

January 1983

Incorporating Spectrum User

sinclair user

Issue
No 10

Only
60p

CLUB OFFER FOR BEGINNERS

**MAGIC WAYS
OF USING
YOUR ZX-81**

**Our guide to
education
software**

**Software
outlets
expanding**

**How to
program
— a new
series**

**Record
complaints over
Spectrum**

**Slow
start to
school
sales**

**Plus nine pages of programs,
software and hardware reviews,
helpline, latest news and your letters**

**"FAST LOAD"
£1 OFF
TAPE**

THE GAMES PEOPLE

EAT THE PILLS AND KEEP AWAY FROM
THE GHOSTS. EAT THE VITAMINS AND
CHASE THE GHOSTS. FULL MACHINE
CODE ARCADE ACTION AND SOUND.
DESIGNED TO MAKE YOUR ADRENALINE
RUN HIGH. PRICE £4.95

YOU HAVE THE JOB OF PROTECTING A CONVOY FROM ALIENS AND METEOR STORMS. WATCH OUT FOR THE SPACE MINES AS YOU PLAY THIS AMAZING MACHINE CODE ARCADE ACTION SIMULATION PROGRAM. PRICE £4.95

**WRITE OR PHONE FOR LIST OF GAMES FOR
OTHER COMPUTERS OR JUST MORE GAMES**

☐ **COSMOS**
PRICE £4.95

Signed.....
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 28



page 38

5 SINCLAIRVOYANCE We greet the New Year with a look at what can be expected in the coming months.

7 SINCLAIR USER CLUB With many new Sinclairs being given as presents, we make a special offer to help to learn how to use them.

13 NEWS Strike at Timex in Dundee, sales of Spectrums to schools start slowly, and much more.

16 YOUR LETTERS You keep giving us your opinions on Sinclair User and the state of the Sinclair market. We print a special three pages of your views.

20 SOFTWARE SCENE Games are growing in sophistication and we review some of the latest on the market.

23 HARDWARE WORLD Our regular round-up of the latest improvements for your machines.

28 MAGIC SHOW Frank Adey reveals how to use your ZX-81 in magical ways.

33 STARTING FROM SCRATCH Our regular feature on how to begin getting enjoyment from your Sinclair.

38 PROGRAMMING The first in a new series by John Gilbert giving details of how to learn to write your own programs.

41 BOOKS Exploring your Spectrum is one of the subjects covered in this month's bookshelf.

45 EDUCATION Eric Deeson writes about the uses of Sinclair machines in schools.

49 TEACHING SOFTWARE With the growth of software for schools, Dave Sayers reviews another selection.

53 PROGRAM PRINTOUT Our regular programs section with nine pages of printouts for the Spectrum and the ZX-81.

65 HELPLINE Andrew Hewson answers another selection of problems from his postbag.

69 MIND GAMES An adventure is featured in this month's column by Philip Joy.

NEXT MONTH

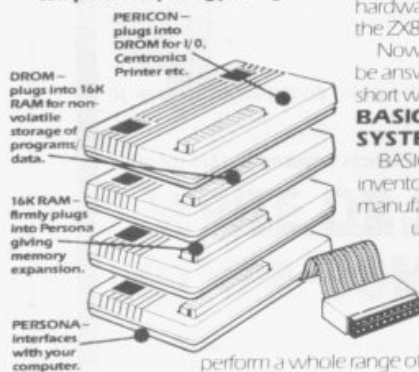
We look in-depth at the increasing amount of of arcade-quality games and continue our series on good programming.

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 a 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
RAM8(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 RAM8 @ £6.50, Add 2K 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 S,
5 Dryden Court, London SE11 4NH or Phone: 01-735 6408



**BASICARE
MICRO
SYSTEM**



More excitement guaranteed

THE NEW YEAR is the traditional time for starting afresh; a time for laying the old year to rest and greeting the next 12 months with all the enthusiasm which is saved only for the new and the unknown.

It is also the traditional time for prophets to attempt to clear the shadowy gloom and look into the future. On the Sinclair scene that is almost impossible. A quick glance at last year's development should be sufficient to show that one month's unexpected wonders are next month's accepted truths.

In a market where, as the Spectrum was launched funeral rites were being read over the ZX-81 and the hardware add-ons industry, only a few months later both were health and blossoming, anything can happen.

There are, however, a few areas which should be watched closely for important developments in the coming months. Top of the list are the long-expected peripherals for the Spectrum — the Microdrive, the RS232 and network interfaces and the Prestel adaptor. To prove they were more than a gleam in Clive Sinclair's eye, prototypes were on display at the Compec exhibition in London. Company confidence in its products appeared to be limited, however, and few people were able to look closely at what was being offered.

The most interesting item, of course, is the Microdrive, the insides of which have kept Sinclair watchers guessing ever since the small black box was displayed at the launch of the Spectrum last April. Despite it being promised before the end of 1982, the latest official estimate is that it will be on sale some time in the first three months of 1983.

Whatever form it takes, it will be needed sooner rather than later to keep Sinclair ahead of the pack.

A growing number of competitors will be another feature of the year, with the long-expected moves from the Japanese beginning to materialise. Sharp, Sanyo and Epson are a few of the names which have begun to appear, each making claims to be better than the Sinclair machines. As yet it is impossible to assess their impact, mainly because they seem to have adopted the tactics of many other parts of the home computer market of issuing a prospectus without the goods to back it up.

The Japanese appear to be no better than anyone else when it concerns the advance announcement of a product, which then takes months to materialise.

Whatever people may think about Sinclair delivery problems — and the latest report from the Advertising Standards Authority is a further guide to the number of people who have not been impressed by deliveries — both the Spectrum and the ZX-81 are available and living up to expectations once they arrive. Despite claims of being ready to go into production, most of the competitors would seem to be at the stage of Sinclair's projected

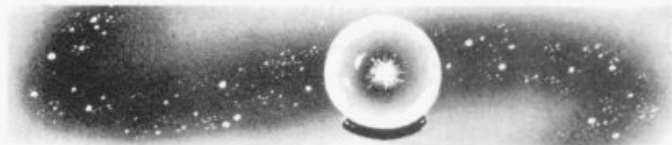
move further up-market which as yet is still at the development stage.

The conclusion would seem to be that the main Sinclair competition is likely to be from the established machines — Dragon, Acorn and the Commodore Vic. The Japanese, when eventually they arrive, will probably dip in their toes at the top end of market. All of which leaves the ZX-81 in a class of its own.

Despite the fears that the Spectrum would mean the end of the market for the ZX-81, the price reduction to slightly less than £50 and the expansion of retail outlets has resulted in demand to revive the machine so that it occupies a position as the perfect introduction to the world of computers. Only Binatone with its threatened £50 unit, yet to see the light of day, has shown any interest in attempting to provide anything like the same computing power at such a reasonable price.

No doubt someone will attempt to introduce a cheaper, more powerful, machine but for it to approach the sales of the ZX-81 it would need to start with the kind of support industry in software, hardware and information which has built around the Sinclair machine in the last 12 months.

Which brings us to what may be the high spot of the year for anyone interested in following the fortunes of



Sinclair and his company. In keeping with the last three years, the company is intending to launch another new machine. It is still at the development stage but Clive Sinclair has already given sufficient hints on what it will be like to be able to form an idea of what will be on offer.

It will be another move up-market at a price expected to be much more than the Spectrum. The price alone is likely to mean that it will mark a move by Sinclair into the business market proper. Clive Sinclair has said that it will include the latest of his company's technology, which means a place for the Microdrive, the flat screen television, and the Prestel adaptor.

Apart from being bigger and better, the possibly revolutionary aspect will be the likelihood of it being fully portable. That means that, unlike the exciting Osborne machine, it will be possible to carry a full system without weight training beforehand.

Whatever the machine is like we can guarantee it will play its part in making 1983 another exciting year in the world of Sinclair computers. The developments have been so fast in the last year that by this time next year we can be sure that we will be looking back on a year when the capabilities of small computers have been greatly increased.

ZX99

AUTOMATIC TAPE CONTROLLER FOR THE SINCLAIR ZX81

● DATA PROCESSING

The ZX99 gives you software control of up to four tape drives (two for reading, two for writing) allowing merging of data files. This is achieved by using the remote sockets of the tape drives, controlled by USR statements or commands.

● RS232C INTERFACE

The ZX99 has an RS232C output allowing connection with any such printer using the full ASCII character code (you can now print on plain paper in upper or lower case, and up to 132 characters per line) at a variable baud rate up to 9,600

● SPECIAL FEATURES

There are so many special features it is difficult to list them all, for example:

AUTOMATIC TAPE COPY: You can copy a data file regardless of your memory capacity as it is processed through the Sinclair block by block.

TAPE BLOCK SKIP: Without destroying the contents of RAM

DIAGNOSTIC INFORMATION: To assist in achieving the best recording settings.

The ZX99 contains a 2K ROM which acts as an extension to the firmware in the Sinclair ROM. The ZX99's ROM contains the tape drive operating system and the conversion to ASCII for the RS232C output.

There is an extension board on the rear to plug in your RAM pack (larger than 16K if required). The unit is supplied with one special tape drive lead, more are available at £1 each.



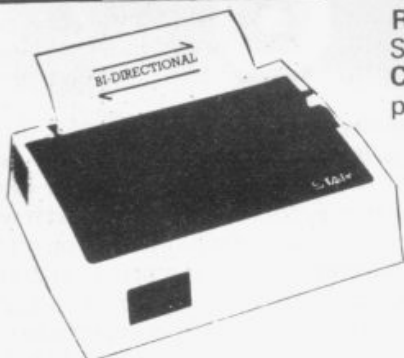
£49.95
+ £2.95p+p

● ZX99 SOFTWARE

We now have available "Editor 99", a quality word processing program including mail-merge, supplied on cassette for £9.95. Also following soon:

- * Stock Control (October)
- * Sales Ledger (November)
- * Business Accounts
- * Debtors Ledger
- * Tax Accounting

Dept. SU9 Data — Assette, 44 Shroton Street, London NW1 6UG. 01-258 0409



● BBC CASSETTE LEAD

7 pin plug to two 3.5mm plugs and one 2.5mm plug. Only £2 inc. P & P. Other leads available — please telephone.

COMPUTER CASSETTES

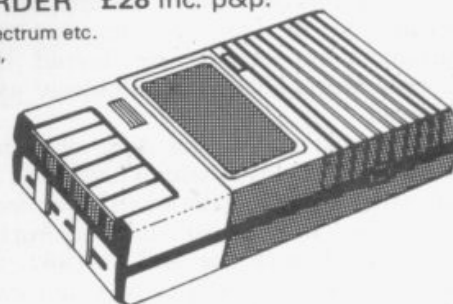
High quality, screw assembled cassettes supplied with library boxes. Any lengths available.

C5 — 37p C10 — 39p C12 — 40p
C15 — 41p C20 — 43p C25 — 45p
C30 — 46p

P&P £1.50 minimum or 10% which ever is greater

● FERGUSON CASSETTE RECORDER £28 inc. p&p.

Tested with ZX81, Acorn, BBC, Dragon, Spectrum etc. Features: Din, Ear, Mic, and Remote sockets, Tape Counter, Tone Control, Built-in Mic., Autostop, Battery/mains. Recommended by Acorn for use with BBC computer.



● STAR DP8480

RS232C (SERIAL) £285 plus £6

Securicor delivery

CENTRONICS (PARALLEL) £265

plus £6 Securicor delivery

This professional printer works with almost any computer with very good upper and lower case typeface.

- Bi-directional
- 80 column width (10" paper)
- Switchable — Tractor or Friction Feed
- 80 chrs. per second

● 2,000 SHEETS OF PRINTER PAPER

£19.50 plus £3.50 p&p.

● E690 REVOLVING CASSETTE RACK



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)

All plus £1 p&p.

ORDER FORM Dept. SU9 Data — Assette, 44 Shroton Street, London NW1 6UG. 01-258 0409

Code	Item	No.	Price	P & P	Total

Cheques/PO made payable to Storkrose Ltd.



Charge my Access/Visa No.

Signed _____ Name _____

Address _____

Books offer reduces cost by 20 percent

TO LINK with our special learning offer we have decided to repeat last month's exclusive offer to club members.

From Read-Out Books and Software we have obtained for members a 20 percent discount on its full range of books.

The full range of books with the special prices, which are open only to its members, is given below.

From Micromega, publisher of business programs, we can offer 20 percent off all of its cassettes. They include **Compushare**, **Bank** and **Computax**, which have all helped to expand the uses for the 16K ZX-81. There are also two games tapes, one for the 16K and the other for the basic 1K ZX-81.

The offers are open only to members of the Sinclair User Club and are available until the end of January. To allow new



members to take advantage of them, orders can be included with the membership application form which is part of the New Year Offer form below. Just tick the Membership Only box and include £12 to the address shown.

Please indicate which computer you own so that you receive the correct cassette.

	Usual Offer	
	price	price
MICROMEGA		
Compushare	£9.95	£7.95
Computax	£9.95	£7.95
Bank	£9.95	£7.95
Space Trek (16K)	£4.45	£3.55
1K Challenge	£4.95	£3.95

READOUT BOOKS AND SOFTWARE

	Usual price	Offer price
Learning to Use the ZX-81, Robin Bradbeer	£4.95	£3.95
Learning to Use the ZX Spectrum, Robin Bradbeer	£4.95	£3.95
Getting Acquainted with ZX-81, Tim Hartnell	£5.95	£4.95
Mastering Machine Code on the ZX-81, Toni Baker	£7.50	£6.20
34 Amazing Games for the ZX-81, Alistair Gourlay	£5.95	£4.95
20 Simple Electronic Projects for the ZX-81, Stephen Adams	£6.45	£5.20
49 Explosive Games for the ZX-81, Tim Hartnell	£5.95	£4.95
Gateway Guide to the ZX-81, Mark Charlton	£6.45	£5.20
Plus £1.20 postage and packing for each order.		



Learning pack aids beginners

DURING the festive season many new owners of ZX-81s will be getting to know their machines. To help in the process, we have put together a special package. We introduced the offer last month but consider it to be so good that it is being repeated.

For only £26, we are able to offer the Sinclair Research Learning Lab and a year's subscription to the Sinclair User Club, the perfect companion to the ZX-81. If bought individually, the items would cost £31.95.

The Learning Lab contains eight cassettes and an explanatory manual intended to take people through all the stages of getting to know the machine.

There are many benefits to be gained from joining our User Club, as an increasing number of people from all over the world have been finding since it was started in June.

The list includes a telephone problem-answering service. Members can telephone at any time for

continued on page 8

NEW YEAR OFFER FORM

I wish to take advantage of the special New Year offer and enclose £26 for a year's subscription to the Sinclair User Club and a copy of the Sinclair Research Learning Lab.

☐ Membership only. I enclose £12 for a year's subscription to the Sinclair User Club.

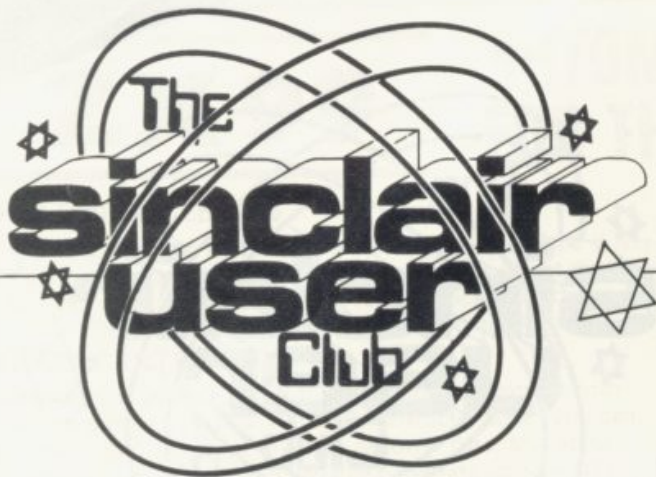
I own a Spectrum/ZX-81

Name

Address

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 7

expert advice on problems they have in using their machines. The telephone number is given on the cassette-based news letter, which is sent every two months, and includes articles, helpful hints,

games and news about the club.

Members can also take advantage of special discounts on various items in the Sinclair market, both hardware and software.

Each month there is a special offer which, in the

last few months, has included a reduction in the prices of the William Stuart Systems ZX-81 Music Synthesiser, the Kempston Electronics click keyboard, the range of Thurnall Electronics add-ons, and many items of software. This month's offer can be seen on this page.

To take advantage of this exceptional offer, available only until the end

of January, fill in the New Year Offer form below.

If you just wish to join the Sinclair User Club, all you have to do is tick the Membership Only box. If you wish to do that, however, you will have to pay the full subscription rate of £12 a year.

Make sure when completing the form to indicate whether you own the Spectrum or the ZX-81, so that we can send the correct cassette.

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 Slagelse, 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: Lönnert ER Fisher, PO Box 61446, Marshallstown, Johannesburg.

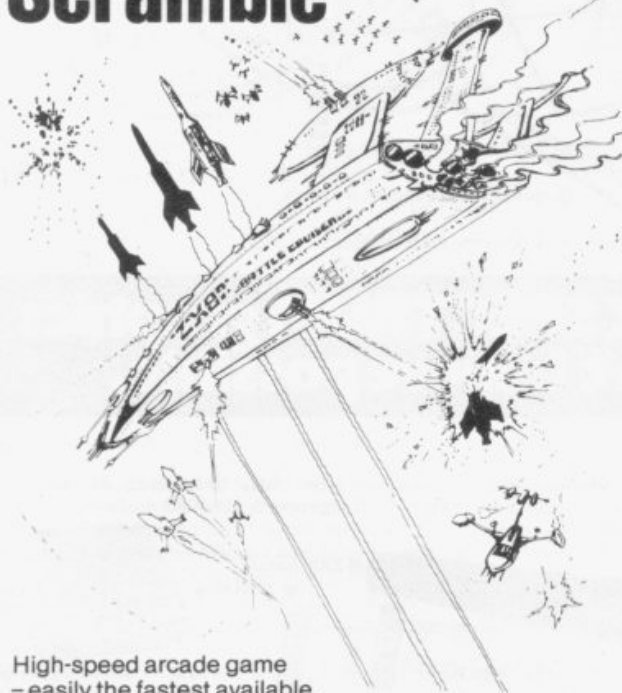
Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine.

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

NEW for your Spectrum

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

Scramble



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

Supplied on cassette
with library case

ONLY £5.50

Plus Mikro-Gen games & add-ons for your ZX81

Space Invaders

the best you can get, with
ever-increasing rate of play

Breakout

with seven bat angles to make
it really difficult

Bomber

positively addictive

ZX Chess

The original — and still the best!

Sorcerer's Castle

takes you into a world of
magical adventure

Above games all supplied on cassette,
with library case

£3.95 each (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)

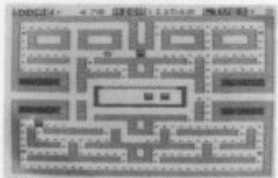
Suppliers of Software to Sinclair

MIKRO-GEN

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

ZUCKMAN

THEY'VE TAKEN A GREAT LEAP
FORWARD IN THE HISTORY OF THE
SPECTRUM FOR THE FIRST TIME
COMING FROM THE
SINCE 1980



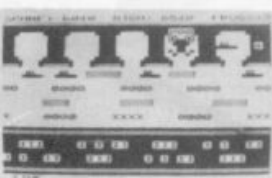
EAT THE DOTS, BEAT THE
GHOSTS IN THIS ADDIC-
TIVE GAME. CLEAR THE
SCREEN OF DOTS TO EARN
A BONUS LIFE AND A
FRESH MAZE-FULL OF
DOTS. WHEN THE CHASE
REVERSES, CATCH A
GHOST AND SEE ITS 'EYES'
RETURN TO BOX.

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

ONLY £5.95 INC P&P

FROGGER

BY
D.J.L. SOFTWARE



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

DJL SOFTWARE

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

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.

**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 ($\frac{1}{2}$ K) 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.



To: Sinclair User, ECC Publications, 30-31 Islington Green, London N1 8BJ

Please send me _____ Fastload Programs at the special Sinclair User price of £8.95 inc VAT and p&p (Normal price £9.95)

I enclose a cheque / postal order payable to Sinclair User for _____

*Please charge my Access / Barclaycard account no _____

*Delete / complete as applicable

Signature _____

Name: Mr / Mrs / Miss _____

Address _____

Offer applies to U.K. readers only. Allow 28 days for delivery

PROGRAM POWER MICRO

THE SPECTRUM 'ADD-ON'

ONLY £19.50 + VAT

BLAMM!

PROGRAM POWER MICRO

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

BBC, DRAGON & ACORN DEALERS

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.

We pay 20% ROYALTIES FOR DRAGON, SPECTRUM BBC, ACORN PROGRAMS

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

JRS SOFTWARE

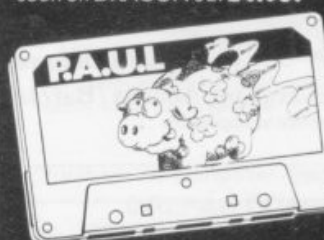
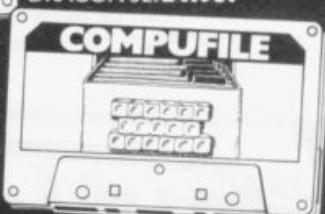
19 WAYSIDE AVENUE, WORTHING, SUSSEX. BN13 3JU Telephone: (0903) 65691

JAYSOFT Business and leisure software for home computers.



A simple user friendly program structured to maximise storage space. With at least 9 headings, it will document up to 80 records on 16K, 240 on 48K. Available for ZX81, SPECTRUM, soon on DRAGON 32. **£4.95.**

Be the James Onedin of the Far East — borrow \$5000, make \$100,000 from trading exotica & retire... **If** you survive the true to life hazards of money lenders & market forces. Available for ZX81, SPECTRUM, DRAGON 32. **£4.95.**



Your Personal Accounting Utility Ledger keeps track of your finances & even helps with tax returns — a boon for the self employed. Prepared in consultation with Professional Auditors. Available now for ZX81, soon for 48K SPECTRUM & DRAGON 32. **£7.95 (16K) £8.95 (48K)** (Trade in 16K for 48K £4.45.)

We will endeavour to send you the tape by return post.
JAYSOFT, 22 Dane Acres, Bishop's Stortford, Herts.
Please send for further information.



Microdrive is a 'floppy' tape

THE ZX Microdrive is to be a floppy tape. Despite the assumption for so long that the much-heralded memory storage would be some kind of disc we can reveal exclusively that it is a tape loop.

That would explain why the average response time is 3.5 seconds. Information will have to be stored in series so that if a piece of

data is needed the whole tape has to be sorted through. A disc system would allow random access and would reduce the response times greatly.

The cost of attaching the first Microdrive will be £80. The drive will cost £50 but an interface is needed which, with the RS-232 and networked interfaces, will cost £30.

The floppy tape is in a black case measuring 2 in. by 1 in. by ¼ in. deep. The tape inside is an endless loop, similar to that on a telephone answering machine, and it is narrower than normal cassette tape.

The latest news available on when it will be on sale is that it will be some time in the New Year, but it is unlikely to be early in that period.

Deliveries 'unaffected by strike'

SEVEN days' production was lost at the Timex factory in Dundee because of a dispute. Sinclair Research says, however, that it is not expected to affect deliveries despite the increase in orders before Christmas.

The workforce went on strike on Wednesday November 10 and, following strenuous efforts by both management and unions, production resumed on Monday, November 22.

According to management the dispute involved the suspension of five workers. The unions said that a shop steward had been sacked without the agreed procedure having been followed.

A spokesman for Sinclair Research said that stocks had been building up before the strike and there should be no problem with deliveries.

Spectrum school sales slow

THE SPECTRUM is lagging behind its competitors in the Department of Industry's Micros in Primaries scheme.

A spokesman for the Department said that 1,200 applications had been received for the scheme but only a few had been for the Spectrum. He added, however, that the scheme had not been running for long and thought the Sinclair machine may catch up later.

It seems that little help in this will be coming from schools in the country's

largest education authority, the Inner London Education Authority. The staff inspector for educational computing, Derek Esterson, said that schools were being advised to buy the Research Machines 380-Z rather than the Spectrum or the BBC Model B.

"They are free to buy the other machines but they will not be able to take advantage of the authority's support services," he said. They have been based on the Research Machines Link 480-Z

which had been available in the Department of Industry's earlier scheme for secondary schools and the cost of adapting that to other machines would be too great.

Another factor may be a rumour that Sinclair Research was demanding payment before delivery, which was not usual practice in education. That was denied by a spokesman for Sinclair, who said that, in common with all educational suppliers, the company is invoicing after delivery.



HAROLD MAYES, production editor of SINCLAIR USER, pictured outside Buckingham Palace after receiving the MBE for services to journalism.

Mayes began his 52-year-career as a 15-year-old reporter on the CHRONICLE AND ECHO at Northampton, becoming sports editor by the age of 19. It was the beginning of a lifetime's connection with sports coverage which has included being Press and Publicity Officer for the 1966 World Cup.

He began his association with electronics in 1962 when he became publicity manager of Ultra Electronics. After a number of other associated posts he joined ECC Publications in 1977 as production editor of WHICH COMPUTER? and took the same job on SINCLAIR USER when it was started nine months ago.



ASA criticises Sinclair

PRODUCTION delays with the Spectrum resulted in the Advertising Standards Authority receiving a record number of complaints.

That is revealed in the

authority's latest report, which showed that there had been 109 complaints about delivery of Sinclair machines, the majority of which concerned the Spectrum.

Software expanding

THERE ARE moves for a big expansion in retailing of software for the ZX-81. W H Smith and a number of retailers, like Buffer Micro Shop in London and Microware of Leicester, have been selling a wide range of cassettes for some months. The number of outlets is likely to grow quickly in the next few months.

The large chains, such

as Boots, Greens and Menzies, have also been selling the Sinclair range of software and are expected to be taking cassettes from other producers soon.

Prism Microproducts is considering expanding into the distribution of software through outlets it supplies and Sinclair Research is expanding its range.

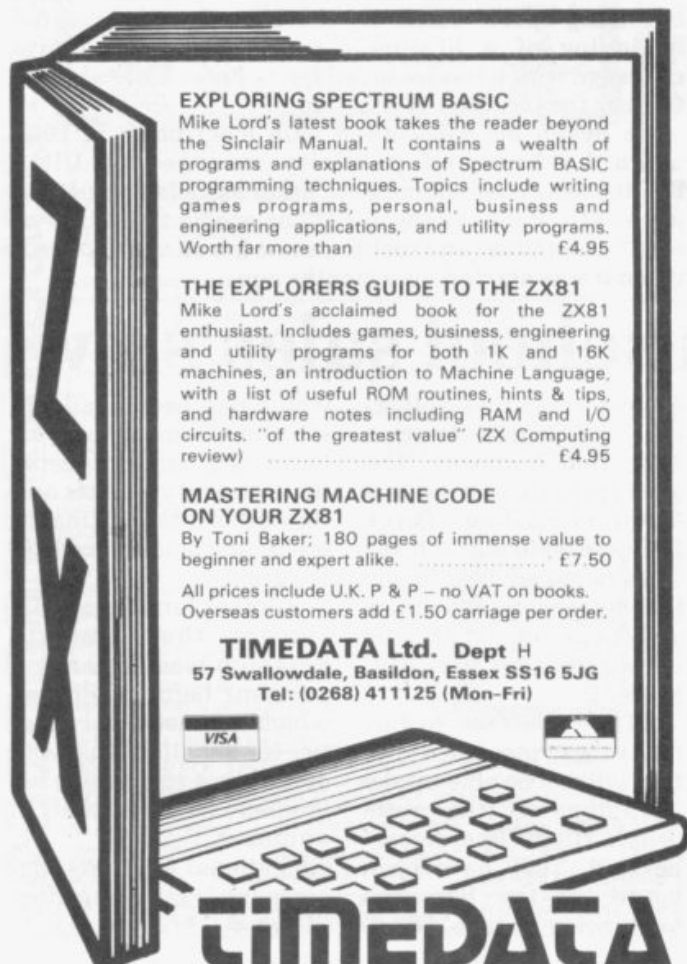
The authority noted that Sinclair Research failed to withdraw the advertisements when it became clear that there were supply problems. It was also concerned that, despite the seriousness of the objections, a number of organisations continued to publish the advertisements.

