December 1982

Incorporating Spectrum User

sinclair user

Issue No 9

Only 60p

£1 OFF "FAST LOAD" CASSETTE

BUMPER CHRISTMAS ISSUE



Sinclair's Spectrum software reviewed

We sort out printers and interfaces

Searle's thoughts on the future

Caution over use of micros

Imports limit sought

Cricket contest winner announced

BEGINNERS' SPECIAL TIPS

Plus nine pages of programs, the latest cassettes and hardware reviewed, helpline, news and your letters.



IF YOU WRITE SOFTWARE THEN READ ON...

15 months ago we had written some excellent Games Software for the ZX-81, but when debugging was finally completed we realised that much of the work remained.
Who could we rely on for the effective marketing and production of our efforts?
Who would give our software the chance it deserved?
No company was really giving ZX Software the professional backup and production it deserved so we created Quicksilva to fulfill this role.
Now Quicksilva has developed a set of specific policies to match our beliefs about how a company of this kind should operate.

CUSTOMERS
The highest priority must be given to customer service — "QS customer relations are the best in this field."

SOFTWARE
A high standard must be maintained for all software — "QS reputation for innovative software is firmly established."

PRESENTATION
Should support and enhance the software — "QS policy is to use full colour reproductions of specially commissioned artworks to match the standards of the programs.

ADVERTISING
Needs to be accurate, informative, enjoyable, eye-catching and effective — See recent magazines.

PRODUCTION
Reliable and efficient duplication of cassettes is essential — "QS cassettes are produced by The Tape Duplicating Company Ltd., who have the expertise and equipment to do just that."

DISTRIBUTION
All avenues appropriate to the Software involved must be explored — "QS has over 200 retail outlets in this country alone and a substantial number in all the major overseas markets."

We now know that Quicksilva will give both of us the professional back-up and expertise our programs deserve. It has taken time and effort, and is very much a continually improving service; always we aim for that indefinable 'quality' that makes all the difference. We feel that now is the time to offer 'You' the same service that Quicksilva gives us.
So if you are a Software Author confronted with the same problems we had 15 months ago, let Quicksilva solve them for you and help you as it helped us.

Yours, Nick Lambert & John Hollis

Quicksilva is interested in quality software for the following personal computers — Spectrum — Atari — VIC 20 — B.B.C. — Atom — ZX81 — Electron — Dragon Quicksilva offers you on acceptance of your program:
25% royalties on all sales; the very best professional quality support for your programs;
full credits in advertising, brochures and on cassette for you as the author;
the opportunities and advantages that working with the leaders in the field offers.
Please contact us immediately to discuss this opportunity at

QUICKSILVA, 92 Northam Road, Southampton, Hants SO2 0PB

or ring our Special Authors' Hotline — Southampton (0703) 20169 Ext. 42 — and we will do our best to give you the answer you are looking for.

contents

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

States 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

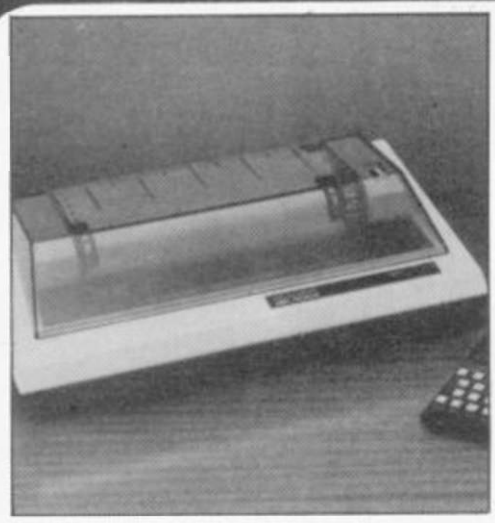
If you would like to contribute to any of the Sinclair User group of publications please send programs, articles or ideas for hardware projects to:
Sinclair User and Programs
ECC Publications
30-31 Islington Green.
London N1 8BJ

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 1982

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 30



page 62

5 **SINCLAIRVOYANCE** Looking at ways of ensuring you all have a happy Christmas.

9 **SINCLAIR USER CLUB** A special introductory offer for the festive season.

13 **NEWS** The latest on the Spectrum deliveries, worries about imports, a new breed of adventure game, and much more.

18 **YOUR LETTERS** Another look into our bulging postbag for your latest views.

25 **HARDWARE WORLD** Our regular look at all that is new in the add-on market.

30 **PRINTERS** We survey all the printers and interfaces available for the ZX-81.

33 **INSIDE SINCLAIR** Nigel Searle gives his thoughts on the future.

37 **STARTING FROM SCRATCH** Our monthly feature on the easiest way to get the best from your new ZX-81.

42 **FUTUROLOGY** Chris Reynolds expresses some of his fears about the growing use of micros.

48 **SPECTRUM SOFTWARE** John Gilbert reviews Sinclair's latest range of software for the Spectrum.

52 **SOFTWARE SCENE** Our writers look again at the growing amount of software for all machines.

57 **EDUCATION** Eric Deeson has reservations about the value of the Sinclair Research offer to schools.

61 **PROGRAM PRINTOUT** Nine programs in this month's issue for the ZX-81 and Spectrum.

73 **HELPLINE** Andrew Hewson answers more of your problems.

77 **MIND GAMES** Philip Joy looks at the games which test your minds.

NEXT MONTH

We begin a series intended to teach you good programming and we look in-depth again at the software available for the education market.

HOW TO GROW UP TO A REAL COMPUTER



SEE US AT 5th ZX MICROFAIR
DECEMBER 18th
NEW HORTICULTURAL HALL LONDON SW1

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

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

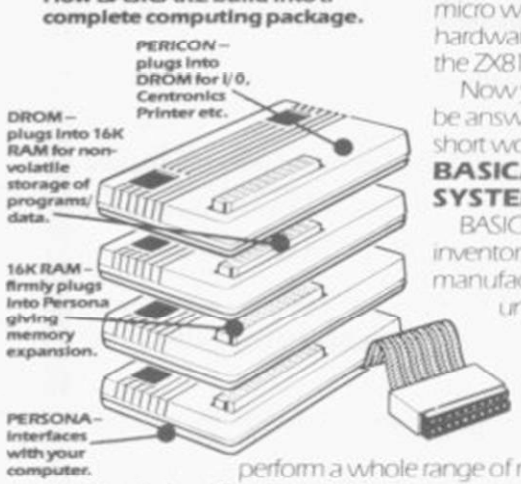
Now your question can be answered in three short words:

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.

How BASICARE build into a complete computing package.



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 it's good looks and stability under working conditions, BASICARE MICRO SYSTEMS offers a fantastic range of micro options for ZX81 users.

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

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

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

Look at the choice you have:

PERSONA — An interface module to enable an ORGANIC MICRO to grow on the ZX81.
MINIMAP — A memory mapping device to extend the address space of the ZX81 from 64K bytes to 1 M bytes.
RAM 08 — A low cost, low power memory expandable from 2K to 8K.
RAM 16 — 16K Add on memory at remarkably low cost.
RAM 64 — A TRUE 64K Add on memory.
DROM — Ultra low power memory backed by rechargeable battery for non-volatile storage of programs and data.
TOOLKIT — A module fully socketed to take up to 8K bytes of utilities in EPROM/ROM.
PERICON a — A general purpose, user programmable device providing 24 lines of input/output.
PERICON b — 24 lines of heavy duty output to access and control the outside world.
PERICON c — A module to drive 80 column printer with Centronics type parallel interface.
USERFONT option — User definable characters available for RAM 08, DROM and TOOLKIT.

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

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

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

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



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

Name_____

Address_____

PERSONA	@ £30.25	DROM(2K)	@ £39.50
MINIMAP	@ £35.95	TOOLKIT	@ £22.20
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.SU2 5 Dryden Court, London SE11 4NH or Phone: 01-735 6408.

BASICARE MICRO SYSTEM



Christmas order glut expected

AS CHRISTMAS approaches, hundreds of small firms are gearing to meet the expected glut of orders. To the surprise of many, the market for Sinclair computers and their software and hardware additions appears to be affected by the normal seasonal fluctuations.

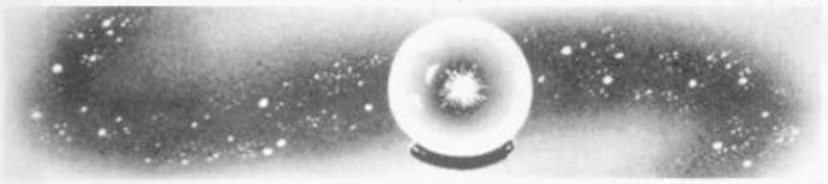
During the summer months, few people were interested in staying inside looking at a television screen. With the colder weather and the darker evenings, so much heat is generated by the ZX-81s and Spectrums that the central heating can be turned off.

Other factors, such as the launch of the Spectrum, have had an effect on this but the basic underlying pattern seems to be the same as for most consumer items.

Last year there was a big increase in the demand for the ZX-81 in the run-up to Christmas. This year there are likely to be even more stockings filled with items from the Sinclair market.

It will be a big test of the ability of the market to meet the demand. Judging by the letters of complaint which we receive, the biggest test will be for Sinclair Research. Despite many of the companies in the market being small, part-time concerns, we receive very few letters about late or non-delivery of items ordered. By contrast, we have been flooded with letters referring to the problems of the Spectrum.

By the time this edition of *Sinclair User* is being read,



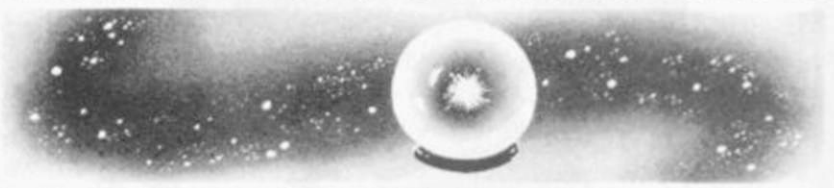
Sinclair Research hopes to have cleared the backlog of orders for the Spectrum. Those hopes, however, are based on a gamble.

Last year the ZX-81 was put on sale in the U.S. and into W H Smith before Christmas. Both those acts, combined with the seasonal increase in demand, resulted in the now-familiar queues of orders.

This year the company tried to avoid that problem by delaying the move into the States and the retail market with the Spectrum. Other problems were sufficient to ensure that delays still occurred.

In the last month deliveries have been increasing and the letters of complaint have fallen to a trickle. Before delivery could be guaranteed at the stated 28 days, however, Sinclair Research decided to try to increase sales. First there was the special education offer to encourage schools to buy the Spectrum and then more recently there was the special offer in *The Observer* which promised there were 500 Spectrums ready for despatch. Also advertisements for the new machine have appeared for the first time in the non-specialist press.

The aim is obviously to catch the Christmas market but the gamble is that the orders could swamp the present level of production. If people order before Christmas on the promise of 28 days' delivery, they will be even more disappointed than the many who ordered them in the



early summer ready for the summer holidays if they do not arrive in time.

As has been argued many times previously, people do not mind waiting for a machine as good and efficient as the Spectrum if they know they will have to wait. If they order something for Christmas and it does not arrive until February, they will not be so understanding.

We hope that the gamble succeeds. The more satisfied Sinclair users there are the more there are likely to be in the future and the greater the potential readership for *Sinclair User*. The danger is that delivery dates would deteriorate quickly, with a corresponding decrease in the reputation of Sinclair Research. The company may have had a good lead on its competitors but brand loyalty can be stretched too far, as many other British industries have discovered.

The long-awaited arrival of the Japanese in the home computer market is here. It will be interesting to see how they cope with the pressures of this fast-expanding market in the next year.

Spectrum User absorbed

In the meantime, we would like to wish all our readers a very merry Christmas. We hope you have many happy hours learning to use your Sinclair computers and promise that we will continue to keep you informed of all that is happening in the market.

After launching our special section devoted to the Spectrum, *Spectrum User*, in September we have decided to absorb it into the rest of *Sinclair User*.

We have made the move to allow us more flexibility in the presentation of information in the magazine. To split the coverage between the Spectrum and the ZX-81 and ZX-80 was proving to be too rigid to permit us to provide the best coverage of the market. From now, all the machines will be covered in all parts of the magazine in our normally comprehensive way.

The SHIVA Christmas Hamper



For the SPECTRUM

	Normal Published Price
By Ian Stewart & Robin Jones	
Easy Programming for the ZX Spectrum	£5.95
Computer Puzzles: For Spectrum & ZX81	£2.50
Machine Code and Better Basic	£7.50
Cassette: Spectrum Special 1	£4.95
By Martin Wren-Hilton	
Games to Play on your ZX Spectrum	£1.95
	~~£22.85~~

£15.75 incl. p. & p.

For the ZX 81

By Ian Stewart & Robin Jones	
PEEK, POKE, BYTE & RAM: Basic Programming for the ZX81	£4.95
Computer Puzzles: For Spectrum & ZX81	£2.50
Machine Code and Better Basic	£7.50
By Martin Wren-Hilton	
The ZX81 Add-on Book	£5.50
	~~£20.45~~

£14.75 incl. p. & p.

Order the complete hamper and save yourself a packet!

Or make up your own with any 3 items for £10.50 (incl. p. & p.)

Offer open until 31st January 1983

Hampers will be dispatched from 1st December onwards.

All books and cassettes are also available individually at the normal published prices.

ORDER FORM

Tick here

Please send me a SPECTRUM hamper, at £15.75 ☐

Please send me a ZX81 hamper, at £14.75 ☐

I wish to make up my own hamper with the following, at £10.50 ☐

.....

.....

I wish to order 1 or 2 items only, at the normal published price: ☐

..... £ _____

..... £ _____

NAME .....

ADDRESS .....

.....

I enclose a cheque for £.....

Please debit my Access/Barclaycard/American Express

Account number .....

Signature .....

Shiva Publishing Limited

4 Church Lane, Nantwich, Cheshire CW5 5RQ
Telephone: (0270) 628272

SHIVA

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

MAZE DRAG RACE

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...£3.95

KRAZY KONG

ALL MACHINE CODE VERSION OF THE POPULAR ARCADE GAME. THIS PROGRAM HAS ALL THE FEATURES OF THE ORIGINAL AND IS EVERY BIT AS FAST.....£3.95

NEW

** NOW YOU CAN WRITE INSTANT MACHINE CODE WITH -

MCODER

THE FIRST REAL COMPILER FOR THE ZX81. THIS SUPERB PROGRAM WILL INSTANTLY TRANSLATE BASIC PROGRAMS INTO SUPER-FAST MACHINE CODE.

MCODER OCCUPIES JUST OVER 2K AND ONCE ENTERED ALL YOU DO IS WRITE (OR LOAD) BASIC PROGRAMS, RUN AND DE-BUG THEM, THEN A SINGLE COMMAND WILL BRING MCODER INTO ACTION.

PRESS A KEY AND WATCH AS YOUR BASIC IS REPLACED WITH MACHINE CODE WHICH IS AUTOMATICALLY STORED IN A REM STATEMENT.

MCODER FAR OUTPERFORMS ANYTHING ELSE ON THE MARKET. WE GUARANTEE THIS PROGRAM WILL AMAZE YOU !

BUY MCODER NOW AND YOU'LL NEVER WRITE BASIC AGAIN - £7.95

NEW

QSAVE

QSAVE IS AN EXCITING PACKAGE WHICH GIVES NEW LIFE TO YOUR ZX81. QUITE SIMPLY YOU CAN SAY GOODBYE TO THOSE WASTED HOURS SPENT LOADING AND SAVING PROGRAMS -

QSAVE LOADS & SAVES 16K IN ONLY 29 SECONDS!

HOW? - BY A COMBINATION OF SOPHISTICATED SOFTWARE AND AN AMPLIFIER / FILTER UNIT WHICH PLUGS IN BETWEEN YOUR CASSETTE RECORDER AND THE ZX81.

FEATURES INCLUDE:

* A VERIFY FEATURE SIMILAR TO THE SPECTRUM WHICH ALLOWS YOU TO CHECK THAT PROGRAMS HAVE SAVED PROPERLY BEFORE UNPLUGGING.

* ABILITY TO TRANSLATE EXISTING PROGRAMS IN MINUTES - NO RETYPING NECESSARY.

* HANDLES BOTH M/C AND BASIC PROGRAMS.

THIS REMARKABLE PRODUCT WHOSE USE IS SUPPORTED BY MANY TESTIMONIALS COMES COMPLETE & READY TO USE AND COSTS JUST £15.95 INCL.

** 64K VERSION NOW AVAILABLE - £17.95 **

SP4

FOUR SUPERB SPACE GAMES IN ONE PACKAGE INCLUDES TAILGUNNER, ALIEN, STAR TREK AND SPACE DEFENDER. SUPERB VALUE AT ONLY.....£4.95

GHOST

GOBBLE YOUR WAY THROUGH A MAZE - GHOSTS, POWER PILLS ETC ETC. VERY FAST...£3.95

** IMPORTANT - ALL THESE PRODUCTS ARE FOR 16K ZX81 **

PSS

452 STONEY STANTON RD
COVENTRY CV6 5DG

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:

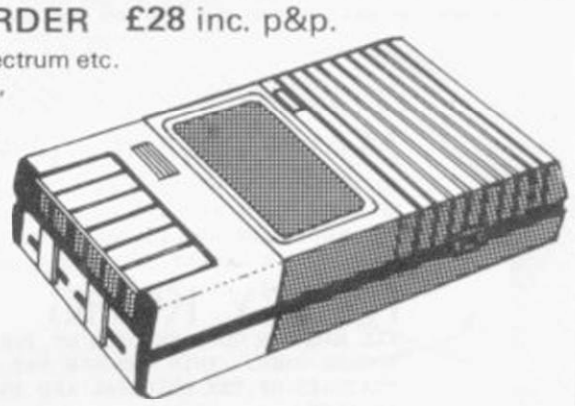
* **Stock Control (October)**
* **Sales Ledger (November)**
* **Debtors Ledger**
* **Business Accounts**
* **Tax Accounting**

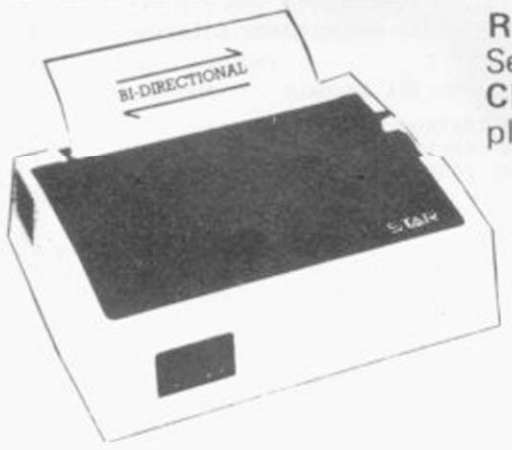
Dept. **SU8** Data — Assette, 44 Shroton Street, London NW1 6UG. 01-258 0409

data-assette®
44, Shroton Street
London NW1
Tel 01-258 0409

● 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.

● 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

ORDER FORM

Dept. **SU8** 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 _____



Booking Sinclair trend

THIS MONTH'S special offer, open exclusively to Sinclair User Club members, is aimed at those who look to books as a way of learning more about their machines and that growing number of people who wish to make more serious use of their machines.

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

The full range of books with their 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 December. To allow new members to take advantage of them, orders can be included with the membership application form which is part of the Christmas Offer form below. Just tick the Membership Only box and include £12 to the address shown.

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

READOUT BOOKS AND SOFTWARE

	Usual price
Learning to Use the ZX-81, Robin Bradbeer	**£4.95**
Learning to Use the ZX Spectrum, Robin Bradbeer	**£4.95**
Getting Aquainted with ZX-81, Tim Hartnell	**£5.95**
Mastering Machine Code on the ZX-81, Toni Baker	**£7.50**
34 Amazing Games for the ZX-81, Alistair Gourlay	**£5.95**
20 Simple Electronic Projects for the ZX-81, Stephen Adams	**£6.45**
49 Explosive Games for the ZX-81, Tim Hartnell	**£5.95**
Gateway Guide to the ZX-81, Mark Charlton	**£6.45**

Plus £1.20 postage and packing for each order.

Festive learning offer

WITH Christmas approaching, many people are likely to be buying ZX-81s as presents. To enable new owners to derive the full benefits from the new machines we have put together a special package.

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

continued on page 10

CHRISTMAS OFFER FORM

I wish to take advantage of the special Christmas 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 9

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 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 Thurna Electronics add-ons.

To take advantage of this exceptional offer, available only until the end of January, fill in the Christmas Offer form below.

If you just wish to join the Sinclair User Club, all you have to do is tick the Membership Only box.

Make sure when completing the form to indicate whether you own the Spectrum or the ZX-8d1, 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 (Ulverton 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, Gourock, Renfrewshire, PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

National ZX-80 and ZX81 Users' Club: 44-46 Earls Court Road, London W8 6EJ.

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

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

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

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

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

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

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

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

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

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

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

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH (Walsall 25465). Please include sae. Meetings twice monthly.

ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworth, Bury, Lancashire. Exchanges information and programs throughout the country.

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

Overseas

Belgium, France, Luxembourg: Club Sinclair, Raymond Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468)

Belgium, Netherlands: Microcomputer Vereniging BZW, Paul Glenisson, Priester de l'Epéestraat 14, B-1200 Brussels, Belgium (322 7349954)

Denmark: Danmarks National ZX-80/81 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
ZX-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre. Gratis medlemskab og gratis blad til enhver interesseret.

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

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

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

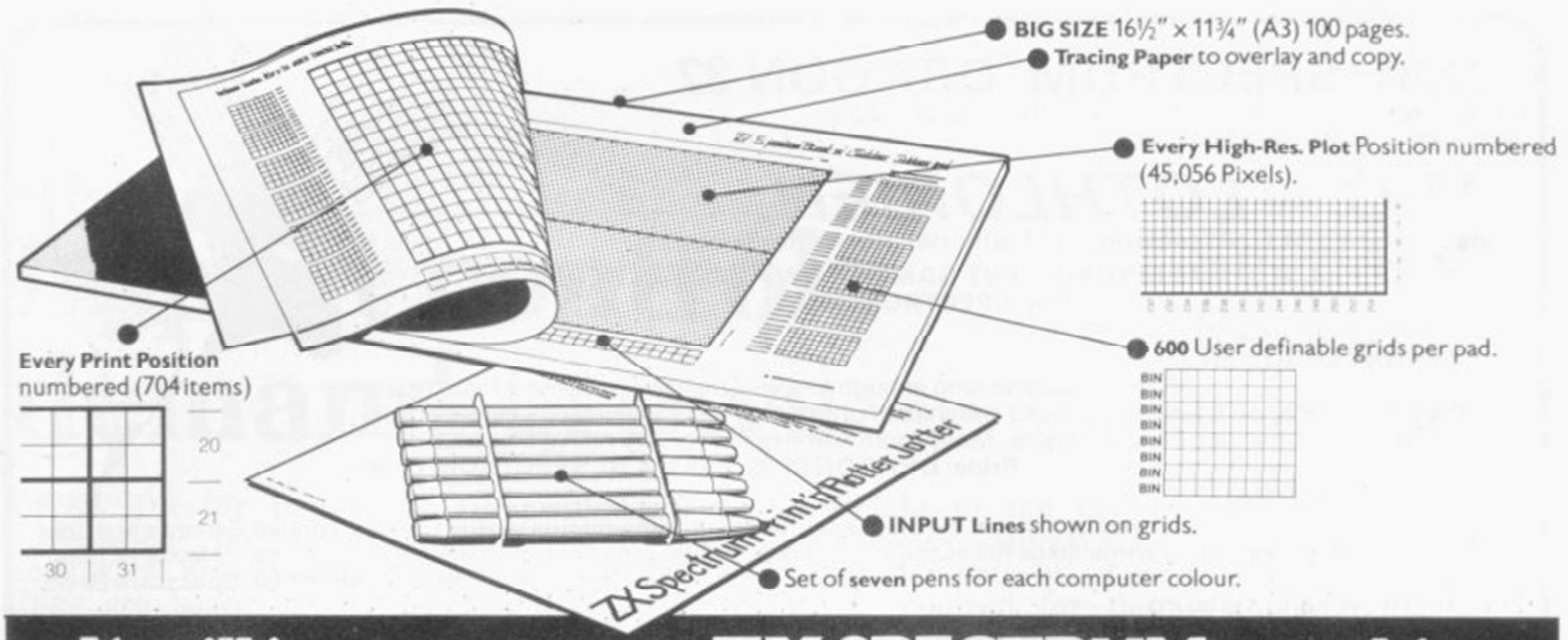
Republic of Ireland: Irish ZX-80/81 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

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: Lënnërt 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).



It will improve your ZX SPECTRUM graphics in ways you wouldn't believe possible.

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

That's why we have packed the new Spectrum Print 'n' Plotter Jotter with every facility to exploit your graphics to the full.

After the first few weeks of "playing" with your computer you will want to get down to serious programming and planning in which professional-looking graphics should play a major part.

What better way to work it out than with a Print 'n' Plotter Jotter?

The professional pad

Print 'n' Plotter is not just another programming pad.

Just look at the specifications:

BIG SIZE 16½" x 11¾". 100 Pages — 50 Print Grids and 50 High Resolution Plot Grids.

Printed on high-quality tracing paper, enabling you to overlay the pages for direct co-ordination between PRINT and PLOT or to copy from illustrations, maps, charts, photos etc.

PRINT Grids show all numbered co-ordinates for the 704 screen positions, plus INPUT lines.

PLOT Grids show every numbered co-ordinate for the 45,056 Pixels!

Each pad contains 600 user-definable grids for use with the BIN n, POKE USR "a" function.

And the whole thing is fully bound with fly leaf cover and complete with a set of seven colour pens!

The simple way to get serious

Spectrum Graphics can become very complex, so before you start to program the best way is to work it out on a Print 'n' Plotter and save all those errors!

Take for instance the common CIRCLE. With a Jotter you can establish the exact screen location for the centre in seconds, and it will stop you running out of screen because of a too large radius. Working our DRAW is similar: pre-determine DRAW lines and PLOT positions before you start. With a Jotter you can build-up graphics using every facility with a direct co-ordination between each.

For instance, correct PLOT OVER or PRINT OVER positions will be easy with a Jotter.

See the show for just 60p!

To demonstrate the graphic possibilities with the SPECTRUM JOTTER we have produced a cassette-based Demonstration program for only 60p (inc VAT and P&P). Why not send for a copy, or order it together with your JOTTER?

Just part of a range of ZX products

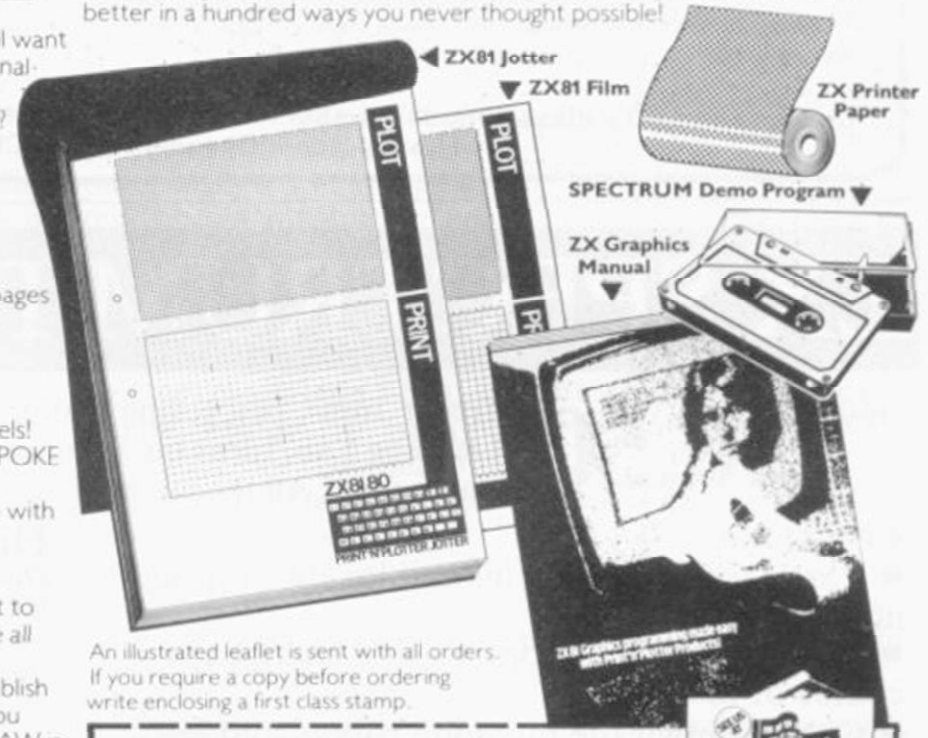
The Spectrum Jotter is, of course, an upgraded version of our popular *ZX81 Print 'n' Plotter Jotter and Film*. For ZX81 owners these are available by direct mail or through a growing number of retailers and compshops.

The ZX81 Jotter is a 100 page Graphics pad that exploits to the full the graphics facilities of that micro. ZX81 Film is a matt film version of the Jotter which is re-usable and ideal for 'copying' graphics.

Our manual: "*ZX Graphics programming made easy*" explains everything you need to know about using the ZX81 products, and when used in conjunction with the Spectrum cassette will prove to be the definitive guide to the subject.

And for ZX users (whether Spectrum or ZX81) we still market Printer Paper at £1 less than Sinclairs!

Why not write and place your order today? Graphics can be a very serious subject . . . Print 'n' Plotter products can make it easier . . . and better in a hundred ways you never thought possible!



An illustrated leaflet is sent with all orders. If you require a copy before ordering write enclosing a first class stamp.

To: Print 'n' Plotter Products (SL) 19 Borough High Street, London SE1 Please forward me the following products:

..... ZX SPECTRUM JOTTERS @ £9.95 each.
..... ZX81 JOTTERS @ £3.50 each.
..... ZX81 PLOTTER FILMS @ £2.25 each.
..... "GRAPHICS PROGRAMMING MADE EASY" MANUALS @ £1.50 ea
..... PACKS OF ZX PRINTER PAPER (5 ROLLS) @ £10.95 per pack
..... ZX SPECTRUM DEMO CASSETTES @ 60p each.

PLEASE NOTE ALL PRICES INCLUDE POST, PACKING AND VAT FOR U.K. DELIVERIES (Overseas should add 25% for additional Surface Mail)

Remittance enclosed payable to Print'n'Plotter Products.
Please bill my Access/Barclaycard/Visa/Mastercard No:–

Name: .....

Address: .....

.....

.....

5th ZX MICROFAIR

Print 'n' plotter Products©

Most Print 'n' Plotter products are available 'over the counter' from the following retailers: • Specialist branches of W.H. Smith • Buffer Micro Shop Streatham • Microware Leicester • Denny's Booksellers London EC2 • Georges Bookshop Bristol • Also represented in U.S.A., Canada and South Africa.

ZX81/SPECTRUM/DRAGON 32

A fantastic range of 16K games, each complete with fully comprehensive instructions from:

M.C. — LOTHLORIEN.

(incorporating M.C. Associates and Lothlorien Computer Group).



3 OF THESE MAGNIFICENT GAMES NOW AVAILABLE FOR THE SPECTRUM 16K

1. TYRANT OF ATHENS.

Can you survive long enough to turn Athens into the most feared state in the Mediterranean? Train troops, build warships, fight battles by land and sea against hostile Greek States and the vast Persian Empire. Many more features in this very addictive game.

Price: DRAGON £6.95, ZX81 £4.50, SPECTRUM £5.50

2. ROMAN EMPIRE.

Your aim is to conquer the hostile countries surrounding Rome. Build armies, appoint Generals and fight campaigns. This challenging game takes full account of morale, fighting efficiencies, leadership ability, etc. 3 levels of play.

Price: ZX81 £4.50. Spectrum £5.50.

3. PELOPONNESIAN WAR.

Set in Ancient Greece from 431-404 BC, covering the Great War between Athens and Sparta. Your goal is a final victory over the Spartans but you will need all your skill in a combination of diplomacy and military force before you even stand a chance.
3 levels of play.

Price ZX81 only £4.50

4. SAMURAI WARRIOR.

How could you have fared as a Samurai in 13th Century Japan? Face challenges from Samurai and bandits. Are you a survivor? Or will you be forced to commit ritual suicide? 7 levels of play, a most fascinating game.

Price: DRAGON £6.95, ZX81 £4.50. Spectrum £5.50.

5. WARLORD.

A challenging game of analytical skill, set in 13th Century Japan. You control a village and must meet attacks from other armies, combat challenges from other warlords and their Samurai, attack and defeat pirates, make raids for gold or slaves and feed your village.

Price: ZX81 £4.50, DRAGON available December.

Cheques and PO's please, made payable to: M.C. LOTHLORIEN,
4 Granby Road, Cheadle Hulme, Cheadle, Cheshire SK8 6LS

ZX SPECTRUM POCKET BOOK

160pp £6.50

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

Programs

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

Hints & Tips

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

Machine Code

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

Also Available

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

Cassettes for ZX81

Prices include VAT

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

PHIPPS ASSOCIATES

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

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



Import controls demand grows

DEMANDS for import restrictions on micro-computers are growing. They are based on the fears of British producers of a Japanese invasion similar to that which which has resulted in the decline of so many industries in the U.K.

"There are increasing demands among our members for some kind of reaction to the threat from Japan, "says David Broad. chairman of the British Micro Manufacturers' Group.

He accuses Japanese producers of unfair competition. "They have help with their development costs from the government and also further assistance to allow them to undercut producers here," he adds.

Broad, who is also chairman and managing director of micro manufacturer Comart, says that although companies in the group are young and growing fast, help is needed to ensure that the British industry continues to grow. No direct help is available from the Government, so some form of import restriction is needed.

BMMG is a group of 21 of the leading companies in microcomputers, including Sinclair Research. As the fears have grown, a number of new machines have been announced by Japanese companies. The latest is Sanyo, which is launching three machines.

The PHC-25 is the biggest and is aimed at the same people who would be considering buying a Spectrum. It has 16K of on-board RAM, can have nine colours on the screen at one time, has touchpad keyboard, and costs £150.

Its 16K has 14K available to the user, unlike the Spectrum, which has only 9K. The RAM required for the display has been reduced because the machine includes a special memory area, called video RAM, which contains the screen display.

Unlike the Spectrum the Sanyo can control a tape recorder directly from a program. It also has extensive Microsoft Basic.

The PHC-10 is a battery-powered £60 training computer with a single-line liquid crystal display and no provision for television display. The other machine, the PHC-20, has 4K RAM with no colour and will cost about £100.

The range is being marketed by Logitek of Chorley, Lancashire. No date has been fixed for the launch but it is expected to be soon.

ZX-81 in kitchen

ANYONE still worrying about whether the ZX-81 has any practical uses should visit Milton Keynes. The Development Corporation has built a house for the future and in the kitchen a ZX-81 can be seen helping to manage the household.

The machine controls items such as deep-freeze stocks, recipes and shopping lists.

The house has been opened as part of the Corporation contribution to Information Technology Year. Its purpose is to illustrate the practical uses of information technology in the home.

Apart from the Sinclair machine, a wide variety of other companies have products on view indicating a full range of the technology available for the home.

The house is at The Pavilions, Cottisford Crescent, Great Linford, Milton Keynes and is open from Thursday to Sunday from noon until 6pm until April 4.



ZX-81 in the Information Technology Year house at Milton Keynes.

Sinclair Research message spreads

THE MESSAGE of Sinclair is spreading quickly all over the world. On the basis of sales of *Sinclair User*, ZX-81s are being plugged into television sets throughout most of the developed and developing world.

The magazine now sells about 4,000 copies each month overseas. The largest number goes to the Scandinavian countries — Sweden, Norway, Finland and Denmark — with the next major area of sales being France and the Benelux countries — Belgium, Netherlands and Luxembourg.

Benelux and Scandinavia are areas where *Sinclair User* has been read almost from the first issue in April. Much of the rest of the world has been convered by agreements with distributors in the last few months.

The magazine now goes to the Far East, the Middle East — mainly Saudia Arabia — most parts of Europe, North America and South Africa. The major exceptions are West Germany and Australasia.

Terry Cartwright, managing director of ECC Publications, which publishes *Sinclair User*, says that as yet sales in the U.S. are not very great but he expects them to improve in the next few months as sales of the Timex Sinclair 1000 grow.





Contest craze rising

A NEW CRAZE for selling competition tapes seems to be growing, with Artic and Automata setting the pace. A £10,000 cash prize is being offered to the first person who completes the new Artic Computing game, **Krackit**, successfully.

