

Personal Computing Today

NOVEMBER 1982
65p

NEW

**SOFTWARE
CHECKLIST**
Pick out a
program

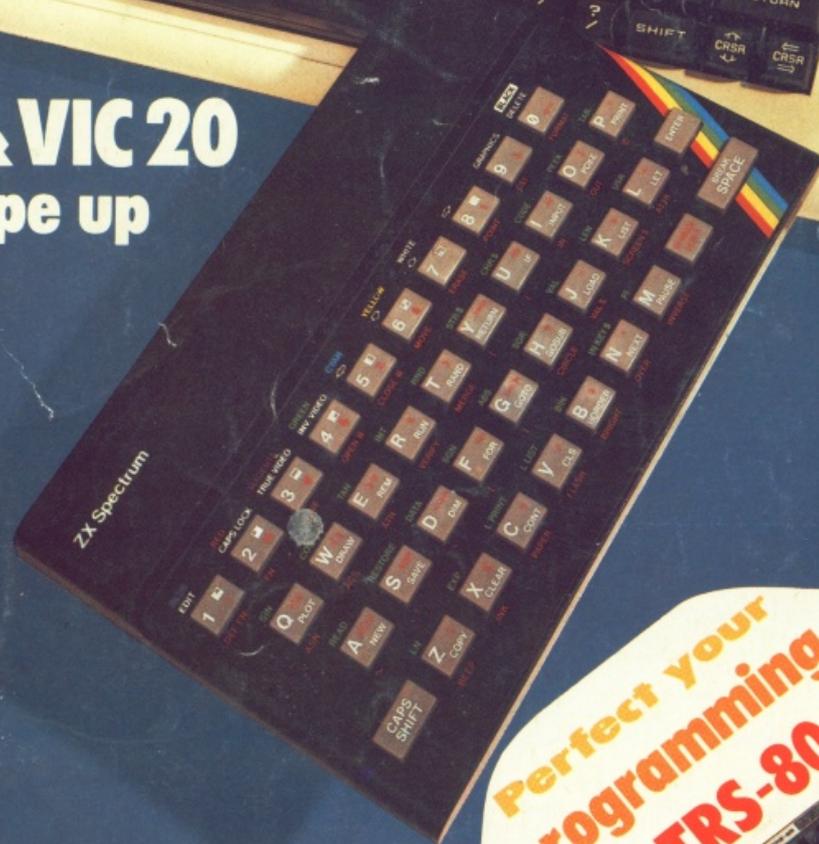
HARDWARE
Get the micro
low-down
from our
Factfile

