

February 1983

Incorporating Spectrum User

sinclair user

Issue
No 11

Only
75p

100 FANTASTIC FACT-FILLED PAGES

**HOME
ARCADES—
A NEW
CRAZE**

**Our guide to
brighter
programming**

**Eleven
pages of
programs**

**Complex
Spectrum
graphics
revealed**

**Tips on
saving
memory**

**Zeaker—
we reveal
its secret**



**OFFERS
GALORE**

ABBEX

☐ **COSMOS**
PRICE £4.95

date.....

sinclair user

Editor

Nigel Clark

Consultant editor

Mike Johnston

Production editor

Harold Mayes MBE

Staff writer

John Gilbert

Design

William Scolding

Editorial director

John Sterlicchi

Advertisement director

Simon Horgan

Advertisement manager

John Ross

Sales Executive

Annette Burrows

Editorial/production assistant

Margaret Hawkins

Managing director

Terry Cartwright

Chairman

Richard Hease

Sinclair User is published monthly by ECC Publications Ltd. It is not in any way connected with Sinclair Research Ltd.

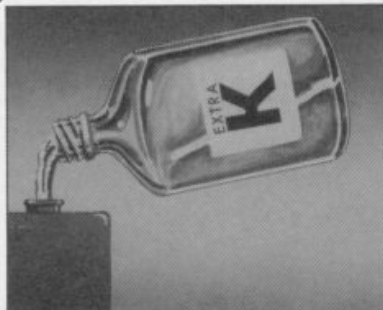
Telephone
All departments
01-359 7481

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

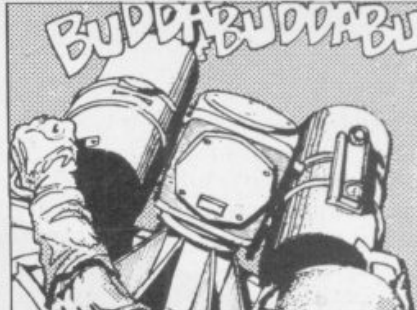
Programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £10 for each program published and £50 per 1,000 words for each article used.

© Copyright 1983
Sinclair User
ISSN No. 0262-5458
Origination by
Outline Graphics.
Printed by
Eden Fisher (Southend) Ltd

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411



page 50



page 65

5 SINCLAIRVOYANCE We attempt to assess the possible effects of a ban on micro imports.

9 SINCLAIR USER CLUB Two more offers to members of our popular club and news of events.

15 NEWS Spectrum on sale in Smiths, artificial intelligence on the Spectrum, call for import ban, and much more.

19 YOUR LETTERS Another big selection from our postbag, with your views on a variety of subjects.

25 HARDWARE WORLD The range of available add-ons continues to grow and we look at the new items.

29 SOFTWARE SCENE Cassettes for the Spectrum are flooding on to the market and we have three pages of reviews to keep you up-to-date.

36 ZEAKER Stephen Adams reviews a new product which could help in the teaching of mathematics in schools.

39 SPECTRUM GRAPHICS Ian Stewart manages to display polygons on the Spectrum with some unusual results.

43 STARTING FROM SCRATCH We have updated our beginners' article to include tips for the new Spectrum user.

50 MEMORY SAVING Our special feature gives a number of tips on how to save memory when writing programs.

57 PROGRAMMING John Gilbert continues his series on how to program to achieve good results.

62 ARCADE GAMES With the Spectrum there have been more opportunities for reproducing arcade-type games. John Gilbert investigates.

65 PROGRAM PRINTOUT Our regular section of readers' programs with 11 pages this month.

83 BOOKS This month we look at books which have a more general interest.

87 COMPETITION WINNER We announce the winner of our September contest for the ZX-99.

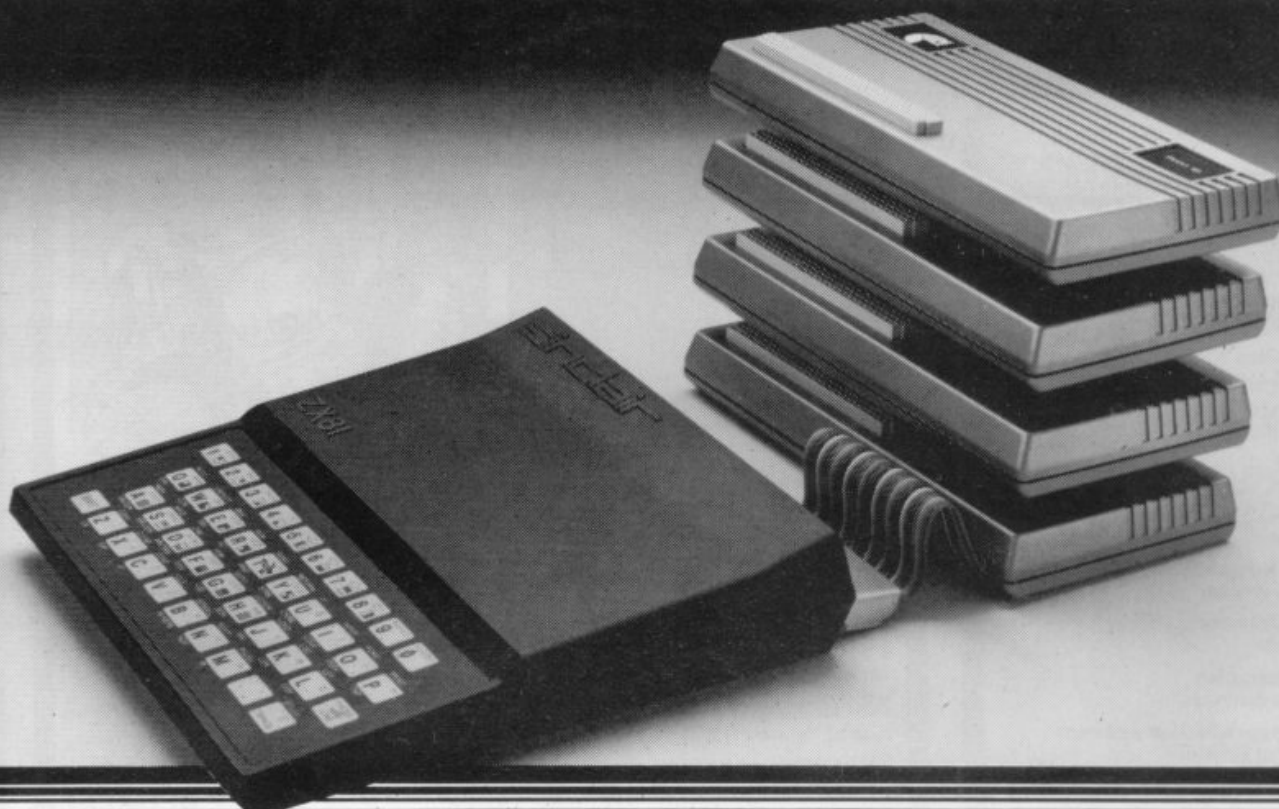
89 HELPLINE Andrew Hewson concentrates on problems with the PRINT command.

93 MIND GAMES Philip Joy with his regular column for people who like to think while playing the computer.

NEXT MONTH

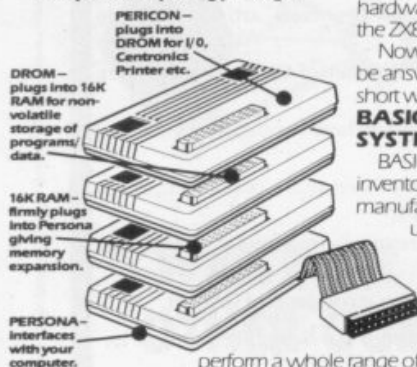
We profile the company which deals with Sinclair Research distribution and assess the new range of software from Sinclair Research.

HOW TO GROW UP TO A REAL COMPUTER



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.



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

Now your question can be answered in three short words:

BASICARE MICRO SYSTEMS

BASICARE are the inventors, developers and manufacturers of a totally unique microcomputing upgrade system.

It's the sort of system others have dreamed about ... a series of separate modules that

perform a whole range of microcomputing functions that simply (and firmly) stack together.

If you're confused ... don't be ... you only have to think of it in terms of the way Hi-Fi equipment has evolved.

You buy the hardware you want and add to the system! Each module may have a separate function or integrate functions. And when you want more ... you add more!

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

And what a package!

Apart from its good looks and stability under working conditions, BASICARE MICRO SYSTEMS offers a fantastic range of micro options for ZX81 users.

Of course, such a system needs a starting point from which to expand. The heart of BASICARE'S system is a unique computer interface which we call PERSONA.

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

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.

RAM 08 — A low cost, low power memory expandable from 2K to 8K.

RAM 16 — 16K Add on memory at remarkably low cost.

RAM 64 — A TRUE 64K Add on memory.

DROM — Ultra low power memory backed by rechargeable battery for non-volatile storage of programs and data.

TOOLKIT — A module fully socketed to take up to 8K bytes of utilities in EPROM/ROM.

PERICON a — A general purpose, user programmable device providing 24 lines of input/output.

PERICON b — 24 lines of heavy duty output to access and control the outside world.

PERICON c — A module to drive 80 column printer with Centronics type parallel interface.

USERFONT option — User definable characters available for RAM 08, DROM and TOOLKIT.

Of course, there's lots more BASICARE Modules under development including joysticks, EPROM Programmer, Floppy Disc Controller and much more.

BASICARE is the sort of system that GROWS when you grow ... and remember, when you change your micro, you will be able to change to a PERSONA unit to suit your new equipment!

In short, BASICARE will serve you forever ... no matter how big you want to grow!

"As space is limited to describe BASICARE products, we have produced a fully documented brochure ... send for it today (enclosing stamp please)."



BASICARE MICRO SYSTEMS are available by mail simply by sending today together with cheque/PO/Access or Barclaycard No. Please indicate clearly your exact requirements.

Name: _____

Address: _____

PERSONA @ £30.25 DROM(2K) @ £39.50
MINIMAP @ £35.95 TOOLKIT @ £22.20
RAM(2K) @ £24.50 PERICON A @ £27.90
RAM16 @ £26.75 PERICON B @ £33.75
RAM64 @ £76.25 PERICON C @ £41.75

Options: USERFONT @ £8.00.

Add 2K for RAMB @ £6.50, Add 1K for DROM @ £7.50

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

Post today to: BASICARE MICROSYSTEMS LTD., Dept 5, 5 Dryden Court, London SE11 4NH or Phone: 01-735 6408



**BASICARE
MICRO
SYSTEM**



Same game, different rules

IF 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



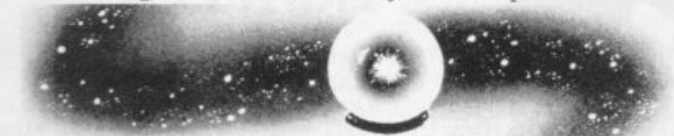
growth and the Spectrum delays of last year would seem to be short by comparison.

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 difficulty 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.

dktronics

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 x 9 x 2½. 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.

NOTE

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.

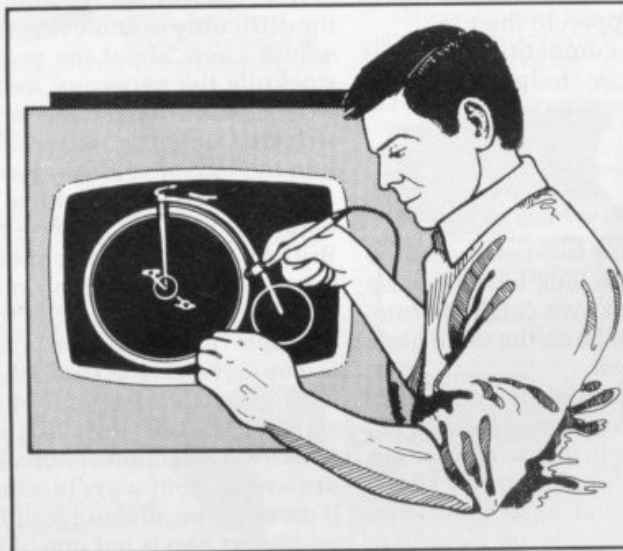
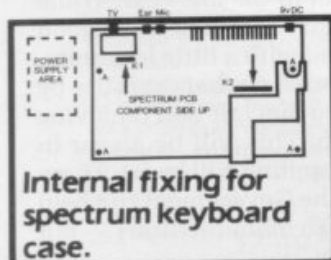
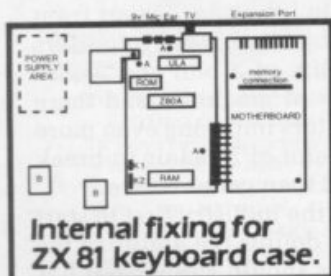
SPECTRUM MODEL

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.



**KEYBOARD
(SPECTRUM/81)**

£45



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**

4K GRAPHICS ROM £24.95

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.

**WHY WAIT?
ORDER TODAY FOR FAST DELIVERY**

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

£10

16/64 MEMORY FOR ZX 81



16K Memory £22.95
16K (uncased) £19.95
64K Memory £52.95
64K (uncased) £49.95

The above illustration shows the casing for the 16K or massive 64K.

MEMORY

16K MEMORY EXPANSION

£22.95

The 16K used 4116 Dynamic Ram Chips. We use the dynamic because they are much denser than static ram and occupy less space. They are also much cheaper than the equivalent product using the static Ram. The Ram is manufactured with high quality materials and uses high speed low power Rams. It is supplied ready-built and only needs to be plugged into the rear of the computer. All the components are fitted into holders. This massive add on memory which comes to you fully assembled and tested is the cheapest 16K memory available anywhere. Position in memory from 16384 to 32768 (same as the Sinclair Memory).

16K (UNCASED) £19.95

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 8192-16384 is switchable.

64K (UNCASED) £49.95

Please state type of machine, which Rom memory size, quantity and place when ordering.

Please send me @ £.....

Please send me @ £.....

Please send me @ £.....

Please add on £1.25 for PIP

In enclose cheque/P.O. payable to DK Tronics total £.....

or debit my Access/Barclaycard ☐

Signature

Name

Address

Send to DK Tronics, 23 Sussex Road, Gorleston, Gt. Yarmouth, Norfolk.

Tel: Gt. Yarmouth (0493) 602453

dktronics

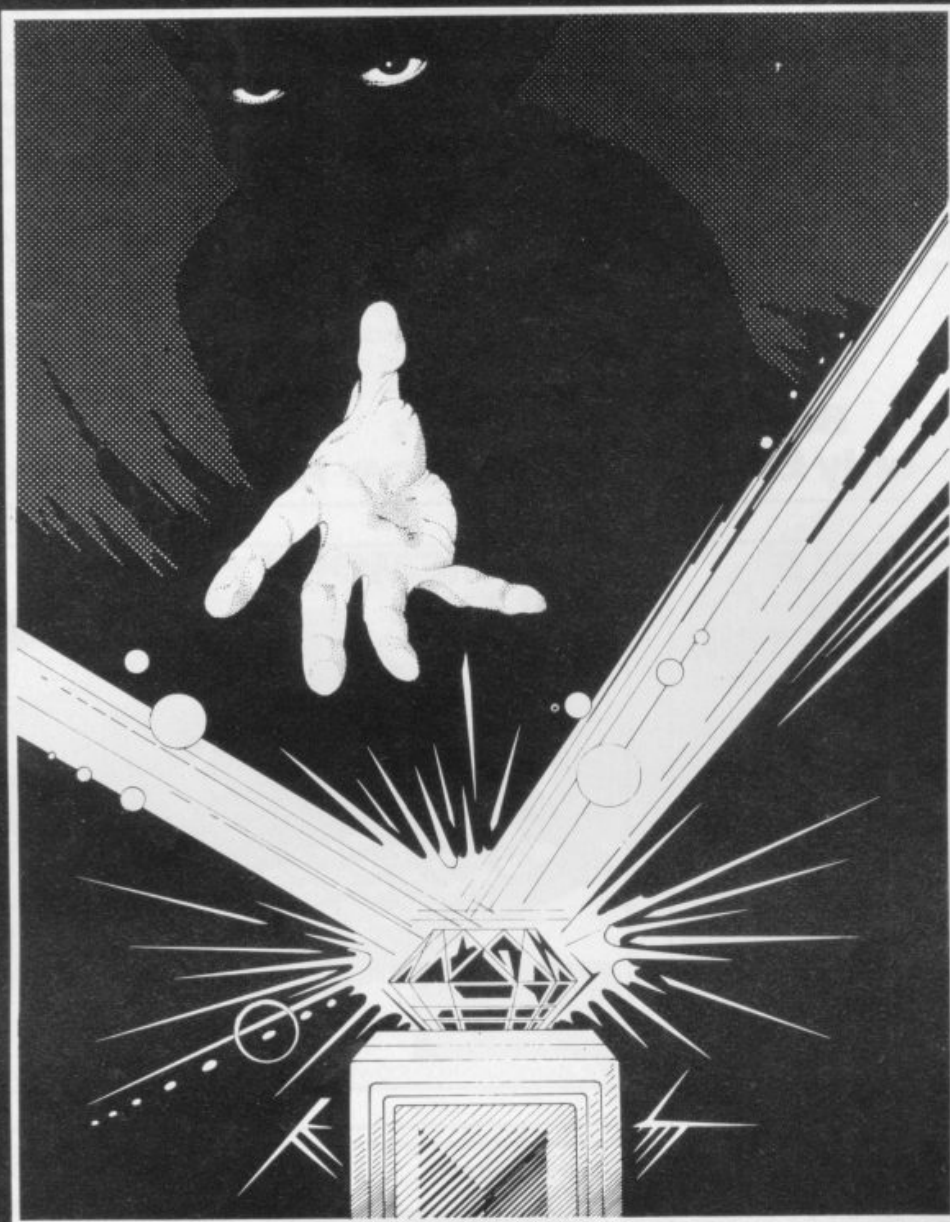
New colour brochure now available, send SAE for quick return

BLACK CRYSTAL



BLACK CRYSTAL

ZX81 16K
SPECTRUM 48K



An epic role-playing
adventure of fantasy
in six programs.



CARNELL SOFTWARE

ONLY £7.50 incl.

AVAILABLE FROM: CARNELL SOFTWARE, 4 Staunton Road, Slough, Berks.

OR FROM:

SOFTWARE SUPERMARKET, 87 Howard's Lane, London SW156NZ. (MAIL ORDER ONLY).

MICROSTYLE OF BATH, 29 Belvedere, Lansdown, Bath.

MICROWARE LEICESTER, 5 St. Peter's Lane, Leicester.

BUFFER MICRO SHOP, 310 Streatham High Road, London SW16.

ZEDEXTRA, 5 School Lane, Kinson, Bournemouth, Dorset.

FAL-SOFT COMPUTERS, 6 Stephney Parc, Bidock Water, Falmouth, Cornwall.

AND OTHER GOOD MICROCOMPUTER STORES.

TRADE ENQUIRIES WELCOME.

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-

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 in-
continued on page 10

Hilderbay	List price	Offer price
48K Spectrum		
Critical path analysis	£15.00	£13.50
Payroll	£25.00	£22.50
Stock Control	£25.00	£22.50
Gold (game)	£8.00	£7.20
ZX-81		
Beamscan	£25.00	£22.50
Budget	£15.00	£13.50
Critical path analysis	£15.00	£13.50
Financial Pack	£8.00	£7.20
Optimax	£40.00	£36.00
Payroll	£25.00	£22.50
Stock control	£25.00	£22.50
Time Ledger	£15.00	£13.50
Gold	£6.00	£5.40
Tape accessories		
Alignment and test cassette	£4.90	£4.40
Loading aid	£5.95	£5.35
Microcomputer Tape Book	£3.10	£2.80
Pre-publication offer		
The Guide to the Spectrum ROM		£2.95
Mikro-gen	List price	Offer price
Spectrum		
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
Bomber	£3.95	£3.15
Paintmaze	£3.95	£3.15
ZX Chess	£6.50	£5.20
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
DeLug	£3.95	£3.15

MEMBERSHIP
FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name

Address

.....

.....

.....

Which computer do you own?

ZX-81 ☐ Spectrum ☐

Send your coupons to Sinclair User Club, ECC Publications, 30-31 Islington Green, London N1 8BJ. Cheques should be made payable to Sinclair 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 increasing numbers, are learning, there are many advantages 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 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 full range of Thurnall Electronics add-ons.

This month's offer can be seen on the preceding page.

The club also offers a service to help with the loading and saving of

tapes. Many of the problems arise from tape heads being wrongly-aligned. 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 (Ulverston 55068). Meets every other week on Wednesday evenings.

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, Gourrock, Renfrewshire, PA19 1PL (Gourrock 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 Monday, 6pm.

Nottingham Microcomputer Club: ZX-80/81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent, (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

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 country.

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-Brugerguppen 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 Jencyk, Hameln, Postfach 65 D-3250 Hameln, Germany.

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

Republic of Ireland: Irish ZX-80/81 Users' Club, 73 Cnoc Crionain, 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).

ZX81 GAMES

from

J.K. GREYE SOFTWARE LTD
THE NEW GENERATION SOFTWARE HOUSE

"Without question the finest machine code games available today".....J.N. ROWLAND Product Manager for W.H. SMITH.

GAMESTAPE 1 for 1K only £3.95
10 Games incl. ASTEROIDS, UFO, CODE, BOMBER, GUILLOTINE, KALEIDOSCOPE, etc.
PROBABLY THE BEST VALUE 1k TAPE AVAILABLE.



We've done in 1k, games which some of our competitors require 16k to do!



GAMESTAPE 2 for 16K only £3.95
***STARFIGHTER** Superb machine code Space Battle. Set against a background of twinkling stars, with stunning explosions - if you can hit the enemy!
PYRAMID Can you move the Pyramid? Make a mistake and it will collapse! A Thinkers game.
ARTIST The ultimate Graphic Designers aid. 8 Directions, 10 Memories, SAVE, COPY, RUBOUT, CLS, etc.

GAMESTAPE 3 for 16K only £4.95
***CATACOMBS** A Multi-Level Graphics Adventure. Each level can contain up to 9 Rooms, 8 Passages, 7 Monsters, Food, Gold, Traps, Phantoms, an Exit (to the next level), and there's an infinite number of levels.
NOTE: ... This is NOT one of the necessarily limited text Adventures as sold elsewhere.
"An excellent addictive game which will keep you amused for hours".... COMPUTER & VIDEO GAMES.



GAMESTAPE 4 for 16K only £4.95
***3D MONSTER MAZE** The Game to Top All Others. Unbelievable Graphics! Can you find your way through the Maze? The EXIT is there somewhere, but then so is a T.REX, and its after YOU! All in 3D (the T.REX will actually run towards you in full perspective!), you've never seen anything like this before!
"3D MONSTER MAZE is the best game I have seen for the ZX81".... COMPUTER & VIDEO GAMES

"If I had to choose just one programme to impress an audience with the capabilities of the ZX81, then J.K. Greys's 3D MONSTER MAZE would be the one without doubt"..... ZX COMPUTING. "Brilliant, brilliant, brilliant!".... POPULAR COMPUTING WEEKLY

GAMESTAPE 5 for 16K only £4.95
***3D DEFENDER** The Ultimate Space Game. Super fast Machine Code 3D version of the Arcade favourite. You have to save your home planet from the marauding Alien Spacecraft. This is all in 3D, your viewscreen shows you the view out of your fighters cockpit window. The backdrop moves when you turn, or fly up or down (8 flight directions). Just as if you were really flying it! But then YOU ARE! The Enemy Saucers 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 full 3D!
A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!



GAMESTAPE 6 for 1K only £1.95
***BREAKOUT** Super Fast Full Screen Display Game. Your all time favourite with an added twist. See how much Money you can win and watch the pounds convert to Dollars. All in Machine Code for Fast Action with 3 Speeds, 2 Bat Sizes and three angles of rebound! The best BREAKOUT around and at this price you can't go wrong!

GAMES MARKED * INCL. MACHINE CODE.

Prices include VAT and U.K. P. & P.

(Add appropriate Postage on Foreign Orders). Cheques/P.O.s to

J.K. GREYE SOFTWARE LTD
DEPT. SU.,

16 Brendon Close, Oldland Common, Bristol BS15 6QE

CREDIT CARD SALES: Phone: 01-930-9232 (9 a.m. - 7 p.m.)

FOR INSTANT DESPATCH

If you prefer to see before buying, our range of **GAMESTAPES** are stocked by the following stores.

BUFFER MICROSHOP	374A Streatham High Rd., London SW16:
GAMER	24 Gloucester Rd., Brighton;
GEORGES	89 Park St., Bristol, Avon;
MICROSTYLE	29 Belvedere, Lansdown Rd., Bath, Avon;
MICROWARE	131 Melton Rd., Leicester;
SCREEN SCENE	144 St. Georges Rd., Cheltenham, Glos;
W.H. SMITH	Over 200 Computer Branches;
ZEDXTRA	5 School Lane, Kinson, Bournemouth, Dorset;

TRADE & EXPORT ENQUIRIES WELCOME

NEW

From Warp
Factor Eight

**Lift-off into
'83 with HI-STAK**

- makes your computing easier, faster, more reliable, less exhausting and simply more enjoyable.
- angles your computer neatly to the correct ergonomic position for the most efficient keyboard operation.
- provides extra ventilation for hot ZX81's and Spectrums.
- instantly applied.
- styled for '83, adds that professional look to your set up.
- precision injection moulded in quality ABS, non scratch - non slip base.

**ZX81
SPECTRUM
VIC20
TRS80
NEW BRAIN
JUPITER ACE
Etc.**

ONLY
£3.95
includes
VAT, p&p

Order form. Please send me _____ HI-STAK set(s) (at £3.95 per set). I enclose cheque/P.O. for _____

Name _____

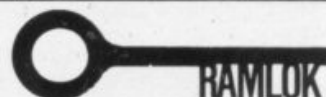
Address _____

Post code _____

To: Warp Factor Eight, Dept. SU.
6 Pelham Road, Braughing, Ware, Herts. SG11 2QU.

adapt electronics

**WOBBLY
RAMPACK**



Q. What is 'wobbly rampack'?

A. Ask Sinclair Users. They will tell you about the programs they have lost due to intermittent loss of memory connection resulting in a program 'crash'.

Oxidation of the tin-plated edge connector is the root cause of the problem. The lack of mechanical attachment between the Rampack and the Computer aggravates this condition. Slightest movement of the rampack can cause a program crash. Improvement of the Rampack case design will not completely cure the problem.

RAMLOK kit from ADAPT Electronics provides the complete cure.

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.

- RAMLOK kit is easily fitted requiring no specialist knowledge or skills.
- No cutting or drilling necessary.
- No special tools required just a soldering iron.
- Step by step instructions included.
- Access to the computer after modification is unaffected.
- Suits ZX81/80. Spectrum version available shortly.
- Suitable for all popular RAMPACKS including Sinclair 16K.

PRICE £7.50 + 50p p&p inclusive

Please send _____ RAMLOK kits.

I enclose cheque/PO value £.....

Name _____

Address _____

ADAPT Electronics, 20 Starling Close, Buckhurst Hill, Essex IG9 5TN.

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 User' 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 free!**



We **know** you've got big ideas about your Sinclair. Make sure you live up to them with **threefold** computing pleasure. Fill out the order form now and we'll send you the first ideas-packed **Sinclair Projects** — hot off the press.

Mail to: ECC Publications Limited; 30-31 Islington Green,
London N1 8BJ

Sinclair User / Spectrum User; Sinclair Programs; Sinclair Projects

Yes — I'd like to subscribe to:

- ☐ Sinclair User (12 issues — price £11.00) including special 'Spectrum User' supplement in each issue.
- ☐ Sinclair Programs (6 issues — price £6.60)
- ☐ Sinclair Projects (6 issues — price £6.60) Remember you get the first three issues **FREE** if subscribing to all three magazines!
- ☐ I enclose a cheque for £ _____ (deduct £3.30 from total cost if subscribing to all three publications)
- ☐ Please charge my credit card Card name _____ Number _____

Name _____
Address _____

Signature _____ Date _____

NB This offer applies to UK subscribers only. Overseas rates available on request.

Step into the unknown with the Future Makers

P.S.S. bring you fast action, arcade style games, fantasy
and sci-fi, plus exciting technology in machine
program aids & hardware/software combinations

ZX81 16K PROGRAMS

Krazy Kong £3.95

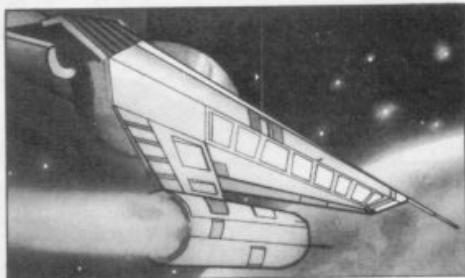
All machine code version of the popular arcade game. This program has all the features of the original and is every bit as fast.

Ghost Hunt 3.95

Gobble you way through a Maze- Ghosts, power pills etc etc. very fast.

Maze Drag Race 3.95

Drive through a giant maze 9 times the size of the screen picking up points as you go - but watch out for the other cars, rocks oil & ice. A really superb M/C game.



Alien 3.95

Set on board the spaceship Nostrodamus, can you choose the right weapon to repel the alien before he kills your crew?

DCoder 5.95

Essentially a disassembler for your machine code but with one important difference - it will relocate the code in whole or part to any other part of memory.



Zonix 12.95

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 the facility to make your own.
- b) A program that turns your ZX81 into an electronic organ.

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 only your own imagination.

MCoder £7.95

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

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

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 ¼).

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.

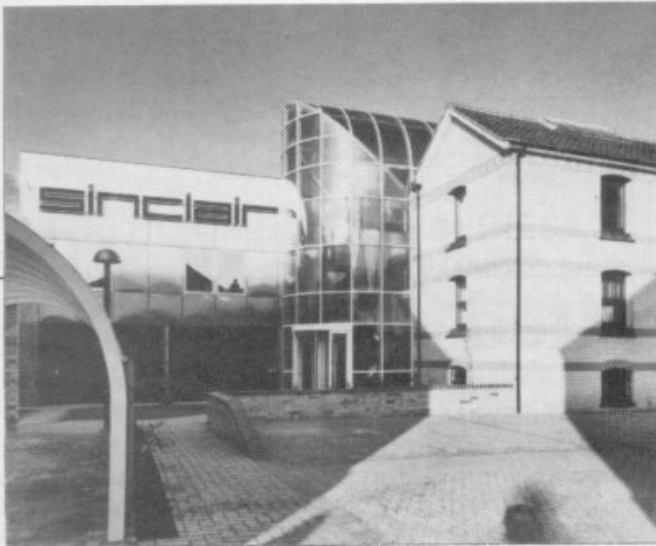
All the above is contained in ½K of superbly easy to use Software.



PSS

PERSONAL SOFTWARE SERVICES

SEND CHEQUE OR P.O. TO: P.S.S. 452 STONEY STANTON ROAD, COVENTRY CV6 5DG.



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.



Spectrum goes on retail sale

THE SPECTRUM is now 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

about the new addition to the Smith computer range.

"We are selling the Spectrum on a permanent basis and we would like to sell peripherals 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.

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 ZX-81 since before 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.

Fiction prize awarded

THE FIRST Sinclair Prize for Fiction has been won by Hilda Bernstein 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-

published work to encourage "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.

New software club plans

A NEW CLUB has been 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-of-the-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 conceived last August. We did some test marketing in November and December and launched our first

catalogue with the January 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. "Run-it programs all feature professional-level programming and clearly-written manuals," the company says.

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 acknowledgment has been received and the manufacturers are now waiting to see if there will be any ac-

tion.

The firms, known collectively as the British Micro-computer Manufacturers Group, are worried that imports could cause the British industry to be still-born.

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 Christopher 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 pro-

grammed 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 SPECTRUM
KEYBOARDS
PROGRAM
SOUND GEN
BUSINESS
MEMOR

ZX81/80
SOFTWARE
HARDWARE

ZX SPECTRUM
KEYBOARDS
PROGRAM AIDS
SOUND GENERATORS
BUSINESS PROGRAMS
MEMORY EXTENSIONS

PRINTERS
USER GROUPS
BOOKS
CONSOLES
GAMES
JOYSTICKS

ZX81/80
SOFTWARE
HARDWARE
MONITORS
MAGAZINES
COMPUTERS

ZX SPECTRUM
KEYBOARDS
PROGRAM AIDS
SOUND GENERATORS
BUSINESS PROGRAMS
MEMORY EXTENSIONS



See us at the ZX Microfair!

If you own a ZX81 or SPECTRUM — or if you're thinking of buying for the first time — the ZX MICROFAIR is not to be missed!

There's literally everything for the beginner, amateur, enthusiast and professional.

A fantastic range of products from both the established

manufacturers and the newer ones!

There's a bring and buy sale and a complete show guide available on the day.

It's a good day out and the opportunity of learning everything there is to know about ZX Computers.

The facilities at the hall include Bar, Restaurant and lots of seating!

Make a note of it now, or write to Mike Johnston, 71 Park Lane, London N17 0HG for advance tickets (Cheques etc made payable to ZX MICROFAIR and please enclose S.A.E.)

At 80p for adults and 50p for kids (under 14) it must be a bargain!

6th
ZX MICROFAIR



SAT FEBRUARY 26th • NEW HORTICULTURAL HALL LONDON SW1 • 10am-6pm

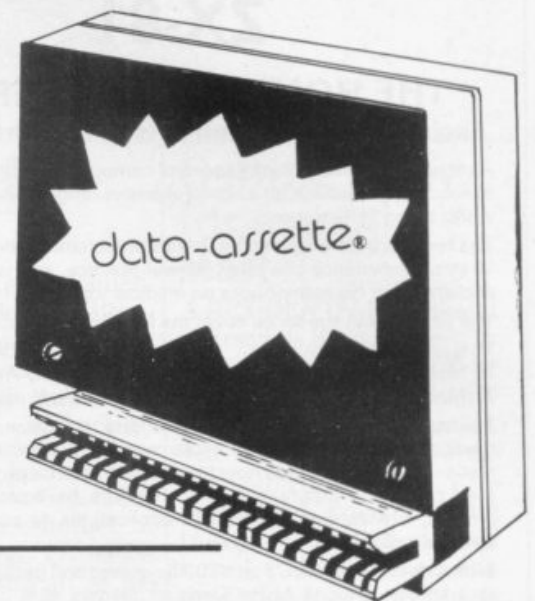
NEW RELEASES

British made, high quality, add-on memory at affordable prices. Fully guaranteed.

