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THIS WEEK'S SOFTWARE  
SEE PAGE 70

POPULAR

# Computing WEEKLY

35p 10-16 November 1983 Vol 2 No 45

## This Week

**The Word**  
Mike Grace looks at a word processor plus 80 column board for the Commodore 64. See page 16.

**Ant Attack**  
David Kelly talks to Sandy White, author of 3D Ant Attack. Page 12.

**Filing system**  
Sam Knowles presents a filing program that can be used on cassette or Microdrive for 48K Spectrum. See page 28.

**New Releases**  
All the latest software including Morris meets the Bikers from Automata and Doom Bugs from Work Force. Page 68.

**★ STAR**  
Walk on the Wall on Commodore 64.  
See page 10.  
**GAME★**

## News Desk

### Acorn shoots itself in foot

ACORN has run into serious problems with its Electron computer.

With retailer orders, according to Acorn, over the 150,000 mark, the company has been able to do little else than supply a trickle of demonstration models to dealers in the two months since the Electron was launched. Software, too — the 12 titles announced with the Electron — is nowhere in sight.

This, despite claims earlier this year by Acorn's joint managing director Chris Curry that

Continued on page 5

### IBM announces Peanut Junior

AS expected, IBM has announced its Peanut home computer — to be called the PC Junior.

The machine, very like a cutdown IBM PC, is expected to be in the shops in North America and Canada early in the New Year but, at present, there are no plans to sell the machine in the UK.

As was the case when the PC was announced, only a version compatible with the American tv standard is available, and it is expected to be

some time before a PAL version will be manufactured for the UK.

The PCjr is based on the same chip as the PC — the 16-bit 8088, and it will be available in two versions.

The PCjr Entry model has 64K Ram and costs \$669 (around £450). The PCjr Expanded model has 128K Ram, includes a built-in 5¼ inch disc drive, with 360K dual sided, double density discs and will sell for \$1,269 (around £850). The Entry model is capable of being up-graded to the Expanded version.

Otherwise, the two models are identical. Neither has a built-in display but the PCjr will work with an ordinary tv or monitor.

Both have 64K Rom which includes Basic, and both feature a separate keyboard connected to the main unit by an infra-red link. The link operates in a similar way to a remote tv controller and has a range of about 20 feet. A cord

Continued on page 5



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Continued on page 61

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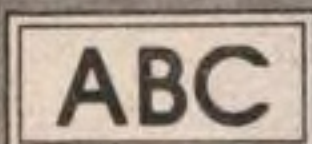
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Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your own program returned you must include a stamped, addressed envelope.

### Accuracy

*Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

## This Week

**News** 5

Electron backlog

**Letters** 7

TV stars wanted

**Star Game** 10

Walk on the Wall on Commodore 64

**Street Life** 12

David Kelly talks to Sandy White



**Reviews** 16

Mike Grace looks at The Word

**Dragon** 21

Sound and graphic capabilities

**BBC & Education** 26

Streetscapes by Mike Batty

**Spectrum** 28

Filing system by Sam Knowles

**Programming** 31

Aquarius by Keith Brain

**Commodore 64** 41

Sprite graphics by Pete Gerrard

**Open Forum** 43

Six pages of your programs

**Microradio** 51

Communications

**Adventure** 57

Tony Bridge's corner

**Peek & Poke** 59

Your questions answered

**New Releases** 68

Latest software programs

**This Week** 70

Top 10 plus all this week's software

**Competitions** 71

Puzzle, Ziggurat, Losers

## Editorial

The ubiquitous International Business Machines (IBM) has spawned yet another computer.

PCjr, known before its debut as Peanut, arrived in New York last week after months of speculation as to its specifications and capabilities. In the event there were few surprises, though the keyboard is physically separated from the computer and linked only by an infrared device.

Like its elder brother, the IBM PC (perhaps IBM will now rename it the PCsr?), the PCjr is a considerable departure from IBM's usual territory of mainframes and minis. Based on the same 16 bit microprocessor as the PC, the PCjr comes in two different models costing \$669 or \$1,269. The more expensive model includes extra memory, two cartridge slots and a disc drive, and is likely to compete with machines such as the Apple IIe. The cheaper model is aimed at the top end of the home computer market, currently dominated by Commodore in the US.

The PCjr will not go on sale in the US until the beginning of next year, and is unlikely to appear in the UK for at least nine months after that.

Both Acorn and Sinclair, who are planning to release business machines in the first half of next year, will be watching the PCjr closely.

## Next Thursday

Split second reactions are needed in **Crossfire**, next week's star game for the BBC B by Abdul Nathekar. In this two player, joystick operated, game, you must place your crosshair sight over your opponent's and fire before he does. The first player to score 10 points wins.

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### BLASTERMIND

At first glance this might seem to be just another version of a very popular game. How wrong can you be!!! True, the start is simple enough. The Spectrum picks a code of numbers or colours with a selection of levels of difficulty — and invites you to do the same. You then take it in turns to guess each others code from the clue supplied after each guess. An extremely well written, fast and very clearly displayed game, with almost inevitable defeat.

This was exactly as intended but unfortunately *something went wrong*. During the programming strange uncomplimentary messages began to appear on the screen. At first they were so few they were not taken too seriously, but soon they could no longer be ignored. Somehow the Spectrum had been given a personality — a rather devious, supercilious, dislikeable, hateful, horrible mind.

\* Side B contains a version of the game compatible with the excellent Currah  $\mu$ Speech unit — even worse!! \*



SPECTRUM 48k £5.50

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### HARRIER ATTACK

Pure machine code, super-fast, action-packed, highly addictive arcade-style game requiring great skill. The harrier takes-off from an aircraft-carrier and flies over seaborne defenses to attack enemy installations on a nearby island. The harrier may fly faster, slower, higher or lower, and has bombs and cannon fire with which to protect itself and make its own attack. If it flies too high it is detected by enemy jet-fighters (which it may counter-attack) — so it needs to hug the mountainous terrain which also varies with every new game. But the island is heavily defended by anti-aircraft rockets and tanks, which again the harrier may counter-attack or try to fly through. A tally is kept of fuel, speed, altitude, ammunition, plus player score and high score. Finally the harrier must make its bomb-run over the enemy base before returning past more hostile shipping to its own carrier.



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### SCUBA DIVE

Pure machine code with super cartoon graphics. You are in control of a diver who must swim down through jellyfish, sharks, barracuda and a host of other under-sea nasties to locate the entrance of a submarine cave. He must then follow its twisting and branching passages which change with every new game, to locate the magical giant oysters with their fabulous treasure of enormous pearls. Many of the passages lead to dead-ends, while some are filled with horrible underwater monsters. Each dive has to be timed carefully so that there is enough oxygen left for the return journey, which is further frustrated by the diver's boat shifting anchor and threatening to decapitate him with its propellor. This game which features three divers, player score, high score, hall of fame and sound effects, presents perhaps the ultimate epic arcade adventure.



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Telephone: (0323) 768456 Telex: 87465 EXIM Brighton

## Peanuts Jr

Continued from page 1

connection can also be used.

The PCjr has twin cartridge ports (the PC has none), cassette port, twin joystick ports, modem and interface, light-pen port, tv and composite video outputs, RS232 serial interface and an additional I/O bus. Options include a thermal printer priced at \$175, joysticks and 64K Ram pack.

Most programs available for the PC will run directly on the PCjr, although the up-dated 2.1 disc operating system may cause some difficulties.

A number of software cartridges have also been announced for the PCjr — mostly games: *Crossfire*, *Mineshaft*, *Mouser* and *Scuba Venture*. There is also an extended Basic cartridge.

IBM hopes to produce 20,000 machines for the US and Canada this year — only enough to supply each dealer with 15 machines. Although IBM plans to make over 300,000 PCjrs next year, the company's manufacturing capacity is already severely stretched by the run-away success of the earlier PC model. PCjr may not, therefore, be available in the US in volume until well into 1984.

## Acorn

Continued from page 1

the delays and production problems which characterised the early days of the BBC machine would not befall the Electron.

Even WH Smith, the only High Street chain to be offering the computer, has received but a few machines. A WH Smith spokeswoman said: "We are having to disappoint customers — we are not able to supply demand. What we have had has sold out and while we are expecting more deliveries, the amount will still be well below demand."

The problems all appear to stem from serious production difficulties at Astec in Malaysia, at present the only Electron manufacturer.

Acorn has quickly looked for alternative manufacturing sources and has found Hong Kong manufacturer Wongs and South Wales AB Electronics.

Unfortunately, the first Wongs Electron will not come

## Aquarius is still alive and kicking

THE Aquarius computer, recently abandoned by troubled Mattel, is far from dead.

Its Hong Kong manufacturer Radofin, which is to take over selling the machine when Mattel bows out later this year, has announced two new machines.

The Aquarius 2 will be launched in January, to be followed by a more up-market Aquarius 3 machine in April. Both computers will be compatible with the present range of Aquarius cartridge software and peripherals.

Aquarius 2 will be very similar to the existing Aquarius 1 machine, but with a full-size,



full-travel keyboard and additional Ram. It will have 4K on-board plus an additional 16K or 32K either on-board or as a plug-in cartridge.

The Aquarius 3 will have 64K Ram and be a competitor for machines like the Commodore 64 computer.

No prices have yet been decided for two of the new machines. Radofin's managing director Alan Leboff commented: "I could guess, but there are too many hazards in doing so at this stage — who knows what will happen between now and the New Year?"

## Glasgow micro show

THE Scottish Home Computer and Electronics Show will be held at the Anderston Exhibition Centre in Glasgow from November 11 to 13. The show is open from 12 noon to 8 pm on Friday, 10 am to 6 pm on Saturday and 10 am to 5 pm on Sunday. Admission is £1 and 50p.

off its far east production lines until the end of November and AB will not get going until early 1984.



Chris Curry

So, it seems the situation is unlikely to improve before Christmas and, unfortunately, many of Acorn's orders from retailers are conditional on their being fulfilled before Christmas. In the words of one industry source — Acorn would appear to have shot itself in the foot.

"There isn't a problem with manufacture — they just can't make enough," explained an Acorn spokesman. "The production line target is 25,000 a month. As they ramp up to that, there is no way that they will clear the backlog."

## Irish Spectrum protection

DUBLIN-based software house Micro-Kraft has developed a range of software protection systems for Sinclair Spectrum programs.

Three software packages have been developed — *Basic Protectrum*, *Machine-code Protectrum* and *Anti-copier Protectrum* — designed to help software authors protect their work.

In each case, the *Protectrum* program is loaded into the Spectrum, followed by the software to be secured. The degree of protection required is then selected from a menu and the secured program is then saved out to tape in the normal way.

*Basic Protectrum* contains seven security systems to prevent merging, listing to screen or printer, to corrupt the program if edited, to store the program as junk on tape and to disable the *Break* key. *Basic Protectrum* will be available in December.

*Machine-code Protectrum* performs as for the *Basic Pro-*

## Mettoy struggles no more

METTOY, the struggling Corgi-toy giant which originally developed the Dragon 32 computer, has gone into receivership.

It was Mettoy's continuing financial problems which forced the company to sell off its Dragon 32 computer venture to Dragon Data in November last year, retaining only an 18 percent share.

In September this year, when Dragon itself ran into cash-flow problems, Mettoy was unable to contribute to a £2.5m rescue plan, and its shareholding in Dragon was further diminished to 15.5 percent.



Brian Moore

Now Mettoy's receivers will be looking for a buyer for the company's share of Dragon but, so far, no likely candidates have emerged.

Commenting on Mettoy's failure, Dragon Data's new managing director, Brian Moore, appointed after the Prutech rescue in September, said: "Dragon Data is a fully independent company and the news of Mettoy's receivership can have no significant effect on the running of this company."

Mettoy's collapse has long seemed probable. At the end of 1982 the company's debts stood at £10.5m. Deloitte, Haskins and Sells have been appointed as receivers.

*tectrum*, but for machine code programs, and *Anti-copier Protectrum* secures software against the use of so-called 'breaker' programs. The latter is claimed to work against all known copier programs. These two programs will be available in January 1984.

The *Protectrum* series is priced at £5.95. More details from Micro-Kraft, 48 Seacourt, Clontarf, Dublin, Eire.

## COMMODORE CASSETTE INTERFACE

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# LETTERS

## No offence

I am sure that A Pidgeon meant no offence to be taken from the title of his program "The Drumming Native" (PCW 29 September, 83).

The misuse of the word "Native" to mean 'dark skinned person of primitive mean' however could upset many of your readers.

Within living memory, it was the habit of certain colonialists to address mixed race gatherings as "Ladies, Gentlemen and Natives" with all the implied disrespect intended. The definition of the word (Latin *nativus* (Nationive)) would indicate that even A Pidgeon is a native — of somewhere!

A title such as "War drums" would have been much more suitable without overtones of ethnic bigotry.

Patrick Langford  
PO Box 152  
Nyeri  
Kenya

Certainly no offence was intended and if any was taken we apologise.

## Waste of space?

I would like to agree with a recent letter about high score charts.

You should publish the more popular ones, eg, the ones that appear in the Top 10 frequently.

I would like to complain about the amount of space which is used up by the silly picture in the star game. Surely this space could be put to better use (a machine code section)?

Not wishing to be a moaner, but who in the world handles your classified advertisements? For instance, why do you manage to get Spectrums under ZX81s for sale and what is *Trantam* or *Vetpac*, surely you mean *Transam* and *Jet Pac*?

PS. My high scores are 40,685 for *Pssst*, after revealing Robbie's Ultimate dream, and 142,110 for *Zzoom* after surviving 14 attacks, saving 244 refugees and getting past the

aircraft carriers.

Craig Mitchell  
28 Kirkstall Road  
Hollin  
Middleton  
Manchester M24 3EU

There definitely seems to be a groundswell of support for high score charts. To use an old phrase 'watch this space'.

We actually rather like the star game illustrations, but we would be interested to know what other readers think.

As for the classified advertisements, we're afraid that a few mistakes do creep in from time to time. However, we are doing our best to rectify them.

## Screen displays

In response to the letter from Kevin Jenkins (PCW 27 October-2 November), the solution to his problem of recording screen displays on to videotape is simple.

Instead of plugging the computer's aerial lead into the tv, connect it to the aerial socket of the video recorder. The video recorder should then be connected to the tv in the normal way. Next, by tuning a spare channel on the video recorder, you will be able to produce a clear image on the tv screen.

The VCR can now be used to record any image appearing on the tv screen; eg, listings, screen displays.

You can even record games as you play them, and then watch the action replay on video!

Perhaps this could be an infallible (albeit expensive) way of authenticating high scores should the demand for a table prove worthwhile.

John Clifton  
69 Davison Drive  
Cheshunt  
Herts  
EN8 0SX

## Arcade corner

Having read Jonathon Whitehouse's letter (PCW 27 October to 2 November) I would like to offer my views on the subject of a games high score table.

First, a printer dump would be impossible in the case of most commercial

games, which are unstoppable, and may easily be forged. It would be more difficult to forge a photograph, perhaps, but still not infallible. So, I would suggest a photograph together with the signature of a witness to the score.

I agree that only one game should be selected for each computer (or memory size), otherwise there would be little room in your magazine for anything else. As to the selected games, perhaps best-sellers should be chosen. A few suggestions are *Jet Pac* or *Arcadia* for the 16K Spectrum, *Manic Miner* for the 48K Spectrum, *Planetoid* for the BBC B, any of the Acornsoft 'Arcade Action' games for the BBC A, *Donkey King* for the Dragon, *Xenon* for the Oric, *Grid Runner* for the Vic20, *Preppie* for the Atari, *3D Defender* for the 16K ZX81 and so on.

While on the subject of arcade games, how about a page similar to Tony Bridge's adventure page? The score tables would be the central feature of this, but need only appear every two or three weeks.

I am not a great arcade fan, but enjoy the odd game and feel that, having seen the scope of the adventure page, an arcade page would have a lot to offer.

Another welcome feature would be a 'Manic Miner Hall of Fame', similar to Tony Bridge's list of *Hobbit* solvers.

Raymond Blake  
32 Derwent Avenue  
Rayleigh  
Essex SS6 8LE

An arcade game page is a very interesting idea. Anyone who would be interested in contributing to such a page, or who has comments to offer on possible format, please drop us a line.

## Zero score

Upon reaching 1,000,000 on *Jet Pac*, my score returned to zero. Is this a bug, or is it because there is not enough room on the screen for it? I got 5,455 more points, so my high score is 1,005,455 (beat that).

Also, in reply to Jonathon Whitehouse's letter on a high

score table, I think it would be a great idea.

Adrian Byrne  
140 Nutley  
Hanworth  
Bracknell  
Berks RG12 4HF

## Kong bug

I have found a bug in Ocean's excellent game *Kong*. If you go behind the last ladder on the bottom floor and wait until the bonus gets to 00000 and then rescue the girl, your score will then go up to about 65,000 instead of about 1,600.

Richard Couchman (12)  
22 Kings Hedges  
St Ives  
Huntingdon  
Cambridgeshire

## Extraordinary uses

We are planning a series of television programmes on the use of microcomputers and are looking for two groups of people — first, celebrities who love messing with their micros, and secondly any micro maniacs who have developed extraordinary uses. We do want extraordinary uses — not just unusual games, but blowing up balloons or feeding the dog.

Can any of your readers help us, I wonder? If so, perhaps they could write to me direct.

Adam Hart-Davis  
Producer  
Yorkshire Television  
The Television Centre  
Leeds LS3 1JS

## Pssst is tops

I buy your computer magazine every week and I always turn to the 'Top 10' games feature, but I have never seen the game *Pssst* by Ultimate in the Top 10 for the Spectrum. I have this game and I think it is better (nearly) than *Jet Pac* or *Cookie*.

If anybody else feels the same way as me, I think they should write to you.

Edward Beard  
100 Burnt Ash Road  
Lee  
London SE12 8PU

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## GAMES AND UTILITIES

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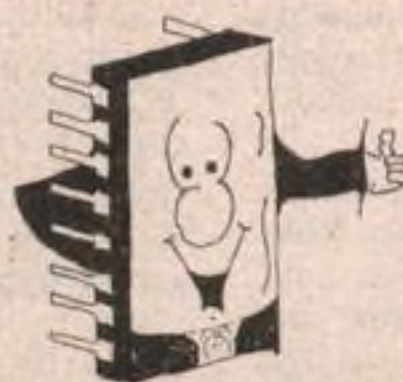
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ULTIMATE PLAY THE GAME is a trade name of Ashby Computers & Graphics Ltd. The Green, Ashby de la Zouch, Leics LE6 5JU.

# Walk on the Wall

A new game for Commodore 64 by S Semlee

This game is for the Commodore 64 + joystick. It looks very easy to start with, as all you have to do is get your man from one side of the the wall to the other. Of course, it's not that easy.

You have to jump over the gaps in the wall and avoid the flying insects. You score 50 each time you reach the end of the wall, but lose 10 each time you fall off.

## Notes

4	CLEAR SCREEN AND GOES TO THE TITLE AND INSTRUCTIONS	125-127 130-202
11-16	MOVES 64 CHARACTERS FROM ROM TO RAM	600-620 700-725
100	RESETS CHARACTER STARTING LOCATION TO 12288	730-735
105-110	READ DATA FOR SCREEN DIS-	800-1700 1710-1740 1750-1900 6000-6004 8000-8100

PLAY  
DATA FOR GRAPHICS  
PRINT AND POKE WALL ON TO THE SCREEN AND ADD COLOUR  
GET AND READ SPRITE DATA  
CHECK WHICH SHEET YOU ARE ON AND POKE THE CORRECT SPRITES ON THE SCREEN  
SET VARIABLES AND LOCATIONS OF SPRITE DATA  
READ JOYSTICK IN PORT A AND MOVE SPRITE 0  
SPRITE 0 PAST 255 POSITION  
POKE M.S.B  
POKE SPRITES ON SCREEN  
CHECK FOR COLLISION MOVE SPRITES 1 AND 2  
SUBROUTINES FOR MAN JUMPING  
SPRITE DATA

11000-11040 SUBROUTINES FOR MAN WALKING DRAGONFLY AND MAN FALLING. DETECT ANY COLLISIONS

## Variables

L =	LIVES
SC =	SCORE
I =	SHEET NUMBER
DD =	HOW FAR THE MAN IS PAST THE INSECT
SO =	SID CHIP
V =	SPRITE CHIP
Y =	SPRITE 0 Y POSITION X=SPRITE 0 X POSITION
Y1 =	SPRITE 1 Y POSITION X1=SPRITE 1 X POSITION
Y2 =	SPRITE 2 Y POSITION X2=SPRITE 2 X POSITION





# Travels with my ant

David Kelly talks to Sandy White, author of *3D Ant Attack*

Top-flight games programs never come out of thin air. And *Soft Solid 3D Ant Attack* by Edinburgh sculptor Sandy White is no exception.

He bought his first computer — a Mk14 — as long ago as 1979. At that time Sandy was at Edinburgh art college and he bought it with a view to controlling mechanical sculptures and simple robots.

"I've always been fascinated by such things," he says. When he was about 12 he built a completely mechanical arcade game — you had to control the movement of a steel ball, guiding it to the centre of a plywood maze to win a prize.

At about the same time as he bought the Mk14, he started his four-year course in sculpture. "It started out as a standard course," he explains, "They sent you off into clay and plaster. But I sort of digressed. I started sneaking bits of electronics into college, connecting up motors to my sculptures to make them move."

At first the designs were quite simple but Sandy soon started writing machine code routines on the Mk14 — the computer only understands machine code — to produce sequences of movements and lights.

"The Mk14 didn't last long," says Sandy, "I cannibalised it to build a special project. Then I got a Softie, an Eprom Hex monitor — again machine code only. After that, somebody lent me an Acorn Atom."

*3D Ant Attack* is the first game Sandy has written, but it didn't start out as a game. He first got interested in three-dimensional graphics. He says, "I just love

if I could get it to draw faster and maybe shade in the line-graphics shapes. At that time I did a lot of experimenting with the algorithms needed for three-dimensional representation."

But Sandy had to return the Atom to its owner, which meant looking around for another machine. He decided on the Spectrum and immediately had to start learning Z80 machine code to replace the 6502 code he had learnt for the Atom. In February this year he took delivery of his 48K Spectrum.

"It turned out that the Z80 was much better suited for my particular needs than the 6502 — some of the registers are 16-bit and the block search instructions run a lot faster on the Z80. Once I got used to it, the Z80 was quite an enlightenment."

Having looked and worked at 3D representation in detail on the Spectrum, Sandy chose to write a game: "I'd been looking at other Spectrum games. *3D Tanx* by John Ritman is drawn out in lines and although it is true 3D, it is slow to up-date the screen. Also, at that time there were a lot of games which claimed to be 3D but weren't."

"I went through a lot of ideas before coming up with *3D Ant Attack*. The final idea just evolved."

Sandy was looking for something which made full use of his 3D techniques. He was also determined to write a game to be played either by boys or girls. "There are a lot of sexist games around and I wanted



possible to climb onto some of the constructions in the city to avoid being attacked by the extremely ferocious giant ants.

At the start of the game the player stands outside the walled city of Antesch. Jumping over the wall you must avoid the deadly ants to rescue a number of imprisoned unfortunates from various points within the city. The further in you go, the more difficult it is to return to freedom. The primitive-looking townscape of buildings within the city walls are represented as shaded 3D blocks, cylinders and pyramids.

In a similar way to Atari's *Zaxxon*, *Ant Attack* shows only part of the city at one time, scrolling diagonally with the action. An additional feature is a choice of viewpoints. Just as if you are a detached observer watching the proceedings from on high, it is possible to choose your vantage point. Selecting different keys gives four different views of the city. When your hero or heroine disappears in one view, hidden behind a building, it is possible to switch the viewing angle to look from the other side.

"Viewing from different directions is really necessary. If you are attacked by one of the giant ants behind a building it is vital to be able to change your view to find out what is happening."

Every part of the city is represented on an XYZ co-ordinate system. Each point of every building is held as three numbers by the computer. The computer does a computation on the data to work out what is within the field of view at any point from a particular viewing angle. The whole city is stored in memory, but to save time, the computer knows roughly which part of the city to look at to make up the picture you see. The screen is up-dated 12 times a second.

"To make it run as fast as it does, I had to think really carefully about the routines I used. You have to watch, down to the nearest machine-cycle, what happens in a particular loop. That took much longer than



the computer graphics you see in tv commercials.

"When I started on the Atom, the only thing you can do from Basic is line-drawing graphics and, even then, it takes a long time to up-date each image, making animation difficult.

"I thought it would be interesting to see

one which made no assumptions that the player was male." In *3D Ant Attack* the player is able to choose his or her sex at the start of the game.

The final version of the game features a remarkable representation of 3D. The character you control is able to walk round and hide behind buildings. It is even

anything else — just sitting down and trying to find the optimum code.

"In the end, it was quite a panic to squeeze it all in. For the captions which come up from time to time I had to start modifying what they said just to fit them in.

