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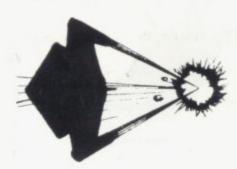
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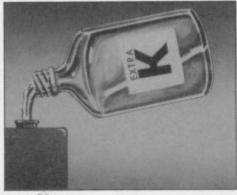
If you would like to contribute to any of the Sinclair User group of publications please send programs, articles or ideas for hardware projects to: Sinclair User and Programs ECC Publications 30-31 Islington Green. London N1 8BJ

Programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.

We pay £10 for each program published and £50 per 1,000 words for each article used.

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NEXT MONTH

We profile the company which deals with Sinclair Research distribution and assess the new range of software from Sinclair Research.



If you're enthusiastic about microcomputing, sooner or later you'll ask yourself the question . . "where do I go from here?"

How BASICARE build into a complete computing package.

PERICONplugs into DROM for I/0,

This is particularly true if you own a micro with limited expansion and hardware peripheral options . . . like the ZX81.

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In short you can develop a whole range of hardware options that fit together to form a complete package . . . "Computing" in the real sense

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This one unit simply plugs into your ZX81 without modification and acts as the "brains" of the whole

Thereafter you choose how you want to expand your micro by simply plugging-in more modules.

Look at the choice you have:

PERSONA — An interface module to enable an ORGANIC MICRO to grow on the ZX81.

MINIMAP — A memory mapping device to extend the address space of the ZX81 from 64K bytes to 1 M bytes.

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PERICON a — A general purpose, user programmable device providing 24 lines PERICON b - 24 lines of heavy duty output to access and control the outside

PERICON c - A module to drive 80 column printer with

ype parallel interface. **USERFONT option** — User definable characters available for RAM 08, DROM and TOOLKIT.

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All prices include VAT, postage and packing in the U.K. [Overseas allow at least 15% for surface mail].



Same game, different rules

F THE CALL for a year's ban on imports of micros is agreed by the Government, it will have a dramatic effect on the home computing market. No longer would there be the present choice for the growing thousands wishing to upgrade their computing capabilities, having had their appetites whetted by the ZX-81.

An increase in the size of the market, similar to that achieved last year, would mean tens of thousands of people chasing the limited numbers which would be available from the producers in Britain. Any extra



growth and the Spectrum delays of last year would seem to be short by comparison.

Consider a situation in which there would be no Apples, Commodores or any of the theoretical Japanese invasion. Despite the growing numbers of British machines, it is unlikely that they would be able to cope with the orders.

Having said that, it is easy to understand why British micro manufacturers have made their pleas to the Prime Minister. The members of the British Microcomputer Manufacturers Group are mostly producers of business machines, the exception being Sinclair Research. They have not seen the phenomenal growth of the home computer market but have been working hard at getting a slice of a market long dominated by American machines.

Now they fear their work might all have been in vain, because the Japanese threaten to invade the market. They have seen what happened to the car industry, the motor-cycle industry, the hi-fi industry and the television industry, and they fear it could happen to them.

They see the help the Japanese competition receives from its government, money to help with new



developments and exports being only two items, and the ability to consider the market in the long term because each company has the backing of its own conglomerate, and they realise their pricing cannot be on the same basis and is likely to result in lower prices.

By contrast, the Government seems to be doing all it can to discourage our industry from growing. Despite the financial support it has been willing to give to companies to develop their products, it has refused to adopt a buy-British policy for micros in Government departments and imposes a 17 percent levy on imports of electronic components used by the British industry in making its machines, whereas the duty on completed machines is only between six and eight percent.

The fears of British manufacturers are compounded by having seen the first of the Japanese machines making a brief appearance on the scene. Names like Epson, Sony and Sharp, no strangers to the British market for a variety of other products, have all produced machines which are threatening to make an appearance in Britain.

Added to that there is the assumption by many people that, if a subject has anything to do with electronics, the Japanese are bound to be better at it than the rest of the world. A BBC television program before Christmas introduced its viewers to the uses of the Spectrum, Dragon and BBC Model B, but saved its greatest praise for the new portable Epson machine, despite the fact that the markets at which each of the machines was aimed was different.

It also failed to mention that the British machines were available immediately and had been for some time, while the Japanese machine had yet to prove itself in the market.

While accepting that the Japanese have been very successful in a limited number of markets, they are not infallible. They have their problems with unemployment and the high levels of public spending. Also many people



forget that the most successful country at exporting in the world is Britain.

On that basis it would be better for the British industry to concentrate on its strengths and forget about asking for help in the form of a blanket ban for a year. Apart from the difficultly in achieving the objective, many importers would know about the possibility of a ban and would stockpile the necessary number of machines and there would be the danger of competitors imposing even more stringent import controls. The aim of Sinclair to break into the Japanese market would then get nowhere.

A better course would be for the industry first to start believing in itself. Anyone who doubts the ability of the British to adapt to new markets should study what has happened in the Sinclair market in the last year. While being only a small part of industry's output, it is a good example of what can be achieved with a little ingenuity.

The Government could then build on that expertise by accepting the arguments of Clive Sinclair and removing some of the obstacles to growth. This will be a year in which the direction of home computing will be set. There are a number of ways in which the Government can help it move to the advantage of British manufacturers — but an import ban is not one of them.

difonics

ZX KEYBOARD FOR USE WITH 80/81 SPECTRUM

Our new cased keyboard has 52 keys, 12 of these are used for the numeric pad. The numeric pad offers some useful features, you can cursor with one hand and it will be a boon for anyone who enters a lot of numeric data. The pad is a repeat of the 1-9 keys plus it has a full stop and a shift key. The numeric pad keys are coloured in red, the normal keyboard keys are grey, with the case being black which makes the whole thing very attractive. The case measures $15 \times 9 \times 21/2$. The computer (either 80/81 or spectrum) fits neatly inside. You will have to remove the computer from its original case, it is then screwed to the base of the case. The case had all the bosses already fitted and the screw holes are marked. Also fitted inside the case is a mother board (81 model only) which allows 16K, 32K and 64K to be fitted in the case. All the connections are at the rear of the case i.e. Power, Mic, Ear, T.V.

and the expansion port. The case is large enough for other add ons also to be fitted inside. One of these could be the power supply, then you could very quickly fit a mains switch, or a switch on the 9V line. This means you have a very smart self-contained unit. This case does not stop you from using any other add-ons that you may have e.g. Printer etc. We are convinced that this is the best keyboard available at present. It offers more keys and features than any other keyboard in its price range.

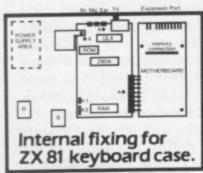
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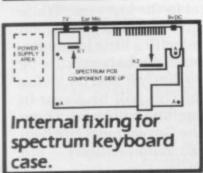
The case can be purchased separately with the keyboard aperture uncut, so if you have one of our early uncased keyboards, or in fact any other suppliers' keyboards, these could be fitted. The keyboard is connected to your computer by a ribbon cable and this has connectors fitted which simply push into the Sinclair connectors. It is a simple two minute job and requires no electronic skills. This keyboard does not need any soldering. Please specify on order whether you require the ZX 81 or Spectrum case.

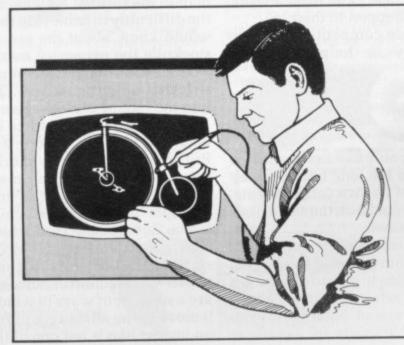
SPECTRUM MODEL

This is supplied with spectrum legends, and a slightly different base for fitting the spectrum inside, again all the connectors are at the rear of the case and there is plenty of room for the power supply (and other add-ons). Should you want to change, we can supply both the Spectrum legends and details of updating your case which will enable modification from the ZX 81 to spectrum. PLEASE specify on your order whether you require the ZX 81 or spectrum case.









SPECTRUM LIGHT PEN

The pen enables you to produce high resolution drawings on your own television set, saving a vast amount of time over using basic programming statements, such as Plot, Draw etc. You can erase, modify and save drawings and it comes complete with software program. The superb light pen is available from DK Tronics at only £19.95

ZX 80~81 Spectrum HARDWARE

4K TOOLKIT

This is the toolkit which won acclaim in the feature in the August 1982 issue (pages 29 and 30) of Sinclair User. "It is the most impressive program, fast in execution with clear and full instructions...it stands out from the rest of the field." The ZXED is a powerful editor for use on the expanded ZX81. It is intended for use by the serious BASIC programmer and offers several useful and time saving features most helpful during all stages of program development. The facilities provided are as follows: ALTER, BYTES, COPY, DELETE, FIND, HELP, INSERT, KEEP, MOVE, RENUMBER AND VERIFY. The Spectrum Toolkit contains most of the features above plus autoline numberer and append, and will run in the 16K and 48K spectrum.



Both at only £6.95

FLEXIBLE RIBBON CONNECTOR

If you have ever had whiteouts or system crashes this could be the answer. It stops the movement between the computer and the RAM expansion, it is supplied with a ribbon, 6 inches long, with a male connector at one end and a female at the other, at only



4K GRAPHICS ROM

E24.95

The DK Graphic module is our latest ZX 81 accessory. This module unlike most other accessories fits neatly inside your computer under the keyboard. The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you an unbelievable 448 extra pre-programmed graphics, your normal graphic set contains only 64. This means that you now have 512 graphics and with their inverse 1024. This now turns the 81 into a very powerful computer with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there, it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder can be fitted with a 1K/2K/RAM and can be used for user definable graphics so you can create your own custom character sets.

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64K MEMORY EXPANSION

£52.95

All the above information on the 16K also applies to the 64K Memory Expansion, but the advantage lies in the 64K giving nearly four times the memory. This advanced model has 56K of usable memory. In addition, the block from 8K to 16K can be switched out to enable the use of other add-ons. The graphics Rom is to be used in this area. Position in Memory: 8192-65536. The block from 813/42-16384 is switchable.

64K (UNCASED) £49.95

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AND OTHER GOOD MICROCOMPUTER STORES.
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Business prices cut

Hilderbay offer repeated

FOLLOWING the success of our offer to members in October, we have decided to repeat the discount of 10 percent on the full range of hardware and software from Hilderbay.

The items include a number of business programs, such as Payroll, Stock Control and Critical Path Analysis both for the ZX-81 and the 48K Spectrum. There are other cas-

Hilderbay	List	Offer
Harta Caraca (Albasilia da Balika)	price	price
48K Spectrum	are guil alim	
Critical path analysis	£15.00	£13.50
Payroll	£25.00	£22.50
Stock Control	£25.00	£22.50
Gold (game) ZX-81	00.83	£7.20
Beamscan	£25.00	£22.50
Budget	£15.00	£13.50
Critical path analysis	£15.00	£13.50
Financial Pack	00.83	£7.20
Optimax	£40.00	£36.00
Payroll	£25.00	£22.50
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Time Ledger	£15.00	£13.50
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Alignment and test cassette	£4.90	£4.40
Loading aid	£5.95	£5.35
Microcomputer Tape Book Pre-publication offer	£3.10	£2.80
The Guide to the Spectrum		
ROM		£2.95
Mikro-gen	List	Offer
	price	price
Spectrum		rate payar i
Scramble	£5.50	£4.40
Masterchess (48K)	£6.95	£5.55
Sorcerer's Castle (48K)	£6.50	£5.20
ZX-81		
Scramble	£3.95	£3.15
Frogs	£3.95	£3.15
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Breakout	£3.95	£3.15
Space Invaders	£3.95	£3.15
Asteroids	£3.95	£3.15
Tempest	£3.95	£3.15
1K Gamespack	£3.95	£3.15
Debug	£3.95	£3.15

settes for the more serious user which are available only for the ZX-81, such as **Budget** and **Financial Pack**.

In addition, we can make a pre-publication offer on a book being published shortly, Guide to the Spectrum ROM. It is not yet generally available but can be bought by members at the special price of £2.95.

As usual, we are making two special offers and this month we have been able to obtain a special price on some of the best games software on the market. Mikro-gen Chess and Scramble are both highly-rated cassettes and we have been able to obtain a discount of 20 percent on them and the rest of the company's range.

Sinclair has it covered

ALL THE cassette newsletters being sent to members now have a picture of Clive Sinclair on the cover. That is the result of a program sent by one of the members, M Scott of Gateshead, Tyne-and-Wear.

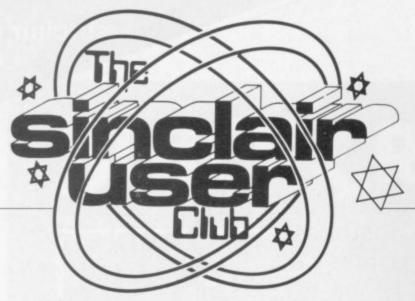
The program to print Clive's face was adapted from the entry from Scott, one of the oldest members of the growing Sinclair User Club. It was one of an increasing number of programs being sent by members.

The printout of Clive is now likely to be on all the newsletters, which are sent every two months to keep everyone in the User Club up-to-date on what is happening, both in the club and the world of Sinclair computers.

The latest cassette incontinued on page 10

MEMBERSHIP
FORM

	wish to join the Sinclair User Club and enclose ny subscription of £12
N	Name
Α	ddress
V	Vhich computer do you own?
	ZX-81 □ Spectrum □
E	end your coupons to Sinclair User Club, CC Publications, 30-31 Islington Green, London II 8BJ. Cheques should be made payable to inclair User Club.



continued from page 9

cludes another instalment of the course for learning machine code, as well as programs and news. There is also the special telephone number for the problem-answering service which members can ring at any time for expert advice on difficulties they

may be having. As readers of Sinclair User, in increasthere are many advantages Electronics add-ons. to be gained by being a member of the User Club.

Apart from the cassette newsletter, they include regular discounts on a wide range of hardware service to help with the and software. Each month

there is a special offer. In the last few months it has included a reduction in the prices of most of the leading games programs on the market, the Kempston Klik keyboard and the ing numbers, are learning, full range of Thurnall

> This month's offer can be seen on the preceding

The club also offers a loading and saving of tapes. Many of the problems arise from tape heads being wronglyaligned. We are able to offer, for a nominal cost of £5, to re-align members' cassette heads. Further details can be obtained from the Sinclair User Club.

The activities of the club are also dealt with each month in the special club pages. To take advantage of all the benefits, complete the application form.

Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Doncaster and District Micro Club: John Woods, 60 Dundas Road,

Wheatley, Doncaster DN2 4DR; (0302) 29357.

Edinburgh ZX Users' Club: J. Palmer (031 661 3183) or K Mitchell (031 334 8483). Meetings: second Wednesday of the month at Claremont Hotel.

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 (Ulverton 55068). Meets every other week on Wednesday

Glasgow ZX-80/81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and

fourth monday of each month. Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530). Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road,

Gourock, Renfrewshire, PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock. Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley

(603133). Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville

Road, Bootle, Merseyside L20 6NE; 051-922 3163. National ZX-80 and ZX81 Users' Club: 44-46 Earls Court Road,

London W8 6EJ. North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each

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.

Scunthorpe ZX Club: C P Hazelton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield: Andrew Moore, 1 Ketton Avenue, Sheffield S8 8PA would like people interested in starting a club in the area to contact him enclosing a stamped-addressed envelope for details.

Sittingbourne: Anurag Vidyarthi (0795 73149). Would be interested to hear from anyone who wants to start a club near the Medway towns.

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and software library

Thames Valley ZX Users' Club: Richard Shepherd, 22 Green Leys, Maidenhead, Berkshire SL6 7EZ; (0628) 21107 (evenings and weekends). Hopes to start meetings on a regular basis.

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH (Walsall 25465). Please include sae. Meetings twice monthly. ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworth, Bury,

Lancashire. Exchanges information and programs throughout the

ZX-80/ZX81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgium, France, Luxembourg: Club Sinclair, Raymond Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468) Belgium, Netherlands: Microcomputer Vereniging BZW, Paul Glenisson, Priester de l'Epéestraat 14, B-1200 Brussels, Belgium (322 7349954)

Denmark: Danmarks National ZX-80/81 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.

ZX-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre. Gratis medlemskab og gratis blad til enhver interesseret.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jenczyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-80/81 Users' Club, J.S. Wijaya, Jakarta, Indonesia.

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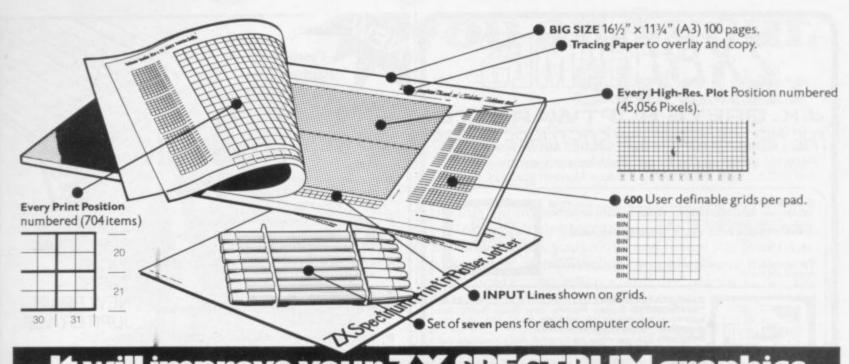
Baile Atha, Cliath 1. Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX80/81 Computer Users' Club: S Lucas, c/o Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg. Teaches Basic and machine code, interest in hardware.

Johannesburg ZX Users' Club: Lennert ER Fisher, PO Box 61446, Marshallstown, Johannesburg.

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.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611. — Harvard Group, Bolton Road, Harvard MA 01451; (617 456 3967).



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Your new ZX Spectrum is literally packed with sophisticated graphics. Colour. High resolution. Plot. Draw. Circle. Border. Ink. Paper Colours. User-defined characters to name just a few!

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The Spectrum Jotter is, of course, an upgraded version of our popular ZX81 Print 'n' Plotter Jotter and Film. For ZX81 owners these are available

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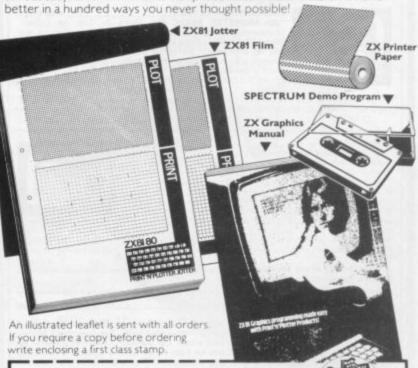
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will actually zoom towards you in 3D, and shoot you if you let them! Your display includes Score, Shield Strength, Altitude, Proximity, Forward Radar and your viewscreen, which shows your rotating home planet, backdrop of Stars, Meteors, Explosions, Plasma Blasts, your Photon Beams, up to 4 Enemy Saucers and of course its all in A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!



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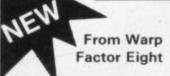
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The kit replaces the tinned connector with a reliable high quality gold-plated version and provides an ingenious simple mechanical clamping device which clamps the Rampack to the Computer but is simple and easily released.

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We've got big ideas about you and your Sinclair Because we know you're always looking for new ideas to make the most of your Sinclair computer, we're making sure you never run out of steam! Just launched — and out in December — was Sinclair Projects magazine, full of fascinating schemes to tax your skills and reveal the practical potential of your Sinclair in applications like controlling lights, upgrading computer graphics, household security, and many more. Whether you're new to computing, or an old hand, you're certain to be an enthusiast. That's why we introduced Sinclair User magazine for the latest news, techniques and enhancements to match your enthusiasm (now with new 'Spectrum (Iser' supplement!) Next, its companion magazine, Sinclair Programs, became an overnight success with 40 NEW programs, ready for you to key, in every issue. Now the exciting new Sinclair Projects completes your store of possibilities with a huge increase in computing potential for you to explore. Sinclair Projects is published on alternate months to Sinclair Programs, so there's always something new to test your skill. But here's the best news: when you subscribe to all three Sinclair magazines, you get the first three issues of new Sinclair Projects absolutely

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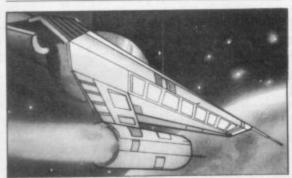
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This truly amazing program is the most flexible compiler available for the ZX81 AND NOW THE SPECTRUM TOO!.

Sound effects for your ZX81 are now available at

a price you can afford! Zonix is a hardware/software combination that allows you to write programs with real impact. The software includes two programs:

a) A program set to produce bombs, missiles, fire

engines, tunes, telephones and sirens. Also includes

b) A program that turns your ZX81 into an elec-

The hardware is an amplifier with volume control and loudspeaker which simply plugs into the mic

socket of your ZX81. The sounds can be actuated

from within your programs with a simple command.

They can also be of various lengths so the limit is

MCoder will instantly translate your slow basic programs into super fast machine code at the touch of a key. It is also extremely easy to use: just load MCoder (the ZX81 version is just 2K long,the spectrum versions 3K) and then write your basic program as normal or you can load a basic program from tape to save you retyping the whole thing. MCoder then allows you to run and debug the basic until it is fault free. Now you can bring MCoder into operation using a print USR command — the basic will then be compiled into machine code as you watch!

On average MCoder will increase the speed of basic programs 75 times. Both the ZX81 and the spectrum version will handle 95% of all basic commands and is quite simply the best compiler on the market. Please state whether 16K or 48K when ordering the spectrum MCoder.



QSave

£15.95

MANY THOUSANDS OF SATISFIED CUSTOMERS NOW HAVE A HIGHLY RELIABLE LOADING SYSTEM WHICH OPERATES 16 TIMES FASTER THAN THE SINCLAIR SYSTEM'

The news is that QSAVE has been improved for '83

This is what you get:

1. A cassette interface to improve the signal quality (essential if a high speed loader is to be reliable) which will also improve the loading of your programs. The interface plugs into your ZX81 using the leads supplied and has been improved to incorporate: AN AUTOMATIC LEVEL CONTROL....AN OVERLOAD WARNING LIGHT....A SAVE/LOAD SWITCH (no unplugging of mic or earphone leads)....AN ON/OFF SWITCH (which doubles as a Reset switch). With these features loading is highly reliable (programs will still load with a volume setting as LOW as 1/4).

