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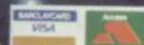
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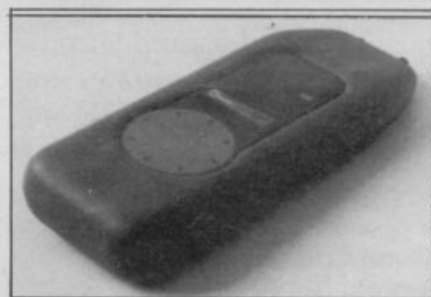
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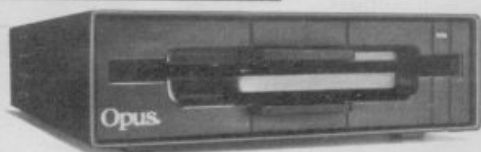
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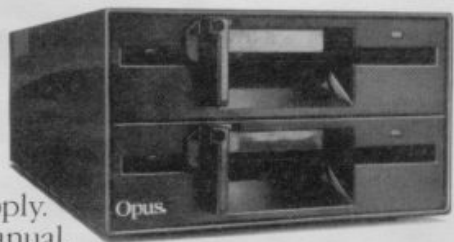
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IT SEEMS that almost every day another major chain of high street stores enters the computer market. The latest of these is Marks and Spencer, renowned for its lines of durable Y-fronts and sensible sweaters. The more outlets there are for micro products, the better it is for the user, or so the argument goes. There is, however, dissatisfaction amongst consumers and manufacturers with the service provided by the main street middlemen.

The trade paper *Home Computer Trade Weekly* recently conducted a spot survey of seven retail chains and the signs are not encouraging.

It is no surprise that top of the pops is WH Smith which gets good ratings for floor space, trained staff, software range and layout. It does not, however, score highly where new products are concerned, and that is a fault with all retailers who stock old ranges until they have been cleared off the shelves. Both customer and software house suffers as a result because new products are not generally available. It is not surprising that publishers have complained of disastrous sales this summer when shop shelves are stocked with dusty copies of **Maziacs** and **Mad Martha**.

The amount of shelf space is itself a problem and one which is tied in with floor space given to a computer department. Again WH Smith comes top and Rumbelows comes bottom in the CTW report. In most outlets software is put at the back of the shop where few people can see it and is given little shelf space. Frequently it is displayed inside the forbidding glass cabinets, a discouragement to browsing customers. The display can be confusing, with Spectrum software jumbled up with VIC 20 and Commodore cassettes, under the misleading sign reading 'Atari', or even 'Computer Books'. Cut-price Mastertronic tapes stand shoulder-to-shoulder with full-priced Virgin games, and the price of a particular item can vary on different shelves in the same shop.

Finding software and getting technical help is frustrating for the potential customer. Few chain stores train staff to handle computer buffs and some staff are transferred from other departments to work with computers without having the slightest idea of what a computer can be used for. Those assistants are good at handling merchandise but when it comes to providing information about it they are lost. When in doubt, the answer is "It's out of stock".

WH Smith give the best training of all the computer retail

stores and Currys is about to give its staff some help by sending them on courses. Those will take place at Currys training establishment at Worthy Park. The company hopes to turn out computer consultants which it will distribute among 90 of its top computer stores. The consultants should be able to talk about the market, advise which software and machines to buy and how to program.

The identification by Currys of the need for trained consultants in its stores shows that some movement is being made toward market maturity, although chain stores still have a long way to go.

THE TERMINAL SOLUTION



The problems are not only concerned with software distribution and retailing. Readers of *Sinclair User* have experienced difficulty in buying machines and hardware add-ons. One reader had difficulty in obtaining a complete printer package for his Spectrum. He tried Boots, Laskys, Dixons and a back street computer shop before going to a mail order company. That company, Transform, delivered printer, leads and interface on the day that the order was confirmed. If shops are going to carry printers or computers who not stock the necessary interfaces between the two?

Discs and printer ribbons are notoriously difficult to obtain off the shelf even from the same shops that supply the disc units or printers. One *Sinclair User* staff member bought a printer at Dixons and was told, "Sorry, we don't have any spare ribbons for that printer". WH Smith was no more helpful, Boots had never heard of the printer and Laskys said that one was on order.

A solution to the hardware problem might be elusive but the answer to software availability may be near with the introduction into John Menzies of a system of electronic distribution by a company called Program Express.

Shops using the system each have a computer terminal linked to a mainframe at a computer centre. When a customer wants a particular program the assistant selects the program required. The mainframe can hold 1000 programs at a time and those are updated regularly. The machine downloads the selected program onto disc, tape or ROM cartridge and it can then be taken away.

The retailer would never again have any difficulty in finding or stocking a piece of software. Mind you, the distributors might complain. There would be less need for their services in a world in which software is on tap in the high street.

John Gilbert

First, a question.

Who do you think are the world's most avid consumers of microcomputers?

The ingenious Japanese?
The fashionable French?
The acquisitive Americans?

Believe it or not, it's we British who own more micros per person than any other nation on earth.

Yet, despite its amazing impact, the microcomputer has only just begun to scratch at the surface of our lives. Without doubt, the best is yet to come.

Use and Abuse.

In several recent surveys, some astonishing facts about micro use and abuse were revealed.

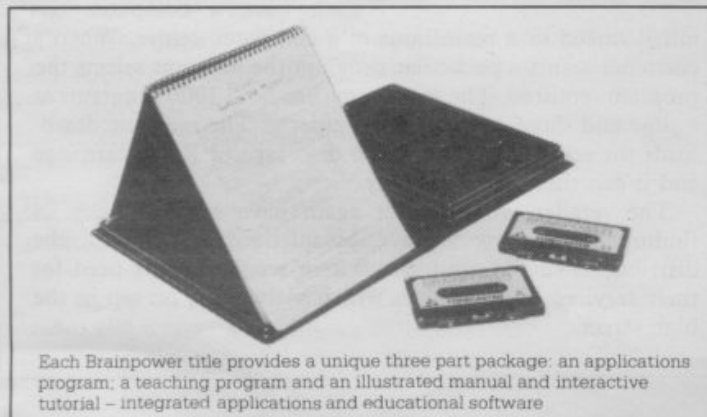
It was discovered that the micro is hopelessly under-utilised. If you're already a micro owner, your own experience may well confirm this unhappy state of affairs.

Brainpower. A source of knowledge.

For thousands of years, the key to self improvement has been in the hands of the written word. Now, thanks to the Brainpower range, it's very much in the hands of the micro.

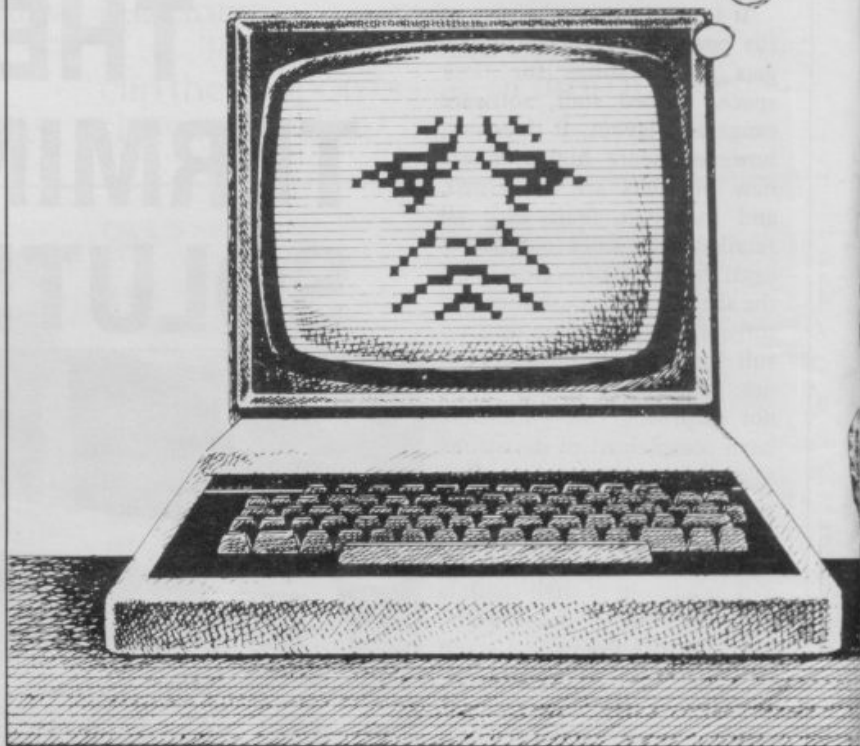
As the Brainpower range demonstrates, this does not require prior knowledge of micros, or how they work.

The Brainpower concept has been devised as *integrated* applications and educational software. And its aim



Each Brainpower title provides a unique three part package: an applications program; a teaching program and an illustrated manual and interactive tutorial - integrated applications and educational software

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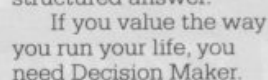
You will find each title comprises three distinctive elements: A teaching program that helps you to get to grips

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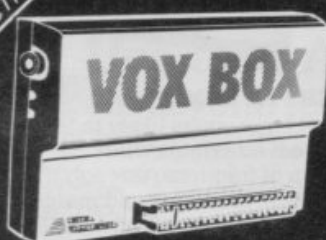
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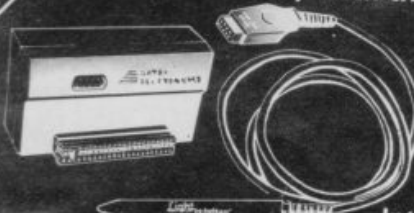
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Virgin revamped

MEDIOCRE software has become the hallmark of Virgin Games, but the autumn is going to see a fresh start for the company according to managing director Nick Alexander.

Virgin is going to change its approach to the games market and no longer release a mass of titles for a wide range of machines. Instead it will focus its attention on promoting one or two new titles at a time, concentrating on the Spectrum and the Commodore 64.

Alexander says: "This autumn we are only releasing six titles, all of which have been extensively researched and tested for market appeal and we are going to market the hell out of them".

Two of the six titles are Spectrum games. The first, released in September, is **Strangeloop** and is Virgin's answer to the **Jet Set Willy** cult. It is an arcade adventure game and Virgin is offering a £2,000 robot for the first person to complete it.

Steve Webb, Virgin's Technical Manager, says:

Our readers know best

SINCLAIR USER is the second best selling computer magazine according to the Audit Bureau of Circulation (ABC) figures for the six month period January to July 1984.

The magazine had an audited circulation of more than 96,000 and no other monthly or weekly computer publication has equalled that in the Sinclair market.

As the *Sinclair User* circulation continues to grow, its readership grows even faster. A recent survey of home computer usage showed *Sinclair User* was the best read computer magazine with more than 250,000 readers.

"We believe that **Strangeloop** takes the Spectrum to its limit. We would have called it a Mega Game but we felt that the term has been devalued".

The Biz is the second new Spectrum release and has been written by Chris Sievey of rock group The Freshies. It simulates the life of a rock star whose aim is to get to the top, a vocation which Sievey has been following for some time.

Both games use the specially developed Flashload technique

which allows programs to be entered in under a fraction of the normal load time.

Virgin is also dropping some of the titles that they have been marketing. Jeremy Cook, commercial director, says: "We've taken our complete catalogue, thrown out the few duff titles that we, like everyone else, have had, and are putting the rest on sale at a retail price of £2.99 until the end of November. That's a saving of between nearly £3.00 and £5.00".



Virgin Games' prestigious new headquarters

Anti-piracy software

A REVOLUTIONARY remedy to software piracy has been introduced by CSP Systems.

Padloc Nine is a software-based device which can be operated from a Basic program and will protect cassette software for the Spectrum.

The package requires no extra hardware to operate it and is unlike any other system because it acts against copier programs and not hackers who are intent on using their initiative to break into programs.

The system is aimed at any programmer or software house that requires it. The company claims that pirates are unlikely to even detect the operation of the device within a piece of software and that no duplications of a program need be alike.

More information about Padloc Nine can be obtained from CSP Systems, 213 Stainbeck Road, Leeds.

Imagine programmers join Beyond

IMAGINE programmers have been found alive and well and working for Beyond, the company which produced the **Lords of Midnight** adventure game.

The group of six including John Gibson, of **Stonkers**

fame, is working on an adventure, called **Shadowstar**, for the company. Simon Goodwins, says: "They approached us as they were looking at the possibilities of staying together as a group".

One of the head program-

mers working at Imagine who did not join the group when the company went into liquidation was computer whizz kid Eugene Evans. Like the other directors of Imagine, he appears to have gone to ground.

Comrade Clive

SMUGGLING COMPUTERS into Yugoslavia used to be big business because the government frowned upon the import of machines by individuals.

Despite the unofficial ban on microcomputers small groups have been able to smuggle machines into the country. As a result at least 20,000 machines have been smuggled in, two computer magazines have been launched and a game for the Spectrum about computer

smuggling, called **Contra-band**, has just been released.

All that is about to change, though, as Sinclair Research has agreed a deal with ISKRA electronics to import Spectrum parts into Yugoslavia where machines will be assembled and marketed.

Asked whether the decision was taken at government level Julian Goldsmith of Sinclair Research says: "Our overseas policy has always been to work with British embassies and consulates

so I would think that something like that would be the case".

The Yugoslav Embassy could throw no light on the matter and told us to contact the Yugoslav economic chamber. A spokesperson there says: "There is no ban on the import of computers but an individual who tries to bring a computer into the country may have to pay certain duties. I'm afraid I can't tell you any more as it changes so often".

Damned winners

MORE THAN 2000 entries were received for **The Inferno** competition published in the August issue of *Sinclair User*. The 250 winners, who will each be sent a cassette of the game from Richard Shepherd Software, are listed below:

J Beattie, Aberdeen; Nicholas Court, Bromsgrove, Worcs; S Houghton, Lytham, Lancashire; Katy Muller, Avonside, Leamington Spa; Colin Haughton, Felixstowe, Suffolk; G Moffatt, Sunderland, Tyne & Wear; Ian Thompson, Grays, Essex; Gary Varnham, Bolton, Lancs; Phillipp Ewart, Cheltenham, Glos; J M Lownders, Knaresborough, Yorkshire; C P Webb, Eastwood, Nottingham; Brian Axten, Shephed, Leicestershire; Lawrence Gilbert, Workingham, Berks; Gavin Mills, Wetherby, W. Yorks; Paul Holden, Rustington, W. Sussex; Steve Ross, Inverness; Mike Mansfield, Hawkshurst, Kent; B Johnson, Pimlico, London; G A Hold, Wakefield, W. Yorkshire; M Wideman, Halifax, W. Yorks; Colin Anson, London, NW2; Ian Clay, Grantham, Lincs; Stephen Pettigrew, Epsom, Surrey; Christopher Haswell, New Barnet, Herts; Nicholas Edwards, Reading, Berks; Niall Fernie, Caithness, Scotland; Richard Costall, Harborough, Leics; J Barnett, Todmorden, Lancs; A E Rochard-Thomas, Purley, Surrey; D C Ward, Chippenham, Wilts; J A Garwood, Colchester; G Davis, London, W14; L Williams, Wrexham, Clwyd; Ashley Ross, Westcliff-on-Sea, Essex; J G Farrell, Sunderland, Tyne & Wear; P Harvey-Hunter, Gosport, Hants; Jonathan Rees, Headington, Oxford; Nigel Knowles, Reading, Berks; Simon Strong, Willesden Green, London; A G Sherriff, Keighley, W. Yorkshire; G Henry, Wirral, Merseyside; Sheila Thomas, Duxford, Cambridge; J D Whitaker, Liversedge, W. Yorkshire; George Gilpin, Stretford, Manchester; Martha Lewis, Derrington, Nr. Stafford; G G Robinson, Edinburgh; Jason Goodwin, Nailsea, Avon; Jonathan Veal, Market Rasen, Lincs; Davis Lumsden, Glenrothes, Fife; Paul Gamble, Dereham, Norfolk; Adam Harvey, Gt. Ormesby, Gt. Yarmouth; Steinar Nohr, Bertnes, Norway; David Cadwallader, Corringham, Essex; Stephen Hardcastle, Hayling Island, Hampshire; Michael Turbett, Co. Tyrone, N. Ireland; Bernie Hamilton, Barnard Castle, Co. Durham; Shirley Edge, Wrexham, Clwyd; Timothy C Sellick, Bridgwater, Somerset; J S Wijaya, Jakarta, Indonesia; Michael Thompson, Bearsden, Glasgow; Valerie Rickis, Edinburgh; Pedro Santos, Madrid, Spain; Paul Staniford,

Bletchley, Milton Keynes; S J Foster, Spilsby, Lincs; Philip Allen, Cheltenham, Glos; Dean Johnson, Portsmouth, Hants; Frank Burns, Stevenston, Ayrshire; Jacky Martin, Stowmarket, Suffolk; Nicholas P McNally, Farnham, Surrey; T W Arkinstall, Epsom, Surrey; Christopher Wood, Thames Ditton, Surrey; John Blondel, BFPO 58, Cyprus; James Bankers-Fay, Teignmouth, South Devon; Stephen Chapman, Ivybridge, Devon; Diane Harvey, Colinton, Edinburgh; C H Gardner, Newcastle-upon-Tyne; Chris Stainsby, Heanor, Derbyshire; Graham Brown, Heaton Chapel, Stockport; B R Grunshaw, Blackburn, Lancs; J Boarman, Woolston, Warrington; P A Barrett, Camborn, Cornwall; Keith Morrison, W. Bridgford, Nottingham; Mark Nurse, Withernsea, E. Yorkshire; P J Crocker, Rossendale, Lancs; K Tunnicliffe, High Heaton, Newcastle-upon-Tyne; Peter Ellis, Aylesbury, Bucks; Eamon Ahern, Middleton, C. Cork; Richard Pearson, Chelmsford, Essex; Colin Johnson, Auckland, Co. Durham; Jason Senior, Huddersfield, Yorks; Ronald Fraser, Ayr, Scotland; Jonathan Kelk, Ruddington, Nottingham; Steven Pinfold, Par, Cornwall; Philip Saunders, New Milton, Hampshire; K J Simpson, Nr. Dover, Kent; Gavin Currow, Hayle, Cornwall; Owen Brunette, New Romney, Kent; Mr Brame, Walling, Kent; Elizabeth Shipworth, Nottingham, Notts; Ahmed Jawed-Al Moosa, Safat, Kuwait; Ian Gostellow, Dewsbury, W. Yorkshire; Jason Cales, Nr. Bristol, Avon; C Riby, Barnsley, S. Yorks; Nicholas Bower, Sheffield, South Yorkshire; Alistair Brown, Livingston, W. Lothian; Steven Paton, Edinburgh, Scotland; Ray Speller, Ware, Herts; J F Cunningham, Blackpool, Lancashire; Adrian Wilson, Grimsby, S. Humberside; Simon Howitt, Huntingdon, Cambs; G Wilym King, Berkhamsted, Herts; S D Taylor, Exmouth, Devon; Stefan Symonds, Ipswich, Suffolk; David Gabbittas, Doncaster, S. Yorks; A Allen, Warley, W. Midlands; Paul Smith, Erdington, Birmingham; Fiona Warner, Frodsham, Cheshire; James Williams, Nantwich, Cheshire; Laurie Leigh, Varese, Italy; Matthew Moden, Rossendale, Lancashire; Jason Wilts, Nr. Darri, S. Glam; Gareth Williams, Ruthin, Clwyd; Pal Christian Warloe, Tertnes, Norway; Ivor Cotten, Rochester, Kent; Gavin P McCafferty, Belfast, N. Ireland; G Holliday, Strood, Kent; Scott Harper, Quinton, Birmingham; Dean Anthony, Orpington, Kent; James Buchanan, Lochwinnoch, Renfrewshire; Steve Tindell, BFPO 44, Recklinghausen; Suzanne Allen, Nr. Llangollen, Clwyd; G Martin, Harare,

Zimbabwe; Ivan Mazzanti, Scorsbrick, Lancs; Howard Murray, Welling, Kent; Ramsey Bayati, Sale, Cheshire; Bruce Hall, Edinburgh; Rosemary Oakeshott, Romsey, Hants; R Jex, Gt. Yarmouth, Norfolk; Neil Gunn, Goole, North Humberside; James Longwill, Balam, Cambridge; David Cooke, Redruth, Cornwall; Denis Noctor, County Donegal, Ireland; Andrew Brodie, Greenfaulds, Cumbernauld; Paul Hale, Hull, N. Humberside; J E Collins, Sevenoaks, Kent; Peter N John, Guildford, Surrey; Graham Epps, North Lancing, Sussex; Jonathan Wragg, Oughtibridge, Sheffield; Ian MacAdam, Wirral, Cheshire; P C Thompson, Consett, Co. Durham; F Spence, Northampton; Leigh Sanderson, Penrith, Cumbria; Michael Coates, Wallasey, Merseyside; B King, Bexleyheath, Kent; Paul Jordan, Pontefract, W. Yorkshire; Stephen J Lear, Crewe, Cheshire; V Ratnayake, Harrow,

Swindon; Richard Hinton, St. Andrews, Fife; Mark Drysdale, Tilverton, Devon; David Slater, Sywell, Northampton; J M Goddard, West Derby, Liverpool; A Rotter, Lichtenvoorde, Holland; Paul Baker, Barking, Essex; Ian Benzie, Holdfast Camp, BFPO 12; Helen Williamson, Elgin, Moray; Stuart Bell, Weybridge, Surrey; Paul Vanlint, Walthamstow, London; M J Cuthbert, Leeds, W. Yorks; Simon Taylor, Clarendon Park, Leicester; Orla Nansen, Devtoft, Denmark; G N Yannopoulos, Reading; Ole Martin Kristensen Drøbak, Norway; Joanne Roughton, Wisbech, Cambs; Kevin O'Connor, Dagenham, Essex; F D Van Wijk, Eindhoven, Holland; Andrew Howarth, Liversedge, W. Yorkshire; Peter Baker, Maidstone, Kent; D C Chandler, Flockton, Wakefield; Anthony Lewis, Rugeley, Staffs; Frank Knapp, Nr. Accrington, Lancashire; M La Riviere, Bournemouth, Dorset; S Green, Chesterfield, Derbys; Alan MacKenzie, Abergavenny, Gwent; A Logie-Campbell, Cheltenham, Glos; Brett Smart, Ealing, London; D Stewart, Glasgow; C A Smith, East Bohdon, Tyne & Wear; John Elyde, Ashby de la Zouche, Leicestershire; Roman Henke, Den Haag, Holland; Kevin Anclewi, Halsted, Essex; Darren Foster, Dogsthorpe, Peterborough; C Thodes, Blackburn, Lancs; David Pusuy, Sudbury-on-Thames, Middlesex; Dawn Ainslie, Ashbrooke, Sunderland; A J Hart, Wembley, Middlesex; Peter Pickstone, Shepton Mallet, Somerset; Peter Lee, Avdenschaw, Manchester; Michael Davison, Nr. Barnsley, S. Yorks; Rafe Bundy, Stevenage, Hertfordshire; W A Prinn, Haverhill, Suffolk; Raymond Wright, Warrington, Peterborough; P Hullett, Grimsby, S. Humberside; Paul Dodd, Winsford, Cheshire; Derek Sol, Welwyn Garden City, Herts; K Crossling, Darlington, Co. Durham; J A Tomlinson, Daventry, Northants; John Denley, Nr. Andover, Hants; Stephen Jack, Hyde, Cheshire; Matthew Lloyd, Redditch, Worcs; Kevin O'Rourke, Farnborough, Hampshire; J H Eastwood, Nr. Colchester, Essex; A Smith, Harlow, Essex; Kevin Chadwick, Barrow-in-Furness, Cumbria; Denis McCarthy, Todmorden, Lancs; Mathew Hillman, London, SE16; J Holmes, Leeds, Yorkshire; Paul Blatchford, Newport Pagnell, Bucks; Alan Levesconte, Tonbridge, Kent; D Woolmore, Wokingham, Berks; Peter Custerson, Bridgend, Mid Glam; Robin J Baker, Congleton, Cheshire; C J Hammond, Headingley, Leeds; John Anderson, Garrawhill, Glasgow; Paul Flouk, Huddersfield, W. Yorkshire; L Evans, Wirral, Merseyside.



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Playing for time

A WORLD record for the continuous playing of computer games has been claimed by 18-year-old Sean Sullivan of East Yorkshire.

He and his friend Paddy Bell started the attempt at 8 pm on Tuesday 28 August at the Bridlington Computer Centre. Paddy gave up on Wednesday afternoon, after 30 hours, but Sean went through until 10 pm on Thursday 30 August. The record was set at 50 hours and Sean says: "I had set myself this target when I started, yet when I reached it I still felt fresh enough to do a lot more".

Unfortunately, the Guinness Book of Records has refused to have a category for the continuous playing of computer games. The organisers of the event say, however, that it was conducted under the strict standards required by Guinness in the hope that the organisation will relent.

Sean was allowed a five minute break during each hour of the event and two independent invigilators were present at all times. The software was supplied by the Bridlington Computer Centre and the machines used included both the ZX-81 and the Spectrum.

Weetabix goes soft

A NEW ARCADE game called **Weetabix versus the Titchies** is to be launched by Romik Software to coincide with a television competition campaign by cereal maker Weetabix.

The game features the characters of the popular television advertisements, runs on the 48K Spectrum and was written by Chris Ratcliffe. Romik says "we're glad to be leading the way into the consumer market".

The marathon was sponsored in aid of the Kingfisher Trust, a charity whose aim is to set up a leisure centre for young people in Bridlington, especially those who are unemployed.

Mike Gowen, Chairman of the Trust, says: "We are delighted to be involved in this magnificent effort by Sean and Paddy. Not only will they have raised several hun-

dred pounds for the Trust, but this has given us the opportunity to be involved with young people in something which is of great interest to them, namely computer games. As a result of this Sean and Paddy have already offered their services to help teach young people to program and use computers more effectively, just as soon as we have our centre".



A REVOLUTIONARY touch sensitive keypad from Touchmaster will provide an aid to those who have difficulty using the Sinclair keyboard. The device interfaces with the computer and, with the aid of a series of learning packages together with pad overlays, to be released later this year, will do away with the need for a keyboard.

Computer machismo

FEW PEOPLE may know but 1984 is supposed to be the year of WISE — Women Into Science and Engineering.

According to research done by Ebury Software, however, women are not getting a fair deal in the world of computers. The company report, collated by Audience Selection, shows that males hog the computer at home as well as in the office. In selected families 51 per cent of sons and 25 per cent of fathers used the computer most as opposed to 19 per cent of daughters and only five per cent of mothers.

As a result of the survey Ebury, an imprint of the National Magazine Company, is determined to generate more female interest in computers by publishing software which is specifically aimed at women. These titles will be launched under the name of one of NMC's magazines, *Good Housekeeping*, which the company hope will promote the cause.

Roger Barrett, Publishing Director of Ebury says: "A woman has just as much ability as a man when learning about computers. In fact, the positive, traditional skills women have, for example, or-

Fuller is bought out

THE FATE of Fuller Design, the company which produced hardware for the Sinclair computers and alienated many customers as a result, has finally become known. It has been acquired by a company called Nordic Keyboards.

As a result of the move managing director Roy Backhouse and his 12 staff have been made redundant and the company name and tooling taken by Nordic.

Backhouse blames a magazine publisher for paving the way to the ruin of a company which last year had an annual turnover of £500,000. Fuller owed the publisher £3,000 in advertising debts but when the case came to court Fuller Design was wrongly named as Fuller Micro Systems and the claim failed.

Unfortunately, the news of the debt made other companies wary of doing business with Fuller. Backhouse was forced to call a meeting of creditors and later the company was sold.

The new owner has promised to correct the kind of delivery problems which customers had experienced.

organisation, typing, languages and plain, old commonsense, are all very relevant to computers".

A new book, *Women and Computing*, by Rose Deakin also follows the theme and shows that it is possible to break into the computer world with few qualifications. Deakin explains that some of the greatest programmers in the world were women, such as Ada Lovelace.

More information about the book can be obtained from Papermac, 4 Little Essex Street, London WC2R 3LF.

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Teenage pirates— who is to blame?

THE calculations of software houses are based on the premise that every schoolkid would be willing to buy a tape if they could not obtain a copy.

I would never shell out £15.00 for **Sherlock**, but if someone offered me a copy I would take it, so how could Melbourne House claim to have lost the £15.00 which I wouldn't have paid anyway?

Of the many Spectrum owners I know, all own at least five original tapes, and most have over 30. So stop getting at the kids — who can't afford any more games than they buy already — and try to get the real pirates who churn out hundreds of copies a day, flogging them at cut prices. Software houses and others, give us a break.

Colin Baxter,
aged 15,
Glasgow.

I WOULD like to comment on Julian Rowland's letter concerning software piracy in the last issue.

It is good to see someone of his age taking a sensible and moral stand on this issue. My school has 10 Spectrums, which are available for games as well as educational use, and I have had to take a very firm line about copying games, to the extent of banning certain boys from the machines.

However, there are two points I would like to make regarding tape copiers. Firstly, most of the boys I found to be copying tapes were doing so using only tape-recorders, notably the dual cassette "ghetto blaster" type. Tape copiers would have been a mystery to most of them, since they were very definitely arcade players rather than would-be programmers.

Secondly, I use a tape copier with no moral scruples at all to transfer programs of all kinds onto microdrive, and I suspect that is their major use. I am quite aware that this may be technically illegal; but if I bought a program, on tape, for my own or school use, and can add the convenience of microdrive, why not? Very few manufacturers seem to be supplying anything on microdrive yet; those who do expect me to pay as much as £8.00 more than for the same program on cassette.

C J Dickinson,
St Edmund's Junior
School, Canterbury,
Kent

I TOO have noticed the huge software piracy which goes on in schools. I know of people who have copied as many as 30 games on one two-hour tape.

I feel a great deal of sympathy for software firms, but surely they could spend more time on protecting their tapes from pirates. Whilst playing **Flight Simulation** I found it was simple to BREAK into the program. **Test Match** by GRL is also extremely easy to BREAK into. Many other games are the same. Surely the software firms have only themselves to blame.

David Betteley, aged 15,
Newcastle,
Staffordshire.

The world's worst game?

METEOR STORM for the 16K ZX-81 from dk'tronics, is so pathetic I decided to warn people of spending their money on it.

I balanced my cassette holder on the fire button of the computer and manoeu-

vered my character into the right hand corner of the screen. As I write it is now running.

I believe this game is barely good enough to be a magazine listing, and could be a contender for a record — the only game with a negative Gilbert Factor.

Alistair Macdonald,
Sale, Cheshire.

Hacking in the jungle

HAVING JUST hacked my way through **Sabre Wolf**, I have discovered how to obtain infinite lives.

Load the first part of the program press BREAK and stop tape. Type: POKE 23756,1: CLEAR 65535. Edit the line, move the cursor to the end and delete: PRINT

Abandoning the ZX-81

THERE HAS been in your magazine a growing, an annoying trend away from the 'dwindling' ZX-81 market towards the Spectrum and now, to my horror, the QL.

Take the September issue for example. Only four of 56 reviews were for the ZX-81. Most of the Hints & Tips, Helpline and nearly all of the Hardware reviews are for the Spectrum. I give up.

Please don't desert us — there are still a large number of us around. The ZX-81 remains an excellent beginner's computer. Finally here is a tip for the ZX-81 which helps overcome its annoying limited List function.

To avoid the program text scrolling up the screen as it is

USR 23424: Add line 10, with any of the following POKES: POKE 43575,255 — for infinite lives, on player; POKE 45520,255 — infinite lives, two players; POKE 45599,255 — number of initial lives (1 to 255); POKE 41725,255 — no limit on gained lives.

Next add line 20: 20 PRINT USR 23424 and then type RUN to load the rest of the program.

Jeremy Diccox,
Dorchester,
Dorset.

I HAVE broken into **Cave-
lon** by Ocean Software and discovered a way of getting any level.

First use all of the crosses, then by pressing every key at once the message "Hi, Chris, what do you want?" appears. Then press any key from 1 to 6 and the game returns to normal. Now the game will start from the level pressed. At the end of level six it plays *Greensleeves*.

Marc Jones,
Gotham,
Nottingham.

typed in, delete an early non-existent large line number — about 9000. Upon pressing Return you do not get the last line number at the bottom of a full screen, but a screen with the number at the top and the rest clear. It remains that way after subsequent line numbers are added.

Richard Brooker,
Headingley, Leeds.

● Your criticisms have been noted, and we will endeavour to keep the ZX-81 flag flying. Regarding software and hardware reviews, very little for the ZX-81 is produced nowadays, and while this is a regrettable state of affairs, we can only review what we receive.

more letters on page 17

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SU/11/84

Spectrum complaints

YOUR correspondents seem surprised that they have had to return the odd Spectrum or two under guarantee. I had my first Spectrum in May of this year. Three months later, my fifth 48K Spectrum crashes anywhere and everywhere. A replacement, machine number six, will, hopefully, be given me next week. Can anybody beat this infamous record?

Incidentally, Sinclair Research as a company has been singularly unhelpful and unsympathetic on the phone, and unusually rude in answering my letters. What a dance it is leading its founder.

I hope this letter will encourage any other unhappy users to complain — not to Sinclair Research, who couldn't care less — but publicly. I hope that if Sir Clive Sinclair should see this he

will apologise on behalf of his company for the unfriendly treatment I have received from his staff and assure me that at least one machine is properly tested before it reaches me.

**Terry Braverman,
Cambridge.**

DAVID Hetchworth (Letters, September) should consider himself lucky that he couldn't obtain a 16K Spectrum.

In November 1982 I purchased, direct from Sinclair, a 16K Spectrum for £125, an issue 2. It performed perfectly until June 1983 when the keyboard ceased to function. Taking a note of the serial number I returned the computer to Sinclair's marketing agency.

Imagine my disgust when 28 days later I received an issue 1 Spectrum. By that

time, the value of the replacement was £99.95, not the 'equivalent value' required by the Sale of Goods Act.

In common with most other people my letters to Sinclair Research have gone unanswered.

The reasons for this cavalier attitude seem quite clear to me; why should an organisation worth many millions of pounds trouble itself with complaints? We the dissatisfied must just sit back and remember Ted Heath's phrase 'The unacceptable face of Capitalism'.

**Trevor Jones,
Oldham, Lancashire.**

No bugs on moon

FURTHER to John Lambert's review of **Moons of Tantalus** in the September issue, in which he stated that there is a bug in the program, we are writing to assure all your readers that the problem has now been corrected and that all copies of the game are now totally bug free.

We should like to thank *Sinclair User* for its assistance, but would point out that the price of the game is £6.45.

If any of our customers

have found that they have a faulty copy of **Moons of Tantalus** and wish to have it changed, will they please return it to us and we shall be delighted to send them a revised copy, completely free of charge, together with their refunded postage?

Whoops, sorry everyone!

**B G Cornhill,
Cornhill Services,
2 Penrith Way,
Aylesbury,
Buckinghamshire,
HP21 7JZ**



Disgusted

I AM writing in disgust about Steven Robbie's letter — *Sinclair User*, September — criticizing your reviews of **Halls of the Things** and **Maziacs**.

I have both and I am very pleased with them. **Maziacs**, far from being monotonous, is exciting and though it's not the hardest Spectrum game ever it is challenging.

All I can say is Steven Robbie has no taste whatsoever.

Andrew Moore,
aged 13,
Liverpool.

I MUST complain at the lack of credibility in your reviews. **Mugsy** does not deserve a Gilbert Factor of eight as it is, leaving aside the graphics, a dull and repetitive game. **Urban Upstart**, on the other hand, is an amusing and reasonably complex ad-

venture deserving at least nine.

Games should be reviewed by the age group which plays them and so I suggest a team of younger reviewers.

Apart from those small points *Sinclair User* is a great magazine easily beating its other rivals.

Sean Buckley,
Hadleigh,
Essex.

AFTER READING various reviews of **Mugsy** and seeing its high placing in the charts I decided to buy it.

I was very disappointed; the graphics are not bad but the game is boring. All you do is type in numbers and the things the characters say are nearly the same every game. There are few scenes.

It is not a patch on **The Hobbit** and how it gets eight

points in *Sinclair user* I'll never know.

Chris Boyes,
Wakefield,
W Yorkshire.

Underlining the easy way

IN THE 'Hints & Tips' article (September) there is given a 'memory remaining' routine. For my 48K machine I

have used the much simpler ROM routine: PRINT 65536 — USR 7962.

USR 7962 gives the ROM and RAM in use so by subtracting from your total capacity (65536 for 48K) you get the memory remaining. It also allows for microdrive and net channels.

N H Unitt,
Stratford-upon-Avon,
Warwickshire.

Just fancy that

AS AN update to the **Chuckie Egg** affair last mentioned in the September issue, I am pleased to inform you I have reached level 122 with a score of 2,306,560. It took me four hours 30 minutes, then I had to switch it off before my brother or his Spectrum blew up.

Craig Ruxton,
Dalrymple, Ayrshire.

AFTER READING the letters in your September issue I would like to point out that I am the **Sabre Wulf** king. I finished first on June 7.

For proof see *Popular Computing Weekly* Vol 3, No 30. For further proof contact Ultimate.

I finished with a score of 124,405 and 80 percent.

Des Claypole,
The Sabre King,
Peterborough,
Cambridgeshire.

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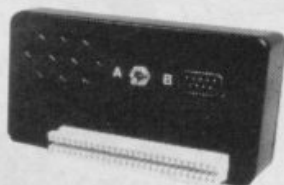
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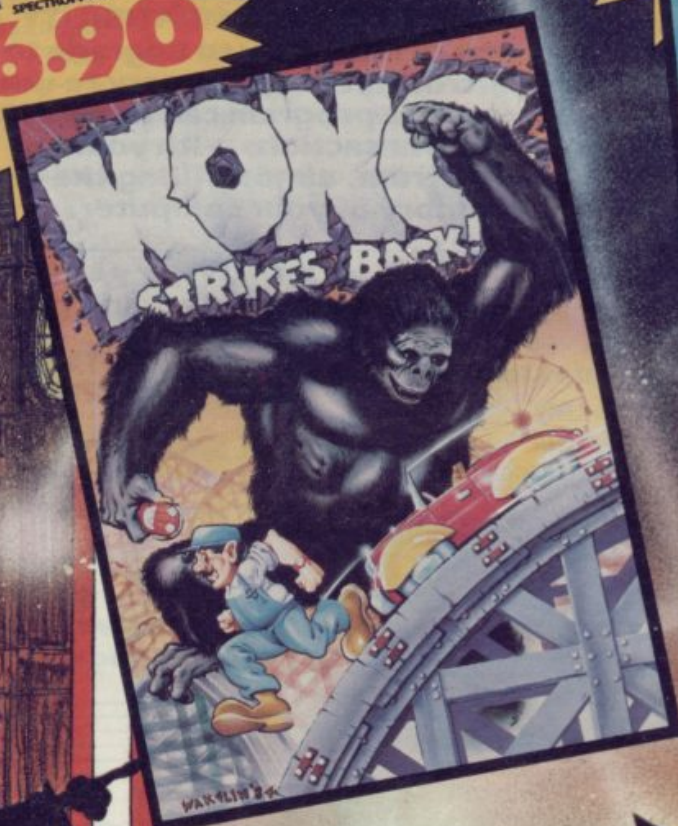
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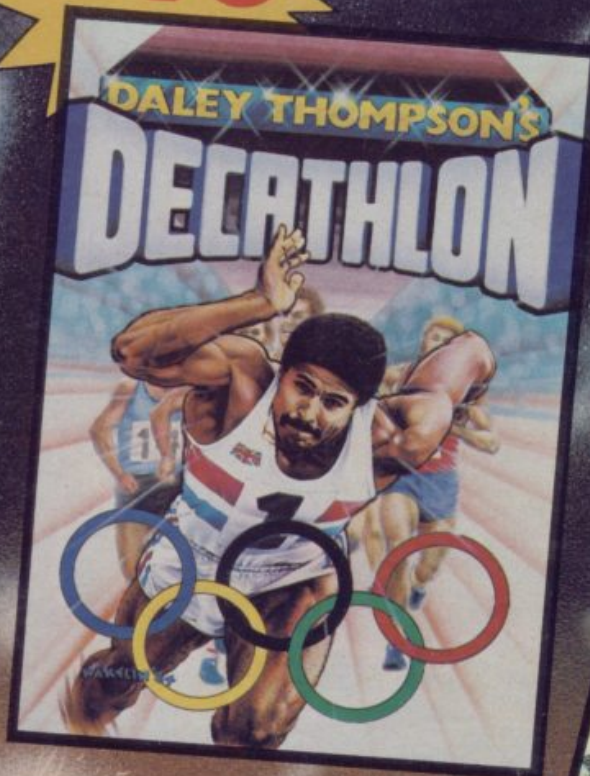
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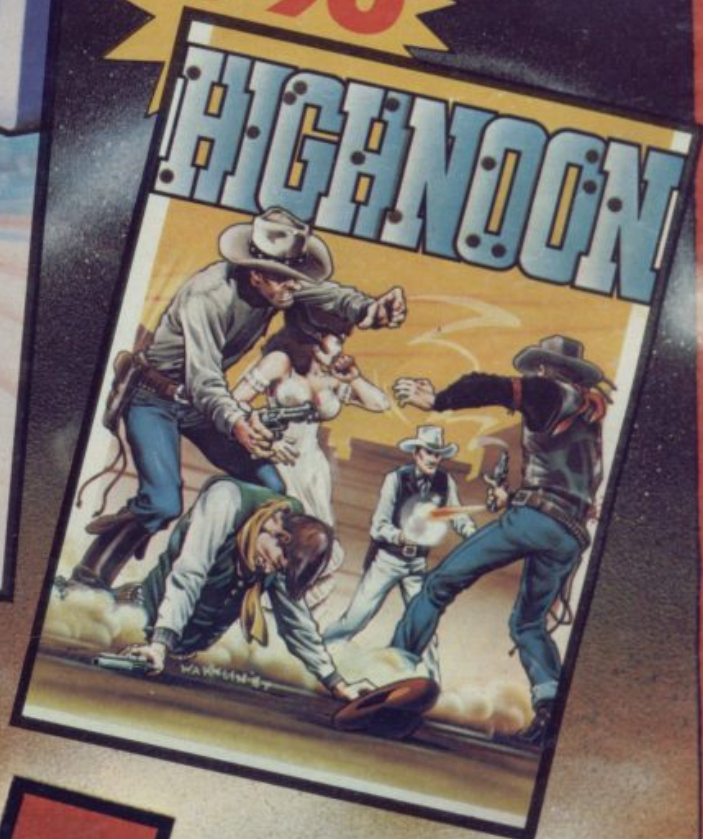
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and report writing, a financial analysis program to help you control your budget (Spreadsheet), and a graphics program to translate complex figures into easy-to-understand graphs.

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Sinclair User is published monthly by EMAP Business & Computer Publications.

Meet the guardian of chaos and levitate in 3D Avalon

ENTER the 3D movie world of **Avalon**. You are a wizard intent on the destruction of an evil image who inhabits an underground web of caverns inhabited by goblins, skeletons, wraiths, a guardian of chaos and seven wizards.

You move around the rooms after casting an astral projection spell which will enable you to levitate.

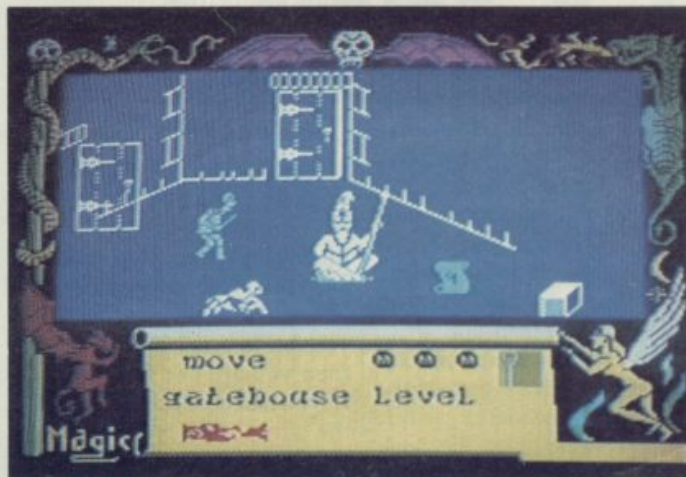
Pursued by the various monsters which dwell in the caves you must accumulate your power by finding spell scrolls. Those enable you to freeze your enemies and summon a servant to help you in your quest for the mage's ectoplasm.

To reach the bowels of the earth you must pass through the gate-house level and find a treasure chest in which the key to the dungeons is hidden.

As you travel through the adventure you will become wise in the ways of magic and earn gradings no doubt given by the magic circle. Those are divided into stages and ranks. A stage describes the physical location at which you have arrived in the game. Those range from Apprentice to Supreme. The ranks denote your skill as a magician, and start at Lore Seeker progressing to the august title of Lord Lord.

The magic system in particular breaks new ground. The spells you have are listed on a scrolling window, and you must use the joystick to select the appropriate spell. Even movement is conducted using a spell, so that physical and magical activities are directly interlinked.

Graphics are not so clear as in the Ultimate arcade/adven-



tures such as **Atic Atac**. However, the 3D representation of each room, with doors that really open, and the attempts at animation of monsters represent a bigger challenge than those earlier games tackled.

Hewson Consultants claims the game will do for computers what the *Jazz Singer* did for movies. A ridiculous suggestion which should not however detract from a product that intro-

duces a new style and sophistication in 3D graphics. If you are into arcade games then you will enjoy moving around and killing the monsters in the maze. If, on the other hand, you like adventures you will be fascinated by the puzzles. *John Gilbert*

AVALON
Memory: 48K
Price: £7.95
Joystick: Kempston, Sinclair, Cursor
Gilbert Factor: 9

Awkward orcs

SMOKE drifts over the devastated countryside as you set forth in search of the subterranean dens of the Death Moon Orcs. Not long ago a raiding band led by Thorg, chieftain of the unwholesome clan, laid waste your village and murdered your defenceless family. Revenge is all you seek and you will brave the perils of the Savage Lands around the Azonti river to find the bestial killers.

A magic runesword, kept by a hermit, will finish off the ghastly Thorg if you can trace it. Along your way are strewn the marks of war and death, and objects are scattered about which may help you in your single-minded quest. Magic and danger dog you every footstep.

The central theme of **Orc Slayer** by Gamma Software is relatively simple but the

setting is well drawn and consistent, providing a good atmosphere for this pure text adventure. The program uses all the standard adventure commands, though the vocabulary did not appear exceptionally large. The interpreter had that irritating habit of responding to many requests with a simple 'I can't' and, at points, rejected the only appropriate responses to a given situation.

In general the program is an entertaining and eventful game full of mystery and monsters. The statutory maze is thrown in for good measure. A good average adventure in the classic mould. Slay away.

Richard Price

ORC SLAYER
Memory: 48K
Price: £5.50
Gilbert Factor: 5

Awful hawks

GAMES which have television series tie-ups are becoming popular and can be surprisingly good considering it is usually the plot and not the standard of programming that is the important aspect of the game. **Terrahawks**, from CRL is just surprising.

It uses none of the characters from Gerry Anderson's series and the graphics, which should have been the best part of the game, are slightly out of perspective and jump when a move is made in any direction.

The minimal plot takes your spacecraft into a black hole where you will find green crystal towers which

you must avoid or destroy. If you destroy them you use one of your 80 antimatter bolts but if you do not then some quick action is required to avoid a crash.

Terrahawks is just another piece of mediocre space entertainment but if your idea of a good space game is blasting your way through a platoon of green monoliths then this game is for you.

John Gilbert

TERRAHAWKS
Memory: 48K
Price: £6.95
Joystick: Cursor, Kempston, Interface One
Gilbert Factor: 5

Astronomy adventure

ASTRONOMER by CP Software is a comprehensive package to display the planets, stars and constellations and calculate their positions reasonably accurately.

The program contains a series of facilities. You may choose to display the solar system, which will move according to a specified time lapse, or the night sky in general, which is split into five views. Constellations will be drawn in if you wish.

The Star Chart enables you to look at any part of the sky in greater detail, while the calculator gives the positions of planets and minor bodies in Right Ascension and Declination.

The accompanying booklet explains some of the principles behind Astronomy, and gives examples of how the program can be used.

As a means of learning the positions of astronomical features and as a guide to where you will actually find them in the sky, the program should prove effective.

Chris Bourne

ASTRONOMER

Memory: 48K
Price: £9.95
Gilbert Factor: 7

Daley takes the gold

OCEAN continues its policy of bringing out amusement arcade games under license with a superb version of the popular Track and Field, entitled **Daley Thompson's Decathlon**. All ten events are represented, and played with dedication the full game is a gruelling exercise indeed.

The graphics are large and colourful. Each event has a qualifying time, and the 10 are split over two days, one on each side of the cassette. If you fail to qualify three times then you are out for the day. If you successfully complete the first day, you can go round again with higher

qualifying times until your three lives are gone.

Some of the events are very tough, particularly the 400m sprint. In order to qualify you must pump the joystick backwards and forwards as fast as you can to maintain speed. After about 200m the wall of pain sets in. By a cruel trick, the 400m is the last event of the first day and the 100m is the first, so if you are still in the game you will immediately have to race the 100m just when your arm is ready to drop off.

The second day is more gentle, winding up with the 1500m which requires strat-

egy and restraint if you are not to run out of energy too soon. All the events are reasonably easy to play, apart from the high jump, which appears next to impossible. Getting a decent score is, of course, another matter.

Arcade conversions do not always work on the small screen. Daley Thompson's Decathlon is an exception, and captures the spirit of the competition.

Chris Bourne

DALEY THOMPSON'S DECATHLON

Memory: 48K
Price: £6.90
Joystick: Kempston, Sinclair
Gilbert Factor: 8

Fairy tales and factories in Glasgow

LIFE in a Glaswegian warehouse is evidently dangerous to judge from **Bewarehouse**. Glasgow-based Positive Image has created a game in which death goes hand in hand with the boredom of manual labour.

You must climb up through the various floors of the warehouse, avoiding barrels which roll along the floor. At later levels the warehouse acquires a few ghosts which chase you with mur-

derous intent.

Unfortunately the game is a lame version of **Donkey Kong** with no gorilla, no maiden to rescue, no variety in the levels and very little in the way of addictive excitement. The cassette insert describes programmer Tom Canavan as one of Scotland's finest. I shudder to think what the others are like.

Frog Face, a text adventure from the same company, is rather more attractive. The

program credits the Quill adventure system, but includes a number of attractive pictures of locations.

You have had your face turned into a frog by the evil Meegan, and must find a magic potion to restore your natural beauty. The game setting is clearly based on the land of fairytales, with whispering flowers, lucky silver spoons, royal castles and the like, although there are darker and more deadly creatures as well.

The only real fault is that it is very easy to be killed in a somewhat arbitrary fashion early on. Death traps are by no means a bad thing in adventures, but there should not be too many of them. That said, **Frog Face** is a pleasant romp, and since there is an option to play as a man or a woman, may have a wider appeal than the more macho monster-bashing adventures.

Chris Bourne

Egg on Humpty's face

ARTIC Computing is heading for a big fall if it thinks that its series of Humpty Dumpty games is going to be a success.

Humpty Dumpty and

the Fuzzy Wuzzies is surprisingly addictive. Humpty is struck in a maze. He must avoid the evil Fuzzies, their bombs and the deadly snappers. If he is lucky he will

find a transporter to reach safer surroundings.

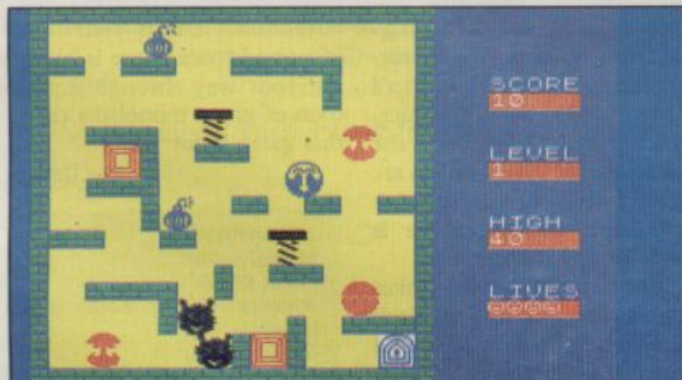
As any good egg knows the way to get around is to roll and Humpty moves whenever you tilt the maze but be careful as he might end scrambled.

The game has a novel concept but does not develop it. There is nothing either in the scenario or technical execution makes it anything more than mediocre.

John Gilbert

HUMPTY DUMPTY AND THE FUZZY WUZZIES

Memory: 48K
Price: £6.95
Joystick: Kempston, Sinclair
Gilbert Factor: 5



BEWAREHOUSE

Memory: 48K
Price: £5.95
Gilbert Factor: 4

FROG FACE

Memory: 48K
Price: £5.95
Gilbert Factor: 7

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The great computer fraud

IF YOU have ever had a desire to take part in a giant computer fraud, or longed to break into the Pentagon's central computers, or simply spy on the private accounts of some multi-national company, then **System 15000** is the game for you.

Your friend Mike has written to you with details of a computer fraud in which Comdata has been ripped off by Realco for \$1,500,000. Your task is to break into the correct computers in order to transfer the money back to where it belongs. To do so you will need to track down the appropriate accounts and find the correct code numbers to access them.

The entire game is played out as if your Spectrum really was hooked into a vast network of computers. The **System 15000** of the title is a high-powered user network similar to Micronet of which you are a member. Mike

gives you a few clues to start with, and there is another hacker, Geoff, who may occasionally send helpful messages to you through the system. Otherwise you are on your own.

