Personal Computing Today

OCTOBER 1982
65p

NEW

ATOM+ BBC BASIC= MODEL A?

PROGRAMS TO RUN FOR THE NASCOM, BBC, VIC 20, TRS-80, TEXAS TI99/4A

GAMESBOARD
Rolling the roulette wheel in our games programming series

FACTFILE
Hardware help for the micro buyers

SOFTWARE CHECKLIST
Your computer's software listed

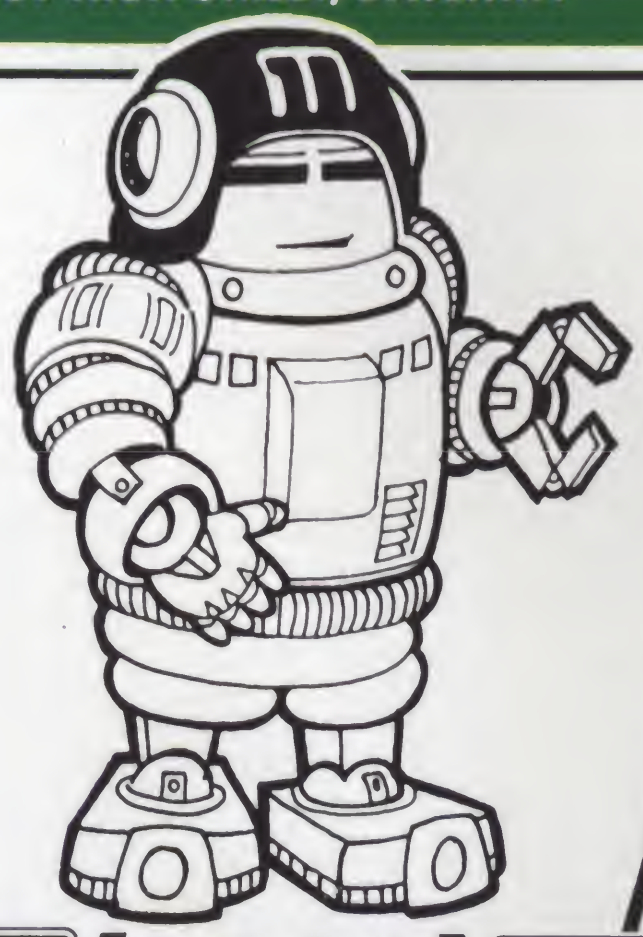


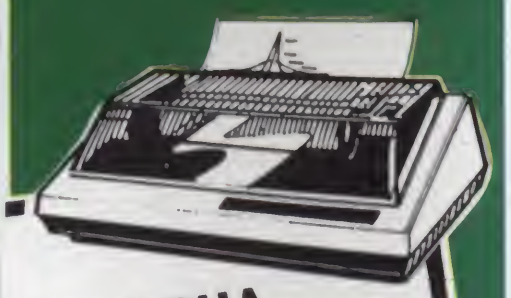
HOW TO GET MORE OUT OF YOUR SPECTRUM'S GRAPHICS

MicroStyle

29 BELVEDERE, LANSDOWN ROAD, BATH
47 CHEAP STREET, NEWBURY
67 HIGH STREET, DAVENTRY

NEW SHOP WILL OPEN IN NEWBURY IN SEPTEMBER





SEIKOSHA GP100A PRINTER

ENTIRELY NEW DESIGN.
UNBELIEVABLY LOW PRICE.
FULL GRAPHICS CAPABILITY.
CENTRONICS PARALLEL INTERFACE. PAPER WIDTH ADJUSTABLE UP TO 10".

£195.00 + VAT

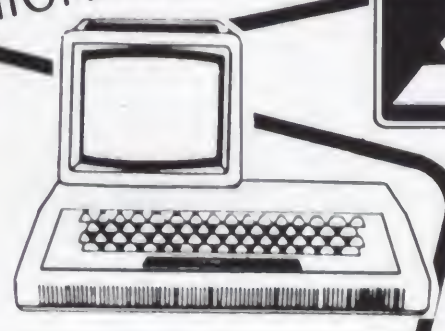
PRINTERS

EPSON MX80
EPSON MX100
ANADEX
PAPER TIGER
T.E.C.
SCRIPTA
MICROLINE 80



SHARP
MZ 80A & MZ 80B
ALWAYS ON DISPLAY

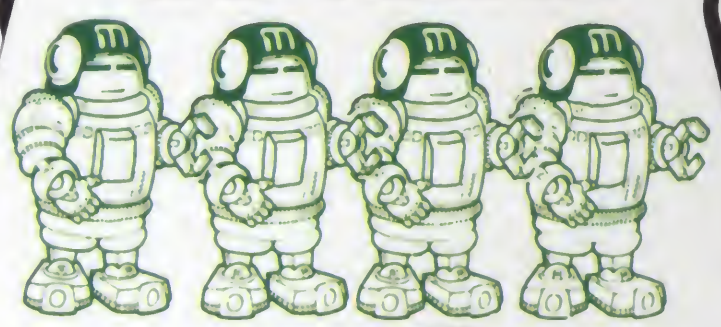
Access **(0225) 334659.** VISA

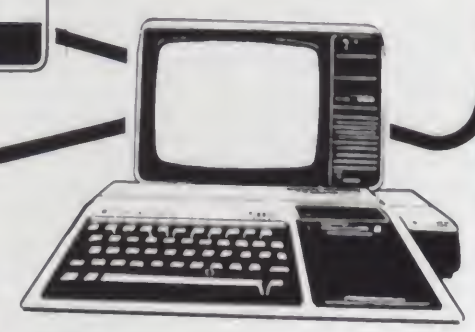


ACORN ATOM

Sensational New Micro-Pack!
8K ROM 5K RAM, PSU included.
Colour fitted. Starter pack software.

£170.00 + VAT



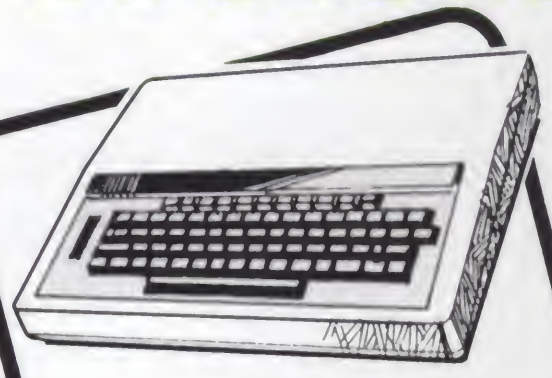


THE TI-99/4A FROM TEXAS INSTRUMENTS.

- 16K RAM (Expandable to 48K)
- Keyboard: 48 key QUERTY
- Sound: 5 octaves, 3 simultaneous tones plus noise generation • Colours: 16.
- Resolution: 192 x 256 (24 x 32 characters)
- Built-in software: 14K byte BASIC interpreter.

Vast range of Educational and Pre-School early learning modules!

£199 incl. VAT



BBC
MICROCOMPUTER SYSTEM

Complete BBC support:
books — software — peripherals
Model "B" ex-stock

VIDEO MONITORS

All sizes and prices.
Black/white 9" **£90.00**
Black/white 12" **£65.00**
Green Screen 12" **£85.00**
Amber 9" **£95.00**
All Plus VAT

BBC — COMPATIBLE COLOUR MONITOR £225 + VAT

EXTENSIVE RANGE OF BOOKS AND SOFTWARE ALSO AVAILABLE

Plus Lots More.

Post to:
MICROSTYLE, FREEPOST,
29 Belvedere, Lansdown Road, Bath BA1 1FP

Please send me further details on the following, and your special offers:

. . . . . .

. . . . . .

Name . . . . . .

Company . . . . . .

Address . . . . . .

. . . . . .

. . . . . Tel . . . . . .



Personal Computing Today

Volume 1 Number 3 October 1982

Editor:
Elspeth Joiner

Editorial Assistant:
Chris Palmer

Advertisement Manager:
Beverley McNeill

Advertisement Executive:
Coleen Pimm

Managing Editor:
Ron Harris

Origination and design by:
MM Design & Print

Managing Director:
T J Connell

Published by:
Argus Specialist Publications Ltd.,
145 Charing Cross Road,
London WC2H 0EE

Printed by:
Alabaster Passmore & Sons Ltd.,
London and Maidstone

Distributed by:
Argus Press Sales & Distribution
Limited, 12-18 Paul Street,
London EC2A 4JS

Personal Computing Today is normally published on the first Friday in the month preceding cover date. The contents of this publication including all articles, designs, plans, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications Limited. All rights conferred by the Law of Copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications Limited and any reproduction requires the prior written consent of the Company. © 1982 Argus Specialist Publications Ltd All reasonable care is taken in the preparation of the magazine contents, but the publishers cannot be held legally responsible for errors. Where mistakes do occur, a correction will normally be published as soon as possible afterwards. All prices and data contained in advertisements are accepted by us in good faith as correct at time of going to press. Neither the advertisers nor the publishers can be held responsible, however, for any variation affecting price or availability which may occur after the publication has closed for press.

Subscription Rates. UK £11.65 including postage. Airmail and other rates upon application to Personal Computing Today, Subscriptions Department, 513 London Road, Thornton Heath, Surrey CR4 6AR.

The battle for the cheapest micro computer on sale began two months ago with consumer electronics firm Binatone's announcement of a £50 computer, but where will it all end?

Binatone's forthcoming micro computer sounds an extremely sophisticated little machine with features including a typewriter style keyboard, colour graphics and sound effects. The basic machine will come with 16K RAM on board selling for £49.95. It can be expanded to 64K RAM but the price for that add-on is as yet unknown. The specification for Binatone's baby includes the facility to use software written for a Tandy TRS-80 computer with the machine, as well as that of another so far un-named supplier. An interesting idea which can be developed.

Now the veteran pioneer of personal computing, Clive Sinclair, is making a bid to be the first manufacturer on the market with an under £50 computer. Through an associate firm he is reducing the cost of ZX81s to the golden price of £49.95.

The motives behind these two firms are similar. Both want to capitolise on the current personal computer boom — and who can blame them? That is Binatone's prime reason for the new computer. That's all very well, but what of the quality of the product? Binatone is not established in the computer manufacturing field. It's product range consists of a variety of consumer electronics, and includes a first generation, which means basic, television games centre. Last year Binatone had no plans to continue software support for the machine.

There is also nothing innovative in the computer it has announced. Computer technology has now reached the stage where it can be easily used to design a computer around, as long as the basic microprocessor is a good, tried and tested one providing standard functional facilities.

This is good news for the buying public because it boosts the competitive edge of the market, but does little for advancements in computing. The recently launched Dragon 32 is an example of this practice. There is nothing new in the workings of the computer, but it has just about anything a beginner or home user would want in a computer for a low price, £200.

Sinclair's motive is less obvious. Sinclair Research is an established name in the personal computing field and he wants to keep it that way. By letting another, unknown, firm launch the first micro under £50 he risks losing a stronghold, if only in reputation, on the market.

Whoever gets there first it will be interesting to watch the winner's progress and see whether other manufacturers will knock down prices of their own computers.

Turn over the page for a full contents list of this issue.

CONTENTS

OCTOBER



NEWS

Newstalk 8
Refresh your memory cells with the latest goings on in the computer world.

NEXT MONTH

Next Month 12
Find out what awaits you in next month's Personal Computing Today.

LETTERS



Your Letters 14

PET SOFTWARE

Solgor 16
Could anything be more frustrating than Rubik's cube? Try Solgor and find out just how infuriating a row of numbers can be.

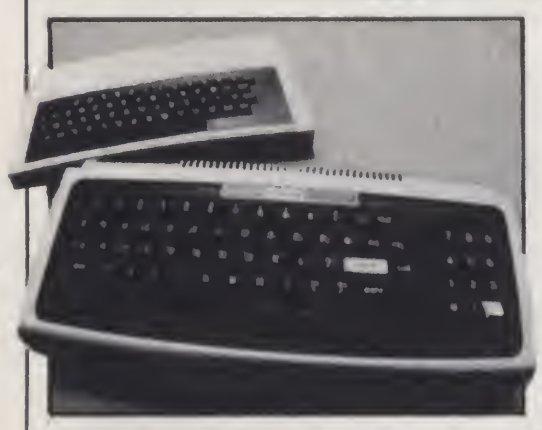
COMPUTER CLUBS

Clubhouse 21
This month we cast a watchful eye on the Crawley Computer Club and find out what trouble is brewing as they meet in their local.

NASCOM SOFTWARE

Bouncing Beastie 23
Where does it come from? What does it want? How did it get into your computer? All these questions will be answered as you come face to face with the dreaded Bouncing Beastie.

SPECTRUM



User Defined Graphics 27
This article not only gives you an insight into how user defined graphics work, but also allows your Spectrum to give birth to its very own invader.

DEALERS

Look Before You Leap 30
In the second of our regular series we look at the Tandy Computer Centres and find out what they can do for prospective Tandy buyers.

ZX-81 TECHNIQUE

ZX Memory Saving 34
Stretch 1K to the limits using these techniques on your ZX81.

REVIEW



Software Reviews 38
Once more our review team has spent hours just playing games and now they tell you if they are any good.

ATOM SOFTWARE

Little Black Book 42
Despite its slightly dubious title this program is in fact a very useful utility. Honest.





TI/99 4A SOFTWARE

Blind Maze 49
Get lost . . . deep in the heart of Texas. You too can blunder around for hours in the depths of your computer wandering in the labyrinths of this maze.

REVIEW

Using Atom with BBC BASIC 54
How does your Atom match up to the BBC computer when you give it the BBC BASIC board. In our lead feature we find out whether the Atom becomes a nephew to auntie beeb.



LETTERS

Micro Answers 62
This month we delve deep into our mailbag and attempt to sort out where people have PEEKed instead of POKed.



PROGRAMMING TECHNIQUE

Gamesboard 66
This month in gamesboard we look at the ins and outs of transferring the infamous game of Roulette onto your TV screens.



REVIEW

NewBrain 70
Is the NewBrain a home computer or a business computer. Find out in our review.

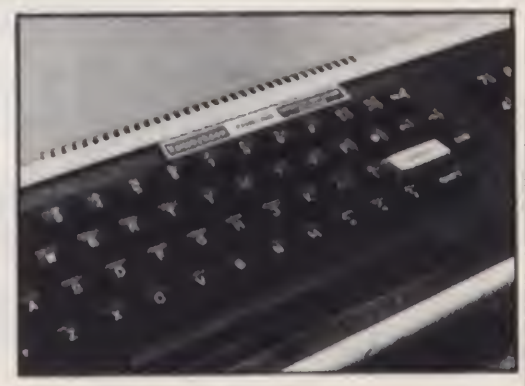


TRS 80 MICROSPOT

Random Numbers 74
Try out this useful routine in programming your games.

BBC SOFTWARE

Wordprocessing on the BBC 77
If you want to drop us a line, why not use your BBC computer and do so with this program?



TRS 80 SOFTWARE

Asteroid War 82
Dodging meteors, zapping aliens and winning through. All on a Tandy.

REFERENCE

Factfile 87
Get the low-down on which machines are available, what you can add to them and how much it will cost you.



REFERENCE

Software Checklist 97
After some software for your machine? Consult our checklist and find out what's available.

REFERENCE

Micro Terms 110
Keep your head above water in the sea of computer jargon and read our dictionary.



New From Fuller

FD System for the

ZX SPECTRUM



£39.95

+ £2.50 p & p.

Professional Keyboard & Case —

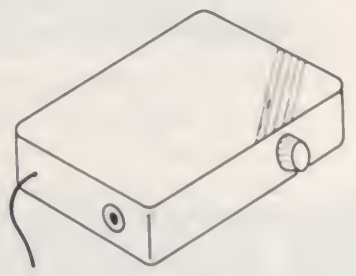
This unit has the same high standard as our ZX81 unit.
Tough A.B.S. Plastic case encloses our Keyboard, the Spectrum Printed Circuit Board and the Power Supply.
Our own Power supply is available:- 9 volts DC at 2 amps.
Mains either 110v or 240v AC at £5.95 + 80p. p & p.

The Keyboard has 42 keys with all the spectrum functions printed onto them, the full travel key switches have gold plated contacts and a guaranteed life of 10^6 operations.
INSTALLATION - Simply unscrew the ZX printed circuit board from its case and screw it into the FD case, plug in the keyboard and that's it. No technical know how or soldering required, the built unit is tested and comes with a money back guarantee.
Spectrum Keyboard and Case Kit £33.95

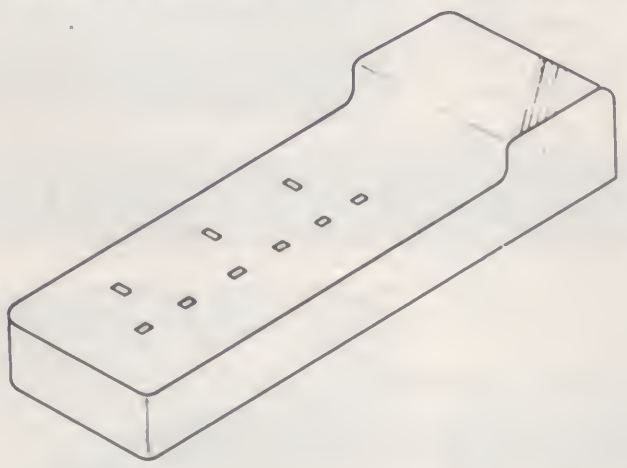
Our Mother Board for the spectrum has 2 slots at £15.95 or 3 slots at £19.95, this unit also fixes inside the case. p & p 80p.

SPECTRUM SOUND AMPLIFIER £5.95 + 80p p & p.

Complete with leads, volume control and loud speaker in tough ABS Plastic case measuring 5" x 3" x 1" just plugs into your spectrum MIC input.



SPECTRUM PLUG PLANNER — £18.95 + £1.00 p & p



Complete with 3 metres of cable, three 13 amp sockets for TV, Tape etc AND 9 volt at 2 amp power supply with power jack to fit Spectrum or ZX81

The ever popular FD42 Keyboard and case for ZX81 **£39.93** including VAT & Post
FD42 as a kit **£33.95** including VAT & Post
FD42 Built only **£24.95** including VAT & Post
FD42 Keyboard Kit **£18.95** including VAT & Post

GUARANTEED 14 DAYS DELIVERY FROM RECEIPT OF ORDER, OR CALL TO THE ZX CENTRE.

Mail to **FULLER MICRO SYSTEMS,**
The ZX Centre, Sweeting Street, Liverpool 2. England, U.K.

AD Code	

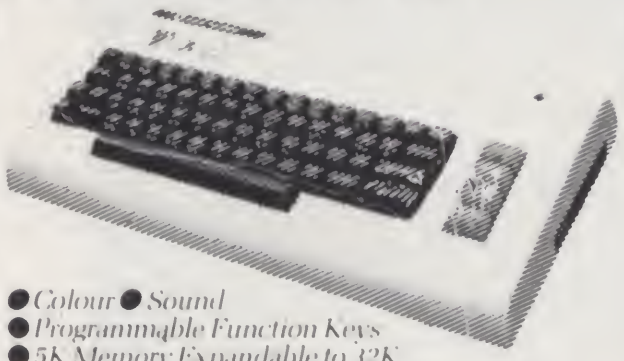
Please Supply:-
Name .....
Address .....

SAE for more details — Enquiries: Tel. 051-236 6109

FULLER FD SYSTEM

PLAY FOR TODAY

COMMODORE VIC

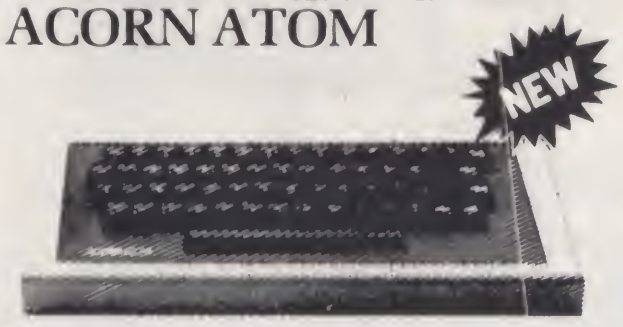


● Colour ● Sound
● Programmable Function Keys
● 5K Memory Expandable to 32K
● Standard PETBASIC | ● Full sized Typewriter Keyboard ● Graphics Character Set ● Plug-in Program Cartridges
● Low Priced Peripherals
● Self Teaching Materials

£189.95

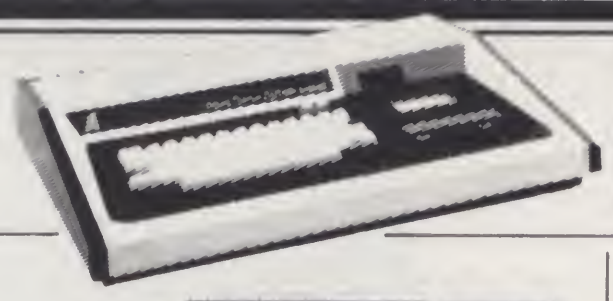
VIC Compatible Cassette **£44.95**

ACORN ATOM

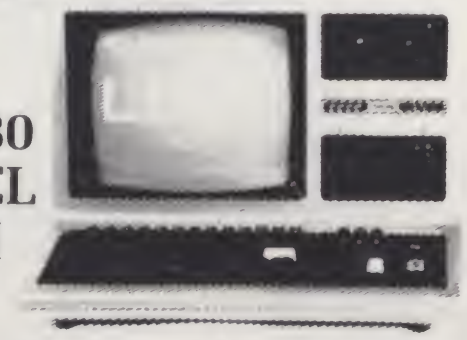


● 8K Rom + 4K Ram ● Sound
● 20 Introductory Programs
● Built-in Colour

£199.00



TRS80 MODEL III



● 48 K User Ram ● Extended Microsoft Basic
● Parallel or RS232 Interfaces
● With 40 Track Single Density Disk Drives **£1596.00**
● With 80 Track Double Sided Disk Drives **£1741.00**
● With 80 Track Double Density Drives 1.4MB **£1999.00**

VIDEO GENIE I

● Machine Language monitor
● Sound and Lower Case
● Renumber and Screen Print

£344.00



TEAC DISK DRIVES

● Interfaces with Video Genie, North Star Horizon, Superbrain Nascom etc.

● 40 Track Single Disk Drive **£259.00**
● 40 Track Double Disk Drive **£448.00**
● 80 Track Single Disk Drive **£344.00**
● 80 Track Double Disk Drive **£599.00**



SHARP MZ80A

● 48K User RAM
● Extended Basic
● Integral Cassette

£549

THE COMPUTER SHACK

Computer Shack Ltd, 14, Pittville Street, Cheltenham, Glos. Telephone: (0242) 584343

Credit available through major credit company.
Access or Barclay Card Accepted. Mailorder Enquiries Welcomed.

Prices include VAT

LOW PRICE HIGH QUALITY SOFTWARE FOR 32K COMMODORE PET

DATABASE £120 + VAT
(For 4032, 8032 or 8096 only)
A complete information retrieval system for office or school administration. Lay out files for dates, numbers, money or other data. Display, update or amend as required.

PURCHASE AND SALES CONTROL £80 + VAT
Runs both purchase and sales ledgers with optional calculation of VAT from the gross or net amount analysis for any period, "due for payment' report, totals for net VAT and gross, etc.

INVOICE PRINT £80 + VAT
Prints invoices on your own stationary laid out according to your own instructions. This programme is an optional add-on to be used in conjunction with "purchase and sales control".

STOCK CONTROL £60 + VAT
Keeps detailed stock records including stock location, re-order level, quantity on order, cost and selling prices and stock valuation.

NOMINAL LEDGER £60 + VAT
Produces trial balance and up to 20 reports in addition to profit and loss and balance sheet from up to 1,000 nominal accounts. This programme is intended for use on its own, but it can read files set-up by our purchase and sales control and stock control programmes.

Electronic Aids (Tewkesbury) Ltd.,
Mythe Crest, The Mythe,
Tewkesbury, Glos GL20 6EB
Telephone (0386) 831020 or (0684) 294003

It's easy to complain about advertisements.

The Advertising Standards Authority.
If an advertisement is wrong, we're here to put it right.
A.S.A. Ltd., Brook House, Torrington Place, London WC1E 7HN.

Clive Beats Binatone to First £50 Computer

Sinclair Research has pipped Binatone to the post in bringing out the first micro computer under £50.

Although he is not setting the world alight with another brand new computer Clive Sinclair has knocked down the price of his top-selling micro computer, the ZX81, to £49.95 from £69.95 including VAT. The new prices took effect from August 9.

In the same swift move he has also changed his marketing plans to make the ZX81 more widely available. From that date the ZX81 was on sale through a number of high street retail outlets including Greens, the electrical shop located in most Debenhams stores, as well as Boots the chemists. All existing peripherals available for the machine are now on sale there too.

Clive Sinclair summed up his reasons for this change: 'The personal computer is no longer the preserve of the hobbiest, but is becoming as much a houshold item as a television or hi-fi'.

Also pulled in to aid Sinclair in this attack is a new distribution company called Prism Microproducts. It is responsible for supplying high street stores who have less than 20 outlets, with the ZX81 and its peripherals. So, if you have a computer orientated shop and fancy stocking the ZX81 contact Bob Denton, Prism Microproducts, 30/31 Islington Green, London N1, or phone him on 01-359-7481.



Hollywood's Video Star

Now video games are so popular that even Walt Disney Productions has been hard at work producing a film revolving around spectacular computer graphics.

The film, called TRON, is the first of its kind. Making extensive use of computer generated graphics and imagery, the film's producers have created a fantasy world inside a computer, where programs are the alter egos of their creators and video games are played out in real life.

The plot revolves around the exploits of Kevin Flynn, who after leaving his job as a programmer for an American multi-national firm and becoming a video game expert, gets called back by two of his colleagues so that he can help them recover their programs from the control of the tyrannical MCP (Master Control Program).

In doing this Flynn gets transported very cleverly to the electronic world inside the computer where he proceeds to do battle with all and sundry in an effort to wrest control of the computer from the MCP.

Along his journey through this futuristic landscape he meets and is helped by Tron, a radical program that was written to destroy the MCP, Yori, who is a program written by Flynn's ex-girlfriend to simulate her laser experiments and Ram, an actuarial program who he meets in one of the video games. Together they fight, trick and zap their way to the MCP, in scenes of pure visual delight, for the final showdown.

Tron is fast action all the way through and should appeal to all ages, the graphics themselves are an experience all of their own. But you will have to wait until September to see it. It also contains a few 'in-jokes' that computer people will appreciate. One of the best is when Flynn meets a small energy pulse called Bit, who can only answer his questions yes or no.

All told the film is a superb piece of highly entertaining fantasy and the thought of all the work that must have gone into programming the computer graphics makes me want to hang up my light pen, burn my BBC Micro and take up something easy like sheep farming.



Computer Music At A Price

What has a nightingale and a smashing plate got in common? The answer is that you can use both of them to play tunes on the Fairlight CMI.

This is the ultimate marriage between computer and synthesiser technology. It even looks as if it might be equally at home on a businessman's desk or centre stage at Madison Square Gardens.

The Fairlight CMI, which stands for Computer Musical Instrument, can be programmed in one of two ways. First, you can play a sound into it via a microphone which the computer will then analyse digitally and transpose it onto its six octave keyboard. For an example of this listen to the plate smashing sequence in singer Kate Bush's hit single Babooshka.

Once the sound is in the Fairlight you can modify it or combine it with other sounds using the light pen or the alpha-numeric keyboard that come with the system. The second way to program the machine is to directly draw a wave shape onto the VDU and then use the machine's editing faciltiies to alter or add to it.

What this all adds up to is a synthesiser that creates any sound you dream up, or mimic any natural sound you play to it. The actual quality of the sounds which come out the other end are staggering. It is very hard to tell the difference between the original sound source and the Fairlight produced sound.

If you fancy having a complete orchestra in your living room, or want to record your household pets and play your way onto Top of the Pops, then all you need is the Fairlight CMI, a little time and a cool £18,000. One day it might be available at a sensible price. Not surprisingly only 26 have so far been sold.

Bumper Books

Following hot on the heels of the Getting Acquainted series of books computer author Tim Hartnell has another two under his belt.

The first is aimed at beginners who have joined the BBC Computer army and is titled 'Let Your BBC Micro Teach You to Program'. It is designed to take the reader from first principals of computing up to the more advanced features of the computer, including a chapter on mastering the graphics. The cost is £6.45 and it is available directly from the publishers Interface.

'Programming Your ZX Spectrum', will enlighten that computer's owners in many areas. The book offers a graded course in all aspects of Spectrum programming and contains over 100 routines and programs that are all guaranteed to run. It costs £6.95 and it too is available from Interface.

Sinclair Plugs Into Prestel

Bubbling up from the depths of Sinclair Research is another new development. It concerns the use of telesoftware as a method for distributing programs and information more cheaply and conveniently.

The idea revolves around using Prestel or a similar system like a catalogue into which you can plug your computer and 'download' programs that you want. That means you can put programs into your micro from another computer system. Sinclair sees cassettes and floppy discs as an outdated medium that is commonly subject to piracy and plagued with distribution and sales problems. The firm sees the future of personal computing relying on communication and hope that by providing cheap interfaces, modems and telesoftware facilities, they can allow the computer user to communicate and exchange information with various sources around the country.

The telesoftware concept will enable you at home to connect your computer, via a telephone, to the Prestel computer and use it as if it were a proper Prestel adapter. Set up on Prestel will be computer pages containing lists of software titles. If a user wishes to run one of these programs all he has to do is tell the computer to send him the program.

The Prestel computer then sends the program down the telephone line and the computer at the other end loads it as if it were loading from either tape or disc. The user's Prestel account is then debitted for the cost of the program and for the time spent using the system.

Once in the user's computer it can then be saved onto tape in the usual fashion. Also possible with this system is a software library. This will allow a user to 'download' a program into his machine, but not save it on tape or disc. The cost will be a lot cheaper than buying the program outright, as you only pay for the number of times you use it.

Hopefully, as well as giving greater power to the computer user, this system will provide a useful boost to the ailing Prestel scheme. Times and prices have yet to be announced, but as soon as they are you will read them here.

The Last Word . . .

Rounding up the news for this month are three new products that you can add to your computers. Starting off is the Peripheral Expansion System for the Texas TI 99/4A computer. This unit will allow you to plug up to seven peripherals into the single unit. It will hold memory expansions, interface cards and a single 51/4" disc drive, along with other plug in cards. For further information and prices contact your local Texas Instruments dealer.

ZX81 owners frantic for a new keyboard can turn to the Economic ZX81 keyboard. This keyboard fits on top of your original ZX keyboard and gives you a more positive feel to all of the keys. The key tops have been redesigned and repainted, using a total of seven different colours. Included with the keyboard is a separate function sheet, which can be fixed to the top of the ZX81 case. The cost is £11.95 inclusive, and details can be obtained from David Heartford, 91 High Street, Evesham, Worcestershire WR11 4DT.

Finally, Audiogenic has announced a new cartridge for the VIC-20 which professes to turn it into a full wordprocessor. The cartridge which contains the program and an extra 8K of memory retails for £125 including VAT. The program is based on the widely used, tried and tested, Wordcraft package and is called, not surprisingly, Wordcraft 20.

It embraces all the usual wordprocessing functions such as, scrolling screen, delete, insert, move and all the output functions. Documents can be output to either the VIC printer or any parallel or RS232 serial printers. Audiogenic can be contacted at

P.O. Box 88,
Reading Berkshire
or telephone
(0734) 595647.

Don't let its size fool you.

If anything NewBrain is like the Tardis.

It may look small on the outside, but inside there's an awful lot going on.

It's got the kind of features you'd expect from one of the really big business micros, but at a price of under £200 excluding VAT it won't give you any sleepless nights.

However, let the facts speak for themselves.

You get what you don't pay for.

NewBrain comes with 24K ROM and 32K RAM, most competitors expect you to make do with 16K RAM.

What's more you can expand all the way up to 2 Mbytes, a figure that wouldn't look out of place on a machine costing ten times as much.

We've also given you the choice of 256, 320, 512 and 640 x 250 screen resolution, whereas most only offer a maximum of 256 x 192.

Big enough for your business.

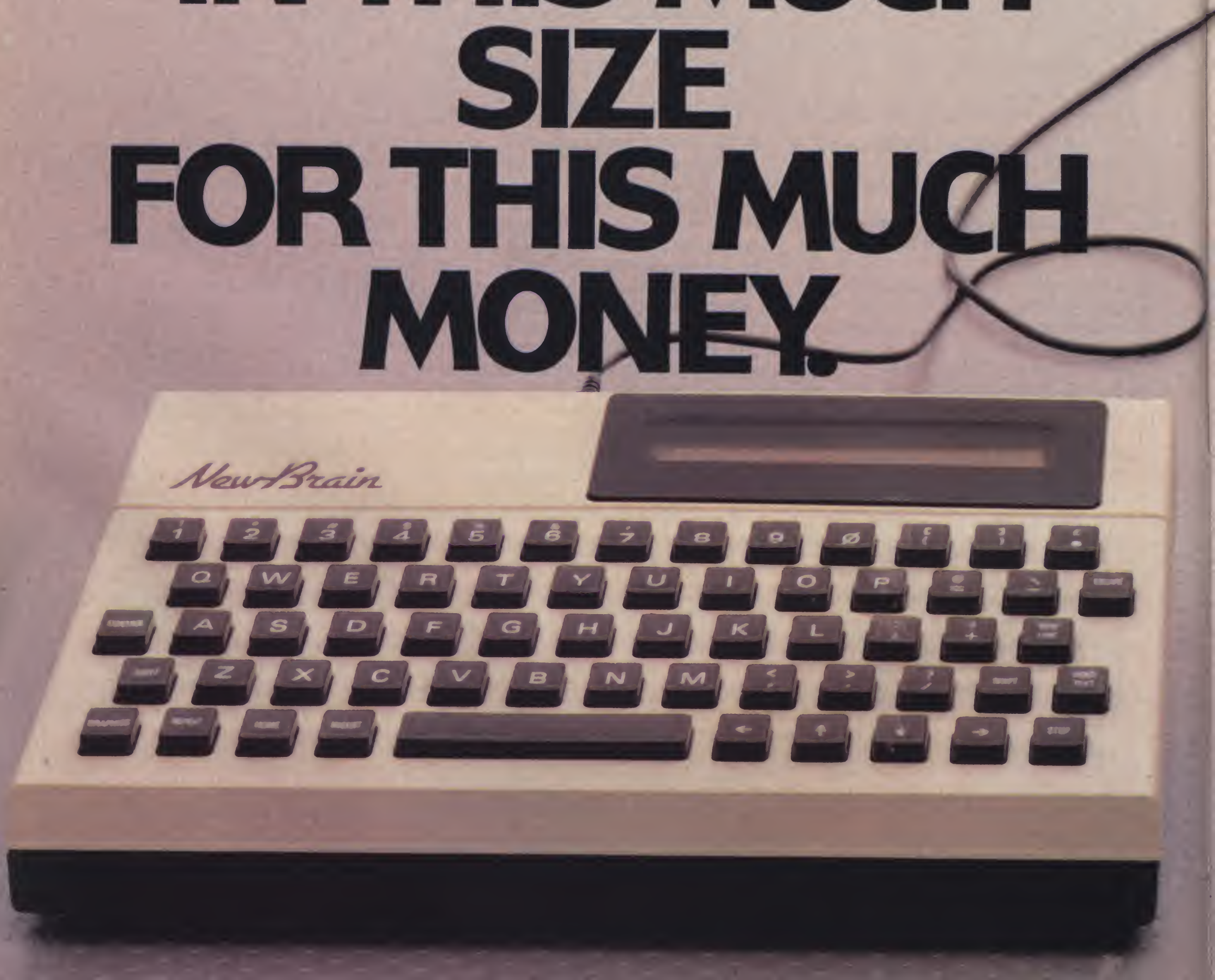
Although NewBrain is as easy as ABC to use (and child's-play to learn to use) this doesn't mean it's a toy.

Far from it.

It comes with ENHANCED ANSI BASIC, which should give you plenty to get your teeth into.

And it'll also take CP/M® so it speaks the same language as all the big business micros, and feels perfectly at home with their software.

NO OTHER MICRO HAS THIS MUCH POWER IN THIS MUCH SIZE FOR THIS MUCH MONEY.



So as a business machine it really comes into its own.

The video allows 40 or 80 characters per line with 25 or 30 lines per page, giving a very professional 2000 or 2400 characters display in all on TV and/or monitor. And the keyboard is full-sized so even if you're all fingers and thumbs you'll still be able to get to grips with NewBrain's excellent editing capabilities.

When it comes to business graphics, things couldn't be easier. With software capabilities that can handle graphs, charts and computer drawings you'll soon be up to things that used to be strictly for the big league.

Answers a growing need.

Although NewBrain, with its optional onboard display, is a truly portable micro, that doesn't stop it becoming the basis of a very powerful system.

The Store Expansion Modules come in packages containing 64K, 128K, 256K or 512K of RAM. So, hook up four of the 512K modules to your machine and you've got 2 Mbytes to play with. Another feature that'll come as a surprise are the two onboard V24 interfaces.

With the aid of the multiple V24 module this allows you to run up to 32 machines at once, all on the same peripherals, saving you a fortune on extras.

The range of peripherals on offer include dot matrix and daisy wheel printers, 9", 12" and 24" monitors plus 5¼" floppy disk drives (100 Kbytes and 1 Mbyte) and 5¼" Winchester drive (6-18 Mbytes).

As we said, this isn't a toy.

It doesn't stop here.

Here are a couple of extras that deserve a special mention.

The first, the Battery Module, means you won't be tied to a 13 amp socket. And, even more importantly, it means you don't have to worry about mains fluctuations wreaking havoc with your programs.

The ROM buffer module gives you a freedom of another sort.

Freedom to expand in a big way. It gives you additional ROM slots, for system software upgrades such as the Z80 Assembler and COMAL, 2 additional V24 ports, analogue ports and parallel ports.

From now on the sky's the limit.

Software that's hard to beat.

A lot of features you'd expect to find on software are actually built into NewBrain so you don't need to worry about screen editing, maths, BASIC and graphics.

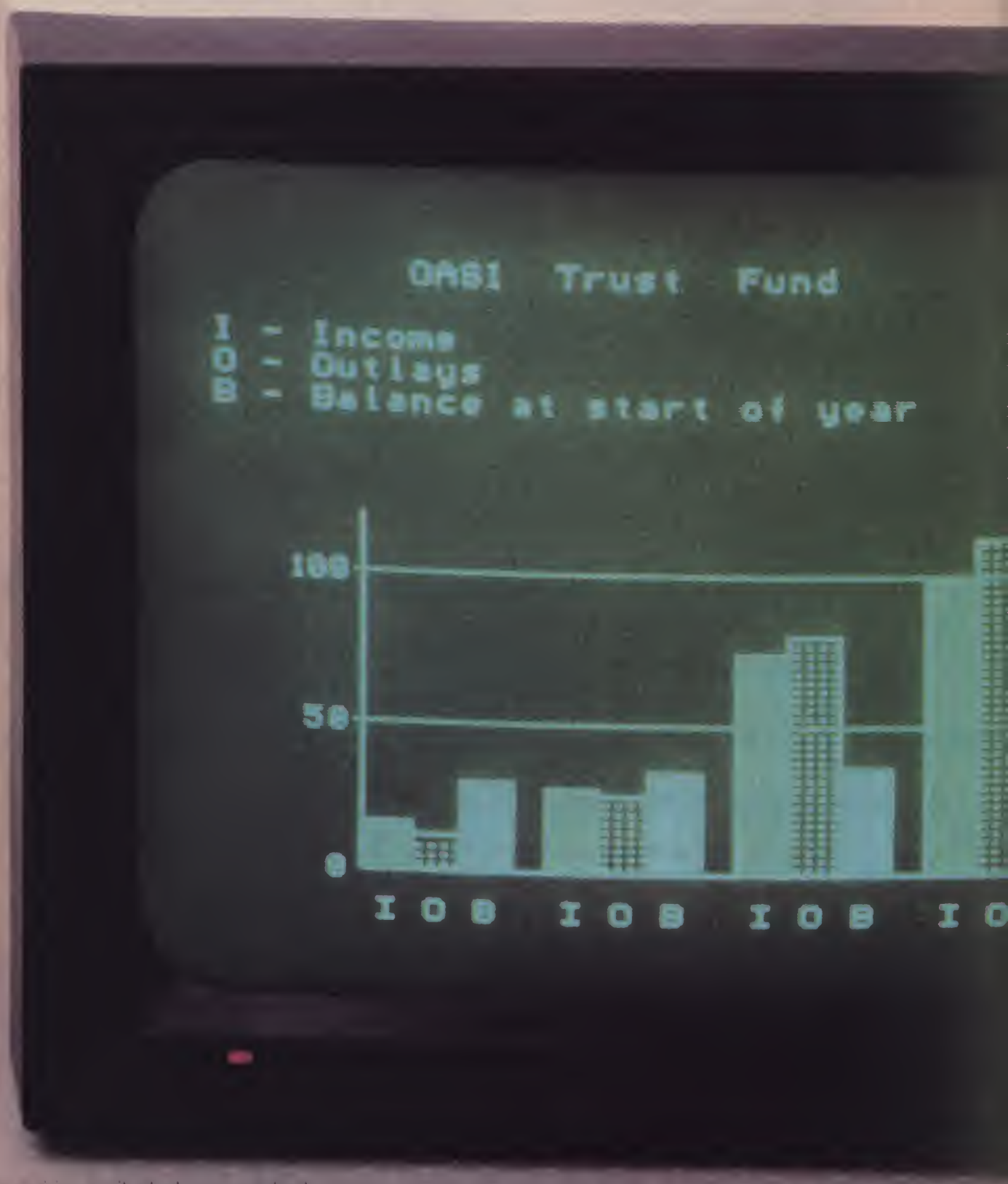
However, if you're feeling practical you can always tackle household management, statistics and educational packages. And because NewBrain isn't all work and no play, there's the usual range of mind-bending games to while away spare time.

Waste no more time.

To get hold of NewBrain you need go no further than the coupon at the bottom of the page.

With your order we'll include a hefty instruction manual so you'll know where to start, and a list of peripherals, expansion modules, and software so you'll know where to go next.

® CP/M is the registered trade mark of Digital Research Inc



Dealer enquiries invited, please contact:–

NewBrain, Grundy Business Systems Ltd., Grundy House, Somerset Road, Teddington TW11 8TD.

Each NewBrain order will include a FREE comprehensive user manual, a catalogue of expansion modules and peripherals, and a detailed list of available software.

Please send me the following:–

Quantity	Item	Price per item (Inc. VAT & p&p)	Total
	NewBrain A	£233.00	
	NewBrain AD with onboard single line display	£267.50	
	Printer	£466.00	
	Monitor 12"	£142.50	
		Total £	

I enclose a cheque/Postal Order for £_____ payable to Grundy Business Systems Reader Account. NewBrain, Grundy Business Systems Ltd., Grundy House, Somerset Road, Teddington TW11 8TD.

Please debit my Access Card No:_____ my Barclaycard No:_____

Signature_____

Name_____

Address_____

_____

_____ Postcode_____ PEC 10

Registered Number 1522978
VAT Number 358661618
Please allow up to 28 days for delivery.

NEWBRAIN

Personal Computing Today

Submitting Programs to Personal Computing Today

Have you written a program or article and would like to tell the world about it? Everyone likes to have a go at programming and we would love to look at your programming works of art to consider them for publication.

Remember we can only print what you want to read by knowing what you like. So the more you send us the better. We want to cover as many sorts of programs as possible too so whether yours is a game or a useful programming routine or aid don't hesitate to send it to us. We pay a standard fee for any programs published, if you need any incentive.

If you would like to submit a program for publication send it to: The Editor, Personal Computing Today, 145 Charing Cross Road, London WC1.

So that you know how we like to submit programs for use in the magazine printed below are guidelines which we would like you to follow.

What To Do

There are two kinds of program feature carried within our pages. The first is the brief "Micro-Spot": A page in total containing a brief description of the software, notes on its usage and a full listing.

These are designed to be short and to the point and are not primarily intended for the beginner in programming. Thus the explanation does not have to be totally explicit.

The second method of presentation is that of a full article. This can run anywhere in length from two pages to five pages and is formatted to a rigid style of presentation.

Because PCT is aimed at the newcomer to computing, our main software has to be well documented and explained. We have decided upon the following method of publishing programs and would ask authors to submit material in this form whenever possible.

1. The article is broken into four parts.
   (a) Introductory Text
   (b) Program Listing
   (c) How It Runs
   (d) Hints on Conversion

2. The Introductory Text should contain an explanation of what the program is designed to do, what is to be expected on-screen when it is run, any problems the author overcame in producing the program and any background necessary to enable our readers to use the listing. For example, if it is a game program, state the rules of the game, win condition, 'good score' level etc., etc.

3. Programs should preferably be run out on a printer straight from the computer. In this way less errors creep in. Otherwise typed or handwritten is acceptable but must be double-spaced and DOUBLE CHECKED!

4. How it Runs should be as near to a line-by-line, or block-by-block description of the program as is possible. In this way people can learn more easily how to produce programs of their own to your standards.

5. Each computer on the market has its own little foibles and oddities. No one knows those of your machine better than you. How would someone wishing to adapt your program go about untangling them? What special use have you made of your computer's special abilities? Graphics?

Always include a full list of variables, too.

NEXT MONTH

Spectrum / VIC 20 Graphics

To most poeple graphics are a very important function of their computer but high resolution facilities tend to make the inexperienced have a brain storm.

In an effort to overcome the difficulties people come across when programming in high-resolution mode next month we take the Spectrum and VIC 20 aside and compare the facilities of the two. Find out what the two computers have to offer graphically speaking. We will tell you what you can do with the facilities they offer, and compare just how easy, or difficult, both machines' graphics are to use. We'll help you solve you shape-making problems.

Micro Buying — Get it Right

Many people are on the brink of taking the plunge and entering the tide of computer owners but the wealth of machines now available at a reasonable price is bewildering and daunting. Personal Computing Today has come up with what we believe, from our readers viewpoint, is the 'ideal' personal computer.

We will make sure you get it right the first time round when you join the computer army. By taking our advice we hope you will make the right decision when micro buying. Pick up on the points we make to guide you in the right direction and watch out for the pitfalls.

TRS-80 Tipster

TRS-80 owners, whether recent or old timers, can make the most of our programming feature giving hints and tips. Iron out some of those old problems and discover how to improve your programs.

Space gamester addicts can wait with baited breath for an exciting TRS-80/Video Genie game, Saturn Attack. Collect valuable mineraloids from Saturn's surface but watch out for the deadly space sweepers planted by the enemy Titans which can destroy your probe. Can you and your computer survive the sweeping onslaught? Find out next month.

Piles of Programs

A useful program for VIC-20 owners who have experienced problems with their function keys. This short, sharp listing will fill you in on a neglected part of Commodore's baby. It enables you to assign a separate function up to eight characters long to each of the eight keys.

November brings autumn and bad weather but PCT will brighten up your days with a special analyses of teletext display on the BBC Microcomputer. This stands up where the BBC manual falls down and tells you how to make the most of your machine's high resolution graphics and use the functions supplied for teletext.

Our regular games programming series focuses on an ancient, traditional board game Ayo which is a version of one of the oldest known games called Mancala. It can be as simple as noughts and crosses or as tactically difficult as chess. It involves occupying and capturing your opponent's territory which consists of rows of cups. Sounds intriguing? Read November's PCT to find out more.

ON SALE FROM OCTOBER 1st

TRS80 Models I+III and VIDEO GENIE



Announcing ACCEL3 — the practical BASIC compiler for home, education, or business.

Are you troubled by gradual graphics, languid loops, tedious table searches, or capricious keyboard response? ACCEL3 is the cure. Highly compatible with interpreted BASIC — correct programs compile without modification.

On Tape or Disk £49.95

southern software

PO Box 39, Eastleigh, Hants, SO5 5WQ

AB & C Computers

MAIL ORDER SPECIALISTS

NEW COLOUR COMPUTERS

DRAGON 32K

GENIE IV 16K

£199.50 INC VAT EACH

THE PERFECT HOME COMPUTERS WITH:—
COLOUR, SOUND, TYPEWRITER KEYBOARD AND HIGH RESOLUTION PIXEL GRAPHICS

FREE: PROGRAMS CASSETTE WITH ALL COMPUTERS

TEXAS T199/4A Home Computer **£170**

Invaders	14.75	Attack	18.22	Music Maker	21.70
Soccer	18.22	Blackjack	18.22	Speech Editor	14.47
Munchman	21.70	Chess	£29.35	Reading	21.70
Car Wars	21.70	Yahtzee	18.22	Ext'd Basic	66.09

GENIE I + II Summer Sale at **£259**

12" Green Monitor	£73.07	Genie Printer	£180.00
EG3014 Expander	£184.07	Fred (Music)	£41.07

SEIKOSHA — EPSON PRINTERS FROM **£199**
EXPANSION RAM FOR GENIE — VIC 20 — TRS80
SOFTWARE — BOOKS — MEDIA — ACCESSORIES

SEND SAE FOR FULL PRICE LISTS

A. B. & C. COMPUTERS,
11 BROCKSTONE ROAD,
ST AUSTELL, CORNWALL.
Tel: St Austell (0726) 64463
Tel: Newquay (06373) 6886
Personal callers welcome

Terms — Please add VAT at 15%. Cheque P.O. with order. Carriage Computers' Printers £5.00. Post and Packing other items 60p. All hardware checked by service engineer.

24 HOUR ANSAPHONE FOR ACCESS ORDERS

Superior Systems Ltd.

178 WEST ST., SHEFFIELD S1 4ET TEL: (0742) 755005

ACORN SOFTWARE

Atom Games Packs 1-11	each	11.50A
Word Pack Rom		29.95A
Forth		11.50A
Forth Theory & Practice		6.95A
Business		11.50A
Business Book		6.95A
Synthesiser		11.50A
Life Package*		11.50A
Desk Diary		11.50A
Database		11.60A
Utility Pack I		11.50A
Soft V.D.U		11.50A
Peeko Computer		11.50A
Maths Pack I & II	each	11.50A
Word Tutor		11.50A
Adventures		11.50A
Atom Chess		11.50A
Floating Point Rom		23.00A
B.B.C. Rom Pack		49.95C
Magic Book		7.95A
B.B.C. Basic Programming Book		5.95A
Acorn Atom Dust Cover		4.55A

B.B.C.

BBC Dust Cover	4.55A
Desk Diary	9.95A
Creative Graphics Book	7.50A
Creative Graphics Pack	9.95A
Graphs & Charts Book	7.50A
Graphs & Charts Pack	9.95A
Algebraic Manipulation Pack	9.95A
Peeko Computer Pack (inc manual)	9.95A
Forth Book*	7.50A
Forth Pack*	16.85A
Lisp Book*	7.50A
Lisp Pack*	16.85A

GAMES SOFTWARE

Philosophers Quest	9.95A
Defender	9.95A
Monsters	9.95A
Snapper	9.95A

IJK B.B.C. SOFTWARE

Cassette 1. Star Trek, Candyfloss	5.95A
Cassette 2 Hangman, Dice, Kryptogram, Music, Grand National & Beetle	3.95A
Cassette 3. Mutant Invaders	5.95A
Cassette 4. Breakout	3.95A
Cassette 5. Beebmunch (mod B)	5.95A
Cassette 6 Super Hangman (mod b)	3.95A

MZ80A SOFTWARE

Star Trek	6.32A
Cassette Database	33.93B
Forth	40.20B
Zen Editor Assembler	22.43B
Reactor	6.32A
Wordpro Word Processor (tape)	45.43B
Packman	9.20A
Apollo Word Processor (tape)	28.70B

MZ80K SOFTWARE

Wordpro Word Processor (tape)	45.43B
Wordpro Word Processor (disk)*	91.74B
Apollo Word Processor (tape)	28.69B
Database (cassette based)	33.39B
MZ80 Calc II	39.68B
Zen Editor Assembler	22.43B
Zen Dos (editor assembler disk)	43.13B
Zen Disassembler	12.08B
Program Filing Index	6.32A
Lunar Lander	6.32A
Map of England	6.32A
Chess	16.67A
Tankwarp	6.32A
Space Invaders	6.32A
Head On	6.32A
Racing	6.32A
Showjumping	6.32A
Fireballs	6.32A
Monkey Climb*	6.32A
Football Manager	5.75A
Combat	5.75A
Composer	5.75A
Bank Account	4.60A
Address Book	4.60A
MZ80K Dust Cover	5.75A

VIDEO GENIE SOFTWARE

Acquire Business Game	12.96C
BI Nuclear Bomber Pilot	10.96C
Conflict 2500	10.96C
Midway Campaign	10.96C
North Atlantic Convoy	10.96C
Nukewar	10.96C
Planet Miners	10.96C
Adventures (various titles)	13.77B
Adventure Sampler	10.06A
Alien Armada	10.06A
Android Nim	10.06A
Asteroids	10.06A
Battle of Britain	15.53A
Copysis Program Copier	12.94A
Cube Hunt	10.35A
Database	28.75B
Duel-N-Droids	10.93A
Invaders	14.95A
Dust Cover for Genie I/II	5.75A

VIC 20

Programmers Aid Cartridge	34.95B
Machine Code Cartridge	34.95B
3K Ram Cartridge	29.95B
8K Ram Cartridge	44.95B
16K Ram Cartridge	74.95B
Joystick	7.50B
Paddles	13.50B
Intro to Basic Part I	14.95B
Vic Revealed	10.00B
Getting Acquainted with the VIC 20	7.95B
VIC Programmers Reference Guide	14.95C
VIC Avenger Rom Pack	19.95B
VIC Star Battle Rom Pack	19.95B
VIC Super Slot Rom Pack	19.95B
VIC Jelly Monsters Rom Pack	19.95B
VIC Alien Rom Pack	19.95B
VIC Super Lander Rom Pack	19.95B
VIC Road Race Rom Pack	19.95B
VIC 20 Dust Cover	6.50A

CASSETTE SOFTWARE

Pack Man (high resolution)	£6.50A
Gunman (high resolution)	£6.50A
Space Invaders	6.50A
Fire Trek	6.50A
Alien Wars	6.50A
Head On	6.50A
VIC Cube	6.50A
Crazy Balloon	6.50A
Mole Attack	6.50A
Balloon Bomber	6.50A
Skier	6.50A
Treasurer Carrying	6.50A
Super Moon Lander	6.50A
Slot Machine	6.50A
Ant Raiders	7.50A
Missile Command/Sub Hunt	7.50A
Six Programmes for VIC 20	7.50A
Fly Snatcher	7.50A

BUG BYTE SOFTWARE

ACORN

Galaxian	8.00A
747 Flight Simulation	8.00A
Chess	9.00A
Atom Invaders	8.00A
Pinball	4.50A
Atom Breakout	4.00A
Fruit Machine	4.00A
UFO Bomber	4.00A
Star Trek	5.00A
Disassembler	4.00A
Labyrinth	7.00A
Lunar Lander	5.50A
Golf	5.00A
Backgammon	7.00A
2K Programs 1	4.50A
2K Programs 2	4.50A
2K Programs 3	4.50A
Statistics	20.00B
Typist	4.00A

BBC

Space War	11.50A
Golf	7.00A
Backgammon	8.00A
Multifile	25.00B
Chess	11.50A
Polaris	8.00A

VIC 20

VIC Men	7.00A
VIC Breakout	7.00A
VIC Asteroids	7.00A
VIC Gammon	7.00A

BOOKS

Apple Pascal Games	11.45C
CP/M Handbook	11.50C
Don't (how to look after micros)	9.65C
Intro to Word Processing	11.95C
Pascal Handbook	13.95C
Programming Z80	11.95C
Programming 6502	10.75C
6502 Games	10.25C
A-Z Computer Games	*5.60B
Apple II Users Guide	*11.85C
Apple Basic Data File Frogs	*8.95B
Applesoft Language	7.65C
Basic Basic	9.95B
Basic Computer Games	6.95B
BMMI MD Apple Software	10.50C
CP/M Primer	10.45B
CP/M Users Guide	11.30C
Microsoft Basic	8.95B
Sharp Software Secrets	5.95B
Peeking & Poking on the MZ80K	5.00B
Wordstar Made Easy	9.25C

COMPUTERS

Acorn Atom 8K rom, 5K ram, P.S.U. & Colour Board	179.95E
Apple II 48K Computer	770.00E
VIC 20 Computer	179.95E
VIC Cassette Deck	44.95D
Sharp MZ80A (48K)	Phone for
Sharp MZ80B (64K)	best price
Genie I Computer	339.25E
Genie II Computer	339.25E

DISK DRIVES

Atom Disk Pack, 96K Single Disk Drive	343.85E
VIC 20 Single Disk Drive	396.00E
Sharp Dual Disk Unit	632.50E
Genie Single Disk Unit	228.85E
BBC Single Disk Unit	228.85E
Apple Drive with Controller	329.00E
Apple Drive without Controller	279.00E

MONITORS

12" NEC High Res Colour Monitor	654.35E
14" Decca R G B Colour Monitor	269.00E
14" JVC Video Monitor	299.00E

All prices include V.A.T. but exclude carriage. A. 50p. B. £1. C. £2.50. D. £5.00. Prices correct at time of publication. Confirmation of prices by phone.

YOUR LETTERS

This page is where you get the chance to put your opinions in print. Personal Computing Today welcomes letters from you on any aspect of microcomputing and views in general — as long as they're printable!

Please drop us a line to: The Editor, Personal Computing Today, 145 Charing Cross Road, London, WC2H 0EE.

Dear PCT
I have had a ZX81 for 6 months. But since I bought it I've had nothing but problems with it, and they are getting worse. At first my programs crashed when I was entering them. Then two months ago I received a 16K RAM pack. Due to the fault I am only able to get 5.4K out of the RAM. It is not the RAM because I have checked it on other ZX81s. Sometimes when typing in a program the cursor stops dead and the only solution is to pull out the plug. Also when loading machine code the computer will change the hex code into a character which isn't the right one.

E.G. Hex code Character
C5 CLEAR

I have written to Sinclair in case it is a faulty ROM but I've had no reply and I sent the letter three weeks ago. Do you have any ideas on what the problem is? If so, how can I fix it?
K Driscoll
Merseyside

Editor's reply: Unfortunately it does sound like your machine has a bad ROM in it somewhere which means that you will just have to keep plugging away at Sinclair to remedy it.

Dear PCT
Congratulations on the introduction of a superb new computing magazine. Your method of software review is clear, concise and amusing.

As this will be a regular feature I would be interested, as would I'm sure, many other readers, on war games software. In particular, I was interested in one called "Conqueror" marketed by Algray for the 16K PET.

A review of this game would help me decide on a purchase.
D R Wilson
Humberside

Editor's reply: In future issues we will try and include as wide a variety of games and computers as possible. So keep your eyes peeled for a war game review.

Dear PCT
Having written a text program of my own I was interested in S A Barnett's program in your August 1982 issue.

It is not quite true to say you cannot input a line containing a comma. You can if you put the entry inside quotation marks. In fact, you need only type in the opening quotes. It is, however, a nuisance to have to remember to include the quotes and I have therefore used substantially the same method as S A Barnett.

There seem to be two mistakes in his program. Line 5 should be PRINT CHR$ (14) which is the TRS-80 "cursor on" command. There should be a closing bracket after the second B$ in line 40. I am a little puzzled why A$ is used for a second purpose in line 40. The following simpler line works just as well

```
40 IF A = 8 THEN PRINT A$;: B$ = LEFT (B$,LEN(B$) - 1): GO TO 10
```

I am looking out for the next issue of the magazine with interest.
Peter Davy
Wakefield

Dear PCT
First, may I congratulate you on the first edition of your magazine, it proved both interesting and useful.

I am an owner of a ZX81 and intend to purchase a BBC Micro when finances permit.

I would be pleased if you could answer some queries of mine.

1. Will a ZX user quickly adapt to the BBC BASIC?
2. Do the cassette and TV cables come complete with the machine?
3. Are the LOAD and SAVE commands reliable even with a domestic recorder?
4. Does the manual give details on the machines assembler?
5. Is it true that on the Model B machine only 4 colours are available on the screen at the same time?

A Stead
Hull

Editor's reply: Once you have learned one version of BASIC it is very easy to change to another. One thing that might take some getting used to when you get your BBC machine is that you have to type the keywords in as opposed to putting them in with a single keystroke.

The BBC machine does come complete with cassette and TV cables, but you do have to fit plugs on the end of the cassette cable for your particular tape machine.

The BBC machine offers you two tape operations, one which loads and saves at 300 baud, and one which uses 1200 baud. If you have a reasonable quality tape recorder then both of these are reliable. However, if you are trying to load a 1200 baud tape from someone else's machine you might encounter some problems.

The machine's manual does give some basic information about the machine's assembler capacity but there will be another manual available shortly to deal purely with this.

In some modes the Model B will support up to 16 colours, notably Mode 7 and Mode 2. ■

INNOVATIVE
TRS 80-GENIE SOFTWARE
from the professionals

JUMBO



Fantastic new flying simulation

Occasionally a program comes along of such magnitude that it is hard to describe it, especially within the space allowable in an advertisement. Jumbo is such a program. There have, of course, been flying simulation programs before, but they have all rather fallen into the trap of trying to produce a graphic representation of the ground at some stage or other in the program, thus taking up space, and/or they have concentrated on the single act of flying. In other words, although one gets the feeling of flying a small aircraft, one is not going anywhere.

Jumbo is a fantastically accurate simulation of flying a Boeing 747. These planes are not small, and are not flown by eye. They are flown by eyes and instruments, and the instrument graphics in this simulation are really first class. As you may know, the primary instrument of an aircraft is the artificial horizon. This is simulated very well, and includes instrument landing approach indicators. Graphic maps of very high quality are produced and it is possible to fly in all of the British Isles including Southern Ireland, and to New York on the Eastern U.S. seaboard. The actual airports are at London, Birmingham, Manchester, Prestwick, Edinburgh, Belfast, Shannon and New York.

The program was written by two authors who combined their joint skills to produce a unique piece of software. The programmer got the last byte of performance out of the machine and the pilot the last drop of authenticity out of the simulation. Other simulation programs produce at best a similarity towards flying. With Jumbo you really feel that you are behind the controls.

The authors have used a number of gimmicks and programming techniques. For instance, it is possible to switch on an automatic pilot and to jump forward in time in increments of one minute or one hour — otherwise of course a flight from London to New York or vice versa would take some 8 hours to simulate. Whilst in this time skip the various controls are left as they are but fuel consumption and distance to go are taken forward at their correct rate.

A chart is supplied containing various items of data which you will need, including the take-off data for a 747 with various take-off weights, flap retractions, climb and cruise speeds and descent distances.

Realising that not everybody can fly a 747 and that there is even a large proportion of the population that cannot fly anything, two important items of assistance have been added. First of all is the documentation. This is split into two parts. The second is a "manual" on flying the 747. In other words, the instructions for running the program. The first part, however, is what amounts to an instruction manual for flying. It assumes that the user knows nothing about aircraft and although we do not purport that it gets anybody up to any sort of standard after it has been assimilated, the reader should have sufficient knowledge of flying and the theory of flight to fly in the program itself. The second feature of assistance to the novice pilot is a feature in the program which enables the user to practice landings. When the program is started, if one presses the P key, the aircraft is automatically put 11 miles out from London Airport approaching on an instrument landing.

The controls are pretty well complete, even to dive and wheel brakes. The flying track may be continuously monitored on the map display. Bearing and distance to your intended point of landing are available all the time. The instruments, incidentally, consist of:

- Artificial horizon
- Aileron indicators
- Indicated airspeed
- Power setting
- Elevators
- Attitude
- Compass
- Turn indicator
- Flap indicator
- Altimeter
- Fuel
- Elapsed time
- Distance to landing
- Rate of climb

Six maps may be chosen, as follows:

Scotland, Northern England, Southern England, Ireland, Eastern U.S.A., The whole of the U.K.

Route information and present position are shown on the map displayed. It is very difficult to think of any factor that the authors have overlooked. Even the quite meaningful thinning of the air with increasing height, which greatly affects the airspeed indicator in real life, is taken into consideration. Rather than having a fixed stalling speed, this continuously changes with the flight configuration, the weight, height and power setting, again as it does in real life.

We like to think that we publish good programs. Jumbo is outstanding. It is available on tape or disk for 16K or 32K memory machines. It is compatible with the Model I and Model III Tandy, Video Genie, Genie I and Genie II machines.

Tape ..... £15.00 + VAT = **£17.25**
Disk ..... £17.00 + VAT = **£19.55**

Plus 75p P & P please.

MOLIMERX LTD
A J HARDING (MOLIMERX)

1 BUCKHURST ROAD, TOWN HALL SQUARE, BEXHILL-ON-SEA, EAST SUSSEX.

TEL: [0424] 220391/223636 **TELEX 86736 SOTEX G**

TRS-80 & VIDEO GENIE SOFTWARE CATALOGUE £1.00 [**refundable**] plus £1 postage.

SOFTWARE

SOLGOR

Practice programming your PET with this numerical tangle to give your braincells a tussle by Andy Hennigan.



Solgor is a simple number game that is quite easy to program but requires a bit of thought to play. At the beginning of the game you are presented with the numbers 0 to 9 all shuffled up like this:

3 5 6 4 2 7 9 0 8 1

All you have to do is sort them into ascending order, 0 to 9, 'smallest on the left, greatest on the right' — hence the name. The catch is that you are only allowed to reverse the order of 2 to 10 digits counting from the left with each move. For example, if you decide to reverse the first three digits in the string of numbers above the result will be:

6 5 3 4 2 7 9 0 8 1

The game finishes when the numbers are in 'Solgor' order and you judge your performance by counting the number of moves it took.

The sample run shows one way of solving the arrangement given at the beginning. The easiest way to attack the problem is to join up neighbouring numbers without breaking up existing runs.

It is important to think ahead so that you can re-unite two numbers with almost every move. In the example only two moves (8 and 10) do not actually place any numbers in their correct sequential position.

If you get bored with the game you could make it more difficult by using the 26 letters of the alphabet instead. Another suggestion is to provide it with a store of words to shuffle so that your first problem is to spot the anagram, and then sort it our using the Solgor rules.

For the deep thinkers a very interesting exercise is to devise an algorithm to play the game — not as easy as it sounds.

HOW IT RUNS

Line By Line Description

150-220 Places the digits 0-9 randomly in the array. The array is first filled with " – 1"s so that placing the loop can recognise vacant places.

250-300 Prints out the numbers and the input prompt "reverse ?". The player decides at this point how many to move.

320-340 Rejects fractions and numbers less than two or greater than ten.

350 The "number of goes" is increased — after the check on validity in the interests of fairness.

370-400 Reverses the numbers. Try executing two and three digit reverse by hand on paper if you can't see how it works. This routine works for both even and odd moves because the middle number in an odd reverse is not moved.

420-430 Checks to see if the numbers are in Solgor order. If they are the game's over.

450-510 Success at last! Prints an evaluation of you skill — or lack of it. The critiscim is perhaps a little harsh.