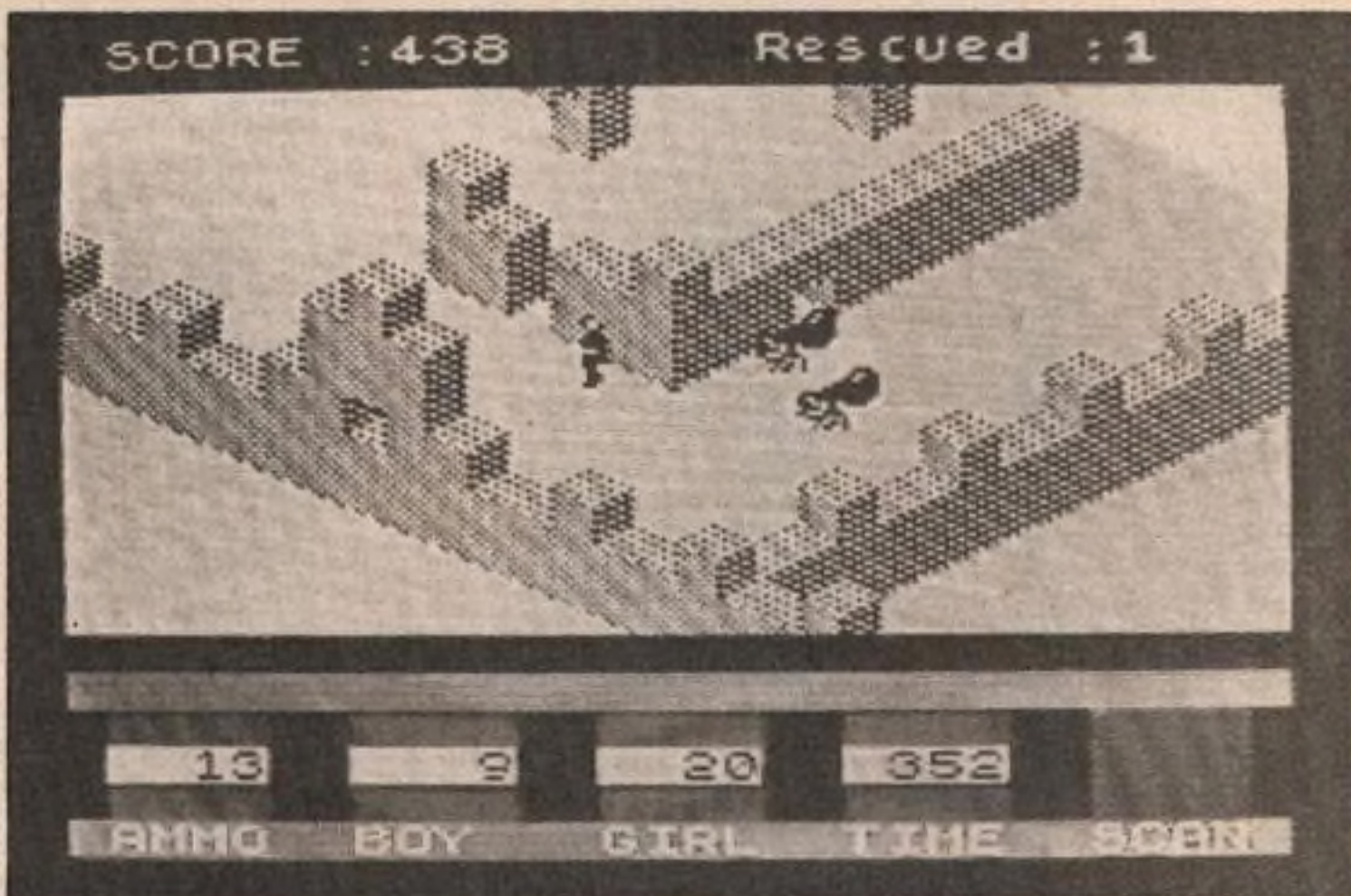
"The city is not in colour. Apart from space limitations the main reason for that is that the time taken to work out the colour information would cause the game to run at approximately half speed."

The city was planned out on paper long before any programming began. Sandy's friend Angela Sutherland, also a sculptor, designed many of the actual buildings. All the different structures in the city have names because it was necessary to keep track of them when planning it out. Sandy had to write an entirely separate program just for editing the design of the city, just like a real building site.

"I had to take care to avoid it looking too complicated. Too many buildings close together would mean you couldn't see between them easily."

**A**ctual programming on *3D Ant Attack* took 15 weeks. "Writing the game once it was planned was incredibly tedious — like a punishment. I was crossing off the days on the wall like Robinson Crusoe waiting to get off his island. But, there is no point in starting something if you don't finish so I pressed on. If I had known what it would be like, I probably would never have started."

In the event, completion of the program was quite well timed — companies were just putting the finishing touches to their plans for Christmas. Sandy first went down to the shops in Edinburgh to find out which companies had the most titles on the shelves. From this simple research, Sandy decided to offer his program first directly to Sinclair. Unwilling to send out a copy of the actual game, he sent a video tape of the program down to Sinclair's software manager at Cambridge. They sent it back, explaining they didn't have a video recor-



der to play the tape on. Sandy was forced to think again!

Next he sent it to Quicksilver and they jumped at it. They flew Sandy and Angela down from Glasgow to Southampton the next day. And the rest is history, as they say.

Now Sandy has just started thinking about what to do next after a short holiday to recover from what he describes as "computer fatigue".

There is nothing definite yet, but he is kicking a few ideas round. "The problem is coming up with a good enough game — I don't want to do another one unless what I can come up with is really much better than the first."

**S**andy is also in the final stages of patenting his 3D code routines. "Usually it is more or less impossible to protect computer software, but I have been very lucky — the ideas behind the three-dimensional techniques I use are not necessarily applicable only to computers and the patent specification covers new

ways of making 3D images."

So Sandy is now looking to licence his three-dimensional routines for use by other programmers: "I may licence the package to any manufacturer who is interested, but in the meantime I shall hedge my bets by producing other games myself.

"Three-dimensional graphics with colour is one possibility. I said before that it would be very slow, but I've got a couple of ideas.

"Also, I'd like to explore some 3D ideas that aren't games. I had to write a game to sell my 3D routines, but now perhaps I'll do a graphics package. Computer art for the home — sounds a bit sterile, doesn't it, but it needn't be!

"I'm dying to get my hands on a 16-bit machine, too. Just what could then be done is the kind of thing dreams are made of. I'm not going to limit myself to any one machine because that would be dangerous."

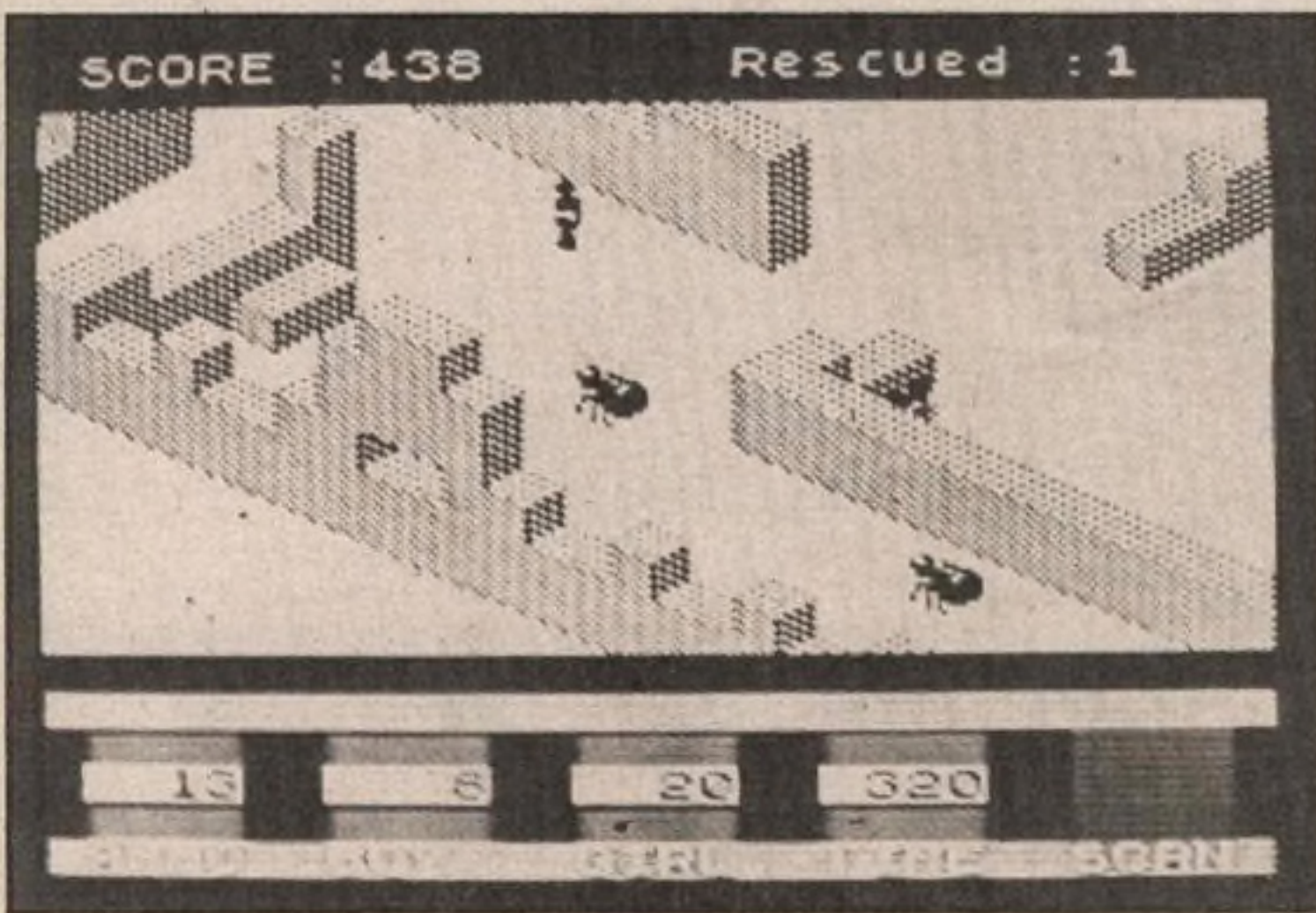
**N**either has Sandy abandoned his sculpture. He is now building custom designed computer boards to control his most recent work and he is writing a new computer language specifically to play music and choreograph robots.

"I'm working on a development system to enable me to combine a music keyboard and joystick console to make it easier to enter data." At an exhibition in Aberdeen last year Sandy showed three sculptures, each of which told its own story in music and movement: "People pressed the button and they would perform for about five minutes."

Sandy seems full of ideas for new projects. On the other hand, he shows no interest in converting his computer work for other machines — taking the 3D ideas across to different computers and processors.

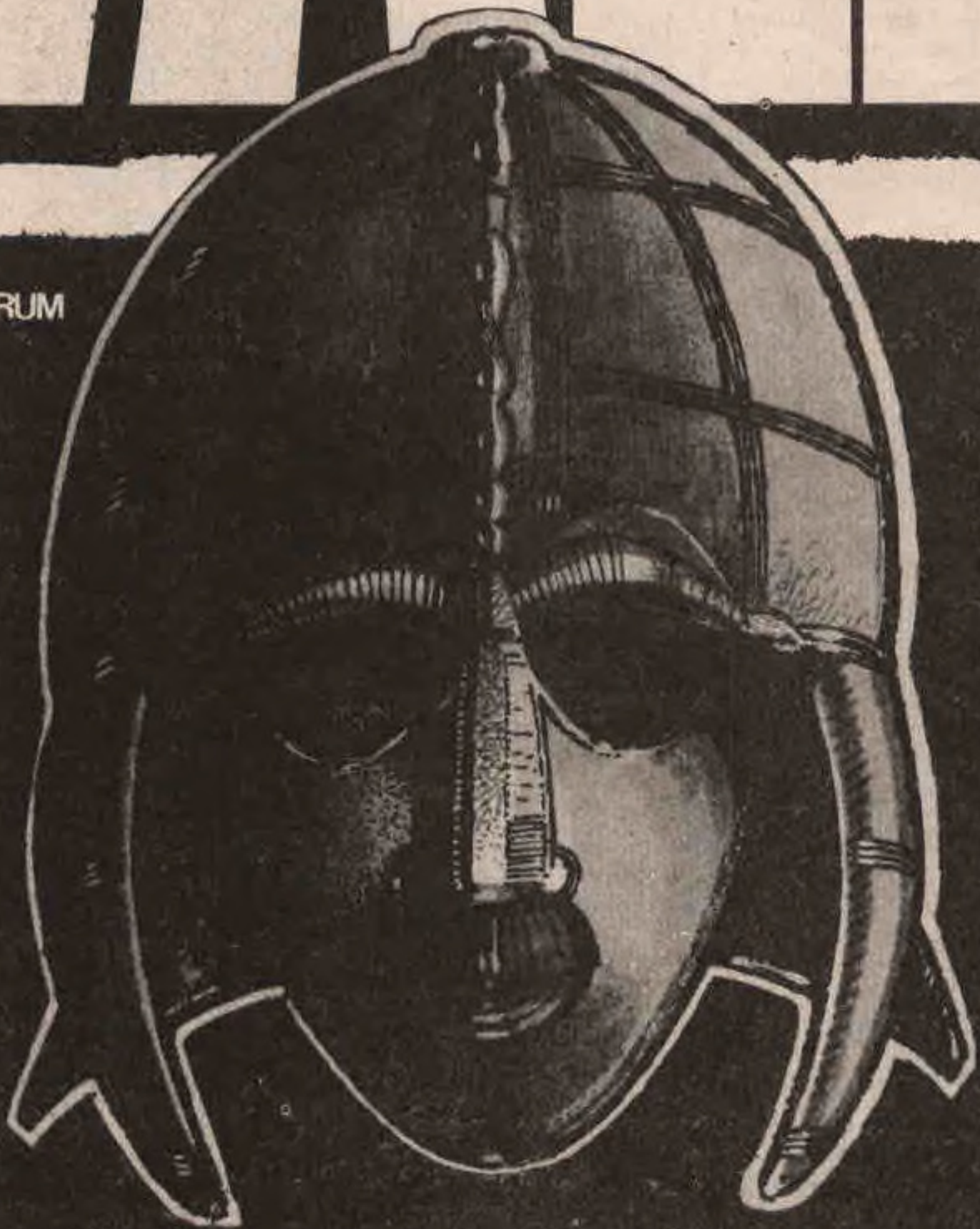
"I like innovating. Doing conversions you don't get your programming highs.

"When I write a bit of code that does something new you can show it to your friends and go 'Hey, look at that!' and it feels good." ■



# WALLS

48K SPECTRUM



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# More than words can say

**Mike Grace** looks at *The Word* — a powerful word processing package for the Commodore 64

About two years ago I was introduced to the word processor as a tool for helping me write more efficiently.

At the time I had suspected I would be attracted to the machine, but until I sat down and tried it I had no idea what a revolution it would be to my life. Suddenly I could do rewrites of articles, change teaching timetables with minimum effort from one year to the next, thump out reviews in much less time, not worry about all those silly spelling mistakes I needed to Tippex out — in short, I found I was writing more in less time and with much more enjoyment.

The main problem with word processing is that (like anything worthwhile) you have to work hard at it for quite a long time before you get anywhere. Instant results just don't happen — the potential user must stumble and stagger through an initiation period (or as the chap selling you the package will say — a training period), before any apparent benefit will penetrate the murky haze of comprehension.

Why do people word process anyway? There isn't space in a review article to explain the benefits and advantages of text manipulation (as it is otherwise known) in depth, except to say that the difference between typing or writing and word processing is a bit like the difference between trying to see the world without glasses when you are short-sighted — it's so much easier and you have a much greater

£13,000 dedicated machine that was just beautiful. Once I had started using it I knew I would have to have one at home as well — the possibilities seemed endless. But, working with a whole hunk of hardware plus the appropriate software tends to spoil one, and only having a Vic20 I tended to look upon the various packages that appeared with some degree of scorn.

The main problem was the screen, or rather lack of it. For true word processing you need 80 columns, otherwise you can't see the whole page. No matter how much people tell you that scrolling across your text is soon mastered, or that you type the words in 40 columns and then just alter the margins at the end, once you've worked with 80 then anything less is frustrating.

But, the Vic only has 22 columns and after looking at lots of packages with a desperate longing to convert myself into thinking small, I gave up.

Came the 64 and new hope burned eternal. Forty columns was a lot better, and perhaps . . . I thought . . . perhaps I'd adjust. I looked at a few packages again, saw the potential, and was about to buy a very swish-looking piece of software when I chanced upon a small stand at the last Commodore Show. Tucked away at the back was a little 64 sitting with a monitor and — wonder of wonders — 80 columns.

It was true. A company called Impex Designs (UK) (Metro House, Second Way, Wembley, Middlesex HA9 0TY), is importing an 80 column card from Impex International, US, that not only converts your 64 into an 80 column machine (even for your basic program if you want), but also contains an incredibly powerful word processing package called *The Word* (along with a maths facility and database as well). It looked too good to be true, and I ordered it then and there.

Now exhibitions are really the last place you should order anything, because you don't get the chance to see a proper demonstration and in the rush and bustle it's easy to be misled. So it was with slight concern that I awaited my purchase, in case I'd made a mistake and there were snags in this beautiful piece of work.

I needn't have worried. *The Word* turned out to be better than Impex had told me. In

fact I can honestly say that my 64 plus *The Word* does everything that I've ever been able to do on the dedicated machine at work. Of course I haven't yet aspired to a daisywheel, but hopefully prices will continue to fall and that's only a matter of time.

The main use of word processing is the ability to *Insert* and *Delete*, whether it's letters (to correct spelling) or words, sentences or blocks of text.

But word processing has other great uses, like *Search* and *Replace*. For this you might want to change the word "stress", in the essay you've written, to "strain". With word processing, the computer will go right through your essay and automatically change every "stress" to "strain" for you. You can also use the *Search* facility to find the place in your written work so you can alter something quickly, which is very useful.

Your letters and your documents begin to look much more professional. Your 64 will automatically centre anything (for titles, or posters for the stamp club), will underline anything (with the right printer) and will double space.

What makes *The Word* stand out to me is not just its capabilities, but the ease of use. For a start the manual is quite readable, albeit a little daunting to the first-time user. A lot of care has been put into creating a manual that's "easy to read", so that even loading and running the program is covered simply.

I did find the order of the manual a little patchy, and it seemed that there was no structure in the overall planning, but it was still pretty easy to find your way to the appropriate section if you needed reminding how to delete a paragraph. The first-time user is taken carefully through simple procedures first, to give him, or her, confidence in using a computer.

The essence of the program is that the *Control* key is just that, a method of controlling what you are doing. Thus pressing *Control* plus *a* will allow you to *Save* your data, *Control* plus *l* to load text from disc, *Control* plus *f* to find a word or phrases, etc. Most of the other keys are fairly obvious, with *Clr/Home* acting as a homing key to take you back to the beginning of the document and *Run/Stop* acting as a Tab key.

If you want to insert or delete, then there are three basic methods:

(1) The usual *Inst/Del* key acts in the same way as 64 owners are used to, and is really just for letters or the odd word.

(2) To insert or delete whole phrases or sentences you need to press *Control* and *p* (for phrase) then press *Control* and either *w* for word, *s* for sentence, or just use the cursor to select as many letters and spaces as you wish.

Having set the phrase in this way, you then type *Control* and *m* for moving text, or *Control* and *k* for deleting, or *Control* and *k* for changing a phrase from capitals to lowercase or vice versa.



understanding if you can see properly — it's the same once you've learned to process words.

So let's pass over the reasons at this stage and assume that you already know a bit about it — or if you're just getting interested, you can discover more by reading on.

In my capacity as a teacher at one of the London hospitals I was introduced to a



(3) To manipulate whole paragraphs there is another set of facilities. This time *Control plus r* (for range) allows you to take as many lines of text as you require by pressing the cursor down key. As you do so, each new line is highlighted and, unlike the software I use at work (all £13,000 of it), if you make a mistake you can alter it without having to go back to the beginning.

For most word processing though, *The Word* has a system of "embedded" commands, something familiar to most wp packages. What this means is that you write commands in the text to tell your printer what to do. Thus, if you want a line centred, you would write *cn1* within the text and when the line was printed it would appear in the centre of the page.

Similarly, the instruction *ju1* tells the Sprinter to "right justify" the text (this means have all the lines of text end with a straight margin on the right side of the page). This really is extremely easy to use, and I found it took me about 30 minutes to get the hang of most of the commands.

Perhaps one of the best aspects of *The Word* is the hidden power, the extra facilities it offers besides the ones available on all other packages. I will list them, to give you an idea of the scope available.

(1) *Column manipulation*

This allows you to set up columns of figures (with alignment of the decimal point) and then move them around in the same way that paragraphs are moved around. Very useful for figures in accounting and for lists of things like slides, photos, records, etc.

You can also sort names in columns into numerical or alphabetical order or add or subtract figures.

(2) *Linking files*

Every time you write a file you have approximately 350 lines of text, or the equivalent of four to six pages of A4 single-spaced. If you need more than this, each file can easily be linked to the next so the printer will print out the whole in one document (you can even stop in the middle of a word).

(3) *Writing form letters*

All this means is that you can write letters and put spaces in (like the name and address) so that one standard letter can be used, but can be "personalised", as in various advertisements and book offers that we all get through the post.

(4) *Printer compatibilities*

*The Word* has been set up for a large variety of popular printers, and also has a program allowing you to adapt it to your own if you don't happen to

have one of the printers on the list.

(5) *Automatic Word Count and Page Numbering*

This is just amazing for budding authors, especially the word count, which seems to be missing from many other packages.

(6) *User-defined Special characters*

Because some of the characters are used for special functions in wp (for example the £ sign is used to control the embedded commands I was talking about earlier), the package will allow you to define any Ascii character you like. Thus, to print a £ sign, you need to define it earlier as the Ascii code number (92 in the case of the £) and you can still use all the keyboard characters including the \$.

At £195 + VAT for the package, it may seem a little expensive at first, but it includes a database, a mailmerge, and the 80 column board as well as the word processor. The 80 column board is also available on its own for £125 + VAT together with a free word processor starter package. Versions are also available for the Vic20.

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FIGURE I. An example of embedded commands.

*cn1*← (means centre the next line or lines)

INTRODUCTION←

*cn0*← (means cancel centre command)

← (means create a blank line)

*ai+5*← (means indent each Paragraph 5 spaces)

One of the fears of micro-computer owners must be the disappearance of either the hardware or, more significantly I suspect, the software. The computer world is notorious for fortunes that are made and lost in the twinkling of a line feed (you only have to watch the cover of Popular Computing Weekly to see that) and even an investment of a hundred pounds can be pretty tiresome if there's nothing to play with or use in the way of software. So - I thought to myself the other day - how about my slightly battered but lovable Vic ?

When the above is actually printed out it looks like this:

INTRODUCTION

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multi-program tape. The Echo simply plugs into the Ear, Mic and Power sockets of the computer and does not require an additional power supply. The expansion port at the rear of the computer is left free for use with other peripherals and the unit is housed in an attractive case custom designed to complement the ZX-Spectrum.

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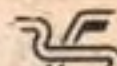
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# Sharps and flats

Keith and Steven Brain demonstrate the sound capabilities of the Dragon in the first of a two-part series

This graphic music editor gives an excellent demonstration of a combination of the sound and graphics capabilities of the Dragon as it allows you to enter a piece of music, display it in standard musical notation on the screen, and then play it (Figure 1).

When entering music we need to consider a number of different factors. A single character on the manuscript tells us more than one thing. The shape of the character tells us the note length, and the position on the staff the actual note on the scale and octave. We also need to be able to include sharps and flats. Two modes are provided.

In *Edit* mode the position is indicated by a flashing cursor which is placed on the line of the staff which corresponds to the current note on the scale. The cursor keys can be used to move this position in any direction. Up and down arrows change the note on the scale, left and right arrows move from your position in the tune, and shifted up and down arrows move you from line to line. The length of note required is chosen by pressing keys 1 to 4. The spacebar is used to delete an unwanted note.

The tune is stored in strings which are sliced to obtain the relevant information for both sound and graphics. Each note is coded by a seven character block, eg:

L1203B-, L 402C', or L 802D#

The first three characters define the note length (eg, L12, L 4 or L 8). Note the space when L is less than 10. The next two characters specify the octave, which can be 02 or 03. The sixth character is the note on the scale (A - G) and the last character indicates whether the note is flat (-), natural (') or sharp (#).

If "P" is pressed in *Edit* mode, then *Play* mode is entered and the tune so far is *Played* and displayed on the screen. A method of saving your tune is also provided.

## Setting up

The first stage of the setting up procedure involves clearing the screen to black on green, clearing 10000 bytes for variables, and setting a number of these. X controls the left/right position on a line, and Y on the overall up/down position on the screen, NO is the vertical position on the staff, and LI is the current line of music (1 - 4)>.