2. Highly sophisticated software which will load and Save programs at 16 times their normal speed (i.e. 8K in 10 secs; 48K in 110 secs). Programs can be named to allow a superfast file search through a tape. It works equally well with autorun programs, Basic or machine code.

A TRUE verify feature is also provided — this allows you to verify that a 'SAVE'd program has 'SAVE'd properly BEFORE turning off the power and finding all is lost.

QSAVE will operate with ANY memory, on ANY program length AND with your existing programs. All the above is contained in ½K of superbly easy to use Software.



PERSONAL SOFTWARE SERVICES



THE COMPUTER DIVISION of Sinclair Research has moved into new premises at Willis Road, Cambridge (above). An old factory, part of which can be seen on the right of the picture, has been completely refurbished.

It is the first time both sections of the division research and development and marketing — have been together on one site. The factory was bought in the autumn of 1981 and improvement work has been going on since then.

Healthy move by young software house

SINCLAIR computers are moving into the health market. A series of programs has been launched by Eastmead Computer Systems intended to educate and advise on a comprehensive range of medical topics.

The series is not intended to replace professional advice but to complement it by teaching people about preventative techniques and how to cope with problems when they arise. It is hoped that people will be encouraged to seek medical advice in cases when they might otherwise have delayed.

Two of the cassettes have been available for the before ZX-81 since Christmas. They deal with basic medicine and a simple screening system. There are plans to issue them later for the Spectrum.

The series is based on the writings of Dr Vernon Coleman, author of a number of books and articles on the subject.

Spectrum goes on retail sale

THE SPECTRUM is now about the new addition to being sold over the counter in 65 major branches of W H Smith. Sales areas include Manchester, Birmingham and south-east London.

It was introduced into Smiths at the beginning of December and John Rowland, market development manager, is optimistic the Smith computer range.

"We are selling the Spectrum on a permanent basis and we would like to sell periphals for the Spectrum when, and if, they arrive," he says.

"We are also selling the Sinclair range of software to support the Spectrum and this is expanding all the time."

The Smith move into selling the Spectrum has not slackened demand for the ZX-81 and its software. "We were surprised by the continuing demand for the ZX-81. Sales figures are on a level with this time last year," he says.

Smith's range of software now comprises more than 40 titles for the Spectrum and ZX-81. The company is also starting to sell accessories and books for both machines.

Fiction prize awarded

for Fiction has been won by Hilda Berntein for her novel based on her experience of political conflict in South Africa. She will receive £5,000 and Death is Part of the Process is to be published soon by Sinclair Browne, the publishing house formed by Clive Sinclair and Patrick Browne in 1981.

Sinclair Research sponsored the prize for un-

THE FIRST Sinclair Prize published work to enfor Fiction has been won courage "high-quality writing with contemporary social and political relevance". After its success in the first year it is intended to continue with the award, which the company is confident will become a major feature of the literary scene.

> It is part of the company's sponsorship of the arts which involves the support of many groups.

ew software club plans

A NEW CLUB has been catalogue with the January formed in the U.S. for owners of the TS-1000, the American equivalent of the ZX-81. The Run-it Software Club is described by one of its organisers, Gayle Morse, as a program-ofthe-month club. If the software which it presents is received well in the States, the club may also expand to cover the British market. Morse says:

The club was conceivsome test marketing in November and December and launched our first company says.

feature program"

That program deals with buying and selling property which Run-it has priced at \$10.95. The suggested retail price is \$16.95 and the regular Run-it price is \$14.95.

The Real Estate Advisor is just one sample of the quality of software which Run-it wants to market in the coming months. "Runit programs all feature ed last August. We did professional-level programming and clearlywritten manuals," the

Regular selections in the catalogue will have 10 and 20 percent discounts each month but the Run-it feature programs will be priced at 30 or 40 percent off retail. The programs are written by a combination of staff and outside programmers.

Individual orders from Britain are welcome and further information can be obtained from Run-it Software Inc. 732 South Sherman, Chicago, Illinois 60605.



Import decision awaited

A FINAL decision is still awaited on the demand for a year's ban on the import of microcomputers into Britain. The plea was made by a group of British micro manufacturers in a letter to the Prime Minister. An received and the manufacturers are now waiting to see if there will be any ac-

The firms, known collecacknowledgment has been tively as the British Microcomputer Manufacturers Group, are worried that imports could cause the British industry to be still-

> Although Sinclair Research is a member of the group, it has criticised the import ban call as being unhelpful. It would be better to dismantle controls which inhibited the growth of the British industry.

It is understood that officers of the BMMG are seeking a meeting with Clive Sinclair to try to resolve the differences.

Getting away for a good start

A RESIDENTIAL weekend course has been started for new owners of the ZX-81 who are having difficulty with the official manual. The course, at the Gainsborough House Hotel, Kidderminster, costs £55 and includes full bed and board. There is accommodation for 20 people on each course and there is 15 hours of hands-on experience on one of the hotel's 20 ZX-81s.

Further information about the courses can be obtained from Christoper Dale, Gainsborough House Hotel, Bewdley Hill, Kidderminster DY11 6BS.

The thinking Hobbit

ARTIFICIAL intelligence has reached the Spectrum, according to Nigel Searle, head of Sinclair Research computer division. Searle was talking about The Hobbit, a new 48K adventure game from Melbourne House.

Artificial intelligence gives a computer the ability to communicate with a user as if it had not been programmed to do so. In the case of The Hobbit, artificial intelligence is exhibited by the characters in the adventure which seem to act out normal lives which do not depend on how the player moves.

The Hobbit forms part of a new line of Spectrum software sold by Sinclair Research. Other titles include Adventures A, B and C



ZX-81

THE HOME DOCTOR SERIES

Exciting Breakthrough In Home Health Advice

Announcing the launch of a series of computer programs designed to educate and advise on a comprehensive range of medical topics whilst being FUN to use.

The text has been prepared by Dr Vernon Coleman who writes from 10 years experience in a busy general practice, and who is widely acclaimed for his many books on medical topics

The cassettes in the series cover the following topics:

- 1. Basic Medicine
- 4. All About Children
- 2. Mainly for Women
- 5. How Healthy Are You?
- 3. Mainly for Men
- 6. 101 Home Nursing Tips

The computer programs are not intended to replace professional medical advice but rather to complement this by educating users on preventitive medicine and how to cope with medical problems when they arise. The programs would therefore be equally useful in schools, homes and in industrial applications as part of health screening programs.

Each cassette costs £6.75 plus £0.45 postage and packing although as a special offer to Micro Decision readers all 6 cassettes are available for £35.75 post free.

Users should indicate whether the cassettes are for VIC 20 or ZX81. VIC 20 owners require a 3K or 8K RAM pack and ZX81 owners require a 16K RAM pack to run all of the programs.

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SPECTRES "Latest twist in the maze game" - CVG. Help Eddie light up his mansion, outwit the 4 ghosts. Beautiful graphics, multi-level, on-screen score and freeze feature. (Bug-Byte). 16/48K SPECTRUM. £8.00.

TIMEGATE Breathtaking 4D adventure. Hi-speed graphics. "The best graphical game I have seen on any micro" - (Interface). FREE training program and keyboard overlay. Great. (Quicksilva). 48K only. £6.95.

16K ZX81 ONLY TRADER "Fantastic 48K graphic adventure...original and entertaining" - S.U. Loads in 3 x 16K chapters. Beautiful. (Pixel). £10.50.

FROGGER Addictive. Great graphics. Moving cars, logs, diving turtles, alligators - watch out for the snake! All m/code. On-screen score, hi-score, timing. Hall of fame. (DJL). £6.95. PILOT Brilliant flight simulation, written by a pilot. 7 modes, including Autopilot demo. earn to take-off, land, direction-find (Hewson). £5.95.

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BLACK CRYSTAL More variety than any other Sinclair adventure. From the people who wrote 'Volcanic Dungeon'. 180K of Spectrum program loads in 6 chapters. Over 100K for ZX81 loads in 7 chapters. (Carnell). £7.50.

PIMANIA "An adventure enthusiast's dream" - CVG. And you may win the £6,000 Golden Sundial of PI. Best use of music and graphics we've seen for the Spectrum. Brilliant on ZX81. (Automata). Spectrum, £10.00. 16K ZX81, £8.00.

CHESS "The standard for ZX chess" - ZX Comp. 7 play levels, all legal moves, position analysis, recommended move option. Spectrum version has beautiful graphic chessmen. (Artic) Spectrum, £9.45, 16K ZX81, £9.95

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with library boxes

BBC1

c5-37p

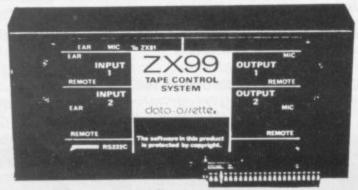
c10-39p

c12-40p

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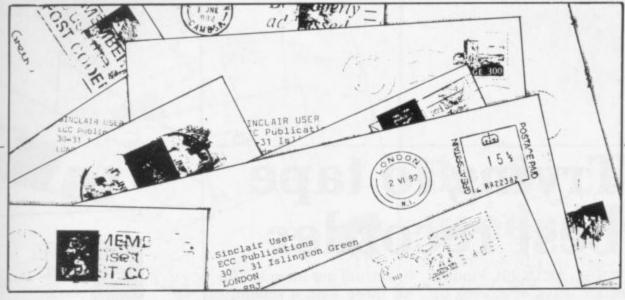
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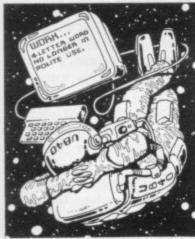


Sinclair helps ensure a very busy retirement

Sandra Mason for their microcomputers derogatory statement in retirement. your November issue that microcomputer.

bought a ZX-81 about 18 poorly printed months ago. In July he unusable.

fault — it got stuck in the red shift and the K



intermittently changes to F - I ordered a new Spectrum, with which I now play happily.

If anyone can tell me how I can rectify cheaply the fault on the ZX-81 I shall be very grateful, as I can then pass it to another

IMUST gently remonstrate surely a number of people with Bill Martin and my age who have found in somewhat dismissive and absorbing hobby for

Incidentally, I agree people over 60 years of age with your correspondent K are unlikely to buy a Watson that programs in Sinclair User and Sinclair I am 67 1/2 and my son Programs are frequently Please bought another computer remember that people and gave the ZX-81 to me. capable of deciphering I became addicted and poor print are adept when, about six weeks ago, enough to write their own the ZX-81 developed a programs. I have a number of books of programs for ZX-81, which are printed normally, so why cannot you do the same and help us oldsters?

> E W Ansell, Cowes, IoW.

I FEEL I must refute the opinion of Messrs Martin and Mason — Futurology, September — that householders over 60 years old are too mean to buy a computer costing more than £10. I know of at least three in Caernarvon who are Sinclair users. I have a Spectrum and two are on the waiting list. Or perhaps they think we are too old to understand them? We may be slower but we get there in the end.

Reference Promises, potential addict. There are Promises. My enquiries to magazine. Your comments

Sinclair have been promptly and politely answered, both by sales technical departments, apart from late delivery, I have no complaints.

F Smalley, Llanfaglan, Caernarvon.

Non-wobble solution

HERE IS an idea to stop RAM pack wobble on the ZX-81. Simply stick the RAM pack to the computer with small pieces of Velcro fastening tape placed between the two units. It also works with the memopack.

Trevor Neale. Folkestone, Kent.

Food for thought

I HAVE seen advertisements in your magazine and others regarding other programming languages for the ZX-81 and Spectrum. The Artic Computing software house with its ZX Forth at £35 is one example.

I have yet to see a review or assessment of their value or quality in any

or a review or assessments would be much appreciated.

> W E Rogers, Dagenham, Essex.

THE SPECTRUM programming manual lists the Microdrive keywords but does not explain their use. Could you publish an article explaining how the Microdrives will operate.

> P Bankes. Debenham, Suffolk.

 Thank you for your comments. All the suggestions are being considered for future articles.

Spaced out with commas

I FIND that what the manual says - page 200 is not what happens in practice with my ZX-81; for commas in print statements, the rules are:

Each comma causes a space to be printed at the print position in force immediately before the comma is acted on.

Each comma moves the print position to the next column 0 throwing a new line — or the next column 16. Here is a demonstration program:

10 FOR I=1 TO 64 20 PRINT "*": 30 NEXT I

40 PRINT AT 0,15,.."O" which shows that line 40 prints three spaces at (0.15) (0,16) (1,0) and 0 at (1,16).

> W E Thomson, Aldeburgh, Suffolk.

Taking the MIC

AFTER many days spent vainly attempting to SAVE and/or verify on my Spectrum, using three different

continued on page 20





continued from page 19

cassette recorders, all of which would LOAD easily. I accidentally found a solution.

No matter whether I want to SAVE, VERIFY or LOAD, I ignore the MIC socket and always use the EAR socket with, of course, the EAR or MIC socket on the recorder. Success every time.

This is obviously contrary to the Spectrum instruction manual. Is my Spectrum faulty? Have many/any other Spectrum users had the same problem/solution?

> S C Craxford, Andover, Hampshire

·Sinclair Research says that the Spectrum probably has a faulty MIC socket and should be returned for replacement.

Spectrum amplified

I AM the owner of a Spectrum and am writing to inform you how powerful the Ear output of the Spectrum is. I have a cassette monotone recorder and I have found that if I connect a lead from the Spectrum Ear socket into the Ext Sp of my recorder, the sound is much amplified.

There is not only sound coming louder from the recorder but the computer

sound, too.

When connecting the lead to the recorder, the jack plug should be pushed only halfway into the Ext Sp socket. Some fiddling may have to be done to achieve the amplification but the difference can easily be distinguished.

> M Hawes, Ely, Cambs.

Trying to tape best recorder

YOUR ARTICLE Finding better ways of storing on tape, October 1982, failed to provide a practical conclusion, i.e., a list of approved or recommended cassette recorders. If washing machine manufacturers can recommend washing powders, surely computer manufactures can provide a similar service on cassette recorders?

I particularly wish to know whether a Philips D6310 cassette recorder is compatible with the ZX Spectrum which I am pationtly waiting to receive.

PD Curle, Kings Lynn, Norfolk.

• We did not give a list as it is impossible to test all the recorders on the market and so any list would inevitably exclude ones which worked and include others which, because of the reasons expressed in the article, might not work in a particular instance. Sinclair Research informs us that its engineers have yet to find a machine with a 3.5mm. jack, MIC and EAR sockets which does not work with the Spec-

Ephemeris put right

THANK YOU for printing reviews of our Ephemeris and Lynchmob programs in your superb Christmas number. May we ask you to publish this letter to correct two slight errors?.

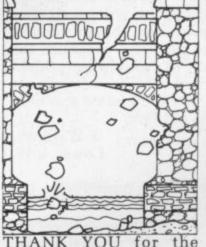
Our Ephemeris programs for the ZX-81 and

Spectrum are intended for all those with a scientific interest in the solar system and will appeal to amateur astronomers rather than astrologers. The prices of the programs are £6.90 for the ZX-81 version and I WOULD appreciate it if

Our fun educational game of Lynchmob is priced at £4.95 (ZX-81 16K) and £6.50 (Spectrum 16K). The prices are allinclusive.

Christine Hine, Stockport, Cheshire.

London Bridge finds favour



London Bridge program in the Christmas edition. It was lovely. I beat your score of 1,700 by scoring 2,050. There was one brick left when I fell in to the water. I am only eight years old. Has anyone beaten my new high score?.

I also like Phasor when the alien hits you.

> Owen Nurse, Cambridge.



Games not for sale

£7.90 for the Spectrum ver- you would publish a retraction of a review you did a few months ago of a collection of my games sent to you for publication. It implied that I could supply the cassettes commercially which I cannot do.

I am still receiving Bridge Software, orders and it is costing me a good deal of money to return cheques and explain the situation.

D E Healey, 63 Cedar Avenue, Coselev. West Midlands.

Bug feared in Spectrum

I OWN a Spectrum on which I seem to have discovered a bug. I would be interested to know if other readers have reported any problem, since I cannot get a reply from Sinclair on the mat-

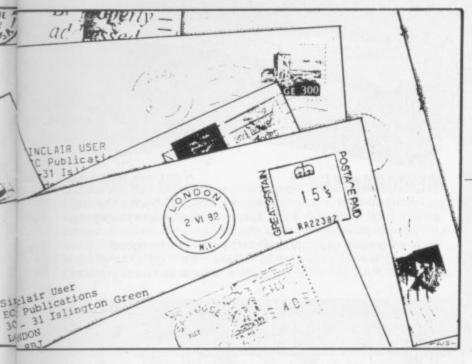
The INKEY \$ function does not appear to work correctly, e.g.,

10 Pause O: Let i\$ + **INKEY \$**

20 If i\$ = "a" then . . . 30 If i\$ = "b" then . . .

The above fails to run past the INKEY \$ statement.

Similar pieces of program, for example in the "Draw" program on the Horizons pack, also crash



the program. Replacing the above with:

10 Poke 23560, 0 (sys. variable — last key) 20 Pause O; Let i\$ = CHR\$ PEEK 23560 . . . works fine.

Do I have a ROM bug?

M Adcock,

Braintree, Essex.

• According to a Sinclair Research spokes man, you do not have a bug. He adds that Pause 0 will wait until a key is pressed.

Program shortage

I WISH to complain at the lack of Spectrum programs in December in your Program Printout. I know that some of the programs listed can run on the Spectrum with some modifications but that is beside the point. Your publication is normally very good but should cater for all Sinclair users every month, in articles and programs.

I was sorry to see Spectrum User absorbed into the main body of the magazine but concede to your reasons.

Your software reviews are excellent but I think you could do with a little more in-depth hardware reviews, i.e., comparative merits of 10 types of RAM or keyboard, for example.

Nicholas Wright, Leicester.

· We apologise for the

lack of Spectrum programs in the December issue, due to an oversight. We had, however, a number of articles of interest to Spectrum owners, including a review of the Sinclair range of software. We acknowledge your comments about possible reviews and will bear them in mind.

Printer fumes harm query

CAN YOU tell me if there are any harmful effects from breathing the fumes given off by the Sinclair printer?

P Matthews, Hampstead, NW3.

 None of which we are aware.

Bachs chord skill needed for keys

I HAVE not had my Spectrum very long. It is still having teething troubles with me but one thing is already obvious — that the approach to the keyboard has to be not that of a touch-typist, but rather of an organist with all J S Bach's skill in playing chords.

How he would have appreciated the power of this great little four-decker instrument, though I suspect that he would have had two shift tabs brought out under his thumbs.

C R Oswin, Christchurch, Dorset.

Sufferers' club donation plea

I HAVE just read the November issue of Sinclair User, in particular the latest batch of letters from members of the Sinclair Sufferers' Club. As an ear-

social experience to fit

them for a sparkling career

ly sufferer myself, I felt moved to make an observation which might benefit Uncle Clive.

As the average member of SSC has to wait in the region of three months before receiving an order, would it not be a good idea to invest all that money for three months and donate the interest to a well-known charity?

Also bearing in mind the number of complaints you have received about delays of Sinclair products does anyone know of a case where the company managed to deliver within 28 days?

R Whitehead, Odiham, Hampshire.

Identity problem

FOR EIGHT weeks Oxford Computer Publishing has been advertising in Sinclair User Machine Code Test Tools and inviting orders to PO Box 99, Oxford. The dymostickers identifying customers of Box 99 at Oxford Post Office fell from the boxes, according to the Post Office, and OCP orders were sent to the previous owner of Box 99.

OCP therefore is appealing to customers, with apologies, to persevere and to telephone orders to its office address, 0753 888866, or to post orders to 4 High Street, Chalfont St. Peter, Bucks SL9 9QB.

B N Richardson, Director Oxford Computer Publishining.

Code sexists rule

WHILE READING the article on code junkies — December, 1982 issue — my enjoyment was dampened once more by the assumption that only young males are now striving at school, Scouts and in cricket clubs to gain the



in computing.

My children, a girl and a boy, buy this magazine between them each month and they are equally interested in computers, mathematics, the Beano, Scouts/Guides, netball/cricket. When my daughter reads this article once again she will get the message — boys only. From Ladybird books to

seems to be clear. Sad?
JEM Fradgley,
Stratford-upon-Avon,
Warwickshire.

Sinclair User, the meaning



MEMOPAK 16K For those just setting out on the road to real computing, this pack transforms the ZX81 from a toy to a powerful computer. Data storage, extended programming and complex displays become feasible.

For even greater capacity, memory packs can be added together (16 + 16 + 16K or 16 + 32K). The MEMOPAK 32K and the MEMOPAK 64K offer large memories at economical prices.

MEMOTECH

MEMOCALC The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a MEMOPAK 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified. Each location in the table can be either a number which is keyed in or a formula which generates a number. Every time the command to 'calculate' is given, all the formulae in the table are re-evaluated. Spreadsheet analysis started as an aid to cash-flow analysis, but this powerful tool has now been generalised and MEMOCALC with its special ability to perform iterative calculations is invaluable in the performance of numerical tasks.

HIMITHIAN

PEROCEIC

The Memotech approach to microcomputing is to take the well-proven and popular ZX81 as the heart of a modular system. This small computer houses the powerful Z80A processing unit and acts as the central processor module through which the MEMOPAKS operate.

Memotech has a reputation for professional quality, producing units which are designed to fit perfectly, to look well-balanced, and to work efficiently and reliably.

The modular approach gives ZX81 owners the freedom to design the system they really need. Furthermore, the intercompatibility of the modules ensures that later additions will click straight in, to give you a system that grows with your ambitions and abilities.