One of those was *Sinclair User*. Terry Cartwright, managing director of ECC Publications which publishes *Sinclair User*, said that the magazine acted in good faith on the basis of assurances about the supply position from Sinclair Research.

Course tries to improve micro selling

A NEW COURSE is being started by a London polytechnic to train sales staff for the growing number of high-street computer retailers. It is being run by the Polytechnic of North London and it intended to give people a thorough grounding in selling micro computers and associated computer systems.

Applications are being taken now for the course, run as part of the Government TOPS scheme. It will start in February and last five months. There are places for about 25 students.





EXPLORING SPECTRUM BASIC
Mike Lord's latest book takes the reader beyond the Sinclair Manual. It contains a wealth of programs and explanations of Spectrum BASIC programming techniques. Topics include writing games programs, personal, business and engineering applications, and utility programs. Worth far more than £4.95

THE EXPLORERS GUIDE TO THE ZX81
Mike Lord's acclaimed book for the ZX81 enthusiast. Includes games, business, engineering and utility programs for both 1K and 16K machines, an introduction to Machine Language, with a list of useful ROM routines, hints & tips, and hardware notes including RAM and I/O circuits. "of the greatest value" (ZX Computing review) £4.95

MASTERING MACHINE CODE ON YOUR ZX81
By Toni Baker; 180 pages of immense value to beginner and expert alike. £7.50

All prices include U.K. P & P - no VAT on books.
Overseas customers add £1.50 carriage per order.

TIMEDATA Ltd. Dept H
57 Swallowdale, Basildon, Essex SS16 5JG
Tel: (0268) 411125 (Mon-Fri)

TIMEDATA



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.



PERSONAL SOFTWARE SERVICES



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.

ACCOUNTS £4.95

A superbly flexible and easy to use home (or business) accounting system. Remarkably powerful and User friendly.

AUTOFILE £4.95

A compact and highly efficient filing system for any type Card Based records. This program can handle up to 1,000 short records or a smaller number of long ones — You Choose.

ALIEN £3.95

Set on board the spaceship Nostrodamus. Can you choose the correct weapon to repel the Alien before it is too late??

MCODER £7.95

The most flexible compiler available for the ZX-81. Extremely simple to use — simply load the Mcoder (which is just 2K long and entirely in machine code) and then write your Basic program as you normally would. Run and Debug your Basic program until it is fault free. Then enter the Mcoder (using a print USR command) — the Basic will then be compiled into machine code as you watch.

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 and ice. A really superb M/C game.

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 your way through a maze — Ghosts, Power Pills, etc, etc. Very fast.

ZONIX £12.95



Sound effects for your ZX-81. Zonix is a hardware/software combination that allows you to write programs with real impact. The software includes two programs.

1. A program set to produce bombs, missiles, fire engines, tunes, telephones and sirens and the facility to make your own.
2. A program that turns your ZX-81 into an electronic organ. The hardware is an amplifier with volume control and loud speaker which plugs into the MIC socket of your ZX-81.

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 imagination.

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 ZX-81 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 10secs; 48K in 110secs). 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 ½ K of superbly easy to use Software.

CHEQUE OR PO TO: PSS, 452 STONEY STANTON RD, COVENTRY



Gap appears in market which needs to be filled

I TOOK the slightly unusual step of buying your magazine before buying a computer. Despite my lack of knowledge, I found the articles interesting and informative.

Due to your recent special offer, I was able to purchase a ZX-81 kit, which I put together easily. Sadly, it doesn't work. It was then that I realised that kit builders have very few information sources on which to draw. Is this a gap *Sinclair User* could fill?

I wrote to Sinclair describing the problems and the company replied within a few days to the effect that most faults are caused by poor soldering. It made me wonder how many people, as myself, may not know what a correctly-soldered component looks like and, presented with a machine which does not work, either give up or poke around causing real problems.

Perhaps an illustrated article showing the correct methods for handling components and building the ZX would help the would-be kit builder; no doubt mistakes occur in the same areas repeatedly and they would be highlighted.

Before learning to debug programmes some of us would like to learn to debug the computer perhaps. It is possible to return the unit to Sinclair, of course, but how much

better it would be to finish the job oneself.

**G Williams,
Birmingham.**

We have published a new magazine, *Sinclair Projects*, to deal with problems like this.

Copyright worries

I AM very concerned about the topic of program copyrights. One of the reasons for buying a home computer as powerful as the Spectrum is to play faithful copies of arcade games hour after hour economically, and in the comfort of one's own home.

I would like to feel confident that if a new arcade game is invented one of the better software houses would produce a copy for the Spectrum without being hounded into changing it beyond recognition by a company which would not think of producing a copy itself.

**Paul Edson,
Aylesbury, Bucks.**

Cassette for 1983 tax

WE WERE delighted that the November issue of *Sinclair User* contained favourable reviews of our ZX-81 software products *Comp-U-Share* and *Comp-U-Tax* (Income Tax). I would like to make one point clear to your readers. Your reviewer

refers to *Comp-U-Tax* being valid for the year to April 5, 1982, which was correct for the product provided to him for review.

We have, however, now released the annual update for the year to April, 1983 — the current tax year — which incorporates some improvements but should at the same time be familiar to existing users of the earlier product.

This confusion arose because we do not release for review, or any other purpose, products until they are fully operational and we are confident that we can supply them from stock.

**R E Cooke-Hurle,
Managing director,
Micromega,
230-236 Lavender Hill,
London SW11.**

Growth in 'Vapourware'

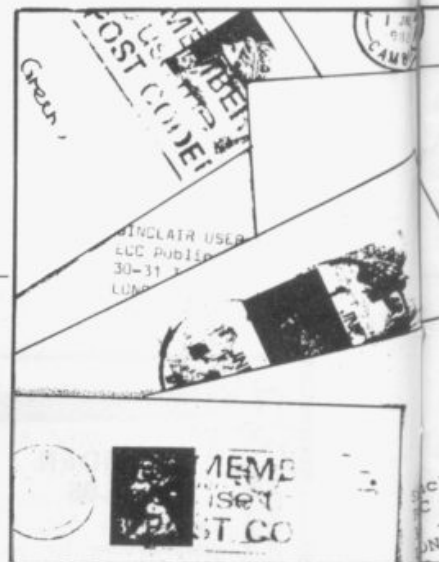
I WAS pleased to see your editorial in the September issue on the subject of what can be termed 'vapourware'. There is plenty of it about and anything magazines can do to help readers know what is really available when advertised would be a boon to them, although a curse to the advertisers.

Apart from the chain promises on my Spectrum, the last one being given to me as 'another two weeks' by telephone as the postman rang the doorbell to

deliver the parcel, I have suffered from *Microl Spectrum USE & LEARN*, non-delivery and cancelled after one month; *R&R Software*, *Golf* delivered by return post; *Adda Computers*, printer interface ordered five weeks ago and I cannot get a word from the company; *Hewson Consultants*, 20 programs for Spectrum — I cancelled after 14 days; *Bug-Byte*, *Spectral Invaders*, delivered by return; *Harris & Lochyer Associates*, Spectrum keyboard did not get into production.

Apart from the two software firms, it frustrates one and makes one doubt the promises given to one by suppliers who are probably truthful. I feel that my best way of getting add-ons will be through a local shop, *Microware* — in Leicester — where if it is in stock I can have it, but it restricts my choice not being able to rely on advertisers in the computer press.

May I be permitted to make two comments about *Sinclair User*. Some of the printouts are of such poor quality that they are no advertisement for the Sinclair printer, let alone being tantamount to unreadable. Of course, as you say, they should be computer printouts but you ought not to pay good money for inadequate





printing. The alternative would be for submissions to be on cassette and you do the printouts which we could then read.

Second, I was delighted to see that an EPROM blower had won a competition. To give it two pages without any construction data for hardware buffs was a waste of paper. We would be well served if it had been a constructor article.

Keep up the good work.

**Alan Batch,
Rugby.**

To answer your problem about the EPROM blower we have started a new magazine called Sinclair Projects intended for people who enjoy building hardware items for their machines. In the first issue, which appeared in November, we included an article giving details of the blower.

Basic video inversion

ON READING the August edition of *Sinclair User*, I noticed an advertisement and subsequent article promoting various pieces of hardware designed to give the ZX-81 an inverse video option.

Although inexpensive, the devices require that the owner drills holes in or re-wires his/her machine in a manner many users would consider to constitute mis-treatment of what may well be their

best friend. The function can, of course, be performed by a Basic routine, though you would need an alternative equally absorbing pastime to occupy your mind during its execution.

There is nothing simpler in machine code programming than to provide yourself with just such a facility. I offer a routine which could sit neatly in a one-line REM statement at the beginning of the pro-

gram, i.e., 5 REM 1234567-890123456789.

The sequence would then be POKED into addresses 16514-16532. This may then be called whenever required from within the Basic program with an instruction such as:

LET A = USER 16514

Much better than defacing a friend.

**Phil Lester,
Leverstock Green,
Hemel Hempstead.**

Screen invert routine for ZX-81

Step	Mnemonic	Code (HEX)	Decimal
1)	Ld HL (NN)	2A OC 40	42 12 64
2)	Ld C,N	OE 16	14 22
3)	Ld B,N	06 20	6 32
4)	Inc HL	23	35
5)	Ld A (HL)	7E	126
6)	Add A,N	C6 80	198 128
7)	Ld (HL),A	77	119
8)	DJNZ -7	10 F9	16 249
9)	Inc HL	23	35
10)	Dec C	OD	13
11)	JRNZ -13	20 F3	32 243
12)	RET	C9	201

1) Loads HL with the system variable D FILE.

2) Loads C with the amount of lines on the screen.

3) Loads B with the amount of characters per line.

4) Increases HL.

5) Loads A with the contents of HL.

6) Inverts the character in A.

7) Loads the inverted character back into HL.

8) Decreases B and jumps back to step 4 if B is not zero.

9) Skips over each 33rd (newline) character.

10) Decreases C.

11) Jumps back to step 3 if that last step did not result in zero.

12) Returns to Basic program.

Courage needed for machine code

YOU SEEM to be serious about trying to make sense out of that shambles of a series on machine code. Where do you get such courage? After a full page of the wonders you were going to offer us you said:

"When the program (figure one) is in, then type POKE 16514,128." It took dozens of attempts and restarts to discover that it should have read. "...is in, do not run it, but instead type..." which was the only way I could get it to work as described.

Then came the gem: "Then we can enter our

first machine code program but previously we call a machine code program."

Apart from the logic of "Then — but previously," I was still under the impression that I would find what a machine code program looked like, and "enter" and "call" it later but I understood 10 LET A = USR (16514) and entered that.

Was there now a machine code routine at address 16514 or was I supposed to put one there? and did line 10 tell the "program flow" to execute it there and then or later? Had I given a value to 'A', whatever 'A' happens to be; were the 'B' and 'C' register alike now and, if so, how could I use it 'to advantage'?

The next two items of comprehensible information proved to be a table of instructions and a paragraph of instructions. On closer study they proved to be one item of information written two ways. I have given up long ago on explanations but I can understand the 'instruction', '1 NEWLINE' and when I type it half the program vanishes, never to be seen again.

I am a ZX-81 owner with a few weeks' experience. Half a million ZX-81s have been sold within the last year or so. That works out — on a ZX-81 if you own one — that nearly all those half million Sinclair users have also only a few weeks' experience, or months at the most,

continued on page 18



continued from page 17

because the ZX-81 is essentially a first-time buyers' computer, the only really suitable computer for a first-time buyer, in fact.

What we are doing is learning the particular delights of presenting precisely-defined instructions in a strictly logical manner — to our computers and to one another. What a pity *Sinclair User* cannot share that pleasure.

Norman Gale,
Boston, Lincs.

Printout welcomed

WITH ALL the people who complain about the printing in the program print-out, I feel I must say a few words of praise for you. I have bought *Sinclair User* since April with the exception of June, and in all my copies I can find only five programs spoiled by the methods of printing. I think it makes the layout look better and I like it.

Also I have a hint for RAM wobble. I cured mine by using the point of a pair of scissors to press in the connectors to make the connection stronger with the ZX-81 edge connector. This makes it more difficult to take off and put the RAM pack on, but stops wobble. Also type this in with 16K:

10 LET LINE 20 = USR 12345
20 RUN USR 5

A reader,
Dorking, Surrey.

Penfriend corner

I WOULD like a pen-friend who has a ZX-81 with whom I can exchange programs and other things.

Han Loke Su,
Blk. 108, 280D,
Toa Payoh,
Lor. 1 S1231,
Singapore.

I WOULD like a pen-friend of about 14 who owns a Spectrum so that we could swap ideas and programs.

Steve Kaul,
143 Gipsy Road,
Welling, Kent.

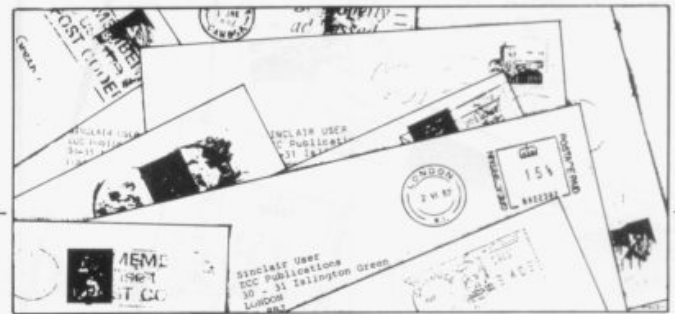
Clean printer runs better

THE FOLLOWING tips may be of use to owners of Sinclair printers. After some time in use, and particularly after putting on a new roll of paper, the feed mechanism operates weakly, causing printing to be compressed vertically. Wiping the rubber drive roller with an acetone-moistened cloth removes a deposit of carbon from it and the paper then feeds properly.

On two occasions, with different printers, the mechanism has jammed.

The symptoms are rather like a jammed car starter; there is no response to LPRINT or COPY commands and if the feed button is pressed there is a subdued click but no movement.

If the bottom of the printer is removed, you will see a large nylon gear. Rocking it gently frees the mechanism — on one occasion a large lump of carbon fell out and I suspect that is the usual cause of jamming. Remember, however, that attempting



Praise for Sinclair

HAVING READ page iii of *Spectrum User*, November, 1982, I felt compelled to redress the balance. I had to wait 15 weeks for delivery but was rewarded for my patience with an excellent micro-computer, a free cassette and a £10 voucher. After a few days' use the power supply unit failed. I was crestfallen.

I telephoned 0276 685311 (See John Catterall's letter) and three-and-a-half days later received a replacement power supply unit. If one works out the logistics I think it would be impossible to reduce that time. Good going, Sinclair.

As an innovator myself — recipient of more than one official award for my work — I can understand how unforeseeable difficulties can upset delivery promises and a

good deal of innovation certainly went into the Spectrum. Undue modesty can also upset delivery by demand far exceeding expectation — see *Inside Sinclair*, pages 26, 27.

I am already looking forward to replacing Spectrum with Son of Spectrum, probably by early 1984.

Ronald Edge,
Solihull,
W. Midlands.

Dry paper advice

USERS of the Sinclair printer who have been having difficulty getting a solid black print might like to try baking the paper very gently in an oven.

Aluminised paper is hygroscopic and will absorb any available moisture, making it difficult for the stylus to burn through the aluminised surface in the time allowed.

Always store your spare rolls of paper in their original sealed packages to keep them dry.

B Wigglesworth,
Watlington, Kent.

Spectrum noise annoys

DO YOU or any of your readers know whether it is possible to get rid of the noise the Spectrum makes? If so, how?

P Banks,
Debenham, Suffolk.

So far as we are aware it is impossible to stop the low buzzing once the Spectrum is switched on.

Colin Dickinson,
Canterbury, Kent.



Travelling in time is proving difficult

COMPUTER GAMES are becoming more complicated every month but Quicksilver, the manufacturer of a new game for the 48K Spectrum called **Time Gate**, claims that the game is the ultimate sci-fi arcade adventure.

The game is loaded in two parts. First, the lengthy instruction manual is loaded. That indicates to the player that the object of the game is to destroy a race of aliens called the Squarm who have invaded and taken

over the Earth. The player must locate and travel through a series of time gates to various periods of history to find and destroy the headquarters of the Squarm.

The player must destroy as many aliens as possible in the search for the base, as the score is based on the time the mission takes and the number of craft destroyed before finishing or aborting the game.

If damage is sustained in space battles the player can land on a planet to do

repairs and re-fuel. There are three types of planet and four types of alien craft with which to contend.

The most amazing thing about the game is the graphics. The player looks through the window of a space-craft at a three-dimensional view of space. The alien craft and the planet surfaces are also three-dimensional.

The sound effects have an arcade-style quality. The game has a high-score facility but high scores are

difficult to obtain and we managed only 330.

Time Gate is available from Quicksilver, 92 Northam Road, Northam, Southampton, Hampshire, and costs £6.95.

Improving asteroids

ASTEROIDS seems to be a popular game at the moment for both Sinclair machines and each version is better than the last. **Meteoroids** is an asteroid-type game for the Spectrum and is produced by Softek, a relative newcomer to the Sinclair scene. The meteors are three-dimensional and are of three types, ranging from small meteorites to large meteoroids.

The game is fast but even though you can score a maximum of 200 points for hitting a large meteoroid, a high score is difficult to achieve.

The player's ship can rotate in both directions, can move across the screen, and go into hyperspace. One added extra is a shield which can be used if the ship is about to be hit by a meteor. Each time the player fires the laser a volley of four shots blasts into space.

The instruction leaflet offers various methods for getting out of tight spots. **Meteoroids** is produced by Softek, 329 Croxted Road, London SE24. It costs £4.95.

Scrambling for points

A FAST and furious fight through the air is promised with the Mikro Gen **Scramble**, a better-than-average version of the popular arcade game. The game can be played in fast, normal or slow modes but it is better to play it in slow mode if you are a beginner with this kind of game.

The game goes through four sectors in which missiles, UFOs, meteors and fortresses provide obstacles for your fighter aircraft as it shoots across the sky.

The player is provided with weaponry of laser and smart bombs. Even they are not sufficient to deal with the missiles and UFOs.

Scramble is available from Mikro Gen, 24 Agar Crescent, Bracknell,

Berkshire and costs £5.50 plus 50 pence p&p.

Work Force has produced a less interesting version for the 16K Spectrum.

This version of Scramble uses only the missile stage That does not detract from its playability and in some ways it is more difficult than its bigger brother. The missiles are certainly larger and the large player ship is an easy target.

An unusual feature is that you can steer the ship diagonally, although if you use those control keys as well as the others you could become confused. The controls are set out on the keyboard as if a joystick was being used. At some stages you could begin to feel like a contortionist grappling at the controls.

Apart from the dif-

ficulties with the controls, Scramble is an exciting and addictive game which can be speeded using the thrust control. It is produced by Work Force, 140 Wilsden Avenue, Luton, Beds, and costs £4.95.



Pimania is going for gold

PIMANIA is a fascinating adventure game which has the added compulsion of a prize offered by the manufacturer to the first person who reaches the end of it.

The idea is to pass through a series of Pi-gates which exist in different places in space and time and eventually to find the place in space and time where the Golden Sundial, the prize, has been hidden.

To start the game the players must push the proper key on the keyboard. When first confronted with the task, the problems facing the adventurer seem impassable but the answers are so easy. In fact, it takes a child's mind to determine some of the clues.

The graphics are excellent and the Pi-man, a little cartoon character who can help or hinder the player, is an amusing and brilliant creation.

Some people may not buy the game because they think that when the competition is over the game will no longer be fun. That is not true, as it has many twists and turns before the final answer is found. Locating most of them will take months.

It is the best adventure game we have reviewed for the 48K Spectrum and 16K ZX-81. It is available from Automata Cartography Ltd, 65a Osborne Road, Southsea, PO5 3LR, and costs £10.

The spy with the golden chip

NOW James Bond has managed to find his way on to the 48K Spectrum in an adventure game called **Shaken but not Stirred**. The game is in two parts. In the first part a nuclear missile is abducted and the player, James Bond, must find and disarm it.

The first section of the game is a chase round the world, where Bond is threatened by spies, attacked by muggers and invited into taxis for secret meetings. At various points clues, in the form of anagrams, are given to the player to indicate where

Dr Death's hideout is located. Once you have found that you can load part two of the game and visit Dr Death's island.

You must explore the island and attempt to discover the secret entrance to Dr Death's underwater hide-away. If you find it you will find yourself in a three-dimensional maze. You must find the control room and de-activate the deadly weapon.

To add to your troubles in the maze, a villain called Paws will stalk you and try to kill you. If you manage to

find the control room and de-activate the missile, you must rush to London for your favourite drink, a Vodka Martini.

The game is a fast-moving, machine code adventure but stage one can be slightly monotonous as it is all too easy to be killed. There are also random elements in the game which hamper the planning of strategy.

Shaken but not Stirred is available from Richard Shepherd Software, 22 Green Leys, Maidenhead, Berkshire, SL6 7EZ. It costs £6.50.

Dreadful dwarf

MURDEROUS dwarfs, misty caverns and mysterious objects all play a part in the new Abersoft adventure game for the 48K Spectrum, **Adventure One**.

Anything can happen during the adventure but



one thing to look for is a dwarf who throws knives. He could put a quick end to any adventuring.

The adventure is displayed as text on the screen and reads like a book written by Tolkien with shades of Agatha Christie included. It is ideal for a beginner at adventure games because the computer helps the player more than other games so far released for the Spectrum. The game should prove advantageous for the experienced Dungeons and Dragons player who cannot find a Dungeon Master against which to pit wits.

Adventure One is available from Abersoft, 7 Maes Afallen, Bow Street, Dyfed SY24 5BA and costs £9.95.

Little love from Remsoft

THE MANUFACTURER of a new adventure game for the ZX-81 specifies that it is for women. **Love**, from Remsoft, casts the player as an amorous woman in search of some fun. The player starts in the bedroom wearing pyjamas. There is a chest of clothes which the player can open and investigate.

The game is amusing at times although whether that is intentional or not is difficult to determine. There are hints about sex throughout the game, although the program vocabulary does not stretch that far.

Love is produced by Remsoft, 18 George Street, Brighton BN2 1RH. The game costs £5.95.



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**

- **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 only £4.50

Cheques or PO's please — made payable to:
M.C. LOTHLORIEN
4 GRANBY ROAD CHEADLE HULME
CHESHIRE SK8 6LS

VIEWPOINT

THE PROGRAM THAT
YOUR ZX SPECTRUM HAS
BEEN WAITING FOR!

Draw complex 3-dimensional objects. View them after rotation in any or all of 3 dimensions.

Features:

- 1) Rotation in 3 dimensions about a single point.
- 2) Rotation about a line between two points.
- 3) Generation of stereo pairs.
- 4) View from one point towards another point.

Objects can be stored separately on tape and copied to the ZX printer.

Written in BASIC for you to modify to your own requirements.

Ideal for computer modelling, molecular modelling, CAD etc.

Viewpoint - with full instruction and examples
£6.50

Just starting to write machine code programs? The ideal assembler for beginners is Ultraviolet. Look at the facilities that it offers:

Works entirely in decimal (no hex problems); all Z80 instructions correctly assembled; supports the pseudo-instructions EQU, ORG (multiple ORGs allowed), DEFB, DEFW and DEFS; code can be assembled at one location and then re-located; allows alphanumeric labels of any length; full listings of assembled code and mnemonics can be output to the printer; full error trapping with faulty instruction clearly indicated; comments can be included in the source file.

The ideal complement to Ultraviolet is Infrared - an easy-to-use disassembler.

So now there is no need to be intimidated by machine code - with Ultraviolet and Infrared it's child's play! Buy them from the machine code specialists - ACS Software.

ULTRAVIOLET - £7.50 INFRARED - £6.75

All our Spectrum programs will work in both 16K and 48K models. Please send sae for details of ZX81 programs.

ACS SOFTWARE 7, Lidgett Crescent,
Roundhay,
Leeds LS8 1HN

C.C.S.

MANAGEMENT GAMES

**16K ZX81
Spectrum**



AIRLINE

Can you compete with British Airways? You must decide on the number of aircraft to operate, whether to buy or charter, and the levels of staffing and maintenance. Problems encountered are tax demands, strikes, cancelled flights, hijacks and aircraft crashes.

DALLAS

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!

NEW

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.

AUTOCHIEF

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.

PRINT SHOP

You own a small printing company and are required to decide on (a) the number and type of staff you employ and when to increase or reduce staff (b) the amount and type of paper you stock (c) the week in which work is scheduled (d) the quotation for each. There are 3 scales of difficulty.



SEE US ON STAND 41 AT THE
LONDON HOME COMPUTER
SHOW.

ALL PROGRAMS INCLUDE
DETAILED INSTRUCTIONS AND
NEED 16K.

PRICE ZX81 or Spectrum: Airline, Dallas, Autochef, Print Shop — £5 each. Modeller X — £8.

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

TO ORDER

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

RETAIL STOCKISTS

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

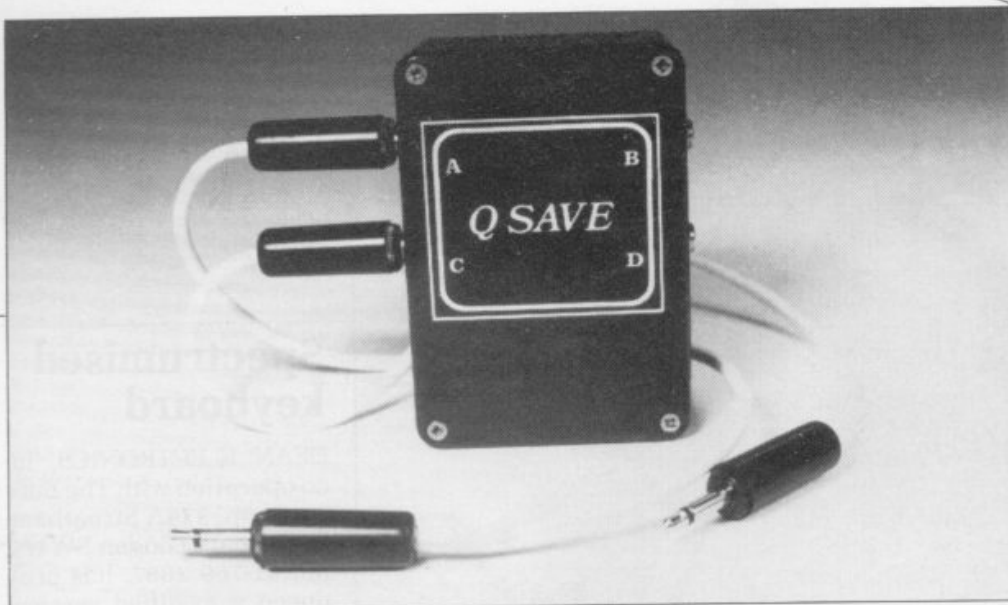
LONDON

Data-assette, 44 Shroton Street, N.W.1.
Buffer Micro Shop, 374A Streatham High Road, S.W.16.

BATH
BOURNEMOUTH
DAVENTRY
LEICESTER
MANCHESTER

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

NEWBURY



QSAVE fast loader hardware

Loading in the fast lane

THE MOST exciting product being reviewed this month is QSAVE by PSS. It is a hardware and software package which will allow you to save and load tapes at 16 times the speed of Sinclair ROM commands.

The hardware consists of a small black box which plugs into the ZX-81 EAR and power sockets via two 3.5mm. cables. The power supply and EAR lead from the tape recorder are plugged into two 3.5mm. sockets on the other side of the box which contains an

amplifier and two filters which eliminate any noise produced by the tape recorder. It also cleans the signal which has been recorded and can be used on its own to improve the loading of machine code or Basic tapes.