16k Ram Pack _____ £28.95

16k Expandable internally by plug-in module to full 32k £29.95

Expansion module _____ £17.95



ZX99 Automatic Tape Controller for Sinclair ZX81



£49.95 plus £2.95 P&P

- ☐ DATA PROCESSING - software control of up to four tape recorders
- ☐ RS232C INTERFACE - allowing connection with any such printer using the full ASCII character code
- ☐ AUTOMATIC TAPE COPY - copy a data file regardless of your memory capacity
- ☐ TAPE BLOCK SKIP - without destroying the contents of RAM
- ☐ ZX99 SOFTWARE AVAILABLE

Contact us for details of all personal computing accessories and a full range of software including Quantec

Distributors of KAYDE products

data-assette®

44, Shroton Street
London NW1
Telephone (01)258 0409

RAM PACKS

Computer Cassettes

High quality, AGFA tape, screw assembled cassettes with library boxes

c5 - 37p	c15 - 41p
c10 - 39p	c20 - 43p
c12 - 40p	c25 - 45p
c30 - 46p	

Cassette Leads

BBC1	7pin to 2x3.5mm, 1x2.5mm	£2
BBC2	7pin to 5pin & 1x2.5mm	£2.50
DRAGON	5pin to 2x3.5mm, 1x2.5mm	£2

Revolving Cassette Racks

SINGLE -	£2.99 (holds 32 tapes or 20 in cases)
DOUBLE -	£5.99 (holds 64 tapes or 40 in cases)
TREBLE -	£8.99 (holds 96 tapes or 60 in cases)
QUAD -	£11.99 (holds 128 tapes or 80 in cases)

ORDER FORM

Dept.US1 Data-Assette
44 Shroton Street, London NW1

ITEM	NO.	PRICE	TOTAL

P&P 10% (min. charge £1.50)



Charge my Access/Visa no: _____

Signed _____ Name _____

Address _____



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 Banks,
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

Sinclair helps ensure a very busy retirement

I MUST gently remonstrate with Bill Martin and Sandra Mason for their somewhat dismissive and derogatory statement in your November issue that people over 60 years of age are unlikely to buy a microcomputer.

I am 67½ and my son bought a ZX-81 about 18 months ago. In July he bought another computer and gave the ZX-81 to me.

I became addicted and when, about six weeks ago, the ZX-81 developed a fault — it got stuck in the red shift and the K

surely a number of people my age who have found in microcomputers an absorbing hobby for retirement.

Incidentally, I agree with your correspondent K Watson that programs in Sinclair User and Sinclair Programs are frequently poorly printed and unusable.

Please remember that people capable of deciphering poor print are adept enough to write their own 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, Promises. My enquiries to

Sinclair have been promptly and politely answered, both by sales and 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 magazine. Your comments



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 potential addict. There are





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 monotone cassette 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 patiently waiting to receive.

**P D 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 Spectrum.

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?.

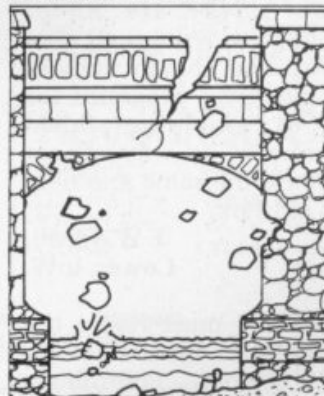
Our Ephemeris programs for the ZX-81 and

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 £7.90 for the Spectrum version.

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

**Christine Hine,
Bridge Software,
Stockport,
Cheshire.**

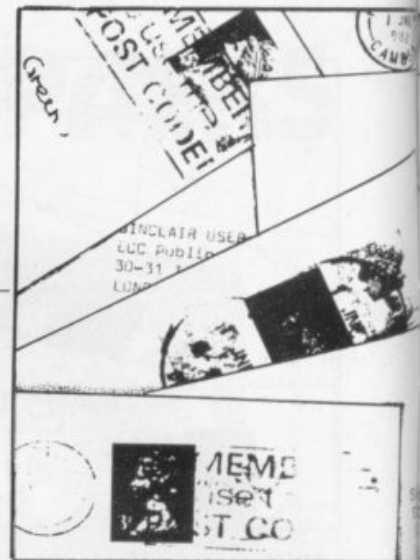
London Bridge finds favour



THANK YOU for the 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

I WOULD appreciate it if 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 orders and it is costing me a good deal of money to return cheques and explain the situation.

**D E Healey,
63 Cedar Avenue,
Coseley,
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 matter.

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

10 Pause O: Let i\$ +

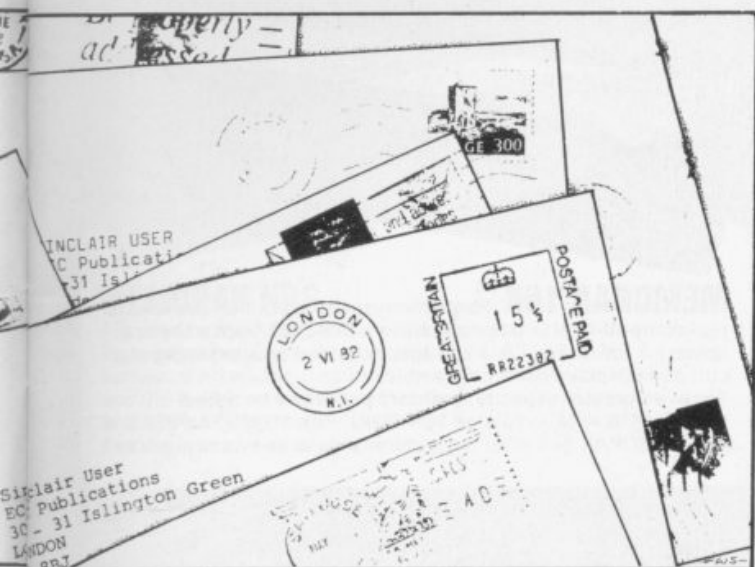
INKEY \$

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 0; 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.

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



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-

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
Publishing.

social experience to fit them for a sparkling career 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 *Sinclair User*, the meaning seems to be clear. Sad?

J E M Fradgley,
Stratford-upon-Avon,
Warwickshire.



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.

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 ZX81 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).

We want to be sure you are satisfied with your Memopak – so we offer a 14-day money back guarantee on all our products.

MEMOTECH

MEMOTECH LIMITED, WITNEY, OXON. OX8 6BX
TELEPHONE (0993) 2977 TELEX 83372 MEMTEC G

Push your Sinclair to the limit

ZX81/SPECTRUM ARCADE GAMES

NEW

ZX INVASION FORCE (ZX81)

Use your skill to fire through the energy band to destroy the menacing alien ship — £3.95

NEW

SPEC INVADERS SPEC GOBBLEMAN

These exciting high-speed classic games incorporate hi-resolution graphics and sound to bring you the best in arcade action at only £4.95 each (16/48K)

NEW

SPEC FROG 5/SHOWDOWN (16/48K)

Hop across the dangerous road avoiding the lethal cars, then lorries. Go back to the wild west for a gunfight battle amongst cacti and wagons. Features include western music. £4.95

NEW

NAMTIR RAIDERS (ZX81)

High speed, quick action arcade game with four separate groups of attackers. £3.95

Gobbleman also available for ZX81 at £3.95

UTILITIES



TOOLKIT

Nine powerful new functions for your ZX81 (including re-number lines (goto, gosub), program merge, string finding and replacement. £5.95

SPEC BUG

A 30 in 1 machine code tool and disassembler for your ZX Spectrum. £6.95

ZX BUG

A 30 in 1 machine code tool and disassembler for your ZX81. £6.95

Improve your machine code programs with this new 48K Spectrum Assembler

Just released by Artic, this new professional quality assembler is also available for 16K ZX81 and features:—

- Word-processor-like text editor. • High-speed, versatile two-pass mnemonic assembler with labels and detailed error-trapping. Will assemble to any address.
- Essential support facilities such as memory-edit, register inspect/modify and search for de-bugging. • Full output to ZX-printer. • Memory-status report and comprehensive user-manual.

**ONLY
£9.95**



ADVENTURE GAMES



**JUST RELEASED
for 48K
SPECTRUM**
Still available for ZX81

INCA CURSE

(Adventure B)
In a jungle clearing you come across an ancient Inca temple. Your mission to enter, collect the treasure and escape alive. But beware!

Includes a cassette save routine. £6.00

SHIP OF DOOM (Adventure C)

You are unavoidably drawn to an alien cruiser. Can you reach the control room and free yourself? Or will they get you first? Includes a cassette save routine. £7.00

ESPIONAGE ISLAND (Adventure D)

While on a reconnaissance mission your plane loses control and you are forced to land. Can you survive and escape with the island's hidden secret? £8.00

PLANET OF DEATH (Adventure A) 16/48K

You find yourself stranded on an inhabited alien planet. Can you reach your ship and escape? £5.00

**REDUCED TO
£29.95**

ZX FORTH

Supplied on cassette with editor cassette, user manuals and keyboard overlay. ZX FORTH combines the simplicity of basic with the speed of machine code

THE ULTIMATE ADVENTURE FOR THE SPECTRUM/ZX81 for only £9.95

AND THE CHANCE
TO WIN
£10,000
or more IF YOU

KRAKIT™

KRAKIT TRADE MARK OF INT.
PUBLISHING & SOFTWARE INC.

RULES AVAILABLE
FROM ARTIC

Your eccentric father has left you £10,000 in his will. In order to claim your windfall you must solve twelve clues and gain access to a bank account in which the money has actually been deposited. Be the first to crack the puzzle and the prize is yours! Plus you will win two tickets to the city of the secret KRAKIT™ vault location. The prize money is increased weekly. A telephone number will be supplied so you have the opportunity to find out just how much you could win.

DON'T MISS YOUR CHANCE TO WIN A FORTUNE!

ALWAYS AHEAD WITH ZX81/SPECTRUM SOFTWARE

Cheques & P.O. made payable to: Artic Computing Limited. Dealer enquiries welcome. Please state whether your order is for ZX81 or Spectrum. Send S.A.E. (6in x 9in) for catalogue.



ARTIC COMPUTING LTD.

**396 JAMES RECKITT AVENUE,
HULL, N. HUMBERSIDE,**

A GREAT CHESS GAME FOR YOUR ZX81 OR SPECTRUM*



*SPECTRUM
CHESS 48K

ZX CHESS I

Very popular machine code program, with six levels of play and an analysis option. Available for ZX81. £6.50

ZX CHESS II

A new improved version, with a faster response time, seven levels of play, analysis option and in addition a recommended move option. £9.95

ZX 1K CHESS

An incredible game in 1K for only £2.95

As advertised on ITV



SPECTRUM VOICE CHESS

This incredible program talks you through your game. It tells you its move, recommends a move, and contains a range of facetious comments. The game is based on the highly successful ZX Chess II and is offered at the Christmas offer price of £9.95.

SPECTRUM CHESS now only £9.45

To: Artic Computing Ltd., 396 James Reckitt Avenue, Hull, N. Humberside, HU8 0JA.

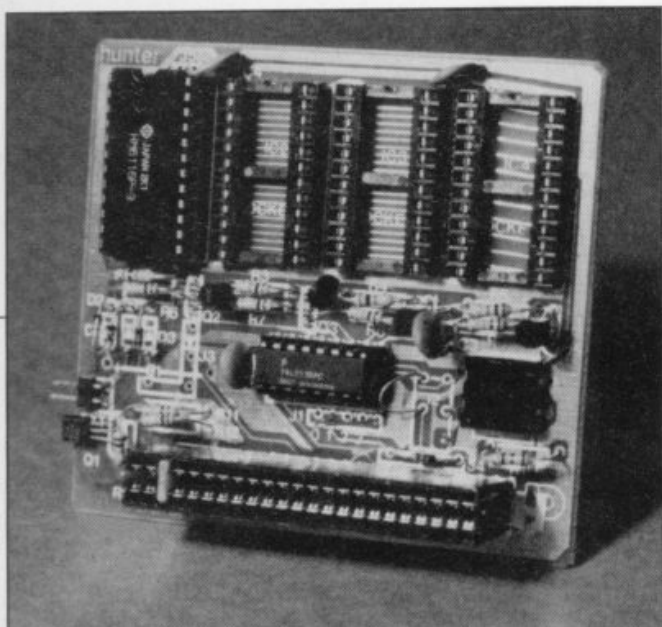
Please supply.....

Cheque for total amount enclosed.

Name.....

Address.....

SU2



Hunter Products battery-backed RAM board

U.S. firm aids fact storage

HUNTER PRODUCTS, an American firm, has produced a battery-backed RAM board which can be moved about in the memory of a ZX-81 to any 8K section. The board is available as a kit and is very easy to build from the 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 on-board 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 battery-backed copy and then add your own commands or correct the mistakes in the ROM.

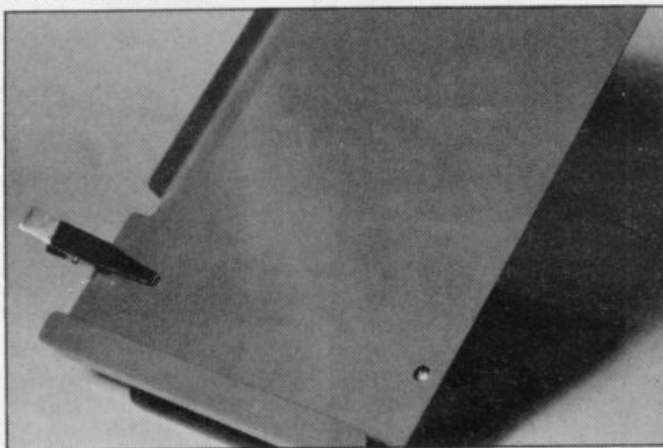
The kit costs £19.95 inc. VAT from Hunter

Electronics, PO Box 5, Axminster, Devon EX13 5AS. That is a postal address as the company is in the U.S.

Easier Reader

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

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 4½ in. long by 3 in. wide and 2 in. tall.

The Interspec has an expansion bus at the back which provides the data, read and write control

signals, plus two device-select 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 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 all machines

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 though some require the disabling of the joystick while speeds are chosen. The only disadvantage is the cheap edge connector and the fact that you cannot select which keys are simulated — that would allow an arcade game to be played.

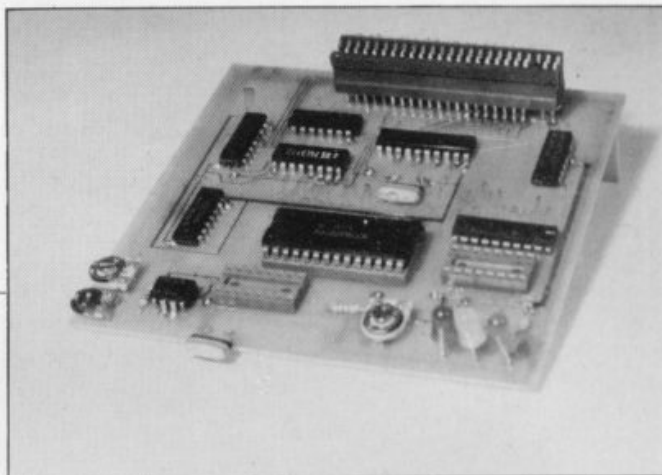
Joystick interface costs £15.96, joystick £7.54 inc.

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

AN ANALOGUE port from University Computers is a memory-mapped device and is designed to be used by the ZX-81 Basic instructions 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-channel analogue input port and digital eight-bit



University Computers' analogue port

output port. That is an 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

measured.

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.

A very good teaching tool at £39.95 inc. VAT and postage from University Computers, 5 St. Barnabus Road, Cambridge.

LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ... NEW LOW PRICES ...

EXTREMELY Addictive Games



FEATURES INCLUDE

★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★ TRANSFER MARKET ★ TEAM SELECTION ★ SAVE GAME FACILITY ★ LEAGUE TABLE ★ AND MUCH MORE!

ALSO AVAILABLE AT BOOKSTORES & COMPUTER SHOPS INCLUDING BUFFER MICROSHOP LONDON & MICROWARE LEICESTER. 3D GRAPHICS ONLY INCLUDED IN SPECTRUM VERSION

NEW LOW PRICES
£7.95 ALL PRICES FULLY INCLUSIVE
£6.95 - SPECTRUM
£5.95 - ZX81

HARDWARE REQUIRED
Spectrum 48K RAM ZX81 16K RAM

To Order send Cheque/P.O. payable to:
ADDITIVE GAMES
At: Dept. S.U. P.O. Box 278
CONIBURROW
MILTON KEYNES MK14 7NE
PLEASE STATE COMPUTER

NOW!
for the
SPECTRUM FOOTBALL MANAGER

IN 3D COLOUR GRAPHICS

We're tired of telling you how good our game is..... let our customers tell you

Dear Sir,
I received a copy of your Football Manager, Spectrum 48K game a couple of weeks ago and felt I must just write and congratulate you on such an "addictive game".
I started on the beginners skill level with Ipswich Town in the Fourth Division. After having played six seasons I am now into the first division having won the F.A. Cup whilst in the second division. All of which took about nine hours of being glued to the screen.
Since reaching the first division I have increased my skill level and am now sixth in the table after ten seasons and about 15 hours!
The reason I am surprised that I have played this game more than any other in my library over the last two weeks, is because I don't really like watching football on television. I don't even support a team. The structure of your game is such that anyone can play it.
P. A. HACKMAN,
BURY ST. EDMUNDS
ORIGINALS CAN BE SEEN ON REQUEST



FAST MAIL ORDER-SEND TODAY!

SPECTRUM MONITOR. Machine Code Debug/Disassembler
• Enter, Run, Debug machine code programs. • Compatible with Basic • Breakpoints and Registers Display • Disassembly to screen and/or ZX Printer • 16K and 48K versions on one cassette + 30 page manual **£7.50**

SPECTRUM EDITOR/ASSEMBLER. A powerful and essential machine code programming aid.
Major features include:
• 16K & 48K on same cassette with full documentation. • 40 Column screen display, tabulated into fields for easy reading. • 5 character Label Names: simple Line Editing and Cursor Control.
EDITOR with Auto Line Numbering: output to ZX PRINTER.
SAVE/LOAD Text Buffer to cassette: output to ZX PRINTER.
TWO-PASS ASSEMBLER accepts all Z80 mnemonics (plus many unpublished mnemonics): Decimal or Hex numbers: simple arithmetic on operands: Assembler Directives — ORG, END, DEFB, DEFW, DEFL, EQU, DEFM.
WE CANNOT FULLY DESCRIBE THIS IMPORTANT UTILITY HERE, AND ASK YOU TO SEND A S.A.E. FOR COMPLETE DETAILS OF THIS AND ALL OUR PROGRAMS **£8.50**

ZX81 SCREEN KIT 1. More power to your screen in all your Basic programs
BORDERS any size, anywhere on screen. SCROLL in all 4 directions. CLEAR and REVERSE PART OF SCREEN. FLASHING CURSOR anywhere on screen — simulates INPUT. DATA FILES SAVE AND LOAD Basic variables: Double Speed. 880 bytes machine code for INSTANT RESPONSE. Becomes part of Basic Program. **£5.70** 4K to 64K.

ZX81 ZX-MC. Machine Code Debug/Monitor
• ENTER, RUN, DEBUG machine code programs • SAVE, LOAD, VERIFY at double speed • BREAKPOINTS and REGISTERS DISPLAY • Self contained — cannot be used with Basic • Cassette plus 36 page manual **£7.50** 4K to 64K

ZX81 REMLOAD. Machine Code Debug/Monitor
• A version of ZX-MC without the Save/Load/Verify facility • Compatible with Basic • CREATE A REM LINE of any length • BREAKPOINTS and REGISTERS DISPLAY • Cassette plus 30 page manual **£6.95** 16K to 64K

SEND S.A.E. NOW FOR DETAILS
6 Corkscrew Hill, West Wickham,
Kent BR4 9BB.
Prices include VAT & P&P

PICTURESQUE PICTURESQUE PICTURESQUE

1) SPECTRUM ANALOGUE PORT (24 channel control)
 8 channels digital voltage input (e.g. for switch closure detection).
 8 channels digital voltage output (e.g. for driving relays).
 8 channels analogue voltage input (for measuring voltages from e.g. transducers).
 High quality cased unit including all connectors (uses standard 'D' type).

(2) ZX81 ANALOGUE PORT
Our popular, industry proven board for measurement and control.
8 channels digital voltage output.
8 channels analogue voltage input.

£29.95 inclusive of comprehensive manual.

2 DIL headers for inputs and outputs £2.00

Light sensor	£3.00
Reed relay	£2.20

Joysticks, thermometers, humidity sensors, pH probes etc. also available.
Prices and details on application.

Spectrum female	£3.00
ZX81 female	£2.20
male	£1.60

Design notes + connectors (male, female) + veroboard **£6.50**

FAST FOURIER TRANSFORM (Frequency Analysis).
NUMERICAL SOLUTIONS TO DIFFERENTIAL EQUATIONS.
STATISTICS.

Very high standard including manuals. Assumes no expertise.

TERMS: Post and packing (U.K.), add £1.00 (30p on item (4)). Europe multiply by two, elsewhere multiply by four. Delivery return of post (otherwise immediate notification, with delivery always within 28 days). Official, bulk, dealer orders welcome.

Cheques payable to:

UNIVERSITY COMPUTERS
5 ST. BARNABAS ROAD, CAMBRIDGE CB1 2BU

**MICRO
SHOP**

(Near Streatham S.R. Station)

The original **ZX** software shop
exclusively

ZX-81 & SPECTRUM

The best of the Mail Order items available over the counter — Games, Serious Progs., Keyboards, RAM's, Books and a variety of useful extras.

★ ★ NEWS ITEM ★ ★ ★ ★ ★

**NEW BIGGER, BETTER
SHOP**

NOW OPEN

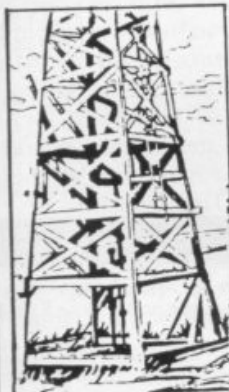
310 Streatham High Rd
London SW16
Tel: 01-769 2887

SAE appreciated for catalogue

OPEN TUES-SATS 10.30 TO 5.30. CLOSED MONDAYS

MANAGEMENT GAMES

16K ZX81 Spectrum



ALL PROGRAMS AVAILABLE
FOR 16K ZX-81,
SPECTRUM 16K AND 48K.

NEW!

A game of oil exploration and exploitation in Texas. Decisions are required on purchasing concessions, the movement and use of drilling rigs, and the building of platforms and pipelines. Can you take-over the Ewing Empire, or will you be taken-over in the attempt!

As MD of a Catering Company you must negotiate for leases, decide on menu prices, level of wages, advertising and dividends. Each year you must predict the inflation rate. You will be made to resign if you are not successful. There are 3 levels of difficulty.

FINANCIAL MODEL — MODELLER X

This is a user friendly business modeller which provides Managers with a tool to plan the strategic decisions of a business. The model shows the profit sensitivity and the interaction of the pertinent marketing and production factors of a business. A user manual is included in the price of the program.



EXCELLENT ROYALTIES
PAID FOR SINCLAIR
SOFTWARE.

ZX81 or SPECTRUM

Dallas, Airline, Autochef, Print Shop
Modeller X

* Extended 48K Spectrum now available.

MAIL ORDER DISCOUNT £1.50 for two, £3 for three, £5 for four and £7 for the five.

Please state computer type and send cheque to:-
DEPT.S., CASES COMPUTER SIMULATIONS
14 LANGTON WAY, LONDON SE3 7TL.

16K 48K*

10R	40R
£5	£6
£8	£9

If you prefer to have a demonstration before buying, our stockists are as follows:

LONDON

Data-assette, 44 Shroton Street, N.W.1.
Buffer Micro Shop, 310 Streatham High
Road, S.W.16.

BATH
BOURNEMOUTH
DAVENTRY
LEICESTER
MANCHESTER

Micro Style, 29 Belvedere, Lansdown Road.
Zedextra, 5 School Lane, Kinson.
Micro Style, 67 High Street.
Microwave, Unit 5, St Peters Lane.
Micro-Link, 830 Hyde Road.
J.M. Computers, 136 Park Lane, Whitefield.
Micro Style, 47 Cheap Street.

NEWBURY

ZX SPECTRUM POCKET BOOK

160pp **£6.50**

Trevor Toms, best selling author of the ZX81 Pocket Book and the Sinclair Learning Lab, turns his attention to the ZX Spectrum — the book you have been waiting for! All the material in the book is totally new.

Programs

- Castle walls; boiling oil and lovely slurping noises
- Great Fire of London; try and change the course of history
- Chase; outwit the pursuing robots and lead them to their doom
- Truly amazing; generate a new maze puzzle every go
- Reversi; the classic oriental strategy game with board screen display
- 3D Maze; race against time and three dimensions to escape.

Also Available ZX81 Pocket Book 138pp£5.95
ZX80 Pocket Book 128pp£4.95
Atom Business 110pp£7.50

Hints & Tips

Discover new ways of using PRINT; INSTR functions, VAL, PRINT USING, hexadecimal conversion, upper case conversion, load and save arrays. BEEP with sliding tones, automatic scroll and how to use all the machine features within machine code.

Machine Code

All the tools you need to write machine code effectively. Graphics tool kit — debug monitor — symbol assembler (with labels, all ED commands, ORG statements, forward and relative jumps) — disassembler (with label assignment); now you can really dig into the Sinclair ROM! This section alone would be stupendous value for money!

Cassettes Spectrum games as opposite£5.00
Spectrum machine code as above£5.00
for ZX81 Nowotnik Puzzle, Demolition & Tenpin £5.00
3 Adventures: Greedy Gulch,
Prices Magic Mountain, Pharaohs Tomb£5.00
include VAT ZX81 Pocket Book Cassette£5.00

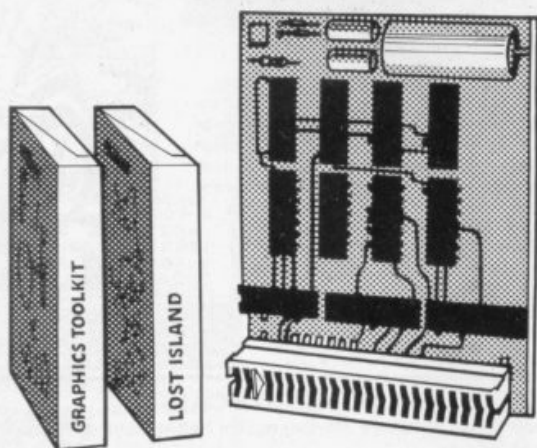
PHIPPS ASSOCIATES

Dept B FREEPOST EM463 (No stamp required)
99, East St, Epsom, Surrey KT17 1BR.
Telephone 03727-21215. 24hr phone service.

Prices include postage but for air mail delivery in Europe add 90p (outside Europe add £2.20) per item.



16K ECONOPAK



16K ECONOTECH RAM **AND** GRAPHICS TOOLKIT
plus either LOST ISLAND **or** GAMES TAPE II
SAVE £7.35! Total package price only £24.50

ZX81

Hardware

Econotech 16K RAM (uncased) Only £20.95
JRS 16K RAM Only £26.50
JRS 64K RAM Only £62.95

Software

Programmers Toolkit (16K) Only £4.95
Graphics Toolkit (16K) Only £5.95
Lost Island (16K) Only £4.95
Games Tape II (16K) Only £4.95
Battleships (16K) Only £4.95

SPECTRUM

A full range of software and hardware are available. Tick the coupon below for your free 1983 catalogue and enclose a large stamped addressed envelope.

I wish to order the following:

<input type="checkbox"/> 16K Budget Pak with Battleships	Only £27.75
<input type="checkbox"/> 16K Budget Pak with Games Tape II	Only £27.75
<input type="checkbox"/> Econotech 16K RAM	Only £20.95
<input type="checkbox"/> JRS 16K RAM	Only £26.50
<input type="checkbox"/> JRS 64K RAM	Only £62.95
<input type="checkbox"/> Programmers Toolkit (16K)	Only £4.95
<input type="checkbox"/> Graphics Toolkit (16K)	Only £5.95
<input type="checkbox"/> Lost Island (16K)	Only £4.95
<input type="checkbox"/> Games Tape II (16K)	Only £4.95
<input type="checkbox"/> Battleships (16K)	Only £4.95
<input type="checkbox"/> 1983 JRS Catalogue	Free

Tick as applicable Total (Including VAT & P&P)

Name Age

Address

**Post to: JRS SOFTWARE, Department SU2
19 Wayside Avenue, Worthing, Sussex BN13 3JU**

JRS SOFTWARE

19 WAYSIDE AVENUE, WORTHING, SUSSEX. BN13 3JU Telephone: (0903) 65691



Microl packages are well worth the wait

CUSTOMERS finally have started to receive their Spectrum software packages from MiCROL and the general impression of the **Use and Learn** and **Spreadsheet** cassettes is very good. Use and Learn consists of a software cassette and well-presented booklet containing explanation and listings of the programs on the cassette.

The first program is an excellent music composer which draws manuscript lines and notes played on the screen as a tune is composed. When the tune has been completed the composer can listen to the music.

The cassette also contains a variety of novel and interesting games, including one in which you have to make a parachutist jump from an aircraft 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

than one-tenth of the price. Compared to the Vucalc spreadsheet produced for the Spectrum by Sinclair it is much clearer and slightly easier to understand. Its one failing compared to the Sinclair version is that it is slower. The decision when choosing to buy either must be a

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

IT IS too cold to go and play a round of real golf, so why not settle in your armchair and play a round on the Spectrum? This version of **Golf** for the 16K Spectrum shows a graphic view of the holes, rough, trees, fairway and lakes. To make a shot the player selects a number, imagining that the ball is the centre of a clock-face.

You then choose the

strength of the shot and 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 B S McAlley, 78 Hedgerley, Chinnor, Oxon OX9 4TJ 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

IF YOU have always wanted to manage a football 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 Division.

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

After you have selected your team you will be given a position in the league table, usually at the bottom of the Fourth Division. A team will be selected for

you to play and highlights 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 do too much of one the other suffers.

The game is ideal for a football fanatic but the most interesting thing for us was the 3D graphics used to create the goalmouth. The league tables, players' records

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, **Leapfrog** and **Number Reversal**, are very simple games and use block graphics, no colour and no sound. The idea behind both is to get into correct 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 the tape are much better and make up for the simplicity of the first games.

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

SOFTWARE manufacturer J P Gibbons seems to have money on the mind with two new 16K Spectrum

cassettes just reaching the market. One, **Casino 1**, is concerned with gambling away money and the other, **Personal Banking System**, is concerned with saving it.

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 of numbers flashes on to the screen. If it stops on your spot you win the pot, if it does not you lose your stake.

Personal Banking System allows a user to keep an accurate record of financial affairs. It will keep track of standing orders and even locate a specific cheque through its number. The system is user-friendly and supports separate data files.

Casino 1 costs £4.95; Personal Banking System 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 is available from 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 programs, with some others, on to one cassette.

Sketchpad can be used to draw pictures using a cursor, the circle command and the Draw command. The pictures can then be saved on to cassette tape.

Lunar Lander and Mastermind are both fairly standard programs. The lander program gives you a spacecraft to land, using the cursor keys, on the surface of the moon. The problem with most of the programs is that you must ensure that the computer is in CAPS mode or the programs will not respond to commands.

On side two of the cassette is a character generator which will allow you to define your own character set. When it has been defined the new character set can be viewed on screen and SAVED.

The redeeming feature of this package is the diassembler on side two of the cassette. You can list machine code in standard Z-80 mnemonics or assemble your own Z-80 program



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 or you can have any two for £4.95.

New ZX-81 ideas

MICROMEGA, renowned for its business software on the ZX-81, has a cassette of machine code games for the little machine. **Challenge**, for the 1K ZX-81, presents some original and clever ideas. Two of our favourites are **Cartoon Man** and **Juggler**. In the first a little man walks across the screen. You can control his movement using the shift and BREAK keys and increase his speed using number keys.

Juggler is almost the same but he juggles while moving. The idea is to keep the balls in the air.

Road Race is a fast action racing game, a race between two cars on a map, starting in London. The cars are on separate roads but you can go on to your opponent's road during the game. If you cross on to the other car's road in London you cannot pass but if you change in

Galaxy battle sets a new trend

GALAXY CONFLICT is one 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-

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 Dillingburgh Road, Eastbourne, East Sussex BN20 8LY. It costs £9.95.

Better part of Sinclair range

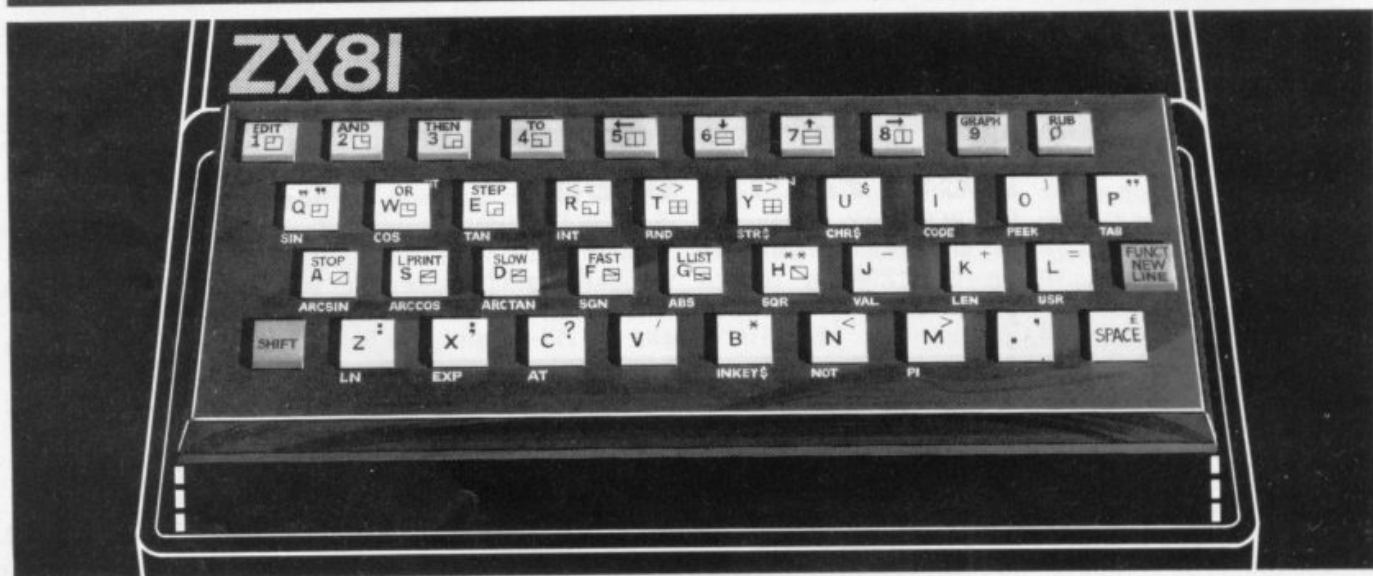
THE NEW **Flight Simulation** program from the Sinclair Research Spectrum software library is one of the better offerings in that range. The program runs on a 48K Spectrum and gives you the opportunity, for a short time at least, to become the pilot of a light aircraft.