Whenever you telephone a computer, the Spectrum responds with simulated ringing tones. Sometimes the number is engaged, and sometimes the system shuts down while security checks are made. Somewhere, someone knows you are on the track.

Undoubtedly the economy of a game in which most of the commands are in the form of numbers or character strings of only a few letters, and the display simply a series of different types of computer screen, means the actual structure of the game can be very complex. After playing for many hours, unless you are a master code-breaker or just very lucky,



you will still feel you have only penetrated the outer strands of the web of conspiracy surrounding Realco and the missing millions.

System 15000 is an absolutely first-rate game and the very stuff of which good ad-

ventures should be made. We can hardly wait for the sequel.

Chris Bourne

SYSTEM 15000
Memory 48K
Price: £9.95
Gilbert Factor: 9

Crusoe castaway

NO prizes for guessing the theme of **Crusoe** from Automata.

A map of the island takes up half the screen, and includes objects which may be useful to Crusoe, who is shown as a small figure. Various status indicators are also shown.

Crusoe's task is to assemble a decent set of living equipment without running

into thorns or boulders and reducing his strength. If Automata's eccentric style appeals, you will enjoy the game, though the crabbed script and minute screen detail are likely to irritate even the most persistent.

Richard Price

CRUSOE
Memory: 48K
Price: £6
Gilbert Factor: 5



Happy driving

A new version of the **Friendly Face** microdrive utility contains several routines, including a piece of code which can be merged into other programs to catalogue and auto-run programs by asking for numeric inputs entered with reference to a menu.

The **RUN** utility can be automatically saved to any cartridge for use with its programs and does away with the need to type in long microdrive commands which are needed when using Sinclair Basic. **RUN** can also be batch auto-saved onto several cartridges, one after another, using a program loop within the routine.

The utility has to be adapted for use with some programs but the manufacturer has included ready-made routines to merge **Friendly Face** into **Masterfile** and **Tasword Two**. That means both programs become instantly microdrive compatible so that data can be **SAVED** and **LOAD**ed using microdrives.

Two new options include

an intelligent **FORMAT** routine which will make sure that the maximum amount of storage space on a cartridge is made available every time. As with the auto-save facility it can perform its task on a batch of cartridges.

The second new function is a **CAT**alogue of the files on a selected microdrive cartridge which will be listed on a printer. It gives a hard copy of files on a cartridge.

Also included is a **Masterfile** file which contains two formats. The first, **Action**, can be used as a database in which you can include a diary of events. These records can be displayed on the screen or printed out for later use.

Memo allows the input of notes and memorandums on a variety of subjects. These can be accessed efficiently using **Masterfile**.

John Gilbert

FRIENDLY FACE
Memory: 16K
Price: Cartridge £12.95
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Gilbert Factor: 7

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Eureka!

THEN THE RACE IS ON!!!

DEvised BY
IAN LIVINGSTONE

The storylines for "Eureka!" are by Ian Livingstone, whose "Fighting Fantasy" books have sold over 2,000,000 copies. He's dreamed up some rather nasty tricks and twists for you in this Epic, because he has also devised the cryptic clues and conundrums in the booklet that goes with the program. He's the one who knows the answers.

"Eureka!" was programmed by Andromeda teams led by Hungarians Donat Kiss and András Császár. It took the equivalent of 5 YEARS to create, and the skills of 4 graphic artists, 2 musicians and a professor of logic too. We told them to stretch the hardware's capabilities, and make sure you were kept awake for hours!! They've done it...

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The race for the £25,000 starts on 31 Oct 1984 and closes on 31 Dec 1985.

Robots on the rampage

THE ROBOTS have gone loopy in the mechanised factory far out in space. Your job as the metagalactic repair man in **Strangeloop** from Virgin Games, is to get through the rooms filled with dangerous swarf, reach the control room and shut down the crazed computer. On the way you will meet super-swarf and an anti-hero who will try to disrupt everything you do, as well as robots which will help you to patch up your space suit when it has been attacked by swarf. Virgin is giving a £2,000 robot to the first player to complete the game.

You are guided by a map on which you can see some of the 240 rooms around you and which will help you find a jet-bike.

You can pick up fuel and patches for your suit and retrieve items such as rings and spanners, which are given out by robots or left strewn around the floor. The objects can be used to perform various tasks which must be done before you stop the factory computer. For those reasons the game can be called an arcade adventure, on a par with **Jet Set Willy** and **Manic Miner**.

If you run into trouble you

can save the state of play onto cassette and resume the game later. You can also halt all the on-screen action to take a quick break. A real-time clock tells you how many months you have spent on the game.

If you are killed off you are reincarnated, as long as you have one of your eight lives left, and may position yourself anywhere within the present room. Thus you can sacrifice a life to escape from a particularly lethal situation.

Strangeloop is more than likely to be one of the biggest

selling games at Christmas and may make as large an impact on the market as any game from Software Projects or Ultimate. For the first time in its short life Virgin Games has a winner on its hands.

John Gilbert

STRANGELOOP

Memory: 48K

Price: £5.95

Joystick: Kempston, Interface 1, Sinclair, Cursor

Gilbert Factor: 9



War without Wells

JUST READING the instructions may have you feeling quarrelsome and irritable about **The War of the Worlds** from CRL. H G Wells does not even get a mention and the only way to find out the order of places to visit is to buy the record of the same name.

Martian fighting machines terrorize the Home Counties in this graphic 'adventure' and your aim is to guide your man, a stick-like figure, through the moving landscape.

Much of the game seems to be spent moving along the streets towards London and there is no real text input. The few text commands are

single key entries such as E for eat or G for get. You will find yourself zapped frequently if you take a wrong turning, which sends you back via long delays to the teletype-style beginning.

After reaching London things get chaotic. I was swamped by refugees from the city for so many moves that I gave up in absolute annoyance as the program seemed to be stuck in an endless loop. No movement was possible after that point.

Richard Price

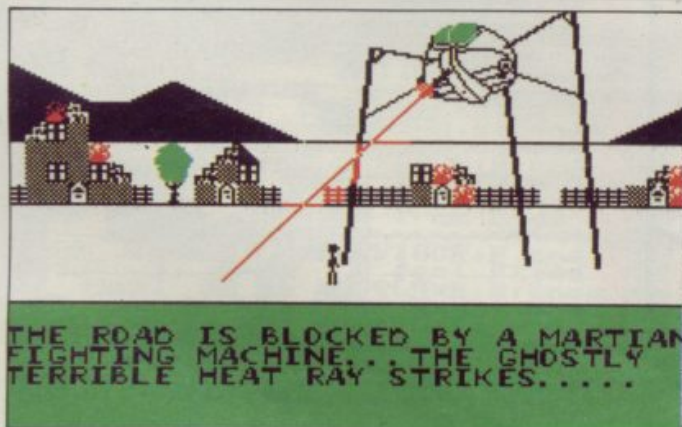
WAR OF THE WORLDS

Memory: 48K

Price: £7.95

Joystick: Protek, AGF, Cursor

Gilbert Factor: 4



Fireater flops

GOODNESS gracious, great balls of fire! Coming at you every which way too in **Dragonfire** as, in the persona of Prince William, you attempt to cross the drawbridge, enter your castle and rescue the valuables in the Treasury.

The fortress is guarded by a powerful dragon who has clearly dined too well on chicken vindaloo and the fireballs fly thick and fast. Young Willy can be made to jump, duck and run towards the gate and, if he makes it, enters the second screen. That depicts the strongroom where the flatulent reptile lurks.

Willy must then collect items of value and escape once again avoiding incineration. If successful he returns to the drawbridge and begins all over again, only this time the action is faster and yet

more dangerous. There are four levels like that, each apparently using the same screens.

The game is fast, challenging, with good strong graphics and clear displays. It is pure arcade and the storyline is minimal. All you need are fast reactions and the urge to play again and again. To begin with the program is exciting and difficult but with only two screens, the thrill soon wears off. That is a serious limitation on what is basically a well-designed game and is bound to reduce its permanent appeal.

Richard Price

DRAGONFIRE

Memory: 48K

Price: £6.95

Joystick: Cheetah RAT, Kempston, Interface 2.

Gilbert Factor: 5

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Quick on the draw

WHITE LIGHTNING is an apt name for the games development package released by Oasis Software.

The package is described by the company as "the first true sprite manipulation language". Although some would not agree with the first point, as the ISP SCOPE arrived on the scene much earlier, it has to be admitted that the package provides a powerful graphics utility language which will add a new dimension to games written by amateur programmers.

Sprites are made up of several character segments which can be moved around the screen in unison. Any one of a possible 255 sprites can be set up at any width and height you indicate. The unit of measurement for sprites is one byte and the most common size is four by four. That will produce characters similar to those which can be found on the Commodore and Atari computers.

The **White Lightning**

language is compiler-based and runs Fig-Forth together with a set of commands to handle graphics, sound and input. Oasis has labelled that new sub-set of Forth 'Ideal' and it fills in the holes which the official Forth language leaves on the Spectrum.

If you do not have any knowledge of that esoteric language then the 131-page booklet which accompanies the package explains all the commands in detail.

As well as being able to use Forth and Ideal you can incorporate Basic commands into programs. The reason

for allowing the use of Basic keywords is that a beginner can be gradually weaned onto Forth code and off Basic. That is a commendable idea and one that works well.

Anyone who wants to write compiled games ought to buy White Lightning. It is easily the most complex games language on the market and produces stunning effects on the screen.

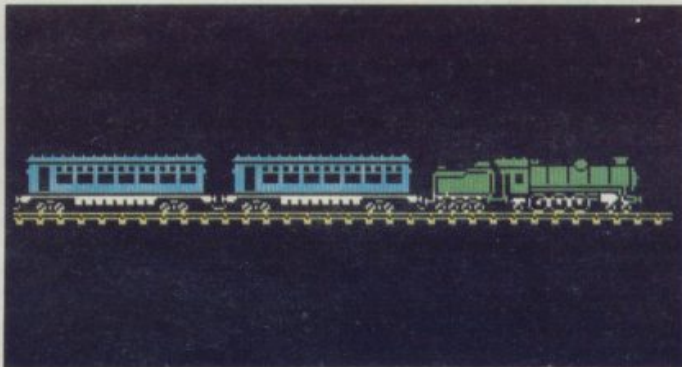
John Gilbert

WHITE LIGHTNING

Memory: 48K

Price: £14.95

Gilbert Factor: 9



Get past the gorilla

ENTER the domain of the two kings who rule **Twin Valley Kingdom**. Explore the forests, the mountain paths and the caverns of the land where eternal life is possible.

You will meet other creatures which may have objects, such as broadswords, which you need. Those mon-

sters are a motley crew and include trolls and gorillas. They have a nasty habit of throwing things at you and do not behave as intelligently as Bug-Byte claims.

The location pictures are colourful and drawn at a speed which beats that of **The Hobbit** graphics.

There are 180 locations of

which 150 have corresponding screen pictures. Bug-Byte claims that it has crammed more locations and pictures into the Spectrum than any other company. That is a matter of opinion.

Another attraction is the addition of speech if you have a Currah Microspeech unit.

The game is excellent value for money. The only criticism is that little seems to happen until you have been playing it for some time and have found some of the objects which you need. That is all part of the simulation and dedicated adventure players should not be put off.

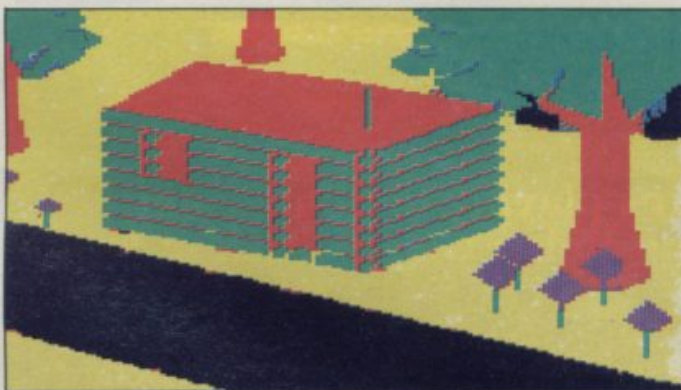
John Gilbert

TWIN VALLEY KINGDOM

Memory: 48K

Price: £7.95

Gilbert Factor: 8



Young users' picture play

AN EARLY reading program for 3-7 year olds, **Words and Pictures** is based on the old idea of matching pictures to words. Four programs — Wordsa, Sentsa, Wordsb and Sentab — can be called from the menu. On **LOADing** a list of words appears for each section, and options 1-4 can be chosen; there are approximately 100 words introduced, including prepositions.

You can choose whether to include sound, and a performance table at the end of the game. Both word games operate on the same format; four pictures appear on the screen with a word at the bottom, and the object of the game is to match the word to the correct picture.

The pictures are colourful, although simplified as is the case with computer graphics. That simplification could be confusing if a child is playing the game alone, for the word 'daddy' is supposed to match a picture which could easily be confused with 'man'.

The sentence section makes quite a leap from the initial matching of single words; sentences such as 'The fir tree is always green' are a far cry from the initial matching activity. If the word matching is correct then a frog eats a bug, and when 10 bugs are eaten a song is played. If incorrect the frog leaps up and down.

The booklet provides hints for parents and teachers. Words and Pictures is an adequate first-reading program, but at £9.95 rather expensive. After all, flashcards and word cards could be made for a fraction of the price to provide identical activities, and would probably be a richer visual experience. Theo Wood

WORDS AND PICTURES

Memory: 48K

Price: £9.95

Gilbert Factor: 6

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BUILT-IN 80K MEMORY

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BUILT-IN DISC DRIVE

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BUILT-IN 16 COLOUR

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1	Addictive R.	v	Stourvale A	5	0
2	Corinthians	v	Richmond Utd	2	2
3	Wimborne W.	v	Kings Arms	2	1
4	AFC Spectrum	v	Red Lion	1	1
5	Poole OB	v	Charminster	3	0

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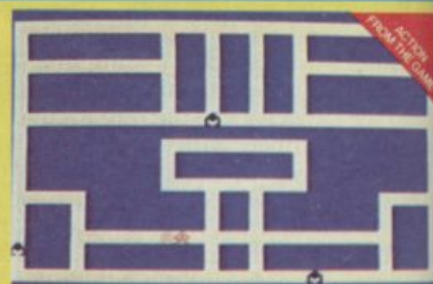
TRIO



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Jet-propelled action

DIAMONDS is where your future lies, diamonds sitting on little platforms above a hostile sea. Why they are there nobody knows, but it is your job to get them.

Unfortunately you are some distance from the diamonds, and have to reach them by using a rocket pack which has no fuel. To obtain the fuel you must leap around a series of platforms and ladders dicing with watery death and avoiding the menacing bubble which pursues you, like something out of *The Prisoner*.

When you have enough fuel you can fly using the rocket pack, but the bubble will still chase you. It is difficult to amass the required quantity of fuel — you must judge for yourself how much you need — but the bubble seems almost unbeatable when you are flying.

At higher levels a touch of the Manic Miners sets in, as your rocket pack becomes a vulture and the fuel legs of lamb. Never mind that the vulture looks more like one of

those exotic seabirds which frequently appear performing their mating dances for David Attenborough. Do not ask yourself what ready-carved legs of New Zealand's finest are doing on platforms high above the ocean. Enjoy the game, and avoid awkward questions which might threaten your sanity.

For **Rocket Man**, the second in a series of high-resolution ZX-81 games from Software Farm, is indeed worth playing. For once the high-resolution boast is true, and the game is sufficiently

difficult to hold the interest while not being so impossible at the beginning as to discourage you from continuing. The game is not the fastest, but given the apparent intelligence of the deadly bubble, that is probably a blessing. You should be more concerned with working out economical routes and safe tactics for moving round the ladders and platforms than worrying about sheer speed.

Rocket Man is attractively presented and fun to play. While the scenario shows signs of an erratic rather than inspired imagination, at least there is an attempt at inventive whimsy rather than a reliance on the old standbys

of laser cannon and dragon breath.

On the strength of **Rocket Man**, Software Farm is to be congratulated, not least for its loyalty to a machine which few professionally minded software companies are seriously considering. Since the game is the second in a series, and a series would seem to imply more than two games, we hope it will be not long before the next is released.

Rocket Man can be obtained from Software Farm, Freeport (BS 3658)A, Bristol, BS8 2YY.

Chris Bourne

ROCKET MAN

Memory: 16K
Price: £5.95
Gilbert Factor: 7



Laser fare

SOME COSMIC disaster has resulted in numbers of spacemen being marooned in the inhospitable wastes of the asteroid belt. It is your task in **Space Rescue** to collect them and ferry them to their home planet.

Of course, life and arcade games are never so simple, and a meteor storm is in full progress at the time, so you must dodge or destroy the deep-space debris while locating the astronauts.

The graphics are impressively drawn, partly in high resolution, and machine-code programming ensures that the action is fast. You pilot a small craft with UFO written upon it, which must leave the mothership in search of the lost astronauts. The playing area is several times the area of the screen, so you will have to search to find the spacemen.

Once found, they must be ferried back to the mothership. Be careful as you dock, or you will crash, and lose a life. Then the scene changes to a region of space populated with space stations, where

you must deposit the man, and then return to head out again for the asteroids to make another rescue.

The craft is equipped with a laser gun, which can fire in eight directions. That, coupled with the movement of the craft itself, gives six different commands, and it is a little difficult to control the ship at first on the ZX-81 keyboard. Fortunately, D Pinch has provided a wide range of keys which can be used, and it should be possible to find a configuration to suit your own personal taste.

Although the game is repetitive, it is fun to play and has four levels of skill, so if the easier levels become boring, you can increase the number of meteors in the storm to provide a new challenge.

Space Rescue can be obtained from D Pinch, 72 Norwood Crescent, Coldbrook, Barry, South Glamorgan.

Chris Bourne

SPACE RESCUE

Memory: 16K
Price: £2.99
Gilbert Factor: 7

Of mice n'bugs

MICRO-MOUSE goes debugging is the unlikely title of an arcade game in which you are a miniature mouse living in the bowels of the computer. The lines of a program are continually under attack from bugs, and it is your job to keep the program free and functioning.

What you see on the screen is a few lines of Basic with some letters flashing. The flashing letters are missing and you must go to one of four bins in the corners of the screen to collect the letters and replace them in the program. The bugs, meanwhile, will carry off more letters, and if the program is sufficiently corrupted the system will crash.

The game is fun to play with a novel, if whimsical, idea. Be careful when you play lest you mistake the 'system crash' in the game for a genuine system crash — the effect looks very realistic and lasts for several seconds.

I always wondered how Sir Clive managed to cram so much into the ZX-81 at the price. Now we know — it was nothing to do with custom-built chips at all, simply exploitation of cheap mouse labour.

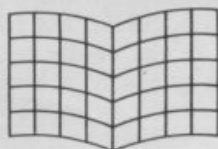
Chris Bourne

MICRO MOUSE GOES DE-BUGGING

Memory: 16k
Price: £5.95
Gilbert Factor: 7

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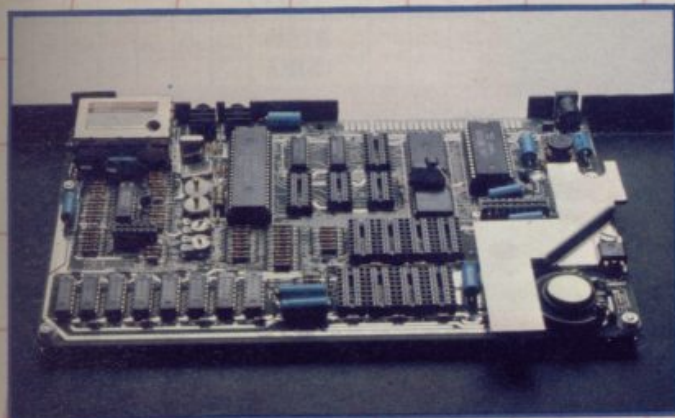
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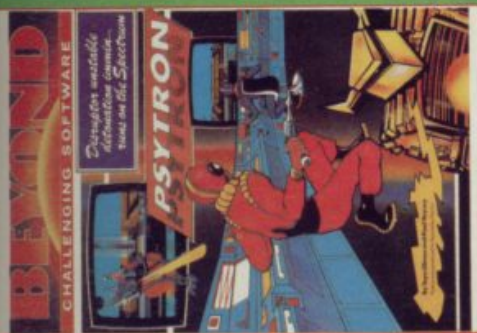
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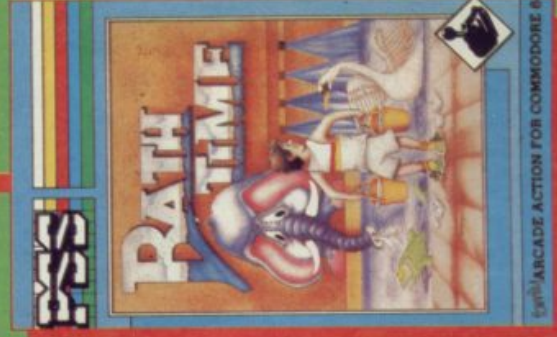
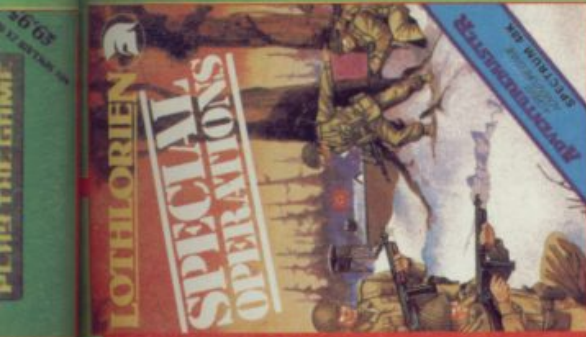


PLUG THE GIMME

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THIS WEEK	LAST WEEK	WEEKS IN CHART	TITLE	Publisher	Computer	SPECTRUM	VIC 20	COMMODORE 64	ELECTRON	ATARI	DRAGON	ORIC	BBC	OTHER
1	9	2	DALEY THOMPSON'S DECATHLON	OCEAN	Commodore 64	●		●						
2	2	5	FULL THROTTLE MICROMEGA		Spectrum	●								
3	—	1	MONTY MOLE GREMLIN GRAPHICS		Spectrum	●		●						
4	4	7	BEACH HEAD ACCESS/U.S. GOLD		Commodore 64			●						
5	5	13	JET SET WILLY SOFTWARE PROJECTS		Spectrum	●								
6	3	3	DECATHLON ACTIVISION		Commodore 64	●		●						
7	11	3	MICRO OLYMPICS DATA BASE/MICRO USER		Spectrum	●		●					●	
11	6	7	LORDS OF MIDNIGHT BEYOND		Spectrum	●								



7	11	3	MICRO OLYMPICS DATA BASE/MICRO USER	Spectrum
8	7	6	TORNADO LOW LEVEL VORTEX	Spectrum
11	6	7	LORDS OF MIDNIGHT BEYOND	Spectrum
12	20	8	JACK & THE BEANSTALK THOR	Spectrum
13	19	8	PSYTRON BEYOND	Spectrum
14	8	4	MATCH POINT PSION	Spectrum
15	-	1	VALHALLA LEGEND	Commodore 64
16	22	11	TRASHMAN NEW GENERATION	Spectrum
17	23	2	FLIGHT PATH 737 ANIROG	Commodore 64
18	17	14	FIGHTER PILOT DIGITAL INTEGRATION	Spectrum
19	-	1	WAR OF THE WORLDS C.R.L.	Spectrum
20	27	3	WORLD CUP FOOTBALL ARTIC	Spectrum
20	-	1	OLYMPICON MITECH	Spectrum
22	28	14	ATIC ATAC ULTIMATE	Spectrum
23	13	12	CODE NAME MAT MICROMEGA	Spectrum
24	-	1	FRAK AARDVARK	BBC
25	-	1	DALEY THOMPSON'S DECATHLON OCEAN	Spectrum
26	-	1	3D MAZE MASTERTRONICS	Vic 20
27	-	1	FLIGHT PATH 737 ANIROG	Vic 20
28	-	1	GNASHER MASTERTRONICS	Spectrum
29	-	1	SON OF BLAGGER ALLIGATA	Commodore 64
30	30	2	BLAGGER ALLIGATA	Commodore 64



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The New Force in Software

THE GAME OF DEADLY DRIVING

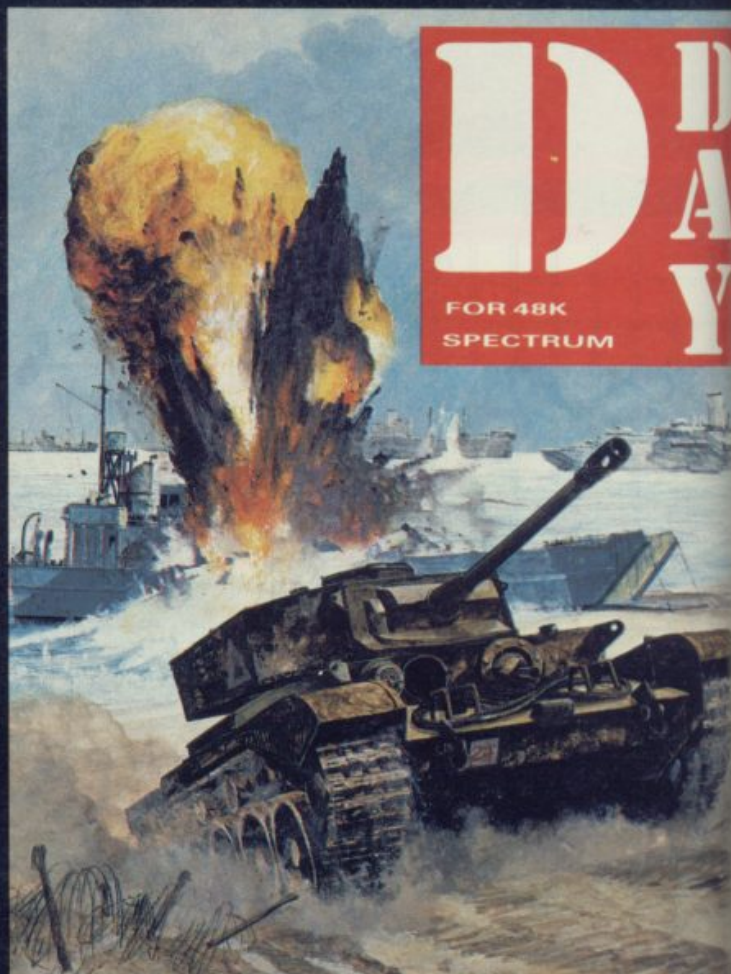
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D DAY

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Tower of Despair

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The new Sprint from Challenge Research will load and save Spectrum programs at four times the speed of conventional cassette players, this even applies to standard program and games cassette software that has been pre-recorded at normal speed. All this plus improved loading reliability is available for just £64.95 inclusive of post, packing, VAT and a 12 month guarantee. The Sprint is dedicated to both the 16K and 48K Spectrum and provides an innovative but inexpensive new concept in cassette tape storage.

Use of the Sprint is simplicity itself:

- Retains the standard Spectrum commands and format.
- Advanced digital circuitry and signal processing improves loading reliability and eliminates volume setting.
- Simply plugs into the Spectrum port – no interface or external power unit is required, it even has it's own expansion slot so that you can still use other peripherals at the same time.
- A full 48K program will load or save in 75 seconds rather than five minutes with a conventional cassette recorder.

CHALLENGE RESEARCH
A DIVISION OF A.E. HEADEN LTD.

218 High Street, Potters Bar, Herts EN6 5BJ Potters Bar Tel: (0707) 44063

Spend less on a Sprint.
Spend more time working your

Spectrum and be the envy of your friends.
If you have Visa or Access cards you may phone your order to ensure faster delivery by calling Potters Bar (0707) 44063, or post the coupon below.
Please allow 28 days for delivery. If you are not delighted with your Challenge Sprint simply return it within 7 days and we will refund your money in full.

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218 High Street, Potters Bar, Herts EN6 5BJ, Tel: Potters Bar (0707) 44063
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SU/11/84

I enclose cheque/postal order made payable to Challenge Research for £

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GET TO GRIPS WITH ARCADE ACTION!



QUICKSHOT II £11.95

New improved design • Trigger + Top Fire Button • Auto Fire • Built in Stabilizing Suction Cups • For use with any computer with a '9 pin D' type connector. (Atari Compatible).



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New improved styling • 3 Fast action fire buttons • 4' foot long cord • Arcade Control • For use with any computer with a '9 Pin D' Type connector. (Atari Compatible).

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Simply plugs in • Compatible with any Atari type Joystick, e.g. Quickshot and Games Master • Suitable for use with all standard BBC Software.



protek JOYSTICK INTERFACE

ZX SPECTRUM SWITCHABLE INTERFACE £19.95

No programming required • Simply plugs in • No additional software • Compatible at the flick of a switch with Protek (Cursor Keys) Kempston and Sinclair Joystick Software. Compatible with any Atari Type Joystick, e.g. Quickshot or Games Master.



BBC JOYSTICK SET £19.95

Contents: Quickshot I Joystick • Protek BBC Joystick Interface • In an attractive Gift Box.

ZX SPECTRUM JOYSTICK SET £29.95

Contents: Quickshot I Joystick • Switchable Joystick Interface • Airliner — A Full Flight. Simulation Program (16K) • In an attractive Gift Box.



Protek



Protek Computing Ltd, 1A Young Square,
Brucefield Industrial Park, Livingston, West Lothian. 0506 415353.

Wafadrive v microdrive

THE ROTRONICS Wafadrive is likely to be the main competition to the Sinclair Interface One and micro-drives.

The unit is more compact and better designed than Sinclair's, containing both RS-232 and Centronics printer interfaces as standard.

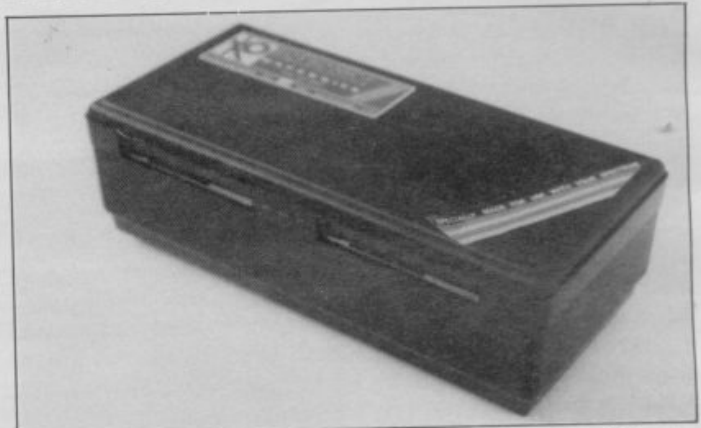
The power for the drives is taken from the Spectrum user port and fed through a ribbon connector which is fitted onto the base of the Wafadrive. That connection could be a disadvantage as it limits the range of other peripherals that can be put onto the user port at the rear of the drive unit.

The large manual supplied

with the drive shows that the storage medium contained within the cartridges can have 16K, 64K or 123K formatted capacity, approximately 40K more than a ZX Microdrive.

Before use a tape cartridge has to be FORMatted. Once that has been done the drive will display drive name, wafer name, list of files, type of code, size of each file and how much space is left on the wafer.

Once SAVED, programs are easily LOADED. The drive is slower than a microdrive but faster than cassette. It is also more reliable than the Sinclair storage unit and all Basic programs run after



LOADing from it ran first time.

Backing up programs is easy with the Rotronics unit. Code can be copied from drive A to drive B using the system software supplied by the manufacturer. Cartridges are, however, guaranteed for a lifetime of 5000 hours and, at a cost of £3.99 each, they represent better value than the Sinclair cartridges.

One small criticism of the drives concerns the printer interfaces which use push-on

connectors. It is possible that they might wear quickly if maltreated and that normal plugs might have been better. The Wafadrive is sold with two manuals, two free wafers, a word processor package together with an extra manual describing its use.

It costs £129.00 and can be obtained from Rotronics Ltd, Santosh House, Marlborough Trading Estate, West Wycombe Road, High Wycombe, Bucks, HP11 2LB.

The RAT sees red

Conventional joysticks are dead! claims Cheetah Marketing, unleashing the RAT upon an unsuspecting public. The RAT — Remote Action Transmitter — is a joystick with a difference, remote controlled, working up to 15 feet from the receiver unit.

The receiver unit has a user port connector and a rear edge connector for other add-ons. The unit picks up infra-red beams from the hand set, which is touch sensitive and similar to TV remote control. The handset has two touch pads which work in a similar manner to the ZX-81 keyboard. In the base is a compartment which takes a PP3 battery. The RAT is operated by pointing its nose at the screen and pressing its pads.

The RAT was tried on several games, and was found to be hard on the hands because of the pressure needed to push the pads.

When used on TVs with a remote control facility the RAT changed channels constantly without controlling the objects on the screen. Cheetah assures us that this bug has now been eliminated.



On other TVs and monitors the RAT worked well.

Retailing at £29.95, the RAT can be run to ground in High Street chain stores and computer shops.

Resetting without tears

FROM Computer World comes a reset switch for the Spectrum which does not involve opening up your computer, and thus does not invalidate the guarantee.

The switch avoids constantly removing the power lead when resetting the Spectrum, although putting the

switch on top of the case would have been better, as you must hold the case each time the switch is pushed. Instead there is a light emitting diode (LED) on the top to tell you the power is on.

The main reason for having this type of outside reset switch is to save your power

socket and plug from all the wear and tear it would receive in normal use.

Priced at £4.99, the switch is available from Computer World, 208 Kent House Road, Beckenham, Kent BR3 1JN. Tel: 01-778 0479.

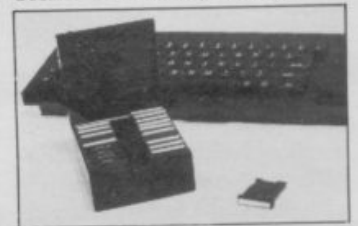
more hardware on page 44

Keeping track of your microdrive cartridges

STORING microdrive cartridges has, up to now, been a problem but the new Cartridge Box from Transform should solve it. Made to match the Spectrum and QL, the flip top box will house 20 cartridges and has space to hold record cards in the middle. Any number of boxes can be slotted together.

Priced at £5.95 the boxes

are available from Transform Ltd, 41 Keats House, Porchester Mead, Beckenham, Kent. Tel: 01-658 6350.



Striking a light

THE DATAPEN, from Datapen Microtechnology Limited, is completely self-contained, all interface electronics being stored within the main body of the light pen.

A light pen is an input device which can be used instead of the keyboard. By using it to point to areas on the screen changes can be made to a display such as option menus. A pen can also be used to draw pictures on the screen and saves time when trying to produce accurate screen diagrams.

The manual supplied with the Datapen is technical in some parts but the information provided should allow most people to get to grips with it. It explains that if you want to use the pen in your own programs you will have to know something about machine code.

One problem found when fitting the light pen was that the interface is dead ended. That means that you will not be able to add other peripherals onto the back of it.

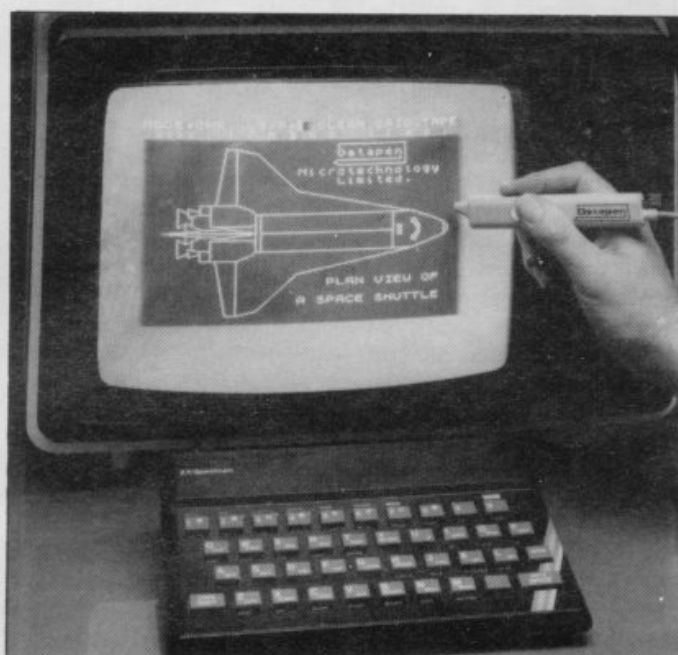
The Datapen is different

Micro cable

AN ALTERNATIVE to the Sinclair Research microdrive extension cable has been brought out by dk'tronics.

The cable is much the same as the Sinclair one and is about eight inches long with a connector plug on each end and a key which will stop you from plugging it into the wrong end of the interface or microdrive.

The dk'tronics interface cable is much longer than the one from Sinclair and that helps to reduce the cluttering up of space around the Spectrum keyboard. The cable costs £5.95 and can be obtained from dk'tronics, Unit Six, Shire Hill Industrial Estate, Saffron Walden, Essex, CB11 3AQ.



from other light pens as it incorporates a switch which enables you to use the pen without having to look at the keyboard for guidance. There is also an indicator which when lit tells you that the pen is looking at a light area of the screen and when unlit it is pointing at a dark area.

There are several programs supplied with the instrument the first of which gives an introduction to the mechanics of the pen and how to use

it. The other programs show how the Datapen is capable of drawing graphic shapes and the type of accuracy that it can achieve when producing diagrams on the screen.

The Datapen is one of the best light pens on the market and we suggest you check it out before buying anything else. It is available from Datapen Microtechnology Ltd, Kingsclere Road, Overton, Hampshire, RG25 3JB for £29.00.

Competition Zipstick

The new Zipstick from Cookridge Computer Supplies, is a competition-style joystick designed for a long life of furious action. It is compatible with all standard interfaces, such as Kempston and Sinclair, and has the D-type plug on it.

Standing seven inches tall the unit has several good features — rubber feet to stop it sliding and two separate fire buttons, one of which is a bar, while the other is on top of the stick. Made out of ABS high impact plastic with stainless steel springs, it is a good looking, easy to use, joystick and is guaranteed for two years.

Priced at £12.95 inc. p&p, the Zipstick is available from Cookridge Computer Supplies, PO Box 1W9, Leeds LS16 6NT.



Teletext adaptor

NEW from OEL is the TTX 2000 teletext adaptor for the Spectrum.

The unit is a decoder allowing you to look at and print out hundreds of pages of information transmitted free with the normal television broadcasts, but usually invisible because teletext is at the top of the screen. The service is free to those with a decoder, normally fitted inside a TV. A TV-type decoder uses a remote key pad whereas the TTX 2000 uses the Spectrum keyboard to access the information.

Teletext is up to the min-

ute information on many different subjects; sport, news, weather, stock prices and even some computer games are included. Both the BBC and ITV transmit teletext, called Ceefax and Oracle respectively. All the channels offer comprehensive indexes, so making it quick and easy to

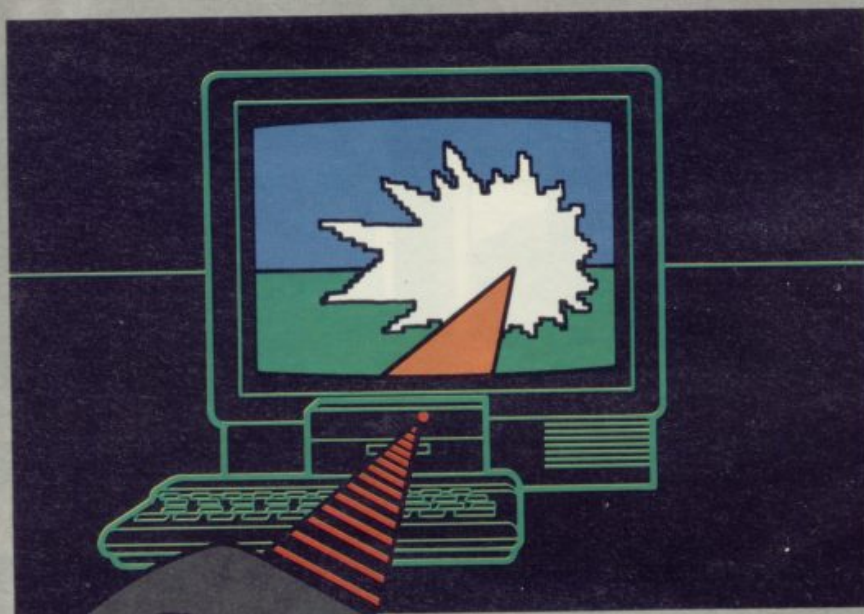
find information. The advantage the TTX 2000 has over normal teletext televisions is its ability to save to tape or microdrive as a screen or to a printer.

Supplied with the decoder are an 18 volt power supply, a manual and a three-way connector lead. All that is then required is a strong television signal.

It costs £143.75 which represents good value and is less expensive than buying a teletext set. It can be obtained from OEL North Pint, Gilwilly Industrial Estate, Penrith, Cumbria, CA11 9BN.



THE AGE OF THE R.A.T



CONVENTIONAL JOYSTICKS ARE DEAD!

The Cheetah Remote Action Transmitter is the most sophisticated computer controller available.

It has these features:



- Infra Red transmission – so there are no leads trailing across the living room. Just sit back in your chair up to 30 feet from your machine.
- Touch control – no moving parts, extremely fast, long life.
- No extra software required.
- Can be used with all Cheetah RAT/Kempston compatible software.
- Fits comfortably in your hand for long play periods.
- Comes complete with receiver/interface unit which simply plugs into the rear of your Spectrum.
- Compatible with all Sinclair/Cheetah peripherals via the rear edge connector.

Simply incredible at £29.95 including VAT and p & p.
Dealer enquiries welcome. Export orders at no extra cost.

Send cheque/p.o now to:

Cheetah Marketing Ltd. (Dept. SU), 24 Ray Street, London EC1R 3DJ. phone 01-833 4909

Cheetah products are also available from branches of

John Menzies  **WHSMITH**  **Rumbelows**

and all good computer shops.



NOT JUST A PRETTY ^{Inter}FACE!

This superb new interface is one of our very latest developments for your Spectrum.

Offering even more features, and as it's programmable from the keyboard or with the cassette supplied you can now use it with any software.

Features include:-

- 17 directional movement
- Keyboard fully functional
- Rear connector for other add-ons
- Microdrive compatible



ONLY
£22.95

NOT JUST A PRETTY ^{Inter}FACE!

The Spectrum dual port joystick interface is a highly versatile and price competitive joystick interface offering two joystick ports.

The first port simulates 6,7,8,9, & 0 keys. The second port simulates in (31) command.

The ports will accept any Atari

style joystick.

It will run any software. That is:-

- Using keys 6,7,8,9 & 0.
- Having redefinable key functions.
- Using in (31) (i.e. Kempston).



ONLY
£13.00

NOT JUST A PRETTY ^{Inter}FACE!

The new **dktronics** Parallel Centronics Interface will link your Spectrum to any printer with a standard centronics input. As the choice is vast, you can select the printer exactly suited to your needs.

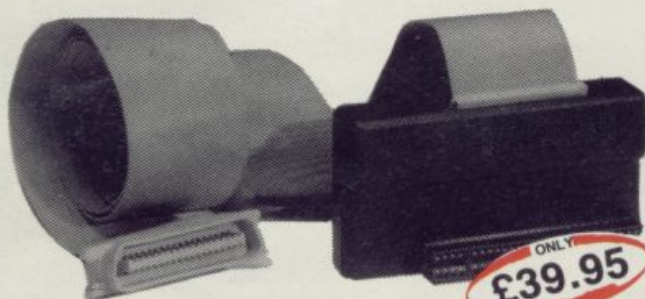
Features of the Interface include:

- Runs all parallel centronics type printers
- Controlling software fully relocatable
- Interfaces with any software using the

printer channel e.g. Tasword Dev pack etc.

- LUST LPRINT recognised. High res screen dumps
- All control codes allowed through to printer
- Fully microdrive compatible
- Supplied with full instructions and controlling software

All **dktronics** products are covered by a comprehensive guarantee.



ONLY
£39.95

NOT JUST A PRETTY ^{Inter}FACE!

Our new generation light pen and interface is designed specifically for your Spectrum and works down to pixel level for complete accuracy.

Now you can produce high resolution illustrations with the 16 pre-defined instructions, selected from the screen controlled menu. Change colour, border, paper, ink. Draw circles, arcs, boxes or lines. You can fill in objects with colour, insert text or draw freehand, save and load completed or

partially completed screens onto and from a tape and with a 48K Spectrum retain screens in memory and animate.

You can also use the machine codes in your own programmes for selecting from a menu, playing games etc. (all entry points supplied).

The interface fits neatly into position and comes complete with software cassette.



ONLY
£19.95

Please rush me the following:

..... Programmable Interface(s) £

..... Dual Port Interface(s) £

..... Parallel Centronics Interface(s) £

..... Light Pen and Interface(s) £

Please add post and packing £ 1.25

I enclose cheque/PO/Cash for Total £

or debit my Access/Barclaycard No.

Signature

Name

Address

Or send S.A.E. for the New D.K.Trionics Spectrum Catalogue

SU/11/84

dktronics

DK Trionics Ltd., Unit 6, Shire Hill Industrial Estate, Saffron Walden,
Essex CB11 3AQ. Telephone: (0799) 26350 (24 hrs) 5 lines

The Spectrum Connection

THE FINAL TOUCH

We've just added the final touch to our professional keyboard. This new Microdrive compatible keyboard offers more key functions than any other in its price range. And the stepped keys and space bar make it even easier to use. Our keyboard, constructed from high density block ABS, will take your Spectrum into the professional league. It has 52 "stepped" keys plus space bar. A separate numeric key pad consisting of 12 red keys including a single entry 'delete' plus single entry 'decimal point', facilitate fast

numeric data entry. The 15" x 9" x 3" case will accommodate your Spectrum and other addons like interface 1, power supply etc. and forms an attractive self-contained unit. All connections, power, Mic, Ear, T.V., network RS232 and expansion port are accessible at the rear. A few minutes, a screwdriver and the simple instructions supplied are all you need to fit your Spectrum. All dktronics products are covered by a comprehensive guarantee.

Constructed from high density block ABS

All connections accessible at rear



FOLLOW OUR LEAD FOR THE RIGHT CONNECTIONS

MICRO DRIVE EXTENSION LEAD

This is an 8" version of the micro 16 way drive lead. Sinclair's lead is only 4" long and for many applications this may not be long enough. It enables you to space the micro drive much further away from interface 1.



56 WAY RIBBON CONNECTOR

This is an extension cable that enables Spectrum peripherals to be distanced from the computer. It is supplied 9" in length and will allow male or female connections to be made to the computer. The connector has special lugs to enable easy fitting/removal from the computer's expansion port.



WINNING IS WITHIN YOUR GRASP

Quickshot Joystick I

- Super positive response
- 2 fire buttons
- Stabilising suction caps
- 4ft lead

Quickshot Joystick II

- Incorporating all the features of 'Quickshot I' plus
- Improved control grip
 - Trigger fire button
 - Rapid fire option



SOUND IDEAS FOR YOUR SPECTRUM

Three Channel Sound Synthesiser interface incorporates a BEEP audio amplifier and a 3 channel sound synthesiser. The BEEP amplifier improves the sound quality and output of the BEEP enormously. The 3 channel sound synthesiser adds a totally new dimension to sound on your Spectrum. It allows you to program your own music with harmonies, explosions, zaps, chimes, whistles and an infinite range of other sounds over a full 8 octaves. Based around the popular AY-3-8912 sound chip it gives you complete control

(from basic or M/C) over 3 channels of tone and/or white noise, plus envelope and volume control. It comes with its own pod mounted (4") speaker with 1 metre of cable so that it can be positioned anywhere.

Once this is fitted to the expansion port your programmes will never sound the same again!



Please rush me the following:

- Microdrive Compatible Keyboard(s) £
 Microdrive Extension Lead(s) £
 56 Way Ribbon Connector(s) £
 Quickshot Joystick(s) I £
 Quickshot Joystick(s) II £
 Three Channel Sound Synthesiser £

Please add post and packing £ 1.25

I enclose cheque/PO/Cash for Total £
 or debit my Access/Barclaycard No.

Signature

Name

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Or send S.A.E. for the New D.K.Trronics Spectrum Catalogue

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The Spectrum Connection

**If you think that dragons,
wizards and warlords
are dangerous, test your skill
and daring against pirates,
Indians and wild beasts...**



**An interactive, real-time
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characters for the
48k Spectrum.**

Never before has J. M. Barrie's magic world of the Neverland been so real. **PETER PAN - The Adventure Game** takes you to the realms of pirates, lost boys, Indians, wild beasts and Captain Hook. Explore the Island, fight the pirates, save Tiger Lily and, if you are really fearless, destroy Hook and steal his ship, to return Wendy and the boys safely home again.

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Name

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Post code

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P.O. Box 6, Dunton Green, Sevenoaks, Kent TN13 2XX.

**Acute add-on allergy?
Chronic hardware headaches?
Don't suffer in silence —
write to Sinclair Surgery.**

Sinclair Surgery

Fading printouts

COULD you inform me why Alpacom printer paper always fades even if covered in cellophane folders?

Another point of contention is the new blue paper clogs the unit, as does the new black paper.

**G W Harrison,
Kettering.**

● A spokesperson for Dean Electronics, makers of the Alpacom 32, said that the paper will fade but should last for up to two years if kept out of the light. It was suggested that any listings that you wanted to keep should be photocopied, but again those are liable to fade. That would appear to be a major drawback of the printer and should be kept in mind by prospective purchasers.

Regarding the clogging of the printer, the spokesperson said that should not happen and any complaints would be dealt with by the Product Manager. Let us know how you get on.

Screaming RAM packs

MY GRANDSON has bought a 16K RAM pack for his ZX-81. When it is attached he cannot run the programs he has typed in. When loading from cassette he gets only a high-pitched scream. He has taken one RAM pack back but the replacement is doing exactly the same.

**Mrs J Armitage,
Bury, Lancashire.**

● The ZX-81 is well known for its cassette problems but in this case matters seem to have got out of hand. Attaching a RAM pack should not affect the operation of the cassette so something else must be at fault.

The high-pitched scream is usually an indication that when the program was SAVED the ear lead was still connected — that should be removed. Other than that, cleaning and aligning the heads usually helps. If that fails then take the computer and cassette to the shop where you bought the RAM pack and try all the stock until you find one that works.

Fitting modems

I HAVE an Interface One and Microdrive, and my Spectrum is fitted inside a Saga keyboard. Can I fit a VTX 5000 modem via the Interface 1?

**Mr A R Gardiner,
Rhyl,
Clwyd.**

● The VTX 5000 Modem was designed to work with Interface 1 so that should not present any problems. However as the Saga keyboard is larger than the Spectrum the front will need to be supported.

Changing characters

I HAVE bought a Sinclair Interface 2 and have discovered that very few games can be used with it. Is there any way to change the characters, used to control the joystick, to a Kempston or Protek joystick interface?

**Chris Bowler,
Derby.**

● There is no way to change the characters used by the Interface 2. Your only alternative is to buy a programmable joystick, such as those from AGF or Cambridge Computing, which works on most programs. When buying, always ask for a demonstration to make sure the product does what you want it to.

Limiting memory

I HAVE recently fitted a new keyboard to my ZX-81 and a curious fault has developed. Although my 16K RAM pack is attached, running the program: 10 DIM A (4000) produces error report code 4 — out of memory.

The above led me to believe my RAM pack was malfunctioning by limiting the amount of memory available. That was not so; large programs work normally, as do any other programs.

**D Williams,
Bradford, W Yorkshire.**

● The problem possibly lies within the ULA, though you could try changing the CPU (IC3) as that sometimes causes the fault. I am assuming that you do not have RAM pack wobble, though if you are unsure you could buy a ribbon cable from a computer shop.

Failing keyboards

CERTAIN keys on my Spectrum no longer work — I, Q, A and Caps Shift, and also O, P, Enter and Break/Space. All other keys are functioning.

**Stephen Neal,
Liverpool.**

● There must be a break in one of the ribbon cables that connects your keyboard to the circuit board. The keys are laid out in eight half rows of five keys — see chapter 23 of the manual — using five data lines and eight address lines. It is one of those address lines which is not connected.

If you separate carefully the two halves of the Spectrum case and look at the cable with eight wires in it then you may be able

to spot where the break is. If you cannot then I am afraid you will have to get a new keyboard matrix. Those are available from a number of sources quite cheaply — you might of course consider getting a full-size keyboard.

Heating problems

I HAVE had a Spectrum 48K for about 18 months. It is the second machine I have had — the first one was returned because after it had been in use for about 45 minutes it ceased to accept information, and I was told that it was probably overheating.

The replacement machine, however, was little different, and I wonder if the power pack is giving out excess current and causing this defect.

**J Wallis,
Bridport.**

● All Spectrums give out a fair amount of heat and that is nothing to worry about. However if it keeps crashing for no apparent reason then your only course of action is to get it repaired.

Networking Spectrums

IS IT possible for two microdrives to interchange programs with each other, and is an Interface 1 needed for networking two Spectrums?

**Carl Williams,
Wallasey, Merseyside.**

● The only way for two microdrives to communicate is via the Spectrum. If you have information in drive one that you want to transfer to drive two then it must be LOADED into the computer and then SAVED. To network two Spectrums both must be fitted with an Interface 1.

**What's New For Christmas?
See For Yourself**

The Christmas ZX MICROFAIR



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NEW SPECTRUM AND QL GOODIES!
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Come along on Saturday or Sunday 17th and 18th November to the Show that shows you everything for Sinclair Computer enthusiasts!

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And you'll have a fantastic day out . . . meeting friendly people . . . having fun . . . full of Christmas cheer!

Send now for reduced price advance tickets — and don't forget to note the date!