The money is being offered jointly by Artic and a Canadian company, International Publishing and Software, which is organising the competition.

The cassette has rules on side one and the game on side two. It consists of 12 riddles, graded by level of difficulty.

Pimania, from Automata Cartography, is part of the growing mass of adventure software. Christian Penfold, the programmer behind the project, stresses that it is more than a game.

The idea is based on Kit Williams' book, *Masquerade*.

Spectrum on time?

SPECTRUM order delays are a thing of the past. That is the official comment from Sinclair Research after a summer in which some people have had to wait more than four months for their machines.

A spokesman said that orders being placed at the end of October were being met within 28 days and the backlog from before that was expected to be cleared by the first week of November.

He added that the special offer to readers of *The Observer* at the end of October would not affect the speed with which the backlog was being reduced.

He added that the company is trying to increase output to be ready for the launch overseas in the early months of 1983.

To help increase output Sinclair has appointed a further sub-contractor, Thorn-EMI at Feltham, Middlesex. The company and Timex in Dundee are said to be making 30,000 Spectrums a month.

Meanwhile, Sinclair's other new products are expected to be on sale sometime in the new year. The most accurate estimate anyone is willing to give is that the Microdrive and the RS232 interface will be appearing in the first three months of 1983.

Launch of Oric is postponed

A NEW microcomputer released every month was the forecast for the end of this year but it now looks as if prospective buyers will have to wait until next year.

The problems began with the BBC microcomputer and spread to the Spectrum. Delays in- increased to several months and the queues of angry customers grew.

Now the new Oric One computer, which was designed for direct competition with the Spectrum, has run into difficulties. Peter Harding, sales director of Oric Products, says that the ULA for the computer had been designed to circumvent the kind of problems experienced by Acorn and Sinclair. The previous difficulties with ULAs have been overcome but now there is another problem. Oric has found that it has not produced sufficient to satisfy expected demand.

As a result of the delays, the Oric One will be launched in early December — not October as had been expected. Harding says: "I am absolutely confident that our shipping date will be firmly adhered to."

Second-hand market expanding

THE MARKET for second-hand ZX-81s is growing rapidly. One small company, Second Hand Sinclairs, has had a rush of orders since placing one advertisement in *Sinclair User*.

The business is run by Arthur Sampson, of Biscombe, Stroud, Glos. He says: "Most of the machines have been from people who wanted to upgrade to the Spectrum. I have been making about £15 on each machine and I am selling about three a week."

Sampson's business ran well for a time but soon he realised that demand for the machines was too great for him to handle. "Second Hand Sinclairs is something which I run in my spare time. I soon found that I had very little spare time left."

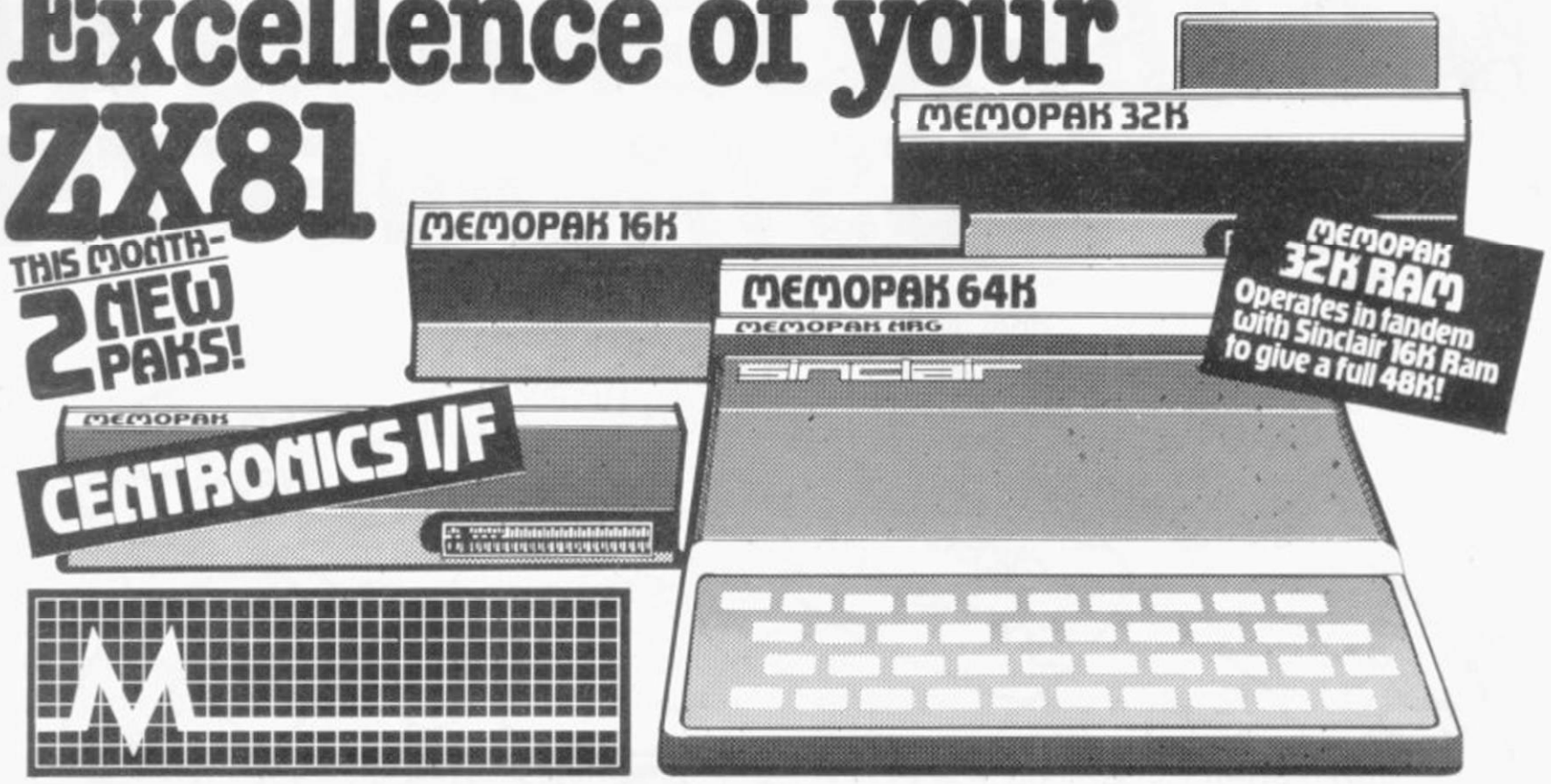
Second Hand Sinclairs stopped buying microcomputers for a time and Sampson tried to sell the stock which remained. Now he has decided to continue with the business for a period. He says:

"I am not making much profit. I may buy a 16K ZX-81 and 20 tapes but I may sell only the ZX-81 and a few tapes. For some reason the rest will not sell. That is the problem, I sell bits and pieces and the things which don't sell just pile up.

"I will not be advertising any more but I will deal with any custom I receive."

The prices of second-hand machines depend on the quality but, according to Sampson, buying a ZX-81 with RAM pack from a second-hand dealer can be cheaper than buying a new 1K unit from Sinclair.

MEMOTECH Explores the Excellence of your ZX81



THIS MONTH- 2 NEW PAKS!

Memotech's Memopak Range

All five of the currently available Memopaks are housed in elegant black anodised aluminium cases, and are styled to fit wobble-free onto the back of the ZX81, allowing more add-ons (from Memotech or Sinclair) to be connected.

£68.70 plus VAT

MEMOPAK 64K MEMORY EXTENSION

The 64K Memopak extends the memory of the ZX81 by 56K, and with the ZX81 gives 64K, which is neither switched nor paged and is directly addressable. The unit is user transparent and accepts commands such as 10 DIM A(9000).
Breakdown of memory areas...0-8K-Sinclair ROM. 8-16K-This area can be used to hold machine code for communication between programmes or peripherals. 16-64K-A straight 48K for normal Basic use.

£43.43 (32K) / £26.00 (16K) plus VAT

MEMOPAK 32K and 16K MEMORY EXTENSIONS

These two packs extend and complete the Memotech RAM range (for the time being!) A notable feature of the 32K pack is that it will run in tandem with the Sinclair 16K memory extension to give 48K RAM total.

£52.00 plus VAT

MEMOPAK HIGH RES GRAPHICS PACK

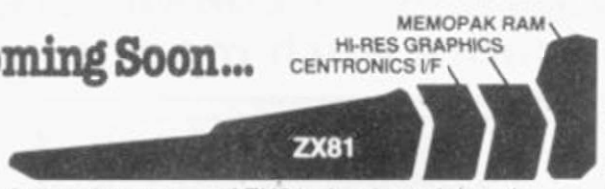
HRG Main Features — • Fully programmable Hi-Res (192 × 248 pixels) • Video page is both memory and bit mapped and can be located anywhere in RAM. • Number of Video pages is limited only by RAM size (each takes about 6.5K RAM) • Instant inverse video on/off gives flashing characters • Video pages can be superimposed • Video page access is similar to Basic plot/unplot commands • Contains 2K EPROM monitor with full range of graphics subroutines controlled by machine code or USR function

£34.70 plus VAT

MEMOPAK CENTRONICS TYPE PARALLEL PRINTER INTERFACE

Main Features — • Interfaces ZX81 and parallel printers of the Centronics type • Enables use of a range of dot matrix and daisy wheel printers with ZX81 • Compatible with ZX81 Basic, prints from LLIST, LPRINT and COPY • Contains firmware to convert ZX81 characters to ASCII code • Gives lower-case characters from ZX81 inverse character set

Coming Soon...



A complete range of ZX81 plug-in peripherals

Digitising Tablet **RS232 Interface**

We regret we are as yet unable to accept orders or enquiries concerning the above products, but we'll let you know as soon as they become available.

Access/Barclaycard Holders Please Tel. Oxford (0865) 722102 (24 Hrs)

© R. Branton & G.A.C. Boyd 1982

Please make cheques payable to MEMOTECH Ltd.

Please Debit my Access/Barclaycard* account number

*Please delete whichever does not apply

Please send me	Price	No	Total
64K RAM £68.70 + £10.30 VAT	£79.00		
32K RAM £43.43 + £6.52 VAT	£49.95		
16K RAM £26.00 + £3.90 VAT	£29.90		
HRG £52.00 + £7.80 VAT	£59.80		
CENTRONICS I/F £34.70 + £5.20 VAT	£39.90		
Packaging & Postage £2.00 per unit			
		TOTAL ENC	

SIGNATURE _____ DATE _____

NAME _____ ADDRESS _____

_____ TELEPHONE _____

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: Oxford (0865) 722102 Telex: 837220 Orchid G

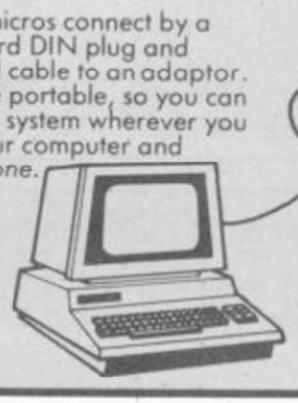
MORE IDEAS THA
MORE PROGRAMS THA
LESS MONEY THA



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.

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

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

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

MICRONET 800 is packed with ideas and information. And there's no waiting – you get programs straight down the phone line! Updates on operating systems . . . school and college programs . . . gobble man . . . invaders . . . business packages. They're constantly renewed. And hundreds of them are free: you simply turn on your micro, dial up MICRONET 800 and LOAD.

Sounds expensive? Here's the surprise!

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

- **Free Telesoftware:** Indexed by subject and by name of micro, a huge selection can be loaded down onto your computer.
- **Educational Exchange Library:** Schools and colleges are already preparing to display programs written by students and teachers, so many can benefit from them easily and economically.
- **Applications Guides:** Quick-reference guide by subject and by micro name shows you available applications software. You can move from the guide to further details held on the system if you wish.
- **Demonstrations:** Check through the features of the software packages that interest you – privately and without obligation. Order only if you're sure it's what you need.
- **Purchase 'Downloadable' Software:** Many 'telesoftware' programs can be bought from the system and loaded down direct to your micro. But don't worry – there's plenty of warning if any MICRONET service you're planning to use carries a charge.
- **Electronic Mail:** A mailbox service on Prestel allows you to exchange messages with other Prestel or Micronet users. Messages are held securely and only you can collect them.
- **Bulletin Board:** For an additional subscription you can operate your own bulletin board – club news, for example, like tips, swap-shop for second-hand items and so on.
- **Phone-In:** If you're away from your computer but need to send a message to another Micronet user – call the Micronet 800 service by phone and we'll send the message for you.
- **Prestel:** Over 200,000 pages of information on British Telecom's established service. Facts and advice on finance, business, entertainment, features and even direct bookings for travel, holidays, etc.
- **Product and Service Guide:** A constantly updated reference source – covering product comparisons, software reviews, dealership and price details and all the 'best buy' information.
- **Action Advertising:** Includes features, just like a magazine, including jobs and classified ads. If you've read an article that interests you, through MICRONET you can find out about the manufacturer, the dealers, the prices, and even order the product via your micro!
- **User Group News:** The Amateur Computer Club and many others like ALCC, BASUG, ICPUG, TUG, TRS 80 UG, will maintain their news and reference service on Micronet.
- **Big Prize Games:** Micronet offers a range of games and quizzes to keep you entertained and involved – and there'll be big prizes too!

SOUNDS FANTASTIC? THAT'S JUST THE START!

MICRONET 800 is a completely new service and we'll be adding to it all the time. Find out more about what Micronet 800 has in store for you: return this coupon TODAY and we'll send you a FREE FACTS FOLDER on Micronet 800 services and details of how you can join!

micronet 800

IT BRINGS YOUR COMPUTER TO LIFE!

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

SU8

☐ 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



Beginners' assistance is not appreciated

WHAT is going on at *Sinclair User*? I bought the October edition only to find on page 25 an article entitled A lifetime's obsession can easily be acquired, which also appeared on page 23 of the September edition and page 27 of the August edition. A very similar article also appeared on pages 50 and 51 of your May edition.

I would suggest that in pursuing this extraordinary editorial policy you are deliberately misleading those members of the public, including myself, who buy your magazine in good faith regularly, expecting to read a fresh set of articles each month and not the same stuff rehashed month after month.

The only explanation I can perceive for this bizarre situation is that the energies of your staff have been channelled virtually exclusively into the production of the supplement, *Spectrum User*. I would take this opportunity to remind you that the vast majority of Sinclair users are ZX-81 users and I suspect that this is also true of your readership.

By all means try to cater for Spectrum users but let it be within the format of the magazine and not in a 24-page supplement which can serve only to create a privileged minority within your readership.

M P Nadin,
Tuffley,
Gloucester.

• *The reason for including the regular Starting From Scratch spot is that with sales of the ZX-81 running at many thousands a month, there is always a large number of people who are still encountering all the problems most users had when they bought their machines.*

The article occupies one page which, in a total in the October edition of 39 editorial pages, is not a great deal to have to give up if it helps others to take the first steps to find how to enjoy their new machines.

As you will have noticed, in this issue we have decided to incorporate Spectrum User *within the rest of the magazine. While disagreeing that the vast, majority of our readers own ZX-81s, we felt that having a separate section limited our flexibility to bring you the best news on the whole range of Sinclair machines.*

Voucher alternative

ANY DAY now I will be receiving my Spectrum, of which I have heard some very good reports, but there is something which I find a little puzzling — the £10 voucher which can be used in part-payment for a ZX printer or to buy a complete pack of five rolls of printer paper.

Supposing I do not want a ZX printer or the rolls; surely the compensation for the delay is being reduced by £10? Why not permit the voucher to be used for any piece of ZX equipment, like some tapes, or part payment for the 48K RAM add-on?

S Chamberlain,
Melbourn, Herts.

• *Sinclair Research says that alternative methods for compensation were considered but it decided against offering the voucher for future products. As it had and has no fixed launch or availability dates it was felt that it would be unfair to customers. Also at the time the offer was made there was no Spectrum software available from Sinclair.*

More news from the ROM

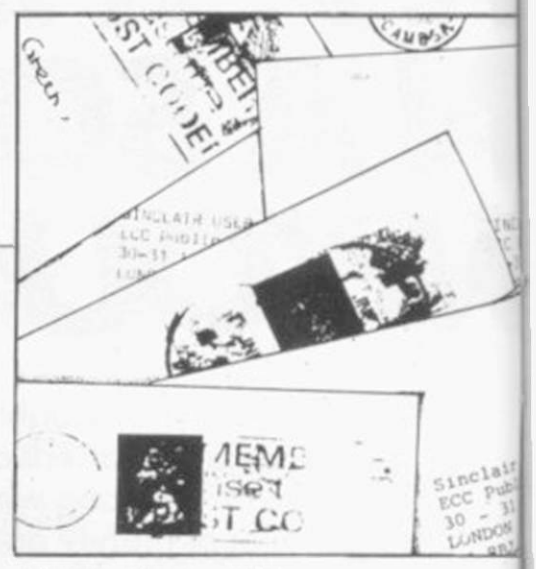
I WOULD like to make a few points about my Spectrum ROM article in your October issue, as I have now completed its disassembly.

A RST 10 is also used to output characters to the printer and microdrives, so to be sure of screen output, place at the beginning of any routine the instructions:

LD A,02h
CALL 1601 h

If the I register contains a number between 64 and 127, picture break-up occurs. That must be something to do with the ULA.

There is a misprint in the listing — the beginning



of line 30 should be 'DEF FN B$(A) . . .'

Andrew Pennell,
Cliftonville,
Kent.

Radio group still exists

I WRITE to inform your readers of the continued existence of the Sinclair Amateur Radio User Group which, despite an announcement that it will cease to function will, in fact, continue to function for the foreseeable future. SAROG, formed in 1981, was set up to provide radio amateurs with the means of sharing experience and expertise in the use of the Sinclair micros in amateur radio projects.

Achievements to date include the full implementation of Morse code transmit and receive in SLOW mode on the ZX-81 and the same functions are being sought in radio teletype. The same models are also being pursued with the Spectrum.

The group is non-commercial, non-profit — we sell nothing nor do we use advertising material. We share our information via a newsletter which usually runs to about 16 sides of A4 paper. It is hoped soon to produce it quarterly.

Membership is open to all licensed radio amateurs in the U.K. and Europe, though it is to be noted that we cannot ac-



cept members from the Americas. U.K. membership costs £5; non-U.K. residents should pay £8 in sterling only. Full payment details for non-U.K. enquirers may be had for 21RCs. All U.K. enquiries should enclose s.a.e. Telephone enquiries are not welcome.

Some countries may require extra subscription due to high airmail charges, if airmail is required. We cannot accept those with other micros.

May I say that the reason we are able to continue is in no small part due to the help obtained from some members who came to us originally from information supplied in an earlier issue of your magazine.

Paul Newman,
G4INP,
Sinclair Amateur Radio User Group.
3 Red House Lane,
Leiston,
Suffolk IP16 4JZ.

Home learning is best

SINCLAIRVOYANCE — September — drew attention to the dangers of home education. The concluding sentence — "At the moment, however, the problems of transferring learning to the home seem too great to be surmounted" would seem to be denied by the more than 700 members of Education Otherwise, most of whom are educating their children at home — otherwise than at school.

My view of the use of computers in learning is that they are best when used as aids to developing thinking and logical skills. Logo is an excellent example. The idea of using them for the kind of quiz games which seem so popular among writers of educational software at the moment seems little better than text books.

At a recent conference of Education Otherwise, attended by about 250 adults and 100 children, a room was set aside for a demonstration of computers and their uses. I was there with two ZX-81s and met a number of people who already use a computer for home education or were thinking of doing so. It seems computers certainly have a place in home-based education.

I must confess, however, that I see one of the main advantages in home-based education as being the greater availability of adults' time in such a situation. Compared to that, computers are a poor substitute.

One other point mentioned in Sinclairvoyance was that schools are a major stage in learning social skills. Most of my friends involved in home-based education would argue that most schools encourage the wrong kind of social skills — unhealthy competitiveness being mentioned by many — and that there are plenty of other places for social contact outside school.

C W Parker,
Toddington, Glos.

Music aid good value

IN THE October issue of *Sinclair User*, I feel that the article on the ZX-81 Multi-Sequencer entitled Roll over Beethoven was somewhat unfair in describing its instructions as incomprehensible. As a professional musician, I find the system easy and flexible to produce my own work and good value at £15.

Peter Hanson,
London SW7

Routine crashes

I HAVE owned a ZX-81 personal computer for 10 months, during which time I have had no problems with it. It was a surprise, therefore, to me that while entering machine code into a REM statement earlier this week that problems began to develop.

Until that moment, I had written considerable amounts of machine code for the computer with considerable success but it was the first time I had included the following two instructions in a routine:

126 LD a,(hl)
118 halt

The inclusion of the LD a,(hl) instruction in a REM statement holding a machine code routine resulted, on listing the statement, either in the truncating of the REM statement or the production of a flashing listing of the statement moving in a diagonal path down the screen.

Inclusion of the halt instruction in a REM statement led similarly to the truncation of the statement on listing although, in addition, that also produc-

continued on page 20

Leap improves calendar

I WAS interested to see William Mitchell's program Calendar — *Sinclair User*, October — as, several years ago, I wrote such a program for my Sinclair Cambridge programmable calculator based on the same method of calculation.

There appears to be an error in the program in that it calculates the years 1800 and 1900 as being leap years, which they are not. That results in an incorrect answer being given for the months of January and February of those years — try December 31, 1799 and January 1, 1800, which will be given as a Tuesday, for both dates. The program can be corrected by:

55 IF A = 0 AND B< = 2 THEN LET A = 1

That will have the effect of correcting the error, at line 90, of subtracting 1 for all years divisible by four without remainder.

Derek Brown,
Innsworth,
Gloucester.



continued from page 19

ed a four-digit number on the line following the statement. That number, I discovered later, appeared to be dependent on the character used to fill out the REM statement in the first place.

On demonstrating the problem to staff at my local branch of W H Smith, where I purchased it, I was promptly handed a replacement. Out of curiosity, I decided to carry-out the same demonstration test on the machine in the shop before taking it. To may surprise, it suffered the same problem as my original computer. Perplexed, a young assistant supplied me with five more computers to examine, all of which, on testing, had the fault.

G Mallet,
Maidenhead,
Berkshire.

● *We contacted Sinclair Research and the reply was that attempting to list a REM statement with code 118 and possibly 126 may cause crashing. The solution was either to avoid listing the REM or to POKE in the correct values before running the routine and POKE in dummy values afterwards.*

Taking a cool approach

REGARDING the letter from Marion Stubbs in the September issue about over-heating, I had the same trouble when I used my ZX-81 without the 16K RAM pack.

The voltage from the power pack often switches to almost 12V instead of 9V so that inside the ZX-81 the voltage regulator has to deal with a greater voltage dropping — 12V to 5V instead of the 9V to 5V. That resulted in greater power dissipation, so that heat emission of the connected cooling plate rose.

As the case of the ZX-81 has a smaller ventilation hole, much of the heat will remain inside the case.

My final solution was to place a voltage regulator between the power pack and the computer so that the voltage input was reduced to the voltage input of about 8V and own the computer remains very cool.

Paul Cauwe,
Bruges, Belgium.

Families branch out

THE LETTER from L Gross in the October issue of *Sinclair User* attracted a great deal of interest. Gerard Fitzgibbon of 8 Cedar Close, Wokingham, Berkshire and D Bradburn, of The Shieling, Wayside Road, Basingstoke, Hampshire replied that they had written programs on the subject. G.S Baker of 2 Grange Road, Sanderstead, South Croydon, Surrey wrote that a program was in preparation.

EXCLUSIVE sinclair user **OFFER!**

Save £1 on this fantastic new product

(Not due for general release until 1983)

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 (½K) of RAM**
- **Consists of 2 separate programs — KEYBOARD MONITOR and FAST LOADER**
- **Supplied on cassette with extensive documentation**

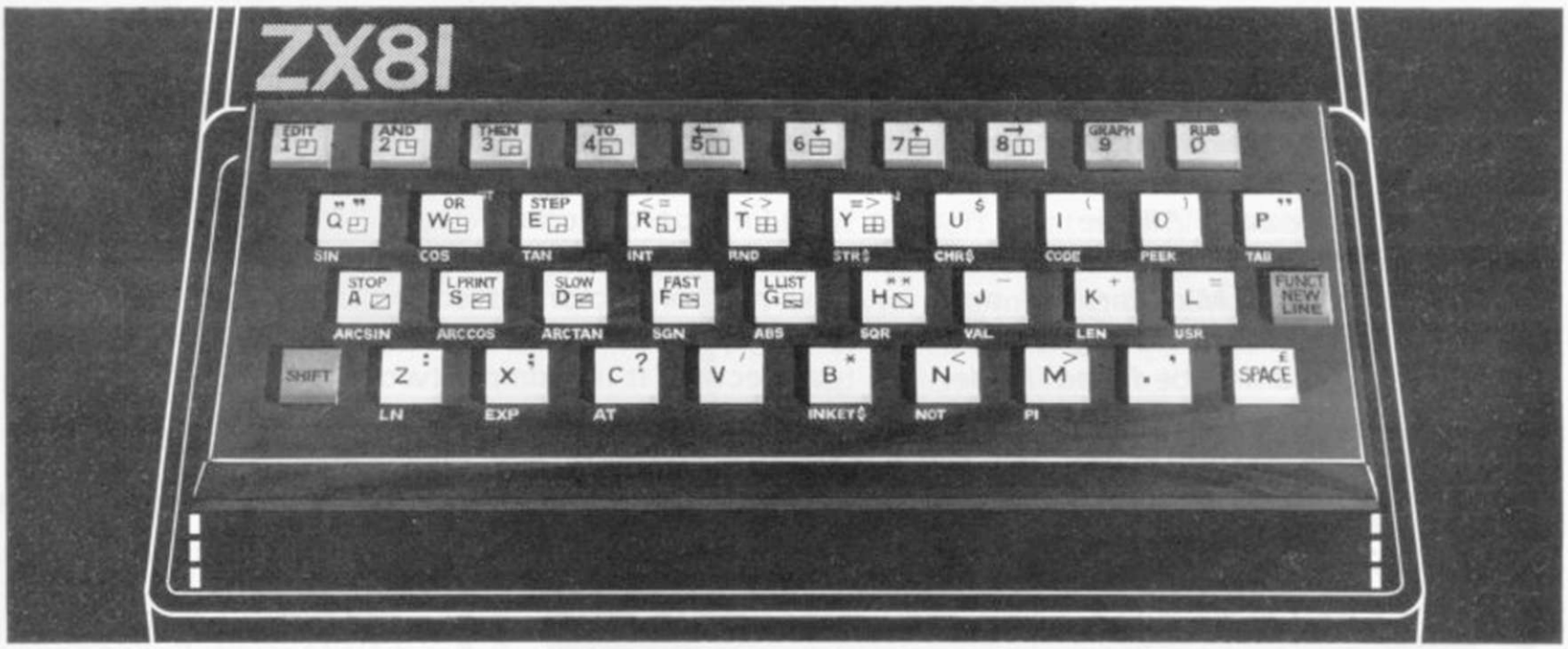
The I.P.S. "Fast Load" Monitor is the dramatic breakthrough in software needed to make serious use of the recent improvement in ZX81 hardware add-ons, such as 64K memory units.
Whether you use the ZX81 for business, education or recreation, the I.P.S. "Fast Load System" increases available computing 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.

ZX Fastload™

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 to 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

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



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

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

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

Cheques/PO made payable to Filesixty Ltd.

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

Total £_____ BLOCK CAPITALS

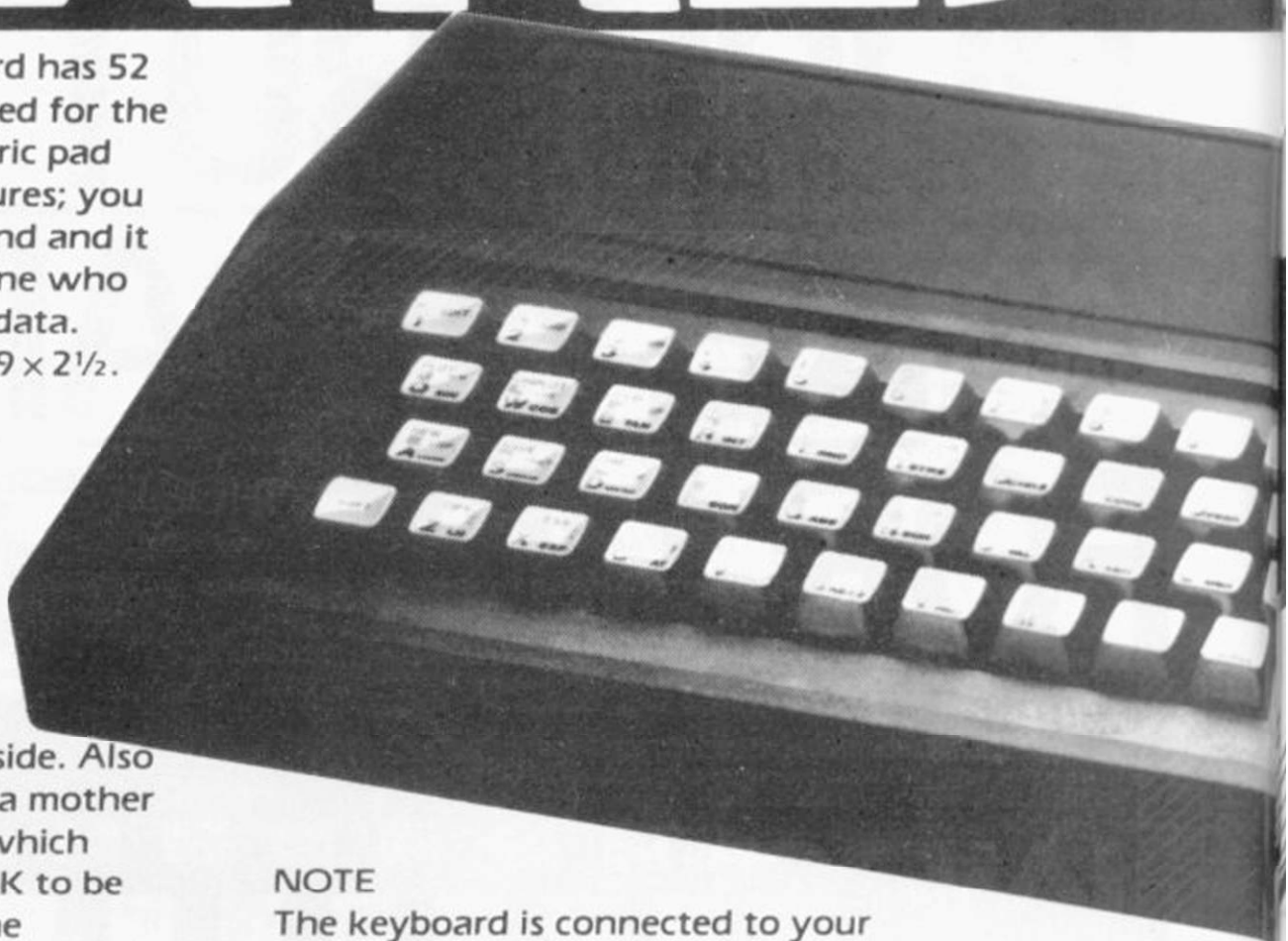
Name_____

Address_____

_____ SU2

FILESIXTY

ZX KEY



Our new cased keyboard has 52 keys, 12 of these are used for the numeric pad. The numeric pad offers some useful features; you can cursor with one hand and it will be a boon for anyone who enters a lot of numeric data. The case measures 15 × 9 × 2½. The computer (ZX81 or spectrum) fits neatly inside. Also fitted inside the case is a mother board (81 model only) which allows 16K, 32K and 64K to be fitted in the case. All the connections are at the rear of the case i.e. Power Mic, Ear, T.V. and the expansion port. The power supply could also be fitted inside. This means you have a very smart self-contained unit.

NOTE
The keyboard is connected to your computer by a ribbon cable and this has connectors fitted which simply push into the Sinclair connectors. It is a simple two minute job and requires no electronic skills or any soldering.

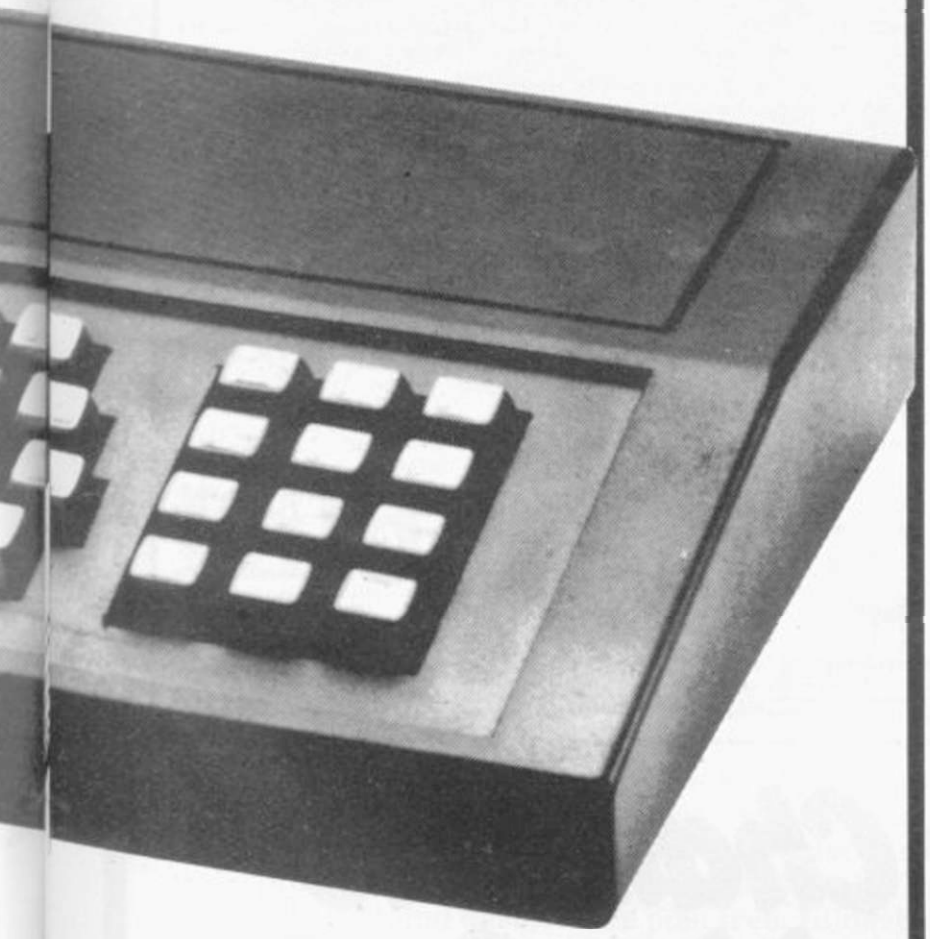
ZX81 ARCADE SOFTWARE
THE FOLLOWING EXCITING MACHINE CODE ARCADE ACTION GAMES ARE AVAILABLE FOR THE 16K ZX81 ★ CENTIPEDE ★ METEOR STORM @ £4.95 each

Fully cased with numeric pad	**£45**
Uncased with numeric pad	**£30**
Case	**£15**

- ★ 16K Ram Massive Add On Memory Fully assembled and tested £19.95
- ★ 64K Memory Expansion £49.95
- ★ 4K Tool kit full of utilities to aid the programmer in constructing and de-bugging

dk'tronics

BOARD



4K GRAPHICS ROM £29.95

The DK Graphic module is our latest ZX81 accessory. This module unlike most other accessories fits neatly inside your computer under the keyboard.
The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you an unbelievable 448 extra pre-programmed graphics, your normal graphic set contains only 64. This means that you now have 512 graphics and with their inverse 1024. This now turns the 81 into a very powerful computer with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there, it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder can be fitted with a 1K/2K/RAM and can be used for user definable graphics so you can create your own custom character sets.