As one example, a system with 16K of memory and MEMOCALC is all that is required to perform sophisticated numerical calculations giving the same results as a computer at 10 times the price. The problem may be as complicated as a cash flow or production schedule, or as simple as household accounts or pocket money budgeting. If the bank manager wants to see the cash flow, then a single print instruction to the Centronics I/F will give a printout which is more than acceptable to any bank.

The example system which is shown, on the other hand, would satisfy the needs of someone who wanted to enter data via a light-touch keyboard, construct and label graphs, and then copy the screen to an 80-column printer. Only 16K of memory is used here but with additional memory, more than one video page can be stored. Up to 7 successive pages can be displayed cyclicly to give animated displays.

16K £26.00 + £3.90 VAT £29.90 32K £43.43 + £6.52 VAT £49.95 64K £68.70 + £10.30 VAT £79.00 HRG £34.70 + £5.20 VAT £39.90 CI/F £34.70 + £5.20 VAT £39.90 MEMOCALC £26.00 + £3.90 VAT £29.90 Z80 ASSEMBLER £26.00 + £3.90 VAT £29.90 KEYBOARD WITH BUFFER £43.43 + £6.52 VAT £49.95

Memotech products are available at larger branches of WHSMITH



MEMOPAK HRG This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 × 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels. Scrolling, flashing and animation are all here.



MEMOPAK Centronics I/F The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case. Additional facilities allow high resolution printing. The full capabilities of your printer are now under the control of the ZX81.

REALISES-THE 7001-POTENTIAL



MEMOPAK Z80 Assembler This click-in EPROM based pack accepts standard Z80 assembly language mnemonics to allow you to write faster and more compact programs. It has its own ADD, EDIT, LIST, ASSM and QUIT functions, the editor allowing insertion, deletion, automatic line renumbering and error checking. Source code and object code listings can be displayed and printed in decimal or hex format.



MEMOTECH Keyboard The light-touch positive stop keys of this elegant typewriter-pitch keyboard allow you to work faster, more accurately and more confidently. To speed you along we have added an extra SHIFT key to the array at top right. The keyboard is attached by a cable to the Keyboard Buffer which fits in amongst your other Memopaks or straight onto the back of your ZX81.

To ensure that your expectations are realised, care is taken at every stage to design features into the system to anticipate your frustrations and to forestall them. For example:

A) Memories are cumulative e.g. 16K and 32K can be added to the MEMOPAK 16K or even to the Sinclair 16K RAM pack.

B) The HRG firmware allows commonly used constructions (such as scrolling, shading and labelling graphs), which might otherwise be beyond the user's programming capabilities, to be evoked by a few simple commands.

C) The Centronics I/F converts ZX81 character codes into ASCII and extends the print line to the width of the printer, still using the LLIST, LPRINT and COPY commands.

Looking forward, Memotech will continue to back the ZX81 through 1983 with fast storage devices, pressure sensitive electronic drawing boards and more software packs including a wordprocessor and an RS232 interface.

MEMOPAKS may be ordered by post (cheque, Access/Barclaycard quoting number) or by telephone. Please make cheques payable to Memotech Ltd. and please include £2.00 per unit for packaging and postage inland (overseas £3.00).

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Just released by Artic, this new professional quality assembler is also available for 16K 2X81 and features:—

* Word-processor-like text editor. * Highspeed, versatile two-pass mnemonic assembler with labels and detailed error-

trapping. Will assemble to any address.

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user manuals and keyboard overlay. ZX Forth combines the simplicity of basic with the speed of machine code



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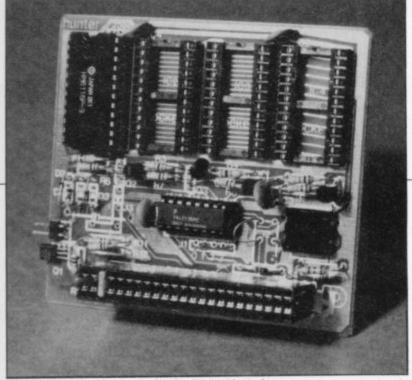






ARTIC COMPUTING LTD.

396 JAMES RECKITT AVENUE, HULL, N. HUMBERSIDE



Hunter Products battery - backed RAM board

U.S. firm aids fact storage

American firm, has can be moved about in the in the U.S. memory of a ZX-81 to any 8K section. The board is available as a kit and is very easy to build from the BRANDON PRODUCTS detailed instructions.

The lithium battery included means that the 6116 RAM chips keep the program even when you switch-off the machine, just like a ROM. That means that machine code routines and even Basic can be stored in the onboard RAM, to be recalled at any time without having to load them from tape.

A simple 2K RAM is provided, ROMs and RAM can be mixed on the board but that involves some cutting of tracks. One problem is that the board cannot decode the last address line A15.

One advantage is that you can replace the 8K ROM with a batterybacked copy and then add your own commands or correct the mistakes in the ROM.

The kit costs £19.95 inc. Hunter VAT from

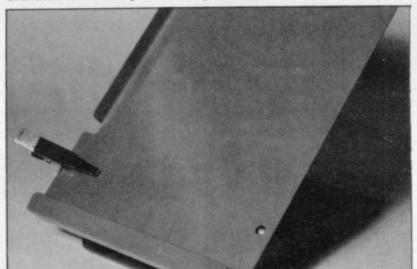
Axminster, Devon EX13 produced a battery- 5AS. That is a postal backed RAM board which address as the company is

HUNTER PRODUCTS, an Electronics, PO Box 5,

stocks the easy reader computer stand for holding magazines and books. The metal stand i very stable and tilts back a magazine at an angle for easv viewing. magazine is held by a large and there are clip extension arms on both top and right-hand side for large pages. It is very useful for copying-in programs; it folds flat for storage.

Brandon Contact Normansand, Salisbury, Wilts SP5 2BN. Tel: 079439-336. Cost is £14.95 inc. VAT and postage. Brandon also has a range of T shirts and sweat shirts with ZX-81 and Spectrum logos for £3.25 and £6.99 respectively.

Brandon Products' easy reader computer stand



The complete expansion unit

DCP INTERSPEC pack is a combination of several other packs produced by the same firm into one box which fits the ZX-81 or the Spectrum. It contains an 8-bit input and output port, four relay-isolated outputs rated at 24V-1amp, four switch inputs - for joysticks, thermostats — and an analogue-to-digital converter with eight channels. That is an appreciable amount in a box only 4 1/2 in. long by 3in. wide and 2in. tall.

The Interspec has an expansion bus at the back which provides the data, read and write control signals, plus two deviceselect pins to add to your own interfaces. All are fully-decoded, to the limits allowed on eight address lines, and work very well. DCP Micro Developments Ltd, 2 Station Close, Lingwood, Norwich NR13 4RX. Tel: 0603-712482.

Rosetta award in second year

THE SECOND annual Rosetta Stone Award will be presented sometime in April by Mindware Inc for outstanding intellectual achievement on a ZX machine. The award was presented last year to Dr Ian Logan for his work on the ZX-81 ROM. The award is worth \$200 and one year's free subscription to an American computer journal of the winner's choice.

The winner is also Products, Forest Home, presented with a replica of The Rosetta Stone.

Nominations are being taken at present and the judging will be done by a panel of representatives of American and British magazines. Nominations should be sent as soon as possible to Mindware Inc. 15 Tech Circle, Natick, MA 01760, U.S.A.

Joystick for

AGF HARDWARE has produced a joystick interface which fits on the expansion port of a ZX-81 or Spectrum and imitates the keyboard. Both versions simulate the cursor keys and the 0 key on Joystick 1 and keys T-Y-U-I-P on Joystick two.

There is no soldering to continued on page 26



continued from page 25

do as the board is plugged into the expansion port and any other devices plug in after it. The joystick is very easy to use and it speeds games enormously. The other advantage is that while it is enabled — via a switch - the rest of the keyboard is inoperable, thus preventing errors. Several programs already work with the joysticks AN ANALOGUE port from while speeds are chosen. The only disadvantage is and the fact that you cannot select which keys are simulated - that would allow an arcade game to be played.

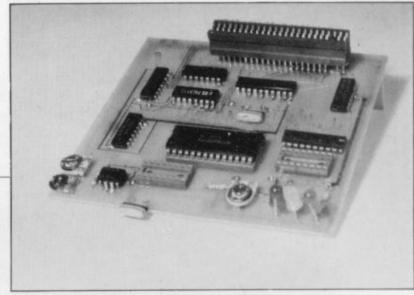
£15.96, Joystick £7.54 inc. port and digital eight-bit

VAT, from AGF Hardware, 26 Van Gogh Place, Bognor Regis, West Sussex PO22 9BY. Interfaces are accompanied by a free cassette of demonstration programs and instructions how to alter your own.

University analogue port

though some require the University Computers is a disabling of the joystick memory-mapped device and is designed to be used by the ZX-81 Basic instructhe cheap edge connector tions PEEK and POKE. It is decoded into 64 locations just below the start of Basic RAM — 15488-15552.

The first eight locations are used as an eight-Joystick interface costs channel analogue input



University Computers' analogue port

output port. That is an measured. unusual combination and, together with the manual, it can provide a complete demonstration unit for schools.

The board is despatched without a box but with an expansion connector at the back for plugging-in the 16K RAM pack. Three LEDs are also provided on the board to test the digital port, as is a light sensor to check the analogue input. There is also an amplifier so that voltages in the millivolt range can be

A full circuit diagram is provided and the manual takes you through a very easy course on how to use the port. The same firm can also supply various sensors for heat, light, sound and gas to fit on to the board. It can also supply various relays up to 25 amp 250V for control applications.

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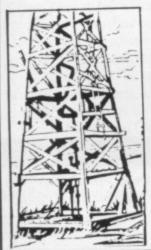
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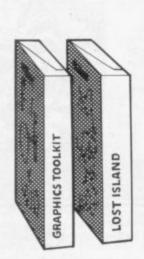
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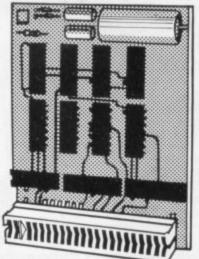
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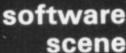
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started to receive their presented booklet contain- ing to buy either must be a ing explanation and listings of the programs on the cassette.

The first program is an excellent music composer which draws manuscript ITIS too cold to go and play strength of the shot and

chutist jump from an air- tre of a clock-face. craft on to a target.

Also included in Use and Learn is a series of useful routines such as Ramtest to check for faults in memory; Tapefile, which lists your collection of tapes; and Memory Map Monitor, which tells you how much memory for programs and variables you have remaining.

The Spreadsheet, for the 48K Spectrum, provides the user with a table. or matrix, which can contain numbers or formulae for solving numeric problems. It can be used in business and the home and closely resembles VisiCalc for the Apple but is less

Compared to the Vu-Spectrum software pack- Calc spreadsheet producages from MiCROL and the ed for the Spectrum by general impression of the Sinclair it is much clearer Use and Learn and and slightly easier to Spreadsheet cassettes is understand. Its one failing very good. Use and Learn compared to the Sinclair consists of a software version is that it is slower. cassette and well- The decision when choos-

CUSTOMERS finally have than one-tenth of the price. trade-off between facilities and speed.

Both MiCROL software packages are excellent value for money. Both packages cost £9.95 and can be obtained from MiCROL (U.K. Mail Order), Freepost, 38 Burleigh Street, Cambridge CB1 1BR.

Armchair golf

lines and notes played on a round of real golf, so why the screen as a tune is com- not settle in your armchair posed. When the tune has and play a round on the been completed the com- Spectrum? This version of poser can listen to the Golf for the 16K Spectrum shows a graphic view of The cassette also con- the holes, rough, trees, tains a variety of novel and fairway and lakes. To interesting games, in- make a shot the player cluding one in which you selects a number, imaginhave to make a para- ing that the ball is the cen-

You then choose the



your ball starts on its way towards the hole — or the lake, depending on how good a player you are.

A variety of penalties are handed-out by the computer when you land in the rough, in a bunker, or out of bounds. For instance, if you go out of bounds the computer will return your ball but you will have a penalty shot against you. If you land in a bunker, the computer will get you out but again you must suffer a penalty shot.

The computer will recognise special scores such as birdies, eagles and a hole in one. The game is interesting for golf fans but is very unremarkable in the software market as several games of golf, one of them very much like this one, have been produced for the Spectrum already.

Spectrum Golf is available for the 16K and 48K versions. It can be obtained from BS McAlley, 78 Hedgerley, Chinnor, Oxon OX9 4TI and costs £3.95.



Pacman gets look a like

AT LAST someone has produced a Pacman game for the 16K Spectrum which looks like the popular arcade game. The Abbex Spookyman has four ghosts, dots, power blobs, diamonds, hearts, clubs and the cutest Pacman you will ever see.

The keyboard is divided into three vertical sections with Left control on the left, Right control on the right and Up and Down in the centre. The controls take some getting used to but once they are mastered they make the game move faster.

Abbex estimates the total score possible after every screen of the game is 22,400. The player receives a bonus life when 10,000 points have been reached.

Spookyman is available from Abbex, 20 Ashley Close, Manor Hall Drive, London NW4.

Spectacular graphics

THE GRAPHICS capabilities of the Spectrum can produce fairly spectacular results, especially with two cassettes from Video Software, Superdraw and Superview.

continued on page 30

continued from page 29

Superdraw is for the 16K machine and can be used to create pictures, in high and low resolution. All the graphics symbols on the Spectrum are available through the program and a Prestel-type display can be achieved through a special large alphabet which can be loaded into the program separately.

Superview is for the 48K Spectrum. It acts rather like a personal viewdata system and can hold up to 42 pages of information displayed in two colours and 21 pages in full colour.

The creation of new pages is achieved using a cursor. A large alphabet is also included.

Superview and Superdraw are produced by Video Software Ltd, Stone Lane, Stourbridge, West Midlands DY7 6EQ. Each program costs £5.

Getting as sick as a Spectrum parrot

ball team, Football Manager, from Addictive Games, is for you. The game works on the 48K Spectrum and charts the career of a professional football team from the Fourth to the First Divi-

At the beginning you choose your team, which has a full complement of be sold and bought during other suffers. the progress of the game.

table, usually at the bot- ed A team will be selected for tables, players' records

IF YOU have always you to play and highlights wanted to manage a foot- from the match will be shown to you in 3D. After that a brief rundown of the rest of the day's matches is given and the league table is calculated for the division.

The skills needed are that you must keep a balance between earning money from the gate returns and winning on the field. It seemed that if you players. The players can do too much of one the

The game is ideal for a After you have selected football fanatic but the your team you will be given most interesting thing for a position in the league us was the 3D graphics usto create tom of the Fourth Division. goalmouth. The league

and match results seemed to bear no reflection of real life. For instance, Kevin Keegan is given a very low skill rating and a transfer fee of £5,000. Apart from that, the game is a winner.

Football Manager costs £7.95 and can be obtained from Addictive Games, PO Box 278, Conniburrow, Milton Keynes MK14 7NE.

If you read the book . . .

MELBOURNE HOUSE, the publisher, has a range of software cassettes to supplement a range of microcomputer books it has just launched. Spectrum 3 is a tape which contains several of the programs printed in the book Over the Spectrum.

The first two programs, of numbers flashes on to Leapfrog and Number the screen. If it stops on Reversal, are very simple your spot you win the pot, games and use block graphics, no colour and no sound. The idea behind Personal Banking System both is to get into correct allows a user to keep an order a number of randomly-situated objects, such as numbers or frogs, which are in a line. To do so you enter the number of items you want swapped.

The other programs on user-friendly and supports the tape are much better and make up for the Casino 1 costs £4.95; simplicity of the first

> Over the Spectrum 3 should be used in conjunction with the book of the same name. In that way the user will learn about the programs in the book

Money is the inspiration

two new 16K Spectrum



SOFTW ARE manufacturer cassettes just reaching the J P Gibbons seems to have market. One, Casino 1, is money on the mind with concerned with gambling away money and the other, Personal Banking System, is concerned with saving

> Casino 1 includes three old favourites, Blackjack, Craps and Roulette. Blackjack and Craps are fairly routine card games where you stake money against the computer pot and, more often than not, lose all of it. The computer seems to hit a winning streak too easily for our liking - perhaps it has a system?

The roulette game is very interesting and we managed to win money from the computer. When the bets have been laid on the roulette board the wheel is spun and a series if it does not you lose your

accurate record of financial affairs. It will keep track of standing orders and even locate a specific cheque through its number. The system is separate data files.

Personal Banking System games. costs £9.95, including instruction manual. Both cassettes are available from J P Gibbons AIB, 14 Avalon Road, Orpington, Kent BR6 9AX.

The tape costs £4.95 and from available Melbourne House Group, Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, Bedfordshire LU7 7NA.

A Spectrum collection

IF YOU made a list of the programs for the Spectrum which you never wanted to see again, would it include Sketchpad, Lunar Lander and Mastermind? In its hurry to produce for the Spectrum, Spectrum Software has put all three proon to one cassette.

Sketchpad can be used cursor, the circle com- New ZX-81 cassette tape.

commands.

On side two of the you to define your own the balls in the air. character set. When it has been defined the new character set can be viewed on screen and SAVEd.

The redeeming feature ble your own Z-80 program pass but if you change in



into machine code. The program is very compact, user-friendly and relatively crashproof.

The package, called Spectrum Software, is available from Spectrum Software, 44-48 Magdalen Street, Norwich, Norfolk NR3 1JE. All five programs can be obtained for £7.95 grams, with some others, or you can have any two for £4.95.

Galaxy battle sets new trend

of the first games to be produced following a new trend in ZX-81 software, called computer moderated gaming. Two people can play the game. They make their moves with plastic counters on a playing board which has on it a map of a fictional area in space.

The object is to become ruler of the galaxy by building Eoncruisers and maintaining them on planet stations if they are damaged during conflict. A player may take com-

GALAXY CONFLICT is one mand of any planet station or can take over the bridge of one of the Eoncruisers.

The game played by the computer is a very complex one. Even the amount of wear taken by a mesongun during firing is taken into account.

Players must be very careful to preserve sufficient energy on their planet stations.

Martech, which produces the game says that a leader must have the ability to think clearly, plan ahead and develop a tactical approach to the conflict which will win the prize of galactic control in the end.

Galaxy Conflict, for the 16K ZX-81, is available from Martech Games, 9 Road. Dillingburgh Eastbourne, East Sussex BN20 8LY. It costs £9.95.

mand and the Draw com- MICROMEGA, renowned mand. The pictures can for its business software then be saved on to on the ZX-81, has a cassette of machine code Lunar Lander and games for the little Mastermind are both fair- machine. Challenge, for ly standard programs. The the 1K ZX-81, presents lander program gives you some original and clever a spacecraft to land, using ideas. Two of our the cursor keys, on the sur- favourites are Cartoon face of the moon. The pro- Man and Juggler. In the blem with most of the pro- first a little man walks grams is that you must en- across the screen. You can sure that the computer is control his movement in CAPS mode or the pro- using the shift and BREAK grams will not respond to keys and increase his speed using number keys.

Juggler is almost the cassette is a character same but he juggles while generator which will allow moving. The idea is to keep

Road Race is a fast action racing game, a race between two cars on a map, starting in London. The cars are on separate of this package is the roads but you can go on to diassembler on side two of your opponent's road the cassette. You can list during the game. If you machine code in standard cross on to the other car's Z-80 mnemonics or assem- road in London you cannot

Scotland he cannot pass

Challenge contains five machine code games for the 1K ZX-81 and can be obtained from Micromega, Computer Personal Division, Quantec Systems and Software Ltd, 230-236 Lavender Hill, London SW11 1LE. It costs £4.95.



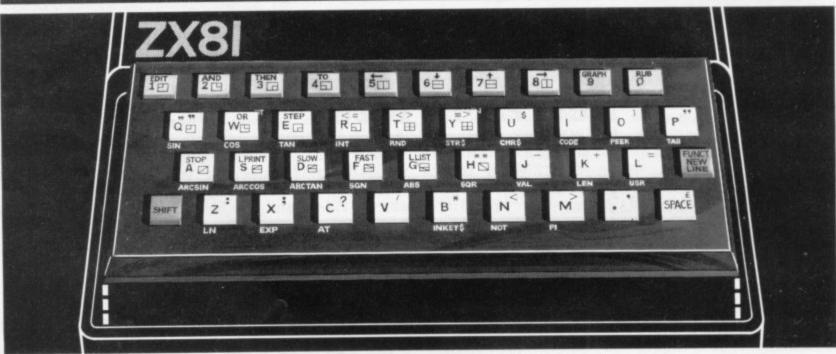
Better part of Sinclair range

NEW Flight Simulation program from the Sinclair Research Spectrum software library is one of the better offerings in that range. The program runs on a 48K Spectrum and gives you the opportunity, for a short time at least, to become the pilot of a light aircraft.

The program is very interesting and better value than some of the other Sinclair programs.

Flight Simulation costs £7.95 and is available from Sinclair Research, Stanhope Road, Camberley, Surrey GU15 3PS.

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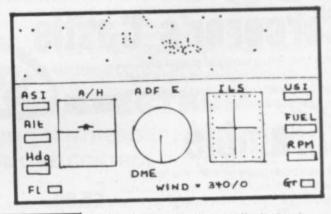
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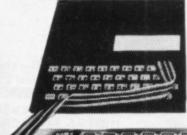
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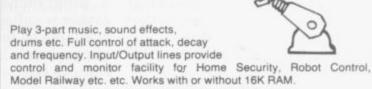


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Stephen Adams reviews a remarkable little machine from Colne Robotics which could help in writing programs

Inexpensive maths aid goes into production for ZX-81

THE ZEAKER is an electronic device controlled by a ZX-81 through two 2-metre long cables. It consists of a black box with wheels on either side and four sensors mounted on each corner. The motions of each of the wheels can be turned on and off under program control, so that it can be steered by the computer in much the same way as a tank. The motors can also be programmed to go forward and reverse, so that the zeaker can retract from a wall.

The sensors can be used to detect obstructions around the zeaker. The sensors consist of metal plates which are curved around each corner of the zeaker and spring-loaded so that it is held away from the box.