SPECTRUM & VIC 20
How they shape up
graphically

**TUNE YOUR
BBC B INTO
TELETEXT**

**MICRO
BUYING**
Get it right
first time

**PROGRAMS
FOR VIC, BBC,
ATARI, ZX81,
ATOM, TRS-80**

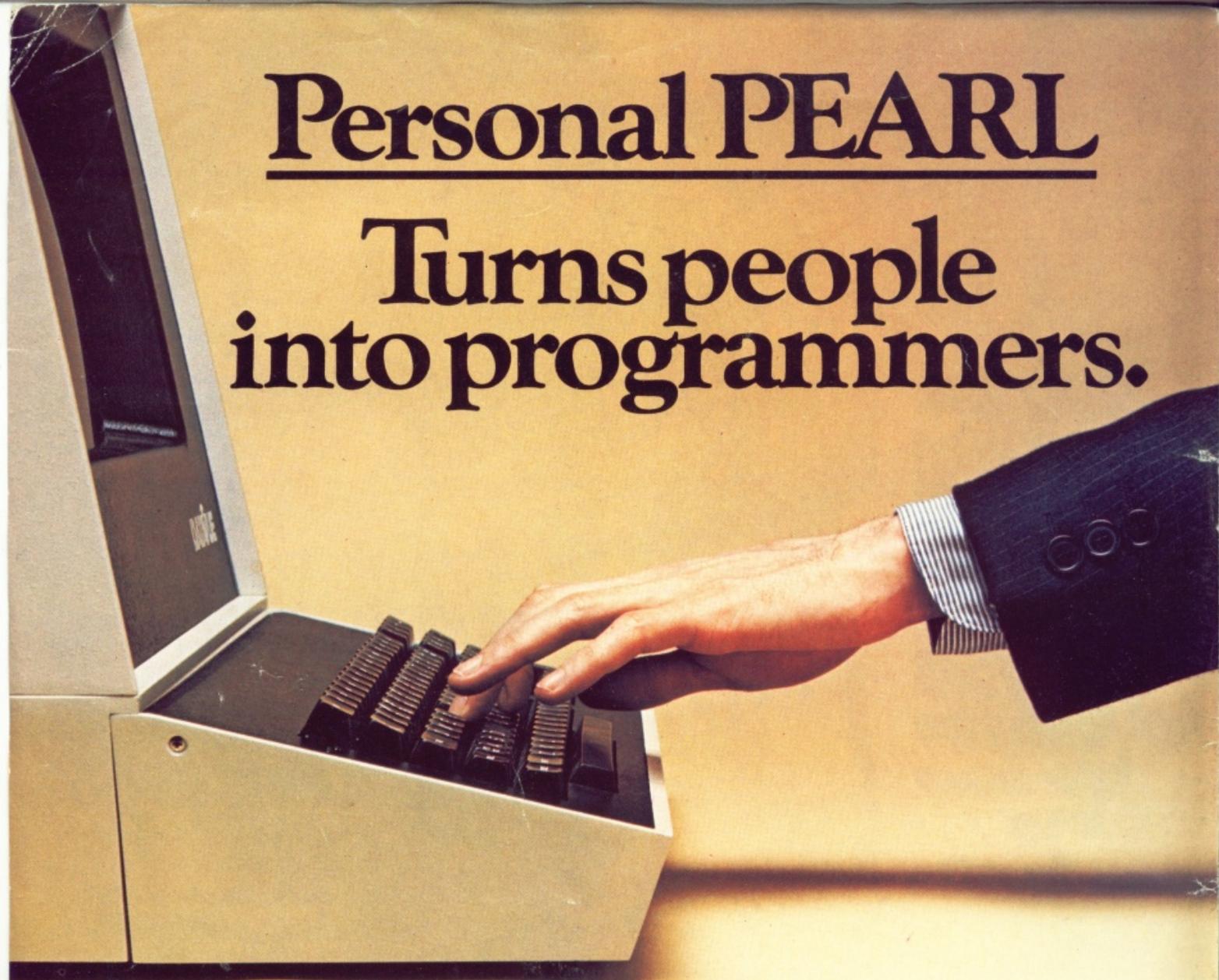


**Perfect your
programming
with our TRS-80 tipster**



Personal PEARL

Turns people into programmers.



If you could program a computer by simply telling it the result you wanted, without using complex codes or languages, then anyone could become a programming professional. Sounds fantastic?

But now it's possible with Personal PEARL, and all for less than £200. It generates quality Business Programmes, Data Management, Costing, Mailing – in fact you

create your own library of programmes that matches your operation today, and tomorrow.

After all, no-one understands your business better than you. So let Personal PEARL take the technology out of computer programming, and you'll find yourself writing professional business software – at the touch of a button.

Please send more details of Personal PEARL.

Name: _____

Company: _____

Address: _____

Tel: _____

Computer Make: _____

Disk Size: _____ VDU Make: _____

Pearl Software International (UK) Limited, PO Box 34, Poole, Dorset, BH14 8AR.
Tel: Parkstone (0202) 741275

Pearl Software International (UK) Limited,
PO Box 34, Poole, Dorset, BH14 8AR.
Tel: Parkstone (0202) 741275



Personal Computing Today

Volume 1 Number 4 November 1982

Editor:

Elsbeth 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
Telephone 01 437 1002

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 Per-
sonal Computing Today,
Subscriptions Depart-
ment, 513 London Road,
Thornton Heath, Surrey
CR4 6AR.

Last month yet another new computer was launched into the sea amongst the fleet of existing ones but it breaks with the tradition set by previous computer designers.

The Jupiter Ace does not use BASIC as its mother language. Instead it uses FORTH, a recently written programming language which has gathered a substantial following in a short time-span.