THE FOLLOWING SOFTWARE IS AVAILABLE FOR USE WITH THE GRAPHIC ROM@£4.95 each
★ ASTEROIDS ★ CENTIPEDE ★ DEFENDER
★ SPACE INVADERS ★ METEOR STORM

E.Prom version for use with graphics Rom £9.96
Cassette Version £6.95
★ Flexible ribbon connector £10
★ Spectrum Memory Upgrade to 48K £35

SEND S.A.E. FOR INFORMATION PACKED CATALOGUE

WHY WAIT?
ORDER TODAY FOR FAST DELIVERY

23 Sussex Road,
Gorleston,
Great Yarmouth,
Norfolk.
(0493) 602453

Send off the coupon today or telephone Gt. Yarmouth for our answering service (available 24 hrs. a day 7 days a week) quoting Barclaycard or Access number).
Please add on £1.25 for P/P

Access BARCLAYCARD VISA

Please state type of machine which ROM/memory size quantity and price when ordering

Please send me ..... @£.....
Please send me ..... @£.....
Please send me ..... @£.....
Please send me ..... @£.....
Please send me ..... @£.....
Please add on £1.25 for P/P. I enclose £

Name .....
Address .....
.....
Cheque/P.O. payable to DK Tronics

SPECTRUM NEWS FROM ELR

EAST LONDON ROBOTICS

Just received your ZX SPECTRUM? No point in looking any further—we have the products you need at the prices you expect.

SP48
32K Memory extension
(giving total of 48K. Upgradeable to SP80)

£25

SP80
64K Memory extension
(giving massive 80K)

£50

Both the SP48 and the SP80 fit inside the Spectrum case, are fully compatible with all Sinclair add-ons (ZX Printer, RS232, Microdrive etc.), are very low in power consumption, require no soldering, are easy to fit and remove and carry our full guarantee.

Transfer your ZX81 BASIC and machine code programs and data onto your Spectrum in minutes with the fabulous new

ZX SLOWLOADER
£10

SOFTWARE PRODUCT OF THE YEAR

This superb piece of software enables your Spectrum to LOAD programs from ZX81 tapes and automatically converts them to 'Spectrumese' ready for normal Spectrum SAVEing.

ORDERS & ENQUIRIES

Send s.a.e. for **FREE** catalogue to East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London E6 4BT. Tel: 01-471 3308

Prices include VAT. Please tick if you require VAT receipt ☐

Please rush me	Item description	Quantity	£	p
			P & P	45

I enclose cheque/PO payable to East London Robotics for TOTAL £ _____

Name: Mr/Mrs/Miss _____ Address _____

EAST LONDON ROBOTICS—THE OPTIMUM SOLUTION

★NEW A 16K CMOS RAMPACK FOR ZX81

THE NEARLY IMMORTAL RAMPACK

CRAMIC-81

It lets you abolish the whir, click, wait and try again of ZX81 systems

Cramic-81 is a 16K memory module using chips made in a special CMOS technology which requires only a tiny amount of power to retain data when not actually in operation. A state-of-the-art, long life Lithium battery supplies this power in the standby mode. In the active mode, power is taken from the ZX81.

Used on its own it behaves just like an ordinary Rampack except that it can be powered down an removed from the ZX81, with program and data securely saved. Because of the adaptor on its rear, an ordinary Rampack can also be plugged on. The two Rampacks then occupy the same area of memory but a clever hardware/software implementation allows swapping of memories from your program, without changing links or switches. Two separate programs can actually run alternately with alternating screen displays. Most importantly 16K of data can be stored almost indefinitely and loaded almost instantly with a negligible probability of error.

Cramic-81 comes in an elegantly moulded lie-flat, ABS case with a cabled connector.

Price including P&P £79.95 + VAT

OTHER CAMEL PRODUCTS

MEMIC-81	A 2 K or 4 K CMOS memory unit	MEMIC-81	£24.95 + VAT
		MEMIC-81.2	£29.95 + VAT
MEMIC L/T	2 K CMOS units for a 2716/2732 Socket in any system		£26.05 + VAT
ROM-81	2 K - 8 K Eprom unit with or without Wait States		£14.95 + VAT
PPS	Cased 25 W pwr. supply 5V, 3A/12V, 1A/-12V, .25A		£44.95 + VAT

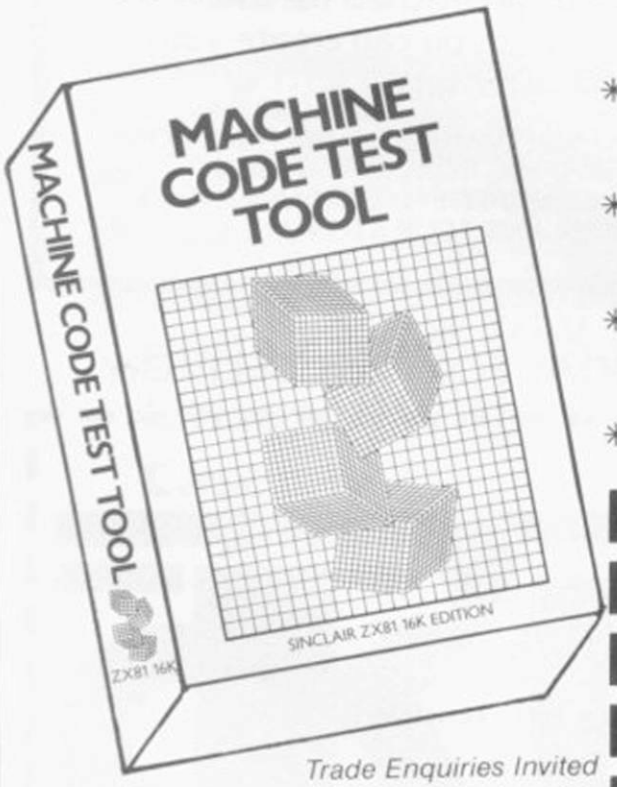
CAMEL PRODUCTS

Also NEW . . . . . Dream-81 . . . . . 64 K RAM a 64 K RAM expansion for the ZX81 with links for disconnecting memory in the 0-16 K area for other peripherals. Also EPROM socket for 2-16 K.

Price incl. P&P . . . . . £69.95 + VAT

Cambridge Microelectronics Ltd., One Milton Rd, Cambridge. CB4 1UY *tel (0223) 314 814*

At Last Your Chance To Crack The Machine Code



ZX81 and SPECTRUM OWNERS

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

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

Please send me . . . . . Machine Code Test Tools at £9.95 each

Tick box for edition required ☐ ZX81 ☐ SPECTRUM

Send cheque/postal order to above address

NAME . . . . . .

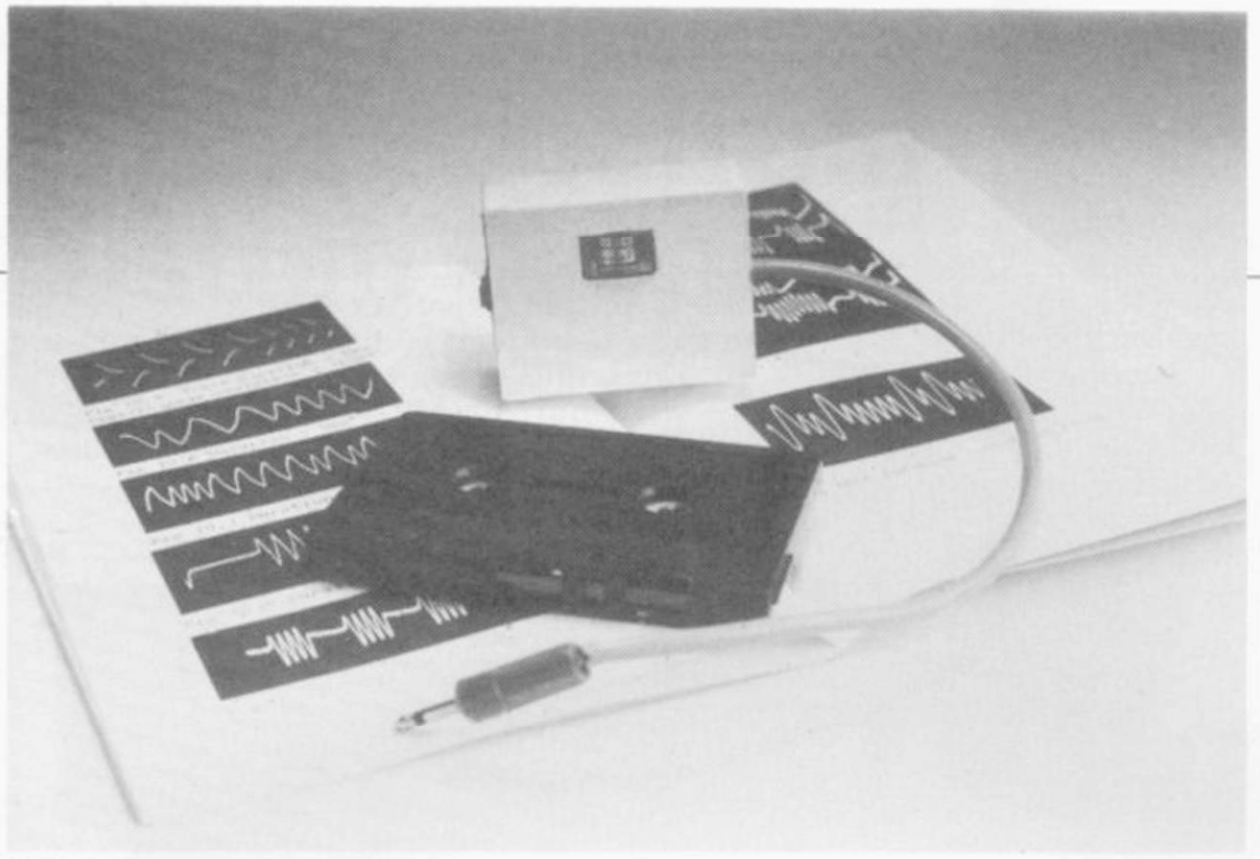
ADDRESS . . . . . .

. . . . . POSTCODE **ASUI23**

Allow up to 28 days for postage

Trade Enquiries Invited

Also available from most branches of
WHSMITH



Aids to good tape use from Hilderbay

Hilderbay aiming at tape users

HILDERBAY, which specialises in business programs, has produced three products for the tape user. The first and easiest to use is a level meter which allows you to LOAD the programs at a constant level and to identify tape defects, such as sudden changes in level.

The second is a book which explains how to get the best from your tape recorder and even hints on which one to buy. It also contains some very good tips on loading "unloadable" tapes. The third is a test tape which can be used to tune your tape recorder to its peak. That means that you may have to use a screwdriver but that is nothing to the confidence it gives you to know that it is not your tape recorder causing the problem.

All the products are first-class and very easy to use. The meter costs £5.95, the book £2.90 and the tape £4.90. Hilderbay also sells a tape recorder aligned and tested for £24. All prices include VAT and are post free. Hilderbay is at 8-10 Parkway, Regents Park, London NW1 7AA. Tel: 01-485 1095.

ZX-81 gets a home

ZX BUSINESS systems produces three products for housing the ZX-81. One stand houses the ZX-81, notepad and printer on the top, with the ZX-81 and RAM pack clamped to prevent wobble. On the lower level a tape recorder and cassettes can be stored. The unit measures 14in. × 10in. × 4in. and costs £17.50 inc. VAT.

The other two are cases, one made from birch plywood and the other in ABS plastic. Both hold the ZX-81/RAM/tape recorder securely. The plastic version costs £35 — 16¾in. × 13in. × 5½in — and the wooden one £27.50 — 20½in. × 13in. × 5½in. — from ZX Business Systems, 14 Brookfield Gardens, Ryde, Isle of Wight. Tel: 0983-65897.

Protection for software

A DEVICE called the Software Protection Unit will supply battery power for up to three hours on a basic 1K ZX-81 and 1.5 hours with the 16K RAM pack, Microbyte says. It will also stop crashes or errors due to mains fluctuations by using "high-speed detection and switching circuitry". What it consists of is two battery holders for AA cells — you supply the batteries at £3.34 per set — in a black box with a jack socket to take the power supply plug at one end and a power supply plug at the other.

The unit costs £8.60 inc. VAT and postage. It can be obtained from Microbyte, 19 Worcester Close, Lichfield, Staffs.

Microbyte software protection unit



Wood case by Kalenia

A WOODEN case made from birch ply is available from Kalenia Wood Products. There are models for the ZX-81 and the Spectrum. Both hold computer, manual, printer and RAM encased in plastic foam ready for use.

continued on page 26





continued from page 25

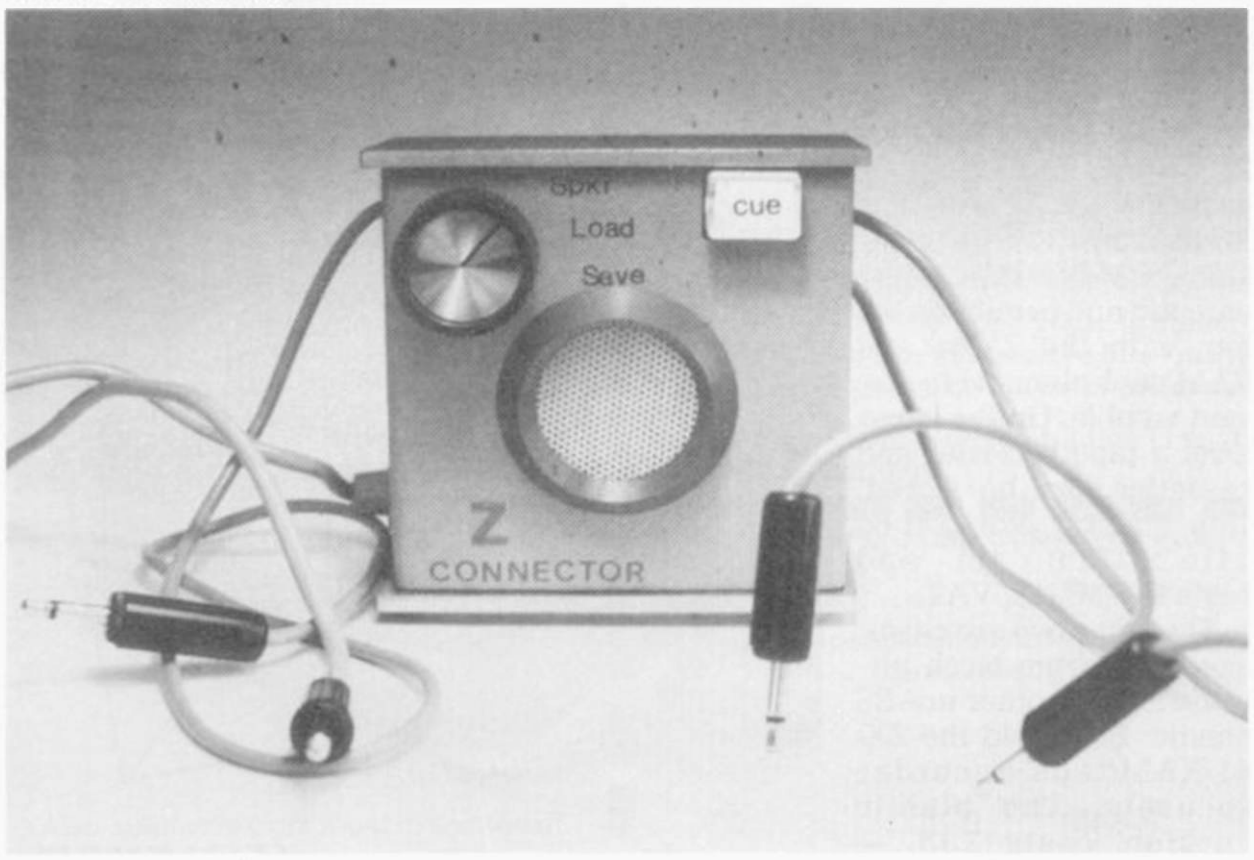
The cases cost £21 for the ZX-81 version, which can contain the printer or the tape recorder, and £22 for the Spectrum version, which also has space for the Microdrive. Kalenia Products is at 4-6 Auckland Street, Burslem, Stoke-on-Trent ST6 2AX. Tel: 0782 813533 (daytime only).

Cassette lead controller

THE OZ CONNECTOR is a strong aluminium box which contains a switch for controlling the cassette leads on your tape recorder for the ZX-81 or Spectrum. It will allow you to listen as a tape is being loaded and to speak an introduction to the program on tape. It requires no power supply and is robust. It has a built-in amplifier but has a socket at the side to disconnect the internal speaker and connect it to an external amplifier.

At £18 it is more expensive than the Abacus offering at £14.95. The OZ connectgor is available from J Incledon, Long Beach, Warren Road, Brean, Somerset TA8 2RR.

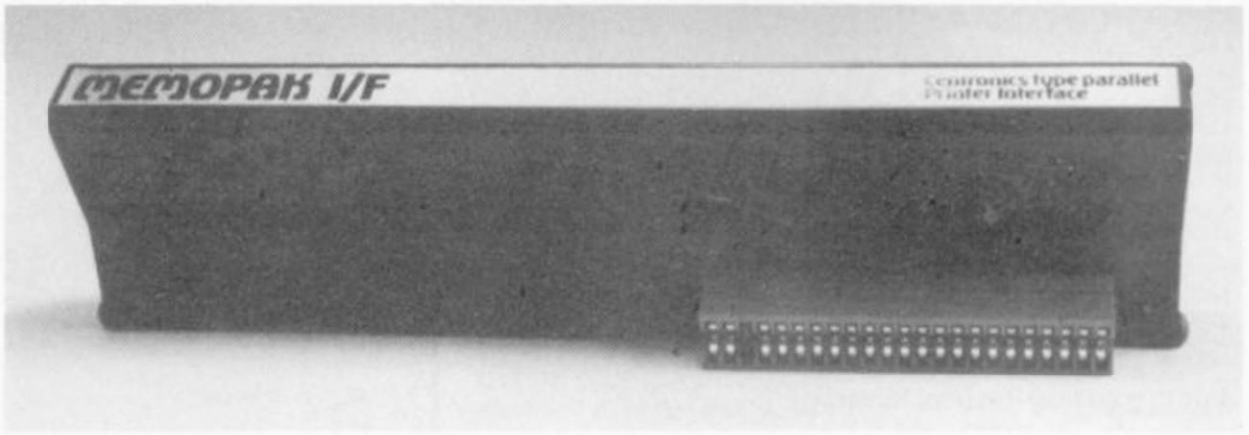
Cassette leads connector



Printer interface

MEMOTECH has produced a Centronics parallel interface for the ZX-81. It enables the user to use a proper paper printer to list from a ZX-81. The printer, however, will not print graphics, except with the hi-res pack fitted, or inverse characters. It changes all the inverse letters to lower-case and gives a code C error if invalid characters are used.

Control characters, which can produce double-width characters are available by prefixing a letter with an inverse dot. The commands are used are the ones in Basic — LLIST, LPRINT and COPY. A 2K ROM is included in the pack to do the conversion from Sinclair codes to ASCII, which the printer uses. A high-quality product but with limitations, the Centronics I/F costs £41.90 inc. VAT and postage from Memotech Ltd, 3 Collins Street, Oxford OX4 1XL. Tel: 0865 722102.



Memopak Centronics interface

Double port by Kempston

KEMPSTON Electronics now has a port which will work on both the ZX-81 and the Spectrum. It is I/O mapped and is operated by address bit 7, so it is free of any expansion by Sinclair. It has an 8255 interface chip which gives three ports programmable for input or output.

The output at the top of the board is via a 28-way PCB edge or DIL sockets and edge connectors can be used to connect the equipment. The 8255 presents a very light load on the data and address lines, which is a good idea. It requires either a mother board — £16.95 — or a stackable connector — £5.50 — to user it. It costs £16.50 plus 70 pence postage for one and £1 for two or more items.

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

ZX81 & Spectrum Custom Cases.

Just £34·95 (+P&P) each.







Turn your ZX system into a portable computing centre!

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

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

The portable computing centre in a briefcase.

A ZX Custom Case holds all your hardware in the most ergonomically sensible positions for easy operation. Each piece of equipment is gripped securely by shock-absorbing foam. Each connecting lead fits under the foam, so there's no chance of tangles. And as each piece is held firmly, connections are excellent.

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

Designed by ZX enthusiasts – for ZX enthusiasts.

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

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

ZX Spectrum Custom Case now available!



Send for your ZX Custom Case – now!

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

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

COMPUTEX CASES

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

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

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

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

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

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

Please debit my Access/Visa* account no. _____

*Please delete as appropriate. PLEASE PRINT.

Signature _____

Name: Mr/Mrs/Miss _____

Address _____

_____

_____

Reg. in England no: 991288. SUS 212

PENETRATOR



ANNOUNCING THE MOST EXCITING GAME FOR YOUR 48K SPECTRUM!

PENETRATOR is a state-of-the-art game for the 48K Spectrum. Your mission is to penetrate through four defence rings, and blow up an illegal cache of neutron bombs – an almost impossible feat!

Enemy missiles and radar bases track your movements, and the landscape is as treacherous as your enemies. This is where the unique feature of PENETRATOR comes in: you may redesign the landscape, add or subtract missiles and radar bases to suit your abilities!

This means that each PENETRATOR game actually contains hundreds of different games to keep you challenged and stimulated.

Other features are a training mode, superior graphics, excellent sound, and more!

PENETRATOR is written entirely in machine language, and takes up almost all of the 48K memory. If you have a 48K Spectrum, then you must have PENETRATOR in your software library.

Don't wait any longer: order PENETRATOR from your favourite software dealer or directly from Melbourne House. PENETRATOR is just £6.95 including VAT, and is only one of the many fabulous programs available from Melbourne House.

Other cassette software includes THE HOBBIT, a 48K super-program like no other before, encompassing all the features of J. R. R. Tolkien's book – £14.95 including VAT.

Spectrum books include: Over The Spectrum – £6.95. Spectrum Machine Language – £6.95. Understanding Your Spectrum – £7.95.

Melbourne House Publishers SU12
Orders to: 131 Trafalgar Road, Greenwich, London SE10.
Correspondence to: Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 7NA.

Please send me:
☐ Penetrator @ £6.95
☐ Other .....
(Please add 80p post and pack)
☐ Spectrum Catalogue

Name .....
Address .....
.....
..... Postcode .....

Dealer enquiries welcomed. Phone 01.6921475 and ask for a Melbourne House operator.

MELBOURNE HOUSE PUBLISHERS

Illustration includes actual photographs of Spectrum screens.

THE

BUFFER

OPEN TUES. TO SAT.
10.30am to 5.30pm.

MICRO SHOP

(NEXT TO STREATHAM STATION)

★ ★ ★

OLDEST SOFTWARE SHOP EXCLUSIVELY FOR

ZX81 & SPECTRUM

PROGRAMS, GAMES, "ADD/ONS"

★ ★ ★

MOST OF THE MAIL ORDER ITEMS ADVERTISED IN THIS MAGAZINE AVAILABLE OVER THE COUNTER

★ ★ ★

LOADING PROBLEMS? TRY OUR INTERFACE
BUSINESS & TECHNICAL DATA HANDLING PROGS.
PROPER KEYBOARDS; CONSOLES; VDUS

★ ★ ★

374A STREATHAM HIGH ROAD,
LONDON SW16
Tel: 01- 769 2887
S.A.E. APPRECIATED FOR CATALOGUE

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, KALEIDESCOPE, 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. Greye's 3D MONSTER MAZE would be the one without doubt" . . . . ZX COMPUTING. *"Brilliant, brilliant, brilliant!"....POPULAR COMPUTING WEEKLY*

GAMESTAPE 5 for 16K _____ **only £4.95**
***3D DEFENDER** The Ultimate Space Game. Super fast Machine Code 3D version of the Arcade favourite. You have to save your home planet from the marauding Alien Spacecraft. This is all in 3D, your viewscreen shows you the view out of your fighters cockpit window. The backdrop moves when you turn, or fly up or down (8 flight directions), just as if you were really flying it! But then YOU ARE! The Enemy Saucers will actually zoom towards you in 3D, and shoot you if you let them! Your display includes Score, Shield Strength, Altitude, Proximity, Forward Radar and your viewscreen, which shows your rotating home planet, backdrop of Stars, Meteors, Explosions, Plasma Blasts, your Photon Beams, up to 4 Enemy Saucers and of course its all in full 3D!
A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!





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

GAMES MARKED * INCL. MACHINE CODE.
Prices include VAT and U.K. P. & P.
(Add appropriate Postage on Foreign Orders). Cheques/P.O.s to

J.K. GREYE SOFTWARE LTD
DEPT. SU.,
16 Brendon Close, Oldland Common, Bristol BS15 6QE
CREDIT CARD SALES: Phone: 01-930-9232 (9 a.m. - 7 p.m.)
FOR INSTANT DESPATCH

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

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

TRADE & EXPORT ENQUIRIES WELCOME

ZX81 + ADD-ONS + ZX SINCLAIR STOCKIST

and DCP packs

Cambridge Computer Store

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



Ap Pandaal sorts his way through the serials and the parallels to get copies

Getting the better of the ZX printer

WHEN the Sinclair printer was introduced, it was regarded as a real breakthrough both in design and price. Since then, the price has been increased from £49.95 to £59.95 — perhaps to offset the price reduction of the 16K RAM pack and because the special metallised paper has proved to be expensive to use.

Since the printer draws its power from the ZX-81 power supply, that has caused problems due to the heavier current consumption, even though a bigger transformer capable of providing 1-2 amps is provided free by Sinclair with every printer sold; sometimes, a helping hand has to be given to pull through the paper while it is printing.

Those shortcomings prompted several independent companies to find other ways of providing hard copy. Before examining them it is worthwhile looking at the problems involved in transferring information or data from the ZX-81 to a printer.

The keywords LPRINT, LLIST and COPY are subroutines contained in the ROM, so entering one of those keywords from the keyboard is a jump to the relevant section in the ROM.

The LLIST command looks at the section of memory where your Basic program is stored and transfers the contents for forwarding to the printer. That process is very complex, since the program is not stored as simple characters but in a much shorter form using tokens to represent the keywords.

Those tokens have to be 'blown up' by the ROM to form a keyword before they can be sent to the printer. Sinclair uses a non-standard way of representing characters which would not be recognised by a printer other than its own. The industry standard, ASCII, ensures that the alphabet, numbers and other characters are each represented by a fixed number, for instance A to Z have the numbers 65 to 90.

There are also standards for connections to printers, two of the popular ones being Centronics parallel and RS232C serial.

In simple terms, a parallel data transfer means that the eight data bits which comprise a character are transferred all at once, while in serial transfer the bits are sent one after another. Parallel transfer therefore is much faster but fewer wires are required for hooking-up a printer with a serial transfer method. Not surprisingly, Sinclair has its own standard which is largely the result of economies in design.

At present there are four companies which have designed interfaces for linking the ZX-81 to a printer:

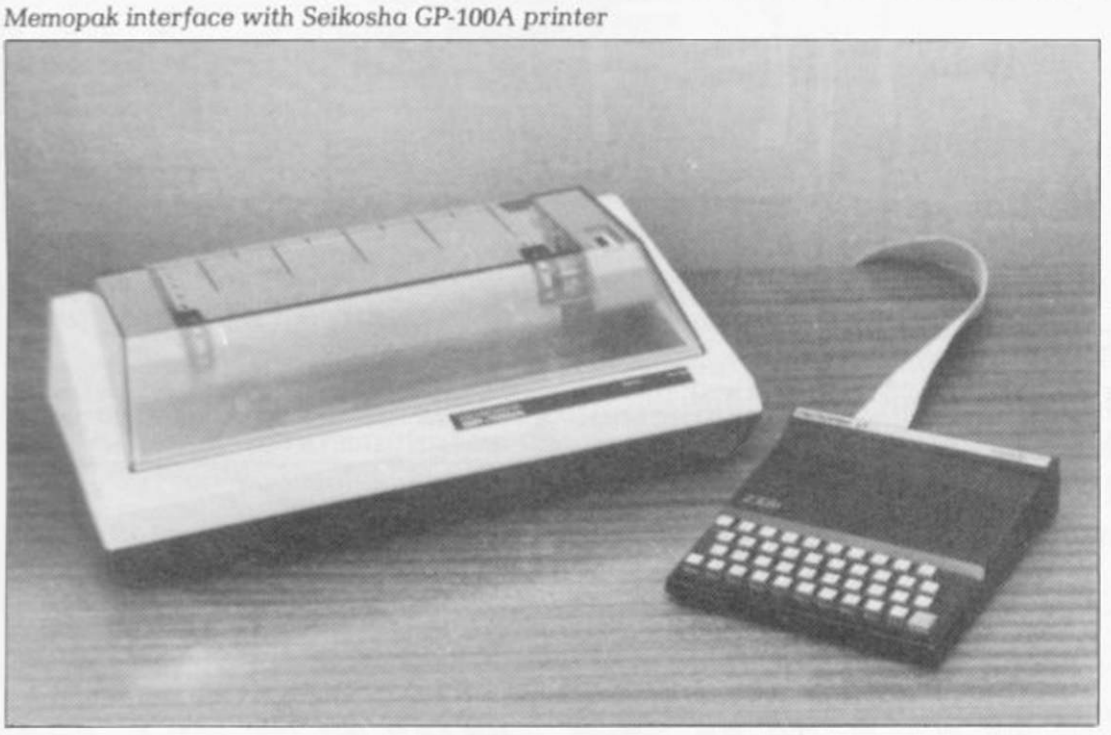
Company	Interface	Handshake	Price
Cobra	RS232C	Yes	£29.95
Data-Assette	RS232	No	£49.95
Memotech	Contronics	Yes	£39.90
Capital Computers	RS232/ Centronics	Yes	£39.95

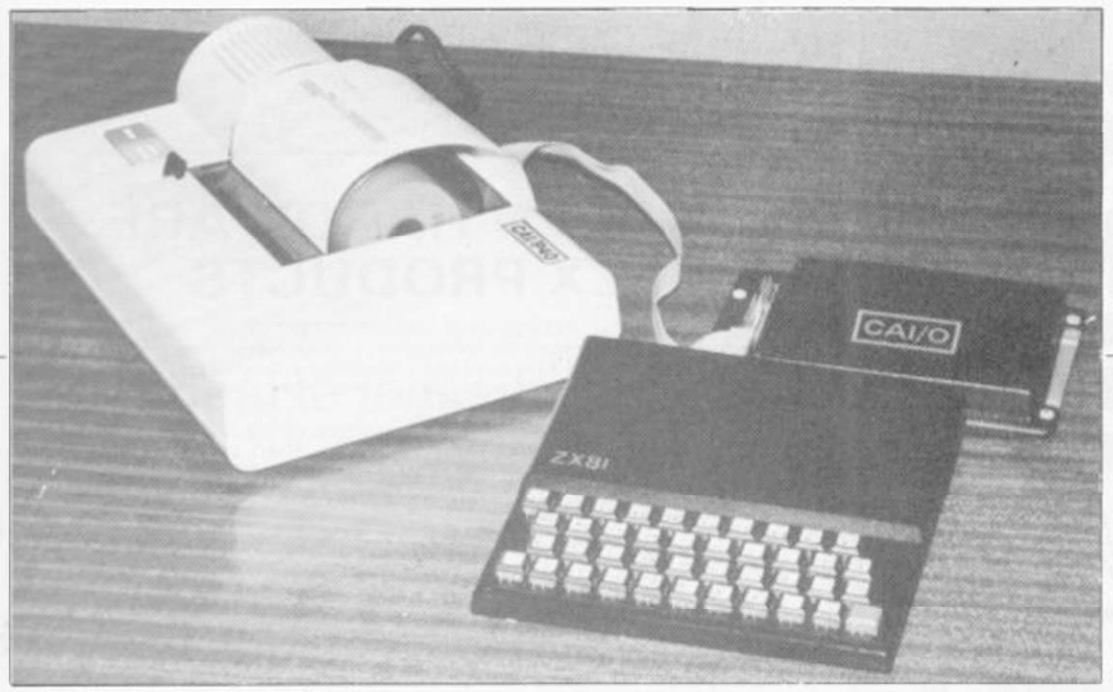
The significance of the handshake column is that the speed of data transfer is restricted — up to 300 baud — if handshake is not provided.

The Cobra interface is contained in a neat black box which plugs into the back of the ZX-81. There are two jack sockets on the side of the interface, the bigger one being the serial output while the smaller one is for handshaking. The interface contains a 2716 EPROM, located between 2000 hex and 2FFF hex. In the EPROM are the routines which provide program and data listings. A four-page instruction manual is provided by Cobra which describes how to connect it to a printer.

The interface does not use the Sinclair keywords LLIST and LPRINT but uses a USR call to its own EPROM. Before a program can be listed, the format of the output has to be set by using a table or the manual. It is possible to list a program, list a string of data and also to type in lower-case by using the inverse characters. Unfortunately, there is no way of obtaining a screen copy.

Memopak interface with Seikosha GP-100A printer





Dean Electronics thermal printer

The ZX-99 made by Data-Assette works in a similar way but is not a true RS232C, as it is not capable of monitoring the status of the printer, since it has no handshake facilities and can therefore operate only at up to 300 baud on most printers. Although more expensive than the Cobra, it provides extra facilities for tape handling.

Capital Computers also markets a combined RS232C and Centronics interface for use with its motherboard system. It has not been possible to test the interface for this survey but it operates on the Sinclair keywords LLIST, LPRINT and COPY. The interface is said to be bi-directional, thus allowing full communication between other intelligent devices.

The Memotech interface is neatly-packaged in a black aluminium case which is similar to RAM modules. The version supplied was designed to be used exclusively with a Seikosha GP100A 80-column printer but the later versions have a small hardware modification to allow them to work any Centronics-type printer.

As well as providing listings in upper- and lower-case, using inverse characters, the interface also allows double-width printing, which is achieved by sending control characters to the printer.

It is also possible to print up to 80 characters on a line by sending-out the relevant control character. A flat 34-way ribbon cable connects the interface to the printer, the two ends plugging-in. It is not possible to print the Sinclair graphics since they are not standard ASCII but the high-resolution module can be used with the interface to print graphs plotted in high resolution.

The unit is easy to use, since the standard keywords are used to list, print and copy and that is a great advantage over some of the other interfaces which have to make use of variables for their operation.

Other than the Sinclair printer, there are only three known printers which have been designed for use on the ZX-81. Dean Electronics markets the model 81 thermal printer which costs £110.97 including the purpose-built interface, a roll of paper, postage and VAT. The printer uses 4.2in. wide thermal sensitive paper and is capable of printing up to 40 columns. The only controls on the printer are power and paper advance.

The interface is contained in a rather over-sized black case. That seems strange, since the interface printed circuit board is populated largely with empty IC sockets, perhaps to allow future use with other computers.

Another annoying feature is that the cable from the interface to the printer is so short that it is difficult to plug or unplug the power, cassette and TV leads to the ZX-81, since the computer has to be to the right of the printer, which gets in the way of the leads.

That apart, the instructions provided with the printer are clear and easy to follow. It is possible to list, print a string of characters and perform a screen copy, both in normal mode and enhanced mode, which means that the characters are printed at twice their height. The printer prints faithfully all the Sinclair character set, including inverse and graphics. That is achieved by using variables in conjunction with USR calls.

It is not possible to copy the screen directly from the keyboard, since the display file is cleared. The only way to deal with that problem is to put the USR call in the program in such a position that the screen is filled first.

The Amber 2400 is a plain-paper dot matrix printer costing £105.24 including interface cable, paper, postage and VAT. The paper rolls are 2¼in. wide, which allows up to 24 characters to be printed in normal mode. The printer can be used in serial or parallel mode with a variety of computers but, sadly, it is extremely difficult to use with a ZX-81.

Amber is the first to concede that the interface provided is not the complete package you need for use on ZX-81. The main reason is that the driving software is not provided in an EPROM as it is on the other interfaces mentioned, but has to be loaded separately from a cassette.

That software has the task of converting the non-standard internal character codes into ASCII and also checking the status of the printer. It is not possible to obtain listings or a screen copy. There are, however, routines to allow the printer to be used with a Spectrum, which is much easier to interface, since it uses ASCII codes.

'As the printer draws its power from the ZX-81 power supply that has caused problems due to the heavier consumption'

Amber Controls Ltd, Central Way, Walworth Industrial Estate, Andover, Hampshire.
Capital Computers Ltd, 100 Church Street, Luton, Beds LU1 3JG.
Cobra Technology Ltd, 378 Caledonian Road, London N1 1D7.
Data-Assette, 44 Shroton Street, London NW1 6UG.
Dean Electronics Ltd, Computer Printer Division, Glensdale Park, Fernbank Road, Ascot, Berkshire.
Memotech Ltd, 3 Collins Street, Oxford OX4 1XL.



POWERMICROPOWERPROGRAMPOWERMICROPOWERPROGRAMPOWERMICROPOWERPROGRAMPO



Nigel Searle looks to the future

Carrying memory in your pocket



IN 1964, as an undergraduate, I saw a computer for the first time. It was an IBM 1620. I spent a good deal of time, much of it late at night, using that machine during the next two years. I realised that the IBM 1620 represented a considerable advance over the technologically primitive computers of the late 1940s and 1950s and I gave some thought to the directions in which future improvements might lead.