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.



NOW. A ZX81 PUSH-BUTTON KEYBOARD FOR UNDER £10.



At last there's a really cheap but efficient way of ironing out the ZX81's only real bug: its keyboard. The Filesixty Buttonset offers

- A full-travel calculator-type moving keyboard for only £9.95.
- Installed in seconds. The peel-off adhesive backing means you just register into position and press.
- No messy labels, dismantling or soldering.
- 3 groups of colour keys to pick out shift, numerals and newline.
- Precision moulded in ABS to match your ZX81, with contrasting legends for maximum legibility.

Allow up to 28 days for delivery.
Orders to Filesixty Ltd., 25 Chippenham Mews, London W9 2AN.

Cheques/PO made payable to Filesixty Ltd.

Please send me _____ (qty.) Buttonset(s)
at £9.95 each (including VAT and P&P).

Total £ _____ BLOCK CAPITALS

Name _____

Address _____

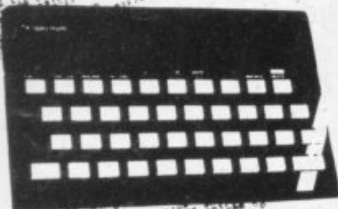
SU2

FILESIXTY

ANDREW HEWSON'S BOOKS

20 BEST PROGRAMS

for the ZX SPECTRUM WITH EXPLANATORY TEXT



ANDREW HEWSON

NETT
PRICE
£5.95

Program titles include:

Machine Code Editor — Write, modify, extend and load machine code using this all-basic program. No need to use an Assembler when you have this program.

Index File — Learn about fixed length records, save numeric and string information, add to, sort, modify, delete and print your records. Ideal as a computer based filing system.

Duckshoot — Learn how to manipulate the attributes file and have fun at the same time.

Graphix — Construct up to 210 graphics characters with the full on-screen editing facilities, enhance and modify them and recall them later to build a detailed display to save on cassette.

Spiromania — A program to stretch your artistic talents, imagination and ingenuity. Draws a limitless variety of curves and spirals.

Plus: FOOTBALL, DIGITISER, DIARY and many more.

Available through Computer Bookshops and W.H. SMITH.

Mr HELPLINE — the man who answers your ZX queries in his column in *Sindair User*, the author of *HINTS & TIPS FOR THE ZX80* and *HINTS & TIPS FOR THE ZX81* now presents:

★ 20 original programs for you to load into your Spectrum.

★ 20 interesting programs for you to enjoy and learn from.

★ 20 great programs to teach you about fixed and variable length records, binary searches, bubble sorts, graphic displays and much, much more...

FOR THE SPECTRUM

40 BEST MACHINE CODE ROUTINES FOR THE ZX SPECTRUM

£5.95

by Andrew Hewson and John Hardman.

Section A: Three chapters explaining what you need to know about Z80 machine code on the Spectrum.

- ★ How to load and save machine code.
- ★ How to use the system variables.
- ★ How memory is organised.
- ★ How program lines are stored.
- ★ How to use the stack, the display, the attribute files.
- ★ How to call ROM routines — where they are and what they do.
- ★ The structure of Z80 code — plus a valuable glossary.

Section B: 40 routines including,

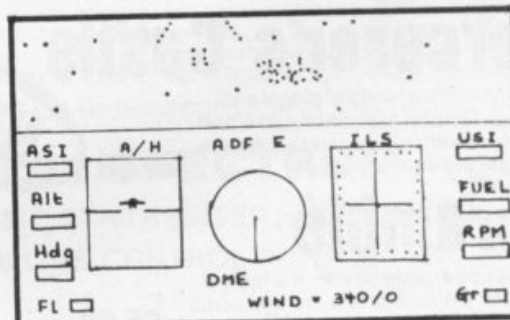
- ★ Scroll — up, down, side to side by pixel or by character.
- ★ Search and replace, token swap, string search.
- ★ Rotate character, invert character — horizontally and vertically.
- ★ Line renumber — including GOSUBs, GOTOs, RUN etc.

All routines are relocatable (except 'line renumber')

This book teaches the beginner all he needs to know in a simple, easy-to-learn form and its an invaluable reference work for the expert too!

NIGHTFLITE FOR ZX SPECTRUM

£5.95



Fly your own aircraft from take off to landing via navigational beacons, over mountains and using a fully detailed direction finding and instrument landing system. *You are the Pilot of a light aircraft flying at night. *You must use your skill and judgment to fly your aircraft accurately over radio beacons and then land safely on the runway. *Hazards are mountains and cross winds. *Instruments: Artificial Horizon, Non Directional Beacon, VHF Omnidirectional Range, Instrument Landing System. *Readouts: Gear, Flap, Air Speed, Distance Measuring Equipment, Vertical Speed, RPM and heading. *Visual display of runway on approach. *5 Modes from Take off to Autopilot. *Happy landings.

Z80 OP CODES

£1.45

A must for the beginner and the experienced programmer alike. This handy ready reckoner lists all 600 plus Z80 machine code instructions in decimal and hexadecimal with their mnemonics. Each Op Code is succinctly explained and cross-referenced. Supplied in a protective transparent wallet for easy reference and durability.

PILOT ZX81

£5.95

Essentially the same as Nightflite but without the hi res graphics.

PUCKMAN ZX81

£5.95

All action display. Best score to date, scour the maze for food, dodge the ghost, eat a strawberry and attack the ghosts.

HINTS & TIPS FOR THE ZX81

£3.95

Available by direct mail order or through computer bookshops and W.H. Smith.

THE PROGRAMS

The programs advertised here are available from computer bookshops with a software stand, and many independent micro-computer shops.

RETAILERS

We are continually on the look out for new outlets. If you are interested in stocking the items advertised here, write to us for our trade rates.

URGENT

We require high quality Spectrum and Dragon software. Good royalties paid. Send your samples today for fast evaluation.

QUANTITY	PRODUCT	COST
TOTAL		

MAKE CHEQUES/PO's PAYABLE TO: HEWSON CONSULTANTS.

NAME
(block capitals please)
ADDRESS

My Access/ Barclaycard No. is

Signed
Post to: HEWSON CONSULTANTS, DEPT SU 60A St MARY'S STREET, WALLINGFORD, OXON OX10 0EL.
TEL (0491) 36307.

Great games for your Spectrum

from **MIKRO-GEN** the leaders
in ZX games



Sorcerer's Castle

Takes you into a world of magic and mystery. Graphical position and a host of options with this exciting adventure game for the 48K Spectrum

£5.50

NEW

Scramble

High-speed arcade game – the fastest available. Thrust, altitude, fire and bomb controls. For 16K or 48K Spectrum.

£5.50

Masterchess

Ten levels of play + change sides or level in mid-game + set board to any position + scrolling history + displays your moves and computer's + copy display & history to printer any time + save game at any point + recommend move option + plays all legal moves + indicates illegal moves + Chess Clock on reverse. A powerful, adventurous and enjoyable 48K program

£6.95

the program
for the
real player!

And for your ZX81:

Scramble ★ Frogs ★ PaintMaze ★ ZX Chess ★ Breakout
★ Space Invaders ★ Asteroids ★ Tempest ★ 1K Games-
pack ★ Debug

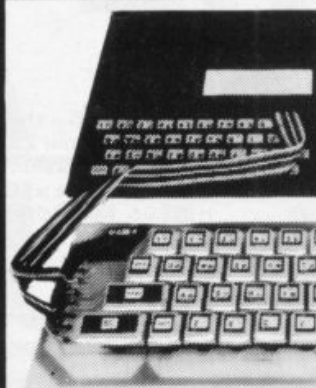
All supplied on cassette with library case £3.95 (ZX Chess £6.50)

Write for full details of the Mikro-Gen range of programs and add-ons, available from local stockists or direct from the manufacturers (please make cheques/PO's payable to Mikro-Gen and add 40p post & packing)

Suppliers of Software to Sinclair

MIKRO-GEN

24 Agar Crescent Bracknell Berks RG12 2BK
Tel: Bracknell (0344) 27317



Keyboard with Electronics for ZX81

A full-size, full-travel 43-key keyboard that's simple to add to your ZX81 and requires no soldering in the ZX81.

Complete with the electronics to make "Shift Lock", "Function", and "Graphics 2" single key selections making entry far easier.

Powered from ZX81's own standard power supply – with special adaptor supplied. Two-colour print for key caps.

Amazing low price for complete build-it-yourself kit, only £19.95 incl. VAT and carriage.

Order As LW72P

Full details in the June 1982 issue of "Electronics – The Maplin Magazine" on sale at all good newsagents price 60p. In case of difficulty send 60p to address below, or £2.40 for annual subscription (4 issues).

MAPLIN

Electronic Supplies Ltd

P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel (0702) 552911

Retail shops at

159 King St., Hammersmith, London W6. Tel: 01-748 0926

284 London Rd., Westcliff-on-Sea, Essex. Tel: (0702) 554000

Lynton Square, Perry Barr, Birmingham. Tel: (021) 356 7292

(Shops closed Mondays). All mail to Rayleigh address.

ZX-81 HI-RES GRAPHICS PACK

- Fully programmable 256 by 192 pixel hi-res display
- Powerful Hi-Res-BASIC monitor in 2K EPROM includes PAGE, PLOT, PRINT, SCROLL, INV, CLS, COPY, END
- Includes LOWER CASE CHARACTER SET for word processing
- Full dynamic control of USER DEFINABLE GRAPHICS
- Slim, stylish case fits between ZX-81 and RAM pack
- No additional power supply or soldering necessary
- Complete with Hi-Res Handbook. Fully guaranteed.

PRICE £49.95 inc. Please allow 28 days delivery.

***** ZX-81 FIGHTER PILOT *****

15 feet . . . 7 feet . . . TOUCHDOWN! Instrument landings are not always as easy as this. You are in full control from take-off to landing during this real-time flight simulation of a jet fighter. Written by pilots – tested by pilots – for you to fly like a pilot.

'An excellent program!' Capt. H. Senior, British Airways pilot.

Requires 16K RAM only

Super value at £4.45 inc.

***** ZX-81 NIGHT GUNNER *****

Enemy aircraft approaching . . . BATTLESTATIONS!! Waves of enemy fighters swooping in for the attack! Can you survive another mission? This is the ULTIMATE challenge.

An entertaining machine code game with excellent graphics.

Requires 16K RAM only

Highly addictive! £4.95 inc.

Now available in W.H. Smith and other retailers.

All products guaranteed – refund if not satisfied

DIGITAL INTEGRATION
Dept. SU
22 Ash Church Road,
Ash, Aldershot,
Hants GU12 6LX.

MAIL ORDER ONLY
Overseas add 55p per tape,
and £2 p&p for Hi-Res
Pack. SAE for Hi-Res
data sheet.

NEWSOFT PRODUCTS

16K SOFTWARE FOR SINCLAIR ZX81 AND SPECTRUM

3D SPECTRAL MAZE

Fast action. 3D maze. Superb plot and draw routines. Make this specially commissioned program one that you must see.
SPECTRUM ONLY

SECRET VALLEY

A complex role-playing adventure with great graphics and full sound effects!

ZX81 OR SPECTRUM

TIME BANDITS

Two programs for the price of one! Side A has five fast action games. Practice them now before running Side B or you will not survive long in this magical adventure.

"Perhaps the most original of the new graphic adventure games (Eric Deeson, Your Computer, November).
ZX81 OR SPECTRUM

THE GREAT WESTERN

Arcade Adventure in the Wild West. Shoot the Moose, hunt the gold or fight the Indians. You have to be fast to survive the journey.

ZX81 OR SPECTRUM

ROULETTE

The Original Microcomputer Roulette. The only program to allow all legal bets within 16K. Excellent graphics. Can be used to test any system!

ZX81 OR SPECTRUM

The Black Dwarfs Lair

An impossible chase through the underground tunnels of the Black Dwarfs Caverns. Virtually unbeatable. Try it if you dare.

SPECTRUM ONLY

Cassettes £4.95 each — £8.00 for any two.
Please specify which version required — ZX81 or Spectrum

NEWSOFT PRODUCTS
12 WHITE BROOM ROAD, WARNERS END
HEMEL HEMPSTEAD, HERTS, HP1 3PU



Crystal

Innovative ZX Software

MERCHANT OF VENUS (ZX81 + 16K RAM)

This absorbing graphics game combines the skill of 'Lunar Lander' with the judgement of 'Stock Market'. With your freighter you have the freedom of the skies above the cities and spaceports of Venus. Each area of the planet has its own market prices for goods and fuel and you must discover the most profitable routes to work. Careful trading can make your fortune, but beware — upkeep of your ship is expensive and poor landings could cost you heavily in repairs. Start trading today for only £5.95.

CRYSTAL MACHINE CODE (ZX81 + 16K RAM) MONITOR AND DISASSEMBLER

This comprehensive program takes all the effort out of entering, editing, debugging and running your machine code. Occupying less than 3 1/2 K above RAMTOP its features include:

- 19 one-touch 'keyword' commands
- A full editing system
- High speed LOAD and SAVE
- RUN with breakpoints
- A Hex to Decimal and Decimal to Hex converter
- Print, Tabulate and Copy blocks of memory
- Display and alter CPU registers

This essential aid for all machine code users is fully compatible with your BASIC programs and comes complete with a detailed instruction manual for only £8.95.

SYMMETRICAL CRYSTAL 1K GAMES TAPE

Simply the ultimate in 1K games. Four flicker free fast action games all with on-screen scoring plus a challenging puzzle to solve:

- ASTRAVOID** Dodge the asteroids! Dock with Pods to refuel. How long can you survive?
- INVADERS BOMBER** Blast the advancing aliens before they land. Full screen display. Flatten the rocky wastes below to clear a landing strip for your damaged plane. Special HI-SCORE feature plus full screen display.
- SUPER SLALOM** Can you beat the elusive 10 second barrier?
- DUNGEON QUEST** Dwarves, Trolls, Dragons, Wizards and more! You must solve the hidden mysteries of the dungeon to free the imprisoned Princess.

Five great machine code programs for just £4.95.

Send s.a.e. for our latest catalogue
Please add £0.50 p.p. and make cheques/POs etc payable to

CRYSTAL COMPUTING
291-293 Station Road, Dunscoft
DONCASTER DN7 4DY

Every computer needs a

CHATTERBOX!

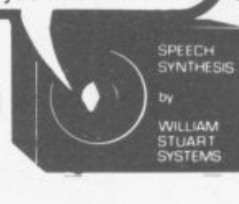
"OK Spock, you win this time...."

SAVE £££s

NEW!

for
**ZX81
SPECTRUM**

NASCOM, VIC, PET,
BBC, APPLE, TRS80,
IBM, CRAY, ETC.
(Please state)



SPEECH
SYNTHESIS
by
WILLIAM
STUART
SYSTEMS

ONLY

£49

At last! Genuine phonetic synthesis at a sensible price. Gives your computer an *unlimited* vocabulary (nothing more to buy!). Self contained speaker/amplifier, Sinclair connector etc, **PLUS** Expansion socket for BIG EARS AND Monitor socket for Music Board. Full instructions, technical notes and programme examples supplied with this outstanding educational unit.

OR COMPLETE D.I.Y KIT **£39**
DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

* BIG EARS *

SPEECH
INPUT
FOR ANY
COMPUTER



Hugely successful Speech Recognition System, complete with microphone, software and full instructions.
BUILT TESTED & GUARANTEED ONLY **£49**
PLEASE STATE COMPUTER: UK101, SPECTRUM, ATOM, NASCOM2, Vic 20, Micron, ZX80/81, PET, TRS80, MZ80K, APPLE II, BBC MICRO

NEW: FAST MACHINE CODE FOR ZX SPECTRUM **£7.40**

ZX81/SPECTRUM

MUSIC SYNTHESISER (STEREO)

+ 16 LINE CONTROL PORT



Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency. Input/Output lines provide control and monitor facility for Home Security, Robot Control, Model Railway etc. etc. Works with or without 16K RAM.

Add keyboard to make a live performance polyphonic synthesiser! Full instructions/software included.

AMAZING VALUE AT ONLY **£19.50** (KIT)
Extra 23 way connectors at £2.60
£25.50 (BUILT)

THE COMPOSER

Music Programme for above synthesiser.

Enter and play 3 part harmony.

Includes demonstration tunes. Recommended **£7.40**

COLOUR MODULATOR

RGB in, PAL/UHF out (not for ZX)

KIT **£15**
BUILT **£20**

SPECIAL OFFER

SPEECH OUTPUT CHIP SX-01

Phoneme Speech Processor

I.C. **£18**

DATA **£0.60**

Please add VAT at 15% to all prices.
Barclay/Access orders accepted by telephone

All enquiries
S.A.E. please

**WILLIAM
STUART
SYSTEMS Ltd**

Dower House, Billericay Road,
Herongate, Brentwood,
Essex CM13 3SD, England
Telephone: Brentwood (0277) 810244





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 ZEAKEER 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.

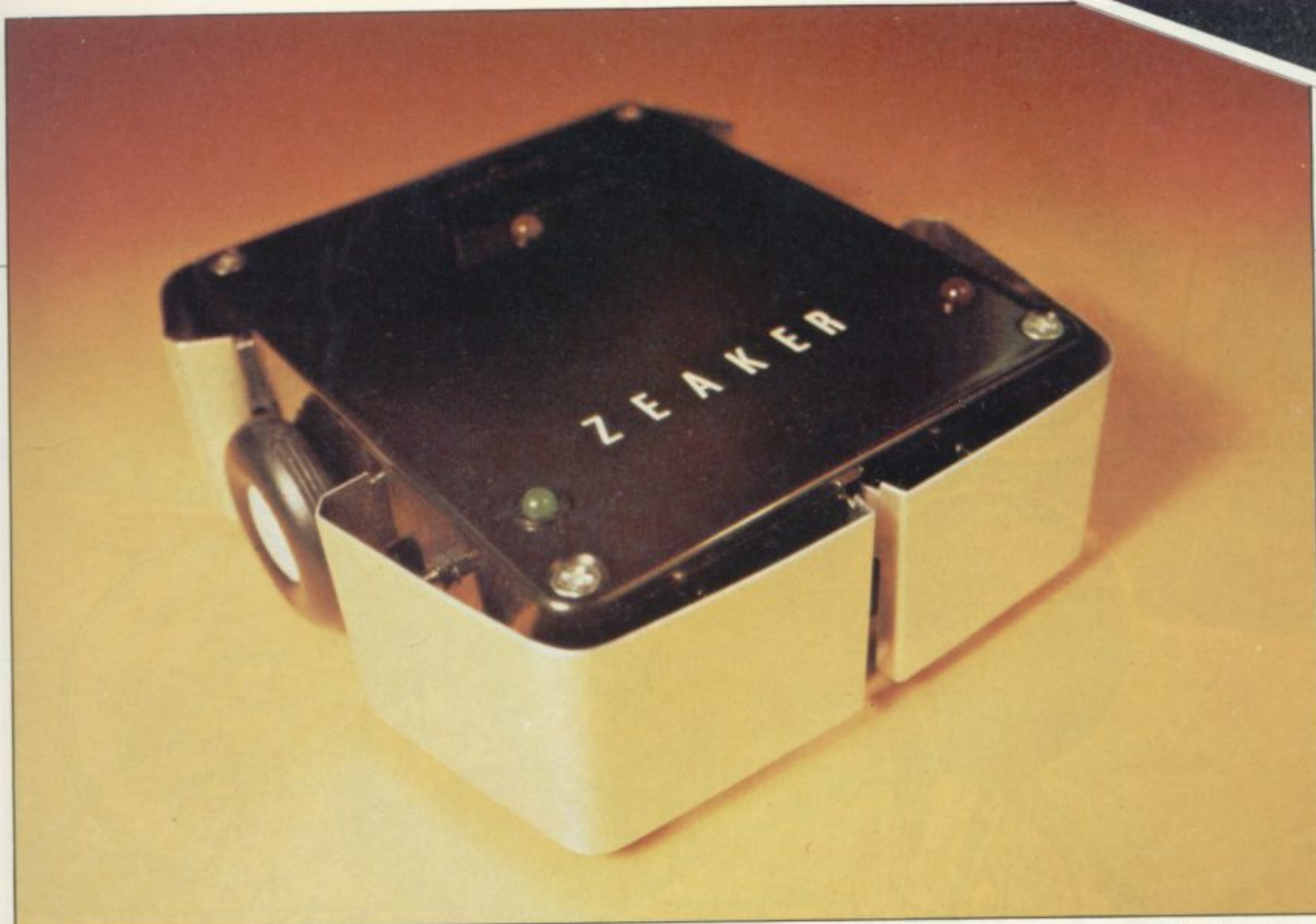
The program in Basic is used to POKE and PEEK at a memory location where a port has been inserted. The demonstration model was running on a Technomatics port but, being Basic, the port used could be any memory-mapped port which provides two eight-bit ports, one input and one output.

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. × 5 in. × 2 in. 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.

COMPETITION-PRO JOYSTICK

PRECISION GAME CONTROL!



For
ZX SPECTRUM
Complete with
stylish interface unit
simply plug in for
instant arcade
action.

**ONLY
£25.00
inc. VAT**

Outstanding Features

- Super strong nylon and steel construction, built to last.
- A total of 8 directions plus 2 large fire buttons.
- Arcade proven moulded leaf switches ensure incredible reliability.
- Complete with self contained boxed interface which simply plugs into the Spectrum expansion port (with or without printer).
- Easily programmed in BASIC or M/C

These arcade games, designed exclusively for the **Joystick** by leading software houses, are now available for Spectrum:

Time Gate	M/C	48K	£6.95
Meteroids	M/C	16K	£4.95
Spooky Man	M/C	16K	£4.95
Cosmos	M/C	16K	£4.95

Watch this space for new software!

I wish to order:

Quantity	Item	Price
		£1.00

Cheques/Postal orders should
be made payable to
Kempston (Micro) Electronics

Post & Packing
Total (VAT inclusive)

Name _____

Address _____

Post to Kempston (Micro) Electronics, Dept
180a Bedford Road, Kempston, Bedford MK42 8BL

SUZ

KEMPSTON
MICRO ELECTRONICS

180a Bedford Road, Kempston, Bedford MK42 8BL



Play curlygons for a novel design

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

AN ARRESTING title, as the policeman said to Lady Chatterley, no doubt referring to a species of Klingon with poodley-wool 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 with deep mathematical significance which, fortunately, it is unnecessary to understand to produce the results.

The fundamental principle used is one which pervades the entire

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

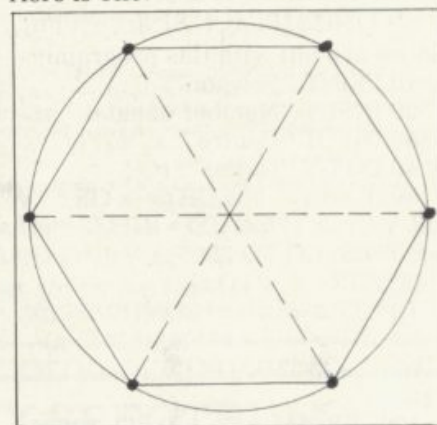
'Incorporate it as a subroutine in other equally simple programs and you can cover the screen in complex designs'

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

be coaxied into doing everything else.

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 — hexagons.

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 would be $360^\circ/n$. 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

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 $r \cdot \cos x$, $r \cdot \sin x$, 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 2π radians. π = key M in extended mode.

What we have to do is to divide that 2π range into n equal bits; obviously we do taking and one n th of it, $2\pi/n$, and then (multiples of that, $i \cdot 2\pi/n$ for $i = 0, 1, 2, \dots, n$). So the corners of a regular polygon of radius r and centre 0,0, lie at points whose co-ordinates are:

$$r \cdot \cos(i \cdot 2\pi/n), r \cdot \sin(i \cdot 2\pi/n).$$

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<y
OR 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 IF i=0 THEN PLOT u,v:GO TO
110
100 DRAW u — PEEK 23677,
v-PEEK 23678
110 NEXT i
□ = 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 ($0 \leq x \leq 255$, $0 \leq y \leq 175$) you have to add the x and y lines 70 and 80.

Line 50 is crashproofing; it makes sure your picture does not go off-screen 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 co-ordinates x_0 and y_0 , 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 x_0,y_0 to x_0+u,y_0+v . That is useful for some applications and a nuisance for others; what you often want is to draw from x_0,y_0 to u,v . You can write

DRAW $u-x_0, y-y_0$
to achieve this but then you need to remember x_0 and y_0 in the program and watch for rounding errors in arithmetic. Instead, you can "lift" their values from the operating system using PEEK.

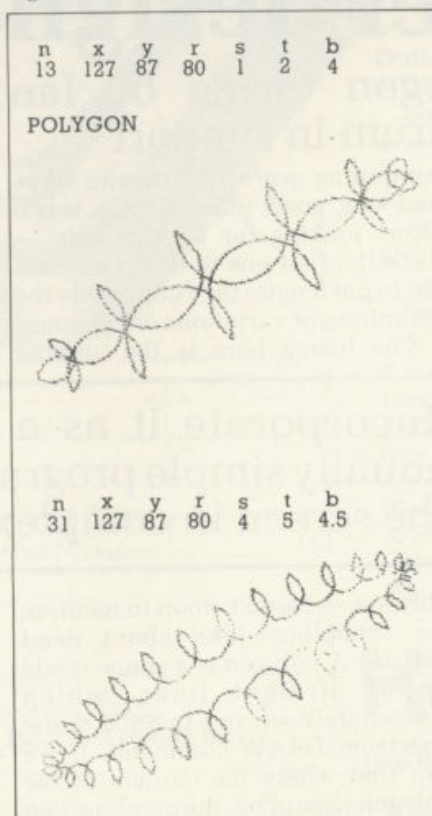
That is the theme program; now for variations. One thing which is easy to do is to twist the polygon into a less regular but still very artistic shape. To that you add the line:

