCfin ELSEPROCparamete
r:PROCgrid:PROCcompile:PROC
cluecount
70 ONERRRGOTO150
80 REPEAT:PROCMenu2
90 IFoptX=1THENPROCInfou
t
100 IFoptX=2THENPROCgrid:
PROCprint
110 IFoptX=3THENPROCgrid:
PROCllookup
120 UNTILOptX=0
130 MODE6:OSCL1"FX4"
140 PRINTTAB(0,8);"Goodby
e":END
150 OSCL1"FX3":VDU3:IFERR
=177HEN0
160 IFERR=170ERR=222THEN

```

```

SOUND0,-15,4,20:RUN
170 REPORT:PRINT" at line
";ERL:END
180 DEF PROCgrid
190 LOCALCX,RX,RZ,CX:CL
6
200 CX=639-ACROSSX*24:C2
X=639-ACROSSX*24:R1X=688-DO
WNX*22:R2X=688+DOWNX*22
210 VDU28,10,31,28,23
220 GCOL0,1:FORCX=0TOACRO
SSX:MOVECX+CX+48,R1X:DRACW
1X+CX+48,R2X:NEXT
230 FORRX=0TODOWNX:MOVEC1
X,R1X+RX*44:DRACW2X,R1X+RX*
44:NEXT
240 GCOL3,1:VDU5:FORRX=1T
ODOWNX:MOVEC1X+62,R1X+(DOWN
X-RX)*44+36:VDU6+RX:NEXT
250 FORCX=1TOACROSSX:MOVE
CX+(CX-1)*48+5,R1X-4:VDUCX
+96:NEXT
260 VDU23,159,255,255,255
,255,255,255,255,255
270 PROCBlank(32)
280 VDU4:ENDPROC
290 DEF PROCcompile

```

```

300 LOCALAX,0X,CX,RX:GCOL
3,1
310 0X=137:PRINTTAB(0,4);
"Build crossword now":CX=1
:RX=1:VDU5:GOSUB440
320 REPEAT:PROCcursor(C1X
+(CX-1)*48,R1X+(DOWNX-RX)*4
4):AX=GET
330 PROCcursor(C1X+(CX-1)
*48,R1X+(DOWNX-RX)*44):IFAX
=32THENAX=159:PROCchalkin
340 IFAX/96ANDAX/123THENA
X=AX-32
350 IFAX/64ANDAX/91THENPR
OCchalkin
360 IFAX=136ANDCX>1THENCX
=CX-1
370 IFAX=137ANDCX<ACROSSX
THENCX=CX+1
380 IFAX=138ANDRX<DOWNXTH
ENRX=RX+1
390 IFAX=139ANDRX>1THENRX
=RX-1
400 IFAX=1AND0X=138THENG0
SUB450:0X=137:GOSUB440
410 IFAX=4AND0X=137THENG0
SUB440:0X=138:GOSUB450

```

```

420 UNTILAX=6:IF0X=137THE
NGOSUB440 ELSEGOSUB450
430 VDU4:ENDPROC
440 MOVE572,R1X-48:DRAW70
8,R1X-48:DRAW664,R1X-60:RET
URN
450 MOVEC1X-78,756:DRANC1
X-78,620:DRANC1X-90,664:RET
URN
460 DEF PROCcursor(C1X,RT
X)
470 MOVECTX+5,RTX+36:VDU2
55:ENDPROC
480 DEF PROCchalkin
490 LOCALCTX,RTX:CTX=C1X+
(CX-1)*48+5:RTX=R1X+(DOWNX-
RX)*44+36
500 MOVECTX,RTX:VDU7*((RX-
1)*ACROSSX+CX-1+SSX),0,AX
510 7*(SSX+(RX-1)*ACROSSX+
CX-1):AX=AX+0X
520 ENDPROC
530 DEF PROCcluecount:LOC
ALCX,RX,KTX,CHX:CAI=0:COI=0
:CLS

```

Crossword listing

From Page 35

```

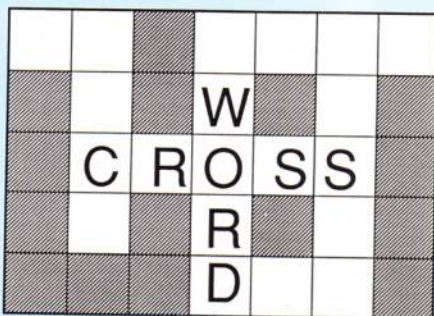
540 FORRX=1TODOWNX:KTX=0:
FORCX=1TOACROSSX:CHX=(RX-1)
+ACROSSX+CX+SSX-1
550 IF?CHX=159ANDKTX>1TH
ENCAX=CAZ+1
560 IF?CHX<>159THENKTX=KT
+1ELSEKTX=0
570 NEXT:1FKTX>1THENCAX=C
AX+1
580 NEXT
590 FORCX=1TOACROSSX:KTX=
0:FORRX=1TODOWNX:CHX=(RX-1)
+ACROSSX+CX+SSX-1
600 IF?CHX=159ANDKTX>1THE
NCDX=CDX+1
610 IF?CHX<>159THENKTX=KT
+1ELSEKTX=0
620 NEXT:1FKTX>1THENCAX=C
DX+1
630 NEXT
640 CLS:PRINT"Across clue
s "STR$(CAZ):PRINT"Down cl
ues "STR$(CDX)
650 DIM LL$(CAZ+CDX):KTX=
0:LLX=0
660 FORRX=1TODOWNX:FORCX=
1TOACROSSX:CHX=(RX-1)*ACROS
SX+CX+SSX:IFX1ntest THEN:
TX=KTX+1
670 NEXT:NEXT
680 1FKTX>0THENCLS:PRINT"
Isolated letter":SOUND0,
-15.4,10:FORKTX=1TO9000:NEX
T:=FX125
690 1FCAX=0ORCDX=0THENCLS
:PRINT"Insufficient clues":
SOUND0,-15.4,10:FORKTX=1TO
9000:NEXT:=FX125
700 PROCCLUESIN:ENDPROC
710 DEF FNtest:IF?CHX=15
9THEN=FALSE
720 1FRX=1AND?1CHX-ACROSS
X<>159THEN=FALSE
730 1FRX=1AND?1CHX-ACRO
SSX<>159THEN=FALSE
740 1FCX=1AND?1CHX-1<>15
9THEN=FALSE
750 1FCX=1AND?1CHX-1<>15
9THEN=FALSE
760 =TRUE
770 DEF PROCCLUESIN
780 LOCALCX,RX,KTX,CHX
790 FORRX=1TODOWNX:KTX=0:
FORCX=1TOACROSSX:CHX=(RX-1)
+ACROSSX+CX+SSX-1
800 IF?CHX=159ANDKTX>1THE
NCLX=CX+KTX:PROCAfill:PROCge

```

```

tclue:PROCAfill:CLX=CLX+KTX:K
TX=0
810 IF?CHX<>159THENKTX=KT
+1ELSEKTX=0
820 NEXT:1FKTX>1THENCX=CX
-KTX:PROCAfill:PROCgetclue:
PROCAfill:CLX=CLX+KTX
830 NEXT
840 FORCX=1TOACROSSX:KTX=
0:FORRX=1TODOWNX:CHX=(RX-1)
+ACROSSX+CX+SSX-1
850 IF?CHX=159ANDKTX>1THE
NRX=RX-KTX:PROCDfill:PROCge
tclue:PROCDfill:RX=RX+KTX:K
TX=0
860 IF?CHX<>159THENKTX=KT
+1ELSEKTX=0
870 NEXT:1FKTX>1THENRX=RX
-KTX:PROCDfill:PROCgetclue:
PROCDfill:RX=RX+KTX
880 NEXT
890 ENDPROC
900 DEF PROCgetclue
910 LOCALST$,AZ,WD$,IFLLX
>CAZ:THENST$=CHR$(96+CX)+CH
R$(64+RX)ELSEST$=CHR$(64+RX)
+CHR$(96+CX)
920 CLS:PRINT"Clue "ST$:
WD$=""
930 REPEAT:AZ=GET:1FAZ=12
7ANDLEN(WD$)>0THENWD$=LEFT$(
WD$,LEN(WD$)-1):VDUAZ
940 1FAZ=23THENPROCwordwr
ap
950 1FAZ=31ANDAZ<127ANDLE
N(WD$)<114THENWD$=WD$+CHR$(
AZ):VDUAZ
960 UNTILAZ=13ANDWD$<>"A
NDWD$<>STRING$(LEN(WD$)," "
):LLX=LLX+1:LL$(LLX)=ST$:RI
GHT$(ST$(KTX+100),2)+RIGHT
$(ST$(LEN(WD$)+100),3)+WD
$
970 ENDPROC
980 DEF PROCwordwrap:LOCA
LT$,ZX,TX,T$:B$=""
990 FORZX=1TOLEN(WD$):T$=
MID$(WD$,ZX,1)
1000 1FT$="" THENZX=TX+1 E
LSETX=0
1010 1FTX<2THENB$=B$+T$
1020 1FTntest(T$)THENB$=B$
+ " ":TX=1
1030 NEXT:WD$=""
1040 WD$=WD$+LEFT$(B$,19):
WD$=LEFT$(WD$,114):PRINTTAB
(0,1):WD$:1FLEN(B$)<19THE
NENDPROC
1050 B$=RIGHT$(B$,LEN(B$)-

```



```

19):1FB$=STRING$(LEN(B$),"
")THENENDPROC
1060 1FLEFT$(B$,1)= "THEN
REPEAT:B$=RIGHT$(B$,LEN(B$)
-1):UNTILLEFT$(B$,1)<>" "G
OTO1040
1070 TX=-1:REPEAT:TX=TX+1:
UNTILMID$(WD$,LEN(WD$)-TX,1
)= " "ORTX=19
1080 1FTX>0ANDTX<19THENT$=
RIGHT$(WD$,TX):WD$=LEFT$(WD
$,LEN(WD$)-TX)+STRING$(TX,"
"):B$=T$+B$
1090 GOTO1040
1100 DEF FNtest(M$):1FM$="
"!ORM$=""ORM$="?"ORM$=":"O
RM$=":"ORM$=","ORM$=","THEN
=TRUE ELSE=FALSE
1110 DEF PROClookup
1120 LOCALRX,CX,AZ,KTX,LPX
,A$,B$+FX21
1130 CLS:PRINT" You can no
w check"PRINT" through the
clues"
1140 PRINT"" Press return
now":LPX=0
1150 REPEAT:AZ=GET:UNTILAZ
=13ORAZ=6:1FAZ=6THENENDPROC
1160 REPEAT:LPX=LPX+1:1FLP
X>13THENLPX=1
1170 AS=LEFT$(LL$(LPX),2):
CLS:PRINT"Clue = ":AS:B$=RI
GHT$(AS,1):AS=LEFT$(AS,1)
1180 KTX=VAL(MID$(LPX),
3,2):PRINTRIGHT$(LL$(LPX),
LEN(LL$(LPX))-7):
1190 1FLPX<CAXTHENCX=ASC(
B$)-96:RX=ASC(A$)-64:PROCAf
ill ELSE RX=ASC(B$)-64:CAZ=A
SC(A$)-96:PROCDfill
1200 REPEAT:AZ=GET:UNTILAZ
=13ORAZ=13ORAZ=6
1210 1FAZ=19THENLLX=LPX-1:

```