I did not imagine, however, that 18 years later a small company called Sinclair Research would have sold more than one million computers and that the biggest-selling model, the ZX-81, would offer computer power similar to that of the IBM 1620 for less than £50. Still less did I imagine that I might be involved in running that company.

Obviously, the 18-year period from 1964 to 1982 has been one of enormous change. Another 18 years will take us to 2000, a suitable target for predictions about the future. What will personal computers be like in 2000? For what will they be used?

If Sinclair Research has anything to do with it, as it intends it should. The personal computer of the future will be small and inexpensive. Sufficiently inexpensive that anyone who has a use for one, and that might be everyone, will be able to afford it. As for size, it will certainly fit in your pocket and it may even be as small as a credit card.

There will be no keyboard. Instead you will communicate with your computer by speaking to it. You may have to adhere more strictly to rules of grammar and pronunciation than in human-to-human speech but even that requirement eventually will disappear and, as Sinclair advertisements for the ZX-81 say, "Inside a day, you'll be talking to it like a friend".

You will also be listening to it like a friend. A principal means of computer-to-human communication will by synthesised speech. It will also employ a flat, colour, high-resolution display to output information in graphic and alphanumeric form.

That small device will have a massive memory containing just about anything you might want to know in the way of general data about the rest of the world, as well as any amount of personal information which you have instructed it to remember for you.

The resident software in your personal computer will enable it to organise its memory so that accurate, rapid retrieval is possible. It will also be able to reason — to make logical deductions from what it knows — and also to induce new facts, attempt to verify them, and to assess their plausibility.

> 'You will communicate with your computer by talking to it'

In terms of intelligence, it will be human-like but will far surpass the speed and capacity of the human brain. It will lack a body, consciousness and emotion. The latter two might be simulated eventually but why one would want a machine which was, or appeared to be, conscious and have emotions is not clear. On top of that the personal computer of 2000 will also serve as a portable telephone, enabling you to communicate with any other computer owner anywhere in the world.

Perhaps more important, you will be able to talk not just to another person but to his computer; and your computer will be able to communicate directly with his computer, perhaps without either of you being aware you are doing so.

A typical use might go something like this:
Fred to computer: "What time is Bill getting back today?
Computer: "Bill who?"
Fred: "My brother Bill".

Computer searches its memory for information about brother Bill's travel plans for today.

Finding no such information in its memory, Fred's computer sends a message via satellite to Bill's computer, which recognises Fred's code number and gives him access to the semi-private parts of its memory.

Bill has not told his computer when he is travelling, so:
Bill's computer to Fred's: "I don't know; do you want me to ask him?"
Fred's computer: "Yes, please"

These are not spoken but digitally-encoded communications.

I hope *Sinclair User* will let me write a second article in 2000 to review the next 18 years. Perhaps I shall be lying on a beach somewhere and I will just ask my computer to write it.

Nigel Searle is head of the computer division of Sinclair Research.

THE THOUGHT PROCESSOR

MiCROL© SPECTRUM

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

£9.95

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 command — Display File Memory Map — Important PEEK and POKE locations you won't find in your Spectrum manual. Program Design Aids:–ScreenDesigners, 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. POWERFUL. RELIABLE. AND ONLY FOR 48K 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.

THE THOUGHT PROCESSOR

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/12

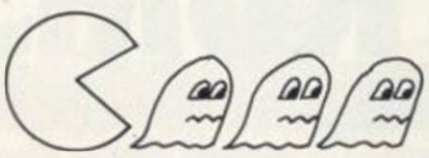
Credit card holder's signature .....

SPECTRUM COMES TO LIFE !

ABBEX

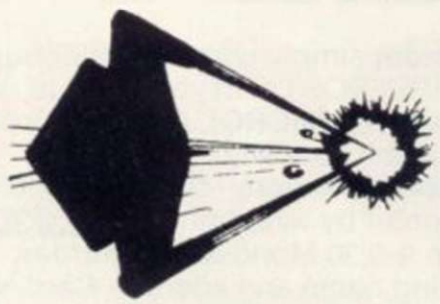
THE GAMES PEOPLE

SPOOKYMAN



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

COSMOS



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

ABBEX ELECTRONICS LTD

20 ASHLEY COURT, GREAT NORTHWAY, LONDON NW5

Tel: 01-203 1465

PLEASE COMPLETE IN BLOCK CAPS
NAME (Mr/Mrs/Miss).....
ADDRESS.....
(CARD HOLDERS).....
POST CODE..... PHONE NO.....

Make cheques payable to ABBEX
I enclose my cheque for £

I wish to pay by ☐ CHEQUE ☐ VISA ☐ ACCESS ☐
Please debit my creditcard a/c
NUMBER ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signed.....
date.....

Please send me the following
(Allow 14 days for delivery)

POST BY DEC 8th and receive your order in time for Christmas

☐ **SPOOKYMAN**
PRICE £4.95

☐ **COSMOS**
PRICE £4.95



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.

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 .....

.....



*SPECTRUM MONITOR
*SPECTRUM EDITOR/ ASSEMBLER
*ZX81 SCREEN KIT 1
*ZX81 ZX-MC *ZX81 REMLOAD

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, DEFS, DEFL, EQU, DEFM. WE CANNOT FULLY DESCRIBE THIS IMPORTANT UTILITY HERE, AND ASK YOU TO SEND A S.A.E. FOR COMPLETE DETAILS OF THIS AND ALL OUR PROGRAMS. **£8.50**

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

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

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

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

PICTURESQUE



ZX Spectrum — ZX81

In 1981, ACS Software published ACSEMBLER and DIS-ACSEM. These are now generally regarded as quite simply the best assembler and disassembler programs available for the ZX81.

"The disassembler . . . is really fantastic." A.M., London
"I am very pleased with the assembler and I feel that you have a real winner in this program." R.B., Gloucester
Your programs are first class. Looking forward to more." A.J., Norway.
". . . the single biggest step to proficiency in machine code programming." SINCLAIR USER

Now, with the superior facilities of the ZX Spectrum, ACS Software have done it again. **Ultraviolet** and **Infrared** are assembler and disassembler programs that will extend your Spectrum. Look at the facilities that Ultraviolet 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 relocated; 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.
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**

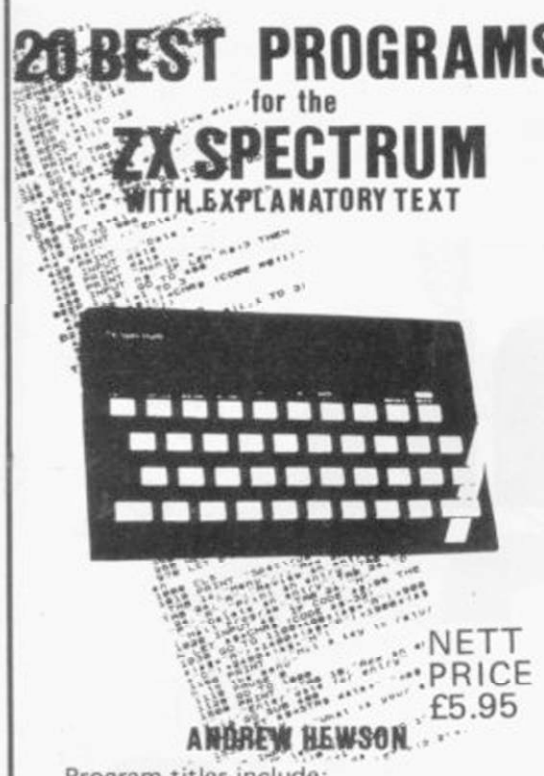
The following programming aids are available for the 16K ZX81 at £5.50 each. SAE for details. Prices include postage and packing for UK orders, overseas clients please add appropriate postage.
ACSEMBLER: DIS-ACSEM: ACS DEBUG: PROGSTORE: TOOLKIT: PROGMERGE (version 2): TAPEKIT
PROGMERGE and TAPEKIT won't make a Spectrum out of your ZX81 but they will give it some interesting new facilities!

ACS

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

ANDREW HEWSON'S BOOKS

20 BEST PROGRAMS for the ZX SPECTRUM WITH EXPLANATORY TEXT



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

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

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

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

Program titles include:

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

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

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

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

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

Plus: FOOTBALL, DIGITISER, DIARY and many more.

Available through Computer Bookshops and W.H. SMITH.

FOR THE SPECTRUM

40 BEST MACHINE CODE ROUTINES FOR THE ZX SPECTRUM £5.95

by Andrew Hewson and John Hardman.

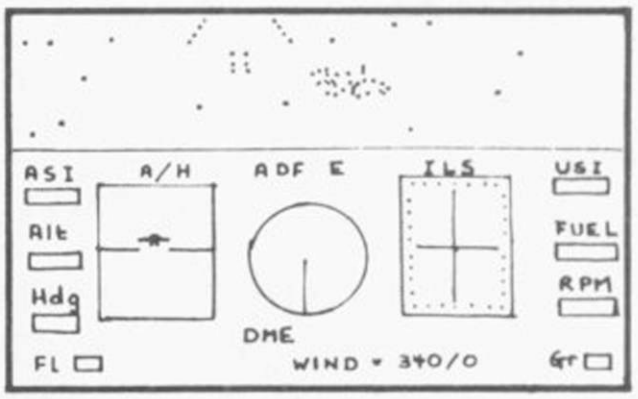
Section A: Three chapters explaining what you need to know about Z80 machine code on the Spectrum.
★ How to load and save machine code.
★ How to use the system variables.
★ How memory is organised.
★ How program lines are stored.
★ How to use the stack, the display, the attribute files.
★ How to call ROM routines — where they are and what they do.
★ The structure of Z80 code — plus a valuable glossary.

Section B: 40 routines including,
★ Scroll — up, down, side to side by pixel or by character.
★ Search and replace, token swap, string search.
★ Rotate character, invert character — horizontally and vertically.
★ Line remember — including GOSUBs, GOTOs, RUN etc.

All routines are relocatable (except 'line remember')

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

NIGHTFLITE FOR ZX SPECTRUM £5.95



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

Z80 OP CODES £1.45

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

PILOT ZX81 £5.95

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

PUCKMAN ZX81 £5.95

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

HINTS & TIPS FOR THE ZX81 £3.95

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

THE PROGRAMS

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

RETAILERS

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

URGENT

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

QUANTITY	PRODUCT	COST
	TOTAL	

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

NAME .....
(block capitals please)
ADDRESS .....

.....

My Access/ Barclaycard No. is .....

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

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.

Push your Sinclair to the limit

ZX81/SPECTRUM ARCADE GAMES

NEW **ZX INVASION FORCE** (ZX81)
Use your skill to fire through the energy band to destroy the menacing alien ship — **£3.95**

NEW **SPEC GALAXIANS**
SPEC INVADERS
SPEC GOBBLEMAN
These three exciting high-speed classic games incorporate hi-resolutiongraphics and sound to bring you the best in arcade action at only **£4.95** each (16/48K)

NEW **SPEC FROG 5/SHOWDOWN** (16/48K)
Hop across the dangerous road avoiding the lethal cars, then lorries. Go back to the wild west for a gunfight battle amongst cacti and wagons. Features include western music. **£4.95**

NEW **NAMTIR RAIDERS** (ZX81)
High speed, quick action arcade game with four separate groups of attackers. **£3.95**

Galaxians and Gobbleman also available for ZX81 at **£3.95** each.

UTILITIES

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

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

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

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

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

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

ONLY **£9.95**

ADVENTURE GAMES

JUST RELEASED for 48K SPECTRUM
Still available for ZX81

INCA CURSE (Adventure B)
In a jungle clearing you come across an ancient Inca temple. Your mission to enter, collect the treasure and escape alive. But beware!
Includes a cassette save routine. **£6.00**

SHIP OF DOOM (Adventure C)
You are unavoidably drawn to an alien cruiser. Can you reach the control room and free yourself? Or will they get you first? Includes a cassette save routine. **£7.00**

ESPIONAGE ISLAND (Adventure D)
While on a reconnaisance mission your plane loses control and you are forced to land. Can you survive and escape with the island's hidden secret? **£8.00**

PLANET OF DEATH (Adventure A)
You find yourself stranded on an inhabited alien planet. Can you reach your ship and escape? **£5.00**

REDUCED TO **£29.95**

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

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

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

KRAKIT™

KRAKIT TRADE MARK OF INT. PUBLISHING & SOFTWARE INC.

RULES AVAILABLE FROM ARTIC

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

DON'T MISS YOUR CHANCE TO WIN A FORTUNE!

A GREAT CHESS GAME FOR YOUR ZX81 OR SPECTRUM*



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

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

ZX 1K CHESS
An incredible game in 1K for only **£2.95**

SPECTRUM CHESS now only **£9.45**

NEW **SPECTRUM VOICE CHESS**

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

*SPECTRUM CHESS 48K

ALWAYS AHEAD WITH ZX81/SPECTRUM SOFTWARE

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

VISA

ARTIC COMPUTING LTD.
396 JAMES RECKITT AVENUE, HULL, N. HUMBERSIDE,

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

Please supply .....

Cheque for total amount enclosed .....

Name .....

Address .....

SU 12



Home computers are expected to help people. Chris Reynolds has reservations

Code junkies hooked on micros

MANY YOUNGSTERS have home computers because they, or their parents, feel that owning such a computer will help them in their careers. As a university lecturer responsible for training future computer professionals, I have my doubts. Let me explain.

In the last 30 years the uses of computers as part of practical working information systems have mushroomed. For most of that time there has been a desperate shortage of suitably-experienced staff. Salaries rocketed as companies bid to obtain employees with the greatest length of experience, apparently regardless of quality. The whole was surrounded with the prestige of being at the forefront of modern technology, at least in the eyes of one's neighbours.

Much of the gloss has now been shed. There is, of course, still a shortage of good computer professionals but the incompetent now find it almost impossible to climb on the bandwagon, and salaries are no longer so wildly out of line with other occupations. One no longer hears people boasting that they know someone who knows someone who works with computers. In fact, it seems likely that in five years having a computer in the house will be socially as significant as is owning a digital watch today. When acne-embarrassed schoolboys with home computers are ten-a-penny the simple ability to program will have no value in the job market.

Those changes will have a major effect on the structure of the computer profession. The need for highly-skilled people to work on research and development projects in the computer industry will continue. The majority of existing professionals work for companies which use computers as tools to help the company business and it is in that area that the biggest changes will take place. The pressure will be for more flexible and easier-to-use systems with the minimum of fuss.

A prime requirement will be for staff able to communicate with other people, verbally and in writing, with the minimum of jargon. Knowledge of management, economics and psychology, and the design of systems are next on the list. A good understanding of what a computer can reasonably be expected to do is far greater importance than the ability to PEEK and POKE on a particular make of microcomputer.

> 'The pressure will be on for more flexible and easier-to-use systems'

Universities already have moved in that direction and introduced courses which anticipate that future need. For instance, Brunel University has a Systems and Information Management course which has been running for five years and which has attracted 28 good students this year, compared to 22 on its more conventional course. Because it is felt that breadth of experience is important, students who do not have A levels in computer science and mathematics are preferred to those who have already specialised narrowly with double mathematics and computer science.

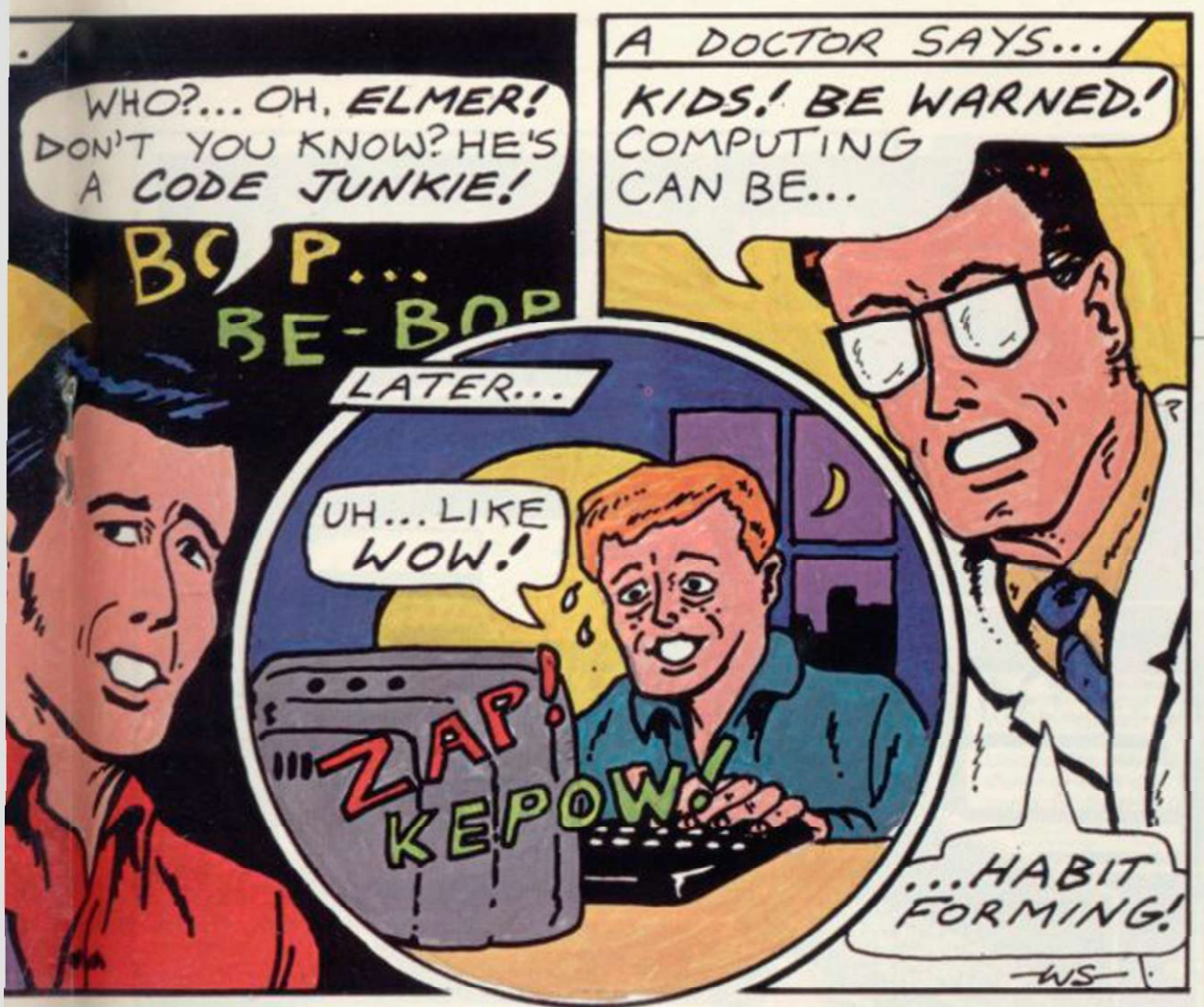


Many of the leading 21st century computer professionals are now at school and in the light of the foregoing comments, it is useful to speculate what they are doing now. We can be certain that they will be well-acquainted with modern electronics technology. Digital watches and pocket calculators will be taken for granted. Their parents will have television sets with teletext and a variety of electronic games. As soon as they are old enough they will use autobanks and credit cards to buy things such as electronic organs. Even if they never saw a general-purpose computer they would take for granted keys to be pressed, video displays, and automatic information. processing.

While at school they will almost certainly have been given a computer appreciation course and may have had computer-aided instruction. Most will have taken O and A level computer science. That will not be because this is necessary for their careers but because the education system encourages early specialisation.

Socially, most of them will be good mixers. They are therefore likely to be found in the Boy Scouts, the school band or the local cricket team.

One thing not mentioned is owner-



ship of a home computer. The reason is that the evidence at Brunel suggests that in many cases a private micro can have an adverse effect on student studies and sometimes on employment prospects.

There are a number of reasons. The first is that to understand and use a language well, you have to be able to think in that language, be it French, Arabic, Pascal or Cobol. Students who have written a large number of programs in a single language, often on a single machine, have difficulty in transferring to other languages.

Gerald Weinberg, in his book *The Psychology of Computer Programming*, showed how easy it was to guess a student's former language by the stylistic errors he makes in learning a new language. Ten years later the problem is much the same. Most novice students learn rapidly the essentials of modern programming concepts, such as block structuring and recursion.

Students who have extensive experience in old-fashioned languages which lack those features often insist on using more powerful high-level languages as if the newer features did not exist. That is apparently because they find it easier to write longer, inelegant programs than to learn something new.

The second problem is that writing programs and playing games on a home computer is most entertaining. The ability to use a home computer is, however, of little relevance to any but the most junior jobs in the computer field. Most adults would discourage a child from wanting to become a television news reader simply because he had built a crystal radio at the age of eleven. Unfortunately computers are so new, and so mysterious to many adults, that most teachers and parents are not sufficiently knowledgeable to recognise a fun hobby as just that and, as a result, they encourage children to attempt to follow a career path for which they may be almost totally unsuited.

> 'The big danger seems to be the bright but socially-gauche adolescent'

The big danger seems to be the bright but socially-gauche adolescent. He finds the school computer more friendly than his school-mates and develops an interest rapidly. A home computer is bought by enthusiastic parents to encourage him in what is certain to be a wonderful career in this marvellous technology. He is delighted to be allowed to spend many hours every evening enjoying himself in the privacy of his room. Socially, he finds he can boast about his wonderful programs which look most impressive, with flashing screens and perhaps even sound effects.

Because of all this praise and the absence of anyone who can assess the quality of his work properly, he soon becomes convinced that he is a computer genius and spends even more time at the keyboard. He has become a code junkie who craves for his two-hours-a-day session at the keyboard.

In fact, the idea of code junkies is not new. In the last decade we have had several who have become addicted to the university computer. From experience we know that almost all such students fail the course. They prove to be almost unemployable because of their inability to get on well with people, and because of a marked reluctance to work with, rather than play with, computers.

Last year, for the first time, we had the problem of new undergraduates who were already code junkies before they arrived. This year the number of students who have home computers on arrival has more than doubled and it is suspected that many of them will prove to be junkies.

It has been said that home computers and computer games will help to keep the future unemployed occupied in an enjoyable manner. That may well be true in the long term, when society has become adjusted to the new technology. In the short term there is a danger that the majority of the unemployed who play such games will be code junkies who caught the bug during a vulnerable period of adolescence.

• Dr Chris Reynolds is reader in computer science at Brunel University. He organises the computer science teaching for first-year mathematics computer science students. He also researches improved systems for the man-computer interface.

BLAST-OFF YOUR ZX81



And explore a galaxy of NEW software!

Software Masters Ltd. Dept., A, 30 Lincoln Road, Olton, Birmingham B27 6PA, England. Telephone: 021-707 7544.

All these titles are available now from your local Bookstore or Computershop. In case of difficulty, send cost of tape plus 25p postage per tape with the coupon to: **Dept., A,** Software Masters Ltd., 30 Lincoln Road, Olton, Birmingham B27 6PA.
Trade enquiries welcome!

SM2015.....	Breakout	16K	5.95
SM2011.....	Computacalc	16K	7.95
SM2022.....	Constellation	16K	8.00
SM2023.....	Football Manager	16K	7.95
SM2003.....	Labyrinth	16K	5.95
SM2025.....	Magnus	16K	9.95
SM2021.....	Mazogs	16K	10.00
SM2017.....	Mugsy	16K	5.95
SM2018.....	Murgatroyds	16K	5.95
SM2019.....	Murgatroyds Revenge	16K	5.95
SM2005.....	Nightmare Park/Music	16K	6.95
SM2027.....	P.E.P.	16K	5.95
SM2012.....	Personal Banking System	16K	9.95
SM2024.....	Pilot	16K	5.95
SM2020.....	Progmerge	16K	5.95
SM2026.....	Puckman	16K	5.95
SM2008.....	Space Intruders	16K	5.95
SM2014.....	Space Invaders/Space Rescue	16K	6.95
SM2013.....	Star Trek/3D Os & Xs	16K	6.95
SM2007.....	ZX 81 Chess	16K	6.90
SM2001.....	Bumper 7	1K	5.95
SM2016.....	1K Games Pack	1K	6.00
SM2002.....	1K Super Trio	1K	7.95

Prices include VAT

Please send me the following programs

Code	Title	Cost
		£

Postage:-

I enclose Postal Order/Cheque for Total £

Name _____

Address _____

_____

SU

Software Masters Ltd.
Dept., A, 30 Lincoln Road, Olton, Birmingham B27 6PA, England. Telephone: 021-707 7544.

ZX81/SPECTRUM OPERATING and CARRYING CASES



Protect your microcomputer keep your ZX81 or Spectrum and accessories together Stop RAM-PACK 'wobble' on ZX-81.

Software storage space,
Lift-off hinged lid,
manufactured from light,
strong birch ply in traditional finish
of scientific instrument cases.
Designed to make your **SINCLAIR** computer system fully portable.





ZX-81 — **£18.95** inc. VAT
Spectrum — **£19.95** inc. VAT
+ **£2.05** P&P
C.W.O.:**KALENIA WOOD PRODUCTS**
4-6 Auckland St., Burslem,
Stoke-on-Trent ST6 2AX
Tel: 0782-813533

NOW AVAILABLE FROM J.P. GIBBONS A.I.B.

(AUTHOR OF THE BEST BANKING PROGRAMS IN THE WORLD!)

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 J.P. Gibbons A.I.B.
14 Avalon Road, Orpington, Kent, BR6 9AX.
Your P.B.S. is never out of date!

ZX81 MACHINE CODE?

NEW
Send for details of under-the-keyboard board for ASZMIC & BASIC.

ZX.ASZMIC rom transforms ZX81 into an **Assembly Language** programming unit



£ **39**.95 total

ø FULL-SCREEN EDITOR

Sixteen shift keys take you into a world with a word processor feel. A blink cursor moves at your command to control insertion, rubout, line or string deletion, auto-scroll & page flip up or down. Text block operations. Ultra-fast editing.

ø MULTI-FILE SYSTEM

Declare as many files as you like, with any names you like, & they are automatically handled by the Operating System. Merge them, delete them, print, save & load them, & edit them by name. Superb flexibility with a simple but powerful system.

ø TOTAL ASSEMBLER

Full Z80 mnemonics, unlimited length labels, ORG & EQU directives, proper assembly listings with errors flagged on screen or printer. Relocatable object code & options to facilitate cross-assembly. Interpretive immediate execution available.

ø POWERFUL DEBUG

All the usual dump, modify, fill & copy commands; plus breakpoints, single stepping, context control, the convenience of interpretive execution mode, full use of the names in your program, Command Macros, autodump, and full operating system interface.

ø HI-RES GRAPHICS

255 x 144 resolution under program control to give you truly convincing graphics. With the power & flexibility of assembler you can really use this high definition.

ø MUCH, MUCH MORE

Repeat function on all keys. Double height titling on printer. Lots of extras. But more important than all these features, attractive though they are, is the fact that ZX.ASZMIC is an integrated development system in which everything fits together to give you a tool which can satisfy the professional programmer by simplifying all stages of the program development process. It is excellent for those who are taking the first steps into real programming but the more expert you become the better you realise just what ASZMIC can do for you. If you are at all interested in machine code it will be worth your while to find out more.

Comprocsys limited

I enclose £39.95. Please rush me ZX.ASZMIC + manual

NAME .....

Address .....

.....

.....

Sole UK agents:- CAPITAL COMPUTERS LTD.
Dept. SU, 1 Branch Rd, Park St, St Albans AL1 4RJ.
Phone 0727 72917. Cheques payable to:
COMPROCSYS LTD/ASZMIC a/c.

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

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.
ESDEVIUM GAMES, 185 Victoria Road, Aldershot.
SCREEN SCENE, 144 St Georges Road, Cheltenham.
BUFFER MICRO SHOP, 374A Streatham High Road, London SW16.
GEORGES, 89 Park Street, Bristol.

OR MAIL ORDER FROM martech games

Send cheque/P.O. (£9.50 each, £18.00 for two) to:
MARTECH GAMES, 9 Dillingburgh Road, Eastbourne, East Sussex BN20 8LY.

Ideal Christmas gift for the thinking ZX enthusiast

SPECTRUM'S SOFTWARE SETS YOU A CHALLENGE

Each program is written in Basic for the SINCLAIR SPECTRUM COMPUTER USER.
All games incorporate both colour and sound.
Flexible parameters intrigue both the beginner and more advanced alike.



SPECTRUM SOFTWARE

Instructions supplied.
All programs have been written, tested and proved by Spectrum Software's own computer experts.
Prices are fully inclusive.

SPECTRUM SOFTWARE

45-53, Prince of Wales Road, NORWICH, NR1 1BL.

To: SPECTRUM SOFTWARE, 45-53, Prince of Wales Road, NORWICH, NR1 1BL.

NAME _____

ADDRESS _____

_____ POSTCODE _____

(TICK APPROPRIATE BOX)

Please send me any two of the following programs for £4.95.

SP 101 SKETCH PAD ☐
102 LUNAR LANDER ☐
103 MASTERMIND ☐
104 DISASSEMBLER ☐
105 CHARACTER GENERATOR ☐

Please send me all FIVE individual programs for £7.95 ☐

Please send me the following programs at £3.95 each.

SP 110 COSMIC INVADERS ☐
111 VOYAGER ☐
112 SPIDER ☐

Allow 28 days for delivery.

I enclose my cheque/postal order for _____ made payable to SPECTRUM SOFTWARE

SUI2 82

NOW
AT 5 ST. PETERS LANE, LEICESTER
Tel: 0533 29023
(Close to Clock Tower, Large Car Parks, Bus Stn)

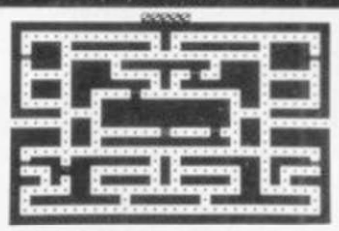
THE FRIENDLY TO USER STORE
The first Midlands Region retail shop specialising in SINCLAIR computers.
Wide variety of Hardware, Software, Books & Magazines.
Reliable Cassette Recorder tested for loading/saving on ZX81 and SPECTRUM – only £18.50

MICROWARE SOFTWARE
for Spectrum
ALIEN COMMAND (16k) Testing Invaders style game making full use of Spectrum sound, colour and graphics ★SPECIAL XMAS OFFER £4.75★
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.

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
SF CRAIGO FARM, BOTANY BAY, TINTERN, GWENT SF

SILVERSOFT
SPECTRUM – ZX81

NEW!
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 tortureous 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.



Sinclair Research opens its Spectrum software library

John Gilbert assesses the new major range of cassettes and finds they do not compare to the machine's qualities

WHEN THE Spectrum was launched, Sinclair stressed that a software library containing business, household and games cassettes would be released soon.

The first batch of tapes was launched at the Personal Computer World Show in September. The launch was billed as one of the great attractions of the show. Spectrum owners were looking forward to putting their machines to good use. Unfortunately, unlike the Spectrum computer, the new tapes are disappointing.

The Spectrum library, with a few exceptions, seems to be a repeat of the ZX-81 range of tapes launched in early 1982. The new software library comprises several sections which include the **Fun to Learn** series, **Pastimes** and **Games.** There are also several cassettes, such as **Bio-rhythms** and **Vu-calc,** which stand alone.

There is a set of five games cassettes. Each contains four 16K games which have been written for Sinclair by ICL.

The games are very simple and it is easy to lose interest in them in a very short time. Several of them, such as **Martian Knockout, Invasion from Jupiter,** and **Galactic Invasion,** are all based on the same principle — guessing the velocity at which you have to fire a laser cannon at a group of marauding aliens.

The game consists of entering the guessed velocity and pressing NEW LINE. That becomes incredibly tedious after the first 10 minutes' play. The rest of the games are either of the Invader, Mastermind or maze types.

Daylight Robbery is not only the phrase which might be used to describe some of the new software but is also on the **Games Three Cassette,** although it has slightly more depth to it than some of the others. The player moves around a maze full of safes. For every safe which can be cracked the player will have the amount of money in it added to the total score.

The only danger encountered with entering the safes is that the player must dodge the guards in the maze. The game is enjoyable for a short time but it plays rather like **Pacman** and is much less addictive.

Of the five games tapes in the series so far, **Games One** seems to be the best value. It contains one of the few games which will last longer than five minutes. **Labyrinth** is an adventure maze game in which the player must fight monsters to find hidden gold in the maze.

> 'Of the five games tapes Games One seems the best value'

Each of the games cassettes costs £4.95, which is somewhat expensive for what they contain. It would have been better to have sacrificed quantity for quality on this occasion. The illustrations on the insert cards are of good quality but people expect better games for the price.

Two of the cassettes in the library mysteriously are labelled **Pastimes** but would have been better-placed in the Games series. They include a Mastermind game called **Secret Code**; a memory game **Kim**; and a puzzle, **Magic Square.**

Magic Square is interesting for a time but soon it becomes just another trivial observation game. The computer displays a square filled with rows of letters of the alphabet in a jumbled sequence. One space in the square is empty. Letters can be shifted around using the blank to place the alphabet in the correct sequence.

Kim also displays a square but with numbers in it. The numbers disappear one at a time in a random sequence and the player must guess which letter has disappeared each time. Again, the game is interesting but becomes dull and repetitive after a time.

The games on the two cassettes do not warrant the title of Pastimes as they are too repetitive and because of the lack of depth the player may soon begin to feel dissappointed. Pastimes cost £4.95 each.

The Fun to Learn cassettes provide the user with a series of question-and-answer races on various subjects. With only one exception the graphics capabilities and sound facilities of the Spectrum are not used to full advantage. Neither is there a real reward at the end of the tests to induce the user to try again.

The cassette which redeems the whole Fun to Learn series is **Geography.** The computer displays maps labelled with numbers and the user has to guess which numbers correspond to towns and countries displayed below the map.

The idea behind the cassette is good and the map display is



reasonably detailed. The cassettes in the Fun to Learn series are £6.95 each.

The **Bio-rhythms** cassette from ICL is also very good value. The program will plot bio-rhythms and also calculate the critical days for the intellectual, physical and emotional cycles. The graphics are fairly good but the display is confusing when all the cycles are plotted on one graph.

The best cassettes in the range have been produced by Psion. They include **Vu-calc, Space Raiders, Planetoids** and **Hungry Horace,** a new Pacman-type game.

Space Raiders is an addictive space invaders game. The only thing wrong with it is that it is too easy to achieve a high score. Scores of 10,000 have been reached in less than 10 minutes.

Planetoids is an above-average asteroids game which is very difficult to beat for any length of time. The asteroids are displayed in 3D and the players' ship is easy to move around the screen. The game is more difficult to beat, faster, and much more fun than Space Raiders.

Hungry Horace is an ideal game for young children. It uses the Pacman mould but is a great improvement on the popular arcade game. Horace is a large purple blob with arms and legs. He wanders up and down the maze-like park eating everything in his path and avoiding the guards who try to capture him. He can scare away the guards by ringing the alarm in the maze. If he can reach the exit he enters another sector of the maze and continues to the next exit.

> 'There are no really outstanding tapes in the series so far'

The game is difficult but after a time a degree of skill can be developed in evading the guards. The mazes become more difficult as the game proceeds and we managed to reach only the third section of the maze. Hungry Horace costs £5.95 and is well worth the money.