Fixed to the box under the plate are two adjustable metal stubs which form the other half of the switch. When the zeaker hits an obstruction the metal plate touches the metal stub on that side of the corner and completes the circuit. That can be detected by the computer by PEEKing a location in memory. There are four corners, each having two sensors, one on each side of the corner beneath the metal plate, making eight sensors in all.

The zeaker also contains a loudspeaker which is connected to two oscillators inside the interface box. They produce a two-tone horn—which can be switched on and off under program control to indicate obstructions and turning.

There are also three LEDs mounted on top of the zeaker. Two of them can be turned on under program control and the third is used to indicate that the pen, which is underneath the zeaker, is in the

down position. The pen is the really important part. It turns it into a turtle-type creature which can be used by teachers to describe mathematics to children in a visual way. The pen is operated by a solenoid mounted in the body of the zeaker which is lowered under the command of the ZX-81. It consists of a cut-down ball-point refill and so is simple enough to replace when it runs out. The pen can be used to follow the motion of the animal and can be raised and lowered at any time.

A program usually associated with drawing by computers through a programmed device like the zeaker is called Logo. Although not available on the ZX-81, a similar set of commands is available via a program on tape with every zeaker. The zeaker can learn a set pattern and

'The zeaker
can learn a
set pattern and
with its pen
can repeat
that pattern'

with its pen in tow can repeat that pattern at any time.

If that pattern is the result of a formula or program, the results can be illustrated graphically by running the zeaker over a large sheet of paper and watching the results. If there is a bug in the program the place where it appears will be shown by the trace; thus it is a very simple method of getting children — and I suspect even adults — to program a

computer and see if the answer is correct. If the answer is incorrect the trace will give the exact position of the error, so that it can be corrected easily.

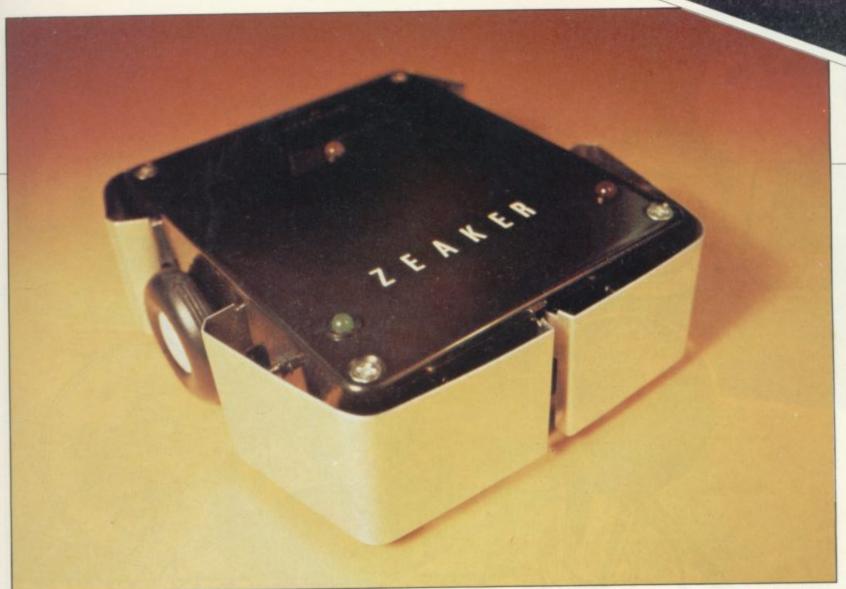
The program in Basic is used to POKE and PEEK at a memory location where a port has been inserted. The demonstration model was running on a Technomatics port but, being Basic, the port used could be any memory-mapped port which provides two eight-bit ports, one input and one output.

The port is not included in the price of the zeaker and Technomatics is understood to have ceased production of the port. That should not affect zeaker users, as Colne has said that it will undertake to supply a similar port at the same price.

The port presents the user with two 16-pin DIL sockets which provide the interface box containing all the electronics and power supply, with eight wires for input, eight wires for output to the zeaker, plus 0V and +5V connections to the computer.

The interface box contains the motor control circuitry for forward and reverse, as well as on and off for both the motors inside the zeaker. It also contains protection circuitry so that it cannot be programmed to go in two directions at once. The interface box is between the port which is attached to the expansion port of the computer and the zeaker and is connected to both via ribbon cables. The ribbon cables are two metres long and so allow the zeaker to roam from the ZX-81. Both ends are terminated in two 16-pin DIL plugs so that they fit into the sockets on the top of the zeaker and the port.

The interface cables to the port



would have to be altered if a different port was used but Colne says it could provide a set of cables for commonly-used ports. The connections, however, will be listed in the manual so that they can be changed over easily.

The zeaker is available as a kit, as well as ready-built, as is the interface box. The two are available together as one package. Construction should not be difficult. The manual includes the circuit diagram, port description — for those who want to use another one — and details of the control codes used. The principles of operation also include tips on how to write your own programs, as well as describing the ones provided.

Two 1K programs provide a demonstration of random action of the zeaker and a 'learning phase', one which allows you to enter a few commands telling where to go. Two 16K programs are also included—they should take up only about 8K, in fact—and once again demonstrate random action, plus a learning function.

The learning function is much more comprehensive than on the 1K machine in that it will allow you to use letters of the commands to program the action of the zeaker. The

basic functions will be F(foward), B(backward), L(Left), R(Right), PU(Pen Up) and PD(Pen Down). Those letters are accompanied by a number describing how many steps are to be done under each command.

The commands are combined into a string and then the zeaker is asked to execute the set of commands, which may also be given a name and the ZX-81 told to execute name. That leads to programs made up of a series of command words like box

'The zeaker
with interface
and port is
robust and
very simple
to use'

and triangle. To test one of the programs before trying it on the computer, a child can be asked to go through the same series of steps, imitating a zeaker, to check that the program which has been written can be understood.

Schools and colleges have not generally accepted this method of demonstrating computers because of the previous cost of a few hundred pounds each. Now that the cost of microcomputing power is down to £49.95, Colne has produced this version which will sell at £59.95 as a kit or £69.95 assembled. Remember that does not include the cost of the port required to run it — it cannot be connected directly to the ZX-81 expansion port. The price includes the interface box, the zeaker and power supply. A port can be supplied at approximately £13.

The size of the zeaker is 5 ½ in. × 5in. × 2in. and it has four ZX-81 programs in Basic. The interfaces and programs could be adapted easily to most computers with a user port.

The Spectrum, Sinclair says, will soon have a version of Logo written for it as part of the package offered under the schools scheme. As there are already ports available for the Spectrum and the Spectrum Basic is ZX-81-based there should be no difficulty using it on either machine—using IN and OUT instead of PEEK and POKE.

The zeaker and interface box, along with the port, was demonstrated by the company for Sinclair User and is robust and very simple to use. Colne Robotic Ltd is at 2 Station Road, Twickenham TW1 4LL. Tel: 01-892 7044.

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Play curlygons for a novel design

Variations on a polygon theme by Ian Stewart with the Spectrum in support

policeman said to Lady Chatterley, no doubt referring to a species of Klingon with poodleywool hair. He's going to tell us how to write Space Inveigler games better than that - Spectrum graphics.

The result will be a very simple 14-line program which produces an enormous variety of attractive graphic displays on the Spectrum hires screen. Incorporate it as a subroutine in other equally simple programs and you will be able to cover the screen in intriguing and complex designs, all of them fraught mathematical deep significance which, fortunately, it is unnecessary to understand to produce the results.

The fundamental principle used is one which pervades the entire

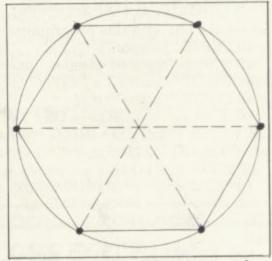
N ARRESTING title, as the computing world. Once you have had one good idea, do not waste effort looking for another one hack the first one to death instead. Or, to put it more tactfully, apply the technique of variations on a theme.

The theme here is the humble

be coaxed into doing everything

The most symmetric polygons are the regular ones, which are very democratic - all angles are equal, and all sides are equal. The 50 pence coin is a seven-sided regular polygon with slightly curved sides. A square is a four-sided regular polygon. Honeycombs are formed from regular six-sided polygons

Let us consider a regular hexagon. Here is one:



Notice that I have drawn it inside a circle, to show that its corners are all equal distances from its centre. Notice also that the angles divide the full circle of 360 degrees into six equal portions. So each angle is 60 degrees. If the polygon had n sides, then the angle wold be 360°/n. Mathematicians call this "putting 6=n" or inductive reasoning.

Now all we need is some elementary trigonometry, which I will explain. Get out the stepladder, climb into the attic, and haul down

'Incorporate it as a subroutine in other equally simple programs and you can cover the screen in complex designs'

polygon - I won't stoop to mention the schoolboy joke about dead parrots. A polygon is a shape made up of straight lines, which immediately sets one in mind of the Spectrum DRAW command. If we can find where the corners of the polygon should be, the machine can your May issue of Sinclair User; look at the article Triggy questions by me. It will tell you that to get things moving in circles you use the functions SIN and COS. If you want a circle of radius r you have to plot points r*COS x, r* SIN x, as x varies continued on page 40



continued from page 39

from 0 degrees to 360 degrees, or rather, there being a mathematician somewhere in the Sinclair camp, from 0 to 2*PI radians. PI = key M in extended mode.

What we have to do is to divide that 2* PI range into n equal bits; obviously we do taking and one nth of it, 2*PI/n, and them (multiples of that, 1*2*PI/n for i = 0,1,2,...,n. So the corners of a regular polygon of radius r and centre 0,0, lie at points whose co-ordinates are:

r*COS(i*2*PI/n), r*SIN(i*+/PI/n).So we are left with this program:

10 PRINT "Polygon"

20 INPUT "Number of sides", n. 30 INPUT "Centre", x;"□";y 40 INPUT "radius", r

50 IF x + r > 255 OR r > x OR r < yOR y+r > 175 THEN INPUT "off edge",d\$: GO TO 20.

60 FOR i = 0 TO n

70 LET u = x + r*COS(i*2*PI/n)80 LET v = y + r*SIN(i*2*PI/n)

90 IFi = Ø THEN PLOT u,v:GO TO

100 DRAW u - PEEK 23677, v-PEEK 23678

110 NEXT i

 $\square = \text{space}$

Before I explain, type this into your Spectrum and RUN it. INPUT in turn the numbers 7, 127, 87, 75 for n, x, y, r. You will have a big heptagon seven-sided thingy - in the centre of the screen.

Now the details. First, everything I have said so far assumes that the centre of the polygon is 0,0. Unfortunately that is the bottom left-hand corner of the screen. To adjust to a general centre x,y $(0 \le x \le 255,$ $0 \le y \le 175$) you have to add the x and v lines 70 and 80.

Line 50 is crashproofing; it makes sure your picture does not go offscreen and thus offend the operating system of the Spectrum.

Line 100 could have been made PEEKless but is such a useful trick that it deserves to be mentioned. The system variables in addresses 23677 and 23678 hold the coordinates x0 and y0, say, of the last point PLOTted. A DRAW command on the Spectrum draws from that point to a point offset from it by the

numbers in the DRAW command. In other words,

DRAW u,v

draws from x0,y0 to x0+u,y0+v. That is useful for some applications and a nuisance for others; what you often want is to draw from x0,y0 to u.v. You can write

DRAW u-x0, y-v0

to achieve this but then you need to remember x0 and y0 in the program and watch for rounding errors in arithmetic. Instead, you can "lift" their values from the operating system using PEEK.

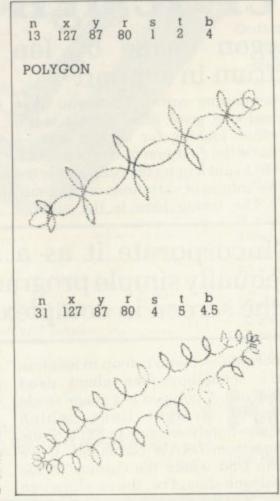
That is the theme program; now for variations. One thing which is easy to do is to twist the polygon into a less regular but still very artistic shape. To that you add the line:

45 INPUT "twists",s; "□";t and change 70 and 80 slightly with the EDIT key:

70 x + r*COS(s + i*2*PI/n)

80 LET v = y + r*SIN(t + i*2*PI/n)Another item to exploit is that the Spectrum can draw curved lines. So add:

Figure 1





48 INPUT "bend",b and modify line 100:

100 DRAW u-PEEK 23677, v-PEEK 23678,-b

Then there are more numbers to input. I suggest you go gently at first; for s,t, and b try smallish things like 0.5,1,1.5. They can be negative, too. there are two typical samples of the results in figure one.

nxyrstb

nxyrstb

That is still not all. If you embed that as a subroutine in a program which goes round a FOR/ NEXT loop, generating values for n,x,y,r,s,t,b and plotting the resulting curlygons on top of each other, you can get very complex results. You can generate the numbers at random or according to a pattern. Here are two samples add these lines and RUN. The old line 10 is deleted deliberately.

- (a) 10 FOR 1 = 10 11 LET n = INT(3 + 12*RND)12 LET x = 127 : LET y = 8713 LET r = INT (1 + 80*RND)14 LET $s = \emptyset$:LET $t = \emptyset$: LET $b = \emptyset$ 15 GO TO 50 120 NEXT q
- (b) 10 FOR q = 1 TO 10 11 LET n = q + 212 LET x = 100 + 5*q: LETv = 50 + 5*q13 LET r = 4014 LET s = q/10: LET t = q/515 LET b = q/316 GOTO 50 120 = NEXT q

Even then you can add colour commands, or print OVER x, or that is the trouble with an idea, even a simple one; it's amazingly difficult to hack it to death altogether.

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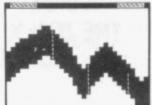
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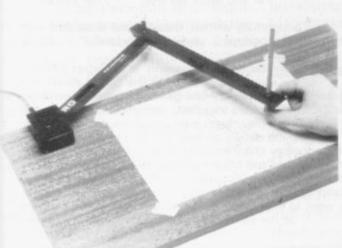
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'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are included, with clear instructions on entry and play. Each program is explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for youl

Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

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Our easy-to-follow guide for new owners of the ZX-81 and the Spectrum

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 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines 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 book-

let 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 systems. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find

sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson.

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 able to type-in other people's programs, such as those in Sinclair User and Sinclair Programs, without too much difficulty.

It is important that when using the ZX-81 it is not jolted. Some of the connections can easily work loose and everything which has been put in will be lost.

The manuals are not to everyone's liking and if you find them difficult

'For those with only a little knowledge the best way to approach the machines is to abandon any ideas for special uses'

that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy training 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 may be at fault.

Some users have experienced some difficulty with some television

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

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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 over-come 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 re-wind 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 with your Sinclair machine.

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and so lonely, so empty.

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David Anderson and Ian Morrison give a number of tips on memory saving

Easy ways of getting quart into a pint pot

S MANY of the thousands of ZX-81 owners will know, the 1K memory provided in the basic machine is often insufficient for even the simplest of programs. That can leave the user frustrated as he thinks of the program he could have written had he bought a 16K RAM pack. Therefore any bytes of memory which can be saved in a program are of great importance.

There are many ways in which vital bytes can be saved on a 1K machine. Once mastered, the user will discover that his computer is very versatile.

The ZX-81 1K — 1,024 bytes — of memory is filled with 124 bytes used by the machine as its system variables; x bytes for the program; y bytes for the display file - varies depending on how much is printed and finally z bytes for the variables defined during the

Each line in a ZX-81 program takes five bytes as soon as it is entered — two bytes for the line number, two more for the length of line, and one byte at the end for the NEWLINE. Anything typed in the line will take up more bytes. Thus REM statements should be removed as a needless waste of memory, as they serve no useful purpose except in a machine code program.

More memory can be saved by making one line out of two. Thus: 10 LET G = 15

20 IF INKEY\$ = "5". THEN LET G = G - 1

30 IF INKEY\$ = "8" THEN LET G = G + 1

40 GOTO 20 can be replaced by 10 LET G = 15

20 LET G = G + (INKEY\$ = "8") -(INKEY\$ = "5")

The removing of one line saves the five bytes which are taken up by each line and because of that saving the program will RUN considerably

The method shown, making two INKEY\$ lines into one, is a type of conditional statement similar to IF. The condition inside the brackets can either be correct or incorrect. If it is correct the result of the brackets will be 1 but if it is incorrect the result of the brackets will be 0. Therefore if the user were pressing "8", the result of the first bracket would be 1 and the second would be 0. Under those circumstances G would increase by one. An

'Constants will save memory only if the number is used three or more times'

expansion of the system is shown in the following two programs:

Original

10 LET G = 1520 IF INKEY\$ = "5" THEN LET G = G - 1

30 IF INKEY\$ = "8" THEN LET G = G + 1

40 IF G< 0 THEN LET G = 0 50 IF G> 30 THEN LET G = 30

60 GOTO 20

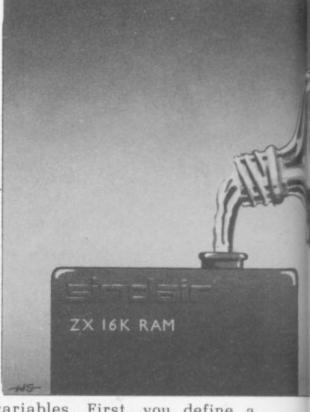
After revision

10 LET G = 15

20 LET G = G-(INKEY\$ = "5" AND G > 0) + (INKEY\$ = "8" and G < 30)

30 GOTO 20

Probably the most effective and would become possibly the simplest method of saving memory is by the use of constants which are non-varying of memory.



variables. First, you define a variable e.g., 10 LET N = a number used more than twice in the program, at the start of the program and wherever that number appears in the program substitute it with the variable.

As proof of its effectiveness, 0.9K was saved in a 16K program by the use of only one constant - zero.

In a program line a number is stored as follows:

Number as it Byte Exponent Four mantissa appears in containing Byte the program 126-(7Ehex) storage of the number ten 32,0,0,0

When using a variable the number will take up only one byte of memory. Constants will save memory only if the number is used three times or more in the program.

If, however, there is a number in a program which is used only once or twice there are two more relativelyefficient methods of saving memory in this.

If the number is between 0 and 255, the function CODE can be used: 10 LET T = 14

can be replaced by: 10 LET T = CODE ":"

That will save four bytes of memory. This method will be effective for those numbers which have a character assigned to them but will not work for those numbers 67 to 127, as they are not used in the ZX-81 character set.

The second method is for those numbers above 255 or between 67 and 127. It makes use of the function VAL, thus: 10 LET V = 300

10 LET V = VAL "300"

The use of VAL will save three bytes



Numbers above 999 which can be written easily in scientific notation should be written in scientific notation in conjunction with VAL, which will save even more memory—10,000 can become VAL "10000" which can become shortened even further to VAL "1E4" which saves another two bytes.

After all those methods have been employed there are still a few more ways of finding those extra bytes. A 0 can be replaced by NOT PI. That takes up two bytes and saves five bytes over the seven-byte number zero. A "1" can be replaced by SGN PI. That uses only two bytes and saves five bytes over the seven-byte number one. A "3" can be replaced by using INT PI, which also saves five bytes.

Galaxians is a simple 1K invaders program which makes use of the whole screen area. There are four

types of invaders — on-screen display of base, missile and alien plus score, highest score and highest scorer's name. All those superb features are achieved by some powerful memory-saving programming.

The features to note in the LISTING are the absence of REM statements, as few numbers used as possible and the use of four constants. Conditional brackets are also put to their fullest use.

Four constants are used R,N,U, and W which are set in lines 2 to 5. They are followed by the variables H\$,H,S,P,X,Y and A\$ in lines 6 to 90.

The FOR — NEXT loop T is used to move the invader down the screen. That is the most effective way of doing it.

Line 110 is the INKEY\$ line which controls the movement of the missile base. That makes the fullest use of conditional brackets. Note that the AND inside the brackets stops the base from moving off either side of the screen.

In line 120 everything to be displayed is printed, for three reasons — memory is saved as all the printing is done in the one line, everything is displayed speedily and that leads to little flicker after the CLS in line 119.

Line 130 tests to find whether an

alien has been hit. Line 140 resets the missile when necessary. Line 150 moves the missile upwards. Line 160 moves the alien horizontally to either side at random.

Lines 200 to 250 are used at the end of the game. Note that the CLS in line 240 empties the display, thus leaving sufficient memory for the initilisation routine in lines 20 through to 90, i.e., memory is saved here by adding an extra line to the program.

To play Galaxians first RUN the program. Alien after alien will dive towards you. Use keys "5" and "8" to manoeuvre your base. Key "0" to fire. You cannot move and fire at the same time due to the basic INKEY\$. As your score increases the type of invader will change. The random invader scores a bonus of 200 points.

At the end of the game if the score does not appear but instead an INPUT prompt appears that means you have set a new highest score and the computer is waiting for you to INPUT your initials of up to five characters. Once the score has appeared, press NEWLINE for another game; any other INPUT will end the game. In that eventuality GOTO 20 will start the game once more with the highest score retained.

```
LET R=CODE "+"
  3 LET N=NOT PI
  4 LET U=VAL "2"
  5 LET W=SGN PI
  6 DIM H#(VAL "5")
 10 LET H=N
 20 LET S=N
 30 LET P=CODE "?"
 40 LET Y=R
 50 LET X=RND*R
 60 LET As="9raphic T,6,Y"
 70 IF S>VAL "1E3" THEN LET A ==
"C graphicY,7,T"
  80 IF S>VAL "2E3" THEN LET As=
"W graphicT,6,Y"
  90 IF RND>VAL ".9" THEN LET A≢
="COS graphic 5-graphic8"
100 FOR T=U TO R-W
 110 LET P=P+(INKEY$="8" AND P(2
8)-(INKEY$="5" AND P>N)
 119 CLS
```

find whether an retained.
120 PRINT AT T,X;A\$(U TO);AT Y 130 IF Y>T OR ABS (P-X)>=U THEN
GOTO VAL "140"
131 PRINT AT T,X;"-=-";AT T,X;C
ODE As; CHRs N
132 LET S=S+CODE A\$
133 GOTO CODE "C"
140 TE YOUT THEN LET YER
150 LET Y=Y-U*(INKEYS=STRS N OR
V/P)
160 LET X=INT (X+RND*3-W-(X)28)
+(X <w>)</w>
170 NEXT T
200 IF HKS THEN INPUT HE
210 TE HKS THEN LET HES
220 PRINT AT R.P. "X*X"; AT N.N."
SCORE ";S;" HI ";H;" BY ";H\$
230 INPUT A\$
240 CLS
250 IF AS="" THEN GOTO CODE "="
200 It 114- 1.11411

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Key features of the Sinclair ZX Spectrum

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- ASCII character set with upper- and lower-case characters.
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- Sinclair 16K extended BASICincorporating unique 'one-touch' keyword entry, syntax check, and report codes.

um



The ZX Printeravailable now

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A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrivecoming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium.