Launching a micro on the market running in FORTH says a lot for manufacturers and designers Jupiter Cantab's high impressions of this language, but could be a big risk for the firm.

Steven Vickers and Richard Altwasser must be praised for carrying out the courage of their convictions. But it could cause sales problems in convincing buyers to opt for FORTH.

FORTH itself was chosen by the Jupiter entrepreneurs because it is a very powerful and flexible language. In essence it is quite straightforward to pick up the thread of FORTH. You build up a string of command words starting from a basic dictionary. All these commands represent a procedure that the computer has to carry out. If you can already use BASIC it will be awkward learning FORTH because the programming notation works in reverse.

This form of notation is much quicker than the standard Basic method and FORTH is said by many to be an excellent language because of it. Versions of FORTH are available for the Atom, Pet, TRS-80, BBC, Sharp, and Texas computers. Unfortunately, people are slow to take to anything that breaks the bounds of tradition so Jupiter Cantab will have quite a hard task convincing people that theirs is the machine to buy.

To try and overcome people's reservations, with the Ace comes an operators guide which includes a complete FORTH tutorial. Steven Vickers wrote the ZX Spectrum manual for Sinclair Research so is a dab-hand at documentation.

Both Vickers and Altwasser have a good computing pedigree being the real brains behind the Sinclair ZX Spectrum. The idea for the Ace came to them while working on the Spectrum's design, and the Ace project started when the Spectrum had been completed. The price of the Ace is competitive at £89.95 and with the market as buoyant as it now is the Ace should sell well providing Jupiter Cantab can convince people of FORTH's potential as a reliable and easy-to-use programming language.

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



NEWS

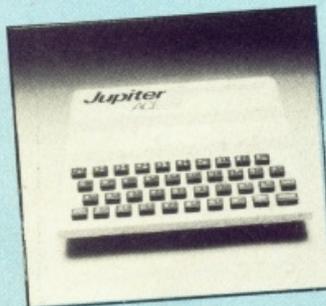
Newstalk 8
Catch up on what's occurring in the home computer industry.

NEXT MONTH

Next Month 13
Here's an inkling of what is to come in our festive Christmas issue.

LETTERS

Letters 16
Scrutinise the news and views of your fellow readers in Your Letters.



VIC 20

VIC 20 Function Keys 18
Find out how to use the VIC 20's function keys properly, an area almost untouched by the VIC manual.

SOFTWARE

ATARI 400

Sardaukar Assault 21
Defend the golden tower against an assault by the meanest space warriors you will ever find.

SOFTWARE

COMPUTER CLUBS

Clubhouse 26
Find out how to start your own computer club from your front room.

BBC

Tune Into Teletext 30
Get the best out of the BBC B's teletext graphics mode.

TECHNIQUE

DEALERS

Look Before You Leap 35
Highlighted this month is the Spectrum Computer Group who started off in photography and now sell computers.

TECHNIQUE

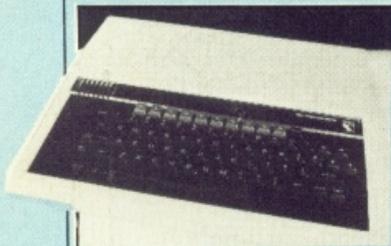
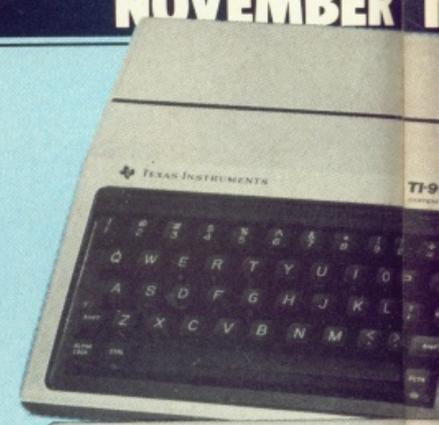
TRS-80 Tipster 40
Some programming hints for Tandy owners.

REVIEW

Software Reviews 44
Avoid the one-day wonders with our honest games reviews.