530-550 Offers the player another game.

```
>RUN

** SOLGOR !! **

All you have to do is sort out the string of numbers into
ascending order, 0-9, by reversing 2-10 digits counting from the
left. Good luck!
3 5 6 4 2 7 9 0 8 1
reverse ? 4
4 6 5 3 2 7 9 0 8 1
reverse ? 3
5 6 4 3 2 7 9 0 8 1
reverse ? 2
6 5 4 3 2 7 9 0 8 1
reverse ? 5
2 3 4 5 6 7 9 0 8 1
reverse ? 9
8 0 9 7 6 5 4 3 2 1
reverse ? 3
9 0 8 7 6 5 4 3 2 1
reverse ? 2
0 9 8 7 6 5 4 3 2 1
reverse ? 10
1 2 3 4 5 6 7 8 9 0
reverse ? 9
9 8 7 6 5 4 3 2 1 0
reverse? 10
SOLGOR !!!!!!!!
It took you 10 moves wihch is not so good.
Another game (Y/N) ? N
```

PROGRAM LISTING

```
10    REM # # SOLGOR. BP # #
20    REM # # THE NUMBER SORT GAME # #
30    REM # # ANDY J. HENNIGAN 1981 # #
40    REM
50    DIM N(10)
60    PRINT
70    PRINT"** SOLGOR !! **"
80    PRINT
90    PRINT "ALL YOU HAVE TO DO IS SORT"
100   PRINT "OUT THE STRING OF NUMBERS"
110   PRINT "INTO ASCENDING ORDER, 0-9, BY"
120   PRINT "REVERSING 2-10 DIGITS COUNTING"
130   PRINT "FROM THE LEFT. GOOD LUCK !"
140   PRINT
150   FOR  I = 1 TO 10
160   LET N(I) = – 1
170   NEXT I
180   FORI = 1 TO 10
190   LET X = INT(RND(1)*10 + 1)
200   IF N(X) > – 1THEN190
210   LET N(X) = I – 1
220   NEXT I
230   LET G = 0
240   PRINT
250   FORI = 1TO10
260   PRINTN(I);
270   NEXT I
280   PRINT
290   PRINT
300   INPUT"REVERSE";R
310   PRINT
320   IFR < = 10 AND R > 1 AND R = INT(R) THEN 350
330   PRINT"NO GOOD, PLEASE TRY AGAIN"
340   GOTO 300
350   LET G = G + 1
360   FORI = 1TOINT(R/2)
370   LET P = N(I)
380   LET N(I) = N(R – I + 1)
390   LET N(R – I + 1) = P
400   NEXT I
410   FORI = 1TO10
420   IF N(I) < >I – 1 THEN 240
430   NEXT I
440   PRINT
450   PRINT"SOLGOR !!!!!!!"
460   PRINT
470   PRINT"IT TOOK YOU";G;"MOVES WHICH"
480   IF G<5 THEN PRINT "MEANS YOU PROBABLY
      CHEATED."
490   IF G<10 AND G> = 5 THEN PRINT"MEANS YOU ARE
      PRETTY GOOD."
500   IF G> = 10 AND G<20 THEN PRINT "IS NOT SO
      GOOD."
510   IF G> = 20 THEN PRINT "IS TERRIBLE."
520   PRINT
530   INPUT "ANOTHER GAME ? (Y/N) ";Q$
540   PRINT
550   IF Q$ = "Y" THEN 60
560   END
```



SOLGOR

HINTS ON CONVERSION



The Solgor program is written in Zilog BASIC 3.0, which is fast rather than fancy, and no special or peculiar features are used so you will have no problem running it in other dialects. The following points will help clear up any doubts.

- Arrays, strings and dimensioning N(10) is a ten element numerical array; Q$(1) is a one character string. Array elements are numbered from 1.
- RANDOMIZE, RND

RANDOMIZE reseeds the pseudo-random number generator; RND supplies the next number in sequence. Many versions of BASIC use RND(X) for both of these.

- INT(X)

An intrinsic function that returns the integer part of X. Eg., INT(3.8) is 3.

- "&"

The ampersand symbol "&" is a logical AND in IF . . . THEN statements. The word "AND" is often used instead.

- < > "not equals" (often =).
  < = "less than or equals".
  > = "greater than or equals".

The digits to be sorted are held in the array N(10), G is the number of goes you've had and R is the number of digits you want to reverse.

The program has been converted from zilog BASIC to MICROSOFT BASIC, so it is already in a standard form. The points to pay attention to when converting are firstly, the random number generation in line 190, as this is achieved in different ways on different machines. The statement shown in line 190 will generate a random number between one and ten.

The logical operator AND in lines 320,490,500 might have to be changed as some machines do not support this sort of comparison. The way to replace the AND statement is to reduce it to a number of IF . . . THEN statements to check whether the condition is true.

Finally, if you are converting this program to run on a VIC 20 then all you have to worry about is adjusting the PRINT statements so that the lines do not wrap around on the VIC's smaller screen.

LET ACORNSOFT OPEN THE DOORS TO YOUR IMAGINATION



BBC Microcomputer or Acorn Atom

Acornsoft is the software division of Acorn Computers, designers and manufacturers, of the BBC Micro and Atom. We know better than anyone the capability of the machines, we know how to get the very best from the hardware. And we have produced a range of exciting games, exacting business and useful household software.

The Biggest Range Available

Acornsoft software ranges from authentic arcade games like Snapper to Algebraic Manipulation to Desk Diary to other languages like FORTH and LISP. Striking colour, amazing sound effects and powerful graphics are all used to the full. And it does not stop there. There is a complete range of manuals, accessories and plug-in ROMs.

Free Brochures

Just clip the coupon or write to us and we will rush our catalogue absolutely free. Can't wait for the post ring 01-930 1614 now! Don't delay – do it today. Let Acornsoft help you get the best from our machine and open the doors to your imagination.

Acornsoft and Atom are registered trade marks of Acorn Computers Ltd.

ACORNSOFT
4A Market Hill,
CAMBRIDGE CB2 3NJ.

Please rush me my free literature from Acornsoft.

☐ Atom ☐ BBC Please tick

Name _____

Address _____

_____

_____

_____

Postcode _____ PCT/10



- Plug in — no desoldering.
- Space bar linked to space key.
- Full travel keys. Six spare keys for your own use.
- Case available to hold keyboard and ZX 81 microcard.
- 16K RAM pack clamp supplied with case to eliminate white outs!!



THE PROFESSIONAL ZX81 KEYBOARD

- All-you-need Keyboard Kit £28.95.
- Case only £15.00.

All prices inclusive of VAT, postage and packing.
Please allow 21 days for delivery.

de COMPUTER KEYBOARDS DIV.
DEAN ELECTRONICS LIMITED
Glendale Park Fernbank Road Ascot Berkshire England
Dial-a-leaflet 03447 5661 Telex 849242

Software for all

72 NORTH STREET, ROMFORD, ESSEX. TEL 0708 60725

Announce the launch of their range of BBC programs

For Model B only. **Grand Prix**
Time Trials around our race track. Includes computer controlled car to hinder your progress. 9 levels of difficulty **£5.95**

GHOST MAZE For Model B
Our own version of this popular Arcade game
With colour and sound.
9 levels of difficulty. **£6.95**

BEEBTREK
For Model A or B, real time advanced Startrek Game.
Extra facilities include "probe satellites"
"damage reports" & "on-board computers". **£7.95**

Cobra/Robo-Swamp
For A or B (please state version required).
Two addictive games — insomniacs delight! **£6.95**

J.R. For Model B only.
Two player game, features include, exploration, drilling, employment and price wars. **£6.95**

DATABASE For Model A or B
Accepts up to ten definable fields. Facilities includes Quick Search, sort and Hard copy — capable of storing up to 300 complete records in memory (Model B). **£9.95**

INVADERS For Model A or B.
Classic Arcade game. With colour & sound. **£6.95**

Character Generator
For Model B only. Useful utility program enables user to re-define character set using Mode 4. displays new character in graph form. **£4.95**

Paralander VIC-20
For unexpanded model, graphics and sound are incorporated into this absorbing battle between you (the dare-devil) and the elements. **£4.50**

ZX Spectrum Disassembler Useful Utility Programme Fits in 16K. **£4**

Programmers We are looking for good quality programs covering games utilities & education. We pay exellent rates. Please write or phone us on (0708) 60725. Dealer enquiries welcome.

Attention Dragon Owners!
Software Coming Soon!

We're only a few minutes from your Post Box.
So why not try our mail order service.

NAME .....
ADDRESS .....
.....
.....
.....

Please send me:-

Add £1 p&p per order

£
£
£
£

I enclose cheque/P.O. for £.....
or
Please debit my Access/Barclaycard No.

Make cheques/P.O. payable to SOFTWARE FOR ALL
72 North Street, Romford, Essex.
Tel: Romford (0708) 60725

Business/Applications for your TRS-80

DOSPLUS
DOSPLUS
DOSPLUS

NO ONE ELSE CAN GIVE YOU:
The same high level of Model I/Model II diskette and program compatibility. True, complete BASIC program chaining with files open and variables saved.
DOSPLUS is the fastest, most powerful, and easiest to operate system on the market. DOSPLUS works! And works right. For the business person and hobbyist, the speed and simplicity cannot be beat. For the BASIC programmer, no one can offer you more than DOS-PLUS!

DOSPLUS **Regular £69.95** **Save £49.95**
This price till Aug 1st

ONE-D MAILING LIST
Here is a mailing list system that can be run on only one disk drive! You can have up to 17 fields of selection for name/address retrieval.

Disk versatility allows you to add, delete, or change the numerous details stored in the system.

Features of the One-D Mailing List include:
*Automatic name sort (with zip code option).
*Rapid access to any name on file.
*Easy error correction and recovery.
*Prints selective name listings.
*Revise or update listings at any time.
*Up to 2500 names on-line (with 4 drives).
*Prints a list of all names on file.
*Prints mailing labels.

This package requires the following minimum system:
1. A TRS-80 Model I, Level II with 16K RAM.
2. An Expansion interface with 0 to 32K memory.
3. A single disk drive (with automatic upgrade for up to three additional disk drives).
4. Any compatible Disk Operating System.

(Disk) £24.95

FIND IT QUICK

Put an end to the misplaced information syndrome! Here is a reliable, fast, subject-oriented information locator – FIND IT QUICK! This information indexing and retrieval system is versatile and flexible – the ideal tool for doctors, lawyers, engineers, businessmen, educators, anyone who needs to locate information.

Designed with a journal/magazine format. FIQ is versatile enough to be used to store and retrieve any type of reference information including client lists, vendor advertisements, report bibliographies and more – even poems and famous quotations. Subjects can be indexed or called according to author, journal and date or by up to nine keywords that you determine. Keywords can be used singly or in combination during the search routines.

FIQ can be used by anyone. It requires no special skill, just the ability to type. Article references to be stored can be pre-selected and then entered into the system by a secretary or assistant. Even the contents of entire file cabinets can be indexed and stored!

FIND IT QUICK requires a minimum system consisting of TRS-80 Model I. Level II with 16K of RAM, an Expansion Interface and at least one disk drive. Up to 1080 items can be stored on one data disk. Instant Software's Tiny DOS operating system is included on the program disk so that you can use the program without fuss or bother.

Make your computer work like your own personal librarian with FIND IT QUICK. Can you afford to wait another day?

(Disk) £29.95

BUSINESS ANALYSIS
(Formerly Oracle-80)

Business Analysis will provide you with analytical and forecasting capabilities previously available only in large computer and time-sharing systems. It is a flexible, professional time series package that can be used in sales analysis and forecasting, product planning, business planning, etc. The professional forecaster will recognize BUSINESS ANALYSIS as a tool which incorporates all the power of the X-11 model and extends it. Investors can analyze stocks, market trends and growth rates. Financial managers and economists can analyze the general economic climate and investigate business cycles. Even families can find this program useful in analyzing spending or energy consumption trends, for it is ideal for anyone who needs to analyze and forecast monthly, quarterly or annual data.

Even though this package uses advanced statistical methods, you don't have to understand higher math to use it. Designed to be used and understood by the typical business person, its powerful analytical capabilities will satisfy even the professional forecaster. All inputs and outputs are written in plain English and the documentation carefully explains all functions.

Adding, deleting and modifying data is accomplished with a very flexible editing routine. Automatic scaling of numbers, ability to choose from several output formats, a calendar format that identifies all your data by month/quarter/year, and the ability to add and subtract values while inputting from the keyboard provide added user flexibility. You can use several methods – moving average, rate of change, seasonal indices or cyclical indices – to analyze your data. The unique graphing capability lets you visualize your historic data or any of the modified data series you calculate, and direct any chart or graph to your printer.

Business Analysis will forecast future data values using trend, moving averages or seasonal methods. You may choose either constant unit-trend or a constant percentage-growth-trend forecast for even more flexibility.

This is one of the most powerful and useful business tools you will ever use. It puts the future in your hands.

The package requires the following minimum system:
1. A TRS-80 Level II with 16K RAM.
2. An Expansion Interface with 16K RAM.
3. One or more disk drives.
4. Any compatible Disk Operating System.
5. An optional line printer.

Note: Tape version *only* is Model III compatible.

(Tape) £75.00 (Disk) £99.95

SEND 75p FOR FULL CATALOGUE
(Refundable against purchase)
DEALER ENQUIRIES WELCOME

ANGLO AMERICAN SOFTWARE
138a STRATFORD ROAD, SPARKHILL
BIRMINGHAM B11 1AG 021-771 2995

ALL PRICES INCLUDE VAT & POSTAGE
24 Hour answering service
on 021-771 2995 for Access orders.

PLEASE SUPPLY.....
.....
I enclose a cheque/PO for £..... made payable to ANGLO AMERICAN or debit my
Access card number .....
Signature.....
NAME .....
ADDRESS.....
.....
..... PCT/10/82

COMPUTER USERS CLUB

In Clubhouse this month we take a look at the Crawley Computer Club and also bring you a round-up of new, recently and soon-to-be-started computer clubs.

The Crawley Computer Club is a small group of amateur computer enthusiasts who live locally and meet to help each other out and exchange views on their favourite hobby, personal computing.

Their meetings are informal affairs as they find that this helps members discuss their problems and interests without constant interruption. From time to time they arrange special evenings where guest speakers come down and enlighten them on further facets of the computer field.

Membership is made up of people that come from all walks of life interested in computers. Some of the members are more interested in hardware, spending their time building interfaces and other wonderful gadgets to plug into their machines, whilst others are more interested in software, writing games and utilities. Some members have been experimenting with word processing and accounting. Most of the club members prefer to stick to BASIC as a language except a few of the more adventurous who have moved on to assembly code and PASCAL in order to give full range to their programming concepts.

The club does not specialise in one particular machine and the computers owned by the members range from ZX80/81s and Acorn Atoms at the low end, to the Apple II and the Video Genie at the top end. Most of the commercially available machines are well represented along with a few from enterprising people who have designed and built their own.

Don't be afraid to go along to the club for the first time, whether as a novice or as a seasoned campaigner, there are many people who will help you with your problems, or argue with you over the best way to POKE your machine.

Meetings take place twice a month on the first Tuesday of the month at the Broadfield Community Centre in Broadfield Barton, Crawley. The meeting starts at about 7.30pm and usually runs until about 10.00pm. Members bring along their own machines so that they can demonstrate their latest mind-boggling creations. On the third Tuesday of each month the club transfers its headquarters to a local hostelry, the Tavern on the Green in Pound Hill, Crawley, where the club members discuss any new developments in the salubrious surroundings of the bar, downing a few pints of the local brew. This could result in many interesting advances in computer technology that can't be remembered in the morning.

If you are interested in joining, the subscription for a year is £6 and the people to get in touch with are:

Max Clark
(chairman)
31 Hyde Heath
Court
Pound Hill
Crawley
West Sussex
RH10 3UQ
Telephone:
(0293) 884207

Chris Seager
(secretary)
43 Jewel Walk
Bewbush
Crawley
West Sussex
RH11 8BH
Telephone:
(0293) 517035

Club Call-Up

Leaving the Crawley Computer Club and heading north we encounter another alcoholically powered computer group, in the form of the VIC-Pet Computer Club. Members meet fortnightly in the Spread Eagle, Oakley Hay, near Corby, Northants and as the name suggests they concentrate on the Commodore range of computers. For further details contact:

P Wilson
26 North Cape Walk
Corby
Northants
NN18 9DQ
Telephone: (0536) 742622

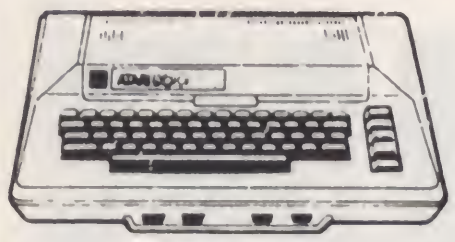
Moving on we travel to Blackburn in Lancashire where a new club is forming, The Club, which hasn't got a name yet, but plans to meet on the first Monday of each month at a yet undecided venue. The club is also hoping to publish a monthly journal and contributions are welcome from anyone, whether they are a member or not.



GAMER

24 Gloucester Rd
Tel. 698424
BRIGHTON

ATARI



NEW LOW PRICES

400 (exc. BASIC)	**£173.04**
400 (inc. BASIC)	**£216.52**
800 (exc. BASIC)	**£390.43**
800 (inc. BASIC)	**£433.91**

ATARI PACKAGE DEALS

400 (16K) + BASIC + Recorder + Joystick + 5 Blank Cassettes + Free Programs	**£251.30**
400 (32K) + All above items	**£307.83**
800 (48K) + All above items	**£546.96**
800 (48K) + Disk Drive + Joystick + 3 Blank Disks + Demo Disk + 3 Apx Programs	**£734.78**

SHARP

MZ80A	**£434**	VIC 20	**£152**
MZ80B	**£950**	GENIE I & II	**£289**
		ATOM	**from £150**

NOW IN STOCK — **DRAGON** — 32K + COLOUR + SOUND + TYPEWRITER KEYBOARD **£173 + VAT**
+ PERIPHERALS + SOFTWARE + BOOKS + MAGAZINES + CHESS COMPUTERS + GAMES FOR ZX81 AND APPLE

PLEASE ADD 15% VAT TO ALL PRICES

B B C SOFTWARE

MEMORY UPGRADE KITS **Now only £26.00 + VAT**
Model A — Upgrade the Model A to 32k RAM. Simple to fit – no soldering. Supplied with step by step instructions.

SNAKE — Model B **£7.80 + VAT**
This colourful arcade type game makes full use of the amazing graphics (Mode 2) and sound facilities of the BBC Micro. A highly adictive game that will give hours of fun.

CHARACTERS — Model A/B **£5.80 + VAT**
Forget about clumsy binary or Hex notation when re-defining character shapes. This utility program could not make it any simpler.

CUBE — Model B **£7.80 + VAT**
A simulation of the famous Rubik Cube. Full colour 3 dimensional view of all sides of the cube. Choose how jumbled you want the cube and then try to solve it.

FRUIT MACHINE — Model A/B **£5.80 + VAT**
Another game that shows off the superb graphics and sound effects possible on the BBC Micro. Features Nudges, holds, gamble etc.

CASH OR ROYALTIES waiting for any interesting software (not just games) for the BBC Micro. The better the program the more we will pay.

Send an SAE to get the latest details of our software.

COMPUTER CONCEPTS

Dept PE1
16 Wayside
Chipperfield
Herts WD4 9JJ
Tel. (09277) 62955

MICRO COMPUTER SOFTWARE

THE BIG NAME IN FAMILY SOFTWARE

MUSIC TUTOR 2
Comprehensive easy tutor.
Definitely music made fun.

ROGUE ELEPHANT
Exciting thrills and spills of Jungle Survival.

DIGGLESWINE CELLAR
Let your computer select your wine

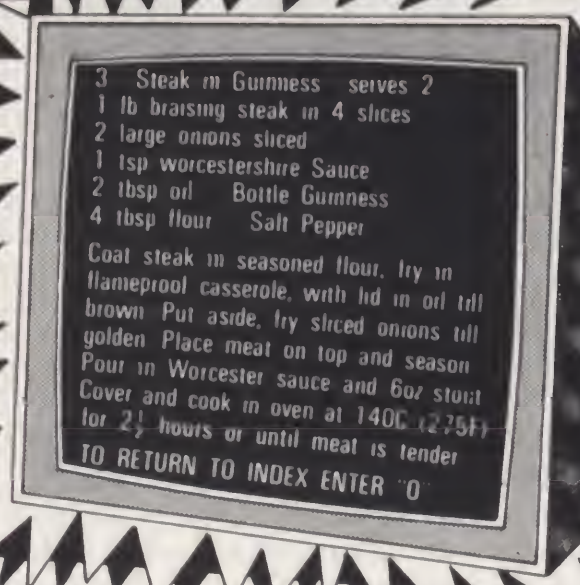
DIGGLES KITCHEN 1, 2 & 3
Exciting and sensible menus for the decerning palate.

BILL SOWERBUTTS GARDENING HINTS
Everything you want to know about houseplants.

AVAILABLE ON
ZX81+16K
VIC20+16K
VIC20+8K
PET

EXAMPLE **DIGGLES KITCHEN**
INDEX – VOL. TWO WORLDWIDE RECIPES

PART ONE	PART TWO
APRICOT PIGEON	BEEF AND PEPPERS
PHEASANT IN BASIL	HUNGARIAN BEEF
TURKEY BYZANTE	BRAISED STEAK IN GUINNESS
ORANGE CHICKEN	HALIBUT A LA CREME
COQ AU VIN	COD PORTUGUESE
POULET NICOISE	GARLIC BREAD
BOLOGNESE SAUCE	CABBAGE & ONION SALAD
LASAGNE AL FORNO	COURGETTES NATUREL
MOUSSAKA	GOLDEN CAULIFLOWER
BOEUF BOURGUIGNON	CARROTS WITH HERBS
ZABAGLIONE	OREGANO POTATOES
CREPES SUZETTE	PEPPERONATA
	CHEESECAKE
	SHERRY TRIFLE



HURRY POST THIS COUPON TODAY AND SAVE 99p OFF ANY TITLE
Offer open for 30 days only

			Now Only	No. Req.	Price	
ROGUE ELEPHANT	unexpanded VIC20	£4.99	£4.00			
MUSIC TUTOR	unexpanded VIC20	£7.99	£7.00			
MUSIC TUTOR De Luxe	expanded VIC20	£8.99	£8.00			
DIGGLES KITCHEN Vol. 1	ZX81+16K, VIC20+16K	£4.99	£4.00			
DIGGLES KITCHEN Vol. 2	ZX81+16K, VIC20+16K	£4.99	£4.00			
DIGGLES KITCHEN Vol. 3	VIC20+16K VIC20+8K	£4.99	£4.00			
BILL SOWERBUTTS GARDENING HINTS	ZX81+16K ONLY	£4.99	£4.00			
DIGGLES WINE CELLAR						

NAME _____ Total value of cheque

ADDRESS _____

All above include postage and packing
Micro Computer Software Type of Computer
Unit D6, Pear Industrial Estate, Stockport Road, Lower Bredbury, Stockport SK6 2BP.

DON'T MISS THIS GREAT OPPORTUNITY

SOFTWARE

BOUNCING BEASTIE

Chase after some very elusive creatures in this fun game from D.A.H. Elworthy.



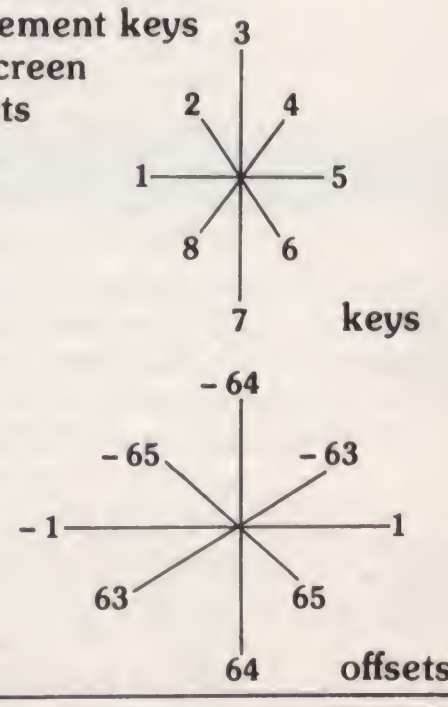
This game runs on a Nascom with BASIC and NAS-SYS, but can easily be adapted for any machine with BASIC and a memory-mapped display. The aim is to chase after the "beasties" and "squiggles". If you run into them, you score ten points and one point, respectively. However, if they hit you first, then your "man" is destroyed. You have three men in total.

Beasties appear somewhere along the top line of the play area on the screen, and then bounce provocatively around. Occasionally, they undergo a random change in direction, or release a squiggle. The probability of either of these events occurring depends on the skill level chosen, multiplied by a constant.

This constant is contained in line 1070; 0.05(1 in 20) has been found to give a satisfactory starting probability at a skill level of one. Once on the screen, a squiggle moves in a straight line at twice the speed of men and beasties, and may start to home in on you, with a probability of five times the value set up above. Fortunately there is only one squiggle on the screen at a time.

If you kill a beastie, probabilities are doubled. Whenever a man is killed, the current score and number of men left are shown on the screen. Movement is controlled by keys 1 to 8 (see figure 1), with 0 meaning stop. All other keys are ignored.

Figure 1:
Movement keys & Screen offsets



NASCOM

BOUNCING BEASTIE

HOW IT RUNS

The program requires about 1½kbytes of memory.

10	Sets up FNR to generate random direction codes, and jumps to the initilisation routine.
20-90	Move subroutine. The parameters are: V direction code (i.e. value added to current location), W Current location on screen. Values returned are: V,W (updated) X the value of the character on the scren at the new location. BB set to 1 if a bounce occured, i.e. the object hit the border of the play area; 0 otherwise.
100-170	Squiggle subroutine. The squiggle is moved, and checks made for going out of play, and collision with a man. In the latter case, a jump is made to 400. Otherwise a normal return is made.
200	Introduces a new beastie to the screen.
210-340	Routines to move beastie, squiggle, man, and beastie again. A jump is made to 400 if a man is hit.
400-460	Dead man: checks for end of game. If so, jumps to 500. Otherwise shows score, waits, erases it, and either continues with a new beastie, or returns.
420	SCREEN10,7 puts the cursor at line 10, position 7
440	As line 420
500-530	Game over: gives final score, and tests for restart.
520	Test for a string starting with 'y' or 'Y'.
500	SCREEN1,15 puts the cursor at the bottom left corner of the screen.
900-990	Rules. CLS clears the screen.
920	[CTL D] is the squiggle symbol (see Table 1).
1000	Sets up the address of the USR routine (with DOKE), and clears variables. Actually they're clear already, but this line allows us to put them in BASIC's variable list in a specific order, which is useful for making fast access to important variables.
1010-1020	Set up more variables.
1030-1040	DOKE the machine code routine, called by USR(0). It has the same ffect as INKEY, GET, etc. The routine is called once, at line 300, and this should be changed on other machines.
1050-1060	Set up the array of movement codes. A() has dimension 8, so no DIM is needed.
1070	Sets up probability Y, and clears screen. A restart comes here.
1080-1120	Draws border around play area.
1130-1140	Initialises values, and starts the game.

If you find that using keys 1-8 is inconvenient, then change the input function called at 300, so that the keys that you use are converted to values in the range 49-56, corresponding to the ASCII codes of 1-8. A code of 0 should be returned if no key is pressed. An alternative to this is to use a joy-stick.

Table 1: Graphics

Symbol	Code	Variable	Lines where used	Use
—	95	E	1010	Top of play area
‾	126	F	1010	Bottom of play area
/	47	G	1010	Left of play area
\	92	H	1010	Right of play area
Ω	7	I	1010	Man
*	42	J	1010	Beastie
≀	4	K	1010	Squiggle
[SPC]	32	P	1020	Space (!)
□	0	none	1120, 75	Corners of area

Table 2: Screen Values

Value	Variable	Lines where used	Use
2058	TL	1020	Top left of play area border
2103	TR	1020	Top right of play area
2954	BL	1020	Bottom left of play area
2999	BR	1020	Bottom right of play area
2530	U	1020	Screen centre
±65	none	1060, 200	See text
±64	none	1060,1 100,1110	See text
±63	none	1060	See text
44	none	200	TR-TL-1 = width of game area

Table 3: Variables not listed in tables 1 or 2

A()	Address offsets for various move directions
A	Address offsets for man movement, or 0 if stopped
D	" beastie "
Q	" squiggle ", or 0 if no squiggle
M,B,S	Locations of man, beastie and squiggle, respectively
L	Skill level
N	Score
T	Number of men left, including one on screen
V,W	Various temporary values
X	See program breakdown, line 20
Y	Probability
Z	Y times 5
BB	Bounced flag

PROGRAM LISTING

```
1     REM Bouncing beastie - D. A. H. Elworthy -June
      82
10    DEFFNR(X) = A(INT(RND(1) * 8 + 1)):GOTO900
19    REM Move subroutine.  Full details in text
20    W = W + V:BB = 0:X = PEEK(W)
30    IFX = PTHENRETURN
40    IFX = ETHENV = V + 128:GOTO90
50    IFX = FTHENV = V - 128:GOTO90
60    IFX = GTHENV = V + 2:GOTO90
70    IFX = HTHENV = V - 2:GOTO90
75    IFX = 0THENV = - V:GOTO90
80    RETURN
90    W = W + V:X = PEEK(W):BB = 1:GOTO30
99    REM Squiggle subroutine
100   POKES,P:W = S:V = Q:GOSUB20:S = W:Q = V
110   IFBB = 1THENQ = 0:RETURN
120   IFX = ITHEN400
130   POKES ,K
140   IFRND(1)>ZTHENRETURN
150   V = M - S:W = 1:IFV<0THENW = - 1:V = ABS(V)
160   IFV<64THENQ = W:RETURN
170   Q = W * 64:RETURN
199   REM Introduce a new beastie
200   B = TL + 65 + INT(RND(1) * 44):D = FNR(0):G-
      OTO230
209   REM Beastie move routine
210   POKEB,P:W = B:V = D:GOSUB20:B = W:D = V
220   IFX = ITHENPOKEB,P:GOTO400
230   POKEB,J:IFRND(1)<YANDQ = 0THEN
      Q = FNR(0):S = B
240   IFRND(1)<YTHEND = FNR(0)
249   REM Deal with squiggle, if any
250   IFQTHENGOSUB100
259   REM Man move routine
260   POKEM,P:W = M:V = A:GOSUB20:A = V:M = W
270   IFX = PTHENPOKEM,I:GOTO300
280   IFX = JTHENN = N + 10:POKEM,I:Y = Y * 2:Z
       = Z * 2:GOTO200
290   IFX = KTHENN = N + 1:POKEM,I:Q = 0
300   V = USR(0):IFV = 0THEN330
310   IFV<49ORV>56THENA = 0:GOTO330
320   A = A(V - 48)
329   REM Squiggle again
330   IFQTHENGOSUB100
340   GOTO210
399   REM dead man routine
400   T = T - 1:IFT = 0THEN500
410   Q = 0:POKES,P:POKEB,P:A = 0:M = U
420   SCREEN10,7:PRINT"Score:"N"Men left:"T
430   FORV = 1TO1000:NEXT:SCREEN10,7
440   PRINT" [30SPC ]"
450   IFQTHENRETURN
460   GOTO200
499   REM end of game
500   SCREEN1,15:PRINT:PRINT:PRINT"Final
      score"N
510   INPUT"Another game";AS
520   IF(ASC(AS)AND223) = 89THEN1060
530   END
899   REM Initialisation
900   CLS:PRINT" [15SPC ]BOUNCING
      BEASTIE":PRINT
910   PRINT"Jump on the beasties ( * ) for 10 points."
920   PRINT"Jump on the squiggles ([CTL D ]) for 1
      point."
930   PRINT"You have three men.  Move them with
      the following keys:"
940   PRINT"  3"
950   PRINT" 2   4"
960   PRINT"1  .    5  0 stops movement."
970   PRINT" 8   6"
980   PRINT"  7"
990   PRINT"Good luck:":PRINT
1000  DOKE4100,3200:A = 0:B = 0:C = 0:D = 0:M = -
      0:Q = 0
1010  R = 0:S = 0:E = 95:F = 126:G = 47:H = 92:I = 7:-
      J = 42:K = 4
1020  P = 32:U = 2530:TL = 2058:TR = 2103:BL = 2954:
      BR = 2999
1030  FORV = 3200TO3210STEP2:READW:DOKE
      V,W:NEXT
1040  DATA25311,312,18351,10927, - 8179,233
1050  FORV = 0TO8:READA(V):NEXT
1060  DATA0, - 1, - 65, - 64, - 63,1,65,64,63
1070  INPUT"Skill level";L:Y = .05 * L:CLS
1080  FORV = TL + 1TOTR - 1;POKEV,E:NEXT
1090  FORV = BL + 1TO BR - 1:POKEV,F:NEXT
1100  FORV = TL + 64TOBL - 64STEP64:POKEV,G
      :NEXT
1110  FORV = TR + 64TOBR - 64STEP64:POKEV,-
      H:NEXT
1120  POKETL,0:POKETR,0:POKEBL,0:POKEBR,0
1130  T = 3:A = 0:C = 0:M = U:N = 0:Q = 0
1140  Z = 5 * Y:GOTO200
```

HINTS ON CONVERSION

The three tables give details of graphics, screen references, and variables.

Obviously, different machines run at different speeds. The BASIC used was NASCOM ROM BASIC. If the program is found to run too fast, I suggest that line 20 be renumbered 25, and this line entered:

20 FORAA = 1TOn:NEXT where n is a value which gives an acceptable speed.

The play area is 44 spaces wide, by 13 lines deep (excluding borders); the corners of the borders are at the addresses held in TL, TR, BL and BR, and the width is referred to in line 200. On the Nascom screen lines are 64 bytes apart in memory (although only 48 bytes of those 64 are shown); hence the values of 63, 64 and 65 used for movement, and in setting up the borders (see Table 2).

All PEEKs and POKEs are to the screen. DEEKs and DOKEs, peculiar to Nascom BASIC, are detailed in the program breakdown, and will not be needed on machines other than the Nascom. Commands specific to Nascom BASIC are also given in the How It Runs section.

BBC MICROCOMPUTER A & B

SPACE INVADERS MODE 5 M/C (MACHINE CODE) **£8**
Probably one of the better versions of this popular arcade game for any Microcomputer. Full features, fast moving, sound and colour.

MICRO MAN MODE 5 M/C **£8**
Fast moving version of the latest arcade games, with colour and sound.

MIDDLE KINGDOM MODE 7 BASIC & M/C **£8**
Real time adventure game with over 300 rooms. Fight the many monsters and retrieve the lost treasure of Hylem.

REVERSI & COMOKO MODE 5 M/C **£8**
Response time under one second for the first 3 levels. 6 levels of play, Graphic Board etc.

GAME TAPE ONE MODE 5 BASIC & M/C **£8**
Breakout Snake and Hunt are fast moving with colour and sound.
All Games will run on Model A and Model B Computers and in black and white.

ACORN ATOM

Quality Machine Code Software

SPACE ADVENTURE (12K gr.4 m/c) **£6**
Real time adventure in an alien spaceship.

SPACE INVADERS (12K gr.4 m/c) **£6**
Full feature version of the arcade game.

REVERSI (7K gr.0 m/c) **£6**
6 levels of play, graphic board, problem setting, etc.

AIR STRIKE (9K gr.3 m/c) **£6**
Attack the enemy but watch out for flak and enemy planes.

CHASE (9K gr.4 m/c) **£4**
Fast thinking required to beat the robots.

FIZZLE BRICKS (4K gr.1 m/c) **£3**
Moving wall breakout with a difference.

ELIZA (7K gr.0 m/c) **£3**
Converse with your sympathetic computer. With excess of 100 replies.

All prices shown are inclusive, no extras. SAE for catalogue free with each order. All games with sound and supplied on quality C15 cassettes.

SPECIAL OFFER. Buy any two cassettes from the BBC and ATOM ranges and deduct £1 from the total. All prices shown are inc. No extras. SAE for full details of Software available. Mail Order only.

PRO SOFTWARE, 121 Tyn-y-Twr, Baglan, Port Talbot, West Glamorgan SA12 8YE.

SIR Computers
Cardiff

BBC Microcomputers, Available Direct from Stock

BBC Microcomputer Model A	£320
BBC Microcomputer Model B	£400
Conversion of your Model A to B	£92

ATOM PRICES SMASHED

8K ROM plus 2K RAM	£149.50
8K ROM plus 12K RAM	£175.00
12K ROM plus 12K RAM	£199.00
Atom Disc Drive	£299.00

Large Range of Atom & BBC Software in Stock
DRAGON 32 IN STOCK
ZX Spectrum Hardware

8 Bit Input Output	£11.00
8 Bit Input Output with LED Display	£15.50
4 Channel Analogue Port (Four Joysticks)	P.O.A.
Joysticks (Analogue Board also needed)	P.O.A.
"Centronics" Printer Interface	P.O.A.

ALL PRICES ARE INCLUSIVE OF V.A.T.
Please add £10 for delivery of BBC Computers/Atom Disc Drive, £7 for delivery of Atoms, £1 for all other items.

SIR COMPUTERS
38 DANYCOED ROAD, CYNCOED, CARDIFF CF2 6NB, WALES.
Tel: 0222 — 759015

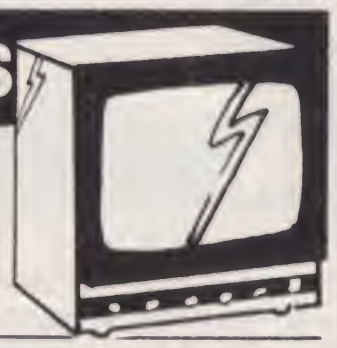


FLOPPY DISC DRIVES
Single and Dual 40 track for BBC Micro
CALL FOR BEST PRICES!

BBC MICRO

BBC COMPUTER MODEL 'A'	£299 + VAT
BBC COMPUTER MODEL 'B'	£399 + VAT
BBC COMPUTER WITH DISC	£ Phone

MONITORS



High resolution 18 MHZ 12" Green Phosphor Monitor

£99.00 + VAT
BBC Cable **£4.95**

OTHER ITEMS AVAILABLE FOR THE BBC MICRO
Books, Cables, Joy Sticks, Cassette Decks, Dust Covers, Teletext Adaptor.
SEND FOR PRICE LIST

SEIKOSHA GP-100A



★ DOT MATRIX PRINTER
★ 80 CHARACTERS PER LINE
★ 30 CHARS/SEC
★ FREE HI-RESOLUTION 'DUMP OUT' LISTING

£195 + VAT. Carr £6 | **BBC Printer Cable £16 + VAT**

BBC MICRO

SPACE WARP	£11.50	BBC MULTIFILE	£25.00
BBC CHESS	£11.50	BBC BACKGAMMON	£ 8.00
		BBC GOLF	£ 7.00
		MUNCHYMAN	£ 5.95
		SNAPPER	£11.50
		DEFENDER	£11.50



BBC MICRO
MICRO UPGRADES

RAM KITS: Upgrades the Model 'A' to 32K RAM Supplied with full fitting instructions. . . . . £29.90 + VAT
ANALOGUE KITS: Suitable for adding joysticks, controllers etc. . . . . £15.00 + VAT
PRINTER INTERFACE & I/O PORT: Enables a Centronic Interface printer to be attached . . . £16.00 + VAT

MODEL 'A' TO MODEL 'B' UPGRADE
£89.00 + VAT (fitted)

DISC EXPANSION	Phone
DISC DRIVES	Phone
COLOUR MONITORS	£249.00 + VAT

Send for details on other items, cables, cassettes, plugs, software etc.
WHY NOT SEND YOUR MACHINE TO US FOR UPGRADING?

PRINTERS

EPSON MX80 F/T3 — The printer recommended for the BBC Microcomputer.

★ Dot Matrix Printer
★ 80 Cps
★ Hi-Resolution Graphics
★ Bi-directional Printing



Q-TEK Systems
Telephone STD (0438) 65385
2 Daltry Close, Old Town, Stevenage.

BBC Service & Information Centre.

TECHNIQUE

USER DEFINED GRAPHICS

Ever wondered how to make a Space Invader? David Harwood shows you how to get the most out of your Spectrum graphics.

Before starting to define characters on the Spectrum, we must first understand how numbers are stored in computers.

The Spectrum, and other computers, hold numbers in binary form, which is another name for base 2. We work with decimal numbers, base 10, where the digits can be from zero to nine. In base 2 the digits can either be one or zero.

The groups of one's or zero's, which are called bits (short for *binary digits*), are held in the computer in sets of eight, known as bytes.

A single byte can be any number, in decimal 0-255, in binary 00000000 to 11111111.

To change binary to decimal we must look at the position of the 1's. Let us look at an example (Fig. 1)

Figure 1

128	64	32	16	8	4	2	1
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1	0	0	0	1	1	1	1

and see how this works. The first column is 2^0 so if there is a 1 in the first column, add 1 to our new decimal number. The second column is 2^1 so if there is a 2 in the second column, let us add 2 to our decimal number. The third column is 2^2 so if there is a 1 in the column, add 4 to our decimal number and so on up to 2^7.

We now have found out that 10001111 is 1 + 2 + 4 + 8 + 128 = 143.

You may be asking yourself what has this got to do with defined characters. In order to define your own character, draw an 8 by 8 grid, and draw your character on this grid, shading in the required squares.

Each row of eight squares can now be thought of as a byte (eight-bit binary number) with a 1 representing a shaded square and a 0 representing an unshaded square.

Let us consider drawing an invader.

We can convert the invader character (Fig. 2) into eight bytes.

Figure 2



(0—unshaded: 1—shaded).
00011000 1st Byte
00111100 2nd Byte
01011010 3rd Byte
11111111 4th Byte
01111110 5th Byte
01011010 6th Byte
10011001 7th Byte
00011000 8th Byte

Binary numbers can be entered directly on the Spectrum by using the BIN command. If you type in PRINT BIN 10001111, the computer will print the decimal form of this number. You are allowed to use BIN in an INPUT statement.

Having converted the invader into binary numbers we must now assign it to a key, so that when we press this key in graphics mode we get the invader character. (Defined characters can be assigned to the letters A to U). In order to do this we must store the eight bytes at eight separate addresses (places in the memory). If, say, we pick the letter "i" to have the invader character, then USR"i" is the first address to store the first byte, USR"i" + 1 is the second address to store the second byte and so on. So for our invader character, type in:

```
POKE USR"i"     , BIN 00011000
POKE USR"i" + 1, BIN 00111100
POKE USR"i" + 2, BIN 01011010
POKE USR"i" + 3, BIN 11111111
POKE USR"i" + 4, BIN 01111110
POKE USR"i" + 5, BIN 01011010
POKE USR"i" + 6, BIN 10011001
POKE USR"i" + 7, BIN 00011000
```

Typing in "i" in graphics mode will now give you an invader character, which can be treated like any other character and is also able to be printed on the printer.

Fig. 3 shows this program.

On running it, you will be asked for the letter to be assigned the defined character, which is stored in A$, and then you will have to type in the eight binary numbers for that defined character.

The Program

Drawing characters on paper is very time consuming so I have included a program (Fig. 4) which allows you to design a character on the screen and then assign it to a certain key. On running the program, an 8x8 grid will be shown with a flashing pointer in the first box. You can either move over every box automatically or by using the cursor controls move to any point in the grid. ▶

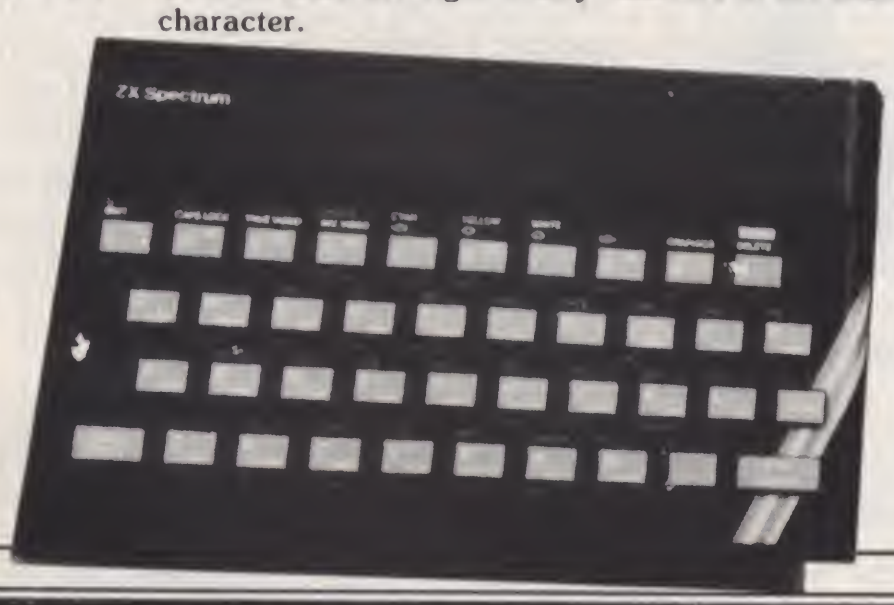
USER DEFINED GRAPHICS

HOW IT RUNS

Lines 10 – 50	Defines a box character for use in the grid.
Lines 70 – 90	Prints the 8 x 8 grid. (To get the box, press 'p' in graphics mode).
Line 110	Sets the screen position.
Lines 120 – 130	Sets up 8 binary numbers (value 0) into a string.
Line 135	Prints flashing cursor in first box.
Lines 150 – 250	Shades a square if 's' is pressed. Leaves a space if 'u' is pressed. Moves around the grid depending on what cursor keys you press.
Lines 190 – 200	Will print, from where you have moved, a shaded or unshaded square, according to what was there before. If these lines were not there you would get flashing cursors in every position where you went. Erase these lines to see what happens.
Line 210	Will add 1 to X if X$ = "6" and subtract 1 from X if X$ = "7".
Line 220	Will add 1 to Y if Y$ = "8" and subtract 1 from Y if Y$ = "5".
Lines 230 – 240	Will move you to the opposite square if you get to the edge of the grid.
Lines 255 – 263	Prints over the pointer.
Lines 264 – 320	Assigns your character to a chosen key.
Line 265	LINE L$ will await for a string input, although the quotes are not printed.
Line 300	CHR$ (CODE L$ + 47) is the character L$ in graphics mode.

List of Variables

T	Is a dummy variable, as it has no real purpose, only being used as a control in a loop.
A	Holds the value of the defined box character.
I	Used in a loop for printing the grid – a row at a time i number of lines down the screen.
X	Used to hold x (line) co-ordinate of the flashing pointer.
Y	Used to hold y (column) co-ordinate of the flashing pointer.
P$ (8,9)	Used to store the eight binary numbers of the defined character. (P$ (8,9) reserves 8 dimensioned strings, each of 9 spaces long. The first space is used to hold BIN, the other 8 are used to hold the binary number. We can then use VAL P$ (L) where t is 1 – 8, to work out the value of the string).
X$	Stores key pressed.
L$	Used to hold letter to be assigned new character.
C$	Used to hold yes or no, whether to finish or return to program.



HINTS ON CONVERSION

If you wished to change the program to your computer, providing it is capable of user defined characters, you would have to change lines 30 – 50, which define a box character (on the BBC micro, for instance, you would put: 30 VDU 23, 255, 255, 129, 129, 129, 129, 129, 129, 255) to suit your micro. Also lines 265 – 290 would have to be changed to whatever system your computer uses to create user defined graphics.

The string handling can be implemented on to your computer if you change line 130 to:

130 FOR t = 1 to 8: LET p$ (t) = "BIN": NEXT t

and then add the following line:

131 FOR t = 1 to 8: FOR s = 1 to &: LET p$ (t,s) = "0": NEXT s: NEXT t

PROGRAM LISTING

Figure 3

```
10 INPUT "Type in letter to be assigned character ";A$
20 FOR t = 0 to 7
30 INPUT "type in row ";r
40 POKE USR A$ + t,r
50 NEXT t
```

Figure 4

```
10    REM user defined characters
20    REM define a small bot to P
30    FOR t = 0 TO 7: READ a
40    POKE USR "P" + t,3: NEXT t
50    DATA 255,129,129,129,129,129,129,255
60    REM draw 8X8 grid
70    FOR i = 6 TO 13
80    PRINT AT i,12;"□□□□□□□□"
90    NEXT i
110   LET x = 6: LET y = 12
120   DIM p$(8,9)
130   FOR t = 1 TO 8: LET p$(t) = "BIN 00000000": NEXT t
135   REM print flashing marker
150   PAUSE 1000
153   REM scan keyboard
155   LET x$ = INKEY$
157   REM shade or leave a space depending on key held
      down (s-space u = unshaded)
160   IF x$ = "s" THEN LET p$(x – 5,y – 10) = "1": PRINT AT
      x,y;"■": LET y3y + 1
170   IF x$ = "u" THEN LET p$(x – 5,y – 10) = "0": PRINT AT
      x,y;"□": LET y = y + 1
180   IF x$ = "f" THEN GO TO 260
185   REM routine to move pointer around grid
190   IF x$ = "5" OR x$ = "6" OR x$ = "7" OR x$ = "8" THEN
      IF p$(x – 5,y – 10) = "0" THEN PRINT AT x,y;"□"
210   LET x = x + (x$ = "6") – (x$ = "7")
220   LET y = y + (x$ = "8") – (x$ = "5")
230   IF y = 20 OR y = 11 THEN LET
      y = 19* (y = 11) + 12* (y = 20): LET
      x = x + (y = 12) – (y = 19)
240   IF x = 5 OR x = 14 THEN LET x = 13* (x = 5) + 6* (x = 14)
250   GO TO 140
255   REM print over pointer
260   IF p$(x – 5,Y – 10) = "0" THEN PRINT AT x,y;"□"
263   IF p$(x – 5,y – 10) = "1" THEN PRINT AT x,y;"■"
264   REM routine to assign character to a key
265   INPUT "letter (a – v) to be assigned character "; LINE ($
270   FOR t = 0 TO 7
280   POKE USR l$ + t,VAL (p$(t + 1))
290   NEXT t
300   PRINT AT 20,0;"Here is the character ";CHR$ (CODE
      l$ + 47)
310   INPUT "Is this alright? (yes or no) "; LINE c$
320   IF c$(1) = "n" THEN LET x = 6: LET y = 12: GO TO 140
```

ZX Spectrum
20 Programs £6.95

The ZX Spectrum has brought advanced computing power into your home, The Cambridge Colour Collection, a book of 20 programs, is all you need to make it come alive.

No experience required. Simply enter the programs from the book or load them from tape (£2.95 extra) and run.

Amazing effects. All programs are fully animated using hi-res graphics, colour and sound wherever possible.

Entirely original. None of these programs has ever been published before.

Proven Quality. The author already has 30,000 satisfied purchasers of his book of ZX81 programs.

Hours of entertainment

- **Lunar Landing.** Control the angle of descent and jet thrust to steer the lunar module to a safe landing on the moon's surface.
- **Maze.** Find your way out from the centre of a random maze.
- **Android Nim.** Play the Spectrum at the ancient game of Nim using creatures from outer-space.
- **Biorhythms.** Plot the cycles of your Emotional, Intellectual and Physical activity. Some would say this is not a game at all.

Improve your mind

- **Morse.** A complete morse-code training kit. This program will take a complete beginner to R.A.E. proficiency.
- **Maths.** Adjustable to various levels, this program is an invaluable aid to anyone trying to improve their arithmetic.

Run your life more efficiently

- **Home Accounts.** Keeping track of your finances with this easy-to-use program will enable you to see at a glance where the money goes and plan your spending more effectively.
- **Telephone Address Pad.** Instant access to many pages of information.
- **Calendar.** Displays a 3 month calendar past or future, ideal for planning or tracing past events.

ORDER FORM:

Send Cheque or P.O. with order to:–
Dept. H., Richard Francis Altwasser, 22 Foxhollow, Bar Hill, Cambridge CB3 8EP

Please send me

☐ Copies Cambridge Colour Collection Book only £6.95 each.
☐ Copies Cambridge Colour Collection Book & Cassette £9.90 each

Name: _____

Address: _____

_____

THE COMMODORE 64

THE PERSONAL COMPUTER



£299
PLUS VAT

- 64k built in RAM
- 40 column colour display— tv interface
- Upper and lower case characters and graphics
- Sprite graphics on eight levels
- Music synthesiser with three voices and nine octave range

Business and home utility programs available soon. Can use VIC-20 printer and disk (with rom upgrade). Supports other languages including Comal and Pascal—has CP/M option.

From Adda Computers
Telephone: 01-992 9904
for credit card orders or call at
the VIC Centre, 154 Victoria Road,
London W3 (near Acton North tube)

adda

FOR PERSONAL AND BUSINESS COMPUTING THAT ALWAYS ADDS UP TO A GREAT DEAL MORE.

TANDY COMPUTER CENTRE



LOOK BEFORE YOU LEAP

In the second of our regular series on computer dealers we look at the Tandy Computer Centre to find out what they can do for you if you want a TRS 80.

Tandy Computers is the only computer manufacturer to build up a chain of high street stores selling a complete range of its products.

The idea is based around a single concept to provide hardware, software and support for anybody who wants to use a TRS-80 computer in either business, hobby or educational applications. Now there are 18 Tandy Computer Centres throughout the country with plans to double this figure over the next year.

Inside a Tandy Centre you will find everything you need displayed neatly and accessibly which is a welcome change. These centres are set up as places where a person can go to find the right machine for the purpose they want, take advantage of support and trained on the computer. The one I saw looked as if the idea works. Each centre carries the full range of Tandy computers, starting at the small hand-held computer, through the Model I and III and the Color Computer, to the Model II machine, which is the business work horse. These are all fully supported with disc units and printers to suit anybody's needs.

The first striking thing when you go into a Tandy Centre is the range



of machines on display and being demonstrated. There are plenty of staff capable of showing you virtually any facet of the machines on show. Present at the centres are a computer marketing representative, who looks after the business side of the machines, a customer support representative, who is responsible for the software packages and the applications training, and an engineer. This means that on top of the normal sales staff there are people around who should be able to handle any problems that are thrown at them.

One great advantage with the Tandy shops is that they are a part of the organisation that develop and build the machines. This alleviates the problem that most computer buyers run across in trying to get information from a dealer who is usually out of touch with the supplier and under-informed about the product and its peripherals. This is solved in the Tandy shops where you can buy Tandys own range of accesories, such as printer ribbons, discs and cassettes, for all their machines.

The TRS-80 range of computers rank high in support as far as software goes, and the Computer Centres really make the most of this. Apart from stocking and demonstrating their own range of software, they also have produced a massive directory of independent software which gives details of where you can buy it, what it does and on what machines it runs. This valuable document retails for under £1.00 and is obtainable from the shops.

The support doesn't stop there though because at each Computer Centre there is a full classroom facility. This is used primarily to give courses to the business users, giving them training on the packages they have bought and on the computer concept in general. For the home or hobbiest user the classrooms are available for people to run 'teach ins' on Saturday mornings. You can get details of courses when you buy a machine.

These sessions are run by ordinary users who feel like sharing their knowledge with anybody who is interested. Each classroom is very well fitted out with different machines that can be interconnected to allow the teacher (or educator, as Tandy call them) to monitor what the pupils are doing and give them assistance through their computer screens.

For user groups Tandy produces a newsletter available through the shops and Tandy will actively participate in workshop schemes that the clubs run themselves as well as making the classrooms available.

If you are interested in buying a Tandy computer a visit to your local centre is very worthwhile and will give you a clear idea of what the machines can do and whether any of them are up your street.







MICROWORD COMPUTER & VIDEO CENTRE

MZ80 B	**£999.99** + VAT
MZ80 A	**£452** + VAT
VIC 20	**£165** + VAT
PC 1500 Pocket Computer	**£145** + VAT
CE 150 Four Colour Graphics Printer for above	**£127** + VAT

BUSINESS SOFTWARE FOR ABOVE

Data Base Account. Stock Control each at **£19.95**

Games packages for VIC 20

Cartridges from **£18.99 — £23.99**

ZX80 Games, Cassettes also available. Please ring for details. Barclaycard & Access welcome.

TO: MICROWORD COMPUTER & VIDEO CENTRE
40 Broadfield, Barton, Crawley, Sussex.

Please send me further information

Name_____

Address_____

PCT/10

NEW SHAPE COMMAND

ACORN ATOM

INTO UTILITY SOCKET FLASHING CURSOR

1200,600,300 BAUD CASSETTE OPERATING SYSTEM

VISIBLE AND AUDIBLE INDICATION OF LOAD & SAVE

Draw complex graphic shapes with one instruction using our special 'SHAPE' command

33 NEW COMMANDS

SHAPE N X,Y	- draw shape number N at X,Y
BLOCK	- draw block of any size, any graphic mode
POINT	- test if graphic point set or clear
FIND	- print lines which contain a given string
KEY	- scans keyboard for use in real time games
ZERO	- zero all basic variables
SCREEN	- set cursor to screen location (0 to 511)
STOP	- debugging program command
STRG	- print strings in graphic modes
MC	- monitor — memory change, Hex & textdump
RENUMBER	- including GOTOs and GOSUBs
AUTO	- automatic line numbering
DELETE	- delete block of program lines
VERIFY	- verify programs after recording on tape
PACK	- removes non significant spaces
TONE	- sound a note of any duration and tone

PLUS: READ, DATA, RESTORE, BSAVE, APPEND, TAPE . . . BSTRG, CHAR, POP, VAR & BLEEP

Fits any size memory Atom
Full Documentation Included
EXTRA SPECIAL PRICE £16.95 ALL INCLUSIVE

Ross Software

RUSH YOUR ORDER TO: **ROSS SOFTWARE**
44 Premier Avenue, Grays, Essex RM16 2SD
Send S.A.E. for details.

From the Publishers of:



SHIVA's friendly micro series

Machine code and better Basic
Ian Stewart & Robin Jones
with an educational program by
Eric Deeson
£7.50 ISBN 0 906812 18 6 *July*

The ZX81 Add-On Book
Martin Wren-Hilton
£6.50 ISBN 0 906812 19 4 *July*

Easy Programming for the ZX Spectrum
Ian Stewart & Robin Jones
£4.95 (approx) ISBN 0 906812 23 2 *August*

Easy Programming for the BBC Micro
Eric Deeson
£4.95 (approx) ISBN 0 906812 21 6 *September*

Further Programming for the BBC Micro
Alan Thomas
£7.50 (approx) ISBN 0 906812 20 8 *September*

Further Programming for the ZX Spectrum
Ian Stewart & Robin Jones
£7.50 (approx) ISBN 0 906812 24 0 *September*

SHIVA

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

Please supply me with _____

Cheques should be made payable to Shiva Publishing Ltd.

NAME (Capitals please) _____

Full postal address_____

PCT/10/82

For payment by Access/American Express:

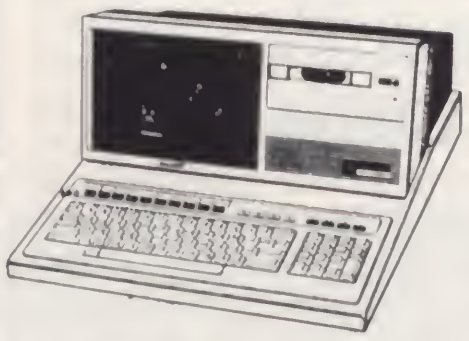
Card No._____

Signature _____

SUSSEX
SHARP MAIN DEALER



MZ80A
Latest Model
£425 + VAT



MZ80B
Our Price
£925 + VAT



Crown Ranier with Centronic parallel or (IEEE) interface for computers, including Sharpe, Pet, Apple, Superbrain and Sirius. Adaptor available for R.S. 232. Perfection as a typewriter, perfection as a printer.

£795

Buying from a reputable dealer will give you service after sales.
All prices inclusive of delivery.

CROWN BUSINESS CENTRE LTD.
56-58 SOUTH ST., EASTBOURNE. Tel. 639983/20496

Kempston (Micro) electronics introduce the

ZX81 Klik-Keyboard



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

- Positive feedback from keys
- Fits onto the 2 x 81
- No trailing wires
- No special case needed
- Elegant design with two colour legends.

The fully built keyboard requires ***absolutely no soldering*** since two flexible connectors plug into the ZX81 sockets. Alternatively, the keyboard is available as an easy to build kit at a considerable saving. Other ZX81 products available include a two-tone keyboard bleeper (fits inside the case) at £8.95 built, and a Repeat key kit at £3.95.

Your Name and Address_____

Proprietor:
A. Pandaal
B.Sc., P.G.C.E.

Date

Quantity	Description	Unit Price	Amount	
	2 x 81 Keyboard Kit	£22.50		
	2 x 81 Keyboard Assembled	£26.00		
		Sub total		
		Carriage		70
		Total due		

Cheques/P.O. made payable to:
KEMPSTON ELECTRONICS
60 Adamson Court, Hillgrounds Road,
Kempston, Beds MK42 8QZ
Please allow 14 days for delivery

PC3

IT'S MORE FUN LEARNING WITH VIC -at Home or School

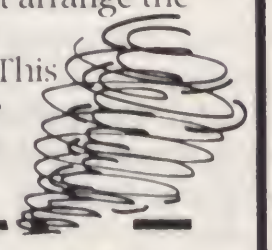
If you are over 3 years old, and still young enough to hit the keys, then these new VIC programs are for you.

From top software publishers ASK, they let you learn—and laugh about it too.

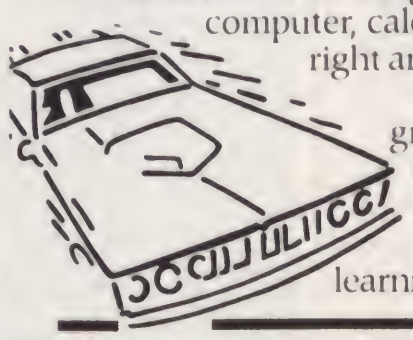
Fabulous graphics. Demanding ideas that make learning lots more fun.

All on cassette at £8.95 inc. VAT.

TWISTER. Designed to improve concentration and logic. Rearrange a geometric puzzle—a bit Rubik cube-like—so that no row or column contains a repeated colour. There can be from 3-10 columns and if you cannot get out of it, Twister will do it for you. For really clever users you can go into the Super-Twister mode where you must arrange the squares so that no diagonal, as well as row or column, contains the same coloured square. This is so difficult that the computer does not give you the answer! Supposedly designed for age 8 upwards.



NUMBER CHASER. Designed to improve estimating and multiplication skills for 5-12 year olds. A car race where you move against the computer according to your skill at estimating the given sum. We forget that in the age of the calculator estimating is important to see if your computer, calculator etc has come up with the right answer.

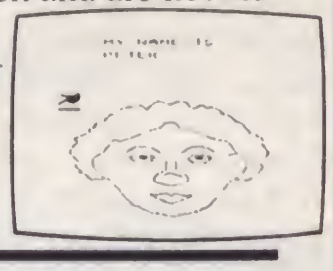


Number Chaser has superb graphics and sound—you would not want more than a few of these in a classroom at any one time since the level of excitement, as well as learning, is very high.

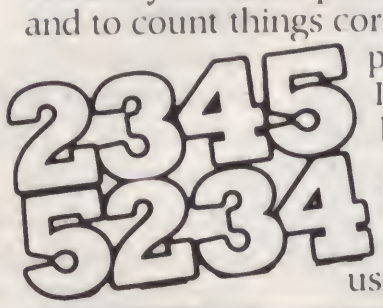
FACEMAKER. This is designed to improve spelling, to expand vocabulary and also sharpen observational skills. Designed for 5-12 year olds this is an interactive program where you draw people's faces.

Superb graphics that—like most of these ASK programs—fill the monitor or TV screen and are not restricted to the normal VIC format.

A beautifully crafted piece of software that will find many applications in school and at home. It will also be of special benefit to people teaching children who are slow to learn to read.



WE WANT TO COUNT. This is a program for children of three years and upwards who want to learn numbers and to count things correctly. There are four parts in the program with games-type graphics. In two of these you can select levels between one and five. This program has been designed to be extremely simple to operate so that, once loaded, children can use it entirely on their own.



ADDA COMPUTERS
Contact your local dealer for these VIC products from Adda.

adda

In case of difficulty—or to see demonstrations—call the VIC Centre
154 Victoria Road, London W3. 01-992 9904.

TECHNIQUE

MEMORY SAVING ON THE ZX81

Having trouble fitting your programs into a ZX81? Then follow these suggestions by Philip Coley.



The Sinclair ZX81 is an amazing machine, but as all users of the basic 1K unit know the memory space available only allows very small programs to be written. To enable more complex programs to be run requires the use of various space saving tricks so that you can squeeze more into the available memory. This article deals with the amazing uses for the function PI and the memory saving techniques they allow.

One of the largest users of storage space is the use of numeric literals within a program. The method in which these are stored is shown in diagram 1a. This is an example of a command line to print the letter A three spaces in. It shows that seven bytes or characters are required to store the number. Diagram 1b shows the same command line substituting PI for the number three, this shows a saving of six bytes, resulting in a 1/3 saving in space for the entire line. However the way the Sinclair system operates means that where a number 3 is required in a basic command, the function PI can be substituted instead. Examples of this substitution are shown in Table 1. Most of them are clear cut, but an interesting point is shown by the use of GOTO PI instead of the commonly used GOTO 10 at the end of a program. GOTOs in ZX81 BASIC do not have to specify the exact line to be gone to. Instead it first looks for the number and if that is not found it then looks for the first line number above it. As GOTO 10 usually means GOTO the beginning of a program, GOTO PI can be used instead and give a substantial saving in memory space. A normal line containing GOTO 10 will use 14 bytes, whereas GOTO PI uses 7 bytes, a saving of 50%. Therefore consistent use of PI to replace the number 3 in command lines will result in considerable savings in memory space. In addition, this method has the advantage of not radically altering the program and making it difficult to understand.

Further Savings

There are further space savings that can be made using PI. The various combinations of the other functions with PI produce several useful numbers. The various usable combinations are shown in Table 2. The numbers 0 and 1 are commonly used in all programs and different methods are shown to generate them. The choice of method used will depend on circumstances. All the functions except for NOT have a high priority for calculation and are dealt with first by the basic interpreter. If the number 0 is required in a calculation or in a evaluation statement like IF...THEN, then it is preferable to use SIN PI or TAN PI so as to avoid the use of brackets, which themselves use extra memory space. However in a line where the calculation of the PI function is the only sum, for example in a FOR...NEXT loop, then the use of NOT PI is preferable as it is calculated faster. The statement PI-PI also results in a 0 but as it uses 3 bytes of storage and has a low priority, it is not to be recommended.

If the number 1 is required then the statement SGN PI is nearly always to be preferred. It has a high priority and uses only 2 bytes of storage. This is to be compared with the 3 bytes required for the statement PI/PI and the time consuming division it requires.

The other two integer numbers which can be generated from two functions are –1 from COS PI and 3 from INT PI. These are self evident and can be used anywhere that these numbers would be required.

These numbers are so economical in their use of memory that further savings can be made by

removing unnecessary LET commands. In most programs a great deal of use is made of the LET command to set up variables, for instance LET A = 1. This example uses 15 bytes of memory space for the program and an additional 6 bytes for storage of the variable, a total of 21 bytes. Even if a space saving NOT PI is used instead of the number 1 a total of 16 bytes is still required. In addition each time the variable is specified in the program an extra byte of storage is required. If instead of assigning to a variable the numbers – 1, 0, 1 and 3 the PI functions are used directly at each point where they are required, they would have to be used more than 16 times each to use more space than an equivalent LET statement. In any program where these numbers are used it pays to use them directly if they needed less than 16 times. For example the two program lines:

10 LET A = SGN PI
20 FOR X = A TO 3

use 27 bytes for the program and 24 bytes for the variables, a total of 51 bytes. Whereas the line:

10 FOR X = SGN PI TO 3

uses only 18 bytes for the program and 18 bytes for the variables, an overall saving 15 bytes and if PI was substituted for the 3, a further 5 bytes would be saved.

Certain larger numbers can also be generated using functions and PI. Table 2 only shows the more useful in the sense that they do not use more than 3 bytes of storage each. Other numbers which could be generated can be stored more economically using other space saving techniques. The numbers can be used in BASIC commands or in calculations, although care should be taken to ensure that they are generated when required in a program. Only EXP PI and INT EXP PI will be calculated early due to their high priority. The use of PI results in a considerable saving of user memory in the ZX81. The program shown in figure 3 asks for your name and then prints Hello to you five times before asking if you wish to run it again. If you answer anything but "Y", it will then print out the total number of bytes of program space used for lines 3 to 99. Line 9999 is a useful routine which calculates the program space not counting itself. As the program stands it uses 167 bytes, by using the techniques in this article this can be reduced to 123 bytes, a saving of 26%. Try and modify it and see if you can reach this figure.

There is unfortunately a price to be paid. In this case memory saving can result in longer running times for programs. The sample program does not really show this, but in some programs it could be a problem. However the choice for most users lies between a program which will not fit in to the available memory or a program which works slowly after using these memory saving techniques. So if you wish to squeeze more out of your ZX81 try using these PI memory saving techniques in your programs.