The software does the tricky bit and has to be LOADED first in the normal way before QSAVE can be used. It Auto-Runs and transfers a 300-odd-byte machine code program above RAMTOP. There it will stay unless you remove the power or

use the NEW command. PSS will provide a tape for use with any memory size.

Three routines are provided via PRINT USR X where X is the routine required. They are SAVE-VERIFY and LOAD. They will enable you after you have LOADED a Basic program in the normal way to re-record it in QSAVE format — 16K takes 30 seconds.

After re-winding the tape it may then be verified and checked against what is stored in memory. LOADING of any program QSAVED must be done by the LOADING routine provided. As it takes only 30 seconds to LOAD a program of up to 16K that does not take long; if the VERIFY command does not recognise the QSAVE program it will not return to Basic, so the only way to get out of it is to load known loadable tape.

That is its major failing but PSS says it will be corrected by now.

The price is £15.95 inc. VAT and postage — 64K version £17.95. A version with a switch prevents you having to pull out the EAR lead of the cassette recorder when SAVEing. PSS is at 112 Oliver Street, Coventry CV6 5FE, tel: 0203-667556.

RD ports for Spectrum

RD LABS has made most of its range of input/output ports Spectrum-compatible. So the scientific or educational user has a wide range of test equipment at his disposal. Devices include digital I/O ports, analogue inputs to one port and a real-time clock.

The clock is battery-backed and has a calendar, as well as the time protected for up to four months without power.

All the units are memory-mapped and Spectrum users require an adaptor as well as the basic motherboard and ports. The prices range from £33.93 for the digital port to £51.24 for the real-time clock/calendar. The Spectrum adaptor costs £9.50 extra.

There is a 10 percent discount for cash with order but you must add £3 postage to the VAT-included price.

RD Labs also does main-frame units for industrial users; price on application to RD Labs, 5 Kennedy Road, Dane End, Ware, Herts SG12 0LU. Tel: 0920-84380.

Keyboard overlays

ANOTHER hardware/software combination is from Quicksilver which now supplies keyboard overlays for its Spectrum games — Space Intruders and Meteor Storm. The black pieces of plastic fit over the keys and are real-

continued on page 24

Battery RAM kit

A CMOS battery-backed RAM board for the ZX-81 is available as a kit. The board has four sockets which can be used for 2K RAM chips (6116) or 2K and 4K EPROM and by placing the chips in different sockets it can be made compatible with other equipment — graphics ROMs, Toolkits — which inhabit the same 8K-16K space on the memory map.

The kit should take approximately two hours to make, Hunter Electronics says, and the RAM board can be moved to any 8K

space in the 0-32K section of memory. It can then be used to modify the Sinclair ROM by replacing it with 8K of RAM which, because it has a lithium battery, does not lose the program when the power is turned off.

The expected life of 2K of RAM using the battery only is 10 months, or two months with a full 8K of RAM. The cost of the kit is £19.95 inc VAT, plus £1.95 for postage. It is supplied with only one 2K of RAM on board. Hunter Electronics is at PO Box 5, Axminster, Devon EX13 5AS.





continued from page 23

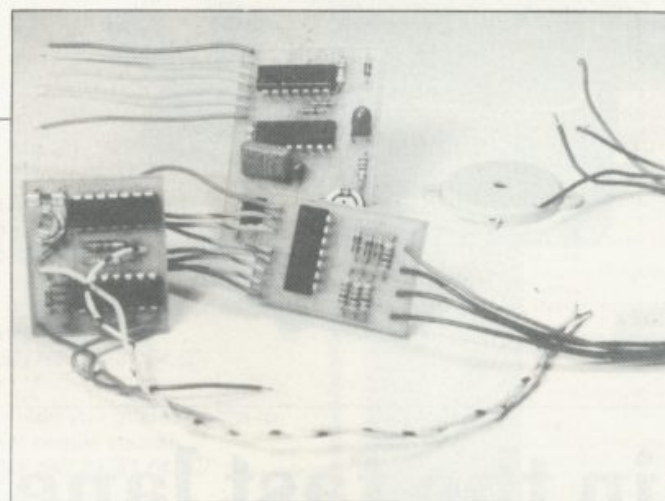
ly convenient as they tell you in bold letters which is THRUST-ROTATE LEFT and the like — a real incentive for buying the excellent QS games.

QS is at 92 Northam Road, Southampton SO2 0PB and the tapes can also be obtained through some micro shops specialising in ZX equipment.

Modules from Haven

HAVEN HARDWARE no longer offers the ZX-81 colour board due to the lack of a satisfactory modulator but will sell the circuit diagram for £4.95.

Haven sells three other



Haven Hardware modules

modules. A single-entry key module can be soldered on to the ZX-81 or Spectrum, although the connections are different. It is ideal for those with an external keyboard with a few spare keys on it. It costs £2.95 as a kit and £4.95 made up but not fitted. The beeper is a

standard oscillator which operates every time a key is pressed. It costs £8.90 and £7.50 as a kit. The third offering is an inverse video module but it tends to be unstable.

Haven Hardware is at 4 Asby Road, Asby, Workington, Cumbria CA14 4RR.

Spectrumised keyboard

DEAN ELECTRONICS, in co-operation with The Buffer Shop, 374A Streatham High Road, London SW16, tel: 01-769 2887, has produced a modified version of the ZX-81 keyboard for the Spectrum. It costs £35 and a black case to contain it and the Spectrum PCB will cost £15 inc. VAT.

They can be obtained only from The Buffer Shop and £1 must be added if ordering by mail for postage and packing.

The ZX-81 version has a space bar and a typewriter-style key layout — it is the same keyboard, but Spectrumised.

Go on a computer date

(and take along the wife and kids)

Friday 7th January '83
(10.00am-6.00pm)

Saturday 8th January '83
(10.00am-6.00pm)

Sunday 9th January '83
(10.00am-4.00pm)

SAVE 50p

Present this token duly completed when buying your ticket for a 50p reduction. Only 1 token allowed per person.

Name Mr/Mrs/Miss

Address

Signature

S.U.

These are the dates of the London Home Computer Show. On display will be a complete cross section of the hard and software available to the home-user.

The emphasis is on the lower end of the price bracket, with computers from £50-£300.

You will be able to chat to the manufacturers and play with the computer before you buy.

So bring along the wife and kids (who'll probably be more of an expert on what you're buying than you)

Admission £1.50p (Children under 8 and O.A.P.s FREE)

*And if you're in a party of 20 or more, there's a 25% discount.

THE LONDON HOME COMPUTER SHOW.

Royal Horticultural Society's Old Hall, Vincent Street, London SW1.

*For advanced bookings for parties of 20 or more, please send cheques payable to Argus Specialist Publications Ltd. (Dept. LHCS), 145 Charing Cross Road, London WC2H 0EE. Telephone 01-437 1002.

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



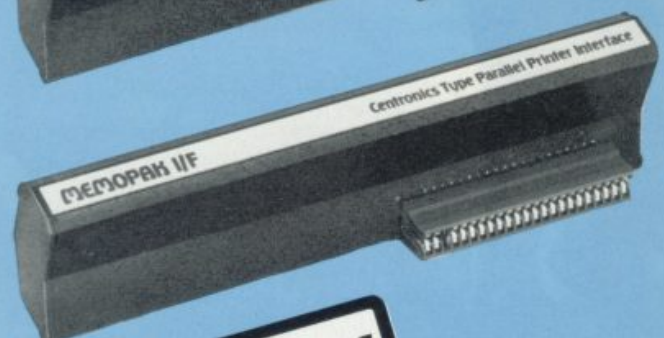
Name.....
Address.....

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.....

MEMOTECH



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.

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.

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.

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
KEYBOARD WITH INTERFACE		
	£43.43 + £6.52 VAT	£49.95

Memotech products are available at larger branches of WHSMITH

realises the ZX81 potential

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.

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.

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 below, 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.

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, an RS232 interface and a Z80 assembler.

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 LIMITED
3 COLLINS STREET
OXFORD OX4 1XL ENGLAND

TEL. 0865 722102
TELEX 837220 ORCHID G



The ZX-81 cannot extract a white rabbit from a hat. It can do many things which seem impossible. Frank Adey investigates

Baffling tricks from the Magic Sinclair

ITHAS to be admitted that there is no way your ZX-81 can be programmed to extract a rabbit from a top hat but you can make it do a number of things which seem to be impossible. Here are a few examples using only 1K and you may be able to use the principles involved to design some baffling tricks of your own.

Take the old Find The Lady routine, otherwise known as Three Card Monte. Imagine that you hand a volunteer three cards, one of

which is a Queen. You run a program. The computer instructs your friend to shuffle the cards, face down, and to type 'G' when he has finished. In addition, it displays the backs of three cards — shifted Hs. Once your friend has lost the Queen to his satisfaction, you hit the keyboard, and the ZX 'turns over' one of the cards, revealing a 'Q'. Your volunteer flips over the card he has at that position and the card is the Queen. Your ZX has found the lady.

To do the trick, you will need two things, program one and a Queen whose back has been marked subtly in some way to distinguish it from the other two cards. There are many ways of doing it. Buckle the card slightly, make a tiny crease with your thumbnail, use a barely noticeable pencil dot, or leave the card face down on a sunny window sill for two days until the colour of the back has faded sufficiently for you to be able to recognise it.

Next you have to let the ZX know where the Queen is, without telling your friend. This is how to do it. Run the program and you will see that although the computer is supposedly waiting for you to type G, no cursor appears on the screen. Do not worry; it is the last thing

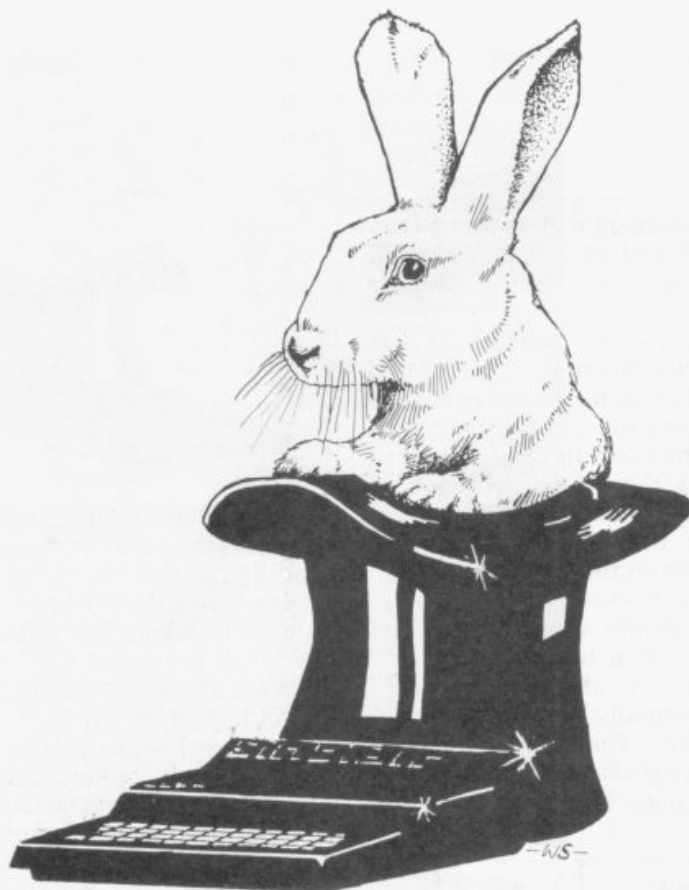
Program 1

```
1 REM "MONTE"
2 PRINT "FIND THE LADY"
20 PRINT AT 3,1;"MIX THE 3 CAR
DS FACE DOWN."
30 PRINT "I BET I CAN FIND THE
QUEEN"
40 PRINT " TYPE"G"WHEN READY
..."
43 PRINT AT 11,5;"shifted H";A
T 11,10;"shifted H";AT 11,15;"sh
ifted H"
45 PAUSE 4E4
50 IF INKEY$="F" THEN PRINT AT
11,5;"Q"
60 IF INKEY$="H" THEN PRINT AT
11,10;"Q"
70 IF INKEY$="H" THEN PRINT AT
11,15;"Q"
80 PRINT AT 15,5;"HOWZAT?"
99 STOP
```

which will be noticed. What is happening is that the ZX is PAUSEing endlessly. A key you touch will make it snap out of it but we are interested only in three — F,G, and H.

Think of them as the possible positions at which the Queen can be found. If it is on the left, type F; if it is on the right, type H; and if it is in the centre, type nothing. Let your friend





hit the G. That last touch makes the whole thing seem totally innocent. Whatever happens, the ZX will check INKEY\$ and display the Queen at the correct position. Don't feel nervous about hitting the F or the H; the ZX keyboard is so tiny that no-one can see what you are doing. Do not run the trick more than twice at a showing, or your victim may guess the method.

The next trick could have been made for the ZX but it was not — the first printed description of it appeared in 1612. It enables you to 'read the minds' of three people. The original version required the volunteers to take counters and you to do some awkward mental arithmetic. Program two mercifully is simpler.

You will need three volunteers. Explain to them that computers can be used to store and analyse the results of ESP experiments, thus reducing the chance of the experimenters 'unconsciously' cooking the books to produce favourable results. Offer to demonstrate.

Produce three pencils — any objects will do — coloured red, blue and yellow respectively, and lay them down near the keyboard. Run

the program. It will display the words ESP TEST NO. 6, and the colours RED, BLUE and YELLOW, and the request ENTER THE INITIAL OF THE COLOUR YOU CHOSE. Turn your back on the screen and pencils.

Then, one at a time, your helpers take a pencil, hide it in pocket or purse, and type-in the relevant initial — R, B, or Y. When they have finished, you take a notepad and, after 'concentrating', tell each of them the colour he or she chose, writing the results in your notebook as you proceed. Amazingly, you are correct. Act as if this kind of telepathy is the easiest thing in the world and unconcernedly PRINT L;M;N to verify the results you have

Figure 1.

CODE	VOLUNTEERS		
	1	2	3
9/11	Y	R	B
9/12	R	Y	B
9/13	Y	B	R
9/15	R	B	Y
9/16	B	Y	R
9/17	B	R	Y

written on the pad. Your blasé attitude is designed to direct attention from the TV screen, which is the source of your telepathic knowledge. All you have to do is to remember the sequence in which your volunteers took the pencils. After the last one has typed-in his colour initial, the ZX will STOP, with a line number which tells you who took what. In your notebook you will have figure one, a tiny chart which related the final line number of the possible combinations of people and colours.

Suppose the code and line number are 9/16. Looking at the chart, you will see that means that the first

Program 2

```

1 REM "ESP"
2 PRINT "ESP TEST NO. 6"
3 PRINT AT 7,16;"RED";AT 9,16
  ,"BLUE";AT 11,16;"YELLOW"
4 PRINT AT 14,1;"ENTER THE IN
  ITIAL OF THE COLOUR YOU CHOOSE"
5 GOTO 20
11 STOP
12 STOP
13 STOP
15 STOP
16 STOP
17 STOP
20 INPUT L$
21 INPUT M$
22 INPUT N$
25 IF L$="Y" THEN GOSUB 1000
30 IF L$="R" THEN GOSUB 2000
35 IF L$="B" THEN GOSUB 3000
40 LET N=N+10
45 GOTO N
1000 IF M$="R" THEN LET N=1
1010 IF M$="B" THEN LET N=3
1020 RETURN
2000 IF M$="Y" THEN LET N=2
2010 IF M$="B" THEN LET N=5
2020 RETURN
3000 IF M$="Y" THEN LET N=6
3010 IF M$="R" THEN LET N=7
3020 RETURN

```

person took the blue pencil, the second the yellow pencil, and the third the red pencil. Moreover, the low line number — the highest possible is 17 — gives the impression of a short, simple program, free from hocus pocus. Remember, not to give the display more than a fleeting glance.

Program three is a legpull aimed at those irritating people who suggest that you cannot do much in 1K. Ruefully agree with them, pointing to the ZX gazetteer system as a case in point. Explain that although, due to machine code

continued on page 30





continued from page 29

programming, you can store virtually every place name on Earth, you have insufficient core to display a map of its location. Needless to say, your victim will not believe a word of it.

Offer to display 'just the map reference'. Run the program and have him enter a place name while you are out of the room. As soon as he had done so, the screen will clear and three mysterious-looking numbers will appear — the map reference. You return, skim through a gazetteer or atlas, and hesitantly name his location correctly.

Your know-all will at once assume that the 'reference' is arrived at by manipulating the character codes of the word he typed. Challenge him to crack the code. He will fail, because the numbers are meaningless. They are, in fact, generated at random.

All you have to do is get him to turn away from the screen for two seconds and you can discover his place name. The best way to do this is to place the gazetteer or atlas behind him, so that he has to turn to pass it to you. Failing that, leave the

Program 3

```
1 REM "GAZ"
2 PRINT "GAZETTER SYSTEM"
5 PRINT "ENTER PLACE NAME"
8 PRINT "(8 CHARS. MINIMUM)"
10 INPUT B$
15 LET A$=B$(1 TO 8)
20 CLS
25 LET C=1
30 FOR X=1 TO 15 STEP 5
50 PRINT AT 5,X:INT (RND*88)+1
55 NEXT X
60 PAUSE 4E4
65 PRINT AT 21,24:A$
70 FOR Y=1 TO 5
72 LET Q=333*67
75 NEXT Y
80 PRINT AT 21,22:"ten SPACES"
85 GOTO 90
90~GOTO 85
```

book on top of the TV, so that your body will block the screen for the vital instants.

What happens is that after generating the bogus 'map reference' the ZX will PAUSE 4E4. As soon as you touch the keyboard, the first eight characters of the place name will flash briefly into view in the lower right-hand side of the screen. Then they will vanish

and the program will go into a loop — lines 85 and 90 — which you will have to use the BREAK key to terminate.

Explain to your friend that it is another consequence of the limited core; so far as he is concerned, of course, the program has been in a loop all the time. In case you were wondering, the strange arithmetical operation in lines 70 to 75 is a means of timing the appearance of the place name on the screen.

The final trick — program four — requires ideally a pack of marked cards. You can buy them at most joke and toy shops, advertised euphemistically as Magic (Secret Mark) Cards. The trick depends on your knowing a friend's chosen card before he does. If you cannot obtain

Program 4

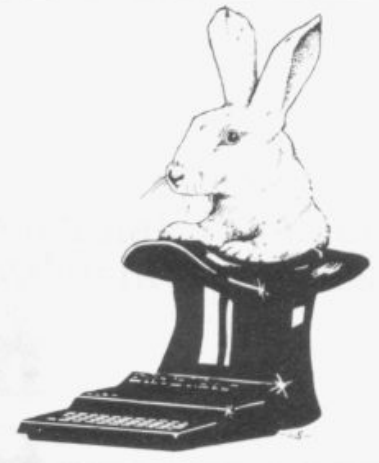
```
1 REM "STAR"
5 PRINT "YOUR CARD IS..."
10 PAUSE 150
15 PRINT "THE FOUR OF CLUBS"
20~STOP
```

any, you have to use a stacked deck. Arrange the Clubs, Hearts, Spades and Diamonds in order, with the cards in each suit in ascending order — your deck should start with Ace, two, three of Clubs, and end with Jack, Queen, King of Diamonds.

You will also need four program cassettes, one for each suit, with 13 mini-programs on each, one for each card. Keep them in separate pockets or otherwise handy and do not mix them.

If you are using a stacked deck the routine for marked cards will become obvious as we proceed. First, have your friend cut the deck a few times. Believe it or not, that does not affect the order of the cards. Now ask him to cut again but this time to take the top card from the bottom half of the deck, without looking at it.

As he does so, look at the bottom card of the upper half of the deck. Suppose it is the seven of Hearts. As the deck is in order, you know that his card must be the eight of Hearts. Immediately you produce the cassette with the Hearts programs



on it and hand it to him. Explain that the program on it is supposed to predict which card a person chooses. You do not believe it but perhaps he would like to load it and see what happens. Give him the program name, let him load it, and the ZX names his card.

To remember the program name for each card value, familiarise yourself with the mnemonic table in figure two. The last letter in each word refers to the number of one of the pip cards and the three court cards are very easy to memorise. With very little practice you should be able to whizz through the trick, amazing your friend and — you let him believe — yourself. Afterwards it is advisable to shuffle the cards.

Figure 2. Card mnemonics

Card	Prognome
Ace is	WAND. There is one downstroke in the D and a wand looks like the numeral 1.
TWO is	DJINN. There are two downstrokes in the N, and two Ns in Djinn.
THREE is	CHARM. There are three downstrokes in a small 'm'.
FOUR is	STAR. R is the fourth letter in FOUR; four-star is a common classification.
FIVE is	SPELL. L is the Roman numeral for 50, and there are 5 letters in 'spell'.
SIX is	GUESS. S for 'six'.
SEVEN is	WARLOCK. 'K' can be made from two sevens (K), and 'warlock' has seven letters.
EIGHT is	MEPHISTO. 'O' is for 'Octopus' (eight arms) and 'Mephisto' has eight letters.
NINE is	IMP. The 'P' resembles a reversed '9'.
TEN is	HEX. X is the Roman numeral for 10.
JACK is	WIZARD.
QUEEN is	WITCH.
KING is	MAGIC.

**campbell
systems**

THE VERY BEST IN MACHINE CODE
FOR THE ZX SPECTRUM & 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



THE PROXIMA GRAPHIC PLANNER

Still only
£3.50
(inc. P&P)

The Planner is a well printed, perfect-bound, A4 book containing ● instructions and ideas for the preparation of user-defined graphics ● followed by 12 pages of prepared and coded graphic characters to use or to spark your imagination ● then 2 brief Basic program listings to test, POKE and SAVE your graphics ● The meat of the pad is in the 64 pages of 8x8 grids on which you design your graphic characters. These grids, with column values preprinted, are arranged singly or grouped in 2s, 4s and up to 48s. At a pinch, room for over 2000 of your designs!

A great time-saver in preparing user-defined graphics, this 80 pager results in a permanent, instantly accessible store of graphics.

An invaluable companion to (A) graphic pads which offer full-screen plotting facilities but which skimp on user-defined graphics or (B) to software which allows definition of only one graphic unit at a time.

While in part written for the Spectrum owner the Planner is equally useful to the owner of any micro with 8x8 user-defined graphics.

Proxima Centauri Ltd., Suite B2
23 Denmark Street
London WC2H 8NA



Send me, by return

Proxima

Graphic Planner(s) at
£3.50 ea. (inc P&P).

I enclose £

Name

Address

(UK only)

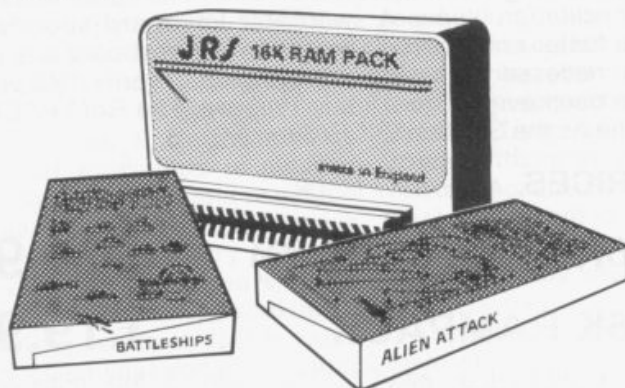
Postcode

Post to Proxima Centauri Ltd., Suite B2, 23 Denmark Street, London WC2H 8NA.

16K BUDGET PAK

JRS 16K RAM **AND** FREE ALIEN ATTACK **plus** either
BATTLESHIPS **or** GAMES TAPE II

SAVE £8.65! Total package price only £27.75



64K BUDGET PAK

JRS 64K RAM **AND** FREE ALIEN ATTACK **plus** either LOST
ISLAND **or** BATTLESHIPS

SAVE £7.95! Total package price only £64.90

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

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"/> 64K Budget Pak with Lost Island	Only £64.90
<input type="checkbox"/> 64K Budget Pak with Battleships	Only £64.90
<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
19 Wayside Avenue, Worthing, Sussex BN13 3JU

SPECTRUM 48K ZX81 TRS80 VIDEO GENIE



NOW! for the SPECTRUM FOOTBALL MANAGER IN 3D COLOUR GRAPHICS

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 MICRO SHOP & MICROWARE. 3D GRAPHICS ONLY INCLUDED IN SPECTRUM VERSION

HARDWARE REQUIRED

Spectrum 48K RAM	TRS80 Video Genie
ZX81 16K RAM	LEVEL II 16K RAM

To Order send Cheque P.O. £7.95 made payable to:
ADDICTIVE GAMES
at: Dept. S.U. P.O. Box 278
CONNIBURROW,
MILTON KEYNES MK14 7NE
PLEASE STATE COMPUTER

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

I received F.M. about 10 days ago, and have played about 23 hours so far — addictive is the operative word. — D. BLAIR, FIFE

I think your game is fabulous since starting with Port Vale in the 4th Division, being promoted, winning the F.A. Cup, and being promoted again to the 2nd Division. — C. DICKENSON, CANTERBURY

I recently bought your F.M. program and was very pleased indeed. I found it very good value for money and played it all day the day it arrived — I own a ZX81 which is now only used for F.M. — Yours addicted, M. FRAMPTON, CANVEY ISLAND

I felt that I had to write and congratulate you on your program F.M. I found the game very compelling and exciting, really just like the real thing — keep up the good work and standard. — N. LAWRENCE, FULHAM

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. 16K & 48K on same cassette with full documentation. Major features include:
EDITOR with Auto Line Numbering. 40 Column screen display tabulated into fields for easy reading. 5 character Label Names: simple Line Editing and Cursor Control. 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. **£8.50**

SEND A S.A.E. FOR COMPLETE DETAILS OF THIS AND ALL OUR PROGRAMS

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

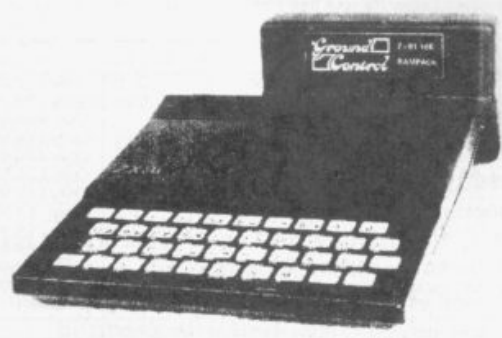
ZX81 REMLOAD. Machine Code Debug/Monitor
• A version of ZX-MC without the Save/Load/Verify facility • Compatible with Basic • CREATE A REM LINE of any length • BREAKPOINTS and REGISTERS DISPLAY • Cassette plus 30 page manual. **£6.95** 16K to 64K

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



NEED MORE ZX81 MEMORY?

WHY WAIT ANY LONGER WHEN YOU CAN HAVE THE BEST 16K RAM PACK AVAILABLE NOW FROM GROUND CONTROL? Built to high-quality standards using a unique design of custom moulded plastic case and gold-plated edge connector, the RAM PACK clips on to the ZX81 tightly, ensuring no "wobble" or disconnection problems. A switchable keyboard sounder is available inside the case as an extra, enabling faster entry of programs from the keyboard and less eyestrain, due to the decreased amount of time necessary referring to the screen to verify data entry. The sounder operates in fast mode and gives a beep every time a key is pressed. The RAM PACK is memory mapped from 16384 to 32767, the same as the Sinclair 16K RAM.



Please send SAE or IRCs with any enquiries for the above or details of our 16K RAM and I.O. BOARD still available at £32 for kit version.

Same-day despatch for cash, P.O. or credit card orders, five days for cheques. Access and Barclaycard accepted.

PRICES. All inclusive for UK.

16K RAMPACK (S) £24.95

16K RAMPACK £19.95

European postage add £2. Others add £5. Mail order only. Please make cheques, etc, payable to GROUND CONTROL and send with orders to: Dept SU



Ground Control
Alfreda Avenue
Hullbridge
Essex SS5 6LT
ENGLAND

Telephone No: 0702 230324. 10 am to 6 pm



Come to the ZX-81 with a clear mind to make the best use of your new machine.