REVIEW

Shaping Up Graphically 48
Today graphics are one of the most important facilities available on a computer. Our lead feature takes two best selling machines the VIC 20 and Spectrum and compares their graphics capabilities.





TI 99/4A

MICROSPOT

Message Simulator 53
Turn your TI into an instant printer.



LETTERS

Micro Answers 56
Our resident computer doctor does his monthly diagnosing and curing.

FEATURE

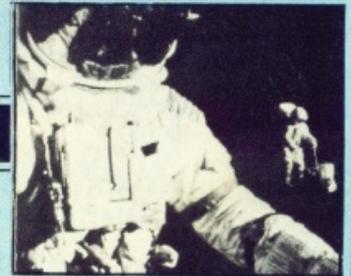
HARDWARE

Microbuying 60
Want to buy a computer but don't know where to start? Read our special report and get it right first time round.

PROGRAMMING

TECHNIQUE

Gamesboard 64
Ayo is the name of this month's game. One of the oldest strategy games around is taken apart for programming purposes.



TRS 80

SOFTWARE

Saturn Attack 72
Avoid the menacing mines guarding valuable mineraloids littered across the planet Saturn. Touch one and you and your TRS-80 will soon be obliterated.

BBC

MICROSPOT

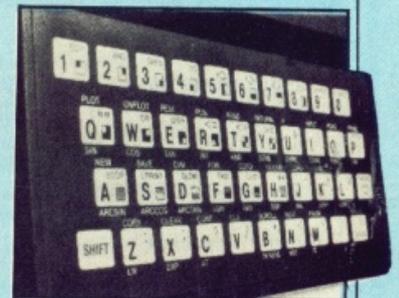
Pitching into the BBC 78
A short sharp program to sort out sound envelopes on the BBC.

REFERENCE

Factfile 81
Find out which computer will be best suited to your needs in our regular reference section.

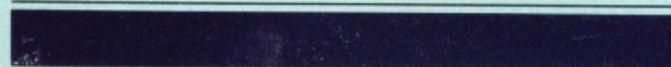
REFERENCE

Software Checklist 91
Need Asteroids for your Atom? Want Space Invaders for your Spectrum? Check out the Checklist and find out who can supply you.



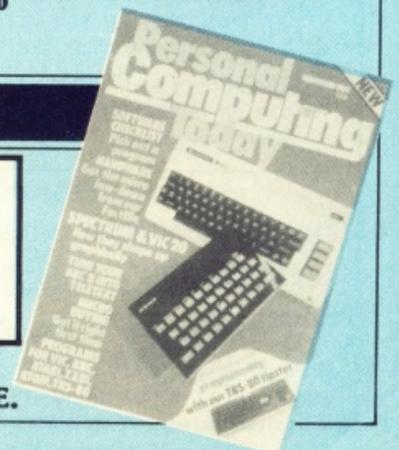
REFERENCE

Micro Terms 110
Baffled by byte or perplexed by peek? Micro Terms will set you straight.



**Personal
Computing
Today**

**Personal Computing Today,
145 Charing Cross Road, London WC2H 0EE.**



MICRO COMPUTER SOFTWARE

**THE BIG NAME
IN FAMILY SOFTWARE**

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

**DIGGLESWINE
CELLAR**
Let your computer select
your wine

**BILL
SOWERBUTTS
GARDENING
HINTS**
Everything you want to
now about houseplants.

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

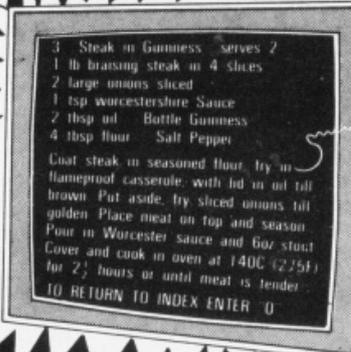
**ROGUE
ELEPHANT**
Exciting thrills and spills
of Jungle Survival.

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

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

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

NAME _____
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

TROUBLE FREE PROGRAMMING FOR ONLY £13.95 INC V.A.T. (+£1.40 p/p)

**WITH THIS BACK-UP RECHARGEABLE BATTERY PACK AND MAINS FILTER.
NO MORE PROGRAMME CRASHES DUE TO MAINS FLUCTUATIONS AND TRANSIENTS**

If you use or programme computers you know the frustration and problems caused by sudden drops in the mains supply or high voltage transients. Hours of tedious programming can be lost in a fraction of a second.