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

```
70 LET u = 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.

$n \ x \ y \ r \ s \ t \ b$
 $n \ x \ y \ r \ s \ t \ b$

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 = 87
13 LET r = INT(1 + 80*RND)
14 LET s = 0: LET t = 0: LET
b = 0
15 GO TO 50
120 NEXT q
(b) 10 FOR q = 1 TO 10
11 LET n = q + 2
12 LET x = 100 + 5*q: LET
y = 50 + 5*q
13 LET r = 40
14 LET s = q/10: LET t = q/5
15 LET b = q/3
16 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.

***** SPECTRUM AND ZX81 SOFTWARE *****

from  SOFTWARE

Specialists in high quality intelligent games

***** SUPERCHESS *****

Play against the most powerful ZX chess program. *10 levels of play *choice of positional or tactical evaluation *substantial book of openings eg. French Defense, Sicilian, Ruy Lopez, Queen's Gambit *high quality display with hi. res. pieces & board, list of moves, playing level. Many more features too: *self-play *recommended move *analyse. Each cassette comes with full instructions.

16K ZX 81 £6.95.....48K SPECTRUM £7.95

***** ZX DRAUGHTS *****

Did you know that a computer draughts program has beaten the world draughts champion! Draughts is an ideal game to apply tree searching techniques to. Our program analyses each position in depth, making it a formidable opponent. Choice of colour, 10 levels of play, at level 5 (response time approx. 20 seconds) it beats its own programmer!

16K ZX 81 £6.95.....48K SPECTRUM £7.95

***** BACKGAMMON *****

Play this fascinating game of skill and chance. High resolution colour display, with dice roll. Can be used by expert players and also has documentation to enable beginners to learn the game.

48K SPECTRUM.....£6.95

***** SPECTRUM SPEECH *****

Yes it's possible! Software driven speech from the Spectrum. Simple to use in your own programs. Each cassette comes with user documentation and demonstration program. No extra hardware is required, uses Spectrum speaker and top 32K ram. SOFTALK 1 "Multiwords" 60+ words (0 to 1 million, plus, add, go, limit, right etc.) SOFTALK 2 "Spacegames" 60+ words (numbers, red, alert, damage, fire, torpedoes, bearing, south etc.)

48K SPECTRUM.....£6.95 each

***** SPECTRUM ASSEMBLER *****

An essential aid for m/c programmers. User documentation supplied with each cassette. 16K and 48K SPECTRUM.....£4.95

All prices are inclusive. Dispatch within 48 hours of receipt of order. Send cheque or postal order (and state whether ZX 81 or SPECTRUM) to:

CP SOFTWARE
17 Orchard Lane, Prestwood, Great Missenden
Bucks. HP16 0NN.

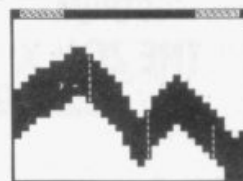
A TOTALLY NEW AND ORIGINAL GAME
FROM SOFTWARE FARM
FOR 16K ZX81

NEW!

the Super Scramble

YOUR MISSION

To penetrate the Witches Defences, Enter her Cavern and Destroy her wicked Heart



THE WITCHES DEFENCES

STALAGMITES AND STALACTITES which grow across your path. Blast a way through with your Lazer Cannon (but beware — a surprise is in store for you!).

VOLCANOES to get past alive — if you can! — an ever increasing amount of white-hot Larva to avoid the closer you get to the witches cavern.

VAMPIRE BATS that cling to your ship, making your controls sluggish and finally (if you are not careful) dragging you down to your destruction.

CAVE-INS should you hit the side of the cave with your Lazer Cannon or Bomb, part of the roof will cave-in on you — the greater the landslides to avoid each time!

THE NEARER you get to the Witches Cavern, the more of her Defences she will throw at you at once. Should you survive all of them (highly unlikely) then you must contend with the Witch herself! Avoid being turned to stone by her spells while attempting to destroy her wicked Heart!

- * 1 or 2 Players
- * Written entirely in Machine Code
- * Mystery Score positions to bomb
- * Hall of Fame
- * 5 Skill Levels

DESTINED TO BECOME A CLASSIC!

AND ONLY £5.95



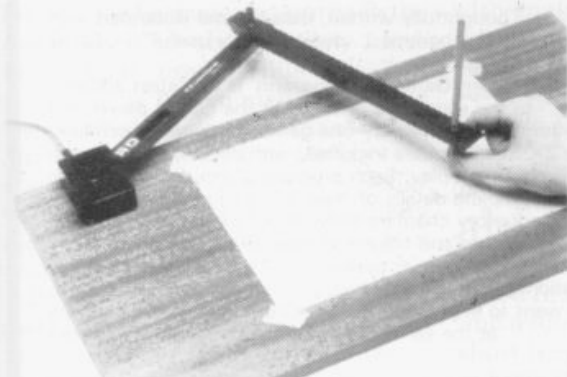
THE SOFTWARE FARM

CRAIGO FARM, BOTANY BAY, TINTERN, GWENT



NEW

INSTANT IMAGE TRANSFER TO ZX SPECTRUM RD DIGITAL TRACER £49.95



(unretouched originals)

The high resolution colour graphics of The ZX Spectrum permit accurate presentation of complex or irregular images — maps, technical drawings, even personalities. But entering individual co-ordinates for unusual shapes can be tedious and time-consuming.

The new RD DIGITAL TRACER cuts out much tedious plotting. It provides instant transfer from original to display file — for screen display in colour, ZX printer printout, or retention on cassette.

The RD DIGITAL TRACER is of immense benefit in many fields — for geographers and weathermen, for engineers, architects and technicians, even for budding Leonardos! Designed for use with the ZX Spectrum, the RD DIGITAL TRACER as supplied is compatible with ZX 81, although high-resolution colour graphics cannot be obtained on this machine.

The RD DIGITAL TRACER is available only from RD Laboratories. The price of £49.95 includes P & P and VAT. Send your cheque now for delivery in 28 days. (Cheques payable to "RD Laboratories".) The RD DIGITAL TRACER is supplied with tracing sheet, software cassette, and full instructions on use.

Please send me RD DIGITAL TRACER(S) at £49.95 each. I enclose payment of £

Name:

Address:

Send to: RD Laboratories, Dept. YCS, 5 Kennedy Road, Dane End, Ware, Herts. SG12 0LU.

RD Laboratories' policy is to bring sophisticated computer techniques to low-cost computing. RD Laboratories therefore maintain the right to amend specifications at short notice. Please send for further details of the RD DIGITAL TRACER, and the RD 8100 SYSTEM for automatic monitoring, test and control.



R D Laboratories

5 Kennedy Road, Dane End, Ware, Herts. SG12 0LU
(0920) 84380

SOUND with SINCLAIR

MAKE AMAZING SOUND EFFECTS
WITH YOUR ZX 81,
TIMEX Sinclair 1000
or SPECTRUM

THE ZON X

£25.95

incl p&p & V.A.T



The ZON X SOUND UNIT is completely self-contained and especially designed for use with the ZX81, TIMEX Sinclair 1000 and Spectrum Computers. It just plugs in — no dismantling or soldering.

No power pack, batteries, leads or other extras.*

Manual Volume Control on panel — ample volume from built-in loud-speaker.

Standard Sinclair — 16K Rampack or printer can be plugged into ZON X Sound Unit without affecting normal computer operation.

Huge range of possible sounds for Games, Music, Helicopters, Sci-Fi, Space Invaders, Explosions, Gun-shots, Drums, Planes, Lasers, Organs, Bells, Tunes, Chords, etc., or whatever you devise!

8 full octaves. Uses 3-Channel sound chip giving programme control of pitch, volume of tones and noise, all with envelope control.

Easily added to existing games or programmes using a few simple "BASIC" lines or machine code.

No memory addresses used — I.O. mapped.

FULL instructions with many examples of how to obtain effects and the programmes, supplied. Fully guaranteed. British Made.

*Except with Spectrum you need the Spectrum Extension Board Order No. SE1 — Price £6.80 incl. V.A.T.

Payment may be made by Cheque. PO Giro No. 388 7006.
Postal Order or Credit Card.
Export orders: — Bank Cheque. International Money Order.
U.S. \$ or £ Sterling.

BI-PAK

Dept. SU2, PO Box 6
63A High Street,
Ware, Herts.



Access & VISA accepted
Ring 0920 3182 for
immediate despatch

NOW

AT 5 ST. PETERS LANE, LEICESTER

Tel: 0533 29023

(Close to Clock Tower, Large Car Parks, Bus Stn)

THE FRIENDLY TO USER STORE

The first Midlands Region retail shop specialising in SINCLAIR computers.

Wide variety of Hardware, Software, Books & Magazines.

Reliable Cassette Recorder tested for loading/saving on ZX81 and SPECTRUM — only £18.50

MICROWARE SOFTWARE

for Spectrum

ALIEN COMMAND (16k) Testing Invaders style game making full use of Spectrum sound, colour and graphics **£4.75** *NOW STOCKING JUPITER ACE **£89.95***

BACKGAMMON (16k) Play against your computer in this version of the popular board game **£5.00**

BOTH GAMES AVAILABLE SHOP or MAIL ORDER
Trade enquiries welcome.

SOFTWARE WRITERS

GOOD SPECTRUM OR DRAGON SOFTWARE
WANTED. EXCELLENT ROYALTIES

MICROWARE
Leicester
Open 9.30 - 12.00 noon
12.30 - 5.30 p.m.
Closed Monday.

THE SPECTRUM GAMES COMPANION

Bob Maunder

LINSAC

Linsac's ZX Companion series has received excellent press reviews:

ONLY £5.95

"Far and away the best" — *Your Computer*

Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'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 you!

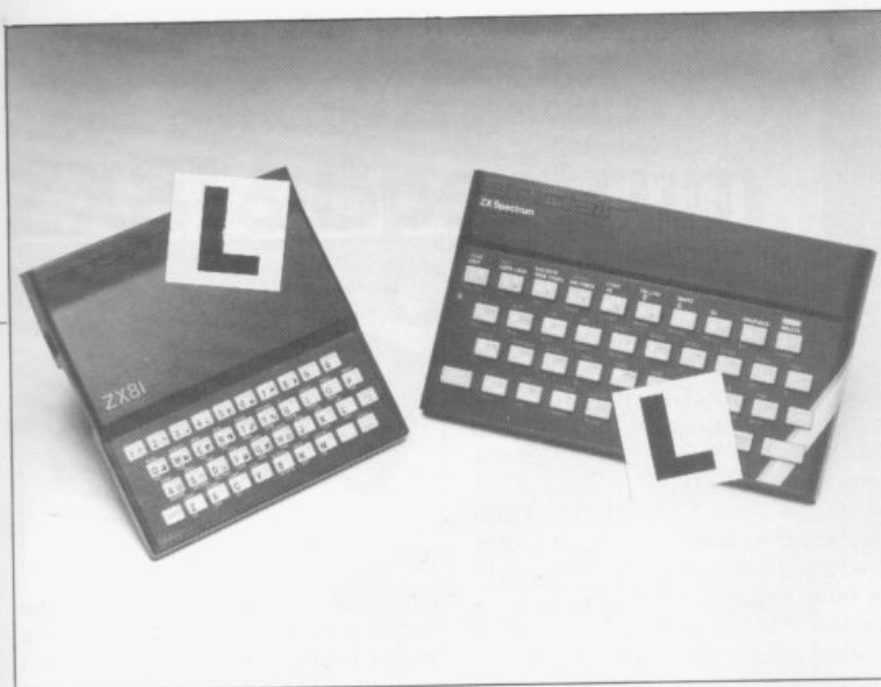
Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

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

LINSAC, () 68 Barker Road, Middlesbrough, Cleveland TS5 5ES

Postage is free within the U.K. — add £1 for Europe or £2.50 outside Europe.

ISBN 0 907211 02 X



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

'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

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

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

continued on page 44





continued from page 43

provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

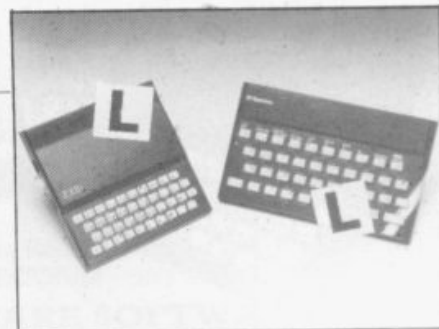
An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but

there can still be difficulties. Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD " " followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then 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.

At Last Your Chance To Crack The Machine Code



ZX81 and SPECTRUM OWNERS

- * If you are interested in finding out how a computer REALLY works and want to experience TRUE PROGRAMMING POWER - THE MACHINE CODE TEST TOOL is the answer.
- * The MACHINE CODE TEST TOOL is a utility program which comes complete with tutorial course enabling you to enter, test, display and debug hexadecimal machine codes simply and quickly.
- * THE MACHINE CODE TEST TOOL is constructed to help the absolute beginner who wishes to explore this fascinating subject, or the expert keen to polish up his machine code programs.
- * A HEX: decimal conversion routine is contained within the program as standard.

Post to: OXFORD COMPUTER PUBLISHING, P.O. Box 99, Oxford

Please send me Machine Code Test Tools at £9.95 each

Tick box for edition required ☐ ZX81 ☐ SPECTRUM
Send cheque/postal order to above address

NAME
ADDRESS
POSTCODE SU2

Allow up to 28 days for postage

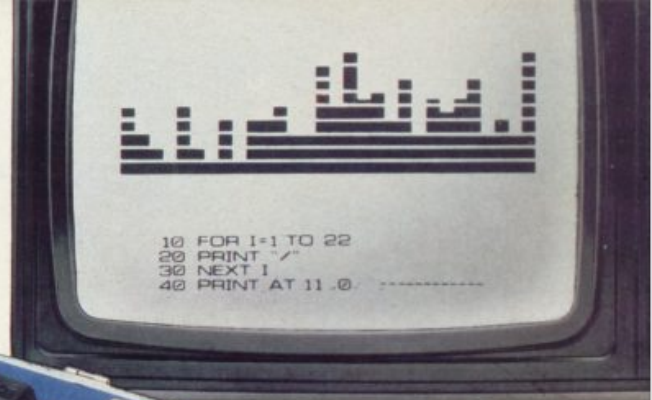
Also available from most branches of
WHSMITH

SINCLAIR USER February 1983

Use your computer in the case...
Foam rubber gives complete protection...
Purpose-built for the ZX system...

ZX81 & Spectrum Custom Cases.

Just £34.95 (+P&P) each.



Turn your ZX system into a portable computing centre!

Your ZX hardware - ZX81 or Spectrum - is designed to work together as a system.

And now there's a simple way to make the most of the fact.

The portable computing centre in a briefcase.

A ZX Custom Case holds all your hardware in the most ergonomically sensible positions for easy operation. Each

piece of equipment is gripped securely by shock-absorbing foam. Each connecting lead fits under the foam, so there's no chance of tangles. And as each piece is held firmly, connections are excellent.

You can forget wasted time setting up or unhooking the system, too. When you've finished, simply tuck in the mains and TV leads and replace the hinged, lift-off lid. And of course, if you're taking your ZX system to college or the office, ZX Custom Cases are a lot less cumbersome than a bag or rucksack. And a lot more protective and professional.

Designed by ZX enthusiasts - for ZX enthusiasts.

Both the ZX81 and Spectrum Custom Cases were designed by a group of ZX system users and manufactured by Britain's leading case makers. Made from impact-resistant ABS, each case holds every piece of Sinclair hardware available for the respective computers - plus Learning Lab, manual, software cassettes and any cassette player up to 10½" x 5½". If you haven't all the hardware, simply leave the pre-cut foam in position, then remove it as you get extra pieces of equipment.

And when brand new hardware is introduced, or you upgrade from ZX81 to Spectrum, simply contact us for a replacement foam insert for just £4.95 (+p&p).

Send for your ZX Custom Case - now!

ZX81 and Spectrum Custom Cases are guaranteed for two years, and cost just £34.95 (+p&p) each. Remember you could pay more for an ordinary briefcase.

To order, simply use the FREEPOST coupon. Or if you have a credit card, telephone 0276 62155, Mon-Fri, 9.30-5.30.

COMPUTEX CASES

Computex Cases (JBS), Stanhope Road,
Camberley, Surrey, GU15 3PS.

Please allow 28 days for delivery. 14-day money-back undertaking.

To: Computex Cases (JBS), FREEPOST,
Camberley, Surrey, GU15 3BR.

Please send me _____ (qty) ZX81 Custom Case(s) at
£36.95 (inc. £2.00 post, packing, insurance) each. 01.

Please send me _____ (qty) Spectrum Custom Case(s)
at £36.95 (inc. £2.00 post, packing, insurance) each. 02.

*I enclose a cheque/P.O. for £
made payable to Computex Cases.

Please debit my Access/Visa*
account no. _____

*Please delete as appropriate. PLEASE PRINT.

Signature _____

Name: Mr/Mrs/Miss _____

Address _____

ZX Spectrum Custom Case now available!





When you buy
Imagine Software
you buy it for life.
If an Imagine
Software product
EVER fails to load
first time simply
return it to Imagine
for an instant free
replacement.

ARCADIA

the name of the game especially created to be the fastest, meanest, most addictive shoot 'em up game you've ever desired. Wave after wave of the most loathsome and deadly aliens billow hypnotically towards your space fighter with deadly intent. But then you have dual Plasma Disruptors and an Ion Thrust Drive haven't you?

ZX SPECTRUM (16K or 48K)

100% machine code with 12 different alien types, incredible animation and explosive effects, sound and the fastest, smoothest hi-res graphics ever!

NEW SCHIZOIDS for any ZX SPECTRUM.

It's my own fault, I even volunteered.

I thought that with the space-dozzer and its shovel and skyhook it would be easy shifting the galaxy's rubbish. Childs play. HUH!

They warned me of the weird packaging, the trays, the rods, and all the rest. But they didn't say I'd have to stop and control not just one but two or even more garbage pods. Then prod them, push them, toward that black hole, and oh, it's so very, very black, and so lonely, so empty.

Panic, musn't panic, but they won't stop, twirling and spinning and turning, always turning, towards me, against me, at me. And I'm alone. No way out, nowhere to hide, on my own, my own... own... SCHIZOIDS: NOT JUST A GAME BUT A STATE OF MIND.

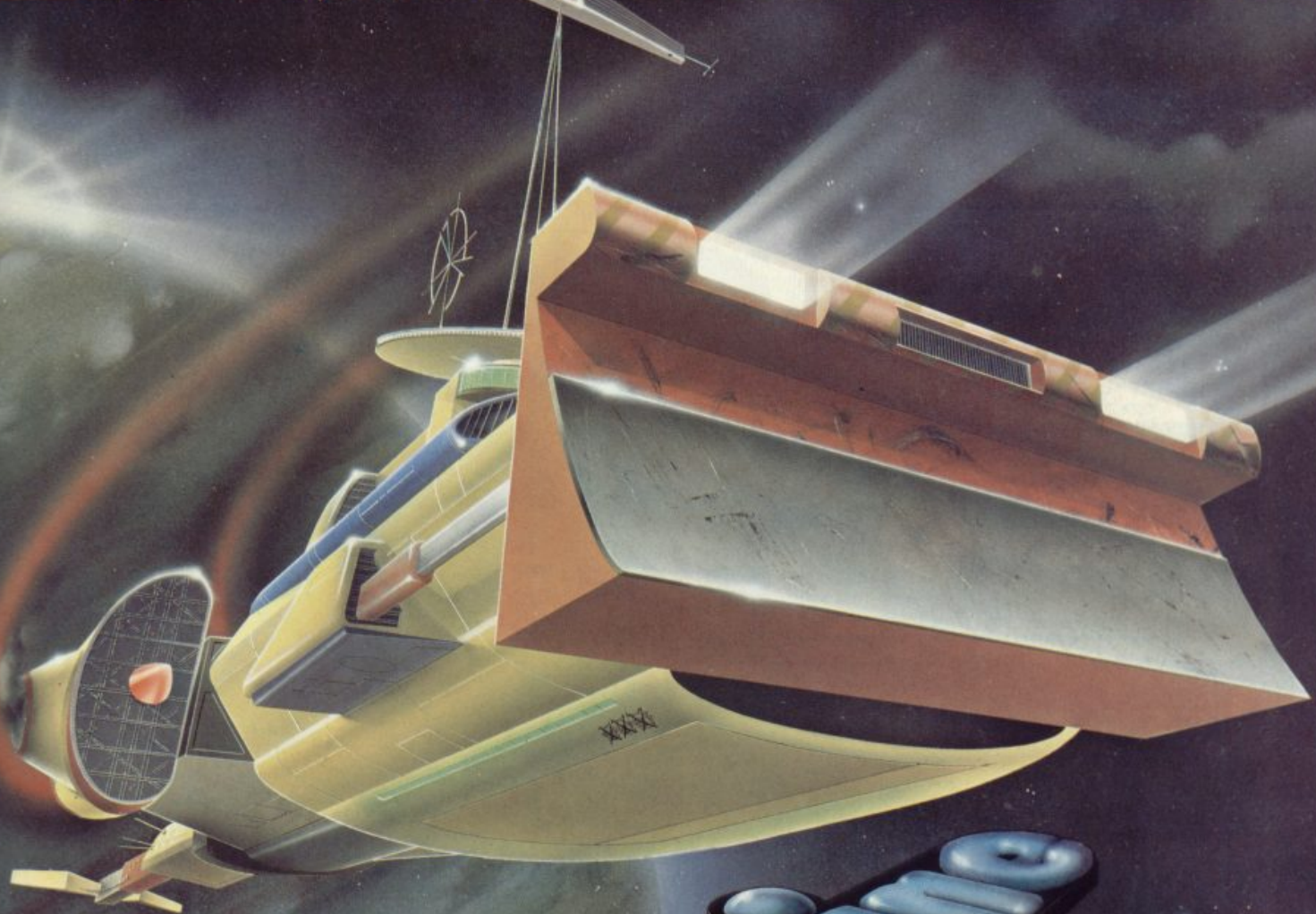
SCHIZOIDS features real-time animated 3d graphics for a breathtaking visual experience, plus sound and all those arcade features you'd expect from IMAGINE.

Game design and Software by Peter Paranoid and the Yid Kids. (D.H.L.)

Imagine Software, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.

Available from all good software outlets
Dealership enquiries contact: Mark Butler

ARCADIA



Both games just

£5.50
EACH

Including first class post, packing, VAT
and an UNCONDITIONAL LIFETIME GUARANTEE

**All orders despatched by first class post
within 24 hours of receipt.**

Why not
put a first
class stamp on
your envelope and
you will receive
your order within
3 days of posting.

Post coupon now to **Imagine Software,
Masons Buildings, Exchange Street East,
Liverpool, Merseyside L2 3PN.**

Please rush me copies of (tick box)

☐ Arcadia ☐ Schizoids for use on any ZX Spectrum

Please debit my Access/Barclaycard (delete as necessary)

Card
Number

I enclose Cheque/PO for £

Name

Address



SUPERFAST CREDIT CARD SALES LINE:

051 236 6849 (24hrs)



SILVERSOFT

ORBITER

A fast and furious arcade action game for the ZX Spectrum, Orbiter is written entirely in m/c code with full arcade features including scanners, reverse, hyper-space, continuous scoring, sound effects and humanoids.

GROUND ATTACK

Survival is the name of the game in this exciting scramble-type arcade game. Fast machine code action with full arcade features.

NEW

MUNCHER

Fruiteatingmonsterbeatingmazemunching creaturecrunchingghostchasingfastamazing Muncher! Fast machine code, maze, race and chase game.

NEW

STARSHIP ENTERPRISE

Soar through the stars in this exciting new space ship simulation. This new, advanced version of Startrek uses the full colour and sound facilities of the Spectrum microcomputer.

ZX 81 Arcade Action List

ZX 81 Compiler	<input type="checkbox"/>	£5.95
Muncher (ZX 81)	<input type="checkbox"/>	£4.95
Asteroids	<input type="checkbox"/>	£4.95
Invaders	<input type="checkbox"/>	£3.95
Alien-dropout	<input type="checkbox"/>	£3.95
Startrek	<input type="checkbox"/>	£3.95
Graphic Golf	<input type="checkbox"/>	£3.95
Super Wumpus	<input type="checkbox"/>	£3.95
Games Pack 1	<input type="checkbox"/>	£3.95

Please send me as indicated.

NAME _____

ZX - Spectrum Software

Orbiter	<input type="checkbox"/>	£5.95
Ground Attack	<input type="checkbox"/>	£5.95
Starship Enterprise	<input type="checkbox"/>	£5.95
Muncher	<input type="checkbox"/>	£5.95

GENEROUS DEALER DISCOUNTS AVAILABLE

Send to:
SILVERSOFT LTD.
20 Orange Street
London WC2H 7ED

I enclose a cheque/PO for £ _____

ADDRESS _____

PROGRAMMERS. Tired of working for nothing, send your programs to SILVERSOFT for a speedy reply.

Northern Premier Exhibitions

proudly announce a ZX fair

MARCH 26th PUDSEY CIVIC CENTRE,
DAWSON CORNER, STANNINGLEY, NR. LEEDS.
(BETWEEN LEEDS & BRADFORD)

MARCH 12th BRUNTON HALL, MUSSELBURGH, EDINBURGH
(MAIN AT ROAD 6 MILES FROM EDINBURGH)

MAY 21st STARS DISCO, QUEENS ROAD, SHEFFIELD.
(NEXT DOOR TO ICE RINK 1/2 MILE FROM CENTRE).

FOR TABLES CONTACT MIKE DONNACHIE 0532-552854 AFTER 4 p.m.

Admission - ADULTS 75p, CHILDREN 50p.
10 a.m. till 5.00 p.m.

HARDWARE, SOFTWARE, BOOKS AND MAGAZINES - EVERYTHING FOR
ZX USERS.

THIS FAIR IS EXCLUSIVELY FOR ZX COMPUTERS.

FED UP WITH SPACE INVADERS? M.C.L.



offers you hours of stimulating entertainment
with their challenging range of wargames for
the SPECTRUM, ZX-81, DRAGON 32

- **PRIVATEER** — A brand new action packed 16K
ZX-81 game. How many enemy ships can you sink.
Price: 16K ZX-81 £4.50

- **SAMURAI WARRIOR** — could you have been
SHOGUN in 13th Century Japan?
Price: Spectrum £5.50/16K ZX-81 £4.50/
DRAGON 32 £6.95

- **TYRANT OF ATHENS** — can you guide Athens to
survival against many other hostile states?
Price: Spectrum £5.50/16K ZX-81 £4.50/
DRAGON 32 £6.95

- **ROMAN EMPIRE** — How good a general are you?
Price: Spectrum £5.50/16K ZX-81 £4.50

- **PELOPONNESIAN WAR** — can you defeat those
nasty SPARTANS?
Price: 16K ZX-81 only £4.50

- **WARLORD** — how well can you protect your village?
Price: 16K ZX-81 £4.50; Dragon: £6.95.

Cheques or PO's please — made payable to:

M.C. LOTHLORIEN
4 GRANBY ROAD CHEADLE HULME
CHESHIRE SK8 6LS

SPECTRUM 16/48K — ZX81 16K

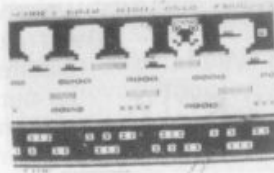


ZUCKMAN ZX81 (16K)

EAT THE DOTS. BEAT THE
GHOSTS IN THIS ADDIC-
TIVE GAME. CLEAR THE
SCREEN OF DOTS TO EARN
A BONUS LIFE AND A
FRESH MAZE-FULL OF
DOTS. WHEN THE CHASE
REVERSES, CATCH A
GHOST AND SEE ITS 'EYES'
RETURN TO BOX.

- ALL MACHINE CODE (10K)
- AUTHENTIC ARCADE
ACTION
- HIGH-SCORE 'HALL OF
FAME'
- TITLE/DISPLAY ATTRACT
MODE

ONLY £5.95 INC P&P



FROGGER ZX81 (16K)

GUIDE YOUR FROG
ACROSS THE ROAD, THEN
CROSS THE RIVER BY
JUMPING ONTO TURTLES
AND LOGS, TO REACH
SAFETY IN A FROG-HOME.
FILL ALL FIVE FROG-
HOMES TO EARN A NEW
'SCREEN' WITH MORE
HAZARDS.

- MOVING CARS, LOGS,
TURTLES
- ALLIGATORS, DIVING
TURTLES
- SAVE BABY FROG FOR
BONUS
- ALL MACHINE CODE
(13.5K)

ONLY £5.95 INC P&P

SPECTRUM 16/48K VERSIONS AVAILABLE SAME PRICE
(NB: Photographs show ZX81 versions)

DJL SOFTWARE

9 TWEED CLOSE, SWINDON, WILTS SN2 3PU
TRADE ENQUIRIES WELCOME

GAMES FOR 16K SPECTRUM

SUPERPLAY-1 £5 by William Smith

Five different games, some of them
entirely original, which should
appeal to fourteen year olds of all
ages!

Using a combination of BASIC and
machine code — for extra zip this
cassette contains the following:-

KONGO Move your man along
girders and up ladders to reach the
terrible kongo. Avoid the deadly
patches of red jelly and watch out
for kongo's patrolling warriors.

ROBOT RESCUE Guide your ship
through a meteor storm to reach
the landing pad and bring the
stranded astronaut back to the
mother ship.

HIGHWAY RUNNER Get your
family of frogs safely across the
M1.

BIG GAME HUNTER Shoot the
advancing hordes of wild lions and
rhinos.

UFO Protect your planet from the
aliens with their deadly torpedoes.
Be sure you don't exhaust your
supply of lasers.

ALL FIVE GAMES FOR £5.

All games feature high score and
on-screen score total.

SOLO-WHIST £5 by J.A. Yates

This is an excellent simulation of
the well known card game and
makes a fascinating change from
the usual arcade type computer
game.

The computer deals the cards and
you play your hand against three
opponents who are controlled by
the computer.

A running total of tricks won is kept
on the screen and you have to use
considerable skill to beat the
computer.

The graphics are of a high standard
and you will soon forget that you
are using a computer and you will
become absorbed in the battle of
wits with your three hard bitten
opponents.

VIDEO SOFTWARE LIMITED

STONE LANE, KINVER, STOURBRIDGE,
WEST MIDLANDS DY7 6EQ, ENGLAND
TEL: KINVER 2462 STD 038 483 2462



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

Easy ways of getting quart into a pint pot

AS 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 program.

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")
```

30 GOTO 20

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 faster.

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 = 15
20 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 possibly the simplest method of saving memory is by the use of constants which are non-varying

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 appears in the program	Byte containing 126-(7Ehex)	Exponent	Four mantissa bytes
storage of the number ten 1.0	126	132	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 relatively-efficient methods of saving memory in this.

If the number is between 0 and 255, the function CODE can be used:

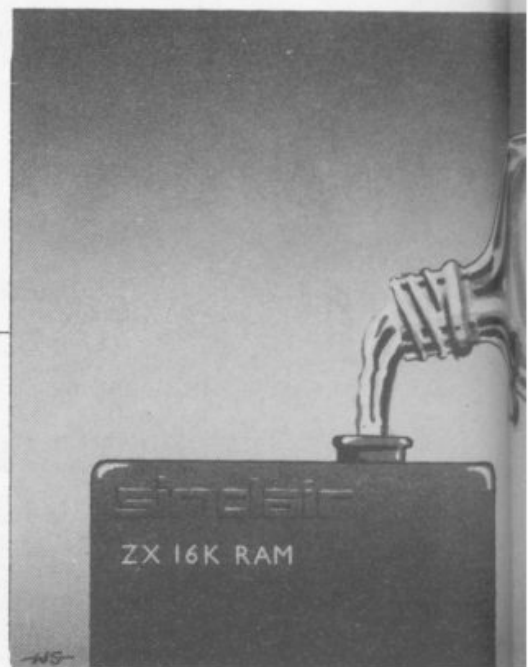
```
10 LET T = 14
can be replaced by:
10 LET T = CODE "14"
```

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

would become
10 LET V = VAL "300"

The use of VAL will save three bytes of memory.





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 initialisation 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.

```

2 LET R=CODE "+"
3 LET N=NOT PI
4 LET U=VAL "2"
5 LET W=SGN PI
6 DIM H$(VAL "5")
10 LET H=N
20 LET S=N
30 LET P=CODE "?"
40 LET Y=R
50 LET X=RND*R
60 LET A$="graphic T,6,Y"
70 IF S>VAL "1E3" THEN LET A$="
C graphicY,7,T"
80 IF S>VAL "2E3" THEN LET A$="
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

```

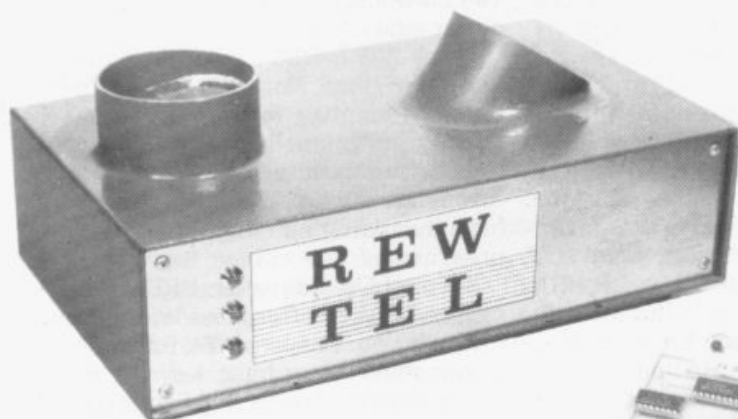
```

120 PRINT AT T,X)A$(U TO )AT Y
130 IF Y>T OR ABS (P-X)>=U THEN
GOTO VAL "140"
131 PRINT AT T,X) "==" AT T,X)C
ODE A$;CHR$ N
132 LET S=S+CODE A$
133 GOTO CODE "C"
140 IF Y<=T THEN LET Y=R
150 LET Y=Y-U*(INKEY$=STR$ N OR
Y<R)
160 LET X=INT (X+RND*3-W-(X>28)
+(X<W))
170 NEXT T
200 IF H<S THEN INPUT H$
210 IF H<S THEN LET H=S
220 PRINT AT R,P) "X*X" AT N,N) "
SCORE ";S;" HI ";H;" BY ";H$
230 INPUT A$
240 CLS
250 IF A$="" THEN GOTO CODE "=="

```


YOUR SINCLAIR AND RADIO & ELECTRONICS WORLD

THE PERFECT COMBINATION



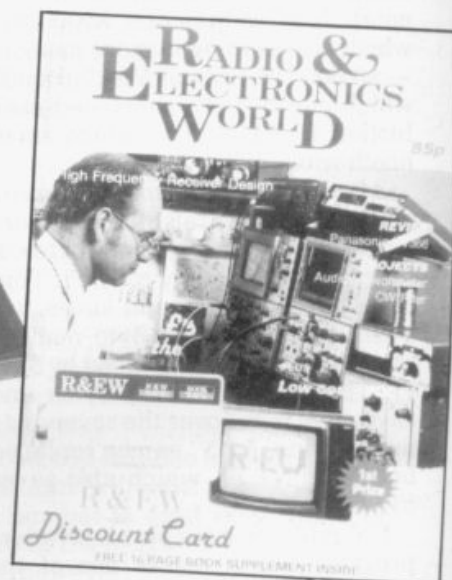
The second great project is an RS232 card for the ZX81. This design enables a ZX81 to both transmit and receive ASCII coded RS232 data. The single-sided PCB plugs into the ZX81's expansion port, and if used in conjunction with our modem, will allow a low cost PRESTEL terminal to be implemented.



Don't miss the February issue of R&EW if you want the low down on some really high quality projects for your Sinclair computer.

Our low cost modem will allow any computer with an RS232 capability to go nationwide, courtesy of Buzby. The design is of a 300 baud originate only specification, yet will only cost about £30 to build.

It's not only February's *R&EW* that has a strong computing flavour – watch out for our March Issue that is to feature a 16-page computing pull-out.



SUBSCRIPTIONS



UK (12 issues) £13.00
Overseas (12 issues) £13.50

If you want to be sure of getting YOUR copy of Britain's most informative Electronics magazine with a strong Computing flavour, **PLAY SAFE AND SUBSCRIBE**. Fill in the form below.

SUBSCRIPTION ORDER FORM

I would like to subscribe to *Radio & Electronics World* for one year (12 issues). Please start my subscription from the _____ issue.

SUBSCRIPTION RATE:
(tick ✓ as appropriate)

UK £13.00 for 12 issues
Overseas £13.50 for 12 issues

PAYMENT:
(Access/Barclaycard orders may be sent using reply-paid order card)

I enclose my (delete as necessary) Cheque/Postal Order/
International money order for £

Please use BLOCK CAPITALS and include postal codes.

Name (Mr/Mrs/Miss) _____

Address: _____

Signed: _____

Date: _____

Please send this order form, with your remittance, to Radio & Electronics World, Subscriptions Department,
45, Yeading Avenue, Rayners Lane, Harrow, Middlesex. HA2 9RL



R&EW – THE ELECTRONICS MAGAZINE WITH A STRONG COMPUTING FLAVOUR

Spectrum Software

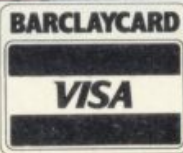
Meteroids • 3D Tanx • Centipede
AVAILABLE NOW! £4.95

Features: Fast machine code, full colour,
fantastic sound effects and define your own play keys **Each**

Send off the coupon today or telephone Gt. Yarmouth (0493) 602453
(24 hrs a day, 7 days a week) giving your Barclaycard or Access number.

dk'tronics

23 Sussex Road,
Gorleston,
Gt. Yarmouth,
Norfolk.
Tel: (0493) 602453



Name
Address

Please send me Meteroids 3D Tanx
..... Centipede @ £4.95 each inc. P&P

I enclose cheque/PO payable to DK Tronics Total £
or debit my ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
Access/Barclaycard.

Signature

Sinclair ZX Spectrum

**16K or 48K RAM...
full-size moving-
key keyboard...
colour and sound...
high-resolution
graphics...**

**From only
£125!**

First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power— personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

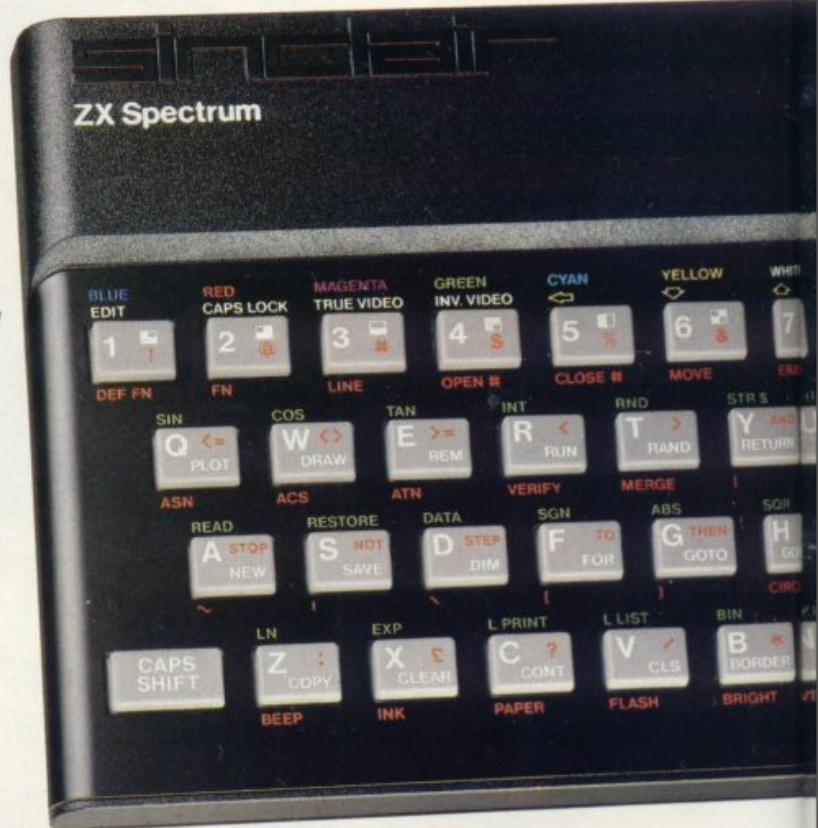
You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can upgrade later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.



Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer—available now—is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour—8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound—BEEP command with variable pitch and duration.
- Massive RAM—16K or 48K.
- Full-size moving-key keyboard— all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution—256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set—with upper- and lower-case characters.
- Teletext-compatible—user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE—16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC— incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum



The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

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 Microdrive – coming 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.

The transfer rate is 16K bytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1983 for around £50.



ZX Spectrum software on cassettes – available now

The Spectrum software library is growing every day. Subjects include games, education, and business/household management. Flight Simulation... Chess... Planetoids... History... Inventions... VU-CALC... VU-3D... Club Record Controller... there is something for everyone. And they all make full use of the Spectrum's colour, sound, and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

ZX Expansion Module

This module incorporates the three functions of Microdrive controller, local area network, and RS232 interface. Connect it to your Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

The potential is enormous, and the module will be available in the early part of 1983 for around £30.

sinclair

Sinclair Research Ltd, Stanhope Road,
Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard,

Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR.

Order

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
	Total £			

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

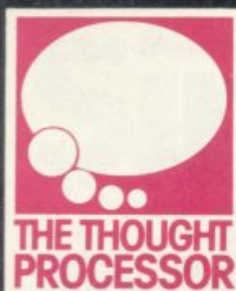
PLEASE PRINT

Name: Mr/Mrs/Miss

Address

SUS 902

FREEPOST – no stamp needed. Prices apply to UK only. Export prices on application.