Four array elements are set up as *PA\$(n)* to hold the notes entered on each line. Initially these are completely filled by 255 single quote marks (') (*CHR\$(39)*). If you try to *Play* a blank space you sometimes get an *Fc error*, but the system is quite happy to *Play CHR\$(39)*, even though you can't hear it. Filling the string in

this way prevents problems when slicing.

```
10 GOTO 690
690 PMODE 4,1: SCREEN 1,0: PCLS1: COLOR0,1:
CLEAR 10000: X = 40: Y = 48: NO = 7: LI = 1:
DIM PA$(4): FOR N = 1 TO 4: PA$(N) =
STRING$(255,39): NEXT N
```

## Graphic parts

We draw all the required graphics parts first and then *Get* and *Put* them (Figure 2). The picture for each graphic part must be stored in a separate array by *Get* so a number of arrays are set up.

```
700 DIMSB (0,10): DIMM1 (0,10): DIMM 2(0,10):
DIMC1 (0,10): DIMC2 (0, 10): DIMQ1 (0,10):
DIMQ2 (0,10): DIMS1 (0,10): DIMS2 (0,10):
DIMSP (0,30): DIM BA (0,10): DIM CU (0,10):
DIM SH (0,10): DIM FL (0,10)
```

Now the signs for the different note-lengths can be drawn. All these have a circle as a basic part, so seven are drawn. This completes the drawing of the first one, the semibreve.

```
710 FOR N = 20 TO 140 STEP 20: CIRC LE (N,20):
NEXT N
```

The other six drawings represent only

three actual lengths of note as the position of the tail on these must vary according to their position on the staff. First those with an ascending tail:

```
720 FOR N = 40 TO 80 STEP 20: LINE (N + 3,20) -
(N + 3,10), PSET: NEXT N
```

and then those with a descending tail:

```
730 FOR N = 100 TO 140 STEP 20: LINE (N - 3,20) -
(N - 3,30), PSET: NEXT N
```

Now we need some black paint to distinguish the quaver and crotchet from the minim:

```
740 PAINT (60,20), 0, 0: PAINT (80,20), 0, 0: PAINT
(120,20), 0,0: PAINT (140,20), 0, 0
```

and finally we must dash the tail of the quaver:

```
750 LINE (83,10) - (88,13), PSET: LINE (137,30) -
(142,27), PSET
```

A replacement section of the staff is drawn:

```
760 FOR N = 0 TO 16 STEP 4: LINE (150,N + 15) -
(170,N + 15), PSET: NEXT N
```

followed by a bar line:

```
770 LINE (180,20) - (180,36), PSET
```

a sharp sign:

Continued on page 23

Figure 1 Graphic music editor

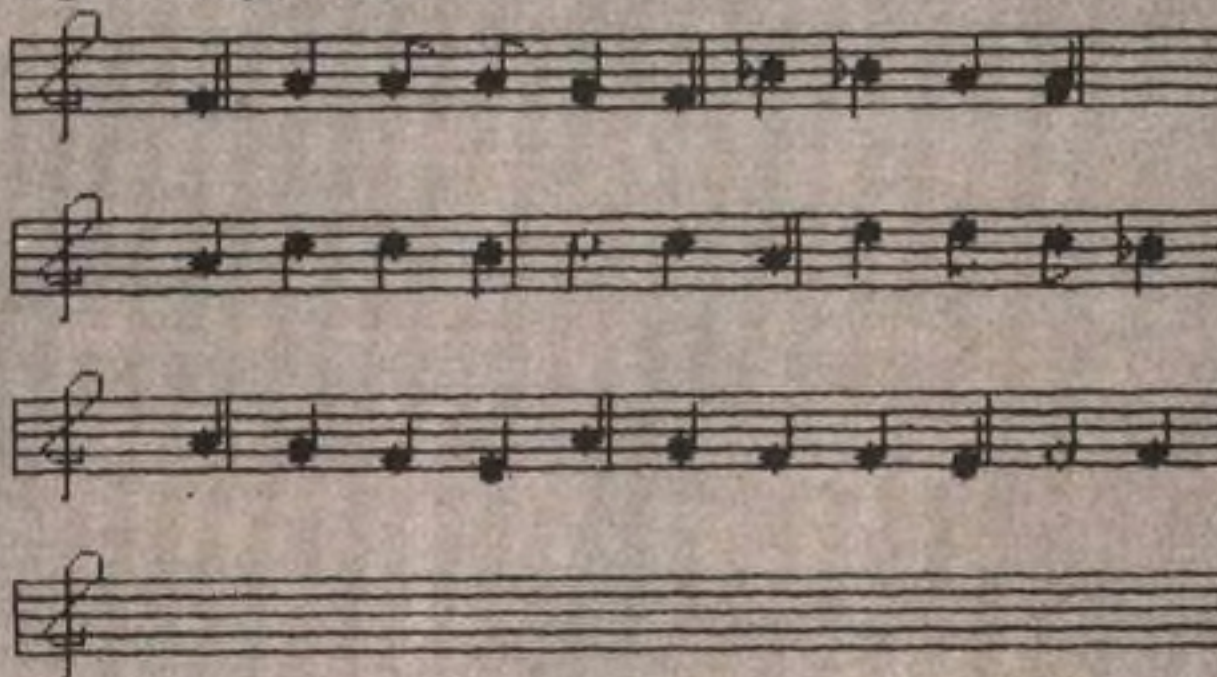
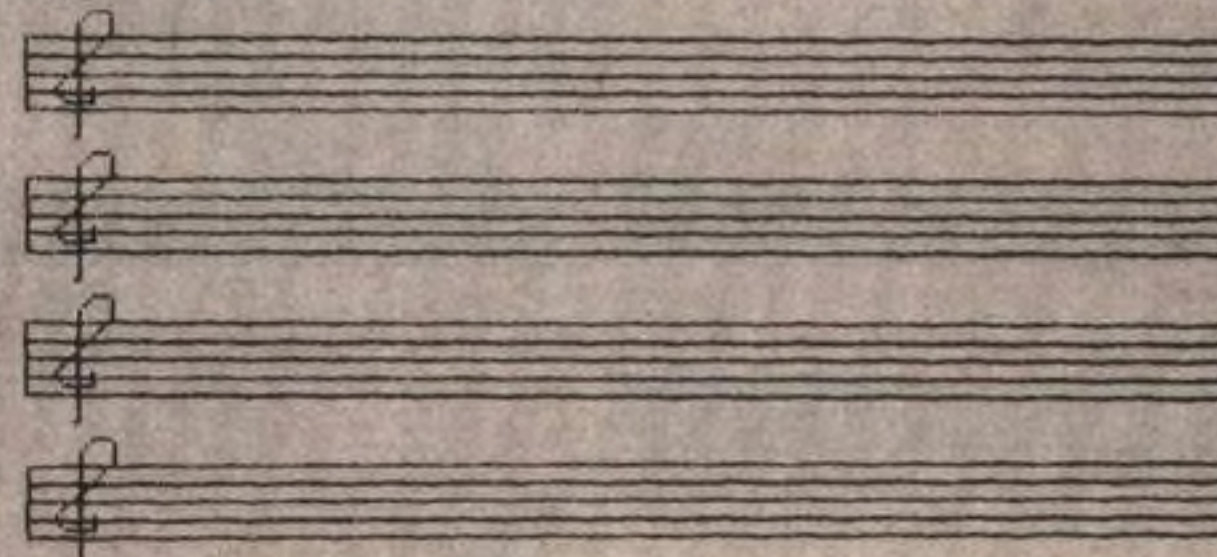


Figure 2 Graphic parts



Figure 3 The staff



# "If you buy Android One, you can give up any hope of spending stress-free evenings with your Spectrum..."

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Now we come to **Android One**, from Vortex Software. The game is one of those guaranteed to keep you sitting, beary-eyed, in front of your TV screen until 3 o'clock in the morning. You are in control of the android in the title, whose mission is to enter a nuclear power station and neutralise the core, which has become unstable. Racing against the clock, you must battle your way through the tortuous corridors, fighting all the while the guardians of the power station.

These little horrors take several forms — some come after you, whilst others just bounce up and down blocking your progress. You can have a laser and a limited number of force fields for dire emergency. As with most of the good games in the present batch, movement may be effected either from the keyboard or by (Kempston) joystick. Humour (in the android's facial expressions) and suspense combine with fantastic graphics to make an excellent arcade game.

Written by Ull...

**ANDROID ONE**  
The best of this batch by a very short head is **Android One**. The Reactor The Vortex stable. This proclaims itself to be just the first of a series of Android adventures. Horace-style and rightly so, I think, since this game is going to make its way well up the charts.

The plot is nothing new — in fact, this is really a souped-up version of *Berzerk*. You have to charge through a heavily guarded enemy mutant warren in search of their reactor — which has to be destroyed, since it is about to... yes, end the world.

No problem, though — for you are in control of **Android One**, the Very Latest in Android Technology. How can you fail?

The graphics in this epic are faultless, and it is a very superior version of the old game. In place of robots to pot-shot, you are faced with four different kinds of mutants, all of which have different ways of moving about the screen and are worth different numbers of points if you do manage to pot them.

Groupies travel in groups of three or four. Wanderers potter about by themselves, generally Bouncers spring up and down the screen and can't be killed, but they can kill you perfectly well when they land on your head. Skaters slither unpredictably around, and are fiendishly difficult to hit.

This is an unreasonably addictive game. There are five levels of play, and at even the slowest there's enough of a challenge to keep you screen-glued and bug-eyed. There's a long and varied series of chambers to explore, with random

Run, from the Vortex stable. This proclaims itself to be just the first of a series of Android adventures. Horace-style and rightly so, I think, since this game is going to make its way well up the charts.

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the action is accompanied with well-thought-out sound effects. **Android 1** runs, rather than glides, across the screen in an endearing manner.

There are five skill levels — the most difficult seems impossible, while the easiest is fast enough to be a challenge. There is a wide choice of keys but controlling the robot is difficult. Provision is made for the Kempston joystick. The comprehensive on-screen instructions are attractively presented. The game loaded in five stages, which makes for a long wait, but there were no loading problems.

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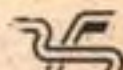
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```
780 DRAW "BM200, 24S4R2U2BM + 2, +0;
D2R2BM + 0, +2; L2D2BM - 2, +0; U2L2"
```

and a flat sign:

```
790 DRAW "BM220, 20D10E3H3"
```

We now *Get* each of these into the appropriate array before passing to the subroutine which draws the stave (this is placed as a subroutine as it is also used by the play routine later).

```
800 GET (17,17) - (23,23), SB, G
810 GET (37,10) - (43,23), M1, G
820 GET (57,10) - (63,23), C1, G
830 GET (77,10) - (83,23), Q1, G
840 GET (97,17) - (103,30), M2, G
850 GET (117,17) - (123,30), C2, G
860 GET (137,17) - (143,30), Q2, G
870 GET (150,0) - (170,56), SP, G
880 GET (180,20) - (180,36), BA, G
890 GET (200,22) - (207,28), SH, G
900 GET (220,20) - (224,30), FL, G
910 GOSUB: 920: GOTO 60
```

### Drawing the stave

The graphics parts are erased and four sets of five lines are constructed down the screen (Figure 3). The complex treble clef is easily *Drawn* after an appropriate Blank Move to set the position.

```
920 PMODE 4,1: SCREEN 1,0: PCLS 1: CLS 1:
COLOR 0,1
930 FOR N = 40 TO 160 STEP 40
940 FOR M = 0 TO 16 STEP 4
950 LINE (0,N + M) - (255,N + M), PSET
```

```
960 NEXT M
970 LINE (0,N) - (255,N + 16), PSET, B
980 DRAW "BM10, "+STR$(N + 22) +
"RU25E3R3FD4G12DF2R6U3"
990 NEXT N
1000 RETURN
```

On *Return* we jump back to the program proper in line 60.

### Cursor and keycheck

*Inkey\$* is read into *A\$* and then we *Get* a square of the screen around co-ordinates *X,Y* into *CU* and immediately *Put* it back with *Preset*. This inverts the screen display in that area.

After a short delay *CU* is *Put* back with *Pset* to recreate the original display. If no key is pressed this flashing cursor sequence is repeated. If a key is pressed a check is made to see if the current position is too far to the left ( $X < 40$ ) or right ( $X > 240$ ).

```
60 A$ = INKEY$: GET (X - 5, Y - 5) - (X + 5, Y +
5), CU, G: PUT (X - 5, Y - 5) - (X + 5, Y + 5),
CU, PSET: FOR N = 1 TO 50: NEXT N: PUT (X -
5, Y - 5) - (X + 5, Y + 5), CU, PSET: IF A$ =
"" THEN 60 ELSE IF X < 40 OR X > 240 THEN
GOTO 80
```

### Note lengths

If the position is valid then the *Value* of the key pressed is taken. Only number keys have a *Value* so this separates the number keys from other keys. Keys 1 to 4 are used

to indicate note lengths from semibreve to quaver and only these will branch in the *On Goto* to the lines which draw the characters.

```
70 A = VAL (A$): ON A GOTO 210,220, 230, 240
```

The semibreve is easily dealt with as it looks the same no matter where it appears on the stave. Note that the array is *Put* . . . . *And* rather than *Or* to produce superimposition as the screen display is inverted.

```
210 PUT (X - 3, Y - 3) - (X + 3, Y + 3), SB, AND:
GOTO 250
```

For the other note lengths the current note position on the scale must be checked to determine if the tail should go up or down. If you have not changed the cursor position, then the note position (*NO*) will still be 7.

```
220 IF NO < 7 THEN PUT (X - 3, Y - 10) - (X + 3,
Y + 3), N1, AND: GOTO 250: ELSE PUT (X - 3,
Y - 3) - (X + 3, Y + 10), M2, AND: GOTO 250
230 IF NO < 7 THEN PUT (X - 3, Y - 10) - (X + 3,
Y + 3), C1, AND: GOTO 250: ELSE PUT (X - 3,
Y - 3) - (X + 3, Y + 10), C2, AND: GOTO 250
240 IF NO < 7 THEN PUT (X - 3, Y - 10) - (X + 3,
Y + 3), Q1, AND: GOTO 250: ELSE PUT (X - 3,
Y - 3) - (X + 3, Y + 10), Q2, AND: GOTO 250
```

This is an extract from *Advanced Sound and Graphics for the Dragon Computer* by Keith and Steven Brain, published by Sunshine Books.

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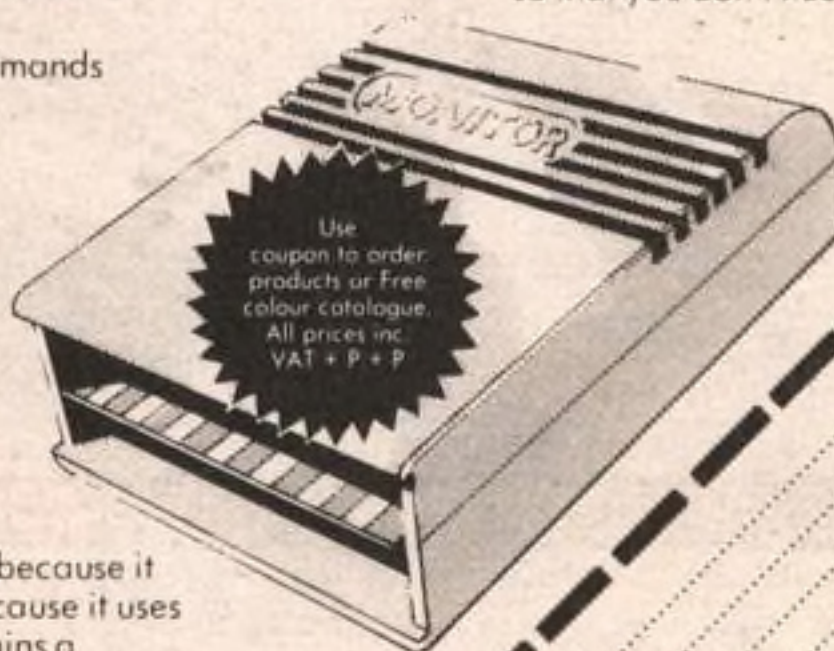
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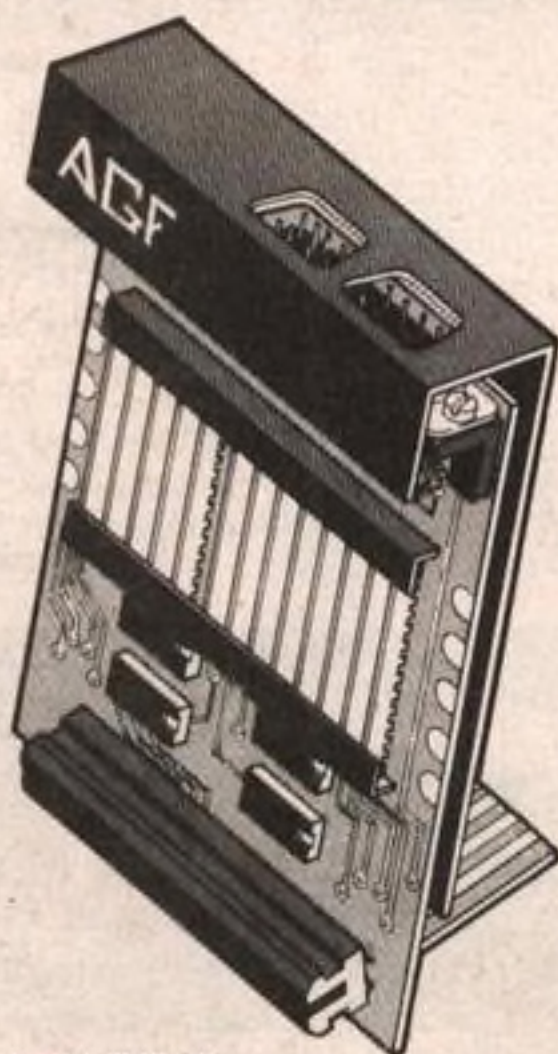
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ONE	VIDEO GRAFFITI	FREE	
ZX81 <input type="checkbox"/> ZX SPECTRUM <input type="checkbox"/>		Please tick	
DEALER ENQUIRIES WELCOME		EXPORT PRICES ON APPLICATION	
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# On the terraces

**Mike Batty** explains how to construct computer streetscapes in the last of the series

Repeating calculations over and over again might seem dull, but if the calculation is repeated in a sufficiently interesting way, computers can produce quite remarkable sequences of patterns.

In an earlier set of articles (*Popular Computing Weekly*, Vol 2, Nos. 38-40), we showed how a routine to draw an ellipse could form the building block for producing flower pictures. In the last two weeks, we have shown how to construct a more literal building block — a wire frame, then solid house and here we will show what happens if we repeat these designs to build up patterns of houses.

Repetition is not only the way structure is built up in nature, but also in man-made objects. Houses are arranged into streets, streets into towns. Using last week's program, we can build up complex sets of houses — streetscapes without ever having to consider the complex as a whole.

The essence of the technique is to plot the houses in lines, starting with the furthest house from the viewpoint which is placed at the back of the screen and then

plotting to the front. We will use a standard house which is roughly a cube with slides of 300 units and build up connected lines of houses — terraces. We will also introduce some randomness to give a feeling of topography.

The idea of plotting from the back of the object to its front was introduced last week in the depthsort algorithm. When we use the technique for the whole complex, it is referred to as *temporal priority* in that nearer objects are plotted later in computer time and have visual priority over earlier and further objects. The program can be extended to plot several lines of streets, but as the temporal priority only refers to each street, the streets have to be wide enough not to overlap from the viewpoints chosen.

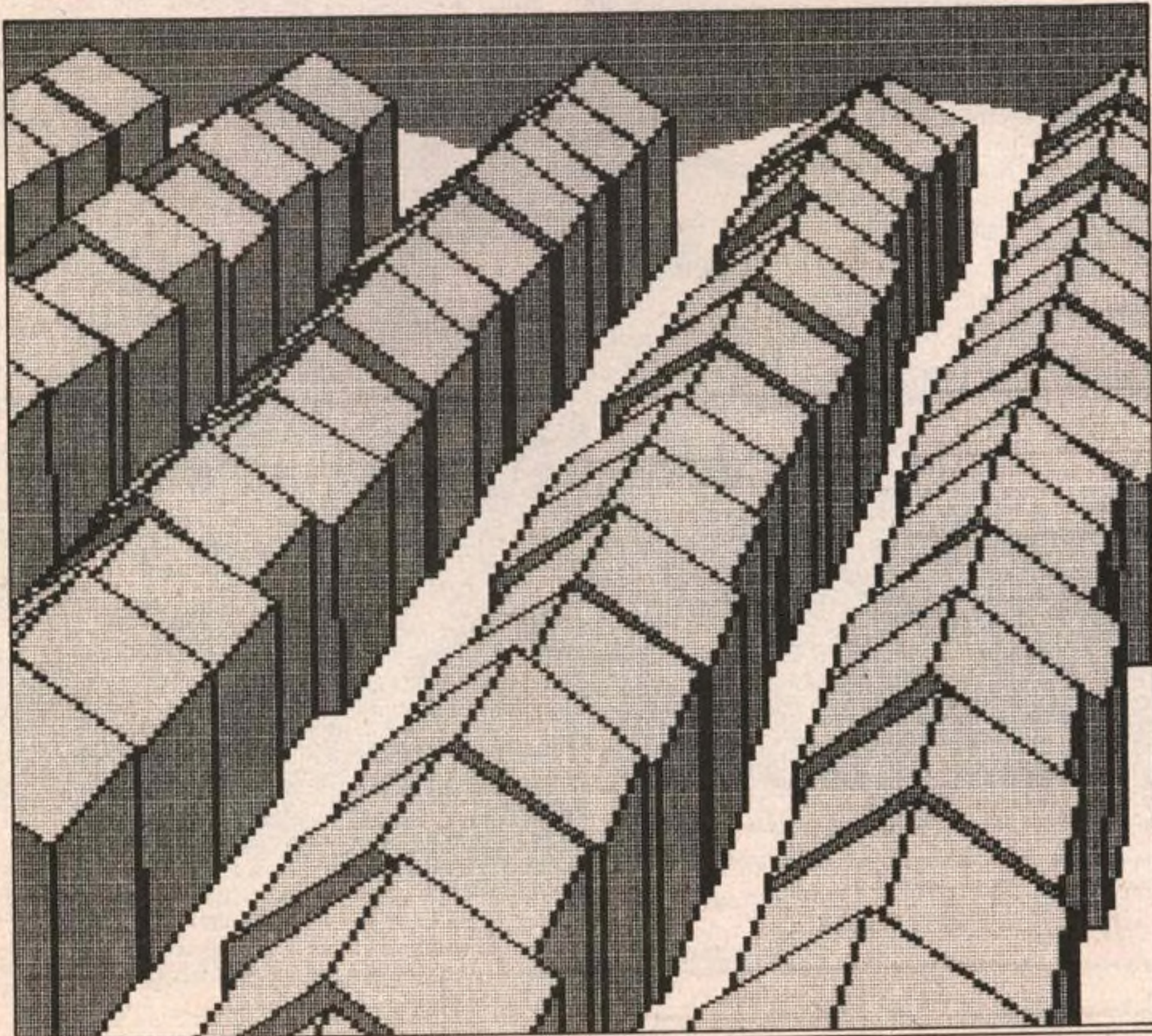
The program has the same general structure as that last week, but the roofs of the houses are coloured red and the streets are laid on a blue background which on its horizon gives the impression of low hills. Each street is plotted from the horizon to the edge of the screen, thus filling the whole screen. Each house is

generated by the program in *Proplace* which ensures that a connected terrace results. *Proback* plots the blue background.

To get a view of these streets, set the viewpoint distance as 1000, screen distance as 5000, horizontal angle at 100° and vertical angle at 80° (as if looking over the rooftops). A typical scene is shown here, but plotted using *Mode5* not *Mode1* due to the space needed to load the screen dump. In fact, changing the level of resolution in this way does not make too much difference. Quite dramatic imagery can result and the 3D effects almost produce a kind of computer sculpture. Press any key after the picture is generated to begin a new one.

If you explore the program from different viewpoints you will get powerful, perhaps disturbing scenes. If you live in an industrial city, the program generates *Coronation Street*. I find the scenes reminiscent of the Welsh valleys — lines of terraces on bleak hills such as in the Rhondda or New Tredegar.

Temporal priority will break down as you approach a flat or side view of the terraces, but there is plenty of scope for improvement here. Introduce new colours, new objects, perhaps the occasional church. The program is general enough to make such extensions. ■