Here at **ADAPTORS AND ELIMINATORS**, who are one of the largest suppliers of mains adaptors to the computer industry, we have developed this rechargeable battery pack and mains filter.

- No more programme crashes due to mains fluctuations.
- In the event of a power cut your computer will run for up to 30 mins, allowing you to record your programme on a battery cassette, or print a hard copy on your printer.
- The battery pack is also a useful source of 9v power, for use on radios, tape recorders etc. Use your adaptor to charge overnight.

Operation could not be simpler. Plug the lead from your ZX adaptor into the socket on the battery pack (male or female are provided). Then using the lead supplied connect the battery pack to your ZX computer or Spectrum.



The battery pack then provides instant back up to the adaptor, leaving you to programme without fear of crashes due to the mains. (Poor mains supplies are responsible for about 90% of all programming faults.)

The pack is housed in a smart ABS case and comes complete with full instructions. No wiring required — JUST PLUG IT IN!! We urge you to protect your programmes. Order now — Only **£13.95 + P/P.**

PLEASE NOTE: This pack is suitable for all computers using a 9v supply but you may need to change the plugs.

FOR TROUBLE-FREE COMPUTING ORDER NOW. MAIL ORDER ONLY

SEND TO: ADAPTORS AND ELIMINATORS LTD, 14, THAMES ST, LOUTH, LINCOLNSHIRE.

PLEASE SUPPLY _____ (Qty) Rechargeable Battery Packs at £13.95 + £1.40 p/p _____ TOTAL

NAME _____ ADDRESS _____

ALLOW 28 DAYS FOR DELIVERY. MONEY BACK GUARANTEE IF NOT ENTIRELY SATISFIED.

Sumlock

Manchester



microcomputer world

SHARP

First and foremost

MZ-80A



MZ 80A 48K COMPUTER **£549.00** (inc VAT)

THE NEW FULL KEYBOARD COMPUTER FROM SHARP

***COMPLETE WITH SOFTWARE PACK:**

EDUCATION — HANGMAN, GEOGRAPHY, ARITHMETIC

GAMES — LUNAR LANDER, TEN-PIN BOWLING,
SPACEFIGHTER, IDENTIKIT, CLEVER CRIBBER
D-DAY, BREAKOUT, STAR TREK, SCRAMBLE,
SPACE INVADERS

HOME FINANCE — HOME BUDGET, BANK RECOCUL,
BANK LOAN, MORTGAGE

BASIC TUTORIAL — BASIC TUTORIAL 1

BASIC TUTORIAL 2

BASIC TUTORIAL 3

BASIC TUTORIAL 4

PLUS BASIC BASIC and THE BASIC ENCYCLOPAEDIA
two very useful additions to your library