```

PROCgetclue:LLX=CAZ+CDX
1220 1FLPX<CAXTHENPROCAfi
ll ELSE PROCDfill
1230 UNTILAZ=6
1240 ENDPROC
1250 DEF PROCAfill:LOCALTX
X:1FKTX=0THEN1270
1260 VDUS:FORKTX=0TOKTX-1:
PROCcursor(C1X+(CX-1+TX)*4
8,R1X+(DOWNX-RX)*44):NEXT
1270 VDUA:ENDPROC
1280 DEF PROCDfill:LOCALTX
X:1FKTX=0THEN1300
1290 VDUS:FORKTX=0TOKTX-1:
PROCcursor(C1X+(CX-1)*48,R1
X+(DOWNX-RX-TX)*44):NEXT

```

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

MicroLink

```

1300 VDUA:ENDPROC
1310 DEF PROCparameter:LOC
ALA$,KTX
1320 REPEAT:CLS:PRINTTAB(1
5,3):"PARAMETERS":PRINTTAB(
15):"=====
1330 PRINTTAB(15,9):"Acros
s = ":ACROSSX=FNinpar
1340 PRINTTAB(17,13):"Down
= ":DOWNX=FNinpar
1350 PRINTTAB(12,22):"Sati
sfied(Y/N)?:AS=GET$:UNTIL
INSTR("Yy",AS)=0
1360 $$$=STRING$(196,CHR$(
159)):ENDPROC
1370 DEF PROCinout:LOCALA
,X$,KTX
1380 REPEAT:CLS:PRINTTAB(1
0,3):"I am ready to record"
:PRINTTAB(12):"the informat
ion"

```

```

1390 PRINT TAB(11); "What w
111 you call":PRINT TAB(13);
"this crossword":PRINT TAB(1
1); (Max len 10 chrs):INPUT
TAB(15,16); "":X$:UNTILLEN
(X$)>BANDLEN(X$)<=10
1400 A=OPENOUT X$:PRINT# A
,ACROSSX,DOWNX,CAX,CDZ
1410 SSX:196=13:PRINT# A,$
SSX
1420 FORKTX=ITOLLX:PRINT#
A,LL$(KTX):NEXT:CLOSE# A
1430 ENDPROC
1440 DEF FNpar:LOCALAX,V
X,B$:B$=""
1450 REPEAT:AX=BET:VX=VAL(
B$)
1460 IFAX<47ANDAX<58ANDLEN
(B$)<2THENB$=B$+CHR$(AX):VD
UAX
1470 IFAX=127ANDLEN(B$)>0T
HENVDUAX:B$=LEFT$(B$,LEN(B$
)-1)
1480 UNTILAX=13ANDVX=1ANDV
X<15:VX=VX
1490 DEF PROCmenu2:VDU2,1
2:PRINTTAB(17,5); "MENU 2":P
RINTTAB(17); "=====
1500 PRINT "TAB(16); "0. Ex
it":PRINT "TAB(16); "1. Save
":PRINT "TAB(16); "2. Print":P
RINT "TAB(16); "3. Check":PRI
NT "TAB(16); "4. Press 0 to 3"
:
1510 REPEAT:optX=BET-48:UN
TILoptX>=8ANDoptX<4:ENDPROC
1520 DEF PROCmenu1:VDU2,1
2:PRINTTAB(17,5); "MENU 1":P
RINTTAB(17); "=====
1530 PRINT "TAB(15); "1. Re
load":PRINT "TAB(15); "2. Cre
ate":PRINT "TAB(15); "Press
1 or 2":REPEAT:optX=BET-4
8:UNTILoptX>=8ANDoptX<4:ENDP
ROC
1540 DEF PROCcode:LOCALIX
1550 FORIX=0TOSTEP2
1560 PX=SC00
1570 OPT IX
1580 LDA#220:STA#70
1590 LDA#0:STA#71
1600 .P1 LDA#70:CLC
1610 LDA#4:STA#70
1620 BCC P2:INC#71
1630 .P2 LDA#70:BNE P3
1640 LDA#71:CMPI#4:BEG fin
1650 .P3 LDA#0:STA#75
1660 LDA#128:STA#76
1670 LDA#7A:STA#72
1680 LDA#7B:STA#73
1690 .P4 LDA#72:SEC
1700 SBC#2:STA#72
1710 BCS P5:DEC#73
1720 .P5 LDH#70:LDV#0
1730 LDA#9:JSR#FF1
1740 LDA#74:BEG P6
1750 LDA#75:ORA#76:STA#75
1760 .P6 LDA#76:LSR A
1770 STA#76:BNE P4
1780 LDH#3
1790 .P7 LDA#1:JSR#FFEE
1800 LDA#75:JSR#FFEE
1810 DEX:BNEP7
1820 LDA#0:BEG P1
1830 .fin RTS
1840 J
1850 NEXT
1860 ENDPROC
1870 DEF PROCprint:LOCALIX
,NAX,NDX,rX,TX,bX,AS,C$:CL
S:PROCcode
1880 CLS:PRINTTAB(4); "Do y
ou want":PRINTTAB(3); "a bla
nk grid?":PRINTTAB(7); "(Y/N
)":
1890 REPEAT:AS=BET:TX=INS
TR("YyNn",AS):UNTILTX>0:IFT
X<3THENPROCblank(159):bX=1
ELSEbX=0
1900 CLS:PRINTTAB(3); "Read
y printer":PRINT "TAB(3); "Pr
ess return":REPEAT:UNTILGE
T=13
1910 LX=10:#FX=6,127
1920 CLS:PRINTTAB(5); "Prin
ting":VDU1,1,27,1,65,1,8
1930 FORrX=712+DOWNX+22TOR
1X-36STEP-16:1#7A=rX+2
1940 FORTX=1T015:VDU1,32:N
EXT
1950 VDU1,27,1,76,1,88,1,2
:CALL#C00:IFLX=10THENVDU1,L
X
1960 NEXT:VDU1,27,1,50,3,1
Fbx#0:THENPROCblank(159)
1970 OSCLI"FX3,18":VDULX,L
X:PROChead(4,"Across"):PROC
head(34,"Down"):VDU10,13,LX
1980 NAX=#:NDX=8:AS="" :C$=
"":REPEAT
1990 IFAS="" THENPROCpline
2000 IFC$="" THENPROClined
2010 PRINTSPC(4);LEFT$(AS,
32);SPC(8);LEFT$(C$,32)
2020 IFLEN(AS)>32THENAS=RI
GHT$(AS,LEN(AS)-32) ELSEAS=
""
2030 IFLEN(C$)>32THENC$=RI
GHT$(C$,LEN(C$)-32) ELSEC$=
""
2040 UNTILNAX=CAXANDNDX=CD
ZANDAS="" ANDC$=""
2050 OSCLI"FX3":ENDPROC
2060 DEF PROChead(SX,neess#
):PRINTSPC(SX);VDU27,45,1:
PRINTneess#;VDU27,45,0:ENDP
ROC
2070 DEF PROCpline:IFNAX=
CAXTHENAS=STRING$(32," "):E
NDPROC
2080 NAX=NAX+1:AS=FNcomon
(NAX):ENDPROC
2090 DEF FNcomon(NX):LOCA
LB$,T$,AS,TX,ZX:AS=RIGHT$(L
L$(NX),LEN(LL$(NX))-7):B$=""
(")+LEFT$(LL$(NX),21+)" :TX
=1
2100 FORZX=1TOLLEN(AS):T$=M
ID$(AS,ZX,1)
2110 IFT$="" THENTX=TX+1EL
SETX=0
2120 IFTX<2THENB$=B$+T$
2130 IFTX=8ANDZXMOD19=0THE
NB$=B$+" " :TX=X+1
2140 .fin TX=X+""
2150 AS=AS+LEFT$(B$,32):IF
LEN(B$)>32THENB$=""
2160 IFLEN(B$)>32THENAS=AS+
STRING$(32," ")+B$
2170 B$=RIGHT$(B$,LEN(B$)-
32):IFB$=STRING$(LEN(B$),"
")THENAS=
2180 IFLEFT$(B$,1)="" THEN
REPEAT:B$=RIGHT$(B$,LEN(B$)
-1):UNTILLEFT$(B$,1)<> " :8
OT02150
2190 TX=-1:REPEAT:TX=TX+1:
UNTILMID$(AS,LEN(AS)-TX,1)=
"
2200 IFTX>0THENB$=RIGHT$(A
S,TX):AS=LEFT$(AS,LEN(AS)-T
X):STRING$(TX," "):B$=T$+B$
2210 GOTO2150
2220 DEF PROClined:IFNDX=
CDZTHENC$=STRING$(32," "):E
NDPROC
2230 NDY=NDY+1:C$=FNcomon
(NDX+CAX):ENDPROC
2240 DEF PROCblank(IX):LOC
ALCX,RX,TX:VDU5:GC03,1
2250 FORRX=1TODOWNX:FORCX=
1T0ACROSSX:TX=(RX-1)*ACRO
SSX+CX+1+SSX
2260 IFTX<1XTHENMOVECIX+(
CX-1)*48+5,R1X+(DOWNX-RX)*4
+36:VDU1X
2270 NEXT:TEXT:VDU4:ENDPRO
C
2280 DEF PROCfin:LOCALA,
X$,AS,KTX
2290 REPEAT:CLS:PRINTTAB(1
1,3); "I am ready to load":P
RINTTAB(13); "the crossword"
:PRINTTAB(14); "information"
2300 PRINTTAB(13,9); "Which
crossword":PRINTTAB(13); "d
o you require":PRINTTAB(12)
; (Max len 10 chrs):INPUT
AB(15,14); "":Y$:UNTILLEN(Y
$)>BANDLEN(Y$)<=10
2310 A=OPENIN X$:INPUT# A,
ACROSSX,DOWNX,CAX,CDZ:INPUT
# A,AS:(SSX)=AS
2320 LLX=CAX+CDZ:DIMLL$(LL
X):KTX=0
2330 REPEAT:INPUT# A,AS:IF
VAL(MID$(AS,5,3))<>LEN(AS)-
7THEN#FX125
2340 KTX=KTX+1:IFKTX<=LLT
HENLL$(KTX)=AS
2350 UNTIL EOF# A:CLOSE# A
2360 IFKTX<>LLXTHEN#FX125
2370 ENDPROC

```

CROSSWORD SOLVER

10 REM Crossword Solver
20 REM By G.Fisher
30 REM (c) Electron User
40 MODE4:DIM S1X 196:DIM
S2X 196
50 OSCLI"FX4,1":VDU19,1,
2;0:ONERRGOTO820
60 PROCfin:ONERRGOTO8
840
70 PROCGrid:ONERRGOTO8
30
80 PROClookup:MODE6:OSCL
1"FX4":PRINTTAB(0,12); "Good
bye":END
90 DEF PROCGrid:LOCALCX,
RX,RZX,CZX,CHX:CLS
100 CX=639-ACROSSX+24:CZ
X=639+ACROSSX+24:RX=688-DO

Crossword listing

From Page 37