```

10 REM Welsh Valleyscape and Streetscape
20 REM (c)Michael Batty,October,1983
30 MODE1
40 DIM W(10,3),S(10,2),P%(7,5),NP%(7)
50 DIM V(7),VV(7),NV%(7),C%(7),COL%(7)
60 VDU19,0,4;0;19,2,0;0;
70 NZ=10:MZ=7:NS%=5:COLOUR 2
80 ZBASE=-200:START=-200
90 FOR I%=1 TO M%
100 READ NP%(I%):NEXT I%
110 FOR J%=1 TO M%
120 FOR J%=1 TO NP%(I%)
130 READ P%(I%,J%)
140 NEXT J%:NEXT I%
150 FOR I%=1 TO M%
160 READ C%(I%):NEXT I%
170 FOR I%=1 TO M%
180 READ COL%(I%):NEXT I%
190 GCOL0,128:CLG:NS%=5:VDU23,1,1;0;0;0;
200 INPUT TAB(1,1)"DISTANCE FROM VIEW",RHO
210 INPUT TAB(1,2)"DISTANCE FROM SCREEN",DIS
220 INPUT TAB(1,3)"HORIZONTAL ANGLE",TH
230 INPUT TAB(1,4)"VERTICAL ANGLE",PH
240 GCOL0,130:CLG:VDU23,1,0;0;0;0;
250 I1%=INT(RHO/DIS):NS%=NS%+I1%
260 XB%=1200:INC%=500:VDU29,0;0;
270 TH=RAD(TH):PH=RAD(PH):PROCSETUP
280 PROCBACK
290 VDU29,640:MAX%;
300 FOR JI%=1 TO NS%
310 W(4,2)=START
320 REPEAT
330 PROCPLACE
340 FOR I%=1 TO NZ
350 PROCTrans(I%)
360 NEXT I%
370 PROCSOLID
380 UNTIL S(5,1)<-900 OR S(4,1)>900
OR S(8,2)<-1100
390 XB%=XB%-INC%-RND(200):NEXT JI%
400 AA=GET:GOTO 190
410 END
420 DEFPROCSETUP
430 S1=SIN(TH):C1=COS(TH)
440 S2=SIN(PH):C2=COS(PH)
450 XR=RHO*S2*C1:YR=RHO*S2*S1:ZR=RHO*C2
460 ENDPROC
470 DEFPROCBACK
480 GCOL0,0:YS%=900
490 DT=RAD(10):A=RAD(RND(360))
500 S=SIN(DT):C=COS(DT):SS=SIN(A):CC=COS(A)
510 SI=25+RND(25):YN%=YS%+SI*SS
520 MOVE 0,0:MOVE 0,YN%:MAX%=100000
530 FOR I%=20 TO 1280 STEP 20
540 SN=SS*C+CC*S:CC=CC*C-SS*S:SS=SN
550 YN%=YS%+SI*SS
560 IF YN%<MAX% THEN MAX%=YN%
570 PLOT85,I%,0:PLOT85,I%,YN%
580 NEXT I%
590 ENDPROC
600 DEFPROCPLACE
610 X1%=XB%-150-RND(50):X2%=XB%+150+RND(50)
620 X3%=(X1%+X2%)/2:Y1%=W(4,2)
630 Y2%=Y1%+350+RND(50):Z1%=ZBASE
640 Z2%=Z1%+250+RND(50):Z3%=Z2%+100+RND(25)
650 K1%=0:K2%=4:K3%=2
660 REPEAT
670 K1%=K1%+1:K2%=K2%+1:K3%=K3%+1
680 W(K1%,1)=X1%:W(K2%,1)=X2%:W(K3%,2)=Y2%
690 UNTIL K1%=4
700 K1%=8:K2%=0:K3%=6:K4%=1:K5%=3:K6%=5
710 REPEAT
720 K1%=K1%+1:K2%=K2%+1:K3%=K3%+1
730 K4%=K4%+1:K5%=K5%+1:K6%=K6%+1
740 W(K1%,1)=X3%:W(K2%,2)=Y1%:W(K3%,2)=Y1%
750 W(K4%,3)=Z2%:W(K5%,3)=Z1%
760 W(K6%,3)=Z2%:W(K1%,3)=Z3%
770 UNTIL K2%=2
780 W(9,2)=Y2%:W(10,2)=Y1%:W(1,3)=Z1%:W(8,3)=Z1%
790 ENDPROC
800 DEFPROCTrans(I%)
810 X=W(I%,1):Y=W(I%,2):Z=W(I%,3)
820 X1=-X*S1+Y*C1
830 Y1=-X*C1*C2-Y*S1*C2+Z*S2
840 Z1=-X*S2*C1-Y*S2*S1-Z*C2+RHO
850 D=DIS/Z1:S(I%,1)=D*X1:S(I%,2)=D*Y1
860 ENDPROC
870 DEFPROCSOLID
880 PROCDEPTH:PROCSORT
890 FOR I%=1 TO M%
900 IF C%(NV%(I%))=1 THEN PROCfill1(NV%(I%))
910 IF C%(NV%(I%))=0 THEN PROCfill2(NV%(I%))
920 NEXT I%
930 ENDPROC
940 DEFPROCDEPTH
950 FOR I%=1 TO M%
960 V(I%)=-EXP(50):VV(I%)=EXP(50)
970 NV%(I%)=I%
980 FOR J%=1 TO NP%(I%)
990 K%=P%(I%,J%)
1000 D1=(W(K%,1)-XR)^2:D2=(W(K%,2)-YR)^2
1010 D3=(W(K%,3)-ZR)^2:D=SQR(D1+D2+D3)
1020 IF D>=V(I%) THEN V(I%)=D
1030 IF D<=VV(I%) THEN VV(I%)=D
1040 NEXT J%:NEXT I%
1050 FOR I%=1 TO M%
1060 V(I%)=(V(I%)+VV(I%))/2
1070 NEXT I%
1080 ENDPROC
1090 DEFPROCSORT
1100 FOR I%=2 TO M%
1110 FOR J%=I% TO 2 STEP -1
1120 IF V(J%)<=V(J%-1) THEN GOTO 1170
1130 T=V(J%):F%=NV%(J%)
1140 V(J%)=V(J%-1):NV%(J%)=NV%(J%-1)
1150 V(J%-1)=T:NV%(J%-1)=F%
1160 NEXT J%
1170 NEXT I%
1180 ENDPROC
1190 DEFPROCfill1(I%)
1200 GCOL0,COL%(I%)
1210 PROCMMove(I%,1):PROCMMove(I%,2)
1220 PROCMPLOT(I%,3):PROCMMove(I%,1)
1230 PROCMPLOT(I%,4):PROCLINE(I%)
1240 ENDPROC
1250 DEFPROCfill2(I%)
1260 GCOL0,COL%(I%)
1270 PROCMMove(I%,1):PROCMMove(I%,2)
1280 PROCMPLOT(I%,3):PROCMMove(I%,1)
1290 PROCMPLOT(I%,4):PROCMPLOT(I%,5)
1300 PROCLINE(I%)
1310 ENDPROC
1320 DEFPROCMMove(I%,J%)
1330 K%=P%(I%,J%):MOVE S(K%,1),S(K%,2)
1340 ENDPROC
1350 DEFPROCMPLOT(I%,J%)
1360 K%=P%(I%,J%):PLOT85,S(K%,1),S(K%,2)
1370 ENDPROC
1380 DEFPROCLINE(I%)
1390 GCOL0,3:PROCMMove(I%,1)
1400 FOR J%=2 TO NP%(I%)
1410 K%=P%(I%,J%):DRAW S(K%,1),S(K%,2)
1420 NEXT J%:K%=P%(I%,1)
1430 DRAW S(K%,1),S(K%,2)
1440 ENDPROC
1450 DATA 4,4,4,5,5,4,4
1460 DATA 1,2,3,4,1,8,5,4,5,6,7,8
1470 DATA 4,3,9,6,5,1,2,10,7,8
1480 DATA 2,10,9,3,7,10,9,6
1490 DATA 1,1,1,0,0,1,1
1500 DATA 2,2,2,2,2,1,1

```

# File under filed

Sam Knowles presents a filing program that can be used on cassette or Microdrive

Multi-file is a cassette (or Microdrive) based filing system designed to operate on the 48K Spectrum microcomputer, although it might be possible to reduce it to run on the 16K model, using fewer entries.

The program is very versatile and can hence be used by a large number of micro owners, eg: (1) A small company of up to and including 200 employees. In an example such as this, information such as surnames, ages, previous experience, NI numbers, wages, salary levels, etc, could be entered. The surnames should be placed as the first item, since the computer will sort out the array *a\$* (Categories, 200,10) with *a\$* (1,n,12) as the most significant. (2) A record cassette or video-cassette library, particularly if you own a disc or Microdrive system.

## Notes

- 20-60 Improvement of certain system variables.  
 70-80 Brief on screen explanation of the program.  
 90 Entry of the number of categories.  
 100-110 Check validity of the entry.  
 120-130 Set up the main arrays.  
 140-200 Set up the Menu of options.  
 210-240 If a key has been pressed, validity will be checked and the appropriate routine gone down to.  
 1000-1420 ENTRY & SORT THE FILE  
 1000-1060 Enter the headings and obtain the full

- colour and printing arrays.  
 1070-1120 Enter information on the WORDSth entry and display them.  
 1130-1180 Carry on, quit or copy?  
 1300-1420 Sort out the file, taking the first piece of info as the most significant.  
 2000-2090 PRINTER DUMP  
 2001-2003 Mug trap.  
 2020 Printer on.  
 2030-2090 Print out the items on to the printer.  
 3000-3140 SCREEN DUMP.  
 4000-4120 SAVE & VERIFY THE FILE  
 5000-5120 LOAD THE FILE OR PROGRAM.  
 6000-6050 ADD TO THE FILE  
 7000-7340 SEARCH THE FILE FOR SPECIFIC ITEM UNDER SPECIFIC HEADING  
 7001-7003 Mug trap.  
 7050-7160 Options for search — make choice and check validity.  
 7170-7177 Enter item to be searched for, and adjust its length if it is too long or short.  
 7180-7340 Search the file to print matches out, and display them  
 9000-9510 Fill the 4 printing and colour arrays.

If it is likely that many items will be matched up during the searching process (more than 30), further dimension array *R(x)* to whatever size seems suitable, but look out for an out of memory error message.

## Microdrive option

- Erase 11 4000-4120, replacing it with:  
 4000 ERASE "m";1;"MULTI-FILE" DATA a\$(  
 4010 SAVE\* "m";1;"MULTI-FILE" DATA a\$(

4020 GO TO 140.

Using the ZX Net, this file could of course be transmitted. User 2 would prepare his station in the following method:

- FORMAT "n";2 — set the network station to no 2.  
 FORMAT "t";19200 — set the baud (data transmission) rate to 19200 bits per second.  
 LOAD\* "n";1 — load program from user 1 to the current network station (2, himself).  
 The first user would now transmit the program by SAVE\* "n";2

## Variables

- F,Z,C,A,G & W — FOR — NEXT loops  
 WORDS — no entries so far.  
 CATEGORIES — number of pieces of info of the max possible 200 filled so far.  
 SORTWORD — WORDS+1 for printing on printer.  
 SORT — SORTWORD, only used in the screen dump.  
 TOT — no item matched.  
 RS — 12 spaces, used for annulling entries.  
 Z\$ — first letters of the various Menu-operated options.  
 Y\$ — universal DATA READING string.  
 X\$ & J\$ — INKEY\$ READING string.  
 E\$ — item to be searched for the rummaging routine.

## Arrays

- P(2,5) — system variable improvement array, used for the Pokes.  
 P(1,1 to 5) — locations.  
 P(2,1 to 5) — addresses.  
 A\$ (CATEGORIES,200,12) — array with CATEGORIES categories, each containing up to 200 entries up to 10 characters in length.  
 H\$ (CATEGORIES,12) — headings of the categories.  
 C\$(CATEGORIES,12) — used in sorting — corresponds to A\$(...  
 Z(7) — CODE value used to GO TO's after the main Menu.  
 R(30) — rummage array to store matched items and their codes.  
 P(10),C(10) — PRINT positions of the max 10 different categories.  
 S(10),T(10) — the colours provided for these PRINT positions.

```
10>REM Multi-file © TDR 1983
```

```
by Sam Knowles
```

```
20 DATA 23693,23658,23609,2356
2,23561
30 DATA 48,8,30,1,10
40 DIM P(2,5)
50 FOR F=1 TO 2: FOR G=1 TO 5
READ P(F,G): NEXT G: NEXT F
60 FOR F=1 TO 5: POKE P(1,F),P
(2,F): NEXT F
70 LET WORDS=0: LET R$=""
": CLS: BORDER 6: PRINT T
AB 10; BRIGHT 1; FLASH 1;"MULTI-
FILE"; BRIGHT 0: PRINT TAB 2;"©
Tyger Data Research 1983""
by Sam Knowles""
80 PRINT "This multi-file syst
em allows you to enter up to 1
0 pieces of information on 200 i
tems, each of which is permitte
d to be up to 12 characters in
length."
90 INPUT "How many categories
do you wish to have in the filin
g system?" : limit (
1 to 10) : CATEGORIES
100 IF CATEGORIES<1 OR CATEGORI
ES>10 THEN PRINT #0; BRIGHT 1;"I
NVALID ENTRY: PRESS ANY KEY": P
AUSE 0: GO TO 90
110 LET CATEGORIES=INT (CATEGOR
IES)
120 DIM A$(CATEGORIES,200,12)
125 DIM H$(CATEGORIES,12)
130 CLS
140 CLS: RESTORE 150
150 DATA "OPEN A FILE","DUMP FI
LE ON PRINTER","PRINT OUT FILE",
"SAVE THE FILE","LOAD A FILE","A
DD TO THE FILE","RUMMAGE THE FI
LE"
160 LET Z$="ODPSLAR": DIM Z(7):
FOR F=1 TO 7: LET Z(F)=CODE Z$(
F): NEXT F
170 PRINT TAB 11;"MENU""
180 FOR F=2 TO 8: READ Y$: PRIN
T AT (F+2),4; FLASH 1; INVERSE 1
;Y$( TO 1); FLASH 0; INVERSE 0;Y
$(2 TO 1): NEXT F
190 PRINT #1; BRIGHT 1;"MAKE CH
```

```
oice by pressing"; BRIGHT 0;"
";#1; BRIGHT 1;"CORRECT KE
Y (FLASHING LETTER)"
200 PAUSE 0
210 LET X$=INKEY$: IF X$="" THE
N GO TO 210
220 LET X=CODE X$: FOR F=1 TO 7
: IF X=Z(F) THEN GO TO (1000+F)
230 NEXT F
240 PRINT AT 19,0;"TRY AGAIN":
PAUSE 100: PRINT AT 19,0;"
": GO TO 210
1000 REM OPEN A FILE
1010 GO SUB 9000
1020 CLS: PRINT TAB 7;"CATEGORI
ES: ";CATEGORIES
1030 FOR F=0 TO (CATEGORIES-1)
1040 INPUT ("HEADING ";(F+1))
LINE H$(F+1)
1050 PRINT AT ((F+2)+2),((2-(LEN
STR$(F+1)))));(F+1);" ";H$(F+
1)
1060 NEXT F
1070 CLS: LET WORDS=WORDS+1: IF
WORDS>=301 THEN GO TO 1500
1080 PRINT AT 21,22;"WORDS: ";WOR
DS
1090 FOR Z=1 TO CATEGORIES
1100 INPUT ( BRIGHT 1;H$(Z); BRI
GHT 0;WORDS) : LINE A$(Z,WORDS)
1110 PRINT AT P(Z)-2,C(Z); INK 5
(Z); PAPER T(Z);H$(Z)
1115 PRINT AT P(Z),C(Z); BRIGHT
1;A$(Z,WORDS)
1120 NEXT Z
1130 PRINT #0; FLASH 1; INK 7; P
APER 3;"C: COPY,0: QUIT,ELSE: CONT
INUE"
1140 LET J$=INKEY$: IF J$="" THE
N GO TO 1140
1150 IF J$="C" THEN COPY: GO TO
1070
1160 IF J$="0" THEN GO TO 1300
1170 IF J$="E" THEN GO TO 1070
1180 GO TO 1070
1300 REM SORT OUT THE FILE
1310 CLS: PRINT TAB 3; BRIGHT 1
;"SORT NOW TO TAKE PLACE"; BRIGHT
0;"The computer will now sor
t out the series of entries int
o alphabetical order, takin
g the first piece of informatio
```

```

n entered in each case as t
he most significant."
1320 PRINT AT 20,0; FLASH 1;"PRE
SS ANY KEY TO COMMENCE SORT": PA
USE 0; PRINT AT 20,0;
1330 PRINT AT 11,6; INK 3; PAPER
7; FLASH 1;"SORT IN "; INVERSE
1;" PROGRESS"
1340 DIM C$(CATEGORIES,12)
1350 FOR F=1 TO WORDS: FOR G=1 T
O (WORDS+2)
1360 FOR C=1 TO CATEGORIES: LET
C$(C)=A$(C,G): NEXT C
1370 IF A$(1,G+1)>A$(1,G) THEN
GO TO 1390
1380 GO TO 1410
1390 FOR X=1 TO CATEGORIES: LET
A$(X,G)=A$(X,G+1): NEXT X
1400 FOR X=1 TO CATEGORIES: LET
A$(X,G+1)=C$(X): NEXT X
1410 NEXT G: NEXT F
1420 GO TO 140
2000 REM DUMP FILE ON PRINTER
2001 CLS : IF A$(1,1)=R$ THEN PR
INT #0; BRIGHT 1;"NO DATA HELD I
N COMPUTER": PAUSE 100: GO TO 14
0
2010 PRINT TAB 8; BRIGHT 1;"PRIN
TER DUMP"; BRIGHT 0;"The file
is now being dumped onto the
printer in full, & in the alpha
betical order into which the
computer has sorted it"
2020 OPEN #2,"P"
2030 PRINT "Multi-file © TDR 198
3"
2040 LET SORTWORD=WORDS+1
2050 LET SORTWORD=SORTWORD-1: IF
SORTWORD=0 THEN CLOSE #2: GO TO
140
2055 PRINT "-----"; (WORDS-SORT
WORD)+1
2060 FOR F=1 TO CATEGORIES
2070 PRINT H$(F); " : "; A$(F,SORT
WORD)
2080 NEXT F
2090 GO TO 2050
3000 REM DISPLAY FILE ON SCREEN
3010 CLS
3020 PRINT TAB 8; BRIGHT 1;"SCRE
EN DUMP"; BRIGHT 0;"The file w
ill now be dumped onto the screen
in full, & in the alphabetic
al order into which the comput
er has sorted it."
3030 PRINT AT 20,0; FLASH 1; INK
7; PAPER 3;"PRESS ANY KEY FOR S
CREEN DUMP": PAUSE 0
3040 CLS
3050 LET SORT=WORDS+1
3060 LET SORT=SORT-1
3070 IF SORT=0 THEN PAUSE 0: GO
TO 140
3075 CLS : PRINT "-----"; (WORD
S+1-SORT)
3080 FOR F=1 TO CATEGORIES
3090 PRINT INK S(F); PAPER T(F);
H$(F)
3100 PRINT " : "; A$(F,SORT)
3110 NEXT F
3120 PRINT #0;"PRESS A KEY":
3130 PAUSE 0
3140 GO TO 3060
4000 REM SAVE THE FILE
4010 CLS : INPUT "Name of file ?
" LINE S$: IF S$="" THEN LET S
$="FILE:"+STR$ WORDS
4020 IF LEN S$>10 THEN LET S$=S$
( TO 10)
4030 PRINT "SAVE:"; INVERSE 1;
S$; INVERSE 0: PRINT "O.K. ?":
PAUSE 0: IF INKEY$="Y" THEN PR
INT CHR$ 8; " ": GO TO 4050
4040 GO TO 4010
4050 PRINT "SAVEing:"; BRIGHT
1; S$
4060 SAVE S$ LINE 140
4070 CLS
4080 PRINT "Now to VERIFY the fi
le"
4090 PAUSE 100: PRINT "Press any
key to VERIFY"
4100 PRINT "VERIFYing:"; BRIG
HT 1; S$
4110 VERIFY S$
4120 GO TO 140
5000 REM LOAD A NEW FILE
5010 CLS : PRINT TAB 6; BRIGHT 1
;"LOAD FILES FROM TAPE": PRINT
"Press 'F' to LOAD a program"
"Press 'D' for a file of DATA"
5020 PAUSE 0
5030 IF INKEY$<>"F" AND INKEY$<>
"D" THEN GO TO 5020
5040 IF INKEY$="D" THEN GO TO 51
00
5050 CLS : PRINT "LOADing:" -
"O.K. ?": PAUSE 0: IF INKEY$="Y
" THEN PRINT CHR$ 8; " ": LOAD ""
5060 GO TO 5010
5070 GO TO 140
5100 CLS : PRINT "LOADing:" -
"O.K. ?": PAUSE 0: IF
INKEY$="Y" THEN PRINT CHR$ 8; "
": LOAD ""
5110 GO TO 5010
5120 GO TO 140
6000 REM ADD TO THE CURRENT FILE
6010 CLS : PRINT "Now to add to
the existing file which is store
d by the computer"
"-----"; WORDS; "-----"
"Es
ch with:"; CATEGORIES; " category"
6020 IF CATEGORIES>1 THEN PRINT
CHR$ 8; CHR$ 8; "ies"
6030 PRINT AT 20,0; INK 7; PAPER
3;"PRESS ANY KEY TO ADD TO THE
FILE": PAUSE 0
6040 GO TO 1070
6050 GO TO 140
7000 REM RUMMAGE THROUGH FILE
7010 CLS : PRINT TAB 5; BRIGHT 1
;"RUMMAGE THE FILE"; BRIGHT 0
"Now is your chance to rummage
through file which you have set
up."
7020 PRINT AT 20,0; FLASH 1; INK
7; PAPER 3;"PRESS ANY KEY TO RU
MMAGE !"
7030 PAUSE 0
7040 CLS
7050 PRINT "There are "; CATEGORI
ES; " categories"
7060 FOR F=1 TO CATEGORIES
7070 PRINT AT (F*2+1), ((2-LEN ST
R$ F)); "{ " F; " } "; H$(F)
7080 NEXT F
7090 PRINT #0; FLASH 1; INK 7; P
APER 3;"PRESS YOUR CHOICE (0 =)
10)": PAUSE 0
7100 LET J$=INKEY$: IF J$<"0" OR
J$>"9" THEN GO TO 7100
7120 LET J=(CODE J$)-48
7130 IF J=0 THEN LET J=10
7140 IF J>CATEGORIES THEN GO TO
7100
7150 PRINT AT 5+(2*(J)-1)-3, ((2-
LEN STR$ J)); OVER 1; FLASH 1; "
"
7151 PRINT AT 5+(2*(J)-1)-3,18;
FLASH 1;"CHOSEN"
7160 IF J=10 THEN PRINT FLASH 1;
OVER 1; " "
7161 FOR F=1 TO 2: RANDOMIZE USR
3582: NEXT F
7170 INPUT "Enter item to be sea
rched" LINE E$
7175 IF LEN E$<12 THEN FOR F=1 T
O (12-LEN E$): LET E$=E$+" ": NE
XT F
7180 DIM R(30): LET TOT=1
7190 FOR F=1 TO WORDS
7200 IF E$=A$(J,F) THEN LET R(TO
T)=F: LET TOT=TOT+1
7210 NEXT F
7220 IF R(1)=0 THEN PRINT #0; FL
ASH 1; INK 7; PAPER 3;"NO ITEMS
MATCHED : PRESS A KEY": PAUSE 0:
GO TO 140
7230 CLS
7235 PRINT TOT-1;" items";
7236 IF (TOT-1)<2 THEN PRINT CHR
$ 8; " has";
7240 PRINT " been found to" -
"ma
tch with "; E$
7250 PRINT AT 20,0; INK 7; PAPER
3;"PRESS ANY KEY TO SEE THE MAT
CHES": PAUSE 0
7260 FOR A=1 TO TOT-1
7270 CLS : PRINT "-----"; R(A)
7280 FOR F=1 TO CATEGORIES
7290 PRINT INK S(F); PAPER T(F);
H$(F)
7295 PRINT " : "; A$(F,R(A))
7300 NEXT F
7310 IF (TOT>F) THEN PRINT #0;"P
RESS ANY KEY FOR NEXT MATCH"
7320 PAUSE 0: NEXT A
7330 PRINT #0; FLASH 1; INK 7; P
APER 3;"END OF MATCHING : PRESS
ANY KEY"
7340 PAUSE 0: GO TO 140
8999 STOP
9000 DIM P(10): DIM C(10): DIM S
(10): DIM T(10)
9010 RESTORE 9500
9020 FOR F=1 TO 10
9030 READ P(F),C(F)
9035 READ S(F),T(F)
9040 NEXT F: NEXT G
9050 RETURN
9500 DATA 2,2,3,7,6,2,1,5,10,2,7
,2,14,2,6,1,18,2,0,5
9510 DATA 2,17,0,5,6,17,6,1,10,1
7,7,2,14,17,1,5,18,17,7,3
9990 FOR F=1 TO 10: PRINT C(1,F)
,C(2,F): NEXT F

```

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## Secret addresses

Keith and Steven Brain reveal some of the secrets hidden inside the Aquarius

The Aquarius is a relatively new contender at the lower end of the home computer market and no information is available on the location of the systems variables. However, we have been *Peeking* around the memory of the Aquarius and, with a little detective work, have unearthed the addresses of a number of the system locations which you can easily *Peek* and *Poke* to improve your programs.

The keyboard scan uses locations 14346 to 14351. The accompanying routine allows you to take a *Peek* into these locations, so that you can see what happens when you press keys:

```
10 PRINT CHR$(11)
20 PRINT "address"TAB(9)"CHR$"TAB(15)"code"
30 PRINT
40 SL=14346
50 FOR IN=0 TO 5:PRINT SL+IN:NEXT
60 FOR SP=130 TO 360 STEP 40
70 POKE 12328+SP,PEEK(SL+X)
80 N$=RIGHT$(" "+STR$(PEEK(SL+X)),3)
90 FOR L=1 TO LEN(N$)
100 POKE 12328+SP+L+5, ASC(MID$(N$,L,1))
110 X=X+1:NEXT SP:X=0
120 GOTO 60
```

Three columns are produced on the screen labelled "address", "Chr\$" and "code" and these are continuously updated. If you press a key, you will immediately notice that three of these locations change their values. A little experimentation reveals that location 14346 always contains the Ascii code of the last key pressed. Location 14350 contains 0, as long as no key is pressed, and when a key is pressed location 14351 contains 6. When you press *Ctl* and a 'keyword', then locations 14347 and 14348 also change.

Checks on combinations of these can easily be used to produce auto repeat on any of the keys. If you add these lines and *Run 200* you will find that, if you hold down a key, it will continue to repeat until you let go.

```
200 IF PEEK(14351)<>6 THEN 200
210 PRINT CHR$(PEEK(14346));
220 GOTO 200
```

When you first start, you will find that you get a few pound signs, as there is a short delay before the value in 14351 goes to 6. You can easily get rid of these by adding a short delay before the check. This auto repeat works for both upper and lower-case characters. The backspace will also act to delete characters, and *Rtn* gives a carriage return (move back to the first column) without a line feed (move down a line).

When you press *Ctl* and a 'keyword', then the whole keyword is printed with the last letter repeated, and some of the keys which are not used for keywords give certain of the graphics characters. For

most immediate response to a key press, it is best to check that *Peek(14351)<>6*, rather than *Peek(14350)=0*, as the system cycles a series of 20-odd values through these locations when a key is pressed.

Although you can use *Print Tab(X)* to move the print position further on, you cannot move the print position back up the screen in Aquarius Basic. This is a nuisance if you want to refresh values on the screen. The normal solution is the one used in our first example, where the simple variable was converted to a string, sliced, and then the Ascii code of each slice *Poked* into place (notice that some spaces were also added to the front of the string and then *Rights* taken to give a *Print Using* type of formatting effect so that the columns of figures lined up correctly).

Unfortunately, all this *Poking* is rather slow and it would be much better if we could reset the cursor position. The key locations here are 14337 and 14338, so change the start address in the previous routine, so that you can inspect these locations:

```
40 SL=14337
```

If you *Run* this, you will see that 14337 contains 145 and 14338 contains 49. Now  $(49 * 256) + 145 = 12689$ , which is the screen start address (12328) plus 10 times 40 (the number of positions already used to print the display) plus one. Now add this line which prints one character at a time and watch how the values increment.

```
115 PRINT "a";
```

You will see that location 14337 increments by one each time a character is printed, until it passes 255 when it resets to 0 and 14338 increments by one. Replace the simple *Print* in line 30 by:

```
30 PRINT PEEK(14337),PEEK(14338)
```

which show the values immediately after clearing the screen and you will see that these are 81 and 48  $((48 * 256) + 81 = 12369$  ie screen start + 1). You can therefore see that these locations point to the next print position.

Now, to construct a *Print At* function all we need do is add our screen offset (*Of*) to the initial value (*Ch*) and then *Poke* in the appropriate figures. As one byte can only hold numbers up to 255, we must convert our value into two bytes and *Poke* them separately. Define the first screen position as a variable (*Ch*) and add on the offset first:

```
300 PRINT CHR$(11)
310 CH=12328
320 PRINT"OFFSET";INPUT OF
330 PS=CH+OF
```

```
340 POKE 14337,ps-256*INT(PS/256)
350 POKE 14338,INT(PS/256)
360 PRINT "HERE"
400 GOTO 310
```

*Run 300* and *Input* offset values from 0 to 920 when you will see that the "Here" message can now be placed anywhere on the screen. The only drawback with this technique appears when you *Stop* the program with *Ctl-C* and *List* — you will find that very strange things happen to your listing which now probably starts half-way across the screen and wraps round at the edges! Fear not, the solution is simple. If you press *Rst* and then *Ctl-C*, the system will automatically reset to the normal state, or alternatively you can *Poke* the system back to a sensible screen position (like 12328) when you finish if you need to.

```
370 POKE 14337,81
380 POKE 14338,48
```

If you used an offset greater than 946, then even stranger things happen when you stop the program, as the screen border changes colour! Now that could be a useful additional feature to include in your programs, so let's look a little further.

Presumably, we must have altered a system address after the end of the character screen, so try *Poking* each location after 12328+959. Lo and behold, when you *Poke* 13312, the border colour changes to the colour corresponding to the number you *Poked* in.

```
400 INPUT N
420 POKE 13312,N
450 GOTO 400
```

Now wait a minute — all the colour Ram addresses have corresponding character Ram addresses which are 1024 bytes lower, so what happens if we also *Poke* 13312-1024 (12288)?