MICROL[®]

SERIOUS SPECTRUM SOFTWARE only £9.95 each!

USE AND LEARN

Your perfect Spectrum starter Kit. 25 original BASIC programs you can use immediately, PLUS 118 page manual to help you get the most from your 16or48K Spectrum.

25 programs include: Music Composer, World Atlas, Computer Term Glossary, Screen Designer, Star Maps – PLUS games and powerful routines to use in your own programs: graph-drawing, text-editing, sorting, searching and much more. 118 page manual includes detailed description of programming techniques, full listings of all programs, and articles to develop your own program-writing skills.

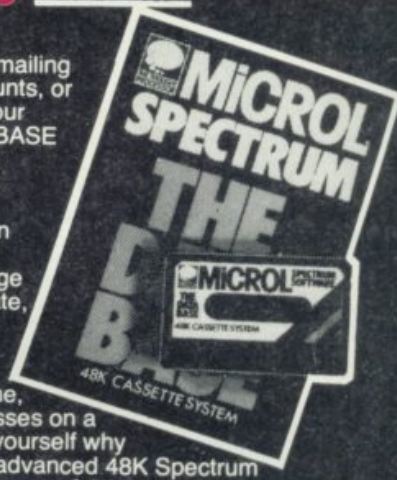
"Excellent" A.R. West, Surrey. "First-time loading, user-friendly, superb documentation" J.E. Mann, Leeds.



THE DATABASE

Whether you want to update mailing lists, manage customer accounts, or simply produce an index of your record collection, THE DATABASE makes it easy and enjoyable.

A breakthrough in power and practicality, THE DATABASE allows you to store information on any subject in the way you want, and gives you a full range of commands to display, update, sort, search and print – even perform calculations. Massive storage capacity: 1,000 lines in memory at a time, over 7,000 names and addresses on a single C90 cassette. See for yourself why THE DATABASE is the most advanced 48K Spectrum database available – far more powerful and practical than Sinclair's VU-FILE and all other "competitors".



THE SPREADSHEET

Based closely on Visicalc, the world's best-selling program, THE SPREADSHEET turns your 48K Spectrum into a "super-Calculator" that helps you solve all kinds of number-based problems quickly and easily. Hundreds of applications in business, engineering and science – and just as versatile for home finance management. Invaluable in education too, helping develop maths ability and confidence. In power, flexibility and ease of use, THE SPREADSHEET outperforms all other Spectrum spreadsheets – including Sinclair's VU-CALC. See for yourself, with the security of MICROL'S 14 day money-back Guarantee.



THE WORD PROCESSOR

The only full feature, professionally-written word processor for 48K Spectrums. Use it to produce memos, letters, reports

– THE WORD PROCESSOR has the features you need, including flexible editing, justification, centering, and automatic "word wrap". Simplicity itself to use, THE WORD PROCESSOR uses the same "what you see is what you get" principle as word processors costing hundreds of pounds more. 20,000 character storage capability for real-work applications, and it's easily adapted to work with full size printers. Once again, MICROL sets the standard in serious Spectrum software.



To order: Simply complete the coupon, and FREEPOST with your cheque, made payable to MICROL (UK Mail Order). All products normally available from stock and despatched by return. Credit Card Orders: By phone 9-5.30 Mon to Sat, stating name and address, Card No. and item(s) required.

MICROL

38 Burleigh Street, Cambridge CB1 1BR.

(0223) 312866

Post to:– MICROL (UK Mail Order) Freepost
38 Burleigh Street, Cambridge CB1 1BR

Please send me.....copy/copies of USE AND LEARN Vol. 1

Please send me.....copy/copies of THE DATABASE

Please send me.....copy/copies of THE SPREADSHEET

Please send me.....copy/copies of THE WORD PROCESSOR

I enclose cheque/P.O. for..... (£9.95 + 50p p + p – £10.45 total each)

Or I wish to pay by Access/Barclaycard/Visa

Card Number

Please print name and address

Name

Address

Credit Card
holder's signature



John Gilbert continues his course

Breaking into the program process

LAST 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

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

```

100 DIM b$(100,20)
200 GO SUB 1000
300 IF a$="1" THEN GO SUB 2000
400 IF a$="2" THEN GO SUB 3000
500 IF a$="3" THEN GO SUB 4000
600 IF a$="4" THEN GO SUB 5000
700 IF a$="5" THEN GO SUB 6000
800 INK 6: CLS: BORDER 2: PRIN
T FLASH 1; AT 10,8; "ENTER A NUMBE
R 1-5": PAUSE 200
900 GO TO 200
1000 PAPER 0: BORDER 0: INK 4: C
LS
1010 PAPER 0: BORDER 0: INK 4: C
LS
1020 INVERSE 1
1021 PRINT INVERSE 0; BRIGHT 1;
INK 6; TAB 14; "MENU"
1030 PRINT AT 5,7; "1 SEARCH FIL
E "; AT 7,7; "2 DISPLAY FILE "
; AT 9,7; "3 LOAD FILE "; AT 1
1,7; "4 SAVE FILE "; AT 13,7;
"5 CREATE FILE "
1040 INPUT " "; INK 6; FLASH 1; "
ENTER OPTION (1-5)"; a$
1050 IF a$="" THEN GO TO 1040
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

```

4000>REM LOAD ROUTINE
4010 CLS : INPUT "NAME FILE TO B
E ENTERED ";C$
4020 IF LEN C$>6 THEN LET C$=C$(
1 TO 6)
4030 IF C$="" THEN GO TO 4010
4040 PAUSE 10: CLS : PRINT "
FLASH 1;"SET UP TAPE AND PRES
S NEW LINE": PAUSE 0
4050 PRINT "INVERSE 1;"FILE "
;C$;" LOADING"
4060: LOAD C$ DATA b$()
4070 PRINT "TAB 10;"FILE L
OADED
4080 RETURN

```

data files — listing two — and SAVE-ing 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 re-entering 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

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 do.

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.

Listing 3

```

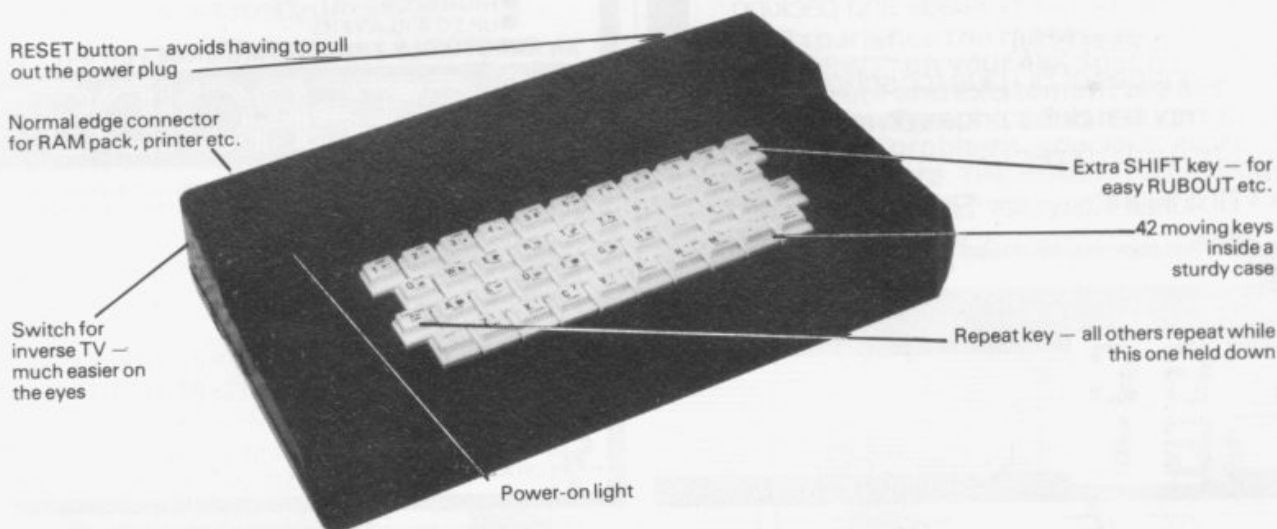
5000 REM SAVE ROUTINE
5010 CLS : INPUT "ENTER FILE NAM
E ";C$
5011 IF C$="" THEN GO TO 5010
5020 IF LEN C$>6 THEN LET C$=C$(
1 TO 6)
5030 PAUSE 10: CLS : PRINT "
FLASH 1;"SET UP TAPE AND PRES
S NEW LINE": PAUSE 0
5040 PRINT "INVERSE 1;"FILE "
;C$;" BEING SAVED"
5050 SAVE C$ DATA b$()
5060 PRINT "FILE ";C$;"
SAVED.";"REWIND TAPE TO VERIFY"
;"AND PRESS NEW LINE." : PAUSE 0
5070 VERIFY C$ DATA b$(): CLS :
PRINT "FILE ";C$;" VERI
FIED"
5080 RETURN

```


TEC Telford Electronics & Computing

The ZX8100 Deal

**Send your ZX81, and for £39.50 (plus £2.50 p&p)
you will get back a computer 100 times better**



All the above features for less than the amount some others charge for a keyboard you have to solder yourself. Optional extras are:

2 Atari-compatible joystick sockets plus sample game.	£9
*Your 16K RAM pack fitted inside case.	<i>no charge, but see below</i>
*Our 16K RAM pack supplied & fitted inside case.	£25
Two-slot motherboard.	£16
Three-slot motherboard.	£20
*I/O board supplied & fitted inside with connectors at back.	£22
Video output socket for computer monitor.	£2
Character-graphics board.	£30
*These items require a motherboard to be ordered at the same time, and will take up one slot each.	

There is a 6-month guarantee given against any fault or defect on the ZX81 main board as well as any items fitted by TEC (Excludes normal wear & tear).

WANTED

Used ZX81's — up to £25 paid.
Write or call for details.

ALSO

Visit our showrooms at 26 Bradford St, Shifnal,
Shropshire. For Oric's, software, books,
components etc. etc.

To: **TELFORD ELECTRONICS & COMPUTING**
26 Bradford Street,
Shifnal, Shropshire

From

ZX8100 conversion **£39.50**

Opt. Extras:

p&p £2.50
TOTAL

Send your 16K RAM if you want it fitted.

Print-out Rolls for your ZX printer

£10.95 per 6 rolls

inclusive of VAT, postage and packing
(U.K. prices only).

Quantities of 50 plus for schools and
computer clubs, prices on application.
Cash with order to:

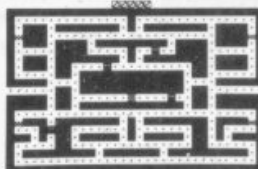
Guildhall Computer Stationery Limited

The Drill House, Street Road, Glastonbury, Somerset, BA6 9EF



GOBBLERS

PUCKMAN FOR 16K ZX81



BEAT THAT HIGH SCORE!
GOBBLE THOSE DOTS
BEFORE THOSE MEANIES
GOBBLE YOU! YOUR ONLY
AIDES ARE FOUR "POWER
PILLS" WHICH MAKE THE
MEANIES EDIBLE. BUT
NOT FOR LONG!

- MACHINE CODED FOR FAST ACTION
- EXTRA "GOBBLER" FOR 10,000 POINTS
- ON SCREEN SCORING
- HIGH SCORE WITH "ENTER NAME" FACILITY
- UP TO 4 PLAYERS

AN ANNOYINGLY FRUSTRATING GAME FOR ONLY £5.95

ASTEROIDS FOR 16K ZX81

STAY ALIVE AS LONG AS POSSIBLE IN OPEN SPACE FILLED WITH FLYING ROCKS.
SCORE BY SHOOTING THEM - WHICH ALSO CAUSES THEM TO BREAK INTO LOTS
OF LITTLE BITS AND MAKES LIFE EVEN WORSE!

- MACHINE CODED FOR FAST ACTION
- ON SCREEN SCORING
- HIGH SCORE WITH "ENTER NAME" FACILITY
- UP TO 4 PLAYERS
- EXTRA SHIP FOR 1,000 PTS (NOT AS EASY AS IT SOUNDS!)
- SHIP MOVES JUST LIKE ARCADE VERSION
- ROTATE LEFT/ROTATE RIGHT/THRUST
- FIRES IN ALL 8 DIRECTIONS
- INCREASING NUMBER OF ASTEROIDS
- THREE ASTEROID SIZES
- "NASTY" ALIEN SPACE-SHIP (FIRES BACK!)

THIS GAME IS JUST AS BAD - AND ONLY £5.95

AN OFFER FOR REAL MASOCHISTS - BOTH TAPES FOR £9.95

MAIL ORDER ONLY-PLEASE MAKE CHEQUE/PO PAYABLE TO

THE SOFTWARE FARM
CRAIGO FARM, BOTANY BAY, TINTERN, GWENT

IVOR KILLERBITE

YOU MUST BUY THIS NEW BOOK

"WRITE EFFICIENT ZX81 BASIC" by IVOR KILLERBITE

(As reviewed in January Sinclair User)

- Improve your programming skills
- Assumes knowledge only of Sinclair manual
- Many techniques for speed, space saving and "good practice"
- Illustrated by over 25 program examples
- Most of the principles applicable also to ZX Spectrum Basic

AND NOW - 2 SUPER CASSETTES BASED ON
DEVELOPMENT OF THE BOOK'S IDEAS:

Cassette 1: "SWEET SIXTEEN":

16 1K Basic programs (8 general interest, 8 action games) which
prove that enjoyable programs of adequate scope and speed are
possible without extra RAM or machine code.

Cassette 2: "WORDKILL":

(needs 16K RAM and ZX printer) A word-processor which can
enter, amend, insert, delete, move, list, print and save up to 200
lines of 42 characters each. 10 or 12 characters per inch. Prints 30
characters per second. Lower case and special character.
Automatic right justification, etc., etc. Turns the ZX81 into a true
word-processing machine.

To: Ivor Killerbite, 10 Elson Road, Formby, Liverpool L37 2EG

Please send me:

- ☐ "WRITE EFFICIENT ZX81 BASIC" at £5
☐ Cassette 1 "SWEET 16" (1K): 16 great programs at £5
☐ Cassette 2: "WORDKILL" (16K + printer): word-processor
at £5.

Prices inclusive of P&P & VAT.

I enclose cash/cheque/P.O. for £.....

Name

Address

SU2

ZX81 & 16K

THE TOMB OF DRACULA!



3D HORROR ADVENTURE GAME!

Occupying over 13½K of memory, a superb 3D graphics
adventure game for the ZX81 with 16K RAM, for only
£3.95! Enter Dracula's tomb at 30 minutes to sunset...
wander through the tomb's pre-mapped 300 vaults in
search of the fabled Vampire's Treasure... **pick up** valuable
silver stakes and use them to defend yourself against the
lurking horrors... ghouls, zombies, pits of primeval slime...
See them all on the ZX81's plan of the tomb... when it
will let you! **Take** a chance on a Mystery Vault... if you dare!
And all the time the minutes are ticking by to sunset...
when **Dracula** rises from his coffin and comes after **you!**
Each of the infinite levels of the tomb has its own 300 vaults...
go as deep as you like, the Prince of Darkness will seek
you out in his blood-lust! **WARNING:** people of an
exceptionally nervous disposition should play this game
only during the hours of daylight! Special facility enables a
game in progress to be saved on tape so you can continue it
whenever you choose.

Price of only **£3.95** includes ready-to-load cassette with
library case and inlay, full instructions, postage and packing.
Order today! Money refunded if not delighted! Send cash,
P.O. or cheque to:

MOVIEDROME VIDEO (Dept. SU7).
19 Leighton Avenue, Pinner HA5 3BW.

Tonight on your Spectrum



MEET AN INVADER UP CLOSE!

And play Adventure, Chess or any of 26 more programs, plus tips and hints, all in OVER THE SPECTRUM book. "In the Spectrum stakes OVER THE SPECTRUM runs out the clear winner." - PERSONAL COMPUTER WORLD. Only £6.95.



THE HOBBIT IS HERE!

Experience the fantasy of J. R. Tolkien's "HOBBIT" on your 48K Spectrum. Danger, adventure and excitement are all part of it in words and graphics, but it is you who must solve the problems. Special features never seen before. THE HOBBIT is the program everyone is talking about £14.95.



CAN YOU SURVIVE PENETRATOR?

PENETRATOR is the most amazing and sophisticated arcade game yet devised for the 48K Spectrum. Features include training mode, unique customizing, superior graphics, excellent sound and more! Cassette £6.95.



TALK TO YOUR SPECTRUM!

Why is this man smiling? You will too when you read Dr. Logan's book UNDERSTANDING YOUR SPECTRUM. Including a special section on the ROM operating system. The definitive guide for only £7.95.

MELBOURNE HOUSE PUBLISHERS

Please send me your free catalogue.

Please send me:

Books

SPECTRUM

- ☐ Understanding Your Spectrum £7.95
- ☐ Spectrum Machine Language For The Absolute Beginner £6.95
- ☐ Over The Spectrum £6.95

VIC 20

- ☐ VIC Innovative Computing £6.95

DRAGON

- ☐ Enter The Dragon £5.95

ZX81

- ☐ Machine Language Made Simple for the ZX80 & ZX81 £8.95
- ☐ Not Only 30 Programs £4.95
- ☐ Understanding Your ZX81 ROM £8.95
- ☐ Complete Sinclair Basic Course £17.50
- ☐ Basic Course cassettes £2.50
- ☐ Complete Sinclair ZX81 Rom Disassembly Part A & B £9.95

Cassettes

16K SPECTRUM

- ☐ Over The Spectrum No. 1 £5.95
- ☐ Over The Spectrum No. 2 £5.95
- ☐ Over The Spectrum No. 3 £5.95
- ☐ Programs from Spectrum Machine Language Book £5.95

48K SPECTRUM

- ☐ Penetrator £6.95
- ☐ The Hobbit £14.95

STANDARD VIC 20

- ☐ VIC Innovative Cassette 1 £5.95
- ☐ VIC Innovative Cassette 2 £5.95
- ☐ VIC Innovative Cassette 3 £5.95
- ☐ VIC Games Pack £5.95
- ☐ The Wizard & The Princess £5.95

All prices include VAT where applicable

£

Please add 80p for post and pack £.80

TOTAL £

Expiry date

All Melbourne House cassette software is unconditionally guaranteed against malfunction. Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397.

I enclose my cheque/money order for £

Please debit my Access card No.

Signature

Name

Address

Postcode

SU2

MELBOURNE HOUSE PUBLISHERS



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

ALMOST 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 Quicksilver 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.

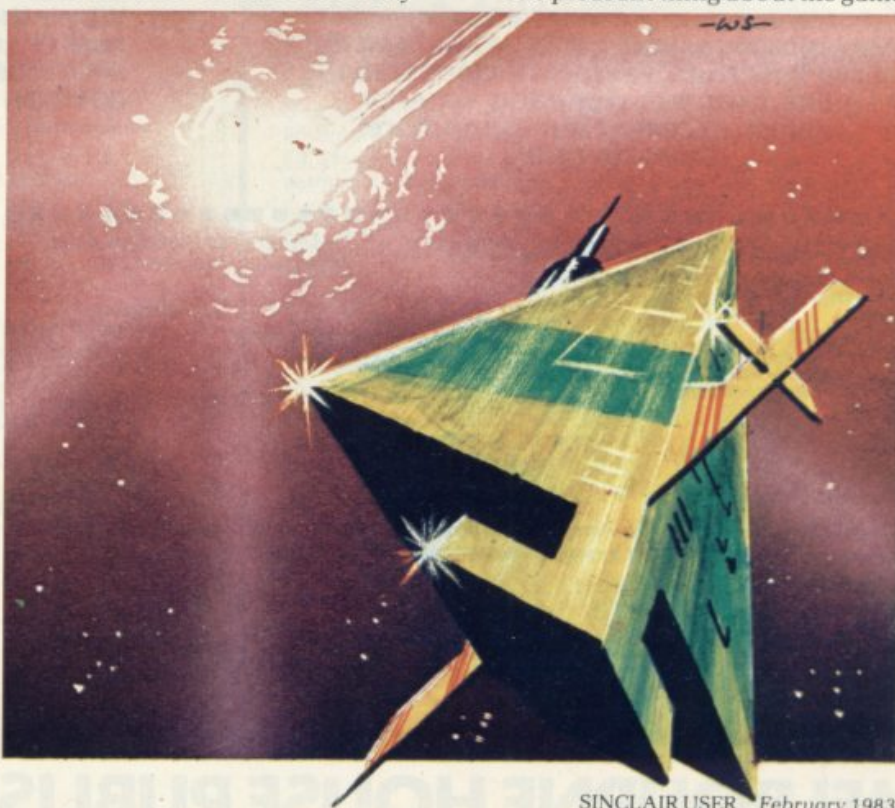
The greater movement permitted to the player is compensated by the hail of bombs dropped by the aliens and the size and power of alien ships. There are four waves of aliens and as the game progresses the ships get bigger until the giant mothership arrives.

The player has five laser bases during the game and they can take only five hits from alien bombs. There are three levels of difficulty —

easy 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 Quicksilver. 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 Quicksilver. It was a good version on such a small machine and is still proving popular.

Quicksilver 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-sought-after 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

'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 manufacturers 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

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

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.

Quicksilver, 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.

DR. WATSON

Computer Learning Series

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

BOOK & TAPE

£ 14.95 inc. P & P
USA/CANADA/FAR EAST
ADD £4.00

**beginners
BASIC
for the
SPECTRUM**

**beginners
BASIC**

SPECTRUM

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:

CHAPTER ONE

PART ONE

The Spectrum Keyboard
Keys on the Top Row
The Main Keyboard

PART TWO

Getting Started in BASIC

PART THREE

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

CHAPTER TWO

PART ONE

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
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

PART ONE

Building on the Video Game
User-Defined Graphics
A Moveable Bat
Colour
Demolishing the Wall
A Final Program

PART TWO

Balltrap

PART THREE

Blockade

CHAPTER NINE

Composatune

CHAPTER TEN

Piecharts
Sample Problem
The Complete Pie Chart Program

CHAPTER ELEVEN

PART ONE

Adventure Game Project
The Adventure Database
Game Sequence Overview

PART TWO

Creating an Adventure
Loading the Database
Messages

PART THREE

Playing an Adventure
Debugging the Adventure
Extending & Improving the
Adventure Interpreter

CHAPTER TWELVE

Sinclair BASIC's Advanced Features
Save
Verify
Load

CHAPTER THIRTEEN

Solutions to Exercises

HONEYFOLD

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

PROGRAM PRINTOUT



REAR 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
30 LET C=INT (RND*26)
40 LET D=INT (RND*17)
50 PRINT AT D,C;"(graphic G)"
60 PRINT AT A,B;" + "
70 PRINT AT A-1,B;"   "
80 PRINT AT A+1,B;"   "
90 IF INKEY$="5" THEN LET B=B-1
100 IF INKEY$="8" THEN LET B=B+1
110 IF INKEY$="7" THEN LET A=A-1
120 IF INKEY$="6" THEN LET A=A+1
130 IF INKEY$="0" THEN GOTO 150
140 GOTO 50
150 IF D<>A THEN GOTO 50
160 IF C=B THEN GOTO 170
170 PRINT AT D-1,C;"(graphic
Y;SPACE;graphic T)"
180 PRINT AT D,C;"(SPACE;inverse
SPACE;SPACE)"
190 PRINT AT D+1,C;"(graphic
T;SPACE;graphic Y)"
200 RUN

```


FIRE TRAP



YOU 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 Douthwaite of Seaford, Sussex. (16K Spectrum).

```

10 INK 7: PAPER 0: BORDER 0: C
LS: GO SUB 1000: LET e=50: LET
r=0: LET s=0
20 DIM a$(21,31): CLS: LET c=
0: LET r=r+1: LET x=10: LET y=15
: LET e=e+25: LET m=INT (RND*28)
+2: LET n=INT (RND*18)+2
30 PRINT AT x,y: INK 5: "+": AT
0,0: INK 7: "SCORE=";s: PAPER (e<
20)*2: FLASH (e<20): " OXYGEN=";e
: PAPER 0: FLASH 0: " level=";r:
40 FOR b=1 TO 4: LET a$(n,m)=b
$: PRINT AT n,m: INK 5: PAPER 1:
b$: FOR a=1 TO 3: NEXT a: NEXT b
: PRINT AT x,y: "
50 LET f$=INKEY$
60 IF a$(x,y-1)<>"■" AND f$="5
" AND y>2 THEN LET y=y-1
70 IF a$(x,y+1)<>"■" AND f$="8
" AND y<39 THEN LET y=y+1
80 IF a$(x+1,y)<>"■" AND f$="6
" AND x<20 THEN LET x=x+1
90 IF a$(x-1,y)<>"■" AND f$="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: "WELL 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 : GAMEOVER": STOP

120 LET e=e-1
130 IF 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
P
140 IF f$="" THEN GO TO 30
150 LET s=s+1
160 LET r1=INT (RND*4)+1
170 GO SUB (r1*10)+180
180 GO TO 30
190 LET a$(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
220 LET a$(x,y+1)="■": BEEP .01
,43: PRINT AT x,y+1: INK 5: "■":
RETURN
1000 LET b$="E"
1010 PRINT INK 2; "
TRAP FIRE
1020 PRINT "You are in a bu
rning space-
the + and
ng the cursor
aim is to get
s before you
en or get
blocks. After
get 100 points
and more oxygen
1030 FOR n=0 TO 200: NEXT n
1040 PRINT "Press any key t
o continue"
1050 PAUSE 0
1060 RETURN

```


BEEETHOVEN

```
1 REM 12345678901234567890123
456789012345678901234544
2 REM .....
```

```
10 LET A$=""
20 LET A$=A$+"FFF"
25 LET O=16567
30 FOR I=1 TO LEN A$-1 STEP 2
40 POKE O,(CODE A$(I)-28)*16+C
ODE A$(I+1)-28
50 LET O=O+1
60 NEXT I
70 FAST
80 LET K=USR 16546
99 STOP
100 SAVE "BEEETHOVEN"
```

```
110~PRINT "*****
*****BEEETHOVEN
*****"
```

```
120 PRINT "PROGRAMME CREATED
BY S. CRAINIC FOR THE SINCLAIR Z
X81 +16K"
```

```
130 PRINT "EACH SOUND CORRESP
ONDS TO AN HE-XADECIMAL VALUE. I
N ORDER TO OB-TAIN THE DESIRED M
ELODY, YOU MUST ENTER SUCCESSIVELY
IN LINE 10 (LET A$=""...)"
"> THE HEXADECIMAL CODE OF EACH
SOUND IN THEIR ORDER IN THE MEL
ODY."
```

```
140~PRINT "THE SOUNDS HAVE EQUAL
LENGTHS. A LONGER DURATION OF
A GIVEN SOUND COULD BE OBTAIN
ED BY ENTERING MANY TIMES SUCCE
SSIVELY THE CODE CORRESPONDING TO
THE SAME SOUND. INTERVALS ARE
OBTAINED BY ENTERING THE "00" V
ALUE."
```

```
145 PRINT AT 21,0;"HIT A KEY TO
CONT."
150 IF INKEY$="" 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
4B484440"
```

```
180~LET C$="C C+D-D D+E
-E F F+G-G G+A-A A
+;B-B "
```

```
190 FOR I=1 TO 12
200 PRINT C$(I*5-4 TO I*5);TAB
11;B$(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
0... IF YOU WANT TO "PLAY" O
NE OF THEM, EN- TER run 1000, OR
1010... >make the tone o
f your tv set louder AND newli
ne."
```

```
230 PRINT AT 21,0;" HIT A KE
Y TO CONT."
240 IF INKEY$="" THEN GOTO 240
245 CLS
247 PRINT "EXCUSE ME, I""M WORK
```

MEANWHILE...



BEETHOVEN is a remarkable program which allows you to produce music from your 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

transpose your tune into hex. After reading the instructions and pressing 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 I
```

```
250 FAST
```

```
255 RUN 9990
```

```
1000 REM happy birthday
```

```
1005 LET A$="B8B800B800A5A500B8B
```

```
8008B8B800949494940000B8B300B800A
```

```
5A500B8B8008B8B0094949400B8B800
```

```
0B800606060737373008B8B80094940
```

```
0A5A5A5006B6B006B737300949400B38
```

```
300949494"
```

```
1009 GOTO 20
```

```
1010 REM 40th symphony
```

```
1011 LET A$="B8C300C3C300B8C300C
```

```
3C300B8C300C3C37A7A7A007A8394940
```

```
094A5B8B800B8C3D0D00D0D0D00C3D
```

```
800D0D0C3D0D0D0D0D0C3D0D0D0D0D0D
```

```
3830083949C9C009CB8C3C300C3D0F0F
000F0F0007A830083836B6B9C9C83839
494C3C3007A830083836B6B9C9C83839
4947A7A007A8394A5B8B8C3C3B8B8"
1019 GOTO 20
9989 STOP
```

```
9990~LET A$="7B3D20FDC906E05EAFB
B280CDBFECD8248D3FFCD824018050E0
50D20FD10E8C921B740CD8740237EFEF
F20F7C9"
```

```
9991 LET O=16514
```

```
9992 FOR I=1 TO LEN A$-1 STEP 2
```

```
9993 POKE O,(CODE A$(I)-28)*16+C
```

```
ODE A$(I+1)-28
```

```
9994 LET O=O+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).



LEMONADE

```

278~PRINT "L E M O N
A D E"
279 PRINT "-----"
280 PRINT AT 10,0;"DO YOU REQUI
RE INSTRUCTIONS ?
N)"
290 LET A$=INKEY$
300 IF A$="Y" THEN GOTO 9000
310 IF A$="N" THEN GOTO 330
320 GOTO 290
330 CLS
340 PRINT AT 10,0;"HOW MANY PLA
YERS (2-4) ?"
350 INPUT P
360 IF P<2 OR P>4 THEN GOTO 350
361 CLS
362 PRINT AT 10,0;"HOW MANY DAY
S DO YOU WANT TO
(MAX=14) ?"
363 INPUT AD
364~IF AD<1 OR AD>14 THEN GOTO
363
369 CLS
370 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
531 NEXT F
532 FOR E=1 TO AD
533 PRINT "L E M O N A D
E day ";E;AT 2,0;"(thirty two
graphic 7s)"
534 LET W=INT (RND*4)
535 IF W=0 OR W=3 THEN LET W$="
sunny"
536 IF W=1 THEN LET W$="rain"

```

```

537 IF W=2 THEN LET W$="snow"
538 PRINT AT 10,10;W$
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 N
A D E"
571~PRINT ",,"(twenty nine graph
ic 7s)"
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;A(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;"
"
onade Per glass ? Price of lem
IN PENCE"
810 INPUT L(F)
820 LET L(F)=INT ABS L(F)
830 PRINT AT 18,20;L(F);"P"
835 PRINT AT 19,0;"
"
840 FOR T=1 TO 100
850 NEXT T
860 NEXT F
870 IF W$="sunny" THEN LET G=17
5
880 IF W$="rain" THEN LET G=75
890 IF W$="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!



A DOLLAR! MAN, YOU MUST BE KIDDING!

C'MON, BRAD, LET'S BEAT IT!



```

920 PRINT ,,"(thirty two graphi
c 7s)"
921 PRINT AT 6,9;W$
925 LET V=INT (RND*50)+G
930 PRINT AT 6,9;W$
940 PRINT AT 10,0;"TODAY THERE
WERE "J;" 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)=I/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 Q=1 TO P
1110 LET N=N+S(Q)
1120 NEXT Q
1130 IF N>V THEN LET M=N-V
1140 IF N>V THEN LET M=INT (M/P)
1150 IF N>V THEN FOR Y=1 TO P
1160 IF N>V THEN LET S(Y)=S(Y)-M
1170 IF N>V THEN NEXT Y
1180 FOR H=1 TO P
1190 IF S(H)>Q(H) THEN LET S(H)=
Q(H)
1195 IF S(H)<0 THEN LET S(H)=0
1196 IF S(H)>V THEN LET S(H)=V
1200 NEXT H
1210 FOR J=1 TO P
1220 PRINT "L E M O N
A D E"
1230 PRINT ,,"(twenty nine graphi
c 7s)"
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 l
emonade for ";Q(J)
1266 PRINT ,,"Price of lemonad
e per glass ";L(J);"P"
1267 PRINT ,,"advertisements "
;A(J)
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) ?"
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
Y"
9050 IF INKEY$="" THEN GOTO 9050
9060 GOTO 330
9500 FOR F=1 TO 5
9510 NEXT F
9520 RETURN

```


Poker Dice

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 A$="NINE TEN JACK QUEE
NKING ACE "
30 LET A=0
40 LET B$="12345"
50 PRINT AT 3,A;"NAME?"
60 INPUT C$
70 PRINT AT 3,A;C$;" "
80 GOSUB 170
90 PRINT AT 16,7;"THROW AGAIN?"
"
100 INPUT B$
110 PRINT AT 16,7;"
"
120 IF B$="0" THEN GOTO 140
130 GOSUB 170
140 LET A=A+B
150 IF A=32 THEN STOP
160 GOTO 40
170 FOR N=1 TO LEN B$
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
  
```



RAINBOW RIOT

MANY pattern generator programmes are submitted to *Sinclair User*. **Rainbow Riot** is one which particularly appealed to us, creating a symmetrical coloured pattern on your TV screen. The program was submitted by G R Stevens of Oakworth, West Yorkshire (16K Spectrum).

```

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
T AT 10,12;"THINKING"
40 REM Create basic form
50 FOR b=1 TO d
60 LET x=213-INT (RND*426): LE
T y=175-INT (RND*350)
70 IF x1+x>213 OR y1+y>168 OR
x1+x<38 OR y1+y<=0 THEN GO TO 60
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 x>50 OR ABS y>50))
90 LET x1=x1+x: LET y1=y1+y: L
ET a(b,1)=x: LET a(b,2)=y: LET a
(b,3)=c
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*
a(b,3)
160 NEXT b
170 NEXT c: NEXT a
180 REM Set colours
190 LET P=0: LET C=22695: FOR a
=0 TO 352 STEP 32: FOR b=0 TO 13
200 LET at=INT (6*RND)
210 LET at=at+5*(at<2)+64
220 POKE c+b+a,at: POKE c+b-a,a
t: POKE c-b+a,at: POKE c-b-a,at
230 NEXT b: NEXT a

```

...ALL THE COLOURS
OF THE RAINBOW
FLEXED AND
FLOWED IN A
DAZZLING DISPLAY!