```

WNXZ+22;RZ+688+DOWNX*22
110 VDU28,0,1,31,18,23
120 SCOL3,1,FORC1Z+OTACROSS
SSZ:MOVEC1X+CZ+48,R1X:DRWC
1X+CZ+48,R2X:NEXT
130 FORZ+OTDOWNNZ:MOVEC1
X,R1X+R2X+44;DRWC2X,R1X+R2X
44:NEXT
140 SCOL3,1,VDU5:FORRZ=1T
ODOWNZ:MOVEC1Z+62,R1X+(DOWN
X-R1Z)+44+36:VDU6+R1X:MOVE
150 FORC1Z+OTACROSSZ:MOVE
C1X+(C1X-1)*48+5,R1X-4:VDUCX
+96:NEXT
160 VDU23,159,255,255,255
,255,255,255,255,255,23,158
,255,129,129,129,129,129,1
9,255
170 SCOL3,1,FORRZ=1T,DOWN
X1:FORC1Z+OTACROSSZ:CHZ?:(R
X-1)*ACROSSZ+CX-1+51Z):MOVE
C1X+CX-1)*48+5,R1X+(DOWNX-
R1Z)+44+36:VDUC1X:NEXT:NE
180 MOVE62,292:PLOT21,1279
,292:MOVE612,0:PLOT21,612,2
,292:MOVE668,0:PLOT21,668,292
6:COL3,1:MOVE64,324:PRINT*
cross*;STRING6(4,CHR(8));S
TRING6(6,CHR(8);(255));:MOVE186
5,324:PRINT*down*;STRING6(4
,CHR(8));STRING6(4,CHR(25
5))
190 VDU4:ENDPROC
198 DEF PROCDCORP(C1X,R1
X):MOVEC7X+5,R7X+36:VDU5,25
4,4:ENDPROC
218 DEF PROCChalkin:LOCAL
C1X,R7X,TX,TZ?:(RZ-1)*ACRO
SSZ+C1X+1+51Z):1FX=159THENE
ENDPROC
228 C1X+C1X+(C1X-1)*48+5;R
7X+R1X+(DOWNX-R1Z)+44+36:MOV
ECTX,R7X:VDU5,TX,68,AX,4
238 ?(S1Z+(RZ-1)*ACROSSZ+
CX-1):AX=AX;RZ:ENDPROC
248 DEF PROCp21:1FXNZ(2TH
ENDPROC
250 NAX=NAX+1:LOCALNNX:IF
NDZ=1THENGSUBA480
260 NNZ=6+VAL(MTD(4,NNZ:(NA
N+1),5,3)):DIV1+VAL(IMD(8:(
NAX),5)):DIV1+GDSUB420:
PROCCLUEP(NAX):ENDPROC
270 DEF PROCp22:1FNDX<2TH
ENDPROC
280 LOCALNNX:NDZ=NDX-1:IF
NDZ=0THENGSUBA140

```

```

290 NNZ:=6+VAL(MID$(LL$(ND
Z+1:CAD,5,3))DIV19+VAL(MID
$(LL$(NDZ+CAD),5,3))DIV19:6
DSUB428:PROCC=ueout(NDZ+CAD
):ENDPROC
300 DEF PROCDOWN1:IFNAX:=
CAT$THENENDPROC
310 IFadX=1$THENGDOSUB400
320 NAX=NAX+1:PROCC=ueout
(NAX):ENDPROC
330 DEF PROCDOWN2:IFNDZ:=
CD$THENENDPROC
340 IFadX=8$THENGDOSUB410
350 NDZ=NDZ+1:PROCC=ueout
(NDZ+CAD):ENDPROC
360 DEF PROCC=ueout(c1X)
370 COLOUR0:COLOUR129:PRI
NTLEF$$(LL$(c1X),2):COLOUR
1:COLOUR128
380 PRINT"RIGHT$(LL$(c1X)
),LEN(LL$(c1X))-7)"
390 ENDPROC
400 adX=0:vp2X=VPOS:VDU28
,0,31,18,23,31,0,vp1X:RETU
RN
410 adX=1:vp1X=VPOS:VDU28
,21,31,39,23,31,0,vp2X:RETU
RN
420 REPEAT:VDU11:NNZ=NNZ-
1:UNTILNNZ=0:RETURN
430 DEF PROCcursor(HUEX,C
TX,RTX)
440 MOVECTX,RTX:GCOL0,HUE
2:DRAWCTX+72,RTX:DRAWCTX+72
,RTX:48:DRAWCTX,RTX+48:DRA
WCTX,RTX:ENDPROC
450 DEF FNfi$LOCALKTX,NX
,dX,OKX:OKX=0
460 FORKTX=0TOACROSSX+DOW
NX-1:4:IF$(KTX)<?$(S2K+T
X):THENOKX=1:KTX=225
470 NEXT:IFOKX=1$THENSOUND
0,-15,4,20:=FALSE
480 VDU28,0,31,39,23,12:P
RINTTAB(15,0),"Well done!":
PRINTTAB(14,6),"Press retur
n":REPEAT:READNX,D: SOUND

```

```

-15,NX,DY,DC: SOUND1,0,0,1:UNT
ILNX=0: REPEAT: UNTIL GET=13
490 =TRUE
500 DEF PROClookup: LOCAL C
X,RX,AZ,BX,adX,NAZ,NDX,vp1I
,vp2Z:GC0L3,1:vp1X=0:vp2X=0
510 #F21
520 FORCX=1T03:OSCLI"FX13
0,0,95":OSCLI"FX138,0,125":
NEXT:FORRX=1T03:OSCLI"FX138
0,96":OSCLI"FX138,0,123":IN
EXT
530 CLS,0,1: C=X-1: adX=0: V
DU28,RX,R1,18,23,BX:137:NDX=
0:NAZ=0:GOSUB690
540 REPEAT: REPEAT: PROCcur
sor (CX)-(CX-1)+48,R1X (DOWN
X-RZ)+44): AX=GET: PROCcursor
(CX)-(CX-1)+48,R1X+(DOWNX-R
Z)+44)
550 IFAX?96ANDAX{123THENA
Z=AX-32
560 IFAX?64ANDAX{917HENPR
OCchaikin
570 IFAX=139ANDRX?1THENRX
=RX-1
580 IFAX=136ANDCX?1THENCX
= CX-1
590 IFAX=137ANDCX{ACROSSX
THENCX=CX+1
600 IFAX=138ANDRX{DOWNZTH
ENRX=RX+1
610 IFAX=1ANDBX=138THENG0
SUB700:BX=137:GOSUB690
620 IFAX=4ANDBX=137THENG0
SUB690:BX=138:GOSUB700
630 IFAX=96THENPROCup1
640 IFAX=123THENPROCup2
650 IFAX=95THENPROCdown1
660 IFAX=125THENPROCdown2
670 UNTILAX=6: UNTILFNfin:
IFBX=137THENGOSUB690 ELSEG0
SUB700
680 ENDPROC
690 MOVE572,R1X-48: DRAW70
0,R1X-48: DRAW664,R1X-60: RET
URN
700 MOVEC1X-78,756: DRAMC1
X-78,620: DRAMC1X-90,664: RET
URN
710 DEF PROCinfin: LOCALA,
Xf,As,KZ
720 REPEAT: CLS: PRINTAB(1
1,31): "I am ready to load": P
RINTAB(13): "the crossword"
: PRINTAB(14): "information"
730 PRINTAB(12,9): "Which
crossword": PRINTAB(13,1) "do
you require": INPUTAB(16)

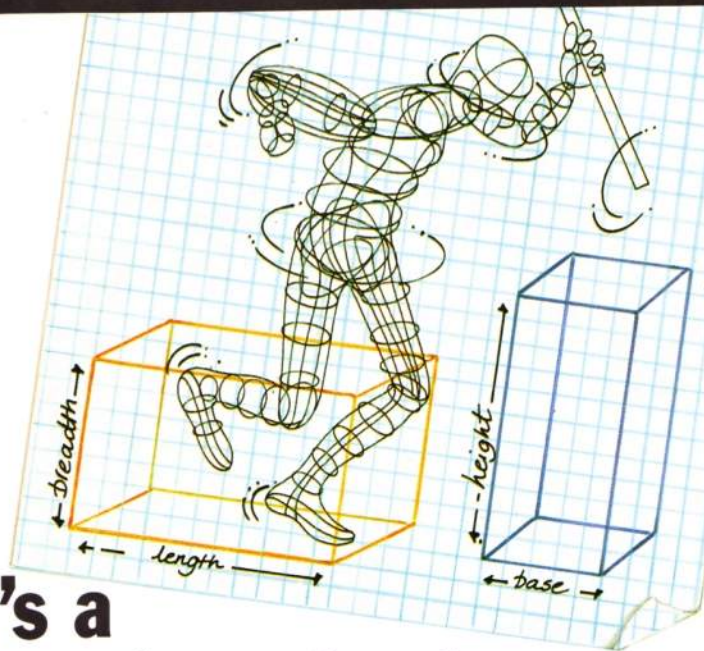
```

```

41: ??:X$:UNTILLEN(X$)?BAND
LEN(X$)=0
740 A=OPEN X$:INPUT# A,
ACROSSY,DOWNX,CAX,CDX:INPUT
# A,A$:(SIZ)=A$
750 LLZ=CAZ+CDZ:DIMLL+ILL
X):KTX)=
760 REPEAT:INPUT# A,A$:IF
VAL(MID(A$,5,3))<LEN(A$)-
7THEN+FX125
770 KTX=KTX+1:IFKTX<LLZT
HENLLZ+KTX)=A$
780 UNTIL EOF# A:CLOSE# A
790 IFKTX<LLZTHENFX125
800 FORKTX=KTX+CDX:DOWN
X:1:IF?152X+KTX)=159THEN?
(SIX+KTX)=159ELSE?(SIX+KTX)=
312
810 NEXT:ENDPROC
820 OSCLI'FX4':IFERR=170R
ERR=222THEN$PRINTRTAB(7,1
2)!'Load error'=e-run progr
am'
830 OSCLI'FX4':IF ERR=17T
HENPROCTYPE:MODE#PRINT#A
B(8,12)!'Goodbye':END
840 REPORT:PRINT' at line
':ERL
850 END
860 DEF PROCTYPEin
870 LOCALX,CX,CTX,RTX,CH
X:VDU$
880 FORRX=1:TODOWNX:CHX=52
X+(RX-1)*ACROSSX:RTX=RX+1*(D
OWNX-RX)*44+36:RTX=BTOACR
OSSX-1
890 CTX=CX+CX*4#5:6COL2
0,MOVECTX,RTX:VDU$55:6COL0
1,MOVECTX,RTX:SOUND1,-15,2
00,1:PRINTCHR$(?CHX+CX1)
900 FORCTX=1:TOSD:NEXT:NE
X:TEXT:VDU4
910 VDU20,0,31,23,12:P
RINTRTAB(16)!'Answers':PRINT
''TAB(14)!'Press return':
REPEAT:UNTILGET=13
920 ENDPROC
930 DATA148,8,148,12,164,
3,156,3,148,8,164,8,164,12,
176,3,168,3,164,3,168,8,168
12,184,14,176,3,168,3,164,8
152,8,154,15,0

```

This listing is included in this month's cassette tape offer. See order form on Page 50.



It's a question of values

Variables come to the fore as PETE BIBBY demonstrates the value of passing parameters to procedures

IF you can cast your mind back, you'll recall that last month we took a look at procedures, sections of code very reminiscent of the subroutines we'd been dealing with previously.

However, unlike subroutines, they weren't called with a GOSUB and terminated with a RETURN.

What happens is that each procedure has a name, carefully laid down in the DEF PROC that defines that procedure.

Using the name in a program causes the Electron to go to the procedure definition and obey the lines it finds there.

When it runs up against the

ENDPROC that finishes the procedure, control is passed to the next statement, the one that comes after the procedure name that invoked the procedure in the first place.

In a way, you can look on a procedure name as a sort of keyword. When you use it the Electron performs a predetermined sequence of actions.

The difference is that in Basic the micro's designers have decided what happens. With a procedure you do.

Program I uses a procedure to calculate the area of a rectangle with sides *length* and *breadth*.

It's hardly a practical program, but it does show a procedure in action. Notice

that every time you run the program you can give different values to *length* and *breadth*. Each time the same procedure, PROCarea, is called and does the calculation.

In a long program you can see that PROCarea might be called from several different

places, each time with different values for the rectangle's dimensions.

In each case the action taken is the same: PROCarea takes the current values of *length* and *breadth* and works out *area*. Program II shows