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Please send me ADVANCE TICKETS for the Special Christmas ZX MICROFAIR.

I require the following:— Adult tickets @ £1.25. Children's tickets @ £0.80p
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I enclose cheque/P.O. made payable to ZX MICROFAIR for the full amount (please include cheque card
number on the back of cheques) and I also enclose a STAMPED SELF-ADDRESSED ENVELOPE for
return post.

Name:

Address:

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OF STAND AVAILABILITY . . .
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17th and 18th NOVEMBER 1984
Saturday 10.00 am to 6.00 pm
Sunday 10.00 am to 5.00 pm

Explore the world of Sinclair

Sinclair User, the monthly magazine, will ensure that all ZX81, Spectrum and QL users get the most from their computers.

Every month we include exciting games programs, reviews on the latest software, bench tests on hardware and peripherals, as well as technical advice and development news on Sinclair products.

Sinclair User interviews key people within Sinclair Research, authors of top selling games plus regular features on the developments in the fast moving computer industry.

We cover all aspects of Sinclair, for beginners to enthusiasts right through to business users —

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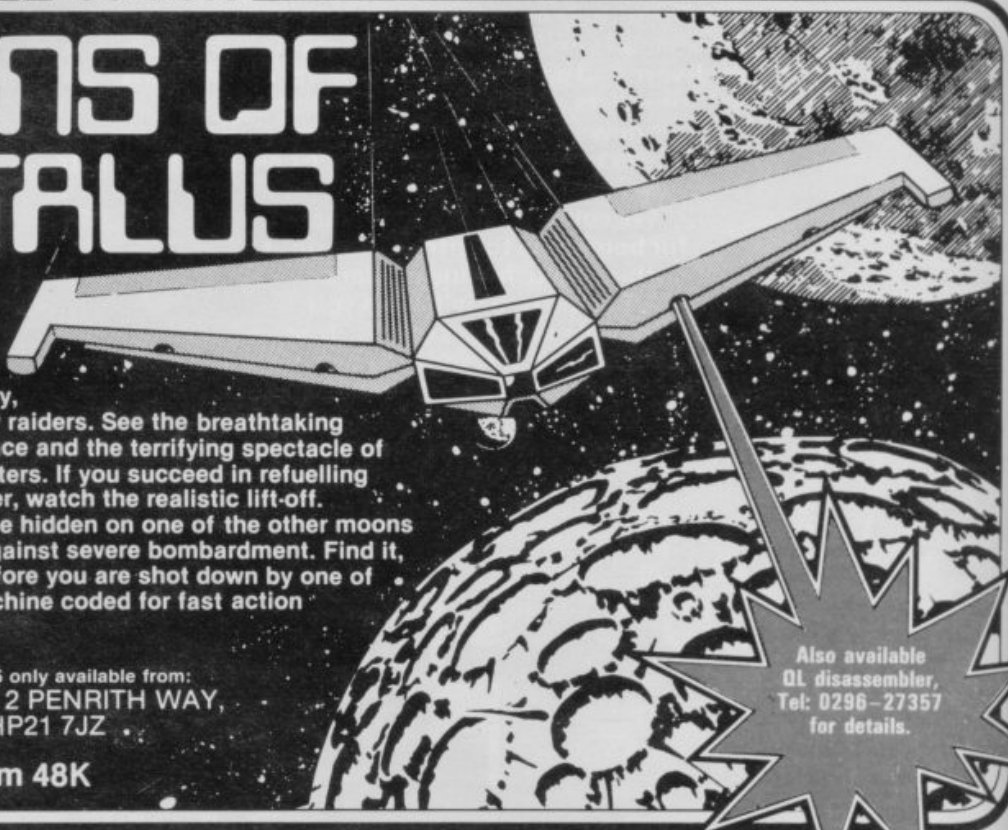
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MOONS OF TANTALUS

This exciting three part adventure game takes place among the Moons of Tantalus. Only you are left to save the mining city, its defences destroyed by raiders. See the breathtaking views of the moon's surface and the terrifying spectacle of the attacking enemy fighters. If you succeed in refuelling the only surviving freighter, watch the realistic lift-off. Search for the enemy base hidden on one of the other moons as you defend yourself against severe bombardment. Find it, but can you destroy it before you are shot down by one of their missiles? 100% machine coded for fast action and superb graphics.

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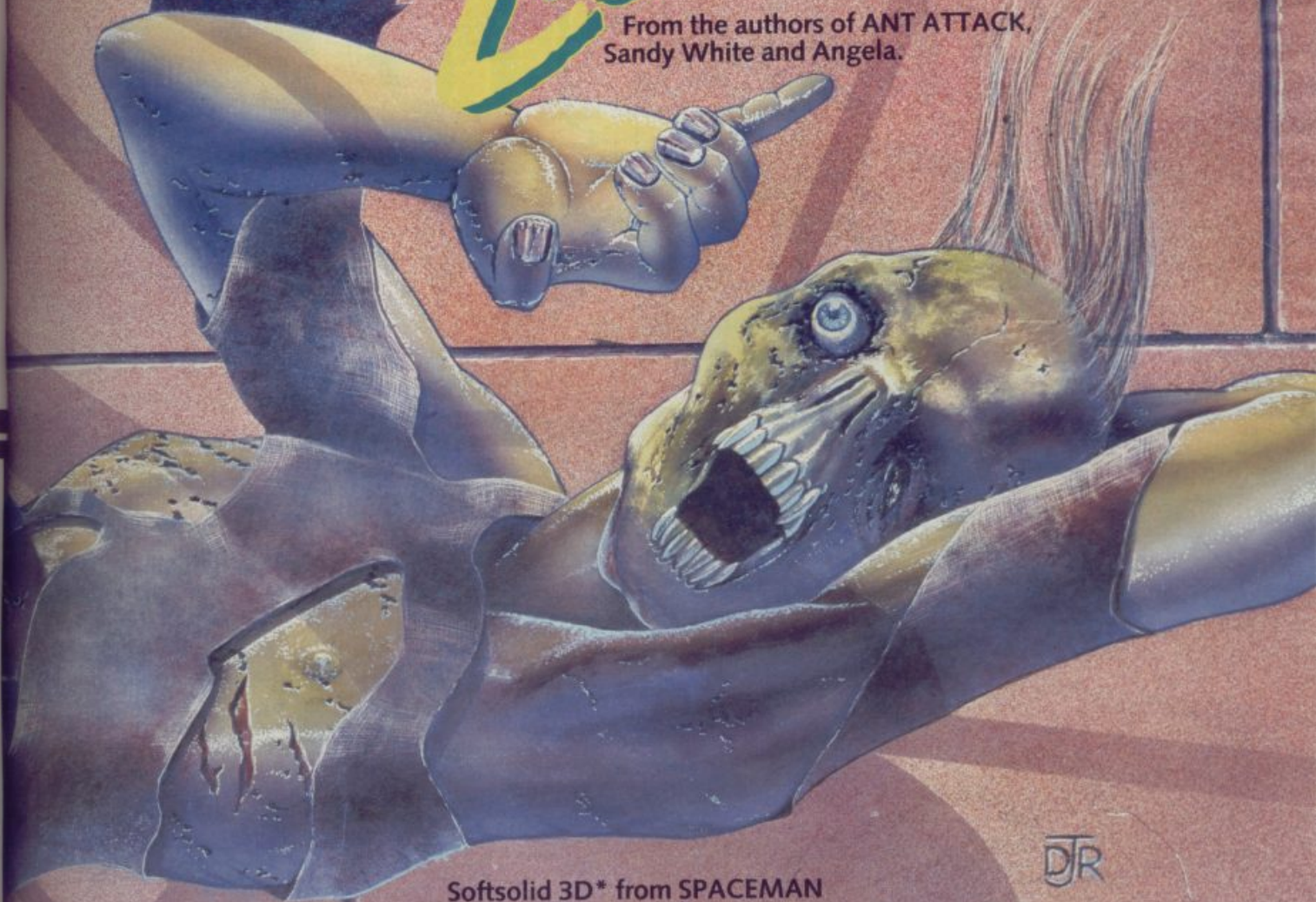
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48k Spectrum

BUG-BYTE

IN THE August issue of *Sinclair User* we investigated simple machine code routines to store and recall, virtually instantaneously, a number of different screens of graphic information to produce simulated animation.

This month we will explore further the possibilities of animating scenes on the 48K Spectrum. The end result is a visual effect which, hopefully, is both interesting and entertaining.

One problem of exploring the technique is that the program which controls the animation is related very closely to the actual screens on which it operates. As these are stored as a literal SCREEN\$ it is obviously impractical to convey them exactly. However, illustrations of the three screens used initially appear in Figure 1, and for those who

Figure 1. Three screens



Night moves

Mike Rapps brews up a midnight storm using machine code animation

wish to reproduce the screens used, a second illustration of the first screen with a grid superimposed on it — Figure 2 — is provided; the other two screens are, as can be seen, developments from this.

The screens were produced using the **Melbourne Draw** program, and the machine code routines used are largely derived from *Super Charge Your Spectrum* by David Webb, published by Melbourne House. Other routines could just as well have been used to produce other effects, but the main object is merely to illustrate possibilities.

The Basic control program used is listed in Figure 3. That should be typed in and saved: SAVE "storm" LINE 999. Immediately following that should be saved the block of code, a dump of which is given in Figure 4. The code is given in hexadecimal and should be read in rows from left to right. It may be entered using the short loader program listed in Figure 5, letters to be entered in lower case. The dump contains reference numbers underlined to show the first byte of each of the various routines, and should be ignored when entering the code. They refer to the list of routines — Figure 6. When the routines have been entered, they should be saved after the Basic program: SAVE "routines" CODE 32000, 360.

Finally, the three screens used should be assembled into a single block of code using the procedure and the screen storage program given in the August article. That block should then be saved as the third element of the program, immediately after the routines. The screens will commence at address

33000, and should be saved: SAVE "scenes" CODE 33000, 21000.

Let us take a look now at how the action unfolds. It is the dead of night. One by one, the lights of the house on the hill go out. A violent thunderstorm erupts, with lightning casting eerie reflections on the house. The storm abates, the moon rises, the stars come out — even a few shooting stars. As morning approaches, the lights are re-kindled.

```

111 e8 80 21 00 40 01 00 1b ed
b0 c9211 00 40 21 e8 80 01 00
1b ed b0 c9 003e 00 4f e6 c0
0f 0f 0f c6 40 67 79 e6 07 84
67 79 87 87 e6 e0 6f 3e 37 fe
c0 d0 91 d8 3c 4f 06 06 7d b0
6f 3e 1f fe 20 d0 90 d8 3c 5f
16 00 3a 41 5b 08 43 a7 cb 1e
23 10 fb 08 a7 ed 52 fe 01 38
20 28 27 cb fe cb 47 20 02 cb
be 08 7c 3c 67 e6 07 20 0a 7d
c6 20 6f 38 04 7c d6 08 67 0d
20 d2 c9 08 7e e6 40 17 b6 77
18 e2 08 3e 00 1f b6 77 18 da
c9 00 00 00 00 00 00 00 00 00
43e 00 4f e6 c0 0f 0f 0f c6 40
67 79 e6 07 84 00 79 87 87 e6
e0 6f 3e 4f fe c0 d0 91 d8 08
0e 00 7d b1 6f 3e 05 fe 20 d0
91 d8 3c 4f 06 00 c5 e5 11 e0
5b ed b0 e1 c1 d9 08 a7 28 1e
47 d9 7c 3c 57 5d e6 07 20 0a
7b c6 20 5f 38 04 7a d6 08 57
eb e5 c5 ed b0 c1 e1 d9 10 e3
d9 3a 41 5b fe 01 d8 20 07 11
e0 5b eb ed b0 c9 3a 42 5b 41
77 23 10 fc c9 00 00 00 00 00
511 fe 08 7b 07 07 07 5f 21 00
40 01 18 00 7e a3 77 23 10 fa
0d 20 f7 15 20 e9 3a 8d 5c 77
54 5d 13 01 c0 02 ed b0 3a 48
5c 77 0e 3f ed b0 c9 00 00 00
616 08 21 00 40 01 18 00 cb 3e
23 10 fb 0d 20 f8 15 20 ef 3a
8d 5c 77 54 5d 13 01 c0 02 ed
b0 3a 48 5c 77 0e 3f ed b0 c9

```

Figure 4. Hexadecimal code

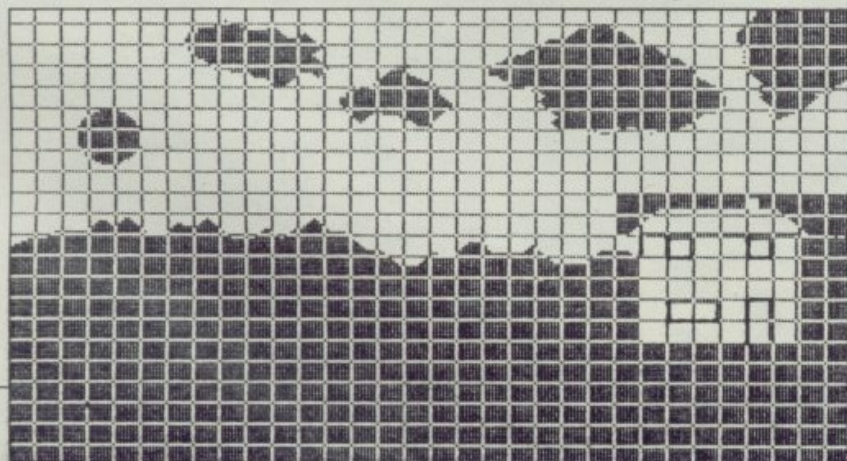
```

10 CLEAR 31999: LET s=32000
20 LET z=0: INPUT "Byte ";(s);
"=";h$
25 IF h$(1)="s" THEN STOP
30 IF LEN h$<>2 THEN GO TO 20
40 FOR n=1 TO 2
50 IF (CODE h$(n))=48 AND CODE
h$(n)<=57 OR (CODE h$(n))=97 A
ND CODE h$(n)<=102 THEN LET z=
z+1
55 NEXT n: IF z=2 THEN GO TO
70
60 GO TO 20
70 LET x=CODE h$(1)-48-(39 AND
h$(1))="a"
80 LET y=CODE h$(2)-48-(39 AND
h$(2))="a"
90 POKE s,y+(16*x)
100 LET s=s+1: GO TO 20

```

Figure 5. Loader program

Figure 2. Screen with grid



Program explanation

- Line 20 Deals with the initial colour settings.
- Lines 30-40 The machine code recall routine at 32012 calls in the second screen as a title screen. Before it can do that, the routine has to be given two POKES — in the fifth and sixth bytes — which tell it the start address of the screen to be recalled. A table of which POKES is given in Figure 7. A text title is printed, with a pause following.
- Line 60 Clears the screen, using the routine at 32320
- Lines 90-100 Supplies fresh POKES to the recall routine and calls in the first screen
- Line 110 Prints three lit windows on house
- Line 120 Pause, then re-calls first screen
- Line 130 Prints two lit windows on house
- Line 140 As 120
- Line 150 Prints one lit window on house
- Lines 160-170 As 120 followed by a pause
- Lines 200-210 Sets up an outer loop of three, so that the following action takes place three times. On each occasion, a nested loop uses the recall routine, suitably POKED, to call in the second screen (line 200) followed by the first (line 210) in rapid succession, thus giving the "lightning" effect
- Line 220 A further loop produces the 'thunder' — what do you expect on a Spectrum?
- Lines 230-240 Pause. Return the outer loop
- Line 300 Provides the POKES necessary to use the rightwards pixel scroll routine at 32025 to scroll away the clouds. The routine works on a defined rectangle within the screen. The rectangle has co-ordinates for its upper left (x1, y1) and lower right (x2, y2) corners. The x co-ordinates are the usual horizontal character positions (0-31), but the y co-ordinates work on a pixel scale (0-175) reading vertically down the screen, not the usual PLOT co-ordinates which read upwards. The POKES, taking s to equal the routine's start address of 32025, are: s+32, x1; s+37, x2; s+1, y1; s+23, y2. POKE 23361, 0 leaves a clear screen immediately behind the scroll. The POKES used in the line define a rectangle which covers the clouds
- Line 310 Calls the routine set up in line 300 a sufficient number of times to scroll away the clouds, with suitable pauses to slow the action
- Line 320 Similar to 300, but sets the up-

Figure 3. Basic control program

```

10 REM 1984 M.J.Rapps
12 PRINT
13 PRINT
14 RANDOMIZE
15 RUN
20 BORDER 7: PAPER 0: INK 0
30 POKE 32016,64: POKE 32017,1
56: RANDOMIZE USR 32012
40 PRINT INK 7; AT 17,5; "THE NIGHT OF THE STORM"
60 PAUSE 200: RANDOMIZE USR 32012
90 POKE 32016,232: POKE 32017,128
100 RANDOMIZE USR 32012
110 PRINT OVER 1: PAPER 6: BRIGHT 1; AT 11,25; "(sp)"; AT 11,28; "(sp)"; AT 14,25; "(2*sp)"
120 PAUSE 100: RANDOMIZE USR 32012
130 PRINT OVER 1: PAPER 6: BRIGHT 1; AT 11,25; "(sp)"; AT 11,28; "(sp)"
140 PAUSE 100: RANDOMIZE USR 32012
150 PRINT OVER 1: PAPER 6: BRIGHT 1; AT 11,25; "(sp)"
160 PAUSE 50: RANDOMIZE USR 32012
170 PAUSE 150
200 FOR n=0 TO 2: FOR f=0 TO 3: POKE 32016,64: POKE 32017,156: RANDOMIZE USR 32012
210 POKE 32016,232: POKE 32017,128: RANDOMIZE USR 32012: NEXT f
220 FOR g=0 TO 30: BEEP .01,-25: BEEP .01,-30: NEXT g
230 PAUSE 80
240 NEXT n
300 LET s=32025: POKE s+32,6: POKE s+37,31: POKE s+1,0: POKE s+23,55: POKE 23361,0
310 FOR f=0 TO 200: PAUSE 2: RA
wards pixel scrolling routine at 32150 to operate on the moon. The rectangle co-ordinates are similarly defined, the POKES being: s+15, x1; s+36, x2; s+1, y1; s+23, y2.
Line 330 Similar to 310, scrolling the moon
Line 400 Sets up a loop for plotting the stars to random co-ordinates. The parameters of the y co-ordinates are set to encompass only the upper sky part of the screen
Line 410 Excludes any random co-ordinates which would plot stars over the moon
Line 420 Carries out plotting of stars, with random colour, and returns loop
Line 430 Saves, as screen four, the existing screen. To do that, the screen save routine at 32000 is used, with appropriate POKES as set out in Figure 7. In the case of this routine, it is the second and third bytes which must be POKEd.
Lines 500-510 Sets up UDGs for shooting stars

```

```

RANDOMIZE USR 32025: NEXT f
320 LET s=32150: POKE s+15,0: POKE s+36,5: POKE s+1,0: POKE s+23,79: POKE 23361,0
330 FOR f=0 TO 35: PAUSE 4: RANDOMIZE USR 32150: NEXT f
400 FOR f=0 TO 125: LET x=INT (RND*255): LET y=INT (RND*70)+105
410 IF (x>8 AND x<56) AND y>144 THEN NEXT f
420 PLOT INK INT (RND*6)+1;x,y: NEXT f
430 POKE 32001,240: POKE 32002,210: RANDOMIZE USR 32000
500 FOR f=0 TO 15: READ a: POKE USR "a"+f,a: NEXT f
510 DATA 1,2,4,8,16,96,96,0,1,2,4,8,16,32,64,128
520 POKE 32016,240: POKE 32017,210
525 FOR f=0 TO 5: LET m=INT (RND*20)+10
530 FOR n=1 TO 8: PRINT PAPER 1; INK 2; AT n,m;"A"; AT n-1,m+1;"B"
540 PAUSE 2: RANDOMIZE USR 32012: LET m=m-1
550 NEXT n: RANDOMIZE: NEXT f
560 PAPER 6: BRIGHT 1: PRINT AT 11,25; "(sp)": PAUSE 50: PRINT AT 11,28; "(sp)": PAUSE 100: PRINT AT 14,25; "(sp)": BRIGHT 0
570 PAUSE 100: RANDOMIZE USR 32012
600 POKE 32016,152: POKE 32017,183: RANDOMIZE USR 32012
630 PRINT PAPER 4: INK 0; AT 21,0;"Do you wish to view again? (y/n)": PAUSE 0
640 IF INKEY$="y" THEN RUN
650 STOP
999 CLEAR 31999: LOAD ""CODE: LOAD ""CODE: RUN

```

- Line 520 Sets screen recall routine to fourth screen
- Line 525 Sets up outer loop of six, so that there are six shooting stars, followed by a semi-random initial horizontal co-ordinate for each
- Line 530 Sets up inner loop of eight, and prints the shooting star on each return of the loop
- Line 540 After a pause, recalls the fourth screen, thus overprinting the star. The star horizontal co-ordinate is then decreased by one, which within the loop makes the star move diagonally across the screen. Returns inner and outer loops
- Line 550 Brings house lights back on
- Line 560 After a pause, clears the screen using the routine at 32270
- Line 570 Resets recall routine to daytime and calls in that screen
- Line 600 Opportunity to re-view
- Lines 630-650 The auto-run line, which sets RAMTOP to protect the code and loads the two blocks of code.

Figure 6. List of routines

Start address	Routine
32000	Screen save
32012	Screen recall
32025	Horizontal scroll
32150	Up scroll
32270	Screen clear (fade)
32320	Screen clear (shift)

Figure 7. List of POKES

Screen number	Start address	Poke 1	Poke 2
1	33000	232	128
2	40000	64	156
3	47000	152	183
4	54000	240	210

For screen save routine POKE 1 should be in second byte of routine, POKE 2 in third byte. For screen recall routine POKE 1 should be in fifth byte of routine, POKE 2 in sixth byte.

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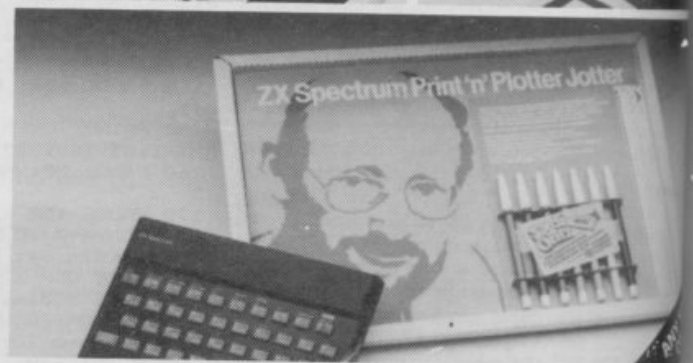
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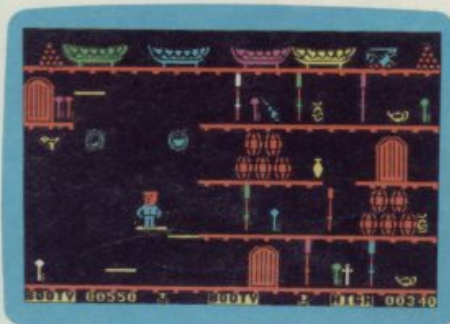
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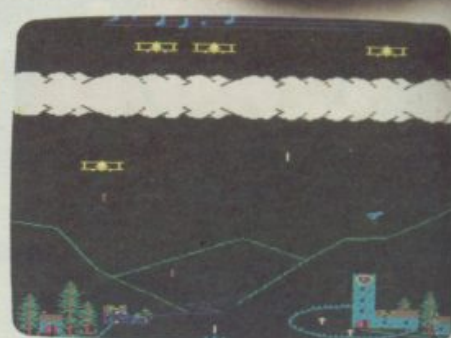
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Modem lovers

Electronic publishing
is still in its infancy.
Chris Bourne talks to
the proud parents



IT ALL started in the garden. Back in the dawn of history, in 1981 to be accurate, East Midlands Allied Press decided that it wanted to get into electronic publishing.

Electronic publishing is simply the presentation of information through some form of computer network. Ceefax and Oracle, the two television information systems, transmit information directly to television sets with the appropriate receivers. Those services are free, as long as you have the right equipment, but limited to pure information, with no opportunity for the user to interact with the system.

The other means of transmitting information is to use an existing network, such as the telephone system. British Telecom originally set up Prestel as a means of utilising spare capacity on the telephone network in the evening.

Prestel sold space on the network for businesses who wanted to set up in electronic publishing, and EMAP decided to use its experience in publishing magazines to provide specialist information to Prestel subscribers. There were, however, problems in setting up the service. Television sets which could receive Prestel were expensive, and you also had to pay a subscription fee and the price of the telephone call every time you used the service.

According to David Babsky, editor of Micronet 800, most of the early Prestel television sets were in travel agents' offices. Despite attempts to allow people to do their shopping on Prestel by ordering goods on credit cards, there were very few home users.

EMAP came into service with Telemap. "EMAP published a magazine called *Garden Trade News*, and decided to start by providing information for garden centre operators who needed to be kept in touch with manufacturers and suppliers. Unfortunately there were relatively few garden operators so it wasn't worth pursuing."

By 1982 EMAP was publishing computer magazines. It was decided to ditch the rather scarce garden centre operators and pursue home microcomputer owners as the ZX-81 was rapidly turning the field into a mass market.

"ZX-81 owners were self-motivated" says Babsky. "They had a keyboard, processing power, and a display in the form of the TV. All that was needed was a telephone connection and a means of presentation."

The black box which connects a home computer to the telephone system is called a modem. You can use a

modem for talking to other computers with modems, as well as for accessing databases such as Micronet 800. A modem has two functions. It can send and receive information down the telephone lines and it can interpret the information it receives so that a computer can print it onto the screen. Prestel presents information in lines of 40 characters, but the ZX-81 and Spectrum only use 32 characters per line. The modem must therefore enable the computer to display the information in the Prestel 40-character mode.

The BBC Model B was a gift to the designers of Micronet, because the graphics mode 7 on the machine, the lowest resolution, was identical with the 40-column configuration of Prestel. Suddenly the problems of producing a cheap modem disappeared. The resulting service was called Micronet 800, the 800 signifying that the service began on page 800 of Prestel. Micronet began operating on March 1, 1983 and since

'Micronet is to the 80s what the Gutenberg Bible was to the Middle Ages'

then has broadened to include special services for owners of the BBC Model B, Sinclair Spectrum, Commodore 64 and Apple II and IIE.

So what is Micronet, what does it offer, and how much does it cost? The first thing you need is a modem. If you own a Spectrum, then you want the Prism VTX 5000 or alternatively Interface One with any modem, as Interface One contains an RS232 socket to standardise the signals sent out by the Spectrum.

Micronet costs £52.00 a year to join, and once you have paid your subscription you will be given a code number and password. Together, those numbers allow you to access Micronet. It all sounds extremely simple, but in practice there can be problems. For a start your phone must have one of those fancy modern plug-in sockets, because you have to plug the phone into the modem instead of the wall. Secondly, if you are blessed with an exceptionally bad line, with lots of background noise, the central computer may fail to understand your code numbers.

The most popular facility, according

to Babsky, is Mailbox. Electronic mail is simply the ability to send messages to other people on the network. It is extraordinary how addictive the idea becomes. Once you discount the cost of the subscription, it is usually cheaper than using the post, and gets round the problem of finding there is nobody on the other end of the phone when you call. You simply obtain the appropriate mailbox number from the list of members and leave your message.

When Micronet first started it budgeted for running the system, obtaining software and similar services. "The one thing we never realised was the enormous number of messages there would be between users," says Babsky. "We had to find people to route the messages, which meant other areas of growth took a back seat."

Mailbox is a definite advance on the usual Prestel/Ceefax style. The ability to send messages through the system is the core to an interactive database as opposed to a mere encyclopaedia of information. For the first fifteen months of operation Mailbox was only available to people who used the same central computer. Briefly, Prestel and Micronet use a number of computers all over the country, and users telephone the nearest one in order to obtain the cheapest price for the call. Even if you live in Edinburgh and the nearest computer is in Birmingham, an arrangement with British Telecom means you only have to pay at the same rates as a local call. Mailbox thus only operated between users grouped together on one computer.

That is changing. Last month Micronet extended Mailbox to cover a national network, so there is no limit to the number of people you can talk to as long as they are registered with the system.

"The big drawback is that although you can write to each other through Mailbox, or to Micronet itself through the response frames, until recently you couldn't broadcast to everyone over the system," explains Babsky.

Micronet has now altered that state of affairs by introducing Chatline, which allows you to write material directly into the system. Chatline is uncensored, but is carefully monitored, and any obscene or libellous messages are deleted. It only operates between 8 and 10 pm.

The Mailbox system is not controlled at all, and there has been a little trouble at times. But Babsky insists that the

continued on page 70

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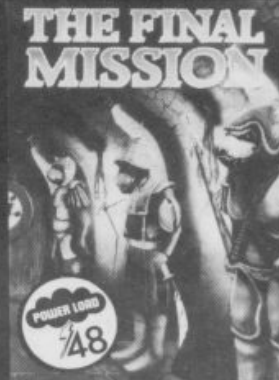


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The Micronet Story

continued from page 65

system allows for much more effective sanctions than with the telephone or postal services. Any messages which offend, shock, or annoy can easily be traced back to the offender as the names are automatically logged. "We have had only two cases out of 10,000 users where we have had to take action" says Babsky. "One was a man posing as a maintenance engineer who obtained people's ID numbers and used them to send messages to others. The second was a boy who was sending rude messages."

Another service is Contact, which includes sections for those seeking advice about their computers, an adventure helpline, and even a 'lonely hearts' section. Requests such as 'Lonely guy seeks sexy BBC owner, how about a drink sometime?' add a whole new dimension to romance. Love me, love my computer tends to be the plaintive cry of the socially bored hacker. Could you love a man with a Jupiter Ace?

Apart from message sending, Micronet also contains an up-to-the-minute news service. Micronet's news editor, Sid Smith says, "It's akin to broadcasting, except that the difference in technology means you always get information whenever you want. We got news, specifications, interviews and reactions to the QL within two hours of it being launched. We had the first programs for the machine, and the first real hands-on review." Smith is clearly pleased with that particular story, as he has a framed photograph of himself interviewing Sir Clive above his desk.

"We produce a minimum of three new stories a day" he says. "It's very exciting. The pressure is far greater than on magazines. You are telling people things they don't already know."

However, the core of Micronet is not the news service — even Sid Smith agrees with that. "We don't think readers want a quick information fix," he says. Babsky is quite clear on the point. Headlines, even for news stories, are deliberately obscure, sometimes to the point of being meaningless. "The object is to provide entertainment and enjoyment rather than an encyclopaedia. We want to make things intriguing. None of the headlines tell you what the subject is about."

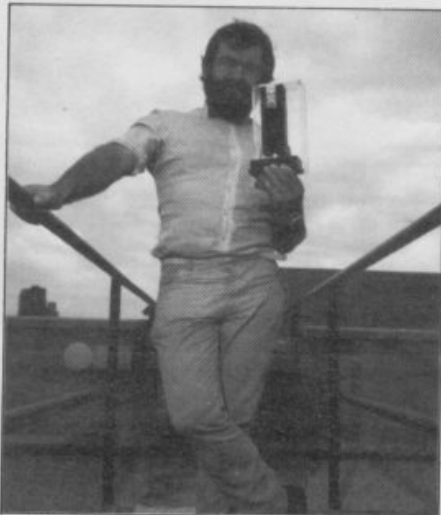
Although Babsky's policy is that you should never be more than three steps away from the information or facility you require, the combination of obscure headlines and the general problem of learning how to operate a 'menu-driven'

system efficiently can cause problems for newcomers to the system.

It is possible — indeed, easy — to get hopelessly lost within the 40,000 frames of Micronet. "People do complain" Babsky admits. "They are obviously very aware of the money factor. But they say it's still great."

Nevertheless, using Micronet may be cheaper than you think. As long as you are talking to the nearest Prestel computer, you only pay local charges. If you telephone after 6pm then you are spending about 40p an hour. Using the system during office hours is obviously more expensive, but not crippling so. An average of an hour a day would cost you £4 a week including the subscription fee.

But it is not the service as it stands at



Babsky with the 1983 Rita Award for System Innovation.

present which is of the greatest interest. Rather, it is what may be made of it in the future. According to Ian Rock, the Marketing Manager of Micronet, there is a general drift away from the light-hearted — some would say silly — aspects of Micronet towards more serious applications.

The advent of a modem for the QL, to be produced by OE Ltd, with luck in time for Christmas, will increase the number of home professional users on Micronet. Micronet is responding with a QL database, including a user magazine and free software. A business service recently available to Micronet subscribers is Computergram, a newsletter published by APT Data Services. Within hours of APT receiving news, it is broadcast on Micronet. The information is worldwide, and covers the upper echelons of the computer market, the financial and competitive shenanigans of such names as DEC, Hewlett Packard, and IBM. "If a story breaks in

California, it can be on Micronet three hours later" says Rock. Those *Sinclair User* readers with a substantial stake in IBM had better tune in fast.

The comparative cheapness of Micronet 800 as an interactive database makes it an attractive means of creating an electronic network for clubs and other organisations who cannot afford either the hardware or the subscriptions to large, business orientated systems. For instance, the Labour Party is now operating a private information database on Micronet as an experiment. The party hopes to provide constituency parties with information and news on action groups and other developments of interest to branches.

Prestel itself will start a service aimed at secondary schools next spring, School Link. Micronet is to attack the home market from November with Head Start. "It will provide programs and notes for the 5-12 age group and their parents" says Ian Rock. "Simple ABC stuff first, but will gradually increase the range to O Level. David Babsky has some Shakespeare programs he's very keen on."

Sid Smith feels electronic publishing is science fiction made fact. "There is a real problem of people who have a Spectrum just sitting on the sideboard. It's a cul-de-sac. To link up yours to thousands is remarkable. You are no longer limited to a Z80 based entity."

David Babsky is in no doubt about the revolutionary potential of electronic publishing. "The thing that inspired me most was looking at the Gutenberg Bible, the first book to be printed using moveable type. Micronet is to communication in the 80s what that Bible was to the Middle Ages."

If Micronet is Babsky's Bible, the service certainly inspires great loyalty among its subscribers as well as considerable vitriol from those who complain. The messageboards of Micronet are packed with electronic insults aimed at the way Micronet is run. But according to Ian Rock, there has only been a 5 per cent cancellation rate of subscriptions, which contrasts with around 25 per cent for more conventional publications. That would seem to indicate that Micronet subscribers, whatever the faults of the system, are sufficiently anxious to be part of a new age of communication technology to forgive the present system its growing pains.

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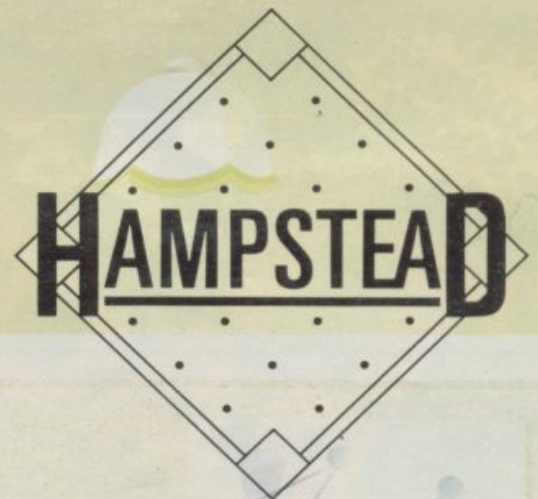
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The fifth generation

Some computer prophets say that the age of the thinking machine is near. They see a world in which machines could be gods of information. John Gilbert investigates the claims.

ARTIFICIAL Intelligence, AI, has become one of the most fascinating areas of interest to the computer fraternity.

An underlying interest in the production of 'intelligent' machines has always been evident in the computer world but it has not been until the last six months or so that the subject has caught the headlines in computer magazines and books. The reason for that is the difficulty in writing about a subject which has evolved no terms of reference at a simple level.

One of the books which has tried to do just that, and failed to some extent, is *The Fifth Generation*, by Edward Feigenbaum and Pamela McCorduck. The attitude of the American authors shows that they have no doubt that fifth generation artificial intelligence within a machine environment is possible. We are currently in the middle of the third generation of microcomputers, which involves integrated circuits. The first and second generations have evolved from gas heated valves and transistor technology. The fourth uses very large scale integrations, VLSI, and fifth generation will show dramatic leaps not only in hardware but in software.

The authors state that artificially intelligent machines will be able to manipulate information and come to conclusions, or reason, on the basis of that data. Unfortunately, their idea of AI seems to be confined to a machine which can amass huge amounts of data, using enormous memory banks, and offer that information to another user in any format required. Many expert systems can do that already and they would in no way be termed intelligent.

Unfortunately, the concept of consciousness, though touched on briefly, is not dealt with in anything approaching enough depth. Some readers will, as a result, feel that the authors have not produced an adequate formulation of the different definitions of AI and have only put across their own views which, they seem to think, are unchallengeable.

Once the problems of terms of reference have been established and cleared the authors then launch into a look at the Japanese innovations in software

and hardware techniques. They see information as the next great commodity on the world market and explain that the Japanese with their KIPS, Knowledge Information Processing Systems, are on the way to becoming the next great superpower which could have domination over the USA and USSR, at least in economic terms.

The fifth generation of computers, unlike the last four, will be one in which software, and not hardware, is most important. Feigenbaum says that 'significant levels of innovation' in software techniques will have to be achieved before the fifth generation can be imple-

new quantum leaps in technology are made by that country. What he does not overtly say, however, is that his pessimistic viewpoint about the American lack of interest in the subject is fuelled by the fear that what could happen to the Japanese if they fail could also happen to the United States.

The Fifth Generation, despite its technofear style, is an interesting and digestible book which will appeal to computer historians and prophets alike. Sir Clive Sinclair thinks that it is 'essential reading for anyone concerned with computers' and what greater endorsement could you get than that?

On a more practical note *Exploring Artificial Intelligence on Your Microcomputer* by Tim Hartnell investigates the traditional idea of artificial intelligence. Unfortunately the book might have been better titled 'How to write strategy games or programs which will talk back to you'.

Hartnell's overview of the field of artificial intelligence is informed and concise. It does not side-step the issue but equally it does not go to much trouble to evaluate the terms of reference that were mentioned earlier. To be fair the book is not just another tome of listings. The examples are broken down so that the reader gets a few lines at a time together with a paragraph of explanation. Many of the listings are then reproduced as a whole, although it is not clear if that is to help the reader or whether it is just to fill space.

All the programs use conventional programming techniques and if The Fifth Generation terms of reference were used the book could not be described as a text about artificial intelligence.

To be fair, the author does deal with the subject of Syllogism, an area which figures greatly in the AI debate along with information processing. The area covers forms of deductive reasoning in the style 'if a and b are true then c is also true'. Computers can deal with such relational arguments and can also make the connections between relationships. Hartnell includes a program to show how it is done.

continued on page 78

artificial intelligence on the spectrum computer

make your micro think

keith and steven brain



Micro thought

mented. He then goes on to say that the Japanese are close to such breakthroughs and that they will have a dangerous monopoly on such new techniques unless other countries, for example the United States, do something to safeguard their interests. Such a viewpoint is slightly naive and shows the authors to be suffering from a highly developed sense of information paranoia.

Feigenbaum does, however, redeem himself by admitting that the Japanese need a lead in the new information revolution. He comments that 'Japan's survival as a nation is at stake' unless

Visions of the Future

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Although *Exploring Artificial Intelligence* is more a book for those casually interested in the thinking machine it provides a view of the subject which should appeal to many people who want to improve their programming skills. It takes the reader to an advanced level but, because of the limitations of Basic, does not even touch the realm of what would now be termed artificial intelligence.

The same can be said of *Artificial Intelligence on the Spectrum Computer*, by Keith and Steven Brain. The book contains little information that could not be acquired from good texts on adventure gaming or data processing.

Subjects such as entering English sentences and getting sensible replies from the computer are covered together with short examples which are not particularly imaginative. One good point about the book is that program listings are backed up with flowcharts which detail the techniques which have been used to create the revolutionary new program. That will better enable the reader to adapt techniques to specific programming needs rather than have to wade through the programs.

The authors have, like Hartnell, taken a simplistic view of AI. They see it as

a method of communicating with computers and in turn receiving a coherent reply. They also touch on matters such as recognising shapes but make no attempt to distinguish the real points of issue in that area of AI.

The chapter on shape recognition deals only with input from the keyboard and not with senses such as touch, sight, and sound recognition. All those areas are under investigation by computer scientists but none of them are mentioned in detail by the Brains.

If other Sunshine books can include information about setting up hardware for simplified sensor devices then surely the Brains' book could make at least some effort to look at the subject in depth without shying away with a few examples which are old hat to most programmers.

Build Your Own Expert System by Chris Naylor on the other hand, is a welcome relief from the simplistic views of AI given by some authors when dealing with the subject.

The book is about building relational databases which can be questioned in order to obtain specific information. Naylor introduces the random element which occurs in the thought processes of most human beings and which probes for new areas of knowledge. For

instance, the author gives an example of a database which will predict what the weather will be like the day after the prediction was made. If it is rainy today and has been raining all week, the chances are that it will rain tomorrow. With that supposition and a knowledge of cloud formations the computer might predict that it will continue to rain tomorrow. If the prediction is wrong the method used by the machine will be adjusted. That might be by providing better knowledge of weather movements or lengthening the odds of certain weather patterns occurring. It is a hit and miss business but it is a better display of AI than any of the books reviewed earlier could muster.

Naylor's book is a must for computer users clamouring for more information about AI or wanting to do something useful with their Spectrums. It is one of the few books worth reading on the subject and, with Naylor's unpretentious skill as a writer, it is certainly one of the most readable.

John Gilbert

The Fifth Generation, Pan Books, £2.95.
Exploring Artificial Intelligence on Your Microcomputer, Interface Publications, £4.95.
Artificial Intelligence on the Spectrum, Sunshine Books, £6.95.
Build Your Own Expert System, Sigma Technical Press.

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SINCLAIR USER November 1981

Idle worship

Theo Wood examines the case against AI

PUBLISHED earlier this year for the first time in Britain *Computer Power and Human Reason, From Judgement to Calculation* was originally published in 1976, but contains much that is relevant today.

The author, Joseph Weizenbaum, must be considered a heavyweight by anybody's standards; currently Professor of Computer Science at MIT — Massachusetts Institute of Technology — he has had a career in computers since 1950.

Weizenbaum's book has received a fair amount of media attention, due mainly to the inclusion of a new preface to the 1984 edition. That contained a blistering attack on the computer games fever which has spread across America and Europe in recent years. The main basis for his attack centres on the process of psychic numbing of the individual who plays those games, similar to that which takes place for man to wage modern warfare. It was he also who described the computer junkie way back in 1976.

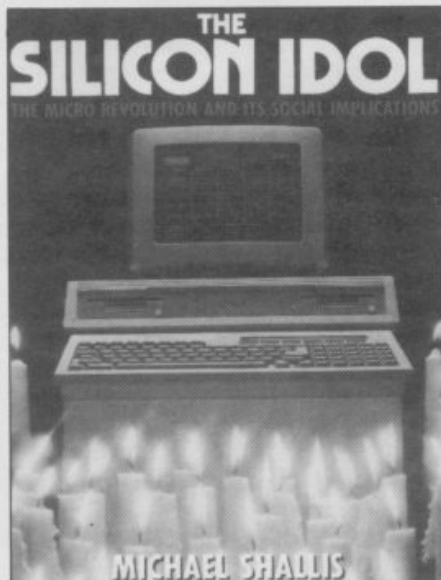
Although important, those are, however, only peripheral to the central concern of the book, which is a systematic description of how computers work and a similarly systematic attack on the work done by Artificial Intelligence researchers. With books such as *The Fifth Generation* published and Sir Clive Sinclair talking about the wonders of the new technology, it is still worth reading Weizenbaum to place those thoughts within the context of human values.

Weizenbaum doubts that Artificial Intelligence can be anything close to human intelligence, and portrays with scorn such statements made by eminent scholars such as Professor John McCarthy, then head of Stanford University's AI laboratory, who said, "The only reason we have not yet succeeded in formalizing every aspect of the real world is that we have been lacking a sufficiently powerful logical calculus. I am currently working on that problem."

For Weizenbaum the idea that all human activity and thought can be reduced to formal equations capable of being computerised is beyond belief. Having worked on a natural language program, ELIZA, which allowed conversation between the user and the computer as to the user's mental state,

Weizenbaum was horrified to find that serious attention was being given to it. Specialists in the psychiatric world were considering the use of such programs in place of human therapists.

Weizenbaum's book is a bellow of anguish from the heart of the computer establishment and, as such, requires some serious attention. However, it is an academic's book in that the main chapters concerned with AI are high-level intellectual infighting. For a more general purpose examination of the social implications of computerisation, Michael Shallis's book *The Silicon Idol* is more suitable.



Cutting down the gods

Depending on which viewpoint it is judged from, the book can either be seen as the work of a Don Quixote tilting at windmills, or of a man trying to communicate the deepest reservations about the introduction of micro-technology into the world of work and human relations. Shallis owes a lot to Weizenbaum for covering the same ground but from a slightly different standpoint. The descriptions of how a computer works are not so comprehensive but, on the other hand, are much more accessible by the reader who may have no previous knowledge of the subject.

For Shallis the suggestion that computers can come anywhere near having what are essentially human characteristics is debasing the human condition. He is particularly strong on the history of computers and intertwined with this

the history of man's attitude to service and technology and the power of technology to transform society.

In a world climate of increasing speed of technological change *The Silicon Idol* is ideal for the general reader to take stock of where that change will have maximum impact, as well as its social consequences. Shallis is sceptical of the shining brave new world of high technology, where most of the population do little or no work as we know it in its present form. He reaches the crux of the dilemma when he states that new technology is usually used for economic reasons, replacing humans in both the manufacturing and the service sector, leaving fewer and fewer people to work in factories and offices. Neither does that move to automation provide an alternative to work which is considered dull and repetitive.

Michael Shallis is an unashamed Ludite and is appropriately pessimistic about the future of work and the social disruption that might cause. He offers no solutions to the problem, merely setting it before the reader in what might be considered a sensationalist and extreme form. In so doing he provides enough fuel for discussion between here and Armageddon.

There seems to be a general consensus that we are in an age of transition, and the two books discussed are important in that they raise issues central to that. Are there activities which computers ought not to be part of? Are computers going to be 'more intelligent' than humans? How are masses of people going to react to enforced leisure/redundancy?

The answers to the first two involve philosophical enquiry, depending on the definition of human intelligence — are we as humans simple input/output devices whose thought processes can be reduced to a logical calculus? The third question depends on the way we as a society organise ourselves in the next twenty years. The debate has already begun — it is too important to be ignored.

Theo Wood

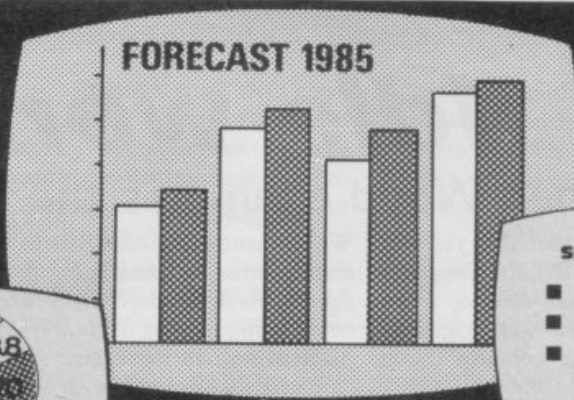
Computer Power and Human Reason: From Judgement to Calculation.

Joseph Weizenbaum, Pelican Books, £2.95.

The Silicon Idol: The Micro Revolution and Its Social Implications.

Michael Shallis, Oxford University Press, £8.95.

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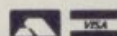
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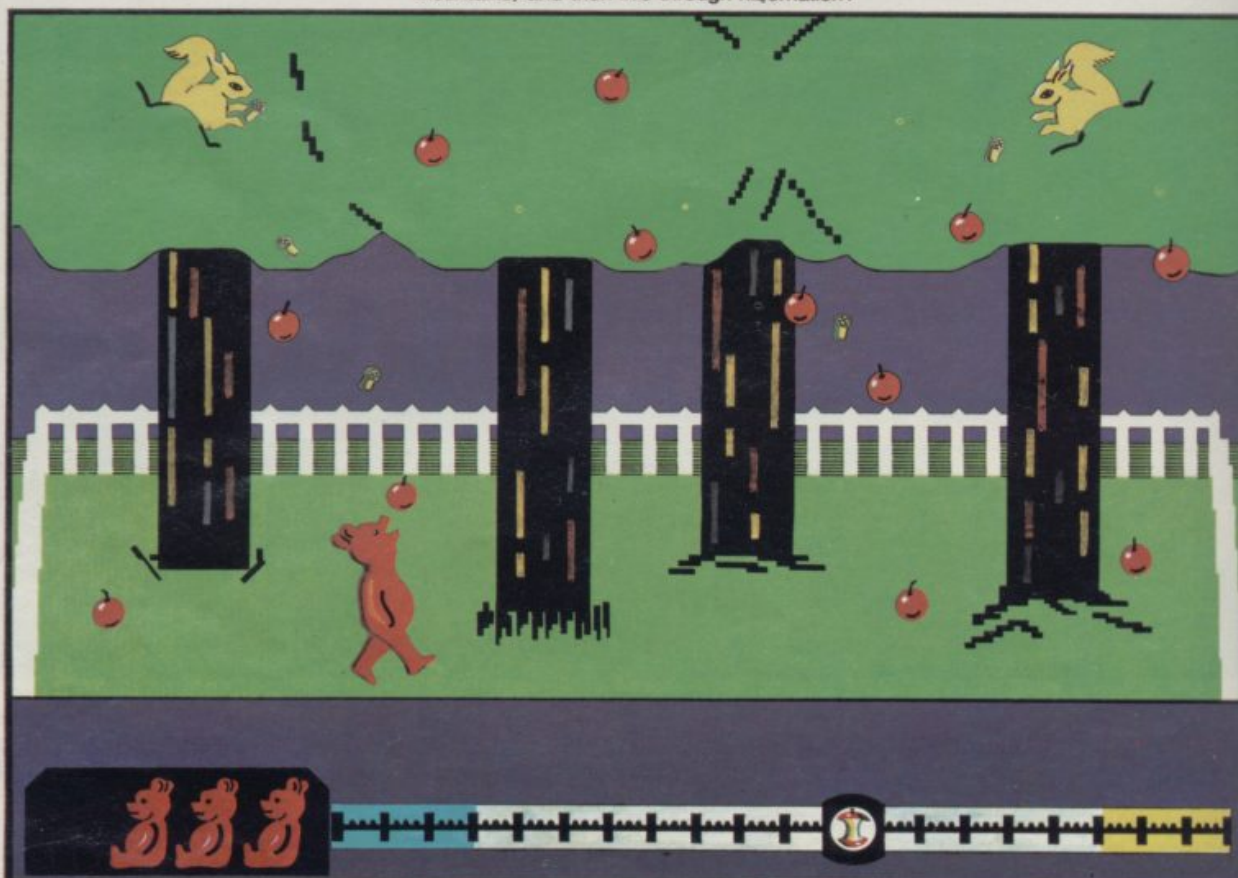
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Silicon nightmares

Sir Clive Sinclair sees a rosy robotic future.
Alexander Macphee, systems analyst, disagrees

SIR CLIVE Sinclair has speculated on a vision of the world of the future, a vision in which, the editorial comment remarked, there was little to cause a raising of the eyebrows. I do not share the editor's eyebrows.

The central ideas in Sir Clive's remarks were firstly that current developments in Computer Science are leading to superintelligent silicon-based life forms and secondly that human problems can be solved by the application of advanced technology. Neither of those assertions is unchallengeable.

The speculation that computers will develop as living beings is a revival of an idea first advanced in the 1950s in Artificial Intelligence studies, often referred to as 'Strong AI'. It is not a new idea, but no more justifiable now than it was then. What is remarkable about those speculations is the number of uncertain, unself-critical and seriously flawed assumptions made, and the seductive use of vocabulary in foreign contexts.

Seriously flawed

The most primitive of those assumptions is that the way in which a computer processes information is in any way similar to or cognate with the way in which a human being — or indeed any other animal — processes information, or even that information processing is the sole or most important attribute of sentience.

There is no reason whatsoever to suppose that the way in which human brains work at the neurophysiological level is in any way similar to the workings of a computer at the electronic bit level. Yet it has always been a human failing to attempt to describe the workings and functions of the human brain in the vocabulary of current technology; formerly as a set of compartments in a Victorian office communicating by memos, later, at the turn of the century, as a telephone exchange switching messages, and currently as a bit-twiddling and byte-shuffling device.

None of these is either valid or instructive, although the computer analogy is clearly more seductive, so much so that as a result of idiot anthropomorphisation people have come to think of human brains as operating like a computer 'brain', a notion which has been reinforced by the use of computing vocabulary to describe human brains. Thus it is an easy step for Sir Clive to turn a computer into a real functioning brain. All you have to do is

"... render it intelligent by loading the proper software ..."



Under that view, thinking is no more than a set of rule-based operations, and the world is no more than a series of puzzles to be solved by primitive and computable rules.

Understanding is not derived from formal rules alone. John Searle demonstrated that in his Chinese Room analogy in *The Behavioral and Brain Sciences*. A man with no knowledge of Chinese is locked in a room. He has a script in Chinese — which he doesn't understand — together with a set of formal rules in English — which he does — which enable him, when given lists of Chinese symbols, to construct other lists of Chinese symbols, which he

can pass back out of the room. Unknown to him, his Chinese script is a story, the list of symbols he is given is a list of questions, and the list of symbols he constructs are really answers to the questions about the story, which are indeed understood by native Chinese speakers. In what sense can that mechanical, rule-based symbol manipulation be called understanding?