A lifetime's obsession can easily be acquired

BUYING a ZX-81 can be the start of a lifetime obsession with home computing. It is easy, however, to become discouraged if everything does not go to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the ZX-81 is to abandon any ideas for special uses. While the basic machine is ideal for learning how to use computers, it is too small for any major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking the 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 a 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.

Once the K appears you are ready to begin learning about the ZX-81. It can save family arguments if you can afford a separate television set for your system. It also makes life easier if you can find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to

tidy trailing leads. The manual is written in great detail and is reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something which is 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 really 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, 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 machine it is not jolted. Some of the connections can easily work loose and everything which has been put in will be lost.

The manual is not to everyone's taste and if you find it 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. There are some programs for the unexpanded 1K machine but most of them require a

16K RAM pack. The tapes vary in quality. It is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

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

You may have heard already about the problem involved in SAVEing and LOADing your own cassettes. The manual again gives detailed instructions but many of the early machines would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

They usually 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 slowly increase the volume of the recorder with the tape running until the television screen shows four or five thick horizontal black bands. If you then re-wind the tape, the program should LOAD normally.

Finally, a health warning. Apart from any practical uses, computing with your ZX-81 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 sort out the problem.

Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a ZX-81 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.

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.

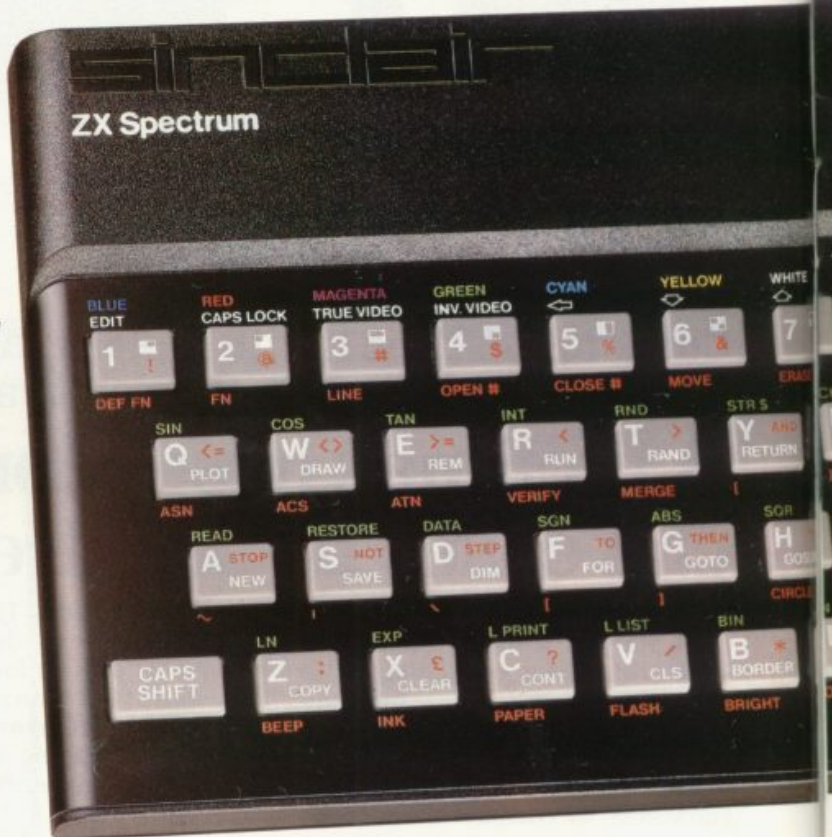
You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

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 uprate 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.

um



ZX Spectrum software on cassettes – available now

The first 21 software cassettes are now available directly from Sinclair. Produced by ICL and Psion, subjects include games, education, and business/household management. Galactic Invasion... Flight Simulation... Chess... History... Inventions... VU-CALC... VU-3D... 47 programs in all. There's 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.

RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

sinclair

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

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.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

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

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.



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 901

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

D J MOODY COMPUTER SOFTWARE

16K SPECTRUM COMPETITION

GAMES



ADVENTURE SERIES..... All £5.00
The Series..... £16.00

For the 16K ZX81 and ZX Spectrum. These Adventures are linked together using data storage above RAMTOP. All can be played independantly of the others. You must complete certain tasks to continue to next Adventure.

ADVENTURE-1. 100 caves, 50 treasures, ghosts, a magician, goblins and trolls all out to get you. Graphic display. Half-a-mo.

ADVENTURE-2. Deep sea adventure with 30 wrecks, 50 treasures, Jelly fish, octopus and sharks, Graphic display. Half-a-mo.

ADVENTURE-3. Land based adventure with 50 locations, 70 treasures, ghosts, vampires, monsters, snakes, Father Christmas and his elves. Graphic display. Half-a-mo.

ADVENTURE-4. Space adventure with 30 stars and planets to visit, 70 treasures, Alien starships, pirates etc. Graphic display. Half-a-mo.

Note: Half-a-mo is our save game feature for stopping a game while playing and returning to same position upon reloading.

COMPETITION

CONDITIONS OF ENTRY

1. One entry form is supplied with every cassette purchased. No limit to the number of entries per person.
2. Closing date is last post on February 15th 1983.
3. Prizes.
 1st prize is a 16K Spectrum and £20 worth of our software.
 2nd prize of £20 worth of our software.
 10 runner-up prizes of £10 worth of our software.
4. Entries must be on official entry forms. No copies accepted.
5. No correspondence will be entered into. Winners will be notified by post.
6. Entry will be construed as acceptance of all conditions.

ORDERING

See our range of Software at Wallasey Software, 3 Monmouth Rd, Wallasey, Mersey-side.

TRADE ENQUIRIES WELCOME

Cheques payable to:
D J MOODY COMPUTER SOFTWARE or
D J MOODY. Prices are all inclusive. P&P is free. VAT is charged at 15%. Orders dispatched within 48 hours. 6 month guarantee. State ZX Spectrum or ZX81. Orders to:
Dept ZXC, 1 Starnhill Cottages, Granby Lane, Bingham, Nottinghamshire NG13 8DH.

UTILITIES

AS/DIS. Hex assembler and disassembler for the machine code user. 5000 bytes reserved. Functions: Hex load assembles hex code. Hex dump disassembles code. Hex clear clears parts of memory. Hex save saves named program..... **£5.00**

CASSETTE DESIGN. To help you store your own tapes this program will use the ZX Printer to print your own designs. These are used as inlay cards. It will store up to 10 designs. Save routine..... **£5.00**

WORD SQUARER. This program will help you solve word squares such as the one in Computing Today, September. Max. dimensions are 20x30 characters. Searches N, S, E, W, NE, NW, SE, SW. Save routine **£5.00**

DISASSEMBLER. Decodes bytes in memory to Z80A mnemonics. All shifts calculated correctly. A very handy tool..... **£5.00**

ASSEMBLER. Type in normal Z80A mnemonics and this program will turn them into their codes and load them into memory. Full editing facilities..... **£5.00**

METRIC CONVERTER. Main converting section will convert Length, Area, Volume, Velocity and Mass. Gives table printout. Hundreds of conversions possible..... **£5.00**

DATA FILE. The newest and most flexible Date filing system yet. Any memory size. Files any length, 20 zones within a file. Functions: Find file, Delete file, Amend file, Search file x zone y for X\$ Swap file, Lprint file, Alphabetical ordering Inverted ordering. The best at only..... **£5.00**

TASWORD THE WORD PROCESSOR

48K SPECTRUM

*"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.

SOUND with ZX-81!

MAKE AMAZING SOUND EFFECTS WITH YOUR ZX-81



£25.95 THE ZON X-81

incl p&p & VAT

- * The ZON X-81 SOUND UNIT is completely self-contained and especially designed for use with the ZX-81. 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 loudspeaker.
 - * Standard ZX-81 — 16K Rampack or printer can be plugged into ZON X-81 Sound Unit without affecting normal ZX-81 operation.
 - * Huge range of possible sounds for games or Music. Helicopters, Sci-Fi, Space Invaders, Explosions, Gun-shots, Drums, Planes, Lasers, Organs, Bells, Tunes, Chords etc., or whatever you devise!
 - * 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.
- FULL instructions with many examples of how to obtain effects and the programmes, supplied. Fully Guaranteed.

BI-PAK

Dept. BUI, P.O. Box 6
63A Hopton Street,
Ware, Herts.



Access & VISA accepted
Ring 0920 3182 for
immediate despatch.

SPECTRUM 48K : ZX81 16K SIX PART ADVENTURE



BLACK CRYSTAL THE QUEST IS ABOUT TO BEGIN

The ultimate role-playing adventure for the SPECTRUM/ZX-81. You can become a warrior, elf or wizard on a quest to find and use the rings of creation: to destroy the Black Crystal and defeat the Lords of Chaos. Held within six programs lies a land of fabulous treasures and mythical monsters. Journey through the land of Beroth, explore the castle of shadows, descend into the Shaggoths lair, search for diamonds in the sea of sand but beware of sand sharks! Confront the fire demon in his temple, battle against the Lords of Chaos and win your way to the Black Crystal. By splitting Black Crystal into six programs we can provide more variety and detail than any other adventure for the Sinclair computers.

Real time monster battles. Superb graphics. Save game feature. All six parts are supplied together on cassette, boxed with instruction booklet.

**SPECTRUM 48K: 180K OF PROGRAM
IN SIX PARTS — ONLY £7.50**
**ZX81 16K: OVER 100K OF PROGRAM
IN SEVEN PARTS — ONLY £7.50**
**WHY PAY MORE FOR LESS OF AN
ADVENTURE**



To: **CARNELL SOFTWARE, DEPT 2, 4 STAUNTON RD, SLOUGH, SL2 1NT.**
Please send me: Black Crystal for my,

Spectrum 48K £7.50
ZX81 16K £7.50

I enclose a cheque/postal order (payable to Carnell Software) for £

NAME

ADDRESS

PROPRIETORS: R. CARNELL, S. GALLOWAY



New Generation Software

PROFESSIONALLY WRITTEN &
PRODUCED SOFTWARE FOR
THE HOME COMPUTER

From M.E. Evans the author of:-

**3D MONSTER MAZE
DEFENDER**

For the ZX81

comes a game for the **SPECTRUM**

ESCAPE

Can you find the axe to break down the exit door of the maze and ESCAPE. The maze is inhabited by 5 hunting dinosaurs including a TRICERATOPS who has the habit of hiding behind the hedges, and a PTERANODON that soars over the maze to swoop down on you.



Send to **NEW GENERATION SOFTWARE
FREEPOST, Oldland Common (no stamp reqd. in UK)
BRISTOL BS15 6BR**

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

PLEASE SEND ME A COPY OF ESCAPE FOR THE 16K
SPECTRUM. I ENCLOSE CHEQUE/P.O. FOR £4.95.

Mr/Mrs
Address
Post Code



Writing your own programs helps boost the enjoyment of your machines. In this first of a series John Gilbert shows how best to start

Following the flow to better programs

MANY PROGRAMS written by beginners to computing show a lack of what professionals call structure. The structure of a program is the way in which it is put together and the order in which the code — the language in which it is written — is put down in the finished product.

This series will show the beginner how to structure programs so that they will work faster and occupy less memory. As an example of how the techniques work, a database will be constructed in the articles which can be used to store lists of information, such as names and addresses or telephone numbers.

The information stored in the database can be called back by typing-in a keyword which corresponds to the information sought by the user.

Before we start to do any coding it is important to know about flowcharting. A flowchart, such as the one in figure one, is constructed before coding to act as a guide to what the finished program will look like. If it is written after coding has been completed and before the programmer starts to search for errors — to debug the program — it will be an aid in finding redundant code or code which inhibits the flow of a program.

The program flow is the way in



which the program will be executed. It is important to have that correct or errors will continue to occur in the program and the speed of the program will be slower.

The basic flowcharting symbols are the Input/Output box, operation rectangle and decision diamond and an example of each is shown in figure one.

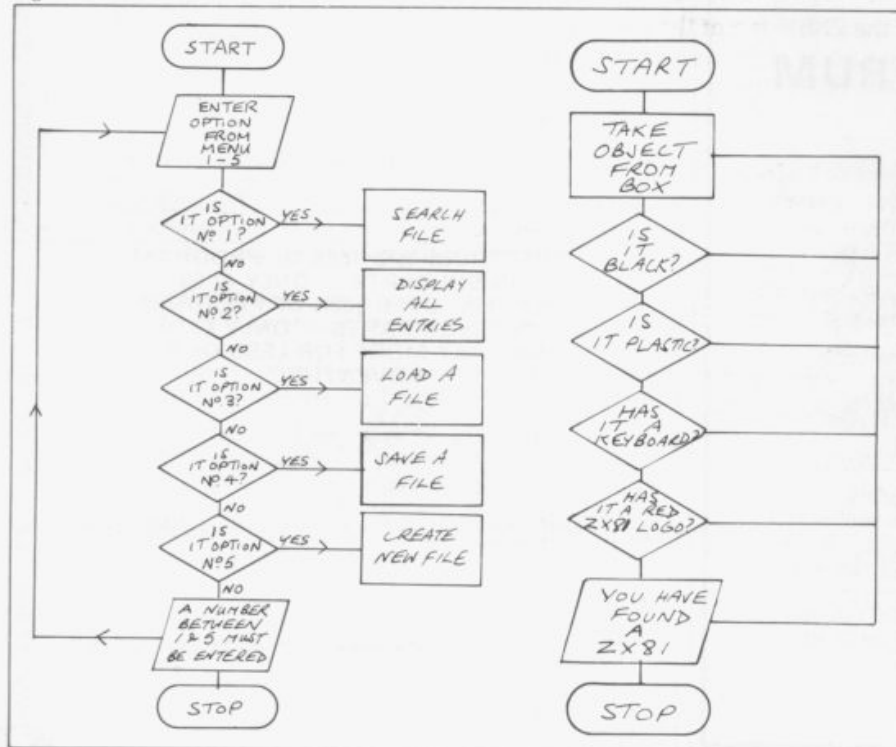
The I/O box is used to mark places where an entry is made by the computer operator, or when the computer displays data on a screen or printer. The box can be used for all forms of input, including keyboard, joystick, or even punched cards on a large mainframe computer.

When debugging a program, checks for errors should first be made at those junctions in the flowchart, as the boxes mark places where a user can crash a program by entering the incorrect information.

The decision diamond is the most complex operation box in a computer flowchart — and the most necessary. A computer is distinguished from other machines through its ability to make decisions based on information. Usually the processing of that information will provide a simple yes or no answer. The inflow to the diamond descends vertically and splits in two to provide the yes/no options.

The option which contradicts the program flow goes out to the side of the box and can be directed up, to form a loop until the action has been performed correctly, or down if alternative action is required to that

Figures 1 and 2





of the normal flow. Finally, the operation rectangle is used to show that the computer has to perform some kind of calculation. That may be adding numbers, assigning numbers to variables, or scanning a string of characters. The use of that and the other boxes is illustrated in figure one.

Flowcharts usually are constructed before writing a program but it is a good idea to draw up one from the finished program to see if the program flows as it was originally intended.

When drawing a chart the boxes should be balanced as much as possible to the left and right of the main stem of the flow. The whole point of flowcharting is to create an easily-understood diagram. The labels inside the symbols should be written in English and not in Basic.

The diagram in figure one uses several decision diamonds and they branch to both left and right. A flow on just one side of the diagram looks sloppy if there are more than two decisions to be made.

The way not to structure a flowchart is shown in figure two. The flow lines at the side have been run together, making it almost impossible to decide what happens next. That is remedied easily by making the chart longer and restructuring the lines into separate boxes as shown in figure three.

When writing a program it is a good idea to draw several flow diagrams. The first would be an overall plan showing the sections of program to be written and subsequent

diagrams would expand each box to show the flow of the various routines.

A program is structured in a similar way to a flowchart. Most programs are constructed in the way figure one shows. The technique is called modular programming because the structure is broken into subroutines, or sections, called modules.

The reason is to eliminate as many GOTO statements as possible, or to make a GOTO statement jump only to a part of the routine in which it is situated, i.e., to make what is termed a local jump, or the control routine at the top of the program.

The control routine consists of a series of GOSUBs. It is the part of the program which is used most, so it is the first thing that the computer encounters when scanning the program. In that way the program is faster in execution, so it becomes more efficient.

A control routine can have two distinct structures. The first is used in a game-type program. That type of program will execute routines by going down through each of the GOSUBs in turn and then returning to the beginning.

The other type of structure is that which we shall use for the database. The program will first jump to the menu routine where the user will select an option. Control is then sent back to the control routine and, using a series of IF... THEN statements, the program will go to the subroutine selected by the player. The control program will not go

down through all the GOSUBs but jump only to those specified by the user through the menu.

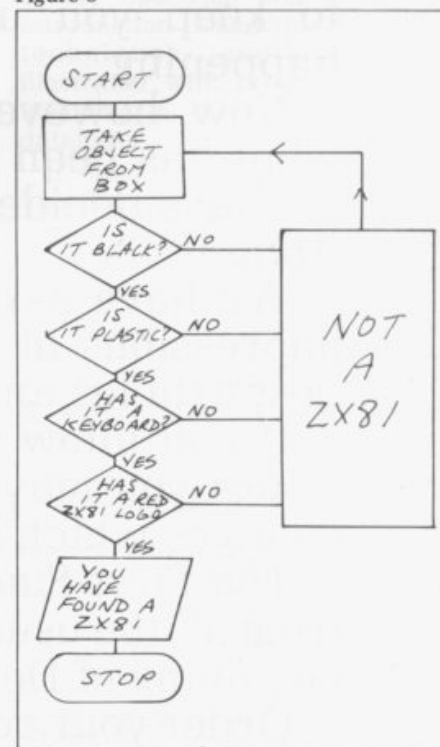
The database will function using a keyboard recognition function. The user enters a few words which act as a key phrase. The program will then look through the list, or file, of information in the program and, if a match is made between the key phrase and part of a piece of information, that piece of information will be output. The computer will output all information which is associated with the key phrase.

The program will also have to support separate data files and be user-friendly so that anyone can use it. The program menu will have search files, display entries, load or save files, and create new files. The program structure will look like this from top to bottom, with the control routine at the top.

The complete flowchart of the database is shown in figure one. Using that chart it will be easy to translate each operation into program code.

Next month I will show how the overall structure of the program is finalised and we can start coding.

Figure 3



Something old, something new

the first

sinclair user

annual

**The complete guide
to the last year
of Sinclair computers**

The world of Sinclair computers is fast-moving, with new developments almost daily. During the months since its launch in April, *Sinclair User* has attempted to keep you up-to-date with all that has been happening.

Now, however, we feel it is time to take stock of what has been happening during those months. So we have decided to publish *The First Sinclair User Annual*.

We have asked all our top writers to give their impressions of the last 12 months and chosen the best articles and programs from past issues.

It will allow you to keep abreast of some of the things you may have missed and to assimilate the changes which have overtaken all of us so quickly.

The First Sinclair User Annual will be available from all the usual newsagents, price £1.50, from the beginning of December.

Order your copy now to avoid being disappointed.



THE emphasis in the Sinclair book market is now on teaching young people about the uses of modern technology, and computers in particular. Usbourne Publishing Ltd has just produced a series of four books on micro-computers.

Two of them consist of listings of programs for various micro-computers, including the Spectrum and ZX-81. There is usually only one listing of each program but symbols at the side refer the reader to conversion notes for their computers.

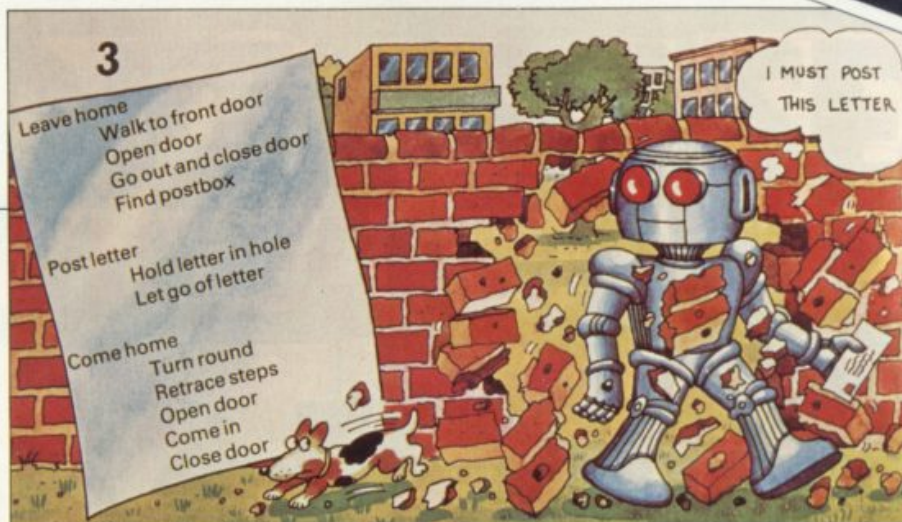
The two, *Computer Space Games* and *Computer Battle Games*, are full of colourful drawings which will appeal to young children. The books cost £1.99 each and are a good idea, for they will coax children into work with computers, something with which some adults still seem to have difficulty. The function of the books is to catch the interest of the young so that they have no difficulties copies with technology in later life.

The other two books in the Usbourne range are *Introduction to Computer Programming* and *Understanding the Micro*. Both explain their subjects, using diagrams and colour drawings as an aid to understanding. Each costs £1.65. The range will be available from most bookshops, including W H Smith.

The ZX-81 is still featuring strongly in the Sinclair publishing

'The quality has improved but is still mainly listings'

market. Following *The Art of Programming the 1K ZX-81*, Babani Publishing has *The Art of Programming the 16K ZX-81*. The book provides one of the most comprehensive introductions to the ZX-81 available. It takes the reader through the possible uses of the expanded machine and then explains advanced subjects such as machine code and programming



A detail from *Introduction To Computer Programming*, one of the Usbourne Electronics range of books

John Gilbert on the growing bookshelf

Leading children into micro world

techniques. It even includes a chapter on advanced randomness with methods of selecting random numbers using Chi squares, poisson and binomial distribution.

Chapters include graphics, designing programs, games and programming techniques. It costs £2.50.

Ivor Killerbyte is obviously a pseudonym but the man who has produced *Write Efficient ZX-81 Basic* does not use the name because he does not want to be associated with the book. The book is very informative and well worth £5.95. It starts with the premise that the reader has a 1K machine and some of the things Killerbyte manages to squeeze from it are amazing.

Included is a series of programs, such as full screen pattern generators, a giant character maker and some interesting graphics games. Killerbyte also provides a series of 36 rules of programming, spread through the book. They include using REM statements to describe programs where possible and making programs as user-friendly as possible. The book is published privately.

Several books concerning the Spectrum appear every week. Even Clive Sinclair has extended into the market with the *Sinclair Computer*

Guides. He has written the foreword to the first guide, which was written by Tim Hartnell.

The ZX Spectrum Explored covers a large range of areas of Spectrum usage. There are chapters on the use of the computer in business and education, as well as games. There is also a short tour of the three-dimensional graphics capabilities of the Spectrum and a 10-page introduction to machine code. The techniques explained are illustrated with program listings, including a diary program and database.

It costs £5.95 and is available from Sinclair Browne.

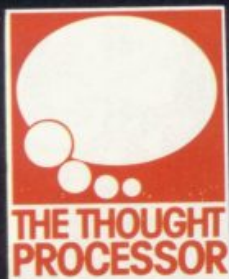
The quality of books about Sinclair computers has improved but authors still seem to concentrate games program listings and books on Sinclair Basic. Many areas, such as machine code and programming techniques, could be better-explored.

Usbourne Publishing, 20 Garrick Street, London WC2E 9BJ.

Bernard Babani (Publishing) Ltd, The Grampians, Shepherds Bush Road, London W6 7NF.

Ivor Killerbyte, 10 Elson Road, Formby, Liverpool L37 3EG.

Sinclair Browne Ltd, 10 Archway Close, London N19 3TD.



MiCROL[®] SPECTRUM

USE AND LEARN VOL.1: 25 BASIC PROGRAMS AVAILABLE NOW

USE 25 PRACTICAL BASIC programs you can put to work immediately—

Programs to demonstrate the wide-ranging potential of your 16 or 48K Spectrum:—

World Atlas — Cassette and Videocassette Index — Music Composer — Computer Term Glossary — Star Maps ...

Personal Programming Aids to help you write your own programs more effectively:—

Memory Map Monitor — System Diagnostic — Program debugging aids ...

Time-saving routines to use in your own programs:—

Text Editor — Flexible graph drawing routines — Sort and Search routines ...

Plus much more.

And, of course, original games to entertain and challenge you.

LEARN New ways to get the most from your Spectrum. Over 100 pages packed with —

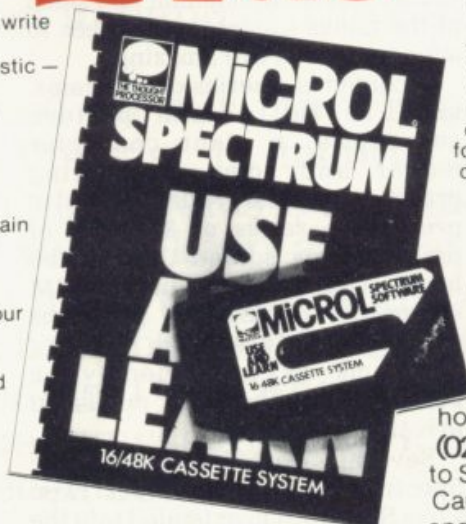
Powerful programming techniques:—
use Structured Programming to save time and make your programs more reliable —

Ideas to make your games more exciting —
How and when to use trees, tables, sorts and searches (do you know the Monkey Puzzle sort?) ...

Facts at your Fingertips:—

Memory and runtime Benchmarks for every

£9.95



command — Display File Memory Map

— Important PEEK and POKE locations

you won't find in your Spectrum manual.

Program Design Aids:—Screen Designers,

for fast graphics and print layouts —

Memory Manager, to keep track of every

variable and array. PLUS:—All 25 BASIC

programs explained line by line

—a goldmine of practical hints and tips.

Send today for USE AND LEARN

Volume 1—25 BASIC Programs, and

we'll also keep you posted with details

of further important MiCROL products

for your Spectrum. And USE AND LEARN

comes with MiCROL's full 14-day

money-back Guarantee.

To order simply complete the coupon, and FREEPOST with your cheque, made payable to **MiCROL (UK Mail Order)**.

Despatch normally by return. **Telephone orders**—credit card holders can order by telephoning **(0223) 312866** from 9-5.30 Monday to Saturday, stating name and address, Card No. Access/Barclaycard/Visa and item(s) required.

THE DATA BASE PRACTICAL. AND ONLY POWERFUL. FOR 48K RELIABLE. SPECTRUMS

AVAILABLE NOW £9.95

Whether you want to update mailing lists, re-organise the filing, or simply produce an index of your stamp collection, THE DATABASE makes it easy and enjoyable:

Easy-to-use one-touch commands and full onscreen prompts for fast, confident operation.

Down-to-earth 40-page manual — full operating instructions plus practical examples to show how THE DATABASE helps you in almost every work and leisure interest.

Massive storage capacity for real-work capabilities — over 900 screens of information (or over 7,000 names and addresses) on a single C90 cassette.

Advanced features you won't find on most £100 + databases — Machine-code automatic sorts and six kinds of searches (including Find Smith, Find Smith And Croydon, Find Smith or Croydon).

Performance you can depend on — professional design and testing ensures the reliability you need for storing important information.

And, with THE DATABASE, you get FREE MICROL UserCare — informed, intelligent assistance and advice, whatever your question — by letter or telephone.



You can put THE DATABASE to work immediately. And as your Spectrum system grows, THE DATABASE will grow too, with low-cost MICROL add-ons for Microdrives and full-size printers available soon.