```
430 POKE 12288,N
```

Not only can we change the border colour, but we can also fill it with coloured characters!

Notice that all the numbers from 0 to 255 can be used to set both foreground and background colours. If you look closely, you will note that there now appears to be an odd little block sitting at the top left of the screen which is the same as the border. In fact, this is not on the normal screen at all — try *Poke* 12328,0 if you don't believe us — but is one line above it. To tidy the screen back up, we need to fill all 40 locations from 13312 with the same value:

```
410 FOR N=0 TO 39
420 POKE 13312+N,N
430 POKE 12288+N,N
440 NEXT N
```

Another thought is to *Poke* a message into the locations following 12288 and see what happens. The easy way to do that is to simply *Input* a negative value (up to 39) in the *Print At* routine. The most important point here is that when the screen scrolls

Continued over the page

# PROGRAMMING

this area remains protected (unless you use `Chr$(11)`), so it is an obvious place to put a title or score. For example, *Input* values of `-30` and then `900`, then keep pressing *Rtn* and watch the screen scroll without affecting your message.

```
320 PRINT"OFFSET";INPUT OF
360 PRINT"TITLE OR SCORE"
```

```
400 GOTO 310
```

Facilities are provided to use machine code routines, but they are not really explained in the manual. You have to tell the Aquarius where in memory you have put your machine code, by *Poking* the start address of your routine into locations `14340` and `14341`. Now, if we want to put the routine at address `16000`, we must *Poke* `14340` with `128` and `14341` with `62`:

```
1000 PRINT CHR$(11)
1020 POKE 14340,128
1030 POKE 14341,62
```

The simplest way to set up your machine code routine is to enter the numbers into a *Data* statement, *Read* this *Data*, and *Poke* the values into consecutive memory locations.

Here is an example of a short routine which will *Fill* a number of consecutive locations with the same number.

```
1040 DATA 33,40,48,229,209,19,1,192,3,54,
0,237,176,201
1050 FOR N=1 TO 14
1060 READ A
1070 POKE 15999+N,A
1080 NEXT N
```

Machine code routines are called by the Basic *Usr* function and the simplest way to use this command in your programs is to

make a dummy (Unused) variable equal to *Usr* times that dummy variable:

```
1090 Z=USR(Z)
```

If you enter the previous line and then *Run*, you will find that after a short delay the whole screen will suddenly fill with pound signs! Even more impressive is the fact that if you now type:

```
Z=USR(Z)
```

as a direct command, the screen fills with no perceptible delay at all. The reason that it was slower the first time was that the Basic program had to load the machine code from *Data* into memory before it could execute it, whereas the second command used the routine you had already loaded into position.

Of course, you can fill the screen with a single character with Basic, but only very slowly. For example, *Poking* a number into each of the `960` positions in the character Ram takes a whole eight seconds. On the other hand, this simple 14 byte routine does the same job instantaneously.

One of the most important numbers in the code loaded was the one put into location `16010`, as this was the value loaded onto the screen. You can change this by simply *Poking* that location through Basic. Try this loop, which manages to sequentially fill the screen completely with each one of the `256` characters in about four seconds, to really appreciate the speed of machine code:

```
1120 FOR N=0 TO 255
1130 POKE 16010,N
1150 Z=USR(Z)
1160 NEXT N
```

Although that gives an impressive demonstration of the speed of machine code, this does not seem a very useful routine, until you realise that if we fill the colour Ram in the same way, we can instantly set the screen to any combination of foreground and background colours. To change the start of the area filled, we need to change the address in the second and third bytes of the code, so that they represent `13352` instead of `12328`. As `12328` is `40 48` and `13352` is `40 52`, we actually only need to *Poke* `16002` with a new value. At the same time we will arrange to hold the display until you press a key, clear the screen each time, and print the current value of *N*.

```
1100 POKE 16002,52
1110 PRINT CHR$(11)
1130 A$=INKEY$:IF A$="" THEN 1130
1140 PRINT N
```

If you *Run* this modified version, you will be able to set up all the possible combinations of foreground and background colours. Of course, you could do this at any point in your normal Basic programs, provided that you included this short machine code routine, and *Poked* in the appropriate values before calling it with *Usr*.

The other key locations in this fill routine are `16007` and `16008`, which control the number of bytes filled. If you change the values in these, then you can clear only parts of the screen. So far, they contain `192` and `3` ( $3 \times 256 + 192 = 960$ ), so if you change `16007` to `0` the last `192` bytes will not be filled. Of course, if you change both the start address and the number of bytes filled, you can fill any section of the screen (and also easily set the whole border).

So far we have put the machine code into memory from address `16000`, but this is not a very safe area as it may be overwritten by your program or variables. The simplest place to put short routines is right at the end of the memory. If you look into locations `14509` and `14510`, you will find the address of the last available byte. On the unexpanded machine this will be `16383`, and with an added `16K` this will be `32767`.

Strings are stored from this last byte address downwards, so as long as you do not input any strings your code will be safe. But that rather limits your Basic, so it is better to persuade the system that some of the memory has vanished by *Poking* different values into `14509/14510`. We need 14 bytes, so just subtract this number from the value in `14509` and *Poke* it in.

```
POKE 14509,(PEEK(14509)-14),
```

Note that this reset of the top of memory will be held unless you carry out a complete reset by pressing *Rst* and then *Rtn* (*Rst* followed by *Ctl-C* has no effect on the top of memory value).

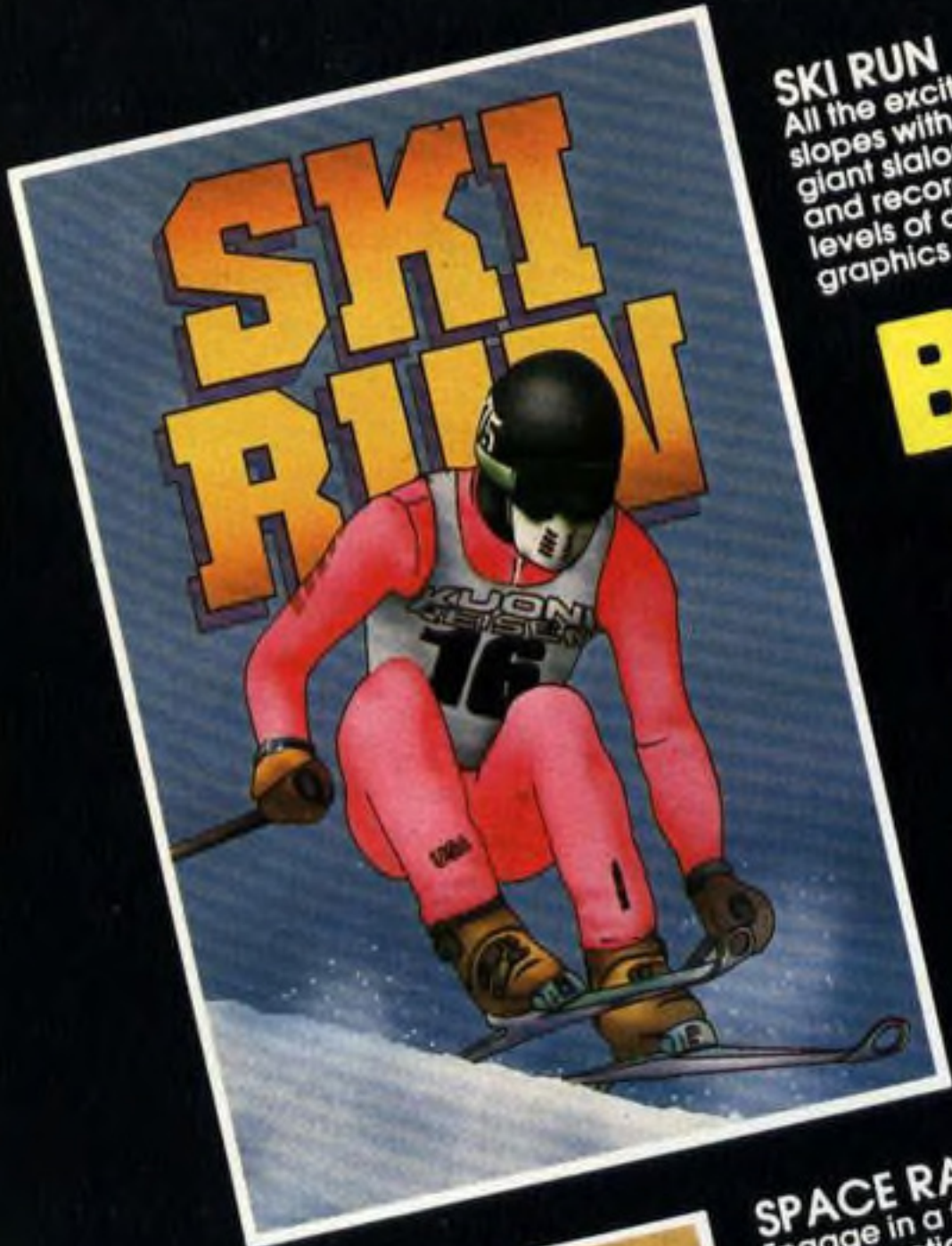
You will also have to recalculate where to *Poke* to change the effect of the routine, and alter the values in `14340/14341` which tell where your routine starts. ■

## THE 'FILL' ROUTINE

address	code*	
0	33	LD HL,n
1	40	low byte of start address
2	48	high byte of start address
3	229	PUSH HL
4	209	POP DE
5	19	INC DE
6	1	LD BC,n
7	192	low byte of length
8	3	high byte of length
9	54	LD (HL),n
10	0	fill code
11	237	LDIR
12	176	"
13	201	return to BASIC

\*decimal values

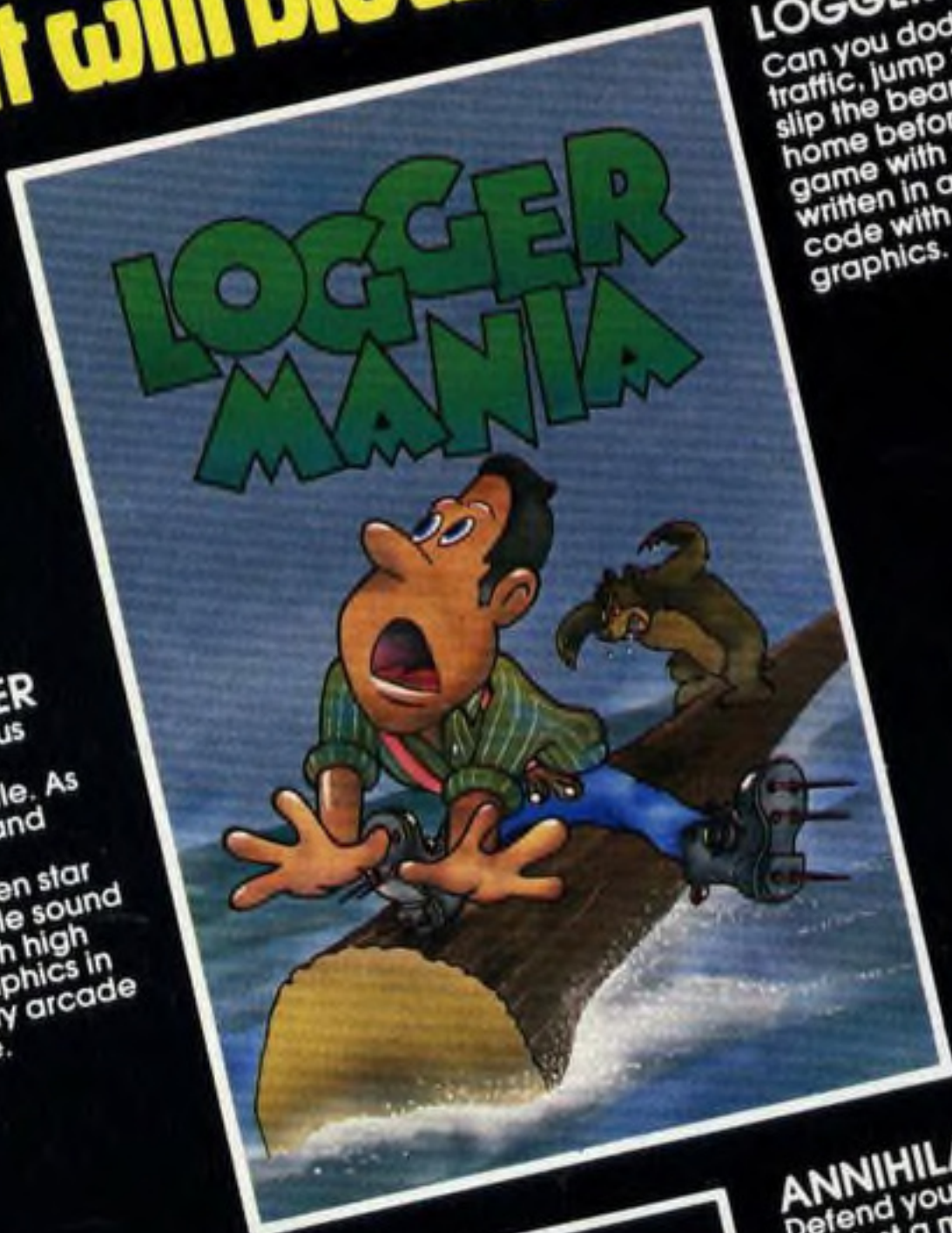




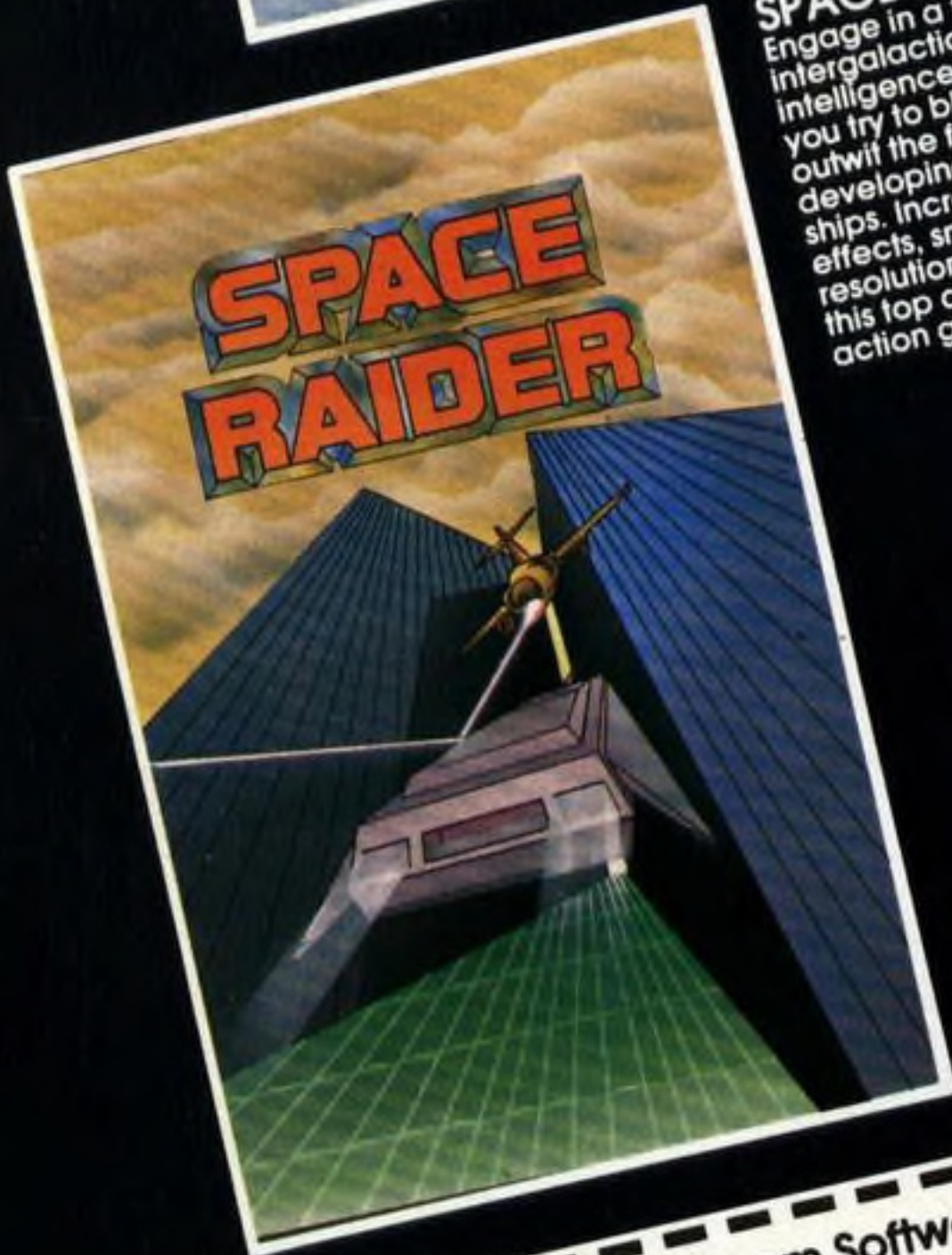
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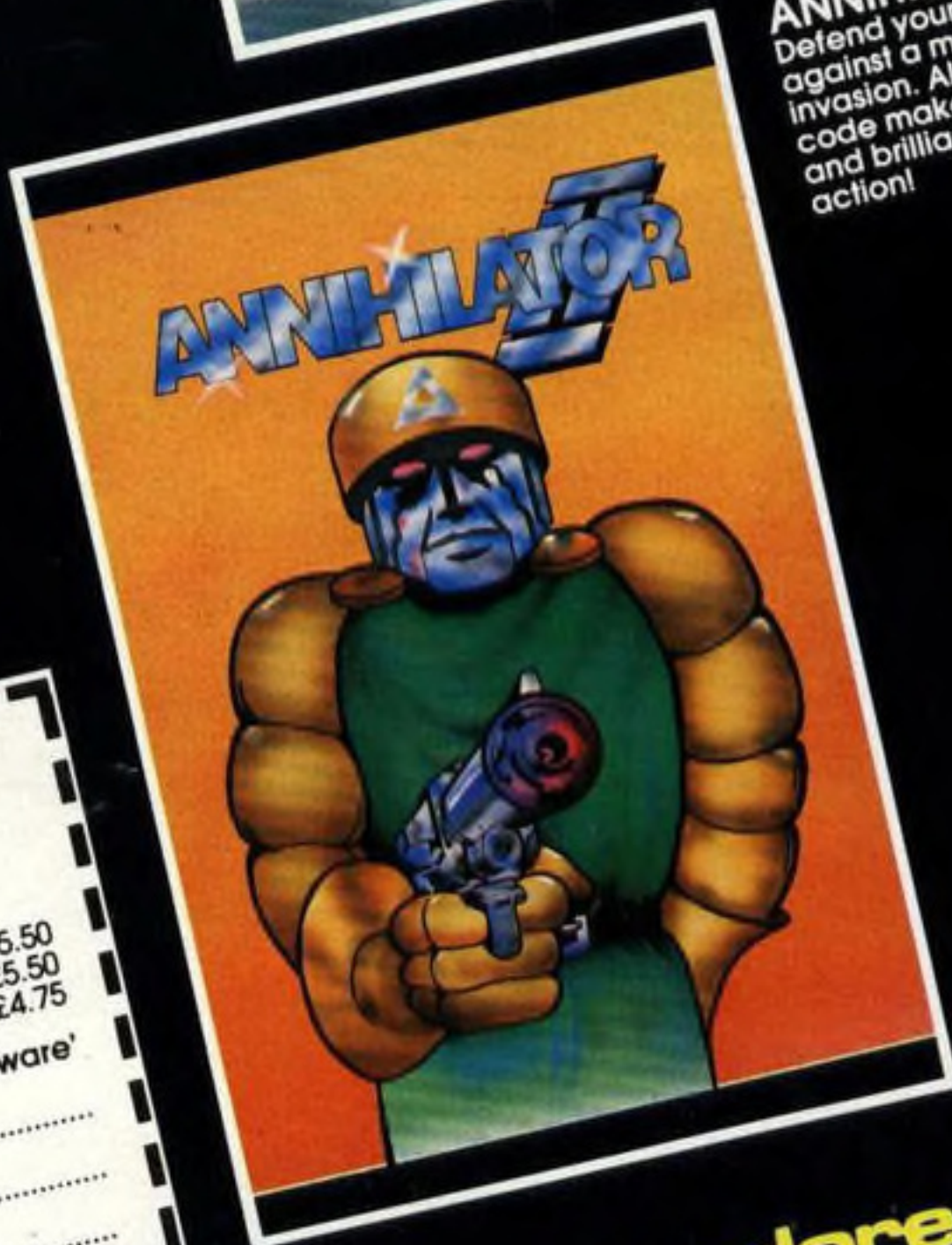
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# Spritely features

*Pete Gerrard examines some of the lesser known features of sprite graphics*

Over the last couple of weeks we've looked at two different aspects of Commodore 64 graphics, namely generating your own characters and handling bit mapping of the screen. In this last look, at graphics, we'll turn our attention to sprites and discuss some of the lesser known features about them.

Your Commodore 64 is capable of defining up to 255 sprites, although for screen display purposes a practical limit is eight. This is usually enough for most applications and is what we'll use here. You'll find all the relevant background information in your owner's manual, so without further ado let's look at the sprite memory map.

The 47 registers that look after sprites start at memory location 53248, and they are defined as shown in the accompanying table.

Armed with this knowledge, let's go into a few facts about sprites. Since there are a lot of locations to remember, we usually refer them all to a base location, here called *V*, where *V* is equal to 53248. Thus, instead of talking about location, say, 53279, we talk about location *V* + 31.

The data for each sprite is stored in a 64 byte block of memory — although each sprite takes up 63 bytes, a further byte is reserved to make life nice and simple for the computer. Commodore call this last byte a place holder: it's another way of saying that 64 bytes is a much easier number for the computer to deal with than 63.

To show where the data for each sprite is stored, an appropriate value must be *Poked* into one of the eight memory locations from 2040 to 2047, one for each of the first eight sprites.

For instance, to tell the computer that sprite 0 is stored in the 13th block of data, we *Poke* 2040, 13 where the 13th block starts at memory location (13 \* 64), or location 832. Since these eight bytes are capable of holding any number up to 255, we can store sprites anywhere up to a maximum starting location of (255 \* 64), or 16320, the end of memory as far as the Vic chip is concerned. We can go further and bank in another block of memory, and put sprites in there, as long as we don't place them anywhere near the Rom image of the character set.

To actually turn the sprite on, you need to *Poke* location 53269, or *V* + 21, with the relevant number, remembering that all this is handled on a binary basis. Thus, *Poking* this location with a 1 turns on sprite 0, with a 2 turns on sprite 1, a 4 for sprite 2, all the way up to 255, which turns on every sprite under the sun.

To move them about the screen, all you now have to do is update the *X* and *Y* screen co-ordinates, as given in the map

earlier. Thus, for sprite zero the *X* co-ordinate is changed by *Poking* location *V* + 0, and the *Y* by *Poking* *V* + 1.

Sprites are expanded in the *X* direction as follows:

POKE 53277, PEEK (53277) OR (2 to the power SN)

where *SN* is the sprite number from 0 to 7. In the *Y* direction, sprites are expanded with:

POKE 53271, PEEK (53271) OR (2 to the power SN)

To get life back to normal again, in the *X* direction:

POKE 53277, PEEK (53277) AND (255 - (2 to the power SN))

and in the *Y* direction:

POKE 53271, PEEK (53271) AND (255 - to the power SN))

So far we've never moved sprites beyond an *X* co-ordinate of 255, simply because memory locations can't hold values greater than this. However, memory location 53264 allows us to move all the way to the edge, in the following manner. When the *X* co-ordinate becomes

equal to 255, *Poke* 53264 (or *V* + 16), with a 1, and then reset the *X* values to zero again. Now we're only moving from 256 to 320, or a total of 64 positions, so *X* ranges from 0 to 63. When we've finished, reset *V* + 16 back to a zero again, to let us move from the left-hand edge of the screen again.

The priority of each sprite can be controlled from register 53275 (53248 + 27). This register works in exactly the same way as all the others, with sprite 0 being controlled from bit 0, sprite 1 from bit 1, and so on. If the bit is set to zero, then the sprite will be displayed instead of anything else: the sprite is in the foreground, in other words.

To get the relevant sprite into the background, the bit must be set to 1.

Collision is controlled from memory location 53278, or 53248 + 30. Again, this works in the same way as all the other locations, and is used to detect collisions between sprites. If the register is showing zero, then nothing has happened, a 3 indicates a collision between sprites 0 and 1, a 6 for sprites 1 and 2, and so on. This is based on the usual manner of selecting sprites from the appropriate bits of a particular byte, ie:

Value	128	64	32	16	8	4	2	1
Bit	7	6	5	4	3	2	1	0
Sprite No.	7	6	5	4	3	2	1	0

Thus, sprites 2 and 3 are controlled from bits 2 and 3, which respectively give the values of 4 and 8. Therefore, a value of 12 (4 + 8) must be *Poked* into that byte, or indeed read from it, and the relevant action will ensue.

Multiple sprite collision is also possible. For instance, if register 53278 returns a value of 82, it means that bits 6, 4 and 1 have been affected, or in other words sprites 6, 4 and 1 are involved in a pile-up. A most useful location!

To talk about disabling sprites always reminds me of Norman Hunter, but the quick and easy way to turn them all off is to type *Poke V* + 21, 0, but for selective sprites you must use:

POKE *V* + 21, PEEK (*V* + 21) AND (255 - 2 to the power of SN)

where *SN* is the sprite number from 0 to 7.

We've already shown you sprites moving across the screen, just from Basic, but they can also be controlled by a joystick. For joystick 1:  $S1 = \text{PEEK}(56321) - ((S1 \text{ AND } 16) = 0)$  gives a 1 if the fire button is pressed, and a 0 if it's not.  $((S1 \text{ AND } 15) = 4) - ((S1 \text{ AND } 15) = 8)$  gives a 1 for moving left, a -1 for moving right, and a 0 if nothing's doing.  $((S1 \text{ AND } 15) = 1) - ((S1 \text{ AND } 15) - 2)$  gives a 1 for moving down, a -1 for moving up, and a 0 if nothing's doing.

To read joystick 2, let  $S2 = 56320$ , and substitute  $S2$  for  $S1$  in all of the previous expressions. Having done that, it would be a relatively simple matter to have a sprite controlled joystick game, written entirely in Basic.

Well, that's it for sprites. Next week, a look at music. ■

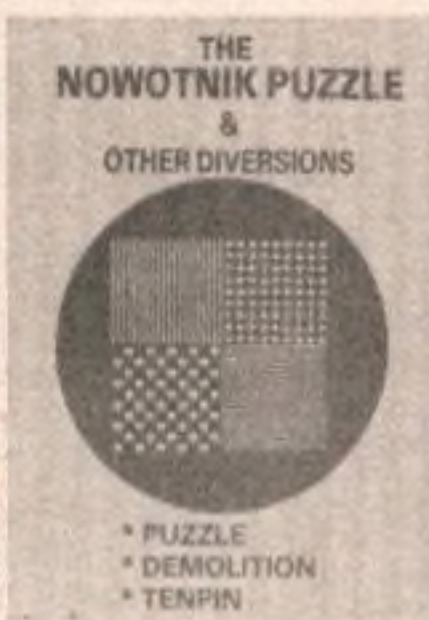
Address	Description
(53248+)	
00	X position of sprite 0
01	Y position of sprite 0
02-15	Ditto for sprites 1 through 7
16	Most Significant Bit of X position More of this one later
18	Raster Register
19	X position of Light Pen
20	Y position of Light Pen
21	Turn Sprite On
23	Expand Sprite in Y direction
24	Memory Pointers
25	Interrupt Register
26	Enable Interrupt
27	Sprite Data Priority
28	Multi-colour Sprites!
29	Expand Sprite in X direction
30	Sprite to Sprite collision
31	Sprite Data collision
32	Exterior colour
33	Background Colour 0
34	" " 1
35	" " 2
36	" " 3
37	Sprite multi-colour 0
38	Sprite multi-colour 1
39	Colour for sprite 0
40-46	Ditto for sprites 1 through 7

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# OPEN FORUM

*Open Forum* is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

## Meteor

### on Spectrum

The object of the game is to guide your man through a series of meteor belts, avoiding the yellow meteors and eating the flashing green apples. If you hit a meteor the game ends.

As you travel through the belts your score is increasing, but your food is decreasing, this is why you need to eat the apples. If your food supply is above 50

then the border will be blue. If it is below 50 and above five then you are short on food and the border will be red. If your food supply is below five then the border will be green. When the border is green, you lose control of your man and you just have to hope he misses the meteors, but eats an apple. This may give you back control. You will know this by the border colour.

For each apple eaten your food supply goes up by a number between 10 and 30. On the first belt you start with 100 units of fuel.

On the second belt you start with 90 units of fuel.

On the third belt you start with 80 units of fuel.

On the belts four upwards you start with 70 units of fuel.

Your controls are: 1 to move left  
0 to move right.

Don't be caught napping at the end when things speed up.

### Program notes

- 3-50 Sets up variables.
- 100-167 Sets up screen and scrolls upwards.
- 170-177 Checks to see if your man has hit anything.
- 180-195 Checks how much food you have.
- 200-215 Prints your man, boosts up your score and checks if you have any food.
- 220-230 Movement of your man.
- 1200-1350 What it would print if you finish a belt.
- 1604-1750 What it would print if you hit a meteor.
- 9000-9600 Sets up graphics.
- 150 Makes the computer scroll upwards automatically.