```
10 REM Program I
20 PRINT "Length";
30 INPUT length
40 PRINT "Breadth";
50 INPUT breadth
60 PROCarea
70 END
80 DEF PROCarea
```

```
90 area=length*breadth
100 PRINT "The area of a
rectangle of length "; length
and breadth "; breadth
is ";area " square units
"
110 ENDPROC
```

Program I

From Page 39

this to good effect.

The FOR...NEXT loop, with the aptly named loop control variable *loop*, cycles four times. At every pass of the loop line 30 ensures that values are read from the data

```
10 REM Program II
20 FOR loop=1 TO 4
30 READ length,breadth
40 PROCarea
50 PRINT
60 NEXT loop
70 DATA 10,8,12,7,3,2,19
.5,11
80 END
90 DEF PROCarea
100 area=length*breadth
110 PRINT "The area of a
rectangle of length "; length
and breadth "; breadth
" is "area " square units
"
120 ENDPROC
```

Program II

of line 70 into the variables *length* and *breadth*.

The next line calls PROCarea, which gives the area of the rectangle with these dimensions.

The result of this is that PROCarea is called four times. Notice that while the values of *length* and *breadth* are different on each occasion, PROCarea is exactly the same.

It does exactly the same job each time except for the fact that the rectangle's dimensions have changed.

This is an important point. The procedure itself doesn't vary. It takes whatever value is currently held in *length*, multiplies it by *breadth* and puts the result in *area*. The values of *length* and *breadth* may change but this is done in the main body of the program.

The procedure takes these values and works with them, giving the result. In a way, the procedure contains the general rule for arriving at a result, while the main program sets up the values to be used and calls the procedure to deal with them.

This point will come up again during our dealings with procedures. One of the nice

things about procedures is that when you've got one written you can use it on other programs.

So if you were working on a program that, say, figured out the amount of carpeting needed in a room you might need to know the area of a rectangle.

Rather than start again from scratch, you can just go to an already existing procedure and use that.

As with our subroutines, you can "plug" procedures into programs as needed. However, it does require a bit of thought, as Program III shows.

```
10 REM Program III
20 PRINT "Length";
30 INPUT base
40 PRINT "Breadth";
50 INPUT height
60 PROCarea
70 END
80 DEF PROCarea
90 area=length*breadth
100 PRINT "The area of a
rectangle of length "; length
and breadth "; breadth
" is "area " square units
"
110 ENDPROC
```

Program III

Here our programmer has written the main section of the program and used a call to PROCarea to figure out the dimensions of the rectangle.

However, he's just tagged PROCarea on to the end of his code and sadly, it's not quite as easy as that.

Can you see what's going to go wrong? If not, run Program III and see for yourself.

The result is that you get rewarded with a:

No such variable at
line 90

and quite right too. The main program uses the variables *base* and *height* to hold the dimensions of the rectangle.

The trouble is that our PROCarea uses *length* and *breadth* and expects to find values in these variables. As it is, this doesn't happen because the main program hasn't given them values.

And while we realise that

base is the same as *length* and *height* is interchangeable with *breadth* the Electron doesn't.

Hence the program halts with an error message. It can't find values for *length* and *breadth*.

This kind of problem can arise quite frequently when using procedures. The procedure has to use values taken from the main body of the program.

These values are known as the parameters of the procedure and if the procedure isn't given these parameters then it can't do its job.

So far we've given our procedures the values they need by setting up the variables in the main program and using these same variables in the procedure.

There is another way of passing parameters to a procedure, as this is known, as Program IV shows.

```
10 REM Program IV
20 PRINT "Length";
30 INPUT length
40 PRINT "Breadth";
50 INPUT breadth
60 PROCarea(length,breadth)
70 END
80 DEF PROCarea(length,breadth)
90 area=length*breadth
100 PRINT "The area of a
rectangle of length "; length
and breadth "; breadth
" is "area " square units
"
110 ENDPROC
```

Program IV

At first sight this might seem the same as Program I and, in fact, it does exactly the same job. But take a closer look at lines 60 and 80.

You'll see that the procedure name is now followed by a set of brackets with variable names inside. In fact they're our old friends *length* and *breadth*.

This method of putting the variables, or parameters, that the procedure is going to use in brackets after the procedure name is our second way of passing parameters to a procedure.

When you run the program,

you're prompted as before for values for *length* and *breadth*. So far, so good. Now, however, instead of:

60 PROCarea

the procedure is called with:

60 PROCarea(length,breadth)

Whereas before the procedure had to "search" for the values it needed as it came across the variables used in its definition, now the procedure call itself specifically tells it which variables to use.

In other words:

60 PROCarea(length,breadth)

tells the Electron "Perform PROCarea and use the values you'll find held in the variables *length* and *breadth*".

Run the program a few times and check that it works. Unless you've switched off or hit Break or generally messed around, you'll find that the procedure PROCarea is still available to be used in command or immediate mode.

So you can enter:

```
length=7
breadth=5
PROCarea(length,breadth)
```

and be rewarded with the area of that rectangle.

And you don't have to use variables in the procedure call, you could use the values themselves as you'll find if you try:

```
PROCarea(7,5)
```

or:

```
PROCarea(15,4)
```

You can even use other variables than *length* and *breadth*, so long as you've given them values. If you don't believe me, enter:

```
ton=4
dick=3
PROCarea(ton,dick)
```

or:

```
first=6
second=2
PROCarea(first,second)
```

and see for yourself.

Now this seems a bit contradictory, doesn't it? After all we've defined our

procedure with:

```
88 DEF PROCarea(length,breadth)
```

and now we're whistling it up with:

```
PROCarea(first,second)
```

The variables in our procedure call, *first* and *second*, don't match those in the procedure definition - to what, *length* and *breadth*.

However, when we're passing parameters this is allowed. What happens is that when the Electron comes across a procedure call it looks at the variables used in that call, takes their values and passes them to the corresponding variables in the procedure definition.

In the above case, *first* has been given the value 6 while *second* has the value 2. When the micro comes across:

```
PROCarea(first, second)
```

it looks at the values of the variables in the parameter list (in brackets after the procedure name) and substitutes for them.

The result is that:

```
PROCarea(first,second)
```

becomes:

```
PROCarea(6,2)
```

The micro then looks at the definition of *PROCarea* and sees that it has two parameters, *length* and *breadth*. It accordingly gives *length* the value of 6, *breadth* the value of 2 and the procedure does its job with these two figures.

A point to notice is that there's a one-to-one correspondence between the parameters in the procedure call and the procedure definition.

There has to be the same number of them, they have to be the same type and the order

matters, as we'll see next time.

Meanwhile we can use our newfound knowledge of passing parameters to "cure" Program III by rewriting it as

```
10 REM Program V
20 PRINT "Length";
30 INPUT base
40 PRINT "Breadth";
50 INPUT height
60 PROCarea(base,height)
70 END
80 DEF PROCarea(length,breadth)
90 area=length*breadth
100 PRINT "The area of a rectangle of length "; length "and breadth "; breadth "is ";area " square units ."
110 ENDPROC
```

Program V

Program V.

Here the dimensions of our rectangle are again stored in *base* and *height* while the procedure definition uses *length* and *breadth*.

Now, however, there's no problem as the parameters are passed to the procedure via a parameter list in brackets.

Given this extra information, the Electron is clever enough to do the translation, substituting the value of *base* for *length* and *height* for *breadth*.

And that's where we'll leave it for this month. Have a go at rewriting some of last month's procedures using brackets after the procedure name to allow the passing of parameters.

● That should keep you busy until next time when we take a further look at parameters and meet local and global variables.

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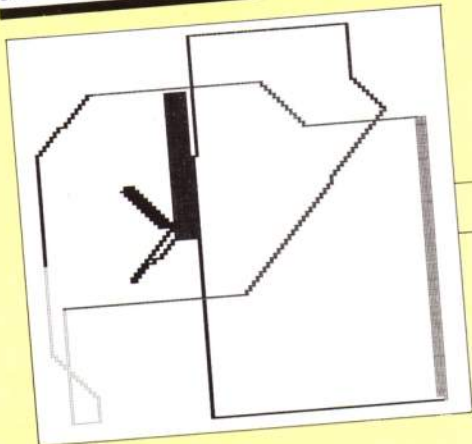
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Doodle Art

THIS is a simple drawing utility for doodling on the screen. Use the cursor keys to move and press 0 to 7 to select a colour - 0 is black, 1 is red, 2 is green and so on.



```
1 MODE 2:0FX4,1
2 VDU23,1,0;0;0;0;
3 XZ=640:YZ=512
4 REPEAT KZ=INKEY0
5 IF KZ>47 AND KZ<56 GC
  0,KZ-48
6 MOVE XZ,YZ
7 XZ=XZ+8*((KZ=136)-(KZ
=137))
8 YZ=YZ+8*((KZ=138)-(KZ
=139))
9 DRAW XZ,YZ
10 UNTIL 0
```



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RATCATCHER

A NUMBER of readers have asked for shorter listings, being not too keen on a long typing session.

So here is Rat Catcher, a reasonably short program that nevertheless has quite a lot going on within it.

It requires a certain amount of quick thinking and skill, and offers a challenge to reach really high scores.

Players take the part of the local rat catcher trying to quell a rat population explosion. The game starts off gently but as higher levels are reached, the rats start to breed with increasing rapidity.

A bonus is set at the start of each level and decreases as time passes. If the bonus reaches zero, the game is over and you are shown your score and the current best score.

Ten points are awarded for each rat caught and when all are eliminated in one level you move on to the next.

Full instructions are given in the program.

Remember - the bonus starts decreasing as soon as you press the spacebar to start each level, so be prepared.

By **PHIL ORD**
and
KEITH OWENS

The keys are:

Z	left
X	right
:	up
/	down
Return	jump

MAIN VARIABLES

X%,Y%	Coordinates of rat catcher.
X,Y	Rat coordinates.
sc%	Score.
r%	Loop number to determine how often to print a rat.
sk%	Skill level.
rl%	Number of rats still to be caught.
bon%	Bonus.

PROCEDURES

chars	Defines characters.
init	Sets initial variables and sound envelopes.
set up	Designs and displays screen layout.
key	Checks for key press, acts accordingly.
jump	Relocates rat catcher in opposite room.
left	Moves left, tests for collision.
right	Moves right, tests for collision.
up	Moves up, tests for collision.
down	Moves down, tests for collision.
rats	Places rats at random. Number of rats depends on skill level.
kill rats	Updates score, and produces a sound to indicate rat caught.
next level	Adds remaining bonus to score and advances skill level.
end	Displays final score.
best score	Displays best score so far, offers new game.
inst	Prints instructions

Full listing starts
on Page 44

From Page 43