Table 1

```
PRINT TAB PI;"A"
PLOT PI,PI
GOTO PI
GOSUB PI
PAUSE PI
DIM S(PI)
PRINT AT PI,PI;"A"
PRINT A$(1 TO PI)
FOR X = 1 TO PI
UNPLOT PI,PI
```

Table 2

PI	= 3.1415929
SIN PI	= 0
TAN PI	= 0
SGN PI	= 1
COS PI	= – 1
INT PI	= 3
NOT PI	= 0
PI – PI	= 0
PI/PI	= 1
PI + PI	= 6.2831853
PI* PI	= 9.8696044
INT EXP PI	= 23
EXP PI	= 23.140693
PI* * PI	= 36.46216

Figure 3.

```
3 PRINT AT 0,3;"NAME?"
10 INPUT A$
20 CLS
30 FOR X = – 1 TO 3
40 PRINT TAB 3;"HELLO";A$
50 NEXT X
60 PRINT AT 6,1;"AGAIN?"
70 INPUT A$
80 CLS
90 IF A = "Y" THEN GOTO 3
9999 PRINT PEEK 16396 + 256 *
PEEK 16397 – 16565
```

DIAGRAM 1A

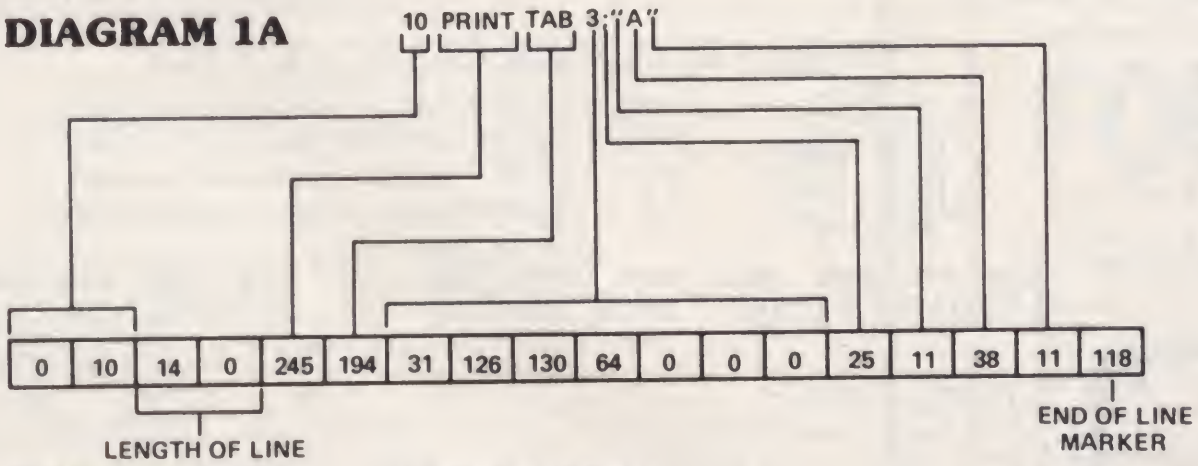
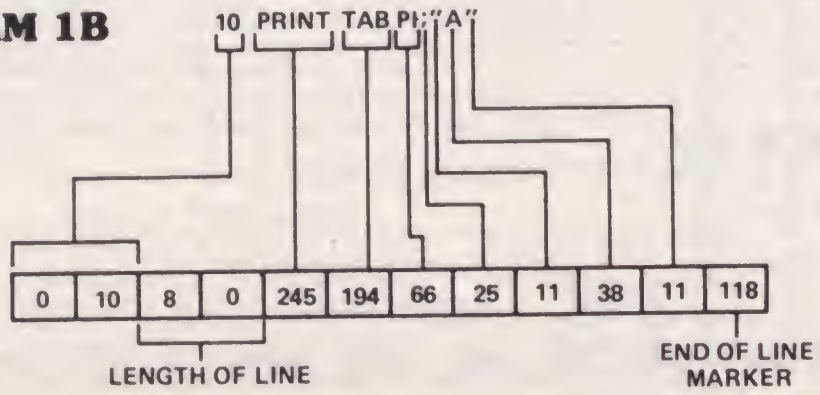


DIAGRAM 1B





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.

NOW ONLY
£49.95
PLUS
£2.95 p&p



● ZX99 SOFTWARE

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

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

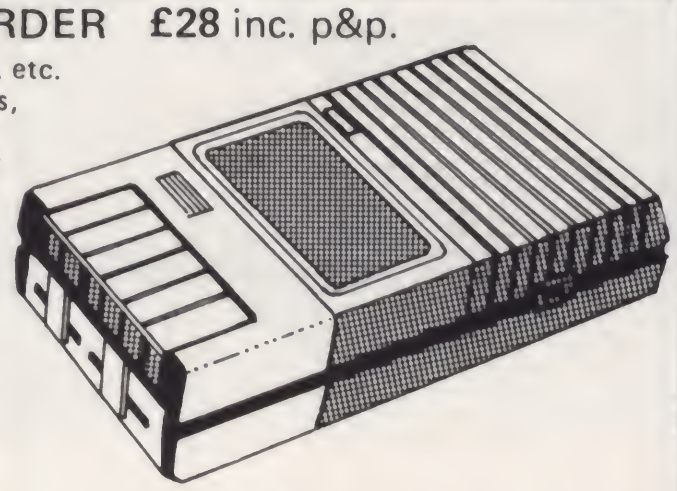
Dept. PC3 Data – Assette, 44 Shroton Street, London NW1 6UG. 01-258 0409

---

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

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

Tested with ZX81, Acorn, BBC, Dragon etc. 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 – 35p **C10 – 37p** **C12 – 38p**
C15 – 39p **C20 – 41p** **C25 – 43p**
C30 – 44p

P&P 10% (min. charge £1.50)

ORDER FORM

Dept. PC3 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 _____

_____

16K ZX SPECTRUM GRAPHICS

SUPERDRAW 16

16K ZX SPECTRUM GRAPHICS

- 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.

If you've now got your Spectrum you will be wanting to explore its graphics potential. SUPERDRAW 16 will help you get the best from it.

VIDEO SOFTWARE
Stone Lane, Kniver,
Stourbridge,
West Midlands

Price £5.00
incl VAT, P & P

Immediate delivery

ZX81 OWNERS



ACCESS THE OUTSIDE WORLD!

Expand and Improve your ZX piece by piece with our specialised products

TE10 INPUT/OUTPUT PORT — Easy to use. Fits between ZX & RAM PACK/PRINTER (if required). No skill required to connect. Can be used for such things as — motor control; sound/music generators, connection to printers/floppy discs/light pens/other computers, temperature monitoring, square wave generating, control of rotating aerials, even train sets etc. Port has 16 lines and may be used without any electronics knowledge to connect other add-ons (listed below). Motherboard required ONLY when two or more add-ons are used at any one time.

FULLY ASSEMBLED **£17.95** KIT (WITHOUT CASE) **£14.95**

TE12 4 CHANNEL RELAY BOX — Plugs into TE10. Contact rating:— 240v AC/1.5A — 24vDC or 110v AC/3A. Up to 4 units i.e. 16 relays can be operated. £14.95.

TE15 8 WAY TRANSISTOR DRIVER — £9.95.

TE17 8 WAY SWITCH UNIT (EDUCATIONAL) — £12.95

TE18 8 WAY INDICATOR UNIT (EDUCATIONAL) — £12.95

TE20 JOYSTICK & FREE GAME — Plugs into TE10. (2 Joysticks may be connected via Motherboard.) **£12.95.**

TE30 MOTHERBOARD — Allows multiple combinations of add-ons — up to 16 I/O lines may be used — **£15.95.**

TE126 POWER SUPPLY — Required for use with add-ons TE12/15 & 18. **£4.95.**

23 + 23 WAY ZX Edge Con **£2.85** Contact cleaner **£2.30**
16 WAY SINGLE SIDED EDGE CON **£1.95** EXTENDED PIO NOTES **£1**

PRICES INCLUDE VAT

Receipts always provided. Delivery normally ex-stock. ADD 50p towards p&p on all orders under £20.00, with the exception of accessories, e.g. Edge con. **Full instructions and examples with all products.**

SEND S.A.E. FOR CATALOGUE. POSTAL OR TELEPHONE ORDERS ACCEPTED

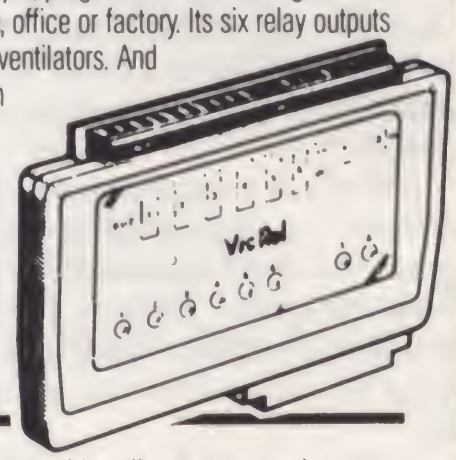
061 - 775 4461

THURNALL (ELECTRONICS) ENG., DEPT PT,
95 Liverpool Road, Cadishead,
Manchester M30 5BG.

VISA

FOUR NEW VIC ADD-ONS FROM ADDA

1. Light up with VicRel. VicRel is a control relay that plugs straight into the Vic user port to give simple, programmable switching of electrical apparatus in the home, office or factory. Its six relay outputs can control door locks, lamps, valves, tools, ventilators. And two inputs allow the Vic to read signals from external sources such as thermostats, push buttons or light activated switches. VicRel eliminates black boxes full of wires and represents one of the most exciting, value-for-money, firmware additions to any Vic computer system.

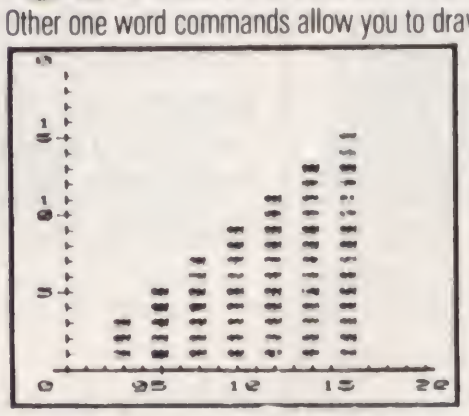


£28.95 INC VAT

2. Plot away with VicGraf. This cartridge allows you to explore the complicated equations and functions of graphs. The menu screen, activated by the Vic's special function keys, will automatically plot a graph, define new functions, calculate accurate values of an intersection, find the maxima and minima of a function. Simple editing allows you to check current functions and to change them. A necessary and attractive addition to any educational situation where graphs need to be explored.

£28.95 INC VAT

3. Crunch & Display with VicStat. A plug in cartridge that undertakes statistical calculations—such as Meanvalues, Standard deviations and Variances—and displays using single commands. Other one word commands allow you to draw vertical and horizontal bar charts, to plot graphs, and to specify the scales and the colours used by these commands. It will also sort numeric and character strings. Finally, all or part of screen displays can be copied to the Vic Printer.



VicStat comes complete with a detailed operating guide.

£28.95 INC VAT

FORTH The VicForth plug-in cartridge, complete with 3K of additional memory, takes programming into new dimensions. As both an operating system and program development aid VicForth can speed up program writing and speed of operation.
VicForth is based on fig-Forth and is almost identical to Pet Forth. It does however support the Vic cassette deck—an unusual feature. For those who do much programming a Vic Disk unit is suggested. VicForth provides several hundred one-word commands—listed in the detailed user guide—that can be added to.

£38.95 INC VAT

ADDA COMPUTERS
Contact your local dealer for these VIC products from Adda.

adda

In case of difficulty—or to see demonstrations—call the VIC Centre 154 Victoria Road, London W3. 01-992 9904.

SOFTWARE REVIEWS

This is the place to find out more about the software for your micro. Each month we review a hat-full of tapes and bring you the results.

Each month PCT will be presenting pages of reviews of the computer programs currently available. We have engaged a team of reviewers, each of whom is a seasoned user of his/her particular machine — and has the crazy streak that means they enjoy playing computer games!

All types of software will, however, be reviewed in these pages; but with around 85% of all home-computer software being of the playful variety, you will be seeing more games than anything else!

Each program is examined for ease of use, interest level, graphics, etc, and the reviews will be presented in a uniform manner to allow you to compare directly between alternatives.

Our 'Ratings Table' headings are:

Program Quality

Here we're looking to see how well written the program is, and how well it exploits the computer's capabilities. Also, how logical is the structure of the program? Does it require the user to make guesses to use it?

Crashproofing

We all hit the wrong key sometimes, do we not? Go on, admit it. If the program has been well written, all should not be lost. If, for example, the machine is asking you to enter "Yes" or "No", then any other key except Y or N should illicit no response whatsoever. In other words, how tolerant is the program of us humans?

Value For Money

Quite frankly, some software on sale today is vastly overpriced. With the low cost of cassette tapes, why *should* simple games cost up to £12 per tape? We judge this one on an overall basis — how much work have the suppliers put into the program and is the price reasonable?

Presentation On-screen

How good are the graphics used in the program? If the instructions are provided on screen, are they both readable and easy to understand? This section examines the visual aspects of the package — vital for games!

Ease Of Use

If the program is for, say, an 'action' game, then the author's choice of keys is very important. Try playing "Invaders" with the movement keys reversed, and the "Fire" button right next to 'Reset'! There are many, many ways in which life can be made easy for the program user. We want to see them *all* used!

Supplied Instructions

Regardless of whether the instructions come on sheets of paper, or are presented as text on-screen, they should be as clear and as concise as possible. One of our pet hates is when you have to LOAD twice; once just to read screens full of words and again to use the software. Pointless! Far better to supply a few Xerox sheets!

Ratings are done on a "Five stars is excellent, one is hopeless" basis; with the reviewer then scoring the supplied package as a whole on a percentage scale.

We would very much like to hear from you, our readers, as to your comments (printable ones only please) on our methods of reviewing software. Any ideas on how we can improve it?

Title: Voyager 1
Type: Tape
Supplier: Avalon Hill
Machines TRS-80 Models I & II/TRS-80 Colour/Apple II/Atari 400, 800 32K/PET 32K
Price: £18.95

Released this year by Avalon Hill, Voyager I is one of the better 'seek and destroy' type of games. You are the only human aboard an alien spaceship that is infested by killer robots.

As you may have guessed, your mission is to either, destroy all the robots or, destroy all of the ships generators and escape yourself.

As you roam around the ships 144 locations, you are given a 3-Dimensional, "eye level", view of your locations. Using single keyboard entries, you move around the ship, you may take a laser gun if you happen upon one, turn left or right and move forward or backwards. Occasionally you will come across an elevator which will take you to a new level within the ship, should you require it. Scattered about the ship are generators which you may destroy or use to re-charge your laser gun. There is also an escape shuttle craft which you must locate before you dare destroy the final generator. During your wanderings you use up your energy, and this is shown on a chart, to the right of your display, together with the charge state of your laser gun and the ships generators. Should you chance upon one of the killer robots, you must hope that you are not too exhausted and that your laser gun is charged.

As well as a command to Abandon Ship, there is one other command that you may call upon. This is MAP! Pressing the M key clears the screen and gives you a graphic display of the rooms that you have searched as seen from above. Also shown on the screen are the number of robots remaining and any objects that you have discovered (eg. lasers, generators etc).

The program boasts a sound capability, but I could not make this facility work with my TRS-80 Model I, but this did not detract from my enjoyment of an excellent game that has many features not normally available on a single game. **D.B.**

Ratings Table

Program Quality	****
Value for Money	****
Presentation On-screen	***
Ease of Use	****
Crashproofing	****
Supplied Instructions	****
Overall	80%

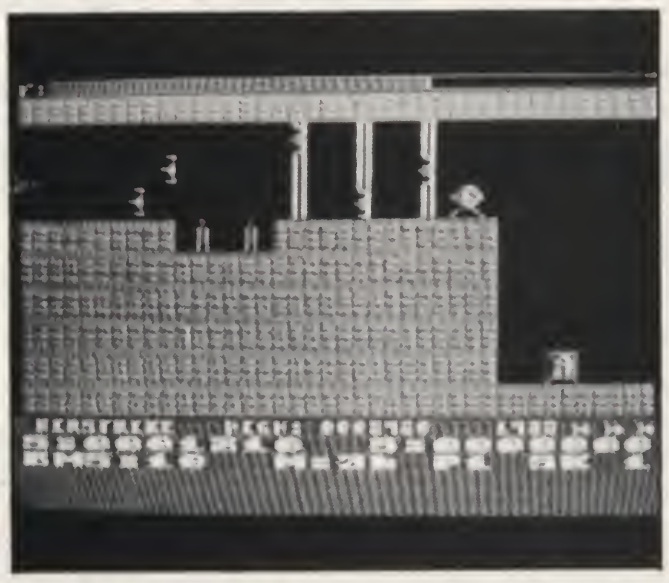
Title: **Airstrike**
Type: **Tape**
Supplier: **Gemini Electronics**
Machine: **Atari 400/800**
Price: **£15.95**

Airstrike is a version of the popular arcade game Scramble, whose format is very similar to the original arcade version, with a fighter craft flying horizontally across the screen through a series of caverns and mazes.

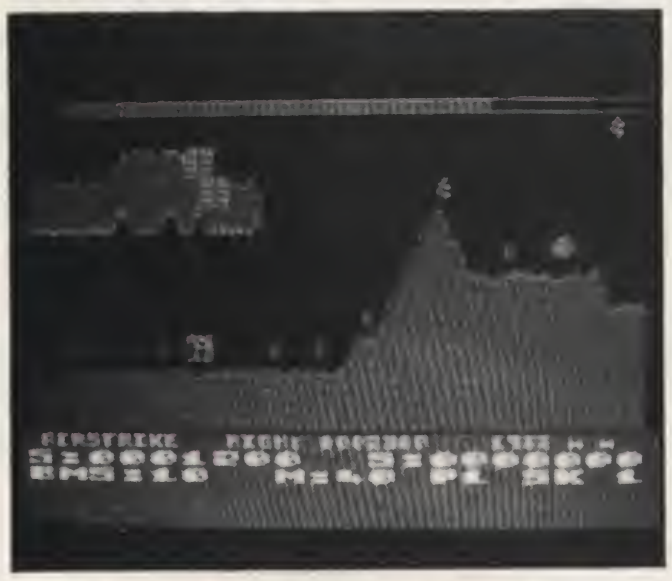
It is divided into three sections. The first section is made up of mountainous terrain which is defended heavily by surface to air missiles. Your mission is to fly throuh this section destroying these missiles while capturing fuel and ammunition dumps which are needed to replenish your ever dwindling supplies.

The second section is populated by fission bombs which are released by satellites and fall like rain across a central cavern through which you must pass. When you have completed these sections successfully you must then enter the labyrinth. To do this you must pass through a series of airlocks which can only be opened if you destroy their activating mechanism.

Once you have entered the first section of the labyrinth you then encounter enemy fighters which guard the airlocks. If you manage to complete this section you then start back at the beginning on a new level where the action is much meaner.



The airlock stage.



Flying across the mountainous terrain.

Airstrike is very difficult to play and unless you are a seasoned gamester takes a long time to master the controls.The best tactic to adopt is to con a friend, wife or lover into operating the smart bomb release button. Otherwise you literally haven't got enough hands to play the game — you need two just to manoeuvre the aircraft and operate the fire button to release missiles.

Despite this the program is well written and uses the Atari computer facilities to the full. I think that this program could easily achieve the cult status of the Atari Pac Man or Star Raiders.

Graphics in this program are up to the Atari computers usually high standard making it a delight to watch both for graphical representation and use of colour.

C.P.

Ratings Table

Program Quality	*****
Value for Money	****
Presentation On-screen	*****
Ease of Use	****
Crashproofing	****
Supplied Instructions	****
Overall	87%

Title: **Chess**
Type: **Tape**
Supplier: **Sinclair Research**
Machine: **ZX81**
Price: **£6.95**

Seeing how much of a chess game can be fitted into a limited memory seems to have become a game in itself amongst programmers. Psion has put in its bid with a comprehensive version for the 16K ZX81.

The game has all the standard features found on computer chess programs plus some extra features which make the game that little bit more acceptable. These are En Passant captures and Castling. Moves are input in standard algebraic notation and a diagram of the board labelling is given in the instructions.

This game also allows you to set up your own board positions and then play them out. This also means that you can change the game parameters in the middle of a game or even to change sides.

There are six levels of play with the lowest taking about five seconds to execute in full and the highest literally taking hours to think about and reply to a move. The screen display is adequate though not stunning, using letters to stand for the pieces.

Including as a bonus on the other side of the tape is a program which simulates the action of a chess clock. A welcome addition for someone like me who prefers playing against flesh and blood to being humiliated by a computer.

C.P.

Ratings Table

Program Quality	****
Value for Money	****
Presentation On-screen	***
Ease of Use	***
Crashproofing	***
Supplied Instructions	****
Overall	70%

Title: **Acquire**
Type: **Tape**
Supplier: **Avalon Hill**
Machines **TRS-80 Models I & III/Apple II/PET**
Price: **£12.95**

Acquire is a strategy game for 1 to 6 players, wehre the object is to start hotel chains and expand them by building further hotels around them. At the same time, each player may buy shares in any hotel chain, even those started by other players. The player with the most shares in the chain controls that chain, and may attempt to make a profit by merging his chain with others.

To try and describe this game is more difficult than playing it, as, with the computer doing all the calculations, and updating the displayed playing board, all that is left is for the player to plan his strategy. It is hard to define the type of audience that this game will appeal to, certainly not those who only play the 'arcade' games.

The game, which does not make use of any graphic features, is written in machine language and is, therefore, fast in its reaction time.

D.B.

Ratings Table

Program Quality	***
Value for Money	****
Presentation On-screen	**
Ease of Use	***
Crashproofing	***
Supplied Instructions	****
Overall	65%

REVIEW

SOFTWARE REVIEWS

Title: **Perilous Swamp/ Sorcerers Island**
Type: **Tape**
Supplier: **Sinclair Research**
Machine: **ZX81**
Price: **Tape £4.75**

Trapped in a swampy forest, dark slimy reeds surround you, deep black tar pits scattered in your path and many hideous creatures waiting in the shadows.

This is the scene that unfolds in front of you as you start the Perilous Swamp adventure. The tape has two adventures on it that run in the ZX81 with 16K memory expansion.

The adventures follow a fairly standard format, where you give the computer instructions how to move about the game map and the computer responds by giving you details of your surroundings, location, what treasure is there and what you have to do to take it. If you encounter a monster then you are given the option of fighting, running or bribing the creature to gain your freedom, or the treasure.





If you choose to fight then you are asked to pit a certain amount of strength points in the battle. The computer will then fight the battle with you and display the outcome. It is best to leave the bribery option till later in the game whn you are low on combat points. However, if you feel that you don't stand a chance you can try and run, which, if you are quick enough will save you.

The game is fun to play even with the limitations of the computer, which seems unfairly biased to the monsters. As you leave the swamp it shows your score in terms of how many righteous monsters died guarding treasure which was rightfully theirs.

C.P.

Ratings Table

Program Quality	* * *
Value for Money	* * * *
Presentation On-screen	* * *
Ease of Use	* * * *
Crashproofing	* *
Supplied Instructions	* * *
Overall	63%

Push your Sinclair to the limit



A GREAT 16K CHESS GAME FOR YOUR ZX81 OR SPECTRUM

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

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

ZX81 ARCADE GAMES

NEW **GOBBLEMAN** — Escape from munching ghosts to eat power dots and then gobble up the ghosts. Similar to classic arcade game. **£3.95**

NAMTIR RAIDERS — High-speed, quick action arcade game with four separate groups of attackers. **£3.95**

GALAXIANS — Swooping attackers, explosions and personalised scoring **£3.95**

NEW **UTILITIES:**

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

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

ASSEMBLER — Full editor assembler and monitor giving an extremely powerful tool for writing and running machine code programs on your ZX81 and Spectrum. Includes user manual. **£9.95**

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

LOW COST **ADDITIONAL RAM PACKS**

16K Ram Packs £29.50
32K Ram Packs £38.95
64K Ram Packs £64.95

ADVENTURE GAMES

JUST RELEASED **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**

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**

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 all for only **£35.00.**

ARTIC COMPUTING
ALWAYS AHEAD WITH ZX81/SPECTRUM SOFTWARE
Cheques & P.O. made payable to: Artic Computing Limited.
Please state whether your order is for ZX81 or Spectrum.

396 JAMES RECKITT AVENUE, HULL, N. HUMBERSIDE, HU8 0JA

We welcome Visa
VISA
sinclair SPECIALISTS

SHARP MZ-80K/MZ-80A/MZ-80B VIC 20, SINCLAIR SPECTRUM, BBC, TEXAS T1994A, ATARI.

FUNCTIONAL CASSETTE SOFTWARE BY DALE HUBBARD
BUY 2 AT £19.95 — TAKE 1 AT £5.95 FREE!!!!

All programs supplied with exhaustive and attractively bound documentation.

DATABASE
The program that everyone needs. Facilities include sort, search, list, delete, change, totals, save file, line print if required, etc. etc. Can be used in place of any card index application. **£19.95**

STOCK CONTROL
All the necessary for keeping a control of stock. Routines include stock set up, user reference no., minimum stock level, financial summary, line print records, quick stock summary, add stock, delete/change record, and more. **£19.95**

MAILING LIST
A superb dedicated database to allow for manipulation of names & addresses & other data, with selective printing to line printer. Features include the facility to find a name or detail when only part of that detail is known. Will print labels in a variety of user-specified formats. **£19.95**

DECISION MAKER
A serious program that enables the computer to make a sound decision for you based on various criteria.
If you want to buy a car, hi-fi, house, etc., or you don't know which woman to marry then you need this one. **£5.95**

INVOICES AND STATEMENTS
Ideal for the small business. A complete suite of programs together with generated customer file for producing crisp and efficient business invoices and monthly statements on your line printer. All calculations including VAT automatic and provision for your own messages on the form produced. Not Spectrum. **£19.95**

RUBIK SOLVER
It's not our policy to offer games but we make an exception here for a program to solve the cube from ANY position. Shorthand notation makes learning the solution by heart possible for most active brains. **£12.95**

THE CATALOGUER
This dedicated database is ideal for use in any situation where a catalogue could be utilised. E.g. stamp collection, coins, photos, slides, books, records etc. **£19.95**

COMMERCIAL ACCOUNTS
A gem of a program, all for cassette, with the following features:—

Daily Journal
Credit Sales
Cash Sales
Credit Purchases
Purchases — other
Sales Ledger
Purchase Ledger
Bank Account
Year to Date Summary

A fully interactive program suitable for all businesses. Files can be saved and loaded and totals from one file carried forward to another on cassette. Particularly useful from a cash flow point of view, with an immediate accessibility to totals for debtors and creditors. Bank totally supported with entries for cheque numbers, credits and, of course, running balance. **£19.95**

HOME ACCOUNTS **£19.95**
Runs a complete home finance package for you with every facility necessary for keeping a track of regular and other expenses, bank account, mortgage, H.P. etc etc etc!! You'll wonder how you ever managed without it.

CHOPIN - LES ETUDES
Six beautiful studies from Opus 10 and 25 performed for you live by Mr. Sharp — Spellbinding!!! **£5.95**

MOTOR ACCOUNTANT
Find out exactly what that car is costing you and keep a data file with all your expenses therein! **£5.95**

RECIPE FILE
Let all those computer widows have a bash! The wives will really enjoy the fun of this program designed to keep all her recipes. Will even suggest a menu for a day/week! Excellent value. **£19.95**

Access Welcome

SPECIAL HARDWARE OFFER!! MAIL ORDER ONLY
MZ-80A PLUS ANY 3 PROGRAMS £477 + VAT
LIMITED STOCKS — HURRY!!!

Send cheque or P.O. or Cash (registered) or Credit Card no. to:

Gemini Marketing Ltd

Dept PCT(2), 9 Salerton Road, Exmouth, Devon EX6 2BR
Or telephone us with your credit card order on (03952) 5832
All prices include VAT and post & packing except Hardware. Full range of Sharp peripherals available. Full range of printers and interfaces at discount prices. Please 'phone for quotations.
Please state machine type when ordering software.

SOFTWARE

LITTLE BLACK BOOK

Sick and tired of racking your brains for a friend's right 'phone number or address? Then try out David Berry's answer to the problem with this telephone and address book so that all those important numbers are at your fingertips. Put them into your Atom and stop the frustration of dialling the wrong number time and time again.

This is a suite of three programs for the Acorn Atom. Between them they set up, maintain and examine a cassette based telephone/address list; but with very minor modifications can be converted to suit your own database requirements.

The largest program requires a lower text space of 4K, and they all need a 3K upper text space (equivalent to mode 3 graphics capability).

They use many of the facilities and tricks available in Atom BASIC such as the use of the upper text space for data storage, and selective assembly of machine code routines.

Throughout this article the American pound sign (hash) — which usually indicates hexadecimal numbers-has been replaced by the British pound sign (£); and the program labels, normally inverted capitals, have been replaced with lower case underlined, e.g. x.

The first program "TELEWRITE", accepts data from the keyboard, entered on a "form" displayed on the screen. Each complete form is stored as a record in memory starting at address £8200; when the memory is full (or earlier on command) the data is downloaded to the cassette tape. This sequence may continue for as long as necessary setting up a series of "pages", each containing up to 2.5K bytes of data on the cassette.

The second program "TELEREAD", draws the same form on the screen then accepts one string as input, positioned on the form against the appropriate heading, by means of the cursor control keys. It then uses the string as a search string. The pages on the tape are loaded and searched one at a time, until a match is made, then the complete record is displayed.

"TELEAMM" completes the set by providing facilities for modifying and resaving pages of data. It is designed to be used in conjunction with "TELEREAD". First the entry to be changed is found using "TELEREAD" then, without clearing the memory or typing NEW, "TELEAMM" is loaded and run; the record address being preserved from one program to the other.

HINTS ON CONVERSION

The fact that the forms displayed by the programs are not saved on the data tape means that the programs can easily be modified to suit any other similar data storage and retrieval system. The simplest adaptations can be made by replacing my form with your own. If you do so you will need to keep the length of the headings to below nine characters, or have to change the cursor control and input string search routines in "TELEWRITE" and "TELEREAD" respectively. Additionally, if you vary the number of headings you will need to change the various loop parameters.

The following table lists the commands available to the user, obviously if you have a friend with the surname of .END you are going to have problems. Put another way: think of the commands as reserved words.

Command	Program	Effect
.END	all	Terminates run
.DSP	all	Displays contents of memory byte by byte.
.LDT	TELEWRITE, TELEAMM	Loads page of data to tape.
.CLR	TELEREAD	Clear memory (automatic in TELEWRITE).
.ALL	TELEREAD	Displays all records on current page.
.MVE	TELEAMM	Moves data pointer to address entered after prompt.
.ERR	TELEWRITE	Aborts current record input moves data pointer back to start of record to allow overwrite.

"TELEWRITE" will only accept commands entered as the first line of input (i.e. in the "SURNAME" position), except for .ERR which may be in any line except the first line.

The flashing "STOP TAPE" signs can be turned off by holding down the shift key. This key is also the one to press to change the displayed data during a .DSP sequence.

Prompts may be answered by "YES", "NO" or any string starting with "Y" or "N". Default is usually "N", so pressing the return key counts as a "NO". This is useful in a number of situations, notably when used simultaneously with the repeat key to step through all the records after the .ALL command.

If all this sounds confusing, that's because it is much more difficult to describe than demonstrate. The name of the game is "experiment" so if you think a particular command sequence should work give it a try — it probably will.

PROGRAM LISTING

"TELEWRITE" LISTING PROGRAM

```
 10 DIM B(12),LL(1)
 20 aH = 0
 30 P.$12,'''''''"CLEARING MEMORY"
 40 A = £8200
 50 GOSUBz
 60 cP.$12
 70 PRINT"sp9 TELEPHONE LIST" ' "spll DATA INPUT"'
 80 PRINT" SURNAME" ' "INITIALS" ' " ALTNAME" '
    "STD CODE" ' "sp2 NUMBER" '
 90 PRINT"sp3 HOUSE" ' "sp2 STREET" ' ' "sp4 TOWN"
    ' "sp2COUNTY" ' "POSTCODE"
100 PRINT' "sp3 NOTES"
110 FOR V = 0 TO 10; P.$£0B; N.
120 M = A
130 H = H + 1
140 GOSUBw
150 INPUT $A
160 IF $A = ".DSP" GOTOf
170 IF $A = ".END" P.S12''''''''"TERMINATED!"; END
180 IF $A = ".LDT" GOTOb
190 R = £20
200 U = £48
210 FOR V = 1 TO 10
220 U = U + £20
230 ?£El = 0
240 ?£DE = U
250 ?£El = £80
260 ?£8060 = £09
270 ?£8128 = R
280 IF V = 6 THEN ?£8008 = £20; U = U + £20
290 A = LEN(A) + 1
300 GOSUBw
310 INPUT $A
320 IF $A = ".ERR" A = M; H = H - 1; G.c
330 R = ?£8128
340 IF R = £A0 THEN R = £20
350 IF U = £E8 THEN !£DE = £80008108
360 NEXT V
370 A = A + LEN(A) + 1
380 $A = "EOR + "
390 A = LEN(A) + 1
400 IF A > = £8AC4 P.S12''''''"MEMORY FULL"'; GOTOd
410 GOTOc
420 bP.$12'''''''
430 A = LEN(A) + 1
440 d$A = "E0P£"
450 PRINT" LOAD TAPE"
460 INPUT $B
470 IF CH$B < >£59 PRINT"TERMINATED!"; END
480 H = H - 1
490 Q = FOUT" "
500 FOR N = $8200 TO £8BFF
510 BPUT Q,?N
520 IF ?N = 0 THEN P."PAGE LOADED"'; GOTOe
530 NEXT N
540 eP.$7; D0
550 !£8140 = £100F1413; !£8145 = £05100114; FOR
    W = 1TO30; WAIT; N.
560 !£8140 = £20202020; !£8145 = £20202020; FOR
    W = 1TO30; WAIT; N.
570 UNTIL ?£B001 < >£FF
580 P."DO YOU WANT TO LOAD MORE DATA"
590 INPUT $B
600 IF CH$B = £59 GOTOa
610 PRINT"TERMINATED!"; END
620 wS = 35830 - A
630 K = 1
640 FOR J = 4 TO 1 STEP - 1
650 J?£81FA = S/K%10 + £30
660 K = K*10
670 NEXT J
680 ?£81F9 = £0D; ?£81FA = £3D
690 K = 1
700 FOR J = 2 TO 1 STEP - 1
710 J?£81F5 = H/K%10 + £30
720 K = K*10
730 NEXT J
740 ?£81F4 = £12; ?£81F5 = £3D
750 RETURN
760 zP.$21; P = £2800
770 !£A0 = £008C8200
780 [ \ CLEAR MEMORY 8200 TO 8BFF
790 :LLO LDX £A2; LDY £A3
800 :LL1 STA(£A0),Y; INY
810 BNE LL1; INC £A1; CPX £A1
820 BNE LL1; RTS
830 ]
840 LINK LL0
850 P.$6; RETURN
860 fP.$12
870 FOR C = £200 TO $A00 STEP £200
880 FOR D = £8000 TO $81FF
890 E = C?D
900 IF E<£80 E = E:£60
910 E = E - £20
920 ?D = E
930 NEXT D
940 DO UNTIL ?£B001< >£FF
950 NEXT C
960 A = M; H = H - 1
970 GOTOc
```

(Note: 'sp4' means 4 blank spaces etc.)

TELEREAD PROGRAM LISTING

```
 10 @ = 0
 20 DIM M(63),N(10),LL(1)
 30 aP.$12
 40 P."sp9 TELEPHONE LIST" ' "sp11 DATA OUTPUT" '
 50 P."SURNAME?" ' "INITIALS?" ' "ALTNAME?" ' "STD
    CODE?" ' "sp2 NUMBER?" '
 60 P."sp3 HOUSE?" ' "sp2 STREET?" ' ' "sp4 TOWN?" '
    "sp2 COUNTY?" ' "POSTCODE?"
 70 P.' "sp3 NOTES?"
 80 INPUT $M
 90 IF $M = ".END" P."TERMINATED!"; END
100 IF $M = ".CLR" GOTOk
110 IF $M = ".DSP" GOTOj
120 R = 0
130 FOR Q = £8049 TO £81A9 STEP £20
140 R = R + 1
150 IF Q = £8149 R = R - 1
160 IF !Q< >£20202020 GOTOb
170 NEXT Q
180 P.$12''''''"FAULT — INPUT STRING NOT IN" '
    "CORRECT POSITION"
190 FOR Q = 1 TO 250; WAIT; N.
200 GOTOa
210 bP.$12''''''"INPUT ACCEPTED"'
220 INPUT"NEW PAGE",$N
230 IF CH$N< >£59 A = £8200; G.d
240 h?£E1 = 0
250 F = FIN""
260 FOR G = £8200 TO £8BFE
270 ?G = BGET F
280 IF ?G = £23 G?1 = BGET F; G.c
290 NEXT G
300 P.'"FAULT — EOP MARKER NOT FOUND"; END
310 cP.'"HIGHEST MEMORY LOCATION" ' "ON THIS
    PAGE = £",&G + 1
```

SOFTWARE

PROGRAM LISTING

```
320  P.$7; D0
330  !£8160 = £100F1413; !£8165 = £05100114
340  FOR Q = 1 TO 30; WAIT; N.
350  !$8160 = £20202020; !$8165 = £20202020
360  FOR Q = 1 TO 30; WAIT; N.
370  UNTIL ?$B001 < > £FF
380  A = £8200
390  dIF $A = "E0P£" OR $A = ".LDT" G.a
400  W = A
410  IF R = 1 GOTOg
420  FOR Q = 1 TO R - 1
430  A = A + LEN(A) + 1
440  NEXT Q
450  gIF $M = $A OR $M = ".ALL" G.e
460  DO
470  A = A + LEN(A) + 1
480  UNTIL $A = "EOR + "
490  B = A + LEN(A) + 1
500  IF $B = ".LDT" B = B + LEN(B) + 1; ?£81FF = £2A
510  IF $B = "EOP£" GOTOi
520  A = A + LEN(A) + 1; GOTOd
530  iPRINT' "NOT ON THIS PAGE"
540  FOR Q = 1 TO 150; WAIT; N.
550  PRINT $12' ' ' ' "LOAD NEXT PAGE"
560  INPUT $N
570  IF CH$N < > £59 GOTOa
580  GOTOh
590  eA = W
600  PRINT S12"sp9 TELEPHONE LIST" ' "sp11 DATA OUT-
     PUT"
610  $N = "SURNAME";GOSUBf
620  $N = "INITIALS";GOSUBf
630  $N = "ALTNAME";GOSUBf
640  $N = "STD CODE";GOSUBf
650  $N = "NUMBER";GOSUBf
660  $N = "HOUSE";GOSUBf
670  $N = "STREET":GOSUBf
680  $N = "TOWN";GOSUBf
690  $N = "COUNTY";GOSUBf
700  $N = "POSTCODE";GOSUBf
710  $N = "NOTES";GOSUBf
720  T = 1
730  FOR J = 4 TO 1 STEP - 1
740  K = W/T%£10
750  IF K < £A K = K + £39
760  J?£81FA = K - 9; T = T* £10; N.J
770  ?£81F8 = £0D; ?£81F9 = £3D; ?£81FA = £23
780  P.' "CORRECT"
790  INPUT $N
800  IF CH$N < > £59 A = A + LEN(A) + 1; GOTOd
810  P."ANOTHER SEARCH"
820  INPUT $N
830  IF CH$N = £59 GOTOa
840  PRINT"TERMINATED!"
850  END
860  f PRINT' $N,$A
870  A = A + LEN(A) + 1
880  RETURN
890  kP.$21; P = £2800
900  !£A0 = £008C8200
910   [ \ CLEAR MEMORY 8200 — 8BFF
920  :LLO LDX £A2; LDY £A3; TYA
930  :LL1 STA($A0),Y; INY
940  BNE LL1; INC £A1; CPX £A1
950  BNE LL1; RTS
960   ]
970  LINK LL0
980  P.$6; GOTOa
990  jP.$12
1000 FOR C = £200 TO £A00 STEP £200
1010 FOR D = £8000 TO £81FF
1020 E = C?D
1030 IF E < £80 E = E:£60
1040 E = E - £20; ?D = E
1050 NEXT D
1060 DO UNTIL ?£B001 < > ?£FF
1070 NEXT C; GOTOa
END
```

TELEAMM PROGRAM LISTING

```
10   DIM N(9); @ = 0
20   cQ = 0
30   IF W > G + 1 P.$7"OUTSIDE PAGE"; W = £8200; FOR
     J = 1TO150;WAIT;N.
40   DO; W = W + Q
50   P.$12' ' ' $W' "M = "&W' "ALTER THIS STRING"
60   IF $W = "E0P£" P.' "END OF PAGE!"; W = £8200; END
70   INPUT $N
80   IF $N = ".END" P."TERMINATED!"; W = £2800; END
90   IF $N = ".MVE" IN."RECORD ADDRESS",W; GOTOc
100  IF $N".LDT" GOTOd
110  IF $N = ".DSP" GOTOe
120  Q = LEN(W) + 1
130  UNTIL CH$N = £59
140  M = £2800
150  INPUT"REPLACEMENT STRING",$M
160  D = LEN(M) - LEN(W)
170  IF G + 1 + D > £8BFF P."MEMORY EXCEEDED";
     W = £8200; GOTOb
180  IF D = 0 GOTOa
190  IF D > 0 X = G + 1; Y = W + LEN(W) + 1; Z = - 1
200  IF D < 0 X = W + LEN(W) + 1; Y = G + 1; Z = + 1
210  FOR L = X TO Y STEP Z
220  D?L = ?L
230  NEXT L
240  a$W = $M
250  INPUT"LOAD TAPE",$N
260  IF CH$N < > £59 GOTOb
270  dF = FOUT" "
280  FOR L = £8200 TO G + 1 + D
290  BPUT F,?L
300  NEXT L
310  P.$7; DO
320  !£8140 = £100F1413; !£8145 = £05100114; FOR J = 1TO30;
     WAIT; N.
330  !£8140 = £20202020; !£8145 = £20202020; FOR J = 1TO30;
     WAIT; N.
340  UNTIL ?£B001 < > £FF
350  bINPUT"MORE CHANGES"$N
360  IF CH$N = £59 IN."RECORD ADDRESS", W; GOTOc
370  PRINT"TERMINTED!"; END
380  eFOR C = £200 TO £A00 STEP £200
390  FOR D = £8000 TO £81FF
400  E = C?D
410  IF E < £80 E = E:£60
420  E = E - £20
430  ?D = E
440  NEXT D
450  DO UNTIL ?£B001 < > £FF
460  NEXT C
470  GOTOc
END
```



sinclair

ZX Spectrum

BLUE EDIT 1 ! DEF FN
RED CAPS LOCK 2 @ FN
MAGENTA TRUE VIDEO 3 # LINE
GREEN INV. VIDEO 4 $ OPEN #
CYAN ⇦ 5 % CLOSE #
YELLOW ⇩ 6 & MOVE
WHITE ⇧ 7 ' ERASE
⇨ 8 (POINT
GRAPHICS 9) CAT
BLACK DELETE 0 _ FORMAT

SIN Q ⇐ PLOT ASN
COS W <> DRAW ACS
TAN E >= REM ATN
INT R < RUN VERIFY
RND T > RAND MERGE
STR$ Y AND RETURN [
CHR$ U OR IF]
CODE I AT INPUT IN
PEEK O ; POKE OUT
TAB P " PRINT ©

READ A STOP NEW ~
RESTORE S NOT SAVE |
DATA D STEP DIM \
SGN F TO FOR {
ABS G THEN GOTO }
SQR H ↑ GOSUB CIRCLE
VAL J − LOAD VAL $
LEN K + LIST SCREEN $
USR L = LET ATTR
ENTER

CAPS SHIFT
LN Z : COPY BEEP
EXP X £ CLEAR INK
LPRINT C ? CONT PAPER
LLIST V / CLS FLASH
BIN B * BORDER BRIGHT
IN KEY$ N , NEXT OVER
PI M . PAUSE INVERSE
SYMBOL SHIFT
BREAK SPACE

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.

um



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.





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.

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

PCT 810

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

ZX Spectrum

Available only by mail order and only from

sinclair

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

ZX Spectrum software: how good and how soon?

The ZX Spectrum uses an enhanced version of Sinclair BASIC, fast becoming a world standard, and unlikely to be superseded. Unique features, such as one-touch keyword entry and syntax check and report, are increasingly attracting software originators.

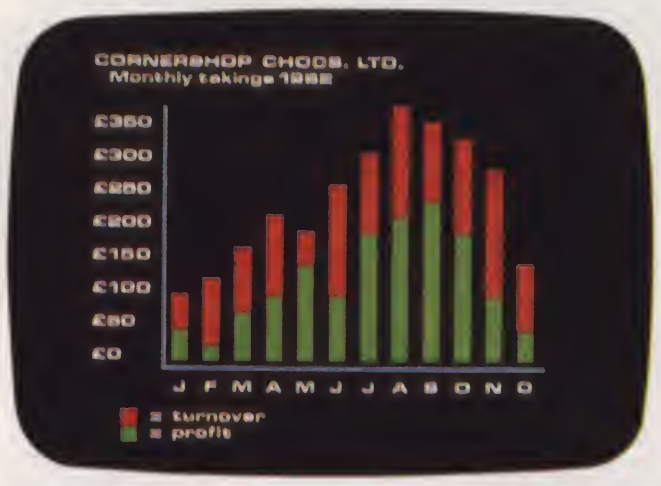
Building the software library is already far advanced, and a complete catalogue will be available in the next few months. Subjects will include sophisticated games, education, 'housekeeping', and business management. The more complex packages can, of course, be used to their best advantage with the full 48K RAM version of the ZX Spectrum.



The Sinclair ZX Spectrum can handle sophisticated games programs with high-resolution colour graphics and sound.



This major advance in computer technology maintains Britain's world-beating position in the field of personal computers.



A range of business software will soon be available, covering both specific applications (eg stock-control and payroll) and general business management systems (eg matrix models).



This second generation of Sinclair personal computers demonstrates continuing commitment. Advanced technology made the ZX80/81 family a price breakthrough: advanced technology makes the ZX Spectrum a breakthrough in price and performance.

Elegant, effective, unique—the ZX Spectrum design.

'Less than half the price of its nearest competitor – and more powerful.'

'These two pictures show how it's done. On the right is the PCB from the BBC Model A Microcomputer. On the left is the PCB from the ZX Spectrum.

'It's obvious at a glance that the design of the Spectrum is more elegant. What may not be so obvious is that it also provides more power.

'The ZX Spectrum has more usable RAM, and higher maximum RAM.

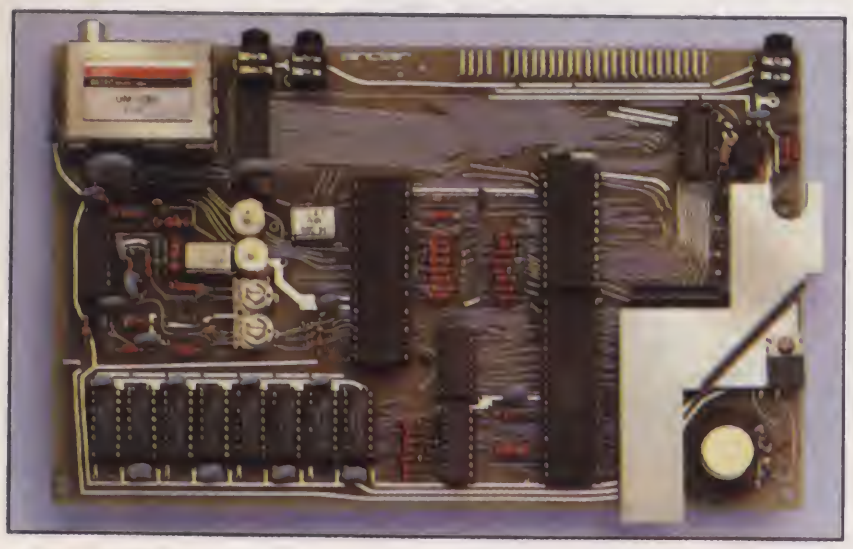
'It offers twice as many colours on the screen at any one time, plus a colour brightness control. It also offers user-definable graphics.

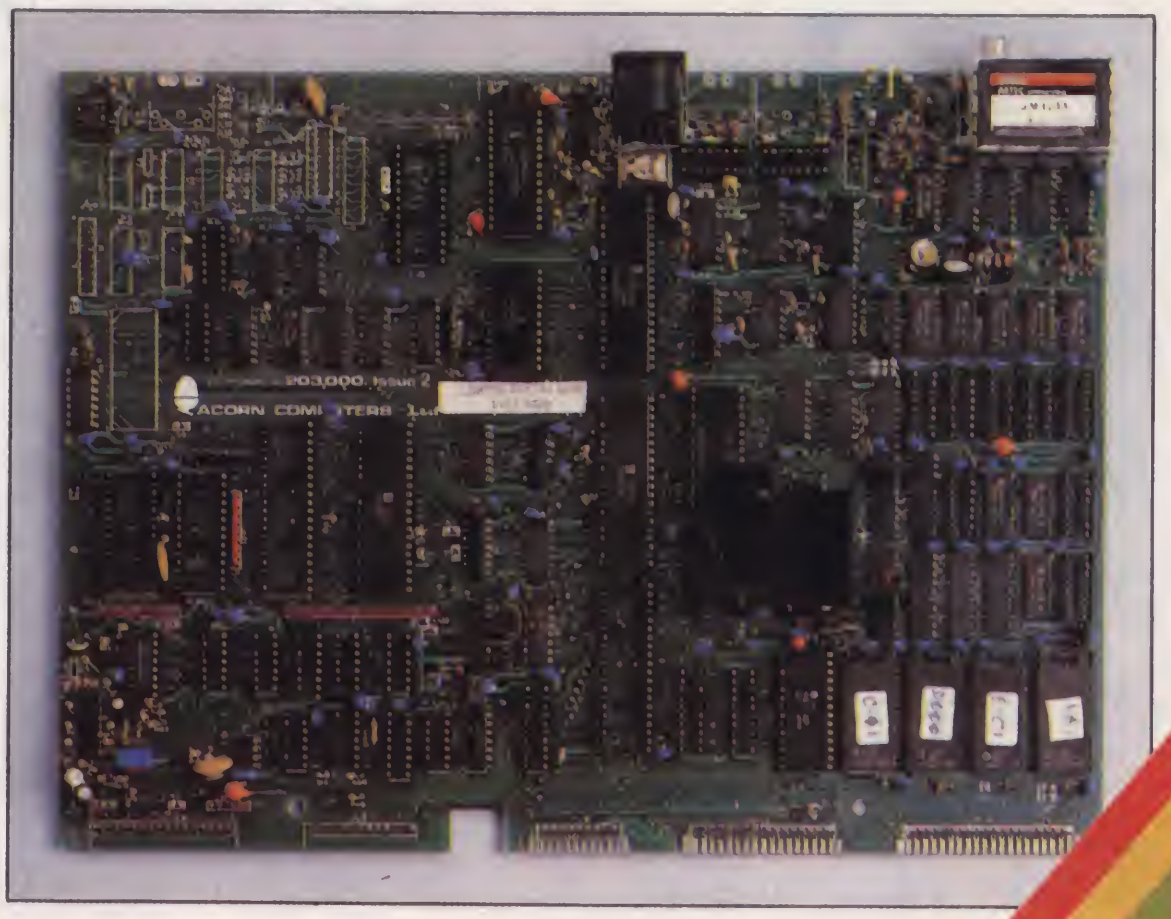
'It has data transfer rate 25% faster, supported by a VERIFY facility.

'And it employs a dialect of BASIC (Sinclair BASIC) already in use in over 500,000 computers worldwide.

'We believe the BBC make the world's best TV programmes – and that Sinclair make the world's best computers!'

– Clive Sinclair.





Above left: internal layout of Sinclair ZX Spectrum.

Right: Internal layout of BBC Micro Model A.

The illustrations are to the same scale, and demonstrate the rate of advance in microcomputer design. The ZX Spectrum uses just 14 chips to provide more power and more user-available RAM.

sinclair ZX Spectrum

BLIND MAZE

Explore the dark depths of your TI 99/4A with this labyrinth game from Mike O'Regan.

In Blind Maze, the program draws a labyrinth on screen with random clumps of bushes and a random exit point. The player has five seconds to try and memorize the layout of the maze, after which the bushes and exit point disappear. The player then starts a timed run through the (invisible) maze to the exit point. Any contact with the maze bushes is signalled audibly and visually and subject to a time penalty.

The player's path is traced by a dotted line and, on completion of the run, the whole maze becomes visible once more, along with the path taken and the time for the run compared with the 'best time so far'. At this point you can choose to play again, if you can stand the frustration, with the same maze layout or a new one.

At the beginning of each game, you may choose to play with the displayed maze or, if you want a sterner test, with a completely invisible one. There is also a facility for the user to increase or decrease the complexity of the maze. User instructions are contained within the program, which is written in standard TI BASIC.

HOW IT RUNS

Lines	100	-	140	Clears screen and sets colours
Lines	150	-	530	Prints up title screen and instructions
Lines	540	-	680	Defines walls and man
Line	690			Seeds random number generator
Lines	700	-	860	Sets up maze
Lines	870	-	1170	Prints maze
Lines	1180	-	1240	Sets up start position
Lines	1250	-	1560	Scans keyboard and moves man accordingly
Lines	1570	-	1730	Checks to see if man has crashed into wall and implements crash routine
Lines	1740	-	1820	Routine to print messages on the screen
Lines	1830	-	1900	Flashes the screen
Lines	1910	-	2440	Prints winning messages and restarts the game

HINTS ON CONVERSION

Although the Texas has a fairly standard BASIC, which means the program will convert to other machines, it does have some very particular screen commands that are unique to itself. These commands are prefaced by CALL in the listings. The first two you meet are CALL CLEAR and CALL SCREEN. The first command clears the screen area and will usually be replaced by CLS on another machine. The second command changes the colour of the screen background and could be replaced with a command such as PAPER or SETCOLOR.

The CALL COLOR command is used to determine the actual foreground and background colour of the individual characters. The first argument in the statement specifies the character set to which that colour is assigned. CALL HCHAR and CALL VCHAR are used to place a character horizontally or vertically on the screen and repeat it in that direction. The first two arguments are the row and column numbers, the third is the character code and the fourth is the number of times it has to be repeated. These can be simulated on other machines by either a PRINT AT statement within a loop or a POKE to the screen.

Two other CALL statements used in the program are CALL CHAR and CALL SOUND. The CALL CHAR command on the Texas allows the programmer to define his own custom characters. Although this can be implemented on other machines that have this facility, the method in which the information is presented to the computer does need further explanation. Other machines present the information in the form of 8 bytes which represent the 8 rows of dots that make up the character (for further information on this see the Spectrum feature in this issue). The Texas however divides the character into 8 rows, each containing two blocks of four dots each. The possible dot positions in these blocks are represented in hexadecimal, from 0 to F. This data is then placed into the CALL CHAR statement from left to right down the character, alternating the blocks. If you are converting this program to your own computer then it would probably be easier to define your own character for the man and the walls.

The CALL SOUND statement is, as the name suggests, used to generate the sound in the program. As with the defined graphics it would probably be easier to create your own sounds using your machines facilities. Finally the CALL KEY command is used to get a character from the keyboard and can be replaced with either GET or INKEY.

TI 99/4A

BLIND MAZE

PROGRAM LISTING

```
100  CALL CLEAR
110  CALL SCREEN(5)
120  FOR QQ = 1 TO 9
130  CALL COLOR(QQ,16,5)
140  NEXT QQ
150  M$ = "BLIND MAZE"
160  Z = 3
170  GOSUB 1750
180  M$ = "**********"
190  Z = 4
200  GOSUB 1750
210  M$ = "BY MIKE O'REGAN"
220  Z = 5
230  GOSUB 1750
240  M$ = "**********"
250  Z = 6
260  GOSUB 1750
270  M$ = "YOU HAVE 5 SECONDS"
280  Z = 8
290  GOSUB 1750
300  M$ = "TO MEMORIZE THE MAZE"
310  Z = 9
320  GOSUB 1750
330  M$ = "THEN YOU MUST TRY TO FIND"
340  Z = 10
350  GOSUB 1750
360  M$ = "THE FINISH IN THE LEAST TIME"
370  Z = 11
380  GOSUB 1750
390  M$ = "IF YOU HIT THE MAZE, THEN"
400  Z = 13
410  GOSUB 1750
420  M$ = "5 PENALTY POINTS ARE ADDED"
430  Z = 14
440  GOSUB 1750
450  M$ = "USE ALL ARROW KEYS"
460  Z = 16
470  GOSUB 1750
480  M$ = "HANG ON FOR 1 MINUTE"
490  Z = 20
500  GOSUB 1750
510  M$ = "WHILE I SORT OUT A NEW MAZE"
520  Z = 21
530  GOSUB 1750
540  CALL HCHAR (1,1,30,32)
550  CALL VCHAR(2,1,30,24)
560  CALL HCHAR(24,2,30,32)
570  CALL VCHAR(1,32,30,24)
580  REM DEFINE WALLS, MAN
590  CALL CHAR(96,"995A3C3C3C3C2424")
600  CALL CHAR(128,"CCCC3333CCCC3333")
610  CALL CHAR(129,"181818FF18181818")
620  CALL CHAR(97,"0000003C3C3C")
630  CALL CHAR(105,"FFFFFFFFFFFFFFFF")
640  CALL CHAR(112,"0")
650  CALL COLOR(9,2,12)
660  CALL COLOR(11,12,12)
670  CALL COLOR(13,13,2)
680  CALL COLOR(10,5,12)
690  RANDOMIZE
700  REM ARRAY TO SET UP COURSE, CHANGE D
     TO MAKE COURSE EASIER OR HARDER
710  D = 1.18
720  DIM M(20,32)
730  FOR I = 4 TO 19
740  TM = 0
750  FOR J = 2 TO 31
760  R1 = INT(RND* D)
770  IF R1 = 0 THEN 800
780  M(I,J) = 128
790  GOTO 810
800  M(I,J) = 112
810  NEXT J
820  NEXT I
830  M(4,2) = 96
840  RANDOMIZE
850  RR = INT(RND* 14) + 4
860  M(RR,31) = 129
870  CALL CLEAR
880  T = 0
890  REM PRINT COURSE
900  CALL HCHAR(3,1,112,544)
910  CALL HCHAR(3,1,105,32)
920  CALL VCHAR(4,32,105,16)
930  CALL HCHAR(20,1,105,32)
940  CALL VCHAR(4,1,105,16)
950  FOR I = 4 TO 19
960  FOR J = 2 TO 31
970  C = M(I,J)
980  CALL HCHAR(I,J,C)
990  NEXT J
1000 NEXT I
1010 FOR PSE = 1 TO 1200
1020 NEXT PSE
1030 CALL COLOR(13,12,12)
1040 N = 48
1050 N2 = 48
1060 N3 = 48
1070 N1 = 48
1080 M$ = "PRESS 'B' FOR A BLIND MAZE."
1090 Z = 22
1100 GOSUB 1750
1110 CALL KEY(O,K,S)
1120 IF S<1 THEN 1110
1130 IF K<>66 THEN 1180
1140 M$ = "HANG ON!"
1150 Z = 23
1160 GOSUB 1750
1170 GOTO 690
1180 CALL SOUND(100,880,2)
1190 REM SET MAN'S START POSITION
1200 X = 2
1210 Y = 4
1220 J = 2
1230 I = 4
1240 CALL HCHAR(I,J,96)
1250 REM MOVE MAN
1260 CALL KEY(0,KEY,STATUS)
1270 N = N + 1
1280 IF STATUS = 0 THEN 1260
1290 IF KEY<>88 THEN 1320
1300 I = Y + 1
1310 GOTO 1580
1320 IF KEY<>69 THEN 1350
1330 I = Y - 1
1340 GOTO 1580
1350 IF KEY<>83 THEN 1390
1360 J = X - 1
1370 CALL VCHAR(1,1,N3)
1380 GOTO 1580
1390 IF KEY<>68 THEN 1410
1400 J = X + 1
1410 IF KEY<>87 THEN 1450
1420 J = X - 1
1430 I = Y - 1
1440 GOTO 1580
1450 IF KEY<>82 THEN 1490
1460 J = X + 1
1470 I = Y - 1
1480 GOTO 1580
1490 IF KEY<>67 THEN 1530
1500 J = X + 1
1510 I = Y + 1
1520 GOTO 1580
```

PROGRAM LISTING

```
1530  IF KEY<>90 THEN 1570
1540  J=J-1
1550  I=Y+1
1560  GOTO 1580
1570  REM CHECK FOR CRASH
1580  IF (J<2)+(J>31)+(I<4)+(I>19)+(M(I,J)=128
      THEN 1920
1590  CALL HCHAR(Y,X,97)
1600  CALL HCHAR(I,J,96)
1610  IF M(I,J)=129 THEN 1920
1620  X=J
1630  Y=I
1640  GOTO 1260
1650  REM CRASH ROUTINE
1660  CALL SOUND(500,110,4,-5,2)
1670  CALL HCHAR(Y,X,106)
1680  GOSUB 1830
1690  CALL HCHAR(Y,X,96)
1700  I=Y
1710  J=X
1720  N=N+5
1730  GOTO 1240
1740  REM SUBROUTINE FOR PRINTING MESSAGES
1750  V=16-INT(LEN(M$)/2)
1760  FOR I=1 TO LEN(M$)
1770  CD=ASC(SEG$(M$,I,1))
1780  CALL HCHAR(Z,V+I,104)
1790  CALL COLOR(10,2,16)
1800  CALL HCHAR(Z,V+I,CD)
1810  NEXT I
1820  RETURN
1830  FOR I=1 TO 3
1840  CALL SCREEN(9)
1850  CALL SCREEN(10)
1860  CALL SCREEN(10)
1870  NEXT I
1880  CALL CHAR(104,"0000001818")
1890  CALL SCREEN(4)
1900  RETURN
1910  REM WINNING ROUTINE
1920  M$="YOU MADE IT!!!"
1930  IF BTM=0 THEN 1940 ELSE 1960
1940  BTM=N
1950  GOTO 1970
1960  IF BTM<N THEN 1970 ELSE 1940
1970  M$="BEST SO FAR: "&STR$(BTM)
1980  Z=1
1990  GOSUB 1750
2000  M$="YOUR SCORE: "&STR$(N)
2010  Z=2
2020  GOSUB 1750
2030  M$="
      "
2040  Z=22
2050  V=9
2060  GOSUB 1750
2070  CALL SOUND(200,370,4,440,4,294,4)
2080  CALL SOUND(600,392,3,494,3,294,3)
2090  CALL SOUND(200,392,2,494,2,294,2)
2100  CALL SOUND(800,294,1,440,1,370,1)
2110  M$="CONGRATULATIONS!"
2120  CALL COLOR(13,13,2)
2130  Z=23
2140  GOSUB 1750
2150  M$="PRESS Y TO PLAY AGAIN"
2160  Z=24
2170  GOSUB 1750
2180  CALL KEY(O,K,S)
2190  IF S=0 THEN 2180
2200  IF K<>89 THEN 2360
2210  M$=PRESS Y FOR SAME SET-UP"
2220  Z=23
2230  GOSUB 1750
2240  CALL KEY(O,K,S)
2250  IF S=0 THEN 2240
2260  TM=0
2270  IF K=89 THEN 870
2280  CALL CLEAR
2290  M$="IT TAKES A LITTLE TIME TO"
2300  Z=14
2310  GOSUB 1750
2320  M$="SET-UP A NEW MAZE."
2330  Z=15
2340  GOSUB 1750
2350  GOTO 690
2360  M$="
      "
2370  Z=23
2380  GOSUB 1750
2390  Z=24
2400  GOSUB 1750
2410  M$="THANKS FOR THE GAME."
2420  Z=22
2430  GOSUB 1750
2440  END
```



TAURUS COMPUTER DESIGN

Our SPECTRUM games are now available (Mastermind, Atoms, L-Game, etc.)

SPECTRUM utilities available soon. Write for details.

Our product range for the ZX81 is as follows:

TAURUS 8K PROMCARD
- Fills memory space 8K-16K
- Housed within ZX81 case—easy installation
- Link selectable: 7K PROM+1K RAM or 8K PROM (2×2732)
- Ideal home for TAURUS SOLID SOFTWARE

TAURUS 16K RAMPACK
- User switchable : Model A 16K RAM or 14K RAM+2K PROM (2716)
  : Model B 16K RAM or 12K RAM+4K PROM (2732)
- Flexible connection to ZX81—eliminates memory wipeout
- Rugged construction—proven high quality design
- Ideal home for TAURUS SOLID SOFTWARE

TAURUS MACHINE-CODE MONITOR
Version 1:
- 16 user utility commands
- Optimised for developing and testing machine code
- Available as TAURUS SOLID SOFTWARE on all TAURUS hardware products
- Also available on cassette

Version 2:
- As Version 1+MACHINE CODE DISASSEMBLER
- Displays address, hex instruction bytes, source code
- Standard X-80* mnemonics
- Relative jumps shown with absolute addresses
- Also available on cassette

GRAPHICS EDITOR
- Make your own character shapes—whatever you want!
- Includes routine for switching character sets
- Two new character sets provided (including lower case)
- Available as TAURUS SOLID SOFTWARE

MACHINE-CODE ASSEMBLER
- Standard Z-80* mnemonics
- Optimised for ZX81 keyboard layout
- Up to 256 user-definable labels
- Available as TAURUS SOLID SOFTWARE
- Also available on cassette

PRODUCT SUMMARY

	16K RAMPACK		8K PROMCARD	Cassette
	Model A	Model B		
(Hardware only)	£38.00	£38.00	£25	—
MONITOR Version 1	£45.00	—	£8 per EPROM	£7.50
MONITOR Version 2	—	£49.00	£9 per EPROM	£8.50
ASSEMBLER	—	—	£12 per EPROM	£6.50
GRAPHICS EDITOR	—	—	£9 per EPROM	—

Send for details or cheque with order to:
TAURUS COMPUTER DESIGN
47 High Street, Baldock, Hertfordshire SG7 6BG
Telephone Baldock (0462) 893900

Three years providing software and support for the TRS80 has taught us a lot.

So now we have a head start with the SPECTRUM and BBC MICRO.

MICROPATH

Why pay upwards of £500 for a critical path analysis package? MicroPath calculates earliest and latest start times, total and free float and the critical path of networks. All versions have optional printed output and permit easy editing and tape storage of networks. The TRS80 version can also use disk files. Available now for the TRS80 Model 1 and 3, the Genie, BBC Micro Model A and B and the Sinclair Spectrum. Complete with full instructions and an example network.

On cassette — £13.50

BEEBTAPE

Tired of typing programs from the pages of books and magazines? Beebtape is a bi-monthly cassette of programs for your BBC Micro. There will be at least five programs in each issue and will include games, educational software, utilities, etc. Available by subscription only. The first issue will be published in September.

Six issues on cassette — £21.00

SPECTRUMON

A machine code monitor for the Sinclair Spectrum. Spectrumon allows you to examine blocks of memory, input and run machine code programs and store and load machine code from tape. Uses hex notation throughout. Optional printer output. Complete with full instructions.

On cassette — £5.50

TRS80 LIGHTPEN

We have now sold over 500 Photopens for the TRS80 and are the acknowledged experts in this field. The Photopen is complete with a cassette of four programs, full instructions and even a PP3 battery. The Photopen connects easily to your system via the cassette recorder. It will operate with any Model 1 or 3 TRS80 or Genie equipped with an external cassette recorder.

Complete and assembled — £14.99

PENPACK ONE

Four additional programs for your CSL Photopen. Penpack One includes a screen drawing routine, a geography test, Towers of Hanoi and Gomoku games.

On cassette — £2.50

Access — Telephone orders welcome.

MICRODATA

4 GREENBARN WAY, BLACKROD,
LANCASHIRE BL6 5TA
TEL. 0204 694265

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."
from the ZX Software review in Your Computer, May '82 issue.

"I had your Invaders-React cassette . . .I was delighted with this first cassette."
P. Rubython, London NW10

"I have been intending to write to you for some days to say how much I enjoy the games on 'Cassette One' which you supplied me with earlier this month."
E. H. London SW4

" . . .I previously bought your Cassette One and consider it to be good value for money!"
Richard Ross-Langley, Managing Director, Mine of Information Ltd.

CASSETTE 1
(eleven 1k programs)

machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
IChing, Mastermind, Robots, Basic Hangman.
PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k.
Cassette 1 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 2 costs £5.

CASSETTE 3
8 programs for 16k ZX81

STARSHIP TROJAN



Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photo 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

ZX-SCRAMBLE (machine code)



Bomb and shoot your way through the fortified caves.

GUNFIGHT
(machine code)



INVADERS
(machine code)



FUNGALOIDS (machine code)
GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft.
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.