VARIABLE LISTER

VARIABLE 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 2
3628 TO PEEK 23641+256*PEEK 2364
2-2
9991 IF PEEK N>224 THEN PRINT "F
OR TO NEXT ";CHR$ (PEEK N-128):
LET N=N+16: GO TO 9999
9992 IF PEEK N>192 THEN PRINT "S
TRING ARRAY",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 "ST
RING",CHR$ (PEEK N+32);"$": LET
N=N+2+PEEK (N+1)+256*PEEK (N+2):
GO TO 9999
9994 IF PEEK N<123 THEN PRINT "N
UMBER",CHR$ (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
T N=N+5
9999 NEXT N

```


THE SECONDS TICKED AWAY...



MADMAZE is a beat-the-clock game requiring you to reach the end of a complex maze in the shortest possible time. You are represented by an inverse asterisk and your movements are controlled by keys 5 to 8. If you touch a wall you are returned to the start. There is a high-score facility.

The maze is partly random and partly programmed so that it is always new but never blocked. **Mad Maze** was submitted by David Hall, of Wellingborough, Northamptonshire.

In our listing, lower-case letters signify inverse video unless enclosed by brackets, in which case they are graphic instructions. In lines 9920 to 9995, all SPACES are inverse and all As are in graphic mode. (ZX-81 approximately 2 1/2 K).

```

1 REM "MAD MAZE"
2 LET H#=""
3 LET H=1000
4 GOSUB 9900
5 LET Z=0
6 PRINT AT 1,20;"TIME: "
7 PRINT AT 19,0;"low time=";H
" BY ";H#
8 PRINT AT 21,10;"counting"
10 LET Y=0
15 LET X=4
20 PRINT AT X,Y;"(inverse ASTE
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
E)"
60 LET X=X+(INKEY#="6")-(INKEY
#="7")
70 LET Y=Y+(INKEY#="8")-(INKEY
#="5")
80 PRINT AT X,Y;
90 LET A=PEEK (PEEK 16398+256*
PEEK 16399)
100 IF A<128 THEN GOTO 160
110 PRINT AT X,Y;"(inverse ASTE
RISK)"
120 IF INKEY#="I" THEN GOTO 350
130 GOTO 20
160 IF A=8 THEN GOTO 10
170 PRINT AT 21,10;"you escaped
"
200 PAUSE 4E4
210 CLS

```

```

220 IF Z<H THEN GOTO 240
230 GOTO 280
240 PRINT "YOU HAVE SET A NEW L
OWEST TIME,";"PLEASE ENTER YOUR
NAME:-";
250 INPUT H#
260 PRINT H#
265 LET H=Z
270 GOTO 300
280 PRINT "SORRY YOU FAILED TO
BEAT",H#
300 PRINT "...ANOTHER GO (Y/N)
?";
310 INPUT Q#
320 IF Q#="Y" THEN GOTO 4
330 STOP
350 CLS
360 PRINT "I AM SORRY IT WAS IM
POSSIBLE"
370 GOTO 300
9900 CLS
9905 PRINT "MAD MAZE"
9910 PRINT
9915 PRINT
9920 PRINT "(32*A)"
9925 PRINT "(6*SPACE;5*A;4*SPACE
;6*A;9*SPACE;2*A)"
9930 PRINT "(3*A;SPACE;A;7*SPACE
;2*A;3*SPACE;4*A;SPACE;2*A;SPACE
;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;A)"
9940 PRINT "(3*A;SPACE;A;SPACE;3
*A;16*SPACE;2*A;SPACE;2*A;SPACE;

```

```

A)"
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
;4*A;5*SPACE;A;6*SPACE;2*A;4*SPA
CE;2*A;SPACE;A)"
9955 PRINT "(2*A;SPACE;2*A;4*SPA
CE;A;SPACE;3*A;SPACE;4*A;SPACE;A
;2*SPACE;A;SPACE;5*A;SPACE;A)"
9960 PRINT "(2*A;SPACE;5*A;3*SPA
CE;3*A;6*SPACE;2*A;SPACE;A;6*SPA
CE;A)"
9965 PRINT "(A;8*SPACE;5*A;SPACE
;4*A;6*SPACE;4*A;SPACE;2*A)"
9970 PRINT "(A;SPACE;6*A;SPACE;2
*A;4*SPACE;9*A;SPACE;2*A;3*SPACE
;2*A)"
9975 PRINT "(A;SPACE;3*A;4*SPACE
;2*A;SPACE;A;SPACE;4*A;10*SPACE;
A;SPACE;2*A)"
9980 PRINT "(A;5*SPACE;5*A;SPACE
;A;6*SPACE;4*A;SPACE;3*A;SPACE;A
;SPACE;2*A)"
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
*SPACE;inverse 0)"
9991 PRINT "(32*A)"
9992 FOR N=1 TO 20
9993 LET J=INT (RND*100)+1
9994 LET K=INT (RND*12)+5
9995 PRINT AT K,J;"(A)"
9996 NEXT N
9999 RETURN

```


DATA FILE

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.

BOB WORKED ON INTO THE NIGHT.



```

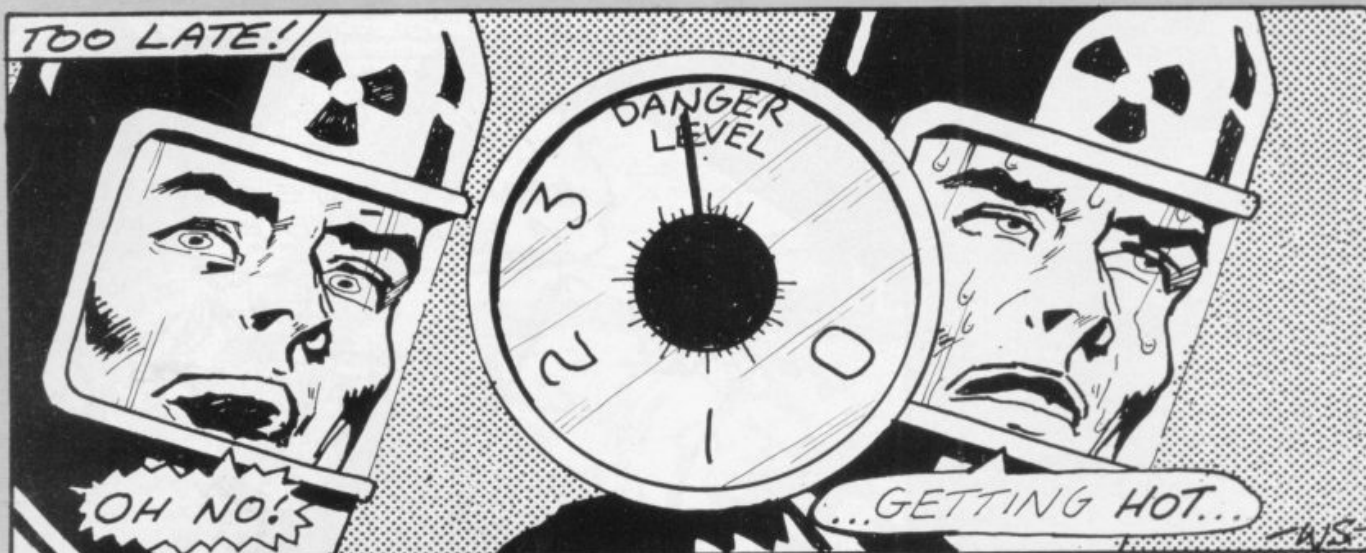
1 REM DATA STORING & SORTING
PROGRAM/P.C.FORRISTER#22-11-82#
5 POKE 23609,200: BORDER 0: I
NK 7: PAPER 0: DIM A$(800,32): L
ET E=1
6 REM 800 FILES/32 CHARACTERS
.LOWER THE 800 IF USING 16K
9 REM ENTER DATA
10 PRINT FLASH 1: INK 5: PAPER
1:AT 0,0;"ENTER DATA FILE NO":E
;"ENTER (E1 OR E1) TO END ENTER
YS"
20 INPUT A$(E): IF A$(E)="E1
OR
A$(E)="E1
THEN LET A$(E)="": G
O TO 100
30 PRINT PAPER 0: INK 4:AT 19,
0:A$(E): LET E=E+1: GO TO 10
99 REM SORT FILES INTO ALPHABE
TICAL ORDER/NUMBERS ARE LOWER TH
AN LETTERS
100 CLS: PRINT FLASH 1: INK 2:
PAPER 7:AT 0,6;"STAND BY-SORTIN
G"
110 FOR B=1 TO E-1: FOR C=B+1 T
O E-1
120 IF A$(B)<A$(C) THEN GO TO
140
130 LET D$=A$(B): LET A$(B)=A$(
C): LET A$(C)=D$
140 NEXT C
150 NEXT B
199 REM PRINT MENU
200 PRINT INK 0: PAPER 4:AT 0,6
;"SORTING COMPLETE": FOR H=-10 T
O 10: BEEP .1,H: NEXT H: LET E=E
-1: CLS
210 PRINT INK 2: PAPER 5:AT 0,0
;"1 TO END" "2 TO A
DD ANOTHER FILE" "3 TO SEARCH"
"4 TO SAVE FILES"
"5 TO LOAD FILES" "7 TO CHANGE A
FILE"
220 IF INKEY$="" THEN GO TO 220
225 IF INKEY$="1" THEN CLS: PR
INT FLASH 1: INK 4: PAPER 0:"DO
YOU WISH TO STOP THE PROGRAM ENT
ER Y OR N?": INPUT B$: IF B$="Y
" THEN STOP
230 IF INKEY$="2" THEN CLS: GO
TO 10
235 IF INKEY$="3" THEN GO TO 10
00
240 IF INKEY$="4" THEN GO TO 20
00

```

```

245 IF INKEY$="5" THEN GO TO 30
00
250 IF INKEY$="6" THEN GO TO 40
00
255 IF INKEY$="7" THEN GO TO 50
00
260 CLS: GO TO 210
999 REM SEARCH
1000 CLS: PRINT FLASH 1: INK 7:
PAPER 3:AT 10,0;"ENTER FILE TO
BE SEARCHED FOR": LET F=E
1010 INPUT Z$
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
1030 IF F>1 THEN LET F=F-1: GO T
O 1020
1040 CLS: PRINT FLASH 1: INK 2:
PAPER 7:AT 10,7;"FILE NOT IN ME
MORY": GO TO 210
1999 REM SAVE DATA A$ ON TAPE 3
TIMES
2000 FOR V=0 TO 2: CLS: PRINT F
LASH 1: PAPER 5: INK 1:AT 0,0;"S
AVING DATA A$": SAVE "DATA" DATA
A$(V): NEXT V
2010 CLS: PRINT FLASH 1: INK 5:
PAPER 1;"SAVE COMPLETE": GO TO
210
2999 REM LOAD DATA A$ FROM TAPE
3000 CLEAR: PRINT FLASH 1: INK
0: PAPER 6:AT 0,10;"LOADING DATA
A$": LOAD "DATA" DATA A$(V)
3999 REM NEVER PRESS (N) WHEN AS
KED SCROLL?
4000 LET E=1
4010 IF A$(E)=" " THEN PRINT FLAS
H 1: INK 5: PAPER 1;"LIST COMPLE
TE": GO TO 210
4020 PRINT A$(E): "No-":E:CHR$ 94
: LET E=E+1: GO TO 4010
4999 REM CHANGE A FILE
5000 CLS: PRINT FLASH 1: INK 1:
PAPER 7:AT 10,0;"ENTER FILE NUM
BER TO BE CHANGED": INPUT X: CLS
: PRINT FLASH 1: INK 1: PAPER 7
:AT 10,0;"ENTER NEW FILE": INPUT
A$(X): PRINT FLASH 1: INK 1: PA
PER 7:AT 10,0;"PRESS 0 TO CHANGE
ANOTHER FILE"
5010 IF INKEY$="" THEN GO TO 501
0
5020 IF INKEY$="0" THEN GO TO 50
00
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 I$
40 PRINT I$;
50 PRINT " TO ";
60 INPUT U$
70 PRINT U$
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 I$=A$(I)
125 IF I$(5)=C$(6) THEN GOTO 50
0
130 LET U$=A$(U)
135 IF U$(5)<>C$(6) THEN GOTO 5
00
140 LET X=VAL I$(1 TO 2)
150 LET Y=VAL I$(3 TO 4)
160 PRINT AT X,Y;C$(6)
170 LET X=VAL U$(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$(I,5)=C$(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$="(graphic 8;3*A;3*SP
ACE;3*A;3*SPACE;3*A;3*SPACE;3*A;
3*SPACE;3*A;graphic 5)"
1010 LET G$="(graphic 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
K)"
1560 LET C$(6)=" "
1565 LET C=1
1569 REM position and rods set
1570 FOR F=2 TO 18
1580 LET A$(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 D$=" **DANGER LEVEL**"
1785 LET L$=" 3 2 1 0"

```




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 gauge 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 goto 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
30
2040 IF U=10 OR U=15 THEN GOTO 2
240
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 A$(U,5)=A$(U-5,5) OR A$(
U,5)=A$(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 A$(U,5)=A$(U-5,5) OR A$(
U,5)=A$(U-1,5) OR A$(U,5)=A$(U+1
,5) THEN GOTO 2500
2215 RETURN
2220 IF A$(U,5)=A$(U-1,5) OR A$(
U,5)=A$(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$(
```

```
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 F
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
Y."
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
P "
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"
3040 PRINT AT 11,0;"TRY TO KEEP
RODS OF THE SAME TYPE IN DIAG
```

neatly onto the back of the Spectrum
in a tough, plastic case. JUST £7.50
NEW! Programmable Sound Generator - adds
exciting new sounds to the Spectrum range. ONLY £20.50

All prices are inclusive of VAT and p&p. Delivery order. All products come with a full ONE YEARS GUARANTEE.

COMING SOON!

OUR RANGE OF PRODUCTS IS CONSTANTLY UNDER DEVELOPMENT AND REVIEW. WE HAVE SELECTED PRODUCTS FROM LEADING MANUFACTURERS IN THE UK AND BELIEVE THESE REPRESENT THE BEST VALUE AND QUALITY COMBINATION ON THE MARKET TODAY.

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

318 Kempshott Lane, Basingstoke,
Hants RG22 5LT

PLEASE SUPPLY (all prices include VAT & P&P)

Qty		
16K EXPANDABLE RAM	£25.00	
16K EXPANSION MODULE for above	£20.00	
32K GIANT PANDA	£40.00	
64K THE BIG ONE	£65.00	
KEYBOARD FD42	£30.00	
KLK KEYBOARD	£26.50	
SPECTRUM KEYBOARD	£42.00	
SPECTRUM 48K MEMORY UPGRADE PACK	£35.00	
SPECTRUM SOUND EXPANSION UNIT	£7.50	
SPECTRUM PROGRAMMABLE SOUND GENERATOR	£20.50	

PLEASE PRINT CLEARLY

NAME _____

ADDRESS _____

Overseas customers add £4 p&p

**EXCLUSIVE
OFFER!**

sinclair user

**EXCLUSIVE
OFFER!**

Save £1 on this fantastic new product

IPS "Fast Load" Monitor Program

- Allows you to **LOAD** and **SAVE** ZX81 programs up to 6 times faster
- **Easy-to-use** in your own programs
- **User-transparent** when incorporated into programs
- **Verifies proper loading**
- **Catalogues feature lists program names and memory usage**
- **LOADER occupies less than 500 bytes (1/2K) of RAM**
- **Consists of 2 separate programs – KEYBOARD MONITOR and FAST LOADER**
- **Supplied on cassette with extensive documentation**

The I.P.S. "Fast Load" Monitor is the dramatic breakthrough in software needed to make serious use of the recent improvement in ZX81 hardware add-ons, such as 64K memory units.

Whether you use the ZX81 for business, education or recreation, the I.P.S. "Fast Load System" increases available computing time by reducing idle "waiting for the program to load" time!

The I.P.S. "Fast Load" Monitor **LOADS** and **SAVES** ZX81 programs up to 6 times faster.

Fast loading and saving means you use less tape. One significant benefit is that almost **ONE MEGABYTE** of information can be saved on a standard C90 cassette! And with "Fast Load" this increased database can be accessed quickly.

The "Fast Load" package consists of two separate programs: **KEYBOARD MONITOR** (including Machine Code Monitor), and **FAST LOADER**.

KEYBOARD MONITOR is a user-friendly BASIC program which gives such information as the speed at which the tape was recorded, file name, file type, number of bytes in file, and whether a read error occurred. If desired, the user-friendly portion of the program can be removed for direct access to Machine Code Monitor. Both parts reside at RAMTOP and are user-transparent. Full details are given in the manual for fast saving of your program.

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$(1,5)=C$(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$="(graphic 8;3*A;3*SP
ACE;3*A;3*SPACE;3*A;3*SPACE;3*A;
3*SPACE;3*A;graphic 5)"
1010 LET G$="(graphic 8;3*SPACE;
3*inverse SPACE;3*SPACE;3*invers
```