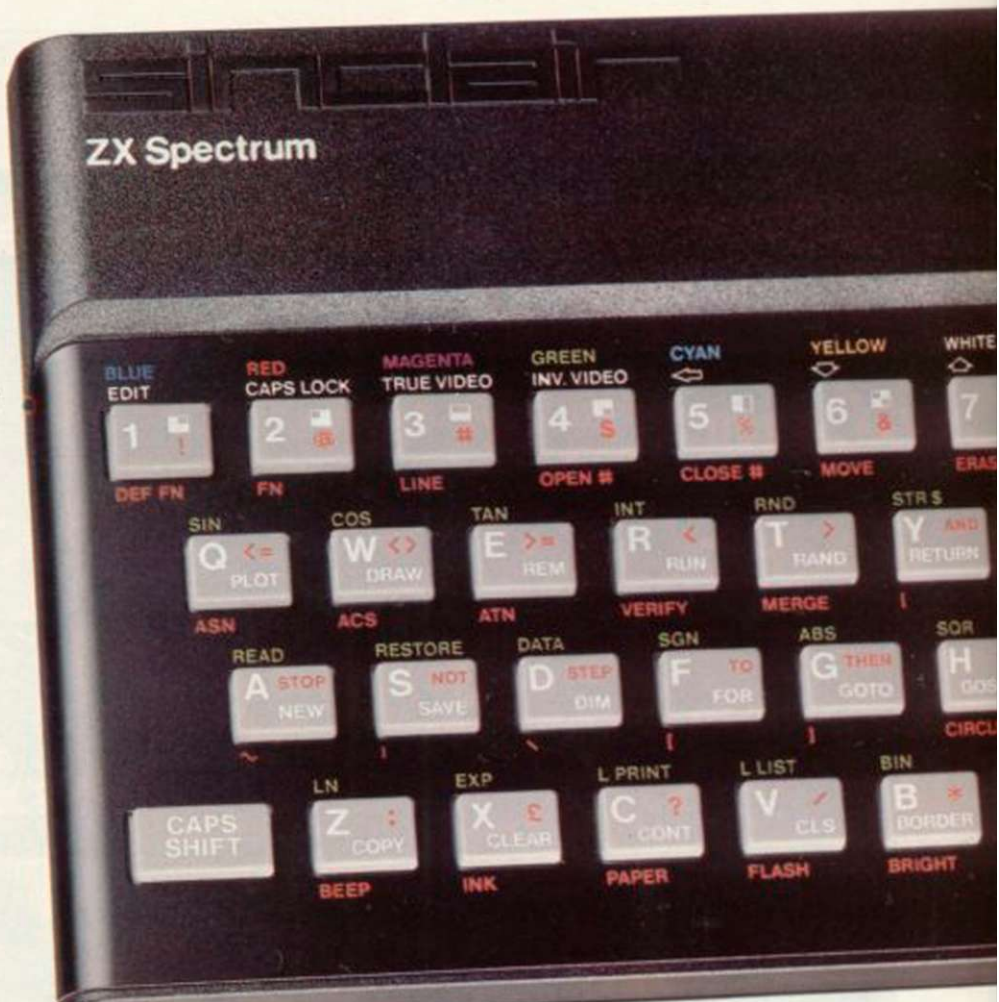
The cassettes in the new Sinclair range can be split into programs which can be played and enjoyed again and again and those with which the user will easily become bored. There are no really outstanding cassettes in the range so far, although Planetoids, Bio-rhythms, Space Raiders and Hungry Horace can be recommended.

Those games have the depth in them to be played for months, while the others may leave the Spectrum owner disappointed. All the cassettes mentioned use 16K memory. Further details about the range can be obtained from Sinclair Research, Camberley, Surrey GI15 3BR.

Sinclair ZX Spectr

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.

rum



The ZX Printer – available now

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

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

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

The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

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

SUS811

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

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.

ZX Spectrum

Available only by mail order and only from

sinclair

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



Power games rule in ancient Greece

THE TYRANT of Athens and Peloponnesian War are two games which take the player into ancient history. Both provide simulations of the Greek way of life.

Tyrant of Athens gives the player the chance to rule the capital of Greece for as many years as the populace allows. Every year the computer asks the player how many troops and ships, allies and food units are required for the year. The money for those items is deducted from the state treasury. Some money should be retained in the royal coffers to pay any invading army you do not want to fight.

There may be many battles during a year and disasters such as lack of money and starvation may occur. The ruler is allowed only three disasters before being deposed. Victory can be achieved within 10 years if you have achieved two-and-a-half times as many victories as defeats and are in a fairly strong position.

Peloponnesian War is similar but is a game of military strategy. The player takes the side of the Athenians, who must beat the Spartan forces. The number of generals and other officers are chosen, the number of warships and the number of ordinary infantry.

Other states may become involved in the war at various times and they would provide extra ships and men. At the beginning of the game none of those states is an ally of either side. The game may develop into a fight to gain the most allies.

The battles may take several years to fight but in the end one decisive battle with Sparta must be fought before 429 BC. If they feel sufficiently confident, the Spartans may enter the final phase after 425 BC but if neither side has committed itself before 404 BC, the final battle phase will be entered automatically.

Both games are available for the 16K ZX-81 and Spectrum from MC Associates, 4 Granby Road, Cheadle Hulme, Cheadle, Cheshire SK8 6LS. Tyrant of Athens costs £6.50 and Peloponnesian War £5.95.

Hanged in colour

A NEW VERSION of Hangman has been produced by Bridge Software. **Lynchmob** was written for both the ZX-81 and Spectrum. The game is for two to six players and the computer takes the role of referee.

The hanging sequence is animated and the large scaffold takes up much of



the screen. The graphics quality of the game is good but it is disappointing that one player cannot challenge the computer.

Bridge Software has also introduced a program for which many serious astrologers may have been waiting. **Ephemeris** provides local sidereal times, rising and setting times of the planets and Moon, and distances from Earth.

All the displays can be output to the printer, which is a necessity for this kind of work. Because of that factor and because the program is very user-friendly, it should be of great help to astrologers.

Both programs are produced by Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire SK6 5BE. Ephemeris costs £6.95 and can be used on the 16K ZX-81. Lynchmob can be obtained for both ZX-81 and Spectrum for £4.95.



Flying the Spectrum

NIGHTFLITE is one of the first flight simulation programs for the Spectrum. At the beginning of the program a series of options is given, including a demonstration flight, take-off, final approach, auto-pilot and a map of the flight area.

The screen display is split into two, with the aircraft instruments at the bottom and a view through the cockpit window at the top.

The navigational instruments include instrument landing system, artificial horizon, non-directional beacon and VHF omni-directional range.

The program is an accurate simulation, since Hewson Consultants, the company behind the simulation, employed a qualified pilot to provide the technical details.

Nightflite costs £5.95 and is available from Hewson Consultants, 60a St Mary's Street, Wallingford, Oxon OX10 0EL.

Deflecting Silly Sid

SID the Space Invader grew tired of racing around the screen being zapped by lasers. He decided to leave and join a new game from Llamasoft called **Super Deflex**. That

is the way a new game for the 48K Spectrum starts. It may sound silly — but the whole game is silly.

The idea is to bounce Sid around the screen using launch pads so that he hits the number target without being destroyed by laser streaks.

All that may seem simple but this game is not like a simple game of Breakout. The launch pads which are set using the m and n keys on the keyboard will hamper you in the object of hitting the target. They will send Sid in different directions if he hits them.

Any invader who is hit by a laser streak will be buried on the spot and a headstone raised to commemorate the deceased. That causes further problems for other invaders who have to bounce around the screen. If they



hit a headstone they will be fried to death and a new invader will appear on the screen.

There are nine levels of difficulty. The first level is easy and the ninth is impossibly difficult. It is difficult to develop much skill in the game but to play it efficiently some kind of skill must be gained.

Super Deflex for the 48K Spectrum can be obtained from Llamasoft Software, Lindon House, The Green, Tadley, Basingstoke, Hampshire for £4.95.

Characters by numbers

NUMEROLOGY has gained as much popularity as Sun sign astrology in the last few years. Several programs calculate the significant numbers of the user's character but the Carnell Software version is one of the best.

The program was written for the ZX-81 and is appealing because of its simplicity of use and the complexity of the answers it gives. The fact that the answers are maddeningly vague and could refer to anyone cannot be blamed on the program.

The instructions with the cassette provide an easy introduction to the 'science' of numbers. After loading the program, the subject types-in name and birth-date. They are then analysed quickly and the results are printed.

The program will appeal to believers and sceptics alike although, while using the game, there was a feeling that it was written tongue in cheek.

Numerology costs £3.50 and can be obtained from Carnell Software, 4 Stainton Road, Slough, Berkshire.

Three games from Firefly

A NEW cassette from Firefly provides a series of 16K games for the Spectrum within one program. The games are selected using a menu which appears at the beginning of the program. All the games on the cassette use the arcade format. They need skill to play but after a few turns the player should develop sufficient expertise to obtain a good score.

There are three games in the program. The first is called **Traft.** The player has to control a little man in a large square. Points are scored every time the player moves as an obstacle is put into a part of the square after every move. If the obstacle hits the player or the player smashes into the obstacle the little man dies. The game is a simple but neat — an original idea.

Star Storm is the second game. It is rather like a poor man's version of Asteroids, where the player's space ship must avoid the stars.

Astro-Run is like Star Storm but with better graphics. The spaceship moves across the screen,

continuied on page 54

JRS Software goes to play

GAMES CASSETTES with a series of games have become more and more popular since Michael Orwin had such a success with his cassettes One to Four. Now JRS has produced a selection of games for the Spectrum on one cassette.

The first game is called **Airport** and is loaded in two parts. Part one is the instructions and part two can be loaded after them. The player is a groundsman at an airport and has to contend with moles digging holes in the runway and trees growing all over the place. The game is hectic and can be confusing at times but it is enjoyable to play and original.

Crabs is like Pacman but much more complicated. It is crabs and not ghosts which chase the player around the maze but the power pills are still the same and so is their effect on the crabs. If you eat a power pill the crabs will run from you. If you manage to catch one your points score is boosted.

Alien takes its plot from the film of the same name. The player has to crawl through the air ducts of the Nostromo spaceship in search of the alien. The only aid the player has is a direction meter. The game quickens in tempo as the alien disappears at any time and can re-appear anywhere. If the monster gets the player the game is finished.

The cassette is well-produced, although Air-



port is confusing for the player who is also a beginner. **ZX Spectrum Games** is available from JRS Software, 19 Wayside Avenue, Worthing, Sussex BN13 3JU. It costs £4.95.





continued from page 53

trying to dodge the asteroids which seem to appear out of thin air. Again, the idea of the game is good but the presentation could be improved.

On the whole, **Game Tape One** is good but the graphics could be better. The graphics characters are too small for the arcade game effect which Firefly is trying to create.

Games Tape One is available from Firefly, 48 Dorset Street, London W1H 3FH. It costs £4.50.

Success with Star Trek

ANOTHER version of **Star Trek** would have seemed more like a threat than a promise before R and R Software produced its new version of the game for the 48K Spectrum. The company made a great impression with its Spectrum Golf, which has good graphics. This version of Star Trek also has good graphics and transforms the game from a mainframe mediocrity into another great success.

As with Spectrum Golf, the Star Trek game is one of skill. It is more complex than most other versions which have so far been produced.

The computer builds a scenario of Klingons, star bases and stars. It then asks if the player agrees with the scenario. If not, the player can create one. The star map occupies



half the screen and the commands for manoeuvring and scanning are listed. The player can lock into the ship's computer to do navigational calculations, go into hyper-drive, or launch a galaxy-destroying smart bomb. To manoeuvre, operate shields, or fire phasers the player must lock into the control room.

The player can operate a colourful self-destruct sequence if things start to go wrong. That sequence is well-presented and players may blow themselves up deliberately just to watch it.

With the on-screen instructions, the game is easy to play and difficult to beat. It is available from R and R Software, 34 Bourton Road, Gloucester GL4 0LE and is well worth £4.95.

SPECIAL CHRISTMAS ZX MICROFAIR!

If you're interested in exhibiting please contact Mike Johnston



Saturday 18th December at the New Horticultural Hall, Greycoat Street, London SW1. One day - 10am to 6pm.

Thinking of buying your Christmas computer?
Looking for ZX hardware or software?
Want to meet local user-groups and ZX enthusiasts?
Or just want an interesting day out?
Then call along on Saturday, 18th December for the **Christmas Special MICROFAIR!**

It's full of Christmas Cheer — everything for the ZX81, ZX80 and ZX SPECTRUM under one roof!

Meet a wide range of manufacturers of all types — talk to interesting people — get advice — buy that last minute present.

There's plenty of room, there's a Bar if you get thirsty and a Buffet if you're famished!

There's even a bring and buy sale so you'll be able to pick up a bargain, and of course a complete showguide available on the day.

Make a note of the date or write for advanced tickets to Mike Johnston, 71 Park Lane, London N17 0HG (enclosing a S.A.E.).

Admission charges are 75p for adults or 50p for kids (under 14). Please make cheque, P.O. payable to ZX Microfair.

Do it now and make sure of a very happy ZX MAS!

5th ZX MICROFAIR
DECEMBER 18th
NEW HORTICULTURAL HALL, LONDON SW1.

As seen on BBC TV "Computer Programme"

BIG EARS

STOP! GO! LEFT! RIGHT!

SPEECH INPUT FOR ANY COMPUTER



Hugely successful Speech Recognition System, complete with microphone, software and full instructions.

BUILT TESTED & GUARANTEED ONLY **£49**

PLEASE STATE COMPUTER: UK101, SUPERBOARD, NASCOM2, Vic 20, Micron, ZX80/81, PET, TRS80, MZ80K, APPLE I:, BBC MICRO

ZX80 ZX81

MUSIC SYNTHESISER + 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)

£25.50 (BUILT)

Extra 23 way connectors at £2.60

The "Composer" Music Program (16K) £7.40

COLOUR MODULATOR KIT £12 BUILT £18

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

UK101/NASCOM COLOUR GRAPHICS KIT £45 BUILT £60

Inc. Modulator. Still the best selling system!

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

Telephone: Brentwood (0277) 810244

BARCLAYCARD VISA

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

SEND TO

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

NOW FROM AFDEC

ZX81

ZX-PANDA



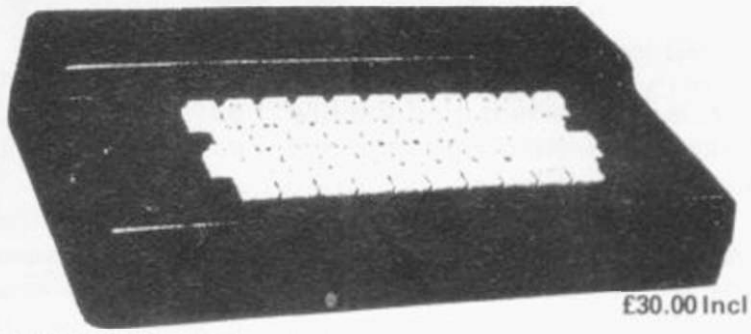
16K Expandable RAM

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

ZX-PANDA Basic 16K RAM Pack	*£27.00 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

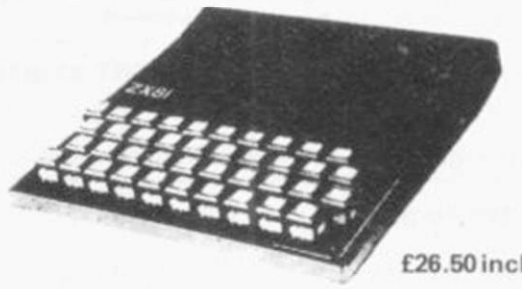


£30.00 Incl

The ZX81 fits inside

The tough ABS injection moulded plastic case measures 8" × 14" × 2½" 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 LETD

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 _____

ZX81



High Resolution Graphics

£32

- Stylish case fits neatly between ZX81 and Ram pack of 8K or more.
- 256 x 192 pixels.
- Hi res display file independent of old display file.
- Very fast and powerful graphics commands as extensions of Sinclair basic: SLOW / FAST CLS COPY PRINT PLOT all extended to hi res.
- **114 PLOT modes including:**

  Points and various line types
  Textured triangle fill
  Absolute and relative co-ordinates
  Line drawing to points off screen

- **Mixed text and graphics including PRINT at graphics cursor.**
- **User defined graphics for space invaders etc**
- **Screen COPY to printer**
- Extensive manual, excellent for school and home use, and full guarantee.
- Arcade games available soon!'

Post to:– Notting Dale Technology Centre (Ltd)
T.F.L. (ZX 81)
189 Freston Road
London W10 6TH (01-969 8942)

Please send me ..... board(s) @ £32.00 each
+ £4.80 VAT plus 75p P&P

I enclose Cheque/P.O. for .....
Or I wish to pay by Access/barclay Card/Visa.

Card Number .....

Name and Address (PRINT)

Name .....

Address .....

.....

Credit card holder's signature.

Buy from us with confidence
Full money-back guarantee on all our products

"Thank you once again for your prompt service; yours must be the most user-friendly company in the business!" G.S. Yorks.

"I must congratulate you not only on the quality of your goods but also on your excellent service." G.W. Solihull.

Quality Software
ZX81 Spectrum

GAMES CASSETTES

ZX81 (16K) SUPER INVADERS £4.95
On-screen league tables, animated instructions. Game in machine code — "excellent . . . one of the two best . . . deservedly popular" (Pop. Comp. Weekly) "Great game!" S.F. Glos.

ZX81 (16K) LYNCHMOB £4.95
Exciting word game. 2-6 players. Excellent for the family. Great fun, educational too! Animation, on-screen scoring. Superb Xmas present.

SPECTRUM (16K) LYNCHMOB £6.50
As for ZX81 but with added excitement of colour, sound and hi-res animation.

APPLICATIONS SOFTWARE on cassette

ZX81 (1K) GRAPHICS STARTER PACK £4.50
Four 1K Graphics programs on cassette with 12pp. explanatory manual.

ZX81 (16K) MULTIGRAPHICS £6.90
A user-friendly package of procedures giving you full control of the ZX81 graphics functions to compose designs, drawings, adverts etc. Incorporates advanced sketchpad, 3 sizes of text (including lower case), animation, printer output, SAVE displays etc. Businessment use it to advertise at point-of-sale. 20pp Manual.

Spectrum (48K) SPECTROGRAPHICS **Send s.a.e. for details**
Another superb user-friendly graphics program — hi-res and lo-res sketchpads, multisize text, etc. etc.

ZX81 1K STATISTICS £4.00
Mean, SD, variance, correlation, regression, t and F tests 8 pp Manual includes listings, test data etc.

Spectrum (48K)b STATISTICS (price includes maintenance) £9.90
Mean, SD, variance, correlation, regression, t tests. Hi-res graphic displays, data manipulation procedures.

EPHEMERIS ZX81 (16K) £5.90
SPECTRUM (16K, 48K) £7.90
Interested in heavenly bodies? Input date, time and your position, Ephemeris computes altitude, aximuth, phase etc. etc. for sun, moon and planets.

16K RAM pack made by Memotech £28.50

Send s.a.e. for details of our products
All-inclusive prices. First Class return-of-post mail in UK.
European customers add 30p per item; 70p worldwide (Air Mail).
Available by mail order or from leading computer stores.
Trade enquiries welcome.
Dept. SU, 36 Fernwood, Marple Bridge,
Stockport, Ches SK6 5BE, England.

5th ZX MICROFAIR

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



PIMANIA

THE ADVENTURE GAME THAT'S FOR REAL ! £6,000 PRIZE!

Will you be the first to locate the **Golden Sundial of Pi** in time and space, and be rewarded with the original? Exquisitely 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 Sinclive 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)





Eric Deeson does his sums and finds Sinclair's £15 million unlikely to be spent

Education offer 'not as it seems'



A FEW MONTHS ago the British computing press reported a new thrust from Apple into the U.S. education market. I do not think the scheme ever materialised; but the stated intention was that every high school would receive an Apple II free. The press releases mentioned a cost of two hundred million dollars; they were issued at a time when there were strong rumours of a significant drop in Apple sales.

I drew the attention of Sinclair Research to the Apple plan and was interested to hear of its recently-announced scheme to subsidise educational computing in a big way. 'Fine', I thought, but then I began to wonder. Is the scheme as good as it first sounds? If it works, will it help education in any useful long-term way?

It is common knowledge that the Department of Industry has been subsidising the provision of micros to schools. The conditions are restrictive, in particular with only the secondary sector benefitting so far. The aim was, and remains, to support British industry and not to support education. All the same, the scheme has received a cautious welcome from teachers on the grounds that any help, however badly designed, is better than none.

In July, the scheme was extended to cover primary schools, for which the 48K Spectrum was added to the list of approved machines. The Spectrum package — micro, monitor, RS232 interface, cassette recorder, console unit and a little software — is the cheapest of the three available for 50 percent subsidy.

The scheme attracted some criticisms on a number of grounds, though no formal statement appeared from any educational computing group, no doubt because of the summer holidays. In particular, Sinclair fans felt aggrieved that the scheme did not provide a two-Spectrum package plus a printer, still cheaper than the most costly package of the three supported.

Then, in early September, Clive Sinclair stepped in — "£15 million microcomputer scheme for schools" screamed the headline, quoting a figure even greater than the DoI commitment. Schools receiving the DoI Spectrum package will receive from Cambridge a printer, a cassette offering the important system LOGO, and 10 vouchers for later discounts.

There is no need to look the first two gift horses in the mouth; a ZX printer has many good uses in the primary sector, though of course teachers will need to keep a tight rein on paper supply; and LOGO, if it is the promised full implementation, will be highly appreciated.

The vouchers? Valid until the end of 1984 — a year after the DoI scheme closes — each will enable a purchaser to have either a 48K Spectrum for £130 — current prices — or a printer when a 48K is bought at the full price.

So the Sinclair scheme is intended to subsidise the raising of school computing power after the initial DoI splurge. Fair enough; any primary school starting with a micro will need several more in a few years and as the Government will not help there, and neither will the local education authorities, extra power will be difficult to acquire.

It is not easy to appreciate how poverty-stricken primary schools are and their precious resources must go, in the main, on consumables, like writing materials. What is Sinclair expecting of them? Let us work it out.

A primary school head is invited to join the DoI scheme. Can the school afford the half-price package? Perhaps it is also offered further assistance from the local authority, as in Birmingham, which will pay an additional 25 percent. To participate, then, the head will have to find anything from £100 to £400. A Birmingham school is tempted to the cheapest package, that based on a Sinclair. A jumble sale will raise the £100 needed to buy a very good computing package and 10 vouchers.

Next year, staff, pupils and parents request a second computer. They have no chance if they did not opt for Sinclair, for both the other packages are more costly and offer

continued on page 58

'His scheme will increase number of schools opting for the ZX. That is good for schools as other machines are less suitable'





continued from page 57

no vouchers. A second 48K Spectrum and a second-hand black and white TV set will cost £160 and one voucher. A bigger jumble sale is needed and still nine vouchers in hand.

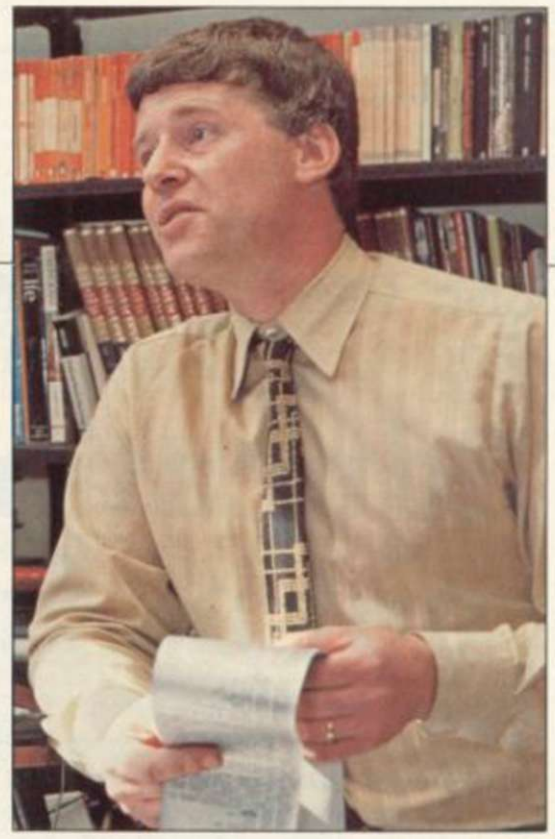
The £15 million in the Sinclair headline assumes that every one of the 28,000 primary schools in the country opts for Sinclair and uses its 10 vouchers to bring its computer facilities up to 11 Spectrums. What will that cost the school? Ten subsidised Spectrums, £1,300, and 10 old TV sets, £300. That is £1,600 in two years and very few primaries could consider that. Not sufficient power points for a start and I have not counted extra tape recorders, some Microdrives, cassettes, software, books, and perhaps network facilities, taking the total past £2,000.

So Clive's money is safe. His scheme will increase the number of schools opting for the ZX package; that is good for the schools, as the other machines — BBC and 480-Z — are far less suitable; and good for Sinclair.

Perhaps 10,000 schools may take the Sinclair with the DoI scheme. They may, on average, use one more voucher each. So Sinclair Research will be subsidising education to the extent of perhaps £1.5 million. That is not be sneezed at and will be money well spent, in Sinclair's view.

Shall we pretend there is £13.5 million left in the kitty? What should Sinclair do with that? Here are some ideas:

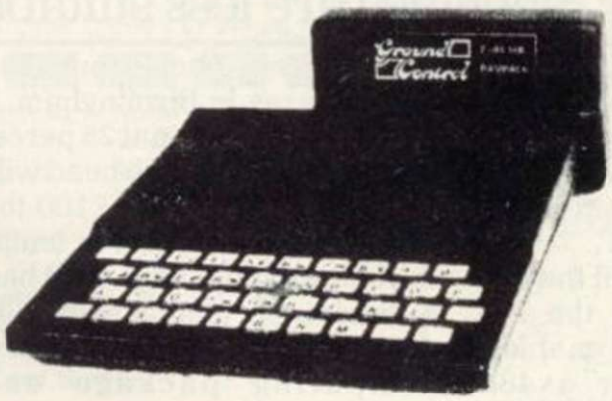
- Donate a second complete 48K Spectrum package to 3,500 primary schools each year, if they prove through some competition or other that they could use it. Cost, £3 million to end 1984.
- Donate a Spectrum to the, 5,000 runners-up each year — £2 million.
- Organise and pay for a series of superb weekend courses on using the Spectrum in the primary school — say nine a year each for 500 people costing £1 million.
- Invest £1 million in an educational ZX software publishing company.



My dream is a micro for every pupil and Sinclair Research is the only company in the West likely to make it come true.

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

Ground Control
Alfreda Avenue
Hullbridge
Essex SS5 6LT
ENGLAND

Telephone No: 0702 230324. 10 am to 6 pm



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 .....



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)

VISA

TIMEDATA

ZX-81
ZX-PANDA



16K EXPANDABLE RAM PACK

Specially contoured unit fits snuggly into ZX-81 thus eliminating wobble and memory loss. No additional power required. Red LED on/off indication.



ONLY £26.50

PANDA EXPANSION MODULE

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

ONLY £19.95

GIANT PANDA

Buy the 32K UNIT

ONLY £43.00

Complete at a special price of:

All prices are fully inclusive of VAT and p&p. Delivery within 21 days of receipt of order. All products come with a full ONE YEARS GUARANTEE.

SEND NOW TO:

FOX ELECTRONICS
141 Abbey Rd
Popley 4
Basingstoke
Hampshire. Tel: 20671

Please send me
.... 16K RAMPACK
.... EXPANSION MODULE
.... GIANT PANDA
I enclose £.....

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

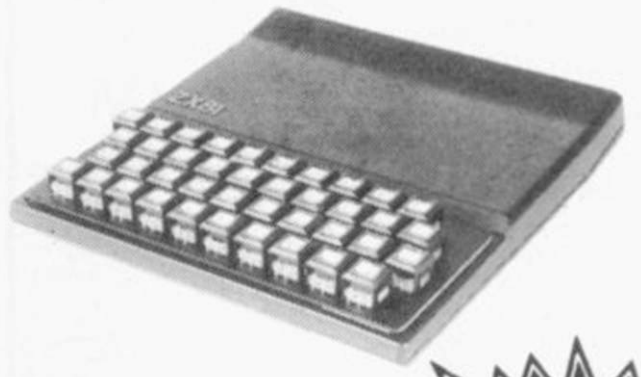
KEMPSTON MICRO ELECTRONICS

ZX KLIK - KEYBOARD

IF YOU ARE like many ZX81 users and are fed up with the dead 'touch sensitive' key pad then consider the advantages of the new KEMPSTON KLIK-KEYBOARD. This is a genuine push button keyboard which has been designed as an exact replacement, being no larger than the existing key pad, but offering all the advantages of a full size keyboard. Consider these facts:

- Fits on to the ZX81.
- No soldering needed on the assembled version (just plug in)
- No trailing wires.
- No special case required.
- Positive feedback from keys.
- Full two colour legends supplied.
- Full back-up service offered, including fitting.

This is a genuine 40-key, push button keyboard which fits into the recess formed after peeling off the existing touch sensitive keypad.
41 key version available at £26.50
New ZX-81 Auto Repeat module (like the Spectrum) £6.95.



£26.00

ZX SPECTRUM HARDWARE

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 true arcade type games without fumbling for keys.

We are proud to announce that we have developed for the ZX SPECTRUM a new 24 line programmable peripheral Interface using MOS technology with the following features: —

- 3 × 8 bit ports
- Port mapped, using IN and OUT commands
- I/O via 16 pin DIL sockets
- I/O also via 28 way edge connector
- Can be used in BASIC or Machine Code

The port is available fully built with a detailed set of instructions and control applications. The port can either be used with out motherboard, thus allowing a further card to be used, or with a stackable connector. Either way, it means that Micro-Drives, Printers, etc., can still be used with the port.

Please note that this is DEFINITELY NOT a ZX81 MODIFICATION but an exclusive design for the new ZX Spectrum.

ZX Spectrum PPI port.....£16.50
ZX 2 slot Motherboard.....£16.95
ZX Stackable connector.....£ 5.50

All prices inclusive of VAT, but postage must be added at 70 pence for a single item, 100 pence for 2 or more items. Available by mail order only. Cheques, P.O's made payable to:



KEMPSTON (Micro) Electronics
180A Bedford Rd. Kempston, Bedford MK42 8BL Tel.0234 852997

Your name_____
Your address_____

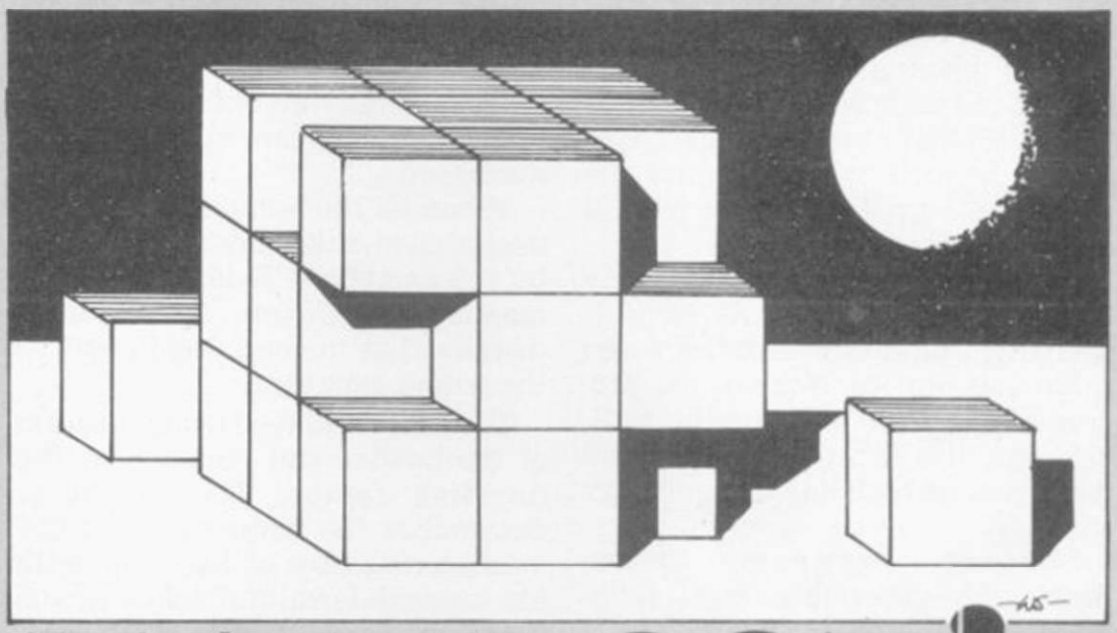
Date_____

Quantity	Description	Unit price	Amount

Postage _____
Total _____

SUA 12

PROGRAM PRINTOUT



HAMPSON'S PLANE

HAMPSON'S PLANE for the 16K ZX-81 is derived from an attempt to simulate in two dimensions as many features of Rubic's Cube as possible. The author of the listing, I Turtle of Scunthorpe, South Humberside, discovered the basic idea from an article in an American magazine.

The rules of the game are fairly simple. The screen is covered by 20 lines of plus signs. The computer, running in FAST, selects one of the symbols at random and inverts it and its eight immediate neighbours. The process is repeated a number of times, depending on the skill level.

When the computer has finished, your job is to convert the screen to normal, using the same technique, i.e., defining the centre square of a group and ordering the machine to invert it and its neighbours. The move should be input as "Letter, number, NEWLINE".

```
  1 REM
  2 REM      HAMPSON"S PLANE
  3 REM
  4 REM
  9 REM  INITIALISE
 10 PRINT TAB 7;"HAMPSON""S PLA
NE"
 20 PRINT
 30 PRINT "ENTER SKILL LEVEL"
 40 INPUT S
 50 CLS
 60 PRINT "   ABCDEFGHIJKLMNOPQR
STUVWXYZ"
 70 FOR Z=1 TO 20
 80 IF Z<10 THEN PRINT " ";
 90 PRINT Z;"++++++++++++++++++
++++++++";Z
100 NEXT Z
101 PRINT "   ABCDEFGHIJKLMNOPQR
STUVWXYZ"
103 FOR W=1 TO 1
106 NEXT W
110 LET D=0
120 LET P=0
125 LET V=0
130 LET X=0
140 LET Y=0
150 DIM K$(3)
160 DIM A(9)
170 LET A(1)=-34
180 LET A(2)=-33
190 LET A(3)=-32
200 LET A(4)=-1
210 LET A(5)=0
220 LET A(6)=1
230 LET A(7)=32
240 LET A(8)=33
250 LET A(9)=34
259 REM  DISPLAY FILE
260 LET D=PEEK 16396+256*PEEK 1
6397
265 RAND
269 REM  SCRAMBLE BOARD
270 FOR W=1 TO S
280 LET X=INT (RND*24)+4
290 LET Y=INT (RND*18)+2
300 GOSUB 400
310 NEXT W
319 REM  GET MOVE
320 INPUT K$
330 LET X=CODE (K$)-35
340 LET Y=VAL K$(2 TO )
349 REM CHECK MOVE
350 IF X<4 OR X>27 OR Y<2 OR Y>
19 THEN GOTO 320
360 GOSUB 400
370 GOTO 320
399 REM  APPLY MOVE
400 FOR Z=1 TO 9
410 LET P=D+Y*33+X+A(Z)
415 LET V=PEEK (P)
420 LET V=V-128*(V=149)+128*(V=
21)
425 POKE P,V
430 NEXT Z
440 RETURN
```

```
   ABCDEFGHIJKLMNOPQRSTUVWXYZ
 1+++++++++++++++++++++++++++1
 2++++++++++++++++++++++++++2
 3+++++++++++++++++++++++++++3
 4++++++++++++++++++++++++++4
 5++++++++++++++++++++++++++5
 6++++++++++++++++++++++++++6
 7++++++++++++++++++++++++++7
 8++++++++++++++++++++++++++8
 9++++++++++++++++++++++++++9
10++++++++++++++++++++++++++10
11++++++++++++++++++++++++++11
12++++++++++++++++++++++++++12
13++++++++++++++++++++++++++13
14++++++++++++++++++++++++++14
15++++++++++++++++++++++++++15
16++++++++++++++++++++++++++16
17++++++++++++++++++++++++++17
18++++++++++++++++++++++++++18
19++++++++++++++++++++++++++19
20++++++++++++++++++++++++++20
   ABCDEFGHIJKLMNOPQRSTUVWXYZ
```

CRICKET

CRICKET and summer go together, so for the summer competition *Sinclair User* asked for a cricket simulation program. The response was varied. Some people designed programs with good graphics and others decided to concentrate more on the laws of the game.

Many of the programs went some way to playing a good game of cricket but none seemed to produce complete simulations. In some cases it was difficult to tell whether the author of a program knew what a computer simulation was.

The simulation needed to be fairly logical in its approach to play. It needed to cater for incorrect and ridiculous entries. None of the programs did that sufficiently well, although the task is possible and there was no restriction on memory size.

Several programs were reasonably close to a good simulation and the best of them was a limited-overs game by Peter Horlock, of Godalming, Surrey.

His program simulated a game of two innings between Surrey and Middlesex, each team consisting of ten players. At the beginning of the game the players are asked to choose sides and the toss is made to decide who bats.

The player whose team is fielding is shown a list of men in the team and may choose a bowler from any of them, except the wicketkeeper, who is shown by an " = ". Alongside each player's name is his bowling form and the number of overs he can bowl during the game.

When the bowling side is set up, the batting side will be listed by the computer. The form of each batsman is also displayed. The computer will choose the two batsmen who are to play next and ask the batting player to enter their form, which is usually a number between one and 20.