"SPECTRUM SOFTWARE WANTED"

Recorded on quality cassettes, sent by first class post, from:
Michael Orwin, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)

PREMIER BUSINESS SYSTEMS

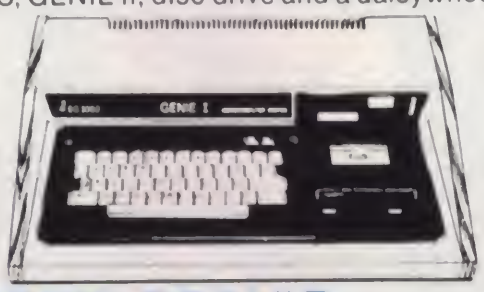
PREMIER WORD PROCESSOR PACKAGES

Premier offer a wide range of WP packages for the hobbyist, school user and small businessman, starting from as little as £370. All are based on our phenomenally successful WORD4WORD word processor which was our top-selling business program in 1981 and has had even more facilities added for 1982! Some of the packages use the EPSON MX80 F/T, the world's best-selling and most reliable dot-matrix printer we have ever sold.

WP6 uses a top quality, highly versatile daisywheel printer which gives a superb quality output and, using a special version of WORD4WORD PLUS, also gives true proportional spacing, right justification, bold print, underlining etc. This package has been developed especially for the small businessman/school user and breaks new boundaries in price/performance. It uses WORD4WORD SUPER PLUS, which features all the facilities of W4W, plus extensive file building and retrieval routines. The system is on permanent display in our showrooms.

The WORD4WORD supplied makes full use of the above features, and gives true proportional justification, whether the text is a letter or a series of columns. All disc-based packages are supplied with DOSPLUS and comprehensive file-handling.

WP1 W4W PLUS, GENIE II with numeric keypad	£369.95
WP2 W4W PLUS, GENIE II EPSON MX80F/T2 PRINTER all cables	£759.95
WP3 W4W PLUS, 48K GENIE 40 track disc drive DOSPLUS MX80 F/T2	£1245.00
WP6 W4W PLUS, GENIE II, disc drive and a daisywheel printer	£2282.75



MAIN GENIE DEALER

Premier Publications now offer the FULL range of Genie equipment, including expander boxes, disc drives and video monitors for the Genie and TRS-80 I/III range. Sample prices .....

GENIE I with FREE TOOLKIT II	£319.95 inc
GENIE II with FREE TOOLKIT II	£342.95 inc
40 track disc drive (EG400)	£229.95 inc
Twin 40 track drives	£379.95 inc
32K Expander Box (EG3014)	£224.95 inc
12 inch black & white monitor	£69.95 inc
9 inch high quality monitor	£92.00 inc
Parallel Printer Interface	£37.95 inc

DRAGON 32

MAJOR STOCKISTS AND SERVICE AGENTS

32K, 6809 256 x 192 HIGH RES, 9 COLOURS, FULL KEYBOARD FOR UNDER

£200 ! !

WORD4WORD PLUS

STUNNING NEW TRS-80/VG WORD PROCESSOR

WORD4WORD PLUS comfortably outperforms Word Processors costing many times its price. Some of its long list of features are:

Full screen editing & two way scrolling
Full text insert/delete on screen
Global Search & Amend
Text formatting to screen or printer
Cassette/disc storage of text
Vision load of stored cassette text
Standard letter & multiple copies routines
Type ahead buffer
Overtype correction
Page layout & numbering
Total printer control
Text highlighting for u/l recognition
Text block manipulation
Comprehensive tab & table generation
Printer spooler
Single keyword deletion
Four numbering systems
Word and phrase counters
Double & multiple spaced printing

W4W PLUS needs only 6K of memory space, yet gives facilities not found in many programs TWICE its size!

Its cursor can be driven all over the text in any direction, with auto-scrolling an integral and extremely useful feature.'

W4W PLUS is comparable to most purpose-built systems. Commissioned and developed by PREMIER with the hobbyist and school user in mind. Please state machine type and printer when ordering.

W4W PLUS can cope with the Centronics 737/9 and Tandy proportional spacing modes.

CASSETTE £39.95 DISC £43.95 FLOPPY TAPE £45.95.

POSTAGE & PACKING
Software 75p per order
EPROMS/DISCS 95p per order
HARDWARE £1.75 per item. Maximum £5.00.

ALL PRICES INCLUDE V.A.T.

UK101/OHIO SCIENTIFIC SUPPORT

Premier Publications, a main OSI dealer, can provide a wide range of add-ons for UK101 and OHIO owners, from manuals to full disc systems. Below is a small part of our range. A full cataglogue is available on receipt of an A5 SAE.

Product	Price inc VAT
SCREEN ENHANCEMENT KIT — 32 x 64, + 19 other screen sizes, all software selectable!	£55.95
BASIC 4 EPROM — cassette filenames, verify, crash recovery etc	£13.95
BASIC 5 EPROM — 17 new BASIC words inc. PRINTUSING,PRINTAT,GETKEY,HLIN,VLIN	£19.95
BASIC X EPROM — tape data handling, sound, printer, IF..THEN..ELSE, REPEAT..UNTIL.	£19.95
CODEKIT EPROM — Assembler/disassembler. Address transparent	£19.95
TOOLKIT II EPROM — renumber, find, delete, view, controlled list, replace, etc	£19.95
WORD WIZARD EPROM, disc or tape — multi-featured Word Processor	POA
CEGMON — our standard upgrade monitor	£17.25
MINI EPROM BOARD — used to fit any of our EPROMS (kit)	£15.95
FLOPPY DISC CARD — takes up to four 5.25in drives, OSI compatible (kit)	£49.95
JI Buffer Board — provides essential buffering for expansion (kit)	£19.95
32K DYNAMIC RAM CARD — superb value (built only)	£69.00
Motherboard — gives 8 slot expansion capability, 5a PSU, (kit)	£29.95
TEAC Disc Drive — cased with PSU	£229.95
Dual TEAC Drives — enclosed in single case with PSU	£379.95
ROM DOS — DOS using BASIC-IN-ROM for fast, economical results (2 disc set)	£19.95
LINK 65 — vital routines for 65D users, DUMP, CREATE, etc	£19.95
OS65D V3.3 — latest, much improved OSI DOS — SIX disc set	POA
SOUND/VIA Board — includes sound chip and 2 VIA chips!	£53.95
Daisywheel printers — RS232, superb print quality	£885.00
Steel case for UK101/OHIO computers	POA
SOFTWARE — many programs available	POA
FORTH — disc or EPROM versions	POA

PREMIER PUBLICATIONS

208 CROYDON RD., ANERLEY, LONDON SE20 7YX. TEL 01-659 7131

BARCLAYCARD VISA

USING ATOM WITH BBC BASIC

As everyone knows, the dialect of BASIC supplied with Acorn's popular Atom computer is very idiosyncratic. So it seems a sensible idea to fit the machine with the much nicer BASIC of the new BBC Microcomputer. Not surprisingly, a converted Atom is a poor relation to BBC Micro so it seems useful to conduct this review from the point of view of seeing how a converted Atom compares with both a BBC Micro and a standard Atom. That way, Atom owners should be able to decide whether they should go out and buy a full BBC Micro, or make do with the new board for their Atoms.

BBC BASIC is supplied on a small 16cm by 9cm printed circuit board which sits on top of the main PCB of the Atom. It is fitted by removing three chips from the Atom board, and then carefully slotting the little legs of the BBC board into the sockets that are now vacated. The Atom I was supplied with already had this modification carried out, so I cannot comment on its simplicity or complexity. It appears though, that dealers will carry out the necessary modifications for the faint of heart. Once the board has been fitted, the user can select either BASIC by the use of a simple switch, but my model had an optional three wire circuit fitted which allowed me to select the BASIC I wished to use from the keyboard. As the documentation I was supplied with was **very** provisional I cannot say whether the board is compatible with the many IC's which fit into the A000 socket on the Atom's main board.

For the curious, the board contains 2K of RAM, 20K of ROM in the form of a 16K BASIC ROM and a 4K operating system ROM, two empty 4K ROM sockets and nine assorted TTL chips. As the review progresses you will appreciate the need for all that circuitry.

The Atom I was supplied with was an Issue Five machine. The Atom in either BASIC is so slow in reading the keyboard, a touchtypist like myself has no difficulty in defeating the machine, and so losing keypresses in the process. The video section also appears to be improved, certainly there is none of the rolling that characterizes my Atom on some televisions.

Having fitted the BBC board, the machine powers up perfectly normally, that is, you have to press 'BREAK' before you can get the machine to do anything sensible. However, if you keep 'CONTROL' pressed whilst doing a 'BREAK', instead of the familiar 'ACORN ATOM' prompt appearing you get the prompt 'BBC BASIC'. Any further depressions of the 'BREAK' key will keep you in BBC BASIC. To return to Atom BASIC, you press 'SHIFT' and 'BREAK' together.

Initial experiments led me to believe that it was possible to have both a BBC BASIC program and an Atom BASIC program in the machine at the same time. Later experience showed that this is only possible if the BBC BASIC program is shorter than 256 bytes long, which is a pity. It is also impossible to change languages half way through a program, which is not very surprising when you consider that the two languages use completely different methods for storing programs.

I was unable to load BBC BASIC programs from my BBC Micro into the Atom when it was running BBC BASIC. I presume this is a hardware fault and that it is normally possible if not the whole product loses much of its appeal.

The table below shows how the three BASIC's under test performed the standard benchmark programs:

In all cases, I inserted lines to read and set the internal timer of BBC BASIC to carry out the timings on the two BBC BASIC machines.

Notice that the Atom under BBC BASIC runs approximately half as fast as a real BBC Micro. This is because the 6502 in the BBC Micro is run at 2 MHz, whilst the 6502 in the Atom only operates at 1 MHz.

The notable features of BBC BASIC for the owner of an Acorn Atom are that it is Microsoft BASIC compatible, that it is 'structured', so that one can do away with statements such as 'FIF', 'FINPUT', 'FPRINT' and 'FDIM' which are present in Atom Basic. The BASIC is also fast, comprehensive and gives you error messages in English which is preferable to being presented with just an error code.

A list of available statements and functions appears in Table II. Some of the interesting ones are:



Benchmark timings to nearest tenth of a second

Language	B1	B2	B3	B4	B5	B6	B7	B8
BBC BASIC on BBC Micro (Integer)	0.2	1.7	7.5	7.7	8.1	10.3	14.9	4.9
BBC BASIC ON BBC Micro (Real)	0.7	2.8	8.0	8.5	8.9	13.8	21.3	4.9
BBC BASIC on Atom (Integer)	0.5	3.3	14.3	14.6	15.4	19.5	28.2	9.2
BBC BASIC on Atom (Real)	1.2	5.4	15.2	16.1	16.9	26.1	40.5	9.3
Atom BASIC (Integer)	0.8	5.5	10.0	11.5	14.5	20.0	31.5	–
Atom BASIC (Real)	–	–	30.5	27.0	30.0	–	–	26.0

AUTO: which automatically presents the programmer with line numbers as a program is typed in.

CALL: which is an extended form of the LINK statement of Atom BASIC. It allows any number of parameters to be passed to a machine code program.

CHAIN: loads and runs a named program from cassette. No more '*RUN' commands.

READ, DATA and RESTORE: which should be welcomed with open arms by Atom owners up and down the country.

DEF: This statement allows the definition of procedures and functions.

DELETE: This deletes a range of program lines.

DIV: an integer division ▶

operator — it is considerably faster than using the normal '/'.

ELSE: This is an indispensable adjunct to the standard 'IF' statement. Notice however that the IF-THEN-ELSE of BBC BASIC is not global. This means all parts of the construction must appear on the same physical program line. Full error handling is provided, via the ONERROR statement, so doing away with the indirection operators used for this purpose in Atom BASIC.

GET, GETS and the variations of INKEY will remove the need for calls to &FFE3, often found in Atom BASIC programs thus making the process of scanning the keyboard for a key-press a lot simpler and easier to manipulate.

PAGE: This removes the need to alter location 18, in order to move around programs in memory.

The new RND statement of BBC BASIC can produce random numbers in a specific range, not just ±200,000,000.

The SOUND statement, while considerably less versatile than the BBC computer's SOUND statement allows notes to be sounded on the internal speaker, of specified frequency and duration.

TIME is a real time clock, counting in hundredths of a second. It appears the Atom's optional VIA must be fitted for this to work.

All the statements you know and love from Atom BASIC are still present, although they are sometimes known by different names.

People with ZX computers and the like will not be able to understand the glee of Atom owners when they discover that this module gives them 'proper' string handling.

Some of the more useful statements from BBC BASIC have, however, not been implemented. Specifically, none of the colour statements, GCOL and COLOUR, are supported, POINT for graphics work is absent and (not surprisingly) ENVELOPE and ADVAL are nowhere to be seen. From studying the documentation it would appear that Acorn made only a half hearted attempt to improve the graphics of the Atom, since none of the useful triangle drawing statements are present. Also it is not possible to mix text and graphics, along with any number of other disadvantages.

Atom owners who switch between the two languages regularly are in for a difficult time. For example in Atom BASIC, hexadecimal numbers are indicated by a hash symbol.

When you progress to BBC BASIC, you have to remember that the hash is used in the assembler, for immediate mode instructions, instead of the Atom's '@' symbol. For hex numbers you must now use '&'. However, in Atom BASIC this means "PRINT THE NEXT NUMBER IN HEX". All this can get very confusing.

The memory map of the Atom alters dramatically under BBC BASIC which will also cause a few problems. I was only supplied with provisional documentation, as mentioned previously, but I did manage to discover things like the screen is now mapped to &4000 (hex number), memory mapped input output is now situated at 28K and programs start at 2K. All of this makes BBC BASIC on the Atom effectively incompatible with the BBC machine for any programs which:

a) Use the screen, since the screen format is different, and the screen of the two machines are in different places in the memory map.

b) Use the area from &DOO to &DFF in the BBC machine for machine code storage, since this is now in the middle of the user program.

c) Use any of the cassette commands, since there is no buffered output on the Atom.

d) Use the MOS commands such as *FX, since these simply do not exist on the Atom.

The documentation I was supplied with consisted of 28 pages of photo copied A4. The first 20 pages consisted of brief descriptions of each keyword.

Next came a couple of pages detailing the operators and symbols used in BBC BASIC. While this was complete, there were no examples, so an Atom owner will be safe in the knowledge that ~indicates a hex number in a print statement, he may well still be baffled, since that is the only information supplied. A half page tells you which variable names are legal, and the order of priority when expressions are worked out. Next comes an (incomplete) list of error messages.

The rest of the manual is taken up with a technical description of the operating system calls and the assembler.



Users of the BBC computer will be familiar with the VDU drivers. These software modules provide access to many of the machine's more advanced facilities. Many of these do not exist when you use the Atom's operating system, but, more annoyingly, many of those that are present are not documented.

The manual finishes with four example programs: Lissajous figures (two varieties), the C-curve and the tower of hanoi problem.

After studying the manual closely again for the purposes of this review, a sickening feeling gripped me. Perhaps this is the final manual after all, and not a provisional one at all? If this is so, I can only hope that prospective purchasers will also be provided with the BBC Micro's 'User Guide' as well, for more detailed documentation. If not, this is the worst example of the art of documentation ever.

To sum up, if your interest lies in games or graphics, you should not consider the BBC BASIC for the Atom, otherwise it is an invaluable product, and I would recommend it unreservedly.



B1

```
10  FOR K=1 TO 1000
20  NEXT K
```

B2

```
120  K=0
130  K=K+1
140  IF K<1000 THEN 130
```

B3

```
210  K=0
220  K=K+1
230  A=K/K*K+K-K
240  IF K<1000 THEN 220
```

B4

```
310  K=0
320  K=K+1
330  A=K/2*3+4-5
340  IF K<1000 THEN 320
```

B5

```
410  K=0
420  K=K+1
430  A=K/2*3+4-5
440  GOSUB 2000
450  IF K<1000 THEN 420
```

B6

```
520  K=0
530  DIM M(5)
540  K=K+1
550  A=K/2*3+4-5
560  GOSUB 2000
570  FOR L=1 TO 5
580  NEXT L
590  IF K<1000 THEN 540
```

B7

```
660  K=0
670  DIM M(5)
680  K=K+1
690  A=K/2*3+4-5
700  GOSUB 2000
710  FOR L=1 TO 5
720  M(L)=A
730  NEXT L
740  IF K<1000 THEN 680
```

B8

```
810  K=0
820  K=K+1
830  A=K↑2
840  B=LN(K)
850  C=SIN(K)
860  IF K<1000 THEN 820
2000 RETURN
```

TABLE II
BBC BASIC for the Atom Keywords

ABS	ACS	AND	ASC
ASN	ATN	AUTO	BGET
BPUT	CALL	CHAIN	CHR$
CLEAR	CLOSE	CLG	CLS
COS	COUNT	DATA	DEF
DEG	DELETE	DIM	DIV
DRAW	ELSE	END	ENDPROC
EOR	ERL	ERR	ONERROR
EVAL	EXP	FALSE	FN
FOR	GET	GET$	GOTO
GOSUB	HIMEM	IF	INKEY
INKEY$	INPUT	INPUT LINE	INSTR
INT	LEFT$	LEN	LET
LIST	LISTO	LN	LOAD
LOCAL	LOG	LOMEM	MID$
MOD	MODE	MOVE	NEW
NEXT	NOT	OFF	OLD
ON	OPENIN	OPENOUT	OPT
OR	PAGE	PI	PLOT
PRINT	PROC	RAD	READ
REM	RENUMBER	REPEAT	REPORT
RESTORE	RETURN	RIGHT$	RND
RUN	SAVE	SGN	SIN
SOUND	SPC	SQR	STEP
STOP	STR$	STRINGS	TAB
TAN	THEN	TIME	TOP
TO	TRACE	TRUE	UNTIL
USR	VAL	VDU	WIDTH

Cambridge Computer Store

Two Great Micros in stock now!

BBC Computer





Sinclair ZX81

Price includes VAT

Cambridge Computer Store

1 Emmanuel Street, Cambridge CB1 1NE
Phone (0223) 358264/65334

Also in our 'Budget Micros' Dept: Commodore VIC-20

ANIROG Computers

"VIC 20 - AUDIO CASSETTE INTERFACE" uses earphone and microphone sockets of the recorder - built and tested - £10.50.
Motor control via mic switch £2 extra.
3K RAM + 2 ROM SOCKETS
+ PROGRAMMER'S AID + HI - RES GRAPHICS - £49.95

SPECIAL VIC - 20 OFFERS

BEGINNER'S BAG - VIC 20 + Cassette Drive + introduction to basic (part 1) + 3 cassette games + 10 blank cassettes - £240.

ECONOMY BAG - VIC 20 + cassette interface + 3 cassette games + 2 blank cassettes - £198

GAMES BAG - VIC 20 + Joystick + Cartridge game £205

VIC 20 SOFTWARE WITH A DIFFERENCE

ALL ANIROG SOFTWARE IS IN HIGH RES. GRAPHICS AND HAS FAST M/C DISPLAY.

LOST IN THE DARK - Occassional flashes of lightning would show you the way to the sacred chalice in the pitch dark maze. The maze is fraught with dangers and hides an unseen beast which is cunning enough to work out your moves almost before you make them. The game stretches your powers of memory and concentration to the limit. A unique maze adventure game - £6

SPACE RESCUE - Rescue the survivors stranded on a devastated star base. You have to thread your way through fast moving debris to land, rescue and then return to dock with the mother ship - £6.

SLALOM - SKI - The giant slalom on the scenic mountain slopes. You need nerves of steel and split second reactions - £6

GOBLINS GOLD – The gold is well guarded by the goblins and their henchmen. Have you the cunning and agility of mind to outwit them.
A high pressure adventure game - £6

HUGE SELECTION OF **VIC 20 - SPECTRUM - ZX81 BBC MICRO SOFTWARE - COMPUTER BOOKS - ADD ON HARDWARE**
Authorised dealer for **COMMODORE - ARFON - STACK - BUG BYTE - AUDIOGENIC - LLAMA - DK'TRONICS AND MANY OTHERS**
ORDER 2 OR MORE BOOKS OR SOFTWARE FOR 7.5% DISCOUNT
SEND S.A.E. FOR CATALOGUE.PLEASE STATE THE COMPUTER TYPE.

Mail Order
Payment by cheque, P.O., VISA or ACCESS

Counter service,
CO-OP CRAWLEY

AR

26 Balcombe Gardens, Horley, Surrey.
Phone order: Horley (02934) 2007/6083

WEST OF SCOTLAND

BBC MICROCOMPUTERS

SOFTWARE
3D GOLF, MONSTER MAZE, DODGEMS, PINBALL AND MANY MORE
SEND S.A.E. FOR DETAILS.

HARDWARE
MODEL A's AND B's, MONITORS, SEIKOSHA AND EPSON PRINTERS, NORMALLY EX-STOCK.

SHARP

MZ80 'A' AND 'B'

LARGE RANGE OF SOFTWARE AVAILABLE.

PERSONAL COMPUTERS
20 Wellington Square,
Ayr
KA7 1HB

MP

B.B.C. MICRO SOFTWARE

'SPACE FIGHTER'	The Galaxy is invaded by Alien Fleets as you fly your ship across the empty wastes of space.
	In this excellent game will you survive this very complex test of your ability.
£8.50	High resolution colour graphics show your ship and the enemies positions.
'SHOOTOUT'	Pit your wits against the Western Gunfighter out to kill. Run and dodge behind the wagons and cactus whilst
£5.00	shooting at this killer. Full colour graphics and sound.
'HANGMAN'	A colourful and entertaining version of this well known word game. Three levels of play against the clock. As you
£4.00	improve your score the response time is reduced.
'CHARACTER GENERATOR'	No more designing characters on paper. This useful tool program makes it simple. Ideal for defining various character sets. Space invaders symbols etc. Store on
£3.00	tape for future use.
'STOP PRESS'	Special offer — Set of four **£18.00**
	Coming soon — A new adventure game — Watch this space for **FIRIENWOOD**
'PROGRAMS'	A 32K Memory Required Unless *

ALL PRICES INCLUDE POSTAGE: CHEQUES AND POSTAL ORDERS PAYABLE TO: "MICRO-POWER SOFTWARE"

MP
SOFTWARE & SERVICES

165 Spital Road, Bromborough, Merseyside L62 2AE
TELEPHONE: 051 334 3472

Silicon Centre Edinburgh

BUSINESS AND PERSONAL COMPUTERS

The SILICON CENTRE has moved to new LARGER premises

Please note our new address:-

Silicon Centre
6/7 Antigua Street,
Edinburgh
TEL: 031-557-4546

(nr. St. James Centre)
(top of Leith Walk)

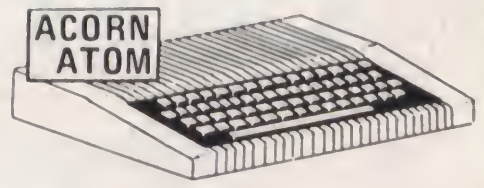
o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o

MAIN ATARI AGENTS

ACORN, ATARI, BBC COMPUTERS, OSBORNE, SHARP, VIC, XEROX 820 : TANTEL PRESTEL, PRINTERS, SOFTWARE, BOOKS, COMPUTER FURNITURE.

*Bring this advert with you and we will give you 10% off ANY piece of Atari software.

VIC-20



	£
VIC-20 CPU	150.00
VIC-20 C2N Cassette	34.00
VIC Printer	187.00
VIC Floppy Drive	304.00
VIC Memory Exp. Board	98.00
VIC 3K RAM Cartridge	23.50
VIC 8K RAM Cartridge	35.00
VIC 16K RAM Cartridge	56.50
VIC Programmer's Aid Cart.	27.00
VIC Super Exp. High Res	27.00
VIC Machine Code Cart.	27.00
VIC Joystick	6.50

* 10% off VIC Tapes and Games Cartridges

B.B.C.	
A — B Expansion + Test	90.00
Part Expansion (32K RAM + Printer I/face) + Test	46.00
RAM Expansion Kit	26.00
Printer Interface Kit	9.83
Bus Expansion Kit	8.65
Analogue Input Kit	9.90
BBC Joysticks per pair	19.50

Please ADD 15% V.A.T.
Orders Over £20 Post Free
Orders Under £20 add 50p Postage

	£
ATOM 8K + 2K Kit	119.00
ATOM 8K + 2K Assy	149.00
ATOM 8K + 12K Assy	170.00
ATOM 12K + 12K Assy.	199.00
ATOM Power Supply	8.00
ATOM Econet	70.00
Prog. Power Toolbox	24.50
ATOM Disc Pack	275.00
ATOM-BBC ROM	43.00
FP Rom	19.00
2114L RAM	0.89

*10% off Acorn & Bug-Byte ATOM Software

PERIPHERALS

Printers (Atom or B.B.C.)	
MX80T	290.00
MX80T/3	299.00
MX80FT/3	340.00
MX82	330.00
MX82FT	362.00
MX100/3	440.00
GP 80	185.00
BBC or ATOM Jumper	15.00
Monitors (B.B.C.)	
BMC	240.00
Microvitec	260.00

Books & Software - Spares and Repair Service

- Send for Stock/Price Lists -

D. A. COMPUTERS LTD.,

184, London Road, Leicester LE2 1ND. Tel: (0533) 549407

P
P R E
P R E S T
P R E S T E L
E S T E L
T E L
L

Calling all hobbyists, schools, software houses and budding programmers!

We would like to hear from software writers who'd like to see their programs published on Prestel for everyone to use. We want programs for most micros — including Apple, BBC, Commodore, Tandy, Sinclair — to be included in our database 'Aladdin's Cave'. Of course we are willing to pay for any that we publish.

If you are interested then please contact us at:

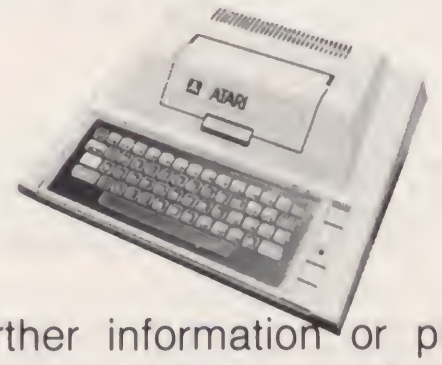
Aladdin's Cave,
Prestel Headquarters, Telephone House,
Temple Avenue, London EC47 0HL.

Prestel and the Prestel symbol are trademarks of British Telecommunications.

ATARI®

COMPUTER SOFTWARE NOW AVAILABLE IN SOUTH WALES

We are the largest stockists in South Wales of Software for the Atari Computers and Video Games. Consul with over 100 programmes available for demonstration. We can also upgrade your 400 computer to 32K for **£69.95** inc. VAT.



For further information or placing an order, write or telephone:

HI-FI WESTERN LTD

52 Cambrian Rd
Newport, Gwent
0633 — 62790

6 The Arcade
Cwmbran, Gwent
0633 — 64834

THE BUFFER MICRO SHOP

(NEXT TO STREATHAM STATION)

★★★

NEW SOFTWARE SHOP EXCLUSIVELY FOR

SINCLAIR COMPUTERS

PROGRAMS, GAMES, "ADD/ONS"

★★★

SPECTRUM SOFTWARE NOW AVAILABLE

★★★

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: VDU's

★★★

374A STREATHAM HIGH ROAD,
LONDON SW16
Tel: 01-769 2887

S.A.E. APPRECIATED FOR CATALOGUE

ZX81 Spectrum 16K

MANAGEMENT GAMES

AIRLINE

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

AUTOCHEF

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 are also given options on consignments of wines and food and loan contracts. You will be made to resign if you are not successful. There are 3 levels of difficulty.

PRINT SHOP

You own a small printing company and are required to decide on (a) the number and type of staff you employ and when to increase or reduce staff (b) the amount and type of paper you stock (c) the week in which work is scheduled (d) the quotation for each. Are you an entrepreneur? Test your business acumen to the limit! There are 3 levels of difficulty.

These simulations are realistic and are not only fun to play but are educational. The user will learn to interpret Trading Profit and Loss Accounts and Balance Sheets. Our programs are very comprehensive and fully utilise the 16K RAM. ALL PROGRAMS INCLUDE DETAILED INSTRUCTIONS.

£4.75 for one, £8.00 for any two or £12 for three. Please state computer type and send cheque to

C.C.S.

DEPT P
CASES COMPUTER SIMULATIONS
14 Langton Way
London SE3 7TL.

New for ZX81 USERS

Even MORE MEMORY

with our Byger Byte 32K + Ram Pack

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

No trailing leads or wires — all you need do is plug the existing 16k Ram Pack into the back of the new Byger Byte 32k + Ram Pack, and bingo, 48k of memory.

Uses existing power supply. The new 32k + Ram Pack is tested and guaranteed with the following 16k Ram Packs: Byg Byte, Sinclair, Downsway.

ALSO AVAILABLE

16k Ram Pack — **£22.00**
New 32k + Ram Pack — **£39.50**
Standard 32k Ram Pack — **£35.00**
64k Ram Pack — **£53.95**

Tape loading Interface — for trouble free loading of Programs — **£9.50**
New High Quality Keyboard with Bleep + Reset — **£49.95**
All prices are inclusive of VAT and Free Postage and Packing

PLEASE SEND ME

☐ 16k Ram Pack	**£22.00**	☐ 64k Ram Pack	**£53.95**
☐ New 32k + Ram Pack	**£39.50**	☐ Tape loading interface	**£9.50**
☐ 32k Ram Pack	**£35.00**	☐ Fully cased keyboard	**£49.95**

PHOENIX MARKETING SERVICES

OAKLANDS HOUSE, SOLARTON ROAD, FARNBOROUGH GW4 9QL.

Name _____

Address _____

_____

Make cheques payable to **Phoenix Marketing**.
enclose my cheque for £ . . . . . .

Please debit my Access/Barclaycard



_____

Signed _____ Date _____

Home Computer - Starter Packs

AT ROCK BOTTOM PRICES

FREE GAMES CASSETTE WITH EVERY CONSOLE

DRAGON

★Britain's newest Personal Computer using the latest 6809E processor.
★Full 32K Specification
★Microsoft Basic, Advanced Graphics, Sound, Editing, 9 colour display
★Professional quality keyboard
★Plug-in connection for Joystick, Cassette, Printer, Games.

★ DRAGON 32K - £199 ★



Cartridges –
Ghost Attack **£24.95**
Octaves **£19.95**. Cassettes **£6.95**
20% off all accessories bought with a Console

VIC 20



VIC 20 + Cassette Unit + Intro to Programming + 10xC12 Cassettes + Blitz Cassette – **£245**

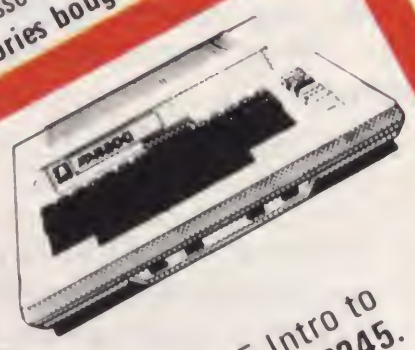
STARTER PACK 1.

STARTER PACK 2.
VIC 20 + Floppy + Printer – **£699.**

Full range of Accessories Available.
20% off games cartridges with any starter pack.

VIC 20 – **£189.95**
Cassette Unit – **£44.95**
Printer – **£219.95**
Single Floppy – **£349.95**

ATARI



AM400 - £189.95
A800 - £479.95
Recorder - £49.95

STARTER PACK 1.
16k Computer + Cassette Deck + FREE Intro to Programming + 10 FREE C12 Cassettes – **£245.**

OR

½ price Programmer Kit with every 16k Computer + 10% off most cartridges and cassettes bought with every Console.

ACORN ATOM

FREE power supply with every ATOM
8+2 Kit – £130. 12+12 – £235. Colour Encoder – £45.24
4k Floating Point – £23.30. Convert your ATOM to BBC Basic – £49.95.



SINCLAIR



ZX81 – **£49.95**
Printer - **£59.95**
16k RAM - **£29.95**

STARTER PACK 1.
ZX81 + 16k RAM + Printer +10xC12 Cassettes + 2 Rolls Paper – **£139.95**

STARTER PACK 2.
ZX81 + 16k RAM + 10xC12 Cassettes – **£79.95**

BBC

Model B – **£399.** Upgrade A to B – **£95.**
Disk Drive – **POA.**

ALL PRICES INCLUDE VAT

10% DISCOUNT ON ALL TANGERINE ITEMS IN STOCK
DISCOUNTS AVAILABLE ON QUANTITY ORDERS for Business, Educational and Export. Try us for Rock Bottom Prices!

EXPORT

Single or QUANTITY EXPORT orders welcome. NO VAT.
Experience of exports worldwide-full documentation
MONITORS, PRINTERS, SOFTWARE.
Popular prices on all popular Computers.
Send A4 S.A.E. for latest FREE Brochures & Pricelists

CASTLE ELECTRONICS

(0424) 437875

CASTLE ELECTRONICS Dept.PCT.
7 CASTLE STREET, HASTINGS, E.SUSSEX

TECHNICAL ENQUIRIES

MICROANSWERS is Personal Computing Today's Technical Enquiries Service. Each month we will endeavour to answer your questions on the subject of micro-computing. We would love to hear of your problems (honest!) as it is certain that if *you* are having trouble then other users of your machine will also be suffering.

So here's your chance to lighten your burden by sharing your troubles with Personal Computing Today's panel of experts.

Address your letters to:
"Micro Answers"
Personal Computing Today
ASP Ltd
145 Charing Cross Road
London WC2H 0EE

If you wish a personal reply, please enclose a stamped addressed envelope *and the reply coupon from this page*. This is to enable us to give priority to regular readers of PCT.

Dear Sir
I am a newcomer to the use of computers and having recently purchased a SHARP MZ80K machine, I was curious as to whether the basic tape from the SHARP MZ80A would function on the SHARP MZ80K. (This would give me a few extra functions, although I'm not sure what). Please advise.

Consequently, I did some ringing around to dealers and Sharp in Edinburgh and received replies of "No" and "I don't know". Fortunately, a friend of mine purchased a SHARP MZ80A machine and I "stole" a copy of his BASIC tape and loaded it into my machine and I think it works. Please could you confirm whether the SHARP MZ80A BASIC tape will run my machine or will it give me trouble later on as my programs become more complicated.

Also, am I likely to come across any other complications eg printer interface.
I Wareing
Leyland

Although the MZ80A tape will function in your MZ80K for small, simple programs you will run into problems on larger, more complex programs. So unfortunately, if you want to save yourself anguish and frustration in the future, stick to the BASIC tape for your model.

Dear PCT
I am giving consideration to the purchase of a Sinclair ZX Spectrum. However, I don't wish to make such an outlay until I have been able to find out what a computer will do and if I would have the IQ to operate one.

As you will gather from the above I know little about computers, so can you help by suggesting an inexpensive paperback introduction or guide for beginners.
D A Churchward
Watford

Many people are under the misapprehension that you have to be a registered genius in order to use a microcomputer, this couldn't be further from the truth because the small computers that are available today have been designed to be used by people like yourself.

Two books which would serve as a useful primer for the computer experience are:
The Computer Book by Robin Bradbeer, Peter De Bono and Peter Laurie.
Personal Computer Book by Robin Bradbeer.

Both these books give you information about what a computer is, what it can do and how it works. The latter title also gives a run down on some of the more popular machines on the market. They are both available from good bookshops.

Sirs
Having received my 16K Spectrum and found how to make it go BEEP etc, I typed in some ZX81 programs, only to find that (unless extremely simple) they do not work!

I think this is because the character codes have been changed to ASC11. Is this true? And if so, how can I convert them? (i.e. CHR$ CODE 33).

Also do PEEK and POKE have to be altered?

These questions will affect a great many people so please try to answer.

Like the mag, by the way.

Thanks.
G Kennedy
St. Leonards-on-Sea

You are partially right in saying that the Spectrum codes have been changed to ASCII. The character codes do conform to ASCII from 32 to 96 although there are some standard ones outside this range e.g. CHR$(13), which still stands for ENTER or RETURN.

There is no easy way to convert between the two values so perhaps the easiest and safest method is to acquire a ZX81 manual, check the meaning of the ZX81 codes in the program and look up their equivalents in appendix A of the Spectrum manual.

As for PEEK and POKE, you have a problem. The Spectrum screen is not constructed in the same way as the '81 screen. The difference in the way that character information is displayed is so great that PEEKing and POKEing are virtually impossible. The alternative is to use the PRINT AT command instead of POKE and the SCREEN command instead of PEEK.

Dear PCT
Are the game cartridges used with the Atari Video Computer System compatable with the Atari 400 or 800 computers? What about the VCS joysticks?
G Nunn
Gillingham

The answer, I'm afraid is no. The two systems are completely incompatable. It is worth pointing out that the games cartridges that are available for the Atari computers are of a much higher standard and usually offer the player a lot more choice as to the configuration of the game.

On a positive note, all the games controllers for the VCS can be used on the computers, as they all have standard connectors.

Dear Sir
May I first of all welcome you into this hectic and strenuous market. Your magazine seems to contain much more than others, I came across it looking for another and now I'm glad it was on the rack. There are one or two questions I would like to ask:

I have a character generator program and have no idea how to use it or to display characters I've saved from it. When I complete the LOAD cycle, the VIC just acknowledged the fact that the character was in the memory. How can I now use them.

I connect the VIC expansion slot to a memory box on the table, by means of a cable or such similar thing. I have seen ads for Ribbon cable – can a user connect a 24 way cable to the expansion port and a box containing cartridges and other things.

I would like to expand RAM as cheaply as possible. So what's the possibility of more memory?
Robin Bohd
Whitchurch

The best way to check whether the characters are in memory or not is to change the value in the register which holds the address of the character ROM. On the VIC this is location 36869. If you change the value stored in this location by POKEing it with a new number then it will think that its character generator is in a different place, hopefully where you have just loaded your character set. The values to try in this location are 255, 254, 253, as this will change the pointer to the three locations in memory where the VIC can store an alternative character set.

When you do this, any characters on the screen will then either be displayed as garbage, meaning the characters aren't stored in this location, or they will appear as your user-defined characters, meaning that you have the right value. This will tell you if they are in the memory and what to do to switch the VIC to use your character set. If you can't locate the characters by this method then it means that they are not in memory, (or at least in a place where you can use them). If this is the case then its back to the drawing board and check to see whether or not the program which actually generates the characters is working properly.

Putting your expansion memory in a box and connecting it to the computer by a ribbon cable is not really a viable idea. This is because the longer the cable then the more likely it is that you will get interference on the data signals, causing your program to be corrupted, or, because the length of cable will slow the access speed of the computer down, meaning that it will not be able to properly read or write to the expansion memory, the machine will 'crash'. But if you want to try it you might be lucky and get away with it.

One of the most economical ways to expand the computer is to buy the Upgradable Ram Cartridge, made by STACK computers. You can buy this cartridge with different amounts of memory, starting at 3K and then at a later date if you want more memory, you can open up the case and plug more RAM chips into the sockets provided. So the cost of expansion is then governed by the cost of the ram chips, which can be bought from electronics suppliers.

PRIORITY REPLY

September 1982 Issue

Personal Computing Reader Enquiry Service



Name .....

Address .....

.....

.....

.....

.....

.....

.....

.....

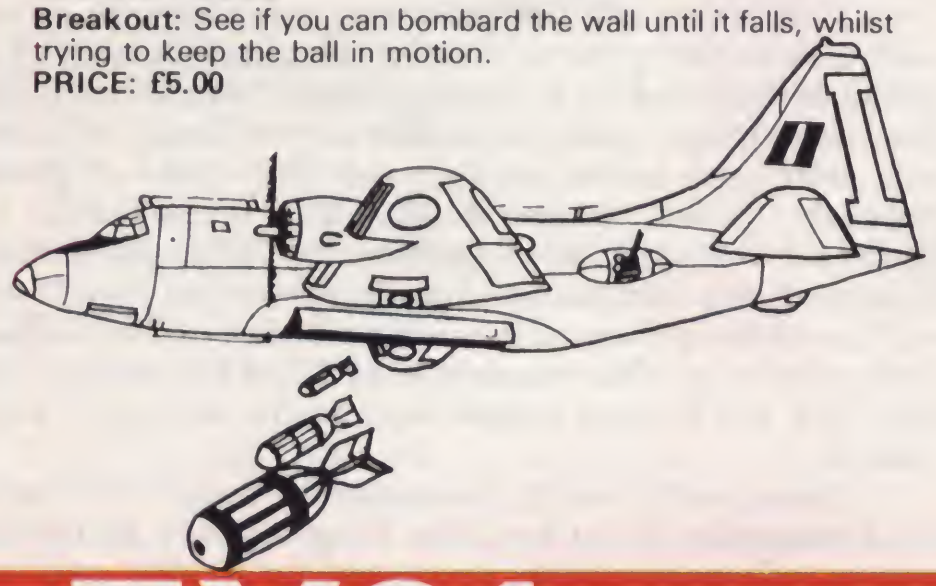
.....

.....

Spectrum Software

MISSILE COMMANDER AND LUNAR LANDER
Missle Commander: defend your city against ICBM's streaming from the heavens, causing a series of mutlicoloured, noisey explosions. You must also deal with marauding enemy bombers. There are 10 skill levels, and/or on screen score.
Lunar Lander: falling towards the lunar surface your lander must be brought to a safe halt on the green moon. A new surface is generated on each run.
PRICE: £5.00

POLECAT AND BREAKOUT
Polecat: A completely original and ingenious maze program in which you are a rabbit and the computer is a Polecat. The action takes place in one of over a million underground mazes. The plot involves the rabbit collecting carrots and bringing them back to his burrow whilst avoiding the attention of the ravenous Polecat.
Breakout: See if you can bombard the wall until it falls, whilst trying to keep the ball in motion.
PRICE: £5.00



YOUR SOFTWARE WANTED NOW

WE PAY AUTHORS **THE BEST RATES** FOR THE BEST SOFTWARE.

BOMBER AND FRUIT MACHINE
Bomber: This fast-action game involves the destruction of cities quickly before you crash into the buildings.
Fruit Machine: Similar to the familiar one-armed bandit, with very realist graphics.
PRICE: £5.00

CRAZY RACE AND SUBHUNT
Crazy Race: You are driving around a racing track. How many obstacles can you run over before you crash?
Subhunt: You are a helicopter pilot firing down at submarines, destroying them before they destroy you.
PRICE: £5.00

ZX81 — Software

ZX VIDEO GAMES

This latest package of software to be released must surely be the most amazing available in the world. It features on one cassette all the fast action machine code games that other companies would sell for £5.00 each, but we are able to bring you *all* the following Machine Code Arcade games for that price. Not only are they excellent value for money but they are of the finest quality available for the ZX81. ZXVG contains.

UFO BOMBER

You are on a mission to destroy enemy fuel pumps and installations, eight directions of movement through caves, fuel dumps and over rocky lunar terrain. You drop smart bombs and can straffe with your gun that fires streaming laser shells. This game is completely addictive, and gives you on screen and Hi scores.

SPACE INVADERS

This is not our "version", this is just like the real thing, with four types of crawling invaders, defences that crumble as they are hit, UFO's for extra scores, Onscreen scoring and Hi scores. This game is brilliant!

GALAXIANS

Wave after wave of sweeping invaders drop their bombs at you. Your only hope is to dodge and destroy them. This is a most addictive game, and we guarantee that this game will make your ZX81 really come to life.

This game pack contains some other exciting machine code games, but you'll have to get a copy to find out what they are!

We absolutely guarantee that this will be the best value pack of video games software you have ever had, for quantity *and* quality. To make sure, just ask someone who has had this pack, enquire at your local computer shop, or send off for it to us.

NEW SHOWROOM NOW OPEN

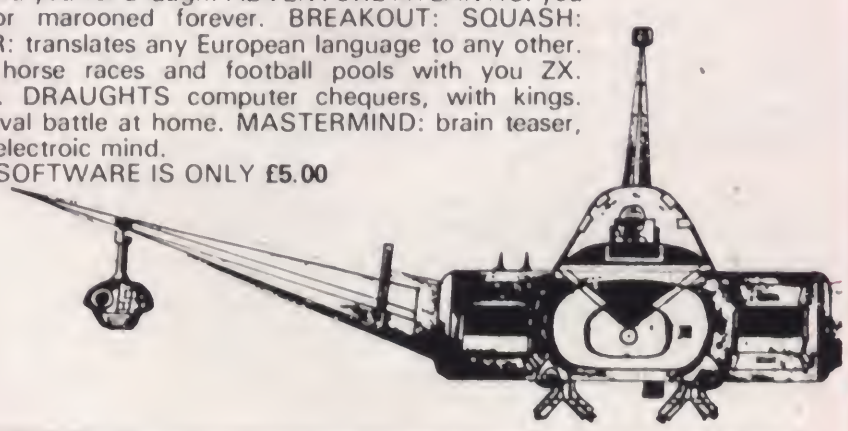
830, HYDE RD, GORTON, MANCHESTER.
MAIL ORDER DEPT TO CONTROL TECHNOLOGY
39, GLOUCESTER RD, GEE CROSS, HYDE,
CHESHIRE SK14 5JE.
(061-368 7558)
ALL PRICES INCLUDE VAT AND P&P.

ZX BUSINESS SYSTEM

Now installed in many businesses, comes with PURCHASE, SALES LEDGER for 100 + entries per week, does daybook analysis, VAT incl. and excl., totals, password protection plus many more excellent features. You also get a STOCK CONTROL, MAIL LIST and PHONEBOOK. Easy to use, designed for everyday small businesses. Includes instruction book and tape. **£17.00 incl. VAT.**
And does the job of systems costing hundreds of pounds

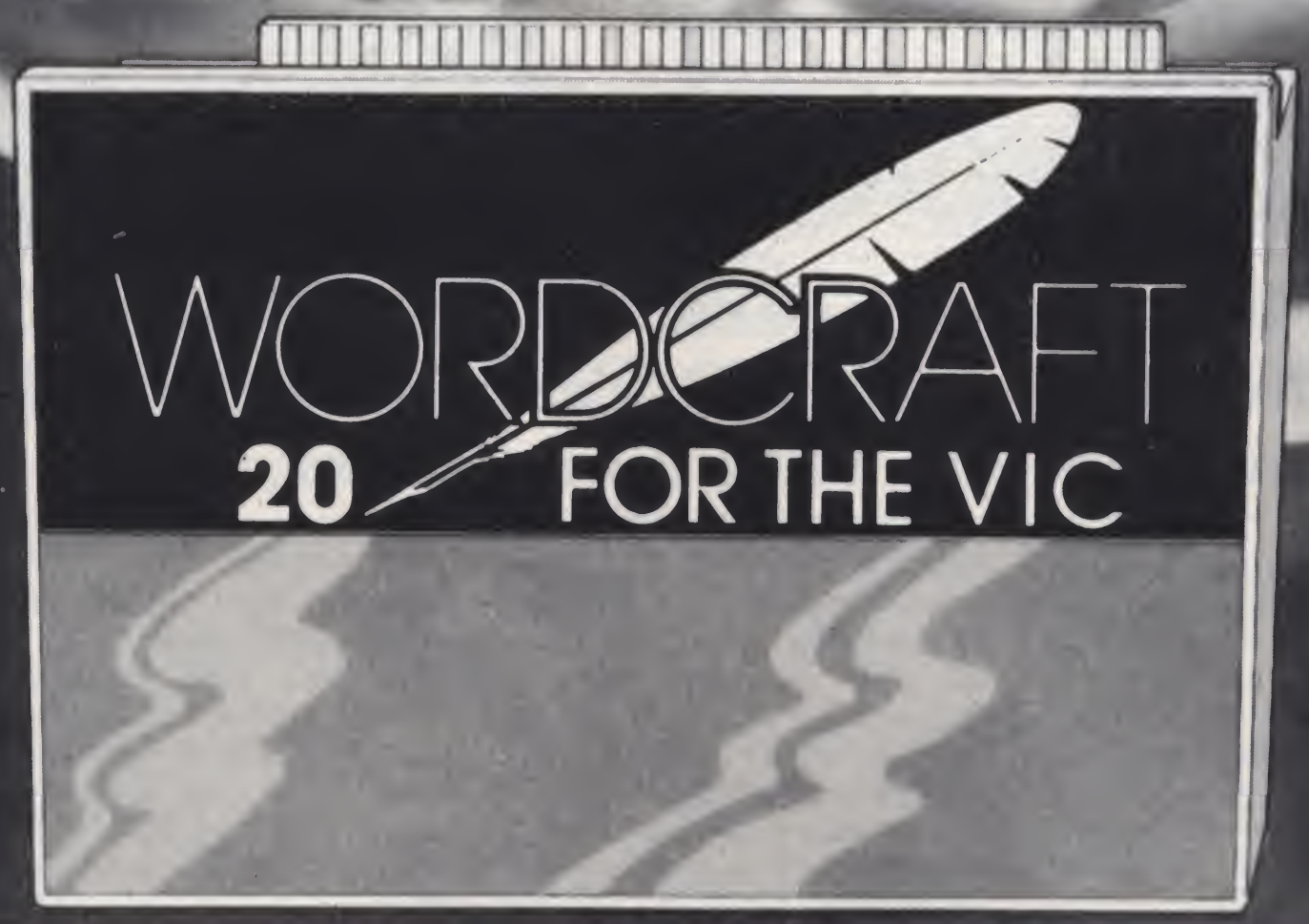
16K PACK 123

Pack 1, 2 & 3 include all of:
AIR TRAFFIC CONTROL: Animated radar screen of busy airport shown. You must bring planes into land; INVADERS SELFPLAY; PHONEBOOK — keep friends' and relatives numbers on cassette. COMPUTER DATING, who will it pick for you and those around you for a laugh. ADVENTURE ATLANTIC: you may become very rich or marooned forever. BREAKOUT: SQUASH: LANGUAGE TRANSLATOR: translates any European language to any other. COMPUTAPUNT: predict horse races and football pools with you ZX. INDISCO, video roadracer. DRAUGHTS computer chequers, with kings. BATTLESHIPS, nautical naval battle at home. MASTERMIND: brain teaser, see if you can beat a microelectroic mind.
THIS MASSIVE PACK OF SOFTWARE IS ONLY **£5.00**



Please send me as soon as possible the following:
☐ _____ £____
☐ _____ £____
I enclose a Cheque/P.O. for the total £____
NAME _____
ADDRESS _____
_____ POSTCODE_____

A NEW ERA OF WORD PROCESSING



The introduction of Wordcraft 20 for the VIC brings the benefits and advantages of full scale word processing directly to the general public.
Until now only the business world could afford word processing systems but this amazing price breakthrough makes it available to everyone.
Wordcraft 20 comes on a cartridge ready to plug into the back of the VIC. Included in the cartridge is an extra 8K of RAM that is also available for use with other programs – so not only do you get a word processor but you also get a memory expansion thrown in. The system also comes with complete documentation catering both for the inexperienced user and for those already familiar with Wordcraft 80.
Just look at these features:

★ Full use of colour and sound.
★ Full compatibility with VIC 1515 printer, parallel printers or RS232C serial printers.
★ Full control over margins, document width, tab stops, decimal tabs, justified output, multiple copies. Complete control of the final output.
★ Automatic underlining and emboldening.
★ Full screen display with automatic paging.
★ Full storage and retrieval facilities from disk and tape.
★ Full compatibility with Wordcraft 80.
★ Name and address capabilities – including labels.
★ Full document merging facilities.

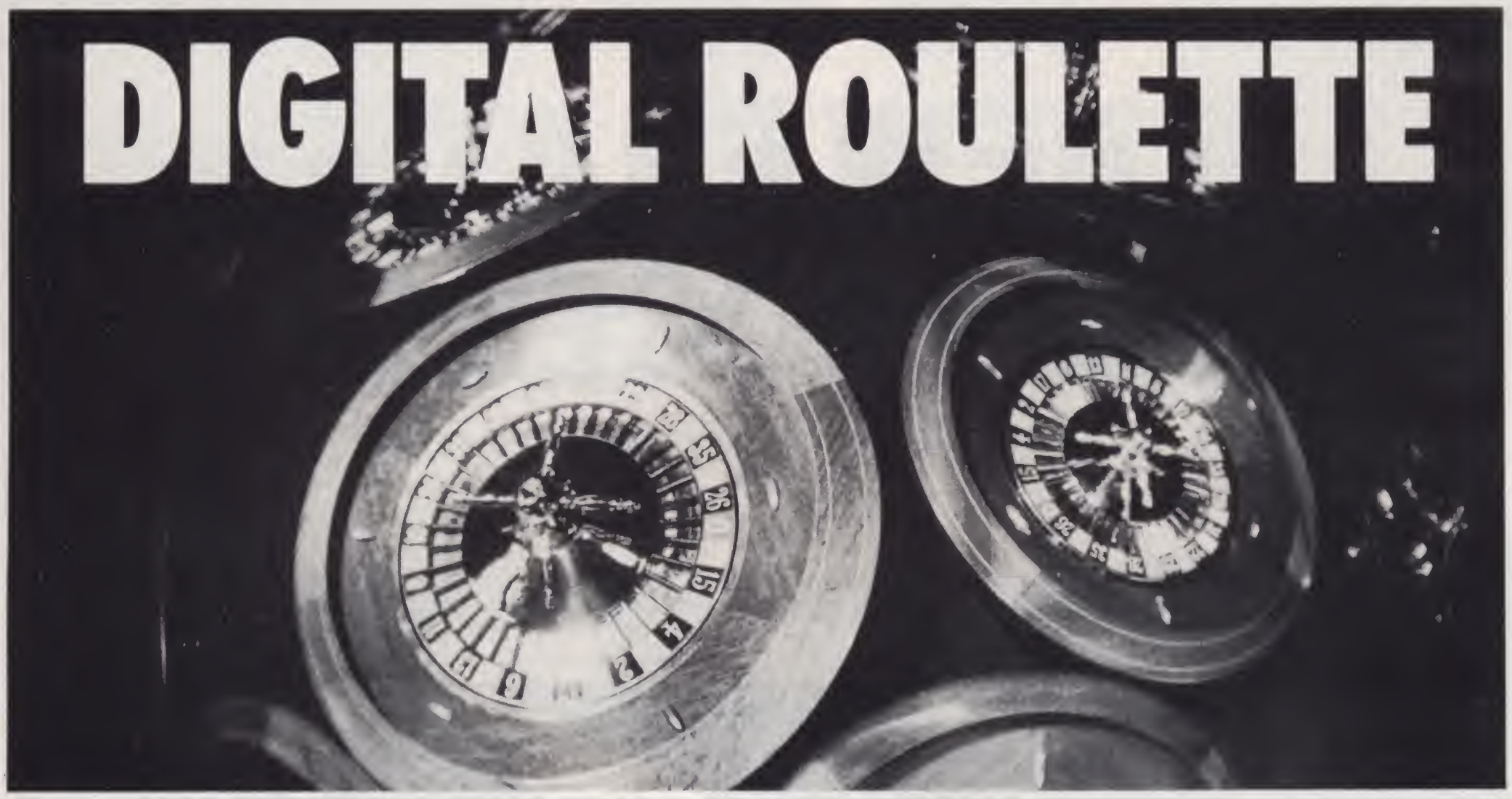
Wordcraft 20. The package that the VIC user has been waiting for. A word processor of proven quality at a low price.
For the first time ever, every home can have one.

audiogenic LTD

Wordcraft 20: £125.00 inc. VAT and p&p. Available from all VIC dealers or direct from Audiogenic Ltd. PO Box 88, Reading, Berks. Tel: 0724 586334.
Wordcraft 20 is copyright P.L. Dowson 1982.

SOFTWARE

DIGITAL ROULETTE



In this months Gamesboard, Simon Williams explores the difficulties of transferring the infamous casino game Roulette onto a computer.

Roulette is a casino game which probably originated in France; some say it was invented by the scientist Blaise Pascal in the seventeenth century. It is now played in clubs all over the world and fortunes are reputedly won and lost on a spin of the wheel. Digital Roulette is played along the same lines as standard roulette.

The original idea of programming the game of Roulette for the TRS-80 Model I was to try to simulate the action of the wheel graphically on the display. The resolution available on the screen (128x48 graphics blocks) soon showed that it would be impossible to properly depict a 37 sided wheel in anything approaching a circular format. It was therefore decided to reproduce the board as accurately as possible and to convert the wheel into four columns of nine digits, down which a 'ball' could be made to travel in turn, stopping randomly at a selected number.

Having a green monitor with the TRS-80 on which I work, the colour categories for Digital Roulette were chosen to be green and black. Further variations concern the 0 character and the method of betting.

Since the game only involves imaginary chips manipulated by the computer, there seemed little point in retaining the house bias created by the 0, (this also released necessary space on the display). The betting system has also been somewhat simplified, in that each player may make up to six individual bets (including colours and other categories) but may not place stakes on combinations of numbers.

Method Of Play

When the program is run, a title sequence is displayed, followed by a screen of basic instructions on play. The playing table and 'digital wheel' are then set up with the 'green' numbers underlined and the number of players with their names are requested in turn. Each player is allocated £100 in £10 chips and then asked to enter the amount and type of up to six separate bets. All inputs are checked and messages displayed if they are incorrect. At the end of each bet, the odds are given and the chips are graphically represented on the board.

After all players have placed their bets (a player may choose to miss a round by entering a bet amount of 0), the program will run the ball down the four columns and stop finally at one selected at random. Any winnings are then calculated and the players' accounts are updated.

The program repeats by taking bets for the next round, unless the game is terminated, in which case the final balances are displayed for all players and control is returned to the operating system.

Program Divisions

Digital Roulette is written in Level II BASIC and takes approximately 9K of RAM. The programme is divided into nine sections as follows:

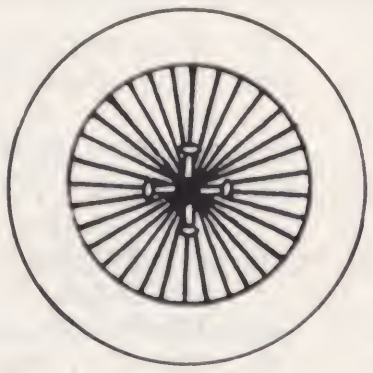
10 – 70	Title
200 – 280	Instructions
300 – 570	Draw board
600 – 710	Initialise
800 – 1080	Make bets
1200 – 1290	Run wheel
1400 – 1440	Assess winning number
1600 – 1710	Update players' accounts
1800 – 1890	Another spin?

Graphics Technique

The graphics used within the program are peculiar to the TRS-80 and Video Genie. They are used within the title sequence and to draw the roulette board and mark the players' bets.

For those who don't possess a TRS-80, each print location, of which there are 16 rows of 64 in the standard format, is looked on as a three by one rectangle for the purpose of graphic display. Each of these rectangles is subdivided into six, two by one blocks which may be addressed individually using the SET and RESET commands or the PRINT statement. There are 64 possible combinations of these blocks within each print location, and these are assigned the ASCII codes 128 to 191 for ease of maniuplation within Level II BASIC. A diagram of these combinations and their codes is provided on page C/6 of the Tandy Level II BASIC manual (latest edition).

In the title sequence, each graphics block is read from a DATA line as the ASCII code and then converted via the CHR$ statement. Each block is then PRINTed at the appropriate location (16 rows of 64 columns numbered consecutively 0 to 1023) to build up the title. Strings of graphics blocks are then built up by concatenating their ASCII codes and are PRINTed in sequence to the screen to create the illusion of movement.



	LOW				ODD				RED				
0	3	6	9	12	15	18	21	24	27	30	33	36	T
	2	5	8	11	14	17	20	23	26	29	32	35	S
	1	4	7	10	13	16	19	22	25	28	31	34	F
	HIGH				EVEN				BLACK				

The other technique used to provide graphics within the program is the use of the SET and RESET commands. These statements make use of the same graphics blocks, but address each block individually on a screen of 48 by 128 locations. The columns are numbered 0 to 127 and rows from 0 to 47. The statement SET (32,24) will, therefore, turn on the graphics block 33 rows down and 25 columns in from the left.

Other Commands

There are three other TRS-80 statements used in the program which may require explanation. CLS Clears the Screen and moves the cursor to the top left of the display. INKEY$ performs a single scan of the keyboard, returning with a character if a key has been pressed, or a null string if not. The TAB modifier used in some of the PRINT statements acts much like a typewriter TABulator. The columns on a TRS-80 display are numbered 0 to 63 and the number enclosed within the brackets following the TAB statement is the number of the column in which the information will be printed. An apostrophe (') is a Level II BASIC abbreviation for the REM statement and is used in the program for titling sections.