**AVAILABLE NOW!
ONLY £9.95**

Find out for yourself how THE DATABASE puts real computing power at your fingertips.

Send for THE DATABASE today, and we'll also keep you posted with details of further important MICROL products for your 48K Spectrum. And THE DATABASE comes with MICROL's 14-day money-back Guarantee.

To order simply complete the coupon, and FREEPOST with your cheque, made payable to **MICROL** (UK Mail Order). Despatch normally by return.

Telephone orders—credit card holders can order by telephoning (0223) 312866 from 9-5.30 Monday to Saturday, stating name and address, Card No.

Access/Barclaycard/Visa and item(s) required.



MICROL SPECTRUM

(0223) 312866

MAIL ORDER DISTRIBUTION EXCLUSIVELY
BY TEMPUS OF CAMBRIDGE
38 Burleigh Street,
Cambridge CB1 1BR.

Designed by Sesames(UK)Ltd

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

Please send me copy/copies of THE DATABASE

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

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

su/i

Credit card
holder's signature

THE HOBBIT



Step into the future: VISIT MIDDLE EARTH WITH YOUR SPECTRUM.

Melbourne House Publishers, in association with the Tolkien Estate, are very proud to announce the release of THE HOBBIT, a super-program like no other before, for the 48K Spectrum.

THE HOBBIT is totally unique, with features never before seen on any computer, let alone on the Spectrum.

Based on the fantasy land described in J. R. R. Tolkien's brilliant novel, in this program you take on the role of Bilbo, the hobbit: danger, adventure, and excitement are all part of it, presented to you in words and graphics, but it is you who must confront and solve the problems this time.

You instruct the computer in completely ordinary English sentences!

THE HOBBIT program is capable of very sophisticated communications, including features not previously thought possible on a microcomputer: adjectives, adverbs, multiple sentences, are just a part of the power of this program.

You will meet all your favourite characters from J. R. R. Tolkien's book, and amazing as it sounds, they will all have an independent life of their own. They can make decisions and act on them! They react not only to what you do, but also to every other character in THE HOBBIT!

Because of this unique feature, you will find that each time you play THE HOBBIT, events will proceed in a slightly different way, and the further you get into Tolkien's world, the more different each visit may be.

THE HOBBIT also allows you to talk to the other characters! At last you can answer the questions they may put to you, or more importantly, you can suggest to them what you would like them to do!

THE HOBBIT program follows closely the plot of the book, and so a copy of the book is included as part of THE HOBBIT package at no extra charge.

THE HOBBIT brings to you the future of microcomputers in an exciting and challenging fantasy. A super-program that is a milestone in computer software.

Other cassette software includes PENETRATOR, a 48K state-of-the-art arcade game—£6.95 including VAT.
Spectrum books include: Over The Spectrum—£6.95.
Spectrum Machine Language—£6.95.
Understanding Your Spectrum—£7.95.

Melbourne House Publishers

SU1

Orders to: 131 Trafalgar Road, Greenwich, London SE10.

Correspondence to: Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 7NA.

☐ Please send me your **free** Catalogue.

Please send me:

☐ The Hobbit package—48K Spectrum cassette, full colour instruction manual and Hobbit book—£14.95

☐ Other

(Please add 80p for post & pack.) I enclose

cheque/money order £..... or debit my Access

card No..... Expiry date.....

Signature.....

Name

Address

.....

..... Postcode

MELBOURNE HOUSE PUBLISHERS





Looking at using the teaching micro

Eric Deeson reveals his thoughts on how Sinclair can help in schools

THE EDUCATIONAL ZX Users' Group Spot ... doesn't that sound good? I believe that we can start thinking that the educational uses of ZX micros have arrived when the field merits regular space in these pages.

Before you all start turning hastily to the advertisements or the kill-for-joy games listings, I think I should emphasise a few points. Educational computing may seem to be a minority interest but it is my task to prove otherwise. This column is not directed only to teachers, though I hope that if you are a teacher you will not need convincing that you should read it.

The EZUG Spot is intended to provide items of interest for all. It replaces the EZUG Newsletter which seemed to fill a need for many folk outside education — teachers, parents, students and pupils, and even people with no significant contact with education; all were important classes of subscribers.

The Newsletter used to provide tips. Such as this one from Ian

Spectrum? A number of add-on manufacturers offer one.

The Newsletter also provided reviews of relevant — i.e., innovative and fairly serious books, hardware and software. Like these:

Machine code and better Basic by Ian Stewart and Robin Jones, Shiva, 188pp, £7.95. Review by Keith Jammer. Many thousands of teachers found its predecessor, *PEEK, Poke, Byte and RAM*, an outstanding introduction to Sinclair programming for themselves and for youngsters. If you are among them, I need say only that this continues in the same vein.

If you were not, I urge you to join the throng to the bookshops. As *Peek, Poke ...* was the most inspiring introduction to beginning with the 1K ZX-81, this is bound to become the most inspiring course on advanced programming with the

kit). Review by David Green. This unit, like others of its kind, is available either as a kit or ready-built. The ZX circuit board is screwed inside. My model had no ribbon cable for connections and two dry joints gave me a little trouble. The keyboard has a video monitor amplifier on board but the leads from the Crofton board to the Sinclair PCB are pitifully short and rather fussy to solder.

A ribbon cable connector with plug-in contacts would have been much better for the keyboard and not everyone will feel a monitor output is necessary and might prefer a REPEAT on the keys. The model I have was "built" — the key-switches were soldered to the PCB — but it arrived with all the key-tops loose in the package, and no spares.

The edge connector is satisfactory for the RAM but a little tight for the printer. All the keys are flat, unlike a conventional keyboard, but the duplication of many keys, such as SHIFT — one on each side — PRINT and " makes typing much easier. NEWLINE is twice the length of a conventional key but, being supported at one end only, tends to 'bend'.

The SPACE BAR is about four keys long and supported by two key-switches; it is rather stiff. When originally assembled, some of the keyswitches were too close to each other but this can be eased gently.

The overall design is very pleasing and matches the RAM and printer. The key layout is very good but one spare key for REPEAT or RESET would have been useful. I am very pleased with the unit and the adverse comments need to be set

continued on page 46

'The column is not directed only at teachers, though I hope they will not need convincing that they should read it'

Logan, for long a much-appreciated supporter of the group:

PRINT 65536 — USR 7962 to find memory available.

Logan reckons that the original Spectrum ROMmer had expected a key, called FRE perhaps, for that useful function.

The Newsletter used to plead for tips. Here are two so far unanswered queries:

- How can you get the Spectrum to drive a video monitor?
- Can anyone supply diagram of, or reference to, a circuit giving key repeat for the ZX-81 as on

16K version — and, of course, the Spectrum.

The text is tight-packed and readable and very well illustrated; it deals with structured programming, data structures and machine coding. As a bonus you get thoughtfully-developed listings of a text editor, a queueing simulator and a vocabulary testing game. If you base your A level teaching on Sinclairs, add this to your course texts; but at whatever level of work, you will find that you and your pupils will gain enormously from it.

Crofton Keyboard (ZX-81 Adapta-





continued from page 45

against the overall advantages and appearance of the kit.

- The video monitor output gets in the way of the all-too-short printer lead.
- The internal connections should have been — perhaps they are now — by ribbon cable and plug, rather than having to solder to the Sinclair board.
- The internal monitor connection leads are cramped together and far too short.
- The well-designed case can be a

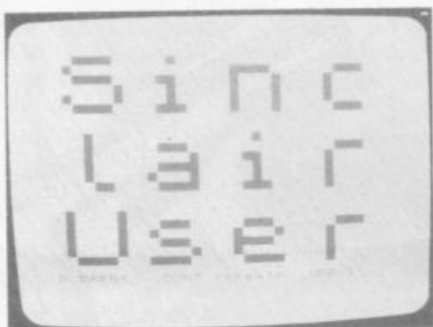


Figure 1.

little distorted and the self-tapping screws are not easy to secure.

This unit has now been in regular use for some weeks, by myself and by a multitude of children. The advantages common to all "standard" keyboards are obvious and the absence of "pitch" on the keys is no disadvantage. The NEWLINE key is easier to see but also easier to displace and a full-length space bar might have been better.

No assessment of such a standard unit as the Crofton 9in. monitor is really necessary but in our local education authority portable TVs are frowned on and the Crofton monitor claims to meet educational safety standards.

In use, driven by the Crofton keyboard, the resolution is excellent, but you have to become accustomed to a slower return of display from FAST mode and to unusual patterns before LOADING patterns appear.

With the Crofton ZX Adaptakit you have a very smart micro. In my situation I use the monitor as standard but often drive a TV as well, so that the children can watch.

The price for these items is £100 exclusive of VAT.

The Educational ZX Users' Group was set up by MUSE, Britain's biggest professional association for educational computing. That was two-and-a-half years ago, soon after the ZX-80 changed our lives. The main aim of EZUG was, and remains, the development of a good ZX educational software library. We have done well there, with more than 50 ZX-81 programs and already more than a quarter as many for Spectrum.

The programs are available in Britain to MUSE members only and therefore will not be mentioned a great deal in this column. You can obtain a list by sending me two 12½ pence stamps.

The Newsletter, which has ceased publication after 12 bi-monthly issues, reached thousands of people in more than 40 countries.

I would like to deal with a short routine, set as a complete program, which should much improve the value of the Spectrum in the classroom. It displays on screen in jumbo size characters — three lines of four — any required 12-character string, as illustrated

Figure 2.

```

10      DIM a(4): DIM
b(8)
20      FOR c=1 TO 8
30          LET b(c)=2+(c-1)
40      NEXT c
50      READ a$
60      FOR h=0 TO 2
70          FOR d=1 TO 4
80              LET a(d)=CODE a$(d+h*4)
90          NEXT d
100         FOR e=0 TO 7
110             FOR d=1 TO 4
120                 LET f=PEEK (15616+8
130                 *a(d)+e)
140                 FOR c=1 TO 8
150                     LET g=1-(f/b(8-c)
160                     PRINT (" " AND N
170                     OT g)+( " " AND g)
180                     LET f=f-g*b(8-c)
190                 NEXT c
200             NEXT d
210         NEXT e
220         PAUSE 0
230         IF h THEN POKE 23692,2
240         NEXT h
250         CLS: GO TO 50
260         DATA "Poke to BBC!"
270         DATA "23+142=165"
280         DATA "etc etc etc"

```



in figure one. The routine in figure two digs up the ROM data for each ASCII character and follows the same pattern, character block for pixel.

The strings for display are held in DATA statements and be 12 characters. Press ENTER at the end of the first and second lines to start the next line coming but do not press it at the end of the third until you want the next string along.

It is not difficult to add colour and sound if you wish to use some other block instead of inverse black, to halve the magnification factor, and/or to provide automatic scrolling of a much longer message.

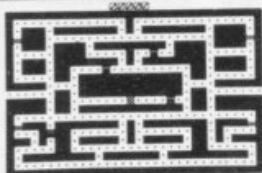
EZUG: Highgate School, Birmingham 12 — send two second-class stamps for details of ZX educational software.

MUSE: Freepost, Bromsgrove, Worcestershire — for information about the benefits of membership of the EZUG parent organisation.

Microscene: 6 Battenhall Road, Birmingham 17 — £2.50 for the Guide to Spectrum Resources.

SF 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

SF 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

NOW FROM AFDEC ZX81

ZX-PANDA

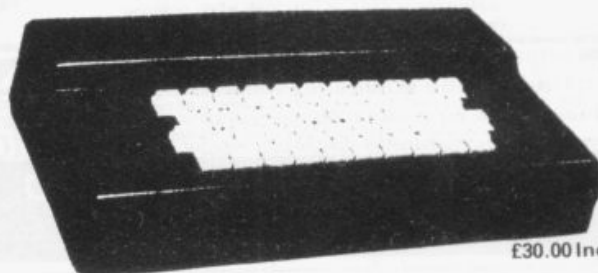


16K Expandable RAM

Uniquely expandable to 32K by the addition of our 16K Expansion Module.

ZX-PANDA Basic 16K RAM Pack	£27.50 incl
ZX-PANDA 16K Expansion Module	£19.95 incl
GIANT PANDA Full 32K RAM Pack	£44.00 incl
Finally the Really big One 64K RAM Pack	£65.00 incl

KEYBOARDS TYPE A CASED 42 KEY

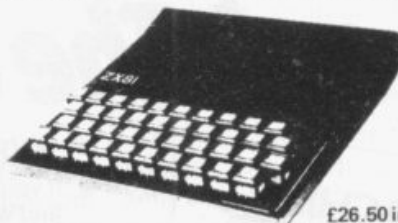


£30.00 incl

The ZX81 fits inside

The tough ABS injection moulded plastic case measures 8" x 14" x 2 1/2" and hooks up to your ZX printed circuit board in minutes. No technical know how or soldering is required.

TYPE B 41 KEY REPLACEMENT



£26.50 incl

- Fits in the Recess left after peeling off existing touch sensitive Keypad.
- No Soldering ● No trailing wires.
- Positive feel and sound as key operates.

Cheques/PO please to

AFDEC ELECTRONICS LTD
318 Kempshott Lane, Basingstoke,
Hants RG22 5LT

PLEASE SUPPLY (all prices include VAT & P&P)	
16K EXPANDABLE RAM.....	£27.50
16K EXPANSION MODULE for above.....	£19.95
32K GIANT PANDA.....	£44.00
64K THE BIG ONE.....	£65.00
KEYBOARD TYPE A.....	£30.00
KEYBOARD TYPE B.....	£26.50

PLEASE PRINT CLEARLY

NAME _____

ADDRESS _____

BUFFER

MICRO SHOP

(Next to 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 ITEMS ★ ★ ★ ★ ★

SPECTRUM KEYBOARDS

ZX-81 WHITE PAPER PRINTER

SPECTRUM WORD PROCESSOR

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

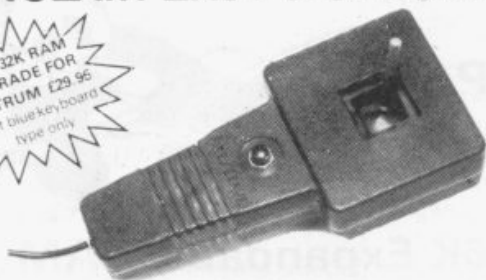
SAE appreciated for catalogue

OPEN TUES-SATS 10.30 TO 5.30. CLOSED MONDAYS

MIDWICH COMPUTER COMPANY LIMITED
FAST EX-STOCK DELIVERY OF MICROCOMPUTER COMPONENTS AT UNBEATABLE PRICES

GAMES PADDLES FOR SINCLAIR ZX81 & SPECTRUM

NEW 32K RAM
UPGRADE FOR
SPECTRUM £29.95
latest blue keyboard
type only



- ★ FULL ANALOGUE/PROPORTIONAL MOVEMENT
- ★ BUILT IN FIRE BUTTON
- ★ ONE OR TWO PER CONTROLLER
- GAMES PADDLE CONTROLLER**
- ★ PLUGS INTO ZX81/SPECTRUM EXPANSION BUS
- ★ EDGE CONNECTOR FOR RAM PACKS etc
- ★ ULTRA-FAST. A/D CONVERTER

Games Paddles 7.99 inc VAT
Paddle Controller 22.95 inc VAT

Please specify ZX81 or Spectrum when ordering
Please add 0.96p post & packing on all orders

VISA 24 Hour Telephone order service for credit card holders.
All prices exclude VAT and carriage (0.75 on orders under £10 nett)
Official orders from educational and government establishments, and
public companies accepted. Credit accounts available to others (subject to status).
All orders despatched on day of receipt. Out of stock items will follow on automatically at our
discretion or a refund will be given if requested.
NO SURCHARGE FOR CREDIT CARD ORDERS

MIDWICH COMPUTER CO LTD

Rickingham House, Rickingham, Suffolk IP22 1HH
Telephone (0379) DISS 898751

ZX SPECTRUM

16K Spectrum GOLF

Hi-Res Full Colour
Graphics. A game for one
or two players, with all the
features of a full size golf
course. (Reviewed Sinclair
User - Oct. 1982)



ONLY £3.75

48K STAR TREK



ONLY £4.95

Rid the Galaxy of evil
Klingons, protect your Star
Bases from attack. The best
graphics in the universe
(Reviewed Sinclair User
Dec. 1982)

34, BOURTON ROAD
GLOUCESTER GL4 0LE
TEL. GLOS. (0452) 502819

R & R SOFTWARE

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 Incl. p & p.

MINEFIELD (5K)

Guide your tank to safety. Hidden
mines will explode on contact and
send you back to the start. With only
nine lives to play with you must
remember your route so far

ONLY £3.75

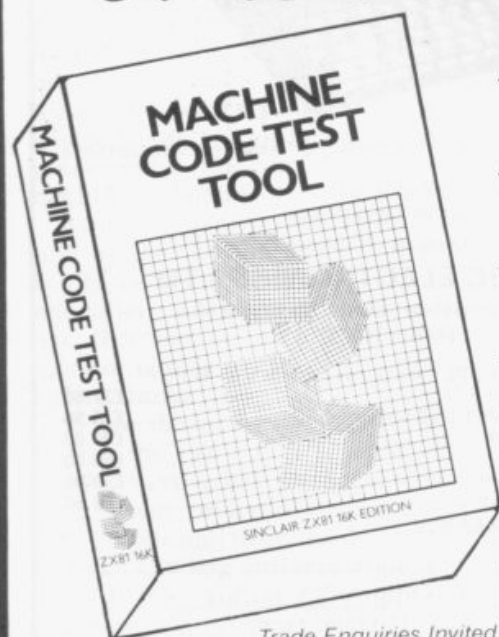
BOMBER (5K)

Destroy the enemy city in this all
action machine code game. Beware
the cities defenders fight back.
Complete with high score feature

ONLY £4.95

ZX 81

At Last Your Chance To Crack The Machine Code



Trade Enquiries Invited

Also available from most branches of
WHSMITH

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..... SUI

Allow up to 28 days for postage



The material covered was good, with useful instructions and tips. Some of the graphics in the chemistry program enlivened what can often be a dull slog of repetitious learning and the randomised questions in the programs required a sound knowledge of the subject.

Suggestions of the degree of success are given at the end of each tape. Overall, the programs represent some of the best educational software so far seen and are recommended for use, either at home or in the school, and are good value at £7.50 each.

The Calpac O level chemistry sent for review is a single cassette with no accompanying literature. There are four programs on the cassette, dealing with elements, compounds, mixtures, activity series, acids, bases and salts.

Each program has only 10 questions and there is no random element. Well-presented and easy to load and use, they were, however, more limited than the Scisoft versions but they could still be useful for drilling. The cassette costs £5.50 and is available from 108 Hermitage Woods Crescent, St Johns, Working, Surrey GU21 1UF.

Rose Cassettes 148 Widney Lane, Solihull, West Midlands B91 3LH sent O level maths revision and O level French. The French cassette has six programs, three dealing

Dave Sayers reviews some of the growing number of cassettes for older pupils

Sinclair route to better O levels

AS MORE and more people get to know the ZX-81 and its possibilities an increasing number of software suppliers are producing cassettes on subjects other than games.

One major growth area has been education. In September we published a round-up of most of the programs which were then available. The market has continued to grow and we have decided to look again at what is an offer.

Cassettes are available for children of all ages, from nursery school to GCE O level. In the upper age range we looked at programs from Scisoft, Calpac and Rose Cassettes.

Scisoft of 8 Minster Gardens, Newthorpe, Eastwood, Nottingham, NG16 2AT, produces cassettes for O level chemistry, biology and physics. The subjects covered in chemistry are titrations, masses, molarity, mystery metal, electrolysis, the gas equation and mystery gas; in biology are enzymes,

hormones, botanical terms, alimentary canal, bodily organs; and in physics, gas laws, linear expansion, moments, electricity equations and Snell's Law.

Each cassette is accompanied by a comprehensive booklet of revision notes, packed with drawings and information. They were a big plus in favour of the programs and would

'Overall, the Scisoft programs represent some of the best educational software so far seen and are recommended for use'

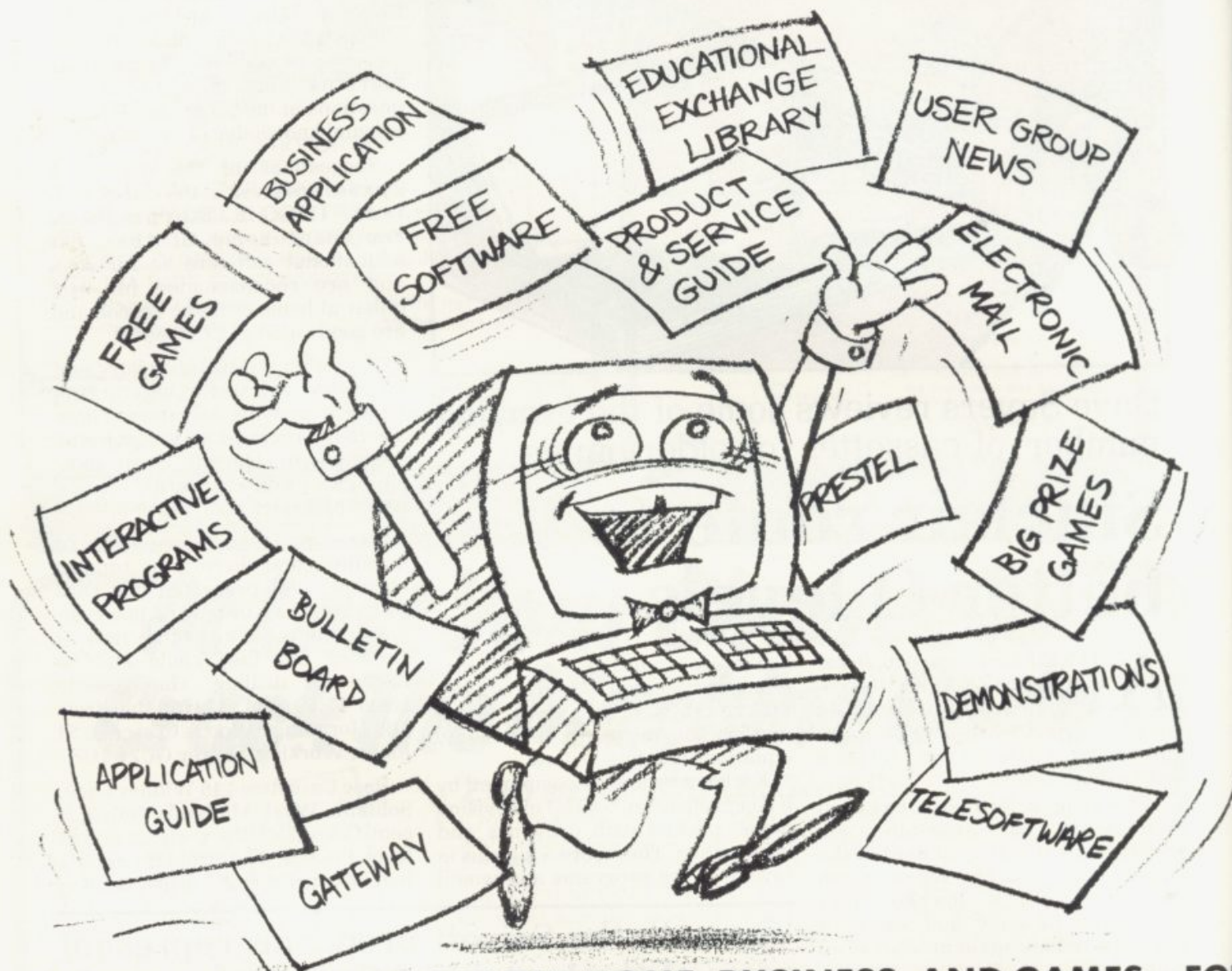
certainly be most useful. The programs are recorded on high-quality cassette and all loaded first time.

The 'unknown' section of the biology tape contains some bugs, bad enough to stop the program and too numerous to alter, not that it should be necessary. The rest of the programs ran so well, though, that it was clear the bugs were the exception rather than the rule.

with grammar and three with vocabulary. The maths cassette has one revision program and two test programs using questions from the O level syllabus.

In classroom use children have been using other Rose programs consistently with no problems at all and so it is safe to recommend these two as useful classroom aids. The cassettes cost £4.50 each and there are no accompanying booklets.

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.

AN A THINK-TANK. AN A SOFTWARE HOUSE. AN 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!



**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**

SUB

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

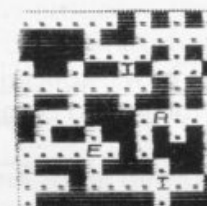
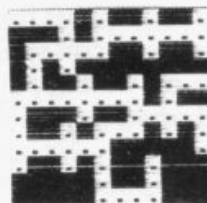
SEND C.W.O. To: A.G.F. HARDWARE, Dept. SU,
26 Van Gogh Place, Bognor Regis, West Sussex PO22 9BY

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	

WORDfit 16K ZX81

(written entirely in machine code)

THE PROGRAM SETS THE PATTERN
YOU KNIT THE WORDS



1. Program will not allow you to input the same word twice.
2. Cell pattern set at random.
3. Choice of 4 square sizes.
4. Copy screen at any time.
5. Rub out entire square, part of word, whole word or last letter.
6. Can instruct program to insert vowels.
7. Statistical analysis on screen continuously.

RAM WRITER,
3 VUMBA HOUSE,
2 CEDAR GARDENS,
SUTTON,
SURREY SM2 5DB

£5



SILVERSOFT

NEW!

SPECTRUM - ZX81

STARSHIP ENTERPRISE

Soar through the stars as a starship commander in this exciting new space ship simulation. This new, advanced version of Startrek uses the full colour graphics and sound facilities of modern micros. Full 3D - Klingon attacks, graphic hyper-warp, plus all the normal 'Startrek' features and a whole lot more, add up to one of the best games in the galaxy!!

48K Spectrum £5.95.

ORBITER

Fast and furious action is what you get in this amazing Defender-style program for the ZX-Spectrum.

ORBITER is written entirely in m/c code and has full arcade features, including scanners, reverse, hyper-space, continuous scoring and sound effects, plus humanoids, landers, mutants and all the other alien nasties.

16K or 48K Spectrum £5.95.

GROUND ATTACK

Survival is the name of the game in this exciting Scramble-type arcade game for the ZX-Spectrum.

Your mission is to pilot your spaceship through torturous caverns while destroying the enemy missile launchers and fuel dumps.

GROUND ATTACK is written completely in machine code. And has full arcade features including lasers, bombs, explosions, continuous scoring and sound effects, plus rockets, fuel dumps and airborne aliens.

16K or 48K Spectrum £5.95.

Any hiring, lending or copying (except backup) of Silversoft software is strictly forbidden without written permission from Silversoft.

GENEROUS DEALER DISCOUNTS AVAILABLE
Silversoft Ltd, 20 Orange Street, LONDON WC2H 7ED.

NEW! ZX81-COMPILER

Yes! Now you can write machine code on your ZX81. No more messing about with assemblers and disassemblers simply type in the BASIC program and the machine does the rest.

ONLY £5.95.