Staggeringly stupid

Those areas that are claimed as successes in the field — the so-called 'expert systems' — owe their success to the fact that the conditions under which they operate are strictly defined, as are the problems which they are designed to solve. 'Expert' is, of course, another of those seductive words. Another example often quoted is the success of some chess programs. Here the restriction of operation to a rule-based and context-free world is signally clear.

Sir Clive also confuses knowledge with data when he proposes that "acquired knowledge of a man" could be given to a computer by "the transfer of data from human to machine mind". Yet those two are not synonymous, the implication being that knowledge is no more than a large database of context-free atomic facts, by which definition human knowledge therefore becomes reducible to logical formalism.

Sir Clive also speculates that these intelligent computers will evolve as silicon-based life forms, able to reproduce themselves. I wish I could be generous but that seems to me to be staggeringly stupid. Again the seductive use of vocabulary with human connotations continues with use of words like "see", "feel", "sensory devices". Optical or physical devices may indeed be used to supply information to a computing device, but the significance of those as sensory devices is a matter of interpretation. The ballcock in a water tank performs a sensory function, but I do not attribute to it the phenomenon of sensation.

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Visions of the Future

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It may be argued, however, that if the machine appears to show intelligence we may never know the difference, the Turing test frequently being invoked. The Turing test, however, is not a test to divine the existence of intelligence, rather it is a measure of the level at which we can be fooled into believing that the responses we detect may be coming from an intelligent source.

Moral dilemmas

Suppose, however, we allow that machines can think in a way cognate with or — superior to human beings. That then raises moral dilemmas of massive proportions. If we have truly created intelligent life then presumably this life form is entitled to what we regard as fundamental human rights. With the concept of life comes the concept of death and killing. The question is by no means trivial, for Sir Clive offers those "superintelligent" life forms as "menial slaves" to human beings. In what sense could beings of such superior intelligence be treated as menial slaves?

The second offering of Sir Clive's speech is of high technology as solutions to human problems. Here he is on equally shaky ground. He is not unique in that, for it is common to propose the salvation of the world by throwing technological solutions at human problems. This is doomed to failure because the problems themselves are not technological, but human and social.

What are the major problems faced by humanity in the twentieth century? And what is the role of advanced technology in solving them? They are not difficult to identify: hunger, poverty, war, unemployment, health, freedom, education, housing. The size of the list is as distressing as its content.

None of those problems is a merely technological problem; indeed, for many of them we know what the solutions are. What we lack is the collective human willpower and trust to take decisions to implement the solutions to end these problems. The immense effort

and logistic enterprise used to transport the men, machinery and materials of warfare and mass public death around the world might equally be used to feed and clothe the sick and the hungry. We have massive food production capabilities, but most of the world is hungry. It is the human application to the solution that is missing, not the solution itself.

Technological solutions show equally great poverty of inventiveness in areas of unemployment. Sir Clive at least acknowledges the unemployment problems — though not the consequential problems — created by advanced technology. He believes those are only temporary; he does not say why. He believes those will widen horizons, he does not say how. He says "... goods are still needed but ... technological change will remove virtually all employment".

Who will buy the goods? And with what? In what way will the wealth (if any) created by this new Technological Revolution be distributed among those who, unemployed, have no part in it? Who will own the means of wealth production?

Sir Clive believes rather that our lives will parallel the lives of the Freemen of Athens. But the world in the twentieth century is not a City-State, and not all the inhabitants of Athens were Freemen. Poverty and misery were not absent in Periclean Athens, nor did educating children to an appreciation of the finer things in life do anything to prevent the wars which sapped, eroded and finally reduced Periclean Athens.

Where, however, human solutions to human problems seem difficult, it is not uncommon for the problem to be simply recast as a technological problem, to which of course technological solutions abound. It is just such a technological solution which Sir Clive offers to the problem of crime. He ignores the relationship between crime and the social problems of unemployment, deprivation, poverty, poor housing; instead, the 'solution' is to implant in the 'criminal' a device linked to a computer.

He dismisses fears of an Orwellian society by saying that we could offer a choice to miscreants. This dismissal fills me with fear and alarm. It presup-

poses that any State given such control *would* offer an alternative, it applies a narrow definition of what people would recognize as a miscreant, it presupposes that the definition of a miscreant would not be 'adjusted' to include anyone who opposed the State in any way.

Plain silliness

That is not mere speculation on my part: the technology of surveillance has already been widely and illegally applied in this country to people who were not criminal in any sense of the word, as exemplified in a recent case. I am not sure if what Sir Clive demonstrates is innocence, naivete or just plain silliness, but our liberty should rest on stronger foundations than unproved declarations of benevolence from the State.

Even the problems of loneliness in old age are cast by Sir Clive as technological problems for which, of course, the solution is a quickwitted robot, not humanity, caring, love, compassion, or understanding. Those are qualities which, if they have them, people have from an understanding of human problems, human ills, human sufferings — in short, by being a human being sharing in those fears and difficulties with which so much of life is fraught. It is not clear how those attributes or properties could be shared by a robot.

A more persuasive application, perhaps, is in the field of education. Sir Clive argues that we can — and presumably therefore should — have our children taught by machines. Yet here again his arguments are faulty. Education does not consist of instilling a list of facts. It is, above all, a social process, not a mechanistic process. Apart from set topics dealt with in the classroom there is also the 'hidden curriculum' of learning — what it is to be human — being in the company of, and interacting with, other human beings.

Robots may, however, be convenient for some in that they may never have the human attribute of accountability for their errors, a feature that is often found useful in computers when it comes time to lay blame at someone's door for some error.

What is really distressing about Sir Clive's views, however, is not so much that they seek to describe computers or robots as a special kind of Man, but rather they describe Man as no more than a particular kind of robot. If that is a vision of the real future, I hope it arrives with the punctuality for which Sinclair is renowned.



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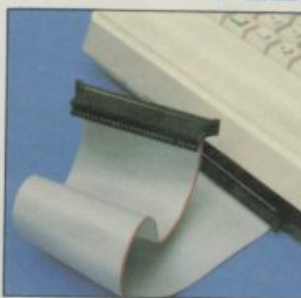
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The standard of QL software has been set by Metacomco. John Gilbert investigates

The first bytes

WHEN A NEW microcomputer, such as the QL, is launched critics and users alike expect the first few pieces of software which appear on the market to be rushed efforts, written sloppily in a high level language and containing many bugs.

Although few software packages are available for the QL the machine and its manufacturers have been extremely lucky in that what does exist is of a high quality. A case in point is the new **Assembler Development Package** from Metacomco, a company which has almost single-handedly provided an insight into what the QL can do.

The package consists of an assembler and full-screen text editor and is a result of several years of experience in 68000 programming by its principal author Dr Tim King. It uses the full 68000 instruction set and provides access to the much-vaunted multi-tasking abilities of the Sinclair machine.

The editor part of the package is more complex and robust than many which are available on other microcomputers. It has to be because although 68000 assembler language is easy to learn it can become complex when writing applications which require a great deal of code.

It provides a user-defined window, initially at the centre of the screen, which can be changed both in position and size to suit the needs of the user. It is also possible to define other windows and run a version of the editor in each so that several files can be entered into the QL simultaneously and edited one after the other. You might, for instance first decide to do some work on the file in window one and then change some lines listed in window two. Switching between the windows is a simple matter of pressing a few keys and makes complex editing tasks much simpler than they would normally be. It is possible to squeeze 12 windows onto the screen and have 12 files in memory at the same time but the text within each is only just legible.

The editor will allow the entry of any ASCII file. So, you could type in assem-

bly source listings, data files or even high level language programs, de-bug them and save them to microdrive. The full screen layout means that you will no longer have to cope with the simple line editor with which the basic QL has been equipped.

Innovations such as automatic word-wrapping have also been included. Word-wrapping has been the province of word processors where if a word ran off the edge of the screen the computer would put it onto the next line. It would then space out the rest of the sliced line so that it appeared as a block of text and the last character on the left- and right-hand margins were aligned vertically.

Once you have entered your assembly



language file, either from microdrive or by hand, there are a variety of options available through which you can correct errors and amend programs. When you enter a long program you will see that the user-defined window through which you can look at the text may only display part of the source program because you have changed the margin settings. In such a case the program lines can be scrolled horizontally and vertically across a specified window.

Other options include copy and delete functions which allow blocks of code to be copied into various sections of memory, exchanged for other sections of source, or deleted altogether.

Some simple de-bugging aids such as Search and Replace will also make your life easier when manipulating source code. Those will allow you to change all occurrences of a string of characters within the source and then replace it with another piece of code. For instance, you might have used a block reference label several times within a program but then decide that it no longer represents the function of that block or you can think of a more apt name with which to describe it. By using Search and Replace you can remove the label and insert a new one.

The real ability of the editor lies in its ability to link or merge files of source. A file can be entered from microdrive and inserted at any point within one which is already resident in memory. That will not only prove useful when you find that an extra piece of code needs to be added to a program, but you can also start building up a library of memory-independent subroutines, which can be placed anywhere within the RAM and be used in several programs.

In order to assemble the source code it has to be saved from the editor and loaded into the assembler. The source can be loaded from a specific part of memory, made position-independent, or relocatable. In the last case a relocater routine is added to your code which can then be put into any spare section of memory by the QL. The first of those options will probably be used when only one short program is to be assembled and where it is not difficult to calculate the exact extent of any jumps that are required to other addresses with the program.

The second option is more important. It can be used with long programs which you may want to alter frequently and do not want the bother of changing memory address references.

The three-pass assembler takes approximately one minute to do its work and requires three program overlays to be loaded in from microdrive before it finishes all of them. The reason that, like some of the Psion software packages, all of the assembler does not fit into the memory at one time is that the error messages take up 10K of internal RAM. Each message is written in English and not the mumbo-jumbo that has become the industry standard and is hard to decipher unless you have the manual to hand.

If an error is found in the source listing while assembly is taking place the process is stopped and the line upon

continued on page 90

continued from page 89

which the mistake has been found is flagged by a cursor at the beginning of the statement. The error message is displayed at the bottom of the screen and a correction can be made cleanly and easily by re-editing the source.

The most powerful aspects of the assembler package are the ability to make routine requests to QDOS, thus plugging into the power of the QL operating system, and being able to create and call macro directives.

A macro is a series of commonly used instructions which can be packaged into one routine and given a label, or name. Those instructions will be executed in sequence when the name of the macro is called within a program.

A large number of ready-made assembler directives are included within the package. Those include the usual ORG and EQU instructions which ensure that a piece of code is assembled at the correct location and produce the nearest thing to Basic variables within assembly language. Other directives include conditional assembly of source code, the setting of boundary size for data areas and the formatting of the code display on any device including screen and printer.

The development package was still at the Beta test level when we looked at it. That means that it is the finalised version minus full de-bugging and the addition of routines recommended by the de-buggers.

The assembler quickly showed, however, that the QL is a very powerful machine when the restrictions of Super-Basic are lifted. The package is a sophisticated piece of software which not only uses the QDOS operating system but also allows the user to gain access to that elusive beast. It is the first assembler onto the market and will obviously not be the last.

Metacomco has no such problems with its package as the software was defined before the QL saw the light of day. Dr Tim King, had to make few changes to the specification to allow it to run on the QL as the specification of all 68000 chips is very closely linked. The company believes that it could sell the same product on an upmarket micro to clients who would be prepared to pay £400. The QL development package is to be sold for £60 which represents an astonishing switch in marketing policy that, if followed by other companies of the same stature of Metacomco, will certainly lower the price expectations of

businessmen.

Just as the price of hardware has fallen rapidly, partly due to the innovations of Sinclair Research, so the prices of sophisticated software packages will fall because companies which have established themselves at the top end of the market will see a reason to move down, reducing prices of existing products, dumping them to other machines, and taking customers with them.

A further innovation, admittedly started by WH Smith with the Advance computer but followed by Metacomco, is the introduction of such serious packages as the assembler into chain stores.

The new moves will produce a better standard of software on the shelves of high street shops and they bode well for the future of the microcomputer market if the Metacomco Assembler Development package indicates the shape of things to come.

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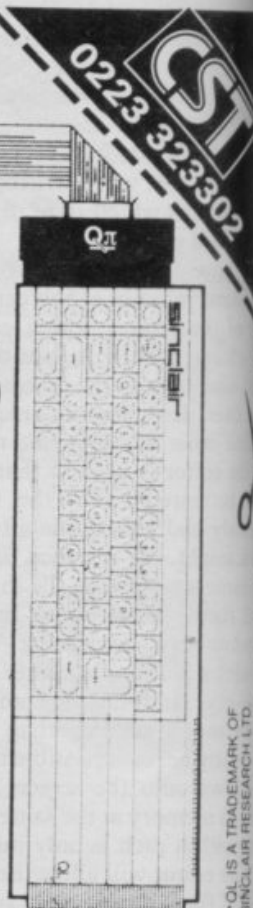
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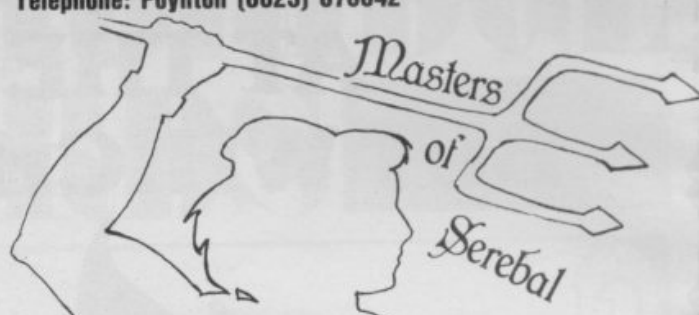
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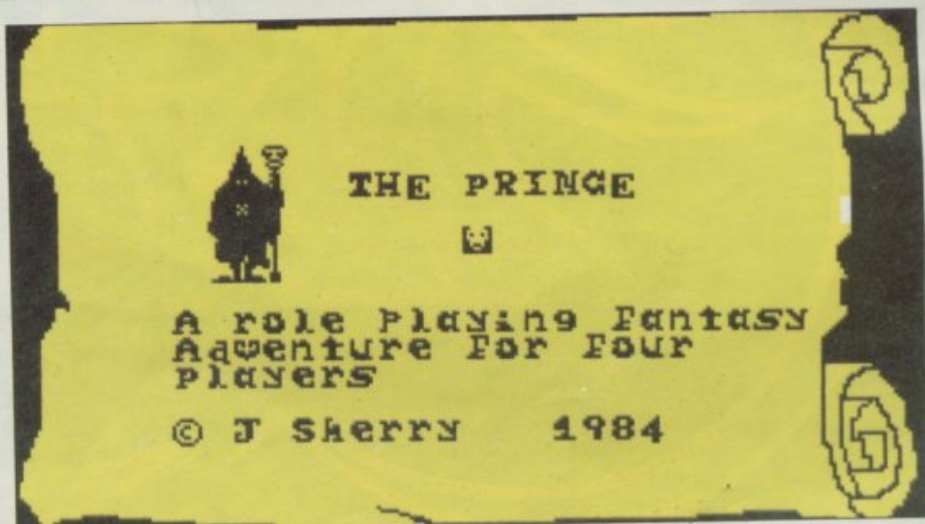
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1984 CAMBRIDGE AWARDS

HISTORY was made at the Ritz Hotel on October 4 when the first multi-player interactive adventure game for the Spectrum was unveiled. Entitled **The Prince**, and written by John Sherry of Keele, Staffordshire, the game won the 1984 Cambridge Award for Programming organised by *Sinclair User* and Cases Computer Simulations. Nigel Searle, managing director of Sinclair Research, presented John Sherry with the trophy and a cheque for £2000.

The Prince is an adventure for four players, set in the walkways, courtyards, dungeons and battlements of a rambling mediaeval castle. Each player competes against the others to complete the quest and gain audience with the Prince. To help him in his task the player can hire spies and henchmen to report on, and hinder, the progress of the rival players, though frequently those servants will be double agents, in the pay of more than one player, and are not always to be trusted.

Only one player can see the screen at one time, accessing it in turn with his personal code number. Alliances can be made with the other players both on and off screen, and gradually a web of



The Prince

intrigue is created as all four protagonists indulge in vicious in-fighting, trapping each other in the dungeons and ambushing the henchmen.

There were also four second prizes of £250 each and those were awarded to Steven Thomas of Luton, Bedfordshire; Thomas Frost, of Argus, Scotland; Nicholas Holgate of Camberley, Surrey; and David Bark of Stranraer, Scotland.

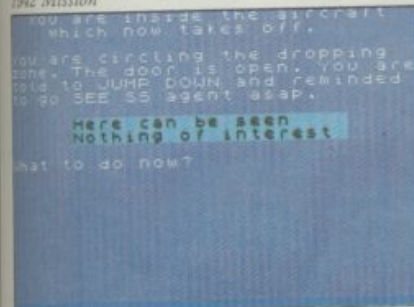
Steven Thomas submitted **War Zone**, a fast graphic wargame in which

the player battles with the computer to gain supremacy of a large territory. **1942 Mission**, from Thomas Frost, is a wartime adventure involving the infiltration of enemy lines by a lone commando in search of a top secret document. Nicholas Holgate wrote **Insurgency**, a detailed strategy game set in an unstable country where guerrillas and government forces fight for control of the native population using propaganda and military strength. Finally, from David Bark came **Blue Riband**, a realistic simulation of navigating a large vessel through the tortuous channels and inlets of a group of islands.

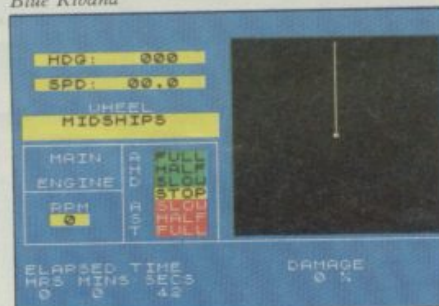
All five prize-winning entries will be published by CCS and on sale for Christmas. The standard of the entries was consistently high and the judges found the final choice a difficult one. The runners-up, who each win five computer games from CCS are: **Columbus**, **Phoenix Tower**, **One Million Years BC**, **Superpower**, **Guadal Canal**, **On the Road**, **Air Defence**, **Badminton**, **Stock**, **Golden Amulet**, **Airways**, **Golden Cobra**, **End Game**, **Strategic Descent**, **Monopoly**, **D Day**, **Shift-Shaft**, **Wizard Killer**, **Chinese Farmer**, **Final Frontier**, **Battlestar Galactica**, **Shopping Trip**, **Spy**, **Sceptre of Power**.



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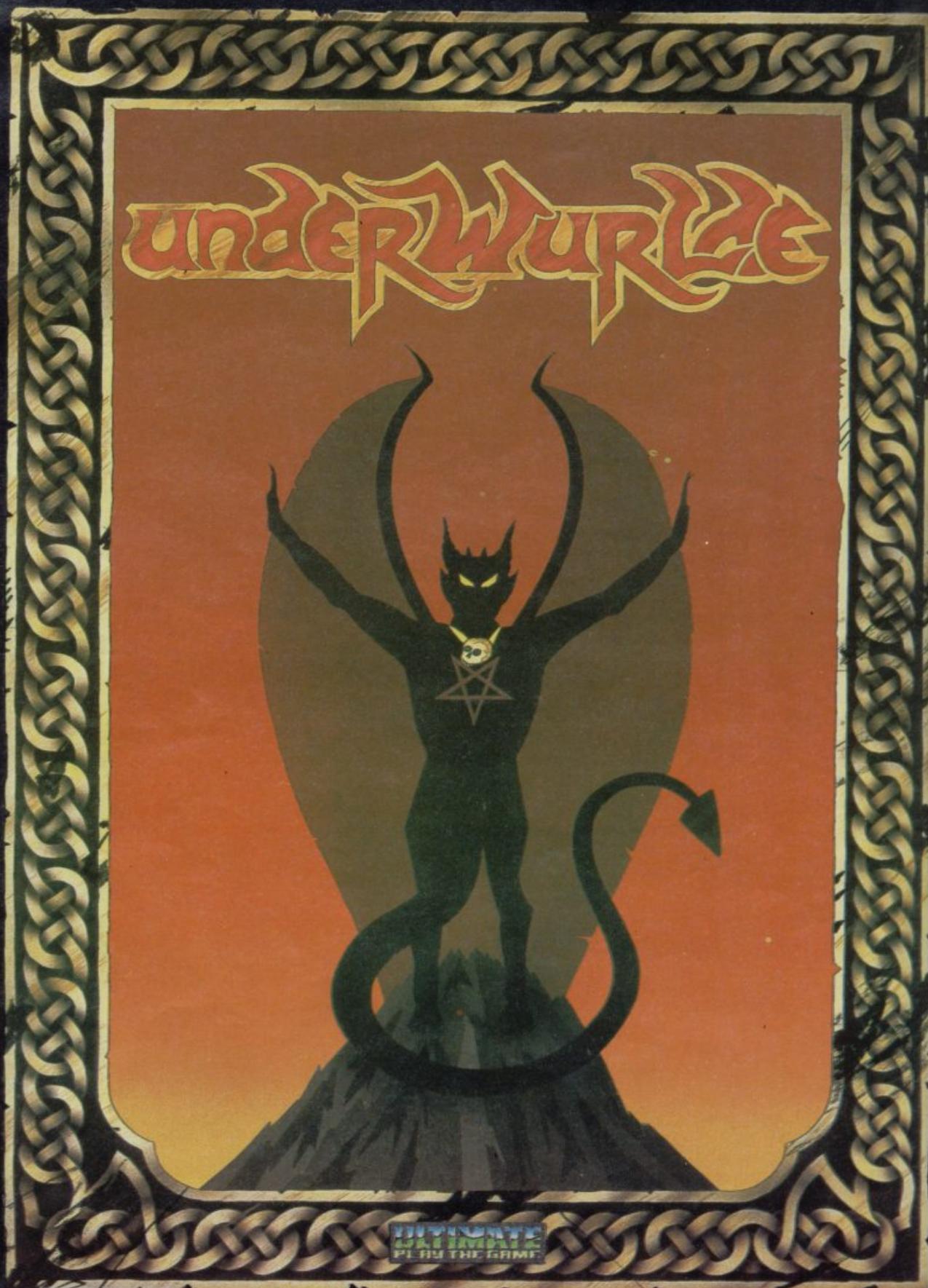
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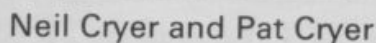
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Inverse characters are represented by the letter "i" and graphics characters by "g". Thus an inverse W would be represented by "iw", a graphics W by "gw", and an inverse graphics W by "igw".

Spaces are represented by "sp" and inverse spaces by "isp". Whenever any character is to be used more than once, the number of times it is to be used is shown before it, together with a multiplication sign. Thus "6*isp" means six inverse spaces and "(g4:4*i4:g3)" would be entered as a graphic four, followed by an inverse four repeated four times, followed by a graphics three.

Where whole words are to be written in inverse letters they appear in the listings as lower-case letters. Letters to be entered in graphics mode on the Spectrum are underlined.

Inverse characters may be entered on the ZX-81 by changing to graphics mode and then typing the appropriate characters and on the Spectrum by changing to inverse video and typing the appropriate letters. Graphics characters may be entered on the ZX-81 by changing to graphics mode and then pressing symbol shift while the appropriate characters are entered. On the Spectrum graphics characters may be obtained by changing to graphics mode and then pressing the appropriate character. User-defined graphics will appear as normal letters until the program has been RUN.

YOU are a prospector for a mining team, seeking gold in the airless caverns of Mars. As luck would have it, the caverns are ruled by a fearsome monster, which will try to devour you. Pick up as many nuggets as you can before your air runs out.

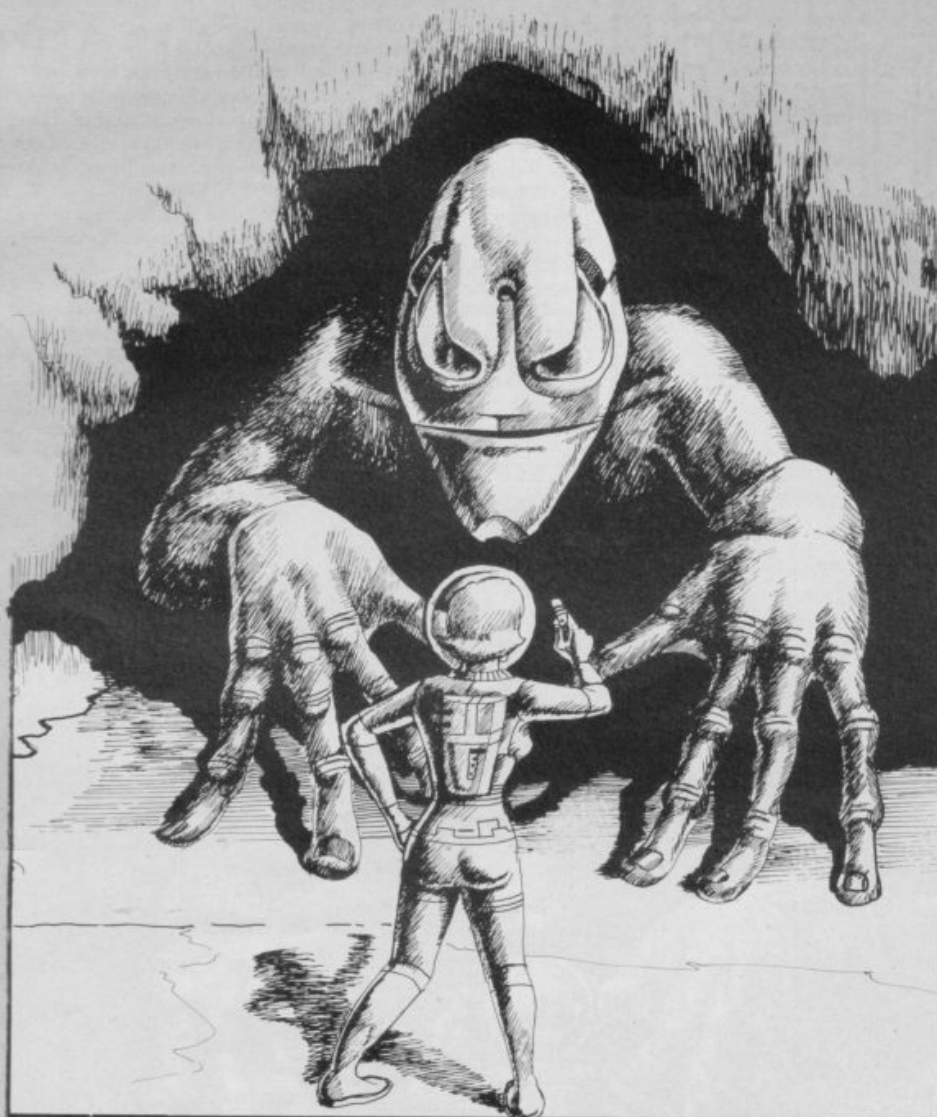
Mars Man was written by Colin Hunniford of Birkhamstead in Hertfordshire for the 16K ZX-81. Make sure you have the right number of characters in the initial REM statement to store the machine code.



```
1 REM "MARS MAN"
240 CHARACTERS
AT LEAST
SLOW
GOTO 1165
CLS
LET P=0
POKE 16418,P
FOR I=0 TO 11
PRINT " "
NEXT I
PRINT AT 23,P," "
MAN++
AT 1,1," "
POKE 16418,2
FOR I=1 TO 19 STEP 2
LET D=INT (RND*29+1)
```

```
70 PRINT AT I,D;"H";AT I+1,D;"
H";AT I+2,D;"H";
NEXT I
LET Z$=""
DIM X(4)
POKE 16514,212
LET X(1)=1
POKE 16515,2
LET X(2)=1
POKE 16516,P
LET X(3)=3
POKE 16517,P
LET X(4)=3
POKE 16518,3
LET A=PEEK 16396+PEEK 16397
POKE 16519,3
LET B=84
POKE 16520,P
PRINT AT 0,0," SCORE";T
OXYGEN
POKE A+B,CODE Z$
LET B=B+P
LET Z$=CHR$ PEEK (A+B)
```

```
IF Z$="" THEN LET Z$=""
POKE A+B,178
IF Z$="" THEN GOTO 640
IF USR 16529=0 THEN GOTO 31
LET P=X(INT (RND*4+1))
IF PEEK (A+B+P)=128 OR B+P<
THEN LET P=0
GOTO 16710
POKE 16418,0
PRINT AT 0,24," "
LET K$="YOU HAVE RUN OU
AIR
FOR I=0 TO 15
PRINT AT 23,0," YOU HAVE
OUT OF AIR
PRINT AT 23,0," YOU HAVE
NEXT I
FOR I=2 TO 22
PRINT AT 1,1,"
350 PRINT AT I,0;"
```

```

335 NEXT I
340 FOR I=0 TO 9 STEP -1
350 PRINT AT 1,0,K$+

```

```

360 NEXT I
370 POKE 16416,0
380 IF USR 10720=1 THEN GOTO 50

```

```

390 PRINT "YOU DID NOT MANAGE TO BEAT THE OLD HIGH SCORE OF"

```

```

400 PRINT TAB 5:PEEK 16520+PE
410 PRINT TAB 10:"SCORED BY"

```

```

420 PRINT "PRESS ANY KEY TO GET THE MENU"

```

```

430 IF INKEY$="" THEN GOTO 450
440 GOTO 1085

```

```

450 PRINT "YOU HAVE JUST SCORED A NEW HIGH"

```

```

460 PRINT "ENTER YOUR NAME" TAB 9:"MAX 7 LETTERS"

```

```

470 INPUT AS$(TO 7)
480 GOTO 430

```

```

490 CLS
500 PRINT TAB 4:"MA

```

```

510 PRINT TAB 7:"MA

```

```

520 PRINT "TAB 9: INSTRUCTION"

```

```

530 TAB 9: "YOU HAVE BEEN TELEPORTED DOWN FROM YOUR SPACESHIP IN ORBIT AROUND MARS TO THE DEEP MARTIAN CAVES. U MUST HAVE TO DO IS TO COLLECT 255 VALUABLE MARTIAN GOLD NUGGETS AS YOU CAN"

```

```

570 PRINT "BEFORE YOU RUN OUT OF AIR" TAB 10:"PRESS (N/7)"

```

```

580 IF INKEY$(<>CHR$ 118 THEN GOTO 590

```

```

590 PRINT "EACH NUGGET IS WORTH 1 POINTS AND IF YOU CAN ESCAPE TO THE TOP LEVEL YOU GET A BONUS OF 255 POINTS. JUST ONE MORE ITEM THERE IS A RATHER NAUGHTY MARTIAN MONSTER THAT LIVES ON THE UPPER LEVELS. THIS MONSTER EATS THE NUGGETS SO YOU MUST TRY TO GET THEM BEFORE THE MONSTER DOES"

```

```

600 PRINT "TAB 9: KEYS TO PRESS"

```

```

610 TAB 9: "LEFT" TAB 11:"6 DOWN" TAB 11:"8 UP" TAB 11:"8 RIGHT"

```

```

620 PRINT "TAB 10: PRESS (N/7)"

```

```

630 IF INKEY$(<>CHR$ 118 THEN GOTO 640

```

```

640 CLS
650 PRINT "TAB 12: FINGERS" TAB 12: "+ YOU" TAB 12: "- MONSTER" TAB 12: "NUGGET"

```

```

660 TAB 11: "WALL" TAB 11: "TOP LEVEL"

```

```

670 GOTO 440
680 POKE 16416,0
690 FOR I=0 TO 15

```

```

700 PRINT AT 23,0:"YOU HAVE BEEN CAUGHT"

```

```

710 NEXT I
720 LET K$="YOU HAVE BEEN CAUGHT"

```

```

730 GOTO 345
740 POKE 16520,0
750 POKE 16521,0

```

```

760 LET AS="NOBODY"
770 GOTO 1085
780 CLS
790 PRINT AT 11,0:"PLEASE START THE TAPE RECORDER"

```

```

ENCODING"
FOR I=0 TO 15
NEXT I
INT V= WAIT FOR THE BLA
FOR I=0 TO 15
NEXT I
PRINT TAB 3:"AND PRESS A
WHEN READY"
PRINT TAB 2:"(TO RELOAD L
AS "MARS MAN"
IF INKEY$="" THEN GOTO 860
CLS
SAVE "MARSHMAN"
GOTO 1085
POKE 16517,PEEK 16517+1
PRINT AT 0,10:(PEEK 16516+
16517+255)
POKE 16416,0
FOR I=0 TO 15
PRINT AT 23,0:"YOU HAVE
ESCAPED THE CAVES"
PRINT AT 23,0:"YOU HAVE
ESCAPED THE CAVES"
NEXT I
LET K$="YOU HAVE ESCAPED
THE CAVES"
GOSUB 345
CLS
PRINT TAB 7:"
TAB 7:"
1100 PRINT TAB 7:"

```

```

1110 PRINT TAB 7:"1 THE GAME"
1120 TAB 7:"2 INSTRUCTIONS" TAB 7:"
1130 HIGH SCORE RESET" TAB 7:"
1140 PROG SAVE"
1150 PRINT "PRESS THE KEY OF
THE NUMBER OF YOUR CHOICE"

```

```

1120 IF INKEY$="1" THEN GOTO 5
1130 IF INKEY$="2" THEN GOTO 330
1140 IF INKEY$="3" THEN GOTO 700
1150 IF INKEY$="4" THEN GOTO 860

```

```

1160 GOTO 1120
1170 FAST
1180 LET L$="00007801C6020000

```

```

1190 LET L$=L$+"007CB8C07DB9C9E1
1200 LET L$=L$+"4B8640210000C0B6

```

```

1210 LET L$=L$+"40281C2A0C401116
1220 LET L$=L$+"0019220E40ED4B86

```

```

1230 LET L$=L$+"400B0B000000ED43
1240 LET L$=L$+"8540CD980A182801

```

```

1250 LET L$=L$+"0000C92A0C401B16
1260 LET L$=L$+"18432A0C40131918

```

```

1270 LET L$=L$+"3C2A0C4006211018
1280 LET L$=L$+"FD1918312A0C4006

```

```

1290 LET L$=L$+"211B10FD1918262A
1300 LET L$=L$+"0C40ED5B8240193A

```

```

1310 LET L$=L$+"8A407701FEF7ED78
1320 LET L$=L$+"FE6F28C701FEFED

```

```

1330 LET L$=L$+"78FE6F28CCFE7728
1340 LET L$=L$+"D3FE7B28B07EFE80

```

```

1350 LET L$=L$+"282FFE622828328A
1360 LET L$=L$+"40ED5382403617FE

```

```

1370 LET L$=L$+"1BC0ED4B84400303
1380 LET L$=L$+"0303ED43E4402A8C

```

```

1390 LET L$=L$+"40110B0019220E40
1400 LET L$=L$+"CD980A3E00328A40

```

```

1410 LET L$=L$+"C92A0C40ED5B8240
1420 LET L$=L$+"193617C90142002A

```

```

1430 LET L$=L$+"8240CD8B40380401
1440 LET L$=L$+"C800C901E800C9E1

```

```

1450 LET L$=L$+"4B84402A8640C0B6
1460 LET L$=L$+"403804010000C9E1

```

```

1470 LET L$=L$+"43884001010009
1480 LET L$=L$+"40110B0019220E40

```

```

1490 LET L$=L$+"C800C901E800C9E1
1500 LET L$=L$+"4B84402A8640C0B6

```

```

1510 LET L$=L$+"403804010000C9E1
1520 LET L$=L$+"43884001010009

```

```

1530 LET L$=L$+"40110B0019220E40
1540 LET L$=L$+"C800C901E800C9E1

```

```

1550 LET L$=L$+"4B84402A8640C0B6
1560 LET L$=L$+"403804010000C9E1

```

```

1570 LET L$=L$+"43884001010009
1580 LET L$=L$+"40110B0019220E40

```

```

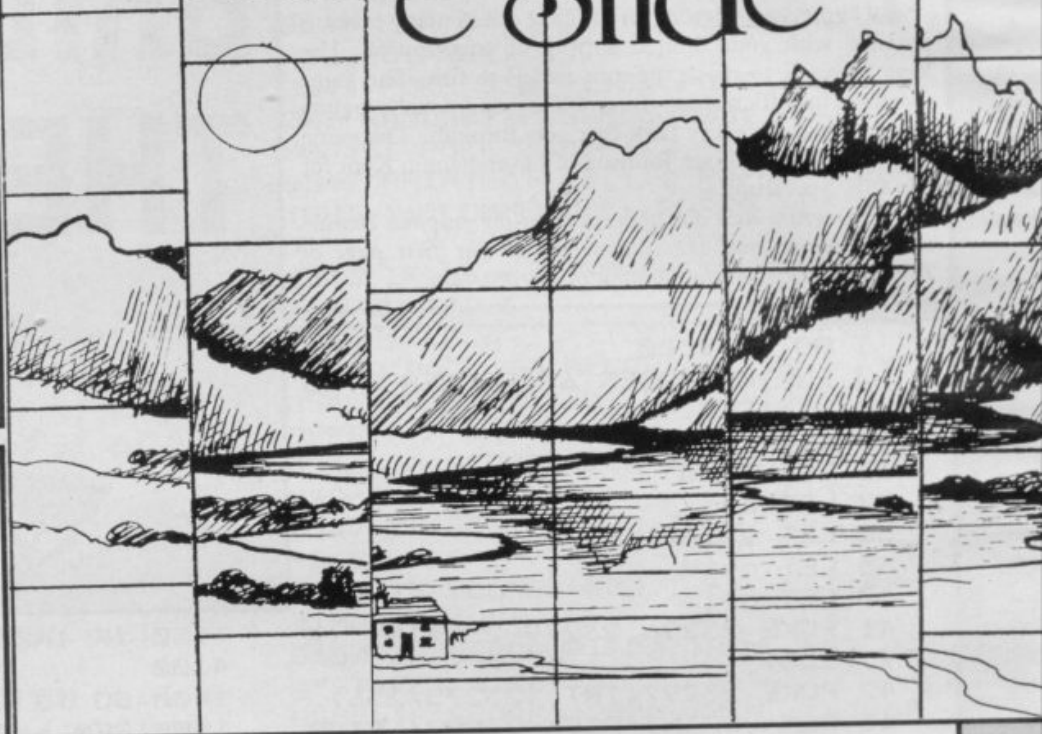
1590 LET L$=L$+"C800C901E800C9E1
1600 LET L$=L$+"4B84402A8640C0B6

```


A VARIATION on those sliding block puzzles you find in Christmas stockings, **Picture Slide** uses an impressive machine-code routine to swap areas of the screen display. Written by Pete Cooke of Leicester for the 16K Spectrum, it uses a simple picture located at lines 8210-8240. If you want you can adapt the program at those lines to draw your own picture, or even use a professional draw program to create a picture.

The program uses our special graphics abbreviations so please read the section at the beginning of Program Printout for instructions on how to enter these.

Picture Slide



```

10 CLEAR 30999
20 DEF FN A(X)=8*(X+1)
30 IF PEEK 31000<>33 THEN GO
SUB 9500
40 POKE 23658,0
100 GO SUB 8000: REM DRAW SCREE
N
105 PAPER 7
110 GO SUB 2000: REM SHUFFLE
120 LET move=1
1000 PRINT #1;AT 0,0; PAPER 7;"P
RESS ARROWS TO MOVE . MOVE ";MOV
E;AT 1,0;"(5*sp)*** Press q to q
uit ***"
1020 LET Z#=INKEY$: IF Z#<>"q" A
ND (Z#<"5" OR Z#<"8") THEN GO T
O 1020
1030 IF Z#="q" THEN GO TO 1100
1040 GO SUB 1500: LET move=move+
1: GO TO 1000
1100 INPUT "": PRINT #1;AT 0,0;
PAPER 6;"**** Stopped ****(2*sp)
Press ENTER(2*sp) to try again, R
to reshuffle.(3*sp)";
1110 IF INKEY#<>" " THEN GO TO 1
110
1120 LET z#=INKEY$: IF z#<>CHR#
13 AND z#<>"r" THEN GO TO 1120
1130 IF z#="r" THEN GO SUB 2000
: GO TO 1000
1140 RUN
1500 IF z#="8" AND x-(y=4)>3 THE
N BEEP .1,12: RETURN : REM X=5
Y=4
1510 IF z#="5" AND x=0 OR (z#="
7" AND y=0) OR (z#="6" AND y=4)
THEN BEEP .1,12: RETURN
1520 IF x=5 AND z#<>"5" THEN BE
EP .1,12: RETURN
1530 LET a=x-(z#="5")+(z#="8"):
LET b=y-(z#="7")+(z#="6")
1540 GO SUB 3000: RETURN
1999 STOP
2000 INPUT "How many swops (0 TO
200) ":swops: IF swops<0 OR swo
ps>200 THEN GO TO 2000
2010 FOR n=1 TO 6: LET z#="55577
7"(n): GO SUB 1500: NEXT n
2020 FOR n=1 TO swops: LET z#="5
678"(INT (1+RND*4)): GO SUB 1500
: NEXT n
2030 RETURN
3000 REM *** SWOP X,Y WITH A,B *
**
3010 POKE 31001,32*A+B: POKE 310
02,32*B+B: POKE 31004,32*X+B: PO
KE 31005,32*Y+B
3020 LET X=A: LET Y=B: REM EMPT
Y SQUARE
3030 LET V=USR 31000
3040 RETURN
8000 REM ** SET UP THE SCREEN **
8010 PAPER 7: INK 0: BORDER 7: C
LS : PRINT AT 0,0;"(ig4,20*g3,g7
)"

```

```

8020 FOR N=1 TO 15: PRINT AT N,0
;"(ig5)";TAB 21;"(g5)": NEXT N
8030 PRINT AT 16,0;"(ig5)";TAB 2
1;"(g1,3*g3,g7)"
8040 FOR N=17 TO 20: PRINT AT N,
0;"(ig5)";TAB 21;"(4*sp,g5)": NE
XT N
8090 PRINT "(ig1,24*ig3,ig2)"
8100 LET X=5: LET Y=4
8110 PRINT AT 0,23; PAPER 1; INK
7; BRIGHT 1;"(9*sp)";AT 1,23;"
Sliding ";AT 2,23;" Block(3*sp)"
;AT 3,23;" Puzzle(2*sp)";AT 4,23
;"(9*sp)"
8120 PRINT AT 6,23; PAPER 6;" P.
Cooke ";AT 7,23;" May 84(2*sp)"
8130 REM
8200 REM

```

**** PUT YOUR DESIGN HERE ****

```

8210 FOR n=1 TO 20: PRINT AT n,1
; PAPER (6-(n<6));"(20*sp)": NEX
T n
8220 INK 1: FOR n=20 TO 80 STEP
2: PLOT n,20: DRAW 0,n: NEXT n
8230 INK 2: FOR n=20 TO 80 STEP
2: PLOT n+76,20: DRAW 0,100-n: N
EXT n
8240 INK 8: FOR n=10 TO 30: CIRC
LE 80,90+n,n: NEXT n
8250 PAPER 4: INK 0: PRINT AT 18
,2;"(2*sp)Puzzle this out ";AT 1
9,2;"(3*sp)If you can !!(2*sp)"
8260 INK 3: FOR n=40 TO 136 STEP
96: FOR m=-15 TO 15: PLOT n,90:
DRAW m,55: NEXT m: NEXT n
8270 INK 2: FOR n=40 TO 136 STEP
96: FOR m=-15 TO 15: PLOT n,70:
DRAW m,15: NEXT m: NEXT n
8280 PRINT AT 1,3; PAPER 7; INK
1;"0000000000000000";AT 1,3; OVE
R 1;"(4*ig3)/\/\(4*ig3)"
8290 PRINT AT 2,3; PAPER 2; INK
7;"<><><><><><><><><>"
8300 RETURN
8900 STOP
9000 DATA 33,168,136,1,136,136,3
4,246,121,237
9010 DATA 67,248,121,34,250,121,
237,67,252,121
9020 DATA 62,32,50,254,121,237,7

```

```

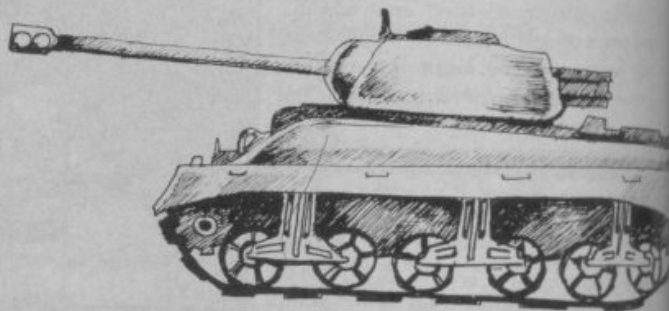
5,250,121,205
9030 DATA 172,121,4,237,67,250,1
21,229,237,75
9040 DATA 252,121,205,172,121,4,
237,67,252,121
9050 DATA 209,6,4,26,119,62,0,18
,35,19
9060 DATA 16,247,58,254,121,214,
1,50,254,121
9070 DATA 32,209,237,75,246,121,
237,67,250,121
9080 DATA 237,75,248,121,237,67,
252,121,62,4
9090 DATA 50,254,121,237,75,250,
121,205,220,121
9100 DATA 120,198,8,71,237,67,25
0,121,229,237
9110 DATA 75,252,121,205,220,121
,120,198,8,71
9120 DATA 237,67,252,121,209,6,4
,26,119,58
9130 DATA 141,92,18,19,35,16,246
,58,254,121
9140 DATA 214,1,50,254,121,32,20
2,201,62,191
9150 DATA 144,216,120,245,230,56
,38,16,111,41
9160 DATA 41,241,245,230,192,203
,63,203,63,203
9170 DATA 63,132,103,241,230,7,1
32,103,121,230
9180 DATA 7,87,121,203,63,203,63
,203,63,133
9190 DATA 111,124,206,0,103,201,
120,230,248,111
9200 DATA 38,22,41,41,121,230,7,
87,121,203
9210 DATA 63,203,63,203,63,133,1
11,62,0,132
9220 DATA 103,201
9500 CLS : PRINT AT 5,3;"Poking
in machine code.";AT 7,9;"Please
wait."
9510 LET total=0: RESTORE 9000:
FOR n=31000 TO 31221: READ a: LE
T total=total+a: POKE n,a
9520 NEXT n
9530 IF total<>29212 THEN PRINT
"Data error ... do not RUN":
STOP
9540 RETURN

```


THE PANZER divisions are rolling in a last-ditch attempt to halt the Allied advance. Your job is to guard a bridge and try to take out as many tanks as possible with your limited supply of ammunition. Use keys Z and X to move the gun and P to fire. The game increases in difficulty as you progress, and penalty points are deducted for every tank that gets through. The game was written by William Johnson of Faversham in Kent for the 48K Spectrum.