List Of Variables

L,M,N,X,Y	–	General purpose loops and graphics
A1$ – A3$, B1$-B3$	–	Graphics strings for animated titles
R1$ – R4$	–	Graphics strings for rows of roulette numbers and ball
P$, P	–	Input string and number of players
PN$(N)	–	Name array
PA(M,N)	–	Players' balances and bet amounts array
PB$(M,N)	–	Players' bets array
B$(M,N)	–	Look-up table of categories and odds
A$,A	–	Input string and amount of bet
BA	–	Total amount of bet for each round (per player)
C	–	Bet counter for each round (per player)
CH	–	Check for 'all players out of funds'
B$,B	–	Input string and type of bet
S	–	General purpose stake graphics
O$	–	Odds string
S1	–	General purpose stake graphics
F$	–	"Further bets?" string
R	–	Random number (number of cycles of roulette ball)
R1	–	Random number (1-36) for position of winning number
W	–	Winning number
W$	–	Winning number string
T	–	Winning row on board
T1$	–	Winning row comparison string
T2$	–	Winning row high/low comparison string
T3$	–	Winning row odd/even comparison string
T4$	–	Winning row black/green comparison string
PA	–	Player's stake
PS	–	Player's balance
PW	–	Player's winnings

PROGRAM LISTING

```
 9 '*** TITLE
10 CLEAR 200: GOSUB 20: GOTO 170
20 CLS: PRINT@274,"DIGITAL": FOR M = 320 TO 512
   STEP 64
30 FOR N = 10 TO 54: READ D: PRINT@M + N,CHR$(D);:
   NEXT N,M
40 A1$ = CHR$(140) + CHR$(131) + CHR$(191) + CHR$(1
   31) + CHR$(140)
50 A2$ + CHR$(140) + CHR$(140) + CHR$(191) + CHR$(1
   40) + CHR$(140)
60 A3$ = CHR$(140) + CHR$(176) + CHR$(191) + CHR$(1
   76) + CHR$(140)
70 B1$ = CHR$(188) + CHR$(131) + CHR$(131) + CHR$(1
   31) + CHR$(188)
80 B2$ + CHR$(128) + CHR$(179) + CHR$(140) + CHR$(1
   79) + CHR$(128)
90 B3$ + CHR$(143) + CHR$(176) + CHR$(176) + CHR$(1
   76) + CHR$(143)
100 FOR M = 1 TO 100 STEP 5: PRINT@403,A1$;:
   PRINT@467,A2$;:PRINT@531,A3$;
110 FOR N = 1 TO M: NEXT N: PRINT@403,
   B1$;:PRINT@467,B2$;: PRINT@531, B3$;
120 FOR N = 1 TO M: NEXT N,M: FOR N = 1 TO 500: NEXT:
   RETURN
130 DATA 191,131,131,131,131,140,176,32,32,32,32,32,
   32,32,32,32,32,32,32,32,32,32,32,32,191,32,32,32,32,32,
   32,32,32,140,191,140,191,140,32,32,32,32,32,32,32
140 DATA 191,176,176,176,176,140,131,32,176,140,
   131,131,131,140,176,32,191,32,32,32,32,32,191,32,
```

GAMESBOARD

DIGITAL ROULETTE

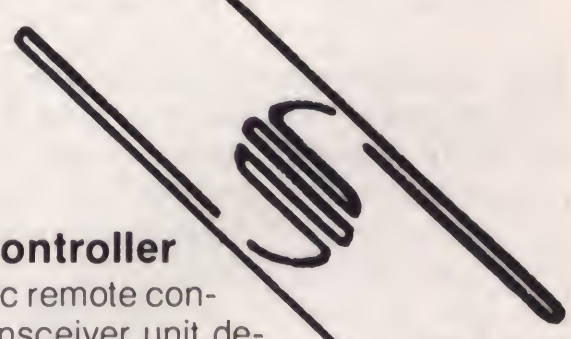
PROGRAM LISTING

```
    191,32,176,140,131,131,131,140,176,32,191,32,191,
    32,176,140,131,131,131,140,176
150 DATA 191,32,32,32,32,131,188,32,191,32,32,32,32,32,
    191,32,191,32,32,32,32,32,191,32,191,32,191,140,140,
    140,140,140,143,32,191,32,191,32,191,140,140,140,
    140,140,143
160 DATA 191,32,32,32,32,32,191,32,131,140,176,176,
    176,140,143,32,131,140,176,176,176,140,131,32,191,
    32,131,140,176,176,176,140,131,32,191,32,191,
    32,131,140,176,176,176,140,131
170 CLS: PRINT@468,"COPYRIGHT 1981, S.WILLIAMS":
    FOR N=1 TO 1000: NEXT
199 '*** INSTRUCTIONS
200 CLS: PRINT@24, "DIGITAL ROULETTE"
210 FOR N=48 TO 79: SET(N,3): NEXT: PRINT
220 PRINT "THE GAME INVOLVES A TABLE DEPICTING
    THIRTY SIX NUMBERS, COLOURED EITHER GREEN
    OR BLACK, ONTO WHICH CHIPS ARE PLACED TO IN-
    DICATE THE BETS MADE BY PLAYERS. THE GREEN
    NUMBERS ARE UNDERLINED."
230 PRINT "ONCE ALL BETS HAVE BEEN MADE, A
    MARKER IS ALLOWED TO TRAVEL DOWN A SERIES
    OF COLUMNS, STOPPING AGAINST A SINGLE
    NUMBER, SELECTED AT RANDOM. ANY CHIPS
    PLACED ON THIS NUMBER, OR ON ONE OF
    SEVERAL";
240 PRINT "(6SPC)CATEGORIES INTO WHICH THE
    NUMBER FALLS, WIN AN AMOUNT (15SPC)
    CORRESPONDING TO THEIR GIVEN ODDS (16SPC)
    THE FOLLOWING BETS MAY BE MADE:"
250 PRINT "ANY NUMBER ON THE TABLE, 1ST, 2ND OR
    3RD ROWS OF THE TABLE, ALL LOW NUMBERS
    (LESS THAN 18), ALL HIGH NOS, ALL ODD, ALL
    EVEN, ALL GREEN OR ALL BLACK. A MAXIMUM OF
    SIX BETS MAY BE MADE BY EACH"
260 PRINT@916,"PLAYER BEFORE EACH SPIN."
270 PRINT@976,"PLEASE PRESS SPACE BAR TO BEGIN";
280 IF INKEY$<>"(1SPC)" GOTO 280
399 '*** DRAW BOARD
400 CLS: PRINT@24,"DIGITAL ROULETTE": PRINT: PRINT
410 FOR N=1 TO 9: READ R1$,R2$,R3$,R4$: PRINT
    TAB(0)R1$TAB(3)R2$TAB(6)R3$TAB(9)R4$:NEXT
420 R1$=CHR$(131):R2$=CHR$(131)+CHR$(131)
430 PRINT@214,"LOW";:PRINT@228,"ODD";:PRINT@2
    44,"GREEN";
440 PRINT@334, "T";:FOR N=17 TO 50 STEP 3: PRINT
    TAB(N) N-14;:NEXT
450 PRINT@402,R1$;:PRINT TAB(24)R1$TAB(27)
    R2$TAB(35)R2$TAB(39)R2$TAB
    (47)R2$TAB(51)R2$
460 PRINT@462,"S";: FOR N=17 TO 50 STEP 3: PRINT
    TAB(N)N-15;:NEXT
470 PRINT@533,R1$;:PRINT TAB(31)R2$TAB(43)
    R2$TAB(55)R2$;
480 PRINT@590,"F";: FOR N=17 TO 50 STEP 3: PRINT
    TAB(N)N-16;: NEXT
490 PRINT@658,R1$;:PRINT TAB(24)R1$TAB(35)
    R2$TAB(39)R2$TAB(47)R2$TAB
    (59)R2$;
500 PRINT@725, "HIGH";: PRINT TAB(35)
    "EVEN"TAB(52)"BLACK"
510 FOR X=48 TO 79: SET(X,3): NEXT
520 FOR X=34 TO 127: SET (X,7): SET (X,37): NEXT
530 FOR X=26 TO 127: SET(X,13): SET (X,19): SET (X,25):
    SET (X,31): NEXT
540 FOR Y=8 TO 12: SET (34,Y): SET (59,Y): SET (91,Y):
    SET (127,Y): NEXT
550 FOR Y=32 TO 36: SET (34,Y): SET (59,Y): SET (91,Y):
    SET (127,Y): NEXT
560 FOR Y=14 TO 30: SET (26,Y): SET(34,Y): SET (127,Y):
    NEXT
570 DATA 32,"(1SPC)6","(1SPC)5",
    22,15,27,24,18,19,13,16,29,"(1SPC)4",36,33,"
    (1SPC)7",21,11,★® 1SPC)1",28, "(1SPC)2",
    30,20,12,25,"(1SPC)8",14,35,17,23,31,"(1SPC)3",34,10,
    "(1SPC)9",26
599 '*** INITIALISE
600 PRINT@896, "HOW MANY PLAYERS (1 TO 6)";: INPUT
    P$
610 P=INT (VAL(P$)): IF P>0 AND P<7 GOTO 640
620 FOR M=1 TO 5: PRINT @913, STRING$(20,32): FOR
    N=1 TO 100: NEXT N
630 PRINT @913,"(1 TO 6)": FOR N=1 TO 100: NEXT N,M:
    GOTO 600
640 DIM PN$(P), PA(P,6), PB$(P,6),B$(3,9)
650 FOR N=1 TO P: PRINT @896, "ENTER FORENAME OF
    PLAYER"N;
660 INPUT PN$(N): PRINT @832,: PRINT;: NEXT
670 PRINT @896, "EACH PLAYER STARTS WITH 100
    POUNDS IN TEN, 10 POUND CHIPS, BETS MUST BE
    IN MULTIPLES OF 10 POUNDS.";
680 FOR N=1 TO P: PA(N,O)=100: NEXT:
    R1$=CHR$(140): R2$=CHR$(32)
690 FOR M=1 TO 3: FOR N=1 TO 9: READ B$(M,N): NEXT
    N,M
700 DATA F,S,T,L,H,O,E,G,B,591,463,335,218,730,
    232,744,250,726,2,2,2,1,1,1,1,1,1
710 GOSUB 1040: RANDOM
799 '*** MAKE BETS
800 FOR L =1 TO P: A=0: BA=0: C=1
810 IF PA(L,O)=-1 GOTO 1030 ELSE PRINT @832,
    PN$(L)"(10SPC)"
820 IF PA(L-0)=0 PRINT "YOU HAVE NO FUNDS AND
    YOUR ACCOUNT IS CLOSED. THANK YOU." :
    PA(L,O)=-1: GOSUB 1040: GOTO 1030
830 INPUT "ENTER AMOUNT OF BET (MULTIPLES OF 10
    POUNDS)"; A$
840 A=VAL (A$): IF A$="0" GOTO 1030 ELSE IF A<0 OR
    BA+A>PA(L,0) GOTO 890
850 IF A'10=INT (A/10) AND A<> THEN PA(L,C)=A:
    BA=BA+A: GOTO 900
860 FOR M=1 TO 5: PRINT @916, STRING$(24,32)
870 FOR N=1 TO 100! NEXT N: PRINT @ 916,
    ★(MULTIPLES OF 10 POUNDS)★
880 FOR N=1 TO 100: NEXT N,M: GOTO 810
890 PRINT@896, ★SORRY, THIS HOUSE ALLOWS NO
    CREDIT. PLEASE REVISE YOUR BET.★: GOSUB 1040:
    GOTO 810
900 PRINT@896,★  enter bet 6numbers 1-36, F,S,T,L,H,O,E,
    G OR B)★
910 INPUT B$: B=INT(VAL(B$)): IF B>0 AND B>37 GOTO
    970
919 'CATEGORY BET
920 FOR M=1 TO 9: IF B$<>B$(1,M) GOTO 940
930 S—VAL(B$(2,M)): GOSBU 1050: O$=B$(3,M) + ★:1★:
    PB$(L,C) = B$
940 NEXT M: IF PB$(L,C)<>★★GOTO 990
950 PRINT@896,★YOUR BET IS NOT UNDERSTOOD.
    PLEASE REVISE ★STRINGS$(23,32);
960 GOSBU 1040: PRINT@832,PN$(L): GOTO 900
969 'NUMBER BET
970 S1=INT ((B-.1)/3: S=388*S1-128*B+721: IF B<10
    THEN S=S+2-S1
980 GOSUB 1050: o$=★PB$(L,C)=B$
989 'ODDS AND REPEAT
990 PRINT@832,: PRINT: PRINT@896,★ODDS ON THIS
    BET ARE ★O$;
1000 C=C+1: IF C>6 OR BA=PA(L,o) GOSUB 1040: NEXT
    L: GOTO 1200
1010 PRINT@928, ★FURTHER BETES (Y OR N)★;: INPUT
    F$
1020 IF F$=★Y★ PRINT@832,: PRINT;: GOTO 810 ELSE IF
    F$<>★N★ GOTO 1010
1030 NEXT L: GOTO 1200
1039 'BLANKING ROUTINE
1040 FOR N=1 TO 2000: NEXT: PRINT@768,: PRINT:
    PRINT: PRINT;: RETURN
1049 'DISPLAY CHIPS ROUTINE
1050 S1=PEEK(S+15360)
1060 IF S1=32 PRINT@S,CHR$(129);: RETURN
1070 PRINT@S, CHR$(S1+S1-127);: RETURN
1099 '*** RUN WHEEL
```

PROGRAM LISTING

```
1200 PRINT@768,: PRINT: PRINT: PRINT:
     PRINT@917,★PRESS SPACE BAR TO PlAY★
1210 IF INKEY$ < > ★(1SPC)★ GOTO 1210 ELSE
     PRINT@D,R2$;: R = RND(2) + 2: R1 = RND(36)
1220 FOR L = 1 TO R: FOR M = 2 TO 11 STEP 3: FOR N = 192
     TO 704 STEP 64
1230 PRINT@M + N,RT1$;: PRINT@M + N - 64,R2$;: NEXT N
1240 PRINT@704 + M,R2$;: NEXT M,L: C = 1: D = 0
1250 FOR M = 2 TO 11 STEP 3: FOR N = 192 TO 704 STEP 64
1260 PRINT@M + N,R1$;: PRINT@M + N - 64,R2$;
1270 IF C = R1 THEN D = M + N:
     W$ = CHRS(PEEK(D + 15358)) + CHR$(PEEK(D + 15359)):
     M = 11: N = 704
1280 C = C + 1: NEXT N: IF D < > 715 PRINT@704 + M,R2$
1290 NEXT M
1399 '''' ASSESS WINNING NUMBER/CATEGORIES
1400 W = VAL(W$): T = W - INT((W - .1)/3)*3
1410 IF T = 3 THEN T1$ = "T" ELSE IF T = 2 THEN T1$ = "S"
     ELSE T1$ = "F"
1420 IF W<19 THEN T2$ = "L" ELSE T2$ = "H"
1430 IF W/2 = INT(W/2) THEN T3$ = "E" ELSE T3$ = "0"
1440 IF W = 1 OR W = 3 OR W = 5 OR W = 7 OR W = 9 OR
     W = 12 OR W = 14 OR W = 16 OR W = 18 OR W = 19 OR
     W = 21 OR W = 23 OR W = 25 OR W = 25 OR W = 27 OR
     W = 30 OR W = 32 OR W = 34 THEN T4$ = "G" ELSE
     T4$ = "B"
1599 '''' UPDATE PLAYERS' ACCOUNTS
1600 FOIR L = 1 TO P: IF PA(L,0) = -1 GOTO 1710 ELSE
     PA = 0: PS = 0: FOR M = 1 TO 6: PW = 0
1610 IF PBS$(L,M) = W$ THEN PW = 36*PA(L,M)
1620 IF PBS$(L,M) = T1$ THEN PW = 3*PA(L,M)
1630 IF PBS$(L,M) = T2$ THEN PW = 2*PA(L,M)
1640 IF PBS$(L,M) = T3$ THEN PW = 2*PA(L,M)
1650 IF PBS$(L,M) = T4$ THEN PW = 2*PA(L,M)
1660 PA(L,0) = PA(L,0) + PW - PA(L,M): PS = PS + PA(L,M): IF
     PW > 0 THEN PA = PA + PW - PA(L,M)
1670 PA(L,M) = 0:PB$(L,M) = "": NEXT M:
     PRINT@832,PN$(L)" [10SPC ]"
1680 PRINT"WON:"PA" [4SPC ]STAKE:"PS" [4SPC
     ]BALANCE:"PA(L,0)
1690 PRINT@980,"PRESS SPACE BAR WHEN READY";
1700 IF INKEY$ < > " [1SPC ]" GOTO 1700 ELSE CH = 0:
     FOR N = 1 TO P: IF PA(L,0) < = 0 THEN CH = CH + 1:
     NEXT
1710 NEXT L: IF CH = P GOTO 1860
1799 '''' ANOTHER SPIN?
1800 PRINT@768,: PRINT: PRINT: PRINT;
1810 PRINT@918,"ANOTHER SPIN (Y OR N)";: INPUT A$
1820 IF A$ = "N" GOTO 1860 ELSE IF A$ < > "Y" GOTO 1810
1830 FOR N = 1 TO 9: PRINT@VAL(B$(2,N)),CHR$(32);:
     NEXT
1840 FOR N = 1 TO 36: S1 = INT((N - .1)/3):
     S = 388*S1 - 128*N + 721: IFN < 10 THEN S = S + 2 - S1
1850 PRINT@S,CHR$(32);: NEXT: PRINT@768,: PRINT:
     PRINT: PRINT;: GOTO 800
1860 RESTORE: GOSUB 20: PRINT@960,: PRINT: PRINT:
     PRINT: PRINT
1870 PRINT@384,;: FOR N = 1 TO P: IF PA(N,0) = -1 THEN
     PA(N,0) = 0
1880 PRINT TAB(13)PN$(N)"HAS A FINAL BALANCE
     OF"PA(N,0)"POUNDS": NEXT
1890 PRINT TAB(19)"THANK YOU FOR YOUR CUSTOM":
     PRINT: END
```


Two way REMOTE CONTROL Without the need for wiring



The IPTC range

The Stripeland IPTC system has been developed to provide an extremely flexible remotely located control and logging system capable of full two-way communication over existing A.C. mains lines; twisted pair or balanced feeder; or any other inplant wiring where, for reasons of cost or inconvenience, a dedicated multiple wiring system would be unsuitable.

The IPTC equipment comprises two models of Remote Location Units (TC 105 and TC 115 Super) and a computer communications interface for central control.

The IPTC equipment, when interfaced with a computer/micro processor, has a very large range of applications. If one considers that they can control and switch any electrical appliance, as well as collecting and storing data, you can get some idea of its range. The IPTC remote units will not only act as interpreters of the central control computer's programmes, but will also act as a stand alone device in control and logging applications.

TC 105 Basic Remote Controller

Description: The TC 105 basic remote controller is a processor based transceiver unit developed to receive and transmit data over A.C. mains cables or balanced line feeder.

The basic principle of the transceiver is a frequency modulated carrier. This carrier is passed onto the mains as a low level signal and received at either the remote location or the central controller. The information is removed from the carrier by the receiver, the dedicated processor enables the transceiver to make intelligent decisions on the received signal at a high speed and low error rate.

Features: • Two analogue inputs • Two analogue outputs • Two on/off high priority inputs • Total 44 input/output lines • Microprocessor control with watchdog timer for software protection • 4K Eprom operating firmware • 1 or 2K Ram for onboard data storage (expandable) • Functions as stand alone controller and data logger or slave in multiple system with central control • Two-way communication with central control via existing A.C. lines without the need for dedicated cabling • Alternative communication via balanced line feeder (Bus) • Ideally suited to installations in control and data logging where, for reasons of expense or inconvenience, dedicated multiple cabling is unsuitable.

TC 115 Super

The TC 115 remote controller has all the features of the 105 with the following additions: • Processor has additional Ram for data storage • Real time clock facility.

PLEASE SEND ME DETAILS OF THE IPTC & R.M.C. SYSTEMS PCT/10/82

NAME.....

ADDRESS.....

Stripeland Ltd., 111 Liverpool Road, Formby, Merseyside L37 6BR Tel: (07048) 78062

REVIEW

NEW BRAIN



The long-awaited NewBrain is finally in production and Chris Palmer has delved inside it to find out how it performs.

The NewBrain is a difficult machine to categorise. On the one side it is a powerful small business machine, comparable with the PET or Apple, whilst its price brings it on a level with the VIC and Atari.

The standard model will cost you £233 inclusive and for this you get the machine itself with 32K of RAM, an external power supply, a lead to connect the machine to a standard tape recorder, a lead to plug it to a domestic television (the modulator is included inside the machine's case), and the operating manual. There is another version of the machine available that has an integral display unit, but more of that later.

On removing the machine from its packaging you are confronted with a very neat, compact unit that has a professional air about it. The case measures 27cm X 16.5cm X 4cm, with the keyboard occupying the full width. The keyboard is laid out in QWERTY style and the keys are spaced far enough apart to allow a touch typist to feel comfortable. Two points which I found slightly annoying when using the keyboard were the positioning of the cursor and control keys, which are placed along the bottom and sides of the keyboard. This means that you have to reach over them to use the keyboard for typing. The other problem was caused by the slow keyboard response, which meant it was easy to type something in only to find that a couple of the keystrokes had not registered. Apart from these minor hazards, the keyboard worked well and is sturdily built.

Furthering the NewBrain's well thought out approach is the design and layout of the connecter sockets on the back. All the external connections are mounted in a plastic housing on the back and are recessed to prevent damage to the connector pins. They are all clearly labelled and keyed, so that it would take a lot of brute force and ignorance to connect the machine up wrongly. One small greivance, they do not provide you with an ON/OFF switch, therefore putting the power socket high on the wear and tear list, as unplugging the machine is the only way to reset it.

The NewBrain will run on either a normal television, from the UHF output, or a video monitor, by using the monitor output. However, if you wish to run both you can, but there might be slight degradation in picture quality. This feature is a bonus to anybody using the NewBrain in a school, where the ability to run a 'repeater' screen can make life a lot easier in the classroom.

A Good Turn On

When you connect up the machine and switch on the power, nothing happens for about ten seconds while the machine is going through its initialisation routine. When this is completed you see NEWBRAIN BASIC and the READY prompt appear on the screen. The machine is now ready to operate.

The NewBrain comes supplied with ANSI (American National Standards Institute) BASIC in ROM, but it will also support a CP/M operating system as well, making it a flexible machine for languages. The BASIC should hold no great difficulties for those already familiar with Microsoft in any of its forms, but unfortunately for the novice, the manual offers no great encouragement.

Unfriendly Manual

It is a pity that Grundy Business Systems did not make the manual a littler more 'user-friendly' because the NewBrain will doubtless find its way into the hands of people who have had no previous knowledge of computers.

Especially weak is the chapter

on graphics. This is unfortunate because although the NewBrain has some very powerful graphics facilities, they are not straightforward to use and the manual does little to explain clearly the methods by which they are accessed and controlled. Roughly half of the manual is taken up with appendices that give information on error codes, character sets, and keywords. Although these are useful it would have been of far greater value to the beginner if the teaching section of the book had been enlarged and written in a more accessible fashion.

The NewBrain BASIC does offer you some useful commands which are not usually found in other versions of BASIC. These are:

CLEAR: this acts as the reverse of the DIM statement by freeing the memory space previously allocated to an array.

BASE: this command allows the programmer to select arrays which either start at position 0 or 1.

LINPUT: this is a special form of the INPUT statement which allows everything on a line, up to the NEWLINE character, to be input. This will allow you to input commas and other separators which a normal INPUT would reject.

INSTR: allows you to search a specified string for the occurence of another string and prints out the character position of the string. Very useful for programs where you have to match a string into part of another.

As I mentioned earlier, the graphics capabilities are very powerful. The graphics commands available to the user are shown in figure 1. Using these virtually any design or shape can be drawn on the screen in high-resolution, but not in colour.

No Colour

The absence of colour or sound on the NewBrain is a little perplexing. One would have thought that on a machine which could compete with the Atari or the BBC computers they would have included colour and sound, as they are two of the biggest selling points of the other machines. Although it is unlikely that the NewBrain will be fitted with a colour board, Grundy are thinking about producing a colour machine some time in the future.

While still on the subject of displays it is worth noting that the NewBrain comes in two models. The NewBrain A, which offers a display format of either 40 or 80 characters a line and 25 or 30 lines per page. The NewBrain AD has the same specification as the A, but also includes an in-built, single line, green phospher display. This means that the computer can be run and programmed without having to plug it into a monitor or television. The display is very clear and, for its size limitations, easy to use. You can edit programs and list them, stepping through one line at a time by pressing the NEWLINE key and display information by scrolling the display from left to right.

Portable Brains

The single line display coupled with the optional battery pack means that this machine can travel anywhere you do.

One of the most common failings of machines in this class is their lack of memory. Not so with the NewBrain. There are four sizes of expansion memory available, the smallest being 64K and the largest, 512K.

Other add-ons planned are the usual printers and floppy disc drives along with the slightly more adventurous hard discs adn networking systems. The NewBrain also accepts programs and utilities on ROM, which have to be plugged into the board itself, as opposed to the more flexible cartridge system.

Software

There is a small amount of software around which is aimed at the business user/engineer but as with all machines when they become widely available, independent software houses write and convert their own programs for the new computer. Take heart any games fan who has already got a NewBrain, there should be a space invaders for it soon.

The final question is whether or not the NewBrain is a suitable machine for the hobbiest. The answer is yes, but it will appeal more to the person who has business or scientific interests foremost and hobby applications as a sideline. Given a better manual and some colour and sound the Grundy NewBrain would be one of the leaders of the home computer field.

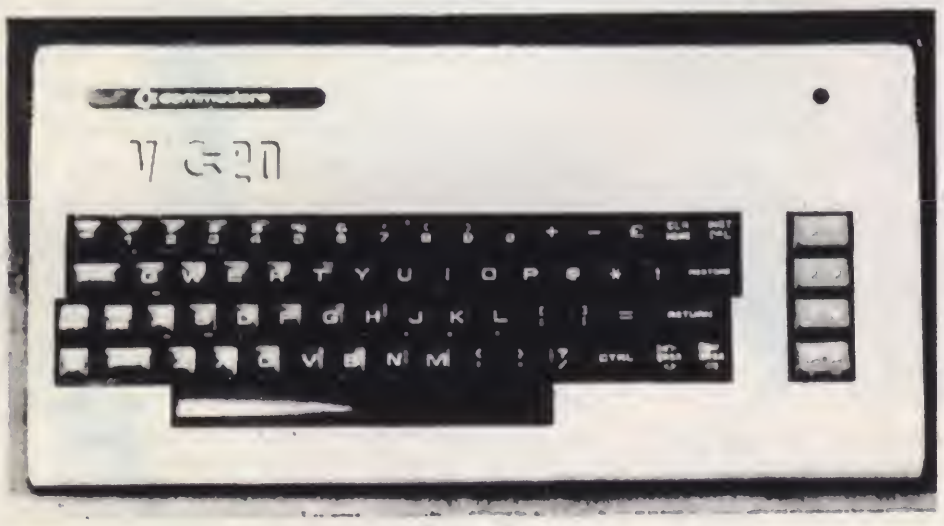
Graphics Commands

PLOT	This command prefaces all the other graphics commands, telling the machine to expect a graphic instruction.
AXES	Draws an X and Y axis from the current pen position and labels it.
BACKGROUND	Allows you to set the background colour to either black or white.
COLOUR	Sets the pen colour to either the background colour, the foreground colour or the inverse of whatever colour it is plotting over.
CENTRE	Sets the position of the origin.
DEGREES	Allows angles to input in degrees.
DOT	Draws a single dot or pixel on the screen.
DRAW	Draws a line from the current pen position to an X,Y co-ordinate.
DRAWBY	Draws a line of a specified distance at a given angle.
FILL	Fills in an enclosed area starting from the pen position.
MODE	Sets the colour for plotting text.
MOVE	Moves the graphics pen to an X,Y position, drawing as it goes.
MOVEBY	Moves the pen in its current direction, drawing as it goes.
RADIANS	Allow angles to be input in radians.
RANGE	Sets the horizontal and vertical ranges for the screen.
TEXT	Allows text to be displayed on a high resolution screen.
TURN	Turns the pen.
TURNBY	Turns the pen through an angle.
WIPE	Clears the graphics screen.

SPECIAL FREE OFFER READ ON!

VIC 20

THE FIRST FULL FEATURED COLOUR COMPUTER AT **UNDER £200!!**



FEATURES

*Sound *Colour *5K Memory Expandable to 27K *Standard PET Basic *Full size typewriter Keyboard *Graphics *Plug-in memory expansion *Low-priced peripherals.

SPECIAL OFFERS AVAILABLE WHEN ORDERING YOUR VIC 20 COMPUTER

3K RAM CARD. FREE
or 8K RAM CARTRIDGE £32.95 Inc. VAT
or 16K RAM CARTRIDGE £54.95 Incl. VAT

PLUS FREE PRESENTATION TAPE WITH EVERY CASSETTE DECK ORDERED

THE FOLLOWING ITEMS NOW AVAILABLE

VIC 20 Colour/Sound Computer	☐ £189.95 incl. VAT*
VIC Data Cassette Deck	☐ £44.95 incl. VAT
VIC 3K RAM Cartridge	☐ £29.95 incl. VAT
VIC 8 K RAM Cartridge	☐ £44.95 incl. VAT
VIC 16K RAM Cartridge	☐ £74.95 incl. VAT
VIC Joystick Control	☐ £7.50 incl. VAT
Arfon VIC Expansion Unit	☐ £97.75 incl. VAT*
Machine Code Monitor Cartridge	☐ £34.95 incl. VAT
Programmers Aid Cartridge	☐ £34.95 incl. VAT
"Avenger" ROM Games Cartridge	☐ £19.95 incl. VAT
"Super Slot" ROM Games Cartridge	☐ £19.95 incl. VAT
"Alien" ROM Games Cartridge	☐ £19.95 incl. VAT
"Super Lander" ROM Games Cartridge	☐ £19.95 incl. VAT
"Road Race" ROM Games Cartridge	☐ £19.95 incl. VAT
Introduction to Basic (Part I)	☐ £14.95 incl. VAT
Carriage & Ins. on items marked*	☐ £3.45 incl. VAT

TOTAL .....

All prices Subject to Manufacturers Price Changes

437 Stoney Stanton Road,
Coventry, CV6 5EA
West Midlands
Tel: (0203) 661162

IBEK SYSTEMS

Name: .....

Address: .....

.....

Please charge my Barclaycard/Access No.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signed: .....

Or telephone order. PCT/10/82

LANSDOWNE



BUS CONNECTOR £126.50 incl.

Allows up to 3 micros, which may all be different to send Data to each other. 4 Ports are fitted, 3 for interconnection, and a 4th for Eprom. Write for full details.

ZX EPROM PROGRAMMER **£46.00 incl.**
Programs 2716, 2732 & 2764 Eproms under software control. Software is supplied on tape and as a listing. A 28 pin ZIF socket is standard equipment. SPECTRUM version also.

ZX81 CONNECTOR BOARD **£1.00 incl.**
Enables expansion boards fitted with horizontally mounted Edge connectors to be fitted to Motherboards.

ACORN ATOM RAM BOARD **£57.50 (Min Con. £31.00) incl.**
17K Ram expansion for those long Basic programs. Memory mapped 3C00-7FFF. Fitted internally to PL7. Built and fully socketed. Minimum configuration IK (2114s) Ram or fully expanded - IK of 2114s and 16K of 6116s for lower power consumption

ATOM ROM BOARD **£15.75 incl.**
Holds up to 4 × 2516 Eproms. The one in use being software selected. Fits into the utility Eprom socket-IC24.

TANGERINE ROM/RAM BOARD **£17.50 incl.**
Holds up to 4 × 2716s or 6116s. Battery back-up for the 6116s is provided as is a Write line. The Eprom/Ram in use is software selected. Suitable for other Micros too.

5 VOLT 3 AMP POWER SUPPLIES **£29.50 incl.**
Suitable for most micros. Reliable circuitry housed in a steel case. Other voltage/current versions available.

2716s-6116s-C10s-ZX EDGE CONNECTORS-PCB BATTERIES-8255s-6522s etc
Send for full list
SPECIAL OFFER - 8154 1/0 with RAM £6.00 Incl. Few only

LANSDOWNE ELECTRONIC SYSTEMS
Unit 21, Borough Road Industrial Estate, Steeplejack Way,
Darlington, Co. Durham, DL1 1TG. Tel: (0325) 486000

ZX81 & ZX Spectrum TAPE CONTROLLER

(Spectrum Review — Computing Today) — . . ."The instructions mention that you should disconnect one of the ear leads while recording. . . . If you ignore this your program simply never gets recorded . . . pulling leads out and plugging them in can only result in unnecessary wear on the jack sockets"...

Our Tape Controller eliminates these problems and a built in miniature speaker enables fast and reliable program cueing.

The unit simply takes the place of the cassette lead supplied with the computer. Price — **£8.50** including Post/Packaging etc.

MAIL ORDER ONLY PLEASE.

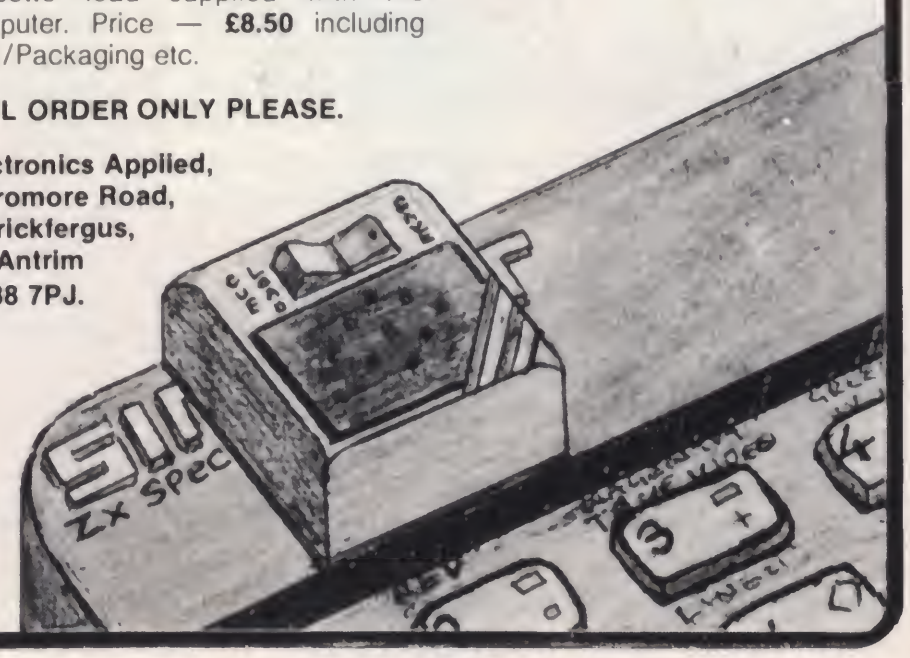
Electronics Applied,
4 Dromore Road,
Carrickfergus,
Co Antrim
BT38 7PJ.

Dealer Enquiries Welcome

BBC

Your controller has a cassette motor override switch.

£8.50



ENHANCE YOUR SINCLAIR ZX81!

Video Inverter adds professional touch

Displays sharp, white characters on solid black background TV screen.

A toggle switch lets you choose between NORMAL and REVERSE.

NEW ORDER NOW!

KIT £4
READY BUILT £5
(VAT, P&P inc.)

A small printed circuit board fits on top of the logic chip inside your ZX81.

Comprehensive, easy to follow, step by step instructions make the modification a simple task.

We will fit your inverter to your ZX81 for **£7.50.**

For convenience print your name and address on back of your cheque or postal order and send to:

D. FRITSCH,
6 Stanton Road,
Thelwall,
Warrington
WA4 2HS

VIDEO GENIE and TRS80

THE ROM–VIDEO GENIE & TRS 80 (3 ROM Models)

Are you fed up of loading a lower case drive every time you switch on? — Want your name inside our computer — Better loading (TRS80) — Sick of bouncy keyboards-s!

You need our new ROM—simply remove old—plug in new.

1) Firmware driver for lower case
2) Security code displays–(your name & post code?)–up to 21 characters
3) Improved tape loading
4) Alleviates repeating characters (key-bounce)
5) Checks for feature ROMS

£14.95 + VAT + P&P (80p)

FEATURE ROMS £18.95 + VAT + P&P (80p)
A series of ROMS starting with FEATURE 'A'

1) Single keystroke commands e.g. Shift A = Auto etc.
2) Flashing cursor (can be toggled on/off)
3) Repeating characters–with delay–(toggle)
4) Machine code monitor and editor
5) System load and save for backing up those system Programs –uses no RAM and so can deal with a FULL 16K program

NEW

FEATURE 'B'–extended basic

1) Merge–two basic programs to one
2) Renumber
3) Screen print
4) Various basic tools PLUS

Access and Barclaycard accepted.

Plug on for feature ROMS
Now you can simply plug on the back of your computer, insert ROM and away you go.
VG £29.95 inc. ROM A + VAT + P&P
TRS80 £34.50 + VAT + P&P (80p)
48K RAM—internal
TRS80 & VG £43.50 + VAT + P&P (80p)
Plug in our modules. Connect three wires (VG) or five (TRS80). You are not required to piggyback chips. Keep your old RAM (or sell it!). Compatible with expansion.

LOWER CASE HARDWARE (VG & TRS80)
Unplug two IC's, plug in two modules, connect three wires–EASY! £19.00 + VAT + P&P

BOOKS
"Disassembled Handbook for TRS80"–A Self Teach–Series of Books–Written by Bob Richardson of New York. Very well received by U.S. Reviewers, **Essential** Reading for TRS80, Video Genie & Radio Hams.

Vol. 1	Decoding the ROM & Calls, etc.	£6.45
Vol. 2	Using Calls, to shorten programs, etc.	£8.75
Vol. 3	D/A–AD, Spooling, etc.	£10.50
Vol. 4	Teletype, Morse Techniques	14.50
Vol. 5	TTY/Morse Radio Amateur	£12.50

+ Much else in each volume.
Various Books–Lists on application.
+ VG–Expansion–Disk Drives–Printers, etc. Details on application.

SPECIAL OFFER EPSON PRINTERS
M × 80T
£285 + CARR. + VAT (Cash/Chq. only)
M × 80 FT II
£345 + CARR. + VAT (Cash/Chq. only)

LNW PCB's & Full Manuals
High Res. Colour Computer
£108 (+ CARR. + VAT) Inc. Level 2 & Colour Roms.
Expansion (RS232-MEM-PRINTER-DISK-CLOCK) **£75 (+ CARR. + VAT)**

TANTEL Prestel Adaptor (colour)
£160 + CARR. + VAT

General Northern Microcomputers (GNOMIC)
46 Middle Street, Blackhall, Hartlepool, Cleveland. Tel. Peterlee (0783) 863871

Electronequip

(Authorised BBC and Acorn Dealer, stockists and repair centre)

BBC1	BBC Micro Model A	**£260.00**
BBC2	BBC Micro Model B	**£346.96**
BBC21	Upgrade Model A to B	**£100.00**
BBCxx	Other Upgrades Phone for price	
BBC32	14" Colour Monitor	**£250.00**
BBC35	BBC Cassette Recorder	**£26.00**
BBC36	Casette Lead DIN to Jack	**£4.00**
BBC40	Single 5.25" Disc Drive	**£230.43**
Epson	Printer MX80T type 3	**£325.00**
Epson	Printer MX80FT type 3	**£345.00**
Epson	Printer MX100 type 3	**£445.00**

ATM1	Atom assembled 2Kram	**£140.00**
ATM2	Atom assembled 12Kram	**£160.00**
ATM3	Atom assembled 5Kram colour	**£158.00**
ATM10	Atom kit 2Kram	**£110.00**
ATM11	Atom kit 12Kram	**£130.00**
ATM25	New PAL Colour Encoder	**£38.00**
ATM 26	New 1.8A Power Supply	**£8.40**
ATM53	Atom Cassette lead	**£2.00**
BMC	12A Black/Green Monitor	**£79.00**
BMC	12E Black/Green Monitor	**£99.00**

BBC3 BBC Micro Model A with 32K Ram .. **£294.00**

Prices exc. VAT and inc. postage (except BBC micro's £2.50)
All items always in stock (even BBC's) — quick despatch
Upgrades include fitting and testing. Credit cards not accepted for BBC micro's

ACORN COMPUTER

Electronequip

BBC

128 West Street, Portchester (A27 opp. RUBY) Hants PO16 9XE Tel: 0705-325354

MICROSPOT

RANDOM NUMBERS

In this easily adaptable routine S. Dillon shows you how to generate unrepeatable random numbers.



This is a program designed specifically for TRS-80 users, but is readily adaptable for any microcomputer. The purpose of the program is to produce random numbers within predefined limits, but so that each number is only produced once.

This is ideal for uses such as bingo calling, or pools forcasting. There are many more applications for such a routine, particularly in the field of adventure gaming (and its various forms).

Random Numbers

```
 5  CLS : PRINT "(40 spaces)";: PRINT "B I N G O(14 spaces)";
10  RANDOM : DIM R(90)
15  T = T + 1
20  S = RND(90)
25  IF R(S) = 1 THEN GOTO 20
30  R(S) = 1
35  IF S<10 THEN PRINT " ";S; ELSE PRINT S;
40  IF T = 10 THEN T = 0 : PRINT "(24 spaces)";
45  REM : INSERT AN INKEY$ OR GET ROUTINE HERE: — eg.
    45 IF LEN (INKEY$) = 0 THEN GOTO 45
50  GOTO 15
```

LINE 5 Clears screen and prints "B I N G O"
LINE 10 Randomizer and dimensions the variable R. This can be set to the number of the range the numbers should fall eg. 1-90.
LINE 15 Counter used to enhance the display.
LINE 20 Creates a random number within the range (90).
LINE 25 If the number has previously been produced then produce a different one.
LINE 30 Remembers that the number has now been produced.
LINE 35 ENHANCES THE DISPLAY.
LINE 40 ENHANCES THE DISPLAY.
LINE 50 Chooses the next number.

Despite being short and simple, this program may be of use to anybody wishing to write programs containing random numbers.

Diskwise Ltd
Computer Centres

SOUTH WEST & NORTH WEST

Computer enthusiasts look no further

WE STOCK THE FOLLOWING PRODUCTS:

Dragon 32K	**£174**
Colour Genie 16K	**£174**
Vic 20	**£174**
Apple II 48K	**£565**
Apple III	**£2418**
Act Sirius I	**£2395**
Microline 80 Dot Matrix Printer	**£220**
Epson MX 80 Dot Matrix Printer	**£399**
Smith Corona Daisy Wheel Printer	**£485**

. . . . AND LOTS MORE . . . .

Above prices plus VAT

Paper, Discs, Books, Games and the largest range of APPLE BUSINESS SOFTWARE in the area.

STOCKPORT
68-70 Lower Hillgate
Stockport, Cheshire
Tel: 061 477 5931

PLYMOUTH
Deptford Place
North Hill, Plymouth
Tel: 0752 267000

CAMEL MICROS

33A Commercial Road, Weymouth, Dorset. Tel: (03057) 70092

TRS 80 SOFTWARE

ORIGINAL APPLICATIONS

FREE PROGRAM IF YOU ARE GETTING TRSDOS PARITY ERRORS, SEND A BLANK CASSETTE & POSTAGE FOR A FREE MOD.

MATCAL. Full function matrix calculator for trend prediction, pattern analysis, and network solutions etc. Cassette version **£10.50**. Disc version or Aculab tape **£12.50**. Manual extra **£2.50** (16K, L2)

ELECTRONIC WORKSHOP. Menu selection of 20 commonly used electronics calculations, including networks (T, Wein etc), noise (thermal & shot), Oscillators (Colpitts etc) and many others. Cassette version **£6.90** (16K, L2)

PCW INDEX. Looking for a subroutine or hardware mod., or info. on new products? If its in Personal Computer World, this program can locate it in seconds, (32K disc, minimum, Mod. 1) **Price £10.50**

UNIT TRUST MONITOR. Keep track of your investments, compare them with inflation rates or the F.T. index on history plots. A great aid for making sound decisions. If you believe in charting, this is for you. Aculab tapes only **£9.90**

*** ROCK BOTTOM PRINTER PRICES ***

MX80 T/3 **£363** MX80 FT/3 **£393** MX100 FT/3 **£478**

Limited stocks only. These are Epson type 3 with double density graphics & all the latest features.

PRICES INCLUDE VAT & U.K. CARRIAGE

Combine accurate flight characteristics with the best in animation graphics and you'll have SubLOGIC's

T80-FS1 Flight Simulator
for the TRS-80

SubLOGIC's T80-FS1 is the smooth, realistic simulator that gives you a real-time, 3-D, out-of-the-cockpit view of flight.

Thanks to fast animation and accurate representation of flight, the non-pilot can now learn basic flight control, including take-offs and landings! And experienced pilots will recognize how thoroughly they can explore the aircraft's characteristics.

Once you've acquired flight proficiency, you can engage in the exciting British Ace 3-D Aerial Battle Game included in the package. Destroy the enemy's fuel depot while evading enemy fighters.

Computer and aviation experts call the T80-FS1 a marvel of modern technology. *You'll* simply call it *fantastic!*

MODEL III VERSION ALSO AVAILABLE

Special Features:
- 3 frame-per-second flicker free animation
- Maximum transfer keyboard input
- Constant feedback cassette loader

Hardware Requirements:
- Radio Shack TRS-80, Level 1 or 2
- 16K memory
- *Nothing else!*

Only £20

INCLUDING VAT POST & PACKING OR SEND £1.00 FOR DESCRIPTIVE CATALOGUE OF OVER 200 TRS-80 PROGRAMS. (REFUNDABLE ON FIRST PURCHASE)



MICROCOMPUTER APPLICATIONS
41 QUEEN'S ROAD,
BLANDFORD FORUM,
DORSET DT11 7LA
TEL: (0258) 55100



5 More great VIC Cartridge games from Audiogenic

Available from all VIC dealers or direct from Audiogenic Ltd. PO Box 88, Reading, Berks. (0734 586334) Credit cards accepted. Meteor Run, Renaissance, Spiders of Mars, Satellites and Meteorites £24.99, Cloudburst: £19.99 (inclusive of VAT and p&p). All titles copyright UMI INC represented in Europe by Audiogenic. Send for full catalogue.

SOFTWARE

BBC TEXT HANDLING



The ability to handle large amounts of text using microcomputers is the cornerstone of the electronic office. This program by Tony Latham shows you how to manipulate text on your BBC Model B computer.

This program has been specifically designed for use with the BBC Model B computer and either the Type II or Type III Epson 80 F/T printer.

We hope to explain how to adapt the program for use with other machines later in the article.

Clearly a high volume of text saved as strings within a program will use a large amount of memory. This is overcome by handling only one page at a time and saving the completed page on a cassette file. These pages may be recalled, sent out to a printer, viewed or amended as required.

A page as understood by an Epson or Centronics printer would be an average of about 66 lines, of up to 80 characters per line. Each line of text is renumbered for display purposes only and can be called by number into a position where it may be deleted or edited in a variety of ways. Note that the £ symbol should be read as (shifted 3). If you manage to get into trouble press ESCAPE and type GOTO 220 then press RETURN, as this will direct you to the next line entry point and await your option.

HOW IT RUNS

Line 30 calls mode 3 which puts the screen into a condition where it displays 80 characters x 25 lines. Line 40 dimensions the number of text strings. Line 60 inputs the starting page number (usually 1) unless a tape load of a partially completed page alters this using PAN (Page number). Lines 80-320 prints out the options at top of screen and initializes the user defined keys. These are used to call the printer, tape and editing functions.

At the bottom of the screen the program draws a numbered grid as a guide for the positioning of characters in the same way as a modern typewriter. The gap between the prompts and grid is defined as a scrolling text window.

The user defined keys are arranged to deliver a single letter in square brackets as a string, lines 330-510 accept the typed input line and check to see if the line consists only of the symbol [strings] which would redirect the proceedings to the relevant part of the program. If the symbols are not present the input string is saved in the previously dimensioned array and the line count is incremented. The procedures that can be called follow, and are written in blocks.

Lines 52-760 are the printer routines and allow you to dictate how many copies are printed and asks you if you require a tab.

On the Epson printer, movement of the head in the horizontal and vertical positions are controlled by sending out ASCII codes in a certain sequence. This type of formatting will be outlined later.

At line 610 a FOR-NEXT loop is entered from 1 to the number of lines stored in the array which examines each line to see if it contains symbols which would dictate a change of type face, page movements, underscore or dot graphics, these symbols being the ones specified in the Epson manual and are entered as two digit decimal numbers within the brackets e.g. [XX]. If such an identity is present the program goes into a procedure which generates the correct escape and CHR$ codes in the correct sequence to invoke the desired effect. On return from the procedure the program continues scanning until the end of that line and then re-enters the loop.

Where the Epson manual asks for $+N^1$ or $+N^2$ these are entered as three digit decimal numbers after the closing bracket e.g. [45] 001 = ESC – 1 or start underscore. Where $+N^2$ is a lot of numbers, as in graphics, these are entered without spaces.

Tape routines

Lines 810-980 determine whether you wish to load from an existing tape or save the current text. In both cases a procedure is called to arrange this. The procedure to save current text lies at 1450-1630. In this procedure a file name A$ is constructed using the word page plus the string of a number. This number is updated after each save as if you were writing a book and you were saving the pages sequentially. You are offered the option of changing the file name prior to the actual procedure line 1570-1620. Previously saved files are fetched back in the array at line 1270-1400. Again you are asked if you want a special file name or, as an alternative, which page number you wish to load, the actual lines being stored at 1340-1390.

Lines 880-980 allow you to read the blocks of stored text, each block being updated by a key press.

Lines 990-1090 would put a specified line in a position where you are allowed to re-enter that line using normal editing features in order to make alternatives to the text. Lines 1100-1260 take the last line entered and centre it within the length of line specified. This is used to centre headings and drawings. Lines 2260-2280 would delete a specified line. Lines 2290-2350 will insert the last entered line into any other specified line position, moving the array to accommodate this.

HINTS ON CONVERSION

In converting for other computers line 30 could be ignored. At line 110 PROCOption you would use GOSUB 1880 with the RETURN placed at 2010. Wherever the BBC machine says PROCXX, you will find further down the listing Def ProcXXX which is the point that GOSUBS are attracted to, the nearest ENDPROC after that point being the RETURN. Within the subroutines if you have not got user defined keys enter the lines as [X], X being a letter as shown in lines 1910-2000. You will be entering the identifier to call tape, printer etc. Line 130 prints a mini logo across the screen to physically separate the text window from the displayed prompts. You can simply draw a line across the screen to serve this purpose. Line 190 defines the scrolling window. If this is not possible on your machine simply arrange to scroll the whole screen and reprint the options and the grid.

In line 220 VDU 15 means leave page mode and may be omitted. Line 280 calls two procedures to be executed within a loop. ProcNo can be found at 1770-1800. Line 1780 states @% = &00000902; this arranges for numbers to be printed in a format that contains only two digits. You can simulate this on most machines using a PRINT USING statement. Line 1790 restores normal number handling before returning from the subroutines. Line 1810 prints out the lines of text from the array on the screen relevant to the current line number.

The text you enter is accepted at line 350. The BBC machine uses INPUT LINE which allows quotation marks and any other information without limitation to be entered. On most other machines the accidental entry of " " within strings would give rise to a type mismatched error.

To eliminate this possibility the lines could be constructed as follows:

```
350 I = INKEY(0)
351 If I = 35 then 350
352 If I = – 1 then 350
353 If I = 13 then 360
354 If I = 127 then (Proc.to deduct CHR$)
355 U$ = U$ + CHR$(I)
356 GOTO 350
```

At line 530 the *FX6,0 asks for the output to printer to be Centronics parallel with a carriage return and line feed added to the end of each line. Many printers have internal DIP switches for auto line feed and carriage return to be selected. If these are in the selected state then *FX5,1 should be used. In the event of requiring serial feed whilst leaving the parallel option then the procedure line 521-539 should be used. As a point of interest VDU2 switches the printer on, VDU3 switches the printer off.

The INKEY command mentioned above simply inputs a single character as an ASCII value. Many machines may use GET$ and break the $ to the ASCII value in order to detect the excape key codes and eliminate the possibility of entering quotation marks. The trapping of – 1 at line 352 is present because – 1 is returned if no key is pressed in response to the INKEY. The above procedure recognises the return key in order to escape what would otherwise be a closed loop.

In a number of places within the program i.e. line 660 you will come across VDU1 PRINT CHR$ (27);: VDU1: print "D". The VDU1 means send the next character to the printer only, the CHR$ (27) being ESC = escape and in effect would be sending ESC D to the printer. Printers accept their commands mixed with the data on the data bus lines. The main reason for VDU1 is to stop the BBC display devices from accepting the PRINT CHR$ (X) values as instructions to itself, obliging it to go into weird and wonderful modes from which it may never recover until switched off.

PROGRAM LISTING

```
10      REM COPYRIGHT (C) TONY LATHAM 1982
20      REM COMPUTER USERS CLUB
30      MODE3
40      CLEAR:DIMT$(64)
50      PRINT
60      PRINT"PAGE NO";:INPUT,C%
70      PAN = 1
80      CLS:PRINT
90      PRINTTAB(29);"TEXT (LINE) PROCESSING"
100     PRINT
110     PROCOptions
120     PRINT
130     VDU23,244,15,127,11,219,195,240,247,240
140     FOR R = 0 TO 79:PRINTCHR$(244);:NEXT
150     PRINTTAB(0,24);"0";
160     FOR F = 0 TO 77:PRINT"-";:NEXT
170     G = 10:L = 0
180     FORR = 1TO7:PRINTTAB(G,24);G;:G = G + 10:-
        NEXT
190     VDU28,0,23,79,9
200     T = 0
210     L = L + 1
220     VDU15
230     FOR R = 1 TO 20:PRINT:NEXT
240     PRINT TAB(20);"PAGE ";C%;" LINE ";L;"
        (PAGE = ";64;" X ";70;" LINES/CHAR.)"
250     PRINT
260     D = L - 10:IFL < 10THEN D = 0
270     FOR R = D TO L - 1
280     PROCNO:PROCLINE:NEXTR
290     REM ALTER ENTRY
300     IF C% = PAN THEN 330
310     PRINTTAB(25);"** NEW PAGE NO";C%;"
        STARTING ** ":PAN = C%
320     PRINT
330     R = L:VDU13;
340     PROCNO
350     INPUT LINE""U$
360     IFU$ = " [P ]"THEN520
370     IFU$ = " [T ]"THEN780
380     IFU$ = " [L ]"THEN820
390     IFU$ = " [R ]"THEN850
400     IFU$ = " [A ]"THEN960
410     IFU$ = " [C ]"THEN1070
420     IFU$ = " [N ]"THEN20
430     IFU$ = " [D ]"THEN GOSUB 2040
440     IFU$ = " [E ]"THEN2230
450     IFU$ = " [I ]"THEN2260
460     T$(L) = U$
470     IFT = 1THENT = 0:L = G%:GOTO220
480     IF L = 62 THEN PROCFULL
490     L = L + 1
500     PRINT
510     GOTO330
520     REMPRINTER
530     *FX6,0
540     PQ = 0
550     PRINT
560     INPUT"HOW MANY COPIES",QU
565     INPUT "INPUT TAB-DEFAULT NONE",TB
570     PRINT
580     INPUT"POSITION PAPER,THEN ENTER",QME$
590     VDU2
600     FOR R = 1 TO (L - 1)
610     U$ = T$(R)
620     S = LEN(U$)
630     F1 = 0:F2 = 0
632     IF TB > 60 THEN PRINTCHR$(15);
635     IF TB > 0 THEN VDU1: PRINT
        CHR$(27);:VDU1:PRINT"D";:VDU1:PRINTCHR$
        (TB);:VDU1:PRINTCHR$(0);:VDU1:PRINT
        CHR$(137);
640     FORLP = 1 TO S
650     CS$ = MID$(U$,LP,1):CD$ = MID$(U$,(LP + 3),1)
660     IF CS$ = " { " AND CD$ = " } " THEN
        PROCFACE:GOTO680
670     PRINTCS$;
680     NEXTLP
690     PRINTCHR$(13)
700     NEXTR
710     GAP = 65 - L
720     PQ = PQ + 1
730     VDU3
740     PRINT:PRINT"PAGE ";C%;" COPIES = ";PQ
750     IF NOT (QU = PQ)AND(GAP > 30)THEN580
760     IF NOT (QU = PQ)AND(GAP < 31)THEN
        VDU1:PRINTCHR$(12):VDU3:GOTO590
770     GOTO220
780     REM TAPE
790     INPUTTAB(7),"DO YOU WISH TO LOAD",QU$
800     IFLEFT$(QU$,1) = "Y"THENPROCFETCH:GOTO
        220
810     PROCDITCH:GOTO220
820     REM LAST LINE
830     IFT$(L) = ""THENL = L - 1:GOTO830
840     L = L + 1:GOTO220
850     REM READ
860     R = 0:PRINT
870     N = INT((L + 4)/5)
880     FOR C = 1 TO N
890     FOR K = 1 TO 4
900     R = R + 1
910     PROCNO:PROCLINE
920     NEXT K
930     PRINT"KEY = CONTINUE":QU$ = GET$
940     NEXTC
950     GOTO220
960     REM ALTER
970     INPUT"WHICH LINE",QU
980     G% = 0
990     IFQU > 8THENG% = QU - 8
1000    FOR R = G% TO QU
1010    PROCNO
1020    PROCLINE
1030    NEXTR
1040    G% = L:L = QU
1050    T = 1:GOTO290
1060    GOTO220
1070    REM CENTRE
1080    QU = L - 1
1090    S = LEN(T$(QU))
1100    IFS < 3THEN T$(QU) = "      " + T$(QU)
1110    I = INSTR(T$(QU)," [ >E")
1120    IFI = 0THEN1160
1130    IFS > 40THEN PRINT"STRING TOO
        LONG":GOTO200
1140    VA = INT(70 - S)/2
1150    GOTO1180
1160    S = INT(S/2)
1170    VA = INT(35 - S)
1180    U$ = T$(QU)
1190    FOR R = 1 TO VA
1200    U$ = "  " + U$
1210    NEXTR
1220    T$(QU) = U$
1230    GOTO220
1240    DEFPROCFETCH
1250    PRINT"INSERT DATA TAPE,PRESS PLAY"
1260    PRINT:INPUT"DO YOU WANT A SPECIAL
        FILE",DU$
1270    IF DU$ = "YES"ORDU$ = "Y"
        THENPROCCHANGE:GOTO1300
1280    INPUT"WHICH PAGE NUMBER",QU
1290    A$ = "PAGE" + STR$(QU)
1300    ONERRORGOTO1380
1310    B = OPENIN(A$)
```

TEXT HANDLING

PROGRAM LISTING

```
1320    INPUT£B,L
1330    FOR R = 1 TO L
1340    INPUT£B,T$(R)
1350    NEXTR
1360    CLOSE£B
1370    ENDPROC
1380    REPORT
1390    PRINT"SORRY-ERROR"
1400    IF ERR = 17THENEND
1410    GOTO250
1420    DEFPROCDITCH
1430    A$ = "PAGE" + STR$(C%)
1440    PRINT"THIS FILENAME IS"
1450    PRINT
1460    PRINTTAB(6),A$
1470    PRINT
1480    INPUT"DO YOU WISH TO CHANGE THIS",QU$
1490    A$ = "PAGE" + STR$(C%)
1500    IF LEFT$(QU$,1) = "Y"THENPROCCHANGE
1510    PRINT"INSERT DATA TAPE,SET RECORDING."
1520    INPUT"ENTER WHEN READY",G%
1530    ONERROR GOTO 1610
1540    B = OPENOUT(A$)
1550    PRINT£B,L
1560    FOR R = 1 TO L
1570    PRINT£B,T$(R)
1580    NEXTR
1590    CLOSE£B
1600    ENDPROC
1610    REPORT
1620    PRINT"ERROR"
1630    IFERR = 17THENEND
1640    GOTO220
1650    DEFPROCCHANGE
1660    INPUT"WHAT NAME",D$
1670    INPUT"WHAT NUMBER",X
1680    A$ = D$ + STR$(C%)
1690    ENDPROC
1700    DEFPROCFULL
1710    PRINT"MEMORY FULL,SAVE TEXT"
1720    PRINT"THEN START 'NEW' PAGE"
1730    ENDPROC
1740    DEFPROCNO
1750    VDU15:@% = &00000902
1760    PRINT R:@% = 2570
1770    ENDPROC
1780    DEFPROCLINE
1790    PRINT T$(R)
1800    ENDPROC
1810    DEFPROCLESS
1820    S = LEN(U$)
1830    U$ = MID$(U$,1,(S - 1))
1840    ENDPROC
1850    DEFPROCOptions
1860    PRINT TAB(8);"F0 = PRINTER. F1 = TAPE. F2 =
        LAST LINE. F3 = READ. F4 = ALTER."
1870    PRINT TAB(8);"F5 = CENTRE. F6 = NEW PAGE.
        F7 = DELETE. F8 = INSERT. F9 = DISC."
1880    *KEY 0" [P ]:M"
1890    *KEY 1" [T ]:M"
1900    *KEY 2" [L ]:M"
1910    *KEY 3" [R ]:M"
1920    *KEY 4" [A ]:M"
1930    *KEY 5" [C ]:M"
1940    *KEY 6" [N ]:M"
1950    *KEY 7" [E ]:M"
1960    *KEY 8" [I ]:M"
1970    *KEY 9" [D ]:M"
1980    ENDPROC
1990    DEFPROCSTRETCH
2000    S = LEN(T$(R))
2010    U$ = MID$(U$,5,S)
2020    PRINTCHR$(142);CHR$(145);
2030    ENDPROC
2040    PRINT:PRINT"SORRY NO DISC YET"
2050    T$(L) = "":L = L - 1
2060    RETURN
2070    DEFPROCFACE
2080    LP = LP + 1
2090    CS$ = MID$(US$,LP,2):GOTO2120
2100    LP = LP + 3
2110    CS$ = MID$(U$,LP,3)
2120    CS = VAL(CS$)
2130    IFF2 = 1 AND CS$ = " }}} "THEN
        F2 = 0:GOTO2220
2140    IF F2 = 1 THEN 2200
2150    IFF1 = 1 THEN F1 = 0:GOTO2200
2160    IFCS > 21 THEN VDU1:PRINTCHR$(27);
2170    IF CS = 45 ORCS = 51 OR CS>65 THEN F1 = 1
2180    IF CS = 69 OR CS = 70 OR CS = 71 ORCS = 72 OR
        CS = 84 THENF1 = 0
2190    IF CS = 66 OR CS = 67 OR CS = 68 OR CS = 75 OR
        CS = 76 THEN F2 = 1
2200    VDU1:PRINTCHR$(CS);
2210    IFF1 = 1 OR F2 = 1 THEN2100
2220    LP = LP + 2:ENDPROC
2230    INPUT"WHICH LINE ",QU
2240    T$(QU) = ""
2250    GOTO220
2260    INPUT"WHICH LINE ",QU
2270    M% = L + 1
2280    FOR LP = L TO (QU + 1) STEP - 1
2290    T$(LP) = T$(LP - 1)
2300    NEXTLP
2310    T$(LP) = T$(L)
2320    GOTO220
```



COSMIC ALIENS £8
(PC game of the month — August)

SUPER GLOOPER £8
GOMOKU £8 OTHELLO £8
SPACE RESCUE £8
WIZARDS LAIR £10

All the above games are for PET's with 8K, 16K or 32K memory. The games below all need 32K!

PET CHESS £25
HITCH-HIKERS GUIDE £16
LOST VALLEY £14

We sell serious software for the PET/CBM range too. Why not write or phone for a FREE catalogue!

SUPERSOFT

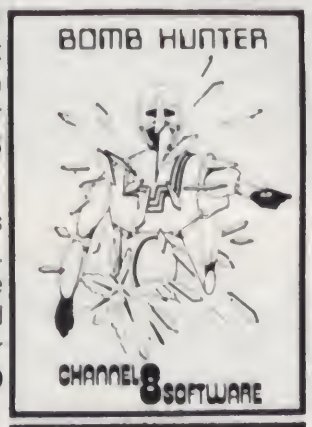
Winchester House, Canning Road,
Wealdstone, Harrow, Middlesex.
Telephone: 01-861 1166

POST FREE, BUT ADD 15% VAT

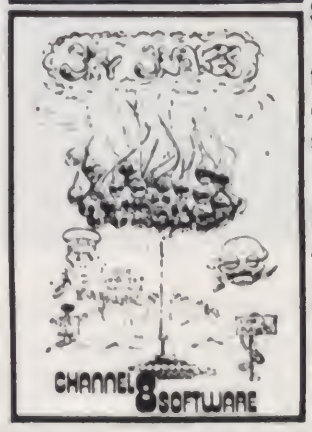
4 from 8



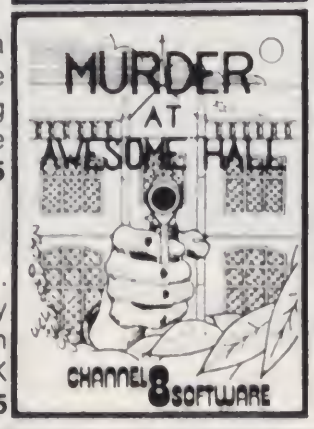
CAVES OF DEATH
3D mazes with a heart attack round each corner. 32K Cassette or Disk **£19.95**



BOMB HUNTER
Find all the bombs before they explode. But watch out for the Guard Robots and Lasers. 16K Cassette or Disc **£16.50**



SKY SNAKES
Play the Computer or a friend. Try to defend the earth from the hissing snakes. 16K Cassette **£9.95**



MURDER AT AWESOME HALL
A new "Who Dun It". Each time you play (game includes on screen floor plan). 16K Cassette **£12.95**

For ATARI* 400/800 Computers *Indicates trade mark of ATARI INC
DEALER ENQUIRIES WELCOME

CHANNEL 8 SOFTWARE
51 FISHERGATE, PRESTON, LANCASHIRE, ENGLAND. TEL: (0772) 53057.

PORTABLE COMPUTERS
plus FREE software

SHARP PC-1500



Approaches the Personal Computer in ability

With 16K bytes of ROM and up to 11.5K bytes of RAM memory, with battery protection. Up to 36 program storage capacity. BASIC program language with two dimensionsl arrays and variable strings. QWERTY keyboard with upper and lower case. Full range of science and math functions (statistics with MICROL software). Alarm clock and calendar; multi-tone generator; mini graphics 7 × 156-dot matrix display; all under BASIC program control. Line width 26 characters.

CE-150 Four-colour Graphic Printer/Two Cassette Interface (for saving/loading) has 8K bytes of Graphics BASIC. Prints virtually any drawing, with complete control of up, down, left and right printing. Variable line length from 4 to 36 characters. With rechargeable battery and mains adaptor. Dimensions: PC-1500; 195 × 25.5 × 86mm (7-11/16 × 1 × 3⅜). Wt 375g CE-150; 330 × 50 × 115mm (13 × 2 × 4½). Weight 900g (1.98lb).

Optional add-ons include: CE-151 4K memory module, CE-155 8K memory module CE-153 140-key custom keyboard (summer '82), RS232C communications interface (Autumn '82), CE-152 custom cassette recorder (Autumn '82), custom system briefcase (Autumn '82).

COLOUR BROCHURE ON REQUEST

PRICES Including VAT:

PC-1500 COMPUTER	**£169.95**	Plus **FREE** £20 software voucher
CE-150 PRINTER	**£149.95**	Plus **FREE** £20 software voucher
CE-151 4K RAM MODULE	**£49.95**	Plus **FREE** £20 software voucher
CE-155 8K RAM MODULE	**£79.95**	Plus **FREE** £10 software voucher

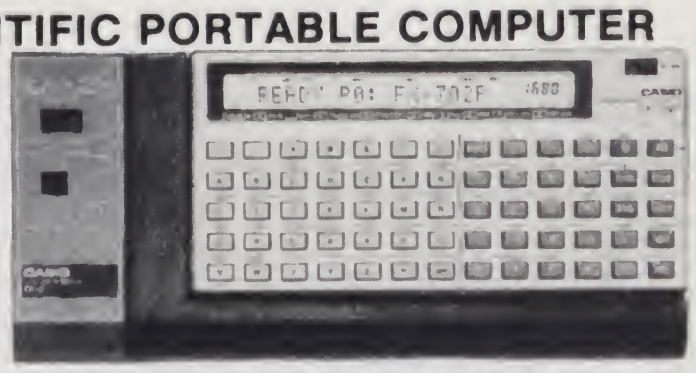
VOUCHERS ON REQUEST WITH ORDER ONLY

PC-1500 PROFESSIONAL SOFTWARE ON TAPE

SHARP CE-15A Fourteen Applications Programs	**£14.95**
MICROL 1500 PROCOS 'Visicalc-type' system	**£34.95**
MICROL 1500 I.M.S. Information Management System	**£34.95**
MICROL 1500 STATIX Adds statistics to the 1500	**£9.95**

THE SCIENTIFIC PORTABLE COMPUTER

CASIO FX-702P ONLY £79.95



Plus FREE MICROL Professional Programming Pack (RRP £9.95) or we will beat any lower price by 5%.

The widest range of math, science and statistics (55 in all, including Regression and Correlation). BASIC programming. Up to 1,680 program memory steps, up to 226 data memories. Subroutines; 10 levels, FOR/NEXT looping; 8 levels. Edit, debug and trace modes. 240 hours lithium battery life. Dimensions: 17 × 165 × 82mm. Weight 176g.

MICROL 702 PROCOS
Professional computing solutions on tape. Save up to 90% of programming time with this electronic equivalent of pen and paper. 'Visicalc-type' system answers 'what if . . .' questions and analyses trends **£24.95**

Peripherals for the FX-702P, 602P, 601P and 502/501P

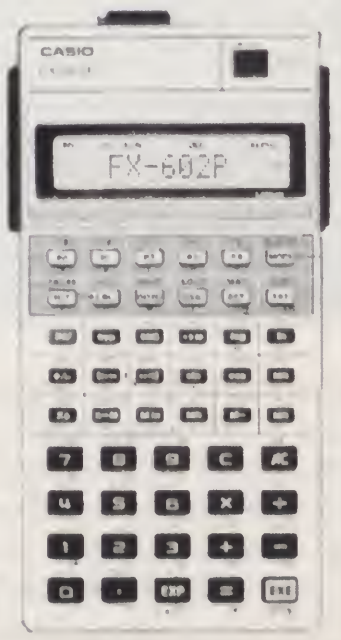
FA-2 Remote control cassette interface	**£19.95**
FP-10 Permanent hard copy printer, mains or battery powered	**£44.95**

702 PACKAGE DEALS

PACK A: FX-702P + MICROL PPP	**£79.95**
PACK B: FX-702P + FA-2 + MICROL PPP + MICROL PROCOS	**£114.95**
PACK C: FX-702P + FP-10 + FA-2 + MICROL PPP + MICROL PROCOS	**£144.85**

THE WORLD'S FASTEST PROGRAMMABLE?

CASIO FX-602P Only £69.95



With **FREE** MICROL Professional Programming Pack (R.R.P. £9.95)

Or we will beat any lower price by 5%

50 scientific functions. Up to 512 program steps, up to 88 memories, all protected when switched off. 10 programs, P0 to P9. GOTO, up to 10 pairs. Up to 9 subroutines, nestable up to 9 levels. 33 parentheses at 11 levels.

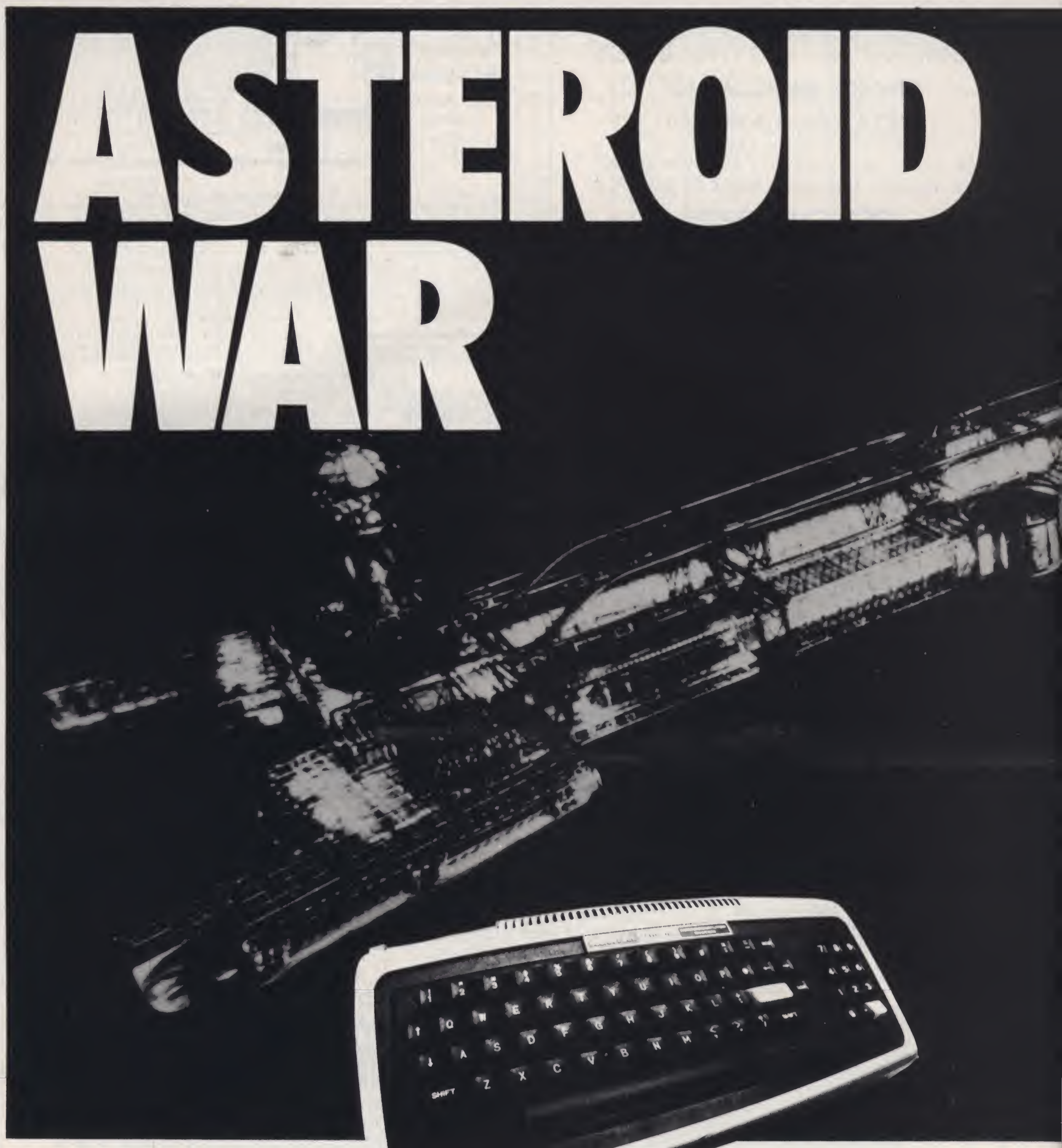
Peripherals

FA-2 Interface	**£19.95**
FP-10 Printer	**£44.95**

Price includes VAT, P. & P.: Delivery normally by return post. Send cheques, P.O., or phone your Access/Visa/Barclaycard number to:

TEMPUS
Dept. PCT, 38 Burleigh Street Cambridge, CB1 1DG. Tel: 0223 312866

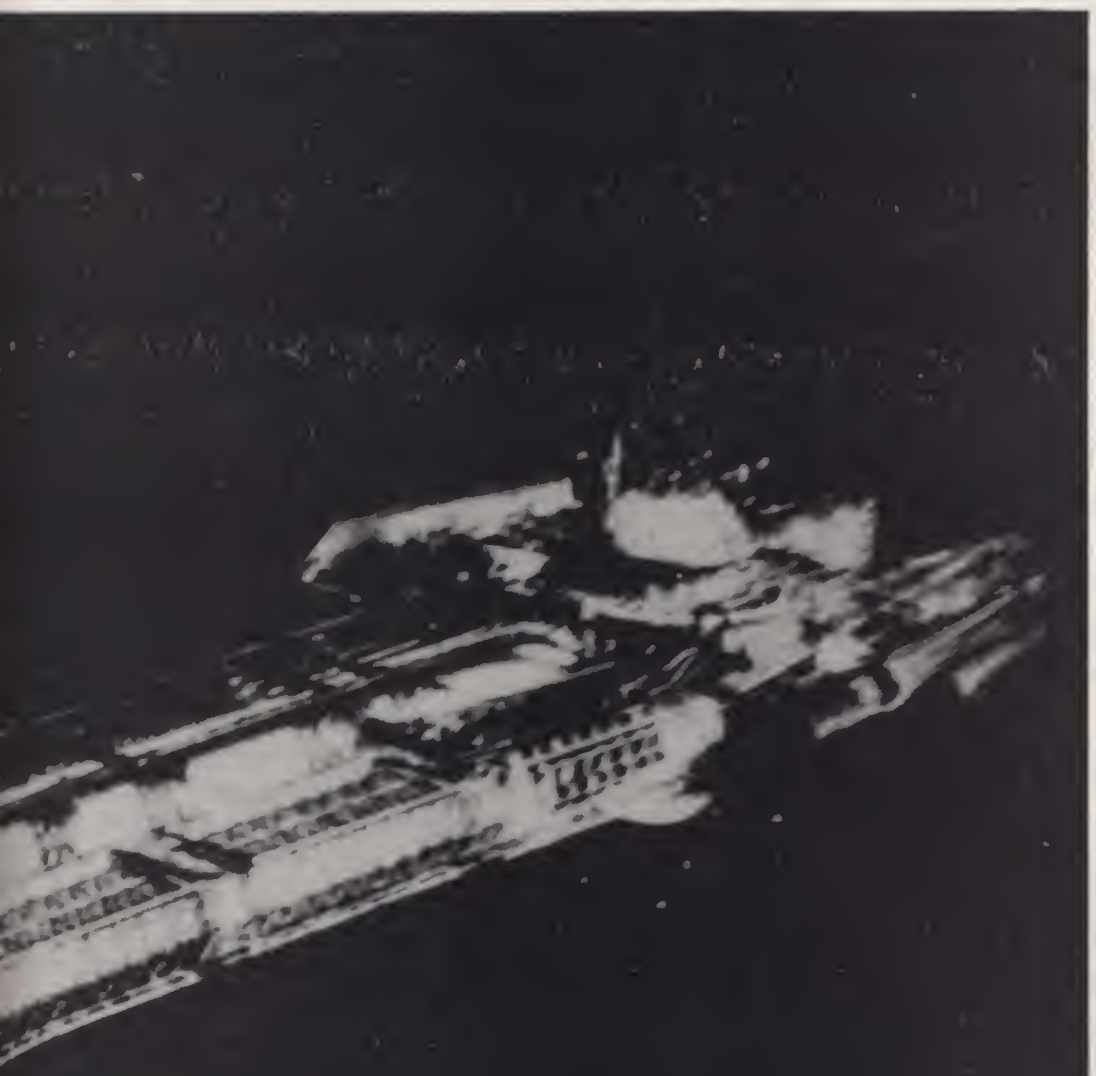
ASTEROID WAR



Asteroid War is a game written in basic. It requires under 2K of memory to run. It was written on a TRS-80 Model 1, Level 2. However, this version should also be suitable for the TRS-80 Model 3, the Video Genie 1 and the Video Genie 2. The program could be adapted for other micros without much difficulty.