When bowling and batting form have been entered, the computer will decide the outcome of a delivery. The batsman could be run out, caught, or leg before. The bowler could bowl a wide or one of the fielders could miss a catch.

Several times during the game the computer will ask whether the players want an analysis of play so far. The batting or bowling figures can be obtained in that way for both sides. The bowling table shows the number of overs, maidens, runs, and wickets for each bowler. It will also show the name of the present bowler, the number of overs so far played, and the number of deliveries in the current over.

The batting analysis shows the names of players who have batted, the number of runs scored by each, and whether they are out. It also displays the total runs obtained and the number of batsmen who have been dismissed.

When all the batsmen have been despatched, the teams are switched by the computer. Each team has a maximum of 20 overs. The winner is displayed at the end with a note of the winning margin.

The game is played using the form of the bowler and batsmen as the deciding factor. The computer determines the chances of a batsman scoring runs or being out with his present form and takes action accordingly.

Horlock needed a few weeks to write the game. He bought his ZX-81 in February and uses it mainly for sports-orientated and intellectual programs. He says:

"I have a ZX-81 version of chess which interests me and I also have a football pools prediction program. The football program takes into account all four divisions of the league".

He is very interested in computers and writes many programs. He was introduced to the ZX-81 last Christmas by a friend in the roofing department of a local firm where he works. He is not a member of any local user group but many of his workmates are also interested in Sinclair computers.

His reasons for entering the competition were for pleasure and practical necessity. He said: "The subject matter interested me and I decided to write the program. The printer I bought with my ZX-81 broke down and I returned it to Sinclair. In the meantime I thought I might be able to win another one in the competition."

The limited-overs cricket program uses much less than 16K of memory. Horlock has written an upgrade of the program which fills the remaining space. The program allows one player to play a game against the computer.

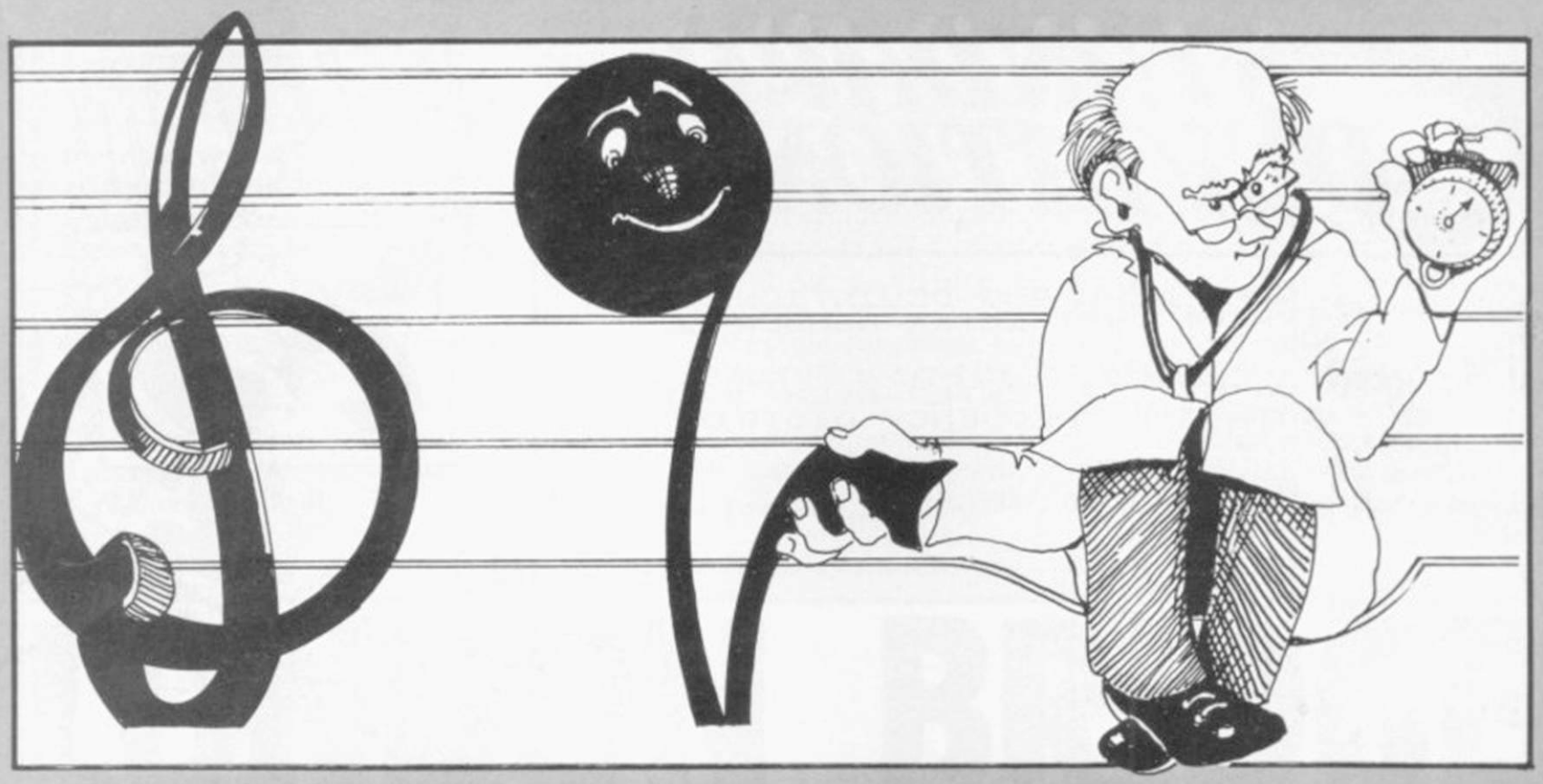




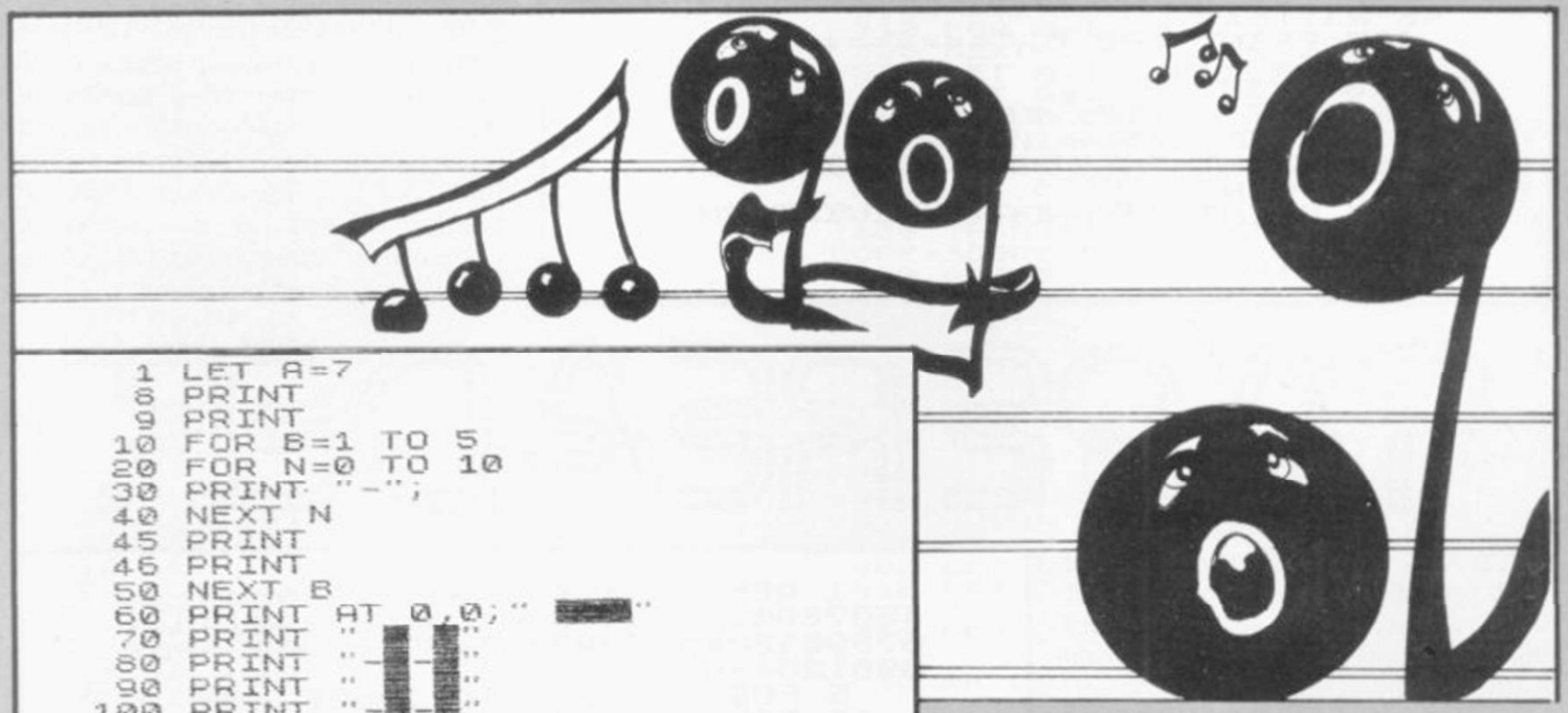
```
  1 REM "CRICKET" BY PETER J.
HORLOCK 15/10/82
  5 LET C=0
 10 LET D=1
 15 LET E=2
 20 DIM A$(E,11,8)
 30 DIM B$(E,11,E,4)
 40 DIM E(E)
 50 DIM U(E)
 60 DIM F(E,5)
 70 DIM O(E)
 75 DIM P(E)
 80 DIM B(11)
 90 RAND
 95 LET L=C
 98 LET K=0
100 LET IN=D
105 LET ZX=C
110 DIM C$(E,8)
120 DIM F$(E,9)
125 DIM H$(E,20)
130 DIM E$(E,9)
135 DIM G$(E,10)
140 DIM D(E)
150 DIM C(E)
160 LET NB=C
170 LET UI=C
175 LET LB=C
180 LET BY=C
190 LET E$(D)="SURREY"
200 LET E$(E)="MIDDLESEX"
210 LET A$(D,D)="BUTCHER"
220 LET A$(D,E)="HOWARTH"
230 LET A$(D,3)="SMITH"
240 LET A$(D,4)="LYNCH"
250 LET A$(D,5)="KNIGHT"
260 LET A$(D,6)="RICHARDS"
270 LET A$(D,7)="ROOPE"
280 LET A$(D,8)="THOMAS"
290 LET A$(D,9)="PAYNE"
300 LET A$(D,10)="CLARKE"
310 LET A$(D,11)="JACKMAN"
320 LET A$(E,D)="BREARLEY"
330 LET A$(E,E)="SLACK"
340 LET A$(E,3)="RADLEY"
350 LET A$(E,4)="BARLOW"
360 LET A$(E,5)="GATTING"
370 LET A$(E,6)="DOWNTON"
380 LET A$(E,7)="EMBUREY"
390 LET A$(E,8)="EDMONDS"
400 LET A$(E,9)="COWANS"
410 LET A$(E,10)="SELVEY"
420 LET A$(E,11)="DANIEL"
500 PRINT "HOW MANY PLAYERS, 1
OR 2 ?"
510 INPUT X
520 IF X<>D AND X<>E THEN GOTO
510
530 CLS
540 IF X=E THEN GOTO 600
550 PRINT "CHOOSE YOUR LEVEL, 1
TO 9"
560 INPUT L
570 IF L<D OR L>9 THEN GOTO 560
580 CLS
600 PRINT TAB 3;"LIMITED OVER C
RICKET MATCH"
610 PRINT ,,TAB 10;"FOR ";X;" P
LAYER";("S" AND X=E)
620 PRINT ,,TAB 8;"20 OVERS EAC
H SIDE"
630 PRINT ,,TAB 6;E$(D);"V";TAB
18;E$(E),,,
640 FOR Z=D TO 11
650 PRINT TAB 3-LEN STR$ Z;Z;TA
B 6;A$(D,Z);TAB 18;A$(E,Z)
660 NEXT Z
670 IF X=E THEN GOTO 1070
680 PRINT ,,"CHOOSE YOUR TEAM",
""S" = SURREY, "M" = MIDDLES
EX"
690 INPUT Z$
700 IF Z$<>"S" AND Z$<>"M" THEN
GOTO 690
710 CLS
715 LET ZX=D+(Z$="S")
720 IF Z$="M" THEN GOTO 1120
730 IF RND<.5 THEN GOTO 1000
740 PRINT E$(ZX);" HAVE WON THE
TOSS"
750 IF RND<.5 THEN GOTO 800
760 PRINT ,," AND WILL ";("BAT"
AND ZX=2)+("FIELD" AND ZX=1);"
FIRST"
770 INPUT Z$
780 CLS
790 GOTO 1550
800 PRINT ,," AND WILL ";("BAT"
AND ZX=D)+("FIELD" AND ZX=E);"
FIRST"
810 INPUT Z$
820 CLS
830 GOTO 1500
1000 PRINT "SURREY HAVE WON THE
TOSS",,,
1010 GOTO 1230
1070 PRINT ,,TAB 3;"PLAYERS CHOO
SE YOUR TEAMS"
1100 INPUT Z$
1110 CLS
1120 PRINT TAB 9;"THE TOSS"
1130 PRINT AT 6,9;E$(E)
1140 PRINT ,,TAB 6;"ENTER ""H"" (
HEADS)";TAB 9;" OR ""T"" (TAILS)"
1150 INPUT Z$
1160 CLS
1170 IF Z$<>"H" AND Z$<>"T" THEN
 GOTO 1120
1200 LET X=RND
1210 IF (Z$="H" AND X<.5) OR (Z$
="T" AND X>=.5) THEN GOTO 1300
1220 PRINT "TOSS = ";("HEADS" AN
D Z$="T")+("TAILS" AND Z$="H")
1222 PRINT ,,
1225 IF ZX=D THEN GOTO 740
1230 PRINT E$(D);" ENTER ""B"" (T
O BAT)"
1240 PRINT TAB 13;" OR ""F"" (TO
FIELD)"
1250 INPUT Z$
1260 CLS
1270 IF Z$="B" THEN GOTO 1500
1280 IF Z$="F" THEN GOTO 1550
1290 GOTO 1230
1300 PRINT "TOSS = ";("HEADS" AN
D Z$="H")+("TAILS" AND Z$="T")
1310 PRINT ,,E$(E);" ENTER ""B""
(TO BAT)"
1320 PRINT TAB 13;" OR ""F"" (TO
FIELD)"
1330 INPUT Z$
1340 CLS
1350 IF Z$="F" THEN GOTO 1500
1360 IF Z$="B" THEN GOTO 1550
1370 GOTO 1310
1500 LET B=D
1510 LET F=E
1520 GOTO 1600
1550 LET B=E
1560 LET F=D
1600 FOR Z=D TO 11
1630 IF Z<>6 THEN LET B(Z)=4
1640 NEXT Z
1650 LET G=D
1660 IF ZX=F THEN LET K=L-5
1670 IF ZX=B THEN LET K=5-L
1900 LET B$(B,D,D,D)="X"
1910 LET B$(B,E,D,D)="X"
1980 LET MA=C
2010 LET B1=C
2020 LET B2=C
2030 LET C$(D)=A$(B,D)
2040 LET C$(E)=A$(B,E)
2070 LET C(D)=D
2080 LET C(E)=E
2090 LET NXB=3
2100 GOSUB 9900
2110 PRINT ,,"ENTER ""A"" TO SEE ANALYSIS
 ENTER ""A"" TO SEE ANALYSIS"
2150 INPUT Z$
2160 CLS
2170 IF Z$="A" THEN GOSUB 7900
2180 IF D(D)=C THEN GOTO 2240
2185 IF ZX=F THEN GOTO 8540
2190 GOSUB 9900
2195 PRINT ,,,D$;,"IS DUE TO BO
WL HIS OVER NO. ";5-B(D(D)),"DO
YOU WISH TO CHANGE THE BOWLER"
2200 PRINT ,,E$(F),,"ENTER ""Y""
 OR ""N"""
2210 INPUT Z$
2215 IF Z$<>"Y" AND Z$<>"N" THEN
 GOTO 2210
2220 CLS
2230 IF Z$="N" THEN GOTO 2300
2240 IF ZX=F THEN GOTO 8550
2250 GOSUB 9700
2260 FOR Z=D TO G
2270 IF CODE G$(F,Z)=D(D) THEN G
OTO 2300
2280 NEXT Z
2285 LET G$(F,G)=CHR$ (D(D))
2290 LET G=G+D
2300 LET P(B)=P(B)+D
2305 LET X1=D(D)+9
2310 IF ZX=F THEN GOTO 8500
2320 GOSUB 9900
2330 GOSUB 9600
2340 PRINT ,,E$(F),,"ENTER YOUR
BOWLING POWER"
2350 PRINT ,,"MAX = ";X1,,"MIN =
 1"
2360 INPUT F1
2370 IF F1>X1 OR F1<1 THEN GOTO
2360
2380 CLS
2400 LET X2=21-C(D)
2410 IF ZX=B THEN GOTO 8520
2420 GOSUB 9900
2430 GOSUB 9600
2440 PRINT ,,D$;" POWER = ";F1;"
 (MAX = ";X1;")"
2450 PRINT ,,E$(B),,"ENTER YOUR
BATTING POWER"
2460 PRINT ,,"MAX = ";X2,,"MIN =
 1"
2470 INPUT F2
2480 IF F2>X2 OR F2<1 THEN GOTO
2470
2490 CLS
2500 LET T=100
2505 IF RND>.05*F1/X1 THEN GOTO
3000
2510 LET P(B)=P(B)-D
2520 IF RND<.5 THEN GOTO 2600
2550 PRINT "[redacted]"
2560 LET NB=D
2565 LET T=150
2570 GOTO 3000
2600 LET X=RND
2610 LET UI=D+(X>.8)+(X>.83)+(X>
.85)
2615 IF IN=E AND UI<4 AND UI+E(B
)>E(F)+D THEN LET UI=E(F)+D-E(B)
2620 PRINT UI;" [redacted]"+("S" AND U
I>D)
2630 IF UI=D AND RND<.95 THEN GO
TO 4510
2635 IF UI<>D AND UI<>3 THEN GOT
O 4510
2640 IF UI=D THEN PRINT ,,"BATSM
EN CROSSED"
2650 GOSUB 9500
2690 GOTO 4510
3000 LET X=RND
3010 LET Z=F1/80*(20+O(B))/40
3020 IF X<Z+K/16*Z THEN GOTO 320
0
3030 IF X>.9-.7*F1/X1*(20+O(B))/
40 THEN GOTO 3400
3040 GOTO 3300
3200 LET X=RND
3210 LET Y=F2/X2+K/16*F2/X2
3250 IF X<.2+Y*.6 THEN GOTO 3500
3260 IF X>D-F2*.01 THEN GOTO 400
0
3270 GOTO 4500
3300 LET X=RND
3310 LET Y=F2/X2+K/16*F2/X2
3350 IF X<Y*.1 THEN GOTO 3500
3360 IF X>.85-F2*.03*(40+O(B))/6
0 THEN GOTO 4000
```

```
3370 GOTO 4500
3400 LET X=RND
3410 LET Y=F2/X2+K/16*F2/X2
3450 IF X(Y*.02 THEN GOTO 3500
3460 IF X>.65-F2*.04+(60+O(B))/8
0 THEN GOTO 4000
3470 GOTO 4500
3500 LET X=RND
3502 IF NB=D THEN GOTO 4500
3505 LET R=C
3507 IF NXB(12 THEN LET B$(B,NXB
,D)="■"
3510 IF X(.45 THEN GOTO 3600
3520 IF X(.71 THEN GOTO 3700
3530 IF X(.97 THEN GOTO 3800
3540 IF X(.99 THEN GOTO 3900
3550 PRINT C$(D);" ■■■ ■■■ ■";D$
;TAB 29;B1
3560 LET B$(B,C(D),D,D)="■"
3570 GOTO 3920
3600 LET X=INT (RND*13)
3610 IF X=C OR X=12 THEN LET X=6
3620 PRINT C$(D);"■";(A$(F,X) AN
D X<>D(D));(" AND " AND X=D(D
));"■";D$;TAB 29;B1
3630 LET B$(B,C(D),D,D)="■"
3635 LET B$(B,C(D),D,E)=CHR$ X
3637 LET B$(B,C(D),D,3)=CHR$ D(1
)
3640 LET B$(B,C(D),D,4)=CHR$ B1
3645 IF U(B)=9 THEN GOTO 3950
3650 IF RND(.7 THEN GOTO 3680
3652 PRINT ,,"BATSMEN CROSSED"
3655 LET C(D)=C(E)
3660 LET C(E)=NXB
3662 LET C$(E)=A$(B,C(E))
3665 LET B1=B2
3670 LET B2=C
3675 GOTO 3690
3680 LET C(D)=NXB
3685 LET B1=C
3690 GOTO 3950
3700 PRINT C$(D);TAB 17;"■";D$;T
AB 29;B1
3710 LET B$(B,C(D),D,D)="■"
3750 GOTO 3920
3800 PRINT C$(D);" ■■■ ■■■ ■";D$
;TAB 29;B1
3810 LET B$(B,C(D),D,D)="■"
3850 GOTO 3920
3900 PRINT C$(D);"■";A$(F,6);"■"
;D$;TAB 29;B1
3910 LET B$(B,C(D),D,D)="■"
3920 LET B$(B,C(D),D,3)=CHR$ D(1
)
3925 LET B$(B,C(D),D,4)=CHR$ B1
3930 LET C(D)=NXB
3940 LET B1=C
3950 LET B$(F,D(D),E,4)=CHR$ (CO
DE B$(F,D(D),E,4)+D)
3955 LET U(B)=U(B)+D
3960 IF U(B)=10 THEN GOTO 6900
3965 LET F$(B,U(B))=CHR$ E(B)
3970 LET C$(D)=A$(B,C(D))
3980 LET NXB=NXB+D
3985 LET T=T+E
3990 GOTO 4600
4000 LET X=RND
4010 LET Y=(20+O(B))/40
4020 LET Z=F2/X2
4030 LET A=F1/X1
4040 LET R=D+(X>D-.15*Z-.15*A-.6
5*(X>D-.1*Z-.1*A-.45*Y)+(X>D-.
03*Z-.08*A-.4*Y)+(E AND X>D-.03*
Z-.03*A-.03*Y)
4045 IF RND((6-R)/100 THEN GOTO
9000
4050 IF R>=4 THEN GOTO 4300
4055 IF IN=E AND E(B)+R>E(F)+D T
HEN GOTO 9200
4060 IF RND>F2/X2*.04*(20+O(B))/
40 THEN GOTO 4300
4065 LET R=R-D
4070 LET U(B)=U(B)+D
4080 LET B1=B1+R
4085 IF NXB(12 THEN LET B$(B,NXB
,D)="■"
4088 PRINT C$(D);" HAS SCORED ";
R;" RUN";("S" AND R>D)
4090 IF RND(.5 THEN GOTO 4200
4100 PRINT ,,C$(D);" ■■■
■■■";TAB 29;B1
4110 LET B$(B,C(D),D,D)="■"
4120 PRINT ,,"RUN OUT GOING FOR
";R+D;" RUN";("S" AND R>D)
4130 LET B$(B,C(D),D,4)=CHR$ B1
4135 IF U(B)=10 THEN GOTO 4340
4140 LET C(D)=NXB
4145 LET C$(D)=A$(B,C(D))
4150 LET B1=C
4160 GOTO 4260
4200 PRINT ,,C$(E);" ■■■
■■■";TAB 29;B2
4210 LET B$(B,C(E),D,D)="■"
4220 PRINT ,,"RUN OUT GOING FOR
";R+D;" RUN";("S" AND R>D)
4230 LET B$(B,C(D),D,4)=CHR$ B1
4235 IF U(B)=10 THEN GOTO 4340
4240 LET C(E)=NXB
4245 LET C$(E)=A$(B,C(E))
4250 LET B2=C
4260 LET NXB=NXB+D
4270 LET F$(B,U(B))=CHR$ (E(B)+R
+NB)
4280 IF R<>D THEN GOSUB 9500
4285 LET T=T+150
4290 GOTO 4340
4300 LET B1=B1+R
4320 PRINT C$(D);" HAS SCORED ";
R;" RUN";("S" AND R>D)
4325 LET B$(B,C(D),D,4)=CHR$ B1
4330 IF R=D OR R=3 THEN GOSUB 95
00
4340 IF R>C THEN LET NB=C
4350 LET E(B)=E(B)+R+NB
4360 LET B$(F,D(D),E,3)=CHR$ (CO
DE B$(F,D(D),E,3)+R)
4370 IF U(B)=10 OR (IN=E AND E(B
)>E(F)) THEN GOTO 6900
4380 GOTO 4600
4400 PRINT "NO RUNS SCORED OR WI
CKETS LOST"
4410 LET R=C
4420 LET E(B)=E(B)+NB+WI
4430 IF R=C AND NB=C AND WI=C TH
EN LET NA=MA+D
4440 LET F(B,D)=F(B,D)+NB
4450 LET NB=C
4460 LET F(B,E)=F(B,E)+WI
4470 LET WI=C
4480 LET F(B,5)=F(B,D)+F(B,E)+F(
B,3)+F(B,4)
4490 IF IN=E AND E(B)>E(F) THEN
4500 GOTO 5000
4700 PAUSE T
4710 POKE 16437,255
4720 CLS
4800 IF P(B)<6 THEN GOTO 2300
4900 LET O(B)=O(B)+D
4910 LET P(B)=C
4920 LET B(D(D))=B(D(D))-D
4930 LET B$(F,D(D),E,D)=CHR$ (CO
DE B$(F,D(D),E,D)+D)
5040 LET A=D(D)
5060 LET D(D)=D(E)
5069 LET D(E)=A
5065 IF D(D)=C THEN GOTO 5080
5070 IF B(D(D))=C THEN LET D(D)=
C
5080 IF D(D)<>C THEN LET D$=A$(F
,D(D))
5100 GOSUB 9500
5110 IF MA=6 THEN LET B$(F,D(E),
E,E)=CHR$ (CODE B$(F,D(E),E,E)+D
)
5120 LET MA=C
5130 LET M$(B,O(B))=CHR$ E(B)
5200 IF O(B)<20 THEN GOTO 2100
5250 GOTO 7000
6900 IF P(B)<6 THEN GOTO 6940
6910 LET O(B)=O(B)+D
6920 LET P(B)=C
6925 LET M$(B,O(B))=CHR$ E(B)
6930 LET B$(F,D(D),E,D)=CHR$ (CO
DE B$(F,D(D),E,D)+D)
6940 LET B$(F,D(D),E,D)=CHR$ (CO
DE B$(F,D(D),E,D)+P(B)*10)
7010 PRINT ,,E$(B);" HAVE SCORED
";E(B);" FOR ";U(B)
7050 LET IN=IN+D
7060 PAUSE 200
7070 POKE 16437,255
7080 CLS
7090 IF IN=3 THEN GOTO 7520
7100 LET X=B
7110 LET B=F
7120 LET F=X
7150 LET D(D)=C
7160 LET D(E)=C
7400 GOTO 1600
7520 IF E(B)>E(F) OR (E(B)=E(F)
AND U(B)<U(F)) THEN GOTO 7600
7530 IF E(B)<E(F) OR (E(B)=E(F)
AND U(B)>U(F)) THEN GOTO 7700
7550 PRINT "THE RESULT IS A TIE"
7570 GOTO 7800
7600 IF E(B)>E(F) THEN PRINT E$(
B);" HAVE WON BY ";10-U(B);" WKT
";("S" AND 10-U(B)>D)
7610 IF E(B)=E(F) THEN PRINT E$(
B);" HAVE WON BY LOSING","FEWER
WICKETS"
7650 GOTO 7800
7700 IF E(B)<E(F) THEN PRINT E$(
F);" HAVE WON BY ";E(F)-E(B);" R
UN";("S" AND E(F)-E(B)>D)
7710 IF E(B)=E(F) THEN PRINT E$(
F);" HAVE WON BY LOSING","FEWER
WICKETS"
7800 PRINT ,,E$(F);" ";E(F);" FO
R ";U(F)
7810 PRINT ,,E$(B);" ";E(B);" FO
R ";U(B)
7550 GOSUB 7900
7690 STOP
7900 PRINT AT 11,C;" TO SEE ANAL
YSIS ENTER "
7910 PRINT ,,"""1"" FOR ";E$(D)
7915 PRINT ,,"""2"" FOR ";E$(E)
7920 PRINT ,,"""3"" SCORE AT END
OF EACH OVER"
7925 PRINT ,," TO RETURN ENTER "
"3"""
7930 INPUT X
7932 IF X=C THEN CLS
7935 IF X=C THEN RETURN
7938 IF X>3 THEN GOTO 7930
7940 IF X=3 THEN GOTO 8300
7945 PRINT ,,"ENTER ""BAT"" FOR
BATTING"
7950 PRINT "    OR ""BOWL"" FOR B
OWLING"
7960 INPUT Z$
7970 CLS
7980 IF Z$="BAT" THEN GOSUB 8000
7985 IF Z$="BOWL" THEN GOSUB 820
0
7990 GOTO 7900
8000 LET Y=D+(X=D)
8005 PRINT E$(X);" BATTING"
8008 PRINT
8010 FOR Z=D TO 11
8020 PRINT A$(X,Z);
8030 IF B$(X,Z,D,D)="■" THEN PRI
NT "■";(A$(Y,CODE B$(X,Z,D,E)) A
ND B$(X,Z,D,E)<>B$(X,Z,D,3));("
  AND    AND B$(X,Z,D,E)=B$(X,Z,
D,3));
8035 IF B$(X,Z,D,D)="■" THEN PRI
NT "■";A$(Y,6);
8040 IF B$(X,Z,D,D)="■" THEN PRI
NT "■■■■■";
8050 IF B$(X,Z,D,D)="■" THEN PRI
NT "■■■ ■■■";
8060 IF B$(X,Z,D,D)="■" THEN PRI
NT "   ■■■      ■■■";
8070 IF B$(X,Z,D,D)<>"■" AND B$(
X,Z,D,D)<>"■" AND B$(X,Z,D,D)<>"
" THEN PRINT TAB 17;"■";A$(Y,CO
DE B$(X,Z,D,3));
8080 IF B$(X,Z,D,D)="■" THEN PRI
NT "    NOT      OUT";
8090 IF B$(X,Z,D,D)<>" " THEN PR
INT TAB 32-LEN STR$ CODE B$(X,Z,
D,4);CODE B$(X,Z,D,4)
8100 IF B$(X,Z,D,D)=" " THEN PRI
NT
8110 NEXT Z
8120 PRINT "■■■■■■■■■■";,,(BY ";F(X,
4);" LB ";F(X,3);" UI ";F(X,E)
;" NB ";F(X,D);")";TAB 32-LEN S
TR$ F(X,5);F(X,5)
8130 PRINT ,,"■■■■■■■■■■";O(X);
8140 IF P(X)<>C THEN PRINT ".";P
(X);
8150 PRINT " OVERS) ";U(X);" UK
TS";TAB 32-LEN STR$ E(X),E(X)
8160 PRINT ,,"FALL OF WICKETS"
8162 LET A=C
8165 FOR Z=D TO 9
8168 PRINT TAB A;CHR$ (Z+156);
8170 IF U(X)>=Z THEN PRINT TAB A
+5-LEN STR$ CODE F$(X,Z),CODE F$
(X,Z);
8172 LET A=A+9
8173 IF A=27 THEN LET A=C
8175 NEXT Z
8180 INPUT Z$
8185 IF Z$="Z" THEN COPY
8190 CLS
8195 RETURN
8200 PRINT E$(X),,"BOWLING";
8210 PRINT TAB 10;"OVERS MDNS  R
UNS  WKTS"
8220 FOR Z=D TO 10
8223 LET Y=CODE G$(X,Z)
8225 IF Y=C THEN GOTO 8270
8230 PRINT ,,A$(X,Y);
8235 LET A=CODE B$(X,Y,E,D)
8240 PRINT TAB 12;A-INT (A/10)*1
0;
8242 IF A<5 THEN GOTO 8250
8245 PRINT ".";INT (A/10);
8250 PRINT TAB 18;CODE B$(X,Y,E,
E);TAB 25-LEN STR$ CODE B$(X,Y,E
,3);CODE B$(X,Y,E,3);TAB 30;CODE
 B$(X,Y,E,4)
8260 NEXT Z
8270 INPUT Z$
8275 IF Z$="Z" THEN COPY
8280 CLS
8290 RETURN
8300 CLS
8305 PRINT "SCORE AT THE END OF
EACH OVER"
8310 IF IN=D THEN GOTO 8400
8320 PRINT ,,,,E$(F);" ";E(F);"
FOR ";U(F);,,,O(F);
8325 IF P(F)>0 THEN PRINT ".";P(
F);
8328 PRINT " OVERS)",,
8330 LET X=C
8340 FOR Z=D TO 20
8345 IF Z>9 THEN PRINT TAB X;CHR
$ (INT (Z/10)+156);
8347 IF Z<=9 THEN PRINT TAB X;"■
";
8350 PRINT TAB X+D;CHR$ (Z-(INT
(Z/10)*10)+156);
8360 IF Z<=O(F) THEN PRINT TAB X
+6-LEN STR$ CODE M$(F,Z),CODE M$
(F,Z);
8370 LET X=X+8
8380 IF X=32 THEN LET X=C
8390 NEXT Z
8395 PRINT
8400 PRINT ,,,,E$(B);" ";E(B);"
FOR ";U(B);,,,O(B);
8405 IF P(B)>0 THEN PRINT ".";P(
B);
8408 PRINT " OVERS)",,
8410 LET X=C
8420 FOR Z=D TO 20
8425 IF Z>9 THEN PRINT TAB X;CHR
$ (INT (Z/10)+156);
8427 IF Z<=9 THEN PRINT TAB X;"■
";
8430 PRINT TAB X+D;CHR$ (Z-(INT
(Z/10)*10)+156);
8440 IF Z<=O(B) THEN PRINT TAB X
+6-LEN STR$ CODE M$(B,Z),CODE M$
(B,Z);
8450 LET X=X+8
8460 IF X=32 THEN LET X=C
8470 NEXT Z
8480 INPUT Z$
8482 IF Z$="Z" THEN COPY
8485 CLS
8490 GOTO 7900
8500 LET F1=INT (RND*X1)+D
8510 GOTO 2400
8520 LET F2=INT (SQR (RND*X2*E)
)+D
8525 LET F2=F2-INT (RND*F1/X1*F2
*(20-O(B))/(20-U(B)))
8530 IF F2<D THEN LET F2=D
8535 GOTO 2500
8540 IF RND<(ABS (E-B(D(D)))+E)/
4 THEN GOTO 2300
8550 LET X=C
8560 FOR Z=D TO 11
8570 IF Z<>D(E) AND B(Z)<C THEN
LET X=X+D
8580 NEXT Z
8590 LET Y=INT ((RND*X**(1L+3)/4
))**(4/(1L+3)))+D
8600 LET X=C
8610 FOR Z=D TO 11
8620 IF Z<>D(E) AND B(Z)<C THEN
LET X=X+D
8630 IF Y=X THEN GOTO 8650
8640 NEXT Z
8650 LET D(D)=Z
8660 LET D$=A$(F,Z)
8670 GOTO 2260
9000 IF IN=E AND R<4 AND E(B)+R>
E(F)+D THEN LET R=E(F)+D-E(B)
9005 IF RND(.2 THEN GOTO 9060
9010 LET LB=R
9020 PRINT LB;" ■■■ ■■■ ";("■" AN
D LB>D)
9030 IF LB=D OR LB=5 THEN GOSUB
9500
9040 LET F(B,3)=F(B,3)+LB
9050 GOTO 9100
9060 LET BY=R
9070 PRINT BY;" ■■■ ";("■" AND BY
>D)
9080 LET F(B,4)=F(B,4)+BY
9090 IF BY=D OR BY=3 THEN GOSUB
9500
9100 LET R=C
9110 LET E(B)=E(B)+LB+BY
9120 LET LB=C
9130 LET BY=C
9140 GOTO 4370
9200 LET R=E(F)+D-E(B)
9210 GOTO 4300
9500 LET A=B1
9510 LET B1=B2
9520 LET B2=A
9530 LET A=C(D)
9540 LET C(D)=C(E)
9550 LET C(E)=A
9560 LET C$(D)=A$(B,C(D))
9570 LET C$(E)=A$(B,C(E))
9590 RETURN
9600 PRINT ,,"■■■■■■ ";D$;" OVER
NO. ";5-B(D(D))
9610 PRINT TAB 13,"DELIVER NO. "
;D(D)
9620 RETURN
9700 PRINT E$(F);" CHOOSE YOUR B
OWLER","MAXIMUM 4 OVERS EACH"
9710 PRINT ,,"NO. PLAYER";TAB 16
;"MAX.";TAB 22;"AVAILBLE";TAB 16
;"POWER";TAB 22;"OVERS"
9730 FOR Z=D TO 11
9740 PRINT TAB E-LEN STR$ Z,Z,TA
B E;("*" AND D(D)=Z)+("+" AND D(
E)=Z)+("=" AND Z=6);TAB 4;A$(F,Z
);TAB 17+(Z=6);(Z+9 AND Z<>6);TA
B 24;B(Z)
9750 NEXT Z
9760 PRINT ,,"ENTER NO. OF SELEC
TED BOWLER"
9770 PRINT ,,"""*"" = BOWLER DUE
 TO BOWL"
9780 PRINT """+"" = BOWLER OF LA
ST OVER"
9790 PRINT """="" = WICKET KEEPE
R"
9800 INPUT A
9810 IF A<D OR A>11 THEN GOTO 98
00
9820 IF D(E)=A OR B(A)=C THEN GO
TO 9600
9830 LET D$=A$(F,A)
9870 LET D(D)=A
9880 CLS
9890 RETURN
9900 PRINT ("1ST" AND IN=D)+("2N
D" AND IN=E);" INNINGS"
9905 IF ZX>0 THEN PRINT AT C,18;
"LEVEL ";L
9910 PRINT ,,E$(B);TAB 12;"SCORE
";TAB 21-LEN STR$ E(B),E(B);TAB
22;" FOR ";TAB 28-LEN STR$ U(B),
U(B)
9920 PRINT ,,"■■■■■■ ■■■■■■";TA
B 14+(C(D)<10);"(";C(D);")";C$(D
);TAB 30-LEN STR$ B1;B1
9930 PRINT ,,"OTHER BATSMAN";TA
B 14+(C(E)<10);"(";C(E);")";C$(E
);TAB 30-LEN STR$ B2;B2
9940 PRINT ,,"COMPLETED OVERS ";
O(B);TAB 20;"EXTRAS";TAB 30-LEN
STR$ F(B,5);F(B,5)
9950 IF IN=D THEN RETURN
9960 PRINT ,,E$(F);" SCORED ";E(
F);" FOR ";U(F)
9990 RETURN
```





NOTE TESTER



```
  1 LET A=7
  8 PRINT
  9 PRINT
 10 FOR B=1 TO 5
 20 FOR N=0 TO 10
 30 PRINT "-";
 40 NEXT N
 45 PRINT
 46 PRINT
 50 NEXT B
 60 PRINT AT 0,0;"    "
 70 PRINT "    "
 80 PRINT "-   "
 90 PRINT "    "
100 PRINT "-   "
110 PRINT "    "
120 PRINT "-   "
130 PRINT "    "
140 PRINT "    "
150 PRINT "    "
160 PRINT "-   "
170 PRINT "    "
180 PRINT "    "
190 PRINT "    "
200 LET B=INT (RND*11)+1
210 PRINT AT B,A;"■"
215 IF B>=8 THEN LET B=B-7
220 LET B=(11-B)+34
230 PRINT AT 15,10;"YOUR GUESS?
240 INPUT A$
250 IF CODE A$<>B THEN PRINT AT
15,10;"    WRONG    "
260 IF CODE A$=B THEN PRINT AT
15,10;"    RIGHT    "
270 PAUSE 4E4
275 CLS
280 RUN
```

IF YOU do not know your notes but want to learn, **Note Tester** from A J Robinson of Monks Risborough, Bucks for the 1K ZX-81 is bound to help. The display features a treble stave and a blob at some random position on it. The blob represents a musical note which you have to guess, or know.