```

10 REM Rat Catcher
20 REM By P.Ord&K.Owens
30 REM (c) Electron User
40 #KEY10 ZX=0:MCLS:MOLD
:IN LIST:IM
50 ON ERROR ZX=0:MODE6:R
EXPORT:PRINT" at line ";ERL:
END
60 MODE1:VDU7:PRINTTAB(8
,12)"INSTRUCTIONS Y or N?":
#S=GET$:IF#S<"Y"AND#S<"N"
GOTO60
70 IF#S="Y" PROCinst
80 INPUTTAB(8,16)"SOUND
Y or N?":IF#S="Y"GOTO100
90 #FX210,1
100 MODE5:PROCchars
110 scX=0:bonX=300:skX=1
120 PROCinit:PROCset_up:G
OTO350

```

```

130 DEFPROCchars
140 VDU23,224,32,112,32,1
12,248,112,80,80,23,225,0,2
55,255,255,255,255,255,
23,226,248,248,248,248,248,
248,248,248,23,227,0,32,96,
248,56,8,120,0,23,1,0;0;0;0
;
150 ENDPROC
160 DEFPROCinit
170 X=X:Y=Y:Z=0:R=0:r=1
X=0
180 IFskX=1 tX=300ELSEIF
skX=2 OR skX=3 tX=250ELSEIF
FskX=4 tX=200ELSEIFskX=5 t
X=200ELSEIFskX=5 tX=200
190 AS=STRING$(16,CHR$(22
5)):BS=CHR$(226):CHRS(8)+CH
R$(10):CS=STRING$(23,BS)
200 ENVELOPE1,1,-3,5,-0,7
,19,8,126,0,0,-126,126,126:
ENVELOPE2,1,-7,2,-2,20,18,5
,126,0,0,-126,126,126:ENVEL
OPE3,1,-20,0,-16,2,23,38,12
6,0,0,-126,126,126
210 ENDPROC
220 DEFPROCset_up
230 VDU5,24,120,224,1120:
960:GCOL0,128:CLG:VDU19,3,
2;0:GCOL0,3:MOVE110,896:PR
INT:AS:MOVE110,544:PRINT:AS
X=320:Y=772:GCOL0,131:FOR1
=1T04
240 VDU24,X;Y;X+112;Y+92:
:CLG:VDU24,X-160;Y+32;X-40;
Y+60:CLG:VDU24,X-80;Y-64;X
-48;Y+28:CLG:VDU24,X-80;Y-

```

```

96;X+192;Y-68:CLG
250 VDU24,X+160;Y-64;X+19
2;Y+28:CLG:VDU24,X+160;Y+3
2;Y+272;Y+60:CLG:X=X+400:1
FX)800 X=320:Y=420
260 NEXT:VDU26:MOVE120,96
0:PRINT:AS:MOVE120,688:PRIN
T:AS:MOVE120,256:PRINT:AS:M
OVE120,960:PRINT:CS:MOVE108
0,960:PRINT:CS
270 GCOL0,0:MOVE80,960:PR
INT:CS:MOVE1120,960:PRINT:CS
0,576:VDU226
280 RESTORE290:FOR1=1T04:
READX,Y:MOVEX,Y:VDU226:NEXT
290 DATA160,896,1040,896,
160,544,1040,544
300 rat=TRUE:FOR1=1T0skX
*5:PROCrats:NEXT:ratX=FALSE
:GCOL3,2:MOVEX,Y:VDU224
310 VDU4:COLOUR2:PRINTTAB
(5,1)"BONUS=";tX*skX
320 #FX21,0
330 PRINTTAB(6,26)"LEVEL
";skX;TAB(2,28)"PRESS SPACE
-BAR":REPEATUNTILGET=32:PRI
NTTAB(2,28):SPC(15):TAB(4,2
8)"SCORE=";scX:VDU5
340 TIME=0
350 PROCkey:IFrX=0 GOTO1
20 ELSE PROCrats:GOTO350
360 DEF PROCkey
370 bonX=skX*tX-(TIME DI
V 20)*20:IFbonX<0 bonX=0:P
ROCend
380 VDU4:PRINTTAB(11,1);b

```

```

onX;":VDU5
390 #FX21,0
400 IF INKEY(-74)ANDYX<60
8 PROCjump(120,576):FORD=1T
0200:NEXT
410 IF INKEY(-74)ANDYX<60
8 PROCjump(120,224):FORD=1T
0200:NEXT
420 IF INKEY(-98) PROClef
t
430 IF INKEY(-67) PROCrig
ht
440 IF INKEY(-73) PROCup
450 IF INKEY(-105) PROCdo
wn
460 ENDPROC

```

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```

470 DEFPROCjump(x,Y)
480 GCOL0,0:MOVEX,Y:VDU
224:GCOL3,2:REPEAT:XX=X+RN
D(23)+40:YY=Y+RND(18)*32:V
NTILPOINT(X+20,Y-16)=0:MO
VEX,Y:VDU224:ENDPROC
490 DEF PROCleft
500 IFPOINT(X-4,Y-14)=1
1 PROCkill_rat(X-40,Y)
510 IFPOINT(X-36,Y-16)=
4 OR POINT(X-36,Y-16)=3 E
NDPROC
520 XX=X-40:GCOL3,2:MOVE

```

```

X,Y:VDU224:MOVEX+40,Y:V
DU224
530 ENDPROC
540 DEF PROCright
550 IFPOINT(X+60,Y-16)=
1 PROCkill_rat(X+40,Y)
560 IFPOINT(X+60,Y-16)=
4ORPOINT(X+60,Y-16)=3 END
PROC
570 XX=X+40:GCOL3,2:MOVE
X,Y:VDU224:MOVEX+40,Y:V
DU224:ENDPROC
580 DEF PROCup
590 IFPOINT(X+20,Y+20)=
1 PROCkill_rat(X,Y+32)
600 IFPOINT(X,Y+16)=4OR
POINT(X,Y+16)=3 ENDPROC
610 Y=Y+32:GCOL3,2:MOVE
X,Y:VDU224:MOVEX,Y-32:V
DU224:ENDPROC
620 DEF PROCdown
630 IFPOINT(X+20,Y-44)=
1 PROCkill_rat(X,Y-32)
640 IFPOINT(X,Y-40)=4OR
POINT(X,Y-40)=3 ENDPROC
650 Y=Y-32:GCOL3,2:MOVE
X,Y:VDU224:MOVEX,Y+32:V
DU224:ENDPROC
660 ENDPROC
670 DEFPROCrats
680 IFratX GOTO720
690 IFskX<6 GOTO710
700 rX=rX+1:IFrX=30-(skX*
2) rX=0:GOTO720 ELSE ENDP

```



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Attack the bandit ships in this fast-moving 3D punch-up.



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Rat Catcher listing

From Page 44

```

C
710 rX=rX+1:IFrX=120:(skX
*20):rX=0:GOTO720 ELSE ENDP
RDC
720 X=120+RND(23)*40:Y=25
+RND(21)*32
730 IFPOINT(X+4,Y-10)<0
GOTO720
740 IFPOINT(X+20,Y-16)<0
GOTO720
750 IFX=560ANDY=280 GOTO7
20
760 GCOLOR,1:MOVEX,Y:VDU22
7:r1X=r1X+1:ENDPROC
770 DEFPROCkill_rat(aX,bX
)
780 scX=scX+10:VDU4:PRINT
TAB(10,20):scX:VDU5
790 SOUND1,1,100,5:BCOLOR,
0:MOVEaX,bX:VDU22:r1X=r1X-
1:IFr1X=0 PROCnext_level
800 ENDP
810 DEFPROCnext_level
820 SOUND1,2,100,40:FORD=
1TO1200:NEXT
830 IFbonX=0 VDU4:REPEAT:
bonX=bonX-20:scX=scX+20:SOU
ND1,1,3,100,1:PRINTTAB(11,1
):bonX:TAB(10,20):scX:SOUND
1,1,0,100,2:UNTILbonX=0
840 VDU5:skX=skX+1:ENDPROC
C
850 DEFPROCend
860 SOUND1,3,100,40:FORD=
1TO2000:NEXT:VDU26,4,12,20,
0,23,19,7,17,129,12:BCOLOR,2
:MOVE0,820:DRAW1279,820:MOV
E0,236:DRAW1279,236
870 IFZX=0 bscX=skX:ZX=1
880 PRINTTAB(15,1)"GAME O
VER"TAB(3,3)"YOUR SCORE WAS
"TAB(8,5):scX:PROCbest_scor
e:ENDPROC
890 DEFPROCbest_score
900 IFscX>bscX bscX=scX
910 PRINTTAB(1,0)"BEST SC

```

```

ORE SO FAR"TAB(8,10):bscX
920 #FX21,0
930 PRINTTAB(3,13)"PRESS
SPACEBAR"TAB(4,15)"FOR NEW
GAME":REPEATUNTILGET=32:COL
OUR120:VDU26,12,5
940 GOTO110
950 DEFPROCinst
960 VDU19,3,6,0:12,23,1,0
;0;0;0:COLOUR2:PRINTTAB(15
,0)"RATCATCHER":COLOUR3
970 PRINTTAB(1,2)"Use the
control keys to guide the
rat-"TAB(1,4)"catcher arou
nd the screen picking off
"TAB(1,6)"rats as fast as t
hey appear. You can use"
980 PRINTTAB(1,8)"the 're
turn' key to skip from one
room"TAB(1,10)"to the othe
r. You must eliminate all th
e"TAB(1,12)"rats on each le
vel before the bonus has"
990 PRINTTAB(1,14)"reache

```

This listing is included in this month's cassette tape offer. See order form on Page 50.

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Micro Messages

Escape sequence for superscript

MANY thanks for the useful printer driver published in the August issue. It's nice to see some serious software in print for the Electron.

However I find it desirable to be able to use both superscript and subscript in many documents, and as published, the driver cannot cope with the escape sequence to produce these.

I have therefore produced the following modifications which enable both to be implemented.

I have chosen to sacrifice double strike because it's a waste of time, and NLQ because you can't use super/subscript with it on the Epson.

The alterations are as follows:

```
451 LDA table,X:CMR #454:
BNE cont1
452 LDA #27:JSR send:LDA
#54:JMP cont
460 .cont1 INX
471 CMP #54:BEQ finish
480 .cont JSR send
808 EQU 454FF0053 VHT 13
1=superscript
810 EQU 454FF0153 VHT 13
2=subscript
```

This adds only 21 bytes to the code and enables you to print:

H2SO4 E=MC²

without affecting the operation of the other printer codes like italic, enlarged and so on.

I realise it is rather a brute force approach and that it isn't a particularly elegant piece of code — the codes to turn on super/subscript are sent again when turning them off.

However it does enable one of the more useful features of the Epson to be used. — G.W. Lynes, Buckhurst Hill, Essex.

Letters on View

I OWN a copy of Acornsoft's View and am having trouble when it comes to printing out letters. It will only print

halfway across the page.

I have an LX80 Epson printer and I am getting very frustrated. Please help. — Steven Talbot, Swavesey, Cambs.

● You must set the ruler to 80 columns to print the full width of the paper.

The easiest way is to work in Mode 3 or Mode 0. Don't forget to type NEW before you start, otherwise you may still have the Mode 6 ruler set at 40 columns.

Aerial selection

I AM in doubt whether to choose either Phantom Combat or Strike Force Harrier. Could you review both, and suggest which one you think to be the best? — Peter Gunn, Wick, Calthness.

● Phantom Combat was reviewed in the April 1986 issue of *Electron User* and Strike Force Harrier was in the January 1986 issue.

Both are excellent games and were recommended by the reviewers, so the choice is entirely up to you — sorry.

Try to see both games before you buy. Either way you'll get value for money.