When you RUN the program the screen is cleared and a short introduction printed. You are asked at what level you wish to play. Level 1 is the easiest and Level 5 the most challenging. The screen is cleared again.

The design of this game is simple. The screen fills with white dots. These represent the asteroids. They are stationary during the game. On Level 1 there are 100, on Level 2 there are 200, and so it increases. Also there are 10 other dots. These represent the enemy vessels. They move with a random motion around the screen. Additionally there is one dot at the centre of the screen. This represents your destroyer star ship. Its movement is under your control



Test your skill amongst the asteroid fields of outer space with this program by Daniel Bishop. It is written for a TRS-80 Model 1, Level 2 but is also suitable for the Model 3 and the Video Genie 1 & 2.

HOW IT RUNS

20	Sends execution to 410.
30	Peeks keyboard to see if keys relevant to game have been pressed.
40	Blanks out location of star ship (X,Y) on screen.
40-70	Calculates new location of star ship.
80	If new location is unoccupied (unlit) on screen then 120.
90-100	To reach these lines new location must be occupied. Tests to see if it is an enemy vessel. If it is then score of vessels destroyed (E) is incremented by one.
110	Starship must have crashed onto an asteroid and program execution is sent to 380.
120	New location of starship is lit on screen. If enemy vessel J has previously been destroyed then 280. Otherwise present location of enemy vessel J, (X(J),Y(J)), is blanked out on screen.
130-170	Depending on present course of enemy vessel J, D(J), new location is calculated.
180	If new location is not on edge of screen then 270.
190-260	To reach these lines new location must be on edge of screen, so new course for enemy vessel J is calculted.
270	Time elapsed (C) is incremented by one and displayed on screen. New location of enemy vessel J is lit on screen.
280	If all ten enemy vessels have been destroyed then 320.
300	Number of enemy vessels destroyed (E) is displayed on screen.
320-370	End display if all ten enemy vessels are destroyed.
380	End display if starship crashes onto asteroid.
390-400	Opportunity given to play game again.
410-420	Introduction to Asteroid War displayed on screen.
430	Input of level of play (1-5) as L$.
440	Initialization of some variables.
450	Locations ((X(J),Y(J)) and courses D(J) of ten enemy vessels are chosen by random (J in this instance ranges from 1 to 10).
460	Asteroids are lit in random positions on the screen.

and by pressing the 'up-arrow' key it moves up the screen. By pressing the 'down-arrow' key surprise, surprise it moves down. By pressing the 'comma' or 'less-than' key it moves left. To move right press the 'full-stop' or 'greater-than' key.

During play the time elapsed is displayed in the top right of the screen. The number of enemy vessels destroyed by you is displayed in the top left of the screen. To destroy an enemy vessel, manoeuvre your star ship so that it intercepts the enemy vessel.

The object is to destroy all ten enemy vessels in the shortest time possible. If you accidentally hit an asteroid then your ship is destroyed and that game ends. At the end of the game, the score is displayed, along with your best ever score. You may then play the game again if you can stand the tension.

Although the game is simple, it is difficult. This is because the asteroids, the enemy vessels and your star ship are all represented as white dots. During play the screen appears to be a confusion of dots. This is intended to confuse you into crashing your star ship — and it usually does.

TRS 80

ASTEROID WAR

HINTS ON CONVERSION

As with all conversions between machines, one of the major differences lies in the screen formats. This program uses the block graphics of the TRS-80. These are low-resolution graphics, giving a screen resolution of 128 X 48, these are referenced from 0 to 127 horizontally and from 0 to 47 vertically.

In transferring this program to another machine you must first decide which sort of graphic display to use. If your micro has high-resolution graphics then you must scale its horizontal and vertical resolution accordingly. Also you will have to replace the commands SET and RESET with equivalents, such as PLOT and UNPLOT. The graphics command POINT used in 80 examines the position (x,Y) on the screen to see whether or not a point has been SET or not.

This can be simulated on a machine without high resolution graphics by POKEing characters onto the screen and using PEEK to determine whether or not a position has been filled. POKE does bring its own problems though. Because POKE is not specifically a graphics command it cannot be used with X and Y coordinates. This is because it is used to reference a position in memory, which runs serially, as opposed to a screen position which are really matrix co-ordinates.

A routine for changing high-resolution co-ordinates to POKE values for a machine with a 40 x 25 character screen is shown below:

```
REM X = Original co-ordinate, X1 = POKE value
REM Y = Original co-ordinate, Y1 = POKE value
REM BV = Base value for start of screen locations
X1 = X
Y1 = 40 * Y
POKE BV + X1 + Y1, Character value
```

This routine assumes that the values of X and Y have already been scaled, so as not to produce results that are outside the screen area.

The line (30) which looks at the keyboard to see if a key has been pressed does so by PEEKing the memory registers which hold the keyboard values. This gives the game smooth movement. Some micro's support this system, noticeably the Commodore range. If your micro does not allow this then it can be replaced with a GET or INKEY statement, although this does mean that the key will have to be depressed and released for every movement, unless you have a repeat facility on the keyboard.



PROGRAM LISTING

```
ASTEROID WAR                    BY DANIEL BISHOP, JUNE 1982 *

10 REM* ASTEROID WAR
20 GOSUB 410
30 FORJ=1TO10:G1=PEEK(14400):G2=PEEK(14500):IFG1<>8ANDG1<>16ANDG2<>
16ANDG2<>64THEN120
40 RESET(X,Y):IFG1=8ANDY>1THENY=Y-1:GOTO 80
50 IFG1=16ANDY<46THENY=Y+1:GOTO 80
60 IFG2=16ANDX>1THENX=X-1:GOTO 80
70 IFG2=64ANDX<126THENX=X+1
80 IFPOINT(X,Y)=0THEN 120
90 FORJ=1TO10:IFX(J)=XANDY(J)=YTHENX(J)=0:E=E+1:GOTO 30
100 NEXTJ
110 GOTO 380
120 SET(X,Y):IFX(J)=0THEN 280 ELSERESET(X(J),Y(J))
130 OND(J)GOTO 140 , 150 , 160 , 170
140 X(J)=X(J)-1:Y(J)=Y(J)-1:GOTO 180
150 X(J)=X(J)+1:Y(J)=Y(J)-1:GOTO 180
160 X(J)=X(J)+1:Y(J)=Y(J)+1:GOTO 180
170 X(J)=X(J)-1:Y(J)=Y(J)+1
180 IFX(J)<>126ANDX(J)<>1ANDY(J)<>46ANDY(J)<>1THEN 270
190 IFX(J)=126ANDD(J)=2THEND(J)=1:GOTO 270
200 IFX(J)=126ANDD(J)=3THEND(J)=4:GOTO 270
210 IFX(J)=1ANDD(J)=1THEND(J)=2:GOTO 270
220 IFX(J)=1ANDD(J)=4THEND(J)=3:GOTO 270
230 IFY(J)=46ANDD(J)=3THEND(J)=2:GOTO 270
240 IFY(J)=46ANDD(J)=4THEND(J)=1:GOTO 270
250 IFY(J)=1ANDD(J)=1THEND(J)=4:GOTO 270
260 IFY(J)=1ANDD(J)=2THEND(J)=3
270 C=C+1:PRINT@59,C;:SET(X(J),Y(J))
280 IFE=10THEN 320
290 NEXTJ
300 PRINT@1,E;"ENEMY VESSELS DESTROYED";
310 GOTO 30
320 CLS:PRINT"YOU HAVE DESTROYED THE ENEMY. CONGRATULATIONS!"
330 PRINT"IT TOOK YOU";C;"TO DO IT."
340 IFW=0THENW=C:GOTO 390
350 IFC<WTHENW=C:PRINT"YOUR BEST SCORE YET!":GOTO 390
360 IFC=WTHENPRINT"YOU'VE EQUALLED YOUR BEST SCORE YET!":GOTO 390
370 IFC>WTHENPRINT"YOUR BEST SCORE IS STILL";W;".":GOTO 390
380 CLS:PRINT"YOU CRASHED ONTO AN ASTEROID AND YOUR SHIP HAS BEEN
DESTROYED!  BE MORE CAREFUL IN FUTURE."
390 PRINT:PRINT"DO YOU WISH TO PLAY AGAIN (Y/N)?"
400 A$=INKEY$:IFA$="Y"THENGOSUB 440 :GOTO 30 ELSEIFA$="N"THENENDELSE 400
410 DEFINTA-Z:CLS:PRINT"ASTEROID WAR";CHR$(244);"............"
420 PRINT"USE THE ARROW KEYS TO MANOUVRE YOUR DESTROYER STAR SHIP.
TRY TO INTERCEPT ALL THE ENEMY VESSELS . BUT BEWARE, DO NOT CRASH INTO
AN ASTEROID. DO YOU WISH TO PLAY ON LEVEL 1,2,3,4 OR 5?"
430 L$=INKEY$:IFVAL(L$)<1ORVAL(L$)>5THEN 430
440 X=63:Y=23:C=0:D=0:F=0:E=0
450 CLS:FORJ=1TO10:X(J)=RND(124)+1:Y(J)=RND(44)+1:D(J)=RND(4):NEXTJ
460 FORJ=1TO100*VAL(L$):V=RND(127):Z=RND(47):SET(V,Z):NEXTJ
470 RETURN
```

READER INITIATIVE TEST

The Question.....

When can 12 equal 15?

The Answer.....

When you book an annual subscription to

PERSONAL COMPUTING TODAY

All you have to do is fill in the coupon below, send it with your remittance and we will be pleased to book your personal subscription to PERSONAL COMPUTING TODAY for 15 issues although you will have only paid for 12!

—What are you waiting for?

(Please note that this special introductory offer is only valid if your subscription booking is postmarked on or before 26th November 1982)

SUBSCRIPTION ORDER FORM

Cut out and SEND TO:
PERSONAL COMPUTING TODAY
513, LONDON ROAD
THORNTON HEATH,
SURREY,
ENGLAND.

Please commence my personal subscription to PERSONAL COMPUTING TODAY with the ..... issue

SUBSCRIPTION RATES

(tick ☐ as appropriate)

£11.65 for 12 issues UK ☐
£13.50 for 12 issues Overseas Surface ☐
£29.40 for 12 issues Overseas Air Mail ☐

I am enclosing my (delete as necessary) Cheque/Postal Order International Money Order for £.....
(made payable to ASP Ltd)
OR
*Debit my Access/Barclaycard**
*(*delete as necessary)*

ACCESS — We welcome yours
BARCLAYCARD VISA

Please use BLOCK CAPITALS and include post codes.

Name (Mr/Mrs/Miss).....

(delete accordingly)

Address.....

.....

.....

Signature.....

Date.....

FACTFILE

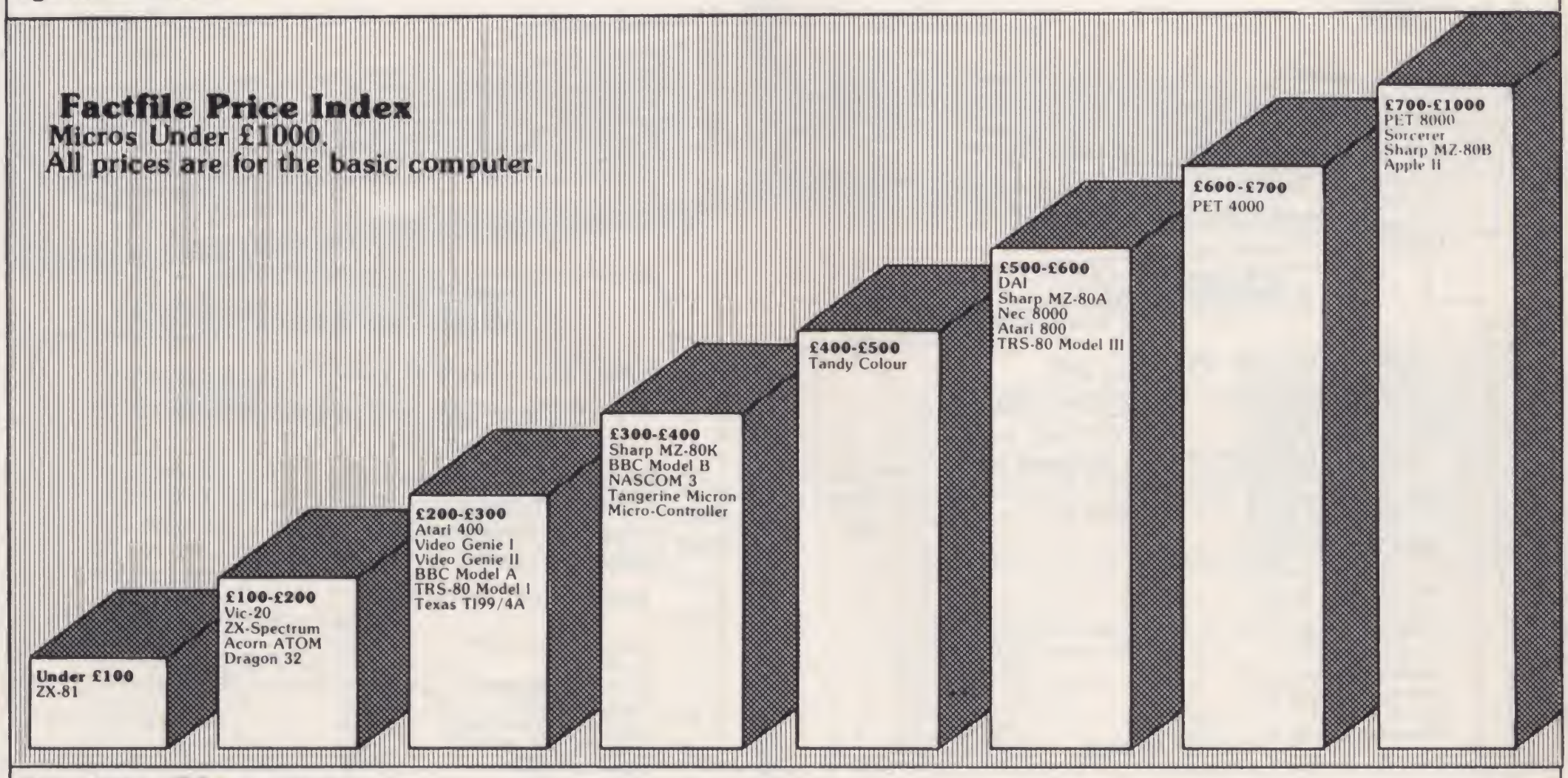
MICRO FACTFILE

Factfile is our regular buyer's guide to microcomputers. Herein you will find all the important facts and figures on 26 of the most important micros on the market under £1000. The idea is that you are able to directly compare what different manufacturers are offering you and how much they are charging you for it. Many brochures and adverts bury the reader in a mass of irrelevant facts and figures, which make it difficult to judge one against the other.

Factfile sorts it all out for you!

Just look down the price index to discover which machines are in your price-range and then consult the 'cards' on each. All the information is in a standard form and has all been checked by our technical staff. The section is presented alphabetically.

As new machines become available, we will add them into the FACTFILE as soon as we can.



Factfile Glossary

RAM: Stands for Random Access Memory and it is in there to accept the user's programs. Amount of memory is measured in "thousands of bytes" or "K" ie, 8K. A byte is a computer 'word' or single piece of information, made up of eight 'bits' which are just 1 or 0. Hence you need thousands of bytes to store a reasonable size program, since each letter, number, full stop, comma, line number, etc, uses up computer 'words' quite rapidly.

As a guideline – you can get about 50 program lines into 1K and 250 into 8K. This is a rough estimate – don't take it literally! The figures are not straight multiples, because you need to allow the machine space to work on your listing, once you've typed it in.

ROM: Read Only Memory. The machine can look and see what is stored in the memory, but it cannot alter the contents, nor store anything new. Generally used for control programs, where the micro consults the memory to see what to do next at various points in the program. Languages, such as BASIC, are stored in ROM and allow the machine to interpret what you type in, in terms of its own 'machine code'.

SIZE OF BASIC: The number of bytes occupied by the BASIC language is important, as it is an approximate guide to the BASICs versatility. The more powerful the language, the easier it should be to use.

BUS CONNECTION: A socket on the micro which allows it to be linked up to various add-ons. This can take the form of many various items, ie, expansion box, printer, disc drives, plotting device. In short a BUS is an information 'window' through which the micro communicates with the outside world.

SERIAL/PARALLEL OUTPUT: This refers to the manner in which the micro transmits data to other units. If it puts out information in a long string, one bit after another, down a single wire or connector, it is a serial output. Parallel output is where pins or wires carry information simultaneously and are 'read' together as a block by whatever it is the micro is communicating with.

VIDEO OUTPUT: an output which will drive a monitor, as opposed to a TV set, allowing it's use as a screen for the computer.

FACTFILE

ACORN ATOM

Acorn Computers, 4A Market Hill, Cambridge.
Tel: 0223-245200.

Acorn Computer's Atom is very popular with home users and is not really suited for business applications. The basic memory space is small but expansion is reasonably cheap.

STANDARD PACKAGE

Memory Size (RAM)	2K
Screen Size	16 lines of 32 characters
Expansion Sockets	BUS connector, Printer, Video output
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£140 kit, £174.50 built**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	12K internal, 32K external options	£45-149
Printer	Yes	£232
Monitor	No	—
Disc Drives	Yes	£299
Other Languages	Yes	£11.50
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	Yes, BBC BASIC	£50

OTHER ADD-ONS:

Centronics-type connector, Technomatic Ltd, 17 Burnley Road, London NW10, £8.50; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **DUO-1 64K add-on,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £64 kit, £70 built; **MZ163 RAM expansion boards,** Timedata Ltd, 57 Swallowdale, Basildon, Essex SS15 5BZ, £59.50-76.

APPLE II

Apple Computer (UK) Ltd, Finway Road, Hemel Hempstead, Herts, HP2 7PS

Apple's microcomputer is a good dual-purpose machine for business and entertainment.

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 40 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	**£812**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£200-1700
Monitor	Yes	£134
Disc Drives	Yes	£379
Other Languages	Yes	£84-500
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£26

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Multifunction Card, disc drive,** Independent Computer Engineering Ltd 16/18, Littleton Road, Ashford, Middlesex, TW15 1UQ; **16K RAM Board,** DDP Research & Marketing, 17 Novel Square, Basildon, Essex, SS13 1LP, £75; **U-port, 8 serial interfaces,** U-Microcomputers, Ltd, Winstanely Industrial estate, Long Lane, Warrington, Cheshire, WA2 8PR, £195.

ATARI 400

Atari UK Ltd, PO Box 59, Alperton Lane, Wembley, Middx.

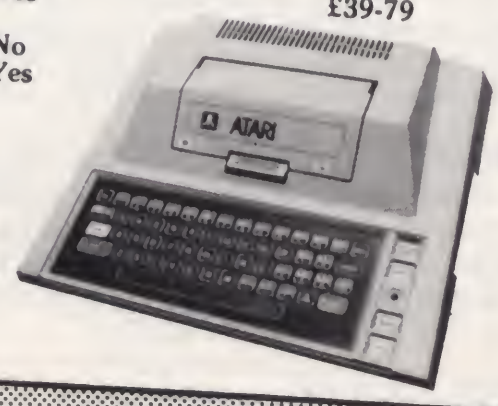
This computer started out as a popular games machine primarily in America where it has just topped Apple in the sales stakes. It's graphics are second to none.

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£199.95**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£265
Monitor	No	—
Disc Drives	Yes	£345
Other Languages	Yes	£39-79
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	—



OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microctonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95

ATARI 800

Atari UK Ltd, PO Box 59 Alperton Lane, Wembley, Middx

The Atari 800 has two distinct advantages over the 400. It has a typewriter keyboard and larger memory

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£599.95**

MANUFACTURER'S EXPANSIONS

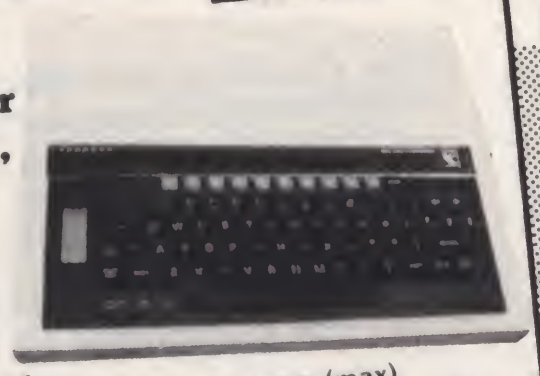
	DETAILS	PRICE
RAM	optional 16K RAM packs (to 48K Max)	£65
Printer	Yes	£265
Monitor	No	—
Disc Drives	Yes	£345
Other Languages	Yes	£39-79
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Carrying case,** CJE Microcomputer, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50

BBC MICROCOMPUTER

BBC Model A,
BBC Microcomputer Systems, PO Box 7, London W3 6JX.



STANDARD PACKAGE

Memory Size (RAM)	16
Screen Size	32 lines of 40 characters (max)
Expansion Sockets	Parallel serial output, analogue output, Bus connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£299**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 32K	£100
Printer	TBA	—
Monitor	Yes	£200
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35 Walnut Street Close, Guildford, Surrey GU1 4UN, Tel: 0483 50321, £199-799; **BBC Cassette Recorder,** Microage Electronics, 135 Hale Lane, Edgeware, Middx, £28; **Colour Monitor,** PortaTel Conversions Ltd, 25 Sunbury Cross Centre, Staines Roach West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Newitt House, Northgate Street, Bury St. Edmunds, Suffolk IP33 1HQ, £42.50.

BBC MICROCOMPUTER

BBC Model B
BBC Microcomputer Systems, PO Box 7, London W3 6JX

This is a superior version of the Model A and therefore more expensive. The main difference lies in memory capacity — there is 32K on the Model B, and it can handle twice the number of characters on the screen

STANDARD PACKAGE

Memory Size (RAM)	32
Screen Size	30 lines of 80 characters
Expansion Sockets	Serial and parallel output, analogue output, printer BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£399**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	TBA	TBA
Monitor	Yes	£200
Disc Drives	TBA	TBA
Other Languages	TBA	TBA
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	TBA

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, Tel: 0483 503121, £199-799; **BBC Cassette recorder,** Microage Electronics, 135 Hale lane, Edgware, Middx, HA8 9QP, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Saires Road West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Hewitt House, Northgate Street, Bury St. Edmunds, Suffolk, IP33 1HQ, £42.50; **Carrying Case,** CJE Microcomputers, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50.

COMMODORE PET 4000

Commodore,
675 Ajax Avenue, Slough, Berks

Commodore's PET 4000 was built on the design of one of the first personal computers brought out by the firm. It is used for a variety of purposes in schools, at home and in the office, but is one of the more expensive microcomputers.

STANDARD PACKAGE

Memory Size (RAM)	16 or 32K
Screen Size	25 lines of 40 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£632.50, £799.25**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes several	£454-1604
Monitor	N/A	—
Disc Drives	Yes	£396
Other Languages	Yes, single or dual	£454-1029
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Burnley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Estate, Ashford, Kent, £82.95; **64K DRC Module,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

COMMODORE PET 8000

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	32K or 96K
Screen Size	25 lines of 80 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£980, £1374**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£454-1604
Monitor	N/A	—
Disc Drives	Yes single or dual	£454-1029
Other Languages	Yes	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

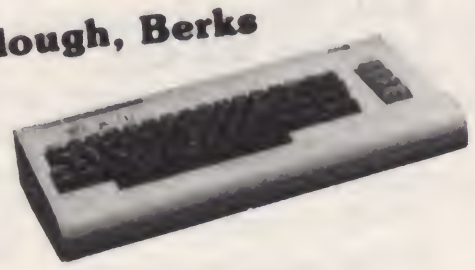
OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Bunley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Easte, Godinton Road, Ashford, Kent, £82.95; **64K DRC Module** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

FACTFILE

COMMODORE VIC20

Commodore,
675 Ajax Avenue, Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	5K
Screen Size	23 lines of 22 characters
Expansion Sockets	BUS connection, Disc, Printer, Serial output, joystick
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£199.99**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	3K,8K,16K expansion options	£30,£45,£75
Printer	Yes	£270
Monitor	No	—
Disc Drives	Yes	£396
Other Languages	Yes	£38.95
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)		

OTHER ADD-ONS:

VCR-20,
20K RAM cartridge, Audio Computers, 87 Bournemouth Park Road, Southend on Sea SS5 2JJ, £39 kit, £45 built; **Expansion Board,** 3K-16K, Arfon Microelectronics Ltd, Gibyn Industrial Estate, Caernafon, Gwynedd, Wales LL55 2BD, £220. Languages: VIC Forth, Adda Computers, 154 Victoria Road, Acton, London, W3.

DAI

Data Applications UK Ltd, 16B Dyer Street, Cirencester, Gloucestershire, GL7 2PF

For the amount of on-board memory the DAI has it is a good price. But for the enthusiast and computing newcomer there is little off-the-shelf software available. It is aimed more directly at the small business user rather than the first-time buyer or hobbyist.

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 60 characters
Expansion Sockets	BUS connection, Serial output, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£575**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	No	—
Monitor	No	—
Disc Drives	Yes	TBA
Other Languages	No	—
Multi-user		
Capabilities	No	—
BASIC extensions (Toolkits)	Yes, maths pack	£149

OTHER ADD-ONS:

None Reported

DRAGON 32

Dragon Data Ltd
Queensway,
Swansea
Industrial Estate,
Swansea, SA5 4EH



STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Yes
Display Unit Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£199**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	—	—
Printer	No	—
Monitor	No	—
Disc Drives	No	—
Other Languages	Yes	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None reported

MICROCONTROLLER

Midwich Computer Company, Ltd,
Hewitt House, Northgate Street,
Bury St. Edmunds, Suffolk IP33 1HQ.
Tel: 0284-701321

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K (control BASIC)
Average Price	**£375**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	POA
Monitor	Yes, 9″ or 12″ screen	£135-149
Disc Drives	No	—
Other Languages	No	—
Multi-user		
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

NASCOM 3

Lucas Logic, NASCOM
Microcomputers Division, Welton Road,
Wedgenock Industrial Estate, Warwick,
CV34 5PZ.
Tel: 0926-497733

STANDARD PACKAGE

Memory Size (RAM)	0-48K
Screen Size	25 lines of 40 or 80 character
Expansion Sockets	Parallel & serial outputs, BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-10K
Average Price	**£549**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£130
Printer	Yes	£215-1285
Monitor	Yes	£99-120
Disc Drives	Yes, single or dual	£470-685
Other Languages	Yes	£50
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	-15-50

OTHER ADD-ONS:

Olivetti disc drives, single and dual, Kram Electronics, Victoria House, 17, Highcross St., Leicester, LE1 4PF, £179-349; **A/D Board,** 10, Research Ltd, 6, Laleham Avenue, Mill Hill, London NW7 3HL, £120 + VAT; **Hobbit – mini-cassette system,** Ikon Computer Products, Kiln Lane, Laugharne, Covnathen, Dyfed, £99 + VAT; **Disc drives, single and dual,** Micro-Spares, 19, Roseburn Terrace, Edinburgh, EH12 5N9, £199-279.

NEC PC8000

IBR, Unit 57,
Sutton Industrial Park,
London Road,
Earley,
Reading,
Berks.

Really only for the small business user.

STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	25 lines of 80 characters
Expansion Sockets	Parallel output Bus Connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	24K
Average Price	**£599**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	optional 32K RAM packs (up to 128K)	£109
Printer	Yes	
Monitor	Yes	£375-1450
Disc Drives	Yes, dual	£149-£549
Other Languages	Yes	£625
Multi-user Capabilities	Yes	£200-£500
BASIC extensions (Toolkits)	No	P.O.A.

OTHER ADD-ONS:

None Reported

NEWBRAIN

Grundy Business Systems Ltd, Grundy House, Somerset Road, Teddington
TW11 8TD.

STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	Printer, serial, video, data bus
Tape Included?	No
Display Unit Included?	No (Single line option on model AD)
Usable Domestic TV?	Yes
Size of BASIC	18K
Average Price	**£199 model A, £299 Model AD**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	64 – 512K,	£75 – £445
Printer		
Monitor		
Disc Drives	NYA	
Other Languages	NYA	—
Multi-user	NYA	—
BASIC extensions	NYA	—

OTHER ADD-ONS:

None Reported.

SHARP MZ-80A

Sharp UK Ltd, Thorn Road, Newton Heath,
Manchester M10 9BE
Tel: 061-205 2333.



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Prte	**£549**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

REFERENCE

FACTFILE

SHARP MZ-80B

Sharp UK Ltd, Thorn Road, Newton Heath, Manchester M10 9BE

As cost is often the most relevant factor in buying a computer this Sharp is suited to the dedicated business user who can afford it.



STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	**£990**

MANUFACTURER'S EXPANSIONS

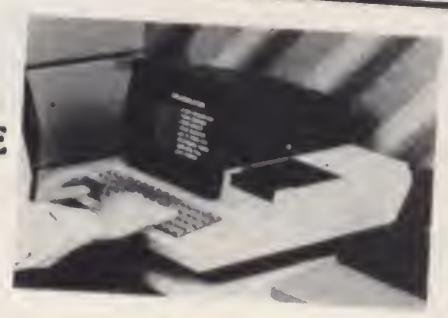
	DETAILS	PRICE
RAM	Yes	£120
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Multi-vision and triple-vision, Datron Micro Centre, 2 Abbeydale Road, Sheffield S7 1FD, £35-79

SHARP MZ-80K

Sharp UK Ltd, Thorn Road, Newton Heath, Manchester M10 9BE



STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£350**

MANUFACTURER'S EXPANSIONS

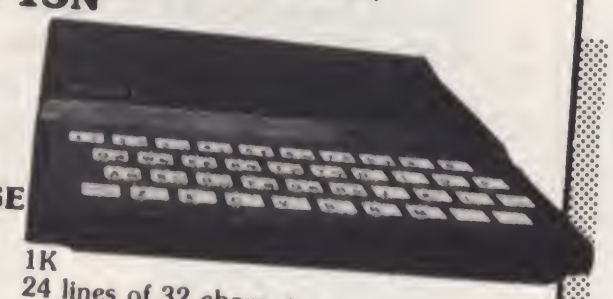
	DETAILS	PRICE
RAM	No	—
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45 upwards
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

SINCLAIR ZX-81

Sinclair Research, 6 Kings Parade, Cambridge, CB2 1SN



STANDARD PACKAGE

Memory Size (RAM)	1K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£49.95 kit, £69.95 built**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K RAM pack	£29.95
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	No	—
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

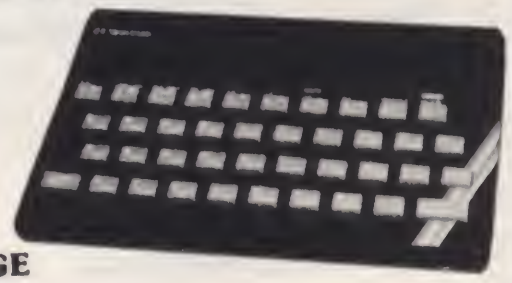
OTHER ADD-ONS:

Memory expansion unit 16K or 64K, Memotech Ltd, 3 Collins St, Oxford OX4 1XL, £39.95-79; **Key Bleep Unit,** Microtronix, 3 Buxton Avenue, Coulton, Nottingham, N94 3RR, £8.85 kit, £9.95 built; **Maximem 1.1,** East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London, EB4 BT, £93.50; **Music Synthesiser + 16 line control port,** William Stuart Systems Ltd, Dower House, Billicicay Road, Herongate, Brentwood, Essex CM13 3SD, £19.50; **Full-size keyboard,** Protos Computer Systems, Frome Computing, 20 Ashtree Road, Frome, Somerset, BA11 2SF, £64.95; **ZX99 Automatic tape control,** Data-cassette, 44, Shroton Street, London NW1 6UG, £59.95.

SINCLAIR ZX- SPECTRUM

Sinclair Research, 6 Kings Parade, Cambridge CB2 1SN

Price wise this computer beats everything else.



STANDARD PACKAGE

Memory Size (RAM)	16-48K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	10K
Average Price	**£125 or £175**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	48K RAM for 16K version	£60
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	ZX Microdrive	TBA
Other Languages	No	—
Multi-user Capabilities	No	TBA
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

SORCERER

EMG, Microcentre, 47 Lower Belgrave Street, London, SW1

Aimed at the business user this computer can either be linked up to a standard television and tape loaded, or be hooked up to a special unit consisting of a monitor and two 5· inch disc drives. Compatible software is thin on the ground from independent suppliers.

STANDARD PACKAGE

Memory Size (RAM)	56K
Screen Size	30 lines of 64 characters
Expansion Sockets	BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£790**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£395-1935
Monitor	Yes	£160-330
Disc Drives	Yes single and dual	£420-599
Other Languages	Yes	£99-420
Multi-user Capabilities	No	
BASIC extensions (Toolkits)	No	

OTHER ADD-ONS:

None Reported

TANDY TRS 80 I

Tandy Corporation, 12th Floor, Tameway Tower, Walsall, West Midlands WS1 1LA.

The TRS-80 Model I is slightly old-fashioned because of its graphics limitations, and black and white screen

STANDARD PACKAGE

Memory Size (RAM)	4 or 16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	**£229 or £339**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	32K extra in expansion unit	£349
Printer	Yes	
Monitor	Yes	£239-1200
Disc Drives	Yes	£100
Other Languages	Yes	£369
Multi-user Capabilities	No	£100
BASIC extensions (Toolkits)	Yes	— £100

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kran Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC) 46 Middle Street, Blackhall, Marlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY TRS 80 III

Tandy Corporation, 12th Floor, Tameway Tower, Bridge Street, Walsall, West Midlands WS1 1LA

This is the upgraded version of the Model I and comes complete with black and white monitor and dual disc drives.

STANDARD PACKAGE

Memory Size (RAM)	4-48K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection, parallel & serial output
Tape Included?	No
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	**£599-1799**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K modules	£70
Printer	Yes various	£239-1200
Monitor	N/A	—
Disc Drives	Yes	£600
Other Languages	Yes	£100
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17, Highcross St, Leicester LE1 4PF, £179-349; **48K** General Northern Microcomputers, (GNOMIC), 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY COLOUR

Tandy Corporation, 12th Floor, Tameway Tower, Bridge Street, Walsall, West Midlands, WS1 1LA



The latest addition to Tandy's range and designed to make up for the faults of earlier models.

STANDARD PACKAGE

Memory Size (RAM)	16-32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Serial output, ROM pack, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-16K
Average Price	**£499**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£239-1200
Monitor	No	—
Disc Drives	Yes	£439
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Olivetti disc drives single and dual, Kram Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349.

FACTFILE

TANGERINE MICRON

**Tangerine Computer Systems Ltd,
The Science Park, Milton Road, Cambridge
CB4 4BH**



STANDARD PACKAGE

Memory Size (RAM)	8K
Screen Size	16 lines of 32 characters
Expansion Sockets	Parallel & serial output, BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	10K
Average Price	**£395**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	48K in system rack	£144
Printer	No	—
Monitor	No	—
Disc Drives	Yes	TBA
Other Languages	Yes	£40
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Sound Board and Graphics Board, Bulldog Video Ltd, 52, Nash Square, Birmingham, B42 2EX, £49-£179; **Toolkit,** Microtanic Software, 235, Friern Road, Dulwich, London, OBD, £22.50.

TEXAS TI 99/4A

**Texas Instruments,
European
Consumer
Division,
Manton Lane,
Bedford MK41 7PA**



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 32 characters
Expansion Sockets	ROM pack, Bus connector, joystick, socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	14K
Average Price	**£199**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£300
Printer	Yes	£275
Monitor	No	—
Disc Drives	Yes	£300
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

None Reported

VIDEO GENIE I

**Lowe Electronics, Bentley Bridge,
Chesterfield Road, Matlock, Derbyshire,
DE4 5LE**

The Genie I is the essence a copy of the Tandy TRS-80 and the software is compatible with both machines. Its main drawback is the graphics limitations

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 64 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	12K
Average Price	**£279**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leiscester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213 **48K Internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Martlepool, Cleveland, £70 + VAT: **32K RAM Card** Audio Computer, 87 Bournmouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

VIDEO GENIE II

**Lowe Electronics, Bentley Bridge,
Chesterfield Road, Matlock, Derbyshire
DE4 5LE**

This is the upgraded version of the original Genie I.

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	13K
Average Price	**£299**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35, Walnut Tree Close, Guildford, Surrey, Gul 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213; **48K internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM Card** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

CAMBRIDGE LEARNING
SELF-INSTRUCTION COURSES



COMPUTER PROGRAMMING IN BASIC £11.50 (CPB)
Microcomputers are here – teach yourself to program! Learn BASIC, the easiest and most widespread language for the small computer. 60 illustrated lessons teach the essentials of good programming: problem definition, coding, flow-charting, debugging and clear documentation. And you don't even need a computer!

ZX81 SUPPLEMENT
£1.10 alone, £0.65p with CPB
When used in conjunction with the above course, it enables you to apply your knowledge to the Sinclair ZX81 microcomputer. It includes some amusing programs to help get you started.

THE ALGORITHM WRITER'S GUIDE £4.40
explains how to define questions, put them in the best order and draw the flow chart, with numerous examples. A must for programmers.

Cheque/PO with order to: **Cambridge Learning Ltd.,** Unit number 139, Rivermill Site, FREEPOST, St. Ives, Cambs, PE17 4BR.
Or phone your credit card details to 0480 67446 (24-hour service).

A retailer for Sinclair accessories in the Yorkshire/Lancashire/Humberside area.

We are situated close to the M1 & M62 motorways and offering easy parking.

As well as a complete range of hard and software, our service department can repair, modify or fit a wide range of accessories.

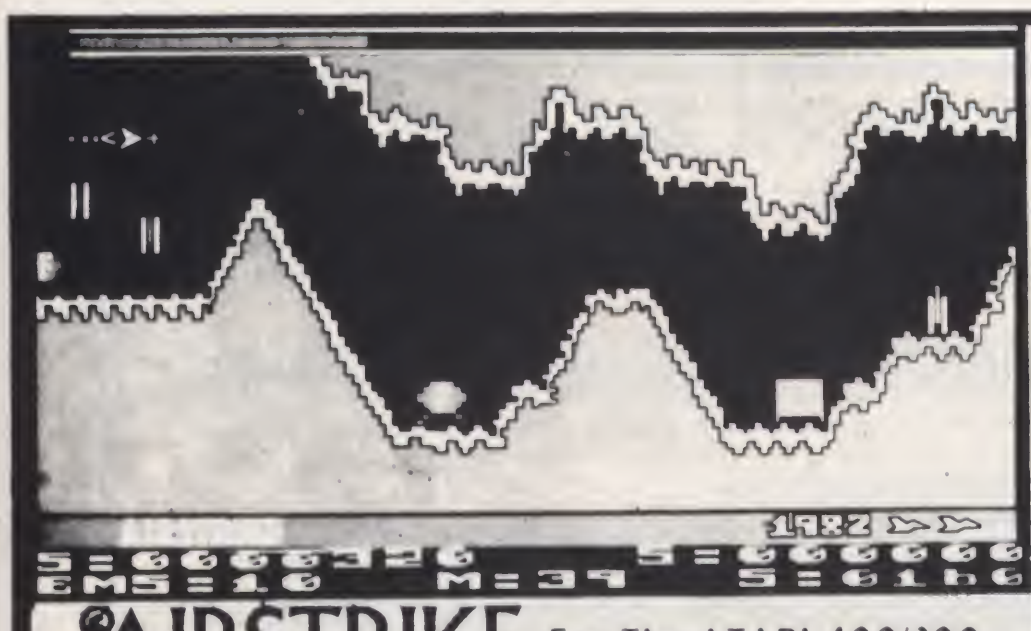
For further details of these and many other services phone:

PHILIP COPLEY
on
0924 272 545

Manufacturers of accessories looking for a retailer in our area are invited to contact us.

SPECTRUM SOFTWARE/HARDWARE AVAILABLE NOW

Hours of business:
MONDAY to SATURDAY, 10am to 8pm



AIRSTRIKE For The ATARI 400/800

- INTRODUCING THE NEW ARCADE GAME FOR ATARI COMPUTERS !
- SUPERB SCROLLING GRAPHICS WITH DAZZLING COLOURS ! ● 100% MACHINE CODE PROGRAMME FOR ONE OR TWO PLAYERS ! ● MULTIPLE SKILL LEVELS – FIGHT YOUR WAY THROUGH CAVERNS AND TUNNELS WITH ATTACKING MISSILES FUEL AND AMMO DUMPS TO CONTEND WITH ! ● AVAILABLE NOW: 16K CASSETTE £15.95) Plus 50p P & P
  32K DISK £18.95)

NEW ATARI SOFTWARE:— Canyon Climber, Pacific Coast Highway, Shooting Arcade, Track Attack, Star Blazer, Alien Swarm, Indruder, Micropainter, Graphics Master, Night Rally, Centipede, Cyclod, Snake Byte, Venus Voyager, Clowns & Balloons Hazard Run, Drawpic, Nautilus, Slime, Chicken and much much more. Call for latest prices!!!!!

NOW IN STOCK : ATARI TV GAMES PLUS ACTIVISION CARTRIDGES AT DISCOUNT PRICES ! WATCH OUT FOR PACMAN AND DEFENDER !

NATIONWIDE MAIL ORDER SERVICE ON ALL PRODUCTS – SEND STAMP OR CALL NOW FOR DETAILS

NOW IN STOCK ON 16K CASSETTE:
FROGGER @ £22.95
CROSSFIRE @ £19.95
VENUS VOYAGE £19.95
*PROTECTOR (32K Cassette/Disk)
Plus: on 32K DISK:
MOUSKATTACK @ £22.95
*THRESHOLD (40K) (unbelievable graphics!)
*RASTER BLASTER (real pinball!)
*ALI BABA & 40 THIEVES
*APPLE PANIC
*Call for Prices
Add 50p P&P
MORE ATARI SOFTWARE DUE SHORTLY ! !

ACTION QUEST™
16K Assembly Language Real-Time Adventure Game For ATARI® 400/800 Computer



16K CASSETTE/DISK £19.95 Plus 50p p&p

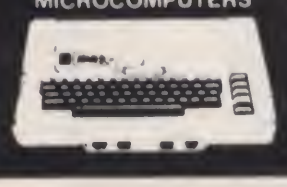
Action Quest is a real time adventure game played with your joystick controller. You, represented as a ghost, move from room to room in an attempt to capture valuable prizes while eluding monsters and solving puzzles. Score is computed based both on prizes captured and elapsed time. Action Quest is entirely played as an action game, no keyboard input is required.

A complete game encompasses 30 rooms and 20 prizes, and prize capture is not always an easy task; a different technique or twist is involved in obtaining each one. Some require physical dexterity to reach while others can be acquired only through an intellectual problem solving path. Even some rooms are initially hidden from the player and must first be found before their prizes can be captured. Action Quest provides challenges both for fast action players as well as for those motivated by intrigue.

GEMINI ELECTRONICS

(Dept.P.C.) 50 Newton St., Off Piccadilly, Manchester M1 2EA. Tel: 061-236 3083.

ATARI MICROCOMPUTERS



Buy it with Access BARCLAYCARD VISA

✸ COMPUTER CHESS GAMES

Commodore VIC-20
PLUS GAMES NOW IN STOCK!

ATARI PERSONAL COMPUTER SYSTEMS ATARI
400 & 800

ZX81 16K SOFTWARE

ADVENTURE **£6.00**
100 randomly positioned caves await you. Choose your starting cave with care. Pick up all the treasures, (there are 30). Remember, you can only carry 6 at once. Beware of the evil magician, the troll and the warped cave. Let the goblin sing in your ear. £10 prize for first person to finish. Game save option.

CASSETTE DESIGN **£5.00**
You have 10 designs of 24 lines by 32 characters. When you have created your designs the ZX PRINTER will Lprint them. All cassettes supplied with a sample design. Design no. 1 contains an example design. You can view, erase, create and SAVE your designs.

METRIC CONVERTER **£5.00**
Convert between imperial and Metric, either way. The program allows you to get a sample printout from the ZX PRINTER of conversions from preset limits. Convert between MPH-KMH, Lengths, Weights, Volumes and areas.

Cheques/PO's payable to:

D J MOODY COMPUTER SOFTWARE,
Dept PCT1,
1 Starnhill Cottages,
Granby Lane, Bingham,
Nottinghamshire NG13 8DH.

Nat. Girobank transfers to 40 652 4009.
Write your order on back of transfer slip or for non-account holders go to your Post Office and ask for a Transcash slip.

MICROWARE MICROWARE

MICROWARE MICROWARE

RETAIL SHOP IN
LEICESTER
FOR
SINCLAIR
COMPUTERS

If it is good and reasonably priced then **MICROWARE** stock it!

Keyboards, Ram Packs, I/O Ports, Monitors, G/Roms; Games, Serious, Home/Business, Education Programs; Books and Magazines.

Also — Now stocking Books and software for SPECTRUM, BBC and VIC 20

NOW Microware's own Software Label "Alien Command" for Spectrum **£5.50**
Mail Order or Shop.
Good Spectrum Software wanted, excellent royalties paid.

"THE FRIENDLY TO USER STORE"

MICROWARE
131 Melton Road
Leicester
Tel: 0533 681812

Closed Thurs
Open 9.30-5.30
Closed 12-12.30

MICROWARE MICROWARE

TITAN PROGRAMS ARE BLOWING THE LID OFF SOFTWARE PRICES

VIC-20

THIS MONTHS SPECIAL OFFER
Buy any two programs from Titan and get one, of your choice, Free offer closes 31/10/82

MISSILE PANIC Unexpanded Vic **ONLY £6**
OUR BABY IS BORN!!!! — The most outstanding game yet for the VIC, specially written for Titan Programs. The guided missile is after you, so fast tactics are needed to stay alive. Fully documented in superfast Hi-Resolution. When you run this game you will wonder what you ever saw in your other software.

SPACE HOPPER Unexpanded Vic **NOW ONLY £5**
You have played invaders, you have played Packman, now try the latest, most exciting find for 1982. This game is squeezed into the unexpanded Vic and uses 'Full-screen' Hi-res Graphics, is ultra fast, and is very hard to put down. No Vic owner should be without it.

STAR WARS II Unexpanded Vic **NOW ONLY £5**
The best in 'Space Battle' games. Hi-res Graphics and fast action make this a must for any budding 21st Century Astronaught.

NAVAL ATTACK Unexpanded Vic **NOW ONLY £5**
With a stunning Graphic display of mountains, golden beaches and deep blue seas, you are assigned to attack a vehicle convoy. Your onboard gun has a quite unique sight which allows you to destroy your target with incredible precision. A totally addictive game that will leave you trembling with excitement.

TROLL ISLAND Unexpanded Vic **NOW ONLY £5**
You have asked for an adventure game so we bring you an adventure game. To reach the landing bay you must complete many tasks. All the usual features. Very compelling.

SPACE WARS/BATTLEZONE Unexpanded Vic **NOW ONLY £5**
At last . . . two very exciting, Hi-resolution, fast action, two player games that can be played simultaneously. Space Wars is a typical dog fight situation where nerves of steel are all important. In Battle Zone strategy is the name of the game.

GAMES TAPE ONE *All* Unexpanded Vic **ONLY £5**
A truly professional, high quality 6-pack for the Vic. A mixture of Hi-res graphics, animation, thrills and spills make this a very exciting package, fully documented and sensibly priced too!

LUNAR MATHS 3K Expanded Vic **NOW ONLY £5**
This educational package has got to be a must for all youngsters up to the age of seven. To get the Apollo spacecraft to the Moon and back ten selected maths questions must be answered correctly. Bright, big numbers. Animated graphics and music together make up an outstanding educational package.

ATARI

SENSIBLY PRICED ATARI SOFTWARE NOW AVAILABLE FROM TITAN
400/800

CAVERNS (16K) **ONLY £6**
At last. . . . A totally addictive, arcade quality program that will take a long time to outgrow, and one that does not cost the earth. Navigate your spaceship through rock caverns, past lazer fields, through rock valley and into the unknown. You will have to see it to believe it!! Supplied on cassette with full instructions.

PROGRAMMERS . . . . . Can you write programs for the VIC/ZX81/T199/4A/ATARI? If so, pop them on a Cassette or give us a ring. Top prices paid for imaginative and creative software.

Dealer enquiries welcome. Quality discounts, no minimum orders. Advertising packs (shop window) available.

T199/4A AND SPECTRUM Software should be available when you read this. Phone for latest details.

Buy your 'Titan' Programs from your local dealer or Access holders may phone 0249 3241 Ext 39. TITAN HOTLINE 0225 810132. Overseas orders welcome. For instant despatch send Cheque/P.O. to: Titan Programs, 83 Ashwood Road, Rudloe, Corsham, Wiltshire SN13 0LG.

TITAN PROGRAMS

Simply the best Software in the world.

SOFTWARE LISTING

Looking for a program to buy? Look no further! If it's available, it's listed here in our exclusive and comprehensive software checklists.

Looking through any computer magazine can be a bewildering experience if you're in search of a program. Count the hundreds of ads and thousands of titles on sale and it would be easy to lose heart!

We've tried to sort out the confusion, and the sheer numbers, to present an easily understood list for each machine. Where possible, we have eliminated duplications, so that the same tape with a different label is not listed twice. Rather it should be credited once, with as many suppliers as we could find.

Table Codes

In order to fit as many programs as possible into our pages, we have had to use codes for some columns, considerably shortening the wording.

The information given for each program is: Title, memory required to run it, company producing it, whether tape/cartridge or disk, type and supplier and price.

The codes we have used are:

Program Type

GM = Game
BS = Business routine
UT = Utility (ie. programming aid)
DO = Domestic
ED = Educational

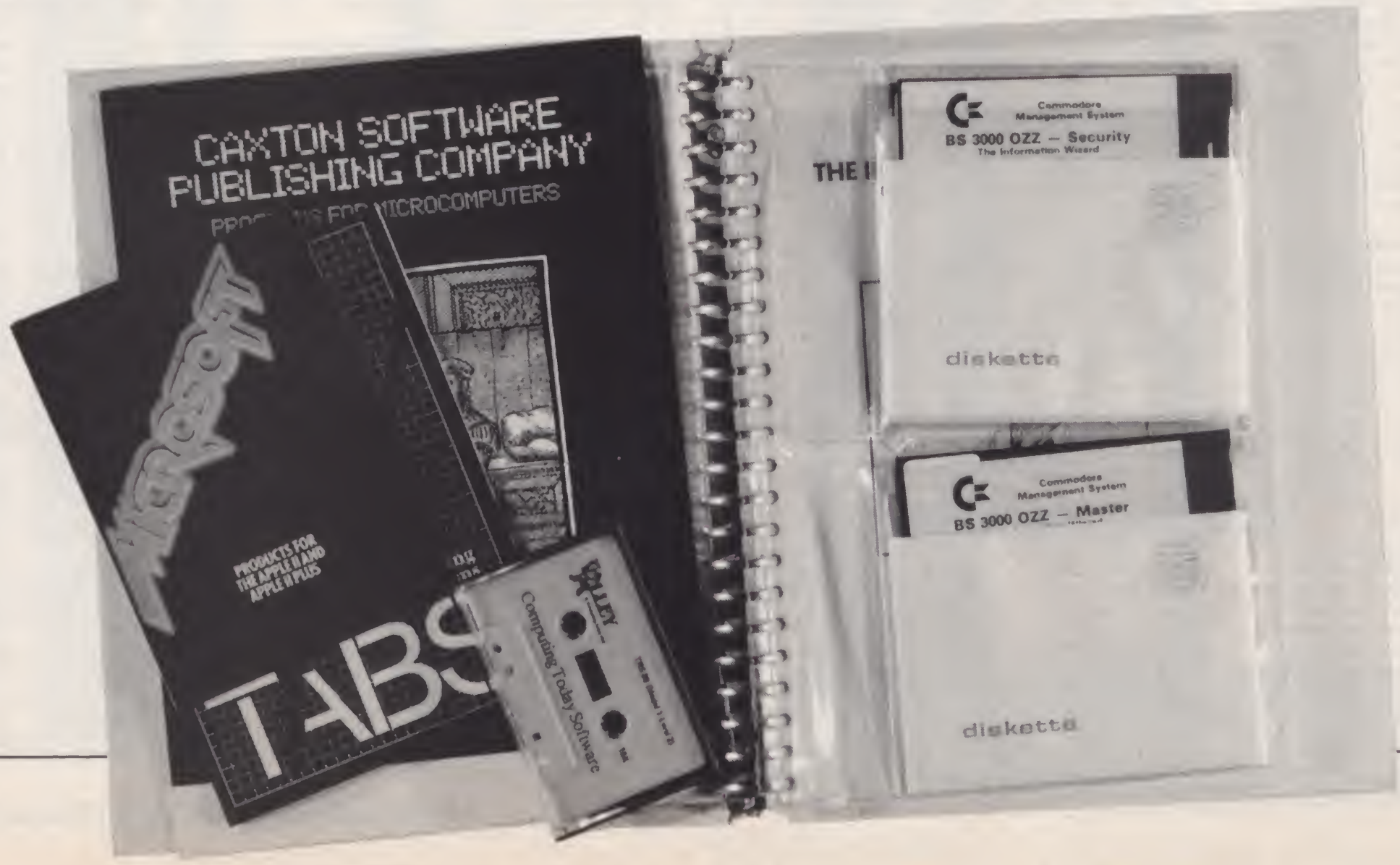
How Sold

R = Cartridge (may include memory)
C = Tape (cassette)
D = Disc (for expanded systems)
L = Listing (sold as print-out)

These tables are repeated throughout the listings to save you having to turn back and forth repeatedly. Once you've found the program you want, check the supplier code with the list of companies at the end of the article for address and telephone number.

Not Here?

To companies whose products are not listed herein we can only say TELL US ABOUT IT! This applies particularly to the smaller retailer who may sell only half a dozen or so programs for one machine. If you produce software for *any* of the machines on the market today, then we would love to include your wares in our checklists. Send it in to us, marked for the attention of the Editor (in our format *Please*!) or ring Chris Palmer on 01-437 1002 as soon as possible.



REFERENCE

SOFTWARE LISTING

ATARI 400

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
3-D Supergraphics	Ut	United S/W of America	48K	C	BC	£29.95
3-D Supergraphics	Ut	United S/W of America	48K	D	AB	£39.95
6502 Disassembler	Ut	Quality S/W	16K	C	BC	£8.95
6502 Disassembler	Ut	Quality S/W	16K	D	BC	£11.95
747 Landing Simulation	Gm	Atari	24K	C	GC	POA
					AB,IK	£16.75
Adventureland	Gm	Adventure Int.	24K	C	BC	£14.95
					AB	£16.50
Action Quest	Gm	J.V. S/W	16K	C	HM	£19.95
Action Quest	Gm	J.V. S/W	16K	D	HM	£19.95
Adventures 1-12	Gm	Adventure Int.	32K	C	CH	£16.50
Air Strike	Gm	English S/W	16K	C	CH,HM	£15.95
Ali Baba	Gm	Quality S/W	32K	D	HM	£22.95
Alpha Fighter	Gm	Dinacomp	24K	C	AB,IK	£11.99
Analog Adventure	Gm		32K	D	BC	£34.95
Angle Worms	Gm	Adventure Int.	8K	C	AB,IK	£12.50
Ants Hill	Gm	Atari	8K	C	GC	POA
					AB	£11.25
Armoured Patrol	Gm	Adventure Int.	16K	C	AB	£16.50
Assembler Editor	Ut	Atari		R	AB,HM	£39.95
Assembler	Ut	Quality S/W	16K	C	BC	£14.95
Assembler Editor	Ut	United S/W of America	16K	R	BC	£34.50
Asteroids	Gm	Atari	16K	R	AC, BC,CH, HM,IK	£29.95
					BC	£18.95
Atari Word Processor	Bs	Atari	32K	C	AB	£95.95
Atari Word Processor	Bs	Atari	32K	C	BC	£85.00
Atari Word Processor	Bs	Atari	32K	D	HM	£99.95
Atari World Graphics	Ut	United S/W of America	48K	D	BC	£43.95
Avalanche	Gm	Atari	16K	C	GC	POA
					CH	£13.95
					AB	£16.75
Babel	Gm	Atari	16K	C	GC	POA
					AB,IK	£16.75
Balrog Sampler	Gm	Adventure Int.	32K	C	AB	£24.95
Basic A Plus	Ut	OSS S/W	48K	D	BC	£52.50
Basic A Plus and Operating System A	Ut	OSS S/W	48K	D	BC	£99.50
Basic Program Compress.	Ut	Atari	32K	D	AB	£16.75
Basic Utility/Renumber	Ut	Atari	16K	C	AB	£16.75
Basics of Animation	Ed	Santa Cruz	24K	D	BC	£10.95
Basics of Animation	Ed	Atari	16K	C	BC	£9.95
Basics of Animation	Ed	Santa Cruz	16K	C	AB	£13.95
Basketball	Gm	Atari	16K	C	AC,HM,IK	£24.50
Basketball	Gm	Atari	16K	R	AB,BC,IK	£29.95
Beneath the Pyramids	Gm	Chrystal	48K	C	CH,AB,IK	£19.99
Black Jack	Gm	Atari	16K	C	GC	POA
					AC,BC	£8.95
					AB,HM,IK	£9.95
Black Jack Shooter	Ed	Atari	16K	C	AB	£16.75
Bob's Business	Bs	Santa Cruz	16K	C	AB	£9.95
British Heritage Jigsaw Puzzle	Gm	Thorn EMI	16K	C	BC,HM,IK	£19.95
Bumper Pool	Gm	Atari	16K	C	GC,IK	POA
					AB	£11.25
Calculator	Bs	Atari	24K	D	BC,IK	£16.95
Canyon Climber	Gm	Datasoft	16K	D	HM	£20.00
Caverns of Mars	Gm	Atari	16K	C	BC,HM,IK	£24.50
Caverns of Mars	Gm	Atari	16K	C	BC,HM,IK	£24.50
Centipede	Gm	Atari	16K	R	GC	POA
					BC,HM,IK	£29.95
Champelo	Gm	Dinacomp	16K	C	AB,IK	£10.99
Character Generator	Ut	Data Soft	16K	C	BC	£9.97
Character Generator	Ut	Data Soft	16K	D	BC	£12.50
Checker Kim	Gm	Personal S/W	16K	C	BC	£15.95
Chicken	Gm	Synapse	16K	C	HM	£19.95
Chicken	Gm	Synapse	16K	D	£19.95	
Chrystals	Gm	Dinacomp	24K	C	AB,IK	£9.99
Code Cracker	Gm	Atari	8K	C	GC	POA
					AB	£11.25
Computer Acquire	Gm	Avalon Hill	16K	C	GB	£17.25
Computer Chess	Gm	Atari	16K	R	GC	POA
					CH,AC,HM	
					AB,BC	£24.95
Conflict 2500	Gm	Avalon Hill		C	GB,AB	£12.50
Controller	Gm	Avalon Hill	32K	D	BH	£17.95
Conversational French	Ed	Atari	16K	C	AC,BC,IK	£32.50
Conversational French	Ed	Atari	16K	R	AB,HM,IK	£39.95
Conversational German	Ed	Atari	16K	C	AC,BC,IK	£32.50
Conversational German	Ed	Atari	16K	R	AB,HM,IK	£39.95
Conversational Italian	Ed	Atari	16K	R	AB,HM,IK	£39.95
Conversational Italian	Ed	Atari	16K	C	AC,BC,IK	£32.50
Conversational Spanish	Ed	Atari	16K	R	AB,HM,IK	£39.95
Conversational Spanish	Ed	Atari	16K	C	AC,BC,IK	£32.50
Convoy Raider	Gm	Avalon Hill	16K	C	BH	£10.95
					GB,AB	£12.50
Cribbage and Dominoes	Gm	Thorn EMI	16K	C	CH,BC,HM ,IK	£14.95
Cross Fire	Gm	On Line	16K	C	HM	£19.95
Cross Fire	Gm	On Line	32K	D	HM	£19.95
Crush, Crumble, Chomp	Gm	Avalon Hill	16K	C	GB,IK	£15.50
Crush, Crumble, Chomp	Gm	Avalon Hill	16K	D	GB,IK	£17.95
Crypts of Terror	Gm	In Home S/W	16K	C	CH,HM	£19.95
Curse of Crawley Manor	Gm	Adventure Int.	16K	C	AB	£16.50
Cypher Bowl	Gm	Artsci Inc.	32K	D	BC	£22.45
DI Nuclear Bomber	Gm	Avalon Hill	16K	C	BH	£10.95
Darts	Gm	Thorn EMI	16K	C	CH,BC,HM IK	£19.95
Data Management S/W	Bs	C E S/W	48K	D	AB	£101.00
Data Management System	DO	Atari	32K	D	AB	£20.50
Datestone of Ryn	Gm	Avalon Hill		D	GB,IK	£15.50
Datestone of Ryn	Gm	Avalon Hill		C	BC	£14.95
					GB,IK	£13.50
Deflections	Gm	Adventure Int.	8K	C	AB,IK	£12.50
Disc Fixer	Ut	Atari	16K	D	AB	£22.50
Display List	Ed	Santa Cruz	16K	C	BC	£9.95
Display List	Ed	Santa Cruz	16K	D	BC	£10.95
Dnieper River	Gm	Avalon Hill	48K	C	BH	£15.95
					CH	£14.50
Domination	Gm	Atari	24K	C	GC	POA
					AB	£16.75
Dos 2	Ut	Atari	32K	D	AB	£21.95
Dragon of Hong Kong	Gm	Adventure Int.	32K	C	AB	£16.50
Eastern Front	Gm	Atari	16K	C	CH	£24.95
Eastern Front	Gm	Atari	16K	D	AB	£30.25
Empire of the Overmind	Gm	Avalon Hill		C	BH	£17.95
					CH	£18.95
Empire of the Overmind	Gm	Avalon Hill		D	GB,AB	£24.95
Escape from Tramm	Gm	Adventure Int.	16K	C	AB	£16.50
European Capitals	Ed	Atari	16K	C	AC,BC	£8.95
					AB,HM,IK	£9.95
European Scene Jigsaw Puzzle	Gm	Thorn EMI	16K	C	BC,HM,IK	£19.95
Extended WSNA	Ut	Atari	16K	C	AB	£19.00
Fantasy land 2041	Gm	Chrystal	48K	C	CH,AB,IK	£34.99
Fastgammon	Gm	Quality S/W	16K	C	BC	£9.95
Forest Fire	Gm	Dinacomp	24K	C	AB,IK	£15.99
Frog	Gm	C E S/W	16K	C	AB	£9.95
Frogger	Gm	On Line	16K	C	HN	£22.95
Frogger	Gm	On Line	32K	D	HN	£22.95
Galactic Chase	Gm	Spectrum	16K	C	AB,BC,HM	£15.99
Galactic Chase	Gm	Spectrum	16K	D	AB	£20.25
Galactic Chase	Gm	Spectrum	16K	D	BC,HM	£17.95
Galactic Empire	Gm	Adventure Int.	32K	C	BC	£14.95
					AB,IK	£16.50
Galactic Guest	Gm	Chrystal	48K	C	CH,AB,IK	£19.99
Galactic Trader	Gm	Adventure Int.	32K	C	AB,CH,IK	£16.50
Galaxy	Gm	Avalon Hill	16K	C	BH	£12.95
Galaxy	Gm	Avalon Hill	16K	D	BH	£14.95
Ghost Hunter	Gm	Arcade Plus	16K	C	HM	£19.95
Ghost Hunter	Gm	Arcade Plus	16K	D	HM	£22.95
Ghost Town	Gm	Adventure Int.	24K	C	BC	£14.95
					AB,IK	£16.50
Giant Slalem	Gm	Dinacomp	16K	C	AB	£11.99
Golden Voyage	Gm	Adventure Int.	24K	C	BC	£14.95
					AB	£16.50
Gomoku	Gm	Artsci Inc	16K	C	BC	£14.95
Graph it	Ut	Atari	16K	C	AC,BC,IK	£11.95
					AB,HM	£13.95
Graphic Sound Demo	Gm	Atari	16K	D	GC	POA
					AB	£16.75
Graphics Machine	Ut	Santa Cruz	16K	C	AB	£13.50
Guns of Fort Defiance	Gm	Avalon Hill	32K	C	BH	£12.95
HMS Impetuous	Gm	Adventure Int.	32K	C	AB	£16.50
Hangman	Gm	Atari	16K	C	AC,BC	£8.95
					AB,HM,IK	£9.95
Hickory Dickory Dock	Gm	Thorn EMI	16K	C	BC,HM,IK	£19.95
Home Financial Mg'ment	Dm	Thorn EMI	16K	D	HM	£29.95
Horizontal/Vertical Scrolling	Ed	Santa Cruz	16K	C	AB	£13.95
House of Usher	Gm	Chrystal	48K	C	AB,CH,IK	£19.99
Humpty Dumpty/Jack & Jill	Gm	Thorn EMI	16K	C	BC,HM,IK	£19.95
Intruder Alert	Gm	Dinacomp	16K	C	AB,IK	£15.99
Invasion Orion	Gm	Avalon Hill		C	GB,IK	£13.25
Invasion Orion	Gm	Avalon Hill		D	GB,IK	£15.75
Invitation to Prog I	Ed	Atari	16K	C	AB,HM,IK	£15.95
Invitation to Prog. II	Ed	Atari	16K	C	GC,IK	POA
					AB,BC,HM	£22.95
Invitation to Prol. III	Ed	Atari	16K	C	AB,BC,HM IK	£22.95
Jawbreaker	Gm	On Line	16K	C	HM	£19.95
Jawbreaker	Gm	On Line	32K	D	HM	£19.95
Jawbreaker	GM	On Line	48K	D	BC,IK	£22.95
Jumbo Jet Lander	Gm	Thorn EMI	16K	C	BC,HM,IK	£29.95
K Dos	Ut	K Bite	32K	D	BC	£53.95
Kids I	Ed	Santa Cruz	16K	C	AB	£9.95
Kids II	Ed	Santa Cruz	16K	C	AB	£9.95
Kingdom	Gm	Atari	16K	C	AC,BC	£8.95
					AB,HM,IK	£9.95
Krazy Shoot Out	Gm	K Bite	16K	C	BC,CH,HM	£29.95
Lazerwords	Gm	Chrystal	16K	C	AB	£19.99
Letter Writer	Bs	CE S/W	16K	C	AB	£19.95
Little Chrystal	Gm	Chrystal	48K	C	CH,AB	£26.99
Little Red Riding Hood	Gm	Adventure Int.	16K	C	AB	£12.50
Local Call for Death	Gm	Adventure Int.	32K	C	AB	£16.50
Lords of Karma	Gm	Avalon Hill	48K	C	CH,BH	£12.95
Lords of Karma	Gm	Avalon Hill	48K	D	CH,BH	£14.95