The program uses our abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

BRIDGE ON THE RHINE



```

1 GO TO 9000
2 INK 0: PAPER 6: BORDER 6: B
RIGHT 1: CLS
10 LET x=29
15 LET cx=0
20 LET a=1
30 LET y=160
35 LET o=10
40 LET g=15
41 POKE 23296,23279-256*INT (2
3277/256)
42 POKE 23297,INT (23275/256)
43 REM PRINT PEEK 23297: STOP

50 LET score=0
55 LET speed=1
60 LET amo=20
65 LET difficulty=1.8
70 LET s=1
75 POKE 23658,0
80 GO SUB 7000
85 GO SUB 8000: GO SUB 8020
90 REM **END OF VARIABLES**
100 GO TO 1000
500 REM ****TANK MOVE*****
505 IF x<1 THEN PRINT AT 5,0;"
(3*sp)": LET score=score-100: GO
SUB 8020: GO SUB 6100: LET x=29
: RETURN
670 IF s=1 THEN GO TO 2100
675 IF s=0 THEN GO TO 2120
680 RETURN
900 REM **END OF TANK MOVE**
1000 REM **MAIN LOOP*****
1010 IF INT (RND*o)=1 THEN LET
speed=0
1100 IF speed=1 THEN GO SUB 500
1110 IF INT (RND*5)=1 THEN LET
speed=1
1121 GO SUB 5000
1125 PLOT INVERSE 1;g*8,y+diffi
culty
1130 IF y<160 THEN GO SUB 3090
1131 IF INKEY$="p" THEN GO TO 3
000
1145 IF INKEY$="z" THEN GO SUB
4000

```

```

1150 IF INKEY$="x" THEN GO SUB
4100
1400 GO TO 1000
1500 REM **END OF MAIN LOOP*****
*
2090 REM ***TANK PRINT*****
2100 PRINT AT 5,x;"AB(sp)"
2110 LET s=0: RETURN
2120 PRINT AT 5,x-1;"CDE(sp)"
2130 LET x=x-1: LET s=1: RETURN
2160 REM ****END OF TANK PRINT:
3000 REM ***BOM DROP*****
3010 PRINT AT 15,g;"G"
3020 PRINT AT 14,g;"H"
3030 RANDOMIZE USR 33000: BORDER
6: LET amo=amo-1: GO SUB 8000
3040 IF amo<0 THEN GO TO 8500
3080 PRINT AT 15,g; PAPER 6;"(sp
)";AT 14,g; PAPER 6;"(sp)"
3110 PLOT g*8,y
3120 LET y=y-difficulty
3130 GO TO 1170
4000 IF g<=0 THEN RETURN
4001 LET g=g-1
4005 LET af=(PEEK 23296)-1
4010 POKE 23296,af
4030 RANDOMIZE USR 32000: PRINT
AT 16,g;"F"
4040 RETURN
4050 POKE 23295,63
4100 IF g>=31 THEN RETURN
4105 POKE 23296,(PEEK 23296)+1
4110 LET g=g+1
4120 RANDOMIZE USR 32000: PRINT
AT 16,g;"F"
4500 RETURN
5000 REM ***HIT?*****
5050 IF y<=128 THEN LET y=160:

```



```

GO SUB 5240
5060 IF y<=134 THEN GO TO 5100
5070 RETURN
5100 IF g=X OR g=x+1 OR g=x+2 TH
EN GO TO 5200
5110 RETURN
5210 IF g=x THEN LET score=scor
e+100
5220 IF g=x+2 THEN LET score=sc
ore+50: LET amo=amo+2
5230 IF g=x+1 THEN LET score=sc
ore+75
5231 GO SUB 8020
5232 PRINT AT 5,0;"(31*sp)"
5233 GO SUB 5240
5234 GO TO 5290
5245 PRINT AT 5,g; INK 2;"G"
5247 PRINT AT 4,g; INK 2;"H"
5250 BEEP .1,-50
5270 PRINT AT 5,g;"(sp)";AT 4,g;
"(sp)"
5280 RETURN
5290 LET x=29: LET y=160
5300 IF score>=300 THEN LET amo
=amo+1
5310 IF score>=1000 THEN LET o=
15: LET difficulty=difficulty+1
5320 RANDOMIZE USR 33023
5330 RANDOMIZE USR 33023
6000 RETURN
6100 LET cx=cx+1: PRINT AT 7,0;c
x: RETURN
7100 PRINT AT 6,0; INK 4;"(6*ig8
,19*#,7*ig8)"
7110 PRINT AT 7,0; INK 4;"(6*ig8
,ig1)/(2*sp,g5,9*sp,g5,2*sp)\(ig
2,7*ig8)"
7130 PRINT AT 8,0; INK 4;"(7*ig8
,ig1,2*sp,g5,9*sp,g5,2*sp,ig2,8*
ig8)"
7140 PRINT AT 9,0; INK 4;"(8*ig8
,ig1,sp,g5)"; INK 5;"(sp,7*_,sp)
"; INK 4;"(g5,sp,ig2,9*ig8)"
7200 PLOT 48,127: DRAW 151,0
7210 PLOT 48,120: DRAW 151,0
7220 PLOT 0,167: DRAW 255,0
7300 PRINT AT 0,0; PAPER 3;"(32*
sp)"
7400 RANDOMIZE USR 32000
7410 PRINT AT 16,g;"F"
7420 POKE 23295,63
7900 RETURN
8000 PRINT AT 0,13; PAPER 3; BRI
GHT 1;"(3*sp)AMMUNITION:(sp)";a
mo;"(sp)"
8010 RETURN
8020 PRINT AT 0,2; PAPER 3;"SCOR
E=";score;" "
8030 RETURN
8510 POKE 33006,20: POKE 33009,1
8

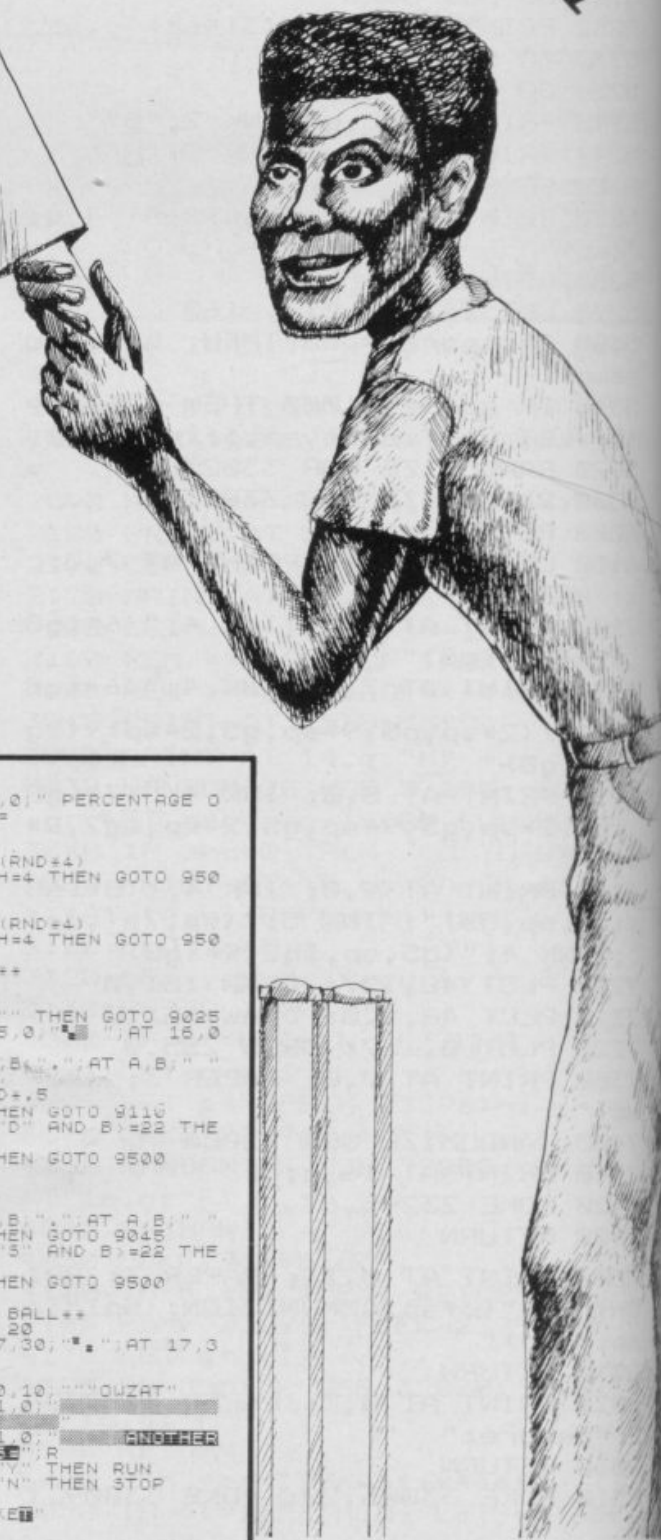
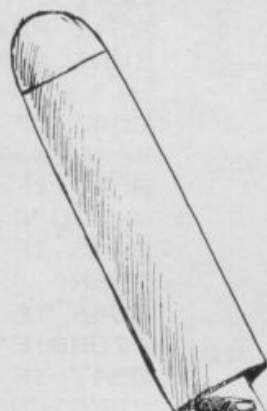
```

```

8520 PRINT AT 10,11; FLASH 1; IN
K 2;"GAME OVER"
8530 PRINT AT 0,26; FLASH 1; INK
2;"EMPTY"
8540 FOR A=1 TO 3: RANDOMIZE USR
33000: NEXT a
8541 POKE 33019,13: POKE 33004,1
00: RANDOMIZE USR 33000: POKE 33
004,3: POKE 33019,12
8542 PRINT AT 10,11; PAPER 3; BR
IGHT 1;"COMMENT:"; PAPER 6;"(2*s
p)"
8543 IF score>=-2000 THEN LET A
$="VEGATABLE"
8544 IF SCORE>=-1000 THEN LET A
$="GO BACK TO SLEEP"
8545 IF SCORE>=0 THEN LET A$="L
OSER"
8546 IF SCORE>=100 THEN LET A$=
"ZOMBIE"
8547 IF SCORE>=300 THEN LET A$=
"BEGINNER"
8549 IF SCORE>=800 THEN LET A$=
"IMPRESSIVE"
8550 IF SCORE>=1000 THEN LET A$
="STREET WISE"
8555 IF SCORE>=2000 THEN LET A$
="GENERAL PRO"
8557 IF SCORE>=5000 THEN LET A$
="WHIZZ KID"
8558 PRINT AT 12,11; PAPER 3; FL
ASH 1;A$
8560 POKE 33006,2: POKE 33009,24
8570 PRINT AT 0,0;"(5*sp)PRESS A
NY KEY TO PLAY(6*sp)"
8580 IF INKEY$<>" " THEN RUN 2
8590 GO TO 8580
9000 FOR z=0 TO 38: READ a: POKE
32000+z,a: NEXT z
9030 DATA 33,0,90,6,255,62,63,11
9,35,16,252,42,0,91,62,0,119,1,3
2,0,237,66,119,237,66,119,237,66
,119,237,66,119,237,66,119,237,6
6,119,201
9050 FOR a=0 TO 63: READ z: POKE
65368+a,z: NEXT a
9060 DATA 0,255,7,1,127,255,170,
85,112,254,254,248,254,255,170,8
4,0,15,0,0,7,15,5,2,7,255,255,63
,255,255,85,170,0,192,192,0,192,
224,64,128,255,165,165,165,165,1
65,165,126,149,215,90,93,107,50,
46,60,129,36,1,138,36,38,88,42
9070 FOR A=0 TO 48: READ X: POKE
33000+A,X: NEXT A
9080 DATA 33,0,0,14,3,22,2,126,2
30,24,211,254,65,16,254,35,21,32
,244,12,32,239,201,33,0,64,126,7
,119,21,35,124,254,88,32,246,33,
0,64,126,15,119,35,124,254,88,32
,247,201
9999 GO TO 2

```


CRICKET

[illegible]

```

0000 DS =R,B
0001 LET P=R/B
0002 PRINT AT 7,0," PERCENTAGE O
0003 RUNS PER BALL="
0004 P
0005 STOP
0006 LET H=INT (RAND*4)
0007 IF H=1 OR H=4 THEN GOTO 9500
0008 GOTO 4000
0009 LET H=INT (RAND*4)
0010 IF H=1 OR H=4 THEN GOTO 9500
0011
0012 REM ==BALL==
0013 LET A=15
0014 LET B=22
0015 IF INKEY#="" THEN GOTO 9025
0016 PRINT AT 15,0," ",AT 16,0
0017
0018 PRINT AT A,B," ",AT A,B," "
0019 LET B=B+1
0020 LET A=A+RAND*.5
0021 IF A>=16 THEN GOTO 9110
0022 IF INKEY#="D" AND B>=22 THE
0023 GOTO 9000
0024 IF B>=26 THEN GOTO 9500
0025 GOTO 9045
0026 LET A=A-.4
0027 LET B=B+1
0028 PRINT AT A,B," ",AT A,B," "
0029 IF A>=16 THEN GOTO 9045
0030 IF INKEY#="S" AND B>=22 THE
0031 GOTO 8500
0032 IF B>=26 THEN GOTO 9500
0033 GOTO 9110
0034 REM ==MISS BALL==
0035 FOR F=1 TO 20
0036 PRINT AT 17,30," ",AT 17,3
0037
0038 NEXT F
0039 PRINT AT 10,10,"""OWZAT""
0040 PRINT AT 21,0,""
0041 PRINT AT 21,0,""ANOTHER
0042 PRINT AT 21,0,""
0043 IF INKEY#="" THEN RUN
0044 IF INKEY#="N" THEN STOP
0045 GOTO 9050
0046 SAVE "CRICKET"
0047 RUN

```


Wally meets the Things

JUST COLLECT six diamonds for us, they said. Avoid the Things and you are home and dry. So, being the Wally you are, you have a go.

Wally Meets the Things was written for the 16k Spectrum by P Mansfield of Cardiff. You must move Wally around the screen, but each column and row has a guardian Thing, which will move out to get you if you step onto its patch. Find the best strategy to lure the Things towards you so you can duck behind them to get the diamonds.

The game uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

```

1 FOR i=0 TO 23
2 READ j
3 POKE USR "a"+i,j
4 NEXT i
5 DATA 126,219,255,195,126,66
,66,129,60,90,153,231,231,153,90
,60,24,24,8,126,8,24,36,66
6 PRINT FLASH 1; INK 4; AT 0,
5;"GET READY"
7 PRINT PAPER 1; INK 7;"USE
CURSOR KEYS TO MOVE MAN -(3*sp)W
ALLY HAS TO AVOID THE THINGYS(2*
sp)AND COLLECT(2*sp)SIX DIAMONDS
TO WIN -THE THINGYS ARE DEADLY
AND SO(2*sp)ARE THE RED AND BLUE
BORDERS(3*sp)"
8 BORDER 3
9 PAUSE 200
10 CLS
11 PLOT 0,7: DRAW 240,0: DRAW
0,167
15 PAPER 7: INK 0
20 DIM a(20)
25 DIM b(30)
35 LET w$="(sp)": LET k=0: LET
t=0
40 LET x=1
50 FOR y=1 TO 30
60 PRINT INK 2; AT x,y;"A"
70 LET b(y)=1
80 NEXT y
90 LET y=1
100 FOR x=1 TO 20
110 PRINT INK 1; AT x,y;"A"
120 LET a(x)=1
130 NEXT x
135 LET c=20: LET d=30
140 PRINT INK 3; AT c,d;"C"
150 PRINT INK 1; AT 0,0;"(31*g3
)"
155 PRINT INK 2; AT 0,0;"(ig4)"
160 FOR p=1 TO 20
170 PRINT INK 2; AT p,0;"(ig5)"
175 NEXT p
176 PRINT PAPER 6; INK 2; AT 0
,1;"B"
177 PRINT PAPER 6; INK 2; AT 0
,15;"B"
178 PRINT PAPER 6; INK 2; AT 0
,30;"B"
179 PRINT PAPER 6; INK 2; AT 6
,0;"B"
180 PRINT PAPER 6; INK 2; AT 1
3,0;"B"
181 PRINT PAPER 6; INK 2; AT 2
0,0;"B"
183 FOR u=1 TO 5
185 BEEP .05,20: BEEP .05,22: B
EEP .05,25: BEEP .05,30
187 NEXT u
190 REM move man
200 GO SUB 300
210 REM move red down
213 IF d=0 THEN GO TO 225

```



```

215 IF a(b(d))=d THEN LET w$="
A": LET k=1
220 GO SUB 400
223 LET w$="(sp)": LET k=0
225 REM move man
230 GO SUB 300
235 REM move blue across
236 IF c=0 THEN GO TO 190
237 IF b(a(c))=c THEN LET w$="
A": LET k=2
240 GO SUB 420
245 LET w$="(sp)": LET k=0
250 GO TO 190
290 REM move man
300 PRINT AT c,d;"(sp)"
310 LET d=d-(INKEY$="5" AND d>0
)+(INKEY$="8" AND d<30)
320 LET c=c-(INKEY$="7" AND c>0
)+(INKEY$="6" AND c<20)
330 IF ATTR (c,d)=57 OR ATTR (c
,d)=58 THEN GO TO 1000
335 IF ATTR (c,d)=50 THEN LET
t=t+1: BEEP .05,10
340 PRINT INK 3; AT c,d;"C"
342 IF t=6 THEN GO TO 700
343 BEEP .01,-20
350 RETURN
395 REM move red down
400 IF b(d)<c THEN PRINT INK
k; AT b(d),d;w$: LET b(d)=b(d)+1
GO SUB 500
410 IF b(d)>c THEN PRINT INK
k; AT b(d),d;w$: LET b(d)=b(d)-1
GO SUB 500
415 RETURN
417 REM move blue across
420 IF a(c)<d THEN PRINT INK
k; AT c,a(c);w$: LET a(c)=a(c)+1

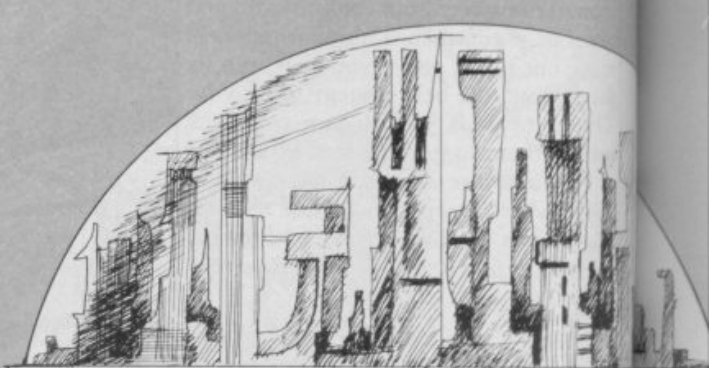
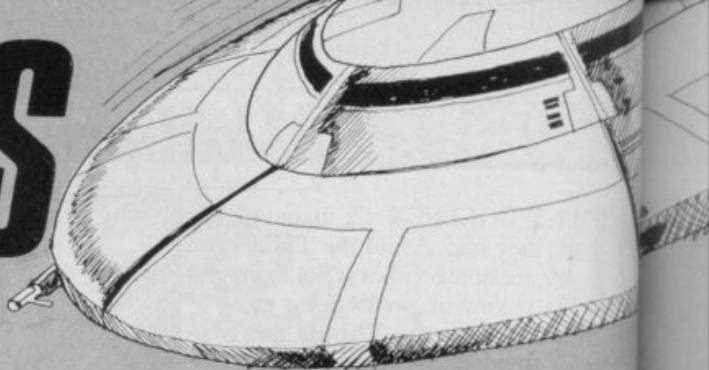
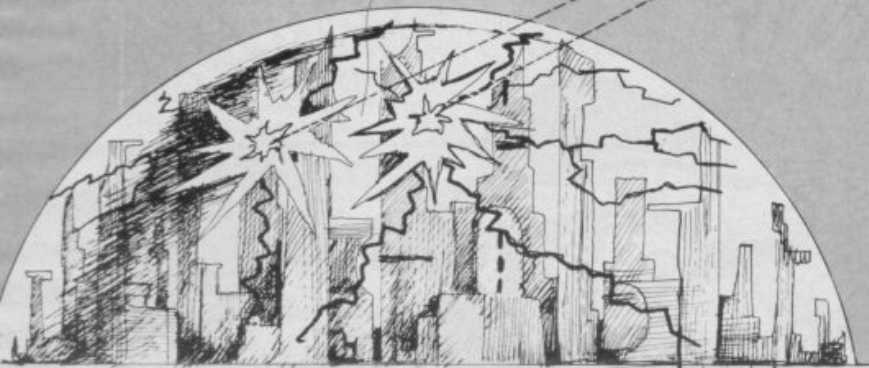
```

```

GO SUB 600
430 IF a(c)>d THEN PRINT INK
k; AT c,a(c);w$: LET a(c)=a(c)-1
GO SUB 600
440 RETURN
490 REM test for a hit
500 IF ATTR (b(d),d)=59 THEN P
RINT AT b(d),d;"A": GO TO 1000
510 PRINT INK 2; AT b(d),d;"A"
530 RETURN
590 REM test for a hit
600 IF ATTR (c,a(c))=59 THEN P
RINT AT c,a(c);w$: GO TO 1000
610 PRINT INK 1; AT c,a(c);w$
630 RETURN
690 REM test for a win
700 PRINT AT 21,0;"YOU'VE WON -
Another game ? Y/N"
760 FOR v=24 TO 36
765 BEEP .05,v: BEEP .05,v: BEE
P .05,v:
767 NEXT v
770 INPUT x$
780 IF x$="y" THEN GO TO 10
790 GO TO 1040
800 RETURN
990 REM HIT
1000 PRINT INK 3; OVER 1; AT c,d
;"C"
1010 PRINT FLASH 1; AT 21,0;"YOU
'RE DEAD-Another game Y/N"
1013 FOR v=1 TO 12
1015 BEEP .05,v: BEEP .05,v: BEE
P .05,v:
1017 NEXT v
1020 INPUT x$
1030 IF x$="y" THEN GO TO 10
1040 STOP

```


DOMEWARS



ON AN ALIEN planet a missile is about to be launched at earth. Time is short, and you must run the gauntlet of the alien defences to bomb the domes in which the evil creatures live.

Stuart Box of Thame in Oxfordshire has used an unusual graphics routine to create some spectacular scenery for **Domewars**, which runs on the 48K Spectrum.

The game uses our special abbreviations for graphics instructions, so please refer to the first page of Program Printout for advice on how to enter them before you type in the program.

```

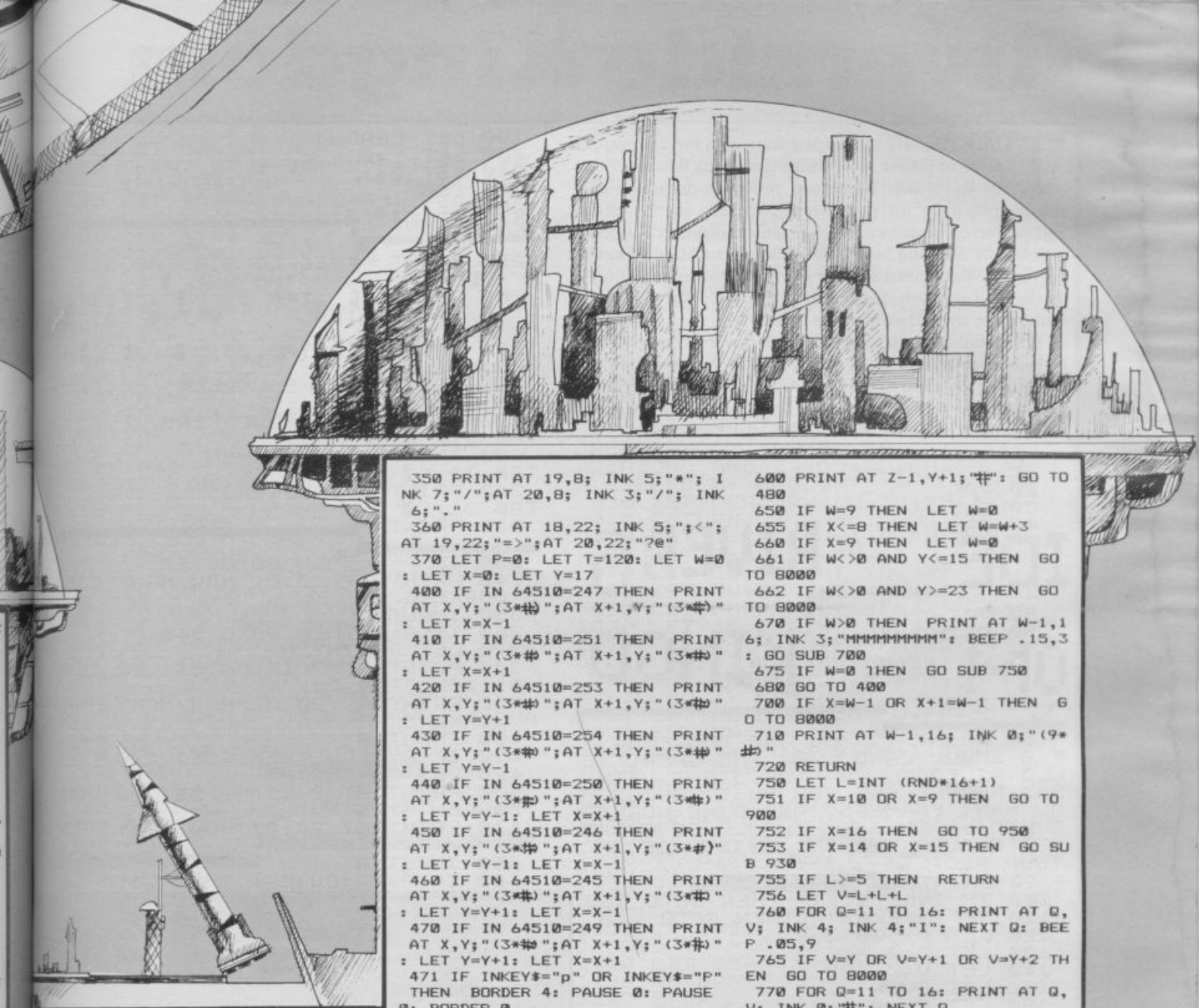
1 BORDER 0
2 CLEAR 65023
3 LET C=43
4 LET R=C*8
5 LET N=65367-R
6 LET F=35-32
7 LET D=F*8
8 LET H=N+1-D-256
9 LET E=H-256*INT (H/256)
10 PAPER 0: CLS : LET T=251: P
  RINT AT 1,12: INK 6: INVERSE 1: "
  SAUCER":#0: "(4*sp)WRITTEN BY STU
  ART BOX."
11 INK 6: PRINT AT 3,1: "YOU MO
  VE YOUR FLYING SAUCER(5*sp)AROU
  D USING THESE KEYS:-(50*sp)Q=LEF
  T(26*sp)W=RIGHT(25*sp)E=DOWN(26*
  sp)R=UP(28*sp)T=FIRES"
12 PRINT AT 11,12: "P=PAUSE":AT
  12,0: "(PRESS ANOTHER KEY TO CON
  TINUE)":AT 13,12: "M=QUIT"
13 PRINT AT 17,1: "YOU CAN PRES
  S MORE THAN ONE KEY AT A TIME WH
  ICH MEANS YOU CAN(3*sp)MOVE DIAG
  ONALLY."
14 PRINT AT 21,10: "PLEASE WAIT
  "
```

```

15 LET T=INT (H/256)
20 FOR I=N+1 TO N+R: READ A: P
  OKE I,A: NEXT I
35 DATA 0,0,0,0,0,0,0,0
36 DATA 255,255,255,129,129,25
  5,255,255
37 DATA 0,0,0,0,0,0,0,3
38 DATA 0,0,0,0,7,56,192,0
39 DATA 0,0,0,0,224,28,3,0
40 DATA 0,0,0,0,0,0,192
41 DATA 4,8,16,16,32,32,64,64
42 DATA 32,33,255,255,153,153,
  255,255
43 DATA 0,0,0,224,228,252,63,6
  3
44 DATA 32,16,8,8,4,4,2,98
45 DATA 64,79,143,153,153,159,
  159,159
46 DATA 255,255,153,153,255,22
  7,227,227
47 DATA 255,231,231,255,153,15
  3,255,255
48 DATA 0,60,66,66,98,98,98,60
49 DATA 0,8,8,8,12,12,12,12
50 DATA 0,124,2,2,60,96,96,62
51 DATA 0,124,2,2,60,6,6,126
52 DATA 0,64,96,100,100,126,4,
  4
53 DATA 0,62,64,64,60,6,6,126
54 DATA 0,62,64,64,124,70,70,1
  26
55 DATA 0,120,8,8,12,12,12,12
56 DATA 0,60,66,66,60,70,70,60
57 DATA 0,60,66,66,60,6,6,126
```

```

58 DATA 98,226,225,49,49,241,
  41,241
59 DATA 0,0,0,0,1,2,4,8
60 DATA 0,0,0,0,128,64,32,16
61 DATA 8,11,11,11,8,8,8,11
62 DATA 16,208,208,208,16,16,
  16,16
63 DATA 11,24,40,72,143,137,14
  5,251
64 DATA 16,216,212,18,241,145,
  137,223
65 DATA 0,0,0,0,0,1,1,15
66 DATA 0,0,0,126,129,56,56,16
67 DATA 0,0,0,0,128,128,240
68 DATA 63,109,118,63,15,0,0,0
69 DATA 255,182,219,255,255,0,
  0,0
70 DATA 252,222,110,252,240,0,
  0,0
71 DATA 0,36,24,60,60,24,0,0
72 DATA 255,255,126,126,60,24,
  24,0
73 DATA 24,24,24,24,24,24,24,2
  4
74 DATA 34,62,28,8,127,93,20,5
  4
75 DATA 192,240,248,255,255,24
  8,240,192
76 DATA 3,15,31,255,255,31,15,
  3
77 DATA 15,31,48,96,199,135,0,
  0
210 PRINT #0: "(2*sp)PRESS ANY I
  EY TO CONTINUE"
220 PAUSE 0
230 CLS
235 PRINT AT 3,11: INVERSE 1: "T
  HE GAME": INVERSE 0: AT 5,1: "YOU
  HAVE TO BOMB THE DOMES(6*sp)BEFO
  RE THE TIME RUNS OUT. IF(4*sp)TH
  E TIME DOES RUN OUT THE(7*sp)MIS
  SILE LAUNCHES AT EARTH !!!!!"
240 PRINT AT 1,12: INVERSE 1: "S
  AUCCER": INVERSE 0: AT 10,1: "TO M
  KE IT EVEN HARDER THERE(4*sp)ARE
  ALSO GUN TURRETS THAT FIRE(2*sp)
  )AT YOU, SO YOU HAVE TO AVOID(4*
  sp)BEING SHOT."
250 PRINT AT 16,1: "YOUR SCORE E
  DES UP TEN WHEN YOU HIT A DOME."
260 PRINT #0: "(2*sp)PRESS ANY I
  EY TO CONTINUE"
300 PAUSE 0: CLS
301 PRINT AT 1,12: INVERSE 1: "W
  ARNING": AT 3,1: INVERSE 0: "DO NO
  T BREAK INTO THIS PROGRAM(2*sp)U
  SING THE BREAK KEYS. INSTEAD(3*
  sp)PRESS 0."
302 PRINT #0: "(4*sp)PRESS ANY I
```

EY TO PLAY."

```

303 PAUSE 0
304 LET S=0
305 CLS : POKE 23606,232
310 POKE 23607,252
320 BEEP .01,0: FOR Z=0 TO 8: P
RINT AT Z,0: "*****$K"; A
T Z,25: "L$*****": NEXT Z: POKE 2
3606,0: POKE 23607,60: PRINT AT
3,2: "SCORE="
321 PRINT AT 5,2: "TIME=": POKE
23606,232: POKE 23607,252
325 PRINT AT 21,0: "*****$
*****$*****$": FOR Z=0 T
O 20: PRINT AT Z,0: "$": AT Z,31: "
$": NEXT Z
326 PRINT AT 17,30: "L": FOR Z=1
6 TO 20: PRINT AT Z,16: "$": NEXT
Z: PRINT AT 17,17: "K": AT 17,19:
INK 4: "MMMMMMMMMM"
327 INK 6: PRINT AT 9,3: "H(2*H
H(2*H(2*H"
328 PRINT AT 15,30: "L": AT 17,15
: "L"
329 PRINT AT 10,1: "K": AT 10,30:
"L"
330 PRINT AT 18,2: INK 4: "%&'("
: AT 18,7: "%&'(" : AT 19,2: ")": AT 1
9,5: ",": AT 19,7: ")": AT 19,10: ",
": AT 20,2: "-": AT 20,5: ":": AT 20,7
: "-": AT 20,10: ":"
340 PRINT AT 19,3: INK 6: "*" : I
NK 5: "+" : AT 20,3: INK 7: "." : INK

```

```

350 PRINT AT 19,8: INK 5: "*" : I
NK 7: "/" : AT 20,8: INK 3: "/" : INK
6: "."
360 PRINT AT 18,22: INK 5: "<":
AT 19,22: ">": AT 20,22: "?@
370 LET P=0: LET T=120: LET W=0
: LET X=0: LET Y=17
400 IF IN 64510=247 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET X=X-1
410 IF IN 64510=251 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET X=X+1
420 IF IN 64510=253 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET Y=Y+1
430 IF IN 64510=254 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET Y=Y-1
440 IF IN 64510=250 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET Y=Y-1: LET X=X+1
450 IF IN 64510=246 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET Y=Y-1: LET X=X-1
460 IF IN 64510=245 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET Y=Y+1: LET X=X-1
470 IF IN 64510=249 THEN PRINT
AT X,Y: "(3*#)": AT X+1,Y: "(3*#)"
: LET Y=Y+1: LET X=X+1
471 IF INKEY$="p" OR INKEY$="P"
THEN BORDER 4: PAUSE 0: PAUSE
0: BORDER 0
472 IF INKEY$="m" OR INKEY$="M"
THEN GO TO 8000
473 IF INKEY$="0" THEN POKE 23
606,0: POKE 23607,60: STOP
475 IF IN 64510=239 THEN GO TO
510
476 IF W<0 AND X<0 THEN LET X
=0
477 IF Y<1 THEN LET Y=1
478 IF Y>28 THEN LET Y=28
480 PRINT AT X,Y: "ABC": AT X+1,Y
: "DEF"
481 PRINT AT 3,8: S: AT 5,8: T: "#
482 IF T=0 THEN GO TO 800
483 LET T=T-1
485 IF P=8 THEN GO TO 305
490 GO TO 650
500 GO TO 400
510 FOR Z=X+3 TO 20
520 IF SCREEN$ (Z,Y+1)<>"#" THE
N GO TO 550
525 PRINT AT Z-1,Y+1: "#
530 PRINT AT Z,Y+1: INK 5: "G"
540 NEXT Z: GO TO 600
550 IF SCREEN$ (Z,Y+1)="#" THEN
GO TO 600
555 IF SCREEN$ (Z,Y+1)="M" THEN
GO TO 600
560 IF SCREEN$ (Z,Y+1)="K" THEN
GO TO 600
565 IF SCREEN$ (Z,Y+1)="L" THEN
GO TO 600
570 PRINT AT Z-1,Y+1: "#: NEXT
Z: LET S=S+10: LET P=P+1

```

```

600 PRINT AT Z-1,Y+1: "#: GO TO
480
650 IF W=9 THEN LET W=0
655 IF X<8 THEN LET W=W+3
660 IF X=9 THEN LET W=0
661 IF W<0 AND Y<15 THEN GO
TO 8000
662 IF W<0 AND Y>=23 THEN GO
TO 8000
670 IF W>0 THEN PRINT AT W-1,1
6: INK 3: "MMMMMMMMMM": BEEP .15,3
: GO SUB 700
675 IF W=0 THEN GO SUB 750
680 GO TO 400
700 IF X=W-1 OR X+1=W-1 THEN G
O TO 8000
710 PRINT AT W-1,16: INK 0: "(9*
#)"
720 RETURN
750 LET L=INT (RND*16+1)
751 IF X=10 OR X=9 THEN GO TO
900
752 IF X=16 THEN GO TO 950
753 IF X=14 OR X=15 THEN GO SU
B 930
755 IF L>=5 THEN RETURN
756 LET V=L+L+L
760 FOR Q=11 TO 16: PRINT AT Q,
V: INK 4: INK 4: "I": NEXT Q: BEE
P .05,9
765 IF V=Y OR V=Y+1 OR V=Y+2 TH
EN GO TO 8000
770 FOR Q=11 TO 16: PRINT AT Q,
V: INK 0: "#": NEXT Q
780 RETURN
800 PRINT AT 17,18: "(12*#)"
810 FOR Z=0 TO 10: BEEP .1,9: N
EXT Z: FOR Z=0 TO 18: PRINT AT 1
7-Z,22: INK 5: "<": AT 18-Z,22: ">
": AT 19-Z,22: "?@": AT 20-Z,22: "#
#": BEEP .05,5: BEEP .05,8: BEEP
.05,3: NEXT Z
820 GO TO 8000
900 PRINT AT 10,2: INK 5: "MMMM
MMMMMMMMMM": AT 10,25: "MMMMM": IF
Y<15 THEN GO TO 8000
910 IF Y>=23 THEN GO TO 8000
920 BEEP .1,0: PRINT AT 10,2: "(
14*#)": AT 10,25: "(5*#)": GO TO 4
00
930 PRINT AT 15,15: INK 5: "MMMM
MMMMMMMMMM"
935 BEEP .1,0: IF Y>=13 THEN G
O TO 8000
940 PRINT AT 15,15: "(15*#)": RE
TURN
950 PRINT AT 17,1: INK 5: "MMMM
MMMMMMMMMM": BEEP .1,0
8000 BEEP .1,1: BEEP .1,2: BEEP
.1,3: BEEP .1,2: BEEP .1,1: PRIN
T AT X,Y: INK 6: FLASH 1: "ABC": A
T X+1,Y: "DEF"
8020 POKE 23606,0
8030 POKE 23607,60
8040 BORDER 1: PRINT #0: "(10*sp)
GAME(3*sp)OVER(11*sp)"
8050 BORDER 0: FOR C=0 TO 75: NE
XT C: GO TO 302

```


Riverside Kingdom

TIME AGAIN to sharpen your wits and take up the reins of power to organise the affairs of a kingdom. In **Riverside Kingdom** you must decide on suitable employment for your people, to keep them well-fed and protected from bandits and natural disaster. A special problem is flooding, and you must try to build dykes to prevent it. The screen display will show how much water is on the land and how much dyke is built; ideally you should build more dyke than there is water.

The initial stages are very difficult to survive as you have little defence against a bad year, but persevere and soon you will find it possible to plan for disaster more intelligently.

The game was written for the 16K ZX-81 by Colin Hunniford of Berkhamsted in Hertfordshire.

```
10 SLOW
20 RAND
30 CLS
40 PRINT "
```

IDE

RIVERS

OM

KINGD

```
70 PRINT "
```

```
80 PRINT "YOU ARE THE KING OF
A SMALL LAND BY THE GREAT YE
LLO RIVER." YOU START WITH
500 PEOPLE AND YOU MUST DECIDE H
OW MANY FARMERS AND DIKE WORKER
S ETC... THERE SHOULD BE SO AS
TO ENSURE THE EXISTENCE OF
YOUR PEOPLE"
```

```
90 PRINT "PRESS A KEY"
```

```
100 IF INKEY$(">") THEN GOTO 100
```

```
110 IF INKEY$="" THEN GOTO 110
```

```
120 LET P=500
```

```
130 LET D=0
```

```
140 LET U=0
```

```
150 LET DW=0
```

```
160 LET FW=0
```

```
170 LET FM=0
```

```
180 LET SD=0
```

```
190 LET DEAD=0
```

```
200 LET Y=0
```

```
210 LET B$=""
```

```
220 CLS
```

```
230 LET Y=Y+1
```

```
240 PRINT "
```

```
250 PRINT "PEOPLE:";P;TAB 31;"
```

```
"+";YEAR :";Y;TAB 31;"
```

```
260 PRINT "DIKE
```

```
:";D;"WATER :";W;TAB 31;"
```

```
270 PRINT "FARM WORKERS :";FW;
```

```
TAB 31;"FISHERMEN :";FM;
```

```
280 PRINT "SOLDIERS :";SD;
```

```
TAB 31;"
```

```
290 PRINT "DIKE WORKERS :";DW;
```

```
TAB 31;"FARM WORKERS :";FW;
```

```
300 PRINT "FISHERMEN :";FM;
```

```
TAB 31;"SOLDIERS :";SD;
```

```
TAB 31;"
```

```
320 PRINT "
```

```
330 IF P<1 THEN GOTO 760
```

```
340 PRINT AT 20,0;"HOW MANY DIK
```

```
E WORKERS ?"
```

```
350 INPUT A
```

```
360 IF A>P THEN GOTO 340
```

```
370 LET DW=INT A
```

```
380 PRINT AT 7,15;DW;B$( TO LEN
```

```
B$-LEN STR$ DW)
```

```
390 PRINT AT 20,0;"HOW MANY FAR
```

```
M WORKERS ?"
```

```
400 INPUT A
```

```
410 IF A>P-DW THEN GOTO 390
```

```
420 LET FW=INT A
```

```
430 PRINT AT 8,15;FW;B$( TO LEN
```

```
B$-LEN STR$ FW)
```

```
440 PRINT AT 20,0;"HOW MANY FIS
```

```
HERMEN ?"
```

```
450 INPUT A
```

```
460 IF A>P-(DW+FW) THEN GOTO 44
```




```

0
470 LET FM=INT A
480 PRINT AT 9,15;FM;B$( TO LEN
B$-LEN STR$ FM)
490 LET SD=P-(DW+FW+FM)
500 PRINT AT 10,15;SD;B$( TO LE
N B$-LEN STR$ SD)
510 PRINT AT 20,0;"

520 LET BI=0
530 LET D=D+INT (DW/10)-INT (RN
D*U)
540 IF D>100 THEN LET D=100
550 IF D<0 THEN LET D=0
560 LET B=INT (RND*(1.9*P))
570 PRINT AT 14,0;
580 IF (FW*1.9+FM*1.5)<P THEN G
OSUB 950
590 IF (FW*1.9+FM*1.5)>P THEN G
OSUB 1040
600 IF B<SD THEN LET B=0
605 IF B THEN LET B=B-SD
610 LET DEAD=0
620 IF B THEN GOSUB 1070
640 PRINT DEAD;(" PEOPLE" AND D
EAD<>1);(" PERSON" AND DEAD=1);"
KILLED BY BANDITS"
650 IF U>D THEN GOSUB 780
660 IF U<5 THEN GOSUB 870
670 LET U=INT (RND*101)
675 LET DEAD=P-(DW+FW+FM+SD)
680 LET P=P-DEAD
690 PRINT BI;(" CHILDREN" AND B
I<>1);(" CHILD" AND BI=1);" BORN "
700 LET P=P+BI
710 IF P<0 THEN LET P=0
720 PRINT "PRESS A KEY"
730 IF INKEY$<>"" THEN GOTO 730
740 IF INKEY$="" THEN GOTO 740
750 GOTO 220
750 PRINT "YOUR PEOPLE HAVE D
IED. GOOD LUCK"
770 STOP

```

```

780 LET Z=DW+FW+FM+SD
790 LET X=(U-D)/100
800 LET DW=INT (DW-(X*DW))
810 LET FW=INT (FW-(X*FW))
820 LET FM=INT (FM-(X*FM))
830 LET SD=INT (SD-(X*SD))
840 PRINT Z-(DW+FW+FM+SD);(" PE
OPLE" AND Z-(DW+FW+FM+SD)<>1);("
PERSON" AND Z-(DW+FW+FM+SD)=1);"
KILLED BY FLOOD"
850 LET DEAD=P-(DW+FW+FM+SD)
860 RETURN
870 LET Z=DW+FW+FM+SD
880 LET DW=DW-INT (RND*DW/1.2)
890 LET FW=FW-INT (RND*FW/1.2)
900 LET FM=FM-INT (RND*FM/1.2)
910 LET SD=SD-INT (RND*SD/1.2)
920 PRINT Z-(DW+FW+FM+SD);(" PE
OPLE" AND Z-(DW+FW+FM+SD)<>1);("
PERSON" AND Z-(DW+FW+FM+SD)=1);"
KILLED BY DROUGHT"
930 LET DEAD=P-(DW+FW+FM+SD)
940 RETURN
950 LET X=(P-(FW*1.9+FM*1.5))/P
960 LET Z=DW+FW+FM+SD
970 LET DW=DW-INT (DW*X)
980 LET FW=FW-INT (FW*X)
990 LET FM=FM-INT (FM*X)
1000 LET SD=SD-INT (SD*X)
1010 PRINT Z-(DW+FW+FM+SD);(" PE
OPLE" AND Z-(DW+FW+FM+SD)<>1);("
PERSON" AND Z-(DW+FW+FM+SD)=1);"
KILLED BY FAMINE"
1020 LET DEAD=P-(DW+FW+FM+SD)
1030 RETURN
1040 LET X=(FW*1.9+FM*1.5)-P
1050 LET BI=INT X
1060 RETURN
1070 LET Z=DW+FW+FM+SD
1080 IF B>DW THEN LET DW=INT (RN
D*DW)
1090 IF B>FW THEN LET FW=INT (RN
D*FW)
1100 IF B>FM THEN LET FM=INT (RN
D*FM)
1110 IF B>SD THEN LET SD=INT (RN
D*SD)
1120 LET DEAD=Z-(DW+FW+FM+SD)
1130 RETURN
9997 STOP
9998 SAVE "KING"
9999 RUN

```



THE 3.30 EXPRESS is hurtling towards disaster. A yawning chasm waits where there used to be a bridge. It is your job, as pilot of a helicopter, to collect the pieces of bridge at the bottom of the chasm and put them back in place before the train thunders across. Unfortunately enemy helicopters and bombs impede your progress, and you must time your efforts carefully to survive. **Rail Rescue** was written for the 16K Spectrum by C Thimbleby and B Knight of Lincoln.

The game uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the game.

```

10 REM Rail Rescue
30 FOR x=0 TO 7: READ a: POKE
USR "a"+x,a: NEXT x
40 DATA 255,56,120,249,255,255
,40,124
50 FOR x=0 TO 7: READ a: POKE
USR "b"+x,a: NEXT x
60 DATA 248,144,147,243,255,25
5,102,102
70 FOR x=0 TO 7: READ a: POKE
USR "c"+x,a: NEXT x
80 DATA 254,146,146,147,255,25
5,102,102
90 FOR x=0 TO 7: READ a: POKE
USR "d"+x,a: NEXT x
100 DATA 0,28,16,56,124,124,124
,56
110 FOR x=0 TO 7: READ a: POKE
USR "e"+x,a: NEXT x
120 DATA 255,195,165,153,153,16
5,195,255
145 GO TO 3000
150 LET nb=0: LET ti=0: LET mi=
28: LET l=11: LET c=16: LET br=0
: LET li=4: LET sc=0
162 BORDER 1: INK 7: BRIGHT 0:
CLS
165 INK 0: PRINT AT 5,0;"EEEEEE
EE";AT 5,24;"EEEEEEEEEE": FOR f=6
TO 13: PRINT AT f,3;"E";AT f,28;
"E": NEXT f
170 INK 0: FOR f=0 TO 8: PLOT f
,0: DRAW 0,127: NEXT f: LET b=12
7: FOR a=8 TO 56: PLOT a,0: DRAW
0,b: LET b=b-INT (RND*5) AND b>
0: NEXT a
180 INK 0: FOR f=255 TO 247 STE
P -1: PLOT f,0: DRAW 0,127: NEXT
f: LET b=127: FOR a=247 TO 199
STEP -1: PLOT a,0: DRAW 0,b: LET
b=b-INT (RND*5) AND b>0: NEXT a
190 INK 0: BRIGHT 1: INVERSE 1:
PRINT AT 20,0;"(2*sp)TIME(3*sp)
:328pm(4*sp)SCORE(2*sp):000(2*sp)
":AT 21,0;"(19*sp)LIVES(2*sp):0
04(sp)"
195 INVERSE 0: BRIGHT 0

```

```

200 PRINT AT 19,8; INK 2;"EEEEEE
EEEEEEEEEEEE"

```

```

214 LET ac=8: LET ac1=23
215 PRINT AT 17,ac; INK 3;"A";A
T 18,ac1;"A";AT 6,ac;"A";AT 6,ac
1;"A";AT 10,ac;"D";AT 12,ac1;"D"
216 IF ATTR (1,c+1)=59 THEN LE
T li=li-1: FOR f=0 TO 5: FOR b=0
TO 7: BEEP .004,b: BORDER b: NE
XT b: NEXT f: BORDER 1
217 IF ATTR (1,c-1)=59 THEN LE
T li=li-1: FOR f=0 TO 5: FOR b=0
TO 7: BEEP .004,b: BORDER b: NE
XT b: NEXT f: BORDER 1
219 IF li<=0 THEN GO TO 2000
220 PRINT INK 1;AT 1,c;"A": IF
br=1 THEN PRINT AT 1+1,c;"E"
221 IF br=1 AND 1<=17 THEN PRI
NT AT 1+2,c;"(sp)": PRINT AT 1+1
,c+1;"(sp)";AT 1+1,c-1;"(sp)"
222 IF 1=6 AND br=1 AND ATTR (1
-1,c)<>56 THEN PRINT AT 1+1,c;"
(sp)";AT 1-1,c;"E": LET br=0: LE
T nb=nb+1: LET sc=sc+40
224 IF ATTR (1+1,c)=58 THEN LE
T br=1: LET sc=sc+20
240 IF INKEY$="o" AND c>8 THEN
PRINT AT 1,c;"(sp)": LET c=c-1
250 IF INKEY$="p" AND c<23 THEN
PRINT AT 1,c;"(sp)": LET c=c+1
260 IF INKEY$="q" AND 1>6 THEN

```





```
PRINT AT 1,c;"(sp)": LET l=1-1
270 IF INKEY$="a" AND l<18 THEN
PRINT AT 1,c;"(sp)": LET l=1+1
275 IF nb=16 THEN GO TO 1000
280 PRINT AT 17,ac;"(sp)";AT 18
,ac1;"(sp)";AT 6,ac;"(sp)";AT 6,
ac1;"(sp)";AT 10,ac;"(sp)";AT 12
,ac1;"(sp)": LET ac=ac+1: LET ac
1=ac1-1: IF ac=23 THEN GO TO 21
4: IF ac1=8 THEN GO TO 214
290 PRINT INVERSE 1; BRIGHT 1;
INK 0;AT 21,29;li;AT 20,28;sc;A
T 20,11;mi
300 LET ti=ti+1: IF ti=254 THEN
LET mi=mi+1: IF mi=30 AND nb<1
6 THEN GO TO 2000
301 IF ti=504 THEN LET mi=mi+1
: IF mi=30 AND nb<16 THEN GO TO
2000
305 IF mi<=30 AND nb=16 THEN G
O TO 1000
310 GO TO 215
1000 LET a$="CCCCCB": FOR f=0 TO
26: PRINT AT 4,f; INK 4;a$;AT 4
,f-1;"(sp)": BEEP .01,-20: BEEP
.01,-20: BEEP .01,-5: NEXT f: PR
INT AT 4,26;"(6*sp)"
```

```
1010 PRINT INK 1;AT 2,11;"WELL
DONE,";AT 3,3;" YOU HAVE SAVED T
HE TRAIN";AT 4,6; INK 2;"YOU SCO
RED ";sc;" POINTS"
1020 PAUSE 0: GO TO 3000
2000 LET a$="CCCCCB": FOR f=0 TO
8: PRINT AT 4,f; INK 1;a$;AT 4,
f-1;"(sp)": BEEP .01,-20: BEEP .
01,-20: BEEP .01,-5: NEXT f: PRI
NT AT 4,26;"(6*sp)": FOR n=5 TO
18: PRINT AT n,8; INK 1;a$: BEEP
.05,10-n: PRINT AT n-1,8;"(6*sp
)": NEXT n
2005 FOR s=-20 TO -30 STEP -1: B
EEP .01,s: NEXT s
2010 PRINT AT 2,12; INK 1;"BAD L
UCK,";AT 3,5;"YOU FAILED YOUR MI
SSION";AT 4,6; INK 2;"YOU SCORED
";sc;" POINTS"
2020 PAUSE 0: GO TO 3000
3000 CLS : BORDER 1: BRIGHT 1: P
APER 7: CLS
3010 PRINT AT 1,11; INK 2;"RAIL
RESCUE";AT 2,9; INK 1;"ECLIPSOFT
1984"
3020 PRINT AT 5,0;"THE OBJECT OF
THE GAME IS TO FLY""AROUND THE
VALLEY FETCHING PARTS""OF A BR
IDGE AND TO REBUILD IT.""ONLY Y
OU MUST DODGE THE""HELICOPTERS
AND BOMBS.YOU MUST""COMPLETE TH
E BRIDGE BEFORE""3:30PM,A TIME
OF TWO MINUTES,.""OTHERWISE THE
3:30 EXPRESS WILL""PLUNGE INTO
THE DEPTHS OF THE""VALLEY."
3030 PRINT AT 15,1; INK 3;"CONTR
OLS:"; INK 2;AT 16,1;"UP....Q";A
T 17,1;"DOWN..A";AT 18,1;"LEFT..
O";AT 19,1;"RIGHT.P"
3040 PRINT FLASH 1; INK 0;AT 20
,9;"PRESS ANY KEY": PAUSE 0: GO
TO 149
```

RAIL RESCUE




```

2 REM Home Accounts
3 GO TO 8400
10 CLS : PRINT AT 1,7;"Monthly
forecast.": PRINT AT 1,7; OVER
1;"-----"
20 PRINT AT 3,11;"MONTHLY": PR
INT AT 6,6;"INCOME": PRINT AT 6,
17;"OUTGOING"
30 PLOT 107,142: DRAW -40,-14:
PLOT 124,142: DRAW 40,-14
40 LET a(1,1)=a(1,5): PRINT AT
8,6;"£";a(1,1)
50 LET a(1,2)=a(1,4)+a(2,1)+a(
2,3)+a(2,5)+a(3,1)+a(3,3): PRINT
AT 8,17;"£";a(1,2)
55 LET a(1,3)=a(1,1)-a(1,2): I
F SGN a(1,3)=-1 THEN LET f1=1
60 PRINT AT 10,11; INK f1+1; F
LASH f1;"BALANCE"
70 PRINT AT 12,11; INK f1+1;"£
";a(1,1)-a(1,2): LET f1=0
80 PAUSE 0
90 RETURN
1000 CLS : PRINT AT 1,9;"Bank St
atement.": PRINT AT 1,9; OVER 1;
"-----": INPUT "Change
cheque start No.?(Y/N)";y$: IF
y$="y" THEN INPUT a(1,6)
1001 IF y$="Y" THEN INPUT a(1,6
)
1002 INPUT INK 0; PAPER 7;"View
or Input?(V/I)";i$: IF LEN i$>1
THEN GO TO 1001
1003 IF LEN i$<1 THEN GO TO 100
1
1004 IF i$="i" THEN LET qu=1: G
O TO 1500
1005 IF i$="I" THEN LET qu=1: G
O TO 1500
1006 IF i$="v" THEN GO TO 1500
1007 IF i$="V" THEN GO TO 1500
1009 GO TO 1001
1010 FOR f=4 TO 18 STEP 8: PRINT
AT f,1;"Cheque(3*sp)Date(5*sp)I
nformation(2*sp)": PRINT AT f,1;
OVER 1;"
-----"
": NEXT f
1020 FOR f=8 TO 20 STEP 8: PRINT
AT f,1; INK 2;"Credit(3*sp)Debi
t(4*sp)Balance": PRINT AT f,1; I
NK 2; OVER 1;"
-----"
": NEXT f
1030 PLOT 75,143: DRAW 0,-130: P
LOT 148,143: DRAW 0,-130: RETURN
1050 INPUT "Day ?";d$: IF LEN d$
>2 THEN GO TO 1050
1055 IF CODE d$>48 THEN IF CODE
d$<58 THEN LET a(j,1)=VAL d$:
PRINT AT 5,10;d$: GO TO 1060

```

Home Accounts

HOME ACCOUNTS should be of use to virtually any reader of *Sinclair User*. It is a comprehensive accounts system to help manage the household budget, and was written by Stephen Hancock of Stoke-on-Trent.

There are three main facilities, monthly forecast, cash expenditure and bank account. The monthly forecast works in conjunction with the cash expenditure to set expenditure against income. To use the monthly forecast move the cursor with keys 6 and 8 to the desired item, and then press key 8 to alter the figures.

To exit from the cash expenditure routine, use any key except 0 or ENTER. The bank account section is independent of the other two and can store details of up to 400 cheques. You can increase this number by altering the first two DIM statements in line 8 from 400 to the desired number, up to about 1,350.