Increased memory

I WOULD like to know if it is possible to increase the memory of my Electron. Does sideways ram do this?

I need about 40k for the program I have in mind. — J.W. Hogarth, Southend.

● Both Slogger and PMS have ram upgrades for the Electron in the form of second processors. These provide you

with a vast increase in memory available.

Remember, though, that nearly all software is designed to run on an unexpanded Electron without this ram and will not take advantage of it.

Roms such as View and Starword do take advantage of the extra memory, enabling you to write much longer letters and documents.

Of course your own programs can be much longer and you'll rarely run out of memory. We'll be reviewing the Slogger upgrade in a future issue.

Sideways ram is totally different to these products and will not give you more memory. For a full explanation have a look at the sideways ram article in the February 1986 issue of *Electron User*.

Games proficiency

AS a recent purchaser of an Electron I am horrified at the poor quality of software which I have come across. With the machine came, inter alia, a program called Boxer from Acornsoft.

This is a disaster, as the player has next to no chance of success in achieving the object of the game.

My latest purchase, which I have just received, is Volume 1 of your own Ten of the Best which contains, "as a freebie", Roland Waddilove's Jam Butty which also is a disaster as there is no way that the player can get off the ground floor.

It seems to me that the instructions are so poor that it is no wonder the program was previously unpublished.

I have not yet had time to peruse the remaining programs on this cassette but I hope that they will be of much

higher standard than the two I mention.

Incidentally, why have the whizz kids not yet found a way of recovering a program using OLD instead of leaving the poor user to guzzle round with rewinding and reloading?

I remain, as yet, a disgruntled and annoyed Electron User. — Simon A. Smith, North Berwick, East Lothian.

● It takes a lot of patience and practice to become proficient at a game. You would be very disappointed if you paid five or ten pounds for a game and found it so easy that you completed it the same day.

There are usually puzzles to solve and techniques to master and the game may take several weeks to complete.

On the first screen in Jam Butty run right until you hit the girder. Take seven steps left and hit the right and jump keys simultaneously. You should now find that you are off the ground and standing on the first level.

We'll leave it to you to work out how to get on to the next girder.

It is impossible to recover commercial software after pressing Break.

A way with vultures

MY mother and I decided to type in the program Necromancer from the listing in the February 1986 *Electron User* and it was a success.

We had few bugs and they were corrected in no time at all. The whole family enjoys it and my highest score is eight out of ten.

However one thing bothers me. Although I have the torch

From Page 47

and I know the culture doesn't like light I can't scare it away. This is getting quite frustrating.

If anyone knows how to scare the vulture away please, please will you let me know. — John Lewis, Grantham, Lincs.

● Try throwing the torch at it!

Handicapped Snapdragon

THE Snapdragon in the July issue of Electron User is blind! In order to obviate this patently unfair disadvantage line 1280 should read as follows:

```
1280 VDU23,224,1,7,43,95,4
7,15,9,13,25,225,17,189,255
,255,255,255,0,128,27,226,2
8,184,248,248,248,144,2
16,23,227,88,120,110,120,12
6,24,12,12
```

Long may your informative and entertaining magazine continue. — Derek Mescham, Ebbw Vale, Gwent.

● Many thanks for the correction Derek, we hadn't noticed the missing eyes.

Line 1330 wasn't very clear in some copies and should read:

```
1330 IF N#N1# MOVE232,318
:VDU18,0,0,224,225,226,9,11
,227:SOUND,5,2,50:FOR I=1
TO 30:GCOL,RND(3):MOVE325,
334:DRAWX232,322,(Y2X+10)-RND
(42):NEXT:ENDPROC
```

Double height text

I HAVE had an Electron for about a year now and I've hit a problem.

On the BBC Micro it is possible to print normal type in double height by using CHR\$(141).

This is not possible on the Electron. Could you please tell me how to do it? — David Laver, Dewsbury, West Yorkshire.

● The following short program demonstrates how to print double height text.

To use double height in your own programs include the

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.**

procedures PROCbig and PROCa.

```
10 MODE 1
20 COLOUR 2
30 PRINT TAB(10,15):
40 PROCbig("Electron")
50 END
60
70 DEFPROCbig(A$):FOR I=
1 TO LEN A$:X=ASC(MID(A$,
I,1)):A%=10:X=X+A%*10:CA
LLAFFFFI:FOR J=0 TO I:VDU27,22
5:FOR K=2 TO 9:VDU18,0,4,J,X+
MOD(I,2):NEXT:VDU225,10,8:NE
XT:VDU11,11,9:NEXT:ENDPROC
80 DEFPROCa(X,X%,A%):PR
INTTAB(X,X%,A%):VDU5:MOVE
R,X*64-8,1016-X*72:PRINTA$:V
DU4:ENDPROC
```

Left in the dark

PLEASE could you tell me if there is a light pen available for the Electron. — W. Hall, Billericay, Essex.

● We haven't seen any light pens for the Electron. It may not be possible to produce one as it lacks the special chip the BBC Micro uses for its lightpen.

Upgrade unnecessary

AS you have said many times before in Micro Messages, no one has made a device to upgrade the Electron's 1.00 operating system to 1.20.

I have noticed that a 1.20 operating system is on sale from Watford Electronics for £6.

Would it therefore be possible to unsolder the original

1.00 operating system, and fit a new 1.20 operating system?

I have a friend who owns a BBC B which originally had a 0.1 operating system, and has now upgraded it to 1.20 (his BBC Micro was one of the first to come out).

If this is possible would I then be able to run non-mode 7 BBC software, but still be able to run Electron software?

— R. Adams, Surbiton, Surrey.

● The Electron's 1.0 operating system is equivalent to the BBC Micro's 1.2 operating system so there is no need to upgrade.

The BBC Micro's OS would not work in the Electron.

Process controls

I HAVE recently bought an Electron along with a Plus 1 and 3 units and have taken out a year's subscription for your magazine, which I find excellent value for money.

My motive in doing so is to learn how computer technology can make things work, especially for applications in industry such as chemical process control.

Generally speaking there seems to be a lot of articles and technology about for the purposes of information storage and manipulation, but not of the kind for control of gadgets — motors, valves, sensors, and so on — in home or industry.

My efforts to learn of these techniques are being slowly helped by attending a local college, but some DIY applications along these lines in your magazine would be welcome and in general I feel well received. — J. R. Fraser, South Hylton, Sunderland.

● A standard Electron isn't

really suitable for control applications and you'll need a Plus 1 at least.

Most hardware projects would require Advanced Computer Products' Plus 5 interface as well since this provides a Tube interface, user port and 1 MHz bus.

With an Electron, Plus 1 and Plus 5 you should be able to use some of the hardware add-on's for the BBC Micro.

We'll be investigating this possibility as soon as we get our hands on a Plus 5.

Moving plea

I LIKE trying to program games on my Electron, but I cannot make a character move around the screen without pressing a key or using a joystick.

Please could you tell me how to do this. — Martyn Graham, Isleworth, Middlesex.

● This short program will move an asterisk smoothly across the screen. You could easily redefine the asterisk to be a space invader or pac-man.

The FOR...NEXT loop controls how far across the screen it travels and the 10 in line 40 determines how far down the screen it is.

```
10 MODE 4
20 FOR X=1 TO 39
40 PRINT TAB(X,10) "*"
50 FOR delay=1 TO 100
60 NEXT
70 NEXT
```

Order of the !BOOT

COULD you please solve a puzzle for me. Looking back at my Electron User I noticed in the August 1985 edition in Micro Messages a letter regarding the message:

**Acorn Electron
Searching
File not found
Basic**

You told David Bociek that when Shift+Break are pressed the disc drive will look for the file !BOOT.

I have just bought the Cumana disc drive and have tried for ages to try to get the

IBOOT to work, but have had no luck.

I do have an additional rom, but this has no effect on the IBOOT.

Also, looking inside my Cumana disc interface I find an R16 missing from the circuit board. Is this the problem? — Richard Bates, Beckenham, Kent.

● None of these are the problem. After creating the IBOOT file you need to tell the Electron what to do with it, otherwise nothing will happen. You do this with the OPT command:

*OPT4,8

means ignore the IBOOT file and is the default state. Enter:

*OPT4,1

to tell the Electron to:

*LOAD :IBOOT

and:

*OPT4,2

to tell it to:

*RUN :IBOOT

The most common option is:

*OPT4,3

which means:

*EXEC :IBOOT

Rom problems

I SHOULD like to be able to use the Slogger T2P3 rom without the expense of buying a Plus 1.

Is there a rom socket within the Plus 3 or a position on the Electron circuit board which would allow the T2P3 rom to be pagged?

Also can you tell me where I can get hold of a circuit diagram for the Electron? — K. R. Towers, Great Eccleston, Lancs.

● There aren't any empty rom sockets in the Electron or Plus 3, so you'll have to buy a Rombox or Plus 1 and rom cartridge.

You'll find a circuit diagram in the Electron Advanced User Guide.

... and Rams

ON reading past issues of Electron User I notice that in Micro Messages you say that IC 18 was not plugged into the circuit board.

Therefore I wonder, if you have a Plus 3 fitted, can you

IN Micro Messages of May 1986 you said it was not possible to make a beep when there is a tape loading error. This is not so!

The BBC Micro on making an error issues a VDU 7. The

Electron OS does the same except that because the ULA is in cassette input mode it does not make a sound.

However for a period after the error is issued it is not necessary to be in cassette

input mode as it will take a moment to rewind the tape.

The enclosed program forces a beep every time a VDU 7 is made, regardless of the state of the ULA. — M. Chilton, Oxford.

10 FOR AX=1 TO 3

20 PX=ACOM

30 OPT AX

40 .init SEI

50 LDA L2BE

60 STA L70

70 LDA L2BF

80 STA L71

90 LDA @main MOD256

100 STA L2BE

110 LDA @main DIV256

120 STA L2BF

130 CLI

140 RTS

150 .main

160 CMP #7

170 BNE out

180 LDA L2B2

190 ORA #2

200 STA L2BF

210 LDA #50

220 STA L2FE06

230 JSR wait

240 LDA L2B2

250 STA L2FE07

260 RTS

270 .out JMP (L70)

280 .wait LDX #0

290 .y LDY #0

300 .i INY:BNE i

310 INX:BNE y

320 RTS

330)

340 NEXT

350 CALL init

place into the socket an 8k static ram, so making PAGE &E00?

If this is not possible, can you place ACPs 1770 DFS into the socket and so have both DFSs available? — David Jones, Greasby, Wirral.

● An EDO DFS is available from ACP, but you'll need their sideways ram cartridge to use it. You can't plug anything into the Electron's circuit board.

Flip for a better Hell

I HAVE just bought Stairway to Hell by Software Invasion which I saw advertised in the August 1986 edition of the Electron User.

While I find that this is a very good game I tried the BBC side of the tape on my uncle's BBC B and found that this is much superior.

I wonder if there is any program code which I could use to enable me to play the BBC version of the game on my Electron. — Tim Cluderay, Leeds.

● The BBC Micro version will only run on a BBC Micro and cannot be made to run on an Electron.

The Electron version may be improved by upgrading your Electron to a Turbo, available from Slogger.

Better boards

AFTER reading Trevor Duncker's letter in the August 1986 issue of Electron User I am inclined to agree with him about the shows — too crowded.

Concerning his problem with Micronet, perhaps he should try some of the independent boards. Some of these are very good and include sections about the Electron.

The Potbug bulletin board is free to use and is backed by a well established computer group.