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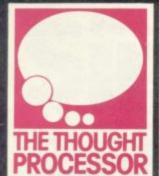
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AST MONTH I explained how to draw a flowchart of a program by splitting it into parts. Each part corresponds to an operation performed either by the user or the computer program. This month we take that a step further and examine a way of breaking a program code into easily-understood areas.

There are three main operations performed in a program — input, processing by the computer, and output. Each of those operations has a distinct box in a flowchart and each has a distinct part in a program. If a beginner is to use the program the input section will be the longest, because of error-trapping techniques and instructions. The processing part of the program will be the longest if a technical person, such as a scientist who knows about computers, uses it.

Now to deal with methods of prompting a user to enter information into the computer and the best ways in which the computer can handle that information. With programs such as the database, which is to be constructed in this series, the screen display is very important. The computer uses the screen to display information to a user.

Many people who use programs such as databases or word processors will know nothing about how a computer works or what it expects as input. The more information given to the user by a program the better. That does not mean clogging the screen with vast quantities of text. Instructions on the screen should be easy to read and well-spaced. The clear screen



John Gilbert continues his course

Breaking into the program process

command should be used as often as possible to break-down information into easily-read pieces but at the same time the jump between one screen of instructions and another should be almost transparent to the user.

The text must flow naturally and there should be no illogical jumps in the instructions. That is a matter of experience but the database has been designed with clarity of instructions and prompts for inputs in mind.

The most important instructions should stand out from the rest. That can be done by liberal use of the commands BRIGHT, INVERSE and FLASH on the Spectrum and the GRAPHICS mode on the ZX-81.

Listing one is the menu subroutine for the database. It is written for the Spectrum but is easy to re-write for the ZX-81. To do that take out the INVERSE in 1020 and 1021, BRIGHT

in 1021 and FLASH in 1040. INVERSE can be substituted with the GRAPHICS inverse lettering of the ZX-81 and the title MENU should have spaces between each letter to make it more prominent.

The menu should not be surrounded by a border of a different colour, as that can confuse a user and make the screen look crowded. It is also important not to use excess graphics commands. A display with FLASH or INVERSE all over the screen is just as confusing as if they were not there.

One other thing which people tend to forget is that they have the use of all the screen. Do not cram things into the corners or sides of a screen. Titles should be central and if there is only an INPUT prompt on the screen, a good place to put it is the top left-hand corner.

Listing one is the first module of the program. If there is a menu in a continued on page 58

Listing 1

SUB 1000,20) 100 DIM b\$
GO SUB
IF a\$= 200 THEN GO SUB 2000 300 a\$="2" IF-GO SUB 3000 4.00 THEN as="3" THEN IF GO SUB 500 4000 35="4" IF THEN GO SUB 666 5000 IF a = "5" INK 6: CL5 ASH 1; AT 10 5": PAUSE 2 GO TO 200 BO TO 200 SUB 700 THEN GO 6000 : BORDER 8; "ENTER T FLASH 1; AT 1 R 1-5": PAUSE 900 GO TO 200 1000 PAPER 0: BORDER 0: 1010 PAPER 0: BORDER 0: INK 1020 INVERSE 1020 INVERSE 1
1021 PRINT INVERSE 0;
INK 6; TAB 14; "MENU"
1030 PRINT AT 5,7; "1
E "; AT 7,7; "2 DISPL
; AT 9,7; "3 LOAD FILE
1,7; "4 SAVE FILE
"5 CREATE FILE "
1040 INPUT ' INK 6; BRIGHT DISPL ILE ";AT 13,7; 1040 . (1-5) ENTER OPTION 1050 IF as=" THEN GO 1060 RETURN



continued from page 57

program it should be situated at the top of the code after any single or array variables have been declared, as

in line 100 of listing one.

The menu module will display the options available from the program, ask which you require, put the number of the option selected in a string variable A\$, and transfer to the control program, also in listing one, at the top of the code. The control program, consisting of a series of IF . . . THEN instructions, will then transfer to the subroutine selected from the menu.

The two other modules which are listed in this article are for LOADing Listing 2

file name is asked for in lines 4010 and 5010. On the Spectrum a file or program name can be only 11 characters long. To stop the program crashing if the name typed-in by the user is too long, lines 4020 and 5020 will take only the first six characters of a file name. The other letters are cut off or truncated. Truncation is also used to cut the YES/NO inputs to Y or N.

The displays in both the SAVE and LOAD routines are important. Error messages should be displayed in the same position on the screen every time they appear. Every program should have a standard error message area to which the user will become accustomed. In the case of

The prompts and information in the SAVE and LOAD routines may seem simple and not worthwhile but the writer knows about the internal workings of the program and what to enter. A newcomer to a program, on the other hand, needs to be taken through it step by step.

When a module of a program has been written it is a good idea to test it on a friend or relative who knows nothing about computers. If they can follow the prompts, leave the display as it is; if they are confused, you know you have more writing to

I have now shown how the database is controlled using the menu and how to ease a user's task in getting through the program. Data storage and retrieval for the system has also been covered. Next month I will explain how data structures are created, how files are sorted, and how a piece of information which you want to retrieve is located for output in a matter of seconds using a special computer search routine.

4000>REM LOAD ROUTINE 4010 CLS : INPUT "NAME FILE TO B E ENTERED "; c\$ 4020 IF LEN c\$>6 THEN LET c\$=c\$(4030 IF c\$="" THEN GO TO 4010 4040 PAUSE 10: CLS : PRINT ''.' FLASH 1; "SET UP TAPE AND PRES 5 NEW LINE": PAUSE 0 4050 PRINT ' INVERSE 2 LOADING" LOAD PAUSE 100 "FILE L 4070 PRINT TAB DADED 4080 RETURN

data files — listing two — and SAVEing files — listing three. They are for the Spectrum but ZX-81 users can add toolkit routines available from such companies as JRS Software. They will handle data files for the ZX-81. If you do not want to go to that expense you will have to SAVE the program and variables together.

ZX-81 owners will have to break out of the program by erasing the left-hand quote mark of an input and typing STOP. Then type SAVE "program name". When LOADing it back in, do the usual load but do not press RUN. Instead use GOTO 200.

The SAVEd program can be verified on the ZX-81 by re-winding the tape, typing LOAD " ", and reentering the program you have just SAVEd. If the program has SAVEd correctly an 0/0 error code will appear; if not you will get another number error code. If that happens you will have to re-SAVE.

In the SAVE and LOAD routines a

the database, that is in the middle of the screen. Also the error message in line 800 is BORDERed in red to warn the user that a specific input is required.

Be careful about using the word "input" in a prompt, as it is computer jargon. The word "enter" is preferred as is shown in line 1040 of the database.

Listing 3

5000 REM SAVE ROUTINE 5010 CLS : INPUT "ENTER FILE NAM 5010 E "; c\$ 5011 IF c\$="" THEN GO TO 5010 5020 IF LEN c\$>6 THEN LET c\$=c\$(5030 PAUSE 10: '' FLASH 1;"5E S NEW LINE": P 0: CLS : PRINT ''''
SET UP TAPE AND PRES PAUSE 0 5040 PRINT INVERSE 1; "FILE BEING SAVED 10\$; " BE C\$; BEING SHOLD

5050 SAUE C\$ DATA b\$()

5050 PRINT '''FILE '"; C\$; "'

SAUED."''REWIND TAPE TO VERIFY

'"AND PRESS NEW LINE.": PAUSE

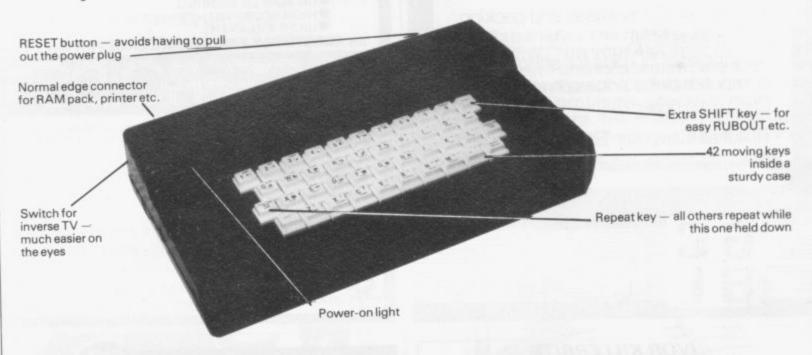
5070 VERIFY C\$ DATA b\$(): CLS:

PRINT '''FILE '"; C\$; "' VER FIED 5080 RETURN

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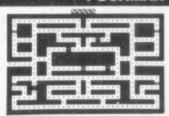
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With the Spectrum, program writers have been able to write more complex games. John Gilbert investigates this new move

Sinclair brings the thrill of the arcade into your home

A LMOST every major type of arcade game has been simulated on Sinclair computers. There are also new games which have an arcade format but have evolved on a microcomputer. The Spectrum is an ideal machine on which to play arcade games. The quality of them has improved substantially since the launch of the machine. Some of the first arcade games to be produced for the Spectrum were versions of Space Invaders, the game which started the arcade craze.

Spectral Invaders was the first to be announced by Bug Byte, which was already renowned for its arcade and adventure games on the ZX-81. So far it is the game which most closely resembles the original arcade version. Although it is slow it is difficult to score points, as you can fire only one laser blast at a time.

By the time the laser bolt has reached the place where you wanted it to go, the target invader has moved on. That means that a great deal of anticipation and skill is required. Graphically, the Bug Byte invaders is the best, with rows of different-colour aliens crossing the screen and large motherships moving from one side of the screen to the other at random intervals. Spectral Invaders is well-presented and costs £5.95.

Another invaders game, Space Intruders, was launched at about the same time as Spectral Invaders. The game is much faster and is recommended for those who like to keep their fingers on the fire button and amass a big score. The only criticism is that the aliens and mothercraft are very small and the mothership is blue on a black background and so is very difficult to hit. Apart from that

Space Intruders from Quicksilva is good value at £5.95.

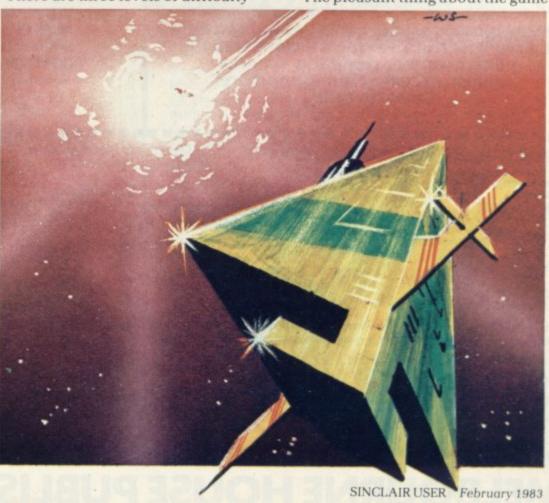
Namtir Raiders, for the ZX-81, is a space invaders game from Artic Computing with a difference. The player still has to face the hordes of aliens which come down the screen but the laser base can be moved up and down as well as left and right.

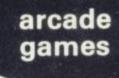
The greater movement permitted to the player is compensated by the hail of bombs dropped by the aliens and the size and power of alien ships. There are four waves of aliens and as the game progresses the ships get bigger until the giant mothership arrives.

The player has five laser bases during the game and they can take only five hits from alien bombs. There are three levels of difficultyeasy to impossible. The game, costing £3.95, is addictive and the graphics are neither awkward in design nor jerky in movement.

The game which is gaining popularity with 48K Spectrum owners is Timegate, from Quicksilva. The authors claim that it is the ultimate in 3D arcade space action. The game is loaded in two parts, the first being a lengthy instruction manual. After the manual has finished you can load the game. The object is to destroy a race of aliens called the Squarm who are trying to colonise Earth. To do that the player must fight the enemy in space and go through time by locating a series of Time Gates to find the Squarm's base.

The pleasant thing about the game







is its graphics. The player is at the controls of a space fighter and looks out into a 3D representation of space. The enemy fighters are also seen in 3D and so are the planets on which the player can land to refuel and repair the ship. It is by far the best arcade action game so far for the Spectrum and costs only £6.95.

Asteroids is also becoming popular on Sinclair machines. One of the first companies to launch a version for the ZX-81 was Quick-silva. It was a good version on such a small machine and is still proving popular.

Quicksilva has also introduced a Spectrum version called **Meteor Storm.** It has the added attraction of speech before play. It is difficult to hear the words but we are informed by the authors that it says "Meteor Alert . . . Meteor Alert . . .". Meteor Storm is a novel version of Asteroids and costs £5.95.

Sinclair Research has a good game of asteroids, called **Planetoids**, in its new Spectrum Software library. The asteroids are in 3D and much careful design work on both the asteroids and the player's ship seems to have gone into the game. Planetoids costs £5.95.

Artic Computing seems to be the only company to have produced a version of Galaxians for the ZX-81. ZX-Galaxians looks a little like Space Invaders but the invaders are 'V'-shaped and are supposed to be inter-galactic birds. The birds swoop from formation and bomb the

player's laser base. ZX-Galaxian is slow in action but can still be a very addictive game. It costs £4.95.

Defender is still a much-soughtafter game in the arcades and Artic Computing took advantage of that early in 1982 by producing a version for the ZX-81. The graphics are not particularly interesting and the spaceship which the player flies across the landscape is made up of a series of blocks which look only slightly like a ship.

Despite those criticisms, the original idea behind the game is still there and the Artic version can be

more difficult and can be run in slow, normal and fast modes. It costs £3.95.

Silversoft has produced a Scramble-type game called **Ground** Attack. It works on the same principles as the Mikro-Gen game but is much slower. There is a good deal of blank screen between game rounds and the average waiting time between rounds is 15 seconds. Ground Attack costs £5.95.

The range of arcade-type games on Sinclair machines is always increasing. Manufacturers seem to feel safe in producing standard arcade games such as Space Invaders and Scramble. Those games, especially for the Spectrum, are becoming more imaginative and the graphics and sound more impressive.

Manufacturers have to be careful about copying ideas from other games but with the imagination of some of the firms in the Sinclair market, children and many adults will be kept happy with arcade-type games on the ZX-81 and Spectrum for a long time.

Space Invaders games have now been overtaken by **Pacman** in popularity. A number of them have been produced for the ZX-81 and

'With the imagination of some of the firms in the market, users will be kept happy with arcade games for a long time'

exciting, as you see the enemy ships rushing at you from the other side of the screen.

Now that the Spectrum has arrived, many manufacture have found an interest in the arcade game Scramble. The best and fastest version so far is from Mikro-Gen. In the game you have to go through caves which become smaller and smaller as it progresses. There are four sectors to the game, including Missiles, UFOs and Meteors. The player has to destroy the missiles which are fired from the ground at the player's ship, destroy UFOs with a laser blaster, and dodge the meteors.

The game becomes progressively

several companies are producing them for the Spectrum. It looks as if Pacman may provide the next boom in Sinclair software — but that is another story.

Bug Byte, 98-100 The Albany, Old Hall Street, Liverpool L3 9EP.

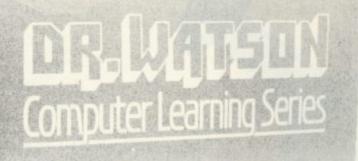
Quicksilva, 92 Northam Road, Southampton SO2 0PB.

Artic Computing, 396 James Reckitt Avenue, Hull, North Humberside.

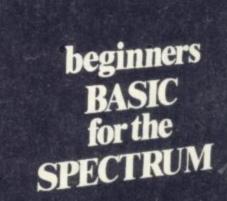
Sinclair Research, Stanhope Road, Camberley, Surrey GU15 3PS.

Mikro-Gen, 24 Agar Crescent, Bracknell, Berkshire RG12 2BK.

Silversoft, 20, Orange Street, London WC2H 7ED.



A COMPLETE LEARNING COURSE THAT EXPECTS NO PRIOR KNOWLEDGE FROM YOU AND GIVES FRIENDLY BUT WELL STRUCTURED TUTORIAL



BOOK & TAPE

The whole Dr. Watson series is written by people who teach computing but specifically structured to be used by you at home. It remembers that home computing is for fun, it is easy to read and to follow but it also realises that you have no-one to answer your queries. All the teaching is integrated into the programs that you write and the whole book and tape leads you to your own adventure game which you will continue to expand as your knowledge increases. Using a tape of prepared programs as you read makes it more simple and much quicker.

The chapters are organised to let you start and stop at will. Those with some idea will quickly cover the first few chapters but will soon reach more difficult sections as the course progresses to your structured adventure game. The book covers:

SPECTRUM

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PART TWO

Getting Started in BASIC

PART THREE

A Brief Summary of Sinclair & Spectrum BASIC Variables Sting Variables Other Functions Screen Format Cursors & Report Codes High Resolution Graphics User Defined Graphics Sound Conclusion

CHAPTER TWO

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Guess the Number

Storing a Program Load & Save Comparing Numbers

PART TWO

BODMAS Tester

CHAPTER THREE

An Etcha-Sketcha Numbers & Strings

CHAPTER FOUR

Putting Structure into your Program PART TWO Writing a Hangman Game Initialisation The Programs Structure

CHAPTER FIVE

Developing a Video Graphics Game A Moving Ball A Randomly-Moving Ball A Bouncing Ball

CHAPTER SIX

Reaction Tester

CHAPTER SEVEN

Barcharts

CHAPTER EIGHT

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Balltrap

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Blockade

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Composature

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Piecharts Sample Problem The Complete Pie Chart Program

CHAPTER ELEVEN

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Adventure Game Project The Adventure Database Game Sequence Overview

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Creating an Adventure Loading the Database Messages

PART THREE

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CHAPTER TWELVE

Sinclair BASIC's Advanced Features Verify Load

CHAPTER THIRTEEN

Solutions to Exercises



Honeyfold Software Limited Standfast House, Bath Place, High Street, Barnet, London.



EAR GUNNER is a program included specifically for the computer novice, to demonstrate the use of graphics mode and the manoeuvring of a display under cursor control.

The screen shows a graphic G, representing your target, and a plus sign which is your gunsight. Align the two with the cursor keys and blast your target to oblivion with 0. The program was sent by Andrew Tilbury of Hyde, Cheshire. [1K ZX-81).

- 5 PAUSE 50 10 LET A=5
- 20 LET B=7
- C=INT (RND*26)
- D=INT (RND*17)
- 50 PRINT AT D.C; "(9raphic G)"
- 60 PRINT AT A, B; " + "
- 70 PRINT AT A-1, B;"
- 80 PRINT AT A+1,8;"
- 90 IF INKEYS="5" THEN LET B=B-1 100 IF INKEYS="8" THEN LET B=B+1
- INKEYS="7" THEN LET A=A-1 110 IF

- INKEY = "6" THEN LET A=A+1
- 130 IF INKEYS="0" THEN GOTO 150
- GOTO 50 140
- 150 IF D<>A THEN GOTO 50
- 160 IF C=B THEN GOTO 170
- 170 PRINT AT D-1,C;"(9raPhic
- Y;SPACE;9raphic T)"
- 180 PRINT AT D,C; "(SPACE; inverse SPACE; SPACE)"
- 190 PRINT AT D+1,C: "(9raPhic
- T; SPACE; 9raphic Y)" 200 RUN

OU ARE trapped in a burning spacecraft and must make your way to the exit before your oxygen runs out. Blocks of molten metal fall from the higher levels and land at random positions around you. With the cursor keys 5 to 8 you must dodge around them to the exit and thence to the next level of the ship, where you will be rewarded with 100 points and a fresh tank of oxygen.

Fire Trap is a simple but entertaining game which could easily be enlivened by some user-definable graphics. It was submitted by Howard Dowthwaite of Seaford, Sussex. (16K Spectrum).