ZX81 ARCADE ACTION (New low prices)

- MUNCHER** Exciting pacman game for the ZX81 £4.95
- ASTEROIDS** "Just the thing for asteroid addicts" £4.95
- INVADERS** "Probably the best version of INVADERS" £3.95
- ALIEN-DROPOUT** Exciting ORIGINAL arcade game £3.95
- STARTREK** YES! you can be a starship commander £3.95
- GRAPHIC GOLF** 18 graphically displayed holes £3.95
- SUPERWUMPUS** An underground adventure £3.95
- GAMES PACK 1** Fantastic value for money, nearly 50K of programs on one cassette! Only £3.95

Please send me _____ SU12

I enclose a cheque/PO for £ _____

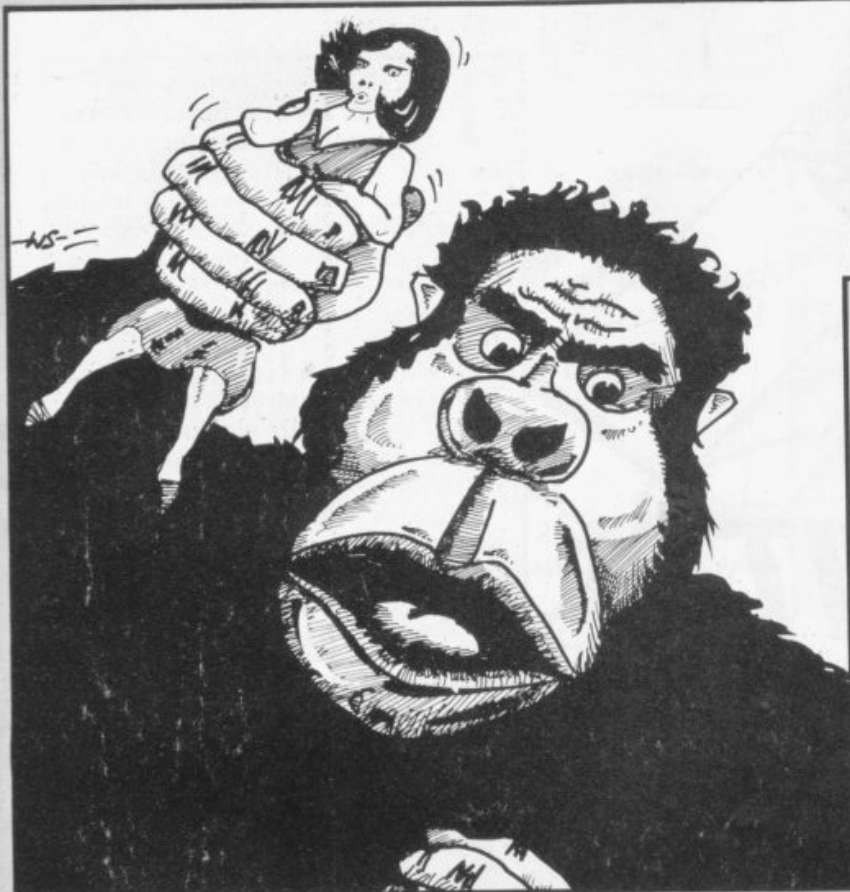
Name _____

Address _____

Silversoft Ltd, 20 Orange Street, LONDON WC2H 7ED.

PROGRAM PRINTOUT

programs



KONG

KONG is a 1K ZX-81 version of the popular arcade game, Donkey Kong. The idea is to leap over all the objects put before you in the game. That could include jumping over logs or jumping holes.

If you do not jump and land in a hole the game will finish with error code 2. The logs start rolling from the right of the screen and you must use the magic keys — shifted 6 or 7 — to jump the obstacles. Shifted 8 will also allow you to jump right but keys 8 and 5 will allow you only to move horizontally right and left respectively.

The program was sent by Nicholas Sheard of Prestbury, Cheshire.

```

10 LET A=1
20 LET B=A
30 LET C=26
40 LET S=PI-PI
50 LET K=C
60 LET L=A
70 LET N=L+L
80 LET P=C
85 LET T=L-L
90 PRINT AT PI,T;"5 INVERSE SP
ACES,SPACE,5 INVERSE SPACES,SPAC
E,3 INVERSE SPACES,SPACE,2 INVER
SE SPACES,SPACE,3 INVERSE SPACE,
SPACE,4 INVERSE SPACES"
100 PRINT AT N,K;"H";AT N,C;"OO
O";AT A,B;"O";TAB B;"L";AT A+N,B
;
110 LET E=PEEK (PEEK 16398+256*
PEEK 16399)
120 IF A=L AND B=C OR A=L AND B

```

```

=C+N OR A=L AND B=C+N+N OR A>=N
THEN PRINT S;H
130~IF E<>128 THEN LET A=A+L
140 LET S=S+(E=P+P)+P*(E=45)
150 IF E=45 THEN GOTO 300
200 LET C=C-1
210 IF C=T THEN LET C=P
220 LET B=B+(INKEY$="8" OR INKE
Y$=CHR$ 115)-(INKEY$="5" OR INKE
Y$=CHR$ 114)
230 IF E=128 AND INKEY$>=CHR$ 1
12 THEN LET A=A-L
280 PRINT AT N,T;"      ";AT T,
B-L;"      ";TAB B-L;"      ";TAB B-L;
"      "
290 GOTO 100
300 LET K=K+((P-L)*(K=L))-((P-L
)*(K=P))
320 GOTO 90

```



HOT PURSUIT

THE OBJECT of *Hot Pursuit* for the 16K ZX-81 is to pursue and capture the moving white square using the cursor-key-controlled cross. The game is made more difficult because the block will do its best to avoid your crusading cross. It will jump to the opposite side of the screen if you force it on to the black border.

The author, S N Yogasudram of Preston, Lancashire, says that the skilful player can manipulate the block so that it is forced to materialise on top of the cross.

There is a timing system which governs the number of points awarded at the end of the game. The more time taken to trap the square the fewer points are awarded.

```

100 FAST
300 FOR N=0 TO 31
310 PRINT AT 21,N;"inverse SPAC
E";AT 0,N;"inverse SPACE"
315 NEXT N
320 FOR N=0 TO 20
330 PRINT AT N,0;"inverse SPACE
";AT N,31;"inverse SPACE"
340 NEXT N
690 SLOW
695 LET X=18
698 LET Y=29
710 LET M=1
720 LET N=1
730 LET S=0
740 PRINT AT M,N;"+"
750 FOR T=100 TO 2 STEP -1
760 PRINT AT X,Y;"graphic H"
800 IF M=X AND N=Y THEN GOTO 30
00
2000 PRINT AT M,N;" "
2020 IF INKEY$="5" THEN LET N=N-
2040 IF INKEY$="6" THEN LET M=M+
1
2060 IF INKEY$="7" THEN LET M=M-
1
2080 IF INKEY$="8" THEN LET N=N+
1
2090 PRINT AT M,N;
2100 IF PEEK (PEEK 16398+256*PEE
K 16399)=128 THEN GOTO 3040
2120 PRINT AT M,N;"+"

```

```

2140 IF M=X AND N=Y THEN GOTO 30
00
2200 LET R=RND
2210 LET DX=0
2240 IF R<=.1 THEN LET DX=1
2280 IF R>=.4 THEN LET DX=-1
2285 IF N=Y THEN LET DX=SGN (X-M
)
2290 LET Z=RND
2300 LET DY=0
2310 IF Z<=.1 THEN LET DY=1
2320 IF Z>=.4 THEN LET DY=-1
2330 IF X=M THEN LET DY=SGN (Y-N
)
2340 PRINT AT X,Y;" "
2400 LET X=X+DX
2420 LET Y=Y+DY
2440 PRINT AT X,Y;
2460 IF PEEK (PEEK 16398+256*PEE
K 16399)=128 THEN GOTO 2480
2470 NEXT T
2480 IF X=0 THEN LET X=20
2490 IF X=21 THEN LET X=1
2500 IF Y=0 THEN LET Y=30
2520 IF Y=31 THEN LET Y=1
2540 NEXT T
3000 PRINT AT M,N;"inverse ASTER
ISK"
3020 LET S=10*T
3040 PRINT AT 21,2;"SCORE ";S;"
POINTS"

```


BRICK BUCKET

```

1010 GO SUB 6000
1020 BORDER 5: PAPER 5: INK 0: CLS
1030 LET d=5: LET A$="L"
1040 LET p=14: LET score=0
1050 PRINT AT 21,p;A$
1060 PRINT AT 0,0: PAPER 6: SCOR
RE "AT 0,22: BRICKS
2000 REM BRICKS
2010 FOR a=1 TO 10
2020 PRINT PAPER 6;AT 0,30;a
2030 FOR n=0 TO 20: BEEP .02,n:
NEXT n: PAUSE 100
2040 LET c=INT (RAND*29)+1
2050 FOR b=1 TO 20
2060 PRINT AT b,c: INK 2: "
2070 IF INKEY$="1" AND p>0 THEN
GO SUB 4000
2080 BEEP d/100,b
2090 IF INKEY$="0" AND p<29 THEN
GO SUB 5000
2100 PRINT AT b,c: "
2110 NEXT b
2120 IF c=p+1 THEN LET score=score+1:
FOR n=60 TO 0 STEP -1: BEE
P .01,n: NEXT n
2130 PRINT PAPER 6;AT 0,7;score
2140 NEXT a
3000 REM NEXT ROUND
3010 IF score<5 THEN LET d=d+1:
CLS: GO TO 1040
3020 IF score=10 AND d=1 THEN GO
TO 3050
3030 IF score>5 AND d>1 THEN LET
d=d-1
3040 CLS: GO TO 1040
3050 BORDER 0: PAPER 0: CLS
3060 PRINT AT 5,5: BRIGHT 1: FLA
SH 1: PAPER 2: INK 6: "WELL DONE,
TOP SCORE.": STOP
4000 REM MOVE LEFT
4010 PRINT AT 21,p: "
4020 LET p=p-1
4030 PRINT AT 21,p;A$
4040 RETURN
5000 REM MOVE RIGHT
5010 PRINT AT 21,p: "
5020 LET p=p+1
5030 PRINT AT 21,p;A$
5040 RETURN
6000 REM BUCKET
6010 FOR n=0 TO 7: READ i: POKE
USR "L"+n,i: NEXT n
6020 FOR n=0 TO 7: READ m: POKE
USR " " +n,m: NEXT n
6030 FOR n=0 TO 7: READ r: POKE
USR "J"+n,r: NEXT n
6040 DATA 192,192,192,192,192,19
2,255,255,0,0,0,0,0,0,255,255,3,
3,3,3,3,3,255,255
6050 RETURN

```

BRICK BUCKET for the 16K Spectrum has the gamer catching red bricks in a bucket. You can move the bucket by pressing '1' to move left and '0' to move right. The score and number of bricks to have fallen is printed at the top of the screen. You must catch more than five bricks to reach the next level of the game, where the bricks fall faster until you catch 10 bricks at high speed.

If you catch five bricks on the first leg, you will go again at the same speed. If you catch fewer than five the speed of the bricks will drop until you have gained more experience of the game. Graphics notes:

Line 1030, graphic ABC

Line 2060 inverse graphic '3'.

The game was sent by Ken Rylett of Burnage, Manchester.



THE GRAPHICS, sound and use of colour in **City Lander**, a version of the arcade game City Bomber, are amazing for a program which has no professional programmer behind it.

The game runs on a 16K Spectrum and full instructions are given on the screen. The aircraft destroys the city so that it can land by creating fires in the buildings. It travels downward all the time and can only travel upward once in the game. That means that you must develop skill quickly.

The game, sent by Mark Williams of Colchester, Essex, also includes a high score routine which keeps track of the names and scores of the highest hitting players.

Graphic notes:

Lines 142, 144, 147, 1010, 3515, 3525, graphic 'G'
Lines 1010, 3525, graphic 'GF'
Line 120 graphic 'CB'
Line 141, graphic 'D'.

CITY LANDER

```

5 POKE 23658,8
11 LET H=3: LET BH=h: LET t=0:
LET w=0: LET SC=0: LET SCH1=0:
LET SCH2=0: LET SCH3=0: LET L=0:
LET D=INT (RND*8+1): LET LI=3:
LET J=0: LET LE=0
12 GO SUB 1200
15 GO SUB 1500: GO SUB 3500: G
O SUB 1100
20 BORDER 0: PAPER 0: INK 5: C
LS
21 FOR a=0 TO 20: BEEP .005,a:
PRINT INK 2,AT a,0:"█":AT a,31,
"█":NEXT a:FOR a=31 TO 0 STEP
-1: BEEP .005,a: PRINT INK 2,AT
a,a:"█":AT 21,a:"█":NEXT a
30 PRINT AT 10,10,"CITY LANDER"

40 FOR N=1 TO 2: RESTORE 60
50 FOR I=1 TO 8: READ H,U: BEE
P H,U
60 NEXT I: NEXT N
70 DATA .1,11,.1,11,.8,16,.05,
11,.05,16,.05,11,.05,16,1,20
80 CLS: REM CITY
90 BORDER 0: INK 2: PAPER 0: C
LS
100 GO SUB 1000
100 LET H=2: LET J=0: LET BH=H:
LET SC=0: LET T=0: LET U=0
101 PLOT 0,160: DRAW 255,0: PRI
NT INK 6,AT 0,23,"SCORE":SC,AT
0,2,"HIGH-SCORE"
102 IF L=-3 THEN PRINT AT 0,15,
SCH1
103 IF L=2 THEN PRINT AT 0,15,S
CH2
104 IF L=4 THEN PRINT AT 0,15,S
CH3
110 FOR q=0 TO 31:
120 PRINT INK 6,AT H,q,"█": BE
EP .0006,(H+6)*2
140 IF INKEY$="Z" OR INKEY$="z"
AND w=0 THEN LET t=1: LET w=q
141 IF t=1 THEN PRINT INK 7,AT
bh,w,"█": BEEP .0006,50: LET BH=
BH+1
142 IF ATTR (bh,w)=1 OR ATTR (b
h,w)=40 THEN PRINT PAPER 2, INK
6, FLASH 1,AT bh,w-1,"█":AT bh+
1,w-1,"█":PRINT INK 0: PAPER 0
,AT bh-1,w,"█": FLASH 0: PRINT I
NK 2,AT 21,U-1,"█": BEEP .01,0:
LET bh=h: LET t=0: LET w=0: LET
SC=SC+5
143 PRINT INK 6,AT 0,29,SC
144 IF bh>20 THEN PRINT INK 0,A
T bh-1,w,"█": BEEP .01,0: LET bh
=h: LET t=0: LET w=0
145 IF ATTR (H,q+2)=40 OR ATTR
(h,q+2)=1 THEN FOR i=1 TO 7: INK
i: FOR j=0 TO 21: BEEP .01,j: P
RINT AT j,0: OVER 1,TAB 31: NEXT
j: NEXT i: CLS: GO TO 4000
146 PRINT AT H,0,"█":PRINT AT
BH-1,U,"█":PRINT AT BH,U,"█"
147 IF ATTR (bh+2,w)=2 THEN PRI
NT INK 0,AT bh,w,"█"
148 IF H=20 AND 0=15 THEN GO TO
4500
149 IF INKEY$="K" AND J=0 AND H
>3 THEN LET h=h-1: PRINT AT h,q:
"█": LET J=J+1
150 NEXT 0
160 LET H=H+1
170 GO TO 110
999 STOP
1000>REM CITY
1010 FOR N=2 TO 31 STEP 2: LET S
=INT (RND*8+10+L): FOR Z=20 TO S
STEP -1: PRINT INK 0: PAPER 5,A
T Z,N:"█":AT Z,N+1,"█":PRINT IN

```



```

K 1; AT 5-1, n; "▲": NEXT Z: NEXT
N: FOR Z=0 TO 31: PRINT INK 2; AT
21, Z; "■": NEXT Z
1015 INK 7
1020 RETURN
1100 PAPER 0: INK 4: BORDER 0: C
L5: LET D=2: LET AL=6: LET A$="
TODAYS GREATEST"
1110 FOR A=1 TO LEN A$
1120 PRINT AT D, AL+A; A$(A TO A)
1125 BEEP .01, 30
1130 NEXT A
1135 IF LEN A$=10 THEN GO TO 115
0
1136 IF LEN A$=11 THEN GO TO 116
0
1137 IF LEN A$=12 THEN GO TO 117
0
1140 LET D=5: LET AL=0: LET A$="
LEVEL(1)...": GO TO 1110
1150 LET D=7: LET AL=0: LET A$="
LEVEL(2)...": GO TO 1110
1160 LET D=9: LET AL=0: LET A$="
LEVEL(3)...": GO TO 1110
1170 PRINT AT 5, 11; Q$(1); " "; SCH
1
1172 PRINT AT 7, 12; Q$(2); " "; SCH
2
1173 PRINT AT 9, 13; Q$(3); " "; SCH
3
1174 PLOT 0, 75: DRAW 255, 0
1175 LET D=13: LET AL=3: LET A$="
CONTROLES:-"
1176 FOR A=1 TO LEN A$
1177 PRINT AT D, AL+A; A$(A TO A)
1178 BEEP .01, 30
1179 NEXT A
1180 IF LEN A$=9 THEN GO TO 1183
1181 IF LEN A$=18 THEN GO TO 118
5
1182 LET D=15: LET AL=7: LET A$="
Z...FIRE": GO TO 1176
1183 LET D=17: LET AL=7: LET A$="
K...UP(ONCE ONLY)": GO TO 1176
1188 PRINT FLASH 1; INK 6; AT 20,
9; "PRESS ANY KEY"
1189 PAUSE 0: RETURN
1200 FOR Z=1 TO 3: DIM Q$(Z, 13):
NEXT Z
1210 LET Q$(1) = " "
1220 LET Q$(2) = " "
1230 LET Q$(3) = " "
1240 LET SCH1=0: LET SCH2=0: LET
SCH3=0
1250 RETURN
1499 STOP
1500 RESTORE 1500: FOR Z=0 TO 7:
READ A: POKE USR "A"+Z, A: NEXT
Z: DATA 0, 126, 126, 126, 126, 126, 12
6, 0
1510 RESTORE 1510: FOR Z=0 TO 7:
READ A: POKE USR "B"+Z, A: NEXT
Z: DATA 128+64+32+1+2+4, 128+64+7
255, 255-128, 63, 3, 3, 0
1520 RESTORE 1520: FOR Z=0 TO 7:
READ A: POKE USR "C"+Z, A: NEXT
Z: DATA 0, 128, 152, 254, 255, 254, 12
6, 0
1530 RESTORE 1530: FOR Z=0 TO 7:
READ A: POKE USR "D"+Z, A: NEXT
Z: DATA 195, 126, 126, 90, 126, 126, 6
0, 24
1545 RESTORE 1550
1550 FOR Z=0 TO 7: READ a: POKE
USR "e"+Z, a: NEXT Z: DATA 1, 3, 7,
15, 31, 63, 127, 255
1560 FOR Z=0 TO 7: READ a: POKE
USR "f"+Z, a: NEXT Z: DATA 128, 19

```

```

2, 224, 240, 248, 252, 254, 255
1570 RESTORE 1580
1580 FOR Z=0 TO 7: LET D=INT (RN
D*255+1): READ a: POKE USR "G"+Z
a: NEXT Z: DATA D, D, D, D, D, D, D, D
2040 RETURN
3500: PAPER 0: INK 6: BORDER 0:
CLS
3510 PRINT FLASH 1; AT 19, 10; "LEV
EL (1/3)": FLASH 0
3515 INK 2: FOR A=0 TO 31: BEEP
.005, a: PRINT AT 0, A; "■": AT 21, A
.005, a: NEXT A: FOR A=21 TO 1 STEP
-1: BEEP .005, a: PRINT AT A, 0; "
■": AT A, 31; "■": NEXT A
3520 INK 6: PRINT AT 4, 2; "3.....
(EASY)": AT 6, 2; "2.....(QUITE H
ARD)": AT 8, 2; "1.....(VERY HARD)
": AT 15, 2; "M.WILLIAMS SOFTWARE
LTD."
3525 FOR A=7 TO 12: PRINT PAPER
2; INK 0; PAPER 5; AT A, 27; "■":
NEXT A: PRINT INK 1; AT 6, 27; "▲"
; INK 0; PAPER 5; AT 12, 25; "■": A
T 11, 25; "■": PAPER 0; INK 1; AT
10, 25; "▲"
3530 IF INKEY$="3" OR INKEY$="1"
THEN GO TO 3530
3540 PAUSE 0: IF INKEY$="1" THEN
LET L=-3: LET LE=1
3550 IF INKEY$="2" THEN LET L=2:
LET LE=2
3560 IF INKEY$="3" THEN LET L=4:
LET LE=3
3570 RETURN
4010 PRINT FLASH 1; AT 10, 3; "YOU
NUT YOU COST US A PLANE"
4020 FOR Z=0 TO 50: BEEP .01, INT
(RND*30)-20: NEXT Z
4041 IF LE=1 AND SC=5CH1 THEN L
ET SCH1=SC: PRINT AT 15, 1; "HIGH
SCORE INPUT NAME.MAX 13": INPUT
Q$(1)
4042 IF LE=2 AND SC=5CH2 THEN L
ET SCH2=SC: PRINT AT 15, 1; "HIGH
SCORE INPUT NAME.MAX 13": INPUT
Q$(2)
4043 IF LE=3 AND SC=5CH3 THEN L
ET SCH3=SC: PRINT AT 15, 1; "HIGH
SCORE INPUT NAME.MAX 13": INPUT
Q$(3)
4045 PRINT FLASH 1; AT 20, 8; "ANOT
HER GO (Y/N) ?"
4050 PAUSE 0
4060 IF INKEY$="Y" OR INKEY$="y"
THEN GO TO 15
4499 STOP
4500 BORDER 0: PAPER 1: INK 7: C
L5
4510 PRINT FLASH 1; AT 10, 7; "WELL
DONE YOU HAVE": AT 11, 4; "COMPLEA
TED YOUR MISSION"
4520 FOR A=0 TO 60: BEEP .01, AND
+30: NEXT A
4522 IF LE=1 AND SC=5CH1 THEN L
ET SCH1=SC: PRINT AT 15, 1; "HIGH
SCORE INPUT NAME.MAX 13": INPUT
Q$(1)
4524 IF LE=2 AND SC=5CH2 THEN L
ET SCH2=SC: PRINT AT 15, 1; "HIGH
SCORE INPUT NAME.MAX 13": INPUT
Q$(2)
4526 IF LE=3 AND SC=5CH3 THEN L
ET SCH3=SC: PRINT AT 15, 1; "HIGH
SCORE INPUT NAME.MAX 13": INPUT
Q$(3)
4530 PRINT PAPER 1; FLASH 1; AT 2
0, 6; "ANOTHER GO (Y/N) ?"
4540 PAUSE 0
4550 IF INKEY$="Y" OR INKEY$="y"
THEN GO TO 15
4560 STOP

```

```

2 FAST
5 LET P=PI/PI
10 LET S=P
20 IF P>PI/PI THEN LET S=VAL "
2"
30 FOR N=PI-PI TO VAL "63"
40 LET Z=PI-PI
50 FOR M=PI/PI TO P STEP S
60 LET Y=VAL "60/(M*PI)*SIN (N
*M*PI/18)"
70 LET Z=Z+Y
80 NEXT M
90 PLOT N,VAL "22"+Z
100 NEXT N
105 PRINT "1 TO ";P
110 PAUSE VAL "100"
115 CLS
120 LET P=P+VAL "2"
130~GOTO VAL "20"

```

THE FOURIER SERIES

A WELL KNOWN result from the **Fourier Series** is that a square waveform can be constructed from the infinite sum of the odd harmonics of sine waves. The Fourier program illustrates this formation as each term is added and also prints-out the range of the summation.

The program, written by Clive Bannister of Wittersham, Kent will run on a 2K ZX-81.

GRAND PRIX is a dodgems game on traditional arcade lines. Your car, an inverse X, is displayed at the top of the screen and a roadway is scrolled up towards you. Steer the car with keys 1 and 0 and do your best to avoid crashing for as many laps as possible.

Two interesting features are a difficulty level and a progressively more crowded road. If the difficulty level 5 is selected, you will be able to see several lines ahead — very useful for planning your manoeuvres. Lower numbers reveal less of the road. In addition, as you speed down the track, the number of other cars increases.

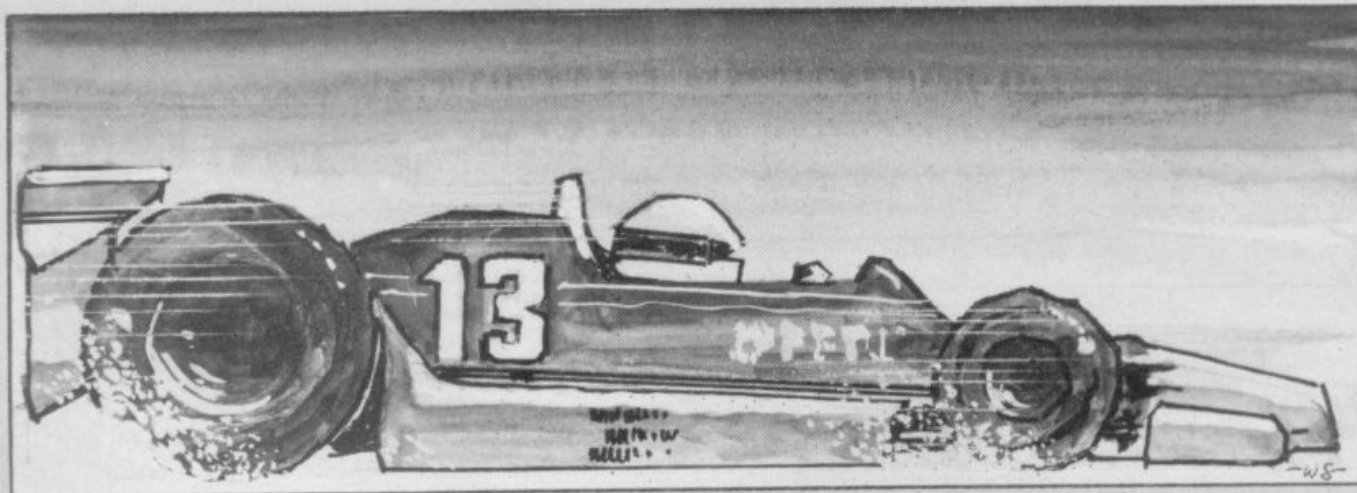
Lower case letters in the listing signify inverse video (1K ZX81).

GRAND PRIX

```

Q 10 PRINT "LEVEL 1-5?"
20 INPUT N
30 LET N=N*2
40 LET V=0
50 LET Z=15
60 PRINT AT 0,Z;
70 IF PEEK (PEEK 16398+256*PEE
K 16399)=187 THEN GOTO 200
80 PRINT "x"
90 LET A$="(eight inverse SPAC
Es)"
100 FOR G=1 TO INT (V/100)+1
110 LET P=INT (RND*8)+1
120 LET A$(P)="v"
130 NEXT G
140 PRINT AT N,10;A$
150 LET Z=Z+(INKEY$="0")-(INKEY
$="1")
160 IF Z>17 OR Z<10 THEN GOTO 2
00
170 SCROLL
180 LET V=V+1
190~GOTO 60
200 PRINT AT 1,Z-2;"crash";AT 2
0,1;"YOU COMPLETED ";INT (V/4);"
LAPS"

```



DAM BLUSTER

Line 2000, graphic D.

-WS-



PONTOON

BLACKJACK, Twenty-One, Chemin de fer. Call it what you will, we have an excellent listing for it. The display features a green baize table, the four suits in appropriate colours, and a neat pattern on the back of the cards.