The program requires a 48K Spectrum, and uses our special abbreviations for graphics characters, so please read the instructions on the first page of the Program Printout section before typing in the listing.




```

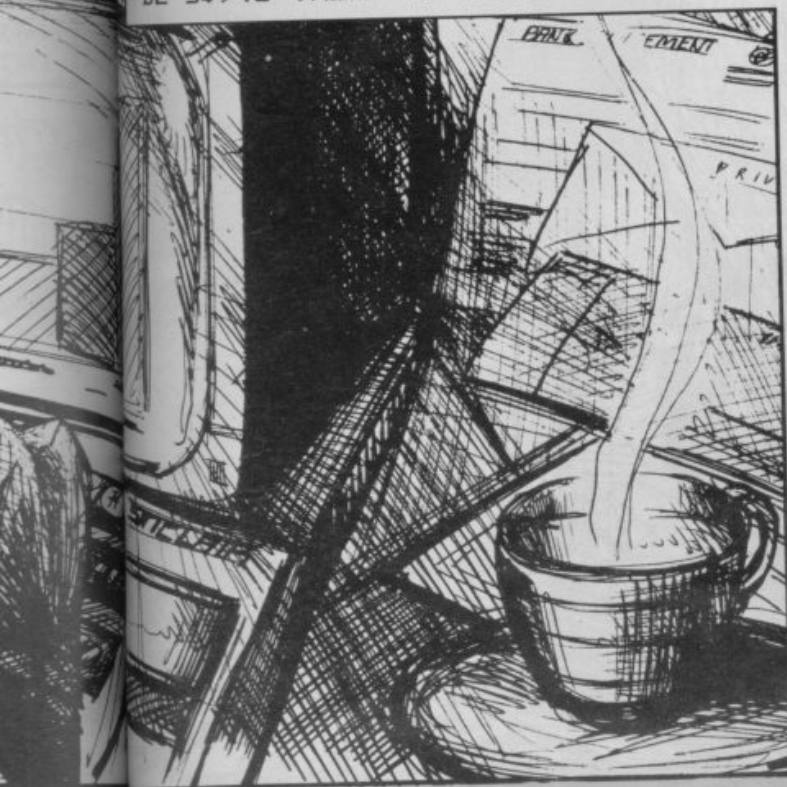
1056 GO TO 1050
1060 INPUT "Month ?";d$: IF LEN
d$>2 THEN GO TO 1060
1065 IF CODE d$>48 THEN IF CODE
d$<58 THEN LET a(j,2)=VAL d$:
PRINT AT 5,13;d$: GO TO 1070
1066 GO TO 1060
1070 INPUT "Year ? ";d$: IF CODE
d$>48 THEN IF CODE d$<58 THEN
GO TO 1076
1075 GO TO 1070
1076 IF LEN d$>4 THEN GO TO 107
0
1077 IF LEN d$>3 THEN LET d$=d$
(3 TO 4): GO TO 1079
1078 IF LEN d$>2 THEN LET d$=d$
+" "
1079 PRINT AT 5,16;d$: LET a(j,3
)=VAL d$
1080 INPUT "Information ?";i$: I
F LEN i$>11 THEN PRINT AT 3,0;
INK 2; FLASH 1;"(3*sp)TOO LONG 1
1 CHARACTERS MAX.(2*sp)": GO TO
1080
1090 PRINT AT 3,0;"(32*sp)"
1095 IF LEN i$<11 THEN LET i$=i
$+"(sp)": GO TO 1095
1100 FOR f=1 TO 11: LET a$((j-5)
,f)=i$(f TO f): PRINT AT 5,18+f;
i$(f TO f): NEXT f
1110 INPUT "CREDIT OR DEBIT ? (C
/D)";g$: IF g$="d" THEN LET deb
=-1
1120 IF g$="D" THEN LET deb=-1
1130 INPUT "AMOUNT ? ";s$: IF CO
DE s$>48 THEN IF CODE s$<58 THE

```

```

N IF LEN s$<7 THEN LET amo=VAL
s$: GO TO 1135
1131 GO TO 1130
1135 IF deb=-1 THEN LET amo=amo
*deb: PRINT AT 9,10; INK 4;amo:
GO TO 1150
1140 PRINT AT 9,1;amo
1150 LET a(j,4)=amo
1160 GO SUB 7400: IF SGN a(j,5)=
-1 THEN LET f1=1
1170 PRINT AT 9,19; INK f1+1; FL
ASH f1;a(j,5): LET f1=0
1490 LET deb=1: LET qu=0
1491 INPUT "CONTINUE OR RETURN T
O MENU ?(4*sp)(C/R)(sp)";l$: IF
l$="c" THEN GO TO 1495
1492 IF l$="C" THEN GO TO 1495
1493 RETURN
1495 CLS : PRINT AT 1,9;"Bank St
atement.": PRINT AT 1,9; OVER 1;
"-----"
1496 LET qu=1
1500 GO SUB 1010
1510 INPUT INK 0; PAPER 7;"Cheq
ue No.?" ;k$: IF LEN k$>6 THEN G
O TO 1510
1520 IF LEN k$<1 THEN GO TO 151
0
1530 IF CODE k$>48 THEN IF CODE
k$<58 THEN GO TO 1540
1535 GO TO 1510
1540 LET chq=VAL k$
1545 IF chq<a(1,6) THEN GO TO 1
510
1546 LET j=(chq-a(1,6))+6
1547 IF j>400 THEN GO SUB 7900
1548 IF qu=1 THEN IF a(j,1)>0 T
HEN INPUT "Cheque used. CONTINU
E ? (Y/N)(3*sp)";u$: IF u$="n" T
HEN RETURN
1549 IF u$="N" THEN RETURN
1550 PRINT AT 5,1;chq;AT 5,12;"/
";AT 5,15;"/";AT 13,1;chq+1;AT 1
3,12;"/";AT 13,15;"/"
1555 IF qu=1 THEN GO TO 1050
1560 PRINT AT 5,10;a(j,1);AT 5,1
3;a(j,2);AT 5,16;a(j,3)
1570 FOR f=1 TO 11: PRINT AT 5,
f+18;a$((j-5),f): NEXT f
1580 IF a(j,4)>0 THEN PRINT AT
9,1;a(j,4): GO TO 1600
1590 IF a(j,4)<0 THEN PRINT AT
9,10; INK 4;a(j,4)
1595 GO SUB 7400: IF SGN a(j,5)=
-1 THEN LET f1=1
1600 PRINT AT 9,19; INK f1+1; FL
ASH f1;a(j,5): LET f1=0
1610 LET j=j+1
1620 PRINT AT 13,10;a(j,1);AT 13
,13;a(j,2);AT 13,16;a(j,3)
1630 FOR f=1 TO 11: PRINT AT 13,

```




```

f+18; a$((j-5),f); NEXT f
1640 IF a(j,4)>0 THEN PRINT AT
17,1;a(j,4); GO TO 1660
1650 IF a(j,4)<0 THEN PRINT AT
17,10; INK 4;a(j,4)
1655 GO SUB 7400: IF SGN a(j,5)=
-1 THEN LET f1=1
1660 PRINT AT 17,19; INK f1+1; F
LASH f1;a(j,5); LET f1=0
1670 INPUT "CONTINUE OR RETURN T
O MENU ?(4*sp)(C/R)(sp)";l$: IF
l$="c" THEN GO TO 1690
1680 IF l$="C" THEN GO TO 1690
1685 RETURN
1690 CLS: PRINT AT 1,9;"Bank St
atement.": PRINT AT 1,9; OVER 1;
"
1700 GO TO 1500
2000 CLS: PRINT AT 1,3;"Probabl
e cash expenditure.": PRINT AT 1
,3; OVER 1;"
2010 PRINT AT 5,3;"ITEM";TAB 20;
"Expenditure";AT 5,3; OVER 1;"
2015 LET a(1,4)=a(4,3)+a(4,4)+a(
4,5)+a(4,6)+a(5,1)+a(5,2)+a(5,3)
+a(5,4)+a(5,5)+a(5,6)
2020 FOR f=1 TO 9: PRINT AT f+5,
2;f;";TAB 20;"£": NEXT f: PRIN
T AT 15,1;"10";TAB 20;"£": PRIN
T AT 18,1;"TOTAL EXPENDITURE= £"
;a(1,4)
2021 FOR f=1 TO 10: FOR d=1 TO 1
5: PRINT AT f+5,d+4;b$(f,d): NEX
T d
2022 LET f=f+20: GO SUB 7700: PR
INT AT f-15,21;a(x,y): LET f=f-2
0: NEXT f
2025 PLOT 158,138: DRAW 0,-90
2030 PRINT AT 3,3;"Key 0 to alte
r items"
2040 PAUSE 0: IF INKEY$="0" THEN
RETURN
2050 INPUT "ITEM No.?" ;v$: IF CO
DE v$>40 THEN IF CODE v$<58 THE
N LET b=VAL v$: GO TO 2052
2051 GO TO 2050
2052 IF b<1 THEN PRINT AT 4,0;
INK 2; FLASH 1;"(9*sp)NUMBER TOO
SMALL(7*sp)": PAUSE 0: PRINT AT
4,0;"(32*sp)": GO TO 2050
2055 IF b>10 THEN PRINT AT 4,0;
INK 2; FLASH 1;"(9*sp)NUMBER TO
O LARGE(7*sp)": PAUSE 0: PRINT A
T 4,0;"(32*sp)": GO TO 2050
2060 INPUT "ITEM ?";h$: IF LEN h
$>15 THEN PRINT AT 4,0; INK 2;
FLASH 1;"(3*sp)TOO LONG 15 CHARA
CTERS MAX.(2*sp)": GO TO 2060
2070 IF LEN h$<16 THEN LET h$=h
$+"(sp)": GO TO 2070
2080 FOR f=1 TO 16: LET b$(b,f)=
h$(f TO f): NEXT f
2090 INPUT "EXPENDITURE?";exp$: L
ET e$=STR$ exp$: IF LEN e$>6 THEN
PRINT AT 4,0; INK 2; FLASH 1;"
(6*sp)TOO LONG MAX. 10 CHRS(5*sp
)": PAUSE 0: PRINT AT 0,4;"(32*sp
)": GO TO 2090
2100 LET b=b+2: IF b>6 THEN LET
b=b-6: LET g=1
2110 LET a(4+g,b)=exp
2997 LET g=0
2998 GO TO 2000
3000 CLS: PRINT AT 1,3;"Key in
average monthly(10*sp)expenditur
e on the following"
3010 PRINT #0;"To exit and see f
orecast press 5": LET a(3,5)=a(1
,5)-a(2,1)-a(2,3)-a(2,5)-a(3,1)-
a(3,3): RESTORE 9000: FOR f=5 TO
17 STEP 2: READ c$: PRINT AT f,
19;"(11*sp)": PRINT AT f,3;c$;AT
f,14;"- £"
3011 GO SUB 7700
3019 PRINT AT f,19;a(x,y)
3020 NEXT f
3030 PRINT AT xc,yc;">": PAUSE 1
0
3040 IF INKEY$="7" THEN LET xc=

```

```

xc-2: PRINT AT xc+2,yc;"(sp)": I
F xc<5 THEN LET xc=xc+2
3050 IF INKEY$="6" THEN LET xc=
xc+2: PRINT AT xc-2,yc;"(sp)": I
F xc>15 THEN LET xc=xc-2
3060 IF INKEY$="8" THEN INPUT a
q: GO SUB 7800: GO TO 3010
3070 IF INKEY$="5" THEN GO TO y
3080 GO TO 3030
7400 FOR f=1 TO (j-6): IF a(j-f,
1)>0 THEN LET a(j,5)=a(j-f,5)+a
(j,4): RETURN
7410 NEXT f: LET a(j,5)=a(j,4):
RETURN
7700 IF f=24 THEN LET x=4: LET
y=6: RETURN
7705 IF f=30 THEN LET x=5: LET
y=6: RETURN
7710 LET x=INT (f/6)+1
7720 LET y=(f/6-INT (f/6))*6
7730 RETURN
7800 LET x=INT (xc/6)+1: LET y=(
xc/6-INT (xc/6))*6: LET a(x,y)=a
q: RETURN
7900 CLS: PRINT: PRINT "Sorry
this filing system cannot cope w
ith this amount of data.(2*sp)In
creasing capacity will clear(2*sp
p)files and lengthen data storag
e and retrieval times."
7901 PRINT "To increase: break
into the(4*sp)program and EDIT l
ine 8400.Then extend the first a
nd second(5*sp)arrays by up to 9
50(extra).Also line 1547 will ne
ed to be(7*sp)altered accordingl
y by adding(3*sp)the same amount
on to the 400."
7902 INPUT INK 2; PAPER 7; FLAS
H 1;"BREAK ? (Y/N)";n$: IF n$="
y" THEN STOP
7903 IF n$="Y" THEN STOP
7904 CLS: LET qu=0: GO TO 8401
8400 GO SUB 9500: DIM a(400,6):
DIM a$(400,11): DIM b$(10,16)
8401 PAPER 7: INK 0: BRIGHT 0: F
LASH 0: CLS: BORDER 1
8500 PRINT AT 1,5;"Home accounts
controller": PRINT AT 1,5; OVER
1;"
8510 PRINT AT 4,3;"a) Monthly fo
recast."

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```

8520 PRINT AT 6,3;"b) Bank state
ment."
8530 PRINT AT 8,3;"c) Probable c
ash expenditure."
8540 PRINT AT 10,3;"d) Alter for
ecast."
8550 PRINT AT 12,3;"e) Save data
to tape.": PRINT AT 14,3;"f) Lo
ad data from tape."
8555 PRINT AT 16,3;"g) Reset prog
ram."
8556 PRINT AT 18,3;"h) Quit prog
ram."
8560 INPUT "Select option:-";q$
8570 RESTORE 9800: FOR f=0 TO 15
: READ q$,q: IF q$=q$ THEN GO S
UB q: GO TO 8401
8580 NEXT f: GO TO 8560
8900 SAVE "Banc Data" DATA a():
POKE 23736,181: PAUSE 60: SAVE "
Data (2)" DATA a$(): POKE 23736,
181: PAUSE 60: SAVE "Data (3)" D
ATA b$(): PRINT 0; FLASH 1;"Sto
p tape.Press any key.": PAUSE 0;
INPUT "VERIFY DATA ? (Y/N)";l$
: IF l$="y" THEN GO TO 8930
8910 IF l$="Y" THEN GO TO 8930
8920 RETURN
8930 VERIFY "Banc Data" DATA a()
: VERIFY "Data (2)" DATA a$(): V
ERIFY "Data (3)" DATA b$(): RETU
RN
8950 CLS: PRINT 0;"Start tape.
": LOAD "Banc Data" DATA a(): LO
AD "Data (2)" DATA a$(): LOAD "D
ata (3)" DATA b$(): PAUSE 5: CLS
: PRINT #0; FLASH 1;"Stop tape.
Press any key.": PAUSE 0: RETUR
N
8980 CLS: INPUT INK 2; PAPER 7
; FLASH 1;"Are you sure?(Y/N)";t
$: IF t$="y" THEN RUN
8981 IF t$="Y" THEN RUN
8982 RETURN
8990 CLS: INPUT INK 2; PAPER 7
; FLASH 1;"Are you sure?(Y/N)";t
$: IF t$="y" THEN RANDOMIZE USR
0
8991 IF t$="Y" THEN RANDOMIZE U
SR 0
8995 RETURN
9000 DATA "Income","Mortgage","R
ates","Gas","Electricity","Other
","Net income"
9500 LET xc=5: LET yc=1: LET fl=
0: LET qu=0: LET deb=1: LET acc=
0: LET x=0: LET y=0: LET g=0: LE
T u$=""
9501 RETURN
9800 DATA "a",10,"b",1000,"c",20

```



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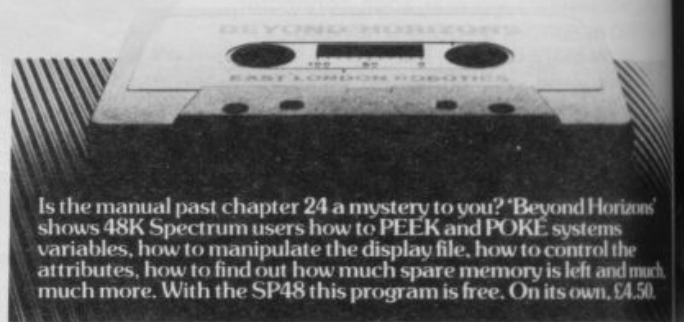
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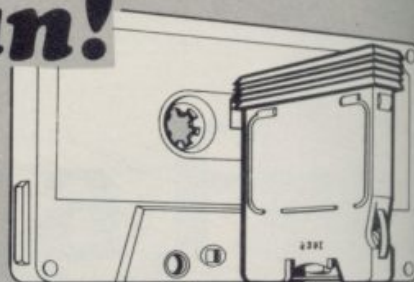
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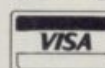
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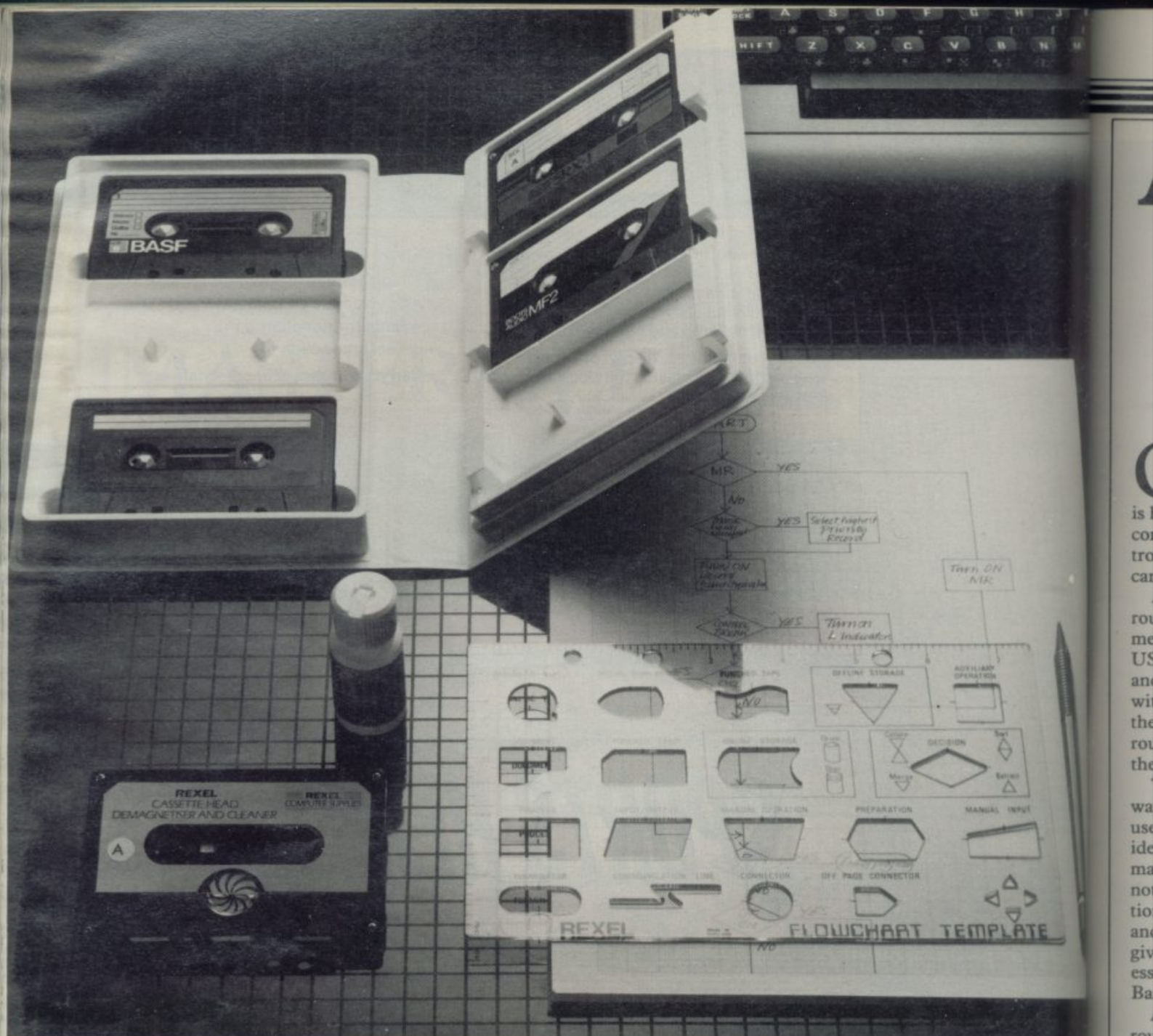
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Adding commands to Spectrum Basic

Keith Williams presents a detailed explanation on how to use interrupts on the Spectrum and provides a useful trace function for printing program line numbers

ONE OF THE problems of adding new commands and routines to the Spectrum Basic is that it is held in ROM. That means that all the computer operations are under the control of an immutable program which cannot be stopped.

Although it is easy to write new routines they can only be called by means of a very user unfriendly RANDUSR call. Passing of information into and out of those routines is also difficult without a whole chain of pokes. Even then it may be impossible to get the routine to work as it may be needed at the execution of every line.

There is, however, one very simple way of beating the ROM and that is to use interrupts. While exploring this idea we can also develop a new command for the the Spectrum. If you are not interested in the detailed explanation you can still follow the instructions and load up the final program which gives a very useful trace function, an essential tool when debugging along Basic programs.

A trace function is a machine code routine which prints on screen, while a program is running, the number of the line which is currently being executed.

The Spectrum is based on the popular Z-80A microprocessor. On that microprocessor are two electrical connections which are involved with interrupts. The first is the NMI which is of little use to our present purposes and so we will ignore it. When the voltage applied to the other pin changes we say that an interrupt occurs. That causes the processor to stop what it is doing, make a note of where it has reached and then jump to follow another program called the interrupt service routine. When that is finished it returns to its place in the original program.

There are three interrupt modes available on the microprocessor. IM0 is designed for use with peripherals such as printers and the like. When the

peripheral needs servicing, such as requiring more information, then it sends the interrupt message and then an address. The computer, in IM0, will run the routine starting at that address before returning from the interrupt.

IM1 is the mode normally used by the Spectrum. When an interrupt occurs it will carry out the routine at address 56. That routine in the ROM does various housekeeping tasks such as

reading the keyboard. The Spectrum is wired in such a way that an interrupt comes with every fluctuation in the mains voltage, in Britain that occurs 50 times a second.

IM2 is much more useful. In that mode the processor jumps to a service routine the address of which must calculate from two numbers. The first of those numbers comes from the thing causing the interrupt. In a Spectrum this number 255 — or FF in Hex — is supplied by the hardware. The other number is programmed in. It is kept in a special store known as the I register. The processor jumps to the address $256 \times I + 255$. Just to make things more complicated this computed address is not the start address but is the address of a store holding the start address.

To get our program on the way we must first poke its start address into another address — whose Hex value is xxFF. Then we must put its vector address — the xx from before — into I. That sounds complicated but really it is simple. There is, however, one problem. The screen chip in the Spectrum works in such a way that putting the vector in the first 16K of RAM causes difficulties for the machine. If you want to use interrupt routines on a 16K machine you must be very devious. If you put 40 into the I register then the processor will look at $40 \times 256 + 255 = 10495$ for a start address. That is in ROM and it contains the start address 32348 or 7E5C in Hex. On the 48K Spectrum you have more leeway and can either use the 16K trick or use the number 128 (80 Hex) in I.

And so to the routines. A word first about getting them into memory. If you have an assembler then it is easy. If you do not then you will need a **Hexloader** program. One is provided in listing 1. You must first type it in and then save it. It enables you to type in the machine code and then save that.

When entering the machine code routines in listing 2 type in only the digits

Listing 1: Hexloader

```

5 DEF FN z$(n)=z$(n+1)
10 DEF FN a(x$)=CODE x$-48-7*(
x$>="A")
15 DEF FN b( )=16*FN a(a$(1))+F
N a(a$(2))
20 POKE 23658,8
30 INPUT "Start address "; LIN
E b$
40 LET a$=b$(1 TO 2): LET h=FN
b( ): LET a$=b$(3 TO 4): LET l=F
N b( )
50 POKE 23728,h: POKE 23729,l:
LET s=256*h+l: CLEAR s-1
55 LET z$="0123456789ABCDEF"
60 LET start=256*PEEK 23728+PE
EK 23729: LET add=start
70 GO SUB 2000
75 PRINT "f$:" " "
80 INPUT "Enter code "; LINE b
$
90 IF b$="" THEN GO TO 80
100 IF b$(1)="R" THEN LET add=
add-1: GO TO 70
105 IF b$(1)="S" THEN GO TO 50
110 IF LEN b$<2 THEN GO TO 80
120 LET a$=b$( TO 2): LET byte=
FN b( )
130 POKE add,byte: LET add=add+
1
135 PRINT a$:" "
140 IF LEN b$>2 THEN LET b$=b$
(3 TO ): GO TO 100
150 GO TO 70
500 INPUT "Do you want to save
"; LINE b$
510 IF b$="N" THEN STOP
520 INPUT "Name "; LINE b$
530 CLS : SAVE b$CODE start,add
-start
540 STOP
2000 REM change to hex
2010 LET h=INT (add/256): LET hh
=INT (h/16): LET f$=FN z$(hh)+FN
z$(h-hh*16)
2020 LET h=add-h*256: LET hh=INT
(h/16): LET f$=f$+FN z$(hh)+FN
z$(h-hh*16)
2030 RETURN

```

continued on page 122

continued from page 121

and letters in the column 'hexcode'. Type in a whole line at a time and the address and code will appear on the screen. If you make a mistake then typing in 'r' will enable you to retype the previous line. When you have typed the last line of hex then an 'S' will lead to a save routine to keep the hex on tape.

To minimise errors and make it easier to explain the program as a whole, it has been divided into its various sub-routines. Type those in one at a time; later they can be put together, using the **Collator** program in listing 3.

The first pair of routines, **TRON** and **TROFF**, are the ones which switch the interrupt vectors around. **TRON** loads the register I with 0FEH, that is, 254. That means that the vector holding the start address of our routine must be placed at address 0FEFFH, that is, 65279. The register I cannot be loaded directly and so we must first load the value into the A register. IM2 is selected for the reasons already stated and the remaining instructions DI and EI switch interrupts off and on. Strictly speaking they are not essential here but it might cause confusion for the machine if it was interrupted during this short routine at the wrong place.

TRON is really quite separate from the rest of the program. Its job is to set the machine up so that we can switch the trace function on or off at will. It must therefore be called early on by a **USR** call. More about that later when the whole program is in.

TROFF performs the opposite function in that it resets the machine to normal interrupts. You will notice that I is loaded with 3FH or 63. That is the address (3FFF) that the ROM sets up as an interrupt vector on power up. In interrupt mode 2 that would cause a jump to address 60 which is part way through the normal interrupt routine. It is important, therefore, when resetting to put the machine into IM1. The only **USR** call that is necessary anywhere in this program is the initial one to **TRON**. **TROFF** is called by means of a normal Basic variable.

Type in the machine code and save it. The start address is FE7E. The pair of routines can be saved together under the name 'tron'.

Once the whole program is in and enabled it is necessary to be able to switch the trace on and off. That can be done from Basic by inserting the line **LET trace = x**, where x can be one of three values: '1' will cause a call to **TROFF** thereby disabling trace; '0' will

Listing 2.

Add	hexcode	label	Assembler	Comments
FE7E	F3	TRON	DI	switch off interrupts
FE7F	3EFE		LD A,0FEH	set up vector address
FE81	ED47		LD I,A	to FEFF
FE83	ED5E		IM 2	select mode 2
FE85	FB		EI	switch interrupts on
FE86	C9		RET	return to BASIC
FE87	FE	TROFF	DI	interrupts off
FE88	3E3F		LD A,3FH	restore the interrupt
FE8A	ED47		LD I,A	vector address to 3EFF
FE8C	ED56		IM 1	restore mode 1
FE8E	FB		EI	interrupts on
FE8F	C9		RET	return
		TRQ		
		ELINE	EQU 5C59H	
		VAR	EQU 5C4BH	
		ORG	0FE90H	
FE90	2A595C	TRQ	LD HL,(ELINE)	calculate the length
FE93	ED5B4B5C		LD DE,(VAR)	of variables area
FE97	A7		AND A	
FE98	ED52		SBC HL,DE	
FE9A	E5		PUSH HL	put length into BC
FE9B	C1		POP BC	
FE9C	EB		EX DE,HL	put variables start in
				to HL
FE9D	3EB4	SEARCH	LD A,0B4H	put code for "t" as first
				letter into A
FE9F	EDB1		CPIR	carry out search
FEA1	2806		JR Z,FOUND	
FEA3	78		LD A,B	end of variables?
FEA4	B1		OR C	
FEA5	2824		JR Z,ZERO	if so then there is
				no trace
FEA7	18F4		JR SEARCH	search on
FEA9	3E72	FOUND	LD A,72H	is next letter "r"?
FEAB	BE		CP (HL)	
FEAC	20EF		JR NZ,SEARCH	search on if not
FEAE	23		INC HL	is next byte "a"?
FEAF	3E61		LD A,61H	
FEB1	BE		CP (HL)	
FEB2	20E9		JR NZ,SEARCH	
FEB4	23		INC HL	is next byte "c"?
FEB5	3E63		LD A,63H	
FEB7	BE		CP (HL)	
FEB8	20E3		JR NZ,SEARCH	
FEBA	23		INC HL	is next byte last letter
FEBB	3EE5		LD A,E5H	and is it "e"?
FEBD	BE		CP (HL)	
FEBE	20DD		JR NZ,SEARCH	
FEC0	23		INC HL	jump over first byte
FEC1	23		INC HL	
FEC2	7E		LD A,(HL)	look at sign byte
FEC3	3C		INC A	jump forward if negative
FEC4	280A		JR Z,NEG	
FEC6	23		INC HL	is next byte 1?
FEC7	7E		LD A,(HL)	
FEC8	3D		DEC A	
FEC9	2802		JR Z,ONE	jump forward if it is
FECB	AF	ZERO	XOR A	trace must be 0 so load
FECC	C9		RET	A with 0 and return
FECD	3E01	ONE	LD A,1	load A with 1 and
FECF	C9		RET	return
FED0	3EFF	NEG	LD A,FF	load A with -1 and return
FED2	C9		RET	
		ORG	PRINT	
		PRINT	OFED3H	
FED3	E5		PUSH HL	save HL
FED4	211840		LD HL,4018H	screen address
FED7	5F		LD E,A	get print position
FED8	1600		LD D,0	into DE
FEDA	19		ADD HL,DE	
FEDB	EB		EX DE,HL	
FEDC	0600		LD B,0	
FEDE	21803D		LD HL,3D80H	character position for
				'0'
FEE1	79		LD A,C	get digit in to A
FEE2	87		ADD A	multiply by 8
FEE3	87		ADD A	

FEE4	87		ADD	A	
FEE5	4F		LD	C,A	and put into C
FEE6	00		NOP		
FEE7	09		ADD	HL,BC	calculate position in table
FEE8	0608		LD	B,8	there are 8 bytes
FEEA	7E	LOOP1	LD	A,(HL)	pick up bytes
FEEB	2F		CPL		invert byte
FEED	12		LD	(DE),A	print it
	14		INC	D	next pixel line 256 bytes
					further on
EEEE	23		INC	HL	next byte
FEED	10F9		DJNZ	LOOP1	all 8 bytes
FEF1	E1		POP	HL	restore HL
FEF2	C9		RET		
COUNT & LINE					
		ORG	OFEF3H		
		PPC	EQU	5C45H	
		PRINT	EQU	OFED3H	
FEF3	0E00	COUNT	LD	C,0	set counter to 0
FEF5	OC	LOOP2	INC	C	increase count each time
					through loop
FEF6	A7		AND	A	
FEF7	ED52		SBC	HL,DE	perform subtractions
FEF9	30FA		JR	NC,LOOP2	repeat till past 0
FEFB	0D		DEC	C	
FEFC	19		ADD	HL,DE	and difference back
FEFD	1802		JR	JUMP	jump over vector
FEFF	2D		DEFB	2DH	the vector (FF2D is
					MAIN)
FF00	FF		DEFB	OFFH	
FF01	C9	JUMP	RET		
FF02	2A455C	LINE	LD	HL,(PPC)	pick up line number
FF05	11E803		LD	DE,3E8H	a thousand
FF08	CDF3FE		CALL	COUNT	how many thousands
FF0B	3E01		LD	A,1	first digit
FF0D	CDD3FE		CALL	PRINT	print it
FF10	116400		LD	DE,64H	now hundreds
FF13	CDF3FE		CALL	COUNT	
FF16	3E02		LD	A,2	second digit
FF18	CDDEFE		CALL	PRINT	
FF1B	110A00		LD	DE,0AH	tens next
FF1E	CDF3FE		CALL	COUNT	
FF21	3E03		LD	A,3	third digit
FF23	CDD3FE		CALL	PRINT	
FF26	4D		LD	C,L	now the units
FF27	3E04		LD	A,4	fourth digit
FF29	CDD3FE		CALL	PRINT	
FF2C	C9		RET		
MAIN					
		ORG	0FF2D		
		PPCH	EQU	5C46H	
		TRQ	EQU	0FE90H	
		LINE	EQU	0FF02H	
		TROFF	EQU	0FE87H	
FF2D	FF	MAIN	RST	38H	carry out normal inter-
					rupt routine
FF2E	F5		PUSH	AF	save A & F
FF2F	3A465C		LD	A,(PPCH)	is a program running?
FF32	3C		INC	A	PPCH holds FF if not
					running a program
FF33	2002		JR	NZ,RUN	jump if it is
FF35	F1		POP	AF	restore flags and
FF36	C9		RET		return
FF37	C5	RUN	PUSH	BC	save all regs
FF38	D5		PUSH	DE	
FF39	E5		PUSH	HL	
FF3A	CD90FE		CALL	TRQ	check variable trace
FF3D	3D		DEC	A	if A not 1 then jump
FF3E	2005		JR	NZ,NOTON	forward
FF40	CD02FF		CALL	LINE	perform trace
FF43	1806		JR	RTN	jump to return
FF45	3C	NOTON	INC	A	is trace 0? If so then
FF46	2803		JR	Z,RTN	just return
FF48	CD87FE		CALL	TROFF	disable trace
FF4B	E1	RTN	POP	HL	restore regs
FF4C	D1		POP	DE	
FF4D	C1		POP	BC	
FF4E	F1		POP	AF	
FF4F	C9		RET		return to BASIC

switch trace off but leave it enabled. '1' will switch trace on. So if in your program you wish to trace through lines 300 to 700, say, insert in your program at line 299 LET trace = 1. Line 701 — LET trace = 0 — stops the trace. Then run the program.

The next routine **TRQ** searches the variables area to see if the variable trace exists. If it does not then it assumes a value of 0. If it does exist then the value is picked up. The method of finding the variable is to search through the variables area for the code 0B4H which is the code for 't' adjusted to show that it is the first letter of a long name variable (see page 167 of the manual, letter code 96 + 160). When the code is found each of the codes in turn is checked against the letters 'r', 'a' and 'c' finally against 0E5H which is the code for 'e' + 128, showing that it is the last letter of the name.

The value of a number is stored in five bytes. The first is 0, the second the sign byte holding 0 for a positive number and -1 for a negative. The routine first picks that byte and adds one to it. If the answer is 0 then the A register is loaded with FF (-1) and a return to the main control routine is effected. If it is not negative then the next byte is looked at. That is the least significant byte of the value, i.e. $x - 256 * \text{INT}(x/256)$. The byte is picked up and decreased by one. If the answer is 0 then it must have held 1 and so A is loaded with 1 and a return made. The only possible remaining value is 0 and so 0 is put into A and then the program returns to the main control.

There are, probably, easier methods of doing this, for example using the LOOK-VARS routine in ROM at address 28B2H, but it is important not to alter any of the system variables or the alternate register set because the processor is in the course of running a Basic program. Consequently no ROM routines at all have been used but only simulations of them.

Now type in TRQ and save it under that name. The start address is FE90.

The **Print** routine is the one that prints out the line number. Again there would be easier ways of doing it, using RST IOH for example, but again a simulation has been produced. The routine is entered with 'C' holding the value of the digit and 'A' its position — 1 for thousands, 2 for hundreds etc.

Every character printed on the screen consists of eight rows of eight pixels. Each row can be represented as one byte. As the screen is 32 bytes wide it

continued on page 124

Spectrum Interrupts

continued from page 123

would seem that the easy way to print a character is to poke the first byte in and then the next byte 32 bytes further on and so on. The problem is that the screen is not laid out in memory in that simple and obvious way. In fact, each row of pixels is 256 bytes away from the last one. The algorithm therefore requires that each byte is poked into an address 256 bytes on from the previous. The pixel bytes are stored at an address pointed to by `CHARS + 256` and the numbers start 128 bytes further on. As there are eight bytes for each character then the value in `C` must be multiplied by eight and then added to that base address.

The routine may now be typed in and saved using the name "print". The start address is `FED3`.

The next two routines are involved in sorting the current line number. **Count** divides the number in `HL` by the number in `DE` and returns the result in `C` and the remainder in `HL`. **Line** picks up the line number and uses **Count** to manipulate it digit by digit and then prints those out by calls to **Print**. The current line number is held in `PPC` so that is first picked up in `HL`. `DE` is loaded with 1000 and then **Count** is called to see how many thousands there

are. The number is printed using `A` to say the print position i.e. the thousands column. Then that is repeated for the hundreds and so on. **Count** overlaps the interrupt vector at `FEFFH` and there must be a jump just before it so that the processor does not interpret the vector as instructions.

The start address for this pair of routines is `FEF3`. They can be typed in and saved.

The final routine is the control routine called **MAIN** and it controls all the others and performs the necessary housekeeping tasks. The start address is `FF2D`; the one held in the interrupt vector `FEFF`. It is the routine called when an interrupt occurs.

The first task is a call to ROM address 56. That is the normal interrupt routine and it updates **FRAMES**, reads the keyboard and so on. Next the `A` register and the **Flags** register are saved so that normal service can be resumed on return. If a program is not running it will hold `FF(-1)` and then a return is made after restoring `A` and the **flags** register. If a program is running then the registers are saved and a call made to **TRQ** to see if the trace is to be switched on, off or disabled. **TRQ** return that information in the `A` register. Depending on the value in that register a call is

made to **LINE** or **TROFF** or none of those. Finally, all the registers are restored and control is returned to the ROM. All that remains is to collate all those routines. Type in the second Basic program in listing 3, rewind the tape and then run it, not forgetting to save **MAIN** first.

The third Basic program — listing 4 — will load the trace utility above **RAMTOP**. It, or something like it, must be used on switching on and before you load or type in the program under test. To enable the trace, i.e. to call **TRON**, you need to give the command `RAND USR 65150` after any start or **NEW**.

Further sophistications can be added, such as a delay loop at the end of **MAIN** which will make it easier to follow the trace.

Listing 3: Collator

```
10 CLEAR 65419
20 FOR n=0 TO 4: LOAD ""CODE :
NEXT n
30 CLS : PRINT "Prepare tape f
or saving Press ENTER"
40 PAUSE 4e4
50 SAVE "trace"CODE 65150,214
60 STOP
```

Listing 4: Trace

```
10 CLEAR 65149
20 LOAD "trace"CODE
30 NEW
```

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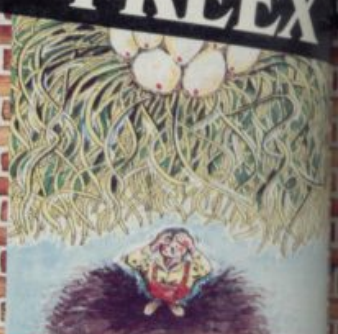


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its north. Whilst checking the
story, which includes Mega-Tennis
Clockwork Oranges and Intoxo-
rages, you hear some very peculiar
who coming from the hold. Dare you
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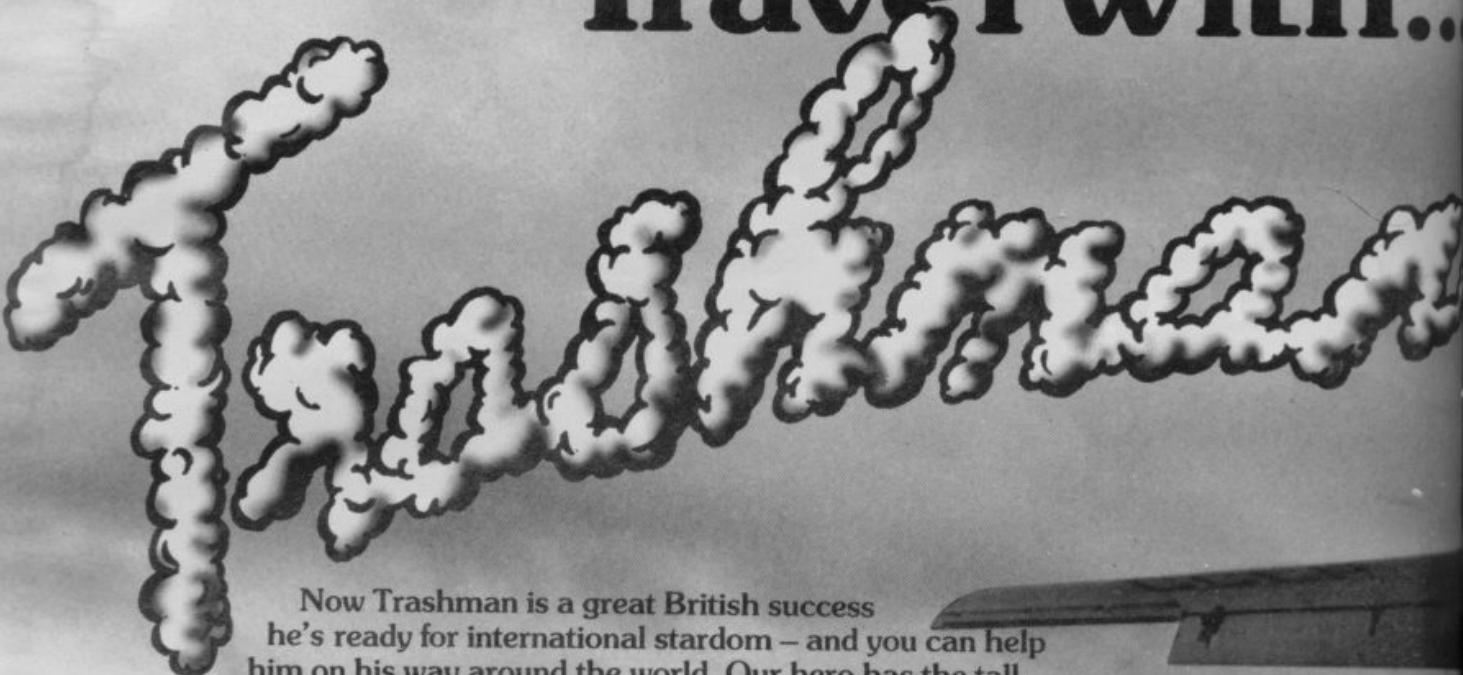
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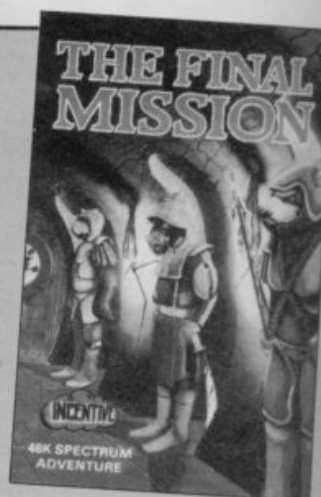
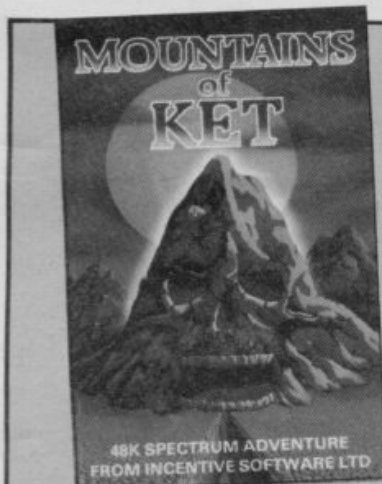
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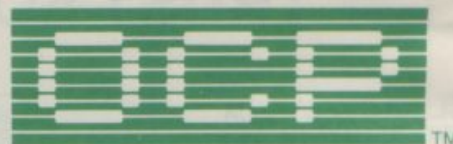
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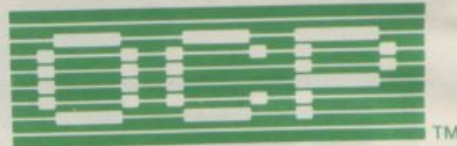
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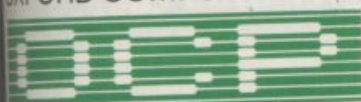
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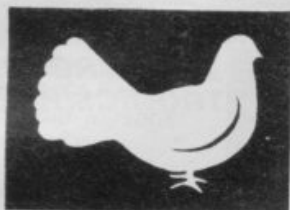
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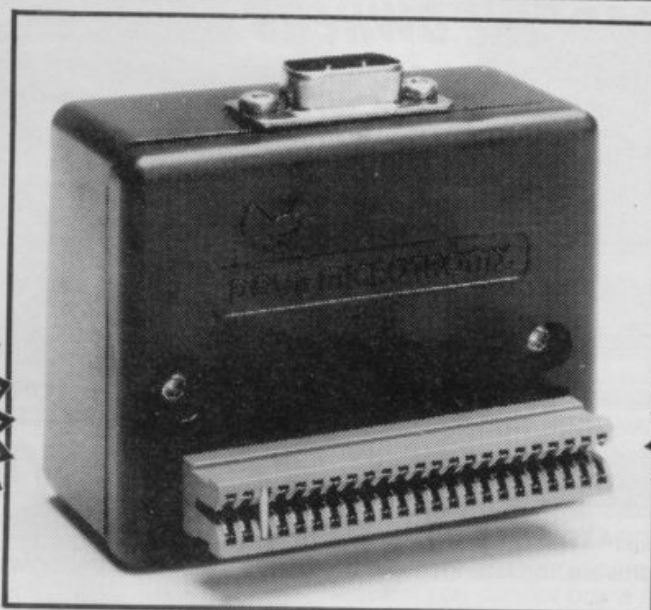
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Flying low

Chris Bourne talks to Costa Panayi, laid back pilot of TLL



IN contrast to the concept of whirling motion suggested by its name, Vortex Software is as laid-back an outfit as you are likely to find in the frenetic software industry.

The company is very much a family business. Brothers Costa and Crete Panayi handle programming and advertising respectively while brother-in-law Luke Andrews concentrates on administration and finance. Greek Cypriots by ancestry, the strong emphasis placed in Greek culture on family ties and loyalty serves the brothers well in their business enterprise.

The founder of the company was Costa, the programmer. As often happens in the industry, the other brothers were brought in later as the operation grew more professional and required their particular talents.

Costa's first introduction to programming was at the University of Salford, where he took a Fortran course as part of his degree in Mechanical Engineering. At first Costa was more interested in the machinery than the programming of computers, and wanted to buy a kit. "I fancied a UK101, but I couldn't afford it. Then the ZX-81 appeared, and as soon as I saw the ad I ordered it. I had to wait three months before it arrived."

By now Costa was working as a design engineer for British Aerospace, and a number of his colleagues at work were also excited by the new machine. "We had bets on which one would arrive first. Mine was last. There were about half a dozen of us, and we swapped programs at work."

It was on the ZX-81 that Costa learned Basic, and the first few programs he wrote were in collaboration with his friend at work, Paul Canter. They sent off their first tape to Michael Orwin, of Orwin Software. "It was a collection of programs, Mastermind, Pontoon, Othello and Awari. We were quite chuffed. You wouldn't believe it, he's still sending us money."

At the time, however, Costa had no intention of quitting design engineering, his chosen career. Besides, he was still learning how to program, teaching himself machine code from books.

"The 1K machine was really useful for learning how to be efficient. To begin with it was difficult to see how you could write games."

Costa began by writing routines instead, mainly connected with screen displays. The scrolling techniques he developed were later used in **Cosmos**, now known as **Astral Convoy**. He and Canter set up Vortex Software and decided to sell it themselves.

The timing was atrocious. Suddenly

the Spectrum appeared on the scene and sales of **Cosmos** went flat as pitta bread. They quickly converted the game to the 16K Spectrum, including sound and colour features, and, deterred by their initial experience, licensed the game to another company.

Costa then began work on **Android One**, and it was at that time that his brother-in-law Luke became involved. "It was a natural progression for Vortex," Luke explains, who is a craft teacher.

"I'd handled money used to have my own furniture-making company." Crete

Panayi had already helped Costa with the advertising side, drawing on his experience working for an advertising agency and his knowledge of design.

Costa's games can easily be seen as a progression of ideas, developing concepts from game to game. The original scrolling technique developed on the ZX-81 in 1K have formed a major feature of all Vortex games, along with other ideas such as 3D effects and large playing areas. Although the original routines are no longer recognisable in the latest products, the development of the style has been a continuous process.

"For **Android One** we tried to produce a game with a lot of features. We used the scrolling techniques to produce a long corridor, and designed a few rooms, then tried to get something running about the screen." It seems a slap-happy technique to design a game while writing it, putting together chunks of old routine and working out the possibilities, but that is one view of the process by which Costa writes games. "We try to look at the trends" he says. The idea for **TLL** came simply from the popularity of **Flight Stimulation**, although the game bears no resemblance whatsoever to the Psion program.

Android One became a popular success, and was accepted for retail by WH Smith. The sequel, **Android Two**, takes the action further using a considerably expanded playing area. The object of the game is to move around a maze-like park destroying blue millipeds.

"I wanted to do a sequel which had something special about it. That's why

I developed the 3D effect. It was our first 48K game, and took me 9 months to write. It was released just before Christmas 1983."

Nine months is an enormous length of time to produce an arcade game, but it must be remembered that all the time Costa was still working for British Aerospace. The game itself caused problems, as the ideas Costa was putting into practice were highly ambitious.

"The game became so complex" he says. "The millipoids caused problems. Most people use dark backgrounds but we decided to use the BRIGHT colours. The other thing was the wraparound maze."

The long haul was certainly worth it. Lurid is the only word to describe those background colours—there is an almost tangible feeling of poisonous heat about the game.

"I was tempted to do **Android Three**," says Costa laconically, threatening further horrors in his metal world of mayhem. "But I decided to leave it for another day."

"TLL is really a progression of the ideas in **Android Two**. I expanded on the 3D landscape, making the wrap-around more complex. There is an extra dimension as the plane isn't always on the ground."

TLL was one of the big hits of the summer, with superb graphics of buildings. "It's easier to get into TLL than **Android Two**" suggests Luke Andrews. "My best score is 34,125. We always like to make each game something of an adventure. There is a sort of Vortex cult. For instance, we don't tell you everything about TLL on the cassette insert."

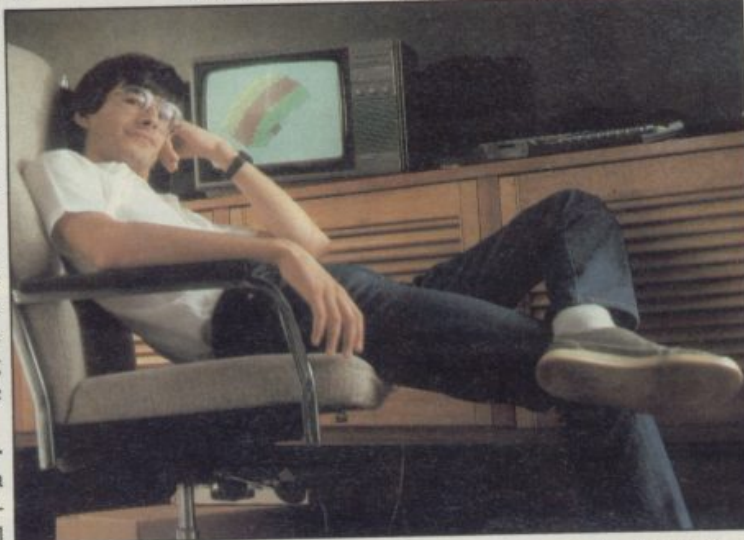
An example of that is the fact that you can fly under bridges and telephone lines in TLL, which at first simply look like obstacles to be avoided. The first time you go under the bridge the 3D aspect of the game really opens up and you see the plane duck under and out of the other side. Costa himself is particularly proud of the shadow which the plane casts. When you fly over a building the shadow climbs up the wall, which, if you think about it, means suddenly it has to move faster than the plane to keep up. "It took a bit of doing that," says Costa, smiling quietly.

The brothers are a quiet spoken trio and Luke is very sanguine about the problems suffered by the software

industry of which we read so much in the computer press.

"Garages are going bust all the time" says Luke. "People don't mention that. Software houses have matured a great deal, but we still regard ourselves as beginning. If we haven't got the money for something then we don't do it. We haven't drawn a penny out of the account yet for ourselves."

That situation is likely to change in



the near future as the company plans to move into a real office—at present it still operates from the front room of Luke's house in a leafy Manchester suburb. Costa left British Aerospace earlier in the summer to devote himself full-time to programming, and thus will require a living from the business.

Vortex has appeared to be happily isolated from some of the problems faced by other companies, partly because of its policy of never borrowing money, and partly because it has released so few titles and yet managed to sustain a loyal following. "We can't be doing too badly" says Luke. "People tell us we're in a slump. Yet in this depressed period TLL has consistently been in the top five since its release. Too many people say it's a seasonal thing, but people still want software in the summer."

If Vortex as a business takes few risks and aims for consistency of quality rather than a high profile and a galaxy of quick-money instant games, Costa himself takes risks of a different kind. "A guy at work in his early sixties did a parachute jump and then put up a notice daring everybody else to copy Granddad," he explains.

Costa and a group of friends went to Langer Airfield in Nottinghamshire, home of the British Parachute School, to try their hand. "The first jump was

over a weekend, you get a day's training and then you do your jump on the Sunday. Once that's done you try to get as many as you can in order to be able to go freefall."

"I've never seen him so enthusiastic about anything before" says Luke. "It's a fantastic sensation" says Costa, and goes into reveries about the joy of jumping out of aeroplanes. Wasn't it just a bit scary? "The night before the first jump was worse" says Costa. "But once you've got your kit on you don't think about it."

Costa is unlikely to be getting much time for parachuting over the next few weeks, as he is busy working on the new game, **Cyclone**. The promised move to a new office will therefore be delayed until the game is completed, so it is likely to be one of the last programs Costa writes by himself, as the new plans include creating a design team to work around him, producing two or three games a year for a range of machines. That may seem a small quantity, but it is more than Vortex has been producing over the past three years.

The way the games are created, with nobody at all sure what Costa's final version is going to involve until it happens, means that the team is understandably reticent about describing **Cyclone**. Luke explains that even the advertising causes problems, as they genuinely do not know what the game will include when the advertisements have to be placed. Hence the mysterious shadowy Tornado in the TLL ads, about the only thing that was certain about the game at the time.

Cyclone however will be another flying game, but with a much bigger playing area than TLL.

"Watch out for innovations" says Luke, mysteriously. "I can guarantee that. And the weather will play a central part."

Jim Bacon meets the space pirates? Michael Fish versus Pacman? At any rate, the game is due to be released at the end of October, and Vortex is certainly looking for a Christmas hit with **Cyclone**.

It seems that while the gales blow around them, and other businesses rock and even crumble under the force of 'natural market pressures', Vortex stays cool—the calm spot at the centre of the whirlwind.

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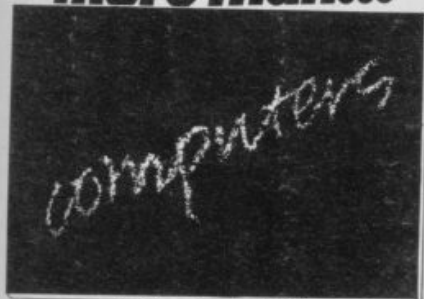
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Raiders of an ancient art

In the first of a regular series Richard Price examines the history of role-playing and the development of micro adventure games

IT IS NEAR DAWN with only the hum of the transformer and the glare of the TV screen to keep you company. Dog-tired, bleary-eyed and suffering from severe back and brain strain you desperately try to escape a band of roving cannibal orcs amongst the dungeons of a menacing fortress. Your computer is overheating and it seems like a week since you last slept but you cannot give up now. You want to be a hero and the real world can just wait until you have managed it.

Recognise yourself? If you do, then you know you are an adventure addict, hopelessly hooked on the multiplicity of fantasy worlds that the computer can offer for exploration. That jumble of wiring and chips can transport you into the far future aboard a giant spaceship or to medieval worlds where magic and myth rule.

To survive in those places you will need a crossword puzzler's mind and be able to solve complex logical problems by a mixture of luck, cunning, planning and lateral thinking. Computerised brute force will come in handy too when your luck dribbles away and you are face to face with some fire-belching dragon.