Once a user has registered

he or she will receive our fairly regular newsletter written by the sysop.

At least one subsection contains articles for the Electron although it is the newest on the board.

Users with Electrons or those interested in adventures and fantasy games should look at "Out to Lunch... The Movie..." on registered Menu 2 of the Potbug board.

This can be accessed on 0782 503254 from 8pm to 11pm during weekdays or 2pm to 11pm at weekends.

The board is updated every two weeks and boasts a selection of dedicated subeditors. — Jon Hancock, Stoke-on-Trent, Staffs.

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.

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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.

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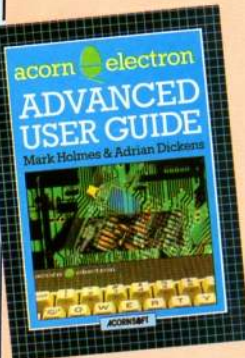
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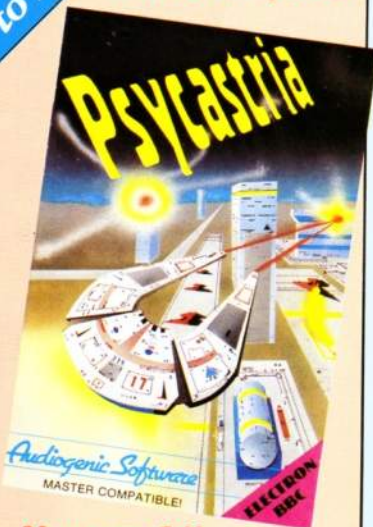
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PERHAPS the best way to increase the power of a computer is to add a second processor. This can be made to work in conjunction with the one already present and the workload shared.

It's like the old saying "Two heads are better than one" when it comes to sorting out a tricky problem.

When Acorn designed the Electron way back in 1982 they built in to it the ability to add a second processor.

In 1984 two second processors were released — a Z80 and 6502, named after the microprocessors they were based on.

Unfortunately these are expensive and can only be used with the BBC Micro since they use the Tube interface only present on that machine.

You could in fact plug one of these second processors into the Electron if you made up your own interface. However, they would still be too costly compared with the basic Electron.

Because of this PMS has brought out its own 6502 second processor E2P at less than half the price of Acorn's, and you won't need a Tube interface to use it either.

Let's go into more detail about what a second processor is and how it works.

It can be thought of as a separate computer complete with 64k of ram connected to the Electron. There aren't any plugs, sockets or keyboard though, just an edge connector which plugs into the Electron.

Unlike the Electron, it does not have any of the usual methods of input or output, which means that it can't load, save, print on the screen or even read a keyboard.

With two processors the workload can be shared so these relatively time-consuming tasks are handled by the Electron which acts as an Input/Output or I/O processor while the second processor gets on with the business of actually running the program.

What happens when you load a program is that the Electron loads it and passes it over to be stored in the second processor, not the Electron itself.

When you subsequently run

that program it is run in the second processor. However when you print something on the screen the characters are passed to the Electron and it is the Electron that prints them.

Of course while the Electron is busy printing, the second processor can get on with the task of running the program and it doesn't need to wait for the Electron to finish.

So you can see that while the Electron is carrying out one task the second processor is busy with the next and the whole program runs much faster.

Well, that's the theory anyway. What is a second processor like in practice?

The E2P, Electron 2nd Processor, is a fairly large but slim cartridge which plugs into either of the Plus 1 cartridge slots.

It contains its own 64k of ram plus a few odd chips here and there to handle input and output to the Electron through the edge connector.

The Tube operating system is required before the second processor can be used otherwise its presence simply won't

be acknowledged.

The version I had for review was on disc and the second processor could be initialised with Shift+Break. After a slight pause the current language is copied across to the E2P since all you get is 64k of ram — no Basic, no operating system.

Normally this language will be Basic but it could be View, Viewsheet, Logo or whatever. This occupies &8000 to &BFFF in the memory map.

The operating system for the second processor is tiny since the Electron does all the hard work and only occupies &F800 to &FFFF, which means that 14k from &C000 is free for data or machine code.

The Electron handles all screen output and contains the screen memory. Consequently HIMEM — don't forget your program is in the second processor and not the Electron — is permanently fixed at &8000 whatever the mode.

It means an extra 20k of memory in Modes 0, 1 and 2, and about half this in Modes 3 to 6.

Similarly the Electron handles all loading and saving, so the input and output buffers and disc workspace are contained in the Electron, not the second processor.

So even with a Plus 3, PAGE is firmly set at &800. No that's not a typing error, you get around 30k of memory free in any mode, even with discs!

Machine code programmers can use the spare 14k at &C000 as well.

For instance, using View in 80 column Mode 0 with a Plus 3 on a standard Electron there is enough memory for around 4.5k of text, whereas with the second processor you get a massive 30k.

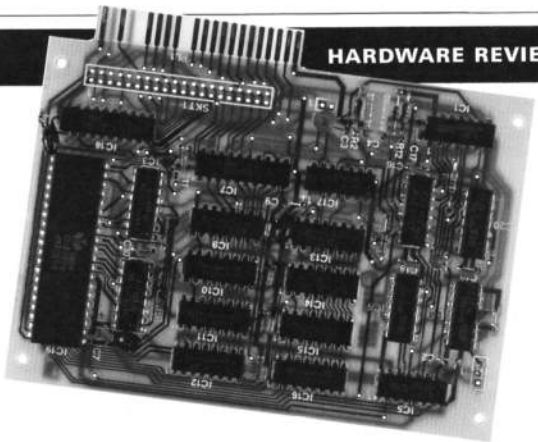
PMS also supplies HiBasic, a version of BBC Basic which sits at &B800 giving around 44k of memory free for Basic or machine code regardless of mode.

This is ideal for large databases, adventures and programs which handle large amounts of data.

With two processors run-

High speed — and memory to match

Roland Waddilove looks over the PMS Second Processor



HARDWARE REVIEW

From Page 55

ning in parallel there can be quite significant speed increases, so I carried out a few simple tests. Table 1 shows the results for a standard Electron, Electron plus E2P and BBC Micro.

Test 1 is a simple loop counting up to 30000 in Mode 6 and test 2 is the same test in Mode 1.

Notice that a normal Electron slows down in high resolution modes and that the second processor actually speeds up. It runs over three times as fast and is nearly the same as a BBC Micro.

Tests 3 and 4 are maths programs calculating SIN, COS and TAN in Mode 6 and Mode 1.

Again notice that the second processor version runs just as fast in either mode and almost as fast as the BBC.

Test 5 is a graphics program running in Mode 2. This is quite interesting since

the Electron and second processor are both fairly slow, with the BBC Micro streets ahead. The reason is that the Electron handles all output to the screen whether you've got a second processor or not, so it makes little difference.

Test 6 really shows what the second processor is capable of. It's a short program with a lot of maths and graphics, so while the Electron is busy drawing on the screen the second processor is racing ahead and working on the calculations.

Here the second processor is faster than a BBC Micro and over four times faster than a standard Electron.

Speed tests do not tell the

whole story though and a second processor isn't quite as useful as it may at first appear.

The problem is that nearly all software is designed to run on a standard Electron and it simply won't work with a second processor, though it's a simple matter to unplug it.

The trouble is that all the best software uses illegal methods to achieve its aims.

For instance arcade games write directly to the screen memory for speed and colour. However the screen memory simply isn't contained in the second processor so you can see the problem, or should I say, you can't!

So for the vast majority of software the second processor

is effectively redundant. Of course you can write your own software taking advantage of the great speed and memory but not everyone is an expert programmer.

What you get when you buy a second processor is a superb piece of equipment which is offset by an almost total lack of software to take advantage of it.

It's great for word processing, spreadsheets and databases, but apart from these you'll have to write your own programs.

Even some *Electron User* games won't work with the second processor.

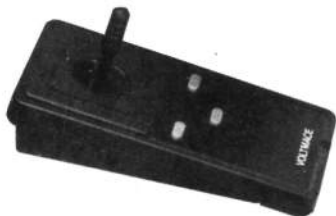
It's the same old problem. A computer or peripheral is useless without software and software houses won't write software unless there is a large user base.

The solution is, as always in your hands. If enough Electron owners buy second processors the software houses will start producing software. ■

Test	Electron	E2P	BBC
1 (Mode 6)	8.13	5.72	5.29
2 (Mode 1)	18.96	5.62	5.29
3 (Mode 6)	15.68	10.72	9.91
4 (Mode 1)	37.82	10.53	9.91
5 (Mode 2)	18.91	15.78	4.36
6 (Mode 2)	119.10	28.58	30.22

Table 1: Results of the speed tests

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WHY ADD A SECOND PROCESSOR?

It has long been realised, by companies such as Acorn, that the best way to increase the power of a computer is to add a Second Processor. BBC users have had this facility for some time, and now PMS can add Second Processor Power to the Electron. The E2P has a full 512K of RAM on board, and a 6502A running at 2MHz. With the E2P installed the Electron becomes an I/O processor, thus freeing the Second Processor from the time consuming, and memory grabbing I/O tasks - controlling disk, keyboard, screen updating etc. The current language, (BASIC, VIEW etc) runs in the E2P, only interrupted from this task when communication

with the I/O processor is required. The E2P Operating System, which controls the Second Processor, fully implements the Acorn TUBE protocols. Software written obeying these protocols will run in the E2P. The default language in the E2P is automatically copied into the E2P, on a CTR-BREAK and certain other languages (eg HIBASIC) can be directly *LOADED into the E2P. The Electron version of HIBASIC, which gives 44K free, can be obtained from PMS. The E2P will work in conjunction with the Slogger Turbo, and makes the Electron/E2P even faster! The E2P is compatible with the PLUS 3 and Cumana disk interfaces.

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STORMING THE CITADEL

AS promised, this month sees the Citadel Special. I don't consider it to be an adventure in the strictest sense, but judging from the vast number of questions about it lots of you do—and it is certainly popular.

The object of the game is to collect five crystals. To do this you must solve a series of puzzles.

There are also three crowns to find. It is possible to complete the game without finding them, but if you do manage to find crowns plus crystals you get the maximum score of 99 and a message

telling you that you are now the ruler of Citadel.

Crystal 1

This is the easiest one to find. It is situated above the main hall and you should unlock and travel through the freezer by using the cyan/white key found in the west wing.

Crystal 2

This can be found in the witch's house. You must get the trampoline from the west wing, drop it on to the red square next to the house and take the key that you now find there.

Use this to unlock the door

into the west tower and then get the green skull.

Next go to the east side of the castle and get the magenta bone. Return to the witch's house and use the trampoline to get down her chimney.

Then jump over the cauldron, dropping the skull and bone into it. Go and get the cyan bone from the pyramid and drop that into the cauldron too.

The witch will attack you but will explode when she reaches the cauldron, revealing an entrance that will lead you to the crystal.

Crystal 3

This is in the pyramid. Take the chicken and drop it in the kitchen. It will slowly turn red as it cooks.

Take it across the ocean and in to the temple and give it to the wolf guardians.

Now get the green man from the east side of the island. Return and, leaving the green man in a convenient location, collect the Egyptian masks from the well and the prison.

Take these to the pyramid and find the secret entrance at the top right hand side of the screen.

Drop the masks when you see the mummies and they will freeze.