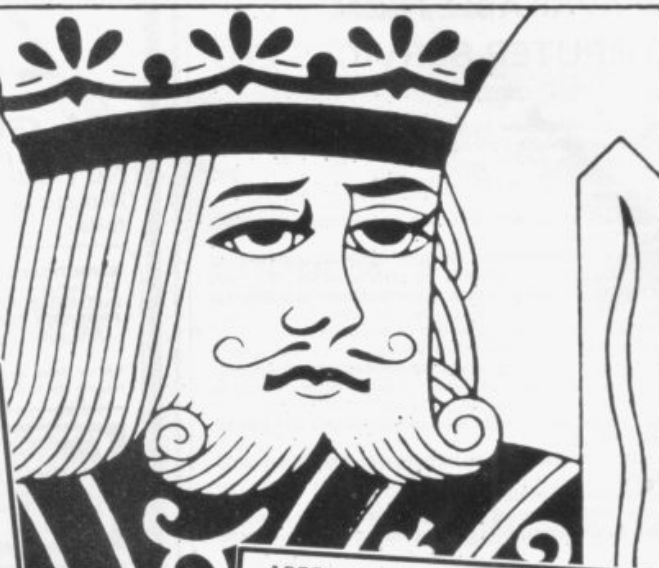
The program has an error-trapping function and tells you whether have bust or won. You start with a stake of £1,000 and the chance to break the bank. Thanks to K Hart of Wakefield for a definitive listing. (48K Spectrum).

```
10 BORDER 4: PAPER 7: INK 0
20 CLS
30 LET Z=0
40 PAPER 7
50 PRINT AT 1,11;"PONTON"
60 PRINT AT 2,11;" "
70 LET X=1
80 PRINT "The card values ar
90 PRINT " "A" = 1 or 11
100 PRINT " "A" = 1 or 11
110 PRINT " "
120 PRINT "The computer will a
130 PRINT "the best value."
140 PRINT " "10" " "J" " "Q" "
150 PRINT " "K" are value 10"
160 PRINT "All other cards = 1
170 PRINT "
180 PRINT "
190 IF PEEK (USR "a"+3)<0 THEN
200 SUB 2260
210 PRINT TO CONTINUE!!
220 PRINT TO CONTINUE!!
230 PRINT TO CONTINUE!!
240 PRINT TO CONTINUE!!
250 PRINT TO CONTINUE!!
260 PRINT TO CONTINUE!!
270 PRINT TO CONTINUE!!
280 PRINT TO CONTINUE!!
290 PRINT TO CONTINUE!!
300 PRINT TO CONTINUE!!
310 PRINT TO CONTINUE!!
320 PRINT TO CONTINUE!!
330 PRINT TO CONTINUE!!
340 PRINT TO CONTINUE!!
350 PRINT TO CONTINUE!!
360 PRINT TO CONTINUE!!
370 PRINT TO CONTINUE!!
380 PRINT TO CONTINUE!!
390 PRINT TO CONTINUE!!
400 PRINT TO CONTINUE!!
410 PRINT TO CONTINUE!!
420 PRINT TO CONTINUE!!
430 PRINT TO CONTINUE!!
440 PRINT TO CONTINUE!!
450 PRINT TO CONTINUE!!
460 PRINT TO CONTINUE!!
470 PRINT TO CONTINUE!!
480 PRINT TO CONTINUE!!
490 PRINT TO CONTINUE!!
500 PRINT TO CONTINUE!!
510 PRINT TO CONTINUE!!
520 PRINT TO CONTINUE!!
530 PRINT TO CONTINUE!!
540 PRINT TO CONTINUE!!
550 PRINT TO CONTINUE!!
560 PRINT TO CONTINUE!!
570 PRINT TO CONTINUE!!
580 PRINT TO CONTINUE!!
590 PRINT TO CONTINUE!!
600 PRINT TO CONTINUE!!
610 PRINT TO CONTINUE!!
620 PRINT TO CONTINUE!!
630 PRINT TO CONTINUE!!
640 PRINT TO CONTINUE!!
650 PRINT TO CONTINUE!!
660 PRINT TO CONTINUE!!
670 PRINT TO CONTINUE!!
680 PRINT TO CONTINUE!!
690 PRINT TO CONTINUE!!
700 PRINT TO CONTINUE!!
710 PRINT TO CONTINUE!!
720 PRINT TO CONTINUE!!
730 PRINT TO CONTINUE!!
740 PRINT TO CONTINUE!!
750 PRINT TO CONTINUE!!
760 PRINT TO CONTINUE!!
770 PRINT TO CONTINUE!!
780 PRINT TO CONTINUE!!
790 PRINT TO CONTINUE!!
800 PRINT TO CONTINUE!!
810 PRINT TO CONTINUE!!
820 PRINT TO CONTINUE!!
830 PRINT TO CONTINUE!!
840 PRINT TO CONTINUE!!
850 PRINT TO CONTINUE!!
860 PRINT TO CONTINUE!!
870 PRINT TO CONTINUE!!
880 PRINT TO CONTINUE!!
890 PRINT TO CONTINUE!!
900 PRINT TO CONTINUE!!
910 PRINT TO CONTINUE!!
920 PRINT TO CONTINUE!!
930 PRINT TO CONTINUE!!
940 PRINT TO CONTINUE!!
950 PRINT TO CONTINUE!!
960 PRINT TO CONTINUE!!
970 PRINT TO CONTINUE!!
980 PRINT TO CONTINUE!!
990 PRINT TO CONTINUE!!
1000 PRINT TO CONTINUE!!
1010 PRINT TO CONTINUE!!
1020 PRINT TO CONTINUE!!
1030 PRINT TO CONTINUE!!
1040 PRINT TO CONTINUE!!
1050 PRINT TO CONTINUE!!
1060 PRINT TO CONTINUE!!
1070 PRINT TO CONTINUE!!
1080 PRINT TO CONTINUE!!
1090 PRINT TO CONTINUE!!
1100 PRINT TO CONTINUE!!
1110 PRINT TO CONTINUE!!
1120 PRINT TO CONTINUE!!
1130 PRINT TO CONTINUE!!
1140 PRINT TO CONTINUE!!
1150 PRINT TO CONTINUE!!
1160 PRINT TO CONTINUE!!
1170 PRINT TO CONTINUE!!
1180 PRINT TO CONTINUE!!
1190 PRINT TO CONTINUE!!
1200 PRINT TO CONTINUE!!
```



```
640 INK VAL a$(c,5)
650 PRINT AT v+1,h+1;f$;AT v+7,
660 PRINT AT v+2,h+1;a$(c,3);AT
670 IF f=55 OR f=56 OR f=57 OR
680 IF f=52 OR f=53 OR f=54 TH
690 IF f=151 OR f=50 OR f=51 TH
700 IF f=56 OR f=57 OR f=58 OR
710 IF f=55 THEN PRINT AT v+3,h+
720 IF f=55 OR f=51 OR f=53 OR
730 IF f=55 THEN PRINT AT v+3,h
740 IF f=74 THEN PRINT AT v+3,h
750 IF f=81 THEN PRINT AT v+3,h
760 IF f=75 THEN PRINT AT v+3,h
770 PAPER 4: INK 0
780 RETURN
790 CLS
800 PRINT AT 10,10; PAPER 7; FL
810 FOR C=53 TO 2 STEP -1
820 BEEP .01,C
830 LET a=(52-(RND*8))+1
840 LET a$(c)=a$(a): LET a$(a)=
850 NEXT C
860 FOR C=2 TO 53
870 BEEP .02,C
880 LET a$(c-1)=a$(c)
890 NEXT C
900 LET C=1
910 PRINT AT 10,10;" "
920 RETURN
930 IF C>40 THEN GO SUB 790
940 LET Z=0: LET d=0: LET da=0:
950 PAPER 4: LET pa=0
960 PRINT AT 0,1;f$;AT 12,1;p$
970 LET l=a$(c)
980 LET v=1: LET h=1
990 GO SUB 570
1000 LET Z=0
1010 LET d=VAL a$(c,1 TO 2)
1020 IF VAL a$(c,1 TO 2)=11 THEN
1030 LET C=C+1
1040 LET V=13
1050 GO SUB 570
1060 LET P=P+VAL a$(c,1 TO 2)
1070 IF VAL a$(c,1 TO 2)=11 THEN
1080 LET C=C+1
1090 PRINT AT 14,8;"Your stake i
1100 PRINT AT 16,8;"Please enter
1110 INPUT b$: IF b$="" THEN GO
1120 PRINT AT 14,8;"
1130 FOR i=1 TO LEN b$
1140 IF CODE b$(i)=46 THEN GO TO
1150 IF CODE b$(i)<48 OR CODE b$
1160 NEXT i
1170 LET bet=VAL b$
1180 IF bet<=st THEN GO TO 1250
1190 PRINT AT 14,8;"You cannot b
1200 BEEP .8,-10: BEEP .3,-30
```





```
1210 PRINT AT 14,8;"
      AT 16,8;"
```

```
1220 GO TO 1090
1230 PRINT AT 14,8;"Whole pounds
only"; AT 16,12;"PLEASE!!!"
1240 GO TO 1200
1250 PRINT AT 11,11;"You have be
t"; bet
1260 LET v=1: LET h=3
1270 GO SUB 570
1280 LET d=d+VAL a$(c,1 TO 2)
1290 IF VAL a$(c,1 TO 2)=11 THEN
LET da=da+1
1300 IF da=2 THEN LET d=12: LET
da=1
1310 LET c=c+1
1320 LET v=13
1330 GO SUB 570
1340 LET p=p+VAL a$(c,1 TO 2)=11 THEN
1350 IF VAL a$(c,1 TO 2)=11 THEN
LET pa=pa+1
1360 IF pa=2 THEN LET p=12: LET
pa=1
1370 LET c=c+1: LET dc=2
1380 LET pc=2
1390 LET h=h+2
1400 IF p=21 AND pc=2 THEN GO TO
1610
1410 PRINT AT 14,h+7; PAPER 7; F
LASH 1;"Another card"; AT 15,h+9;
(Y or N)"
1420 LET c$=INKEY$
1430 IF NOT (c$="Y" OR c$="N") OR
c$="N" OR c$="n") THEN GO TO 14
20
1440 IF INKEY$="" THEN GO TO 14
20
1450 PRINT AT 14,h+7;"
      AT 15,h+9;"
1460 IF c$="N" OR c$="n" THEN GO
TO 1610
1470 LET pc=pc+1
1480 GO SUB 570
1490 LET p=p+VAL a$(c,1 TO 2)=11 THEN
1500 IF VAL a$(c,1 TO 2)=11 THEN
LET pa=pa+1
1510 LET c=c+1
1520 IF p=22 OR pa=0 THEN GO TO
1560
1530 LET pa=pa-1
1540 LET p=p-10
1550 GO TO 1520
1560 IF p=21 THEN GO TO 1580
1570 GO TO 1390
1580 PRINT AT 16,h+6; PAPER 7; F
LASH 1;"BUST"
1590 LET p=0
1600 GO TO 1640
1610 PRINT AT 14,h+7; PAPER 7;"S
land on "; FLASH 1;P
1620 IF p=5 THEN PRINT AT 15,h
+7; PAPER 7; FLASH 1;"BUST"
1630 IF p=21 AND pc=2 THEN PRINT
AT 15,h+6; PAPER 7; FLASH 1;"
1640 PAPER 7; FOR i=1 TO 9: PRIN
T AT i,1;"NEXT 1
1650 PRINT AT 3,2; INK VAL i$(5)
i$(3); AT 2,2; i$(4)
1660 IF p=0 THEN GO TO 1850
1670 IF p=21 AND pc=2 THEN GO TO
1850
1680 LET v=1: LET h=3
1690 LET h=h+2
1700 IF d=22 OR da=0 THEN GO TO
1740
1710 LET da=da-1
1720 LET d=d-10
1730 GO TO 1700
1740 IF dc=5 AND d>11 THEN GO T
O 1850
1750 IF d>=17 THEN GO TO 1850
1760 PAUSE 50
1770 PAUSE 1+50*(dc=2)
1780 PAPER 7
1790 GO SUB 570
```

```
1800 LET d=d+VAL a$(c,1 TO 2)
1810 IF VAL a$(c,1 TO 2)=11 THEN
LET da=da+1
1820 LET c=c+1
1830 LET dc=dc+1
1840 GO TO 1690
1850 IF d>21 THEN LET d=0
1860 PAPER 7: INK 0
1870 LET h=dc*2
1880 PRINT AT 5,h+7;"Dealer has"
1890 PRINT AT 5,h+(11-(d=0));
1900 IF d=0 THEN PRINT ; FLASH 1
"BUST"
1910 IF d>0 THEN PRINT ; FLASH 1
1920 IF d=0 THEN LET dc=3
1930 IF p=0 THEN LET pc=3
1940 IF d=21 AND dc=2 THEN LET p
=0
1950 IF pc=2 AND p=21 THEN LET d
=0
1960 IF dc=5 AND d>0 AND pc<5 T
HEN LET p=0
1970 IF pc=5 AND p>0 AND dc<5 T
HEN LET d=0
1980 IF pc=5 AND dc=5 AND d>=p
THEN LET p=0
1990 IF d>=p THEN PRINT AT 0,9;
FLASH 1;"UINS": BEEP 1,-10: BEEP
3,-20
2000 IF p>d THEN PRINT AT 12,9;
FLASH 1;"UINS": FOR f=0 TO 30: B
EEP .01,f: BEEP .01,f+10: NEXT f
2010 IF d>=p THEN LET st=st-bet
2020 IF d<p THEN LET st=st+bet
2030 IF pc=5 AND p>0 THEN LET s
t=st+(bet/2)
2040 IF pc=2 AND p=21 THEN LET s
t=st+(bet/2)
2050 LET st=INT st
2060 PAUSE 100
2070 PAPER 4
2080 CLS
2090 IF st>0 THEN GO TO 930
2100 PAPER 7
2110 PRINT AT 8,4;"You have no m
oney left"; AT 10,9;"so you lose"
2120 FOR i=1 TO 50: NEXT i
2130 PRINT AT 12,1;"Press any ke
y for
another game"; AT 14,6;"pre
ss "ENTER" to stop"
2140 LET v=CODE INKEY$
2150 IF v=0 THEN GO TO 2140
2160 PAPER 4
2170 CLS
2180 IF v=13 THEN GO TO 2210
2190 LET st=1000: LET x=x+1
2200 GO TO 930
2210 BORDER 1: PAPER 1: INK 7
2220 CLS
2230 PRINT AT 0,1;"Goodbye, it's
been a pleasure"; AT 10,6;"takin
g your money"
2240 PRINT AT 12,8;"You lost £";
x/1000
2250 BEEP .1,(RND*10): GO TO 225
0
2260 RESTORE
2270 FOR f=USR "a" TO USR "i"+7
2280 READ a
2290 POKE f,a
2300 NEXT f
2310 DATA 0,0,0,0,0,0,0,0
2320 DATA 170,85,170,85,170,85,1
70,85
2330 DATA 0,56,56,16,214,254,214
,16
2340 DATA 0,16,56,124,254,124,56
,16
2350 DATA 170,170,85,85,170,170,
85,85
2360 DATA 0,108,254,254,124,124,
108,16
2370 DATA 0,16,55,124,254,254,21
4,16
2380 DATA 152,164,164,164,164,16
4,164,152
2390 DATA 128,128,128,128,128,12
8,128,128
2400 RETURN
```

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 and the ZX Spectrum.

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).

Guaranteed software available from:

Hilton Computer Services Ltd

14 Avalon Road, Orpington, Kent, BR6 9AX.

Your P.B.S. is never out of date!

SO YOU THINK YOU CAN PLAY GAMES . . .

— but can you take it seriously?

**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.
ESDEVUM 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.**

Ideal Christmas gift for the thinking ZX enthusiast

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 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, Bournemouth, Dorset.

TRADE & EXPORT ENQUIRIES WELCOME

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 Programable 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

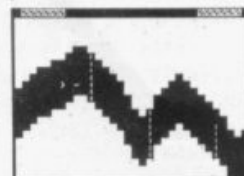
**A TOTALLY NEW AND ORIGINAL GAME
FROM SOFTWARE FARM
FOR 16K ZX81**

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!

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

DESTINED TO BECOME A CLASSIC!

AND ONLY £5.95



THE SOFTWARE FARM

CRAIGO FARM, BOTANY BAY, TINTERN, GWENT



ZX 81 SPECTRUM DRAGON TANDY BBC

16K

16/ 48

32

LEVEL 2

A/ B

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.

FOILKADE LTD

DEPT. PR7
66 LITTLEDEAN
YATE
BRISTOL BS17 4UQ

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

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.

** Buy both Awari and Adventure and enter the 'Foilkade
Challenge' competition. Details with cassette or send SAE.

£1000 IN PRIZES

EDUCATIONAL SOFTWARE ZX81 (16K) & SPECTRUM (48K)

INTERMEDIATE MATHS 1: 6 teach and test programs. Long Multiplication, Long Division, Highest Common Factor, Lowest Common Multiple, Fractions 1 (+ & -), Fractions 2 (\times & \div).

INTERMEDIATE MATHS 2: 6 teach and test programs. Areas, Perimeters, Simple Equations, Percentages, Sets, Venn Diagrams.

INTERMEDIATE ENGLISH 1: Meanings 1, Meanings 2 (harder), Parts of Speech, Proverbs, Similes, Anagrams.

INTERMEDIATE ENGLISH 2: Idioms, Opposites 1, Opposites 2 (harder), Group Terms, Odd Word Out, Spellings.

* **"O" LEVEL FRENCH REVISION:** 3 teach and test Grammar programs, plus 3 comprehensive Vocabulary programs.

* **"O" LEVEL MATHS REVISION:** 1 teach and test program, plus 2 programs using generated questions from the "O" level syllabus.

ARITHMETIC FOR THE UNDER 8's: Add, Subtract, Multiply and Divide. Numbers are in large size type. 3 levels. Enter the answer with units first.

* **EDUCATIONAL QUIZ:** 4 programs for the family. Questions on General Knowledge, Reasoning, English and Maths. All questions use RND function.

Mark your order ZX81 or Spectrum. Cassettes marked * are not yet available for the Spectrum.

£4.50 per cassette, or send s.a.e. for catalogue to:-
ROSE CASSETTES, 148 Widney Lane, Solihull, West Midlands B91 3LH

Our Software has received good reviews in "Sinclair User", "Your Computer" and "Educational Computing" and is included in the MUSE Library of Educational Software.

NOW

AT 5 ST. PETERS LANE, LEICESTER

Tel: 0533 29023

£4.75

(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.

JOIN THE USERS' CLUB

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 20 programs (10 for the ZX81, 10 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. SC
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 ways of programming at the limits of memory

Taking the modular approach to storing information



Andrew Hewson.

THIS MONTH I answer some questions concerned with the storage of data on ZX computers. The word data means information of any kind which the user might wish to store, for example, names and addresses of friends, details of a bank account, extracts from a train time-table or a diary of events.

It is important to realise that much more memory is required to store and manipulate data than for other computing tasks. That is

Print all or part of the data on request.

Sort the data alphabetically or numerically.

SAVE, VERIFY and LOAD the data.

More modules could be added if required. Memory is also required to store the data and I explain how the user can calculate how much he requires. It is obvious that it is worth using a computer only if the amount of data to be stored exceeds that which can conveniently be noted

The machine sets the contents of 23733 to 255 — or 127 on the 16K Spectrum — when it is plugged-in and the line above performs a simple calculation and PRINTs 16K or 48K as appropriate.

At any particular time a user may run out of memory. Michael Fawcett has a problem with his ZX-81 in that regard. He writes: **When I get near to the end of entering a particular program the cursor disappears and whenever a key is pressed subsequently, a letter disappears. What is wrong?**

Many ZX-81 users will recognise in Fawcett's remarks that he is running out of memory. The only guaranteed solution is to buy an add-on RAM pack, although a certain amount of space can be saved by deleting REM statements and shortening PRINT statements. The Spectrum, incidentally, emits a low-pitched buzz when memory is short.

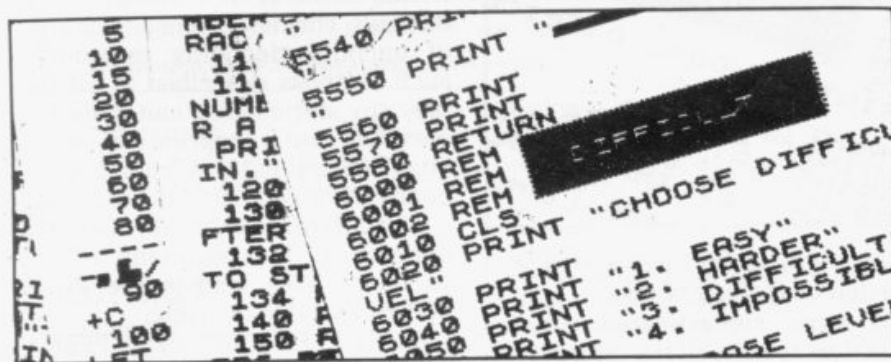
A check on the amount of memory left can be made at any time by entering the following REM at line 1:

1 REM RESERVE SOME SPACE
and POKEing the following numbers:

33, 0, 0, 57, 237, 91, 28, 64,
167, 237, 82, 68, 77, 201
into locations 16514, 16515
16527 (on the ZX-81).

The equivalent locations on the Spectrum are 23760, 23761 23773 and the numbers to be POKED are the same except that 101, 92 should be substituted for 28, 64. In each case a short machine code routine is loaded into the space

continued on page 66



partly because suitable programs tend to be lengthy, as many tasks are involved. It is a good idea to break such programs into so-called modules, where each module executes a particular task. A program, for example, might consist of modules to:

Declare the nature of the data to be stored and define the amount of memory to be allocated to each item.

Read the data from the keyboard.

Display the data in a logical fashion so that the user may check that it has been entered correctly.

Correct erroneous values.

using more conventional systems, so it is safe to assume that the memory requirement will be substantial.

The first question is from Henry Evanson, of Bromborough. He has just obtained a 48K Spectrum and writes: **I now wish to to use 48K software packs but the first I purchased will not load. How can I check that I have received a 48K Spectrum and not a 16K machine by mistake?**

The answer is to check the high byte P-RAMT pointer at address 23733 by entering:

PRINT INT (PEEK 23733/4)-15; "K"



continued from page 65

reserved in the REM statement and then the amount of memory left can be PRINTed by entering:

```
PRINT USR 16514 - 24; "BYTES"
or in the case of the Spectrum:
PRINT USR 23760 - 24; "BYTES"
```

Norman Disley of Cheshire has a collection of about 50 music cassettes which he wishes to catalogue on a Spectrum. He writes: **Each tune would require six or more entries — title name, soloist, and as each cassette contains about 30 titles the collection would use almost all of the 9999 lines of the Spectrum, leaving little room for later insertions. What can I do?**

Several people have written outlining the same idea of using the 9999 program lines available to store up to 9999 items of information. The technique has the merit of simplicity in use but there is no

would need to declare a string array:

```
Z$ (50, 30, 6, 10)
```

This would occupy

```
4 + 2 * 4 + 50 * 30 * 6 * 10 = 90012
bytes.
```

There are about 10,000 bytes available to the user in the 16K Spectrum and about 42,000 bytes in the 48K machine. Clearly Disley will not be able to hold all the data in the machine at the same time in that manner. The problem would still arise even if he were to use program lines, as each character in the line occupies one byte and there is an overhead of six bytes per line.

Space could be saved by using fewer than 10 characters per entry, perhaps by using abbreviations. Alternatively, the six entries per tune of 10 characters each — 60 characters in all — could be combined into a single entry of, say, 30



possibility of writing a program to search, sort or PRINT the information.

The conventional technique is to store the information in a numeric or string array. The length of a numeric array is $4 + 2 * \text{number of dimensions} + 5 * \text{total number of elements}$.

Thus, for example, the two-dimensional array N(2, 5) which contains 10 elements occupies $4 + 2 * 2 + 5 * 10 = 58$ bytes.

A string array occupies $4 + 2 * \text{number of dimensions} + \text{total number of elements}$ and so Z\$(2, 5) uses $4 + 2 * 2 + 10 = 18$ bytes.

Disley wishes to store string data and so allowing 10 characters per entry, six entries per tune, 30 tunes per cassette and 50 cassettes, he

characters so that less space was wasted on trailing blanks.

A more sophisticated solution would be to hold all the information in one long string array and to use a second, numeric, array to point to the location in the string array at which each entry began. The slicing technique described in ZX Spectrum Basic Programming could then be used to select a given entry. The following program demonstrates the method:

```
10 DIM P(101); REM DECLARE
  POINTER ARRAY
20 LET PZ = 1
30 DIM Z$ (1000); REM DECLARE
  STRING ARRAY
40 INPUT "ENTER DATA"; A$
50 IF P(PZ) + LEN A$ > 1000 GOTO
  100
```



```
60 LET P(PZ + 1) = P(PZ + LEN A$)
70 LET Z$ (TO P(PZ + 1)) = Z$
  (TO P(PZ)) + A$
80 LET PZ = PZ + 1
90 IF PZ < 102 THEN GOTO 40
```

Finally, Robert Redrup asks: **I want to store sensitive information. How can I prevent unauthorised access?**

Ultimately there is no way to prevent the determined intruder from reading your cassettes into a suitable computer and then PEEKing at memory to determine what is there. There are two simple tricks, however, to make life more difficult. The first is to use some kind of encoding/decoding technique, such as those described in all the best spy stories. You can build the encoding into a program but omit a vital line and enter it from the keyboard before you RUN the program.

An alternative is to find the address of the beginning of the variables area held in the VARS system variable by using:

```
PRINT PEEK 23627 + 256 * PEEK
  23628
```

on the Spectrum, or

```
PRINT PEEK 16400 + 256 * PEEK
  16401
```

on the ZX-81. Then PEEK at the first few bytes of the area, jot down their content and then POKE in some random numbers instead. You will find that you can SAVE and LOAD as usual but your program will not work unless you POKE the correct numbers back into place. If you RUN the program it will work but all the variables will have been deleted.

● Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.

67

★★ 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 2 or 4 kilobyte CMOS memory unit with Lithium battery backup. Program/data storage up to 10 yrs. Instant retrieval. Basic/M.C. £24.95 + VAT £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



Camel Electronics Ltd, One Milton Rd, Cambridge CB4 1UY Tel (0223) 314814

PIMANIA

THE ADVENTURE GAME THAT'S FOR REAL !!!!

£6,000 PRIZE! FREE HIT SINGLE! 48K ZX SPECTRUM (16K ZX81 VERSION NOW AVAILABLE)

Will you be the first to locate the Golden Sundial of Pim time and space, and be rewarded with the original? Exclusively crafted by the winner of the De Beers Diamond International Award, from gold, diamond and the most precious of the earth's riches.

PIMANIA where saxophones turn into hangliders, where music meets madness, and where the Pi Man rules supreme! He'll talk with you, he'll befriend you, he'll betray you, he'll even do the Hokey Kokey! Animated cartoon graphics! Full musical score! Spectacular colour and sound effects! Includes free hit single "Pimania", with vocals by Clair Sinclair and the Pi Men!

It could take you a week to play, it could take you a lifetime! **PIMANIA**, "the best evidence that computer gaming has come of age" - an adventure enthusiast's dream! (Computer & Video Games)

An investment at £10 (48K Spectrum) £8 (16K ZX81)

Automata Ltd. (S)
65a Osborne Road
Portsmouth PO5 3LR
England

ZX SPECTRUM HARDWARE

24 line programmable Input/Output Port

This new port has been designed exclusively for the ZX Spectrum and utilises MOS technology to minimise bus loading. The main features are:

- 3 x 8 bit ports
- Port mapped using IN and OUT commands
- 3 basic modes of operation
- Direct Bit Set/Reset capability
- Outputs capable of sourcing 1mA at 1.5 volts
- Access via 3 x 16 pin DIL sockets and 28 way edge connector

The port is available fully built together with a set of detailed instructions and suggested control applications. The port can either be used with our new Motherboard thus allowing a further card to be used, or with a stackable connector. Either way, it means that Micro-Drives, Printers etc. will run happily with the port.

- ZX Spectrum PPI Port £16.50
- ZX 2 Slot Motherboard £16.95
- ZX Stackable Connector £5.50

The prices are inclusive of VAT but postage must be added at 70 pence for a single item (100 pence for 2 or more items).

Please note that we shall continue to support the ZX81 and that we also offer a 16 bit port for the 81 based on a Z80A PIO at £15.50 inc.

PRICE BREAKTHROUGH!

Spectrum Joystick complete with its own purpose built interface which simply plugs into the back of the Spectrum for only £19.50 inc. VAT.

Supplied with sample software and a full set of instructions for use in your own basic programs. At last you can play the arcade type games without fumbling for keys.

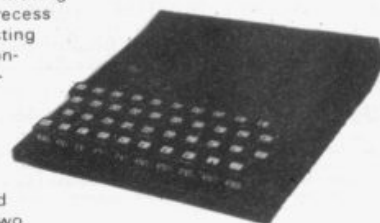
KEMPSTON ELECTRONICS

180A Bedford Road, Kempston, Bedford MK42 8BL
Tel: 0234 852997.