```

3 LET SS=0
4 LET J=0
5 BORDER 1: PAPER 1: INK 7: C
LS
6 GO SUB 9000
7 LET J=J+1
8 LET R=100
10 BORDER 1: PAPER 1: CLS
11 IF J=2 THEN LET R=R-10
12 IF J=3 THEN LET R=R-20
14 IF J=4 THEN LET R=R-30
18 LET D=0: LET F=15
19 LET L=225
45 FOR Q=0 TO 200
50 LET A=20: LET S=INT (RND*31)
)
100 PRINT INK 6; AT A, S; "●"
110 PRINT INK 6; AT A, RND*31; "●"
120 PRINT INK 6; AT A, RND*31; "●"
130 PRINT INK 6; AT A, RND*31; "●"
140 LET K=RND*10
145 IF K>8 THEN PRINT INK 4; FL
ASH 1; AT A, RND*31; "●"
150 PRINT INK 1;USR 3280
155 LET L=L-1
167 IF L=0 THEN GO TO 1200
170 IF ATTR (D, F)=14 THEN GO TO
1600
175 IF ATTR (D, F)=140 THEN LET
R=R+INT (RND*20)+10
177 IF ATTR (D, F)=140 THEN BEEP
,1,10
180 LET R=R-1
190 IF R<50 AND R>5 THEN BORDER
2
195 IF R>50 THEN BORDER 1
197 IF R<5 THEN BORDER 4
200 PRINT INK 7; AT D, F; "R"
207 LET SS=SS+.5
215 IF R<1 THEN GO TO 1000
220 IF F>0 AND INKEY$="1" THEN
LET F=F-1
230 IF F<31 AND INKEY$="0" THEN
LET F=F+1
1000 NEXT Q
1100 GO TO 150
1200 PRINT FLASH 1; AT 8, 4; "METEO
R BELT "; J; " COMPLETE"
1212 IF R<1 THEN LET R=0
1225 PRINT FLASH 1; AT 10, 8; "FOOD
LEFT = "; R
1250 PRINT FLASH 1; AT 14, 3; "PRES
S ANY KEY TO CONTINUE"
1270 PRINT FLASH 1; AT 12, 1; "YOUR
SCORE AT THE MOMENT "; SS
1320 IF INKEY$<>" " THEN GO TO 7
1350 GO TO 1300
1604 PRINT FLASH 1; AT D, F; "●"
1605 FOR F=-50 TO 50 STEP 10
1610 BEEP ,1, F
1620 NEXT F
1650 PRINT FLASH 1; AT 8, 0; "YOU'V
E BEEN SMASHED BY A METEOR"
1670 PRINT FLASH 1; AT 10, 3; "YOU
WERE IN METEOR BELT "; J
1680 PRINT FLASH 1; AT 12, 7; "YOUR
SCORE IS "; SS
1700 PRINT FLASH 1; AT 14, 2; "PRES
S ANY KEY TO PLAY AGAIN"
1720 IF INKEY$<>" " THEN RUN
1750 GO TO 1720
9000 FOR P=0 TO 7: READ Z: POKE
USR "a"+P, Z: NEXT P
9010 FOR P=0 TO 7: READ Z: POKE
USR "b"+P, Z: NEXT P
9020 FOR P=0 TO 7: READ Z: POKE
USR "c"+P, Z: NEXT P
9030 FOR P=0 TO 7: READ Z: POKE
USR "f"+P, Z: NEXT P
9500 DATA 255, BIN 10100101, BIN 1
0011001, 255, 126, BIN 01100110, 66,
BIN 11100111
9510 DATA BIN 00011100, BIN 00111
110, BIN 01111110, 255, 255, 255, BIN
01111110, BIN 00111100
9520 DATA 0, BIN 01001000, BIN 001
01010, BIN 01000100, 1, BIN 0010010
0, BIN 01010010, 0
9530 DATA 4, 8, 126, 126, 255, 126, 12
6, BIN 00111100
9600 RETURN

```

Meteor  
by Michael Kay

## Invert

### on Commodore 64

This program is written for the 64 and it enables you to convert everything on the screen to its background colour.

Immediately after you have typed in the program, check it and Save it because it is

in machine code and could cause your computer to crash if incorrect.

To run the program type in SYS828. You can use this routine to good effect; eg, For A = 1 TO 100:SYS828:NEXT

```

1 PRINT "INVERT BY D. SELWOOD."
2 DATA 169,0,168,133,252,169,4,133,253,177,
252,24,105,128
3 DATA 145,252,166,252,232,208,2,230,253,134,
252,224,232
4 DATA 208,236,166,253,224,7,208,230,96
5 FOR P = 828 TO 863 READ M:POKE P,M:NEXT

```

LDAIM	0	INX	
TAY		BNE	2
STAZ	252	INCZ	253
LDAIM	4	STXZ	252
STAZ	253	CPXIM	232
LDAIY	252	BNE	236
CLC		LDXZ	253
ADCIM	128	CPXIM	7
STAIY	252	BNE	230
LDXZ	252	RTS	

Invert  
by D Selwood

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**Moire**

## on Dragon

This program draws lines on the screen

starting from the four corners. The lines are four pixels apart and because of their closeness, they form a Moire pattern on

the screen. Interesting results can be obtained by changing the *Pmode* and making the lines a random colour.

```

10 PMODE 4,1:SCREEN 1,1:PCLS

20 FOR A=1 TO 255 STEP 4:LINE(0,191)-(A,0),PSET:NEXT A
30 FOR A=255 TO 1 STEP-4
40 LINE(255,191)-(A,0),PSET:NEXT A
50 FOR A=1 TO 255 STEP 4:LINE(0,0)-(A,191),PSET:NEXT A
60 FOR A=255 TO 1 STEP-4:LINE(255,0)-(A,191),PSET:NEXT A
70 GOTO 70

```

**Moire**  
by David Grey

**Seeing Stars**

## on Lynx

This is a game for one player in which you must destroy a moving target. The program will ask you how many shots you want

and how fast the target should go. At the end you will be told how many you have scored.

```

100 CLS
110 PRINT"YOU FIRE WITH THE DELETE KEY"
120 BEEP 500,500,63
130 CLS
140 VDU 24
150 PRINT"INPUT NUMBER OF SHOTS <1-INF>"
160 INPUT J
170 IF J<1 THEN GOTO 160
180 CLS
190 PRINT"ENTER SPEED FACTOR OF TARGET          (1)[HARD]-(5000)[EASY]"
200 INPUT K
210 IF K< OR K> 5000 THEN GOTO 200
220 VDU 25
230 LET U=121
240 LET C=0
250 LET H=0
270 LET W=0
280 CLS
290 FOR T=0 TO 125 STEP 4
310 LET A=INT(RND*2)
320 IF A=0 THEN LET U=U+10
330 IF A=1 THEN LET U=U-10
340 IF U>232 THEN LET U=121
350 IF A<10 THEN LET U=121
360 PRINT& T,U;" ";
370 PAUSE K
380 PRINT& T,U;" ";
390 PRINT& 60,0;"Y"
400 MOVE 123,10
420 IF C=1 THEN DRAW 123,242
440 IF C=1 AND T=60 THEN LET H=1
450 IF H=1 THEN GOTO 590
460 IF H=1 THEN PRINT& T,U;" ";
470 IF H=1 THEN LET T=0
480 IF H=1 THEN BEEP 100,40,63
510 IF W=J THEN GOTO 680
520 LET H=0
530 INK 0
590 FOR P=1 TO 5
620 DRAW T+INT(RND*100)
630 DRAW T-INT(RND*100),U-INT(RND*30)
640 BEEP INT(RND*9000),INT(RND*10),63
650 NEXT P
670 GOTO 460
690 VDU 24
710 PRINT"OUT OF A POSSIBLE";J*100;"POINTS"
750 FOR P=0 TO 7
760 INK P
770 PRINT& 26,125;"DO YOU WANT ANOTHER GAME?"
780 BEEP P*INT(RND*100),30,63
790 NEXT P
800 IF GET#="Y" THEN RUN
805 ELSE END
810 REM *****
820 REM * IAN BARLOW *
840 REM *****

```

**Seeing Stars**  
by Ian Barlow

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# OPEN FORUM

## Renumber

on Vic20

This small routine will renumber any Oric program written in Basic. It will run on the 16K or 48K Oric and it should be placed before the main program. This should not

be any great problem as it was written so that it would be able to fit into one line and therefore does not renumber *Gotos* and *Gosubs*.

```
10 A=#501
20 INPUT "START AT..";X
30 INPUT "STEP..";Y
40 REPEAT
50 B=DEEK(A)
60 DOKE A+2,X
70 X=X+Y:A=B
80 UNTIL A=0
90 END
```

Renumber  
by Gary Gray

## Physics

on Spectrum

This program collects together a number

of useful formula calculations for potential and kinetic energy.

Using your figures the program will then

calculate mass acceleration and object velocity. If you have a printer you can copy out the results.

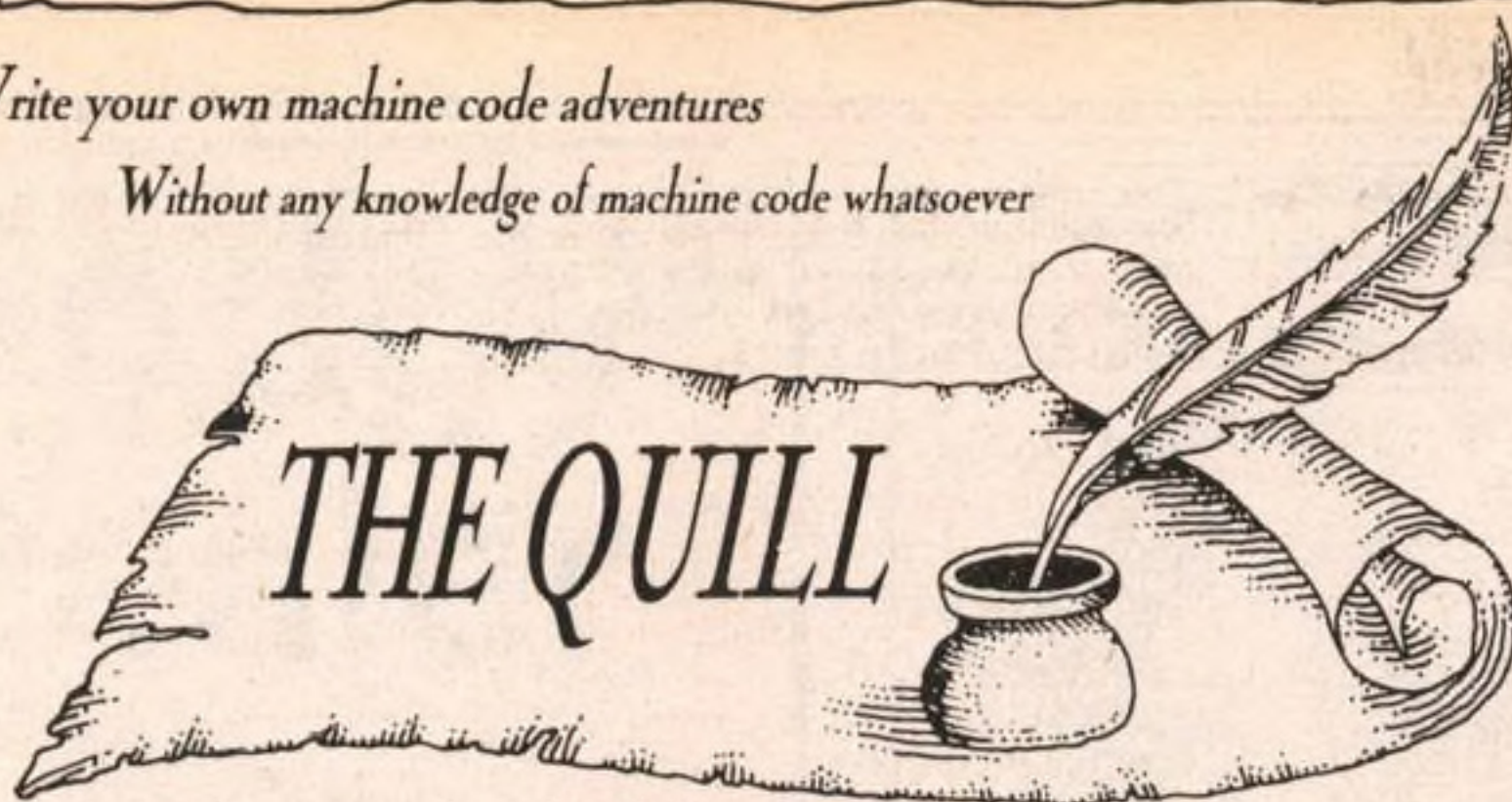
```
5 REM Physics
7 CLS : BORDER 0: PAPER 5: INK 1: CLS
10 BORDER 0: PAPER 5: INK 1: CLS
INPUT "Which formula would you like to use";a$
"energy)" "K(inetic energy)"
a$
15 IF a$="p" THEN GO TO 30
20 IF a$="k" THEN GO TO 100
25 IF a$("<" THEN GO TO 10
30 CLS
35 PRINT AT 5,0; INVERSE 1; "You have chosen the formula for";A
T 9,9; "Potential Energy";AT 14,5
;"m(mass)g(gravity)h(height)";AT 18
,15; "mgh"
36 PAUSE 200
37 CLS
40 INPUT "Mass of Object in Kg";m
50 INPUT "Acceleration due to Gravity in";g
"metres per second per second?";g
60 INPUT "What was the height from which the object was dropped?";h
65 CLS
68 LET x=m*g*h
70 PRINT AT 5,0; "The potential energy of the object is"; P
RINT AT 8,10;x; " Joules"
75 INPUT "Do you want to";t$
"(i) Display results" "(ii) Copy results" "(iii) Go to menu"
;t$
80 IF t$="d" THEN GO TO 90
82 IF t$="c" THEN GO TO 99
84 IF t$="m" THEN GO TO 7
85 IF t$("<" THEN GO TO 75
90 CLS
91 PRINT AT 1,10; "Results";AT 2,10; "
92 PRINT AT 5,0; "Mass of object in Kg was ";AT 7,10;;m; " Kg"
93 PRINT AT 9,0; "Acceleration due to gravity in metres per second per second was ";AT 12,10;g
94 PRINT AT 14,0; "The height from which the object was dropped was ";AT 17,10;h; " metres"
```

```
95 PRINT AT 19,0; "The potential energy of this object was "
;AT 21,10;x; " Joules"
96 INPUT "Copy or Menu?";b$
97 IF b$="m" THEN GO TO 7
98 IF b$="c" THEN COPY
99 IF b$("<" THEN GO TO 96
100 BORDER 0: PAPER 5: INK 1: CLS
110 PRINT AT 5,0; INVERSE 1; "You have chosen the formula for";A
T 9,9; "Kinetic Energy";AT 14,1; "0.5 * mass * velocity squared";A
T 18,5; "0.5 * m * v(squared)"
120 PAUSE 200
130 INPUT "Mass of Object in Kg";m
140 INPUT "Velocity of Object?";v
145 CLS
150 LET y=0.5*m*v^2
160 PRINT AT 7,0; "The Kinetic Energy of the Object is"; PRINT A
T 10,10;y; " Joules"
165 INPUT "Do you want to";t$
"(i) Display results" "(ii) Copy the results" "(iii) Go to the menu";t$
167 IF t$="d" THEN GO TO 180
169 IF t$="c" THEN GO TO 180
170 IF t$="m" THEN GO TO 7
172 IF t$("<" THEN GO TO 165
177 CLS
180 CLS
185 PRINT AT 1,10; "Results";AT 2,10; "
190 PRINT AT 7,0; "Mass of Object in Kg was ";AT 9,10;m; " Kg"
200 PRINT AT 12,0; "Velocity of Object was ";AT 14,10;v
210 PRINT AT 17,0; "The Kinetic Energy calculated by using the formula (0.5*m*v*v) was";AT 21,10;y; " Joules"
220 INPUT "Copy or menu?";b$
230 IF b$="m" THEN GO TO 7
240 IF b$="c" THEN COPY
250 IF b$("<" THEN GO TO 220
```

Physics  
by C Oliver

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# OPEN FORUM

## Entrapment

on BBC

This game is for the model B with joysticks.

The game is for two players and full instructions are included in the program. Note that the joysticks are to be held with the fire button facing towards you. You will

find that the lines move diagonally most of the time and to move in a straight line you will have to move the joystick between the two sectors.

## PROGRAM OF THE WEEK

```
100ERROR MODE7:REPORT:PRINT" at line
";ERL:END
20VDU23,1,0;0;0;0;
30VDU23,227,255,255,255,255,255,
255,255,255
40VDU23,233,153,126,24,165,165,24,126,153,
23,234,66,126,24,102,102,24,126,66
50VDU23,235,66,102,24,90,90,24,102,66,23,
236,66,36,24,66,66,24,36,66
60VDU23,237,0,36,24,36,36,24,36,0,23,238,
0,0,24,24,24,24,0,0
70ENVELOPE1,3,0,0,0,1,1,1,127,0,0,-1,126,0
80
90
100MODE7
110PROCIntro
120MODE2:VDU23,1,0;0;0;0;0;
130PROCSet_Up
140PROCGame
150GOTO100
160
170
180DEFPROCIntro
190FORI=1TO2:PRINTTAB(8,I);CHR#141CHR#157
CHR#134;"E N T R A P M E N T."CHR#15
6:NEXT
200FORI=3TO23:PRINTTAB(0,I)CHR#134CHR#157
:NEXT
210VDU28,2,23,39,3
220C#=CHR#135
230PRINTC#;"The objec of this game is
to move"
240PRINTC#;"a growing life_line into a
free space";
250PRINTC#;"on the screen. That is space
not"
260PRINTC#;"taken up by your own 'tail',
your"
270PRINTC#;"opponent's 'tail' or the
boundaries"
280PRINTC#;"of the screen.As the screen
gradually";
290PRINTC#;"fills, so certain areas of
it are cut";
300PRINTC#;"off from one or both players.
The"
310PRINTC#;"winner is the player who can
cut his"
320PRINTC#;"opponent off with the least
space to"
330PRINTC#;"play with. And then just avoid"
340PRINTC#;"mistakes until his opponent
runs out"
350PRINTC#;"of room and is forced to
hit an"
360PRINTC#;"existing line! Take care
not to"
370PRINTC#;"reverse direction, as this
is judged"
380PRINTC#;"as running back into your
own tail!"
390PRINTCHR#136CHR#131" PRESS BOTH
BUTTONS ON JOYSTICK"
400PRINTCHR#136CHR#131TAB(14)"TO START"
410REPEAT X=ADVAL(0)AND3:UNTIL X=3
420ENDPROC
450DEFPROCSet_Up
460P1X=1000:P1Y=800:P1C=7:P2X=200:P2Y=
300:P2C=3:C1X=0:C1Y=0:C2X=0:C2Y=0
470GCOLOR,2
480MOVE0,0:MOVE0,30:PLOT85,1279,0:MOVE0,
30:PLOT85,1279,30
490MOVE0,30:MOVE40,30:PLOT85,0,1023:MOVE40
,30:PLOT85,40,1023
500MOVE40,1023:MOVE40,990:PLOT85,1260,
1023:MOVE40,990:PLOT85,1260,990
510MOVE1279,30:MOVE1240,30:PLOT85,1279,
1023:MOVE1240,30:PLOT85,1240,1023
520GCOLOR,P1C:PLOT69,P1X,P1Y:GCOLOR,P2C:
PLOT69,P2X,P2Y
530COLOUR3:PRINTTAB(5,3)"COUNT DOWN"
540FORI=5TO0STEP-1:PRINTTAB(10,5);I
550SOUND1,-15,I*5,1:FORD=1TO1000:NEXT,
560COLOUR0:PRINTTAB(5,3);SPC(10);TAB(10,5)"
570ENDPROC
600DEFPROCGame
610S1X=P1X:S1Y=P1Y:S2X=P2X:S2Y=P2Y
620IFADVAL(1)<32000 C1X=P1X-4:C1Y=P1Y:
P1X=P1X-4
630IFADVAL(1)>32000 C1X=P1X+4:C1Y=P1Y:
P1X=P1X+4
640IFADVAL(2)<32000 C1X=P1X:C1Y=P1Y+4:
P1Y=P1Y+4
650IFADVAL(2)>32000 C1X=P1X:C1Y=P1Y-4:
P1Y=P1Y-4
660IFADVAL(3)<32000 C2X=P2X-4:C2Y=P2Y:
P2X=P2X-4
670IFADVAL(3)>32000 C2X=P2X+4:C2Y=P2Y:
P2X=P2X+4
680IFADVAL(4)<32000 C2X=P2X:C2Y=P2Y+4:
P2Y=P2Y+4
690IFADVAL(4)>32000 C2X=P2X:C2Y=P2Y-4:
P2Y=P2Y-4
700IFPOINT(C1X,C1Y)<>0 PROCExplosion(1):
ENDPROC
710IFPOINT(C2X,C2Y)<>0 PROCExplosion(2):
ENDPROC
720GCOLOR,P1C:MOVES1X,S1Y:DRAWP1X,P1Y
730GCOLOR,P2C:MOVES2X,S2Y:DRAWP2X,P2Y
740SOUND1,-10,P1Y/5,1:SOUND2,-10,P2Y/5,1
750GOTO610
780DEFPROCExplosion(PLAYER)
790VDU5
800IF PLAYER=1 X=P1X-18:Y=P1Y+15 ELSE IF
PLAYER =2 X=P2X-18:Y=P2Y+15
810SOUND0,1,6,10
820FORI=233TO238:GCOLOR,7:MOVEX,Y:PRINTCHR#I
830FORD=1TO200:NEXT:GCOLOR,0:MOVEX,Y:
PRINTCHR#227:NEXT
840VDU4:COLOUR6:VDU23,1,0;0;0;0;0;
850IFPLAYER=2 VDU19,P1C,8,0,0,0:PRINTTAB
(1,5);"WHITE WON THE GAME"
860IFPLAYER=1 VDU19,P2C,11,0,0,0:PRINTTAB
(1,5);"YELLOW WON THE GAME"
870FORI=1TO5:SOUND1,-15,100,8:SOUND1,0,0,
5:NEXT
880FORD=1TO4000:NEXT
890ENDPROC
```

Entrapment  
by Kevin Boyd

## SOFTWARE FOR SPECTRUM AND ZX81

### OUR POLICY

We aim to create programs which you will keep on using until your computer wears out. You won't find our programs in the top ten and you will look in vain for colour adverts and fancy packaging. Nevertheless we have built up a solid following of discerning users in all parts of the world. Read the reviews of our programs if you can find them. We have been consistently praised for quality, originality and value for money.

### WHAT DO YOU GET?

The bulk of our cassettes are now made by the factory which produced the Horizons tape. Programs are recorded twice and carry on the reverse side an audio narrative to supplement the operating instructions. Where appropriate, cassettes are accompanied by a comprehensive and clearly written instruction manual.

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## Astro Dodge

on Dragon 32

Using the right hand joystick the player must guide their spaceship at the top of the screen down through a constantly chang-

ing asteroid belt without hitting any of the asteroids.

### Program notes

50 Sets high score to zero.  
60 Sets asteroids to type 1.  
70 Sets score to zero.  
90-120 Sets speed.  
150 Sets graphics for space ship.

160-240 Decides which graphics to use for asteroids and prints it.  
250-270 Checks for movement of joystick.  
290-310 Checks for crash into asteroid.  
320 Tests timer, if greater than 1000 then selects new level.  
330 Delay loop.  
350-480 End routine, calculates score, prints score, hi-score and asks for input for another go.