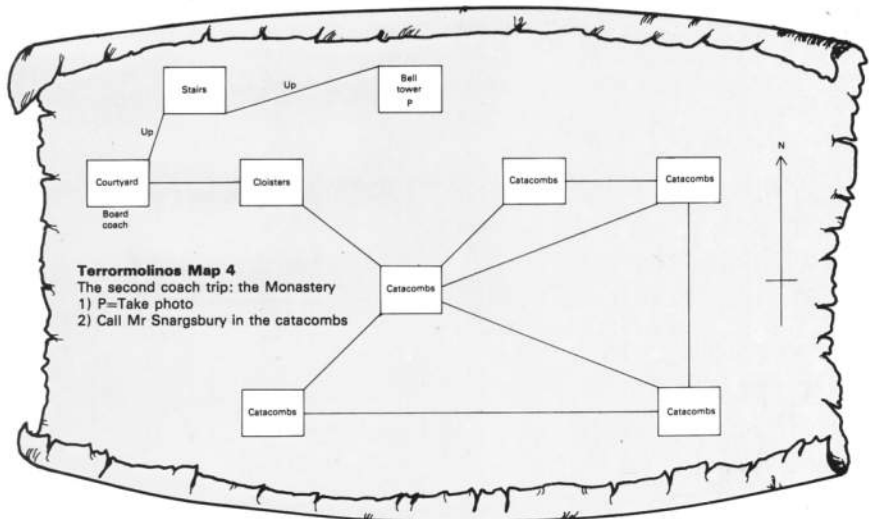
Now head for the bottom of the pyramid and climb on to the platform, taking the green

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Geoff has also sent in three adventures that he has written using the Quill. He is considering marketing them and I would highly recommend them. Please contact Geoff at the above address for more information about them. And if you write to Geoff for help, please remember to enclose an SAE.



man with you and it will be turned into a crystal.

Crystal 4

This is in the laboratory underneath the well. Get the ice crystal from the cellar and go to the east tower.

The water will freeze over allowing you to cross and get the green/white key.

Use the key to get into the well wheel and pull the lever.

Now get the cannonball from the mountain and the gunpowder from the bag from the west wing, above the arena.

Go down into the well and to the lab. Walk over to the cannon and it will fire, revealing an entrance to another location. Enter here and get the crystal.

Crystal 5

Pull the lever in the top of castle location and then go on to the roof via the west tower.

A platform will now be moving up and down. Climb onto it and jump off to the right when it gets to the top.

You will enter the next screen and land high up on the central castle. Go in the door marked with a C and you will find the crystal.

The crowns

The first crown can be found in the well. Leave the ice crystal in the location that you found the Egyptian mask and go in to the room that is revealed to the right.

The second crown is in the witch's house. Enter it and go one location down.

Kill the monk and climb the ladder. Jump when you get to the top of the ladder, and once you start to move press the left movement key.

If you get the timing right a secret passage will be revealed leading to the crown.

The last crown is below the castle near the cellar. Go two locations to the left from the room where you found the ice crystal.

Use the trampoline to jump up and hit the roof, and after you have done so a few times start to move to the left.

Soon you will find you have uncovered yet another secret passage and have found the last crown.

The ice crystal

This is found in the cellar and freezes water, enabling you to stand on it. Use this to get the green/white key for the well wheel.

Also, if dropped at the very bottom of the well it will allow entry to the right to another part of the well where a crown can be found.

The cyan stones

If these are taken to Stonehenge you will be rewarded with large energy bonuses.

The barrel

When filled with water, from any source, it will allow

you to douse a fire.

This is mainly used to get past the fire in the east fireplace, allowing entry to the top of castle location. It can also be used to get on to the witch's house.

The chicken

When cooked in the kitchen the chicken will turn red. Taken to the temple, it will appease the wolf guardians, allowing you to enter the temple at any time.

Nothing!

Locations with nothing in them are handy for leaving

your possessions.

Trampolines

Used to gain height and enable you to reach otherwise inaccessible locations.

Jewelled figure

If you drop the crystals in the location where you found the trampoline and then go under the radar dish to the starport you will be transported to the alien planet.

Taking the jewelled figure to the starport will destroy the transporter. Does anyone know why this needs to be done?

HALL OF FAME

Robin of Sherwood (continued) – Martin Hanson

Once you have found Siward, GET THIEF. Now wait somewhere along the serf's route through the forest and when he appears AMBUSH SERF. Then GO CART, WAIT, LEAVE CART. You are now inside the castle so GO BATTLEMENTS, GO DOOR, GO LEFT, DROP THIEF, and then KILL THIEF. EXAMINE CHEST three times, take what you find and then GO DOOR, GO RIGHT, GO WINDOW.

Sphinx Adventure (continued) – M. Alexander

E-S-D-N-E-CROSS BRIDGE-E-S-S-PAY TROLL-CROSS BRIDGE-W-S-S-TAKE SAPPHIRES-N-N-E-E-KILL OGRE-NO-SWORD-N-TAKE CUSHION-E-N-U-TAKE EMERALD-D-D-WAVE WAND-CROSS BRIDGE-DROP BOTTLE-DROP SILVER-DROP RUG-DROP OPALS-DROP CUSHION-DROP COINS-DROP CARROT-DROP BOOK-DROP EMERALD-CROSS BRIDGE-U-S-W-S-W-W-D-TAKE JACK-RUB RING.

Countdown to Doom (continued) – Craig Romans

To get the motor to the cargo hold from the rocky hole: PULL LEVER, U, SW, SE, W, N, SW. To get the reactor you must go

From Page 59

into the artifact and move along the corridor, remembering the order in which the shapes appear on the walls. Then push the niche.

After you fall GET PENTAGON, L, GET SQUARE, R, GET TRIANGLE, L, GET HEXAGON. Now you must find the room with the hole in the floor. Then GO DOWN, GET SWORD, E, GET REACTOR, W, N, SAY FLEZZ, N, NW.

Sadim Castle (continued) - The Raven

Mend the farmhouse roof and the farmer's wife will give you a pitcher. Give the pitcher to the monk and he will give you some keys.

Pray in the chapel and you can get the Bible. Use the Bible for protection against the mist. Read it when the mist forms, not when the howling starts. To get into the hunting lodge climb the great oak tree outside the lodge and use the gold key you find there to unlock the lodge door. Inside is a hunting knife. Use the knife to kill the cheetah.

To get the wheelbarrow through the undergrowth to the gardener go S - S - E - S - W - W - S - S - E - E - E - E - N - NW - SW - S - S - S - W - E - E - E. Give the wheelbarrow to the gardener and you will receive an amulet.

To lower the drawbridge, ring the bell. To raise the portcullis insert the wooden stake from the crypt into the winch and wind it. You must have the amulet when you go through the portcullis or Lord Sadim will drop it on you.

Go in to the wood-panelled room and enter the inglenook fireplace. Climb up the chimney and then go along the passage. At the end is a room containing the bronze key which will unlock the trapdoor in the kitchen.

In the cellars/dungeons below the kitchen you will see Leonara beckoning to you. This is where you must dig with the pickaxe.

FEEDBACK

Geoff Larsen has written in with help from Linda Smith's problems in Ghost Town. Linda should ensure that she is wearing the silver spurs and then SAY GIDDY to make the horse move off.

To get to the mountains she should JUMP RIDGE. The safe must be opened with gunpowder, and don't be distracted by the violin strings.

To return from the canyon or tepee SAY HOW to the Indian ghost.

Geoff can also help with earlier problems: To avoid the gamekeeper in Ten Little Indians, go into the gatehouse up into the tower and tie the rope to an object you will find there. Then climb down the rope.

In The Wizard Akryz Russell Blake should return the fox to its home and then FOLLOW FOX. Feed the chickens in the hen house to reveal a trap door.

In Gold Baton the oil-soaked rag should be

SQUEEZED above the lamp. To get past the eerie figure WEAR CLOAK. If the matches get wet RUB RING and a genie will appear.

In Time Machine FEED BRONTOSAURUS with the biscuits. To solve the problem with the passage under the Sphinx go to the weapons room, PULL LEVER and then WEDGE (or JAM) LEVER. This stops it sliding back and reveals a hidden door.

To enter the maintenance wagon in Circus you need a bar. This is found after crossing the tightrope using the slippers found in the chest.

In Escape from Pulsar 7 there are two ways out of the first three locations, one of which isn't usable yet! You have to go through the air vent. This really is possible!

Apparently I muddled one of Geoff's answers in a previous Feedback. In Strange Odyssey, PULL ROD, RUB PLASTIC, PUSH ROD, RUB PLASTIC. ■

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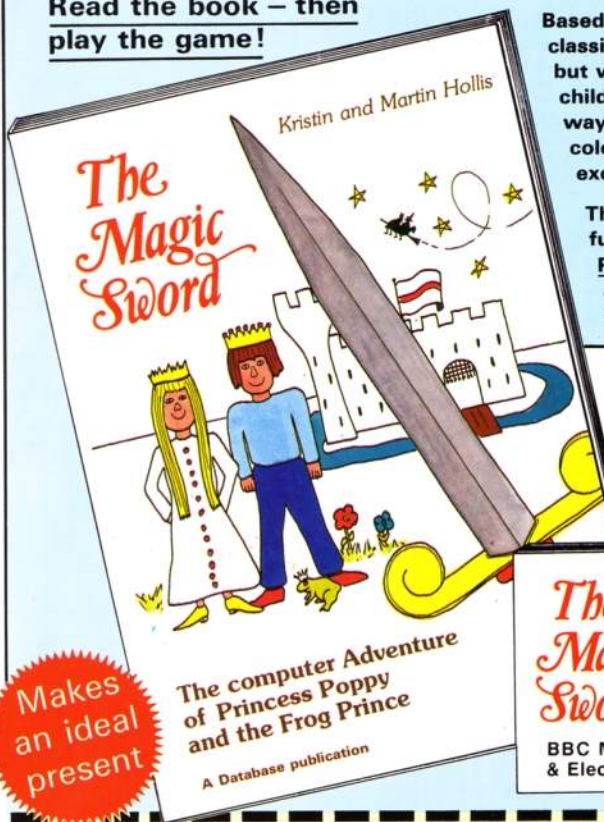
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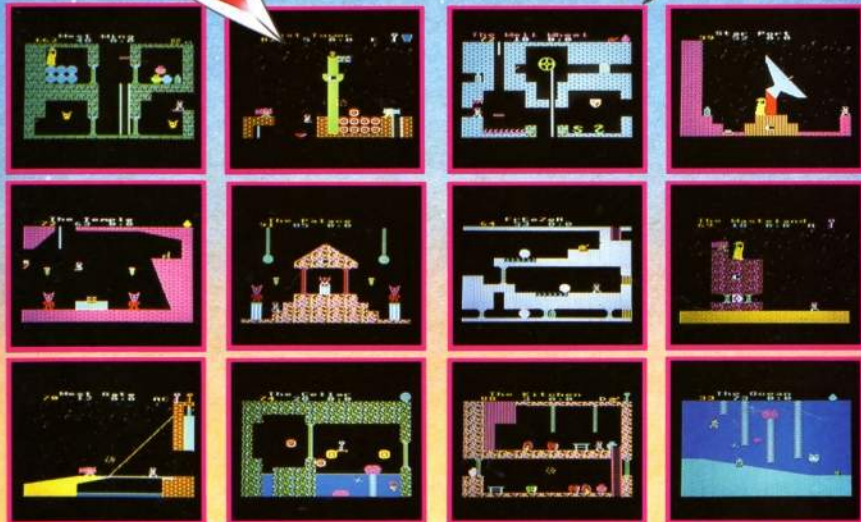
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