Lunar Lander	Gm	Adventure Int.	16K	C	AB,IK	£16.50
Macro Assembler	Ut	Atari	32K	R	BC,HM	£59.95
Matchmaker	Gm	Adventure Int.	16K	C	AB	£12.50
Micro Chess	Gm	Personal S/W	16K	C	BC	£15.95
Microsoft Basic	Ut	Atari		C	AB,BC,HM	£59.95
Midway Campaign	Gm	Avalon Hill	32K	C	AB	£12.50
Mind Bogglers	Gm	Versa Computing	16K	C	BC	£8.95
Mini Wordprocessor	Ed	Santa Cruz	32K	C	AB	£9.95
Minotaur	Gm	Atari	24K	C	GC	POA
					AB	£11.25
Missile Command	Gm	Atari	16K	R	BC,AC,CH	
					HM,IK	£29.95
Mission Asteroid	Gm	On Line	40K	D	HN	£17.95
Mission Impossible	Gm	Adventure Int.	24K	C	BC	£14.95
					AB,IK	£16.50
Monarch	Gm	Dinacomp	16K	C	AB,IK	£10.99
Moon Probe	Gm	Dinacomp	16K	C	AB,IK	£9.99
Mortgage Loan Analysis	Ed	Atari	16K	C	AB,BC,HM	£13.95
					IK	
Mountain Shoot	Gm	Adventure Int.	16K	C	AB	£16.50
Mountain Shoot	Gm	Analog S/W	16K	C	BC	£10.95
Mouskattack	Gm	On Line		D	CH,IK	£22.95
Movie Scenes	Gm	Atari	16K	C	BC	£9.95
Moving Maze	Gm	Dinacomp	16K	C	AB,IK	£9.99
Murder at Awesome Hall	Gm	Channel 8 S/W	16K	C	HN	£12.95
Music Composer	Gm	Atari	16K	R	AC,BC	£32.50
					AB,HM,IK	£35.95
Mystery Funhouse	Gm	Adventure Int.	24K	C	BC	£14.95
					AB,IK	£16.50
Nautilus	Gm	Synapse	32K	C	HM	£20.00
Nomino's Jigsaw	Gm	Dinacomp	24K	C	AB,IK	£15.99
Norton Forth	Gm	Adventure Int.	32K	C	AB	£24.95
Nuke War	Gm	Avalon Hill	16K	C	BH	£10.95
Old McDonald's Farm	Gm	Adventure Int.	16K	C	AB	£12.50
Operating System A Plus	Ut	OSS S/W	48K	D	BC	£52.50
Outlaw Howitzer	Gm	Atari	24K	C	GC	POA
					AB	£16.75
Pacific Coast Highway	Gm	Datasoft	16K	C	HN	£20.00
Pacific Coast Highway	Gm	Datasoft	16K	D	HN	£20.00
Pac-Man	Gm	Atari	16K	R	GC,IK	POA
					BC,HM	£29.95
Page Flipping	Ed	Santa Cruz	16K	C	BC	£9.95
Page Flipping	Ed	Santa Cruz	16K	D	BC	£10.95
Personal Finance	Gm	Atari		R	BC,HM,IK	£49.00
Pilot (Educator)	Ut	Atari	16K			
				C/R	AB,BC,HM	£79.95
Pirate Adventure	Gm	Adventure Int.	24K	C	BC	£14.95
					AB,IK	£16.50
Planet Miners	Gm	Avalon Hill	24K	C	BH	£10.95
Player Missile Graphics	Ed	Santa Cruz	24K	D	BC	£19.95
Player Missile Graphics	Ed	Santa Cruz	24K	C	BC	£18.95
					AB	£19.95
Poker & Solitaire	Gm	Artsci Inc.	16K	C	BC	£10.95
Program Pack I	Ut	Avalon HIll	16K	C	GB	£3.50
Protector	Gm	Synapse	32K	C	HN	£19.95
Purchase Ledger	Bs	Atari	48K	C	AB,IK	£149.95
Pyramid of Doom	Gm	Adventure Int.	24K	C	BC	£14.95
					AB,IK	£16.50
QS Forth	Ut	Quality S/W	24K	D	BC	£44.90
Quest for Power	Gm	Chrystal	48K	C	CH,AB	£26.99
Race in Space	Gm	Analog S/W	16K	C	BC	£14.95
Race in Space	Gm	Analog S/W	16K	C	HN	£15.95
Race in Space	Gm	Analog S/W	16K	D	HN	£15.95
Raster Blaster	Gm	Budgeco	32K	C	HN	£22.95
Rescue at Rigel	Gm		32K	C	BC,IK	£22.45
Reversi	Gm	Artsci Inc	16K	C	BC	£14.95
Rings of the Empire	Gm	Dinacomp	16K	C	AB,IK	£15.99
Rotate and Tilt	Gm	Thorn EMI	16K	C	BC,HM	£14.95
Sales Ledger	Bs	Atari	48K	C	AB,IK	149.95
Sands of Mars	Gm	Chrystal	48K	C	CH,AB,IK	£26.99
Savage Island I	Gm	Adventure Int.	24K	C	BC,IK	£14.95
					AB	£16.50
Savage Island II	Gm	Adventure Int.	24K	C	BC	£14.95
					AB,IK	£16.50
Scram	Gm	Atari	16K	C	GC,IK	POA
					AB,CH,HM	£17.50
Shooting Arcade	Gm	Datasoft	16K	C	HM	£20.00
Shooting Arcade	Gm	Datasoft	16K	D	HM	£20.00
Shooting Gallery	Gm	Analog S/W	16K	C	BC	£15.95
Shooting Gallery	Gm	Analog S/W	16K	D	BC	£15.95
Six Microstories	Gm	Adventure Int.	32K	C	AB	£12.50
Sky Warrior	Gm	Adventure Int.	16K	C	AB	£16.50
Slime	Gm	Synapse	16K	C	HM	£20.00
Snooker and Billiards	Gm	Thorn EMI	16K	C	BC,HM,IK	£19.95
Sound Editor	Gm	Atari	16K	C	GC	POA
					AB	£16.75
Sound Tutorial	Ed	Santa Cruz	16K	C	AB	£13.95
Space Ace	Gm	London S/W	16K	C	HM	£19.95
Space Ace	Gm	London S/W	16K	D	HM	£19.95
Space Invaders	Gm	Atari	16K	R	AB,CH,H-M,BC,IK	
Space Tilt	Gm	Dinacomp	16K	C	AB,IK	£29.95
Space Trap	Gm	Dinacomp	24K	C	AB,IK	£9.99
Space Trek	Gm	Atari	24K	C	GC	POA
					AB	£13.50
Star Raiders	Gm	Atari	16K	R	HM,AC,BC	
					CH,IK	£29.95
Star Trek 3.5	Gm	Adventure Int.	32K	C	BC	£14.95
					AB	£16.50
Star Warrior	Gm	Epyx	32K	C	BC,IK	£28.95
States and Capitals	Ed	Atari	16K	C	AC,BC,IK	£8.95
					AB,HM	£9.95
Statistics I	Gm	Atari		C	AC,BC,IK	£11.95
					AB,HM	£13.95
Stock and Bonds	Gm	Avalon Hill	32K	C	BH	£12.95
Stone of Sisythus	Gm	Adventure Int.	32K	C	AB	£24.95
Strange Odyssey	Gm	Adventure Int.	24K	C	BC,IK	£14.95
					AB	£16.50
Stud Poker	Gm	Dinacomp	16K	C	AB,IK	£10.99
Submarine Commander	Gm	Thorn EMI	16K	C	BC,HM,IK	£24.50
Summer	Gm	Chrystal	16K	C	AB	£11.99
Sunday Golf	Gm	Adventure Int.	16K	C	AB,IK	£16.50
Super Breakout	Gm	Atari	16K	C	AC,HM,IK	£24.50
Super Breakout	Gm	Atari	16K	R	AB,IK	£35.95
Tack Trek	Gm	Atari	24K	C	GC	POA
					AB	£13.50
Tank Trap	Gm	Quality S/W	16K	C	BC	£8.95
Tank Trap	Gm	Quality S/W	16K	D	BC	£11.95
Tanktics	Gm	Avalon Hill	32K	C	CH	£16.95
Tari Trek	Gm	Quality S/W	16K	C	BC	£8.95
Tari Trek	Gm	Quality S/W	16K	D	BC	£11.95
Tele Link	Gm	Atari	16K	R	HM,IK	£21.50
Tele Link	Ut	Atari	16K	R	AB,IK	£19.95
Telelink	Ut	Data Soft	16K	R	BC,IK	£14.95
Terrie	Gm	Atari	32K	C	GC	POA
					AB	£16.75
Text Wizard	Ut	Data Soft	16K	D	AB	£99.95
The Count	Gm	Adventure Int.	24K	C	BC,IK	£14.95
					AB	£16.50
Threshold	Gm	On-Line	32K	C	HM,IK	£24.95
Thunder Island	Gm	Analog S/W	16K	C	BC	£10.95
Touch Typing	Ed	Atari	16K	C	AC,BC,IK	£14.95
					AB,HM	£15.95
Tournament Pool and 8 Ball Pool	Gm	Thorn EMI	16K	C	CH,BC,HM IK	£19.95
Track Attack	Gm	Broada Bond	32K	D	HM	£32.95
Triple Blockade	Gm	Dinacomp	16K	C	AB,IK	£12.99
Tumble Bugs	Gm	Datasoft	24K	D	HM	£19.95
Two Heads of the Coin	Gm	Adventure Int.	32K	C	AB	£16.50
Ulysses	Gm	On-Line	40K	D	HM	£24.95
Video Easel	Gm	Atari	16K	R	GC,IK	POA
					AB,BC,HM	£24.50
Visicalc	Bs	Personal S/W	32K	D	BC,IK	£119.95
Voodoo Castle	Gm	Adventure Int.	24K	C	BC,IK	£14.95
					AB	£16.50
Voyager	Gm	Avalon Hill	32K	C	CH,BH	£12.95
Waterloo	Gm	Chrystal	48K	C	CH,IK	£32.99
Wizard and the Princess	Gm	On Line	48K	D	CH,IK	£22.95
World War III	Gm	Chrystal	48K	C	CH,AB,IK	£19.99

BBC

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Price
Algebraic Manipulation	Ut	Acornsoft	16K	C	AL,GA	£9.95
Asteroid Belt	Gm	Electronics Appplied	16K	C	IF	£4.50
Bounty Pirates	Gm	Aztec S/W	16K	C	IB	£5.50
Characters	Ut	Computer Concepts	16K	C	GJ	£6.67
Characters & Envelope Definer	Ut	Electronics Applied	16K	C	IF	£4.50
Code Race	Gm	Computer Concepts	16K	C	GJ	£6.67
Creative Graphic Pack	Ut	Acornsoft	16K	C	AL,GA	£9.95
Crossed Words	Ed	Aztec S/W	16K	C	IB	£6.50
Database	Bs	Computercat	16K	C	IJ	£11.95
Desk Diary	Bs	Acornsoft	16K	C	AL	£9.95
Early Warning	Gm	A&F Software	16K	C	GE	£6.00
Eldorado Gold	Gm	Program Power	32K	C	GK	£7.99
Graph and Charts Pack	Bs	Acornsoft	16K	C	AL,GA	£9.95
Hangman	Gm	Aztec S/W	16K	C	IB	£5.50
Lisp	Bs	Acornsoft	16K	C	AL,GA	£16.85
Minefield	Gm	A&F Software	16K	C	GE	£6.00
Multifile	Bs	Bug Byte	16K	C	EA	£25.00
Othello	Gm	Computer Concepts	16K	C	GJ	£8.95
Peeko Computer	Bs	Acornsoft	16K	C	AL,GA	£9.95
Lisp	Ut	Acronsoft	32K	C	AL,GA£16.85	
Mission Impossible	Gm	Aztec S/W	16K	C	IB	£6.50
Monsters	Gm	Acornsoft	32K	C	AL,GA	£9.95
Othello	Gm	Computer Concepts	32K	C	GJ	£8.95
Othello	Gm	Computercat	16K	C	IJ	£8.95



REFERENCE

SOFTWARE LISTING

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Peeko Computer	Ut	Acornsoft	32K	C	AL,GA	£9.95
Philosopher's quest	Gm	Acronsoft	32K	C	AL,GA	£9.95
Princess	Gm	Aztec S/W	16K	C	IB	£6.50
Snake	GM	Computer Concepts	32K	C	GJ	£6.67
Snapper	Gm	Acornsoft	32K	C	AL,GA	£9.95
Space Warp	Gm	Bug Byte	32K	C	GA,EA	£11.50
Squash	Gm	Aztec S/W	16K	C	IB	£5.50
Teacher's Toolkit	Ed	Wida Software	32K	C	FY	£30.00
Touch Typist	Ed	Computercat	16K	C	IJ	£9.95
Towns of Britain	Ed	Aztec S/W	16K	C	IB	£6.50
Wordwise	Gm	Computer Concepts	32K	C	GJ	£74.75
Valley, The	Gm	CT Software	32K	C	PF	£9.95
Algebraic Manipulation	Ut	Acronsoft	32K	C	AL,GA	£9.95
Backgammon	Ut	Bug Byte	32K	C	EA	£8.00
Characters	Ut	Computen Concepts	32K	C	GJ	£6.67
Chess	Gm	Bug Byte	32K	C	EA	£11.50
Code Race	Ut	Computer Concepts	32K	C	GJ	£6.67
Creative Graphics	Ut	Acornsoft	32K	C	AL,GA	£9.95
Defender	Gm	Acornsoft	32K	C	AL,GA	£9.95
Desk Diary	Bs	Acornsoft	32K	C	AL,GA	£9.95
FORTH	Ut	Acornsoft	32K	C	AL	£16.85
Golf	Gm	Bug Byte	32K	C	GA,EA	£7.00
Graph and Charts Pack	Bs	Acronsoft	32k	C	AL,GA	£9.95

SHARP MZ-80K

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
3-D Basic	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Address Book	Gm	Highlight S/W	4K	C	CC,AB	£4.60
Aladdin's Cave	Gm	Kuma		C	AX,CH	£6.32
Aldebaren I	Gm	Sharpsoft	20K	C	CH	£5.85
Alien Attack	Gm	J Wolsencroft	24K	C	CZ	£4.60
Analysis Book	Bs	Microtek	48K	C	EQ	£95.00
Animate	Gm	Kuma	48K	C	AX,AB,AO	£9.20
Apollo Front Panel	Bs	Kuma	20K	C	AX	£14.35
Apolloword	Bs	Kuma	48K	C	AX,AC,AO	£28.70
Apolloword	Bs	Kuma	48K	D	AX,AC,AO	£63.25
Ardensoft Toolkit	Ut	Kuma	20K	C	AX	£40.25
Asteroids	Gm	Sharpsoft	20K	C	CH	£5.85
Astro Dodge	Gm	Kuma		C	AX,CH	£6.32
Auto Cross	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Backgammon	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Bank Account	Do	Highlight S/W	6K	C	CC,AB	£4.60
Basic Compiler	Ut	Sharp	48K	C	AB	£34.50
Basic Extensions	Ut	Kuma	20K	C	AX,AO,AB	£14.95
Basic Plus	Ut	Kuma		C	AX	£13.80
Bio-Rhythm	Gm	Highlight S/W	6K	C	CC,AB	4.60
Block QC	Gm	Sharpsoft	20K	C	AB	£3.50
Block Stop	Gm	J Wolstencroft	24K	C	CZ	£4.60
Blockade	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Bomber	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Breakout	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Breakout	Gm	Sharpsoft	20K	C	AB	£5.75
Bridge	Gm	Highlight S/W	22K	C	CC	£12.95
Brownian Motion	Ed	Kuma		C	AX	£12.00
CPM	Ut	Chrystal	48K	C	AX,AO	£172.50
Calc II	Bs	Kuma	20K	C	AX,AO,FZ	£39.65
Camelot	Gm	Kuma	48K	C	AX,AC,AB AO,FZ	£6.32
Carols	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Cash Book	Bs	Microtek	48K	C	EQ	£95.00
Casino	Gm	Kuma		C	AX	£6.32
Catch 2000/Invader	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Cesil III	Ed	Kuma	20K	C	AX	£17.20
Chase	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Chess	Gm	Kuma	12K	C	AX,AO,FZ,CH	£12.00
Children's Maths	Ed	Kuma		C	AX	£6.32
Chrystal Basic	Ut	Chrystal	48K	C	AX,AO	£46.00
Colditz	Gm	Sharpsoft	20K	C	CH	£8.46
Combat	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Combat	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Commands	Gm	Sharpsoft	20K	C	AB	£5.85
Composer	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Concentration	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Connect 4	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Cosmiad	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Cosmiad	Gm	Kuma	12K	C	AX,AC,AO,AB	£9.20
Count and Add	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Cribbage	Gm	Kuma	12K	C	AX,AO	£12.00
Cricket	Gm	Kuma		C	AX	£6.32
Cursed Chambers	Gm	J Wolstencroft	48K	C	CZ	£5.75
Data Base	Bs	Kuma	48K	C	AX,AO	£33.95
Data File	Gm	Gamer	48K	C	CZ	£29.95
Disassembler	Ut	Kuma	20K	C	AX,AO,AB	£12.00
Donky Derby	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Double Precision Basic	Ut	Sharp	48K	C	AB	£28.75
Double Precision Basic	Ut	Sharp	48K	D	AX	£46.00
Drunken Driver	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Dybug	Ut	Kuma		C	AX	£16.65
Editor Assembler	Ut	Sharp	48K	C	AB	£15.50
Editor Assembler	Ut	Sharp	48K	D	AX	£51.75
Election '84	Gm	Sharpsoft	20K	C	CH	£8.45
Electronic Organ	Gm	Kuma	12K	C	AX	£6.32
Electrons I	Ed	Kuma		C	AX	£12.00
Electrons II	Ed	Kuma		C	AX	£12.00
Empire II	Gm	Sharpsoft	20K	C	AB	£5.85
Enigma	Gm	Kuma	12K	C	AX	£6.32
Escape Forth	Gm	J Wolstencroft	24K	C	CZ	£4.60
Evasion	Gm	Kuma	6K	C	AX,AO	£6.32
Executive	Gm	Kuma	6K	C	AX,AB	£9.20
Exploring Africa	Gm	Kuma	6K	C	AX,AB	£6.32
F DOS	Ut	Sharp	48K	C	AB	£57.50
Fall Out	Gm	Kuma	6K	C	AX,AO	£6.32
Fireballs	Gm	Kuma	6K	C	AX,AB	£6.32
Football Manager	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Forth	Ut	Kuma		C	AX	£40.20
Foundry Package	Bs	Microtek	48K	C	EQ	POA
Four in a Row	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Fox and Geese	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Fruit Machine	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Full Accounting	Bs	Microtek	48K	C	EQ	POA
Guess Word	Gm	Kuma	6K	C	AX,AB	£6.32
Hangman	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Head On	Gm	Highlight S/W	10K	C	CC,AB	£6.90
Head On	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Head On	Gm	Sharpsoft	20K	C	CH	£5.85
Hissing Sid	Gm	Kuma		C	AX	£6.32
Home Budget I	Do	Kuma	6K	C	AX,AC,AO,AB	£6.32
Hunter Killer	Gm	Kuma	48K	C	AX,AB	£6.32
I Spy	Ed	Highlight S/W	22K	C	CC	£5.75
Instant Addition And The Four Rules	Ed	Kuma		C	AX	£6.32
Intruder	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Invaders	Gm	Kuma	20K	C	FZ	£6.30
J S Line 4	Gm	Kuma	48K	C	AX,AB	£6.32
Junior Maths and Stepping Stones	Ed	Kuma		C	AX	£6.32
Juntori	Gm	Sharpsoft	20K	C	AB	£5.85
Kentucky Derby	Gm	Kuma		C	AX	£6.32
Knights Commander	Ut	Knights	48K	C	AX	£28.75
Knights Commander	Ut	Knights	48K	D	AX	£74.75
Knights Fortran	Ut	Knights	48K	C	AX	£34.50
Knights Wee Pascal	Ut	Knights	48K	C	AX	£23.00
Large Display	Gm	Kuma	48K	C	AX	£6.32
Las Vegas	Gm	Sharpsoft	20K	C	AB	£5.85
Life	Gm	Kuma	48K	C	AX,AO,AB	£9.20
Lunar	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Lunar Lander	Gm	Kuma	48K	C	AX,AO,AB	£6.32
MZ Othello	Gm	Kuma	48K	C	AX	£12.00
Madness	Gm	J Wolstencroft	24K	C	CZ	£4.60
Maniac	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Map of England	Gm	Kuma	48K	C	AO	£6.32
Map of Englad	Gm	Kuma	48K	D	AX	£12.00
Mastermind	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Mastermind	Gm	Kuma	48K	C	AX,AO,FZ,AB	£6.32
Match the Character	Ed	Highlight S/W	22K	C	CC,AB	£4.60
Match the Word	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Maths	Ed	Highlight S/W	22K	C	CC	£5.75
Melody	Gm	Kuma	48K	C	AX	£6.32
Memory Tests	Ut	Kuma	20K	C	AX,AO,AB	£6.32
Minefield	Gm	Kuma	48K	C	AX	£6.32
Miz-Maze	Gm	Kuma	48K	C	AX,AO	£6.32
Monkey Climb	Gm	Kuma	48K	C	AX,AO	£6.32
Moonlander	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Mortar Attack	Gm	Kuma	48K	C	AX,AO	£6.32
Music Composer/Editor	Ed	Kuma	48K	C	AX,AC,AB	£12.00
Narpex	Ed	Kuma		C	AX	£28.70
Newton/Conservation	Ed	Kuma		C	AX	£12.00
Pac Man	Gm	Kuma		C	AX	£9.20
Pascal	Ut	Sharp	48K	C	AB	£34.50
Patience	Gm	Kuma	48K	C	AX,AO	£6.32
Payroll	Bs	Microtek	48K	C	EQ	£65.00
Payroll	Bs	Tridata	48K	D	ID	£170.00
Picture Count	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Pilot	Ut	Kuma		C	AX	£17.25
Poker	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Pontoon	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Poseidon	Gm	Highlight S/W	6K	C	CC, AB	£5.75
Princess & Monster Maze	Gm	Kuma	48K	C	AX,AB	£6.32
Program Filing Index	Bs	Kuma	20K	C	AX	£6.32
Quadrax	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Quest	Gm	J Wolstencroft	48K	C	CZ	£4.60
Race Track	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Racing	Gm	Kuma	48K	C	AX	£6.32
Raider	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Reactor	Gm	Kuma	48K	C	AX,AB	£6.32
Rhymes	Gm	Kuma	48K	C	AX,AB	£6.32
Road Hunter	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Rocket	Ed	Kuma		C	AX	£6.32
Semi Conductors I	Ed	Kuma		C	AX	£12.00
Semi Conductors II	Ed	Kuma		C	AX	£12.00
Shape Match	Gm	Kuma	48K	C	AX,AO	£6.32
Shapes	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Sharp Demo	Gm	Kuma	48K	C	AX,AO	£6.32
Show Jumping	Gm	Kuma	48K	C	AX,FZ	£6.32
Shudo	Gm	Kuma	48K	C	AX	£6.32
Simon	Gm	Kuma	48K	C	AX	£6.32

Slave Interpreter	Ut	Kuma		C	AX	£16.65
Snakes and Ladders	Gm	Kuma	48K	C	AX,AO	£6.32
Solid State Non VAT Accounts	Ed	Kuma		C	AX	£33.90
Solid State VAT Accounts	Ed	Kuma		C	AX	£33.90
Space Battle	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Space Invaders	Gm	Kuma	48K	C	AX,AO,AC,AB	£6.32
Space Pursuit	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Star Trek	Gm	Kuma	10K	C	AX,AC,AO	£6.32
Stock Control/Invoicing	Bs	Microtek	48K	C	EQ	£316.00
Stomper	Gm	Kuma	10K	C	AX,FZ,AB	£6.32
Stomper/Minefields	Gm	Sharpsoft	20K	C	AB	£5.85
Submarine	Gm	Kuma	10K	C	AX,AO	£6.32
Super Simon	Gm	Kuma	48K	C	AX,AO	£6.32
Supercopy	Ut	Kuma	20K	C	AX	£12.00
Superfire	Gm	Kuma	48K	C	AX	£6.32
Supermouse	Gm	Kuma	48K	C	AX,CH	£6.32
Swordmen	Gm	Kuma	48K	C	AX,AO	£9.20
Tank Wall	Gm	Kuma	48K	C	AX,AO	£6.32
Tenpin Bowling	Gm	Kuma	48K	C	AX,AO	£6.32
Timetabling Aid	Ed	Kuma	20K	C	AX	£22.45
Towering Inferno	Gm	Sharpsoft	20K	C	CH,AB	£5.85
Towers of Hanoi	Gm	Kuma	48K	C	AX	£6.32
Track Layer	Gm	Kuma	48K	C	AX,CH	£6.32
Trader Smith	Gm	Kuma	48K	C	AB	£6.32
Tycoon	Gm	Kuma	48K	C	AX,AO	£6.32
UFO	Gm	Kuma	6K	C	AX,AC	£6.32
Waves I	Ed	Kuma		C	AX	£12.00
Waves II	Ed	Kuma		C	AX	£12.00
Wordpro	Bs	Kuma	48K	C	AX,AC	£45.45
Wordpro	Bs	Kuma	48K	C	AX,AC	£91.95
Zen Dos	Ut	Kuma	4K	C	AX	£66.16
Zen Editor Assembler	Ut	Kuma	20K	C	AX,AO,AB	£22.45
Zenmod	Ut	Kuma	4K	C	AX,AB	£12.00

TRS 80

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
A-Maz-Ing	Gm	Molimerx	4K	C	AJ	£6.33
Acquire	Gm	Avalon Hill	16K	C	IA	£13.95
Adventure I	Gm	Adventure Int.	16K		AJ	£13.77
Adventure III	Gm	Adventure Int.	16K	C	AJ	£13.77
Adventure III	Gm	Adventure Int.	16K	D	AJ	£13.77
Adventures No I	Gm	Cload Inc	16K	C	IA	£11.95
Advanced Programming Aid	Ut	Kansas	16K	C	IH	£12.50
Adventureland	Gm	Adventure Int.	24K	D	AB	£18.99
Adventure Mysterious	Gm	Adventure Int.	16K	C	AJ	£10.06
Adventure Mysterious	Gm	Adventure Int.	32K	D	AJ	£13.50
Airflight Simulation	Gm	Instant S/W	16K	C	GB,AB	£9.95
Airmail Pilot	Gm	Instant S/W	16K	C	GB,AB	£8.50
Ajedit	Bs	Molimerx	32K	C	AJ	£49.95
Aladdin	Ed	Bryants S/W	16K	C	HW	£3.75
Alien Armada	Gm	Molimerx	16K	C	AJ	£10.06
Alien Armada	Gm	Molimerx	32K	D	AJ	£13.23
Alien Attack Force	Gm	Instant S/W	16K	C	GB,AB	£8.50
Alien Attack	Gm	Kansas	16K	C	IH	£9.50
Alien Defence	Gm	Soft Sector Mkting	16K	C	IA	£11.95
Alien Defence	Gm	Soft Sector Mkting	16K	D	IA	£11.95
All Stars	Gm	Instant S/W	16K	D	GB	£26.50
					AB	£28.95
All Turret Gunner	Gm	Instant S/W	16K	C	GB,AB	£8.50
Amateur Log	Ut	Molimerx	32K	D	AJ	£18.40
Amazing Maze Touchdown	Gm	Kansas	16K	C	IH	£7.50
Angel Worms	Gm	Adventure Int.	8K	C	AB	£14.35
Animation	Ut	Molimerx	16K	C	AJ	£17.20
Animation	Ut	Molimerx	32K	D	AJ	£20.65
Android Nim	Gm	Molimerx	16K	C	AJ	£10.06
Arcade Invaders	Gm	Kansas	16K	C	IH	£9.50
Arcade Scramble	Gm	Kansas	16K	C	IH	£9.50
Armoured Patrol	Gm	Adventure Int.	16K	C	GB	£15.50
Armoured Patrol	Gm	Adventure Int.	16K	D	AB	£18.99
Ascertain	Ut	Kansas	16K	C	IH	£6.25
Assembly Package	Ut	Molimerx	32K	D	AJ	£74.75
Asteroids	Gm	Molimerx	16K	C	AJ	£10.06
Asteroids	Gm	Molimerx	32K	D	AJ	£13.50
Astro Navigator	Gm	Molimerx	16K	C	AJ	£14.95
Astroball	Gm	Molimerx	16K	C	AJ	£13.77
Astrolog	Ed	Molimerx	16K	C	AJ	£10.93
Astronomical Calendar	Ed	Molimerx	16K	C	AJ	£10.93
Asylum	Gm	Med Systems		C	IA	£12.00
Atlantian Odyssey	Gm	Guild		C	GB	£19.75
Atlantian Odyssey	Gm	Guild		D	GB	£21.50
Attack Force	Gm	Big 5 S/W	16K	C	IA	£10.95
BI Nuclear Bomber	Gm	Instant S/W	16K	C	GB	£12.50
					BT	£12.95
BQ81	Bs	Baust Computing	48K	D	HA	£79.95
Back 40	Gm	Molimerx	16K	C	AJ	£10.06
Back 40	Gm	Molimerx	32K	D	AJ	£13.50
Back 40 III	Gm	Adventure Int.	16K	C	AB	£14.35
Backgammon	Gm	Adventure Int.	16K	C	AB	£7.99
Backgammon	Gm	Kansas	16K	C	IH	£8.50
Balrog Sampler	Gm	Adventure Int.	16K	D	AB	£33.70
Bandito	Gm	Acorn	16K	C	AJ	£7.49
Bandit/Maze Chase	Gm	Kansas	16K	C	IH	£7.50
Banner	Ut	Kansas	16K	C	IH	£7.50
Basic Bidding	Gm	Bryants S/W	16K	C	HW	£9.00
Basic Compiler Accel.	Ut	Microsoft	16K	C	AJ	£22.94
Basic Compiler Accel. 3	Ut	Microsoft	16K	C	AJ	£45.95
Basic Compiler Accel. 3	Ut	Microsoft	16K	D	AJ	£49.95
Basic Insert	Ut	Molimerx	16K	C	AJ	£10.95
Basic Insert	Ut	Molimerx	32K	D	AJ	£14.39
Basic Programming System	Ut	Instant S/W	16K	C	AB	£12.50
Basketball	Gm	Molimerx	16K	C	AJ	£10.95
Basketball	Gm	Molimerx	32K	D	AJ	£14.39
Battle of Britain	Gm	Molimerx	16K	C	AJ	£15.55
Battle Ground	Gm	Instant S/W	16K	C	GB,AB	£8.50
Bearings	Ed	Bryants S/W	16K	C	HW	£3.75
Bedchest III	Gm	Adventure Int.	16K	C	AB	£20.95
Beewary	Gm	Molimerx	16K	C	AJ	£10.06
Beginner's Russian	Ed	Instant S/W	16K	C	GB,AB	£8.50
Biorhythm	Ed	Molimerx	16K	C	AJ	£8.63
Biorhythms	Do	Kansas	16K	C	IH	£7.50
B-I Nuclear Bomber	Gm	Avalon Hill	16K	C	IA	£11.95
Blackboard	Ut	Molimerx	16K	C	AJ	£10.06
Blackjack Master	Gm	Molimerx	16K	C	AJ	£21.15
Blackjack Master	Gm	Molimerx	32K	D	AJ	£25.42
Blink 1	Ut	Molimerx	32K	D	AJ	£17.00
Blockade	Gm	Molimerx	16K	C	AJ	£7.48
Bradley Estate Mystery	Gm	Ogre	16K	C	IC	£10.00
Bright & Early Build High	Ed	Molimerx	16K	C	AJ	£8.90
Knights Tour	Gm	Kansas	16K	C	IH	£7.50
Business Analysis	Bs	Instant S/W	16K	C	GB	£59.25
Business Analysis	Bs	Instant S/W	16K	D	GB,AB	£82.00
Buzzword	Ed	Molimerx	16K	C	AJ	£5.75
Byte Saver	Ut	Kansas	16K	C	IH	£6.25
CTN Stock	Bs	Baust Computing	48K	D	HA	£79.00
Calendar	Ut	Molimerx	16K	C	AJ	£10.29
Car Doctor	Do	Kansas	16K	C	IH	£7.50
Cash Register	Bs	Molimerx	16K	C	AJ	£10.29
Catalogue	Do	Bryants S/W	16K	C	HW	£3.75
Character and Monster Generator	Gm	Ogre	16K	C	IC	£12.00
Checker King	Gm	Personal S/W	16K	C	AJ	£16.10
Chemical Formulae	Ed	Molimerx	16K	C	AJ	£10.95
Cheque Book	Dm	Molimerx	16K	C	AJ	£15.53
Claws	Ed	Bryants S/W	16K	C	HW	£3.75
City Encounters	Ut	Molimerx	16K	C	AJ	£17.20
Climate Comp	Bs	Instant S/W	16K		AB	£20.50
Cload Cassette	Gm	Cload Inc	16K	C	IA	£5.75
Code Breaker	Gm	Molimerx	16K	C	AJ	£7.49
Combat	Gm	Adventure Int.	16K	C	AB	£12.50
Company Director	Gm	Molimerx	16K	C	AJ	£17.19
Compression Utility	Ut	Instant S/W	16K	C	GB	£15.75
					AB	£16.50
Comproc	Ut	Molimerx	16K	C	AJ	£15.80
Comput-A-Organ	Ed	Molimerx	16K	C	AJ	£6.85
Computer Acquire	Gm	Adventure Int.	16K	C	IA	£10.15
Computer Acquire	Gm	Avalon Hill	16K	C	IA	£17.25
Computer Pools	Do	Molimerx	16K	C	AJ	£16.68
Conflict 2500	Gm	Avalon Hill	16K	C	IA	£12.95
Consequest of Chester Wood	Gm	Adventure Int.	16K	C	AB	£18.99
Constellation	Ed	Molimerx	16K	C	AJ	£14.30
Constellation	Ed	Molimerx	32K	D	AJ	£17.83
Conv/CPM	Ut	Molimerx	32K	D	AJ	£20.70
Convoy Raider	Gm	Avalon Hill		C	IA	£10.95
Cop 16K	Ut	Molimerx	16K	C	AJ	£12.95
Copsys	Ut	Molimerx	16K	C	AJ	£12.95
Corplan	Gm	Molimerx	16K	C	AJ	£32.79
Cosmic Fighter	Gm	Big 5 S/W		C	IA	£10.95
Cosmic Patrol	Gm	Instant S/W	16K	C	GB,AB	£12.50
Cosmic Patrol	Gm	Instant S/W	16K	D	GB,AB	£16.25
Cowboys	Gm	P.C.S.	8K	C	IE	£4.25
Creole Lobster Catcher	Gm	Molimerx	16K	C	AJ	£10.06
Cribbage	Gm	Molimerx	16K	C	AJ	£14.38
Crocodiles	Ed	Bryants S/W	16K	C	HW	£3.75
Cross Reference	Bs	Molimerx	16K	C	AJ	£8.45
Crown of CWL IMDRAS part 1	Gm	Ogre	16K	C	IC	£10.00
Crown of CWL IMDRAS part 2	Gm	Ogre	16K	C	IC	£10.00
Cube Hunt	Gm	Molimerx	16K	C	AJ	£10.35
Curse of Crawley Manor	Gm	Adventure Int.	16K	D	AB	£18.99
DLDIS	Ut	Instant S/W	16K	D	GB	£15.50
					AB	£16.50
DSM	Ut	Racet Computers	32K	D	AJ	£46.00
Danger in Orbit	Gm	Instant S/W	16K	C	AB	£12.50
Danger in Orbit	Gm	Instant S/W	16K	D	GB	£15.50
Daredevil	Gm	Instant S/W	16K	C	IA	£8.50
Dark Void	Gm	Molimerx	16K	C	AJ	£10.06
Darts	Gm	Molimerx	16K	C	AJ	£10.06
Data Base Management	Bs	Hubert Howe	32K	C	AJ	£28.75
Data Base Management	Bs	Hubert Howe	32K	D	AJ	£32.20
Datadisk	Bs	Kansas	32K	D	IH	£24.50
Data File	Bs	Kansas	16K	C	IH	£9.50
Datestone of Ryn	Gm	Automated Simulation	16K	C	GB	£13.50
Datestone of Ryn	Gm	Automated Simulation	16K	D	GB	£15.50
Dataquiz	Ut	Bryants S/W	16K	C	HW	£3.75
Day of the Week	Bs	Molimerx	4K	C	AJ	£5.75
Deathmaze 5000	Gm	Med Systems	16K	C	IA	£10.95
Decision Master	Ut	Sytonic S/W	32K	D	GB	£35.50

REFERENCE

SOFTWARE LISTING

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier	Codes & Prices
Decimal Dan	Ed	Bryants S/W	16K	C	HW	£3.75
Defence Command	Gm	Big 5 S/W		C	IA	£10.95
Defend	Gm	Molimerx	16K	C	AJ,CH	£14.95
Defend	Gm	Molimerx	32K	D	AJ	£18.40
Deflections	Gm	Adventure Int.	8K	C	AB	£14.35
Delay	Ut	Kansas	16K	C	IH	£6.25
Demo II	Gm	Instant S/W	16K	C	IE	£6.50
Descriptive Statistics	Bs	Molimerx	16K	C	AJ	£15.40
Differential Equations	Bs	Molimerx	16K	C	AJ	£16.10
Direction Finder	Ed	Molimerx	16K	C	AJ	£15.40
Disassembler	Ut	Molimerx	16K	C	AJ	£10.35
Disassembler	Ut	Buy Byte	16K	C	GB	£8.25
					AB	£8.50
Disassembler	Ut	Kansas	16K	C	IH	£8.50
Disc Directory	Ut	Molimerx	32K	D	AJ	£20.13
Disc Editor	Ut	Instant S/W	16K	D	GB	£30.50
Disc Scope	Ut	Instant S/W	16K	D	GB	£15.50
Discaid	Ut	Molimerx	32K	D	AJ	£19.49
Discator	Ut	Molimerx	32K	D	AJ	£29.90
Dnieper River Line	Gm	Avalon Hill	32K	C	IA	£12.95
Dnieper River Line	Gm	Avalon Hill	32K	D	IA	£17.55
Doctor Chips	Gm	Instant S/W	16K	C	GB	£12.50
Doctor Chips	Gm	Instant S/W	16K	D	GB	£14.75
Dominoes	Gm	Molimerx	16K	C	AJ	£9.15
Dominoes	Gm	Molimerx	32K	D	AJ	£12.65
Doomwatch	Do	Kansas	16K	C	IH	£7.50
Dosort	Ut	Molimerx	32K	C	AJ	£27.60
Double Take 3741	Ut	Molimerx	64K	D	AJ	£44.85
Double Up	Ut	Kansas	16K	C	IH	£6.25
Dragon Quest	Gm	Instant S/W	16K	C	GB	£13.25
Dragon Quest	Gm	Instant S/W	16K	D	GB	£17.50
Dragons of Hong Kong	Gm	Adventure Int.	32K	C	AB	£18.99
Draughts	Gm	Molimerx	16K	C	AJ	£14.95
Draughts	Gm	Molimerx	32K	D	AJ	£18.40
Draw and Graphics Resolver	Bs	Molimerx	16K	C	AJ	£10.95
Dreamworld	Gm	Molimerx	16K	C	AJ	£10.06
Driver	Gm	Molimerx	4K	C	AJ	£6.33
Duel-n-Droids	Gm	Molimerx	16K	C	AJ	£10.93
Dungeon Escape	Gm	Computer Shack	16K	C	GB	£11.95
Dungeon Escape	Gm	Computer Shack	16K	D	GB	£15.50
Dynamic Device Driving	Ut	Instant S/W	16K	D	GB	£20.50
Dynamic Device Driving	Ut	Instant S/W	16K	C	GB	£15.50
					AB	£16.50
Early Numbers	Ed	Bryants S/W	16K	C	HW	£3.75
Edas	Ut	Molimerx	32K	D	AJ	£53.49
Edit	Ut	Molimerx	16K	C	AJ	£20.13
Editor Assembler Plus	Ut	Molimerx	16K	C	AJ	£24.95
Editor Assembler and Debugger	Ut	Kansas	16K	C	IH	£19.50
Edjust	Ut	Molimerx	32K	D	AJ	£18.40
Eights	Gm	Emjay	16K	C	IG	£7.00
Electric Accountant	Bs	Molimerx	48K	D	AJ	£28.75
Electronic Breadboard	Ut	Instant S/W	16K	C	GB	£39.75
					AB	£40.95
Elemental Maze	Ed	Molimerx	16K	C	AJ	£10.93
Eliminator	Gm	Adventure Int.	16K	C	GB	£15.50
Eliminator	Gm	Adventure Int.	16K	D	AB	£18.99
Emperor	Gm	Molimerx	16K	C	AJ	£15.53
Empire of the Overmind	Gm	Avalon Hill	48K	C	IA	£17.95
Enhanced Basic	Ut	Molimerx	16K	C	AJ	£27.60
Enhanced Basic	Ut	Molimerx	32K	D	AJ	£31.05
Epson Patch	Ut	Molimerx	16K	C	AJ	£13.80
Epson Patch	Ut	Molimerx	32K	D	AJ	£17.25
Escape from Tramm	Gm	Adventure Int.	16K	D	AB	£18.99
Everest Explorer	Gm	Molimerx	16K	C	AJ	£10.06
Escape	Gm	Kansas	16K	C	IH	£7.50
Everest Explorer	Gm	Molimerx	32K	D	AJ	£13.50
Everyday Russian	Ed	Instant S/W	16K	C	GB,AB	£8.50
F for Freddie	Gm	Kansas	16K	C	IH	£9.50
Facto Bingo	Ed	Bryants S/W	16K	C	HW	£3.75
Facto Finder	Ed	Bryants S/W	16K	C	HW	£3.75
Fairytale Adventure	Gm	Molimerx	16K	C	AJ	£10.06
Family Tree	Do	Molimerx	32K	D	AJ	£20.70
Farmer Brown	Gm	Molimerx	16K	C	AJ	£7.49
Fed	Ut	Molimerx	32K	D	AJ	£27.60
Fetch	Ut	Molimerx	32K	D	AJ	£15.53
File Handling for Cassette	Ut	Molimerx	16K	C	AJ	£15.93
File Handling for Disc	Ut	Molimerx	32K	D	AJ	£28.75
Filter Package	Ut	Molimerx	32K	D	AJ	£40.25
Financial Analysis	Bs	Molimerx	32K	D	AJ	£46.00
Find it Quick	Ut	Instant S/W	16K	D	GB	£39.75
					AB	£40.95
Flight Path	Gm	Instant S/W	16K	C	GB,AB	£8.50
Flight Plan	Ut	Molimerx	32K	D	AJ	£20.70
Flying Circus	Gm	Instant S/W	16K	D	AB	£24.50
					GB	£25.00
Forbidden City	Gm	Fantastic S/W	16K	D	IA	£24.95
Forbidden Planet	Gm	Fantastic S/W	48K	D	IA	£24.95
Forest of Mordor	Gm	Molimerx	16K	C	AJ	£8.63
Fortran	Ut	Molimerx	32K	D	AJ	£74.75
Fortress	Gm	Soft Sector Mkting	16K	D	IA	£15.50
Fortress	Gm	Soft Sector Mkting	16K	C	IA	£11.95
Fox and Hounds	Gm	Molimerx	16K	C	AJ	£7.48
French Vocabulary	Ed	Molimerx	16K	C	AJ	£17.19
Frog	Gm	Adventure Int.	16K	C	AB	£12.50
Frog	Gm	Molimerx	16K	C	AJ	£7.48
Frogs/Logic	Gm	Kansas	16K	C	IH	£7.50
Galactic Empire	Gm	Adventure Int.	16K	C	AJ,AB	£9.78
Galactic Empire	Gm	Adventure Int.	32K	D	AB	£18.99
Galactic Firebird	Gm	Kansas	16K	C	IH	£9.50
Galactic Revolution	Gm	Adventure Int.	16K	C	AB	£18.99
Galactic Revolution	Gm	Adventure Int.	16K	C	AJ	£9.78
Galactic Trader	Gm	Adventure Int.	16K	C	AJ	£9.78
Galactic Trader	Gm	Adventure Int.	32k	D	AB	£18.99
Galaxy Invasion	Gm	Big 5 S/W	16K	C	IA	£10.95
Gammon Challenger	Gm	Molimerx	16K	C	AJ	£10.06
Gammon Challenger	Gm	Molimerx	32K	D	AJ	£13.51
Gauntlet of Death	Gm	Programmer's Guild	16K	C	GB	£15.50
Gauntlet of Death	Gm	Programmer's Guild	16K	C	GB	£15.50
G.C.E. O'Levels						
Tape 1	Ed	Bryants S/W	16K	C	HW	£9.00
Tape 2	Ed	Bryants S/W	16K	C	HW	£9.00
Gencop	Ut	Molimerx	16K	C	AJ	£10.06
Geography Explorer	Ed	Instant S/W	16K		AB	£40.95
Ghost Town	Gm	Adventure Int.	24K	D	AB	£18.99
Golden Voyage	Gm	Adventure Int.	24K	D	AB	£18.99
Golf	Gm	Molimerx	32K	D	AJ	£17.19
Good Games No.I	Gm	Cload Inc	16K	C	IA	£11.95
Guns of Fort Defiance	Gm	Avalon Hill	32K	C	IA	£12.95
Guns of Fort Defiance	Gm	Avalon Hill	32K	D	IA	14.95
Gun World	Gm	Ogre	16K	C	IC	£10.00
Graphics Assembler	Ut	Kansas	16K	C	IH	£7;50
Graphs	Ed	Bryants S/W	16K	C	HW	£3.75
Gridref	Ed	Bryants S/W	16K	C	HW	£3.75
Highway Code	Do	Bryants S/W	16K	C	HW	£3.75
HMS Impetuous	Gm	Adventure Int.	32K	D	AB	£18.99
Home Budget Planner	Bs	Emjay	16K	C	IG	£8.00
House of 30 Gables	Gm	Instant S/W	16K	C	AB	£8.50
Hyperlight Patrol	Gm	Fantastic S/W	16K	D	GB	£11.25
ID Mailing List	Ut	Instant S/W	16K	D	GB	£19.50
					AB	£20.50
IRV	Ut	Instant S/W	16K	D	GB	£23.75
IRV	Ut	Instant S/W	16K	C	GB	£19.50
					AB	£20.50
Infinite Startrek	Gm	Kansas	16K	C	IH	£9.50
Invoicing	Bs	Tridata	48K	D	ID	£140.00
Interlude	Gm	Syntonic S/W		C	GB	£20.25
Interlude	Gm	Syntonic S/W		D	GB	£23.50
Invasion Orion	Gm	Automated Simulation		C	GB	£13.25
Invasion Orion	Gm	Automated Simulation		D	GB	£15.75
Investor's Paradise	Gm	Instant S/W	16K	C	AB	£8.50
Jabbertalky	Gm	Automated Simulation	16K	D	GB	£18.95
Jet Fighter Pilot	Gm	Instant S/W	16K	C	GB,AD	£12.50
Jumbles	Ed	Bryants S/W	16K	C	HW	£3.75
Keyspeed	Ut	Kansas	16K	C	IH	£6.25
Kid's Gallery	Gm	Instant S/W	16K	C	AB	£8.50
Label	Gm	Instant S/W	16K	C	GB	£18.75
					AB	£20.50
Labyrinth	Gm	Med Systems	16K	C	IA	£11.75
					BT	£10.95
Laser Defence	Gm	Med Systems	16K	C	GB	£11.95
Laser Defence	Gm	Med Systems	16K	D	GB	£14.50
Little Red Riding Hood	Gm	Adventure Int.	16K	C	AB	£14.35
Local Call for Death	Gm	Adventure Int.	32K	D	AB	£18.99
Lords of Karma	Gm	Avalon Hill	40K	D	IA	£14.95
Lord of the Rings	Gm	Kansas	16K	C	IH	£9.50
Lunar Lander	Gm	Adventure Int.	16K	C	AB	£12.50
Lunar Lander	Gm	Adventure Int.	16K	D	AB	£18.99
Lprint	Ut	Kansas	16K	C	IH	£6.25
Mail File	Ut	Instant S/W		D	GB	£75.25
Martian Adventure	Gm	Emjay	16K	C	IG	£12.00
Master Cab	Ut	Bryants S/W	16K	C	HW	£3.75
Master Directory	Ut	Instant S/W	16K	D	GB	£21.00
Master Reversi	Ut	Instant S/W	16K	D	GB	£23.75
Matchmaker	Gm	Adventure Int.	16K	C	AB	£14.35
Maths Master	Ed	Instant S/W	16K	C	AB	£8.50
Maxi-Micro Manager	Bs	Adventure Int	48K	R	AB	£84.50
Merge	Ut	Kansas	16K	C	IH	£6.25
Meteor Mission	Gm	Big 5 S/W	16K	C	IA	£10.95
Microcosm I	Gm	Basic & Beyond	16K	C	IA	£11.95
Microcosm 2	Gm	Basics & Beyond	16K	C	IA	£19.95
Microcosm 3	Gm	Basics & Beyond	16K	C	IA	£19.50
Microtype	Do	Kansas	16K	C	IH	£12.50
Midway Campaign	Gm	Avalon Hill	16K	C	IA	£10.95
Minotaur	Gm	Instant S/W	16K	C	AB	£8.50
Missile Attack	Gm	Adventure Int.	16K	C	AB	£12.50
Mission Impossible	Gm	Adventure Int.	24K	D	AB	£18.99
Model 1 to 3	Ut	Kansas	16K	C	IH	£8.50
Monopolist	Gm	Baust Computing	4K	C	HA	£7.95
Monopolist	Gm	Baust Computing	4K	D	HA	£10.95
Mountain Shoot	Gm	Adventure Int.	16K	D	AB	£18.99
Multiple Choice Creation	Ed	Kansas	16K	C	IH	£12.50
Multiprint	Ut	Kansas	16K	C	IH	£8.50
Music Master	Gm	Instant S/W		C	GB,AB	£8.50
Musical Yat-C	Gm	Adventure Int.	16K	C	AB	£12.50
Money Box	Ed	Bryants S/W	16K	C	HW	£3.75

Mystery Funhouse	Gm	Adventure Int	24K	D	AB	£18.99
News 80	Bs	Baust Computing	48K	D	HA	POA
Night Flight	Gm	Instant S/W	16K	C	GB,AB	£8.50
Nominal	Bs	Tridata	48K	D	ID	£170.00
Norton Forth	Gm	Adventure Int.	32K	D	AB	£33.70
North Atlantic Raiders	Gm	Tridata	16K	C	IA	£11.95
Number Bonds	Ed	Bryants S/W	16K	C	HW	£3.75
Nuke War	Gm	Avalon Hill	16K	C	IA	£10.95
Oil Tycoon	Gm	Instant S/W	16K	C	AB	£8.50
					GB	£9.95
Old McDonald's Farm	Gm	Adventure Int.	16K	C	AB	£14.35
On Guard	Ed	Bryants S/W	16K	C	HW	£3.75
Patience	Gm	Bryants S/W	16K	C	HW	£3.75
Payroll	Bs	Tridata	48K	D	ID	£170.00
Perfect Pong	Gm	Instant S/W	16K	C	GB,AB	£12.75
Personal Bill Paying	Do	Instant S/W	16K	C	AB	£6.50
Personal Accounts	Do	Kansas	16K	C	IH	£9.50
Pinball Bounce/Robots	Gm	Kansas	16K	C	IH	£7.50
Pirate Adventure	Gm	Adventure Int.	24K	D	AB	£18.99
Pits of Angband	Gm	Kansas	16K	C	IH	£9.50
Planet Miners	Gm	Avalon Hill	16K	C	IA	£10.95
Planetoids	Gm	Adventure Int.	16K	C	AB	£12.50
Plus Sound	Ut	Kansas	16K	C	IH	£7.50
Programmer and Primer	Ut	Instant S/W	16K	C	AB	£8.50
Programmer's Converter	Ut	Instant S/W	16K	C	AB	£8.50
Pontoon	Gm	Kansas	16K	C	IH	£8.50
Punctuation	Ed	Bryants S/W	16K	C	HW	£3.75
Purchase	Bs	Tridata	48K	D	ID	£170.00
Pyramids of Doom	Gm	Adventure Int.	24K	D	AB	£18.99
QSL Manager	Do	Instant S/W	16K		AB	£16.50
Quick Change	Bs	Baust Computing	16K	C	HA	£9.95
Quick Change	Bs	Baust Computing	16K	D	HA	£12.95
Random Dungeons	Gm	Ogre	16K	C	IC	£10.00
Random Dungeons	Gm	Ogre	4K	C	IC	£5.75
Renumber and Compress	Ut	Instant S/W	16K	C	AB	£8.50
Re-Number	Ut	Kansas	16K	C	IH	£6.25
Repeat	Ut	Kansas	16K	C	IH	£6.25
Rescue	Ut	Kansas	16K	C	IH	£6.25
Robot Attack	Gm	Big 5	16K	C	IA	£10.95
SDM	Gm	Adventure Int.	16K	C	AB	£20.12
Sales	Bs	Tridata	48K	D	ID	£170.00
Santaparavia	Gm	Instant S/W	16K	C	AB	£8.50
Savage Island I	Gm	Adventure Int.	24K	D	AB	£18.99
Savage Island II	Gm	Adventure Int.	24K	D	AB	£18.99
Scrafman	Gm	Cornsoft	48K	C	IA	£11.95
Screen Print	Ut	Kansas	16K	C	IH	£6.25
Sea Wolf	Gm	Kansas	16K	C	IH	£9.50
Showdown	Gm	Adventure Int.	16K	C	AB	£12.50
Silverflash	Gm	Adventure Int.	16K	C	AB	£12.50
Simutec	Gm	Adventure Int.	16K	C	AB	£12.50
Six Microstories	Gm	Adventure Int.	32K	D	AB	£14.35
Skirmish 80	Gm	Instant S/W	16K	C	IA	£8.50
Sky Warrior	Gm	Adventure Int.	16K	D	AB	£18.99
Slag	Gm	Adventure Int.	16K	C	AB	£14.35
Smartwork	Gm	Instant S/W	16K	C	IA	£8.00
Space Castle	Gm	Instant S/W	16K	C	IA	£11.95
Space Intruder	Gm	Adventure Int.	16K	C	AB	£14.35
Space Shuttle	Gm	Instant S/W	16K	C	AB	£12.50
Star Fighter	Gm	Adventure Int.	16K	C	AB	£20.95
Star Scout	Gm	Adventure Int.	16K	C	AB	£14.35
Star Trek 3.5	Gm	Adventure Int.	32K	D	AB	£18.99
Space Trek	Gm	Instant S/W	16K	C	IA	£6.50
Speechparts	Ed	Bryants S/W	16K	C	HW	£3.75
Spellsort	Ed	Bryants S/W	16K	C	HW	£3.75
Spelltest	Ed	Bryants S/W	16K	C	HW	£3.75
Starlord	Gm	Bryants S/W	16K	C	IC	£10.00
Storybuilder	Ed	Bryants S/W	16K	C	HW	£3.75
Stock	Bs	Tridata	48K	D	ID	£170.00
Stock or Bonds	Gm	Avalon Hill	16K	C	IA	£12.95
Stone of Sisythus	Gm	Adventure Int.	32K	D	AB	£33.70
Strange Odyssey	Gm	Adventure Int.	24K	D	AB	£18.99
Sunday Golf	Gm	Adventure Int.	16K	D	AB	£18.99
Surveyor's Apprentice	Ed	Instant S/W	16K	C	AB	£8.50
Super Breakthrough	Gm	Kansas	16K	C	IH	£8.50
Super Copy	Ut	Kansas	16K	C	IH	£9.50
Super Nova	Gm	Big 5	16K	C	IH	£10.95
Swamp War	Gm	Instant S/W	16K	C	AB	£12.50
Swords and Socery	Gm	Kansas	16K	C	IH	£9.50
System Master Monitor	Ut	Kansas	16K	C	IH	£17.00
System to Basic	Ut	Kansas	16K	C	IH	£8.50
TL DIS	Ut	Instant S/W	16K	C	AB	£12.50
TRS Test	Ut	Instant S/W	16K	C	AB	£8.50
Tables Test	Ed	Bryants S/W	16K	C	HW	£3.75
Tanktics	Gm	Avalon Hill	16K	C	IA	£15.95
Targetsounds	Ed	Bryants S/W	16K	C	HW	£3.75
Teacher's Aid	Ed	Instant S/W	16K		AB	£34.50
Temple of the Sun	Gm	Instant S/W	16K		AB	£16.50
The Count	Gm	Adventure Int.	24K	D	AB	£18.99
The Mean Checkers Machine	Gm	Adventure Int.	16K	C	AB	£14.35
The Congo Mission	Gm	Bryants S/W	16K	C	IC	£10.00
The Quest	Gm	Bryants S/W	16K	C	IC	£12.00
The Secret Wilderness	Gm	Ogre	16K	C	IC	£6.50
Toolkit	Ut	Kansas	16K	C	IC	£12.00
Towers	Ed	Bryants S/W	16K	C	HW	£3.75
Treasure Quest	Gm	Adventure Int.	16K	C	AB	£14.35
Tunnels of Fahad	Gm	Adventure Int.	16K	C	AB	£12.50
Two Heads of the Coin	Gm	Adventure Int.	32K	D	AB	£18.99
Typing Teacher	Ed	Instant S/W	16K	C	AB	£8.50
Typewriter	Ut	Kansas	16K	C	IH	£6.25
Ultra Man	Ut	Instant S/W	16K		AB	£21.50
Utility II	Ut	Instant S/W	16K	C	IA	£8.50
Valley	Gm	CT Software	16K	C	PF	£9.95
Valley of the Kings	Gm	Instant S/W	16K	C	IC	£10.00
Venture	Gm	Horizon S/W	16K	C	IA	£11.95
Voodoo Castle	Gm	Adventure Int.	24K	D	AB	£18.99
Voyager	Gm	Avalon Hill	16K	C	IA	£12.95
What Next?	Gm	Baust Computing	4K	D	HA	£6.95
What Next?	Gm	Baust Computing	4K	C	HA	£3.95
Word Processor	Bs	Kansas	16K	C	IH	£19.50
Word Watch	Ed	Instant S/W	16K	C	IA	£6.50
Yahtzee	Gm	Kansas	16K	C	IH	£8.50
Your Life Score	Do	Bryants S/W	16K	C	HW	£3.75
Zossed in Space	Gm	Adventure Int.	16K	D	AB	£14.35
Zossed in Space	Gm	Adventure Int.	16K	C	CH	£10.00

VIC20

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Price
3-D Maze	Gm	Adcom	8K	C	AB	£7.50
3-D Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
A-Maz-Ing	Gm	Audiogenic	8K	C	AA,CH,HM	£6.99
Alien	Gm	Commodore	3K	R	FZ,AB,GF	
					CF,DM,CH	
					FD,FP,AA	£19.95
Alien Attack	Gm	Adcom	5K	C	AB	£7.00
Alien Attack	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Alien Blaster	Gm	Paysoft	5K	C	FP	£5.25
Alien Blitz	Gm	Audiogenic	3K	C	AA,HM	£7.99
Alien Blitz	Gm	Audiogenic	5K	C	CH	£7.99
Alien Maze	Gm	Adcom	8K	C	AB	£7.50
Alien Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
Alien Wars	Gm	Hi-Tech	3K	C	FZ	£8.30
					AY	£7.80
					CF,AO	£8.62
Amok	Gm	Audiogenic	5K	C	AA,HM	£6.99
Ant Raiders	Gm	PR Software	3K	C	HN	£7.95
Asteroid Belt	Gm	Adcom	8K	C	AB	£7.50
Asteroid Belt	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Asteroids	Gm	Bug Byte	5K	C	HN	£8.99
Avenger	Gm	Commodore	3K	R	FZ,AB,GF	
					CF,DM,CH	
					FD,FP,AA	£19.95
A.V.I.T.W.	Gm	Bug Byte	5K	C	HN	£8.99
Balloon Bomber	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Blitz	Gm	Commodore	3K	C	FD	£4.99
Car Drive	Gm	Adcom	5K	C	AB	£7.00
Car Drive	Gm	Hi-Tech	3K	C	FZ	£8.30
					AY	£7.80
					CF	£8.62
Car Race	Gm	Adcom	5K	C	AB	£7.00
Car Race	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Charset 20	Gm	Adcom	8K	C	AB	£8.00
Charset 20	Gm	Rabbit S/W	3K	C	AH	£4.99
Chess	Gm	Commodore	3K	R	HN	£24.95
Cloudburst	Gm	Audiogenic	3K	R	HN	£19.99
Code Breaker	Gm	Adcom	5K	C	AB	£5.00
Code Breaker	Gm	Rabbit S/W	3K	C	AH	£2.99
Cosmic Battle	Gm	Adcom	5K	C	AB	£8.00
Cosmic Battle	Gm	Rabbit S/W	3K	C	AH	£4.99
Crazy Balloon	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Defenda	Gm	Llamasoft	5K	C	HN	£9.95
Deflection	Gm	Adcom	5K	C	AB	£7.00
Deflection	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Dragon Maze	Gm	Adcom	8K	C	AB	£7.50
Dragon Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62



REFERENCE

SOFTWARE LISTING

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Price
Dune Buggy	Gm	Rabbit S/W	3K	C	AH	£4.99
Duplicate	Gm	Paysoft	5K	C	FP	£5.25
Fire Trek	Gm	Hi-Tech	3K	C	AY	£7.80
					FZ	£8.30
					CF,AO	£8.62
Fly Snatcher	Gm	PR Software	3K	C	HN	£7.95
Frogger	Gm	Rabbit S/W	8K	C	AH	£7.99
Game Graphics & Graphics Editor	Ut	Soft Toys	3K	C	IG	£8.00
Games Tape 1	Gm	Titan	3K	C	HJ	£5.00
Grand Prix	Gm	Hi-Tech	3K	C	FZ, 8.30	
					AY	£7.80
Gun Men	Gm	Hi-Tech	3K	C	AY	£7.80
					FZ	£8.30
					CF,AO	£8.62
Hangman	Gm	Paysoft	5K	C	FP	£5.25
Hangman Maths	Gm	Audiogenic		C	AA,HM	£7.99
Hesdon	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Highways Plot	Gm	Adcom	8K	C	AB	£5.00
ICBM	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Invader Fall	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
Indi 500	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Intro. to Basic I	Ed	Commodore	3K	C	AA,AB	£14.95
Invader Fall	Gm	Adcom	8K	C	AB	£7.50
Invader Fall	Gm	Audiogenic	3K	C	AA	£6.99
Jelly Monsters	Gm	Commodore	3K	R	AB,CF,DM	
					GC,GF,AA	
					CH	£19.95
Jungle	Gm	Adcom	5K	C	AB	£6.00
Jungle	Gm	Rabbit S/W	3K	C	AH	£4.99
Kiddy Checkers	Gm	Audiogenic	3K	C	AA,HM	£6.99
Lunar Lander	Gm	Adcom	5K	C	AB	£7.00
Lunar Lander	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Lunar Maths	Ed	Titan	3K	C	HJ	£6.00
Machine Code Monitor	Ut	Commodore	3K	R	AA,AB	£34.95
Machine Code Monitor	Ut	Commodore	3K	R	GF	POA
Master Wits	Gm	Audiogenic	3K	C	AA,HM	£6.99
Maths Hurdler/Monster Merge	Gm	Audiogenic		C	AA,HM	£7.99
Maze Men	Gm	Titan	3K	C	HJ	£6.00
Memory Pack	Ut	Commodore	16K	R	FZ	£74.95
Memory Pack	Ut	Commodore	3K	R	FZ	£24.95
Memory Pack	Ut	Commodore	8K	R	FZ	£44.95
Meteor Run	Gm	Anglo American	3K	R	HN	£24.99
Meteroid	Gm	Adcom	5K	C	AB	£10.00
Missile Command	Gm	Adcom	3K	C	HN	£7.95
Missile Commander	Gm	Hi-Tech	3K	C	CF	£8.62
Moak	Gm	Audiogenic	5K	C	CH	£6.99
Mole Attack	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Music Maker	Gm	Adcom	5K	C	AB	£10.00
Naval Attack	Gm	Titan	3K	C	HJ	£7.00
Naval Battle	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
New York	Gm	Paysoft	5K	C	FP	£5.25
Night Flight	Gm	Rabbit S/W	3K	C	AH	£4.99
Othello	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF	£8.62
					AO,AY	£7.80
Pack Man	Gm	Hi-Tech	3K	C	FZ	£8.30
					AO	£8.62
					AY	£7.80
Programmer's Aid	Ut	Commodore	3K	R	AA,AB	£34.95
Rabbit Functions	Ut	Rabbit S/W	3K	C	AH	£4.99
Rabbit Writer	Ut	Rabbit S/W	16K	C	AH	£9.99
Rat Race	Gm	Commodore	3K	R	HN	£19.95
Renaissance	Gm	Audiogenic	3K	R	HN	£19.99
Road Race	Gm	Commodore	3K	R	FZ,AB,GF	
					CF,DM,CH,	
					GC,FD,FP	
					AA	£19.95
Robot Zap	Gm	Paysoft	5K	C	FP	£5.25
Rugby Game	Gm	Adcom	5K	C	AB	£7.00
Rugby Game	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Seawolf/Bounceout	Gm	Audiogenic		C	AA,HM	£8.99
Simple Simon	Gm	Audiogenic	5K	C	AA,HM	£6.99
Six Program Pack:	Gm	PR Software	3K	C	GV	£7.50
War Game						
Smash Out						
Black Jack						
Logic						
Pick Up Game						
Alarm Clock						
Ski Run	Gm	Rabbio S/W	3K	C	AH	£4.99
Skier	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Skimetts	Gm	Audiogenic	3K	C	AA	£6.99
Slot Machine	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Soft Toys 1	Gm	Soft Toys	3K	C	IG	£6.50
Soft Toys 2	Gm	Soft Toys	3K	C	IG	£6.50
Soft Toys 2	Gm	Soft Toys	5K	C	IG	£8.00
Space Defence	Gm	Adcom	5K	C	AB	£10.00
Space Defender	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Space Division	Gm	Audiogenic	3K	C	AA	£6.99
Space Invaders	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
Space Storm	Gm	Rabbit S/W	3K	C	AH	£6.99
Space Wars/Battle Zone	Gm	Titan	3K	C	HJ	£6.00
Spiders from Mars	Gm	Audiogenic	5K	R	CH,AA	£24.99
Spiders of Mars	Gm	Anglo American	3K	R	GB	£25.90
Star Battle	Gm	Commodore	3K	R	AA,CH,AB	
					CF,DM,GC	£19.95
Star Wars	Gm	Audiogenic	3K	C	AA	£6.99
Star Wars II	Gm	Titan	3K	C	HJ	£7.00
Stella Shootout	Gm	Adcom	5K	C	AB	£15.00
Stunt Cycle	Gm	Coloursoft	5K	C	FP	£7.75
Sub Attack/Missile Command	Gm	PR Software	3K	C	HN	£7.95
Submarine	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
Super Breakout	Gm	Adcom	5K	C	AB	£7.00
Super Breakout	Gm	Coloursoft	5K	C	FP	£7.75
Super Breakout	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Super Expander High Resolution Pack	Ut	Commodore	3K	R	AA,AB,FZ	£34.95
Super Lander	Gm	Commodore	3K	R	AA,AB,FZ	
					CF,CH,DM	
					FD,FP,GF	£19.95
Super Moonlander	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Super Slot	Gm	Commodore	3K	R	CH,GC,AA	
					DM,AB,FZ	
					FD,CF	£19.95
Super Snake	Gm	Adcom	5K	C	AB	£7.00
Super Snake	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Super Worm	Gm	Rabbit S/W	3K	C	AH	£4.99
The Alien	Gm	Audiogenic	8K	C	CH,AA	£7.99
Treasure Carrying	Gm	Hi-Tech	3K	C	CF,AO	£8.62
UFO Shooting	Gm	Adcom	5K	C	AB	£7.00
UFO Shooting	Gm	Hi-Tech	3K	C	CF,AO	£8 62
VIC Code Monitor	Ut	Commodore	3K	R	FZ	£34 95
VIC Forth	Ut	Datatronic	3K	R	Hn	£38.95
VIC Graf	Ut	Datatronic	3K	R	Hn	£28.95
VIC Men	Gm	Coloursoft	5K	C	FP	£7.00
VIC Stat	Ut	Datatronic	3K	R	Hn	£29.95
VICalc	Ut	Audiogenic	3K	C	AA, HM	£6.99
Vicgammon	Gm	Bug Byte	8K	C	CH	£7.00
Vicmen	Gm	Anglo American	3K	C	GB	£7.00
Vicmen	Gm	Bug Byte	5K	C	CH	£7.99
Vic Cube	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Wall Street	Gm	Audiogenic	3K	C	AA,HM	£6.99