```

10 '*****
20 '*****ASTRO.  DODGE*****
30 '***BY A.P.GRANGER MARCH 83***
40 '*****
50 H=0
60 X=0
70 S=0
80 CLS1
90 PRINT@38,"FAST OR SLOW SPEED?"
100 A$=INKEY$
110 IF A$="F" THEN I1=0:GOTO150
120 IF A$="S" THEN I1=20:GOTO150
130 PLAY"V2L5003A"
140 GOTO100
150 A$=" "+CHR$(134)+CHR$(137)+" "
160 CLS:PRINT@260,"here we go":PLAY"
    V15L50ABCDEFGFDECBA":CLS1
170 IF X=1 THENB$=CHR$(140+16)
180 TIMER=0
190 IF X=5 THEN S=S+5000:X=1:
    I1=0:GOTO170
200 IF X>1 THEN S=S+1000
210 IF X=2 THEN B$=CHR$(135+32)+
    CHR$(139+48)
220 IF X=3 THEN B$=CHR$(143+16)+"*"
    +CHR$(143+16)
230 IF X=4 THEN B$=CHR$(140+48)+
240 PRINT@(RND(27)+480),B$
    
```

```

CHR$(140+16)+CHR$(140+32)
250 A=JOYSTK(0)
260 IF A>50 THEN A=50
270 PRINT@(A/2),A$
280 FORI=1 TO 3
290 IF POINT(A+I,2)>1 THEN 350
300 PLAY"V504L200A"
310 NEXTI
320 IF TIMER>1000 THEN X=X+1:
    GOTO 170
330 FORI=1 TO I1:NEXTI
340 GOTO240
350 'FINISH
360 T=TIMER
370 S=S+T
380 CLS
390 PRINT@36,"--you crashed--"
400 PLAY"L10005GFEDCBA04GFEDCBA03G
    FEDCBA02GFEDCBA01GFEDCBA"
410 PRINT@101,"YOUR SCORE=";S
420 IF S>H THEN H=S
430 PRINT@258,"HIGH SCORE=";H
440 PRINT@417,"ANOTHER GO?"
450 A$=INKEY$
460 IF A$="Y" THEN 60
470 IF A$="N" THEN END
480 PLAY"V2L5003A"
490 GOTO450
    
```

Astro Dodge  
by A Granger

## Microradio

GW6JJN



### Communications

So what does this all have to do with CB radio, I am asked. Well, many amateurs come up from CB having tasted the delights of communication. It is simplicity itself to send a program to a friend. Just hold the microphone by the tape recorder speaker and transmit it. The happy friend records the received transmission and loads it into his micro. Great fun. Only one problem. The CB licence, unlike the amateur

licence, says that communication must be in speech only. I've heard some funny sounds on CB though...

A small exam must be passed to get the amateur licence; a City and Guilds exam, in fact, and this takes the form of multiple choice questions. Since this is the case I must point you in the direction of your local bookshop and an excellent publication called: *The Working Spectrum* published by Sunshine. This book contains a listing called *Multi Q* which could be adapted to any micro and will, suitably filled with the correct questions from a local amateur, get you through.

But I digress. Back to the satellites. The information that we need to point the aerial is firstly the azimuth,

which is the bearing, north, south-east etc and secondly the elevation: how high, or even how low, it is. Whether in fact it is even above the horizon. These figures can be worked out from tables but when these tables are in the computer, then it is a simple matter for the computer to calculate the azimuth and elevation. The information, as I said last week, can be had from AMSAT UK, as can a listing.

So, why bother to track them at all? Well, the amateur satellites have transponders on board. These are automatic radio transceivers which receive on the Two Metre band at 145.85Mhz and then transmit the signal on the Ten Metre band around 29.4Mhz. The satellite itself consists

largely of solar cells and batteries, that are charged whenever it is in sunlight, and the transponders of course. The satellite also carries a beacon which gives a continuous identifying signal. And speaking of beacons, we'll mention those next week, land based ones that is, and whatever are amateur repeaters and how can the micro keep track of them all? Which way do we point the aerial and whatever is a QTH square? Stay tuned. ■

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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# OPEN FORUM

## Area finder

on ZX81

This little program will work on the 1K machine. First, the program draws a

small or big rectangle. After this the computer gives the length and height of the rectangle. Your job is to find the area by multiplying the length by the height. If you are right the computer will congratulate you. But if you get it wrong the computer will tell you the right answer and you will

get the chance to try again. This program is fairly easy and aged for the ten and unders.

### Program notes

10-30 Set up the variables  
40-75 Draws the rectangle  
80-90 Writes length and height  
130-170 Are you right or wrong?

```

1 CLS
10 LET A=INT (RND*16)+5
20 LET B=0
25 LET D=INT (RND*10)+5
30 FOR C=0 TO A
40 PRINT AT B,C;"■"
50 NEXT C
60 LET B=B+1
70 IF B=D THEN GO TO 30
75 GO TO 30
80 PRINT AT 19,0;"LENGTH OF RE
CTANGLE=";A
90 PRINT AT 20,0;"HEIGHT OF RE
CTANGLE=";D
100 PRINT AT 21,0;"AREA=";
105 INPUT E
110 PRINT E
120 IF E=A*D THEN GO TO 150
125 CLS
130 PRINT "WRONG IT WAS ";A*D;"
AGAIN? (Y/N)"
140 INPUT A$
141 IF A$="Y" THEN GO TO 1
142 CLS
143 PRINT AT 10,6;"-#-#AREA FIN
DER#-#-"; AT 11,10;"BY IAN SMITH"
149 STOP
150 PRINT AT 15,0;"-#-#-#-#-GOD
D-#-#-#-#-#"
150 PAUSE 100
170 GO TO 1
    
```

Area Finder  
by Ian Smith

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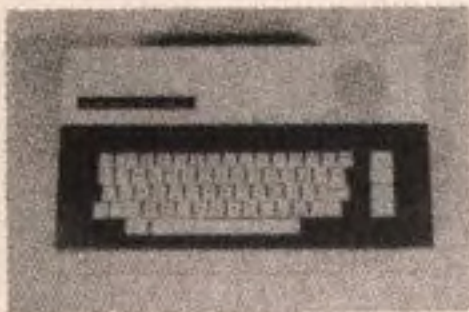
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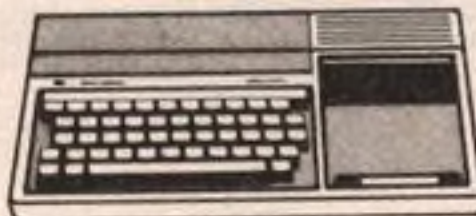
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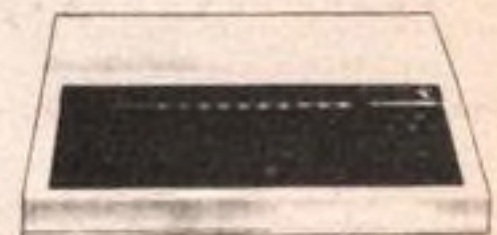
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## Tony Bridge's Adventure Corner



### The Quill

Despite the recent unsettling news from Mettoy/Dragon, programmers seem to be happy to keep publishing programs for the Dragon 32. Just released are several adventures for the machine, and the first one comes from Virgin Games.

*Castle Adventure*, written by 14½-year-old Conrad Jacobson, takes place in that favourite location of adventure writers, and follows the traditional path of the text adventure. It seems, as far as I could tell on first playing, a "passive" game — that is, there is no D&D style combat with monsters. Instead, the player has to solve the usual kind of adventure problem.

The program's responses occasionally get a little childish, witness the rather tiresome "eh! what? pardon!! sorry" which comes up every time the wrong key is pressed, or an illegal command typed in. Jacobson has obviously boned up on his ancient architecture, with terms like "machicolated walkway" (which has holes in so that arrows may be shot at unwary enemies), and "garderobe" (the smallest room in the castle). An educational adventure!

Although the program is logical, the player will often find himself, for example, tripping over the cassette recorder left lying around by some careless knight. Of course, next time, it can be picked up (and will be useful), but a few steps later, something else will put an early end to the unwary player. I wonder if Virgin have Jacobson locked up in the Donjon, working on the next one?

Peaksoft, up in Burton-on-Trent, has written two new adventures for the Dragon 32. Both are included on one tape, at £5.45, which would seem to be good value.

*Towers of Death* is loaded first, followed by *The Ice Kingdom*, and then the player is asked to make his choice of which game to play. Both are in the traditional text mould, and both start off in a quiet, warm village. The player has to make his way to the towers, in the first game, to test the legend of the Obsidian towers (I assume that solving the adventure will make all that clear!), while in the second, the tome of understanding, no less, is the object of the quest. Along the way, of course, useful

items may be picked up to be used further along in the adventure.

The programs stick rigidly to a two-word command, and will ignore anything else. Instead of silliness when faced with an illegal command, the programs, rather intelligently, point out where the player has gone wrong, asking for another verb, or noun, as the case may be — although Peaksoft call *Examine* a noun!

The dreaded "random element" shows up occasionally, and the author (Clive Johnson), himself pokes fun at the unfairness of this rather dated device, as in "would you believe a pack of ghouls tear you to pieces? 'Fraid so!'"

Dungeon Software has some interesting looking things coming up. Although I have not yet seen them, the range, written by Mike Meineck, appears to cater for everyone. *Giant's Castle* is especially for younger players, and features simple graphics, and a simple game format. Next up the scale comes *Treasure Tombe* (sic), which is a graphics adventure for the "Eagle reader age-group". Then *Temple of Zoren*, which is a science fiction adventure for *Star Wars* fans and *Trekkies*. *Crystal Chalice*, and its sequel, *Return of the Klarz*, are text adventures with complex swords and sorcery type scenarios.

That all sounds rather ambitious, and I'll be reporting in the near future on how Dungeon have fared.

In PCW No 39, I had to look at the books available on the subject of adventuring (I found that there were not many!). Browsing through the bookshop on the way through a mainline station in London, I came across a range of paperbacks from TSR. This American company, Tactical Studies Rules, was the originator, in the 1970s, of *Dungeons and Dragons*, and they have now written a series of scenarios which reflect the atmosphere of the D&D world. Like the books of Ian Livingstone and Steve Jackson that I mentioned in No 39, the books give the reader the chance to manipulate his own story-line. The new books, unfortunately, do not allow the reader-player to do anything more than pick one of the multiple choices (the Livingstone/Jackson series require the player to throw dice and indulge in blow-by-blow combat with monsters, and generally form more of a game), but are a good read.

Cash prizes for solving adventures don't seem to have taken off, for some reason. *Castle of Riddles*, from Acornsoft, was launched with the offer of a prize to the first adventurer to solve the game, and there is, of course, the seemingly perennial *Pimania* (will it ever be won?), but that is about it. A few other programs have offered prizes for the first solution — Artic offered a large cash prize to the first person who cracked *Krackit*, but I saw no mention of a winner, and the contest may well still be open. Back in the days of the ZX81, a program called *Lojix* also offered a prize. There are probably a few other games that give this sort of incentive, but,

strangely, apart from the two mentioned, no adventures (that I know of!).

I suspect that one of the reasons for this state of affairs is sheer playability. To make the adventure difficult enough to make a reasonable challenge would necessarily make it too hard for the majority of players — and too easy would not make for a good competition. *Castle of Riddles* is a good adventure, and seems to be keeping many people busy with its problems long after the prize has been collected — how much better to take it nice and slowly, wandering through the program over several months, exploring all the little by-ways on the way to the final solution, than to rush through it as fast as possible, on the way to the prize.

For all those who played and enjoyed Abersoft's *Adventure 1*, a bit of news from the Welsh-based company who have teamed up with a London company, Mordon Games Design, to create a new program called *Mordon's Quest*. Abersoft tell me that *Mordon's Quest* "should definitely tax the most seasoned adventurer", being a text only program available, I'm glad to see, for a wide range of micros.

Still on the subject of new programs (can adventure games be taking over from arcades?), Gilsoft recently sent their new *Adventure Editor* to the office. Running on a Spectrum 48K, this program is nothing less than a system for the adventurer to write his own adventure. Using *The Quill*, which is the name that Gilsoft gives to its Editor, anyone, without computing knowledge, may create his or her own program. Two major programs have recently been released, by Quicksilva and Melbourne House, to enable the complete beginner to design arcade games, and *The Quill* is set to do the same for adventures.

No *Hobbits* here, of course — the user certainly can't create graphics. But text adventures have many devotees, and these can indeed be written with *The Quill*. After planning the scenario of the game on paper, the user then goes on to define all the locations, with the appropriate text, the objects to be placed within the complex, the movements allowed and the conditions to be met within the game.

I've had the program for one or two weeks now, and have written a couple of simple text adventures, but with a bit more thought, some very complex games could be written. And Gilsoft ask only a mention if you decide to market your Quill-written adventure commercially.

*The Quill* obviously deserves a more in-depth look, and I'll return to it later. ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

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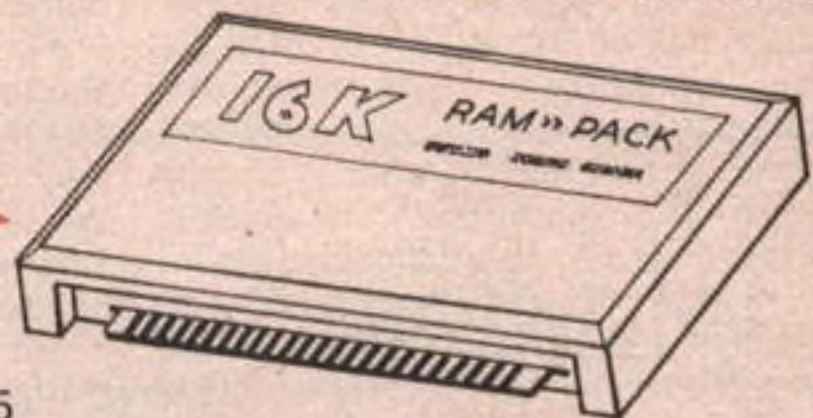
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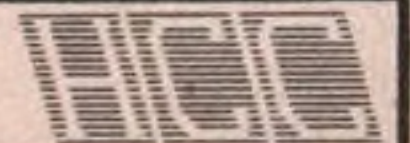
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## ROBOTIC DRAGON

Jason Farmer of Tenterden, Kent, writes:

**Q** I have a Dragon 32 which I am very happy with. I am interested in Robots and how they work and would like to know if it is possible to attach a Robot to my Dragon? If so, where can I get one and how much would it cost? It could be in kit form as I have access to an experienced electrician.

**A** The two companies in this area at the moment are Powertran, and Colne Robotics. Both sell Robotic arms. The Colne one is more flexible but at about £400 is twice the price of the Powertran arm. Perhaps more what you had in mind is the Zeaker also by Colne. This was originally designed for the Spectrum, but is now available on the Dragon. It is a sort of turtle, which can use Logo. It costs £50 as a kit, or £70 if you buy it ready built.

## CHEQUERED FLAG

E McLucas of Highlight Lane, Barry, S Glamorgan, writes:

**Q** I am the owner of a ZX Spectrum. Although I have read the manual I am unable to get user defined graphics. Please can you help?

**A** This subject often crops up, so it's worth going into some detail. The mistake that is most commonly made is to forget that when you Print the new graphic that you have created, you must be in Graphics mode, which in my example means that in line 110 you open the inverted commas and then press Shift/9 to get an inverse G cursor, then press

the letter a. Run the program and list it, your a has become a chequered pattern.

```

10 FOR z = 0 TO 7
20 READ m
30 POKE USR "a" + z,m
40 NEXT z
50 FOR y = 0 TO 7
60 READ n
70 POKE USR "b" + y,n
80 NEXT y
90 BORDER 6
100 FOR w = 1 TO 352
110 PRINT PAPER 2; INK 6; "a"
120 PRINT PAPER 6; INK 2; "b"
130 NEXT w
200 DATA BIN 10101010, BIN 0101-
0101, BIN 10101010, BIN 0101-
0101, BIN 10101010, BIN 0101-
0101, BIN 10101010, BIN 0101-
0101
210 DATA BIN 01010101, BIN 10101-
010, BIN 01010101, BIN 10101-
010, BIN 01010101, BIN 10101-
010, BIN 01010101, BIN 10101-
010

```

Your best option is to enter lines 10 to 40, line 110, and line 200 only, to start with. When you have Run this once start changing just the first two Bin statements in line 200 to all ones, or noughts. If you change it to all ones, then you will find that the top of the chequered flag is now a solid line. You could write the Data and Bin statements like this (though it would take up more memory):

```

200 DATA BIN 10101010
201 DATA BIN 01010101
202 DATA BIN 10101010
203 DATA BIN 01010101
204 DATA BIN 10101010
205 DATA BIN 01010101
206 DATA BIN 10101010
207 DATA BIN 01010101

```

I have closed up the spacing so it is easier to see the chequered pattern. Imagine that each 1 is a black square, (Ink), and that each 0 is the background or Paper. Now try this:

```

200 DATA BIN 00000000
201 DATA BIN 00001000
202 DATA BIN 00111110
203 DATA BIN 00101000
204 DATA BIN 00111110
205 DATA BIN 00001010
206 DATA BIN 00111110
207 DATA BIN 00001000

```

Recognise it? Try and concentrate on the ones . . . Well, as the noughts are Paper, they are just background so . . .