The computer will tell you whether you are correct and will then wait for you to press any key before RUNning once again.

Listing buffs might like the way the random number is linked to the note through CHR$.

STANDARD DEVIATION

```
  10 REM "MEAN AND DEVIATION"
  20 PRINT "(1) ENTER NUMBER OF
VARIABLES"
  30 INPUT N
  40 PRINT "(2) ENTER EACH VARIA
BLE DATA AND FREQUENCY DISTRIBUT
ION"
  50 PAUSE 150
  60 CLS
  70 PRINT TAB 1;"X";TAB 7;"F";T
AB 14;"FX";TAB 21;"FX**2"
  75 PRINT "-------------------
-------"
  80 LET TX=0
  90 LET TF=0
 100 LET TFX=0
 110 LET TFX2=0
 120 FOR C=1 TO N
 130 INPUT X
 140 INPUT F
 150 PRINT TAB 1;X;TAB 7;F;TAB 1
4;X*F;TAB 21;X**2*F
 170 LET TF=TF+F
 180 LET TFX=TFX+X*F
 190 LET TFX2=TFX2+X**2*F
 192 NEXT C
 195 PRINT "-------------------
-------"
 200 PRINT TAB 7;TF;TAB 14;TFX;T
AB 21;TFX2
 205 PRINT TAB 6;"==============
========"
 210 PRINT
 220 LET AM=TFX/TF
 230 LET SD=SQR (TFX2/TF-AM**2)
 250 PRINT "ARITHMETIC MEAN=";AM
 255 PRINT
 260 PRINT "STANDARD DEVIATION="
SD
 270 STOP
```



STANDARD DEVIATION is a measure used in statistics of the scatter of a series of numbers or measurements around their mean value. This program for the ZX-81 from David Lam, of London NW10, is a method of calculating both standard deviation and the arithmetical mean.

TAPE READER

TAPE READER is a useful routine to add to your ZX-81 software library. The bulk of the program is a machine code routine written into line one. It will read through a tape of programs and list the names of programs on that tape as it proceeds.

The program is easy to use. First type-in the program. The REM statement in line one must have 120 characters in it at least. Run the program to set up the machine code and then delete lines 5 to 60. The program is then ready to run.

Instead of typing LOAD" " before starting your cassette recorder type RUN 100 to start the reader program. Then start the tape.

Tape Reader was submitted by C M Woodman of Maybrook Gardens, High Wycombe.

```
   1 REM 12345678901234567890123
4567890123456789012345678901234
5678901234567890123456789012345
6789012345678901234567890123456
7890123456
   5 FOR I=16515 TO 16609
  10 POKE I,PEEK (I-15680)
  15 NEXT I
  20 POKE 16514,55
  25 POKE 16520,140
  30 POKE 16521,64
  35 POKE 16536,35
  40 LET A$="1114FF2A10400106000
9CD88C407123C879C01D20F5C9C3A203"
  45 FOR I=1 TO 25
  50 POKE 16549+I,16*CODE A$(2*I
-1)+CODE A$(2*I)-476
  55 NEXT I
  60 STOP
 100 CLEAR
 105 DIM B$(20)
 110 FAST
 115 RAND USR 16514
 120 PRINT B$
 125 PAUSE 100
 130 POKE 16437,255
 135 RUN 100
```

MOST computer games require nothing except a quick finger on the cursor key. Most of the rest, those which require a bit of brain power, are adaptations of games when the word computer meant a Chinese woman with an abacus.

London Bridge is one of the few routines we have seen which is original, was written for the computer, and which calls for nerve, thought and luck.

The display consists of a graphic representation of the bridge, seen from above, with the roadway made up of a random mix of the numbers 1 to 5, representing five types of flagstone. You are required to cross to the other bank but, as you would expect, London Bridge is falling down.

The computer will give you a number, perhaps 4. That tells you that one of the type 4 stones is about to fall into the river. In selecting your next move, therefore, you can gamble by moving on to a 4 or play safe by selecting a different number.

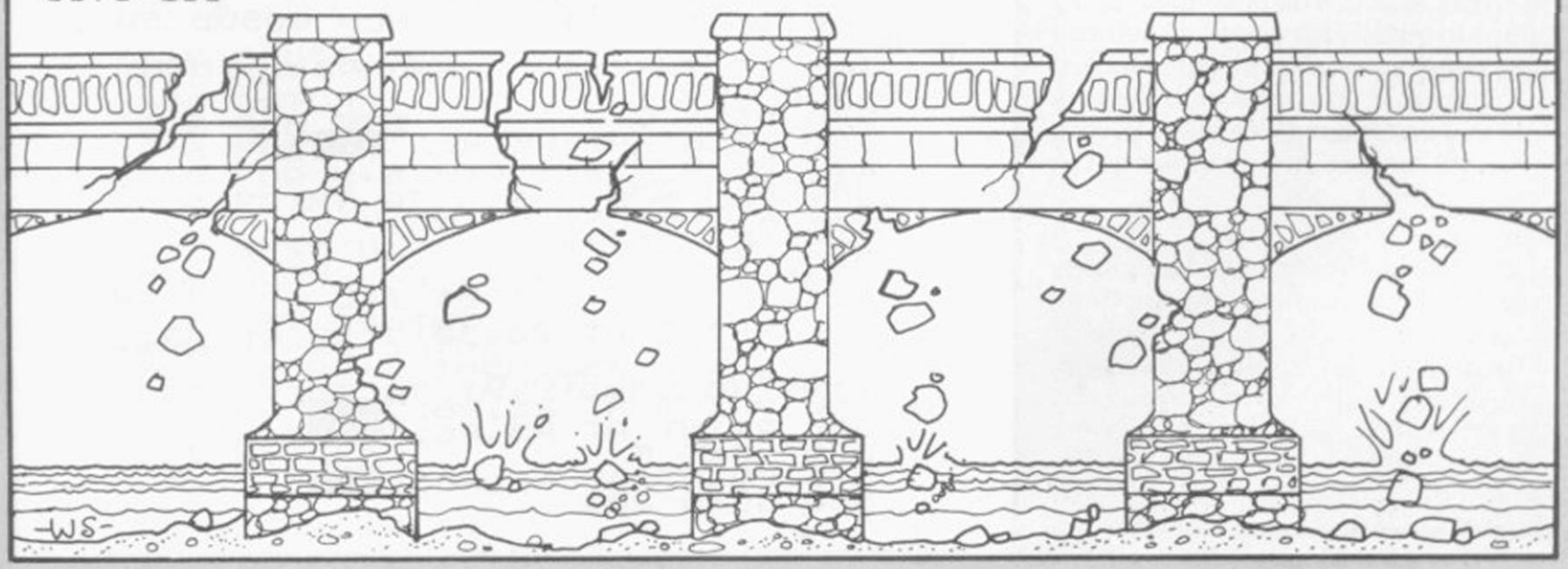
The player enters his move by following the nine-number grid displayed under "INPUT" in the bottom left of the screen; 7, for example, will move you left and down and 2 will send you directly backwards.

Invalid moves are ignored. You score 10, 20 or 50 points respectively for each move forwards, sideways or backwards, but taking risks trebles those scores and a high score is necessary to beat the world record of 1,700. Beware — don't dally too long at the start of the bridge — you may be cut off by successive collapses, and don't shilly-shally near the south bank because that is where the bridge is weakest.

We were very impressed by the program and counted ourselves lucky to manage a score of 1,900 after 12 attempts. Congratulations to J K Laskowski of London SE6 for an impressive listing for the 16K ZX-81.

LONDON BRIDGE

```
  5 FAST
 10 RAND 0
 20 DIM A(66)
 30 PRINT AT 2,9;"LONDON BRIDGE
"
 40 LET WR=1700
 50 PRINT AT 16,25;"WR=";WR;TAB
 11;"▒          ▒";TAB 0;"INPUT";TA
B 1;"123";TAB 1;"4▒6";TAB 1;"789
"
 55 PRINT AT 5,11;"▒▒▒  ▒  ▒▒▒"
 60 FOR I=1 TO 11
 70 PRINT TAB 12;"▒     ▒"
 80 NEXT I
 90 FOR N=11 TO 50
100 LET A(N)=INT (RND*5+1)
110 LET A$=CHR$ (28+A(N))
120 LET M=(N-1)/5
130 GOSUB 500
135 NEXT N
140 LET N=8
145 SLOW
150 LET A(N)=-28
155 PRINT AT 20,20;"TO COLLAPSE
"
160 LET DROP=INT (RND*(67-N)+N-
6)
170 IF A(DROP)<=0 THEN GOTO 160
180 PRINT TAB 25;A(DROP)
190 INPUT DIR
200 LET I=(INT DIR-1)/3
205 LET M=(N-1)/5
210 LET J=M-INT M+I-INT I
220 LET N1=N+5*(INT I-1)+3*(I-I
NT I,-1
230 IF DIR<1 OR DIR>9 OR J<0.1
OR J>1.4 OR N1<6 THEN GOTO 190
235 IF A(N1)<=0 AND N1<=60 THEN
GOTO 190
240 IF N1>60 THEN LET A(N1)=-28
250 LET A$=CHR$ (28+A(N))
260 GOSUB 500
270 LET M=(N1-1)/5
280 LET A$=CHR$ (156+A(N1))
290 GOSUB 500
300 PRINT AT 20,20;"
";TAB 25;" "
310 FOR J=1 TO 70
320 NEXT J
330 LET M=(DROP-1)/5
350 LET A$=" "
360 GOSUB 500
370 IF N1=DROP THEN GOTO 600
380 IF N1>60 THEN GOTO 800
390 LET SCORE=10*(3-INT I)+10*(
2-INT I)*(1-INT I)
400 IF A(N1)=A(DROP) THEN LET S
CORE=SCORE*3
410 GOSUB 900
420 LET A(DROP)=0
430 LET N=N1
440 GOTO 155
500 PRINT AT 5+INT M,13+5*(M-IN
T M);A$
510 RETURN
600 PRINT AT 20,16;"YOU HAVE FA
LLEN";TAB 18;"IN THE WATER"
700 STOP
800 LET SCORE=1000
810 GOSUB 900
820 STOP
900 LET A(1)=A(1)+SCORE
910 PRINT AT 11,22;"SCORE ";SCO
RE;"  "
920 PRINT AT 13,22;"TOTAL ";A(1
)
930 RETURN
```



PHASOR

REMARKABLE graphics effects are the striking features of **Phasor** for the 16K ZX-81. You are an infamous space pirate travelling home through hyperspace after a hard day's murder and mayhem. Suddenly you find yourself wrenched back into real space/time by a squadron of Federation star-ships. You are hopelessly surrounded. Can you fight your last battle with style?

The view from your cockpit is of stars and galaxies in the blackness of space. Each attacking star-ship is an inverse O appearing at random positions around the screen. You are required to note in which column it appears, relate that to the letters at the bottom of the display and hit the appropriate key on the ZX-81.

If you miss, or delay too long, your assailant will take up position at screen centre and loose a series of devastating thermal bolts at your ship.

That is where the original graphics come in. The two energy beams from the Federation ship approach with a striking 3D effect. If they are on target, they rock your pirate ship by means of the FAST/SLOW loop in lines 1200 to 1240. Excellent.

You cannot fire at the ship when it is firing at you. You must destroy 15 ships to qualify for a new screen and the game speeds-up as each screen is cleared. If you break into the program, remember to re-start it with "RUN 2", since the program saves itself in line 1.

A series of honorary accolades is awarded for a high score. Anything above 1,050 gains the accolade of Starfalcon, Starhawk or Stareagle, depending on the level of difficulty selected. You will have to be good, though, since the author of the program, Marcus Harvey of Surbiton, Surrey, has managed a personal best of only 550.

```
    1 SAVE "■"
    2 CLS
    3 PRINT "PHASOR";AT 1,0;"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"
    4 PRINT "WHAT LEVEL OF DIFFICULTY?"
    5 PRINT "(1,2,OR 3)"
    6 INPUT X
    7 IF X>3 OR X<0 THEN GOTO 6
    8 LET INP=(1/INT X)*25
    9 CLS
   10 LET S=0
   11 LET SH=5
   12 LET P=20
   13 LET I=0
   15 CLS
   16 IF X=1 THEN LET A$=" FALCON"
   17 IF X=2 OR X=1 AND S=2100 THEN LET A$=" HAWK"
   18 IF X=3 OR X=2 AND S=2100 OR X=1 AND S=2850 THEN LET A$=" EAGLE"
   20 IF S=1050 OR S=2100 OR S=2850 THEN GOSUB 7000
   25 FOR N=1 TO 21
   30 PRINT "■■■■■■■■■■■■■■■■■■■
```

```
  500 REM ■■■■
  510 IF P<>0 THEN LET P=P-1
  520 PRINT AT 20,30;"  ";AT 20,3
0;P
  525 FOR J=1 TO 5
  530 PRINT AT 0,0;"■LIEN FIRE■"
  535 NEXT J
  540 LET R7=INT (RND*3)+1
  545 PRINT AT 0,0;"■■■■■■■■■■■■"
  546 GOSUB 1000
  550 IF R7<>1 THEN RETURN
  555 FOR Y=1 TO 5
  560 PRINT AT 0,0;"■LIEN ■IT■"
  565 PRINT AT 0,0;"■■■■■■■■■■■■"
  566 NEXT Y
  570 LET SH=SH-1
  580 IF SH<0 THEN GOTO 1000
  590 PRINT AT 12,30;SH
  600 RETURN
1000 REM ■■■ GRAPHIC■■■■
1005 PRINT AT R5,R6;"■■"
1010 PRINT AT 10,11;"■0■"
1015 FOR L=1 TO 5
1020 PRINT AT 11,11;"■";TAB 13;"
■"
1030 PRINT AT 11,11;"■";TAB 13;"
■"
1040 PRINT AT 12,10;" ";TAB 14;"
 "
1050 PRINT AT 12,10;"■";TAB 14;"
■"
1060 PRINT AT 13,8;"  ";TAB 15;"
  ";AT 14,8;"  ";TAB 15;"  "
1070 PRINT AT 13,8;"■■";TAB 15;"
■■";AT 14,8;"■■";TAB 15;"■■"
1080 PRINT AT 15,4;"    ";TAB 17
;"    ";AT 16,4;"    ";TAB 17;"
  ";AT 17,4;"    ";TAB 17;"
";AT 18,4;"    ";TAB 17;"    "
1090 PRINT AT 15,4;"■■■■";TAB 17
;"■■■■";AT 18,4;"■■■■";TAB 17;"■
■■■";AT 16,4;"■■■■";TAB 17;"■■■
";AT 17,4;"■■■■";TAB 17;"■■■■"
1100 PRINT AT 19,0;"  ";TAB 21;
"    ";AT 20,0;"    ";TAB 21;"
    "
1110 PRINT AT 19,0;"■■■■";TAB 21
;"■■■■";AT 20,0;"■■■■";TAB 21;"■
■■■"
1111 IF R7<>1 THEN PRINT AT 10,1
1;"■■■■"
1115 IF R7<>1 THEN RETURN
1200 FOR F=1 TO 10
1210 FAST
1220 SLOW
1230 NEXT F
1240 NEXT L
1242 PRINT AT 10,11;"■■■■"
1245 IF SH<>0 THEN RETURN
1247 GOSUB 8000
2010 PRINT AT 0,0;"HIT ""R"" FOR
 NEW GAME."
2020 IF INKEY$="R" THEN RUN 2
2030 GOTO 2020
7000 PRINT AT 1,1;"CONGRATULATIO
NS";AT 2,1;"■■■■■■■■■■■■■■■■■■■■";AT
4,1;"WE HEREBY AWARD YOU THE TIT
LE";AT 5,1;"OF: ""STAR";A$;""".";
AT 8,1;"KEEP ON FIGHTING, COWBO
Y."
7010 PAUSE 300
7020 CLS
7030 RETURN
8000 REM ■■■■
8010 FAST
8015 FOR U=0 TO 20
8020 PRINT AT U,0;"
"
8025 NEXT U
8030 SLOW
8035 FOR U=1 TO 80
8040 LET R9=INT (RND*4)+1
8050 IF R9>1 THEN LET B$="."
8060 IF R9=1 THEN LET B$="■"
8070 PRINT AT INT (RND*20),INT (
RND*26);B$
8080 NEXT U
8100 RETURN
```

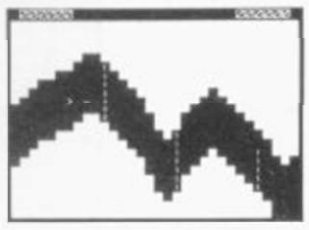
PHASOR



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 fore 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**
***Hall of Fame**
***1 or 2 Players**
***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

CARNELL SOFTWARE

ZX81 ADVENTURE SPECIALISTS
MULTI-PROGRAM ADVENTURE FOR THE SPECTRUM 48K/ZX81 16K
BLACK CRYSTAL

You can be a warrior, elf or wizard on a quest to find seven magic rings and to destroy the Black Crystal. Held in six programs is a land of fantastic treasures and mythical monsters. Beware the Lords of Chaos. Even the gods fear them so what chance have you? Real time monster battles ** Save game routine ** More variety and detail than any other adventure for the Sinclair computers. All six programs supplied together on cassette, boxed with instructions.

SPECTRUM 48K – OVER 180K IN SIX PARTS ALL FOR £7.50
ZX81 16K – OVER LOOK IN SEVEN PARTS ALL FOR £7.50

WHY PAY MORE FOR LESS OF AN ADVENTURE?
Try out other ZX 81 16K adventures. Each adventure designed to be played more than once. Adventures C2, C3 and C4 all come with an enjoyable "B" side game for added value.

C2 Volcanic Dungeon/Hangman ..... Only £4.50
"Volcanic Dungeon is one of the better adventure games currently on the market."
Popular Computing Weekly.

C3 Alien Intruder/Hieroglyphics ..... Only £5.00
"Both programs make good use of graphics and words to make a very entertaining package." Sinclair User

C4 Wumpus Adventure/Movie Mogul ..... Only £5.00
Wumpus Adventure: For 1 to 4 players.

Please make cheques/P.O.'s payable to Carnell Software or send a large S.A.E. for list to: Carnell Software (Dept. 1), 4 Staunton Rd., Slough, Berks SL2 1NT.

Overseas customer please add £1.00 p&p. Trade enquiries welcome.
Proprietors: Roy Carnell, Stuart Galloway.

NEW

SAVE IT!

with battpack©
(Patent applied for)

Only £13·95 + £1·40 p/p

FOR ZX 81 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 rechargable 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 £_____

PLEASE CHARGE MY ACCESS/BARCLAYCARD/TRUSTCARD
ACCOUNT No |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
SIGNATURE_____

NAME |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
ADDRESS |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

ZX81 & 16K

THE TOMB OF DRACULA!



3D HORROR ADVENTURE GAME!

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

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

MOVIEDROME VIDEO (Dept SU6),
19 Leighton Avenue, Pinner HA5 3BW.

ZX81 owners

16K RAM PACK
16K RAM PACK

built tested cased

ONLY £21.95 INC VAT

please add 50p p&p

E.D.S. Ltd.,
49 Firs Ave,
Cowplain, Hants

MIDWICH COMPUTER COMPANY LIMITED

FAST EX-STOCK DELIVERY OF MICROCOMPUTER COMPONENTS AT UNBEATABLE PRICES

GAMES PADDLES FOR SINCLAIR ZX81 & SPECTRUM



- ★ 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

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

ABERSOFT

7 MAESAFALLEN, BOW ST, DYFED, SY24 5BA

ZX81 & Spectrum Games

Now NEW LOW prices!!!!

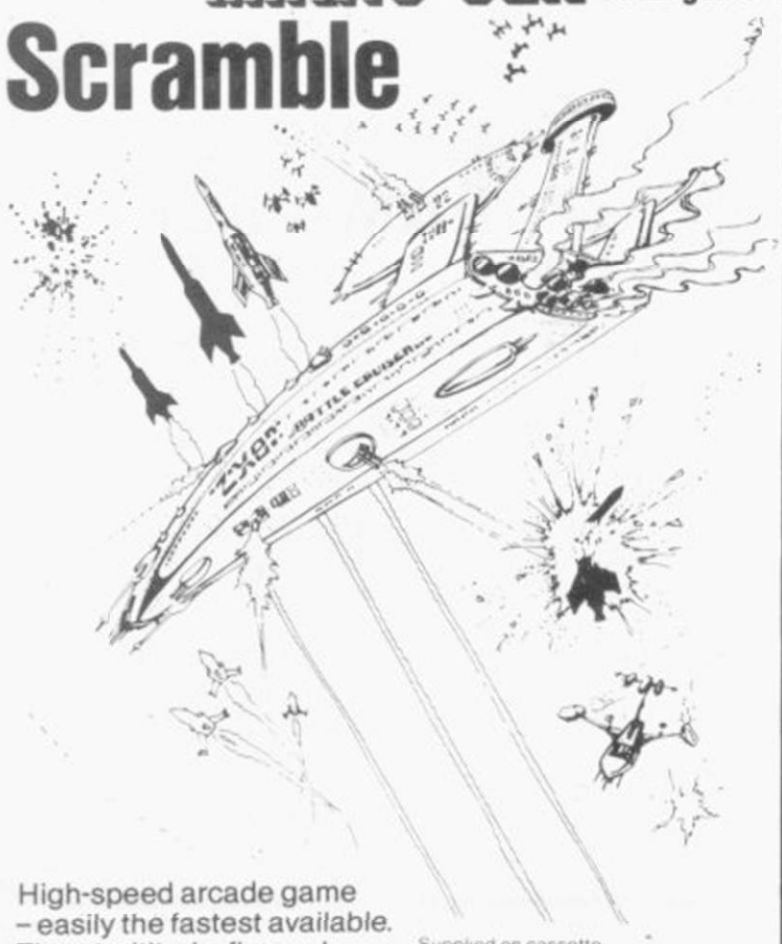
PROGRAM	OLD	NEW 81	SPECTRUM
Chess 1.4 10 levels m/c	10.00	8.95	
Adventure 140 locations based on the original (At £10.00 well worth the money Sinclair User Issue 2 review)	10.00	8.95	9.95*
Invaders Fast m/c arcade action	5.00	4.45	
Mazeman All the features of the original arcade version m/c	5.00	4.45	4.95

*requires 48k Spectrum

All prices are inclusive
Return of post service

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)

A/D Converter Board
Lets you connect analogue joysticks to the ZX81 digital inputs. Suitable for many other applications, easy to connect – and it improves RAM pack stability!
ONLY £18.50

Joysticks
Connect via our A/D Board – makes your ZX81 a true programmable games machine
ONLY £9.50 EACH

Disassembler/Monitor
An absolute must when learning machine code – lets you enter and run your own code
ONLY £3.95

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

SOUND with ZX-81!

MAKE AMAZING SOUND EFFECTS WITH YOUR ZX-81



£25.95 incl p&p & VAT **THE ZON X-81**

- 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 SU12 P.O. Box 6, 63A High Street, Ware, Herts

BARCLAYCARD VISA

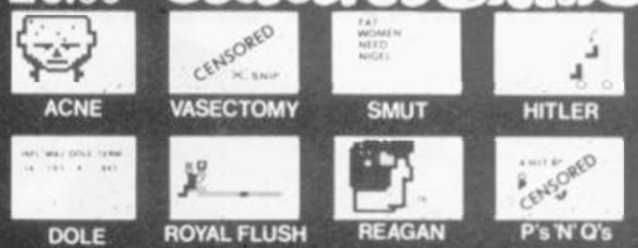
Access & VISA accepted Ring 0920 3182 for immediate despatch.

1K ZX81 ADULT GAMES

FOR JADED MINDS. BAD TASTE IS OUR SPECIALITY

cassette No. 1 for the over 16's **£3.00**

CAN OF WORMS



cassette No. 2 for the over 18's **£5.00**

LOVE AND DEATH



cassette No. 3 for the over 16's **£5.00**

THE BIBLE



prices include bizarre audio intros, revoltingly descriptive instructions, postage & package. send to: AUTOMATA LTD., (Dpt Z), 65A Osborne Road, Portsmouth PO5 3LR, Hants.



Andrew Hewson.



Talking direct to the machine improves uses

MANY PEOPLE are interested in using machine code but find it difficult to master. Books on the market include *Mastering Machine code on your ZX-81* by Toni Baker and several by Ian Logan. The best, in my opinion, on the Z-80 microprocessor is *How to Program the Z-80* by Rodnay Zaks.

One of the easiest ways to learn is to copy a few examples and to try and see how they work. This month I have written two machine code routines in response to requests from readers. The first request is from Chris Chatwin of Wakefield, who asks:

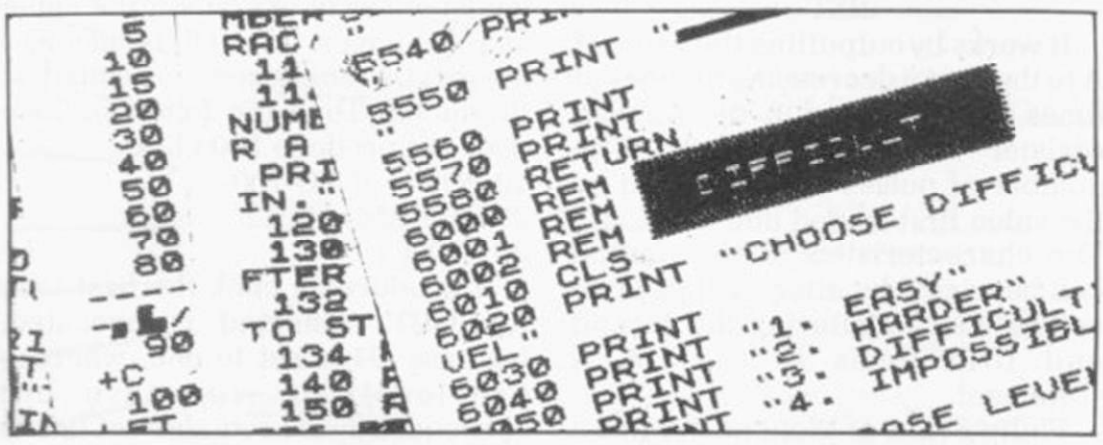
"Is there any way in which an interval timer can be incorporated into a program for the ZX-81 and displayed on the screen?"

The best way to run a clock on both the ZX-81 and the Spectrum is to monitor the FRAMES system variable. In the ZX-81 it is held at 16436 and 16437 and is decremented every time a frame is sent to the TV screen — see page 179 of *ZX-81 Basic Programming*. Provided the ZX-81 is in SLOW mode, intervals of up to 10 minutes or so can be measured to reasonable accuracy without difficulty. The following Basic routine displays the elapsed time:

```
10 PAUSE 0
20 LET T = 65279-PEEK 16436-256
*PEEK 16437
30 PRINT AT 0,0;INT (T/3000);
"MINS";
INT (T/50); "SECS"
40 GOTO 20
```

Line 10 re-sets the FRAMES variable to its starting value, effectively 65279. Line 20 loads the number of frames displayed into T and line 30 converts the results to minutes and seconds. After about 10 minutes the FRAMES variable has been decremented to its final value and it is re-set automatically to the starting value.

The routine takes about half a second to execute, so that a program which called it at a number of separate points, so that the display of elapsed time was more or less continuous, would be slowed considerably. The only solution to the problem is to use a machine code routine to monitor the FRAMES counter and display the current value on the screen. Here are two routines which together perform the task.



The first routine listed in table one is called initially to save the current PRINT position in the display file in the printer buffer. That permits the second routine to PRINT the current elapsed at the same point in the display without using the PRINT AT command.

The second routine is called whenever the elapsed time is to be displayed and is shown in table two. The routine works by restoring the value of DP-CC from the printer buffer and writing blank characters over the previous display. It then loads the value of FRAMES into HL and divides by 50 by repeated subtraction, because 50 frames are displayed per second.

Hex code	Assembler code
2A OE 40	LD HL (16398)
22 3C 40	LD (16444), HL
C9	RET

Table 1. The initialising routine.

The number of seconds elapsed is transfered from BC to HL and the number of minutes elapsed is calculated by dividing by 60. The ROM routine at 2712 is used to PRINT the number of minutes at the current position. The PRINT position is incremented and then the ROM routine is called again to PRINT the number of seconds. The routines can be loaded using a simple hex loader, for example:

```
10 REM AT LEAST 80
CHARACTERS
20 for I = 16514 TO 16600
30 INPUT Z$
40 IF Z$ = "S" THEN STOP
50 PRINT Z$;" ";
60 POKE I, 16*CODE Z$ + CODE
Z$(2)-476
70 NEXT I
```

The REM statement in line 10 must contain at least 80 characters.

continued on page 74





continued from page 73

The routines are loaded by running the program and entering each two-character hex code in turn. The following program demonstrates the elapsed time counter in action:

```
2000 PRINT AT 10,14;
2010 RAND USR 16514
2020 PAUSE 0
2030 RAND USR 17621
2040 GOTO 2030
```

The following Basic routine is slow to execute but it illustrates the use of the OUT command to generate a buzz and flash the BORDER:

```
10 LET a = 0
20 FOR b = 255 TO 0 STEP-1
30 OUT 245, a
40 LET a = a + 15-256*(a>238)
50 NEXT b
```

Line 40 increases the value of a by 15 so that bit 4 changes almost every time and the colour of the BORDER is altered.

There is also an OUT command in Z-80 machine code. The following program loads a machine code routine from the DATA statement and calls it at line 200:

```
10 DATA 6, 10, 197, 6, 192, 197,
16, 254, 211, 254, 198, 15, 193, 16,
246, 193, 16, 240, 201
100 FOR i = 0 TO 18
110 READ a
120 POKE 326000 + i,a
130 NEXT i
140 RANDOMIZE USR 326000
```

The machine code routine in the DATA statement is as follows:

```
                LD B, 10
Repeat          PUSH BC
                LD B, 192
Pulse           PUSH BC
Delay           DJNZ,-2 Delay
                OUT 254,(A)
                ADD 15
                POP BC
                DJNZ,-10 Pulse
                POP BC
                DJNZ,-16 Repeat
                RET
```

It works by outputting the value of A to the port a decreasing number of times as determined by the value in register B — initially 192. The number of pulses is determined by the value first loaded into B, i.e., 10. The characteristics of the routine can be varied by altering those two values, i.e., by altering the second and fifth items in the DATA statement.

Philip Evans of Manchester has a Spectrum. He writes: **"I have found the BEEP command very limited. How could I make proper explosions — "Booomms" and "Whhhamms" — in machine code?"**

I do not think it is possible to produce a sound like an explosion with the simple tone generator in the Spectrum. Nevertheless, it is certainly possible to generate more

Hex code	Assembler code	Comment
2A 3C 40	LD HL, (16444)	Restore DP-CC
22 OE 40	LD (16398), HL	
3E 00	LD A, 0	Clear previous display
77	LD (HL), A	of elapsed time
23	INC HL	
77	LD (HL), A	
23	INC HL	
77	LD (HL), A	
23	INC HL	
77	LD (HL), A	
23	INC HL	
77	LD (HL), A	
21 FF FE	LD HL, 65279	load FRAMES
ED5B 3440	LD DE, (16436)	into HL
A7	AND A	
ED 52	SBC HL, DE	Calculate seconds
11 32 00	LD DE, 50	
01 FF FF	LD BC, 65535	by dividing by 50
A7	AND A	
ED 52	SBC HL, DE	
03	INC BC	
30 FB	JRNC-5	
60	LD H, B	Transfer elapsed
69	LD L, C	seconds to HL
01 FF FF	LD BC, 65535	Calculate minutes
11 3C OO	LD DE, 60	by dividing by 60
A7	AND A	
ED 52	SBC HL, DE	
03	INc BC	
30 FB	JRNC,-5	
CD 98 OA	CALL 2712	Call ROM
19	ADD HL, DE	routine to display minutes
44	LD B, H	Save seconds
4D	LD C, L	in BC
2A OE 40	LD HL, (16398)	Leave one space between
23	INC HL	minutes and seconds
22 OE 40	LD (16398), HL	
CD 98 OA	CALL 2712	Call ROM routine
C9	RET	to display seconds

Table 2. Routine to display elapsed time.



interesting sounds than the simple BEEP using the OUT command.

Chapter 23 of *ZX Spectrum Basic Programming* gives a brief introduction to the IN and OUT commands. It states in particular that the loudspeaker is driven from data line D4 of port 254. In other words, the Basic command OUT 254, a

where a is an integer between 0 and 255, drives the loudspeaker. There are a number of important points about this command.