It is easy to think that computer technology has made all that possible but there is more to it than just the machine. Mazes, and the symbolic hazardous journey through them, have had a powerful fascination for the human mind for many thousands of years.

At Tintagel in Cornwall, bronze age tribesmen hammered intricate labyrinth patterns into the rocks, perhaps as some mystical depiction of the soul's wanderings from birth to death and back again. Before them the first farmers decorated the huge stones of their communal tombs with swirls of interlocking lines and spirals. Dancing mazes cut into the turf still survive in a few places around the country and, all over the world, there are myths and legends of heroes and heroines overcoming the terrors of

the labyrinth or other subterranean places to emerge powerful, fulfilled and triumphant.

Almost all those stories portray a human character facing intolerable danger in threatening places, often lost, often afraid, but succeeding through his or her wit and persistence. Maybe the ordinary, small person has always needed such fantasies as a welcome escape from the humdrum reality of everyday life. With the machine's help it is now possible to enter the unknown and make your own decisions about how the story should develop. No longer a passive listener or spectator, you can become Theseus, Bilbo Baggins or Sherlock Holmes for a day and still get back in time for your beans on toast.

Most people would accept that JRR Tolkien is the father of modern fantasy writing and his plots and terminology run through many of the games that use magical or heroic worlds as their setting. His themes, combined with wargaming rules, were adapted by Gary Gygax and Dave Arneson as the basis of their role-playing game *Dungeons and Dragons*. In that system a Dungeonmaster designs a complex of caves peopled by monsters, treasure and magicians. Through that place, a party of adventurers will journey. Each of them must take on a character and act out their role in as 'real' a way as possible. The more consistent and inventive the setting, the more pleasure, excitement and satisfaction for the player.

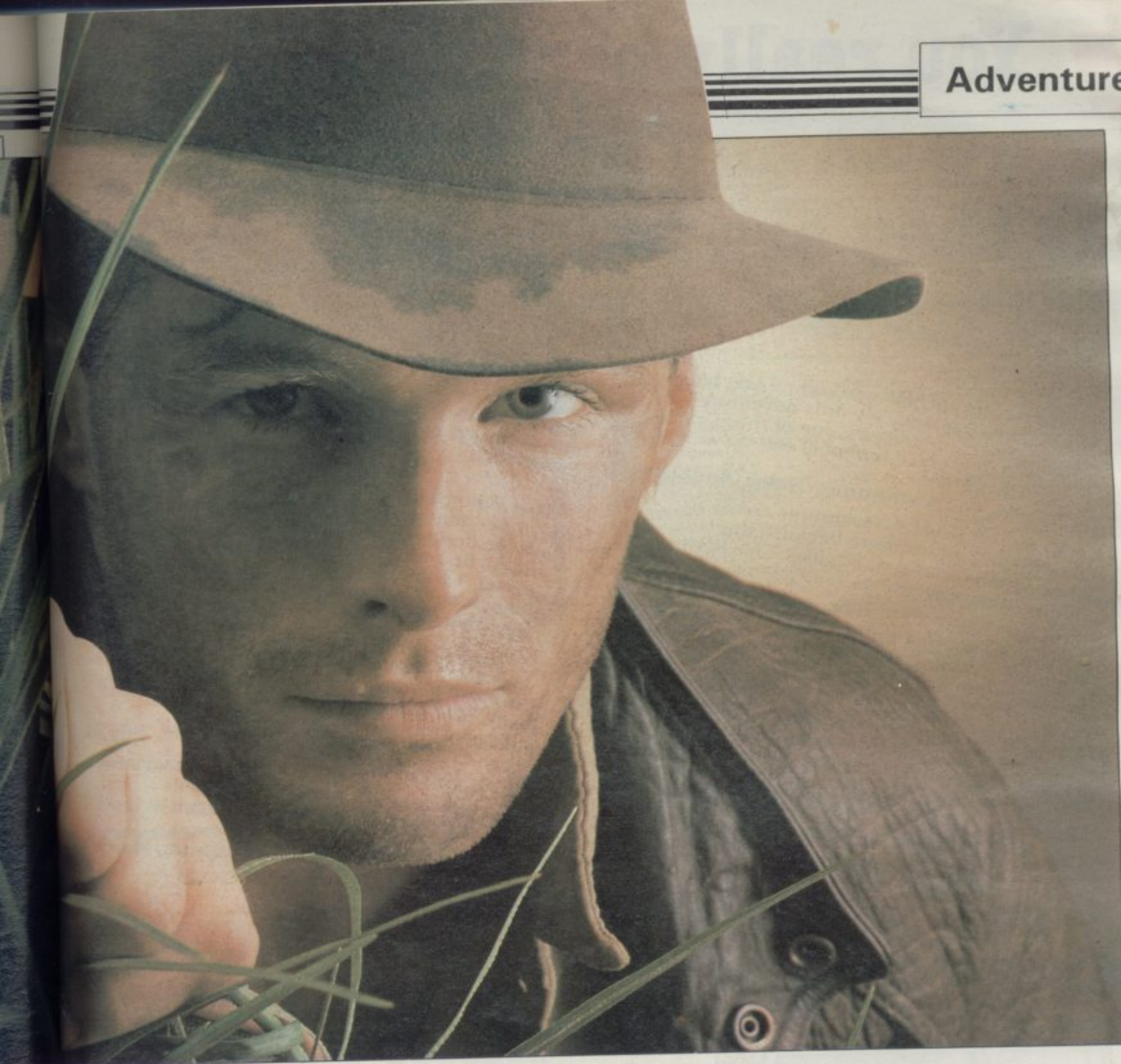
There are now many variants on the original concept, from outer space to Middle Earth, but they all expect the player to do more than just chop up monsters and often demand problem-solving skills and ingenuity. Role-playing games have a vast and dedicated following and their devotees can sometimes seem like members of an esoteric religious cult. Psychologists would claim that the game helps young people to work out their personal problems through safe fantasy.



Absorbing as RPGs are they suffer from a major disadvantage. Creating a dungeon is a painstaking business and the play itself needs the concentrated attention of up to five players all of whom must be willing and able to give up several days, or longer, to their hobby.

That means that a lot of organisation is needed to make a session work well even if you can drum up the group of adventurers. The action itself can also be slow as there are numerous die rolls and consultations with rule books to interrupt the flow of play.

Two computer programmers, Crowther and Woods, translated that sort of single role-playing into computer language and plumbed it into their mainframe. Computer text adventure began with them in the not so remote past of the early seventies. Their original *Adventure* featured a Tolkienesque plot set in a twisting labyrinth with



lots of tricky puzzles and mean monsters. Once Sinclair had pioneered the home computer the field was open for rapid development of the art.

Computer text adventure comes in all shapes, sizes and eras but there are fairly standard features which define the genre. The interpreter must be able to understand some basic English, often just a verb/noun combination and also carry a set of built-in commands and requests, such as Help, Inventory or Score.

Good programs will always possess a varied concealed vocabulary for the player to discover by trial and error. Getting the right words for the right action is one of the trickiest problems in adventure, especially where magic is involved.

Informative location descriptions and a versatile response from the interpreter are very important as they help to set the scene and make the player feel that

the computer has a personality, just like the old Dungeonmaster. Most players would also expect the locations to be properly connected so that a map can be made.

Above all else the theme and the setting ought to be internally consistent. If you are exploring a world where magic is possible then that magic should follow its own rules and not be the excuse for a failure of the writer's imagination. It is also off-putting to wander through some heroic medieval landscape and discover an inn with pool tables or similar oddities. Too many unsuccessful programs hurl a jumble of different eras and technologies together.

The arrival of the Spectrum, with its large memory and graphics capability has inevitably meant that adventure programming has become more and more sophisticated and there are many variations on the format currently available. The purists probably will still

argue that text-only adventures are the real thing as they don't waste valuable space on pretty pictures and are often good value for money, tending to have more locations and better descriptions.

Level 9 produces a range of text games that are inventive, involved and usually large. If you're keen to try out a version of the original mainframe Adventure its **Colossal Adventure** has a lot of similarities but has more locations and a slightly altered set of problems. Other games by the same company carry on from where that game stops.

Level 9 takes a lot of trouble over the plots and settings of its programs and, if you are after an adventure with a difference take a look at **Snowball**. You will find yourself in a vast interstellar spaceship that has gone out of control. While swarms of colonists hibernate in blissful ignorance of the danger you must explore the ship and find the main con-

continued on page 150

You really can't go wrong with any Level 9 game as they are really brilliant

CRASH MICRO SEPT '84.

✓ Whichever machine you own, if you have the vaguest tendency towards adventure playing then you must try one of these games (unfortunately you'll probably end up wanting to buy the lot!).
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✓ To me, all Level 9 adventures create a remarkable atmosphere because the descriptions sound so life-like. This is where so many other adventures fail.
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✓ As in all Level 9's adventures, the real pleasure comes not from scoring points but in exploring the world in which the game is set and learning about its denizens.
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✓ (LORDS OF TIME). As we have come to expect from Level 9, the program is executed with wonderful style.
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✓ I thoroughly recommend these Adventures, they are excellent value for money. No self-respecting Adventure-addict should be without them. I believe Level 9 are producing a series of Adventures which should be regarded as classics.
Atari User, July 84

✓ These programs run very fast and there are no frustrating pauses. Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Adventure is nothing short of brilliance; rush out and buy it. While you're at it, buy their others too. Simply smashing!
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✓ Level 9 - arguably the producer of the best adventure games in the UK - has done it again. LORDS OF TIME is a sparkling addition to its stable of winners.
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ROM 81

PROMER 81

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BLOPROM-81

PROMER SP

PRINT-SP

ROM 81

PROMER 81

CRAMIC-SP

BLOPROM-81

continued from page 147

controls. Guard robots menace you and the sheer vastness of the vessel means that your task will be long and involved. The technology is very carefully constructed and the design is extremely convincing with over 7000 locations.

If you would rather be a classic, albeit reluctant, hero, the **Ket Trilogy** from Incentive Software provides all the magic and mayhem you will need. **Mountains of Ket** and **Temple of Vran** feature mad sorcerers, battle-crazed orcs and combat routines which help to bridge the games nearer to their D&D ancestors. It is also satisfying that the story continues from one program to the next. The world of Ket is consistent and exciting and is well worth a visit.

Adventures using graphics, either to illustrate locations or to show the action itself, seem to be becoming the norm. Games, however, like **Atic Atac** or **Halls of the Things** are not in that class. Those so-called graphic adventures are little more than glorified arcade games and do not have the features that define proper adventures, exciting and accomplished though they are.

It would be difficult to discuss text adventure without mentioning **The Hobbit** from Melbourne House. That program has set a standard for future

adventures with its use of nearly English 'English' and interactive characters who live their own lives while you are busy trying to get out of the goblin's dungeon. A vast range of input is allowed and the variations of possible actions make it seem like ten games rolled into one, though some may find the routine of talking to characters rather tedious at times.

After **The Hobbit** programmers looked for more and more innovation. **Valhalla** combined animated cartoon-style graphics with a versatile text interpreter and has shown the huge potential of the Spectrum. Despite some flaws — like the occasional crash — the game is open to a number of uses. You can follow the quests if you like or develop your character independently, choosing to be evil or good as the mood takes you. The other inhabitants will respond convincingly to the role you take on and they too will go about their own lives, which of course you can sit back and watch if you do not feel like joining in.

Lords of Midnight from Beyond does not quite fit the adventure description. That immense game with its 3D static graphics, multiple leading characters and strategic planning uses an adventure plot mixed in with wargaming concepts. Armies and allies have to be

recruited to defend the world against Doomdark, a Sauron-like sorcerer. The four major characters are guided through the meticulously detailed landscape by the player and there are various ways of defeating the powers of evil. The program is very reminiscent of *The Lord of the Rings* in its theme and you can make the story what you will.

The best adventures are those where a true multiple choice is involved. It is easy to spot a poor program by the linear nature of the action — only one entry is correct and you cannot proceed unless you do exactly what the programmer has put in. In most of the games mentioned there is a reasonable freedom of choice. Remember though — freedom of choice may mean you will find yourself up the creek later on. A bit like real life, in that respect, and that for many is the entertainment in adventure. You will learn from your mistakes, load your saved position and wearily start all over again, but still get a lot of fun and excitement in the process.

The mysteries of adventures can baffle even the greatest hero or mage at times. If you are having trouble on your travels or have hints and tips to offer fellow explorers we would like to hear from you. Scribe your letter to Richard Price c/o Sinclair User, EMAP Business and Computer Publications, 67 Clerkenwell Road, London EC1R 5BH.

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Mindstorming

Theo Wood talks turtle at the Logo Conference and listens to blunt-speaking guru Seymour Papert

LOGO USERS are a special breed of enthusiasts; not only are they deeply involved with the computer language Logo, but they attend a weekend conference discussing it. The British Logo Users Group held its annual conference at Loughborough University at the beginning of September. Conferences are rather like exhibitions where everyone who shares a like interest can see both hardware and software and catch up with all the latest developments. Conferences are also the venue in which much discussion can take place as to the relative merits of the goods on offer, and an opportunity to hear experts expound their views in greater detail.

There are some exciting developments afoot in the hardware field. On show was the radio controlled Jessop turtle, developed at the Artificial Intelligence Department at the University of Edinburgh. The Para version has an interface which will operate on specific computers; that means a version is available for the Spectrum.

The radio control module will fit into the user port enabling the turtle to be controlled through Spectrum Logo. There is no problem with cables getting in a twist as the turtle moves around, and that is an obvious advantage. The Jessop turtle, looking like a transparent dome full of chips, was dressed in a motley array of outfits to make it look like a turtle, with head, legs and arms sticking out, reminiscent of Auntie Dot's yearly offering for the school jumble sale.

The Valiant Turtle accomplishes the feat of remote control by infrared and has a plastic body and eyes which glow. That will also interface with the Spectrum and be controlled by Logo. Prices of both these products are, however, almost certainly beyond the pocket of home users as neither would leave any change out of £200.

Of more interest to the home user is Zero 2, a clever little robotic device which will plug into Spectrums fitted with an RS232C interface. That will operate directly with Spectrum Logo. The basic model has three stepper mo-

tors, two leds, a two tone horn and a line follower. It includes a pen kit for drawing via Logo commands either on the floor or table. A kit form can be bought for as little as £79.95 or built for £99.95. With an eye presumably on the Christmas market, there is a strong possibility of a package bundling Zero 2 with Sinclair Logo for about £120. One has to hope that the device will live up to its specification especially in terms of resolution, supposedly better than 1mm and 1 degree.

User defined graphics are fun to play with, as defining your own shape can lead



Evangelist Seymour Papert.

to great possibilities when writing games programs. Nevertheless they can be rather tedious and time consuming, with the added disadvantage that the BIN statements have to be typed in very carefully. There then follows the problem of making them move. The results are not always fast enough in Basic and require machine code routines to make them work at the desired speed.

The Spectrum sprite board is the answer to all those dreams of fast on-screen action without the sweat. Fitting into the user port of the Spectrum the sprite board provides 32 independently programmable sprites which can move in any direction all at the same time. The sprites will be programmable either from Basic or Logo. By using the second option in particular, animation is within the reach of far more people than before.

Marketed by Logotron, the Spectrum sprite board will be available at a price of £129.95, but as with all new technology one would expect the price to fall as production gets into gear.

Sprites were one of the main topics covered by Seymour Papert in his presidential address to the conference. Papert is the guru of the Logo movement, because not only did he and his team develop the language, but his book *Mindstorms* is the Bible of Logo enthusiasts. He is also a very witty and amusing speaker.

Prefacing the main section of his speech with demonstrations of his 'props', a camera with automatic focusing and his impressive NEC portable computer, he explained how new developments in technology enter the fabric of our lives. Thus the portable computer enables him to write in places where pen and paper are most inconvenient, such as in taxis, but it also becomes 'his' in a way no desktop computer could.

Papert is a somewhat blunt speaker; anyone who makes statements such as "Newton's Laws of Motion are horrible" must strike a chord with all those who have to study them in their school career. Motion is everywhere

in our lives yet the laws which cover it are not immediately accessible and are expressed with reference to a particle, an abstraction. With sprites it is possible to explore the world of movement, just as Logo and the microworld of turtle graphics enable users to explore geometry in a concrete way.

As an evangelist Papert is bound to have his critics, and some delegates could be heard muttering sceptical comments about his claims for Logo. Yuri Leon, from the Haifa Institute of Technology, pleaded for moderation in the claims made for Logo, otherwise the situation may backfire, and many people would be disappointed.

Jessop Electronics Ltd, Unit 5, 7, Long Street, London E2 8HN. Turtle Price £170 + VAT.

Valiant Designs Ltd, Park House, 140 Battersea Park Road, London SW11 4NB. Turtle price £199 + VAT.

Zero 2, Highbury Workshops, 22 Highbury Grove, London N5 2EE.

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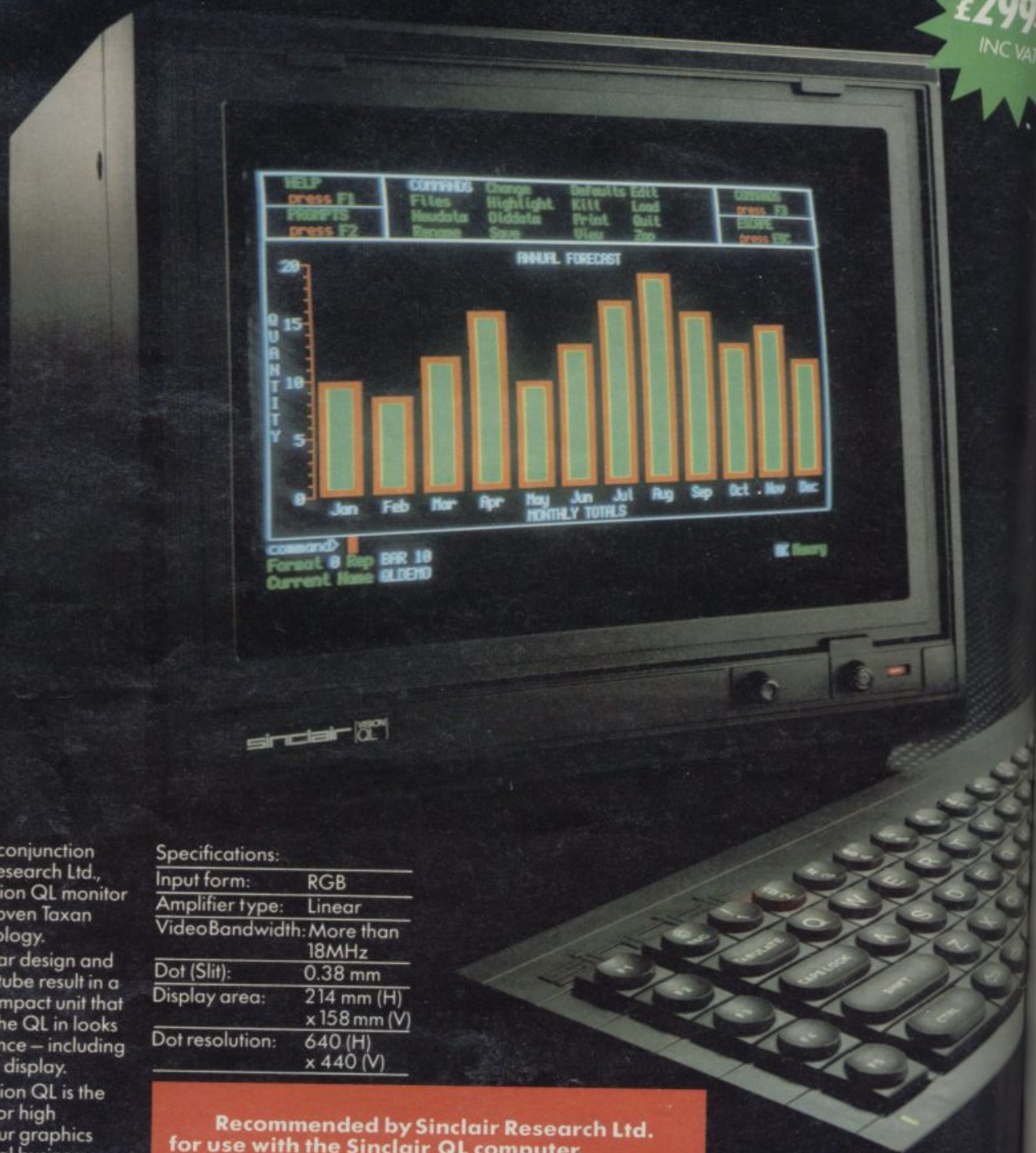
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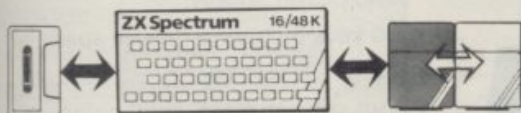
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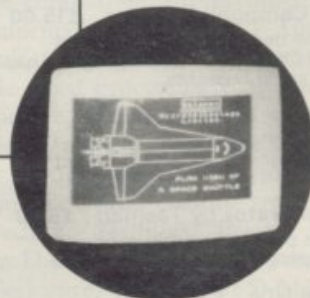
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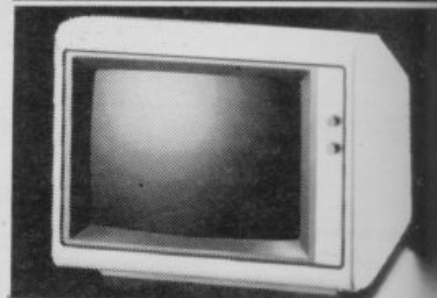
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Contents

Mike Wright reviews the latest microdrive software overleaf and on page 163 antique dealer Alan Proctors shares his programming experiences.

SINCLAIR BUSINESS USER

November 1984

A long four years

THANK YOU for finding the time and space to review my **Building Price** program in the September issue.

I am pleased to see at last a start made with your *Sinclair Business User* to fill the need created by the ZX-81, Spectrum, and QL. It has been a long four years, for the few who took the plunge with the first ZX-81, waiting for the rest of the small businessmen and women to realize the benefit of the Sinclair computer and its future in the small business. In fact, the smaller the business the more the computer can help, as very often, especially in the building industry, the proprietor has to work on site and do the office work as well. I wonder how many fathers who have given their children a computer, try to do their office work in the evening, to the strains of **Jet Set Willy's** *If I was a rich man*.

The **Building Price** program has been in regular use for the last year and copes with most plans; I have just put through a plan for a small extension in less than 10 minutes. I have a microdrive which is a joy to use — it took me two years to write the program and it can load in nine seconds.

Long may you continue to support us *Sinclair Business Users* with your excellent magazine.

John Redman,
Axbridge, Somerset.

Record software

I SHOULD be interested to hear from anyone who is using one or more of the business programs on the market for the 48K Spectrum for running a small retail music tape/record business.

Postage and incidental expenses would be reimbursed.

E Robinson,
Record & Tape Centre,
6 Main Street,
Cockermouth,
Cumbria.

Printing space

IN DUE COURSE I would like to set the copy for a monthly newsletter using a micro-computer and a proportional daisy wheel printer.

Presumably, to do that I would need a word processing package that will show the effect of proportional spacing on the display screen

— especially if columns are to be correctly justified. Is it possible to work in that way on the Spectrum or the QL, or indeed on any other popular micro?

Charles Lane,
London W1N

• *Proportional spacing is possible on most word processors. For the Spectrum **Tasword 2** is the best and the QL is supplied with **Quill**. That is all you will need as the software produces the format of a document and not the printer.*

Shop window

IN AN EARLIER issue of *Sinclair Business User* we asked for details of specialist programs of limited commercial value written by readers which might be of interest to other serious users. Details of programs will appear once only within *Sinclair Business User*. If readers would like details of their programs to appear regularly they can advertise in *Sinclair Supermart* at the back of the magazine.

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Building Price. Calculates the cost of constructing buildings and extensions, drawing a plan of the building after measurements have been entered. Contains more than 100K on two cassettes, price £15.00. Available from J Redman, Stevelon House, Slade Lane, Tarnock, Axbridge, Somerset BS26 2SH. Tel. Edingworth 518.

Calendar. Converts dates from Gregorian (European) to the Hegira (Islamic) calendar systems. Runs on 48K Spectrum, microdrive compatible, drives full-size or ZX printer. For further information contact E J F Austin, BAC Ltd, PO Box 2, Tabuk, Saudi Arabia.

D J Words. Versatile word processing program for 48K Spectrum with microdrive. Capable of 137 character per line in condensed mode. Enlarged, condensed, underlined, emphasized and italics modes available, as are tabulation, centralised and right justified print position and left margin changes. Fast text editing facilities. Priced at £13.80 including p & p, from D J Programs, Lawnspeedie, North Duffield, Selby, N Yorkshire. Tel (075 785) 615. A range of computer programs for farmers also available.

School Fund, Class List. A range of administrative programs for teachers, as well as educational and business software. For further information contact P Nethercot, 2 Chantry Close, Sunderland SR3 2SL.

Mike Wright reviews two products which explore the business potential of the Spectrum

Microdrive pioneers

MORE AND MORE business programs are, at last, advertising microdrive compatibility as a feature. Transform and Hestacrest are both companies which have released programs which go further and require not one but two microdrives.

Invoicing/Accounting from Transform is designed for a 48K Spectrum fitted with twin microdrives and an 80 column printer. It costs £25.00 — or £15.00 for owners of the present Invoicing program — and it bravely attempts to provide all the features of large business systems.

Somewhat strangely, it seems at first, the suite is supplied in a large plastic book type case containing two cassette tapes. The programs must be loaded from tape, customised for the user's interface and saved to microdrive. The infamous problems encountered with microdrive cartridge compatibility, where programs saved on one microdrive will not always run on another, have been a factor in Transform choosing to release the programs on cassettes, one for the ledger and one for the invoicing program, rather than on microdrive cartridges. On one side is a version for a Tasman interface. A version for other interfaces is on the other side.

The customised ledger and invoicing programs are saved onto different cartridges with a third being used for the shared data. When back-up copies of programs and data are made six cartridges are needed.

One feature is the inclusion of **Tas-wide** to give a 64 column screen display. Once copies of the programs have been made the data can be set up. The Accounts cartridge is placed in drive one and the data cartridge in drive two.

You select option D at first from the main menu to set the date which is printed on statements. That can be entered in any format required. Option U is used to enter details of the accounts

on the first run and to add new accounts in later runs. A flashing cursor is used to guide the user in setting up the account. The first input is an account name of up to 10 characters, although referred to as an account number. Next the name and address are entered and finally details of debits and credits — marked with a minus sign.

Once the details have been entered they are saved on drive two. When the data has been saved the option of making a back-up copy by replacing the data cartridge with another is given before returning to the main menu. The original data cartridge can then be replaced and a second account set up. Although it is safer to make the back-up copy at each stage you might find it more convenient when setting up accounts to enter the next account, then make a back-up copy of the whole cartridge once all accounts have been entered.

An account is updated by first loading it into memory using the save and load option then the load account option G of the save menu followed by Y to confirm the choice, before entering the account name.

Once an account has been loaded the screen shows the account reference, the name and address and a delivery name and address together with the last ten items on the account. An abbreviated menu is displayed at the bottom of the screen. Two lines of text can be printed on statements. Other options allow address labels to be added, the delivery address or statement cleared. Statements, address labels, delivery labels and remittance notes can be printed.

The invoicing program is used to set up and print invoices. The details from the invoice can be added to the accounts data at the push of a button and it is that feature which makes the programs an excellent buy for the business user. The invoicing program is loaded from the accounts program by replacing the accounts cartridge with the invoice cartridge and selecting option Q in the save

menu. The invoicing program will usually be run first and the data transferred to the accounts program. Once loaded the main menu is displayed, offering you options, among others, to change the VAT rate, add items to the price list and print that price list.

Your name and address, up to seven lines of 64 characters, and a price list of up to 200 items can be used in the



program. Each item is given a description and a VAT exclusive price. VAT at 15 per cent is calculated, added onto the price, and displayed.

An abbreviated menu is displayed at the bottom of the invoice. A flashing cursor prompts for entries to be made. The account reference is first. If an account has already been set up then the addresses are added automatically. The date, invoice number and a reference are entered next. Then the items are added, the quantity being entered first. Details and unit price are added either by typing or by entering the price list number. The cost is calculated and displayed. Entering 't' as a quantity calculates the total cost of the items. Details of postage, any discount, settlement discount and the VAT rate are added. Only one VAT rate can be used per invoice which could be a problem if your business deals in goods or services

which have different rates.

Finally, up to two lines of text can be printed at the bottom of the invoice. Those lines must be added, even as blanks, before the invoice is printed correctly with the discounts and VAT shown. Other options allow credit notes, orders or addresses to be typed, changes made to the invoice and there is even an option to clear all or parts of it. The invoice, address label and delivery label can all be printed from the invoice menu. The invoice details are added to the accounts data through option X. A warning is given if the data has not been added to the accounts.

Throughout the system the layout of the display and printouts is extremely clear and well-designed. That helps make the programs effective in speeding up the production of invoices and the accompanying accounts. Despite that, however, the programs have some disadvantages.

from drive one; a data cartridge is placed in drive 2.

On the first run the program is set up by prompting for your name and address, your security password, up to six different VAT rates and the type of interface to be used. Giving cash discounts and linking to the other programs are also catered for. On subsequent runs only your password is asked for and whether you are starting a new accounting period; if you are then the details of the last period's transactions are cleared from the data cartridge.

You can handle up to 50 sales analysis codes of 10 characters and 250 customers. Transactions are defined in four categories — invoices, credit notes, journals and cash (including discounts) — and are all entered from a subsidiary menu. Each time you select a transaction menu option in an accounting period the data is given a batch number;

At the end of an accounting period an option allows you to print the daybook, cash listing, journal listing, account statements, lists of debtors and customer address labels. Printing the daybook on an 80-column printer, will give you the customer name, account number, reference, item code, net and total amounts and the item description. On a ZX printer only the account number, item code, net and VAT amounts can be obtained.

The statements and debtors option of the period end menu allows statements to be displayed or printed, and a list of debtors with debts can be printed also. Your own or the customer's version of statements, headed with your name and address, can be printed too, showing the type of transaction, a reference, debit or credit and opening and closing balances.

You must use the end of run option before removing the cartridges from the microdrives. That updates the sales data cartridge and once it has been updated the program must be replaced in drive one with a third cartridge. That is formatted before an updated copy of the data, is made.

The program is very user-friendly after you overcome your initial irritation at loading the interface software every time and using the full load command instead of a run file. The ability to fix VAT rates individually is very useful as are the sales and VAT analyses. The printouts are clear enough although you might find them clumsy.

Both the Transform and the Hestacrest programs can be seen as another step forward in the drive to show that the Spectrum can be used very effectively in business, and although both have weaknesses whether or not those matter will depend on your requirements. They are the first programs to use microdrives as if they were disks. Other companies must surely follow when they see what can be achieved.

Transform Ltd 41 Keats House, Porchester Mead, Beckenham, Kent. Tel: 01-658 1661.

Hestacrest Business Software PO Box 19, Leighton Buzzard, Beds. LU7 0DG. Tel: 052-523 7785.

INVOICING/ACCOUNTING

Memory: 48K
Price: £25.00
Gilbert Factor: 8
SALES LEDGER
Memory: 48K
Price: £32.00
Gilbert Factor: 8

The first drawback is the number of microdrive cartridges needed if back-up copies — a necessity for business users — are to be made. It would be nice to see both programs on one cartridge. For some applications the lack of a sales analysis could also prove annoying. An update has been released that allows the sum of all accounts to be produced.

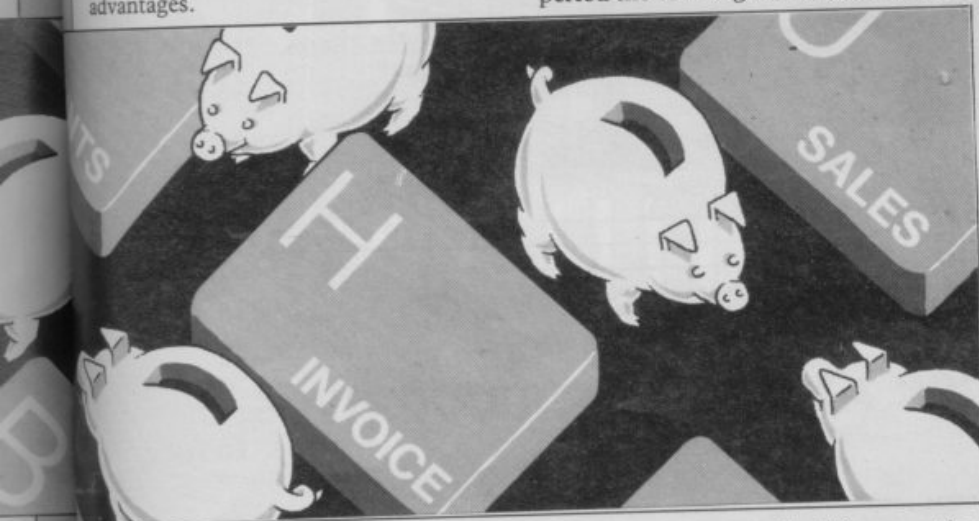
Sales Ledger for the 48K Spectrum, from Hestacrest Business Software, forms part of an accounting package which also includes a cash book and nominal ledger, each priced at £32.50 or £72.00 for all three. In contrast with the Transform software, Sales Ledger is supplied on microdrive cartridge.

The program supports full size printers with Centronics or RS232 interfaces as well as producing abbreviated printouts on a ZX printer. With a Centronics interface the driver software must first be loaded before the program is run

up to 40 batches and 1,000 transactions can be dealt with in any one period. Individual transactions of up to £100,000 and a total of £1 million can be handled.

When entering invoices and credit notes you are prompted for the customer's code number, a reference number, the analysis code, the amount excluding VAT and confirmation of the VAT amount. VAT is calculated from the first digit of the reference code which corresponds to a VAT code. A REF LOCK option, which repeats the customer code and reference number leaving you to enter the analysis code and amount, helps reduce typing.

Opening balances are entered using the input journal option of the transaction menu. That prompts you for the account code and amount. Cash transactions can be input either from the keyboard or by links to the cash book.



Cashflow problems? Kuma attempts to find the answer

Domestic finances

HOME BUDGET from Kuma Computers is intended to help you plan your finances. The program is cassette based and has no manual or written instructions. Instead, a series of Help pages are included in the program.

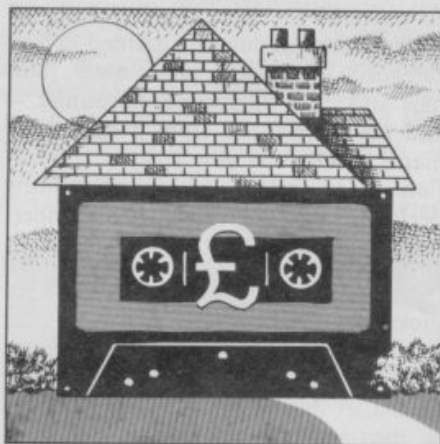
You keep track of your finances by defining a 'year' and entering income and expenditure for each month. The amount entered can be a forecast to be updated later. Expenditure can be entered as one of 10 user-redefinable categories. On the first run the program eases the entry for each month by prompts. Entries can be changed using the back-up option which permits you to re-enter a previous entry.

Option 1 on the main menu allows you to add data or create a new file. It also has a special rolling budget feature which allows new files to be created using the existing data.

Entries for a particular month are displayed using option 2, which also shows the following month's data. The

results for any category can be displayed as a three-dimensional bar chart. Those allow you to define the vertical scale and they do look impressive. The effect, however, is lost when a chart is printed. A printout can be obtained from any of the display options by pressing P.

When the file is saved a six figure security code appears which must be re-entered when the data is loaded.



Though Home Budget is easy to use it cannot be described as user-friendly. The Help pages, which are a great idea, are not effective and the overall lack of instructions is disappointing. That is characterised by the back-up option, which does not make a spare copy but moves back one entry, which is not explained.

You will probably find the biggest obstacle to using the program lies in the fact that monthly totals of expenditure have to be entered. Since such information is not usually kept in that form a separate program such as **Finance Manager** may be needed to get category totals first.

Kuma Computers Ltd Unit 12, Horseshoe Park, Horseshoe Road, Pangbourne, Berks. RG8 7JW. Tel: 07357 4335.

HOME BUDGET
Memory: 48K
Price: £5.95
Gilbert Factor: 5

INTEGRATED BUSINESS SYSTEM FOR SPECTRUM 48K AND TWIN MICRODRIVES

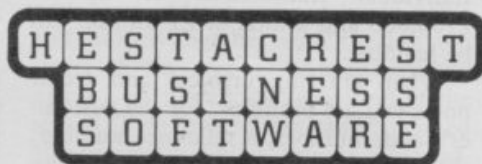
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VAT Analysis
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Remittance Advices
1000 monthly transactions
250 supplier accounts
£32.50

CASH BOOK

Produces:
Cash and Bank Summary
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1000 monthly transactions
95 nominal ledger codes
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250 customer accounts
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★ Professionally designed for twin microdrives
★ Integrated or independent system
★ Easy to operate with clear screen instructions
★ Machine code routines for fast processing



SALES LEDGER

Produces:
Sales
Day Book
Sales Analysis
VAT Analysis
Journals Listing
Cash Listing
Debtors Listing
Address Labels
Customer Statements
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NOMINAL LEDGER AND ACCOUNTS

Available shortly

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★ 64 characters per line screen display
★ Full size printouts for 80 character printers (RS232 or Centronics)
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All programs are supplied on microdrive cartridge with full operating instructions
Full details

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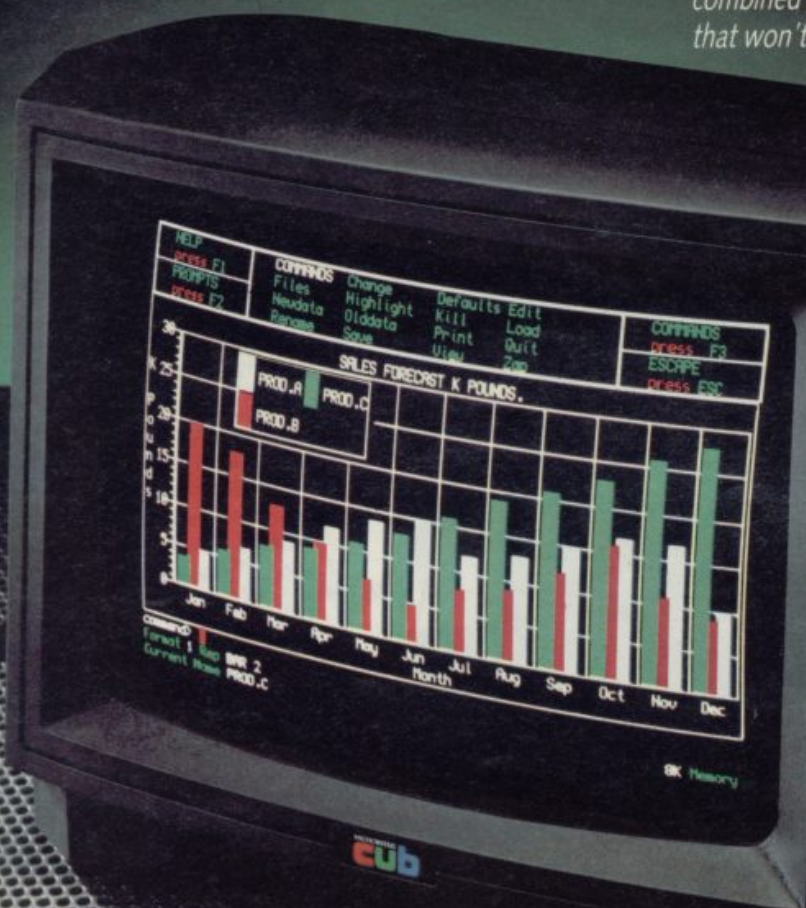
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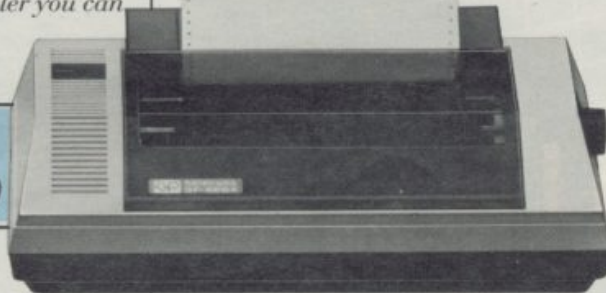
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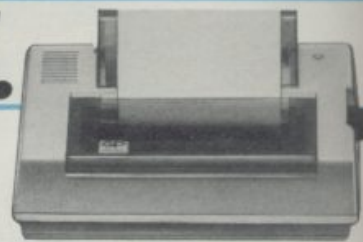
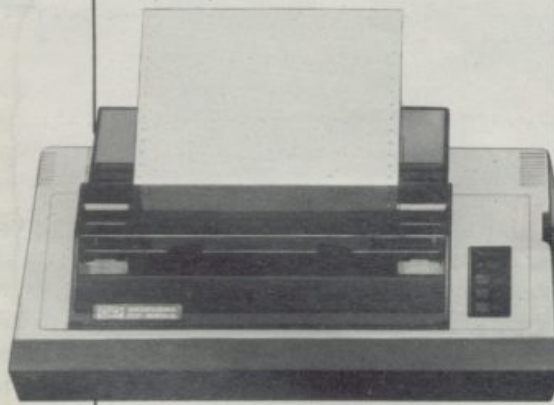
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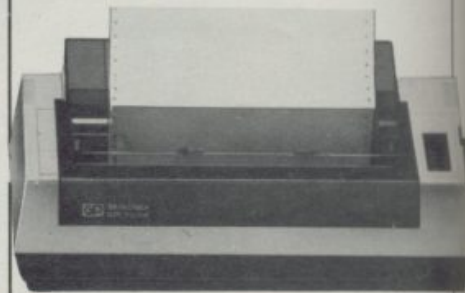
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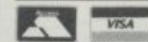
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MY WIFE, SON AND I are employed in the buying, restoration and selling of antique furniture and clocks. As I am a retired civil engineer and my wife takes care of the sharp end of the business I am left to attend to such mundane things as shipping, administration and accounts.

Our business has a turnover which has peaked to around £250,000 per year but is usually around £200,000. We are a limited liability company so the requirements for the maintenance of accounting records and the production of final accounts at the end of a financial year are more stringent than for an unincorporated business such as a partnership or sole proprietor.

Antique dealers, in common with some other traders such as second hand car dealers, may be involved in Special Scheme VAT. The VAT due to the Customs and Excise is calculated on the margin between cost and selling price, not on selling price alone as is the case with the standard VAT scheme, operated by most other business concerns. That introduces a complication for financial accounts whereby purchase cost of individual stock items has to be held until a sale is made.

The cost of employing a bookkeeper — additional to audit fees which we cannot avoid — and a natural aversion to the grind of traditional double entry bookkeeping gave me the final excuse to persuade my wife we should invest in a computer. She agreed to a ZX-81!

That was two years ago. The system now comprises a Memotech 64K memory and parallel interface, a Dean Electronics keyboard, a Seikosha GP100A printer and a rapid load/save Eprom based on Q Save but faster. Without that ROM-based utility, which allows loading or saving the full 64K of memory in 1½ minutes, I do not think the ZX-81 can be seriously considered for general commercial application.

In describing the specification for my system I have to admit that it is a result of evolution during development rather than a system analysis followed by program production. With hindsight I have to admit that I rushed into program coding too early, due the urge to play with the computer. I should have spent more time on detailed system specification in the first instance.

Another lesson learned the hard way was the importance of flowcharting. That technique proved essential both in an overview of the general objectives and subsequently the detailed logic sequences prior to coding. Undoubtedly

ZX-81 in the antique shop

Alan Proctor outlines the problems

had I been a trained systems analyst/programmer I would not have made those mistakes — but then neither would I be an antique dealer.

The system now consists of four program segments and two datafiles. All financial transactions are input into ACCTDATA data file by means of ACCTPROG. The principal data array records hold data in a number of categories which describe stock purchases or sales, administrative cost, capital accounts and cash receipts. The system accommodates both direct and credit transaction.

Each record contains the keys necessary to post to all relevant accounts from each transaction. For instance, the single record for purchase of goods on an individual purchase invoice with post, or printout, to purchase ledger, one entry; personal account of supplier, two entries if cash paid; and Bank, for cash account if payment is made at time of purchase. A provision for 1700 financial records has proved more than sufficient for the last financial year. Facilities are also included to deal with opening accounts, standing orders, monthly or annual, and if monthly, full or partial year payments. ACCTDATA contains all the information needed to produce, when needed, details of individual ledger accounts with full or partial listings, or just monthly balances, individual or administrative. Also End of Year final accounts, trial balance and

balance sheet.

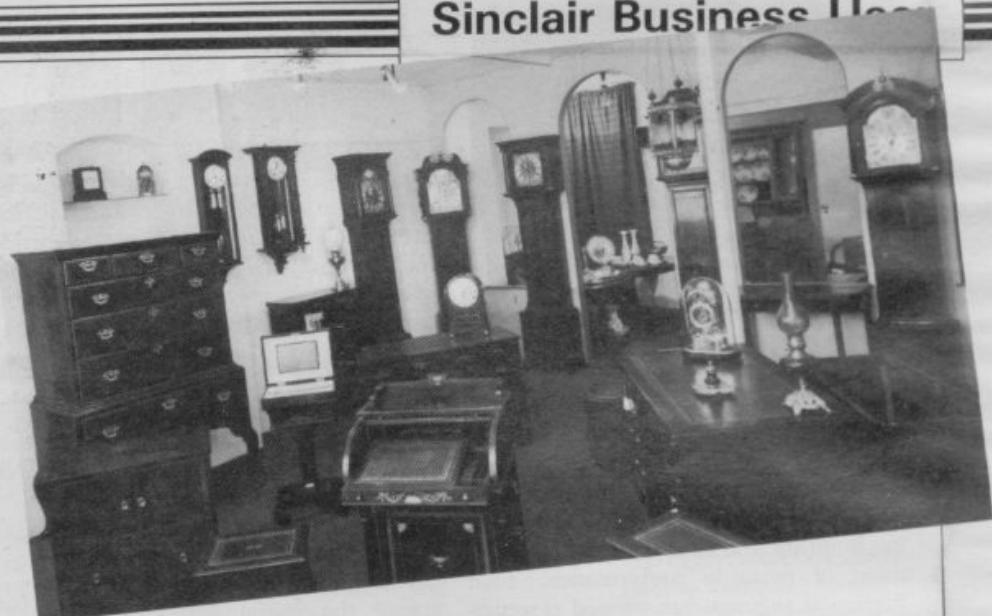
Whilst the financial accounts do not require details of purchase and sale of individual stock items per se, those details are required to be kept in a specific form by Customs and Excise if the Special VAT scheme is being operated. Also the auditors require full information on all transactions in order to be able to do an audit trace on any constituent part of the accounts.

The additional details are maintained in SALEDATA. Each record in SALEDATA is based on an individual stock reference number. It contains a description of the item, date, details of purchase and sale, client and supplier, sales invoice number, VAT details and cost and sales prices. SALEDATA contains 750 records which have proved more than enough for one financial year.

When data has been input the file on line is ACCTDATA. Those aspects of data required for SALEDATA are transferred on input to low memory (12K — 16K) so that when the new generation of ACCTDATA is saved and the previous generation of SALEDATA is loaded, the data required is not lost.

On loading SALEDATA an instruction is given to STOP the recorder when the old generation is loaded. The data is then transferred into the SALEDATA records from low memory automatically. A further instruction is given

continued on page 164



continued from page 163

to restart the recorder on SAVE and the new generation of SALEDATA is created. That facility of using low memory is extremely useful for data transfer or program operating variables loading when the continued memory required of program and data files are close to 64K.

The SALEPROG segment of the system provides a means of interrogating SALEDATA for given current stock lists, current stock value, details of individual stock items, analysis by invoice number, customer, dealer or item, such as clocks, tables and so on, and reports on monthly transactions with a statement of monthly performance. That particular segment has proved extremely useful to me as a management tool.

The ACCTPRNTPROG segment provides the financial reports from the ACCTDATA records. Those include cash flow and bank balance reports and can also provide analysis of types of expenditure per ledger account. How often has the reader been requested by the tax inspector to provide an analysis of sundry expenses? That single byte in the record provides the facility to produce a full subsidiary analysis, often used by bookkeepers as the preliminary

to impersonal account posting.

An interesting feature of ACCTPRNPROG is that it employs an array to control the action to be taken in debiting and crediting accounts, attributing VAT to input or output, depending on the nature of the record. Due to insufficient memory, the array has to be saved in conjunction with ACCTPRNPROG after all other variables have been cleared, using the low memory transfer technique.

A further segment has been developed called INVCPRG. That produces a full invoice with file, invoice number, customer details and full item description. If for export, a shipping invoice is also produced. In that instance the initial data file loaded is SALEDATA. The autoload from low memory subsequently being to ACCTDATA. Although almost complete, my wife and son consider a computer produced invoice is hardly in keeping with the image of an antique shop.

Developments in the world of computers are so fast that whilst my decision two years ago to go ahead with my own system was valid then, I am not sure whether it is so today. Whilst there are a number of financial packages available I do not know of any that cater

for Special Scheme VAT. I now have a working package of interactive programs using common data files which is based on output information I want, and an input format to suit me and my business.

I once, somewhat rudely, described the so-called computer specialist as a person who designs a very clever, computer-orientated solution and then seeks out someone whose problem could be made to fit it.

There are many problems for anyone introducing a computer into a small business. If I had made the decisions in our business, we might have had about 50 per cent of the programs completed, but probably no business life to apply them to.

I feel that for most amateurs, serious programming requires an application that borders on obsession. This can produce several strains into the domestic scene. On the other hand, the employment of a professional agent in producing custom-made software would probably result in a cost for software and hardware that the owner of a small business might find hard to justify.

For further information about accountancy programs contact Alan Proctor, Windsor Antiques & Design, 80 High Street, Eton, Windsor, Berks SL4 6AF.

Microdrive Microdrive Microdrive Microdrive Microdrive

NEW

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The Transform Microdrive Storage Box is attractively designed to match both the Spectrum and QL

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Spectrum Interface

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Drive Unit 2

RS232 Interface

Centronics Interface

Spectrum owners! Imagine what great use you could make of all these components. Rotronics have integrated them all into one attractively styled, compact unit. All the power and convenience of floppy disk can now be yours, but at a fraction of the cost.

A complete package

Wafadrive is extremely versatile. Five major components are housed within this one unit—the micro interface, two 128K drives, RS232 serial and Centronics parallel ports. Also included in the package are a blank wafer and Spectral Writer—a superb word processor program. The micro interface forms the nerve centre of Wafadrive, controlling all its major functions. The dual drive configuration and the ability to connect standard peripherals directly provides professional system flexibility. All this without a mass of separate components and vulnerable cables. Wafadrive transforms your Spectrum into a very powerful system.

Speed, reliability and capacity

The wafers contain an endless loop of specially developed magnetic tape driven at high speed past a read/write head. The result is fast access without data loss.

Three sizes of wafer are available with minimum formatted capacities of 16K, 64K and 128K. The 128K wafer costs £3.95.

Data transfer rate is approximately 2K per second. Access time is proportional to capacity. 16K wafers are ideal for program development, with the larger capacity wafers being more suitable for general use and archiving of completed programs and data. Mechanical longevity is assured by the use of high grade materials throughout and full interchangeability between machines is guaranteed.

Extensive software applications

Wafadrive provides intelligent file handling and rapid access to data. Program development and other applications can be performed with ease. Start word processing immediately with the specially developed software package included with Wafadrive. Or battle with a spectacular interactive games program. Whatever your mood, you'll find the sophisticated Wafadrive software challenging and rewarding. Future versions of Wafadrive will be available for most popular home micros, so software back-up will be comprehensive.

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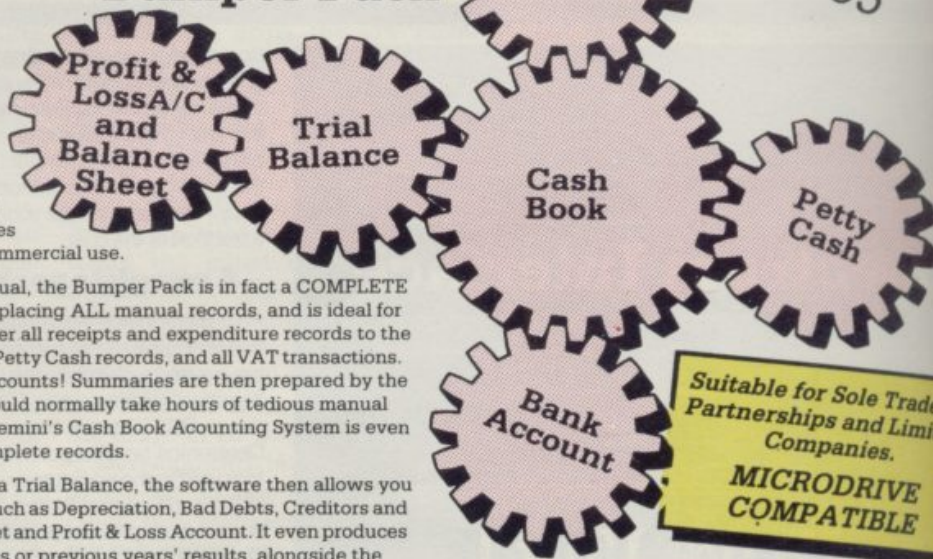
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Having prepared these summaries, and a Trial Balance, the software then allows you to add details of year end adjustments, such as Depreciation, Bad Debts, Creditors and Debtors, and prepares a full Balance Sheet and Profit & Loss Account. It even produces COMPARATIVE figures, such as budgets or previous years' results, alongside the current year's figures, together with notes to the accounts.