10 INK 7: PAPER 0: BORDER 0: C 15: GO SUB 1000: LET e=50: LET 1=0: LET s=0 20 DIM a\$(21,31): CLS: LET C= 20: LET r=r+1: LET x=10: LET y=15 : LET e=e+25: LET m=INT (RND*28) +2: LET n=INT (RND*18)+2 30 PRINT AT x,y; INK 5;"+"; AT 30; INK 7;"SCORE=";s; PAPER (e</r>
20) *2; FLASH (e</r>
20) *2; FLASH (e</r>
20) *2; FLASH 0;" level=";r;" 40 FOR b=1 TO 4: LET a\$(n,m)=b PRINT AT n,m; INK 5; PAPER 1; FOR a=1 TO 3: NEXT a: NEXT b PRINT AT x,y;"" 50 LET [\$=INKEY\$ 50 LET [\$=INKEY\$

60 IF a\$(x,y-1)()""" AND [\$="5"

"AND y>2 THEN LET y=y-1

70 IF a\$(x,y+1)()""" AND [\$="8"

"AND y(39 THEN LET y=y+1

80 IF a\$(x+1,y)()""" AND [\$="6"

"AND x(20 THEN LET x=x+1

90 IF a\$(x-1,y)()""" AND [\$="7"

"AND x>2 THEN LET x=x-1

100 IF n=x AND m=y THEN LET s=s
+100: PRINT AT 21,0;"UELL DONE!

"": FOR m=10 TO 40: BEEP .01,m:

NEXT m: GO TO 20

110 IF e(=0 THEN PRINT AT 21,0;"

"OUT OF OXYGEN: GAMEOUER": STOP 120 LET e=e-1 130 IF a\$(x-1,y)=""" AND a\$(x+1,y)=""" AND a\$(x+1,y)=""" AND a\$(x,y-1)=""" AND a\$(x,y+1)=""" THEN PRINT AT 21,0;" YOU ARE TRAPPED : GAMEOVER": STO 140 IF f\$="" THEN GO TO 30 150 LET s=s+1 160 LET rl=INT (RND*4)+1 170 GO SUB (rl*10)+180 180 GO TO 30 190 LET a\$(x-1,y)=""": BEEP .01 40: PRINT AT x-1,y; INK 6;"": RETURN 200 LET a\$(x+1,y) =" BEEP .01 41: PRINT AT x+1,y; INK 3;" :: RETURN 210 LET a\$(x,y-1) =" ": BEEP .01 42: PRINT AT x,y-1; INK 4;" ": RETURN a\$(x,y+1)=""": BEEP .01 T AT x,y+1; INK 5;"": 220 LET PRINT RETURN 1000 LET b\$="E" PRINT INK 2; "

1020 PRINT rning space-the '+' and You are in craft. You YOU in a are you move by usi controls. Your ng the cursor
aim is to get
s before you
en or get
blocks. After
get 100 points to higher level run out of trapped by oxyg trapped by the every level you and more oxygen 1030 FOR n=0 TO 200: NEXT 1040 PRINT , " Press and continue" Press any key t 1050 PAUSE 0

12345678901234567890123 456789012345678901234544 2 REM 10 LET As="... 20 LET A\$=A\$+"FFF" 25 LET 0=16567 30 FOR I=1 TO LEN A\$-1 STEP 2 40 POKE 0.(CODE A\$(I)-28)*16+0 ODE A\$(I+1)-28 50 LET 0=0+1 60 NEXT I 70 FAST 80 LET K=USR 16546 99 STOP 100 SAVE "BEETHOVE" 110~PRINT "************* N************ ******** 120 PRINT , "PROGRAMME CREATED BY S. CRAINIC FOR THE SINCLAIR Z 130 PRINT ,, "EACH SOUND CORRESP ONDS TO AN HE-XADECIMAL VALUE. I N ORDER TO OB-TAIN THE DESIRED M ELODY, YOU MUSTENTER SUCCESSIVELY IN LINE 10 (LET AS=""...)

THE HEXADECI-MAL CODE OF EACH IN LINE 10 SOUND IN THEIR ORDER IN THE MEL 140~PRINT "THE SOUNDS HAVE EQUA

L LENGTHS. A LONGER DURATION OF SOUND COULD BE OBTAIN A GIVEN ED BY ENTE-RING MANY TIMES SUCCE SSIVELY THECODE CORRESPONDING. TO SOUND. INTERVALS ARE THE SAME ORTAINED BYENTERING THE ""00"" ALUE. 145 PRINT AT 21,0; "HIT A KEY TO CONT. 150 IF INKEYS="" THEN GOTO 150 155 CLS

160 PRINT " NOTE 1ST SCALE 2ND SCALE-

165 DIM B\$(2,24) 170 LET B\$(1)="F0E5D8CFC3B8ADA5 9C948B83"

175 LET B\$(2)="7A736B67605A5651 4B484449"

C+1D-D D+; E 180~LET C\$="C F+)G-G G+; A-A ·E + : B-B

190 FOR I=1 TO 12 200 PRINT C\$(1*5-4 TO 1*5); TAB 11;B\$(1,I*2-1 TO I*2);TAB 24;B\$(2,I*2-1 TO I*2)

210 NEXT I 220 PRINT ,, "AS EXAMPLES, SOME MELODIES WERE CODED IN LINES 100 NE OF THEM, EN- TER run 1000, OR) make the tone o 1010 ... f your to set louder AND newli

ne." 230 PRINT AT 21,0;" Y TO CONT " HIT A KE TO CONT

240 IF INKEYS="" THEN GOTO 240 245 CLS

247 PRINT "EXCUSE ME, I""M WORK



ZX-81. Stephane Crainic of Paris has linked hex values to the tones available from the speaker of your television set and has produced a table allowing you to convert the notes of the musical scale into those values.

When you have typed-in the program, enter GOTO 110 so that you can read the instructions and the table of scales and hex codes. Then

EETHOVEN is a remarkable transpose your tune into hex. After program which allows you to reading the instructions and presproduce music from your sing keys to continue, the screen will show 0/9998.

Enter LIST 10, EDIT, and alter the A\$ to the list of hex values into which you have converted your tune. Increase the volume of your TV, enter GOTO 1 and your tune will be produced. The notes produced are all off-key but the quality is certainly no worse than that available from the Spectrum. Lower-case letters in our listing signify inverse video (16K ZX-81).

```
ING..."
248 FOR I=1 TO 30
 249~NEXT
 250 FAST
 255 RUN 9990
1000 REM happy birthday
1005 LET AS="B8B800B800A5A500B8B
8008B8B00949494940000B8B800B800A
5A500B8B8008B8B009494949400B8B80
0B800606060737373008B8B8B0094940
0A5A5A5006B6B006B737300949400838
300949494"
1009 GOTO 20
1010 REM 40th symphony
```

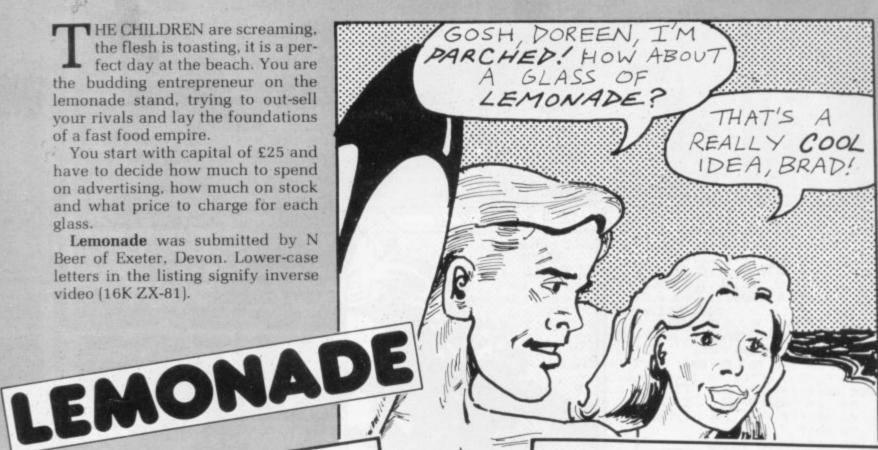
1011 LET A\$="B8C300C3C300B8C300C 3C300B8C300C3C37A7A7A007A8394940 094A5B8B800B8C3D8D800D8D8D800C3D 860D8D8C3D800D8D800C3D800D8D8838

3830083949C9C009CB8C3C300C3D8F0F 000F0F0007A830083836B6B9C9C83839 494C3C3007A830083836B6B9C9C83839 49478780078839485B8B8C3C3B8B8" 1019 GOTO 20 9989 STOP 9990~LET A\$="7B3D20FDC906E05EAFB B280CDBFECD8240D3FFCD824018050E0 50D20FD10E8C921B740CD8740237EFEF F20F7C9" 9991 LET 0=16514 9992 FOR I=1 TO LEN A#-1 STEP 2 9993 POKE 0, (CODE A\$(I)-28)*16+C ODE A\$(I+1)-28 9994 LET 0=0+1 9996 NEXT I 9997 SLOW 9998 CLS

THE CHILDREN are screaming, the flesh is toasting, it is a perfect day at the beach. You are the budding entrepreneur on the lemonade stand, trying to out-sell your rivals and lay the foundations of a fast food empire.

You start with capital of £25 and have to decide how much to spend on advertising, how much on stock and what price to charge for each glass.

Lemonade was submitted by N Beer of Exeter, Devon. Lower-case letters in the listing signify inverse video (16K ZX-81).



M 0 278-PRINT "L E E" 280 PRINT AT 10,0, "DO YOU REQUI 279 PRINT RE INSTRUCTIONS ? 300 IF A\$="Y" THEN GOTO 3000 310 IF A\$="N" THEN GOTO 330 290 LET ASTINKEYS 348 PRINT AT 10,8; "HOW MANY PLA 320 GOTO 290 338 CLS 360 IF P(2 OR P)4 THEN GOTO 350 YERS (2-4) ?" 350 INPUT P 362 PRINT AT 10,0; "HOW MANY DAY 361 CLS S DO YOU WANT TO 364~IF ADK1 OR AD>14 THEN GOTO (MAX=14) ?" 363 INPUT AD 363 369 CLS 378 DIM M(P) 380 DIM A(P) 390 DIM R(P) 395 DIM L(P) 400 DIM B(P) 410 DIM Q(P) 420 DIM I(P) 430 FOR F=1 TO P 440 LET M(F)=25 450 NEXT F 460 FOR F=1 TO P 470 LET A(F)=0 480 NEXT F 490 FOR F=1 TO P 500 LET R(F)=0 510 NEXT F 520 FOR F=1 TO P 530 LET B(F)=0 530 LET F TO AD N A D 531 NEXT F TO AD N O N A D 532 FOR E=1 TO AD N O N A two 532 PRINT "L E M (thirty two 533 PRINT"; E; AT 2,0; "(thirty two graphic 75)" 535 IF W=0 OR W=3 THEN LET W==" 534 LET W=INT (RND*4) 536 IF W=1 THEN LET W=="rain" SUMMY

```
537 IF W=2 THEN LET Ws="snow"
   538 PRINT AT 10,10; W$
539 PRINT AT 15,0; "LEMONDSVILLE
  WEATHER REPORT"
  540 FOR U=1 TO 100
  541 NEXT U
  551 LET AP=INT (RND*3)+1
  552 LET BP=INT ((RND*4)+1)*0.5
  553 FOR F=1 TO P
  560 CLS
  570 PRINT "L E M O
    D
  571~PRINT ,, "(twenty nine graph
 ic 7e)"
  580 PRINT ,,,,,"Player ";F
  590 PRINT ,,,, "money £", M(F)
  600 PRINT ,,,, "advertisements ?
                 EACH BOARD COSTS
 £"; AP
 610 INPUT A(F)
 660 PRINT AT 12,15,8(F)
670 PRINT AT 13,0,"
 680 LET M(F)=M(F)-(A(F)*AP)
 690 PRINT AT 9,7;M(F);"
 700 PRINT AT 15,0; "bottles ?
                      EACH BOTTLE
MAKES 10 GLASSES"
 710 PRINT "BOTTLES COST £"; BP
 720 INPUT B(F)
 770 PRINT AT 15,8;B(F)
 775 LET M(F)=M(F)-(B(F)*BP)
 790 PRINT AT 9,7;M(F);"
 800~PRINT AT 16,0;"
                     Price of lem
onade Per 9lass ? IN PENCE"
810 INPUT L(F)
 820 LET L(F)=INT ABS L(F)
830 PRINT AT 18,28,L(F),"P"
835 PRINT AT 19,0;"
840 FOR T=1 TO 100
850 NEXT T
860 NEXT F
870 IF Wa="sunny" THEN LET G=17
880 IF Wa="rain" THEN LET G=75
890 IF Wa="snow" THEN LET G=10
900 CLS
910 PRINT "L E M O N A D
E
    day ";E
```

HERE YOU ARE, KIDS! THAT'S ONE DOLLAR A GLASS, AND CHEAP AT THE PRICE!





```
920 PRINT ,, "(thirty two graphi
c 75)"
 921 PRINT AT 6,9; WS
 925 LET V=INT (RND*50)+G
 930 PRINT AT 6,9;W$
940 PRINT AT 10,0;"TODAY THERE
WERE ",V;" VISITORS"
 950 FOR U=1 TO 125
 960 NEXT U
  970 CLS
  980 DIM S(P)
990 FOR C=1 TO P
 1000 LET Q(C)=(B(C)*10)
 1010 NEXT C
 1020 FOR C=1 TO P
 1030 LET I=V*10
  1040 LET S(C)=1/L(C)
  1050 IF L(C)>30 AND L(C) =50 THE
  N LET S(C)=INT (RND*(V/(V-2)))
  1060 IF L(C)>50 THEN LET S(C)=0
  1070 LET Z=(RND*(A(C)*5))
   1080 LET S(C)=S(C)+(Z*2)
   1085 LET S(C)=INT (S(C)*0.75)
   1090 NEXT C
   1095 LET N=0
   1100 FOR 0=1 TO P
   1110 LET N=N+S(0)
   1120 NEXT 0
   1130 IF NOV THEN LET MEN-V
   1140 IF NOV THEN LET M=INT (M/P)
    1150 IF NOV THEN FOR Y=1 TO P
    1160 IF NOV THEN LET SCYDESCYD-M
    1170 IF NOV THEN NEXT Y
    1180 FOR H=1 TO P
1190 IF S(H)>Q(H) THEN LET S(H)=
     1195 IF S(H)<0 THEN LET S(H)=0
    Q(H)
     1196 IF S(H)>V THEN LET S(H)=V
     1200 NEXT H
     1210 FOR J=1 TO P
                                    N
     1220 PRINT "L E M
                             0
     1230 PRINT ,, "(twenty nine Graph
      1241 LET MY=INT (S(J)*L(J))/100
      1242 LET M(J)=M(J)+MY
      1250 PRINT ,,,,"player ";J;"
      money £";M(J);" "
1260 PRINT ,,,, "you sold ";S(J);
        glasses"
```

```
1265 PRINT ,,,, "you had enough 1 emonade for ";Q(J)
  1266 PRINT , , , "Price of lemonad e Per 9lass ";L(J); "P"
  1267 PRINT ,,,, "advertisements "
   (L)A:
  1270 PRINT
              ,,,, "Profit £"; MY-BP*
  B(J)-AP*A(J)
  1280 FOR U=1 TO 100
  1290 NEXT U
  1300 CLS
  1310 NEXT J
1320 NEXT E
  1330 GOSUB 10
  1335 PRINT AT 5,19;
  1340 FOR U=1 TO P
  1345 PRINT TAB 19: "Player ": CHR$
   (U+156)
  1350 PRINT TAB 21; "£"; M(U)
 1360 PRINT
 1365 PRINT
 1370 NEXT U
 1380 PRINT AT 3,0; "ANOTHER GAME
 (Y OR N) 7"
 1390 LET X#=INKEY#
 1400 IF X#="Y" THEN GOTO 330
 1410 IF X$="N" THEN STOP
 1420 GOTO 1390
 8998 SAVE "LEMONADe"
 8999 RUN
 9000 CLS
 9010 PRINT " L E M O N A
 D E"
9020 PRINT ,,,,,"THE OBJECT OF
THIS GAME IS TO MAKE AS MUCH M
ONEY (£) AS
                   POSSIBLE."
9025 PRINT "YOU OWN A STALL NEAR
 A BEACH IN THE RESORT OF LEMOND
SVILLE, YOU SELL LEMONADE AND TR
Y TO MAKE A PROFIT. TO START WITH
 YOU HAVE £25 TO BUY LEMONADE
FROM THE
             WHOLE-SALER."
9030 PRINT "YOU CAN ALSO ADVERTI
SE YOUR
           LEMONADE BUT IT ALL
COSTS MONEY. "
9040 PRINT AT 21,0, "PRESS ANY KE
9050 IF INKEY$="" THEN GOTO 9050
9060 GOTO 330
9500 FOR F=1 TO 5
9510 NEXT F
9520 RETURN
```

Dower Dree

THE OBJECT of Poker Dice is to throw five dice to get the best hand. Each player in turn throws all five dice by entering his name and pressing NEWLINE. He may then seek to improve his hand by entering the numbers of any dice with which he is dissatisfied. He can do so only once.

If the player does not wish to throw again, "0" will pass the play to his opponent. Poker Dice was submitted by John South of Bexhill-on-Sea, East Sussex (1K ZX-81).

10 RAND 20 LET AS="NINE TEN JACK QUEE NKING ACE 30 LET A=0 40 LET B\$="12345" 50 PRINT AT 3,A; "NAME?" 60 INPUT C\$ 70 PRINT AT 3,A;C事;" 80 GOSUB 170 90 PRINT AT 16,7; "THROW AGAIN? 100 INPUT B\$ 110 PRINT AT 16,7;" 120 IF B\$="0" THEN GOTO 140 , 130 GOSUB 170 140 LET A=A+8 150 IF A=32 THEN STOP 160 GOTO 40 170 FOR N=1 TO LEN B\$ 180 LET B=INT (RND*6+1)*5 190 PRINT AT 3+2*VAL B\$(N), A; B\$ (N); A\$(B-4 TO B) 200 NEXT N 210 RETURN 220 SAVE "PD" 230 RUN



Sinclair User. Rainbow Riot is one which particularly appealed to us, creating a symmetrical Yorkshire (16K Spectrum).

ANY pattern generator coloured pattern on your TV screen. programs are submitted to The program was submitted by G R Stevens of Oakworth, West

10 RANDOMIZE : BORDER 0: PAPER
0: INK 7: OVER 1
20 LET d=15: DIM a (d,3)
30 LET y1=84: LET x1=123: PRIN
7 AT 10,12; "THINKING"
40 REM Create basic form
50 FOR b=1 TO d
60 LET x=213-INT (RND*426): LE
7 y=175-INT (RND*350)
70 IF x1+x>213 OR y1+y>168 OR
80 LET c=6*RND*(1-2*(y1)>84 AND
x<0 OR y1<84 AND x>0)): LET c=c
2/(2+(ABS c>4)(ABS x>20 OR ABS
y>20)+2*(ABS c>4)*(ABS x>20 OR ABS
y>20)+2*(ABS c>4)*(BBS 100 NEXT b 110 REM Display pattern 120 CLS : FOR a = -1 TO 1 STEP 2: FOR c = -1 TO 1 STEP 2 130 PLOT 123,84 140 FOR b = 1 TO d 150 DRAW a * a (b, 1), c * a (b, 2), a * c * 160 150 NEXT b
170 NEXT c: NEXT a
180 REM Set colours
190 LET p=0: LET c=22895: FOR
190 LET p=0: LET c=22895: FOR
190 LET at=1NT (8*RND)
200 LET at=1NT (8*RND)
210 LET at=at+5*(at (2) +64
220 POKE c+b+a,at: POKE c+b-a,at
230 NEXT b: NEXT a a (b FOR 3



ARIABLE LISTER for the Spectrum is placed at the end of a program and after the program is run it will list all the variables, i.e., string, string array, numeric, FOR. . . TO.

Your program must be RUN first and you should make sure that the variable routine is not RUN during execution of your main program. When you want to see what variables are contained in your program, type GOTO 9990 and they will be listed.

This handy program was sent by Philip Taglione of Bradford, West Yorkshire.

9990 FOR N=PEEK 23627+256*PEEK 23628 TO PEEK 23641+256*PEEK 2364 3628 2-2
9991 IF PEEK N;224 THEN PRINT "F
OR TO NEXT "; CHR\$ (PEEK N-128):
LET N=N+18: GO TO 9999
9992 IF PEEK N;192 THEN PRINT "5
TRING RRRRY", CHR\$ (PEEK N-96); "\$
": LET N=N+2+PEEK (N+1) +256*PEEK
(N+2): GO TO 9999
9993 IF PEEK N(97 THEN PRINT "5T
RING", CHR\$ (PEEK N+32); "\$": LET
N=N+2+PEEK (N+1) +256*PEEK (N+2):
GO TO 9999 (N+1) +256 *PEEK N=N+2+PEEK (N+1) +256*PEEK (N+2):
GO TO 9999
9994 IF PEEK N(123 THEN PRINT "N
UMBER", CHR\$ (PEEK N): LET N=N+5:
GO TO 9999
9995 IF PEEK N(155 THEN PRINT "N
UMBER ARRAY", CHR\$ (PEEK N-32): L
ET N=N+2+PEEK (N+1) +256*PEEK (N+
2): GO TO 9990
9996 PRINT , "NUMBER", CHR\$ (PEEK N-64); 9997 LET N=N+1: IF PEEK N(128 TH EN_PRINT CHR\$ (PEEK N); GO TO 9 997 9998 PRINT CHR\$ (PEEK N-128) : LE N=N+5 3999 NEXT N



```
IF ZKH THEN GOTO 240
      LET HS=""
LET H=1000
                                              230 GOTO 280
240 PRINT "YOU HAVE SET A NEW L
OWEST TIME,", "PLEASE ENTER YOUR
                                                                                            9945 PRINT "(2*A)2*SPACE A) SPACE
                                                                                            5*A; SPACE; 4*A; SPACE; 2*A; SPACE; 7
                                                                                            *A;4*SPACE;A)"
9950 PRINT "(2*A;SPACE;2*A;SPACE
      GOSUB 9900
      LET Z=0
                                              NAME :-
      PRINT AT 1,20; "TIME: "
                                                250 INPUT H$
                                                                                            4*A; 5*SPACE; A; 6*SPACE; 2*A; 4*SPA
    7 PRINT AT 19.0: "low time=" | H
                                                260 PRINT H$
                                                                                            CE;2*A; SPACE;A)
        ": 日生
                                                265 LET H=Z
                                                                                            9955 PRINT "(2*A)SPACE;2*A;4*SPA
   8 PRINT AT 21,10; "counting"
                                                                                            CE; A; SPACE; 3*A; SPACE; 4*A; SPACE; A
                                                270 G0T0:300
  10 LET Y=0
15 LET X=4
                                                                                             2*SPACE; A; SPACE; 5*A SPACE; A
                                                280 PRINT "SORRY YOU FAILED TO
                                                                                            9960 PRINT "(2*A; SPACE; 5*A; 3*SPA
                                              BEAT", H$
  20 PRINT AT X, Y; "(inverse ASTE
                                                                                            CE; 3%A; 6%SPACE; 2%A; SPACE; A; 6%SPA
                                                300 PRINT , , , "ANOTHER GO (Y/N)
RISK)"
  30 LET Z=Z+1
35 PRINT AT 1,27,Z
40 IF INKEY$="" THEN GOTO 30
50 PRINT AT X,Y,"(inverse SPAC
                                                                                            9965 PRINT "(A:8*SPACE:5*A:SPACE
                                                320 IF Q#="Y" THEN GOTO 4
                                                                                            :4*A:6*SPACE:4*A:SPACE:2*A)"
9970~PRINT "(A:SPACE:6*A:SPACE:2
                                                350 CLS
360 PRINT "I AM SORRY IT WAS IM
                                                                                            #R: 4#SPACE: 9#A; SPACE: 2#A; 3#SPACE
                                                                                            (CRR)
  60 LET X=X+(INKEY$="6")-(INKEY
                                                                                            9975 PRINT "(A: SPACE: 3*A: 4*SPACE
                                              POSSIBLE!
$="7"
                                               370 GOTO 300
                                                                                            2#8: SPACE: A: SPACE: 4#8: 10#SPACE
  70 LET Y=Y+(INKEY$="8")-(INKEY
                                                                                            A SPACE : 2 KA >"
                                              9900 CLS
                                                                                            9980 PRINT "(A:5*SPACE;5*A) SPACE
生="5"
                                             9905
                                                   PRINT "MAD MAZE"
  80 PRINT AT X, Y,
                                                                                            A: 6*SPACE: 4*A: SPACE: 3*A: SPACE: A
                                                   PRINT
                                             9910
  90 LET A=PEEK (PEEK 16398+256*
                                             9915 PRINT
                                                                                             SPACE: 2%AO"
                                                                                           9985 PRINT "(5*A)7*SPACE 6*A)SPA
CE:A:8*SPACE;A;SPACE;2*A)"
9990 PRINT "(11*A)10*SPACE;6*A;4
                                             9920 PRINT "(32%A)"
9925 PRINT "(6%SPACE;5%A;4%SPACE
      16399)
 100 IF A<>128 THEN GOTO 160
                                              6*A,9*SPACE;2*A)"
9930 PRINT "(3*A;SPACE;A;7*SPACE
  110 PRINT AT X,Y,"Cinverse ASTE
                                                                                           #SPACE inverse 0
                                             9930 PRINT
 120 IF INKEYS="I" THEN GOTO 350
                                             2*A,3*SPACE,4*A,SPACE,2*A,SPACE
                                                                                           9991 PRINT "(32*A)"
 130 GOTO 20
160 IF A=8 THEN GOTO 10
                                                                                           9992 FOR N=1 TO 20
9993 LET J=INT (RND+30 >+1
9994 LET K=INT (RND+12>+5
                                             )2*A)SPACE;A;2*SPACE;A)"
9935 PRINT "(3*A;3*SPACE;3*A;SPA
                                             CE;6*A;SPACE;4*A;SPACE;2*A;SPACE;2*A;SPACE;2*A;SPACE;2*A;SPACE;A)"
9940 PRINT "(3*A;SPACE;A;SPACE;3
 170 PRINT AT 21,10, "you escaped
                                                                                            2995 PRINT AT K. J. "(A)"
 200 PAUSE 4E4
                                             *A: 16*SPACE: 2*A: SPACE: 2*A: SPACE
                                                                                           9999 RETURN
```

DATA FILE for the 16K Spectrum will store 800 items with a maximum of 32 characters each. When all the data has been entered, a menu will appear on the screen, giving you several choices of action.