```
1630 FOR N=2 TO 26 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 D$=" **DANGER LEVEL**"
1785 LET L$=" 3    2    1    0"
```


AFDEC ELECTRONICS LTD



16K EXPANDABLE RAM PACK

The Famous 'Panda' Ram Pack massive 16K add-on memory. Expandable to 32K with optional plug-in module. No additional power required plug in and go. Led on/off indicator. Rugged injection moulded no-wobble design contoured case. Top quality components throughout. British designed and built.



**ONLY
£25.00**

**INCL.
P&P & VAT**

PANDA EXPANSION MODULE

The 16K unit is easily expandable from
16K to 32K
by simple insertion of
a plug-in-module.

**INCL.
P&P & VAT**

**ONLY
£20.00**

GIANT PANDA 32K UNIT

THE TWO TOGETHER

Complete at
a special price
of:

**INCL.
P&P & VAT**

**ONLY
£40.00**

ZX KLIK - KEYBOARD



£26.50

IF, LIKE MANY ZX81 users, you are fed up with the dead feel of the touch sensitive keypad then consider the well tried 'KLIK-KEYBOARD' this is a simply fitted genuine push-button keyboard which has been designed as an exact replacement for, and is no larger than the existing keypad.

- Fits on to the ZX81.
- Full 40 keys plus one spare for any purpose.
- No soldering — JUST PLUG IN.
- No trailing wires.
- Clear permanent two colour legends.
- Positive feel and sound as data is entered.
- Speeds up programming enormously and reduces errors.
- Fitting service offered £2.00 extra (remember to send your ZX81)

SOUND EXPANSION

a superb addition to your ZX Spectrum!

Clear, dynamic sound effects will really enhance your enjoyment of the new, exciting programs available for the sensational ZX Spectrum. Our new sound box comes complete with leads, volume control and loudspeaker. Just plug it into your MIC input, and it fits neatly onto the back of the Spectrum

in a tough, plastic case — **JUST £7.50**
NEW! Programmable Sound Generator — adds exciting new sounds to the Spectrum range. **ONLY £20.50**

All prices are inclusive of VAT and p&p. Delivery order. All products come with a full ONE YEARS GUARANTEE.

COMING SOON!

OUR RANGE OF PRODUCTS IS CONSTANTLY UNDER DEVELOPMENT AND REVIEW. WE HAVE SELECTED PRODUCTS FROM LEADING MANUFACTURERS IN THE UK AND BELIEVE THESE REPRESENT THE BEST VALUE AND QUALITY COMBINATION ON THE MARKET TODAY.

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

PROFESSIONAL CASED 42 KEY TYPE FD 42



The ZX81 fits inside

This is a full size professional quality 42 key keyboard supplied in a tough ABS injection moulded case measuring approx 8 x 14 x 2.5 ins. The ZX81 fits inside, with, if desired, the power supply unit. No soldering or technical know-how is required. The additional two keys provide extra shift and newline functions for added convenience to speed up program entry. Led power-on indicator if needed. Fitting service available £4.00.

**INCL.
P&P & VAT**

£30.00

NOW ALSO AVAILABLE FOR THE ZX SPECTRUM.

Now the famous FD42 keyboard and case unit is available for Britain's fastest selling colour computer — the amazing ZX Spectrum. It has the same high standard as the ZX81 unit and the tough moulded ABS case houses the Spectrum P.C.B. and power supply. The keyboard has 42 keys including all the Spectrum graphic characters clearly etched onto them. Full travel keys have gold plated contacts with guaranteed life of 10 operations. Its so easy to install. You simply unscrew the ZX PCB from its case screw it into the FD case and plug in the keyboard connectors. No soldering or technical skills needed.

STOP PRESS! 16K Spectrum owners — upgrade to 48K with a Spectrum Upgrade Pack — complete with full assembly instructions.

Cheques/PO please to
AFDEC ELECTRONICS LTD
318 Kempshott Lane, Basingstoke,
Hants RG22 5LT

PLEASE SUPPLY (all prices include VAT & P&P)

Qty		
.....	16K EXPANDABLE RAM.....	£25.00
.....	16K EXPANSION MODULE for above.....	£20.00
.....	32K GIANT PANDA.....	£40.00
.....	64K THE BIG ONE.....	£65.00
.....	KEYBOARD FD42.....	£30.00
.....	KLIK KEYBOARD.....	£26.50
.....	SPECTRUM KEYBOARD.....	£42.00
.....	SPECTRUM 48K MEMORY UPGRADE PACK.....	£35.00
.....	SPECTRUM SOUND EXPANSION UNIT.....	£7.50
.....	SPECTRUM PROGRAMMABLE SOUND GENERATOR.....	£20.50

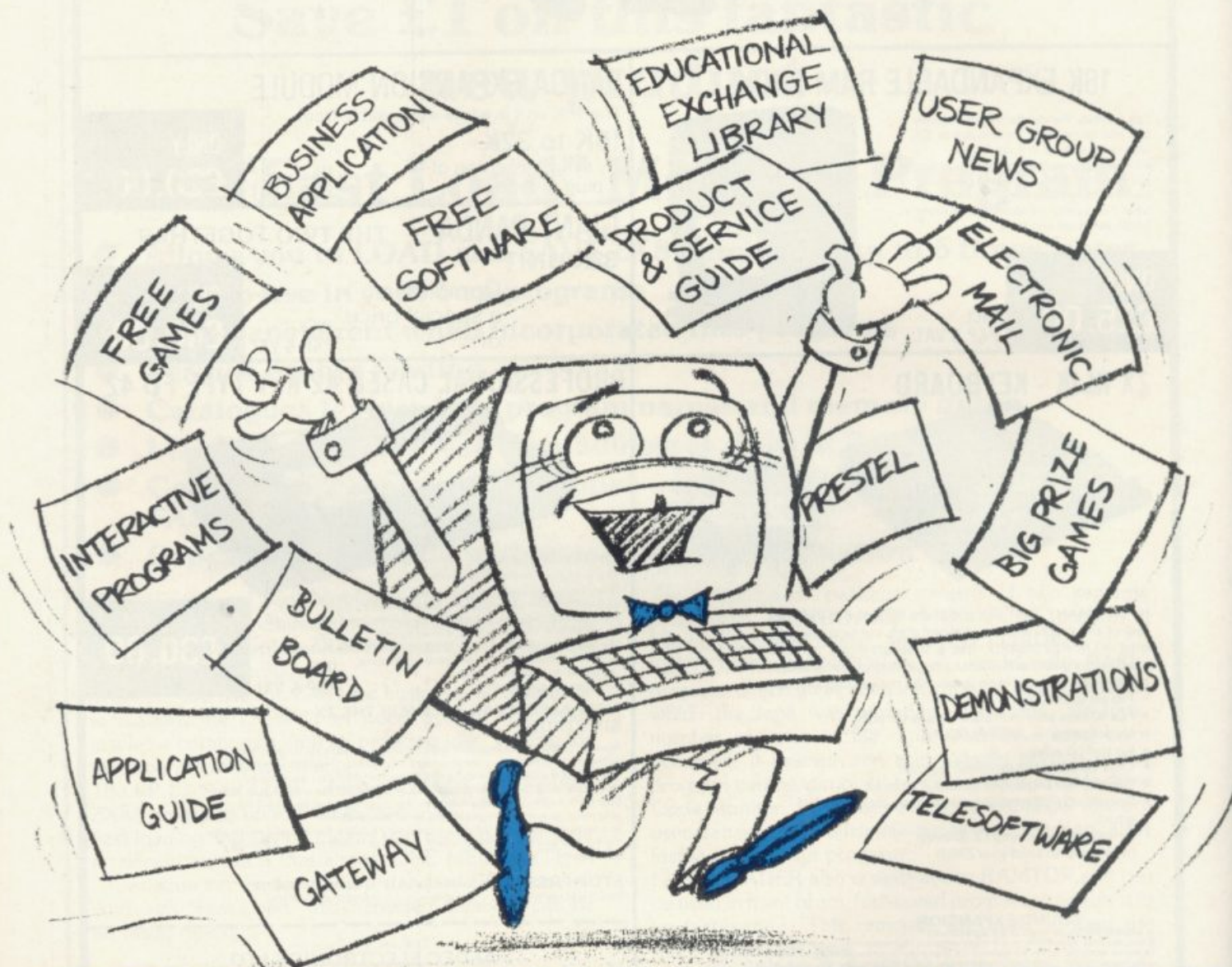
PLEASE PRINT CLEARLY

NAME _____

ADDRESS _____

Overseas customers add £4 p&p

MORE IDEAS THAN MORE PROGRAMS THAN LESS MONEY THAN



**PROGRAMS FOR EDUCATION, HOME, BUSINESS, AND GAMES – FOR
SINCLAIR, BBC, RESEARCH MACHINES, APPLE, COMMODORE,
ACT SIRIUS, TRS-80, IBM, ICL, and more each month. . .**

HOW THE MICRONET 800 SERVICE WORKS:

Most micros connect by a standard DIN plug and coaxial cable to an adaptor. They're portable, so you can use the system wherever you put your computer and telephone.



Simply dial Micronet's number and enter your subscriber number into the keyboard. A 'welcome to Micronet' message appears on the screen. You're on-line to one of the world's largest databases.

PRESTEL

MICRONET 800's

thousands of ideas – packed pages – games, education, business software, club news and information.

When you have all the information you need – or you've finished 'downloading' software to your computer's memory – just switch off the telephone link at your keyboard and replace the receiver.

IN A THINK-TANK. IN A SOFTWARE HOUSE. IN YOU'D EXPECT.

Whether you bought your computer for games, business, or education, you can spend a lot of time wondering what to do with it. And then spend a lot of money on packaged games and applications software.

NOW you can bring your computer to life – economically – by joining the amazing new MICRONET 800 service: a vast database with hundreds of FREE games, plus business and education software, computer news, special offers and 'big prize' opportunities for you to compete against the system – and win!

MICRONET 800 is packed with ideas and information. And there's no waiting – you get programs straight down the phone line! Updates on operating systems... school and college programs

...gobble man... invaders... business packages. They're constantly renewed. And hundreds of them are free: you simply turn on your micro, dial up MICRONET 800 and LOAD.

Sounds expensive? Here's the surprise!

All you pay for is a low-cost adaptor (in most cases just £49) to link your computer to your telephone, plus a MICRONET 800 subscription of about £1 per week. Then, via your computer and telephone line you will be able to access over 30,000 ideas-packed 'pages' of the MICRONET 800 service, and call down the software you want to your own computer! Look at just a FEW of the services already available on Micronet for you to call on:

- **Free Telesoftware:** Indexed by subject and by name of micro, a huge selection can be loaded down onto your computer.
- **Educational Exchange Library:** Schools and colleges are already preparing to display programs written by students and teachers, so many can benefit from them easily and economically.
- **Applications Guides:** Quick-reference guide by subject and by micro name shows you available applications software. You can move from the guide to further details held on the system if you wish.
- **Demonstrations:** Check through the features of the software packages that interest you – privately and without obligation. Order only if you're sure it's what you need.
- **Purchase 'Downloadable' Software:** Many 'telesoftware' programs can be bought from the system and loaded down direct to your micro. But

don't worry – there's plenty of warning if any MICRONET service you're planning to use carries a charge.

- **Electronic Mail:** A mailbox service on Prestel allows you to exchange messages with other Prestel or Micronet users. Messages are held securely and only you can collect them.
- **Bulletin Board:** For an additional subscription you can operate your own bulletin board – club news, for example, like tips, swap-shop for second-hand items and so on.
- **Phone-In:** If you're away from your computer but need to send a message to another Micronet user – call the Micronet 800 service by phone and we'll send the message for you.
- **Prestel:** Over 200,000 pages of information on British Telecom's established service. Facts and advice on finance, business, entertainment, features

and even direct bookings for travel, holidays, etc.

- **Product and Service Guide:** A constantly updated reference source – covering product comparisons, software reviews, dealership and price details and all the 'best buy' information.
- **Action Advertising:** Includes features, just like a magazine, including jobs and classified ads. If you've read an article that interests you, through MICRONET you can find out about the manufacturer, the dealers, the prices, and even order the product via your micro!
- **User Group News:** The Amateur Computer Club and many others like ALCC, BASUG, ICPUG, TUG, TRS 80 UG, will maintain their news and reference service on Micronet.
- **Big Prize Games:** Micronet offers a range of games and quizzes to keep you entertained and involved – and there'll be big prizes too!

SOUNDS FANTASTIC? THAT'S JUST THE START!

MICRONET 800 is a completely new service and we'll be adding to it all the time. Find out more about what Micronet 800 has in store for

you: return this coupon TODAY and we'll send you a FREE FACTS FOLDER on Micronet 800 services and details of how you can join!

micronet
800

**IT BRINGS YOUR
COMPUTER TO LIFE!**

Send to: MICRONET 800, Petersham House, 57a Hatton Garden, London EC1B 1DT.

☐ Yes, I am interested in the MICRONET 800 service. Please keep me in touch with developments and send me details of the low-cost Micronet 800 adaptor.

☐ I am interested in earning money on software I develop for the system.

I am interested in: Home uses ☐ Business uses ☐ Educational uses ☐

Name _____

Address _____

Telephone _____

Type of computer _____

**POST
TODAY**

NOW AVAILABLE FROM HILTON COMPUTER SERVICES LTD

The P.B.S. Bank reconciliation is believed to be the first such program to be available for the Sinclair ZX81, the ZX Spectrum and Dragon.

Just look at some of its features:

- * Automatically matches bank statement items with transactions recorded in your "Personal Banking System."
- * List all outstanding items such as uncleared cheques, funds received but not advised to you, bank charges — highlights all discrepancies. No more scratching around to try and find out why your statement balance is different to what you expected.
- * Full search facilities allowing on-screen correction of any item.
- * Saves and loads data to and from tape (ZX81 version, at double speed). Exchanges data with the main P.B.S. program. No need to save programs.
- * Single key operation — uses m/c keyboard scan for single letter commands (ZX81 version).
- * Extremely easy to use. No jargon to wade through before you get started. Demonstration program included.
- * All item lists, searches (with totals), etc. can be output to your ZX printer.
- * Full instructions included.
- * Unique after sales maintenance provided.
- * Operates in conjunction with "Personal Banking System" (Full input and correction facilities plus automatic posting of standing orders on due dates).

So banish the headaches, make life easier for yourself, send £15 for the Personal Banking System plus P.B.S. bank reconciliation and users manual.

Existing clients need only send £5 for the P.B.S. bank reconciliation which will operate with their present P.B.S.

The Personal Banking System (as reviewed in Popular Computing Weekly — 1st July) is available separately for £9.95 for cassette and user manual. ZX81 P.B.S. owners can order the Spectrum version for just £5.

Please specify whether ZX81 (16K) or ZX Spectrum (48K) or Dragon.

Guaranteed software available from:
Hilton Computer Services Ltd
14 Avalon Road, Orpington, Kent, BR6 9AX.
Your P.B.S. is never out of date!

SPECTRUM SOFTWARE

IQ TEST.....£5.75

How intelligent are you? 2 separate tests give an accurate assessment of your abilities

THE JOKER.....£5.75

Hundreds of rib tickling puns and jokes coupled with mind blowing graphics. Great for parties!!

Trade enquiries welcome: Orders despatched by return

PRICES INCLUDE POST & VAT. ALL PROGS 16 OR 48K.

Flouchart LTD

PHONE
(0933) 650073

DEPT 2
62 HIGH STREET
IRTHLINGBOROUGH
NORTHANTS NN9 5TN

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES £9.95!

ZX spectrum Cassette = Fifty



GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA-BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
OXO
BOGGLES
PONTON
SKI-JUMP
HANGMAN
OLD BONES
THIN ICE

MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SITTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS

SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE



CASCADE SOFTWARE

ALSO AVAILABLE FOR VIC-20

50 PROGRAMS- GAMES EDUCATIONAL BUSINESS HOME



coming soon games
for

BBC ATARI
ATOM DRAGON32

STOP PRESS!

ORDER FORM

only
£9.95
inc. V.A.T. &
Post & Packaging

POSTAGE FREE TO U.K.
ORDER DIRECT TO:

CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES
NP54PA

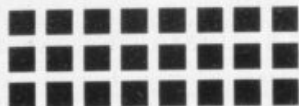
SU 1/1

VIC 20 ☐ SPECTRUM ☐

PLEASE SEND ME
CHEQUE ENCLOSED, VALUE.....
NAME.....
ADDRESS.....
POSTCODE.....

ZX81 + ZX SPECTRUM SOFTWARE BOOKS

also BBC Micro



Cambridge Computer Store

1 Emmanuel Street
Cambridge CB1 1NE
Telephone (0223) 358264/65334
(closed 12.30 - 1.15 except Saturday)

ABERSOFT

7 MAESAFALLEN, BOW ST, DYFED, SY24 5BA

ZX81 & Spectrum Games

Chess 1.4: Ten levels m/c graphic screen display.
16K ZX81 £8.95

Invaders: Very fast m/c action. Includes mystery ship and increasingly difficult screens.
16K ZX81 £4.45

Mazeman: A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics.
16K ZX81 £4.45 - Spectrum £4.95

Adventure 1: Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User, issue 2. Features Save game routine as the game can literally take months to complete.
16K ZX81 £8.95 - 48K Spectrum £9.95

We have full stock of all programs and supply by return of post (which is included in the price)

TASWORD THE WORD PROCESSOR

*"Very good value and great fun to use."
"Unreservedly recommended."*

Popular Computing Weekly 19/8/82 - ZX81 Tasword

Now your Spectrum becomes a word processor with TASWORD. All the features of the ZX81 Tasword plus many extras. Designed to fully utilise the capacity and capabilities of your 48K Spectrum. More than 6K of machine code, a Basic program, and a manual, to give you a usable and powerful package.

Use TASWORD to produce your letters, essays, papers, records, lists, and for almost any task that requires the written word.

Whether you have serious applications or simply want to learn about word processing, TASWORD makes it easy and enjoyable.

TASWORD TUTOR

"an eloquent demonstration of Tasword's uses"

We send you a manual and a cassette. The cassette contains TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD.

£7.95 fully inclusive mail order price.

£1 DEMONSTRATION CASSETTE

See for yourself what TASWORD can do. Send just £1 for a demonstration cassette. This cassette contains the TASWORD program (with some facilities inhibited) and a text file which describes and demonstrates the performance and features of TASWORD. A voucher is included which gives you 50p off the price of Tasword.

TASMAN SOFTWARE

17 HARTLEY CRESCENT LEEDS LS6 2LL

ZX81 TASWORD

Tasword for the ZX81 (16K) is still available at £6.50. No demonstration cassette available but send 50p (refundable against your subsequent purchase of ZX81 Tasword) for a copy of the manual.

48K
SPECTRUM

KRAK! THE SPECTRUM 'ADD-ON' ONLY £19.50 + VAT

COMPLETE your SPECTRUM with our Multi-purpose Sound Generator and Joystick-port Board!! With one low-cost purchase you can obtain the following outstanding improvements to your ZX SPECTRUM:

- **THREE CHANNEL sound effects.** PROGRAM three independent sounds with music, gun shots, explosions etc.
- **AMPLIFICATION** of the standard sound output.
- **PROVISION of JOYSTICK PORTS** to allow simple connection of one or two suitable joysticks (see below).

The 'ADD-ON' uses the amazing AY-3-8910 SOUND Chip, which gives you an enormous range of sound effects. The output and volume of each channel can be separately controlled, with gun shots, explosions, drums etc., produced under the 'sound envelope'. **MOST IMPORTANT TO NOTE**—the CHIP is 'processor independent.' This means that sounds can continue to be produced without any noticeable effect on the speed of your program!!

The 'ADD-ON' contains its own speaker and amplifier chip and is supplied with a cassette containing sound demonstration routines and some sample sounds. The 'ADD-ON' simply plugs straight onto the back of your SPECTRUM. No soldering is required. The 'ADD-ON' is offered at the incredibly low price of £19.50 + VAT.

COMPLETE YOUR SPECTRUM NOW!!

JOYSTICK KITS £3.95 + VAT
To complement our exciting new 'ADD-ON' for the SPECTRUM we are offering low-cost Joystick Kits. Each one contains a potentiometer-joystick, a fire-button and a suitable connector.

NEW ORIGINAL SPECTRUM SOFTWARE
—from PROGRAM POWER—using the 'ADD-ON' to great effect!!

CABMAN (Machine Code) £3.95 + VAT
You are the owner of a fleet of yellow taxis. A rival firm competes with you, trying to steal your fares and run you off the road, if they can. Ten skill levels determine the number of opposing taxis, the speed at which they drive and the amount you earn per completed journey. MAXIMISE your earnings before you lose your entire fleet. This program is **FIRST CLASS**.

ATTENTION MACHINE CODE PROGRAMMERS!
We can now offer SPECTRUM versions of the ASSEMBLER and DISASSEMBLER programs from ACS Software. The ZX81 versions have proved extremely popular.

ULTRAVIOLET (Assembler) £6.95 + VAT
INFRARED (Disassembler) £5.95 + VAT

BOOKS
SPECTRUM
Over the Spectrum £6.95
Cambridge Colour Collection £6.95

ZX81
Mastering Machine Code on your ZX81 £7.50
NOT ONLY 30 Programs £6.95
Getting Acquainted with your ZX81 £5.95
49 Explosive Games for the ZX81 £5.95
Making the most of your ZX81 £5.95
Byteing Deeper into your ZX81 £4.95
The Explorer's Guide to the ZX81 £4.95

MICRO POWER
8/8a REGENT STREET, CHAPEL ALLERTON, LEEDS LS7 4PE
Tel: (0532) 683186

All programs are now available at all good dealers or direct from MICRO POWER LTD

NOTE: We stock (and market) PROGRAM POWER SOFTWARE for the BBC, ACORN, SPECTRUM and DRAGON 32. Send S.A.E. for appropriate catalogue.

BBC, DRAGON & ACORN DEALERS

WRITTEN ANY PROGRAMS!
WE PAY 20% ROYALTIES FOR DRAGON, SPECTRUM BBC, ATOM PROGRAMS

**"A" LEVEL AND UNIVERSITY STUDENTS
RESEARCHERS, SCIENTISTS**

University Software

**PRESENTS SINCLAIR ZX81 (16K)* LIBRARY
OF ADVANCED MATH/STAT/ECON**

Made easy to learn and use with full instructions.

TAPE 1: MATRIX OPERATIONS £5.95

Side A: Inversion, multiplication, addition, subtraction and scalar multiplication of matrices and vectors within one single program which allows the user to complete all his operations without reloading. Inverts a 20 x 20 matrix in 6 min. 40 secs.

Side B: Determinants of square matrices.

TAPE 2: POLYNOMIALS £5.95

Side A: Includes quadratic equations (as degree 2 polynomials) and Newton-Raphson and half-interval search methods for higher degree polynomials. Computes the roots with 8 digits of precision.

Side B: You can plot polynomials in any interval and examine their roots, extremum points.

TAPE 3: INTEGRATION £5.95

Side A: Integration of functions by Simpson's and trapezoidal rules. Also computes the area enclosed by two functions.

Side B: Plot of integrals. Integration can be visualised on the screen.

TAPE 4: REGRESSION £6.95

Side A: A highly developed multivariate regression program featuring up to 20 independent variables, log/in option on each variable (thus allowing exponential, geometric and nth order regressions), standard errors, t-statistics, F-statistic, Durbin-Watson statistic, interpolation.

Side B: Plot of bivariate regressions. You can see how your computer draws a best-fitting line on a set of data points.

TAPE 5: LINEAR PROGRAMMING £6.95

Side A: A general and efficient optimization program capable of handling any sort of linear programming problem with up to 20 variables and 20 constraints. Features the canonical equivalent of the original problem and its dual.

Side B: Solutions of simultaneous equations with up to 30 unknowns.

● Cheques, P.O.'s payable to:

UNIVERSITY SOFTWARE
45/6 Sloane Street
London, SW1X 9LU

* Available soon for Spectrum

● Five tapes for £30

● All incl. prices for first class P&P

● Delivery within a week of receipt



New Generation Software

**PROFESSIONALLY WRITTEN &
PRODUCED SOFTWARE FOR
THE HOME COMPUTER**

From M.E. Evans the author of
the highly acclaimed

**3D MONSTER MAZE
AND 3D DEFENDER For the ZX81**

comes two games for the **SPECTRUM**
Available mid-Jan

3D TUNNEL
(16K & 48K versions on one tape)

What lies down in the depths of the TUNNEL? Flying bats, leaping toads, spiders, * and rats* maybe. Perhaps more! You will have to avoid the walls of the TUNNEL as it weaves up and down and side to side to find out. All in 3D of course (* not in 16K version).

ESCAPE (runs in 16K)

Can you ESCAPE from the maze inhabited by 5 hunting Dinosaurs, including a Pteranodon that soars over the maze to swoop down on you.

"One of the best and most original games we have seen for the SPECTRUM so far".
SINCLAIR USER.

Trade enquiries welcome at address below

Send to **NEW GENERATION SOFTWARE**
FREEPOST BS3433 Oldland Common, BRISTOL BS15 6BR
(No stamp required in UK)

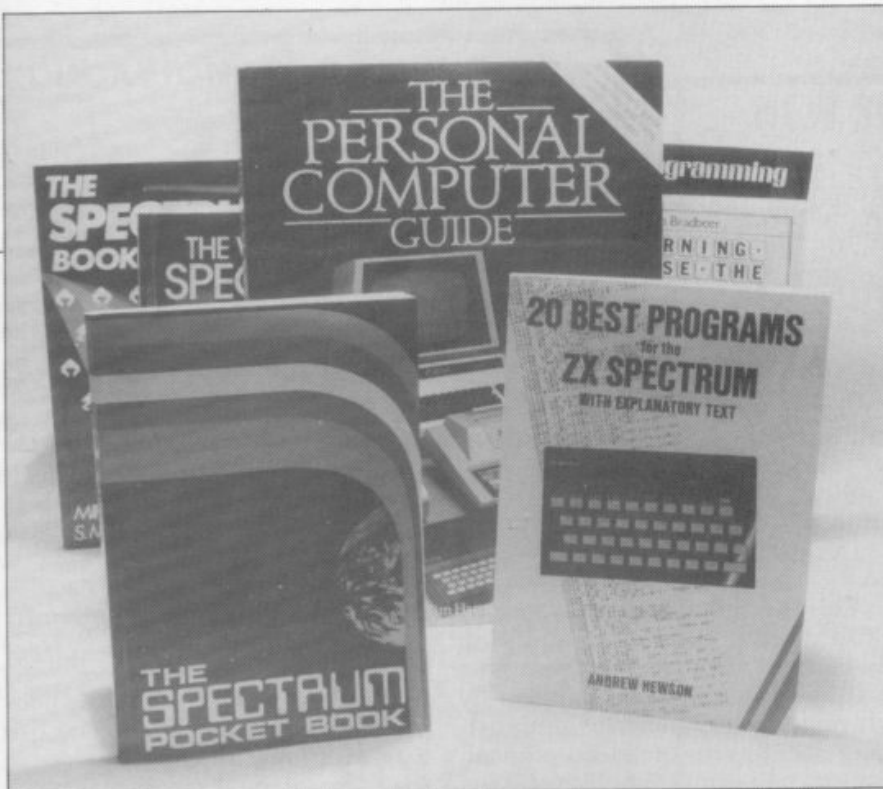
or for **INSTANT CREDIT CARD** sales ring 01-930 9232

SAE with enquiries please

PLEASE SEND ME A COPY OF... 3D TUNNEL/...
OF 3D ESCAPE AT £4.95 EACH (INC P & P AND VAT)
I ENCLOSE CHEQUE/PO

Mr/Mrs
Address

"SU" Post Code



This month John Gilbert looks away from the specific Sinclair publications

More information in general books

MANY GENERAL computer books, not written specifically for Sinclair 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

and local organisations which the computer owner can join.

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

'The 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



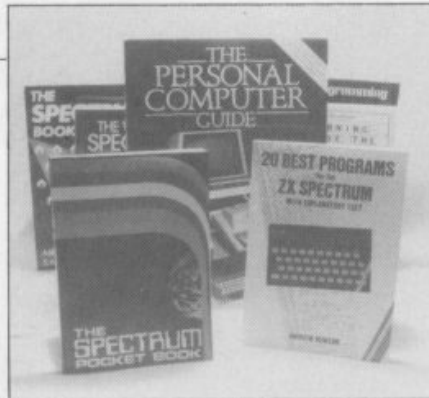
continued from page 83

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.

ZX81 16K SPECTRUM 16/48 DRAGON 32 TANDY LEVEL 2 BBC A/B

AWARI

- ★ The ancient African game of logic. It takes 2 minutes to learn the rules but far longer to master the tactics.
- ★ Select the 'Goat-herd' level of play and it's an addictive game for children (8+) that exercises their minds – not their laser fingers.
- ★ Select the 'Witch-doctor' level and it's a threat to your sanity. We haven't beaten it and we wrote it!

ADVENTURE

- ★ Over 200 places to explore in this machine code game using advanced data compression techniques.
- ★ No random elements – you will need skill, cunning and a sense of humour as you explore caves, forest and castles.
- ★ Evade ruthless pursuers and overcome a host of obstacles.
- ★ Multiple word commands and single letter abbreviations.

£1000 IN PRIZES

FANTASTIC VOYAGE

(ZX81 16K ONLY)

This real-time graphics simulation set inside the human body was written by a lecturer in anatomy. You are injected into the blood stream in your miniature submarine. Navigate the arteries, veins and heart to the brain, where a blood clot must be destroyed. Features a real vascular map. You will be attacked by lymphocytes which must be destroyed using arcade game type graphics. Everything you do uses up precious energy. Three display formats – a lateral and frontal body scan plus blood vessel name, a close-up scan and a laser-sight for fighting lymphocytes.

- ★★ Buy both Awari and Adventure and enter the 'Foilcade Challenge' competition. Details with cassette or send SAE.

**ALL GAMES £5.95 EACH, 2 FOR £9.95,
3 FOR £13.95 (ANY MIX) INCLUSIVE**

FOILKADE LTD

DEPT PR32
66 LITTLEDEAN, YATE
BRISTOL BS17 4UQ

EDUCATIONAL COMPUTING

Suit
children
ages 5-11

strongly
recommended by
educational
authorities

on the ZX81

No comparable
collection
offers so much
for so little

Fifty high-quality programs to turn your ZX81
or Spectrum into a powerful educational tool.

And you don't even need to know programming.
There are clear instructions and plenty of tips
& advice. Designed to go beyond drill & practice
the promote learning through interaction & discovery.

Almost all programs
work on the
SPECTRUM

All programs
fit 1K

Creative use of
graphics

Many innovative
ideas

Fully documented

Includes many
games

Graph-plotter • Histogram • Simon-spell • Sketchboard • Times-table • Sets
Series-quiz • XY-coordinates • Count • Equations • Areas • Guess-a-Volume
Angles • Upstairs-Downstairs • Music-notes • See-saw • Wipe-out • Spell
Temperature • Clock • Money • Snake
Mastermind • Number-shoot • + 26 more

Educare's
50
1K PROGRAMS
for
PRIMARY
EDUCATION

Includes:-

TORTOISE

A simplified
version of the
famous Turtle
programme

CODED MISSILE

Combines the
fun of arcade
games with
learning

£5.95 only
paperback 110 pages
plus Spectrum supplement

EDUCARE

To: **EDUCARE**
139a Sloane St.
London
SW1X 9AY

Please send me copies Educare's 50.

I enclose cheque/postal order for £.....

Name.....

Address.....

Let your child benefit early - Send now

NEW!

AIRWAVES

COMPUTERS LTD

PRESENTS

MACOD 1

Do you want to understand and program
in MACHINE CODE on the SPECTRUM

MACOD 1 is a must for you

This versatile user friendly programming tool
will enable you to unveil the complexities of

SINCLAIR'S ROM

Over 20 commands include:

Disassembly; Single Step; Display and change
memory and Registers; Execute; Fill; Move; Search;
Various Break Points; User Programmable commands;
PROBLEMS? Consult HELP page.

This cassette tape comes with a
clear and understandable instruction manual.

16K/48K
ONLY £8.95
(incl. p & p)

AIRWAVES (COMPUTERS) LTD.
'ICKNIELD'
PITSTONE,
LEIGHTON BUZZARD,
BEDS. LU7 9AN

NEW SPECTRUM AND ZX81 SOFTWARE

"WINGED AVENGER"

Fast and furious. SPECTRUM version has SOUND and USER GRAPHICS. 7 LEVELS. 3 WAVES. MOTHER SHIP. HIGH SCORE. RE-FUELING. RAPID FIRE. SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET". Only £4.50. All SPECTRUM + 16k ZX81.

"SPECTRUM SCRAMBLE"

(CONDITION RED). MORE MICCODE ARCADE ACTION. NO LESS than 8 DIRECTIONAL KEYS for a SMOOTH MOVE. Full ARCADE features including LASERS, BOMBS, INSTANT RESPONSE, CONTINUOUS SCORING, ROCKETS, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. Beware CONDITION RED. With this one you MOVE, FIRE and BOMB AT THE SAME TIME. Don't waste time waiting for explosions, play THE FAST ONE. NEW RELEASE PRICE OF £4.95. 16k or 48k SPECTRUM.

"CONDITION RED" ZX81

For ZX81 owners we have released a SCRAMBLE based MICCODE program written by TWO ARCADE GAMERS for home based excitement. SPEED and a very professional presentation. HIGH SCORE TABLE. SHIPS LEFT. FUEL DUMPS. AIRBORNE MISSILES and a very fancy SCROLL. Overcomes many of the ZX81's limitations and produces a good game with RAPID MOVEMENT and FIRE. See for yourself what these two young men have written. JUST £3.95. 16k ZX81.

"AUDIO SONICS"

WINNER of WIZZ KID 82. For the SPECTRUM, A.S. writes sound effects for your own programs. 26 PRESELECTED SOUND EFFECTS include TELEPHONE, POLICE SIREN, FROG, SPACE EFFECTS and OUTBOARD MOTOR GO into MODIFY and you are presented with a display of SLIDER CONTROLS to adjust PITCH, RISE, FALL, BRISKNESS, DECEL, ACCELL, TONE, REPEAT RATE, STUTTER and DELAY. ADJUST the SLIDERS then INSTANTLY hear the SOUND CREATED. call "THE SOUND ONE" and a program line will appear that is ready for insertion into your own programs. Hours of EXPLORATION YOU WILL BE AMAZED what BEEP can DO. We are proud to offer this at £4.99. 16k or 48k SPECTRUM.

"SPECTRUM RENUMBER DELETE"

All MICCODE RENUMBERS ALL NOT PART "YOU WON'T BUY A BETTER RENUMBER PROGRAM FOR THE SPECTRUM" JUST 600 BYTES. At £4.95. ALSO ZX81 VERSION.

"PROGRAMMER'S DREAM"

A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilities. RENUMBER lines or blocks any increment or start. BLOCK OR LINE MOVE including a renumber into place if required. BLOCK OR LINE ERASE. CHANGE SELECTED STRINGS (NAMES OR CONTENTS). DUMP variable names and values (usable in a loop). DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE. INSTANT and CLEAN. JUST £6.95 with explicit instructions.

"DO NOT PASS GO"

Renamed under protest. ZX81 simulation of the BEST SELLING BOARD GAME. PARK LANE and all that. Up to SIX players. ZX81 acts as DICE THROWER. BOARD. RENT COLLECTOR. UMPIRE. BANK. RULE BOOK. ACCOUNTANT and PROPERTY RECORD. No counters, money, board or dice needed. GAME SAVE INCLUDED, with a winner so far REPORT. Complete with instruction booklet. 16K ZX81 at £6.95.

"GREATEST GAMES VI"

This tape is aimed directly at NEW OWNERS. TEN YES 10 games on one tape. Most use MICCODE all worth playing. Written by a user and well written at that. PAC MAZE: where living is winning; GOBLER: eat the cells, dodge the genes; STAR DEFENDER: hold on till help arrives, VAMPIRES: enter the COUNT; the maze is a death trap; SUICIDE: no winners just better losers - the blobs win again; FROGLER: good fun this, SOGGY BANKS and FLOATERS; STAR TREKER: this is frustration on tape; DICTATOR: an old favourite - push both BUTTONS and PEASANTS. Also BOMBER: bomb your way to a SAFE LANDING. 50p a game makes this the BEST ZX81 value at £5.00. 16k ZX81.

"ADVENTURE IN TIME"

A most extravagant adventure using DATA TRANSFER between programs allowing a 16k ZX81 to run around 60k of adventure. Set in AUSTRALIA... Save Mankind... Only Way... Time Travel... Time Machine... Warp Back... Probe Future... Consult Experts... Word Search... Cave Structure... Decipher Symbols... An AMBITIOUS MARATHON needing ARITHMETICAL and DIRECTIONAL ABILITY along with REFLEX ACTION, DEDUCTION and above all patience. KEY SECTIONS produce a different game each TIME ensuring a new challenge EACH TIME. HOURS upon HOURS of MENTAL GYMNASTICS for £8.00. 16k ZX81.

"A.D.V.E.N.T."

NOW FOR SOMETHING COMPLETELY DIFFERENT. An Eight part SYSTEM to create GAMES. The SYSTEM has particular relevance to "ADVENTURES" but has capabilities beyond its original function. Develop creative skills like PROGRAM PLANNING, the APPLICATION of LOGIC and GAME CREATION without concern for the technicalities of a computer language which can be learnt later. Included is a MINI ADVENTURE to increase your understanding of the SYSTEM. Games can be revised after running. Programs are SAVED as MICCODE DATA FILES for the MASTER PLAY FILE to operate. BASIC lines 1100 and 6500 are available for the user's own routines. A.D.V.E.N.T. is for IDEAS PEOPLE. LAUNCH PRICE of just £5.95. 16k ZX81.

"TRADER JACK"

An ADVENTURE TRADING game set in the POLYNESIAN islands of the SOUTH PACIFIC. With £40,000 to buy and fit out your SHIP, purchase PROVISIONS and obtain a CARGO to TRADE on the ISLANDS. The RISKS are yours to take as are the PROFITS. Are you OUTCAST or MILLIONAIRE. Still POORER means WISER and you can surely beat the SYSTEM next TIME. TRADER JACK £5.95 16k ZX81.

"SPACE TREK"

OH NO, NOT THAT AGAIN! No, not quite. Same story only LONGER and BETTER. This one is not at all forgiving. JUST ONE MISTAKE and you are NO MORE. COPY short and long range RADAR MAPS to PRINTER. Game length is related to your RANK and the higher levels require many HOURS play. A SECOND GENERATION TREK at £5.00. 16k ZX81.

WORK FORCE (WORKS HARDER)

140 WILSDEN AVE., LUTON, BEDS, ENGLAND

U.S.A. users write to:
P.O. BOX 441 TITUSVILLE, FLORIDA 32780, U.S.A.
Also available at **BUFFER and MICROWARE**

30 Hour BASIC (ZX81 edition)

Britain's top selling BASIC course

Over 100,000 users

- 8 chapters
- 155 programs
- 30 worked examples
- 53 self-checks *with* answers
- 35 exercises *with* answers
- 43 figures
- full index
- spiral bound — opens flat
- two colour text

You've got Britain's most popular computer.

Now get Britain's most popular programming course.

Amazing value at £5.95

Send for your copy/ies direct, enclosing payment, to:

The National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN



OXFORD SOFTWARE GROUP

offers you a powerful tool to understanding yourself and those around you:

A PSYCHOLOGICAL PERSONALITY EVALUATION TEST

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.

Please send a cheque or postal order for £7.50 to: Oxford Software Group, Lady Margaret Hall, Oxford OX2 6QA. We will endeavour to deal with your order by return of post whenever possible.

ZX LOADING AID for ZX80, ZX81 or ZX Spectrum (please specify). Removes guesswork from adjusting volume plugs in between computer & tape recorder: red + green LEDs on — optimum volume set; red LED (only) on — volume too low; yellow LED on — volume too high. £11.95 includes instructions. Push-button to reset 'K' cursor £1 extra.

ZX81 KEYBOARD BLEEPER provides feedback missing from touch sensitive keyboard cheaply — easy installation. All 210 characters bleep in slow & fast modes. No soldering required — all connections plug-in. Fits inside case under keyboard or ZX81 PCB. No trailing wires — also suits most full size keyboards available for ZX81. £9.95 includes illustrated instructions. On/off switch £1.50 extra.

T-SHIRTS £3.50 **SWEATSHIRTS** £7.50. Black with red "SINCLAIR ZX81" or white with black "ZX SPECTRUM" + rainbow

Terrific hand airbrushed, multi-coloured designs "I'M A MICRO ADDICT" or "MICROCOMPUTERS TAKE YOU INTO ANOTHER WORLD" against space scene T-shirts £4.50, sweatshirts £9.00.

Specify size required: 24" to 44"

All prices include P&P & VAT
Send s.a.e. for further details:

FULCRUM PRODUCTS DEPT. M

HILLSIDE, STEEP LANE

FINDON, W. SUSSEX BN14 0UF

ZX-81/ ZX SPECTRUM HARDWARE



Desktop console for the ZX81. It raises and tilts the TV to minimise eyestrain, holds in place the ZX81 printer, RAM packs (and other add-ons), power supply, tape recorder and hides most of the wiring. Provides storage space for cassettes.

TV stand removable for access to add-ons, wiring, etc. Can be used separately from the base.

Optional: Two built-in illuminated power switches. Similar unit for the ZX Spectrum also available which holds ZX Microdrive in place.

Qty	Description	Item Price	Total
	Console for ZX81	£29.95	
	Console for ZX Spectrum	£30.95	
	Power Switch for Tape Recorder	£3.00	
	Power Switch for ZX81/ZX Spectrum	£3.00	
	Sub Total		
	Carriage	£3.00	
	Total Due		

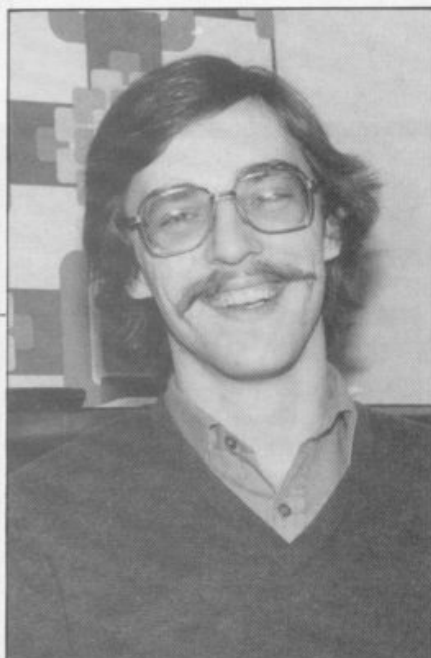
Date

YOUR NAME AND ADDRESS (In Capital Letters Please)

Cheques/ PO made payable to:
COMPUTERLOCK

2 Wychperry Road, Haywards Heath,
West Sussex RH16 1HJ
Telephone: (0444) 451986

All prices inclusive of VAT. Allow 28 days for delivery.



David Janda



Tony Poulter reports on our last contest

Screen expanded in only nine bytes

AT 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

easier to type-in. The nine bytes start 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 — the 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

NEWLINE will get you out of it 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
0 POKE 17328,50
0 POKE 17329,57
0 POKE 17330,64
0 POKE 17331,215
0 POKE 17332,24
0 POKE 17333,-6
0 PRINT USR 17325
```

Figure 2

```
1 REM M6RNDY0 GOSUB ?)ZZLN ?"
```

```
0 POKE 16520,71
0 POKE 16525,107
0 PRINT USR 16514
```

Figure 3

```
1 REM M6RND50Space Graphic fou
RT RAND LNinverse v Graphic twoG
4 IF LN inverse v Graphic two FA
ST AT GC SAVE LN inverse x Graph
ic c inverse j inverse i RETURN
STOP COS RETURN RNDK NEW PLOT in
verse sSpaceNOT / LPRINT
2 GOTO USR 16514
0 RUN
```


★★ **NEW FROM** ★★
CAMEL PRODUCTS
DREAM-81 FOR ZX-81

64K **RAM**
Plus

- PLUS** A 28 pin EPROM socket for 2716/2732/2764 and even the latest 27128 from Intel.
- PLUS** Fast/Slow option, to allow for EPROMs of different speeds.
- PLUS** Link option to disable any part of 0-16k memory area in 2kB multiples.
- PLUS** Full 64k capacity of high speed RAM available for VDU or other use of your ZX81.
- PLUS** Professional standard, built and tested unit in black ABS case with an LED indicator. £69.95 + VAT

OTHER CAMEL PRODUCTS

- | | | |
|-----------|---|--------------|
| MEMIC-81 | A 4 kilobyte CMOS memory unit with Lithium battery backup. Program/data storage up to 10 yrs. Instant retrieval. Basic/M.C. | £29.95 + VAT |
| MEMIC L/T | Two kilobyte CMOS RAM units for a 2716/2732 socket in any system | £26.05 + VAT |
| ROM-81 | 2kB-8kB EPROM Unit with Wait States | £14.95 + VAT |
| PIO-81 | 8+8 Ch. latched Input/Output ZX81 card | £13.00 + VAT |
| PPS | Cased 25w pwr. supply 5v, 3A/12v, 1A/-12v, .25A | £44.95 + VAT |
| | NEW CRAMIC 81 NEW | |
| | A 16 kB CMOS RAMPACK for ZX81 soft switch via keyboard between CRAMIC 81 and ordinary RAM. Cased, cabled & tested | £79.95 + VAT |



Cambridge Microelectronics Ltd., One Milton Rd., Cambridge CB4 1UY Tel (0223) 314814

ENTER THE SUPER JRS
ZX SOFTWARE COMPETITION AND
WIN £250 PLUS
A 14" COLOUR TV

Your original ZX81 or SPECTRUM program could win the first prize of £250 and a 14" colour T.V., the second prize of £150, or one of the three third prizes of a JRS 64K RAM Pack.

PLUS

a substantial cash payment for the distribution rights to your game by JRS (even if you don't win a prize, JRS may still offer to buy your program, providing it meets with the high standards required). All entries must be received by February 28th. Winners will be notified by post by March 31st, and results will be published in the May issues of *Sinclair User* and *Your Computers*.

All programs submitted must be accompanied by an official entry form, available from JRS Software, which contains full details of the rules and conditions of the competition.

Fill in the coupon below and post it today for your official entry form, including a large stamped addressed envelope.

Please rush me by earliest post:

- ☐ Competition Entry Form ☐ New 1983 Catalogue
 * Tick as appropriate

Name

Address

Age

SU2

JRS SOFTWARE

19 WAYSIDE AVENUE, WORTHING, SUSSEX. BN13 3JU Telephone: (0903) 65691

JOIN THE USERS' CLUB

FREE
BOOK!

Make the most of your Spectrum or ZX81 by joining the country's strongest and most enthusiastic users' club—the National ZX Users' Club.

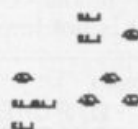
When you join us, we'll send you our 'new members welcome pack' with 30 programs (15 for the ZX81, 15 for the Spectrum), plus the first issue of our value-packed club magazine *INTERFACE*.

Inside *INTERFACE* as well as at least six programs for your ZX81 or Spectrum, you'll find letters from members as they share tips and ideas, and sound off on a variety of subjects (such as you-know-who's appalling delivery times record), a list of local ZX clubs, and special offers from software houses and book publishers—special offers just for members. If you're having problems with your computer, we have experts on tap to try and help you. If you want to start a local users' club, we'll give you publicity, and let you buy books at a special discount for your club members.

If you're not a club member, you're missing out on making the most of your micro (and try saying that ten times quickly!) Come on in and join us, the water's fine. It's £9.50 for a year's *INTERFACE*, and we'll send you a sample issue for £1.00

Run by Tim Hartnell, the National ZX Users' Club is a resource just waiting to be tapped. Come on and start tapping.

National ZX Users' Club,
 Dept. SU
 44-46 Earls Court Road,
 London, W8 6EJ



OK, Tim, you've convinced me:

() Send me my 'new members' welcome pack' plus my first issue of *INTERFACE* and keep those *INTERFACES* coming for the next year. I enclose £9.50 (UK), £12.50 (Europe)

() Just send me a sample of *INTERFACE*. I enclose £1.00

I have () a ZX81 () a Spectrum

Name

Address



Andrew Hewson looks at difficulties concerning the PRINT command

Finding the answer to screen filling



Andrew Hewson.

MOST 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 command.

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 necessary.

Daniel Guillemyn of Toulouse, France asks: **Is it possible to set the colour of a pixel in the Spectrum 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

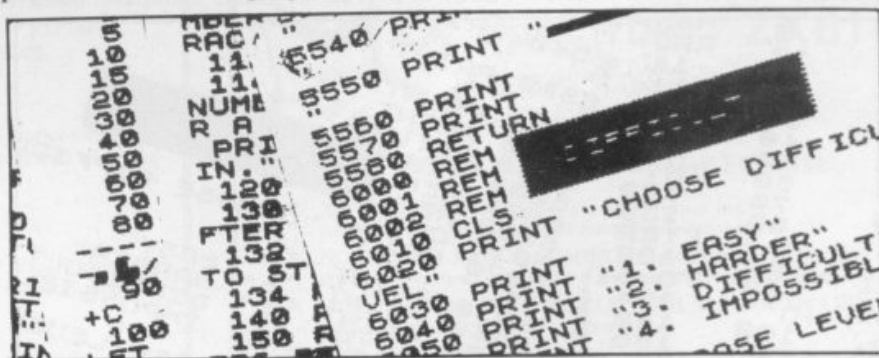
long line is being INPUT or EDITed.

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;
```

continued on page 90



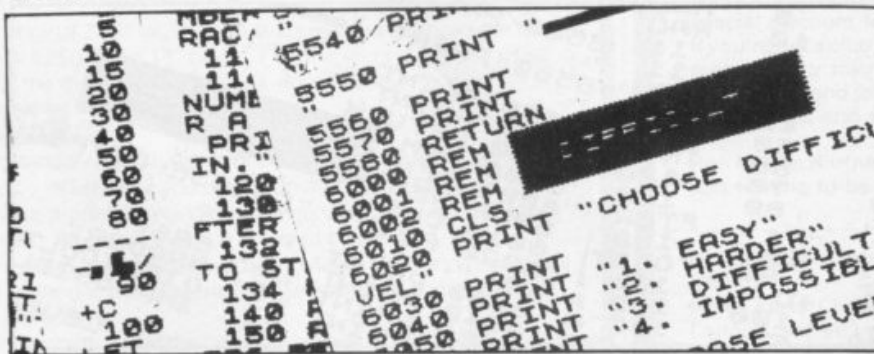
continued from page 89

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"

LDA,16	62 22
RST 10	215
LDA,0	62 0
RST 10	215
LDA,0	63 0



RST 10	215
LDA,41	62 65
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
```

50 NEXT i

To call the routine, initialise the PRINT position and then use theUSR function, for example:

```
100 PRINT
110 RAND USR 32600
```

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

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.