```

200 ...
201 ... 1
202 ... 1111
203 ... 1 1
204 ... 1111
205 ... 1 1
206 ... 1111
207 ... 1

```

The dollar sign. I hope that

these examples will make the manual clearer. The first four lines of the program are a simple loop, and the form is repeated in lines 50 to 80. Do not forget that when you Print a and b in lines 110 and 120 you must be in graphics mode.

## FX CALL

G Oulden of Pamir Road, Southwick, Brighton, writes:

**Q** I have a BBC computer and am very happy with it. I am interested in using the speech synthesizer, and have been told that I will need to use the FX call \*209, x. I do not know what this call does, can you help?

**A** You do not actually need to use the FX call at all, because you can access the synthesizer by using the Sound command, except giving the channel a value of -1. The FX would only be of use if you wished to turn the synthesizer off. The given values are 32 for off, and 80 for on, but in fact, anything other than 80 will turn it off.

## VOLT LOADS

Emma Anderson of Highfields, Feltham, Middlesex, writes:

**Q** Can you tell me what the difference is between the RS232 and the RS232c interface?

**A** The RS232 is an internationally recognised standard for the transmission of data one bit at a time, ie, it is serial. The difference between the two types is a matter of the potential loading on the lines. The RS232 can carry 5 volts and 0 volts only whilst the RS232c carries +12 volts and -12 volts.

This does make a difference in some circumstances, for example, only the RS232c can be used with a modem, but for some other purposes you need the 5 volt and 0 volt loads only carried by the RS232.

## ATARI INFO

Paul J Maddock of Lyndhurst Road, Great Crosby, Liverpool L23, writes:

**Q** Please could you give me some information on the new Atari 600XL. I would like to know the User Ram and what the Help key does? Do you need a special tape deck, and is it compatible with other Atari cassettes and cartridges? Also does the sound have Envelope as well?

**A** The Ram on the Atari 600XL is 16K, while the 800XL has 64K. It has 16 screen modes, 11 of which are for graphics. Like all computers the higher the graphic mode the more of the Ram it uses, and the less left for the User. I do not know how much Ram the various screen modes take up, though I would expect it to be similar to the 400 and 800.

You will need a special tape recorder for the 600XL but all the existing Atari software is compatible. There is no Envelope command as such, although you could achieve the desired alteration to the sound through machine code.

The Help key is an extension of the error codes. It lists the line where the problem has occurred.

## ZX81 FROGGER

Dennis Farmer of Headley Avenue, Garston, writes:

**Q** I have a ZX81 with 16K Ram pack, and find I can get most of the programs I want, but I would like to play Frogger and haven't been able to find a version for my micro. Can you help?

**A** The ZX81 is still a popular machine but the only version of Frogger that I have found for the ZX81 is by DJL. Their address is 9 Tweed Close, Swindon, Wiltshire.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem Peek it to Ian Beardsmore and every week he will Poke back as many answers as he can. The address is Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD.

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**COMMODORE 64** with cassette deck + £48 of software, £280. Tel: Potters Bar 55772, after 5 pm.

**SWAP VIC20 CHOP LIFTER** cartridge for Spiders of Mars or Out World, swap Alien cartridge for Mole Attack, also cassette swap. Tel: Yately 872310.

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**VIC20** + cassette unit, 16K expansion, joystick, arcade + educational software, magazines and books, swap for BBC Model B, must be as new, or sell for £200. Tel: Wakefield (0924) 253265.

**VIC20** + C2N cassette deck + joystick + over £50 software + books + many magazines, original value over £300, bargain at £150 ono, original boxing, good condition. Tel: Dorking (Surrey) 887536, evenings only.

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**DRAGON 32 SOFTWARE**, Telewriter £27.50. Compusence, Dasm-Demon, £15. Books, Programming the 809 (Zaks) £5. UMC 6809 Cookbook (Warren), £5. The Working Dragon (David Lawrence), £3. Tel: Rustington (09062) 72845.

**DRAGON SOFTWARE** hi-res cartridge £15, Quest £3, Family programs and quiz £3, Snakes, Landers, Invaders Machine code £3, Empire £4, Forth and Manual £10. Tel: 06285 20128.

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**DRAGON 32**. Four cassettes, two joysticks. Quite new, £130 ono. Tel: 584 8092.

**DRAGON 32**, pair joysticks, lightpen, dustcover, £200 original software including "Hi-res" 51 x 24 screen, manuals, magazines, leads, only £275 for quick sale. A. C. Durrant, 36 Hessle Mount, Headingley, Leeds LS6 1EP.

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**DRAGON 32** with £300 worth of software + joystick, offers around £250, £10 of magazines. Tel: Sheffield 617919.

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**DRAGON 32** + £100 worth of software + manuals, books + cassette recorder, £150. Tel: 0582 607969 (after 6 pm).

**DRAGON 32** with joysticks + four games, six weeks old, £135. Tel: 267 0055, Mr Cavalla.







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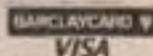
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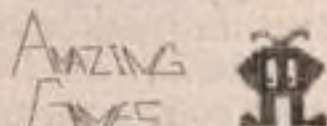
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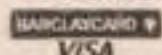
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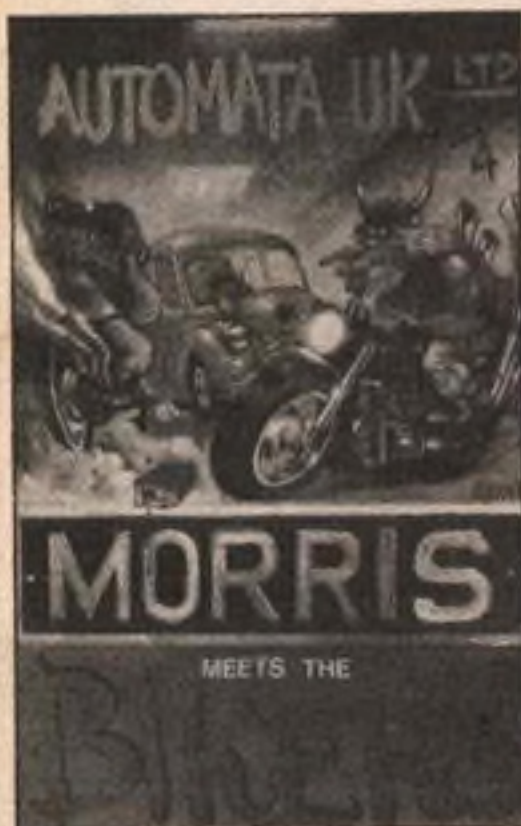


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DEALER ENQUIRIES WELCOME

# NEW RELEASES

## MAD BIKERS



From time to time Automata takes a break from its wacky adventures to release something more conventional. Well perhaps conventional is the wrong word to describe *Morris meets the Bikers*, but it is an arcade-style game.

You must move your Morris Minor through the various levels of a multi-storey car park. Avoid obstacles like tin tacks and parking fees, whilst collecting the 10 golden coins you will need to pass through the exit toll gate onto the next screen.

All the while you are harassed by vicious bikers who will do something nasty but non-violent (this is Automata remember) to you, if you stray into their path. But what about the traditional song on the reverse of the tape I hear you cry. Well, it's a version of that old tear jerker *Leader of the Pack*, quite unlike any you've heard before.

**Program** *Morris meets the Bikers*  
**Price** £6  
**Micro** Spectrum 16/48K  
**Supplier** Automata  
27 Highland Road  
Portsmouth  
Hants PO4 9DA

## PRICELESS

Digital Fantasia has issued a number of adventures for the Spectrum and the BBC.

The adventures adopt *The Hobbit* format of a split screen, showing both graphics and text for each scene, though there is an option to dispense with the graphics.

*The Golden Baton* requires

you to recover a priceless artifact belonging to king Ferrenuil. This involves an epic journey across many lands as you unravel the various problems that beset you.

When you begin you find yourself in a kind of forest, searching around you will find a hut and soon afterwards a puzzle to solve involving a crab and a slug. I can say no more (actually I didn't get any further).

**Program** *The Golden Baton*  
**Price** £9.95  
**Micro** Spectrum 48K  
**Supplier** Digital Fantasia  
24 Norbreck Road  
Norbreck  
Blackpool  
Lancs FY5 1RP

## BILLS

With the chill winds of winter howling through every nook and cranny, now could be a good time to invest in *Cut Your Heating Bills* by Brane Software.

The program, for the Spectrum 48K, calculates the bill for heating your home and will point out areas that it could be worth insulating. It can also be used as a 'what if' model, eg, 'what if I insulate the roof' etc.

A good idea that may actually be useful. The instructions are well written too.

**Program** *Cut Your Heating Bills*  
**Price** £7.95  
**Micro** Spectrum 48K  
**Supplier** Brane Software  
Myrtle Grove  
Brane  
Sancreed  
Penzance TR20 8RE

## CROCODILES

Thorn EMI has recently released its first titles for the Spectrum having previously concentrated on the Commodore and Atari computers.

*River Rescue* was very successful when first released on the Vic. The Spectrum version is said to be true to the original.

The object of the game is to navigate down a river, avoiding obstacles like islands, sandbanks and crocodiles to pick up explorers and transport them safely away.

As you rescue more explorers, things hot up with name-

less rivals buzzing you with planes and dropping mines into the water. Very addictive.

**Program** *River Rescue*  
**Price** £7.00 (approx, none recommended)  
**Micro** Spectrum 48K  
**Supplier** Thorn EMI  
Thorn EMI House  
Upper St Martin's Lane  
London WC2H 9ED

## ADVENTURE



*The Quest of Merravid* is an Adventure game, for the 16K Vic and the Commodore 64 — both versions on the same tape.

Martech, who have issued this game, are the company that experimented with computer board games with *Conflict* and *Galaxy Conflict*. In a way (since I very much liked those games) it's a shame they have issued a conventional program this time.

*The Quest of Merravid* allows for fairly sophisticated sentences like the Artic adventures — up to nine words in any sentence.

Your task is to retrieve the lost firestone of the Dwarfs (a Brownie point to the first company sending me an adventure in which you have to get rid of something) and the whole paraphernalia of goodies and baddies, swords, sorcery and Dragons as well as much humour, lurk within.

**Program** *The Quest of Merravid*  
**Price** £7.95  
**Micro** Vic20 (16K)/  
Commodore 64  
**Supplier** Martech Games  
9 Dillingburgh Road  
Eastbourne  
Sussex BN20 8LY

## QUEST

*Labyrinth of the Snappers* is described as a cross between *Pacman* and a mini-adventure.

You must search for seven fragments of the Orb of Zifron which are hidden in money bags scattered around a maze.

To help you in the Quest there are various objects hidden in the maze.

The *Pacman* element comes in the form of the Snappers who will chase you when they break out of their den.

**Program** *Labyrinth of the Snappers*  
**Price** £4.50  
**Micro** Oric 1  
**Supplier** P W Products  
8 Ravensdale Avenue  
Leamington Spa  
Warwickshire  
CV32 6NQ

## FRUITLESS



*Purple Turtles* is intended for young children — I loved it.

You move a little man back and forth across a river collecting fruit, using some rare purple turtles as stepping stones. The problem is that, from time to time, the turtles decide to take a dive leaving the little man wet and fruitless.

As the game progresses, the turtles start to bob up and down with greater frequency.

Very addictive with beautiful graphics.

**Program** *Purple Turtles*  
**Price** £7.95  
**Micro** Commodore 64  
**Supplier** Quicksilva  
Palmerston Park House  
13 Palmerston Rd  
Southampton SO1 1LL

## UTILITY

Whilst packages like the *Games Designer* from Quicksilva allow for the simple creation of customised games they are necessarily limited to a number of standard formats.

*Scope* is a Forth-like language specially designed for the manipulation of graphics smoothly and at speed.

Although *Scope* commands are written in Basic Rem statements, these are then compiled to give machine code speed of execution. Essentially the program gives you a language which, though no more difficult to learn than Basic, is very much faster.

Not, perhaps, a program for the complete beginner, but nevertheless, one of the most interesting utility packages I've seen yet for the Spectrum.

**Program** *Scope*  
**Price** £11.95  
**Micro** Spectrum 48K  
**Supplier** I.S.P.  
 Crown House  
 38b High Street  
 Godalming  
 Surrey

## GRUBBERS



*Doom Bugs* is an excellent new game from Work Force. Using graphics equal to anything Quicksilva has produced, it has managed to produce an original and addictive game.

Tarant Tula is the name of your hero, a charming insect entombed in the lair of the grubbers — nasty slug-like

things that constantly develop until they become vicious red beetles.

You can escape by eating from the grubbers' supply of honey and biting your way through a sealed trapdoor — beyond it lies a maze and more lairs. Naturally, as you progress it all gets more and more difficult.

**Program** *Doom Bugs*  
**Price** £5.50  
**Micro** Spectrum 16/48K  
**Supplier** Work Force  
 140 Wilsden Ave  
 Luton  
 Beds

## STUNNING

*Zalaga* is a new space attack game for the BBC (32K) from Aardvark Software.

Although basically a 'shoot em up' game, it is supposed to be the fastest and most addictive yet devised for the BBC.

The various waves of aliens all behave differently and so require different tactics. Aardvark also maintain that the keyboard responses are faster than in any other game, that the colours are more impressive, and the sound effects more stunning.

I was impressed by the way the cover blurb shows you how to get a proper display from your BBC utilising the whole screen. Obviously some care has been taken.

**Program** *Zalaga*  
**Price** £6.90  
**Micro** BBC (32K)  
**Supplier** Aardvark Software  
 100 Ardleigh Green  
 Road  
 Hornchurch  
 Essex RM11 2LG

## PACKAGE

Onward goes the Vic20 and onward go the games packs. Regular readers of New Releases will know of my low opinion of games packs, but since a whole new group of people will be buying Vics for Christmas and will be looking for a few games to play, it is perhaps worth mentioning *Survival* by

Avalon Computing.

At least the games in the *Survival* pack look as if some thought and effort has gone into them, even though the themes, Mazeman, Bomber, etc. are the same old weary ones.

**Program** *Survival*  
**Price** £5.99  
**Micro** Vic20  
**Supplier** Excalibur Software  
 Avalon Computing  
 14 Cliff Road  
 Hornsea  
 North Humberside  
 HU18 1LL

## BRIBE



Strategy games have taken many forms and themes — Airlines, Kingdoms, Shipping, Banana Republics and now *Gangsters*.

Cases Computer Simulations specialises in producing strategy games, chiefly for the Spectrum. *Gangsters* is its latest release.

The objective of *Gangsters* is to take over the city from other gang leaders and retain your grip on its illegal activities. You will need a large gang to protect you from your vicious rivals and the police.

As you accumulate money, you may be able to bribe the police or put out contracts on particular individuals who hinder your rise to power. Unscrupulous types should love it.

**Program** *Gangsters*  
**Price** £6.00  
**Micro** Spectrum 48K  
**Supplier** Cases Computer  
 Simulations

14 Langton Way,  
 London SE3 7TL

## AIRLINE



*High Flyer* is a sophisticated management game from Commodore. The aim is to successfully run an airline over 40 years; just like in the real world, it's no easy task.

Most factors which would affect business in the real world have been included, like your popularity among the public, and the opinion of the banks.

With various graphic displays including maps and financial reports, *High Flyer* is more complex than the conventional game of this type and is likely to take a long time to play — hence it can be saved on to disc.

One point though, are you allowed to declare yourself a national airline, form a cartel, and lose fortunes whilst overcharging people, without going broke?

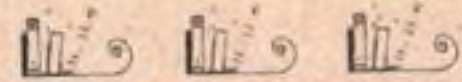
**Program** *High Flyer*  
**Price** £14.95  
**Micro** Commodore 64 (disc)  
**Supplier** Commodore  
 675 Ajax Avenue  
 Slough  
 Berkshire SL1 4BJ

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

# This Week

Program	Type	Micro	Price	Supplier
Alien Swarm	Arc	Spectrum	£6.95	K-Tel
Angler	Arc	Spectrum	£5.95	Virgin
Animated Alphabet	Ed	Dragon 32	£4.95	Dragon Dungeon
Atari Writer	Ut	Atari	£65.00	Atari
Battle of the Toothpaste	Arc	Spectrum	£6.95	K-Tel
Bonzo	Arc	Commodore 64/Vic20	£7.95	Audiogenic
Bugged	Arc	Dragon 32	£5.95	Dragon Dungeon
Cash Flow	Ut	Dragon 32	£8.95	Dragon Dungeon
Cataclysm	Arc	Commodore 64/Vic20	£5.95	Audiogenic
Catalogue, Sort Mail	Ut	Dragon 32	£8.75	Dragon Dungeon
Caverns of Mars	Arc	Atari	£29.99	Atari
Choplifter	Arc	Commodore 64	£29.95	Audiogenic
Crazy Painter	Arc	Dragon 32	£8.00	Microdeal
Cruncher	Arc	BBC B	£7.95	Virgin
Crystal Chalice	Ad	Dragon 32	£7.95	Dragon Dungeon
Cuthbert Goes Digging	Arc	Dragon 32	£8.00	Microdeal
Cuthbert in the Jungle	Arc	Dragon 32	£8.00	Microdeal
David's Midnight Magic	Arc	Commodore 64	£29.95	Audiogenic
Dig Dug	Arc	Atari	£29.99	Atari
Donkey Kong	Arc	Atari	£29.99	Atari
E.T.	Ad	Atari	£29.99	Atari
Eastern Front	S	Atari	£29.99	Atari
Evil Demons	Arc	BBC B	£7.95	Excaliber
Family Finances	Ut	Atari	£34.99	Atari
Four Gates to Freedom	Arc/Ad	Spectrum	£9.95	Phoenix
Ghost Town	Ad	Spectrum	£5.95	Virgin
Giant's Castle	Ad	Dragon 32	£5.95	Dragon Dungeon
Grandmaster	S	Commodore 64	£17.95	Audiogenic
Graphics	Ut	Dragon 32	£5.95	Audiogenic
Hangman	S	Dragon 32	£5.95	Audiogenic
Intergalactic Force	Arc	Dragon 32	£8.00	Microdeal
It's only Rock and Roll	S	Spectrum	£6.95	K-Tel
Jokers Wild	Arc/Ad	Spectrum	£9.95	Phoenix
Juggles House	Ad	Atari	£29.99	Atari
Juggles Rainbow	Ed	Atari	£29.99	Atari
Jungle Jumble	Ed	Spectrum	£6.50	Computer Tutor
Keys of the Wizard	Ad	Dragon 32	£8.00	Microdeal
Kosmik Pirate	Arc	Spectrum	£5.95	Elephant
Maths Trek	Ed	Dragon 32	£5.95	Dragon Dungeon
Mickey in Great Outdoors	Ed	Atari	£29.99	Atari
Midas Maze	Arc	Dragon 32	£4.95	Dragon Dungeon
Monsters	Arc	Dragon 32	£6.95	Softek
Motor Mania	Arc	Commodore 64	£8.95	Audiogenic
Noc A Bloc	Arc	BBC B	£7.95	Virgin
Oscar's Maths	Ed	Dragon 32	£4.95	Dragon Dungeon
Oscar's Spelling	Ed	Dragon 32	£4.95	Dragon Dungeon
Paint	Ut	Atari	£29.99	Atari
Party Time	Ed	Spectrum	£6.50	Computer Tutor
Plague	Arc	Vic20	£6.95	K-Tel
Plankwalk	Arc	BBC B	£7.95	Virgin
R. Nest	Arc	Commodore 64	£6.95	Audiogenic
Renaissance	S	Commodore 64	£8.95	Audiogenic
Rider	Arc	Spectrum	£5.95	Virgin
Road Toad	Arc	Commodore 64	£6.95	Audiogenic
Seafox	Arc	Commodore 64	£29.95	Audiogenic
Serpentine	Arc	Commodore 64	£29.95	Audiogenic
Shifty	Arc	Vic20	£7.95	Audiogenic
Ship of the Line	S	Commodore 64	£6.50	Richard Shepherd
Spiders Maze	Arc	Dragon 32	£5.95	Audiogenic
Star Wars	Arc	Dragon 32	£5.95	Audiogenic
Supavaders	Arc	Vic20	£6.95	K-Tel
Supermind	S	Dragon 32	£5.95	Audiogenic

# Book Ends



## COBOL

Although not a language available on many home micros, Cobol is probably the most widely used language among professional programmers.

Learning Cobol could be a useful task then, particularly for computer fans who hope to earn their living programming.

*Cobol for Micros* is an extensive introduction to the language, particularly with reference to file handling and data storage. The book includes many examples of Cobol programs which are explained in detail and each chapter ends with a summary and some simple questions.

Book	<i>Cobol for Micros</i>
Price	£7.95
Micro	General
Supplier	Newnes Technical Books Borough Green Sevenoaks Kent TN15 8PH

## BEST-SELLING

This Christmas my bet for best-selling micro is the Commodore 64.

A good moment, then, to launch a book called *Practical Programs for the Commodore 64*.

The book, by Owen Bishop, contains 13 programs with a (vaguely) serious basis — home accountant, phone call coster, stock records, etc.

It looks well above the usual standard with extensive notes on all the programs, some of which contain machine code routines for extra speed and flexibility.

Book	<i>Practical Programs for the Commodore 64</i>
Price	£5.95
Micro	Commodore 64
Supplier	Granada Publishing Limited 8 Grafton Street London W1X 3LA

Surround	Arc	Dragon 32	£5.95	Audiogenic
Swarm	Arc	Vic20	£5.95	Temptation
Teddy	Arc	Vic20	£7.95	Audiogenic
Temple of Zoren	Ad	Dragon 32	£7.95	Dragon Dungeon
The Island	Ad	Spectrum	£5.95	Virgin
The Lone Raider	Arc	Atari	£14.99	Atari
The Manager	Ut	Dragon 32	£14.95	Dragon Dungeon
Timewise	Ut	Atari	£22.99	Atari
Treasure Tomb	Ad	Dragon 32	£7.95	Dragon Dungeon
Ugh	Arc	Dragon 32	£6.95	Softek
Ultrapede	Arc	Dragon 32	£6.95	Softek
UXB	S	Dragon 32	£6.95	Virgin
Visicalc	Ut	Atari	£15.90	Atari
Whizz Quiz	Ed	Spectrum	£6.50	Computer Tutor
Word Feud	Ed	Commodore 64	£8.95	Audiogenic

Key: Ad — adventure/Arc — arcade/Ed — education/S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

## Top 10

BBC*		
1 (1) Planetoids	(Acornsoft)	
2 (10) Rocket Raid	(Acornsoft)	
3 (3) Hopper	(Acornsoft)	
4 (5) Snapper	(Acornsoft)	
5 (—) Swoop	(Program Power)	
6 (—) Meteors	(Acornsoft)	
7 (—) Monsters	(Acornsoft)	
8 (—) Reversi	(Acornsoft)	
9 (9) Alien	(Program Power)	
10 (7) 3D Bomb Alley	(Software Invasion)	

\*All Models B.  
(Figures compiled by Micro Management, Ipswich 0473 59181)

## Top 10

Vic20		
1 (2) Arcadia	(Imagine)	
2 (4) Catcha	(Imagine)	
3 (3) Wacky	(Imagine)	
4 (6) Escape MCP	(Rabbit)	
5 (—) Sky Hawk	(Quicksilva)	
6 (5) Laser Zone	(Llamosoft)	
7 (8) Paratrooper	(Rabbit)	
8 (—) Blitz	(Commodore)	
9 (—) Amok	(Audiogenic)	
10 (—) Matrix	(Llamosoft)	

(Figures compiled by Boots & Co, London)

## Top 10

Dragon		
1 (3) The King	(Microdeal)	
2 (1) Talking Android Attack	(Microdeal)	
3 (4) Cuthbert Goes Walkabout	(Microdeal)	
4 (5) Frogger	(Microdeal)	
5 (—) Grid Runner	(Salamander/Llamosoft)	
6 (—) Shark Treasure	(Dragon Data)	
7 (2) Mined Out	(Quicksilva)	
8 (—) Storm Arrows	(Dragon Data)	
9 (—) Grand Prix	(Salamander)	
10 (6) Ring of Darkness	(Wintersoft)	

(Figures compiled by Boots & Co, London)

## Top 10

ZX81*		
1 (2) Football Manger	(Addictive Games)	
2 (6) QS Scramble	(Quicksilva)	
3 (1) Flight Simulation	(Psion)	
4 (5) Asteroids	(Quicksilva)	
5 (4) 1K Games	(Artic)†	
6 (3) 1K Chess	(Artic)†	
7 (7) Defender	(Quicksilva)	
8 (—) Invaders	(Quicksilva)	
9 (—) Planet of Death	(Psion)	
10 (—) Inca Curse	(Artic)	

\*All run in 16K except where shown.  
†1K.  
(Figures compiled by Boots & Co, London)

Spectrum		
1 (3) Flight Simulation	(Psion)*	
2 (—) Lunar Jetman	(Ultimate)*	
3 (8) Kong	(Ocean)*	
4 (1) Zzoom	(Imagine)*	
5 (—) 3D Ant Attack	(Quicksilva)*	
6 (—) Pool	(CDS)	
7 (5) Tranzam	(Ultimate)	
8 (7) Zip Zap	(Imagine)*	
9 (—) Bugaboo	(Quicksilva)*	
10 (6) Pssst	(Ultimate)	

\*Requires 48K  
(Figures compiled by W H Smith and Son, London)

Books		
1 (1) Advanced User Guide for the BBC Micro, Bray, Dickens and Holmes	(Cambridge Micro Centre)	
2 (2) BBC Micro, Basic, Sound and Graphics, McGregor and Watt	(Addison-Wesley)	
3 (10) Supercharge Your Spectrum, Webb	(Melbourne House)	
4 (7) Structured Programming with BBC Basic, Atherton	(Horwood)	
5 (—) 30-Hour Basic, Prigmore	(NEC)	
6 (6) Master Your ZX Microdrive, Pennell	(Sunshine)	
7 (—) Spectrum Hardware Manual, Dickens	(Melbourne House)	
8 (9) One Hundred Programs for the BBC Micro, Gordon	(Prentice-Hall)	
9 (—) Commodore 64 Exposed, Bayley	(Melbourne House)	
10 (8) 6809 Assembly Language Programming, Leventhal	(Osborne)	

(Figures compiled by Watford Technical Books, Watford 0923 23324 Prestel 28844)  
(Last week's position in brackets)

Atari		
1 (3) Miner Zogger	(Big Five)*	
2 (—) Zork 1	(Infocom)	
3 (2) Ultima 2	(Sierra On-line)†	
4 (—) Zaxxon	(Datasoft)	
5 (—) Defender	(Atari)*	
6 (—) Adventureland		
7 (—) Pirate Adventure	(Adventure International)‡	
8 (1) Blue Max	(Showcase)†§	
9 (—) Choplifter	(Broderbund)*	
10 (—) Diamonds	(English)†	

\*Cartridge. †32K cassette. ‡48K disc. §32K disk.  
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

## Ziggurat



### The state of the art

If, as now seems possible, the micro-computer boom is over, then the rate of growth of the numbers of new computers being bought in this country will begin to decrease.

Even so, the number of computers will still increase, but at a slower rate (a similar confusion exists with inflation: the rate of inflation may decrease, but this still means increasing prices).

Which are the companies, and individuals, at risk? Once we start asking these questions we enter familiar territory (at least, familiar to some) — questions about the behaviour of organisations in a competitive market.

For a moment, just consider the smaller company. These days even Dragon or Oric are small companies but let us start with the very smallest companies. The companies which are effectively two or three individuals, perhaps employing a handful of others.

For such a company to be successful it helps to have entered the market early. Then there were fewer firms and profits were there to be made, not because there was no competition.

In some cases these beginners have continued to do well, but those people who were there in the beginning were only there by chance.

An ability to program, or to design a computer, does not necessarily imply a more general ability to run a business. In the beginning an ability to program was far more important than an ability to run a business — the pickings were so easy that many companies prospered which

would not have otherwise succeeded in a more competitive market.

As pickings were so much easier, businesses could prosper despite poor management. As soon as the market became tighter, poor management — which usually meant poor financial management — had its inevitable effects: firms began to suffer problems. Couple poor financial management with projections based on incorrect assumptions, and firms began to over-produce for markets that were never to be.

Many firms were no more than associations of programmers whose main delight was in the programming — as a result, much of the back-up and documentation was poor. I remember ringing up one software house (a group of science students), and criticising their software documentation. The response from the person at the other end was that it was X's fault, not his, and what did a few spelling mistakes matter? Many of the smaller firms which have folded have attitudes like these. The successful ones (and by "successful" I do not necessarily mean "largest") are run by persons with a wider perspective and experience.

The big companies — Texas, Atari, Mattel — have the same problems, and more. Sometimes they stem from over-supply (after all, the population is not infinite). Sometimes the problems have come from the expansion in the number of firms supplying computers (each of which might be over-estimating). Sometimes it is because the company is saddled with an image which made sense at one time (eg: a "games" image) but now is counter-productive. Sometimes the state-of-the-art has advanced, leaving the company with an out-dated, over-priced product.

More often than not it is all of these, plus some more.

The point is simple. In the past, the market was indiscriminating enough, and hungry enough, to support even the poorly run or less-than-top-quality-product companies. That is changing as the market matures. Just as the winners are becoming more obvious, so the losers are too. And it is the losers that are now being weeded out.

**Boris Allan**

## Puzzle

### Squares within squares

#### Puzzle No 80

Some numbers which are integer squares, such as 49 ( $7 \times 7$ ), are made up of two, further, integer squares, in this case 4 and 9



Other such numbers are 169 (16 and 9), 361 (36 and 1), 1225, 1444, 1681.

What is the next number? (Note that  $\sqrt{00}$  is not 0.)

#### Solution to Puzzle No 76

This puzzle can be solved quite easily without using a computer — in fact, using a micro would almost certainly take longer than solving it by inspection.

Knowing the total catches of each pair of twins, all the possible combinations can be written down. Combinations of two equal numbers can be eliminated, since no two people caught the same number of fish.

Robinsons (Tot: 17)	— 10+7 or 9+8
Smiths (Tot: 16)	— 10+6 or 9+7
Taylor (Tot: 9)	— 8+1 or 7+2 or 6+3 or 5+4
Unwins (Tot: 7)	— 6+1 or 5+2 or 3+4
Venn-Wilkinsons (Tot: 6)	— 5+1 or 4+2

Since the ten twins each caught a different number of fish, the correct combination can be chosen from the list above just by looking (shown in italics):

Liz (8) and Isambard (9) Robinson  
 Julie (6) and Jill (10) Smith  
 Gus (7) and Bertram (2) Taylor  
 Charles (3) and Donald (4) Unwin  
 Lynne (1) and Eric (5) Venn-Wilkinson

#### Winner of Puzzle No 76

The winner is: Linda Doyle, Norfolk Crescent, Sidcup, Kent, who receives £10.



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DRAGON 32	£10	<input type="checkbox"/>
B.B.C. 32K	£10	<input type="checkbox"/>

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# AUTOMATA, a statement...

WE SINCERELY THANK ALL OF THOSE SPLENDID SOFTWARE HOUSES WHO HAVE IMITATED US IN THE PAST, AND WE GENUINELY HOPE THAT THEY CONTINUE TO DO SO. HONESTLY WE DO, WAS IT AS FAR BACK AS TWO YEARS AGO WHEN WE WERE THE FIRST TO PUT MUSIC AND SOUND TRACKS ONTO OUR CASSETTES (yee it was...and GET ON WITH IT !!!) AND WERE WE REALLY THE FIRST SOFTWARE CREATORS TO PROVE THAT YOU DON'T HAVE TO PRODUCE SHOOT-EM-UP KILLER-GAMES TO ENTERTAIN PEOPLE, WAS IT AUTOMATA THAT INTRODUCED HUMOUR INTO PROGRAMS BEFORE ANYONE ELSE (you know we did ..... what about EXPOSING our IMITATORS, COWARD!!) THEN, OF COURSE, WE WERE THE VERY FIRST TO INTRODUCE A GENUINELY AUTHENTICATED PRIZE, FOR A BEST-SELLING ADVENTURE GAME, UNLIKE SOME SOFTWARE OUTFITS, WHOSE GAMES COULD BE FITTED ONTO THE TONGUE OF A SMALL WOMBAT, AND WHOSE SO-CALLED PRIZES WERE NEVER SHOWN TO THE PRESS OR PUBLIC. (That's better... now NAME SOME NAMES.. heh!) AND LET US NOT FORGET ALL THE COMPANIES WHO HAVE BEGUN TO USE COMIC STRIP ADVERTISING, SOME OF THEM IN THE HALLOWED PAGES OF THIS FINE MAGAZINE, IN A WEEDY ATTEMPT TO COPY OUR ENTERTAINING STYLE. (Come on you little TOADY!! gimme some LIBEL! Write something SLANDEROUS! Let's see the SOLID WASTE MATTER hit the air cooling device!!) AND LEST WE FORGET, IT WAS THE PIONEERS AT AUTOMATA WHO INTRODUCED LIVE MUSIC & REAL ENTERTAINMENT TO COMPUTER FAIRS, OUR VERY OWN PIMAN IS THE FIRST COMPUTER CHARACTER TO RELEASE AN L.P. RECORD, AND BE INVITED TO ENTERTAIN THE MASSES ON TELEVISION, SO WE SEND OUR HEARTFELT SYMPATHIES AND WARMEST THANKS TO ALL OF OUR IMITATORS, AND PROMISE TO KEEP SHOWING THEM THE WAY FORWARD IN THE FUTURE, AS WE HAVE IN THE PAST. (This is your LAST CHANCE to really INSULT someone ..... OR ELSE) INDEED, IF OTHER COMPANIES, WHETHER THEY ARE BACK-ROOM PENNILESS PLAGIARISTS, OR WHETHER THEY ARE RICHYPOO FAT BIG-BUSINESS RIPOFF ARTISTES, WOULD LIKE ANY ASSISTANCE IN THESE MATTERS, THEY ARE WELCOME TO TELEPHONE ME, IN THEIR CONVENIENCE, AND I WILL GLADLY TELL THEM WHERE TO GO, AHM, HOW'S THAT BOSS ... (LURCH ... GRODDIM !!!!!!!)

snip!

snip!

## my name is Uncle GROUCHO you win a fat cigar!

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THIS CARTOON WAS SENT IN TO US BY OUR PIMANIAC PAL, RICHARD LANGFORD OF ENFIELD, ALONG WITH MANY OTHER WONDERFUL WORKS OF ART. WE LIKED IT SO MUCH THAT WE DECIDED TO PUBLISH IT, AND WE INVITE ALL OTHER PIMANIACS TO SEND US THEIR POCKET CARTOONS AND MAKE US LAUGH HERE AT AUTOMATA. WE WILL PRINT THE BEST ONES RIGHT HERE. (SEND A S.A.E. IF YOU WANT YOUR MASTERPIECES BACK) KEEP SMILING, LOVE, THE PIMAN..

*by the way, looking in my backlog - I was launched exactly in your magazine's first issue.*

MEANWHILE, BACK AT THE ORIGINAL AND LONGEST-RUNNING CARTOON STRIP,