SOFTWARE DEALERS

SOFTWARE SUPPLIERS LIST

Supplier Code

AA Micro Centre Ltd
30 Dundas Street
Endinburgh EH3 6JN
031 556 7354

AB Micro and Video Palace
62-64 Kensington High Street
London W8
01 937 8587

AC Laskys
7-9 Queensway
London W23RX
01 200 0444

AD Datarite Terminals Ltd
Caldare House
144-146 High Street
Chadwell Heath
Essex RM6 6NT
01 590 1155

AE Vincelord Ltd
Suite 2
26 Charing Cross Road
London WC2
240 0213/0217

AF MicroComputerLand
Shropshire House
2-10 Capper Street
London WC1E 6JR
01 637 4078/948 6411

AG Comart Ltd
St Neots
Cambs PE19 3JG
(0480) 215005

AH Cream Computer Shop
Rabbit Software
380 Station Road
Harrow
Middlesex
863 0833

AI Microvalue
Computer Interfacing & Equipment Ltd
The Micro Spares Shop
19 Roseburn Terrace
Edinburgh EH12 5NG
(031) 337 5611

AJ Molimerx Ltd
A J Harding
1 Buckhurst Road
Town Hall Square
Bexhill-On-Sea
East Sussex
(0424) 220391/223636

SOFTWARE DEALERS

AK GW Computers Ltd
55 Bedford Court Mansions
Bedford Avenue
London WC1
01 636 8210/631 4818

AL Acornsoft Ltd
4a Market Hill
Cambridge
CB23NJ
0223 316039

AM Acorn Computers
Fulbourne Road
Cherry Hinton
Cambridge

AN Microcomputers Products Int.
Rm PCW
8 Cambridge House
Cambridge Road
Barking
Essex 1G11 8NT
591 6511

AO Xitan Systems
23 Cumberland Place
Southampton S01
0703 38740

AP KGB Micros Ltd
14 Winsor Road
Slough
Berks
Slough (0753) 38581/38319

AQ Broadside
2 The Spinney
North Cray
Kent

AR Software Ltd
387 8832/388 9927

AS Lucas Logic Ltd
Nasco Microcomputers
Division
Welton Road
Wedgnock Industrial Estate
Warwick CV34 5PZ

AT Atlantic Micro System
70-72 Honor Oak Park
London SE23 1DY
01 699 2202

AU TCL Software
59/61 Theobalds Road
London WC1
405 5240/2113

AV I A S
Cambridge Road
Orwell
Royston
Herts
0223 207689

AW Intelligent Artefacts Ltd
Cambridge Road
Orwell
Royston
Herts
0223 207689

AX Kuma Computers
11 York Road
Maidenhead
Berks
0628 71778

AY Microstore
327 Kings Road
London SW3
352 9291

AZ London Retail
98 Moysen Road
London SW16 6SH
01 677 2052/7341

BA Micro-Spares
19 Roseburn Terrace
Edinburgh EH12 5NG
031 337 5611

BB CAPS Ltd
28 The Spain
Petersfield
Hampshire
GU32 3LA

BC Maplin
PO Box 3
Rayleigh
Essex
0702 552911/554155

BD Caxton Software
Publishing Co.
10-14 Bedford Street
Covent Garden
London WC2
01 379 6502

BE Cornshall Ltd
32-34 Great Peter Street
London SW1

BF Micro Technology
Royal Sussex Assembly Rooms
The Pantiles
Tunbridge Wells
Kent
0892 32116

BG Elcon Research Ltd
Viking Way
Banhill
Cambridge CB3 8EZ
0954 81825

BH Avalon Hill Games
650 High Street
North Finchley N12
445 3044

BI Call Apple (UK)
c/o SBD Software, Freepost
Richmond
Surrey
940 5194

BJ Lifeboat Associates
PO Box 125
London WC2H 9LU
836 9028

BK L & J Computers
192 Honey Pot Lane
Queensbury
Stanmore
Middx HA7 1EE
204 7525

BL Peach Tree Software
International
(Susan Jane)
MSA House
99 King Street
Maidenhead
Berks
0628 71011

BM ACT (Microsoft) Ltd
Freepost
Birmingham B16 8BR
(David Low)
021 454 8585

BN Personal Computer Palace
4-6 Castle Street
Reading
Berks
0734 589249

BO Sinclair Software
Sinclair Research Ltd
6 Kings Parade
Cambridge
CB2 1SN
0276 66104

BP Leicester Computer Centre Ltd
67 Regent Road
Leicester
LE16YF
0533 556268

BQ TABS Ltd
Sopers House
Chantry Way
Andover
Hants
SP10 12U
0264 58933

BR IBR Microcomputers
Suttons Industrial Park
London Road
Earley
Reading
0734 664111

BS Computer Plus
47 Queens Road
Watford
Herts
WD1 2LH
0923 33927

BT The Essential Software Co.
Dept BT (Visconti Ltd)
47 Brunswick Centre
London WC1
866 5445

BU Guestel
8-12 New Bridge Street
London EC4
583 2255

BV Lowe Electronics
Chesterfield Road
Matlock
Derbyshire DE4 5LE
0629 4995

BW Gate Micro System Ltd
The Nethergate Centre
35 Yeaman Shore
Dundee
0382 28194

BY Almarc Data Systems Ltd
Great Freeman Street
Nottingham
NG3 1FR
0602 52457/8/9

BZ Interam Computer Systems
Ltd
46 Balham High Road
London SW12
675 5325/6/7

CA Terodec Ltd
Unit 58
Suttons Park Avenue
Earley
Reading
0734 664343/6

CB Poolsoft
17 Blatchington Road
Saford
East Sussex
0323 890604

CC Highlight Software
3 Nether Court
Halstead
Essex
0787 475714

CD Omega Plus
2c Graham Road
London E8 1BZ

CE Southern Software
PO Box 39
Castleigh
Hants SO5 5WQ

CF Sigma Systems
54 Park Place
Cardiff
Cardiff 21515/34869

CG Planet Software
10 Norton Drive
Eaton
Norwich

CH Brighton Gamer
24 Gloucester Road
Brighton
Sussex
0273 698424

CI Picturesque
6 Corkscrew Hill
West Wickham
Kent BR4 9BB

CJ ACS Software
7 Lidgett Crescent
Roundhay
Leeds

CK Chrisalid
13 High Street
Berkanstead
Herts
74569

CL MED
1736 Church Hill Road
Thurmaston
Leicester
Leic. 704492

CM Simple Software
15 Havelock Road
Brighton
Sussex
0273 504879

CN Buffer Micro Shop
374A Streatham High Road
London SW16
769 2887

CO Pixel Productions
39 Ripley Gardens
London W1 48HF

CP Computics Microsoft
1 Bell Lane
Wheatley
Oxford
OX9 1XY

CQ KW Software
155 Ronginglow Road
Sheffield
S11 7PS

CR Sideline Freepost
Oxford OX2 8BR

CS IQ Services
Canal House
Ardrigshaig
Argyll
Scotland
0546 3212

CT Willow Software
PO Box 6
Crediton
Devon
EX17 1DL

CU Level 9 Computing
229 Hughenden Road
High Wycombe
Bucks

CV J Purves
12 Stobhill Road
Gorebridge
Midlothian
EH23 4PL

CW Cambell Systems
Rous Road
Buckhurst Hill
Essex
IG9 6BL

CX Microdeal
Deal House
Bridges
Bodmin
Cornwall

CY Prof. F H George
Bureau of Information Science
Commerce House
High Street
Chalfont St Giles
Bucks

CZ J Wolstencroft
Sagar Fold
Preston
Chipping (09956) 327

DA Ground Control
Alfreda Avenue
Hullbridge
Essex SS5 6LT
Southend (0702) 230324

DB Mick Bignell
01 953 8385

DC Giltrole Ltd
Dept PCW, PO Box 50
Rugby
Warks CV21 4DH

DD Deep Thought Software
20 Chauntsingers
Alton
Hants

REFERENCE

SOFTWARE DEALERS

DE Silversoft (Dept PCW)
40 Empress Avenue
Ilford
Essex

DF Michael Orwin
26 Brownlow Road
Willesden
London NW10

DG Hisoft
60 Hallam Moor
Liden
Swindon
Wiltshire

DH The Soft Option
Bamberplan Ltd
PO Box 11
Cranbrook
Kent
058080 310

DJ Microcomputer Spacedrome
3 Westholm
London NW11
01 458 5845

DK Spider Software
98 Avondale Road
South Croydon
Surrey
01 680 0267

DL Xavier Business Systems
7 North Lane
Clayton
Scarborough
Yorkshire
(0723) 583509

DM Camden Electronics
(Systems Division)
462 Coventry Road
Small Heath
Birmingham
021 773 8240/021 772 5718

DN Sumlock Electronic Services
Royal London House
198 Deansgate
Manchester
M3 3NE

DO Microstyle
29 Belvedere
Lansdowne Road
Bath
(0225) 334659

DP Small Systems Engineering Ltd
2-4 Canfield Place
London NW6
01 328 7145

HM Gemini electronics
2-4 Enfield Place
London NW6
01-328-7145

DQ Woodland Software
103 Oxford Gardens
W10 6NF
01 960 4877

DR Telesystems Ltd
PO Box 12
Great Missenden
Bucks
HP16 9DD

DS Macronics
26 Spiers Close
Knowle
Solihull
West Midlands
B93 9ES

DT Hewson Consultants
Dept PCW
7 Graham Close
Blewbury
Oxon
(0235) 850075

DU Silicon Office Services
240 Durants Road
Enfield
Middx
EN3 7AZ
01 805 0903

DV Sirton Computer Systems
Unit 14
29 Willow Lane
Mitcham
Surrey
01 640 6931

DW Psion Ltd
2 Huntsworth Mews
Gloucester Place
NW1 6DD

DX JRS Software
19 Wayside Avenue
Worthing
Sussex
Worthing 65691 (evenings and weekends only)

DY Calisto Computers Ltd
119 John Bright Street
Birmingham B1 1BE
021 632 6458

DZ Micro Gen (Dept PCI)
24 Agar Crescent
Bracknell
Berks
0344 27317

EA Anglia Computer Centre
88 St. Benedicts Street
Norwich
NR2 4AB
0603 26002

EB SBD Software
15 Jocelyn Road
Richmond TW9 2TJ
01 948 0461

EC Abacus Software
PO Box 7211
Grand Rapids
Michigan 49510

ED Qdos Business Software
9 Tintern Close
Streetly
Birmingham
021 353 0058

EE dK'tronics
23 Sussex Road
Gorleston
Great Yarmouth
Norfolk
(0493) 602453

EF Computech Systems
168 Finchley Road
London NW3 6HP
01 794 0202

EG Electronics Experts
Avondale Workshops
Woodland Way
Kingswood
Bristol
BS15 1QH

EH Artic Computing
396 James Reckitt Avenue
Hull HU8 0JA

EI Knights TV & Computers
108 Rosemount Place
Aberdeen
0224 630526

EJ Microage Electronics
135 Hale Lane
Edgware
Middx
01 959 7119

EK Holly Products
Blackthorn House
Dukes Lane
Gerrards Cross
Bucks

EL I O Systems
6 Laleham Avenue
Mill Hill
London NW7
01 959 0106

EM Merton Electronics (Dept PW)
85/87 Station Road
W Croydon
680 8606

EN Davinci Computer Shop
65 High Street
Edgware
Middx

EO Calco Software
Lakeside House
Kingston Hill
Surrey
01 546 7256

EP Richard Francis (Dept PCW)
22 Foxhollow
Barhill
Cambridge

EQ Microtek Ltd
15 Lower Brook Street
Ipswich
Suffolk
(0473) 50512 or 52466

ER Diskwise Ltd
25 Fore Street
Callington
Cornwall
05793 3780

ES Control Technology
39 Gloucester Road
Gee Cross
Hyde
Cheshire
SK14 5JG
061 368 7558

ET Comp Shop
311 Edgware Road
London W2
01 262 0387

EU Micro Computer Prods
(Room PC)
Cambridge House
Cambridge Road
Barking
Essex IG11 8NT
01 591 6511

EV GW Computers
55 Bedford Court Mansions
Bedford Avenue
London WC1
01 636 8210

EW C/WP Computers
108 Rochester Row
London SW1P 1JP
01 828 3127

EX Metrotech Mail Order
Waterloo Road
Uxbridge
Middx
0895 58111 x 274/269

EY Microsystems Ltd
Summerfield House
Vale
Guernsey
0481 47377

EZ Superior Systems Ltd
178 West Street
S14ET
0742 755005

FA Control Universal Ltd
Unit 2
Andersons Court
Newnham Road
Cambridge
0223 358757

FB Pete & Pam Computers
98 Moyser Road
London SW16
01 677 2052/7341

FC Zenith Data Systems
Bristol Road
Gloucester
0452 29451

FD Commodore Information
675 Ajaz Avenue
Slough
Berks
Slough 79292

FE Logic Computers
31 Palmer Street
London SW1H 0PR
01 222 1122/5492

FF Overseas Computer Systems Cons.
182a Queens Road
Watford
Watford 48580

FG Blyth Computers
Wenhaston
Halesworth
Suffolk
050 270 565

FH Taurus Computer Design
47 High Street
Baldock
Herts
SG7 6BG

FI HITEC (Austria)
Zollergasse 15
A-1070
Vienna
Austria
01043 222 934331

FJ Graffcom Systems
102 Portland Road
Holland Park
London W11
01 727 5561

FK Electronic Aids (Tewkesbury)
Mythe Crest
The Mythe
Twekesbury
Glos GL20 6EB
0386 831020

FL BUG-BYTE
98-100 The Albany
Old Hall Street
Liverpool

FM Learning Computer Systems
37 St Andrews Drive
Seaford
Sussex
BN25 2SB

FN Jentech Services Ltd
Nordley
Bridgnorth
Shropshire
WV16 4SU
07462 5287

FO Dept ZM Work Force
140 Wilsden Avenue
Luton
Beds
LU1 5HR

FP Twickenham Computer Centre
72 Heath Road
Twickenham
Middx
892 7896 or 891 1612

FQ Sbd Software
15 Jocelyn Road
Richmond
948 0461

FR Beebug
PO Box 50
St Albans
Herts
(Independent User Group for BBC Micro)

FS RAM Computer Services Ltd
15-17 North Parade
Bradford
0274 391166

FT Ozwise Computers
28 Crofts Road
harrow
Middx HA1 2PH
01 863 2309

FU Compusense
PO Box 169
Palmers Green
London N13 4HT
01 882 0681

FV The Avery Computer Company
13 The Mall
Bar Hill
Cambridge
(Crafts Hill 80991)

FW Hilderbey Ltd
8/10 Parkway
Regents Park
London NW1
01 485 1059

FX Micromedia
Vine Cottage
Tentelow Lane
Norwood Green
Middx
01 843 9457

FY Wida Software
2 Nicholas Gardens
London W5 5HY
01 567 6941

FZ Superior Systems Ltd
178 West Street
Sheffield
0742 755005

GA Eltec Services Limited
231 Manningham Lane
Bradford
BD8 7HH
(0274) 491372

GB Anglo American Software
138a Stratford Court
Sparkhill
Birmingham
021 771 2995

GC Castle Electronics
15 Castle Street
Hastings
East Sussex
0424 437875

GD Quicksilva
95 Upper Brownhill Road
Maybush
Southampton
Hants
0703 771248

GE A&F Software
10 Wilpshire Avenue
Longsight
Manchester
061 320 5482

GF SRS Microsystems
161 Bramley Road
Oakwood
London N14 4XA
01 363 8060

GG Stirling Microsystems
241 Baker Street
NW1
01 486 7671

GH Microtanic Software
235 Dulwich Road
London OBD
01 693 7659

GI Lander Microsystems
32 Clockhouse Lane
Collier Row
Romford Essex
Romford 26325

GJ Computer Concepts
16 Wayside
Chipperfield
Herts
09277 62955

GK Program Power
5 Wensley Road
Leeds LS7 2LX
0532 683186

GL Syrtis Software
23 Quantock Road
Bridgewater
Somerset

GM Lutterworth Software
6 Cromwell Close
Walcote
Lutterworth
LE17 4JJ

GN Collins Computing
The Gatehouse
Whinburgh
Dereham, Norfolk

GO Datafax (Dept CT)
Riviera House
Queens Road
Buckhurst Hill
Essex

GP CCSoft
83 Longfield Street
Southfields
London SW18

GQ Microx
52 The Strand
Worthing
Sussex
Worthing 49584

GR Pro Software
121 Tyn-Y-Twr
Baglan
Port Talbot
West Glamorgan
SA12 8YE

GS Sussex Software
Wallsend House
Pevensey Bay
East Sussex

GT Rose Cassettes
148 Widney Lane
Solihull
West Midlands
B91 3LH

GU Axis (YC2)
71 Brockfield Avenue
Loughborough
Leics
LE11 3LN

GV PR Software
28 the Fairway
South Ruislip
Middx
HA4 0RY

GW Bridge Software
36 Fernwood
Marple Bridge
Stockport
Cheshire
SK6 SBE

GX Video Software Limited
Stone Lane
Kinver
Stourbridge
West Midlands
Kinver 2462

GY J M Steadman
6 Carron Close
Leighton Buzzard
Beds LU7 7XB

GZ Transform Ltd
41 Keats House
Porchester Mead
Beckenham
Kent
01 658 1661

HA Baust Computing Consultants
31 Peak Lane
Fareham
Hants PO14 1RX
0329 281480

HB University Computers
5 St Barnabas Road
Cambridge CB1 2BU

HC Educare
139a Sloane Street
London SW1X 9AY

HD Simon Software
Freepost
New End
Redditch

HE Docimodus
161 Walmersley Road
Bury
Lancashire
BL9 5DE

HF M C Associates
4 Granby Road
Cheadle Hulme
Cheshire SK8 6LS

HG Addictive Games
Dept YC PO Box 278
Conniburrow
Milton Keynes
MK14 7NE

HH J K Greye Software
Dept YC
16 Park Street
Bath
Avon
BA1 2TE

HI John Prince
29 Brook Avenue
Levenshire
Manchester M19

HJ Titan Programs
83 Ashwood Road
Rudloe
Corsham
Wiltshire
SN13 0LG
(0225) 810132

HK Micro Computer Software
Unit D6
Pear Industrial Estate
Stockport Road
Lower Bredbury
Stockport
SK6 2BP
061 494 2441

HL Phipps Associates
99 East Street
Epsom
Surrey
KT17 1EA

HM Gemini Electronics
50 Newton Street
Manchester M1
061 236 3083

HN The Vic Centre
154 Victoria Road
Acton
London
W3 6UL
01-992-9904

HP R & R Software
34 Bourton Road
Gloucester
GL4 OLE
0452-502819

HQ Town Book & Toys
15 Eastgate Street
Gloucester
Glos

HR Screen Scene
144 St Georges Road
Cheltenham
Glos

HS Software Masters Ltd
30 Lincoln Road
Olton
Birmingham

HT John Prince Software
29 Brook Avenue
Levenshulme
Manchester M19

HU Nick Godwin
4 Hurkur Crescent
Eyemouth
Berwickshire
TD14 5AP

HV A.Parsons
23 Coxhill Gardens
River
Dover
Kent

HW Bryants (Educational) Software
1 The Hollies
Chalcroft Lane
North Berstead
Bognor Regis
West Sussex
PO21 55X

HX Abersoft
7 Maes Afallen
Bow Street
Dyfed
SY24 5BA

HY D.C. Roberts
107a Royal George Rd
Burgess Hill
Sussex

HZ Hard & Soft
85 Snowden Avenue
Hillingdon
Middx
UB10 OSE
0895-54751

IA Microdeal
Deal House
Luxulyan
Bodmin
Cornwall
PL30 5E
0726-850-821

IB Aztec Software
25 St Mark Road
Deepcar
Sheffield
S30 5TS

IC Ogre Games & Software
Fantasy Department
47 Chiselhurst Avenue
Liverpool 25
Merseyside

ID Tridata Micro's Ltd
Smithfield House
Digbeth
Birmingham
B5 6BS
021-622 6085/6

IE Plympton Computer Services
5 Turbill Gardens
Plympton
Plymouth
Devon
PL7 3XF
0752-330176

IF Electronics Applied
4 Dromore Road
Carrickfergus
Co Antrim
BT38 7PJ

IG Emjay
17 Langbank Avenue
Rise Park
Nottingham
NG5 5BU

IH Kansas City Systems
Unit 3
Sutton Springs Wood
Chesterfield
0246-850357

II Serious Software
7 Woodside Road
Bickley
Bromley
Kent
BR1 2ES

IJ Computercat
224 Chapel Street
Leigh
Lancashire
WN7 2DW
0942-605730

IK Silica Shop
1-4 The Mews
Hatherly Road
Sidcup
Kent
DA14 4DX
01-301-1111

PF CT Software
ASP Ltd
145 Charing Cross Road
London
WC2H 0EE
01-437 1002

100 FREE PROGRAMS
FROM SILICA SHOP — WITH EVERY PURCHASE OF AN
ATARI 400 800

ATARI



ATARI PRICES REDUCED!

We at Silica Shop are pleased to announce some fantastic reductions in the prices of the Atari 400/800 personal computers. We believe that the Atari at its new price will become the U.K.'s most popular personal computer and have therefore set up the Silica Atari Users Club. This club already has a library of over 500 programs and with your purchase of a 400 or 800 computer we will give you the first 100 free of charge. There are also over 350 professionally written games and utility programs, some are listed below. Complete the reply coupon and we'll send you full details. Alternatively give us a ring on 01-301 1111 or 01-309 1111.

ATARI 400 with 16K — £199

ATARI 400 with 32K — £248

ATARI 800 with 16K — £449

400/800 SOFTWARE & PERIPHERALS

Don't buy a T.V. game! Buy an Atari 400 personal computer and a game cartridge and that's all you'll need. Later on you can buy the Basic Programming cartridge (£35) and try your hand at programming using the easy to learn BASIC language. Or if you are interested in business applications, you can buy the Atari 800 + Disk Drive + Printer together with a selection of business packages.

Silica Shop have put together a full catalogue and price list giving details of all the peripherals as well as the extensive range of software that is now available for the Atari 400/800. The Atari is now one of the best supported personal computers. Send NOW for Silica Shop's catalogue and price list as well as details on our users club.

THE FOLLOWING IS JUST A SMALL SELECTION FROM THE RANGE OF ITEMS AVAILABLE:

ACCESSORIES
Cables
Cassettes
Diskettes
Joysticks
Le Stick - Joystick
Misc Supplies
Paddles

ADVENTURE INT
Scott Adams Adv
No 1 Adventureland
No 2 Pirate Adv
No 3 Mission Imp
No 4 Voodoo Cast
No 5 The Count
No 6 Strange Odyssey
No 7 Mystery Fun
No 8 Pyramid of D
No 9 Ghost Town
No 10 Sav Island 1
No 11 Sav Island 2
No 12 Golden Voy
Angle Worms
Deflections
Galactic Empire
Galactic Trader
Lunar Lander
Mountain Shoot
Rearguard
Star Flite
Sunday Golf

AUTOMATED SIMULATIONS
Crush Crumble Cmp
Datestones of Ryn
Dragons Eye
Invasion Orion
Rescue at Rigel
Ricochet
Star Warrior
Temple of Apshai
Upper Reaches Aps

BOOKS
Basic Ref Manual
Compute Atari DOS
Compute Bk Atari
Compute Magazine
De Re Atari
DOS Utilities List
DOS2 Manual
Misc Atari Books
Op System Listing
Wiley Manual

BUSINESS
Calculator
Database Managemt
Decision Maker
Graph-It
Invoicing
Librarian
Mort & Loan Anal
Nominal Ledger
Payroll
Personal Finl Mgmt
Purchase Ledger
Sales Ledger
Statistics 1
Stock Control
Telelink 1
Visicalc
Weekly Planner
Word Processor

CRYSTALWARE
Beneath The Pyram
Fantasyland 2041
Galactic Quest
House Of Usher
Sands Of Mars
Waterloo
World War III

DYNACOMP
Alpha Fighter
Chompelo
Crystals
Forest Fire
Intruder Alert
Monarch
Moonprobe
Moving Maze
Nominoes Jigsaw
Rings of The Emp
Space Tilt
Space Trap
Stud Poker
Triple Blockade

EDUCATION from APX
Algicalc
Atlas of Canada
Cubbyholes
Elementary Biology
Frogmaster
Hickory Dickory
Inst Comptg Dem
Lemonade
Letterman
Mapware
Maths-Tac-Toe
Metric & Prob Solvg
Mugwump
Music Terms/Notatn
Musical Computer
My First Alphabet
Number Blast
Polycalc
Presidents Of U.S.
Quiz Master
Starware
Stereo 3D Graphics
Three R Math Sys
Video Math Flash
Wordmaker

EDUCATION from ATARI
Conv French
Conv German
Conv Italian
Conv Spanish
Energy Czar
European C & Caps
Hangman
Invit To Prog 1/2/3
Kingdom
Music Composer
Scram
States & Capitals
Touch Typing

EMI SOFTWARE
British Heritage
Cribbage/Dominoes
Darts
European Scene Jig
Hickory Dickory
Humpty Dumpty
Jumbo Jet Lander
Snooker & Billiards
Submarine Commdr
Super Cubes & Tilt
Tournament Pool

ENTERTAINMENT from APX
Alien Egg
Anthill
Attank
Avalanche
Babel
Blackjack Casino
Block Buster
Block 'Em
Bumper Pool
Castle
Centurion
Checker King
Chinese Puzzle
Codecracker
Dice Poker
Dog Daze
Domination
Downhill
Eastern Front
Galahad & Holy Grl
Graphics/Sound
Jax-O
Jukebox
Lookahead
Memory Match
Midas Touch
Minotaur
Outlaw/Howitzer
Preschool Games
Pro Bowling
Pushover
Rabbotz
Reversi II
Salmon Run
747 Landing Simul
Seven Card Stud
Sleazy Adventure
Solitaire
Space Chase
Space Trek
Sultans Palace
Tact Trek
Terry
Wizards Gold
Wizards Revenge

ENTERTAINMENT from ATARI
Asteroids
Basketball
Blackjack
Centipede
Chess
Entertainment Kit
Missile Command
Pac Man
Space Invaders
Star Raiders
Super Breakout
Video Easel

ON LINE SYSTEMS
Crossfire
Frogger
Jawbreaker
Mission Asteroid
Mouskattack
Threshold
Ulysses/Golden Fl
Wizard & Princess

PERIPHERALS
Centronics Printers
Disk Drive
Epsom Printers
Program Recorder
RS232 Interface
Thermal Printer
16K Memory RAM
32K Memory RAM

PERSONAL INT from APX
Adv Music System
Banner Generator
Blackjack Tutor
Going To The Dogs
Keyboard Organ
Morse Code Tutor
Personal Fitness Prg
Player Piano
Sketchpad

PROGRAMMING AIDS from Atari
Assembler Editor
Dsembler (APX)
Microsoft Basic
Pascal (APX)
Pilot (Consumer)
Pilot (Educator)
Programming Kit

SANTA CRUZ
Basics of Animation
Bobs Business
Display Lists
Graphics Machine
Kids 1 & 2
Horizontal Scrolling
Master Memory Map
Mini Word Processor
Page Flipping
Player Missile Gr
Player Piano
Sounds
Vertical Scrolling

SILICA CLUB
Over 500 programs
write for details

FOR FREE BROCHURES – TEL: 01-301 1111

For free brochure and reviews on our range of electronic products please telephone 01-301 1111. To order by telephone just quote your name, address, credit card number and order requirements and leave the rest to us. Post and packing is FREE OF CHARGE in the UK. Express 24 hour delivery available at an additional charge.

- SHOP DEMONSTRATION FACILITIES - we provide full facilities at our shop in Sidcup, Monday to Saturday 9am to 5.30pm (closing Thursday 1pm, Friday 6pm).
- MAIL ORDER - we are a specialist mail order company and are able to supply goods direct to your door.
- MONEY BACK UNDERTAKING - if you are totally unsatisfied with your purchase, you may return it to us within 15 days. On receipt of the goods in satisfactory condition we will give you a full refund.
- PART EXCHANGE SECOND HAND MACHINES - we offer a part exchange scheme to trade in many makes of T.V. games for personal computers.
- COMPETITIVE PRICES - our prices, offers and service are very competitive. We are never knowingly undersold, and will normally match any lower price quoted by our competitors.
- HELPFUL ADVICE - available on the suitability of various computers.
- AFTER SALES SERVICE - available on all computers out of guarantee.
- VAT - all prices quoted above include VAT at 15%.
- CREDIT FACILITIES - we offer credit over 12, 24 or 36 months, please ask for details.

SILICA SHOP LIMITED
Dept PCT 1082, 1-4 The Mews, Hatherley Road, Sidcup, Kent DA14 4DX Telephone 01-301 1111 or 01-309 1111

SILICA shop

FREE LITERATURE

I am interested in purchasing an Atari 400/800 computer and would like to receive copies of your brochure and test reports as well as your price list covering all of the available Hardware and Software.

Name .....

Address .....

.....

.....

.....

Postcode .....

(PCT 1082)—Personal Computing Today—Oct 1982

THE ACORN SPECIALISTS

ATOM & BBC MICROS

• Upgrades • Add-ons • Books
•Peripherals • Software

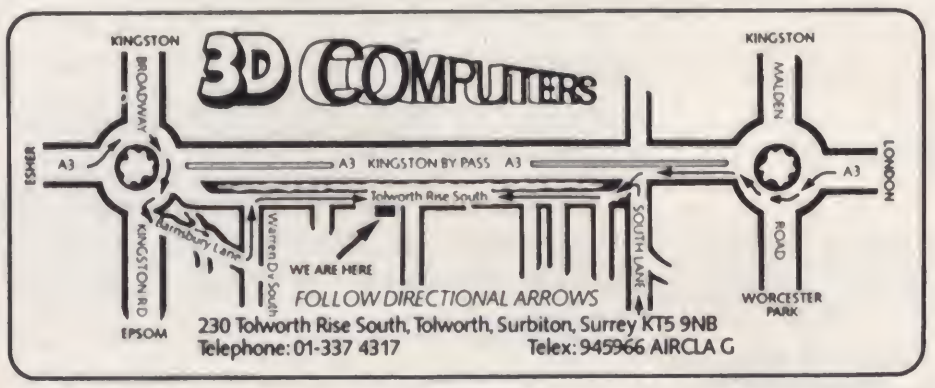
EX STOCK

ACORNSOFT BUG-BYTE
PROGRAM POWER

Available over the counter.

MAIN BBC AGENT FOR

WARRANTY REPAIRS & SERVICE



230 Tolworth Rise South, Tolworth, Surbiton, Surrey KT5 9NB
Telephone: 01-337 4317 Telex: 945966 AIRCLA G

THE ART OF PROGRAMMING THE 1K ZX81

This book shows you how to use features of the 1K ZX81. We explain its random number generator, how to use the graphics, look at PEEK and POKE and the ZX81's timer. We also include a number of complete ready-to-run programs designed to fully exploit the capabilities of your ZX81.



Send order form with remittance to:
ASP Ltd, 513 London Road,
Thornton Heath, Surrey CR4 6AR.

Please rush me a copy of The Art of Programming the 1K ZX81. I enclose my cheque/postal order made payable to A.S.P. Ltd for £2.20 (inc 25p post and packing).

Name .....

Address .....

.....

.....

Please allow up to 14 days for delivery.

CHEAP from CONSUP

Blank Computer Cassettes — Best Quality

CASSETTES !

5 C12's £2.00 + £1.00 p&p = **£3.00**
C 15's £2.00 + £1.00 p&p = **£3.20**

LEADERLESS !

Ten Leaderless C15's = **£6.00** + £1.50 p&p

Best quality, boxed tapes with no leader! Supplied in units of ten.

EPSON MX80 FT2 PRINTER

80 column printer with upper/lower case and full GRAPHICS capability. 80 chrs per second bidirectional printing speed. Condensed and enlarged characters. True descenders. The model F/T 2 takes ordinary sheets of note-paper as well as continuous computer listing paper. Sprockets fully adjustable to take all sizes of paper up to 9.5 inches wide. This is the best value for money printer on the market and we are offering readers of Personal Computing Today a special price of only 349.00 pounds plus 5.00 pounds delivery plus 53.10 VAT. A total of **407.10** pounds! That's all you pay. Offer closes 31/11/82 . . . So Hurry!

ONLY £349 + VAT

Orders enclosing cheque or P.O. to:

CONSUP LTD

62 Tritton Road, London SE21 8DE Telephone: 01-670 4411

SATURN SOFT

SPECTRUM ZX81
NEW — NEW — NEW

MAD MARTHA — Dedicated to the little woman! Adventure with a difference! Can you have Henry, Littlefellow, go out on the town without being caught by your crazy, axe wheeling wife. Lots of fun for the broadminded.
Spectrum **£5.95** inc. ZX81 **£4.95** inc.

GOBBLER, An exciting version of **PAC MAN** for the Sinclair machines. M/code fast action. Spectrum version features full arcade Graphic and sound!
Spectrum **£5.95** inc. ZX81 **£4.95** inc.

MINES OF SATURN The first of a whole series of new adventure programs. Be warned, this is not easy!
Spectrum **£5.95** inc. ZX81 **£4.95** inc.

RETURN TO EARTH The sequel to **MINES OF SATURN**. Where will it end!
Spectrum **£5.95** inc. ZX81 **£4.95** inc.

£1.00 off two or more programs ordered together. Please send SAE for full lists of many programs available for Spectrum and ZX81.

ALL PROGRAMS DOUBLE SAVED
on computer quality cassettes to avoid loading problems. DESPATCHED BY RETURN. No weeks of waiting.

SATURNSOFT
37 Heol Dulais, Birchgrove, Swansea,
West Glamorgan SA7 9LT.
TELEPHONE: (0792) 816579

MICROTERMS

Get to grips with terminology in this month's issue dictionary. A quick reference guide to common computer jargon.

Address
A label or name (usually a *binary* or *hexadecimal* number) specifying a particular *memory* location.

ASCII
American Standard Code for Information Interchange — representing letters, numbers etc by 128 permutations of a 7-bit code.

Assembly Language
Means of representing *program* statemetns in mnemonics and conveniently handling *memory* addressing by use of symbolic terms.

BASIC
Beginner's All Purpose Symbolic Instruction Code. An easy to learn, widely used computer language.

Bit
A single *binary* digit, representing either a 'one' or a 'zero'.

Buffer
(1) An area of memory designated to hold *data* being transferred between devices working at different speeds, eg the fast processor and the slower *keyboard*, *printer* or *disc*.
(2) An electronic device in a signal path designed to allow signals to pass in one direction but to hold back unwanted voltages in the opposite direction, which might damage the sending apparatus.

Bug
An error in *software*.

Byte
A *binary* number, usually of eight *bits*. It can represent a number from 0 to 255 (8-bit byte) as there are 256 possible combinations of "ones" and "zeros" eight bits long.

Cartridge
A self-contained unit which contains either ROM or RAM and plugs into a computer to expand the memory or provide a program.

Character Set
The list of letters, numbers and symbols that you can use to write programs and display information.

CP/M
A standard disc operating system that in theory allows software packages to be run on different machines. It stands for Control Program for Microcomputers.

Cursor
Character or graphic symbol used by the computer to denote where its printing. Also used as a prompt when the computer is expecting you to input information or a command.

Data
Simply, information. The raw material that the computer processes.

Database
An organised collection of information held either in the computer or on disc that can be accessed by the user.

Debug
To correct the errors in a *program*.

Disc
Magnetic storage device allowing fast random access to a large volume of *data*. A full-size hard disc will hold, say, 5 *megabytes* or more; a smaller *floppy disc* typically holds from 80 to 250 *kilo* bytes but in either case the capacity is being increased all the time.

EPROM
Erasable Programmable Read Only Memory. Writing typically takes one minute and erasing, by ultra-violet light, 10 minutes or longer.

Execute
To perform a sequence of *program* steps.

Firmware
Instructions or *data* permanently stored in *ROM*.

Flag
A linen object that one salutes — but sailors use them to send messages. So do computers. A flag is an indicator signal (usually just one *bit)* that generally signals a condition.

Graphics
Literally — drawings; a method of producing graphs or pictorial figures on a suitable output device, usually a video montior (TV set for most hobby computers) but sometimes a chart recorder or printer.

Hard Copy
A computer printout or listing on paper.

Hardware
All the electronic and mechanical components making up a system.

Hex
Shortened version of Hexadecimal, meaning '6 plus 10', which is a funny way of saying 16. It refers to the number system with a base of 16. This uses 0 to 9 and then A to F of the alphabet to represent its 16 digits. Two hex digits can be conveniently used to represent a byte (eight bits).

High Resolution
This means that you can pinpoint one dot on a screen rather than one square giving you graphical pictures of much greater detail and accuracy.

IEEE
Institute of Electronic and Electrical Engineers (in USA) — a body which has set a number of standards for more orderly interchange of information between various electronic devices, including computers.

Instruction
A set of *bits* which causes the *CPU* to carry out a particular task. Usually a basic or fundamental command understood by the *microprocessor*.

Interface
A connection between two or more items of equipment along which data and controlling signals are passed.

I/O
Input/Output. A computer generally has one or more *ports* through which it communicates with 'the outside world' — *peripheral* devices such as a *keyboard*, video display *(VDU)*, *printer* etc. An I/O port may be just an output or it can be bidirectional.

Kilo (K)
Normally means 1000, but stands for 1024 (2^{10}) when referring to memory.

Language
A repertory of commands — symbols, expressions etc, used to 'call up' the instructions or procedures a *processor* can execute. Higher-level languages are easily understood by mere humans and computers designed to work with such languages (*BASIC*, for example) use an *interpreter* to change this into the *machine code* under which the processor operates.

Location
Physical position; *memory* location is the same as *address*.

Logo
Child oriented computer language with easy to use graphics facilities which is available on the TI99/4A computer.

Loop
Program technique where one section of program (the loop) is performed many times over.

Machine Language (or Code)
The lowest (and tediously detailed) level of *program instructions*. All higher level coding must be converted to *machine language* (by *compiler* or *interpreter)* before a *processor* can obey it.

Memory Map
Chart showing how *memory* is used by a computer. The arrangement of *data* and *program* within the memory.

Modulator
A device, included in every good hobby computer, which takes the computer's output and converts it to an RF signal on a suitable TV channel, giving you a cheap, convenient visual display — even if you don't understand what's on the screen!

Monitor
(1) The first level of computer *operating systems: the program* which turns *machine code* commands into action, managing input, output etc.
(2) A TV-type device which is specially constructed to handle Video signals from a computer that does not have a *modulator*.

Non Volatile
Memory which will retain *data* content after power supply is removed, eg *ROM*.

Octal
Base 8 number system. Character set is decimal 0-8.

Pascal
A very powerful, structured computer language, available on a variety of microcomputers.

Peek
This command reads a value from a location in the computer memory. It can be used to access either RAM or ROM.

Peripheral
Device attached to a computer, eg *printer, plotter, disc unit,* but not necessarily essential to its use.

Pixel
The single dot that is used to create characters displayed on the VDU. Also the smallest display unit when using high resolution graphics.

Pointer
In the *microprocessor,* or in *memory* external to it, pointers can be *registers* allocated to listing memory *address* — they 'point' to memory locations.

Poke
This command places a value in a location of the computer's memory. It can only be used to access RAM or control registers.

Port
Terminal which the *CPU* uses to communicate with the outside world.

Printer
A device for producing typed or printed copy *(hard copy).*

Print Out
Same as *hardcopy.*

Program
A set of *instructions,* either in *mnemonics,* in *digital (binary)* form or in a *high-level language,* which tells the computer to perform a sequence of tasks.

Program Counter
Register in the *microprocessor* which keeps track of which part of the program is being *executed.*

PROM
Programmable Read Only Memory. Proms are a special form of *ROM,* which can be individually programmed by the user.

RAM
Random Access Memory. Read write memory. *Data* may be written to or read from any location in this type of memory.

Reset
Simply — go back to the start, do not pass GO, do not collect 200 bytes. A switch whereby computer control is returned to the *monitor* or low-level *operating system* and all internal *variable* values are changed to zero. This may be the only way of getting out of some endless *loop* which has arisen from a programming error.

Register
A general-purpose *memory,* or set of memory *locations,* built into the *microprocessor* itself. Sometimes, particular registers may be designated for a specific purpose.

ROM
Read Only Memory. *Memory* device which has its *data* content established as part of manufacture and cannot be changed.

Routine
A whole *program* or part of a program designed to perform a single function or action.

RS232
A communications *interface* used for *modems* and for serial *printers.*

Run
Instruction to *execute* a *program.*

Serial
Transfer of *data* one *bit* at a time.

Software
The different kinds of *program* required to work a computer.

Source Code
Program written in one of the *high-level languages* and requiring *compilation* into *machine language* before use.

String
A sequence of characters.

Subroutine
A part of a *program* which peforms a specific task and which is available for use elsewhere in a program, as often as you like.

Syntax
The grammar of a programming *language.*

VDU
Visual Display Unit. Usually a TV set in hobby computers, but may be a video monitor which accepts the output directly from the computer.

Volatile
Memory devices that will lose *data* content if power supply removed (ie *RAM).*

Word
Parallel collection of *binary* digits much as *byte.*

Z80
Widely used microprocessor. It is used in the ZX81, Spectrum and TRS-80.

6502
A widely used microprocessor. It is the heart of the PET,Apple and Atari computers.

9900
This is a family of Texas Instruments chips. They are used as the processor in the 99/4A machine.



ADVERTISEMENT RATES

Semi-Display (min 2 cms)

1-3 insertions **£7.25** per cm
4-11 insertions **£6.75** per cm
12+ insertions **£6.25** per cm

Lineage 30p per word (min 15 words)
Box Nos. **£2.50**

Closing date 2nd Friday of the month preceding publication date.

All advertisements in this section must be prepaid. Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request)

Send your requirements to:

PERSONAL COMPUTING TODAY
CLASSIFIED ADVERTISING,
145, CHARING CROSS RD,
LONDON WC2H 0EE.

ZX 81 (16K) EDUCATIONAL SOFTWARE

"O" LEVELS NEXT YEAR?

It s easy to revise Maths and French using your ZX 81

MATHS CASSETTE - 3 programs. First program teaches and tests. 2nd and 3rd programs are timed tests using generated questions from the "O" Level syllabus. Help and explanations are given where appropriate

FRENCH CASSETTE - 6 programs. First 3 programs are teach and test Grammar programs. Programs 4, 5 and 6 are comprehensive Vocabulary tests

ALSO AVAILABLE - An Educational Quiz and a large range of Junior Maths and English programs (8-13 years)

£4.50 per cassette (p & p free) or send sae for catalogue to - **ROSE CASSETTES** 148 Widney Lane, Solihull, West Midlands B91 3LH

Our software has received good reviews in "Your Computer" and "Educational Computing" and is included in the Muse library of Educational Software

---

TRS 80 — VIDEO GENIE SOFTWARE
Superb range of software now available.
ADVENTURE, ARCADE, STRATEGY GAMES, EDUCATIONAL, FUNCTIONAL PROGRAMS, HIGH QUALITY, LOW PRICES
1st class stamp for lists to:
T. SMITH, 26 Wesley Grove, Portsmouth, Hants PO3 5ER.

VIC 20 (Unexpanded) SOFTWARE. Awari collision infection car-race a-maze-ing + Pinball £2.95. Others available. Darron Spencer, 230 Low Grange Aveune, Billingham, Cleveland.

POWERTRAN MICRO-COMP 80 with Video Monitor. Some de-bugging required. £130. 0256 24969 after 6pm.

---

hard & soft E. T. Jones
Computer Ware for the ZX81
Crystal Ball..... 1K or 3K **£3.95**
Personality Predictor ..... 1K or 3K **£3.95**
MAIL ORDER C.W.O.
Sales Office, 85 Snowden Avenue, Hillingdon, Middx UB10 0SE Tel: Uxbridge (0895) 54751

QUALITY VIC SOFTWARE — Games tape 1 £6.50; Games tape 2 for 3.5k only, £6.50, for 6.5k only, £8.00. Add HI-RES to your games the easy way for only £8.00. Contact Soft Toys, 14 Lockharton Avenue, Edinburgh EH14 1AZ.

MZ80K HORSERACE ANALYSIS. Winners galore. A serious program. Not a game. Cassette: £5.75. Details: Paragon, "Moorside", Woodlands, Wimborne, Dorset.

ZX81 KEYBOARD £11.95
UNIQUE DESIGN FOR UNIQUE PRICE
Individually handmade and thoroughly tested before despatch, unconventional but practical — send SAE for details or order with refund guaranteed if performance disappoints.
MAKE YOUR ZX81 A REAL PLEASURE TO USE
Send cheque/PO for £11.95 to
DAVID HEARTFORD
91 High Street, Evesham, Worcs WR11 4DT.

TRS-80 VIDEO GENIE PROGRAMS for 16K L/2. Chess 10 levels. Checkers 2 levels of play. Asteroids, Pac-Man, Bomber, £4 each. 3 for £10. All 5 for £15 inclusive. Money with order. C. W. Craft, 124 Coverts Road, Claygate, Esher, Surrey KT10 0LH.

---

adventure
SPECTRUM ZX81 BBC nascom

Colossal Adventure 16K/32K..... **£8/£10**
The classic mainframe game "Adventure", with all the treasures and creatures of the original. And with 70 extra rooms!

Adventure Quest 16K/32K..... **£8/£10**
From the Great Forest, up Orc Mountain, braving fire. swamp and caverns on a quest against Tyranny. Faci vampires, demons, wizards, 200-foot worms. . . .

Adventure games are fascinating. You enter English phrases and the computer acts as a window to worlds of magic.

Every **Level 9** adventure has over 200 individually described locations and a game may take weeks to solve! Only our combination of data *and* code compaction allows so much to be provided.

FREE P&P. NO VAT. Money back if unhappy. Supplied on TDK cassettes. Send order, describing your computer, or a SAE for full details of all our programs to:

LEVEL 9 COMPUTING
229 Hughenden Road, High Wycombe, Bucks HP13 5PG

• SUPER MAZE •
ZX81
•**Fast** Flicker-Free Action
•**Superb** Graphics
•**Guaranteed** Loading
•**On-Screen** Scoring
•**Constantly** Changing Maze
Special Introductory Offer
£5 inc P&P & VAT
M.M. SOFTWARE
13 Motcombe Farm Road, Heald Green, Stockport SK8 3RN

VIDEO GENIE SOFTWARE: Buy the best. For education and utility. Vulgar Fractions Parts One to Four, £10.00 each: Anagramist £7.50: Computer Hangman, £8.50: Music Theory 'One', £8.50: Translator, Decimal to Hex and Binary, £9.50: "Free" Menu-fed games cassette with every two purchased. Branksome Education, 18 Oxford Road, Guiseley, Leeds.

16K RAM PACK £26.50 incl. free cassette - ALIEN ATTACK (7K M/c). Quite simply the best! Also available **64K RAM PACK** - same size, same quality as the 16K RAM - £62.95. Normally despatched within 10 days of receipt of order.
GAMES PACK £4.95, includes: - 3-D Battle (M/code-1K), City Bomb (M/code-1K), Warp Wars (16K), Snake (16K), Sweet Tooth (16K), Slalom (16K) & Black Holes (16K).
TOOLKIT includes: Line renumber (incl. GO TO & GO SUB), search & list, search & replace, screen file, hyper-graphics mode, free space, tape wait routine. ALL FOR ONLY £4.95.
GRAPHICS TOOLKIT. 22 exciting M/code routines to enable you to produce screen displays as never before. Incls. draw & undraw, border, foreground, background, 4 way scrolling etc. etc. ONLY £4.95.
BATTLE SHIPS (13K): First ZX81 version of the old favourite Battle Ships & Cruisers. ONLY £4.95.
All above software for ZX81 with 16K RAM.

JRS SOFTWARE
19 WAYSIDE AVENUE, WORTHING, SUSSEX BN13 3JU
TELEPHONE: WORTHING 65691

ATOM CASSETTE SOFTWARE. Hangman, Battleships, Invaders, Treasure, Horse Race. Only £5.00. I. Rothwell, 39, Bramlyn Close, Clowne, Derbys.

ZX81 UK101

ZX BASIC TUTOR — Turns a ZX81 into a teaching machine, teaching you Basic programming in six easy stages. Requires 16K Ram Pack. Cassette **£5**

ZX81 PRINTING SERVICE — Send us your program on Cassette and we will send you a printer listing of it. **£2.50**

UK101 PRINTING SERVICE — See above

UK101 SCREEN MAP — Shows memory locations of memory-mapped screen. Ideal for graphics programs **£1.25**

EXTRA-LONG CASSETTE AND VIDEO LEADS — Cassette leads are 1m long, Video leads 2m. For ZX81 and ZX Spectrum. State type required **£3.50 Each**

EON COMPUTING
17 Sidney Road, Wood Green, London N22 4LT.
Same Day Dispatch Mail Order Only

ATOM & BBC



"ZODIAC"
Following the success of our 1st Adventure Competition (winner to be published next month). We are launching our second Adventure Competition (we have doubled the prize money as well). "Zodiac" is your greatest challenge yet from A&F. Solve the problem of this Astrological Adventure and you could win £100.
Full machine code program requires 12K RAM.

Price £6.00

Closing date 30/11/82 the winner will have £100 in his hand in time for Christmas.

ATOM * UTILIKIT EPROM

FOR JUST £16.00 ADD 22 BASIC COMMANDS AND FIVE FEATURES!! TO YOUR ATOM
(SUPPLIED FULLY DOCUMENTED ON 4K EPROM)
COMMANDS Read; Restore; Data; Tone; Key X; Clr; Disassemble; On Error; On Escape; Var; Hex; At; List (controlled list with up & down scroll facility); Renumber; Find; Search & Replace; Auto; Delete; Block Move; Cold; Warm; Fast; Slow.
***1200 BAUD CASSETTE OPERATING SYSTEM FEATURES**
Visible Load/Save; Audio indication of successful Load/Save; Extended Lines (ie up to 208 characters per line); Auto Repeat on all keys (except Break & Lock); Auto list of line when an error occures.
THE BEST VALUE FOR MONEY TOOLKIT AVAILABLE! WHAT! ALREADY GOT A TOOLKIT FITTED? Why not buy our Add-an-Eprom Board — add up to 4 Eproms for only £18.00 (free program when ordering both items)

The Best Software The Best Prices

NEW ATOM

TORPEDO RUN
Another fantastic high resolution (clear 4) real time game for the "Atom". Can you complete your mission and destroy the enemy convoy? Will you return to a heroes welcome or is Davy Jones Locker your final resting place!!!
5K Text 6K Graphics **Price £4.95**

ESCAPE
The invader P.O.W.s are out for exercise. You, a guard have to catch them, enthral and frustrate your family all at the same time.
5K Text 3K Graphics **Price £4.95**

NEW
CYLON ATTACK
A FAST MOVING 3D SPACE BATTLE
As you sit in your starfighter looking out into the void of space remember the CYLON race only want Mankind for food!! You glance up at your long range scanner, the CYLON fleet is in range. Quickly you select a target and turn to meet it ready to defend Earth to the end!!
5K Text 6K Graphics **Price £4.95**

MISSLE COMMAND
A fast moving version of the popular arcade game. You have three bases from which to fire your defence missiles, protecting your cities and bases from the missles and aircraft attacking you!!
SCORE/HI SCORE/MULTIPLE LEVELS/SOUND
5K Text 6K Graphics **Price £4.95**

POLARIS
Your submarine is ordered to sink an enemy convoy. By using skill, cunning and strategy can your avoid the escorting warships and dangerous shallows to succeed with your mission?
5K Test 6K Graphics **Price £3.95**

*SPECIAL OFFER, DEDUCT £1 PER ADDITIONAL CASSETTE ORDERED

BBC

ROADRUNNER MOD. B
The opposition will stop at nothing to get you. In this arcade style car chase: dodge through the Sunday traffic, weave to avoid their fire as the black cars try to shoot you off the road! Beware the hells angels who assist them!
Can you survive! **£6.00**

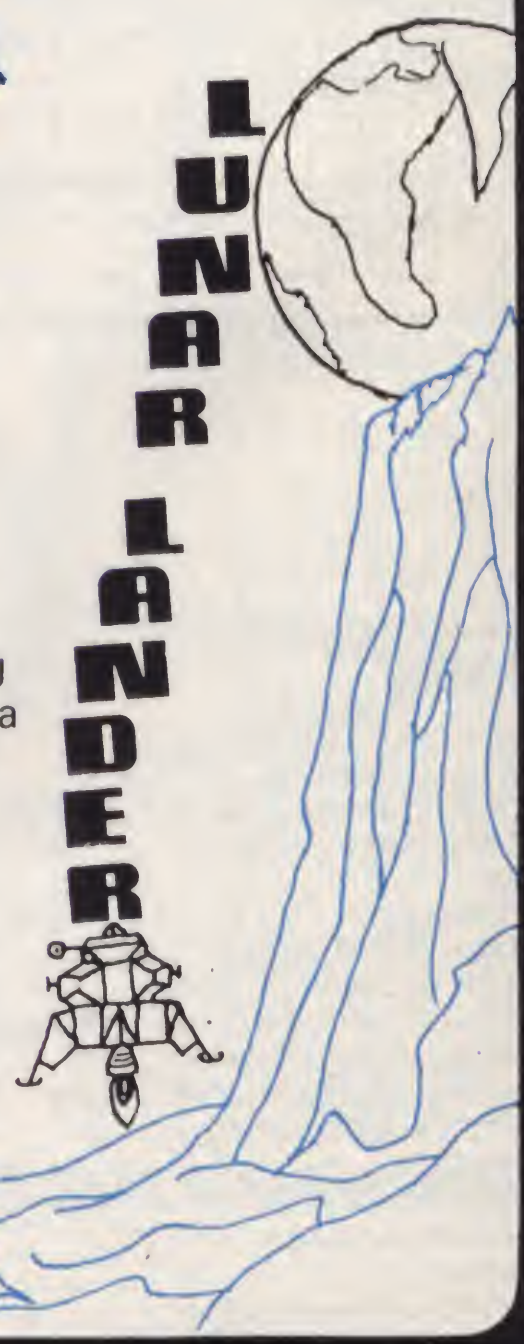
EARLY WARNING MOD. B
Destroy the attacking waves of ICBMs using a radar tracking system and intercept missles. 48 Levels — Each one harder than the last. **£6.00**

NEW "TOWER OR ALOS" MOD. A &B
A fully interactive adventure program for the BBC. Clear "ALOS" of its monster and demons. Fight your way to fame and fortune. **£6.00**

SPECIAL OFFER
DEDUCT £1 PER ADDITIONAL CASSETTE ORDERED.

BBC MOD B ONLY
A superb reproduction of the popular arcade game. Four skill levels, realistic sound and fantastic graphics. Long range and close up Luna Landscape Displays. A safe soft landing is your target. But can you do it?

PRICE ONLY £6.00



Orders to A&F Software, 830, Hyde Road, Gorton, Manchester M18 75D.
Orders by mail or phone (061) 223 6206
All prices fully inclusive no hidden extras
Micro-Link * A&F's Showroom now open Address as above.
We pay 25% royalties on ATOM/ BBC programs

TRS-80 L2 16K, Software, Manuals, £230. Phone 222-7979, Extension 2125. Mr. P. Hodgson, Office Hours Only.

B.B.C. MICRO A/B, three games on one cassette. "Helicopter Rescue". How many crew can you save before the tide comes in? "Tunnel". A new defender game, and "Road-race". All in Hi-Res colour and sound. All for £4. Cheques to A. Lane, A. Lane (Software), 12/316 Seaside, Eastbourne, Sussex BN22 7RH. Guaranteed Loading.

PET/VIC/APPLE
language/utility programs

TINY PASCAL PLUS (PET, APPLE)..... **£31**
TINY BASIC COMPILER (PET)..... **£16.50**
PIPER — The Music Machine (PET, VIC)..... **£16.50**
VIGIL — Interactive games language, complete with 9 games (PET, 8K VIC)..... **£22.00**
HIRES/MULTICOLOUR UTILITIES for unexpanded VIC..... **£11.50**
GRAPHVICS — Super Graphics for VIC (3K or 8K)..... **£16.50**
PET MACHINE LANGUAGE GUIDE..... **£6.00**

VIC games also available. SAE for full details from
ADAMSOFT, 18 Norwich Avenue, Rochdale, Lancs OL11 5JZ.

1 VIDEO GENIE (1) 16K, TAB/CLB. Keys fitted. Some software books, Manuals, £250 ono. Condition as new. Phone 04612 4551

"ON YOUR MARKS". Set of five graphic ZX81 16K games for juniors. £5.95. From Computator, 3 Thalia Close, Greenwich, SE10 9NA.

ZX SPECTRUM SOFTWARE, graphic games, S.A.E. details, Mike O'Neill, 5 Castle-fields Rd, Cheltenham, Glos GL52 6YW.

CLASSIFIED ADVERTISEMENT — ORDER FORM

RATES OF CHARGE: 30p per word per issue (minimum of 15 words). Box numbers £2.50p per issue and post to: **PERSONAL COMPUTING TODAY, CLASSIFIED DEPT., 145 CHARING CROSS ROAD, LONDON WC2.**

					£4.50
					£6.00
					£7.50
					£9.00
					£10.50
					£12.00
					£13.50
					£15.00

Please place my advert in **PERSONAL COMPUTING TODAY** for . . . . . issues commencing as soon as possible.

I am enclosing my Cheque/Postal Order/International Money Order for: (delete as necessary) £. . . . . (Made payable to A.S.P. Ltd)

VISA OR Debit my Access/Barclaycard (Delete as necessary) We welcome Access

All classified advertisements must be paid for in advance.

Please use BLOCK CAPITALS and include post codes.

Name (Mr/Mrs/Miss/Ms) ..... **(delete accordingly)**
Address.....
.....
.....
Signature..... **Date**.....
Daytime Tel. No. .....

AD INDEX

A B & C COMPUTERS 13
ACORN SOFT 9
ADDA 29, 33, 37
ALADDINS CAVE 87
ANGLO AMERICAN 20
ANIROG COMPUTERS 58
ARTIC COMPUTING 40
ATARI 116
AUDIO GENIE 65, 76
BUFFER MICRO SHOP 60
CAMEL MICROS 75
CASES COMPUTER SITUATIONS ... 60
CAMBRIDGE LEARNING 95
CAMBRIDGE COMPUTER STORE .. 58
CASTLE ELECTRONICS 61
COMP SHOP 115
COMPUTER CONCEPTS 22
COMPUTER SHACK 19
CONSUP 109
CONTROL TECHNOLOGY 69
CROWN BUSINESS CENTRE 32
CSL MICRODATA 52
DATA ASSETTE 36
D. A. COMPUTERS LTD 87
DEAN ELECTRONICS 16
D'FRITSCH 73
DISKWISE 75
D. T. MOODY 96
ELECTRONIC AIDS 60
ELECTRONICS APPLIED 72
ELECTRONEQUIP 73
FULLER MICRO SYSTEMS 6
GAMER 22
GEMINI ELECTRONICS 95
GEMINI MARKETING 41
GENERAL NORTHERN MICRO 73
GRUNDY ..... 10 & 11
HI-FI WESTERN LTD 87
IBEK SYSTEMS 72
KEMPSTON ELECTRONICS 32
LANSDOWN ELECTRONICS 72
LEISURONIC COMPUTER STORE .. 60
MICROCOMPUTER APP. 75
MICROWARE 96
MICROWORLD COMPUTER 32
MICHAEL ORWIN 52
MICRO STYLE 2
MICROCOMPUTER SOFTWARE 22
MICROPOWER SOFTWARE 58
MOLIMERX 15
NORMAN AUDIO LTD 71
PERSONAL COMPUTING 58
PHEONIX MARKETING 9
PHILIP COPLEY 95
PREMIER PUBLICATIONS 53
PRO SOFTWARE 26
ROSS SOFTWARE 32
RICHARD ALTWASSER 29
SATURN SOFT 109
SHIVA PUBLISHING 32
SILICA SHOP 108
SINCLAIR RESEARCH .. 45, 46, 47 & 48
SILICON CENTRE 87
SIR COMPUTERS 26
SOFTWARE FOR ALL 16
SOUTHERN SOFTWARE 13
STRIPELAND LTD. 64
SUPERIOR SYSTEMS 13
SUPERSOFT 81
TAURAS COMPUTER DESIGN 52
TEMPUS 71
THURNALL (ELECTRONICS) 37
3D COMPUTERS 109
TITAN 96
VIDEO SOFTWARE 37

BEFORE YOU BUY YOUR MICRO!

COMPUTER, PRINTER, DISC DRIVES & ACCESSORIES

ALMOST EVERY MAKE OF POPULAR COMPUTER STOCKED
AT PRICES WELL BELOW RECOMMENDED RETAIL

GIVE US A RING ON 01-441 2922

AND SAVE £££'s WITH THE LOWEST PRICE GUARANTEE

All products carry a 1 year guarantee (parts & labour)
Pay an extra 10% for a 2 year guarantee

Shelves of Computer Books

Spares & repairs on all products, even if you didn't buy from Comp Shop

EXPRESS MAIL ORDER SERVICE

Many items over stocked on Sale Offer

New products arriving daily

'Phone your order to reserve

INSTANT CREDIT
just pay the deposit by Credit Card and take it away

SATISFYING PRICE CONCIOUS CUSTOMERS FOR NEARLY 5 YEARS

P.S. Hopeless on Software

COMP SHOP LTD

"Europes Largest Discount Personal Computer Stores"

TELEPHONE SALES
OPEN 24 hrs. 7 days a week
01-449 6596

BARCLAYCARD VISA

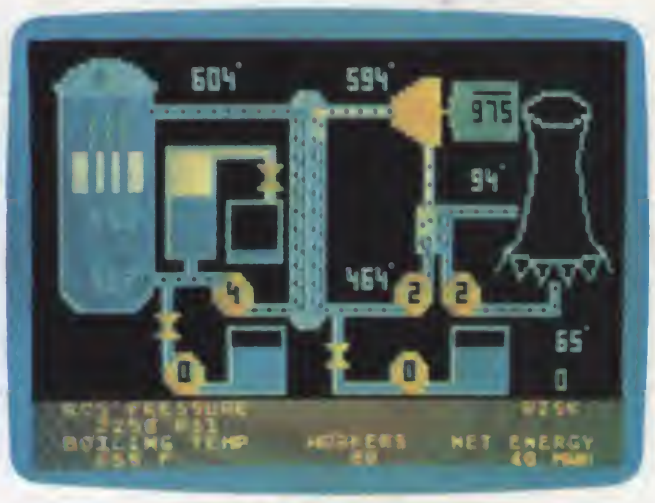
DINERS CLUB INTERNATIONAL · AMERICAN EXPRESS · Mastercharge Interbank

MAIL ORDER SHOP

14 Station Road, New Barnet,
Hertfordshire, EN5 1QW
(Close to New Barnet BR Station - Moorgate Line)
Telephone: 01-441 2922 (Sales) 01-449 6596
Telex: 298755 TELCOM G
OPEN (BARNET) - 10am - 7pm - Monday to Saturday



Music Composer



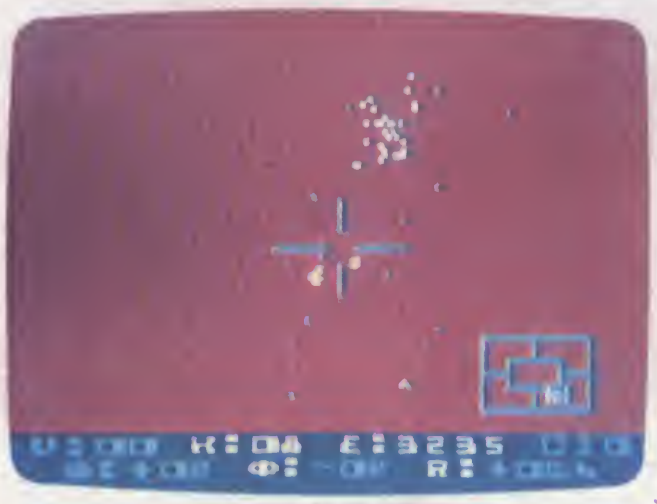
Scram



Graph-it



Intro to BASIC 1



Star Raiders



European Countries



Missile Command



Basketball

THE GRAPHIC DIFFERENCE BETWEEN ATARI COMPUTERS AND ALL THE OTHERS.



Computers for people. Atari Home Computers are designed for use in the home by all the family. After all, you don't have to be a computer wizard to appreciate what breakthrough technology can mean, do you?

Atari does more. All home computers contain a microprocessor...the "chip" that's so often in the news. But Atari Home Computers also have a special kind of chip, one that's custom-designed by experts to provide extraordinary capabilities. Which means that an Atari computer can do more for you.

The Graphic Difference. In an Atari computer, a separate microprocessor operates what experts consider the finest colour display in the industry...without diminishing your Atari computer's capacity for work – or play.

So, whether you're using the Atari Home Computer program that monitors your investment portfolio or the Video Easel program that teaches design and perspective, the information shown on the screen isn't just more colourful, it's more complete.

Hear the difference. There's a separate chip that produces sound, too. It controls four built-in synthetic sound generators that can play simultaneously, producing everything from pure musical tones to explosion sounds.

All work and no play? With separate systems for sound and colour, do we even have to say how much fun games like Space Invaders, Star Raiders and Missile Command are? These you'll have to see – and hear – to believe.

Learn everything from how to converse in French, German, Spanish and Italian to chess and touch typing. All at your own pace from a teacher that never gets tired or impatient. Learning has never been more effective or more fun.

A beginning, not an end. The Atari computer is built with one goal...the expansion of your world. And your family's world. It can speak several programming languages, an important extra. And it is expandable...

To learn more about the amazing capabilities of Atari Home Computers either visit your local dealer or fill in the coupon below.

Please send me FREE a brochure, price list and the address of my nearest stockist.

Name_____

Address_____

_____

_____

_____ PCT 1

Atari International (UK) Inc.
Windsor Hse., 185-195 Ealing Road, Alperton, Wembley, Middlesex.

ATARI®

A Warner Communications Company