ZX81 Klik-Keyboard

This is a full, forty key, moving keyboard which fits into the recess left after peeling off the existing 'touch-sensitive' keypad. Consider the following advantages:

- Positive feedback from keys
- Fits onto the ZX81
- No trailing wires
- No special case needed
- Elegant design with two colour legends



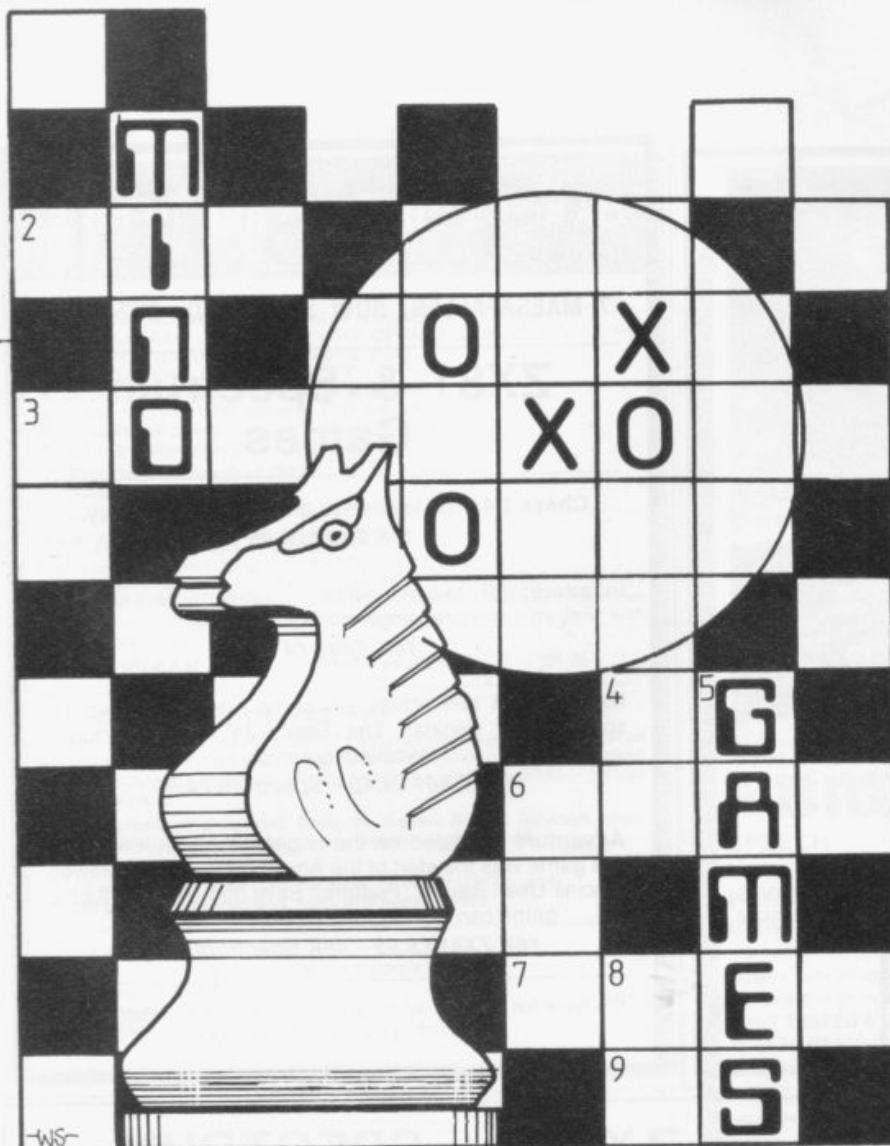
The fully built keyboard requires *absolutely no soldering* since two flexible connectors plug into the ZX81 sockets. Other ZX81 products available include a two-tone keyboard bleeper (fits inside the case) at £8.95 built and a Repeat key kit at £3.95. Now available with 41 keys, the extra key can be used to give a repeat or reset facility £26.50 (built) £23.00 (kit).

Your Name and Address _____

			Date
Quantity	Description	Unit Price	Amount
	ZX81 Keyboard Assembled	£26.00	
	ZX81 User I/O Port	£15.50	
	ZX Spectrum PPI Port	£16.50	
	ZX 2 Slot Motherboard	£16.95	
	ZX Stackable Connector	£5.50	
			Sub total
			Carriage 70
			Total due

Cheques/P.O. made payable to
KEMPSTON ELECTRONICS
Please allow 21 days for delivery

SA



Philip Joy looks at an adventure game

Grave difficulties

FOLLOWING my comments about adventure games in the last issue I have received a game called **Cheops Tomb**. It is available from Algor, Dovercourt, St. James Road, Northampton and the company claims it is probably the best adventure game on the market.

While allowing for the natural over-enthusiasm of the producer, I found that it was one of the best adventure games I have seen for the ZX-81. It is interesting and well-presented with excellent screen display and has an addictive quality about it.

The instructions are unusually well done and very clear but the game is complicated.

The idea is to try to find your way out of the tomb, which consists of a 16 by 5 maze of rooms. The maze includes treasures, weapons, gods, monsters, passageways and locked

doors, for which keys must be found.

The player might be called on to fight a monster with varying amounts of strength. You are also able to cast spells of varying degree of effect, from sleep to death. The goal is to try to find the great key to let you out of the tomb.

The animals and gods will do their best to stop you in any way possible. Gods can appear from nowhere and kill you, without warning; that can ruin the game, as you have no chance to fight. One other point is that you have to enter the whole command, which can be as much as 20 words; therefore some abbreviations should be included. The game is well-priced at £7.

Now for a review of a flight simulator sent by David Cordiner of Birmingham. **Pilot** is a real-time aircraft simulator written entirely in Basic for the 16K ZX-81. The most obvious disadvantage of such a pro-

gram is its speed. As a result of this the information displayed on the screen is updated only every few seconds. It gives the impression that the aircraft is not always responding to your inputs.

The program, however, contains some exceptional points, one of which is the aircraft attitude which can make the difference between a crash and a safe landing. The controls include up, down, left and right, with power, flaps and a good display of the instruments. The game has some humour, if you can call it that, when the flaps fall off at high speed.

The author says that the main reason for writing the program in Basic was so that the program could be studied and altered in places. It could therefore be used as a tool for learning about Basic. **Pilot** is priced at £3 which, compared to some other games, is very reasonable.

I have also received two versions of chess for the 48K Spectrum. The first game is from Prism Computing, 4 Little Lane, Poulton-Le-Fylde, Blackpool. It is, of course, in machine code, with six levels of play, from beginners to postal chess.

It can save a game on cassette and print-out a copy of the board for later reference. Prism says that the loudspeaker of the Spectrum is used in the game — that is, of course, if you can hear it.

The second game is from Artic Computing, 396 James Reckitt Avenue, Hull. The cover and cassette say that it is for the Spectrum but the loading instructions are for the ZX-81. Obviously that is an oversight, but it sounds very funny when a Spectrum game tells you to set up your ZX-81. The game has seven levels of play, with response times from two seconds to several minutes. You can analyse games by setting-up your own positions. The program can also recommend a move.

Now for the answer to last month's problem about adding all the prime numbers less than 5,000. There are 699 numbers, with the last one 4,999, and the sum being 1 548 135.



Educational Electronics manufactures a range of interface units for use with Sinclair microcomputers.

For details, please write to: Educational Electronics, 30 Lake Street, Leighton Buzzard, Beds., LU7 8RX.

**Educational
Electronics**

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)

NEW
SAVE IT!
Only **£13.95** + £1.40 p/p
with **BATTPACK**
(Patent applied for)

FOR ZX81 AND SPECTRUM
COMPUTERS

(AND OTHER MODELS USING 9v DC ADAPTORS)



PROTECT YOUR PROGRAMMES WITH THIS RECHARGEABLE BATTERY PACK

AT LAST! The answer to one of the major problems facing personal computer programmers and users: **Poor mains supplies causing havoc, while you spend hours trying to enter your carefully prepared programmes.**

Now Adaptors and Eliminators, who have produced nearly 70% of all ZX Mains Adaptors, bring you **BATTPACK** — a rechargeable 9V Ni-Cad battery pack and transient suppressor, housed in a complementary black ABS case that simply plugs into your ZX adaptor in seconds.

BATTPACK ensures the voltage into your ZX computer, never drops below 9V, thereby eliminating the possibility of a programme crash because of a split second mains drop-out! (One cycle is all it needs!)

BATTPACK also suppresses transients and RFI using carefully selected capacitors. Your ZX Adaptor keeps the **BATTPACK** at full charge even when in use — so it's always ready for emergencies. Even in the event of a full power cut **BATTPACK** will run your ZX computer for at least 30 minutes giving you time to save your programme on a cassette or print a hard copy on your ZX printer.

BATTPACK comes complete with all connecting leads and is ready for use.

ORDER NOW — SAVE NOT ONLY YOUR PROGRAMMES BUT ALSO YOUR TEMPER!!

MAIL ORDER ONLY. PLEASE ALLOW 28 DAYS FOR DELIVERY.

ADAPTORS AND ELIMINATORS LTD, 14 THAMES ST, LOUTH, Lincs.

PLEASE SUPPLY _____ (QTY) battpack /s

AT £13.95 each PLUS £1.40 p/p

I ENCLOSE CHEQUE POSTAL ORDER FOR £ _____

SIGNATURE _____

NAME | | | | | | | | | | | | | | | | | |

ADDRESS | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | |

ZX81 HI-RES GRAPHICS BOARD

- Fully programmable 256 by 192 pixel resolution
- Powerful BASIC commands for USER DEFINABLE GRAPHICS
- 2K EPROM with graphics routines including PLOT, PRINT, PAGE, CLS, COPY
- Simple to generate your own exciting displays
- Stylish case which fits between ZX81 and RAM pack
- No additional power supply or soldering necessary
- Full instructions provided, fully guaranteed

Price breakthrough at £49.95
SAE for data sheet

*** NIGHT GUNNER ***

Enemy aircraft approaching . . . BATTLE STATIONS!

Survival depends upon your skill to shoot down the enemy fighters as they move in for the attack. Beware, the going gets fast and furious as you survive each mission in this entertaining and challenging machine code game with excellent graphics.

Requires 16K RAM only Highly addictive! £4.95

*** 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

All prices inclusive
(Overseas add £0.55 p&p per tape, £2.00 for HRG board)
All products guaranteed, refund if not satisfied.

DIGITAL INTEGRATION

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

MAIL ORDER ONLY

Ravendale Limited

NEW

8 Stanhope Heath,
Stanwell,
Staines,
Middlesex, TW19 7PH
England.

ZX81 32K + RAM PACK

Why put aside your 16K RAM Pack when you can use it together with the new Byger Byte 32K + Ram Pack to give you **48K of memory**.

Also available: 16K Ram Packs £26.40, new 32K + Ram Pack £45.50, Standard 32K Ram Pack £39.00, 64K Ram Pack £62.50. Tape loading interface for trouble free loading of program £11.50.

All prices are inclusive of VAT and free postage and packing.

- | | | |
|---------------------------|--------|--------------------------|
| • 16K Ram Pack | £26.40 | <input type="checkbox"/> |
| • New 32K Ram Pack | £45.50 | <input type="checkbox"/> |
| • Standard 32K Ram Pack | £39.00 | <input type="checkbox"/> |
| • 64K Ram Pack | £62.50 | <input type="checkbox"/> |
| • Tape boarding interface | £11.50 | <input type="checkbox"/> |

Name _____

Address _____

Make cheques payable to Ravendale Ltd and I enclose my cheque/ PO for £ _____

Telephone: (0895) 59535 (6 lines)
Telex: 897887 (CORCAN-G)

• Please indicate order by ticking boxes

Every computer needs a

CHATTERBOX!

NEW!

for
**ZX81
SPECTRUM**

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



SPEECH
SYNTHESIS
by
WILLIAM
STUART
SYSTEMS

SAVE £££
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.

DEALER ENQUIRIES WELCOME

As seen on BBC TV "Computer Programme"

* BIG EARS *

SPEECH
INPUT
FOR ANY
COMPUTER



STOP! GO! LEFT! RIGHT!

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

I.C. £18

Phoneme Speech Processor

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



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 announced – and due out in December – is **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 incorporating 'Spectrum User'). 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 £9.00) incorporating 'Spectrum User' 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.

Sinclair Supermart

SPECTRUM 16K & 48K STELLAR DUEL

NEW GAME • 2 PLAYERS •
Only one Commander will survive to lead the Star Fleet. Will it be you?

**** FEATURES ****
Land on planets/ Phasors/ Assault Troops/ Warp & Sub light speed/ Status Reports/ Space view scan/ Tactical Scan/ Carnage.

**** SPECTRUMS ON ITS WAY? ****
Have this SUPER NEW GAME ready.
Easy load cassette £4.75 inc post etc.

**** 'A' LEVEL MATHS ****
Matrix algebra package in basic. With general INVERSION ROUTINE. Manual and tape. SAE for details.

WANTED: Spectrum Software. Adventures & Original Games. Good Royalties + . Demo tape & SAE, for reply.

TRICODER CAMBRIDGE. (Mail order)
75, Oxford Rd.,
Cambridge CB4 3PH.

SPECTRUM SPEAKER. Boost your beep with Spectrum Amp. Just plug it into your mic. input. Cased, with volume control, £5.50 p&p. 11 Nettleton Close, Canford Heath, Poole, Dorset. Tel: Poole 682867.

SPECTRUM PONTOON. all features included, Mastermind with 3, 4, 5 colour code, Football Team, Hangman (or your own words). Full colour graphics, sound. Cassette only £3.20. J. Quinell, 18 Cheston Ave, Croydon, Surrey.

ZX81 and SPECTRUM programs made to specification, all programs done in machine code. Also all these programs in machine code for £4.00 each: Startrek, Asteroids, Phoenix, Dodgems. Tel: 640692 (Mansfield) for information.

ZX81 TEMPERATURE SENSORS

Ideal for analysis/remote monitoring of Central Heating/Insulation etc. Suitable for use with long cables.

Single channel — 5 to + 100C **£17.50**
4 channel — 50 to + 150C **£49.50**
8 channel — 50 to + 150C **£75.50**
All supplied with waterproof probes. Including UK postage and VAT. Free leaflet.

CHESHIRE MICRO DESIGN
66 Close Lane, Alsager,
Stoke-on-Trent.

ZX81 SOFTWARE £1.99 ASTRO SLED

Pilot your high-powered sled through the jagged space canyon, but be warned — the further you travel the harder it gets!

SPACE FIGHTER

A space dogfight simulator. Guide your fighter through tight loops and turns, to centre the alien in your cross hair sights. These feature packed arcade games are written in basic and machine code, for 16K ZX81's, and are available on cassette at **£1.99 each plus 60p p&p**. Please state ZX81, and mention this magazine when ordering.

ARCADIA SOFTWARE,
FREEPOST, Swansea SA3 4ZZ.

SPECTRUM OWNERS

All the software you'll ever need . . . the BEST Spectrum programs for a once-only payment of £10 plus a hire fee of £1.25 per tape.

JOIN TODAY: Send £10 for life membership and first FREE tape, to:
SPECTRAL SOFTWARE LIBRARY
Dept SU, 13 Charlecote Rd,
Poynton, Stockport,
Cheshire SK12 1DJ.
Or send s.a.e. for details

ZX81 "21" Full Graphics and Bank. Uses keyboard scan and player's name. Like Sinclair "21". £3.95 to K. Osgood, The Moat House, Great Wolford, Shipston on Stour, Warwickshire CV36 5NF.

SINCLAIR ZX81 + 16K RAM Pack, with leads, power pack and manual. 3 months' guarantee left. £60 ono. R. Hollaway, 5 Denbigh Gdns, Richmond Surrey, TW10 6EN. 01-940 6689.

data-asset

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

MACHINE CODE 16K ZX81 Database. Lists, counts, amend, delete, save, use as a super card index for 325 items. £3 for cassette. Paterson, 28 Norfolk Avenue, Newmarket. Tel: 667240.

ZX81 16K BOARD GAMES. Three superb 16K board games on cassette, price £2.00. Send cheque or P.O. to D. Ibrahim, 42 Kidd Place, Charlton, London SE7.

ZX-81 (16K)

Fast SAVE/LOAD program.

£5.50 incl. VAT and p&p. Up to 4.8K bit per second. (Approx. 20 x Sinclair speed), no tape level doubts — program tells you if level O.K. Uses standard Sinclair cassette port.

MUSAMY SOFTWARE
11 Brettenham Ave,
Walthamstow, London E17.



Erricks' of Bradford ZX-81/PERIPHERALS/ SOFTWARE

All from stock
Rawson Square.
(Bradford) 309266

SPECTRUM 16 & 48K POOLS RESULTS FORECASTING

This program, based on a serious statistical analysis of results since 1952, is no guarantee of instant "Big Wins", however, the discovery of certain trends and cycles of results has been evaluated and will "lessen the odds", which must give you a distinct advantage. Menu driven, with colour and sound, this program offers direct-from-coupon input, review and print-out facilities for only **£4.95 (16K) or £5.95 (48K) incl. P&P.**

Cheques/PO's to: **J ENGLISH,**
10 Meadow Close, Shipdam,
Thetford IP25 79F.

FOR HORSE RACING ENTHUSIASTS

"THE SETTLER"

Work out your winnings on accumulators, bankers, 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.H.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 Seadrifham Road, Newick

ZX81 + 16K RAM Sinclair built hardly used. Plus manual, leads, mains adaptor and 3 tapes. Will deliver reasonable distance. £60 Chelmsford 60312.

SPECTRUM GAMES

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, Ludo ("good value, superb graphics" — leading multiple stationer).

After the children are asleep try our **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 highlighted and bank accounts automatically computed and displayed.

Each cassette: **£4.95 incl. p&p.**
Both on one cassette: **£8.95 incl. p&p.**

DIAMOND SOFTWARE, Dept. S.U.
Hospital Road, Annan DG12 5HP,
Dumfriesshire.

FARADAY UNIT Fits Nex to T.V., protect comp. save/load easier. D.I.Y. details £1. made up Unit £3.50. Stacey (research), 3 Westpark, South Molton, Devon ex36 4HJ.

WEEK-END COURSES

Week-end courses in Sinclair Basic, starting February, 1983. 15 hours of instruction from a qualified lecturer, Friday evening to Sunday evening. Luxurious 3-star Worcestershire Hotel, all rooms with bath and other facilities.

£55.00 inclusive.

GAINSBOROUGH HOUSE

HOTEL,
Bewdley Hill, Kidderminster.
Tel: (0562) 754041.

FREE complete financial analysis program for ZX81 16K. Designed and supplied by Brian Harding, 9 Verdayne Gardens, Warrington, Surrey CR3 9RP. Write or tel: Upper Warrington 2280 (Ansaphone) for your copy.

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.

Sinclair Supermart

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 Pingold Hill,
Leeds LS15 0PW

ASTRO SOFTWARE

CASSETTE 1 16K ZX-81
BATTLESHIPS: Just like the pencil & paper game.
HOUSE OF MYSTERY: Find the Princess before escaping.
FRUIT MACHINE: Includes a hold routine.
BUG-MAN: Eat the dots while trying to avoid the MONSTER.
CODE-BREAKER: Guess the 3, 4 or 5 digit number.
PONTOON: Try to beat your ZX at this difficult card game.
HANGMAN: Guess the word and save the innocent man.
DEFENDER: Defend the earth from non-stop attack.
* 70K of Programs
A genuine bargain at £3.95.

CASSETTE 2
9 1K programs including Pontoon, Mastermind, Sketch, Guillotine, Multiplication Race, Echo, Roll-a-Ball, Roulette and Fruit.
Price £3.95.

Send cheques/PO's to:
Astro Software, 28 Spinney Rise,
Toton, Beeston, Notts NG9 6JN.

SPECTRUM DISASSEMBLER Plus useful hex loader. ROM or RAM code into standard ZX80 mnemonics on screen or printer. 16K or 48K: documentation. Ian Rye, 10 Marriott Close, Oxford OX2 8NT. £3.00.

WANTED: Any ZX81/Spectrum genuine tapes you don't use anymore? Please send listing and quotation to C. Holm, Konvaljvägen 8, 53171 Lidköping, Sweden.

ZX81 - HANGMAN - 16K, practical and educational, 100 hidden words. Interesting graphics techniques. Cassette £1.90 only inc. p&p. J. Kearey, 25 St Michael's Rd, Farnborough, Hants GU14 8ND.

TOPPIX GRAPHIC D.I.Y. for ZX81. Detailed instructions £2 plus s.a.e. Colux. Colour for ZX81 soon. S.a.e. details: N.J. Petry, 3 Lester Drive, Worle, W-S-M, Avon BS22 0NG.

WE ARE WILLING to represent any advertiser in software and hardware here in Malta. Plenty of ZX's but nothing else! All queries answered, John and Ernest, 29 St Michael St, Fgura, Malta.

SPECTRUM BANK ACCOUNT. Balance, Interest, Search and Total, single or multiple transactions, check month's spending, statements, etc. Automatically updates deposit account. Menu driven. Cassette, instructions £4.50. P. Hodgson, 3 Ruddings, Wheldrake, York YO4 6BP.

HOME HEATING and energy program. ZX81 16K. Calculates heat requirements, estimates running costs, evaluates the effect of improved insulation. Send £6.50 to J. Virgo, 22 Kings Ride, Burgess Hill, Sussex.

SCRUNCH - for ZX81 16K. Brilliantly simple new graphics game, plus free maths program. Cassette £2. Jeanette Fenner, 237 Overdale, Scarborough YO11 3RE.

SPECTRUM EDUCATIONAL PROFESSIONAL SOFTWARE

Primary School Level

Packages include:
Time, Area and Perimeter, Shopping, Hangman, Maths Race, Shapes, Abacus Place Value.

Designed by a practising primary teacher, programmed by a computer professional.

Full user documentation included.

£2 each package plus 50p p&p per order (including free game).

Cheque/PO or SAE for details to:

ASHFIELD SYSTEMS ASSOCIATES
Ref. EdS10, 45 Qualitas,
Bracknell, Berks RG12 4QG.

SPECTRUM SPACE MISSION 16K Hi-res colour sound. Can you fight your way through space destroying aliens and trading to continue your mission. Only £4.00, on tape. W. Butcher, 37 Acacia Drive, Sutton, Surrey.

ZX81 + 16K RAM Sinclair built in original packing, leads, power pack, manual, 3 Sinclair cassettes, £65. Phone Burley 2416.

ZX-81 GAMES. Two games on one cassette. "Lander" and "Nibblers". Both require 16K RAM. Send cheque for £4 to Mark Jones, 47 Milton Grove, Orrell, Wigan, Gtr. Manchester WN5 8HP.

"SITUATIONS VACANT" ZX OWNERS

Make money with your ZX81 or Spectrum

We are leading suppliers of software to Sinclair, with a superb range of games cassettes for the ZX81 and Spectrum. We require part-time agents in all areas to find and service retail outlets for our products. Car owners, over 18, with telephone, write for details to: M Meek, Micro-Gen, 24 Agar Crescent, Bracknell, Berks.

ZX SPECTRUM 16K and 48K

DESTROYER - Battle with submarines and aircraft.

SUPER INVADERS - Space Invader style game.

PIN BALL MACHINE - super graphics and sound.

CARRACE - 2 screen circuits.
£2.49 each, plus 30p P&P.

WINTERS LTD.

24 Swannington Close,
Cantley, Doncaster.

ZX81 Sinclair built, 1K manual, leads, PSU two tapes, 6 months old, built-in memory cut out switch. Total value £80, accept £45 o.n.o. Tel: Cambridge 249033 evenings, write 7 Newell Walk, Cambridge.

HARDLY-USED SPECTRUM. Program for immediate use. £15 over list. Smallwood. 043787 644.

ZX SIMULSOLVE - efficient solution of simultaneous linear equations with MANY unknowns for the ZX SPECTRUM. Details: S.A.E. Cassette: £4.95, Alan Turnbull, 65 Vicarage Road, Stockport SK3 8HL.

Z X 8 1 VIDEO INVERTER

Save your eyes. Increases save level. Displays sharp white characters on solid black background screen. Kit £4.00. Built £5.00. Includes VAT & P/P. As reviewed in *Popular Computing Weekly* August 26th. Send cheques/postal orders to:

D. FRITSCH

6 Stanton Rd., Thelwall,
Warrington, Cheshire WA4 2HS.

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.

ABBEX	IFC	KEMPSTON	68
ABERSOFT	70	MARTECH GAMES	62
ACS	22	MAPLIN	14
ADAPTORS & ELIM.	70	MELBOURNE HSE	44
ADDITIVE GAMES	32	MEMOTECH	26 & 27
AFDEC	47	MICRONET	50 & 51
AGF	52	MICROL	42 & 43
AIRWAVES	63	MICROWARE	64
ARGUS	24	MICRO POWER	12
AUTOMATA	68	MIDWICH	48
BASICARE	4	MIKRO GEN	10
BI PAK	37	M.C.LOTHLOREN	22
BUFFER MICRO	47	NEW GENERATION S/W	37
CALPAC	10	MICHAEL ORWIN	IBC
CAMBRIDGE MICROELC.	68	OXFORD COMP. PUB.	48
CAMPBELL SYSTEMS	31	PICTURESQUE	32
CARNELLS/W	37	PRINT & PLOTTER	9
C.C.S.	22	PROXIMA CENTAURI	31
DATA ASSETTE	6	P.S.S.	15
DAVID MOODY	36	RAM WRITER	52
DIGITAL INTEGRATION	71	RAVENDALE	71
D.J.L.	10	ROSE CASSETTES	64
D.K. TRONICS	25	R&R	48
EDUCATION ELECTRONICS	70	SILVERSOFT	52
FOILKADE	63	SINCLAIR RESEARCH	34 & 35
GROUND CONTROL	32	SOFTWARE FARM	47 & 63
JAYSOFT	12	SOFTWARE	
J.K. GREYE	62	SUPERMARKET	19
HEWSON CONS.	67	SUPERMART	73 & 74
HILTON COMP. SERVICES	62	TASMAN S/W	36
INTERFACE	64	TIMEDATA	14
J.R.S.	12 & 31	WILLIAM STUART	
KAYDE	OBC.	SYSTEMS	71

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.



GUNFIGHT

(machine code)



INVADERS

(machine code)



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.



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)

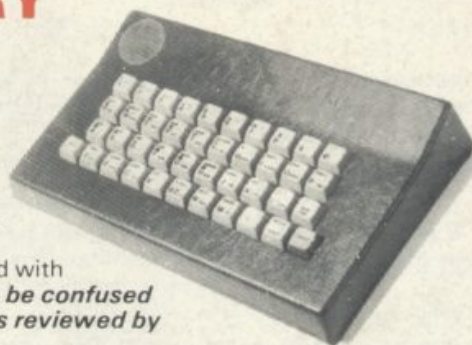
Played on a 4 x 4 x 4 board, this is a game for the brain. it is very hard to beat the computer at it.

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 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

16K GRAPHICS SOFTWARE

PECKMAN — The only true ZX version of the popular arcade game.

SPACE INVADERS — The best version available anywhere.

CENTIPEDE — *"In all I think this is the best presented moving graphic programme I've yet seen"* —
Phil Garratt,
INTERFACE

£5.95 each

Graphic Software can only be used with a Graphics board

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**

16K 81 SOFTWARE

3D/3D LABYRINTH

— A cubit maze that has corridors which may go left, right, up and down.

£5.95

4K Tool Kit full of utilities to aid the programmer in constructing and de-bugging E. PROM version for use with graphics ROM.

£9.95

VIC 20 SOFTWARE

THE KAYDE VALLEY
OTHELLO
TWINKLE TWINKLE
KAYDE PECKMAN
APPOLO 8
SPACE ATTACK
PLUS MANY MORE
All £7.95 EACH

Vic 20 dealer

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. SU12, 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