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Having set up your fields, you may then add, delete or change information on the 'cards' under the headings you have elected. Gemini databases contain other important and useful utilities as well, e.g. alphabetical and numerical sorting, numeric calculations, finding records that meet specific requirements, line printer routines, browsing facilities, etc. For example a list of all recordings by a particular composer, calculate total value of freezer contents, etc.

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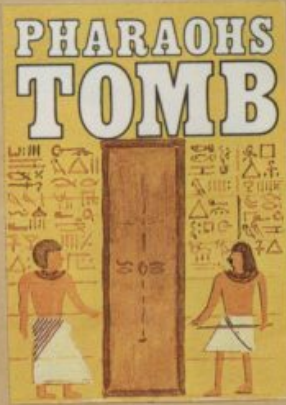
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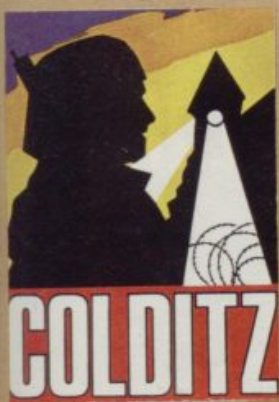
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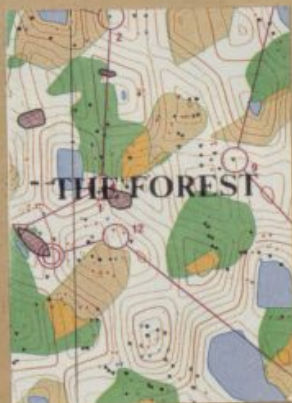
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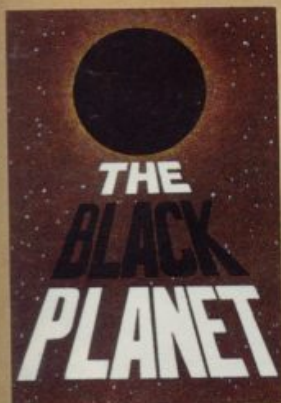
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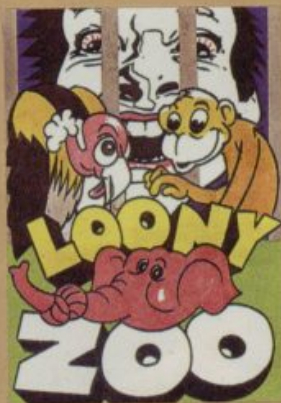
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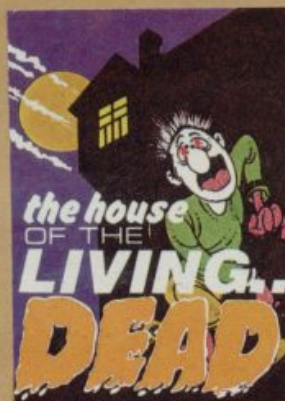
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GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.

Bug — an error in a program.

EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultraviolet light. The memory can then be re-programmed using an electrical device called an EPROM blower.

Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.

Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.

Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.

Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.

Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.

Port — a link to the outside world which can be used by programs and the computer.

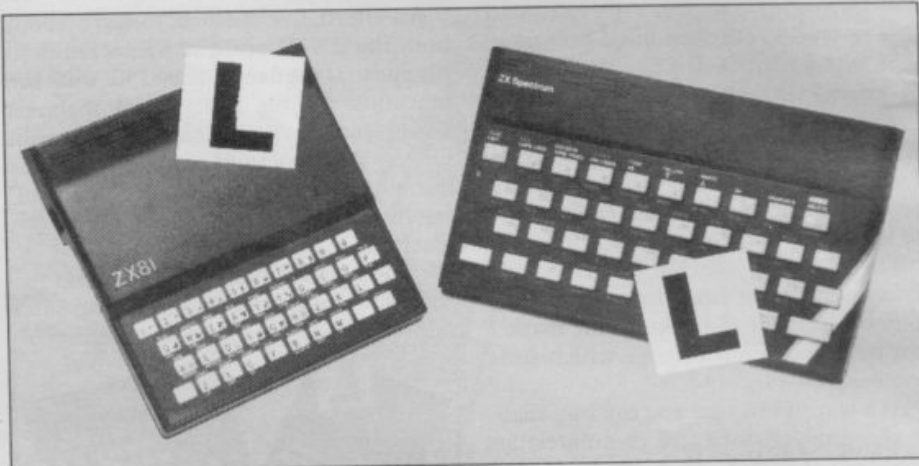
PCB — printed circuit board. A board which has on it the electronic circuits of the computer.

RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.

ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.

Software — programs which control the operation of the computer.

Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the QL computer is big enough for use in small businesses, the Sinclair computers are not really suitable for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a

few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 170

continued from page 169

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD"" followed by NEWLINE; then increase the volume of

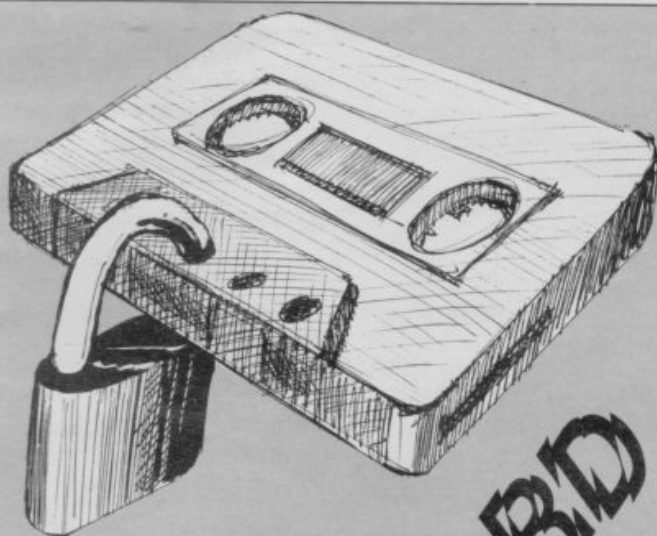
the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then rewind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.



PASSWORD

PROTECT your programs from snooping eyes with this simple Basic routine by Hamish Barr of South Wirral. The program asks for a password, in this case 'eugene'. To use your own password simply alter the word 'eugene' in line 60, making sure you use six characters.

The program works by POKEing the number of lines at the bottom of the screen with the value 0. Since that is where error codes are printed, any attempt to BREAK the program will result in a systems crash until the correct password is entered, and the value is reset to 1.

The program can be used with any Spectrum, but please do not use it with programs that you want to send to us for publication!

```
5 POKE 23659,0
10 LET s$=""
20 PRINT AT 12,9;"ENTER PASSWD
RD"
30 PAUSE 0
40 LET a$=INKEY$: IF a$="" THE
N GO TO 40
45 LET s$=s$+a$
50 IF LEN s$<>6 THEN GO TO 30
60 IF s$<>"eugene" THEN PRINT
AT 1,5;"SORRY WRONG PASSWORD":
PAUSE 100: NEW
70 PRINT AT 16,14;"O.K.": PAUS
E 100
80 POKE 23659,1
90 CLS
100 REM REST OF YOUR PROGRAM
```


DRIVER

Starter Pack

DRIVER by D Gough of Ashton-under-Lyme in Manchester is probably the simplest playable game possible on the unexpanded ZX-81. You must use cursor keys 5 and 8 to control the car, avoiding the obstacles in your way.

Variable used:

A: Holds the horizontal position of the car.
S: Keeps the score.

Line 10 Sets the horizontal position of the car to 11, which is about a third of the way across the screen.

Line 20 Sets the score to zero.

Line 30 Prints one obstacle at line 21, the bottom of the screen, and at a random position along that line. The obstacle is represented by three asterisks.

Line 40 Sets the print position at the same place as the position of the car. Before the car is printed to the screen, we must check to see that there is nothing already there. That will not happen the first time, but may happen later in the game.

Line 50 This line is one of the most useful programming devices for the ZX-81. It looks directly at the bytes 16398 and 16399 in the systems variable area of the memory, which you would not usually use. Those stores contain the address of the square on the screen where the computer is to print the next character. It then looks at that byte to see whether there is already something there, in this case code number 23, which is the code number of the asterisk. You can find the code numbers for characters in Appendix A of your ZX-81 manual. So taken together, lines 50 and 60 set the print position to where the car should be printed next, and then check to see if there is an asterisk already on the screen in that position.

If there is an asterisk there, then you have crashed, and the program jumps to line 120.

Line 60 Prints the car at the pre-arranged print position, which we now know to be clear of obstacles.

Line 70 Moves the whole display up one line, bringing the new obstacles closer to the car, and leaving room at the bottom for a new one. Any obstacles going off the top of the screen will be lost.

Lines 80-90 Check the keyboard to see which keys you are pressing. If you are pressing five or eight then the position of the car must change, and A is adjusted accordingly.

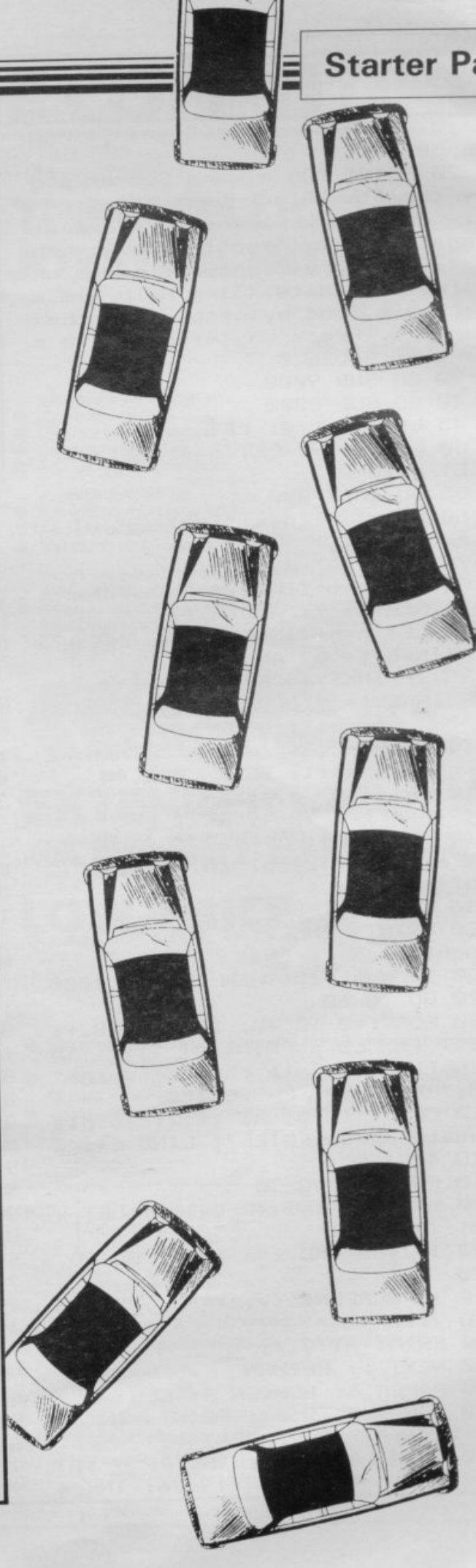
Line 100 Adds ten to your score.

Line 110 Sends you back to the beginning of the main part of the program.

Line 120 You have crashed so the computer prints out your score and then stops.

You could easily adapt the program, still in 1K, to make the game get harder as you play. One possible method would be to have a new variable, say AS, containing the obstacle, and change that each time the score reached a particular level.

```
1 REM "DRIVER"
10 LET A=11
20 LET S=0
30 PRINT AT 21,INT (RND*26); "*"
40 PRINT AT 0,A;
50 IF PEEK (PEEK 16398+256*PEEK
K 16399)=23 THEN GOTO 120
60 PRINT " "
70 SCROLL
80 IF INKEY$="5" THEN LET A=A-
1
90 IF INKEY$="8" THEN LET A=A+
1
100 LET S=S+10
110 GOTO 30
120 PRINT AT 0,0;S
```




```

10 PRINT "The Black swan": PAU
SE 50
20 PRINT "On a warm Summer's d
ay the(6*sp)Black Swan swims gen
tly on his(2*sp)pond. A cloud of
gnats hovers(3*sp)lazily overh
ead. A hungry(6*sp)swallow is ch
asing the gnats.(3*sp)Help him c
atch his food by(6*sp)using the
cursors. Press any(4*sp)key to s
tart.": PAUSE 0
30 GO SUB 9000
40 GO SUB 8000
45 LET gnat=0: LET go=0
50 LET d=19: LET a=4: LET m=3:
LET n=28
55 GO SUB 7000
60 PRINT AT d,a;"(sp)AB";AT d+
1,a;"(sp)CD"
75 PRINT AT m,n;"(sp)"
80 LET m=m+(INKEY$="6" AND m<1
4)-(INKEY$="7" AND m>1)
90 LET n=n+(INKEY$="8" AND n<3
1)-(INKEY$="5" AND n>0)
95 IF INKEY$="5" OR INKEY$="6"
OR INKEY$="7" OR INKEY$="8" THE
N LET go=go+1: BEEP .005,30
100 IF SCREEN$ (m,n)="" THEN L
ET gnat=gnat+1: BEEP .008,40
110 PRINT AT m,n;"H"
112 FOR i=1 TO 4: NEXT i
114 LET a=a+1: IF a>23 THEN PR
INT AT d,a;"(2*sp)";AT d+1,a;"(2
*sp)": LET a=4
116 IF a<4 THEN LET a=4
120 PRINT INK 2;AT 0,8;"Gnats
caught(2*sp)"; gnat
160 IF gnat=30 THEN GO TO 1000
170 GO TO 60
1000 FOR f=0 TO 40: BEEP .008,f:
NEXT f: CLS : PRINT AT 11,0;"Th
e swallow ate all the gnats in "
;go;" swoops": PAUSE 150
1010 CLS : INPUT AT 11,2;"To pla
y again press ENTER"; LINE c$: G
O TO 40
7010 FOR i=1 TO 30
7020 LET y=2+INT (RND*12): LET x
=INT (RND*31)
7030 IF y=m AND x=n THEN GO TO
7020
7040 IF SCREEN$ (y,x)="" THEN G
O TO 7020
7050 PRINT AT y,x;"E"
7060 NEXT i: RETURN
8000 PAPER 6: BORDER 4: CLS
8010 FOR f=0 TO 31: PRINT INK 5
;AT 21,f;"(ig8)": NEXT f
8110 PRINT AT 19,1; INK 4;"E";AT
19,3; INK 4;"E";AT 19,26; INK 4

```



BLACK SWAN

EXTREMELY effective use of the user defined graphics on the 16K Spectrum make this game by Michelle Presslie, of Dudley in the West Midlands, a pleasure to watch. You are a swallow who must eat as many gnats as possible in as short a time as you can, while below a black swan swims elegantly among the bulrushes.

The program uses our special abbreviations for graphics characters. Please read the instructions on the first page of Program Printout before typing in the program.

```

;"E";AT 19,28; INK 4;"E";AT 19,3
0; INK 4;"E"
8120 PRINT AT 20,1; INK 4;"E";AT
20,3; INK 4;"E";AT 20,26; INK 4
;"E";AT 20,28; INK 4;"E";AT 20,3
0; INK 4;"E"
8130 PRINT AT 18,1;"G";AT 18,3;
INK 4;"E";AT 18,26;"E";AT 18,28;
INK 4;"E";AT 18,30; INK 4;"E"
8140 PRINT AT 17,3;"G";AT 17,26;
"G";AT 17,28; INK 4;"E";AT 17,30
; INK 4;"E"
8150 PRINT AT 16,28;"G";AT 16,30
; INK 4;"E"
8160 PRINT AT 15,30;"G"
8200 RETURN
9000 FOR n=USR "a" TO USR "h"+7
9010 READ v: POKE n,v: NEXT n
9020 DATA 0,0,224,112,60,62,31,1
5
9030 DATA 0,48,120,104,124,102,4
8,56
9040 DATA 7,231,55,31,143,255,12
7,63
9050 DATA 204,238,255,255,255,25
4,252,248
9060 DATA 0,0,20,8,0,0,0,0
9065 DATA 16,16,16,16,16,16,16,1
6
9070 DATA 16,56,56,56,56,56,56,1
6
9080 DATA 1,5,106,220,60,2,1,0
9090 RETURN

```


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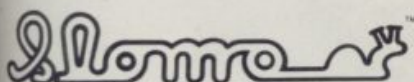
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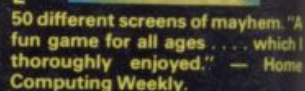
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An object lesson for adventurers

Quentin Heath describes a simple system for creating complex adventures

ARTIFICIALLY intelligent characters can add atmosphere to any adventure game, but the most important parts remain the scenario and the objects it contains.

The most popular means of programming a scenario is to use a grid, first plotted on paper and then transferred to the computer either as a compact data block within a machine code program or an array within a Basic program. Such a

	1	2	3
A			
B	1000 1030 1060	2000 0 0	
C			

Figure 1. Argolian grid.

structure is shown in figure one which is the floor plan of an Argolian monastery. Each of the squares represents one move and the scale could be adjusted to make it one room or part of a room.

The floorplan in figure one does not contain any information about the locations. Instead it contains a list of numbers. These values are address pointers to various other lists which describe locations and events within them. In figure one, for instance, location B1 lists a series of numbers which in themselves mean nothing. To the adventure control program, however, each number has a meaning and they are:

room description = 1000

monster description = 1030

object description = 1060

When the program's movement routine places a player at room B1 in the monastery it needs a long location description in order to inform the player what is going on. It finds the number 1000 in that position on the list and then goes to the memory address where the room description is stored. When it has found it the program gives the information in figure two to the player.

The next action of the program, is to see if any objects are stored within the room. The object description for room B1 is placed at memory location 1060 and printed out after a location description. In the example the object is a small glass egg and the program would produce the printout shown in figure three.

If no object has been stored in a particular location the address indicator in the grid for 'object description' should contain a value which tells the program not to look for an object. The program may also change the value if an object is removed during play.

Using the grid system the task of programming a game is made easier because the program only needs to manipulate the grid of memory references and not the lists of descriptions.

The grid in the example is simple and more factors can, and should, be added to it. For instance, the fighting abilities of a monster who is known to haunt a room could be included in a list indicated by the location grid.

address	room	monster	object
1000	dark room		
1030		Smikey	
1060			crystal egg
2000	chapel		
0			
0			

Figure 2.

These numbers, discussed last month in *Mind Games*, could be compared to player strengths and weaknesses when a fight takes place and changed as the monster wins or loses. If death occurs a zero can be placed in the reference grid.

The monastery shown in the example grid has only one level. It is, however, easy to develop a grid in which you can move to different floors.

Grids should be created as if they were being produced for a one level adventure but with one important difference. A new reference is added to the list for each location which indicates

whether there is a staircase in the room and in which direction, up or down, it goes. The grids are laid end to end in memory.

All the computer needs to do is look at the indicators on the list. If they are set to any number except zero there is a staircase in the room. The player is then asked whether a transition from one floor to another is required. If so, the program then switches to a different floor.

The example, which uses absolute RAM memory addresses, is for a machine code adventure program but by creating a series of arrays, one for each grid and one for each list of information, the grid reference system can be used within a Basic adventure program. The machine code addresses are translated into array elements and a three dimensional array can store any number of grids.

The grid reference system is simple to use and, with the techniques described in previous articles about character generation and manipulation, should enable a substantial artificially intelligent adventure game to be written.

You are standing in a **DARK** room.

There is a **CRYSTAL EGG** in the room which is guarded by a **SMIKEY**.

Figure 3.



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at the end of the program in table 2 to scroll the screen upwards but I have not shown them because it is easier to use the SCROLL command.

The first program works as follows. Variables A and B are set to the values of D-FILE and VARS less one, that is to the addresses of the beginning and end of the display file respectively. Then each location in the display file is inspected in turn using variable I. If it does not contain 118 then the value in it is POKED into the location to the left or

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I HAVE NOTICED a decrease in the number of questions from ZX-81 owners in the past year and so I have tended to concentrate on the Spectrum. This month I redress the balance.

The first question, from Mr Dave Harris of Abingdon, introduces the theme: **Can you explain the ZX-81 display file?"**

The area at the bottom of RAM between 16384 and 16508 holds the system variables and is followed by the program area, starting at 16509. The display file is next but as programs can vary in length, the display file does not start at a fixed address. The ZX-81 keeps track of it by storing the current value of the starting address in D-FILE.

If you look at page 178 of the manual you will see that the value of D-FILE is stored at address 16396 and so you might infer that you have only to look at the contents of 16396 to find the value of D-FILE.

Unfortunately, that is not true. Remember that the value of D-FILE is an address and that addresses are whole numbers, like 16384 and 17407 and 32767. A single location can only hold a number between 0 and 255 and so two adjacent locations are used to store large numbers. The value of D-FILE is given by: value in 16396 + 256*value in 16397. Any whole number between 0 and 65535 inclusive can be stored using that system. The value held at an address can be found by PEEKing at it

Moving displays in black and white

Andrew Hewson looks at the position of the ZX-81 screen display and shows how to produce headerless files on the Spectrum



and so you can PRINT the value of D-FILE by entering:

```
PRINT PEEK 16396 + 256*PEEK 16397
```

You may know that the contents of the first location in the display file is always 118 and you can show that by entering:

```
PRINT PEEK (PEEK 16396 + 256*PEEK 16397)
```

Similarly, the address of the end of the display is held in VARS — or more correctly is one less than the value in VARS — and can be PRINTed by entering:

```
PRINT PEEK 16400 + 256*PEEK 16401-1
```

Each line displayed on the screen is terminated by a byte containing decimal 118 and there is one more byte at the beginning of the file also containing 118. As there are 24 lines in the display, there are 25 bytes containing 118 and it is essential to the correct functioning of the display software that all 25 bytes are present.

With an unexpanded ZX-81 the display file consists of those 25 bytes and no more unless a LIST, PRINT or PLOT command has been executed since the last CLS or RUN command. That is a device to keep the display file as small as possible.

With a memory expansion pack of 4K or more the ZX-81 pads-out the display file with 32 bytes per line each containing zero — i.e., blanks.

Mark Wilson of Aberdeen writes:

"Could you please tell me how to scroll the ZX-81 screen up, down, left and right?"

To scroll the screen downwards or from side to side it is necessary to rearrange the contents of the display file in the appropriate logical fashion. There is one rule which must be obeyed whilst such rearrangements are in progress. It is that whilst running in SLOW mode the ZX-81 display file must contain at least 25 bytes holding 118 at all times. If that rule is broken the consequences are dire — the machine crashes and the only remedy is to pull out the plug and start again.

Tables 1 and 2 consist of programs to scroll the display from side to side and downwards respectively. A few simple alterations as shown to the program in table 1 will change the direction of scrolling from right to left to left to right as required. Similar changes could be made to the program in table 2 to scroll the screen upwards but I have not shown them because it is easier to use the SCROLL command.

The first program works as follows. Variables A and B are set to the values of D-FILE and VARS less one, that is to the addresses of the beginning and end of the display file respectively. Then each location in the display file is inspected in turn using variable I. If it does not contain 118 then the value in it is POKed into the location to the left or

continued on page 182

```
100 LET A=PEEK 16396+256*
    PEEK 16397
110 LET B=PEEK 16400+256*
    PEEK 16401-1
120 LET D=1
130 LET I=B
150 LET S=PEEK I
160 LET I=I-D
170 IF PEEK I=118 THEN GOTO 200
180 POKE I+D,PEEK I
190 GOTO 160
200 POKE I+D,S
210 IF I=A THEN STOP
220 LET I=I-D
230 GOTO150
```

Table 1. A program to scroll the ZX-81 display from left to right. To scroll from right to left alter lines 120, 130 and 210 as follows:

```
120 LET D=-1
130 LET I=A
210 IF I=B THEN STOP
```


continued from page 181

to the right — depending on the value set for D in line 120 — and the routine loops to line 160 to inspect the next location.

If a location contains 118 the value from the beginning of the line — stored in variable — is POKed into the adjacent location. That is the way in which a wraparound effect is achieved. A test is then made — line 210 — to see if the job is completed. The second program works in an analogous fashion.

Adrian Neilson of Dedridge, West Lothian writes: **"Please explain how to get a scan going across the screen which makes up a picture and the name of the game and then fills in with colour"**.

The technique is very straight forward and is explained in the Spectrum Manual but I have received several letters on the topic. The current Spectrum display can be SAVED at any time using either of the commands:

SAVE "name" SCREEN\$

or

SAVE "name" CODE 16384,6912

The display can be LOADED by entering any of the following:

LOAD "name" SCREEN\$

LOAD "name" CODE 16384,6912

LOAD "name" CODE

A particular problem with SAVEing and LOADING the screen is that the various commands and messages are also displayed on the screen. In doing so they prevent the programmer from having full flexibility in the way in which he constructs his display.

A way around the problem is to reserve space RAMTOP for a copy of the display by entering

CLEAR 58623

and to use the area to maintain a copy of the required display. A display which is SAVED from the upper area will automatically LOAD into the display file if the SCREEN\$ qualifier is used, i.e. the following pair of instructions are mutually compatible:

SAVE "name" CODE 58623,6912

LOAD "name" SCREEN\$

Lindsey Round of Chessington, Surrey has written to say: **"How do you create headerless files and save and load them on the Spectrum?"**

In normal operation all Spectrum cassette files are SAVED and LOADED in two parts. The first part is very short and specifies the name, type, length, and so on of the main part of the file. On reading the header the Spectrum checks that the name and type match that which it is looking for and displays

them on the screen. The remaining data are used by the main loading routine so that it knows where to place the incoming data and how much there will be of it.

The main saving and loading routines in ROM can be called directly from a machine code routine provided the correct parameters are passed in the appropriate Z80 registers. In that way headerless files may be written and read

to and from cassette.

Table 3 lists the various parameters and their interpretations and table 4 lists two routines which SAVE and LOAD the screen in that fashion. The routines can be loaded into the Spectrum using an assembler or using the simple decimal loader listed in table 5.

● Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.

```

100 LET A=PEEK 16396+256*PEEK 16397
110 LET B=PEEK 16400+256*PEEK 16401-1
120 LET C=I
130 IF PEEK (B-C)=118 THEN GOTO 160
140 LET C=C+1
150 GOTO 130
160 FAST
170 FOR I=B-1 TO A+C STEP -1
180 POKE I,PEEK (I-C)
190 NEXT I
200 FOR I=A+1 TO A+C-1
210 POKE I,0
220 NEXT I
    
```

Table 2. A program to scroll the ZX-81 display downwards.

	To Save	To Load
Carry flag status	Clear	Set
A register contents	255 (ffh)	255 (ffh)
IX register contents	Address to SAVE from	Address to LOAD to
DE register contents	Number of bytes to SAVE	Number of bytes to LOAD
Address of ROM routine	1218 (04c2h)	1366 (0556h)

Table 3. Parameters of Spectrum routines to SAVE and LOAD headerless files.

Decimal	Assembler	Comment
167	AND A	Clear carry
62 255	LD A,255	Load A with 255
221 33 0 64	LD IX,16384	SAVE from 16384
17 48 24	LD DE,6192	Length 6192
205 194 4	CALL 1218	Call SAVE routine
201	RET	Return
55	SCF	Set carry
62 255	LD A,255	Load A with 255
221 33 0 64	LD IX,16384	LOAD 16384
17 48 24	LD DE,6192	Length 6192
205 86 5	CALL 1366	Call LOAD routine
201	RET	Return

Table 4. Two Spectrum routines to SAVE and LOAD the screen display to and from a headerless file.

```

10 LET I=23296
20 INPUT J
30 POKE I,J
40 PRINT I, PEEK I
50 GOTO 20
    
```

Table 5. A simple Spectrum program for loading decimal code into the printer buffer. When used to store the routine in Table 4 the routines can be called at addresses 23296 and 23310.

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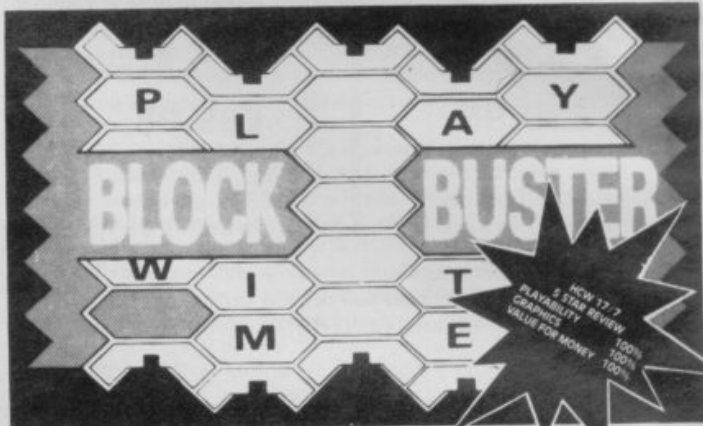
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Basildon: Roundacre Microcomputer Users' Club. J Hazell, Basildon 285119/416333. Meetings every Wednesday 7.30 to 10.30pm.

Blackburn Computer Club: 1 Sutton Street, Feniscowles, Blackburn, Lancashire. Tel: B'burn 60033 (office hours) or 28127. Meets twice a month, subscription £5 (£3 juniors).

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Daventry & District Computer Club: c/o Daventry Ex-servicemen's Club, Market Square, Daventry, Northants.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Edinburgh: Edinburgh Home Computing Club. John Palmer (031 661 3183) or Iain Robertson (031 441 2361).

EZUG-Educational ZX-80-81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverston 55068). Meets every other Wednesday.

Glasgow ZX-80-81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241).

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Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Hobbit Appreciation Society, 12 Middlefield Lane, Hinckley, Leicestershire LE10 0RB. Free newsletter with SAE.

Independent QL Users Group; Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes MK11 1JU. Tel: 0908 564271. Publishes newsletter.

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourrock, Renfrewshire PA19 1PL (Gourrock 39967). Meets every other Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Baker, 32 Heatherington Road, London SW4 7NX.

Liverpool ZX Club: Meetings every Wednesday 7pm at Youth Activities Centre. Belmont Road, Liverpool 6. Keith Archer, 031-236 6109 (daytime).

Llanelli Computer Club: 40 Tan-Y-Bryn, Burry Port, Dyfed. Llanelli 56917.

Manchester Sinclair Users' Club: Meets every Wednesday, 7.30pm, at Longsight Library, 519 Stockport Road, Longsight — 061-225 6997 or 061 445 6316.

Meopham: National ZX Spectrum User Club. Guy Fullalove, Woodcotes, Camer Park, Meopham, Kent DA13 0XS. Bi-monthly newsletter, subscription £1.50. Send SAE for details.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Surrey KT19 0SY.

Mid-Kent Micro Club: Meets once monthly. Enquiries to M Gates, 65 Buckland Road, Maidstone ME16 0SH.

Mill Lane Association Computer Group: Bryan McAlley, 1 Cowleaze, Chinnor, Oxfordshire. (0844) 52426.

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North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 Monday, 6pm.

Nottingham Microcomputer Club: ZX-80-81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Roche Computer Club: 8 Victoria Road, Coop Rooms, Roche, Cornwall: 0726 890473. Twice weekly meetings, Monday and Friday.

Saltcoats Computer Club: Colin Borland, 117 High Road, Saltcoats, Ayrshire KA21 5SD. Weekly meetings.

Sinclair Postal User Group: 24 St. Mary's Way, Code SUL, Chigwell, Essex IG7 5BX. Produces magazine with competitions.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield: South Yorkshire Personal Computing Group. R Alderton (0742 20571), S Gray (0742 351440), P Sanderson (0742 351895).

Sinclair Amateur Radio User Group: SAE or two IRCs for details. Paul Newman G4 INP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

Sittingbourne: Anurag Vidyarth (0795 73149).

St Albans: Bi-monthly meetings and a magazine. Details from Adam Slater, 40 Watford Road, St Albans, Herts AL1 2HA. (0727 54176).

Stratford-on-Avon Computer Club: Meets on the second Wednesday of every month. Telephone: 0789 68080 for details.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.

Washington Sinclair Users' Club, Columbia Community Centre, Tyne and Wear. Meets twice a month, tel. 4179483 or 4167367.

West Sussex: Midhurst and District Computer User Group. Enquiries to V Weston (073 081 3876), R Armes (073 081 3279).

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068).

Universal ZX Club: Postal club for Spectrum owners in the U.K. and abroad. C. Shaw, 1 Swiss Walk, Batley, W. Yorkshire.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

Overseas

Australia: Australian ZX Users' Newsletter, incorporating QL User. Paul Janson, P.O. Box 397, Dapto 3530, Australia. Also seeks unpaid contributions for the newsletter.—W.A. ZX Users' Group, Garth Gregson, 34 Chester Street, South Fremantle 6162. Phone 3351671.

Austria: ZX User Club, Thomas Christian, c/o Wissenschaft Forscht e. V., Postfach 141, A1190 Vienna. Meets every first Friday of the month. Telephone 0222-44 32 050 for details.

Belgium, France and Luxembourg: Club Micro-Europe, Raymond Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (32/2/6537468).

Denmark: Danmarks National ZX-8081 Club (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelse, post giro 1 46 24 66.

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Finland: ZX-kerho, c/o Kalevi Hamalainen, Siltakatu 9 A 8, 33100 Tampere 10, Finland. Phone 35831-34238. Publishes quarterly paper.

France: Yves Chapron, no. SUS-1047, Rue du Puy, La Terrasse, 38660 Le Touvet, France. Specifically for users in the Alps.

Germany: ZX Club, a postal club; contact Aribert Deckers, Postfach 967, D-7000 Stuttgart 1, West Germany.

Greece: Athens Spectrum Club, Paris Stamelos, Spetsou 2, isi22 Marousi, Athens, Greece.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

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Club Corner

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Micro-Europe: Belgium or Club Paris-Micro, 19 Rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

The Netherlands: Clive's Bits and Bytes, Nicholas Beets Straat 164, 6416 VX Heerlen. Telephone 045-423024. Both Spectrum and ZX-81 users welcome.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliaith 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX-80-81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg.

Johannesburg ZX Users' Club: Lennert E R Fisher, PO Box 61446, Marshalltown, Johannesburg.

Dumont and Syndercombe Amateur Computer Club. Jean-Pierre Dumont would like to correspond with ZX-81 owners via tapes. Write to 8 Kipling Road, Farrarmere, Benoni 1500, Transvaal.

ZX SA Club: Jonathan Jones, House 14, Anglo Alpha PO Box 15, 1725 Roodepoort.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.

ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S-122, 22 Enskede.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).—SAF Users' Group, 2749 Eden Road, Leslie, Michigan 49251.—ZX Users Group of New York, Box 560 Wall Street, New York, N.Y. USA 10005. Subscription \$15US, publishes international newsletter. Seeks newsletter exchange with other groups.

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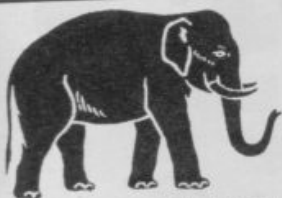
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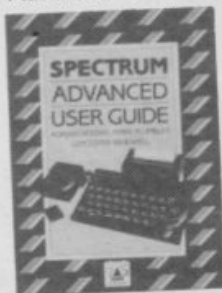
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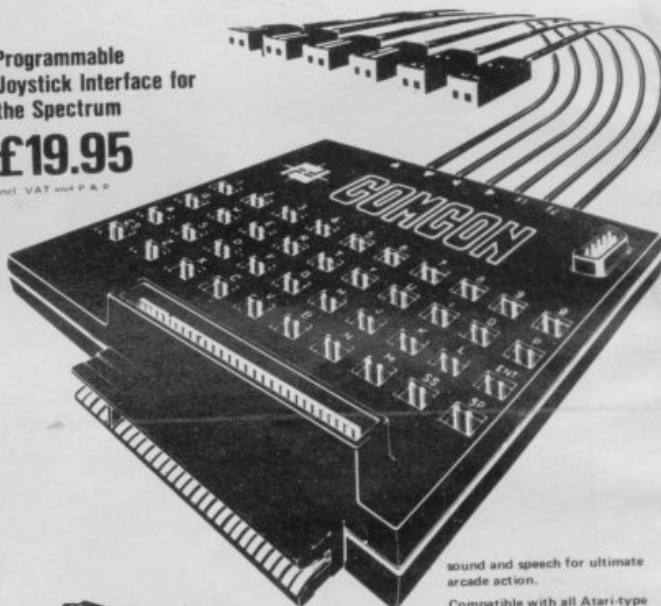
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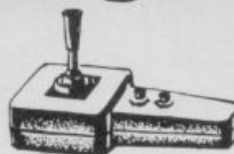
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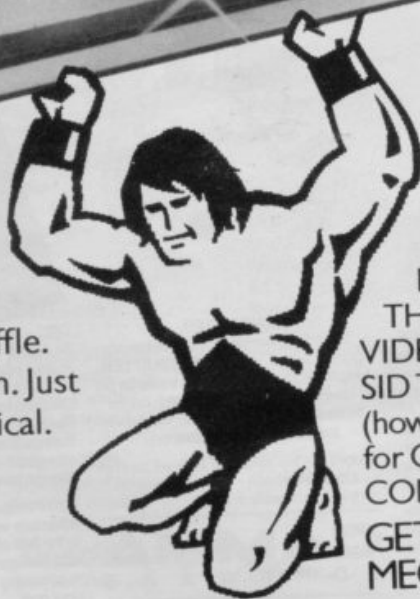
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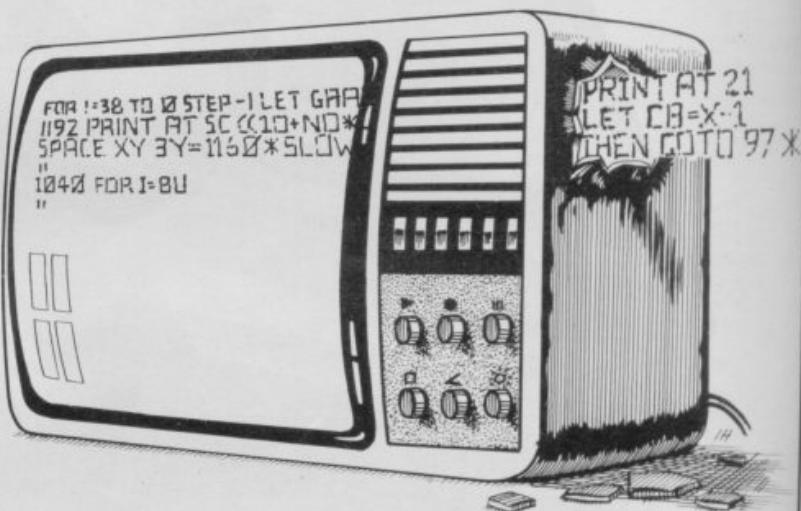
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ZX-81

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Adventure	Bug-Byte
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Dungeons of Doom	Wooisoft
Espionage Island	Artic
Greedy Gulch	Phipps
Inca Curse	Sinclair
Knight's Quest	Phipps
Lost Island	JRS
Magic Mountain	Phipps
Merchant of Venus	Crystal
Pharaoh's Tomb	Phipps
Pimania	Automata
Secret Valley	Newssoft
Serpents Tomb	Vortex
Ship of Doom	Artic
The Great Western	New Soft
Time Bandits	New Soft
Tomb of Dracula	Felix
Trader Trilogy	Quicksilva
Volcanic Dungeon	Mastervision
World of Illusions	Contrast

Arcade

Alien Dropout	Silversoft
Asteroids	Silversoft
Asteroids	Software Farm
Astral Convoy	Vortex
Bank Robber	Romik
Bears in the Wood	Unicorn
Bubble Bugs	Romik
Byter	Protek
Cassette 1	Orwin
Cassette 2-5	Orwin
City Patrol	Sinclair
Damper	Quicksilva
Defenda	Quicksilva
Door Slammer	Cathedral
Forty-Niner	Software Farm
Froggy	DJL
Full-screen Breakout	New Generation
Galactic Trooper	Romik
Galaxians	Quicksilva
Galaxy Jailbreak	Romik
Games 2	JRS
Games Tape 1	J K Greye
Games Tape 2	J K Greye
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Gloops	Quicksilva
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Gobbler	Software Farm
Grand Prix	dk'tronics
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Hickstead	CCS
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Invaders	Silversoft
Krazy Kong	PSS
Maze Death Race	PSS
Maze Man	Abersoft

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Draft	Myrmidon
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O Level Maths Revision	Rose
Polynomials	University
Primary Arithmetic	Rose
Regression	University
Self-teach Program	Anvil

Language

Forth	Sinclair
ZX Forth	Artic

Practical

Ephemeris	Bridge
Football Pools	Hartland
Poolster	Naigram

Puzzle

Nowotnik Puzzle	Phipps
Word Fit	Ram Writer

Simulation

Fighter Pilot
Flight Simulation
Pilot
Print Shop

Strategy

Airline	CCS
Auto Chef	CCS
Battleships	JRS
Conflict	Martech
Cyborg Wars	Stratagem
Dallas	CCS
Dictator	Bug-Byte
Farmer	CCS
Football Manager	Addictive Ga
Fort Apache	Contrast
Galaxy Conflict	Martech
Great Britain Ltd	Hessel
Ocean Trader	Quicksilva
Pioneer Trail	Quicksilva
Racehorse Trainer	G Barker
Racing League	Racing Leagu

Traditional

Do Not Pass Go Work Force

Lynchmob
Original Superchess
Tai
Tenpin
ZX 1K Chess
ZX Compendium
ZX-Chess I

Utility

Graphics
Graphics Toolkit
HI Resolution
Machine Code Test Tool
MCoder
Programme Enhancement
Package
Renumber Delete
Trace
ZX Compiler
ZX Screenkit
ZX-81 Remload
ZX-Bug
ZX-sideprint
ZXAS
ZXDB

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CP Software	*
PSS	*
Phipps	*
Artic	*
Mastervision	7
Artic	*

IPA	*
JRS	9
CRL	6
OCP	*
PSS	8

R and R
Work Force
Texgate
Silversoft
Picturesque
Picturesque
Artic
Microsphere
Bug-Byte
Bug-Byte

SPECTRUM 16K

Adventure

Android One	Vortex	*
Escape	New Generation	*
Mines of Saturn/Return to Earth	Mikro-Gen	*
Moria	Severn	*
Planet of Death	Artic	6
Secret Valley	New Soft	*
The Great Western	Nëw Soft	*
Time Bandits	New Soft	*

Arcade

Aquarius	Bug-Byte
Arcadia	Beau Jolly
Arcadian	J K Greye
Assassin	Spectrasoft
Avenger	Abacus
Baron	Temptation
Base Invaders	Imagination
Black Hole	Quest
Blind Alley	Sunshine
Bug Blaster	Crystal
Cassette A	Orwin
Caterpillar	CDS
Cavern Fighter	Bug-Byte
Centi-Bug	dk'tronics
Children's Compendium	Dymond
City Defence	Mikro-Gen
Colour Clash	Romik
Cookie	Ultimate
Cosmic Guerilla	Crystal
Crazy Cranes	Voyager
Creepy Crawler	Mikro-Gen
Crevasse and Hotfoot	Microsphere
Cruising	Sunshine
Cyber Rats	Silversoft
Death Chase	Micromega
Demolition	Comp. Rentals
Destroyer	Winters
Di-lithium Lift	Hewson
Digger Dan	Ocean
Doombugs	Work Force
Dymonoids	Dymond
Earth Defence	Artic
Ed-On	Add-On
Eskimo Eddie	Ocean
Family Games Pack	Hornby
Fireflash	Abacus
Froggy	DJL
Fruit Machine	dk'tronics
Galactians	dk'tronics
Galactic Trooper	Romik
Galactic Warriors	Abacus
Galaxians	Artic
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Gnasher	Mastertronic
Gobble-a-Ghost	CDS
Gobbleman	Artic
Godzilla and Martians	Temptation

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Hungry Horace	Sinclair	8
Invasion Force	Artic	8
It's the Wooluf	Crystal	5
Jet Pac	Ultimate	8
Labyrinth	Axis	4
Leap Frog	CDS	*
Light Cycle	PSS	7
Luna Crabs	Micromega	2
Magic Meanies	CDS	8
Maze Chase	Hewson	8
Meteor Storm	Quicksilva	7
Meteoroids	dk'tronics	6
Meteoroids	Softek	6
Micro Mouse	Lothlorien	7
Millypede	Add-on	7
Mined Out	Quicksilva	7
Moon Buggy	Visions	6
Mr Wong's Loopy Laundry	Artic	6
Muncher	Silversoft	*
Muncher	Silversoft	6
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Orbiter	Silversoft	7
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Pitman Seven	Visions	*
Planetoids	Sinclair	8
Proteus	Abacus	5
Rapedes	Visions	*
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Rider	Virgin	6
Road Toad	dk'tronics	7
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Sam Spade	Silversoft	5
Santa	Artic	*
Sentinel	Abacus	7
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Sheer Panic	Visions	7
Slippery Sid	Silversoft	8
Space Fighter	Winters	*
Space Intruders	Quicksilva	7
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Space Raiders	Sinclair	6
Space Zombies	Mikro-Gen	*
Spec. Frogs/ Showdown	Artic	*
Spec. Gobblerman	Artic	*
Spec. Invaders	Artic	*
Spec. Invasion Force	Artic	*
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Spectral Invaders	Bug-Byte	8
Spectral Panic	Hewson	5
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Styx	Bug-Byte	7
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Tank Battle	dk'tronics	8
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Train Game
Trom
Vortex
Winged Warlord
Wizard's Warriors
Yomp

Business

Finance Manager
Home Computer Pack
Masterfile 16
Matcalc
Micropen
Vu-Calcul
Vu-File

Education

Alphabet
Alphabet Games
Apostrophe
Ballooning
Calpac 1-3
Car Journey
Cargo
Chess Tutor
Counting
Counting
Education One
Educational
Firework Music
First Numbers
40 Education Games
Four Rules of Number
French Voc Test
Hidden Letters
Hot Dot Spotter
Integration
Intermediate English 1-2
Intermediate Maths 1-2
Know Your Tables
Language Devel. Series
Language Devel. Series
Learn Basic
Learning Read 1
Linear Programming
Marks Book
Maths Invaders
Maths Tutor
Matrix Operations
Money
Night Sky
O Level Maths
O Level Physics
Paddington's Shopping Mix-up
Pathfinder
Polynomials
Pre/early school cassettes
Primary Arithmetic
Punctuation Pete
Regression
Self-teach Program
Shape Sorter
Special Agent
Spellbin
Use and Learn

Language

Beta Basic

Practical

Biorythms
Countries of the World
Cycle Planner
Map of the UK
Shopping List
Spectasort

Puzzle

Flippit
Hanoi King
Lojix
Nowotnik Puzzle
Qazax

Simulation

Air Traffic Controller
Airliner
Golf
Golf

Microsphere
dk'tronics
JK Greye
CDS
Abersoft
Virgin

OCP
SD Micro
Campbell
Work Force
Contrast
Sinclair
Sinclair

Widget
Sinclair
Sinclair
Heinemann
Calpac
Heinemann
Sinclair
Artic
Starter Soft
Widget
Lerm
Startersoft
Soft Cottage
Collins
Granada
Micro Master
Tutorial
Poppy
Longman
University
Rose
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Glasson
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Poppy
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Lerm
Stell
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University
Poppy
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Homestudy

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Widget
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Essex
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Anvil
Widget
Heinemann
Startersoft
Microl

Betasoft

Spectrasoft
Hewson
Medidata
Kuma
SD
Spectadraw

Sinclair
Contrast
Virgin
Phipps
Rose

Hewson
Protek
R & R
Virgin

9 Golf
4 NightFlite
5 Print Shop
6 Pro-Golf
*
7

Strategy

Auto Chef
Big Match Soccer
Dallas
Dictator
Farmer
Football
Heathrow
Las Vegas
Quincy

Traditional

Backgammon
Bridge Tutor
Bridgemaster
Challenge
Gambling Tape
Las Vegas
Odds-on
Othello
Pinball
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Reversi
Roulette
Solo Whist
Spec. Microchess
Super Play I
Tennis

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Auto Sonics
Basic Utilities
Character Generator
Dietron
Disassembler
Display
Editor/Assembler
Extended Basic
FP Compiler
Friendly Face
Keysounder
Letterfont
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Master Toolkit
MCoder
Micropen
Print Utilities
Programmer's Dream
Renumber Delete
Slow Loader
Sound FX
Spec. Bug
Spec. Editor/Assembler
Spec. Monitor
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Spectsound
Supercode
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Trace
TT-S
ZX Spectrum Assembler
ZXED

Virgin
Hewson
CCS
Hornby

CCS
Winters
CCS
dk'tronics
CCS
Winters
Hewson
Temptation
Severn

Hewson
CP Software
Bridgemaster
Temptation
Dymond
Temptation
RSD
CP Software
Winters
Bug-Byte
Sinclair
Newssoft
Video Soft.
Artic
Video
Winters

Bug-Byte
Work Force
Buttercraft
Jayssoft
Spectrasoft
Custom
dk'tronics
Work Force
Picturesque
CP Software
Softek
Monitor
S and G
Allanson
OCP
PSS
Contrast
Sinclair
Work Force
Work Force
ELR
dk'tronics
Artic
Picturesque
Picturesque
Nectarine
PDQ
CP
Tasman
Texgate
Timedata
McGraw Hill
dk'tronics

SPECTRUM 48K

Adventure

Abyss
Ace in the Hole
Adventure I
Adventure Island
Alchemist
Arcane Quest
Atlas Assignment
Black Crystal
Black Dwarf's Lair
Black Planet
Buffer Adventure
Byte
Castle
Castle Blackstar
Circus
Classic Adventure

CCS
Add-on
Abersoft
Contrast
Beau Jolly
Add-on
Virgin
Mastervision
New Soft
Phipps
Buffer Micro
CCS
Bug-Byte
SCR
Channel 8
Melbourne House

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READERS PRO

In February's batch of readers' programs we include listings for Spectrum, Oric and Commodore 64 owners. Those of you with Spectrum will be able to learn about one more with Super Link or game away on our built-in machine. Oric owners can design their own shapes with our unique character editor, while Commodore 64 owners can go it alone with Super Link. We do check the designs but occasionally a time delay may be required. But if you decide to send us your program PLEASE try to ensure it's bug-free. We're looking for more good things and

programming for the future. If you have any ideas or suggestions, please send them to: **Which Micro? and Software Review**, c/o Scriptor Court, 177 Farringdon Road, London EC1. Please do not send anything that cannot return it.



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| 5 PLASMA BOLT | 20 RAIN | 38 BLACK HOLE |
| 6 STARTREK | 21 TUNNEL ESCAPE | 39 DO YOUR SUMS |
| 7 RADAR LANDING | 22 BARRIL RAMP | 40 DYNAMITE |
| 8 ATTACKER | 23 CANNONBALL | 41 BERRY DASH |
| 9 GALACTIC DOG | 24 BATTLE | 42 SPACE SEARCH |
| 10 FIGHT | 25 OVERTAKE | 43 UNIVERSE |
| 11 PISTON ATTACK | 26 SITTING TARGET | 44 RATS |
| 12 INVASION ACTION | 27 SMASH THE | 45 TANKER |
| 13 CRUSHERS AND | 28 WINGS | 46 PARACHUTE |
| 14 BRIGADES | 29 SPACE SHIP | 47 JET MORSE |
| 15 PONTON | 30 JET FLIGHT | 48 HIGH RISE |
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SU/11/84

Software Directory

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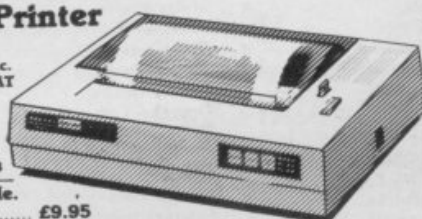
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Personal Financ.
Management Syst.
Sales Day Book
Small Business Accounts
Spectext
Spreadsheet
Stock Control
Stock Control
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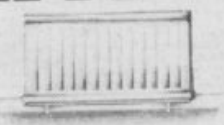
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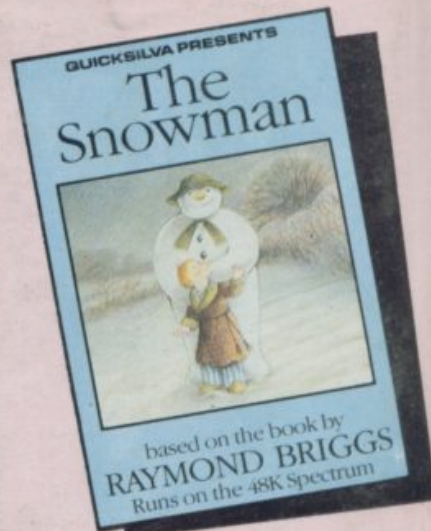
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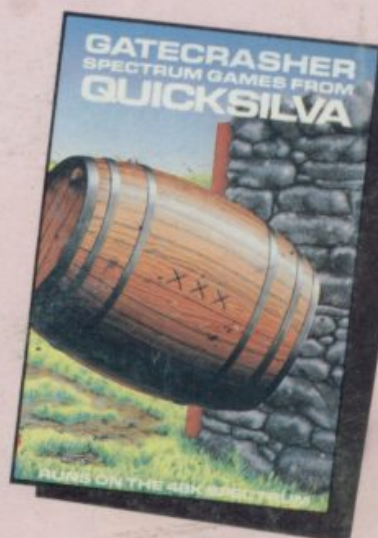
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