The first, that the speaker is driven from data line D4, means that it is bit 4 of the binary equivalent of a which is important. Bits are counted from the right, starting at zero, so that if, for example, a is 37 which is 00100101 in binary, then bit 0 is 1, bit 1 is 0, bit 2 is 1, bit 3 is 0, bit 4 is 0. A few minutes' work with pencil and paper shows that numbers in the range 0 to 15 have bit 4 set to zero, 16 to 31 have bit 4 set to one, 32 to 47 have bit set to zero.

The second point is that the port is latched. That means that the loudspeaker clicks only if the value on D4 changes. If the OUT command leaves D4 unaltered, no sound is produced. Thus the following loop does not produce 100 clicks:

```
10 FOR i = 1 TO 100
20 OUT 254, 16
30 NEXT I
```

It produces a click the first time the OUT command is executed, because D4 is set to one, whereas previously it was zero but subsequently D4 remains set to one and so no click is produced.

The final point is that port 254 is also used to output data to the MIC socket and to determine the BORDER colour and so the value of a will effect the BORDER colour temporarily. Certain commands, e.g., LIST, will restore the BORDER to its original colour using the value stored in BORDER at 23624.

ZX81 16K Spectrum

5th ZX MICROFAIR
DECEMBER 8th
NEW HORTICULTURAL HALL, LONDON SW1

MANAGEMENT GAMES



AIRLINE — £5

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.

AUTOCHEF — £5

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 — £5

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.

£5 for one, £8.50 for any two or £12 for three.

ALL PROGRAMS INCLUDE DETAILED INSTRUCTIONS
PLEASE STATE COMPUTER TYPE AND SEND CHEQUE TO:

C.C.S. DEPT. SA
CASES COMPUTER SIMULATIONS
14 Langton Way
London SE3 7TL.



YOU need the PROXIMA GRAPHIC PLANNER

Introductory Price £3.50 80 Pages

Don't be trapped into designing one graphic at a time on the VDU screen. Work on 2, 4 or up to 48 adjacent units with this quality-printed Graphic Planning Pad. Prepare your designs at home, on the train, at school or the office – anywhere. ■ Full instructions ■ Over 300 predesigned graphics to use or to spark your imagination ■ Space to design over 2000 graphics of your own. ■ All column values printed to aid coding ■ Sample program to calculate values, POKE to memory and SAVE ■ Written for Spectrum but invaluable for any computer with 8×8 user defined graphics ■ All in all the best to be had.

Also available: ZX81/Spectrum BASIC coding sheets. Printed blue on quality paper for neat and precise program development. **£2.50 inc p&p per 100 sheets.**

PROXIMA GRAPHIC PLANNER PAD ~~£6.00~~ **£5.00**
PLUS 100 BASIC CODING SHEETS

Remittances to **Proxima Centauri Ltd.**
Suite A4, 23 Denmark Street,
London WC2H 8NA.
Please specify exact requirements.

MICROMEGA

Personal Computer Division
Quantec Systems & Software Ltd.

RANGE SELECTED BY SINCLAIR USER CLUB
see this issue

QUANTEC SYSTEMS & SOFTWARE LTD works on advanced Communications and Business Applications Programmes. The same professional standards are applied to Personal Computer Products, all of which are fully tested and documented.

ZX 81 SOFTWARE

BANK — Personal Banking System. £9.95.
Automatic update of balance. Full description of items and powerful search and edit facilities to monitor expenditure. (16K)

COMP-U-SHARE — Investment Management System. £9.95.
Includes dealing costs and brokerage for shares, loans and unit trusts. Four report options, automatic recalculation of yield, complete edit/delete plus save, verify and load data files at double speed. (16K)

COMP-U-TAX — Personal Income Tax. (1982/83.) £9.95.
Specified and verified by Chartered Accountants. Includes all allowances and tax rates -automatic selection of those applicable to you. No technical knowledge required. (1K and 16K)

LIMITED OFFER — COMP-U-TAX/82 for year to April 1982 @ £6.95.
SAVE £2.00 : COMP-U-TAX/82 + COMP-U-TAX/83 @ £14.90.

SPACE TREK — The Space Adventure Game. £4.95.
Take command of a STARSHIP with weapons systems, propulsion systems and scanners under your computer control. Rapid decision making needed to survive and accomplish mission. (16K)

CHALLENGE! — Competitive real time machine code game. £4.95.
Fast moving and exciting-advanced programming techniques used to create specialised graphic displays. (1K)

PRICES SHOWN INCLUSIVE OF VAT & POSTAGE/PACKAGING.
Please send Cheques or P.O's to : MICROMEGA, 230-236 Lavender Hill, London SW11 1LE.
ZX81/SPECTRUM PROGRAMMES WELCOME FOR UK AND USA DISTRIBUTION. Trade enquiries welcome, samples available on request.

Crystal

Innovative ZX Software

MERCHANT OF VENUS (ZX81 + 16K RAM)

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

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

This comprehensive program takes all the effort out of entering, editing, debugging and running your machine code. Occupying less than 3½K above RAMTOP its features include:

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

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

SYMMETRICAL CRYSTAL 1K GAMES TAPE

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

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

Five great machine code programs for just £4.95.

Send sae for our latest catalogue
Please add £0.50 p&p and make cheques/ POs etc payable to

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

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" programm 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.

CAMPBELL SYSTEMS

The very best in machine code for
SPECTRUM and **ZX81**

Spectrum 16K GULPMAN game of the xxxMAN 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 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 independant files, printing. Yes, we aim to support the Microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 12-page manual. £15.00

Spectrum SPDE 16K Disassembler and Editor, as used by other ZX professionals, and we used it to develop the above. £5.95.

ZX81 16K GULP II almost identical spec to GULPMAN, £4.75.

ZX81 16K to 64K THE FAST ONE is the predecessor to MASTER-FILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12

All programs supplied double-recorded and mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

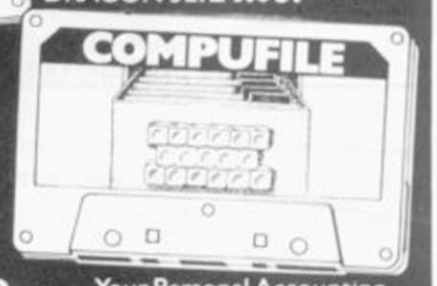
CAMPBELL SYSTEMS

(Dept SU)
15 Rous Road, Buckhurst Hill,
Essex IG9 6BL, England.

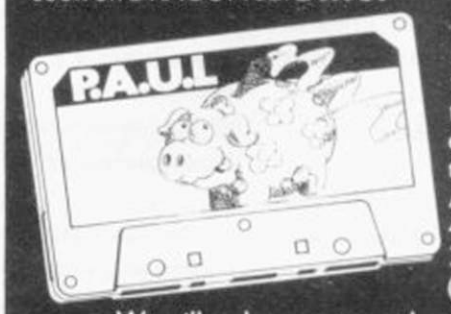
JAYSOFT
Business and leisure software for home computers.



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.**



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.**



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.



Philip Joy looks at a new cassette which is the perfect way to end a long, tiring day

Finding ways of winding down



FIRST this month a review of a new game, **Diceroll**, from John Williamson. The idea is to total 31 by turning dice in a special manner. It was very easy to load, which is something about which most people will be pleased.

From the screen display it was difficult to see exactly what was happening at first. Compared to the Close the Box game, which has been reviewed, it is not up to his standard. With Nim, Close the Box, and this, it should please most people who like relaxing games. The cassette is available from John Williamson, Dunrobin Software, 37 Rivaldsgreen Crescent, Linlithgow, West Lothian. He says that his family found the game interesting.

Here are two games played against the Artic Computing ZXchessII. The ZX-81 plays black in both games and the sender plays white.

	White	Black
1	E2 – E4	E7 – E5
2	G1 – F3	B8 – C6
3	F1 – C4	F8 – C5
4	B1 – C3	G8 – F6
5	C4 × F7	E8 × F7
6	F3 – G5	F7 – G6
7	H2 – H4	D7 – D5
8	H4 – H5	G6 × G5
9	D2 – D3	C5 – E3
10	C1 × E3 MATE	

The game was played at level 0.

	White	Black
1	E2 – E4	E7 – E5
2	G1 – F3	B8 – C6
3	B1 – C3	G8 – F6
4	F1 – C4	F8 – C5
5	C4 × F7	E8 × F7
6	F3 – G5	F7 – G6
7	H2 – H4	D8 – E7
8	H4 – H5	G6 – H6
9	G5 – F7	E7 × F7
10	D2 – D4	G7 – G5
11	C1 × G5	H6 × G5
12	D1 – D2	G5 – G4
13	F2 – F3	G4 – G3
14	D2 – G5	F6 – G4
15	G5 × G4 MATE	

The game was played at level 4.

For anyone interested in writing their own chess games, a good book to buy is *Sargon, a computer chess program*, by Dan and Kathie Spracklen. It includes a complete assembly program in Z-80 machine code for a chess program. Some of the routines included will need changing for the ZX-81 or Spectrum but the main program will go on unchanged. Many of the commercial programs for chess start from this basic program and expand on it.

I would like to include some comments about adventure games from Mike Farley. He says that any game advertised as a new set of dungeons each time the game is played cannot be a real adventure. Games such as **Catacombs, Perilous Swamp** and **Oracles' Cave** were in this category. This view could be taken either way but I feel that a real adventure should have the same story each time it is tried.

'Random mazes are games of luck. Real adventures need large amounts of thinking power'

Games where things change are more like random mazes and random mazes need no real thinking but are luck games. Real adventures need large amountks of thinking power, so the random maze games should not be called adventures.

Farley comments that the best adventure games he has bought are Artic Adventures. He says that he solved A and B in a few hours but C needed much longer. So if you are looking for a real adventure, C is the best one.

Next month I hope to review a flight simulator written in Basic and some more programs. If you are a software producer and produce mind games, please send them to the address below. If you want them returned please send a SAE with your details. Also if you have bought any mind games, send your comments on them. I can then let other readers know which games are the most popular and any comments about any of them.

Here is a puzzle, with no prize, but the answer will be published next month. I hope to include one puzzle a month, which will need the computer and your thinking power to solve. If you have puzzles you have devised, send them. Remember, though, it should require the use of a computer, and some thinking so that it is a mind puzzle.

The puzzle is to find the sum of all the prime numbers below 5,000; taking the first one as being 1, and add to it all the prime numbers below 5,000. I will include the first program sent on either the ZX-81 or the Spectrum to solve the problem. Send the sum with your program. The answer to the puzzle will be provided next month and the program at a later date.

The address to which to write is Philip Joy, 130 Rush Green Road, Romford, Essex RM7 0QA.

What can you get for your

SPECTRUM ?

Find out from our new

Guide to SPECTRUM RESOURCES

- Suppliers
- Hardware + software in various categories
- Books
- Magazines
- User groups
- And so on
- Illustrated

We attempt-to assess objectively and in some detail all that our Panels have seen. And we list, without comment, all other resources that come to our attention.

For this sizable and, we hope, complete collection of information, send £2.50 (overseas £3 sterling) to

MICROSCENE

6 Battenhall Road Harborne Birmingham B17 9UD

ZX-81 (16K)

MAP ASSISTED COMPUTER WARGAMING

Historically accurate simulations

Napoleonic

Dresden £12.50
Austerlitz £12.50

World War II

Desert Rats £12.50
The entire Desert Campaign
Carrier Strike £14.00
The Pacific carrier battles

Cheques or PO's made payable to:

K W SOFTWARE
155 Ringinglow Road
Sheffield S11 7PS.

NEW

SPECTRUM GAMES

16K programmeston cassette

AIRPORT This could be a nightmare! As a member of the airport groundstaff your task is to assist in the successful landing of an aircraft but beware, there are many obstacles in your path!

ALIEN Search for the alien hiding in the maze of air ducts on the spacecraft. Your only weapon is a flamethrower, so progress carefully as success relies on your skill and judgement.

CRABS Collect points as you proceed through the maze – but beware, the crabs will be hunting you.

Full animated instructions included with each game

ON ONE CASSETTE FOR ONLY £4.95

GRAPHICS TOOLKIT

22 exciting MACHINE CODE routines that give you control over your screen as never before!

(ZX81 - 16K RAM ONLY)

Draw/Undraw
Foreground On/Off
Border/Unborder
Fill screen
Reverse screen

Print position controls - UP, DOWN, LEFT, RIGHT
Editprint - moves next PRINT position to first edit line.

Scroll Facilities - UPSCROLL, DOWNSCROLL, RIGHTSCROLL, LEFTSCROLL.

Onscreen/Offscreen
Background On/Off
Search and replace
Square draw

All these routines are in machine code for SUPER-FAST response! GRAPHICS TOOLKIT uses only 2K of your RAM and that includes space to load the programmer's TOOLKIT described below.

ALL FOR ONLY £5.95 ($11.90)

PROGRAMMERS TOOLKIT

Renumber - including GOTO's and GOSUB's
Search and list
Search and replace

Hyper graphics mode
Fillscreen
Reverse screen
Tape wait
Free space

All these routines are written in machine code

FOR 16K ZX81 ONLY £4.95 ($9.90)

ZX81 GAMES CASSETTES FOR 16K

Lost Island – An adventure program ONLY £4.95 ($9.90)
Games Tape II – 3 fast action machine code games (City Bomb, 3D Battle, Gridball) ONLY £4.95 ($9.90)
Battleships – You verses the computer! ONLY £4.95 ($9.90)

SPECIAL CHRISTMAS OFFER – ALL THREE FOR ONLY £11.95 ($23.90)

NEW

an essential addition to your 16K or 48K Spectrum

PROGRAMMERS TOOLKIT

Provides the following additional facilities:-
Renumber – inc. GOTO'S, GOSUB'S, RUN'S, LIST'S, LLIST'S AND RESTORE'S.
Search and List, Search and Replace, Free Space, Shrink – removes REM statements.
Delete – removes blocks of lines by single command.
This program is completely menu driven with prompts and performs full error checking.

FOR 16K OR 48K SPECTRUM – ONLY £5.95

AVAILABLE SHORTLY

GRAPHICS TOOLKIT

for your 16K or 48K Spectrum

This will include:-
Attributes Reverse
Search and Replace
Square/Rectangle Draw
Multiple Scroll Routines
PLUS MUCH MUCH MORE!!

FOR 16K OR 48K SPECTRUM – PRICE TO BE ANNOUNCED

NEW

As reviewed in 'ZX Computing' August/Sept '82

ECONO TECH 16K RAM PACK

We believe the Econo Tech is the lowest priced 16K RAM available.

No frills - just a reliable and economical way to expand your ZX81.

ONLY £20.95 ($39.95)



With advances in microtechnology we are now able to offer the

64K RAM PACK

ZX81, yet having external dimensions no larger than the 16K RAM.

Same quality as the 16K RAM below but giving massive memory to your

ONLY £62.95 ($119.95)

As reviewed in 'Your Computer' March 82

16K RAM PACK

Quite simply the best available plus FREE 'Alien Attack' (7K M/code) on cassette - value £5.75 ($11.00)

Fully built, tested and guaranteed.
Uses existing power supply (Min. 600 m.a.)

Compatible with printer
No wobble problems
Gold plated edge connector for perfect contact with your ZX81
Normally despatched within 10 days of receipt of your order.



ONLY £26.50 ($49.95)

All prices are fully inclusive of post and packing.
OVERSEAS CUSTOMERS PLEASE NOTE: ALL PRICES ARE APPLICABLE FOR EXPORT, INCLUDING AIRMAIL POSTAGE. PAYMENT MAY BE MADE IN STERLING (MONEY ORDER AVAILABLE AT YOUR BANK) OR YOUR OWN U.S.$ CHEQUE, MADE PAYABLE TO JRS SOFTWARE. DESPATCH NORMALLY 7 DAYS FROM RECEIPT OF YOUR ORDER.

JRS SOFTWARE

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

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 with new 'Spectrum User' supplement!) Next, its companion magazine, **Sinclair Programs**, became an overnight success with 40 NEW programs, ready for you to key, in every issue.

Now the exciting new Sinclair Projects completes your store of possibilities with a huge increase in computing potential for you to explore.

Sinclair Projects is published on alternate months to Sinclair Programs, so there's **always** something new to test your skill. But here's the best news: when you subscribe to all three Sinclair magazines, you get the first **three** issues of new Sinclair Projects **absolutely free!**



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

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

Sinclair User / Spectrum User; Sinclair Programs; Sinclair Projects

Yes – I'd like to subscribe to:

☐ Sinclair User (12 issues – price £9.00) including special 'Spectrum User' supplement in each issue.

☐ Sinclair Programs (6 issues – price £6.60)

☐ Sinclair Projects (6 issues – price £6.60) Remember you get the first three issues FREE if subscribing to all three magazines!

☐ I enclose a cheque for £ _____ (deduct £3.30 from total cost if subscribing to all three publications)

☐ Please charge my credit card Card name _____ Number _____

Name _____

Address _____

_____

Signature _____ Date _____

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

ZX SPECTRUM SOFTWARE

SUPERDRAW16 £5.00

List of Features

- 16K Spectrum graphics pack.
- Full screen high resolution colour.
- Moving cursor control.
- Large alphabet facility.
- Pictures saved on cassette.
- Automatic "slide show" option.
- Menu driven, easy to operate, crash proofed.
- Documented to usual high Video Software standard.
- Demonstration slide show.
- Audio commentary on reverse of cassette.

SUPERVIEW48 £5.00

List of Features

- 48K Spectrum personal viewdata.
- Page creation with moving cursor.
- Large alphabet option.
- 48 full screen two colour pages OR
- 24 full screen full colour pages.
- Random page recall.
- Continuous page rotate.
- Print option.
- Full operating manual to our usual standard.
- Audio commentary on reverse of cassette.

Prices include VAT, P & P.
Immediate delivery.

Full range of ZX81 software still available.

VIDEO SOFTWARE LTD.
Stone Lane, Kinver,
Stourbridge,
West Midlands,
DY7 6EQ.

SEE US AT 5th ZX MICROFAIR DECEMBER 18th NEW HORTICULTURAL HALL LONDON SW1

FOR THE FIRST TIME ANYWHERE IN THE WORLD!

ASTROLOGY
ON YOUR SINCLAIR ZX81 COMPUTER (16K)

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemera, etc.

Cassette I ZODIAC I ONLY **£10.00**

makes truly AVAILABLE AT YOUR FINGERTIPS
THE SIDEREAL TIME OF BIRTH.
THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes, and Seconds for EQUAL HOUSE SYSTEM.
THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.
THE SUN AND MOON POSITIONS in Sign, Degrees, Minutes and Seconds.
ALL THE PLANETS POSITIONS in Sign, Degrees and Minutes.
THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX, AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

Cassette II ZODIAC II ONLY **£8.00**

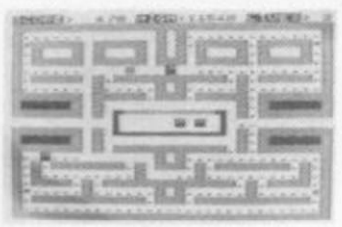
GIVES YOU THE ASPECTS

Other programs in course of preparation include: PROGRESSING THE HOROSCOPE; RECTIFICATION OF THE BIRTH TIME, etc.

STELLAR SERVICES
8 FIR TREE VALE, LEEDS LS17 7EY
Tel: (0532) 692770









EAT THE DOTS, BEAT THE GHOSTS IN THIS ADDICTIVE 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

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

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	☐
• New 32K Ram Pack	£45.50	☐
• Standard 32K Ram Pack	£39.00	☐
• 64K Ram Pack	£62.50	☐
• Tape boarding interface	£11.50	☐

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*

sinclair supermart

MAKE BETTER WINES WITH YOUR 16K ZX81

Enjoy superb wines of commercial quality from readily available ingredients. Based on years of practical and theoretical research into wine-making, these easy-to-use programs enable you to design your own recipes for dry and medium wines, with controlled pH, total acidity, body and alcohol content. 60 minute program cassette and detailed manual (over 6,000 words) of winemaking hints, as well as full operating instructions. All programs recorded twice. Professional tape.

£7.95 including P&P.
Cheques and PO's to:

COMPUTAWINE
(Dept. S), 9 Laburnum Way, Etwall, Derby DE6 6JU.

SPECTRUM USERS. Why labour over defining characters. **CHRGEN** allows you to sketch, modify, save, load characters plus more. £4.25 cassette or SAE for details. **VECTORSOFT**, 18 Milverton Road, London NW6 7AS.

16K ZX81 Software. Z-TOOL (toolkits), PGL (programmable graphics language), Haunted House, Mailing List, Diary, Catalogue, Decision and Z-Calc. £3.50 each. SAE for catalogue. Chris Callender, 'Crogach', Cove, Helensburgh G84 ONY.

CAN YOU WRITE GAMES PROGRAMS?
Usborne Publishing is looking for young programmers to write original and exciting games programs for a new series of visual computer books to follow their recently published titles, *Computer Spacegames* and *Computer Battlegames*.
If you can write fantasy or adventure games, invader games or race games, write to
Jenny Tyler, Usborne Publishing Ltd, 20 Garrick Street, London WC2.

16K ZX-81, Fuller keyboard and case, manual, leads, adaptor, total value £135, bargain: £85. Philip Bird, 178 Hammond Street Road, Cheshunt, Herts EN7 6NY. Tel: Waltham Cross 22442.

SPECTRUM 32K & 64K RAM packs for sale. New, NOT second-hand. 64K at £49, and 32K at £39. **Astounding value,** limited stock so hurry. P. Ralphs, 1 Duxford Walk M/109JN.

FOOTBALL POOLS PROGRAM
FOR ZX81-16K (Soon for ZX Spectrum)
* 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 results come in. 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.

16K ZX-81 superfast machine code. "ZX-Supertrek" a stunningly fast graphic version of "Startrek". **Cassette only £2** or s.a.e. for details. Send to: Robert Armitage, 105 Bramcote Drive, Beeston, Notts NG9 1DU.

SPECTRUM RENUMBER. All or part of program. **All gotos, gosubs,** etc. **included.** The first and fastest, in machine code for only **£3.45**. David Webb, Southolme, 9 Park Road, Woking, Surrey.

TO ADVERTISE IN THE SUPERMART CALL ANNETTE ON 01-359 7481 NOW!

WHAT IS YOUR SPECTRUM HAVING FOR CHRISTMAS?
We know it would like a copy of:
3D MAZE OF GOLD £5.95
This program shows what your Spectrum can do! It draws, using machine code, full colour, 3D perspective views of a labyrinth as you search for GOLD, but hurry find the EXIT before its worthless.
from: **GILSOFT, 30 Hawthorn Road, Barry, S. Glamorgan CF6 8LE.**
Please send S.A.E. for further details of this and other programs in our range of Spectrum software.

ZX-81 16K French Program. Asks the user to translate words and phrases into French, corrects the answers gives scores and ratings. £2.95 Joseh Beevers, 91A Church Road, Hendon NW4 4DP.

ZX-81 USER Defined Graphics Board. Fits inside case. On-board RAM. 64 characters plus 64 inverses controlled by I/O command. **£19.95** inclusive. From D Hutchison (Circuits), 103 Vicarage Wood, Harlow, Essex.

ZX-81 Video Inverter saves your eyes, increases Save level, displays sharp white characters on solid black background screen.
Kit £4, Built £5, fitted into your ZX-81 £7.50 (includes VAT + P/P, instructions).
Reviews in Popular Computing Weekly, 26 August and Sinclair User October.
Send cheque/ PO to:
D FRITSCH
6 Stanton Road, Thelwall, Warrington, Cheshire WA4 2HS

SPECTRUM GAMES TAPES RENTMAN, Falklander, Bandit, £3 each, £5 two, £8, three. Jeff 1 Danylan Aberkenfig Bridgend.

ZX-SPECTRUM (16K): A clever character designer plus six high class games including Pac-Monster, Galaxians, Grandprix. £3 inclusive send to Crown House, Ford, Argyll PA31 8RH.

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.

ZX PRINTER + paper and new power supply, brand new, fully compatible with 16K RAM, only £35. S Amos, 57 Arabin Road, Brockley, London. Ring (01) 691 7395 after 4pm.

SPECTRUM 48K boxed, hardly used, Welcome tape included. Some small programs on separate tape. £190 o.n.o. Phone Mr M Humphries on 01-777 0600 ext 443 (days) or 0634 53361 (after 6pm).

data-assette
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

ZX-81 16K SOFTWARE. Truly 16K adventure game for the thinking computer addict. Bargain at only £4.00. Walles's Treasure Cube. Cheque/PO to J Walles, 25 Box Heath Road, Church Crookham, Aldershot, Hants.

GAMES 'n' MAP CASSETTE for 16K Spectrum. Four original, exciting games to test your ingenuity and reactions. Two interaction programs displaying British Isles. £3. C Lukey, 130 Egerton Road South, Manchester M21 1XJ.

"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.

sinclair supermart

Erricks' of Bradford
ZX-81/PERIPHERALS/
SOFTWARE
All from stock
Rawson Square.
(Bradford) 309266

ZX-81 FORTH. Forth-79 standard sub-set plus extra utilities, 10K free for user code. On cassette for 16K, £7.00. M Peake, 3 Behoes Cottages, Behoes Lane, Woodcote, Reading RG8 0PS.

ZX-81 16K RAM 4K graphics ROM 1K U.D.G. Nine cassettes inc. Invaders, leads, etc. Very good graphics (chance to define your own) cost £108 o.n.o. Phone Wormley 3207 after 5.15pm.

SPECTRUM
16K & 48K

High quality, low cost arcade style games using FULL COLOUR GRAPHICS & SOUND.
CASSETTE 1 — Bombrun, Asteroids, Defender, Missile, & Batrun, at only £5.50.
CASSETTE 2 — Alien attack, Subhunt, Startrek & Lemmings, at only £4.50.
CASSETTE 3 — Space Intruders, at only £2.95. Match your wits against the alien forces.
XMAS OFFER — all 3 cassettes for £9.95.
R.Bhattacharya, (Dept. SU), 3 Wensley Close, Harpenden, Herts.

SINCLAIR ZX PRINTER. Don't wait. Get your printer now for £59.95 and collect **FREE** 5 rolls Sinclair paper (worth £11.95) **AND** Print 'n' Plotter jotter (£4.95) for your graphics. Jack 01-229 8647.

ZX81 Space Invaders 16K, with bombs missiles etc., etc. in M/C only £3. ZX Spectrum dissasembler & Editor only £3. Send cheque or PO to A. Campbell, 21 Lwyn-y-Grant Terrace, Cardiff CF3 7EW.

Spend Christmas with your Spectrum AND your children
SPECTRUM GAMES COMPENDIUM (16K)
Fox & Geese, Snakes & Ladders, Noughts & Crosses, Beetle, Ludo. Hours of family fun and no counters to pick up afterwards!
SPECTRUM ROULETTE (48K)
4 players can place their chips on the authentic Monte Carlo betting table in most betting combinations. Good linear simulation of wheel. Wins and bank accounts displayed.
£4.95 each cassette inc. p&p.
SPECIAL OFFER FOR 48K OWNERS
£8.95 both programmes on one cassette.
Satisfaction or refund.
DYMOND SOFTWARE, Dept SU, 22 Hospital Rd, Annan DG12 5HP, Dumfriesshire.

ZX81 VID SWITCH Inverse Video Module KIT £3.95 Built £4.95, RAM stabiliser and heat sink kit £3.75. All prices inc. B.A. reader 45, Alfred Street Kings Heath, Birmingham B14 7HG.

FARMER: How well could you manage a wheat farm? Play the game of "Farmer" and find out. An entirely original 16K ZX-81 simulation, only £3.95. D Fortune, Shute House, Bishop's Hull, Taunton, Somerset TA1 5EQ.

ZX81/ SPECTRUM

***P.S.E. GAMES TAPE 2 (16K)** — Fruit Machine, Battleships, Fighter Pilot, Night Fighter, Defender, Missile Command; (ZX81)£4.95, (Spectrum) £6.95. *(Arcade games on Games Tape 2 written in fast-action m/code with colour sound and hi-res graphics on Spectrum.)*
FREE ROM disassembler with every Spectrum tape ordered before 1/1/83.

P.S.E. GERMAN LANGUAGE EDUCATION SYSTEM (16K) ZX81 only — Covers grammar, verbs, vocabulary, hints and aids for learning, including random tests to test progress and drive lessons home. 4 tapes: **GERMAN GRAMMAR 1**, 2 and 3, and **P.S.E. DATAPHRASE** — a computerised phrasebook of almost 900 phases in common usage. Each tape £5.50 or £16.50 for all 4.

P.S.E. language tapes produced in conjunction with a local school. Special terms can be sent on request for school usage.

Professionally-produced tapes and documentation by mail order only from: Precision Software Engineering, 20 Shelton Ave., Newark, Notts. NG24 4NX. SAE for further details/up to date price list.

ZX-81 16K Fuller FD 42-key keyboard. Six 16K game cassettes + 1K book of programs. Total value £176; £130 o.n.o. Gerard McArdle. Tel: Pontefract 700262.

SPECTRUM (16K) owners! Fingers tired? Let a typist put your listings on tape, only £1.50 per program. Send listing, cassette and cheque to C Densley, 9 Copsewood, Broadmeadows, South Normanton, Derbys.

SPECTRUM SOFTWARE. Up to 65% royalties paid for good educational and games packages. Send tapes to S. BIRCH, 99 Green Hill, High Wycombe, Bucks HP13 5QB. Full documentation preferred.

SPECTRUM 'POOLS' FORECAST PROGRAM
Based on statistical analysis of results since 1952. Menu-driven, colour and sound. Re-evaluation facility, selections print-out and saving.
Program recorded twice on quality C12 cassette. **£5.95 inc. p&p.**
Cheques etc to:
J ENGLISH (SU)
10 Meadow Close, Shipdham, Thetford IP25 7NF.

ZX-81 16K Morse Code Tutor. Learn Morse up to 30wpm with this versatile self-tutor. Options include letters, numerals, punctuation, variable groups, random/serial sequence, check-back. Cassette and instructions £5.00. M R Irving G3ZHY, 22 Wheatley Way, Chalfont St Peter, Bucks SL9 0JE.

ZX-81 16K machine code games. Asteroids, Invaders, Scramble, Galaxian, Defender — £1.50 each. **Cassette lead,** £1.50 per metre. **Revolving cassette rack** (holds 32), £3.00. G L Stoneman, 1 Tarnside Road, Orrell, Wigan, Lancs WN5 8RN.

ZX-81
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.

Software Protection Unit (pat. appl. no. 8225855) by MICROBYTE

Used with all the ZX's to protect against accidental mains failure or interruptions.

Our unique black box simply PLUGS into your ZX to ensure the safety of your software.

ADVANTAGES

- protects against MAINS FAILURE and INTERFERENCE
- protects against ACCIDENTAL or MALICIOUS switching off of power
- eliminates crashes due to temporary DIPS in power supply
- allows movement of your ZX even during programming
- long battery life
- extremely efficient design of mains detection and switching circuitry
- virtually foolproof

Ideal for use with ZX80 or ZX81 with or without 16K rampacks.
Order NOW only **£8.90** plus 70p carriage (inc. VAT).
Make cheques payable to
MICROBYTE at 19 WORCESTER CLOSE,
LIGHFIELD, STAFFS.
Money back guarantee if not entirely satisfied.
Available around 10 days.

Advertisement Index

ABBEX	36	MAPLIN	32
ABERSOFT	71	MARTECH GAMES	46
A.C.S.	38	M.C. LOTHLORIEN	12
ADAPTORS & ELIMINATORS	70	MELBOURNE HOUSE	28
ADDICTIVE GAMES	46	MEMOTECH	15
AFDEC	55	MICROBYTE	82
ARTIC COMPUTING	41	MICROMEGA	75
BASICARE	4	MICRONET	16 & 17
BI PAK	72	MICRO POWER	32
BRIDGE SOFTWARE	56	MICROL	34 & 35
BUFFER MICRO	29	MICROSCENE	78
CAMBRIDGE COMP. STORE	29	MICROWARE	47
CAMBRIDGE MICROELECTRONICS	24	MIDWICH	71
CALPAC	76	MIKRO GEN	72
CAMPBELL SYSTEMS	76	MOVIEDROME VIDEO	71
CARNELL SOFTWARE	70	NEW GENERATION	59
C.C.S.	75	NOTTINGDALE TECHNOLOGY	56
COMPROCSYS	45	MICHAEL ORWIN	83
COMPUTEX CASES	27	OXFORD COMPUTER PUB.	24
DATA ASSETTE	8	PHIPPS ASSOCIATES	12
D.J.L. SOFTWARE	80	PICTURESQUE	38
D.K. TRONICS	22 & 23	PIMANIA	56
EAST LONDON ROBOTICS	24	PRINT & PLOTTER	11
E.D.S.	71	PROXIMA CENTAURI	75
FILE SIXTY	21	PSS	7
FOILKADE	7	QUICKSILVA	I.F.C.
FOX ELECTRONICS	59	RAVENDALE	80
J. GIBBONS	45	R & R	55
J.K. GREYE	29	SHIVA PUBLISHING	6
GROUND CONTROL	58	SINCLAIR RESEARCH	50 & 51
HAVEN HARDWARE	32	SILVERSOFT	47
HEWSON CONSULTANTS	39	SPECTRUM SOFTWARE	46
INTERFACE	38	SOFTWARE FARM	47 & 70
JAYSOFT	76	SOFTWARE MASTERS	44
J.R.S.	78	STELLAR SERVICES	80
KALENIA WOOD	45	W. STUART SYSTEMS	55
KAYDE	64 (O.B.C.)	SUPERMART	81 & 82
KEMPSTON	60	TIMEDATA	59
K.W. SOFTWARE	78	VIDEO SOFTWARE	80
		ZX MICROFAIR	54

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)

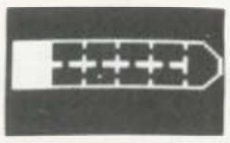
machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
I Ching, Mastermind, Robots, Basic Hangman. PLUS Large screen versions of Invaders and Maze of Death, Ready for when you get 16k.
Cassette One costs £3.80

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.

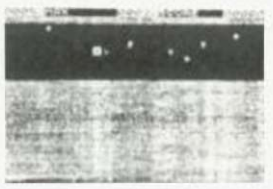
STARTREK This version of the well known space adventure game features variable Klingon mobillity, and graphic photon torpedo tracking.
PRINCESS OF KRAAL An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube 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**

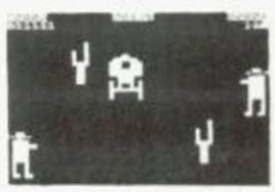
ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.





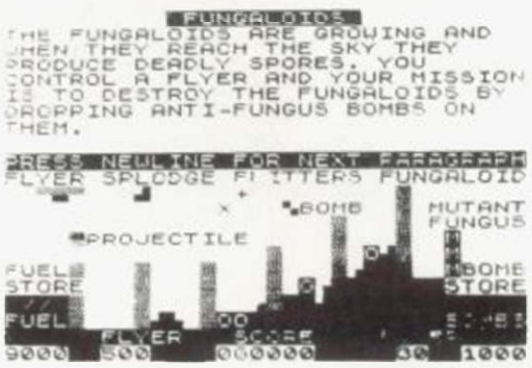


GUNFIGHT
(machine code)



INVADERS
(machine code)



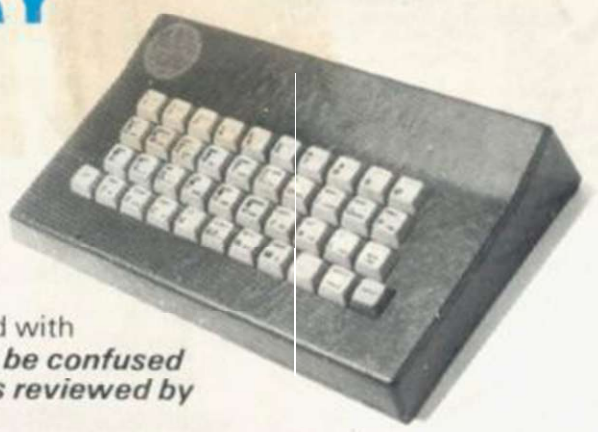


GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).
LIFE (machine code)
A ZX81 version of the well known game.
3D TIC-TAC-TOE (Basic)
Played on a 4 × 4 × 4 board, this 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 progammes. 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.

FAST IMMEDIATE DELIVERY

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

VISA

DON'T FORGET YOUR CAN ALWAYS ORDER ON THE TELEPHONE WITH YOUR CREDIT CARD.
DEALERS WELCOME.

PLEASE PRINT

Qty	Item	Item Price £	Total £

Please allow £1.50 P&P for all Hardware 50p for all software

*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