TWO YEAR WARRANTY ON SHARP

HARDWARE parts and labour



THE DRAGON 32 AND SOFTWARE NOW IN STOCK

£169.95

VIC 20

VIC 1001	VIC 20 computer	£169.95	VIC 2803	Programmers reference guide	£14.95
VIC 1530	C2N cassette deck	£44.95	VP 014	Spiders from Mars ctg.	£24.95
VIC 1515	VIC printer	£230.00	VP 010	Amok	£6.99
VIC 1540	Single floppy disc	£396.00	VP 026	Alien blitz	£7.99
VIC 1210	3K RAM cartridge	£29.95			
VIC 1110	8K RAM cartridge	£44.95			
VIC 1111	16K RAM cartridge	£74.95			
VIC 1212	Programmers aid ctg.	£34.95	SC 09	STACK ACCESSORIES	
VIC 1212A	Super expander ctg.	£34.95	SC 12	Paddles (1 pair)	£11.50
VIC 1213	Machine code monitor ctg.	£34.95	SC 11	Light pen	£28.00
VIC 1311	VIC joystick	£7.50	SC 14	Analogue joystick	£14.95
VIC 1312	VIC paddles (1 pair)	£13.50	SC 16	Low cost RS232 interface	£19.84
VIC 2501	Introduction to Basic (1)	£14.95	GPA	Games port multiplexer	£37.95
VIC 1901	Avenger ctg.	£19.95	SC 13	Games port adaptor cable	£19.84
VIC 1902	Star battle ctg.	£19.95	SC 06	Rom switch board	£44.00
VIC 1904	Super slot ctg.	£19.95	SC 15	Full RS232C interface	£56.00
VIC 1905	Jelly monsters ctg.	£19.95		Memory expansion board — with 3K RAM expandable with chips to full VIC capacity (29K)	£56.35
VIC 1906	Alien ctg.	£19.95	VIC KIT2	Hi resolution and toolkit command single ROM to fit in SC15	£33.25
VIC 1907	Super lander ctg.	£19.95			
VIC 1909	Road race ctg.	£19.95			
VIC 19	Rat race ctg.	£19.95			
VIC 2801	Learn computing with VIC 20	£1.95	DUST COVERS for VIC 20 and C2N (approved CBM product)		£3.75 per set
VIC 2802	VIC revealed	£10.00			

COMPLETE LIST OF HARDWARE AND SOFTWARE AVAILABLE BY REQUEST

We only advertise what we have in stock at the time.

All items are ex stock. Telephone/mail order
despatched within 24 hours. Carriage free U.K. mainland

Sumlock Manchester

Dept PCT 1

Royal London House

198 Deansgate

Manchester

M3 3NE

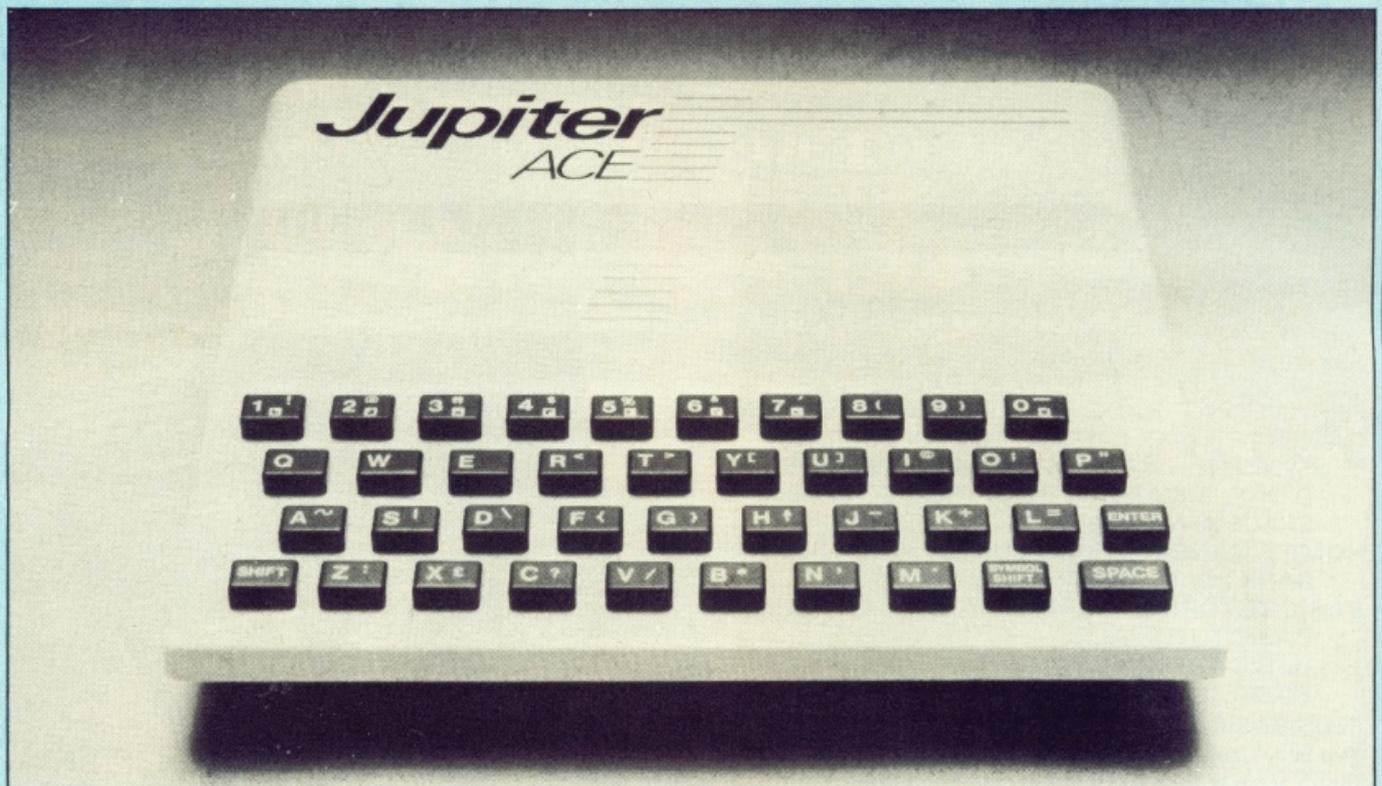
OPEN MONDAY TO SATURDAY
PARKING WATSON ST. N.C.P.