**campbell
systems**

THE VERY BEST IN MACHINE CODE
FOR THE **ZXSPECTRUM & ZX81**

SPECTRUM 16K GULPMAN game of the '.....man' variety with 15 mazes, 4 chasers, laser defence, 9 grades, 9 speeds, demo mode, choice of joystick control. "An extraordinarily good program" raves Boris Allan for Popular Computing Weekly. We think you will agree. £5.95

SPECTRUM 48K MASTERFILE business/domestic filing and reporting system. So flexible that it is equally usable for your mailing lists, catalogues, stock control, text extracts applications are endless. Fully user-defined data and report display formats, dynamic variable-length file, records and data items. Fully menu-driven with powerful search facilities, sorting, total/average, update, multiple independent files, printing. Yes, we aim to support microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 22-page manual. £15.00

SPECTRUM 16K SPDE Disassembler and Editor, as used by other ZX professionals, and we used it to develop the above. £5.95

ZX81 16-48K THE FAST ONE is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

ZX81 16K GULP 2 almost identical spec to GULPMAN. £4.75

All programs supplied double-recorded and mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

CAMPBELL SYSTEMS
(Dept. SU)
15 ROUS ROAD
BUCKHURST HILL
ESSEX IG9 6BL
ENGLAND 01-504-0589



R & R

STAR TREK 48K

Rid the Galaxy of the evil Klingons. Protect your Star Bases from attack. ("Easy to play. Difficult to beat". Sinclair User Dec '82)



ONLY £4.95

P-E-P

THE PROGRAM ENHANCEMENT PACKAGE FOR THE ZX81 (16K)

A suite of easy to use machine code routines designed to transform your Basic programs.

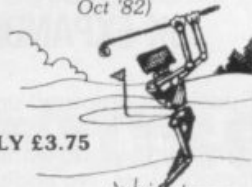
- DEFINED SCROLL REGION 1 line to whole screen ■ SCROLL up or down.
- FILL SCREEN any character.
- CHANGE BACKGROUND
- CHANGE FOREGROUND
- INVERSE VIDEO ■ FLASH SCREEN
- CLEAR SCREEN without changing print position.

Supplied on tape with a 6K DEMO PROGRAM and a FULL instruction booklet

ONLY £5.95

16K Spectrum GOLF

Hi-Res Full colour graphics. A game for 1 or 2 players. All the features of a full size course. THE family game. (Reviewed Sinclair User Oct '82)



ONLY £3.75

GNASHER 16K

THE ULTIMATE MAZE GAME. Ghosts, Energy Pills, Bonus Fruit, Sound, Colour + much more. Starts easy, Becomes impossible.



ONLY £4.95

Send to: **R & R SOFTWARE (SU)**
34, Bourton Road,
GLOUCESTER GL4 0LE
Tel: GLOS (0452) 502819

48 HOUR DISPATCH
Overseas + 10% please
Large Dealer Discounts

**ZX
SPECTRUM**

SINCLAIR BUSINESS USERS

(Software for ZX81 16K)

ACCOUNTS

For preparation of accounts from incomplete records. Produces nominal ledger, profit and loss account and balance sheet.

Sole trader: £17.50 Limited company: £17.50
Sole trader and Limited company: £25.00

SALES

Produces sales day book, sales and VAT analyses, statements and list of debtors. Can handle up to 50 accounts and 200 monthly transactions: £20.00

PURCHASES

Produces purchase day book, purchases and VAT analyses, statements and list of creditors. Can handle up to 50 accounts and 200 monthly transactions: £20.00

Combined price of Sales and Purchases: £25.00

MAILING LIST

This program can hold up to 90 names and addresses. Labels can be printed selectively using previously defined criteria: £3.00

All programs are supplied on cassette with operating instructions.

Further details from:

HESTACREST LIMITED
P.O. Box 19, Leighton Buzzard, Beds. LU7 0DG.

JOYSTICKS



ZX Spectrum / ZX81

FOR ONE JOYSTICK AND
INTERFACE MODULE

BUILT, TESTED & READY FOR USE

- ★ NO SOLDERING, interface module plugs into rear connector between ZX and Ram Pack, Printer etc.
- ★ NO SPECIAL PROGRAMMING, Joystick 1 simulates cursor movement keys 5 to 8 through interface module.
- ★ IMMEDIATELY COMPATIBLE WITH ALL SOFTWARE using the arrow keys for movement.
- ★ TWO JOYSTICKS connect via one interface module.
- ★ EIGHT DIRECTION, SELF CENTRALISING ACTION with integral 'FIRE' button.
- ★ FREE 'VIDEO GRAFFITI' program & full instructions.

IMPORTANT: Use will not invalidate your Sinclair guarantee.

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. To: A.G.F. HARDWARE, Dept. SU,
26 Van Gogh Place, Bognor Regis, West Sussex PO22 9BY

QTY	ITEM	ITEM PRICE	TOTAL
	JOYSTICK	7.54	
	INTERFACE MODULE	15.96	
ZX Spectrum <input type="checkbox"/> ZX81 <input type="checkbox"/> Please tick			FINAL TOTAL

ZX-81

ZX-PANDA



16K EXPANDABLE RAM PACK

Specially contoured unit fits snugly into ZX-81 thus eliminating wobble and memory loss. No additional power required. Red LED on/off indication.



ONLY
£26.50

PANDA EXPANSION MODULE

The above unit is easily expandable from
16K to 32K

ONLY
£19.95

by simple insertion of
a plug-in-module.

GIANT PANDA

Buy the 32K UNIT

ONLY
£43.00

Complete at
a special price
of:

All prices are fully inclusive of VAT and p&p. Delivery within 21 days of receipt of order. All products come with a full ONE YEARS GUARANTEE.

SEND NOW TO:

FOX ELECTRONICS
141 Abbey Rd
Popley 4
Basingstoke
Hampshire. Tel: 20671

Please send me Name
.... 16K RAMPACK Address
.... EXPANSION MODULE
.... GIANT PANDA
I enclose £.....

ZX81



- Stylish case fits neatly between ZX81 and Ram pack of 8K or more.
- 256 x 192 pixels.
- Hi res display file independent of old display file.
- Very fast and powerful graphics commands as extensions of Sinclair basic: SLOW / FAST CLS COPY PRINT PLOT all extended to hi res.
- 114 PLOT modes including:
 - Points and various line types
 - Textured triangle fill
 - Absolute and relative co-ordinates
 - Line drawing to points off screen
- Mixed text and graphics including PRINT at graphics cursor.
- User defined graphics for space invaders etc
- Screen COPY to printer
- Extensive manual, excellent for school and home use, and full guarantee.
- Arcade games available soon!

Post to:- Notting Dale Technology Centre (Ltd)
T.F.L. (ZX 81)
189 Freston Road
London W10 6TH (01-969 8942)

Please send me board(s) @ £32.00 each
+ £4.80 VAT plus 75p P&P

I enclose Cheque/P.O. for
Or I wish to pay by Access/barclay Card/Visa.

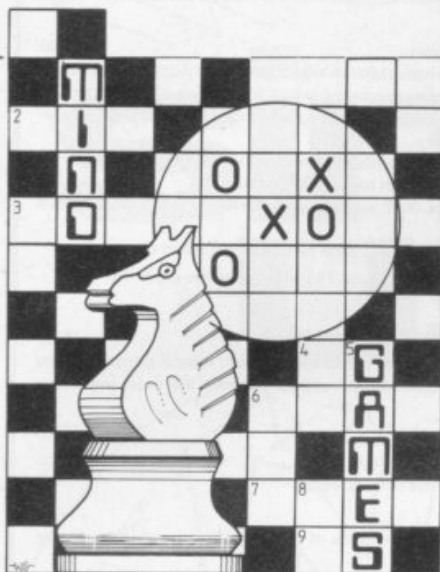
Card Number

Name and Address (PRINT)

Name

Address

Credit card holder's signature.



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 Quicksilver 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 do.

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 details.

For this month's puzzle I have devised a cunning maths problem: $1.2.3.4.5.6.7 = 16 \frac{5}{6}$ or 16.833333

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.

THERE 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

'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 Quicksilver 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

Avenger for the ZX Spectrum (16/48k RAM)



FEATURES

- ARCADE ACTION
- Eight different types of target.
- Rapid manoeuvring of ship.
- Quick firing of bombs and lasers.
- 'Intelligent' alien interceptors.
- Realistic bombing trajectory.
- Continuous display of MISSION TIME, SCORE, SHIELD & LASER TEMPERATURE.
- End of mission report.
- Five levels of play.
- Full use of sound effects and colour.

□ Written by Kevin Flynn.

Send cheque or P.O. for £5.00 including P&P to:



ABACUS PROGRAMS
186 St. Helens Avenue,
Swansea, W. Glam. SA1 4NE

only
£5 inc.

ZX SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

Spectrum Junior Education

£5.50

Use your Spectrum to help your children with their school work. This cassette contains eight attractive, easy-to-use programs for the 7 to 11 age group.

- * Topics include English comprehension, spellings, homophones, junior science, maths and history.
 - * Entering your own questions and answers allows you to adapt two of these programs for exercises in any subject area.
 - * Moving colour graphics and sound are extensively used to improve motivation.
 - * Use the "draw" program to produce pictures, maps and diagrams.
- Suitable for the 16K or 48K Spectrum. Program notes are supplied.

O-Level Chemistry (C1)

£5.50

This cassette contains four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- * Elements, compounds and mixtures.
- * Structure, bonding and properties.
- * Redox, electrolysis and the activity series.
- * Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:

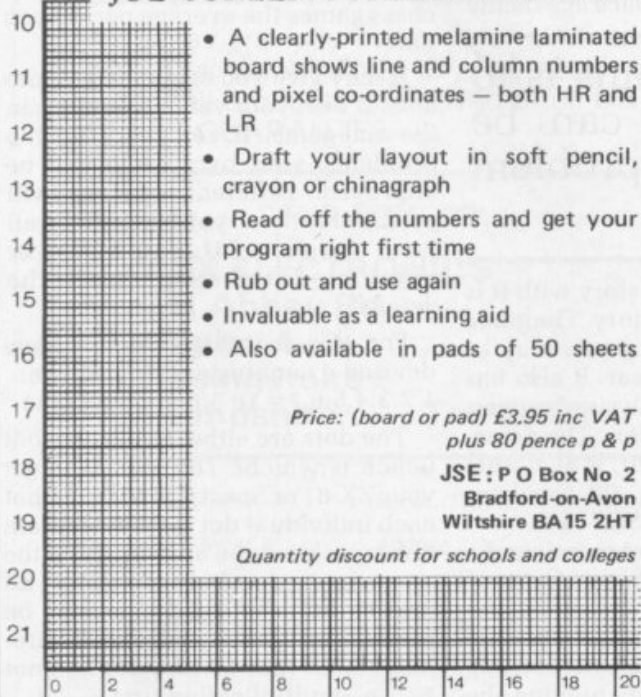
CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns,
Woking, Surrey GU21 1UF.

Overseas orders: £6.50 (\$11.60) per cassette; includes AIRMAIL postage.

SCREEN FORMAT PLANNER FOR ZX COMPUTERS

Speed your programming by planning your screen format with the

JSE SCREEN FORMAT PLANNER



- A clearly-printed melamine laminated board shows line and column numbers and pixel co-ordinates — both HR and LR
- Draft your layout in soft pencil, crayon or chinagraph
- Read off the numbers and get your program right first time
- Rub out and use again
- Invaluable as a learning aid
- Also available in pads of 50 sheets

Price: (board or pad) £3.95 inc VAT
plus 80 pence p & p

JSE : P O Box No 2
Bradford-on-Avon
Wiltshire BA15 2HT

Quantity discount for schools and colleges

WELCOME TO THE COLOURFUL WORLD OF

Custom SOFTWARE

FREE — FREE — FREE

You're on a three week holiday in a small coastal village somewhere near Honolulu and you hear native rumblings about a long lost sunken treasure. Can you with only your holiday funds salvage this gold from its watery grave??? If by chance you can then a 50p. voucher is yours absolutely free. Good luck . . . you'll need it.

SALVAGE
16K Spectrum
with
full colour graphics

EVEN YOUR COMPUTER WILL ENJOY OUR GAMES

**DR. BONGO'S
SAFARI PARK**
16K Spectrum
VIC 20 + min.
expansion
16K ZX81

Dr. Bongo's plan is to destroy the World, with only hours before his devastating missiles are launched you locate his position. Your mission is to stop him and be the World's No. 1 hero. The only problem is that he is on a small island in the middle of a Safari Park, and you are outside the Main Gates, on foot.

Programs written to your specific requirements i.e. EDUCATION, BUSINESS, HOME RECORDS, ETC. Please write stating your exact needs for a FREE estimate. Our prices will astound you.

**SPECTRUM
VIC
ZX81**

All programs are supplied on first quality cassettes. Please enquire as to availability of other computer formats. Each game £4.95 or both for £8.95 inclusive of postage and packing. All programs normally supplied by return of post.
CUSTOM SOFTWARE, 44 AIREVIEW TERRACE, SKIPTON, NORTH YOKS. BD23 1RX.

THE FIRST

Sinclair User

ANNUAL

The Complete ZX Companion

**In the fast-moving world of Sinclair—a year is
a very long time**

The first of the best of the year! A complete guide which follows the course of all the Sinclair developments in the last 12 months—and you'll **never believe** how much has happened until you see it!

Since Sinclair User was launched in April, we've tried to keep you up-to-date. Now we've asked our top writers to take stock of the year's progress in the compendium you won't want to miss.

We've also chosen the best articles and programs from previous issues—so the new **Sinclair User Annual** makes a great gift for a new enthusiast, as well as forming a valuable reference work for you.

The **Sinclair User Annual** will be available from the beginning of December, price £1.50, from your usual newsagents.

Make sure you order your copy in good time—because everything about Sinclair is fast-moving! So **don't** miss it!

If you are unable to obtain **Sinclair User Annual** from your newsagent, order it by post from:

Sinclair User, ECC Publications Ltd., 30-31 Islington Green, London N1 8BJ, price £2.05 including post and packing (£2.75 for non-U.K. residents). Cheques/POs with orders please, payable to Sinclair user.

SO YOU THINK YOU CAN PLAY GAMES . . .

AT LAST . . . EXCITING AND CHALLENGING COMPUTER
GAMES FOR TWO PLAYERS!!!

GAMES INCLUDE:

- ZX81 (16K) and Spectrum (48K) programs on ONE cassette.
- full size professionally printed board.
- counters and markers.
- 2 pads disposable maps (Conflict only).
- comprehensive instructions/rules.

"CONFLICT":- a total war for two players involving both the machinery (armies, missiles, warships), and finance (stock market, oil, piracy) of conflict.

"I enjoyed this strategy game as it made me think, rather than letting the computer do all the work as so many other new computer games do" (*Computer & Video Games*, Sept. 82).

"GALAXY CONFLICT":- raise a fleet of battle Eoncruisers then move from bridge to bridge taking full control and responsibility in this battle for the heavens. Born galactic rulers will do well.

Each game only £9.50 and available from these and other games shops:

GAMER, 24 Gloucester Road, Brighton.
GAMES UNLIMITED, 2 Castle Street, Kingston upon Thames.
ESDEVIUM GAMES, 185 Victoria Road, Aldershot.
SCREEN SCENE, 144 St Georges Road, Cheltenham.
BUFFER MICRO SHOP, 374A Streatham High Road, London SW16.
GEORGES, 89 Park Street, Bristol.

OR MAIL ORDER FROM

martech games

Send cheque/P.O. (£9.50 each, £18.00 for two) to:
**MARTECH GAMES, 9 Dillingburgh Road,
Eastbourne, East Sussex BN20 8LY.**

GAMES CENTRE, 22 Oxford Street, London NW1
GAMES GALARY, 13 Forest Road, Edinburgh
DATA ASSETTE, 44 Shorton Street, London NW1

See Review this Issue

ZX SAS

Serious Application Software

for your 16KZX81 16K or 48K SPECTRUM

(Please specify)

MATHS

For children 5-12 years of age + -*/., all with exceptional HELP facility (full step-by-step explanations) and optional entry of units, then tens. £8.00

SALES LEDGER

Ideal small business system, day-books, statements, etc for up to 200 accounts. £10.00

PURCHASE LEDGER

Day books, remittance advices, etc for up to 200 accounts. £10.00

INDEX/RETRIEVAL SYSTEM

Four levels of data, usual facilities inc search on keyword or part of word, for up to 800 records. £6.50

BRIDGE

Full scoring system displays and prints full scorecard, totals for 5 rubbers and all hands played. £6.50

MORTGAGE

How long will any mortgage be if the rate increases? What should I pay if the interest rate changes? Mortgage tells you. £4.50

RETAIL ACCOUNTING

Excellent retailing system, takings/product sales analysis etc. £10.00

INCOME TAX

Check your PAYE code, tax deductions and calculate your future net pay. £10.00

ALSO Club Lists, Freezer Inventory, etc.

ZX SAS 42/45 New Broad St, London EC2M 1QY
(see for more details)

HUGE SELECTION—OVER 400 IN STOCK!

HIRE ZX81/SPECTRUM PROGRAM TAPES

"An exceptionally professional and thriving organisation with, even, a most readable newsletter"—review in Eric Deeson's "Guide to ZX Spectrum Resources."

Get the most from your ZX81 or Spectrum at minimum cost by hiring program cassettes for just £1 each per fortnight (plus 40p p/p).

Our stock of over 400 tapes (up to 20 maker's original copies of the more popular ones) covers most of the best cassettes advertised in this magazine—and more: thrilling m/c arcade and adventure games, tests of skill, realistic simulations and a wide range of utilities for business, multi-indexing, banking, toolkit and graphic aids.

You can switch from ZX81 to Spectrum membership at any time by paying the balance, and hire up to three tapes at a time. Our regular illustrated magazine "Computerchat" is posted free to all members, with its product and software reviews plus our unique "Top Twenty" ZX tapes chart based on members' scores, and some special offers.



**The Sinclair Owners'
SOFTWARE LIBRARY** Dept. SU,
Heather Cottage, Warren Road,
Liss, Hants GU33 7DD.

Yes, please—I'd like to join for the next 12 months. Please send on money-back approval my magazine, descriptive library catalogue and order forms, on the understanding that if I'm not delighted with your service within 28 days you will refund my money in full.

NAME.....

ADDRESS.....

.....Tel.....

I enclose cheque/Postal Orders for:

- ☐ £8.50 for ZX81 membership (overseas £2 extra in each case)
☐ £9.50 for Spectrum membership

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Sinclair User* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

- (1) You have not received the goods or had your money returned; and
- (2) You write to the Publisher of *Sinclair User* summarizing the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you do write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £4,250 per annum for any one Advertiser so affected and up to £10,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts, or when the above procedure has not been complied with at the discretion of *Sinclair User*, but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc, received as a result of answering such advertisements). Classified advertisements are excluded.

Sinclair Supermart

GAMES FOR YOUR SPECTRUM AND ZX81

Introduce young children to your Spectrum with these traditional games. Quiet, sociable and easy to play. No dice or counters to lose.

Games Compendium 16K Fox & Geese, Snakes & Ladders, Noughts & Crosses, Beetle and Ludo.

£4.95 incl. p&p.

Roulette 48K Four players can place their chips on the Monte Carlo table in a variety of betting combinations. Good linear simulation of wheel. All wins are high-lighted and bank accounts automatically computed and displayed.

£4.95 incl. p&p.

For 48K owners, both games on one cassette.

£8.95 incl. p&p.

GAMES COMPENDIUM is now available for ZX81-16K £3.00 incl. p&p.

Money back guarantee.
DIYOND SOFTWARE,
Dept. SU, Hospital Road,
Annan DG12 5HP, Dumfriesshire.

FOR HORSE RACING ENTHUSIASTS 'THE SETTLER'

Work out your winnings on accumulators, yankers, trebles etc. Available on cassette for ZX81 (16K) or SPECTRUM. Includes the professionally used **SAFE BET SYSTEM** and also the **NEW FORMULA STAKING PLAN** at no extra cost! (Both these plans have been advertised in the S.C. & B. for two years at £27.) This whole package for only £10. Also available: the highly successful **'POOLS FOR PROFIT'** system. NOT a forecasting program but a highly ingenious mathematically stratified method of entry. Complete checking program on cassette and full instructions etc. Price £10.

IMPORTANT — these are NOT games. But programs to help you earn money for a change. Mail remittance to:

BRITISH SPORTING SERVICES (SU)
45 Sandringham Road, Norwich



Erricks' of Bradford ZX-81/PERIPHERALS/ SOFTWARE

All from stock
Rawson Square.
(Bradford) 309266

FOOTBALL POOLS PROGRAM

- * Lists out, in order of preference, the 16 most likely score-draws; also the 16 most likely homes, draws and aways.
- * Picks out the results on the bookmakers' **'FIXED ODDS'** coupons that have been given over-generous odds. Calculates your expected profit!
- * Allows the user to update the tables week by week as the results come in.

THIS POPULAR PROGRAM IS NOW AVAILABLE ON BOTH THE ZX-81 (16K) AND ZX SPECTRUM.

For a copy of the program on a quality cassette, plus an information leaflet giving a brief explanation of the theory send £5.95 to:

HARTLAND SOFTWARE
(Dept. S), 8 PENZANCE PLACE, LONDON W11 4PA.

SPECTRUM/ZX Feedback Eliminating Device (FED)

This is a small switching unit connected between your computer and cassette recorder which isolates the redundant lead when either loading or saving programs. Saves wear and tear on the plugs and sockets. Model 1 £5.00 inc p + p. Available with extra switch to operate your recorder via the remote connection. Model 2 £7.50 inc p + p
BRAINWAVES 1 Stour St,
Manningtree, Essex.

HORNBY SOFTWARE present

PRO GOLF

Spectrum game 16K/48K. Realistic golf game, choose your own club, choose your shot, miss the bunkers, water hazards, out of bounds. 9-hole course with graphics. Price £4.95 incl. P/P & VAT.

21 Pinfold Hill,
Leeds LS15 0PW

PROGRAMMES FOR LEARNING

SPECTRUM programmes for schools and parents which have been **RESEARCHED and TESTED** by teachers. Subjects include — **READING, SPELLING, ENGLISH** (for 7-11 years inc. Common Entrance etc.) and **MATHS** (7 years to 'O' level). No data input is required just **RUN** the programmes.

For free registration and details please write to Dr Glasdon,
94 Airedale Ave,
Chiswick, London W4 2NN.

**TO ADVERTISE IN THE SUPERMART
CALL ANNETTE ON 01-359 7481 NOW!**

ZX81 TO SPECTRUM ADAPTOR

(48K and 16K)
Use Sinclair 16K RAM and other hardware on the Spectrum. Plugs into expansion port. (No soldering on 16K).
£9 inc. From: **STEPHEN ADAMS**
1 Leswin Road, London N16 7NL.
Tel: 01-254 1869.

ZX TAPE DUPLICATING PROBLEMS?

PCS duplicator, up to 50 outputs. Eliminates faulty recording duplication.

- * Amplification of signal, switchable 19KHZ signal disables cassette ARL.
- * Channel monitor (LED) flashes output no. and audible alarm if fault occurs.
- * Allows for computer-cass/cassette-cass recordings.
- * Suitable for cuts based micros inc. ZX and many others.

£830 + VAT. Units starting at £380 + VAT.

For details: **ZX MICRO-PRO
TAPE DUPLICATING SYSTEMS, LONDON, WC1N 3XX.**
24 HR. ANSWER PHONE SERVICE 01-404 5011.

ZX-81 + 16K RAM + all leads, power pack, various manuals, 3 recorded cassette tapes, special cassette Recorder, 12" B&W. T.V. All in perfect working order. £150. Phone Tring (0442) 7366 after 6.30pm.

SPECTRUM SOFTWARE: "OGLIBLOGGS" — the totally original 16K game. Just £2.50 with "Laser Defence" game on side 2. Fast dispatch. Send cheque/P.O. to Michael Coombes, 2 Broadwalk, Caerleon, Newport, Gwent.

ZX81/ZX80 edge connectors. 2 x 23 way, gold plated contacts with keyway in slot 3 £2.60. Inc cash with order to D Adams, 20 Starling Close, Buckhurst Hill, Essex IG9 5TN.

ZX81, 16K TINTION, testing, problems (randomised) on Pythagoras Theorem — important for all those studying C.S.E., 'O' mathematics/physics. No previous knowledge required! Cassette £4.50. C. Jones, 4 The Eyrie, Burton-on-Trent DE15 0DT.

data-asette

44, Shroton Street
London NW1
Tel 01-258 0409



SOFTWARE IN CENTRAL LONDON

We now stock software for the ZX81 and Spectrum (and other computers!) from many famous Software Houses.
MAIL, 'PHONE or VISIT

MUSIC READING MADE EASY with ZX81 (16K) cassettes. Recognising notes in treble and bass clefs (cassette 1) or alto and tenor clefs (cassette 2) and understanding basic rhythms (cassette 3). Send £5 for each cassette or £12 for the set of 3. Available from: Brian Negus, 19 Westfield Drive, Loughborough, Leics LE11 3QJ.

SPECTRUM RAM UPGRADE for issue one micro. £30. Tel Bradford 577424.

ADD VALUE TO YOUR ZX 81 PROGRAMMING AIDS MASSIVE MEMORY

Merge, Renumber, Delete, Dump, Transfer and Save Data.

All this, with the easiness of use given by a process similar to that of a "DISK OPERATING SYSTEM" making a "MASSIVE MEMORY" out of Ramtop area.

Between other features :
- Leaves program memory free.
- Saves Data independently of main program.
- Stores any number of programs in "Massive Memory", merges and rennumbers them, deletes lines.
Modular Software uses 500 bytes to 4K of memory, as needed, through eight independent and relocatable programs. Plain instruction manual.

£5.5 inc. p&p. Cheque to :
**RAMTOP Services - 5, rue d'Artois
75008 PARIS - FRANCE**

Registered and insured shipping.
14 days delivery.

EXAMS SOON?? - DON'T DESPAIR

"O" level and CSE Study Packs.

Each includes a superb book of diagrams.

Physics — 8 programs, superb value £7.50

Chemistry — 6 programs, highly acclaimed £7.50

Biology — 6 programs, fantastic book £7.50

Maths pt. 1. 4 programs on Algebra, Equations, etc. £6.00

Computer Studies. 4 programs on Logic, Boolean, etc. £6.00

For Junior Schools

"Jungle Maths" — excellent graphics £5.00

"Astro Maths" — Makes Maths fun! £5.00

Teachers Handbook — superb at Parent Evenings £5.00

All for ZX81. Jungle Maths for BBC and Spectrum. All available for Spectrum early in 1983! Please add 50 p&p, new catalogue now available. SciSoft, 5 Minster Gdns, Newthorpe, Eastwood, Notts NG1 2AT.

SPECTRUM HARDWARE

48K upgrade (issue 2 boards)

£44 inc.

110/300 baud RS232 output

only for listings and hardcopy

on TTY £12 inc.

Motherboard system for P10,

full RS232, timer, clock and

other boards

... send for details ...

COLE LANE COMPUTING

62 Cole Lane, Ockbrook
Derby DE7 3RD

SPECTRUM 16K & 48K

High quality, low cost arcade style games using FULL COLOUR GRAPHICS & SOUND

CASSETTE 1 — Bombrun, Asteroids, Defender

Maze, Dr Baron, at only £5.50

CASSETTE 2 — Alien attack, Bushum, Star Trek & Lemmings, at only £4.50

CASSETTE 3 — Space intruders, at only £2.95. Match your wits against the alien forces

SPECIAL OFFER — all 3 cassettes for £9.95.

R. Bhattacharya, (Dept. SU), 3 Wensley Close, Harpenden, Herts.

MICHAEL ORWIN'S ZX81 CASSETTES

THE BEST SOFTWARE (BY VARIOUS AUTHORS) AT LOW PRICES

QUOTES

"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."

Your Computer, May '82

"Michael Orwin has built a reputation for value-for-money software and his Cassette 4 offers quantity as well as quality."

Sinclair User, October '82

"If each game was on a separate tape and selling for £5 each I would still recommend them. But all on one for £5 . . . ! This sort of value for money just has not been seen before on any personal computer."

"Without sounding pushy I would like to conclude this review by saying — if you have a ZX81 and like games, then you should buy Michael Orwin's cassette 4."

2 extracts from ZX Computing, Oct/Nov '82

CASSETTE 1

(eleven 1k programs)

machine code:

React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.

Basic:

I Ching, Mastermind, Robots, Basic Hangman. PLUS Large screen versions of Invaders and Maze of Death, Ready for when you get 16k.

Cassette One costs £3.80

CASSETTE 2

Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.

Cassette Two costs £5.

CASSETTE 3

8 programs for 16k ZX81

STARSHIP TROJAN



Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photon torpedo tracking.

PRINCESS OF KRAAL An adventure game.

BATTLE Strategy game for 1 to 4 players.

KALABRIASZ World's silliest card game, full of pointless complicated rules.

CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.

SECRET MESSAGES This message coding program is very txlp qexi jf.

MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.

Cassette 3 costs £5.

CASSETTE 4

8 games for 16k ZX81

ZX-SCRAMBLE (machine code) with 3 stages.

Bomb and shoot your way through the fortified caves.

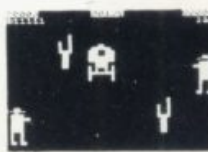


FUNGALOID
THE FUNGALOID IS GROWING AND WHEN THEY REACH THE SKY THEY PRODUCE DEADLY SPORES. YOU CONTROL A FLYER AND YOUR MISSION IS TO DESTROY THE FUNGALOID BY DROPPING ANTI-FUNGUS BOMBS ON THEM.



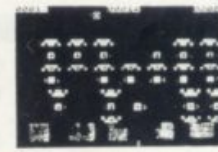
GUNFIGHT

(machine code)



INVADERS

(machine code)



GALAXY INVADERS (machine code)

Fleets of swooping and diving alien craft to fight off.

SNAKEBITE (machine code)

Eat the snake before it eats you. Variable speed. (very fast at top speed).

LIFE (machine code)

A ZX81 version of the well known game.

3D TIC-TAC-TOE (Basic)

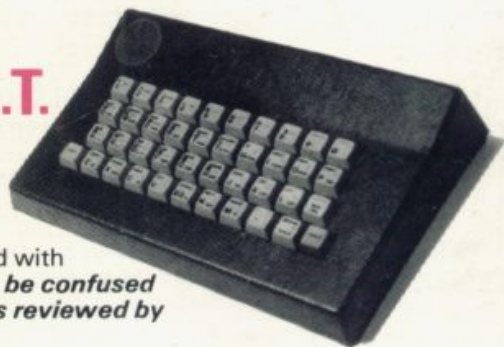
Played on a 4 x 4 x 4 board, this is a game for the brain. it is very hard to beat the computer at it.

7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman). Cassette 4 costs £5.

Recorded on quality cassettes, sent by first class post, from:
Michael Orwin, Dept. SU, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)

ZX81 & SPECTRUM KEYBOARDS COMPLETE WITH LUXURY CASE FOR ONLY £37.95 (ZX81) OR £45.00 (SPECTRUM) INC. V.A.T.

These highly professional keyboards incorporate executive buttons similar to those used on top-quality computers. A repeat key facilitates entering of characters much faster than is possible with a conventional keyboard, thus making it particularly ideal for cursor control and erasing. Attractive black plastic moulded case. Supplied with 12" flexible ribbon cable for connection into your computer. **Not to be confused with toy keyboards currently on the market. Other attributes as reviewed by Tim Hartnell, ZX Computing/Interface.**



OTHER KAYDE HARDWARE/SOFTWARE

ZX81 4K GRAPHICS BOARD

The KAYDE Graphics Board is probably our best accessory yet. It fits neatly inside your ZX81. It comes complete with a pre-programmed 4K Graphics ROM. This will give nearly 450 extra graphics and with the inverse makes a total of nearly nine hundred.

The KAYDE Graphics Board has facilities for either 2K of RAM (for user definable graphics) 4K of ROM or our 4K Tool Kit Chips that will be available shortly. All the graphics are completely software controlled therefore they can be written into your programmes. Here are a few examples:

A full set of space Invaders —
Puckman — Bullets, Bombs —
Tanks — Laser Bases and
Alien Ships
NO EXTRA POWER NEEDED

£29.95

VIC 20 SOFTWARE

THE KAYDE VALLEY
OTHELLO
TWINKLE TWINKLE
KAYDE PECKMAN

APPOLO 8
SPACE ATTACK

PLUS MANY MORE

**ALL AT
£7.95 £3.95
each**

Vic 20 dealer

RAMPACKS... With a difference

Kayde Rampacks are exceptionally stable. They don't over-heat, lose memory, wobble or cause you to lose your program. They are fully compatible with all accessories and need no extra power, and therefore will run efficiently on existing Sinclair power supply. Simply plug them straight into the user port at the rear of your computer. Top quality massive add-on memory only:

**£29.95 for 16K ZX81 Rampack and
£48.95 for 32K Spectrum Rampack**

**FLEXIBLE RAMPACK RIBBON CONNECTOR
only £12.95**

NEW 16K 81 SOFTWARE

TOBOR £7.95

3D WAR OF THE WORLDS £7.95

16K GRAPHICS SOFTWARE

PECKMAN — The only
true ZX version of the
popular arcade game.

£5.95

Graphic Software can only
be used with a Graphics
board

Overseas please add £2.50 p & p for all hardware and 75p for all software. All hardware comes fully built and tested and complete with a 14 day money back option. PRICES INCLUDE V.A.T.

SEND FOR A FREE CATALOGUE STATING TYPE OF COMPUTER.

KAYDE ELECTRONIC SYSTEMS LTD.

THE CONGE, GREAT YARMOUTH, NORFOLK NR30 1PJ

TEL: 0493 57867 TELEX: 975 247 CHATCOM G



**TO: KAYDE ELECTRONIC SYSTEMS LTD,
DEPT. SU2 THE CONGE, GREAT YARMOUTH,
NORFOLK NR30 1PJ**

PLEASE PRINT

Qty.	Item	Item Price £	Total £

Please allow £1.50 P&P for all Hardware 50p for all software



**DON'T FORGET YOU CAN ALWAYS ORDER ON
THE TELEPHONE WITH YOUR CREDIT CARD.
DEALERS WELCOME.**

*I enclose a cheque/postal order payable to KAYDE Electronic Systems Ltd., for
£ _____ *Please charge to my Access/Barclaycard/Trustcard account no.

* Please delete/complete
as applicable.

Signature _____

Name: Mr/Mrs/Miss _____

Address _____