You can add another item to the file, search for items already entered, save, load or list a file. To change the complete file you would enter option 7.

The program was sent by P C Forrister of Romford, Essex. He suggests that it may help beginners if they worked through the listing to see how it works. We agree that is a good idea.

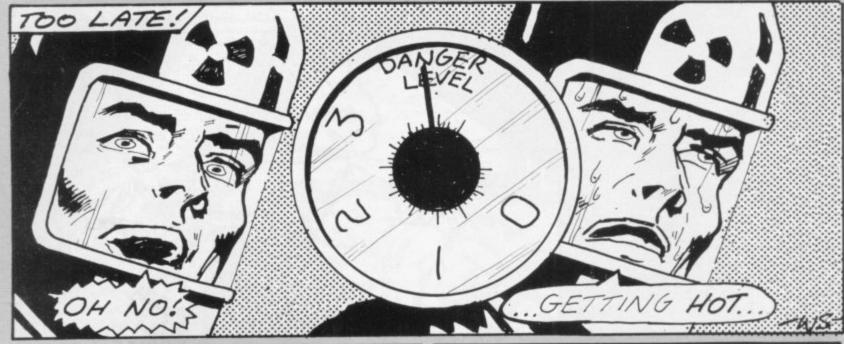


1 REM DATA STORING & SORTING PROGRAM/P.C.FORRISTER #22-11-62#
5 POKE 23609,200: BORDER 0: I
NK 7: PAPER 0: DIM A#(600,32): L
ET E=1
6 REM 800 FILES/32 CMARACTERS
LOWER THE 600 IF USING 15%
9 REM ENTER DATA
10 PRINT FLASH 1: INK 5: PAPER 1: AT 0.0: "ENTER DATA FILE NO"; E
1:AT 0.0: "IN 4:AT 19.
0: A\$(E) = "E1
0 TO 100 PRINT PAPER 0: INK 4:AT 19.
0: A\$(E) = "E1
100 CLS PRINT FLASH 1: INK 2: PAPER 7:AT 0.6: "STAND EY-50RTIN 100 CLS PRINT FLASH 1: INK 2: PAPER 7:AT 0.6: "STAND EY-50RTIN 100 CLS PRINT FLASH 1: INK 2: PAPER 4:AT 0.5
1:0 FOR B=1 TO E-1: FOR C=B+1 T
0 E-1
1:0 FOR B=1 TO E-1: FOR G=B+1 T
0 E-1
1:0 FOR B=1 TO E-1: FOR G=B+1 T
0 E-1
1:0 FOR B=1 TO E-1: FOR G=B+1 T
0 E-1
1:0 PRINT INK 0: PAPER 4:AT 0.5
1:0 PRINT INK 0: PAPER 4:AT 0.5
1:0 PRINT INK 2: PAPER 6:AT 0.0
1:0: BEEP .1,H: NEXT H: LET E=E
-1: CLS
2:0 PRINT INK 2: PAPER 6:AT 0.0
2:1 TO END
DANOTHER FILE" "3 TO SEARCH P

"5 TO LOAD FILES" TO CHANGE A
1-1 TO END
DANOTHER FILE" "3 TO SEARCH P

"5 TO LOAD FILES" THEN GD TO 220
225 IF INKEY\$="" THEN GD TO 220
225 IF INKEY\$="" THEN GD TO 220
225 IF INKEY\$="" THEN GD TO 20
235 IF INKEY\$="" THEN GD TO 20
235 IF INKEY\$="" THEN GD TO 20
240 IF INKEY\$="" THEN GD TO 20

245 IF INKEY\$="5" THEN GO TO 30
250 IF INKEY\$="6" THEN GO TO 40
255 IF INKEY\$="7" THEN GO TO 50
260 CLS: GD TO 210
299 REM SEARCH
1000 CLS: PRINT FLASH 1; INK 7;
PAPER 3; AT 10,0; "ENTER FILE TO
BE SEARCHED FOR": LET F=E
1010 INPUT Z\$
1020 IF Z\$=A\$(F)(TO LEN Z\$) THE
N CLS: PRINT FLASH 1; INK 1; PA
PER 6; AT 10,10; "FILE FOUND" '; A\$
(F): GO TO 210
1040 CLS: PRINT FLASH 1; INK 2;
PAPER 7; AT 10,7; "FILE NOT IN NE
HORY": GO TO 210
1040 CLS: PRINT FLASH 1; INK 2;
PAPER 7; AT 10,7; "FILE NOT IN NE
HORY": GO TO 210
1999 REM SAUE DATA A\$ ON TAPE 3
TIMES
2000 FOR U=0 TO 2: CLS: PRINT FLASH 1; INK 6;
PAPER 1; "SAUE "DATA" DATA
A\$(): NEXT U
2010 CLS: PRINT FLASH 1; INK 6;
PAPER 1; "SAUE COMPLETE": GO TO
210
2999 REM LOAD DATA A\$ FROM TAPE
3000 CLEAR: PRINT FLASH 1; INK
6; PAPER 6; AT 0,10; "LOADING DATA
A\$": LOAD "DATA AB FROM TAPE
3000 CLEAR: PRINT FLASH 1; INK
0; PAPER 6; AT 0,10; "LOADING DATA
A\$": LOAD "DATA AB FROM TAPE
4000 CLEAR: PRINT FLASH 1; INK
4": LOAD "DATA "DATA R\$()
2999 REM NEVER PRESS (N) WHEN AS
KED SCROLL?
4010 IF A\$(E) =" THEN PRINT FLASH
4000 LET E=1
4010 IF A\$(E) =" THEN PRINT FLASH
5000 CLS: PRINT FLASH 1; INK 1;
PAPER 7; AT 10,0; "ENTER FILE NUM
BER TO BE CHANGED": INPUT X: CLS
7; AT 10,0; "ENTER FILE NUM
BER TO BE CHANGED": INPUT X: CLS
7; AT 10,0; "ENTER FILE NUM
BER TO BE CHANGED": INPUT X: CLS
7; AT 10,0; "ENTERS O TO CHANGE
ANOTHER FILE"
5010 IF INKEY\$="" THEN GO TO 50
5020 IF INKEY\$="" THEN GO TO 50
5030 GO TO 100



```
2 GOTO 3000
  5 LET MOVES=0
  6 FAST
  7 LET DL=8
 10 GOSUB 1000
 15 SLOW
 17 PRINT AT 21,23; "moves"
 19 PRINT AT 21,29; MOVES
 20 PRINT AT 21,4; "FROM ";
 30 INPUT IS
 40 PRINT I$;
50 PRINT " TO ";
  60 INPUT US
 70 PRINT US
 80 LET MOVES=MOVES+1
 90 PRINT AT 21,29; MOVES
 100 LET I=CODE I$-28
110 LET U=CODE U$-28
 112 REM check entry is valid
 115 IF U=I-5 OR U=I-1 OR U=I+1
OR U≕I+5 THEN GOTO 120
117 GOTO 500
 120 LET Is=As(I)
 125 IF I$(5)=C$(6) THEN GOTO 50
130 LET U$=A$(U)
 135 IF U$(5)<>C$(6) THEN GOTO 5
 140 LET X=VAL I$(1 TO 2)
 150 LET Y=VAL I$(3 TO 4)
 160 PRINT AT X, Y; C$(6)
 170 LET X=VAL Us(1 TO 2)
 180 LET Y=VAL U$(3 TO 4)
 190 PRINT AT X, Y; I$(5)
 200 LET A$(U,5)=A$(I,5)
 205 LET A$(1,5)=C$(6)
 210 GOSUB 2000
 220 GOTO 17
 500 PRINT AT 21,0; "invalid entr
ydpress any key
 510 PAUSE 4E4
 520 PRINT AT 21,0;"
 522 LET MOVES=MOVES-1
 530 GOTO 17
 999 REM set up board
 1000 LET F$="(9naPhic 8;3*A;3*SP
 ACE;3*A;3*SPACE;3*A;3*SPACE;3*A;
 3*SPACE:3*A:9raphic 5)"
 1010 LET Gs="(9raPhic 8;3*SPACE;
 3*inverse SPACE;3*SPACE;3*invers
```

```
e SPACE:3*SPACE:3*inverse SPACE:
3*SPACE;3*inverse SPACE;3*SPACE;
graphic 5)"
1020 FOR F=1 TO 18 STEP 6
1030 PRINT F$,F$,F$
1040 PRINT G$, G$, G$
1050 NEXT F
1060 PRINT F#, F#, F#
1065 LET Z=1
1070 FOR F=0 TO 19 STEP 6
1080 FOR N=1 TO 26 STEP 6
1090 PRINT AT F,N;CHR$ (Z+156)
1100 LET Z=Z+1
1110 NEXT N
1120 NEXT F
1499 REM Place rods
1500 DIM A$(20,5)
1505 DIM C$(6)
1510 LET C$(1)="Z"
1520 LET C#(2)="Y"
1530 LET C#(3)="X"
1540 LET C#(4)="W"
1550 LET C$(5)="(inverse ASTERIS
K5"
1560 LET C$(6)=" "
1565 LET C=1
1569 REM Position and rods set
1570 FOR F=2 TO 18
1580 LET 8$(F,5)=C$(C)
1585 LET C=C+1
1590 IF C<1 OR C>4 THEN LET C=1
1600 NEXT F
1610 LET A$(1,5)=C$(6)
1615 LET A$(19,5)=C$(6)
1620 LET A$(20,5)=C$(5)
1625 LET M=1
1630 FOR F=1 TO 19 STEP 6
1640 FOR N=2 TO 26 STEP 6
1650 PRINT AT F,N;A$(M,5)
1660 LET M=M+1
1670 NEXT N
1680 NEXT F
1700 LET L=1
1710 FOR F=1 TO 20 STEP 6
1720 FOR N=2 TO 26 STEP 6
1730 LET A$(L,1 TO 2)=STR$ F
1740 LET A$(L,3 TO 4)=STR$ N
1750 LET L=L+1
1760 NEXT N
1770 NEXT F
1780 LET Ds=" **DANGER LEVEL**"
1785 LET L$=" 3
                    2
                         1
```



NUCLEAR WASTE

JOSEPH DONNELLY of Dublin has sent a fascinating game which involves moving a spent fuel rod from a nuclear reactor. The display shows the reactor from above, with different types of fuel rod arranged in a chessboard pattern.

The active rods must be manoeuvred so as to allow the passage of the spent rod, but active rods of the same type may not be placed too close without the imminent risk of contamination. A guage at the side of the screen shows

the danger level you have reached.

The game as listed is extremely difficult but could be made easier by omitting lines 115 and 117, which would allow diagonal moves, or by dropping line 210, which would mean that there was no restriction on the proximity of active rods.

In our listing, lower-case letters signify inverse video except when inside brackets, in which case they are graphic instructions. In line 1000, all As are graphic As (16K Spectrum).

1790 FOR L=1 TO LEN D\$ 1800 PRINT AT L, 29; D\$(L); " "; L\$(L> 1810 NEXT L 1820 RETURN 1999 REM 9oto check boxes 2000 IF U=7 OR U=8 OR U=9 OR U=1 2 OR U=13 OR U=14 THEN GOTO 2200 2010 IF U=17 OR U=18 OR U=19 THE N GOTO 2210 2020 IF U=2 OR U=3 OR U=4 THEN G OTO 2220 2030 IF U=6 OR U=11 THEN GOTO 22 2040 IF U=10 OR U=15 THEN GOTO 2 249 2050 IF U=1 THEN GOTO 2250 2060 IF U=5 THEN GOTO 2260 2070 IF U=17 THEN GOTO 2270 2080 IF U=20 THEN GOTO 2280 2090 RETURN 2199 REM check boxes left right up and down 2200 IF As(U,5)=As(U-5,5) OR As(U,5)=A\$(U-1,5) OR A\$(U,5)=A\$(U+1 ,5) OR A\$(U,5)=A\$(U+5,5) THEN GO TO 2500 2205 RETURN 2210 IF As(U,5)=As(U-5,5) OR As(U,5)=As(U-1,5) OR As(U,5)=As(U+1 ,5) THEN GOTO 2500 2215 RETURN 2220 IF As(U,5)=As(U-1,5) OR As(U,5)=A\$(U+1,5) OR A\$(U,5)=A\$(U+5 ,5) THEN GOTO 2500 2225 RETURN 2230 IF A\$(U,5)=A\$(U-5,5) OR A\$(

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VIC 20 ADD-ONS
SPECTRUM JOY STICK CONTROLLERS
PRODUCTS ARE STOCKED AND USUALLY
DESPATCHED WITHIN 2-4 days.

2275 RETURN 2280 IF A\$(U,5)=A\$(U-5) OR A\$(U, 5)=A\$(U-1,5) THEN GOTO 2500 2285 RETURN 2499 REM Plot danger level 2500 FOR F=DL TO DL+10 2505 IF F>40 THEN GOTO 2530 2510 PLOT 60, F 2515 NEXT 2520 LET DL=DL+10 2525 IF DL<39 THEN RETURN 2530 CLS 2540 PRINT AT 11,2; "YOU TOOK ";M OVES;" MOVES AND DIED" 2550 PRINT AT 13,6; "PRESS ANY KE 2560 PAUSE 4E4 2565 CLS 2570 GOTO 5 2999 REM instructions 3000~PRINT AT 0,6;"NUCLEAR WASTE 3010 PRINT AT 2,0; "THE OBJECT IS TO TRY AND MOVE THE (inverse ASTERISK) AT BOX K TO THE EMPTY BOX AT 1. YOU MAY MOVE ONE BOX U 3020 PRINT AT 5,0; "DOWN LEFT OR RIGHT BUT NOT MORE THEN ONE BOX OR DIAGONAL." 3030 PRINT AT 8,0; "THE BLACK BOX ES ARE TO KEEP RODSOF THE SAME T YPE FROM REACTING WITH EACH OTH ER. WHEN MOVING"

> 318 Kempshott Lane, Basingstoke, Hants RG22 5LT

3040 PRINT AT 11,0; "TRY TO KEEP

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FAST LOADER also resides above RAMTOP and can be used in front of any fast-saved program to enable it to be fast-loaded. This removes the need to load the monitor for each load.

205 LET A\$(I,5)=C\$(6)
210 GOSUB 2000
220 GOTO 17
500 PRINT AT 21,0; "invalid entr
ydpress any key "
510 PAUSE 4E4
520 PRINT AT 21,0; "

522 LET MOVES=MOVES-1
530 GOTO 17
999 REM set up board
1000 LET F\$="(9raphic 8;3*A;3*SPACE;3*A;3*SPACE;3*A;9raphic 5)"
1010 LET G\$="(9raphic 8;3*SPACE;3*A;3*SPACE;3*A;9raphic 5)"

1630 PORT - 10 26 STEP 6
1650 PRINT AT F,N;A\$(M,5)
1660 LET M=M+1
1670 NEXT N
1680 NEXT F
1700 LET L=1
1710 FOR F=1 TO 20 STEP 6
1720 FOR N=2 TO 26 STEP 6
1730 LET A\$(L,1 TO 2)=STR\$ F
1740 LET A\$(L,1 TO 2)=STR\$ N
1750 LET L=L+1
1760 NEXT N
1770 NEXT F
1780 LET D\$=" **DANGER LEVEL**"
1785 LET L\$=" 3 2 1 0"

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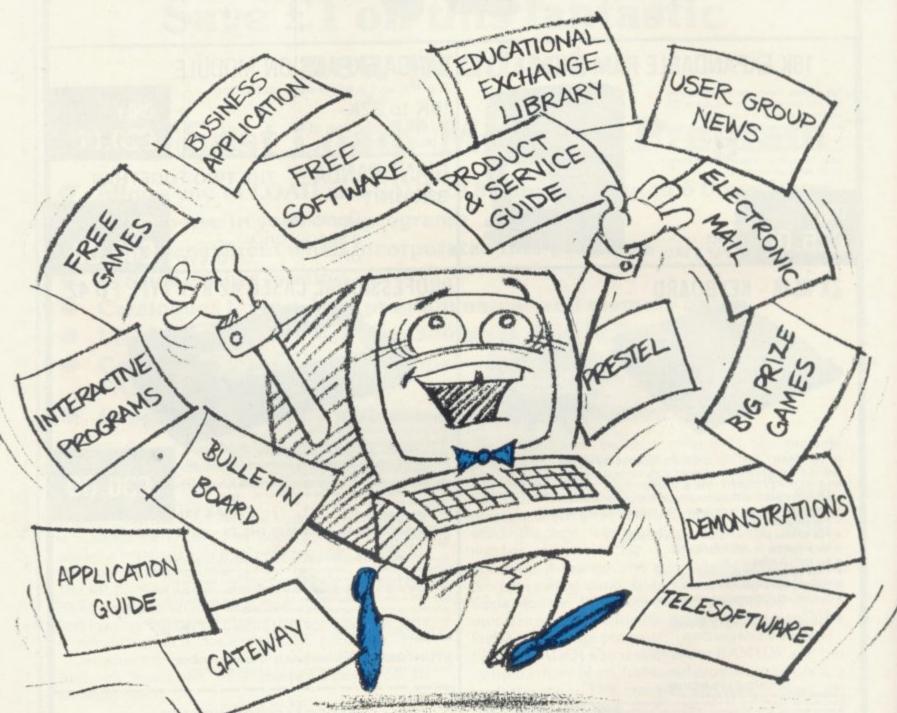
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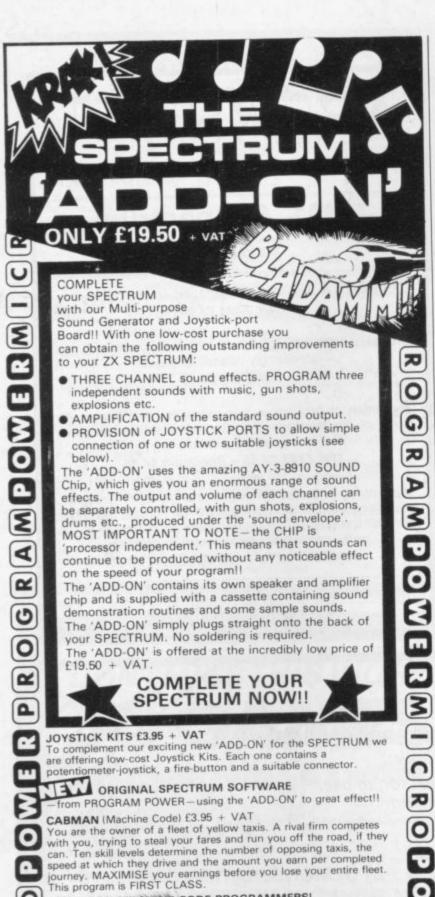
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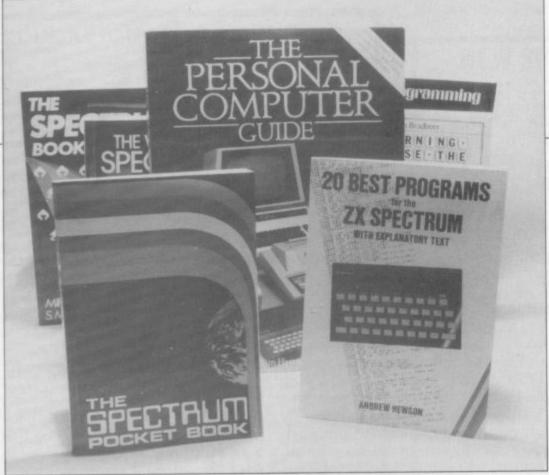


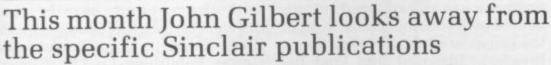
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More information in general books

books, not written specifi- computer owner can join. Sinclair for machines, are so often useful to Sinclair users or other prospective computer owners. The Personal Computer Guide, by Tim Hartnell, provides information on most of the computers available. The guide is split into several sections, with a buyers' guide as an appendix to the computer reviews section.

The computer reviews contain short sections on the general appearance of each computer, approximate price, best and worst features. Hartnell draws some definite conclusions on the performance of each machine.

The guide includes a chapter on the history of computing from the days of Babbage to the present microcomputer boom. There is also a section on computer programming and how to use Basic.

One novel feature is that it has advertisements for a variety of machines, software and add-ons. The book also includes a list of clubs

ANY GENERAL computer and local organisations which the

The Personal Computer Guide contains everything a first-time buyer or beginner to computing might need. It is excellent value at £5.95 and can be obtained from Virgin Books.

Computing is Easy, by David Parker and Martin Hann, is an easy introduction to computing. There are many simple programs ready to be typed-in and it is ideal for the



At the end of the book various topics are suggested to the programmer, such as currency conversion and composing tunes. The authors leave the programming of those tasks to the user. It is published by Newnes Technical Books and costs £4.95.

The Working Spectrum, by David Lawrence, is the handiest book about the Sinclair computer to appear so far. It charts the design of a series of routines, such as a filing system, an accounting program, a banking program and a graphic designer.

Each of the programs includes a discussion on how it works and the various techniques used, such as sorting and searching in the filing program. Each of the routines has been designed so that they can be used separately or in your own programs.

The book covers business uses, education and, of course, games. On the cover it indicates that it is volume one and I look forward to seeing the rest of the series. The Working Spectrum costs £5.95 and is published by Sunshine Books.

The Spectrum Pocket Book is another new book which can be recommended. It is more general than the previous book in the series. which was for the ZX-81, and includes a large section on machine code, which shows, among other things, how to print on to the screen using a machine code program and the Spectrum ROM.

There is also a full assembler program, disassembler and machine

Spectrum Pocket Book can be recommended. It is ideal for the first-time users and one with experience'

young user. A series of cartoons illustrates the book. They explain the concepts and, on occasions, are very amusing.

It has a chapter of debugging exercises, so that the beginner can become accustomed to the types of problem which occur during programming.

code monitor. It provides much useful information on the internal workings of the machine.

It is ideal both for first-time users and a user who has had some previous experience. It costs £4.95 and can be obtained from Phipps Associates.

continued on page 84



continued from page 83

Andrew Hewson has launched into the Spectrum market with 20 Best Programs for the ZX Spectrum. The book includes mathematical, graphics and games programs, with information on how they work and how they were written.

It is excellent value at £5.95 and illustrates many programming techniques, including data filing, sorting and binary search.

Easy Programming for the ZX Spectrum, by Ian Stewart and Robin Jones, is another introductory text which can be recommended for the beginner. In particular, there are several good chapters on graphics which show how to paint outlined shapes with colour.

The authors explain how to debug programs and make them more efficient, an important but little-stressed area in most books about Sinclair machines. It is from Shiva Publishing and costs £5.95.



The Spectrum Book of Games, by Mike James, S M Gee and Kay Ewbank, is ideal for all those who just want to enjoy the machine by playing games. It contains game listings for Space Invaders, squash rackets and even nine-hole golf. The programs are all explained but this kind of book is nothing new. Most of the games are based around Space Invaders, Breakout and Find the Treasure.

It is a good start for a beginner who wants to write or just type-in games programs. It is published by Granada Publishing, PO Box 9, St Albans, Hertfordshire AL2 2NF and costs £5.95.

Robin Bradbeer edited the Spectrum handbook and can be regarded as an expert on the machine. His new book, Learning to use the ZX Spectrum Computer, is an easy introduction to Spectrum Basic and some of the simple ways in which the computer can be used.

It provides a fine foundation for beginners but users who have some computing knowledge already will find little of interest in it. The book includes two appendices. The first lists additional reading material in the form of books and magazines and the second details the differences between Spectrum and ZX-81 Basic. It is available from Gower Publishing Co Ltd, Gower House, Croft Road, Aldershot, Hampshire GU11 3HR and costs £4.95.

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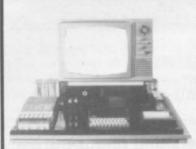
This is not a game - it is a serious scientific program utilising psychological studies which attempt to give an objective measure of personality and provide a comparison to that of the population as a whole. It provides you with a personality test, evaluates it, and allows you to see your own scores marked against those of the general population with extensive use of graphs and bar chart displays. You may run the test to find out how others see you, and compare these results with your own. You may also try the test on your friends, and find out how they view themselves.

The program comes complete with full documentation, including use of the test, the personality traits examined, how the questions are constructed to determine these traits, and a general discussion of questionnaires and their use in psychological studies.

This extensive program is now available on the Sinclair Spectrum 16K by being programmed in three sections each being auto-run, and is available for direct run on the ZX 81. Versions are also available for the T199/4 with the Research 380Z and 480Z (RML Extended Basic) the BBC Model B and the Acorn Atom available in March.

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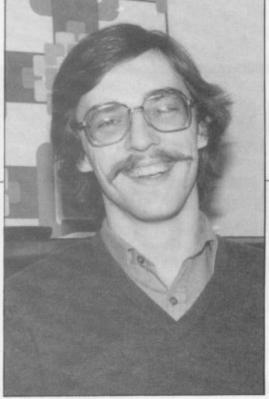
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David Janda

T LAST we can announce the winner of our September competition for the Data-Assette ZX-99. We asked for a program which would fill the screen using only the 1K memory of the basic ZX-81. We also asked that the program should be elegant and flexible.

We had a tremendous response, with no-one being deterred by the misprint which requested a program producing 748 characters instead of the 768 which would be needed to fill the screen. It was thought that a full screen might be impossible to achieve but we did not allow for the ingenuity of our readers. Many achieved the full screen but the winner beat that, with 816 characters being displayed.

David Janda, 21, an unemployed programmer of Durnsford Road, New Southgate, London N11, achieved it by increasing the number of characters in each line from 32 to 34 and using only nine bytes of machine code. His program is listed in figure one, completely in direct pokes. Using any kind of loader is not impossible but it is no



Tony Poulter reports on our last contest

Screen expanded in only nine bytes

easier to type-in. The nine bytes start NEWLINE will get you out of it at 17325, as he says the program will not work anywhere else in the memory. When run, the screen is filled, mostly by inverse Hs and the machine is in a very odd state with the keyboard dead.

What do the nine bytes do? At the start, register A contains the remainder after dividing 17325 by 256, which is 173. Put 173 in 16418 and you enable 24 lines. Put 173 in 16441 and you enable 34 columns.

GOSUB to ROM address 16 and you print 173, which is inverse H, jump back, to the second 50 in fact, until the machine gives up.

Janda says that he entered the competition as part of a challenge from a friend.

Reading a great deal of interesting material, I felt that many were speaking in a new language language of the readable REM. For perfection, that needs to have no spaces or question marks in it.

Figure two, a combination of two entries, is an example of how the method achieves a full normal screen of 768 characters. It has two question marks in its 13 bytes, which are then supplied by the two POKEs, and no spaces. That creates 768 of high resolution. Press NEW quickly.

To print normally have Y2 instead of Y0 and you will find you are using ROM address 2923, a string print routine which expects a start address in the DE, the ZZ and a length in BC, accidentally containing some larger number. This produces a printout of the ROM, or RAM, as readable REM.

Another way the method was used is shown in figure three which has no question marks in its 39 bytes and one space at the fifth byte. Bytes 4 to 8 are how the extra length is achieved. Error 4 is given when the stack pointer is within 36 bytes of STKEND. By increasing the stack pointer by 1K, 31 bytes are gained and nothing else is affected.

You must switch the machine off and on between examples.

The program allows you to type-in the 768 display, accepting letters, figures and punctuation, which it displays inverse. It is also possible to type STOP to return to Basic.

Useful numbers are 699, the ROM keyboard read, which sets H and L, and 1981, the ROM keyboard decode, which expects information in BC and puts in HL, the address at which the character is stored.

Figure 1

- 0 POKE 17325,50 0 POKE 17326,34
- 0 POKE 17327,64
- 17328,50 0 POKE
- 0 POKE 17329,57
- 0 POKE 17330,64
- 0 POKE 17331,215
- POKE 17332,24
- 0 POKE 17333,-6
- Ø PRINT USR 17325

1 REM M6RNDY0 GOSUB ?)ZZLN ?"

- 0 POKE 16520,71
- @ POKE 16525,107
- PRINT USR 16514

Figure 3

REM M6RND5space 9raphic fou rT RAND LNinverse v 9raphic twoG 4 IF LN inverse v graphic two FA ST AT GC SAVE LN inverse x 9raph ic e inverse j inverse i RETURN STOP COS RETURN RNDK NEW PLOT in vense spaceNOT / LPRINT

- 2 GOTO USR 16514
- 0 RUN



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Andrew Hewson looks at difficulties concerning the PRINT command

Finding the answer to screen filling

OST OF the questions this month are concerned with PRINTing problems. The first is from Derek Barry of Witney, who asks: It can be very annoying when the screen fills on the ZX-81 and the program grinds to a halt with Report Code 5. Is there a way to scroll the display automatically?

The column and line numbers of the PRINT position are held in the system variables at 16441 and 16442 respectively. For some eccentric reason the line numbers are counted from the bottom of the screen upwards, starting at one, not from the top downwards starting at zero as with the PRINT AT command. The bottom two lines normally are reserved for INPUT and error messages, although a method for PRINTing on these lines is given later in this column; hence if 16442 contains 2 or less the program will fail at the next PRINT

To SCROLL the screen automatically include the following line before each relevant PRINT statement: IF PEEK 16442 < 3 THEN SCROLL

The SPECTRUM has a separate system variable at 23692 to keep track of the number of lines which may be PRINTed before the next scroll?

query should be issued. To prevent the query appearing, POKE a number larger than 1 — and less than 256 - into 23692 as often as

Daniel Guillemyn of Toulouse, France asks: Is it possible to set the colour of a pixel in the Sprectrum display independently of all the others?

No. There are $256 \times 192 = 49,152$ pixels in the Spectrum display and 49,152/8 = 6,144 bytes are used

simply to determine which of the pixels are illuminated and which are not. If each pixel could take any one of, say, eight colours, a further 3 \times 6,192 = 18,576 bytes would be required, to say nothing of the extra hardware required.

All current colour computers make some compromise on the colour detail they support. In the Spectrum each eight by eight group of pixels which form a character position is assigned an INK, or foreground, colour and a PAPER, or background, colour. Colours can be assigned to each character position independently but changing the INK colour, for example, of one pixel in a character position also changes the INK colour of the other 63 pixels. There are $32 \times 24 = 768$ character positions in the display and their



Andrew Hewson

long line is being INPUT or EDITed.

To PRINT in the lower part of the screen, POKE the value 0 into DF-SZ, as in this example:

10 POKE 16418.0 20 PRINT AT 23,8; "THE BOTTOM LINE" 30 PAUSE 32768

The PAUSE command is not necessary generally but I have included it in this example to prevent the STOP message being PRINTed and thereby obliterating the output from line 20.

The Spectrum stores the value of DF SZ at 23659 and the technique for PRINTing on the bottom of the screen is similar except that the machine will crash if PRINT AT is used on line 23 or if the value in 23659 is not POKEd back to 2 after



current colours are held in the attributes file which is held at locations 22528 to 23295.

Is there a way of printing on the bottom two lines of the display? asks Gordon Charlesworth of Macclesfield, Cheshire. On the ZX-81 the DF-SZ system variable at 16418 is used to store the current number of lines, including one blank line, in the lower part of the screen. DF-SZ is normally set to 2 and is increased only when a particularly

use. The following routine PRINTs a number on all 24 lines of the display:

10 POKE 23659,0

20 FOR i = 0 to 23

30 PRINT i

40 NEXT i

50 POKE 23659,2

60 PAUSE 0

The machine will crash if the routine is run with line 50 omitted or if line 30 is replaced by: 30 PRINT AT i, i; i

continued on page 90



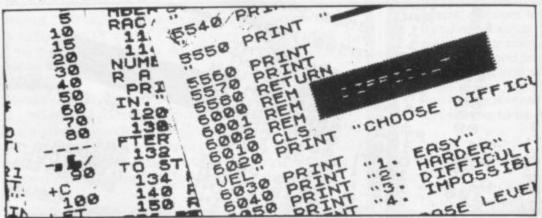
continued from page 89

Several people have asked about the machine code PRINT AT facility for the Spectrum described by Andrew Pennell in the October issue of Sinclair User. Andrew Beale of Tolworth, for example, writes: I cannot find a reference in Appendix A of the manual to the RST 10 command described. Please tell me the exact decimal codes to, say, PRINT AT 0,0; "A" in machine code.

It is conventional to count in hexadecimal when referring to machine code routines, thus the 10 in RST 10 is in hexadecimal, i.e., 16 in decimal. Appendix A of the Spectrum manual uses the decimal system so that the RST 10 instruction used by Pennell refers to the RST 16 instructions about one-third of the way down column four on page 186 of the manual. The decimal code is 215. The following routine is the machine code equivalent of

PRINT AT 0.0:"A"

T TITLE TAX	0,0, 11
LD A,16	62 22
RST 10	215
LDA,0	620
RST 10	215
LDA,0	630



DOT 10	215
RST 10	215
LDA,41	6265
RST 10	215
RET	201

The right-hand column lists the decimal codes. The routine can be loaded into the graphics area of the 16K Spectrum as follows:

10 DATA 62, 22, 215, 62, 0, 215, 62, 0, 215, 62, 65, 215, 201

20 FOR i = 32600 TO 32612

30 READ a 40 POKE i, a 100 PRINT 110 RAND USR 32600 To alter the Y and X

function, for example:

50 NEXT i

To alter the Y and X PRINT AT coordinates, change the fifth and eight numbers in the DATA statement and to PRINT a different character change the eleventh number to the appropriate character code.

To call the routine, initialise the

PRINT position and then use the USR

Finally, Philip Pfeil of Havant, Hampshire, asks a perennial question. He writes: At the risk of admission to the funny farm, can you please tell me how to SAVE and LOAD programs into my ZX-81?

It is a sad fact that many people have difficulty in SAVEing and LOADing. The problem is particularly acute for the newcomer to the ZX-81 who has not had the experience to diagnose a fault. None of the advice I can offer is original; most of it has been published several times but I repeat it because about five percent of the letters I receive are from people who cannot LOAD and/or SAVE.

When SAVEing a program, make sure that the cassette and the player are free of dust, because even a

momentary interruption in the recorded information will make reLOADing impossible. Connect one lead only — the SAVE lead in this case — between the computer and the cassette player, otherwise a low frequency hum may be recorded on the tape, smothering the signal from the ZX-81.

A television set generates a strong oscillating electric field and the result can be a high-pitched noise recorded on the cassette. The



cure is to keep the cassette player at least three feet from the TV set. Always SAVE at least two copies, thereby increasing the probability of obtaining an adequate copy.

Some people suggest that batteries should be used to power the cassette player so that there is no possibility of picking-up interference through the mains supply. I have always found that batteries are more trouble than they are worth; even the high-power versions drain very rapidly, causing the cassette player to run too slowly.

Similar precautions should be taken when LOADing a tape but you must also adjust the volume on the cassette recorder to the required level. If the sound is not loud enough to make you wince when the tape is played with the EAR lead disconnected from the recorder you are unlikely to be able to LOAD the program satisfactorily.

When LOADing, the TV display should show fluctuating broad black and white bands like a zebra crossing. If the volume is low the bands will not appear or the black parts will be interspersed with white. If the volume is too high the screen will appear almost entirely black. Adjust the volume by making a dummy run through the tape.

If you find SAVEing and/or LOADing is impossible, your next step should be to isolate the problem as it could be the tape, the cassette player or the ZX-81. The easiest way to do so is to contact a fellow ZX-81 owner and swap your items with his until you are certain which unit is at fault. Even if the other person is a complete stranger, you will no doubt have an enjoyable time swapping tips with him which may be some consolation if the worst comes to the worst and you have to return your computer for exchange or repair.

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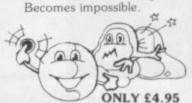
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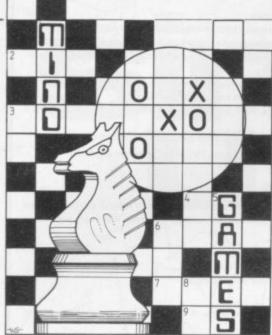
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HERE was a fantastic response to my first puzzle. Many correct answers and only a few incorrect ones. I will include the best program with respect to size, technique, and speed. It was sent by W E Thomson, of Aldeburgh, Suffolk. While most took six to 10 minutes, this took only one minute five seconds.

There was a mistake on my part to the solution given last month; it should be 1,548,137. To use the program it should be typed into a ZX-81 but it should work on a Spectrum. When it is run the highest number to test is required; in the Philip Joy sorts through his postbag and finds a chess cassette which speaks

Good response to first puzzle

120 LET P\$(I)="X" 130 NEXT I

140 FOR M = M + 1 TO L

150 IF P\$(M)="X" THEN NEXT M 160 IF M = L + 1 THEN GOTO 220

170 LET N = M + M + 1

180 LET T = T + 1

190 LET S = S + N

200 IF N< Q THEN GOTO 110

210 NEXT M

220 PRINT "NUMBER OF PRIME NUMBERS = ":T,"SUM OF PRIMES = = ";S

230 SLOW

There was a program sent by B C Woodrow of Dorset. He says he has had his ZX-81 only since September and while not the best version, it was very good.

The Quicksilva 48K Spectrum chess program has been sent. It seems to have some space age theme

program. Studying a program of 9K machine code is not a very easy task. It is a very skilled job to look objectively at the skill sector of a chess game, let alone unravel the machine code as well.

Recording results about the look ahead and speed is much easier. I must agree that very few people could look at so much machine code and decide how a game will play.

Gross suggests mate in so many moves type of problem, so that the program has to look ahead; the better programs will find mate easier and earlier. That is a very good way of testing programs and anyone can create a mate problem. The time it takes to work out the problem, if it does, is noted. That will give the most accurate check on chess games the average person can

It may give you some insight into how to beat your version of chess in the end-game. If you make up the problems, your own game will be improved. Different versions will act differently, so you can try it on all your versions. If you discover anything interesting, send the

For this month's puzzle I have devised a cunning maths problem: 1.2.3.4.5.6.7 = 165/6 or 16.8333333

The dots are either +,-,* or /, but which is which? The idea is to get your ZX-81 or Spectrum to find what each individual dot is. The program must work out the answer. Send the answers and program, again no prizes, but the best one will be published in a future issue. Remember that 1+2*4 is 9 and not 12, i.e., multiplication first.

'A very good way of testing programs is to find in how many moves mate can be achieved. It is easy to create a mate problem and gives the most accurate check'

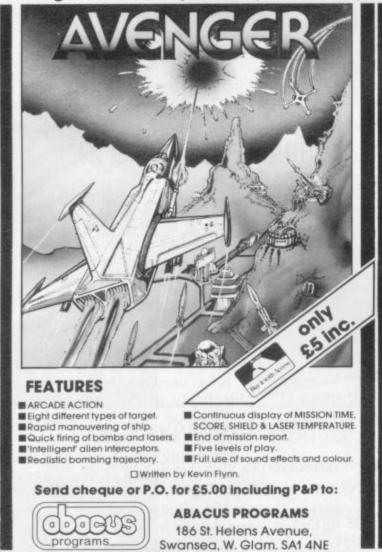
puzzle case that is 5000. The program will then sum all prime numbers below that number:

- 10 FAST
- 20 INPUT M
- 30 IF M < 3 THEN GOTO 20
- 40 LET L = INT (M/2)-1
- 50 LET Q = -INT (-SQR M)
- 60 DIM P\$(L)
- 70 LET T=3
- 80 LET S = 6
- 90 LET N=3
- 100 LET M = 1
- 110 FOR $I = (M + M)^*(M + 1)$ TO L STEP N

about it, as the short story with it is like a science fiction story. The game has speech, something you may or may not be able to hear. It also has six levels of play, analysis of moves, and a save game option. The game, called the Chess player, is available from Quicksilva Ltd, 92 Northam Road, Southampton, SO2 0PB.

Now to a letter first mentioned a few months ago from Simon Gross of Ipswich. He says that to put a chess program through tests, to see how good it is, is best done by recording results, as opposed to studying the

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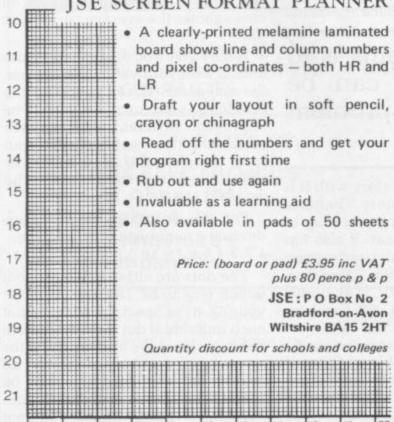
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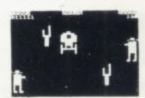
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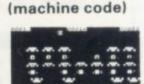






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