keep up to date
join our free mailing list



AMERICAN EXPRESS

061 834 4233



Jupiter Ace Comes FORTH

Now, from the people who helped bring you the ZX Spectrum, comes the Jupiter Ace. Designed by Steven Vickers and Richard Altwasser, both late of the Sinclair fold, the Jupiter's pedigree is instantly recognisable. Looking like a cross between a ZX81 and a Spectrum it contains a whole host of goodies and, shock horror, what appears to be a proper keyboard.

The basic specifications of the machine are as follows; Z80A central processor, 8K ROM, 3K RAM, 32 x 24 character display, high-resolution graphics, upper and lower case letters, inbuilt

cassette interface and a programmable sound generator.

Although there is nothing too different in these, the real difference is in the language the computer comes with. Up till now all home computers have come fitted with BASIC, either supplied on cassette or programmed into a ROM. The Jupiter Ace has broken with tradition by being fitted with the computer language FORTH as standard.

FORTH is a higher level, structured language that is a lot more powerful than BASIC, and because it is compiled it runs a lot faster. The Ace offers unique editing facilities, allowing you to edit FORTH words even after they

have been compiled. They are already planning peripherals for the machine including a parallel Centronics printer interface and a 16K memory expansion unit. The Ace can be expanded to up to 48K of RAM so it looks like there will be a rush from the ZX81 peripheral manufacturers to convert their memory expansions for it.

The Jupiter Ace is available from Jupiter Cantab by mail order and costs £89.95. It comes complete with all the necessary connecting leads and a comprehensive manual and FORTH tutorial. We will be looking at the Jupiter Ace in greater detail in a later issue, so watch this space!

Trendsetting Sinclair

Once again it looks like Clive Sinclair has started a fashion in the computer world, only this time it is in the publishing side. Following the recent price slash of the ZX81 Melbourne House publishers have decided to knock £2.00 off the price of their best selling ZX81 book 'Not only 30 programs for the ZX81', bringing it down to £4.95.

Where will it all end? Will Texas start giving away the 99/4a with cornflake packet tops or will BIC produce the first disposable computer. It could all get very silly so we shall just have to sit back and wait.

BBC Boffins Book

A new book has just been released that looks set to become the bible for all BBC microcomputer users. Titled THE BBC MICRO REVEALED it is a look at some of the BBC micro's more interesting and useful features. It is written by sometime PCT contributor and BBC boffin, Jeremy Ruston.

In the book he looks at the way the BBC organises its memory, techniques uses in speeding up programs, the construction of unique display modes, and lots more besides. The book costs £7.95 and is available through all good book stores, computer shops and W H Smiths.

Asteroid Lander

Apologies are due to all those who bought our September issue hoping to run Asteroid Lander on their BBC computers. Bugs found their way into this program causing havoc throughout.

But don't despair. If you want a correct program listing of this game just drop us a line and we will be delighted to send you one at the speed of light. We await your call.

Stop Press...

Hot news from Commodore which has just cut the price of VIC 20s by a cool £30 to £169.99. The reason is to keep in line with US policies.

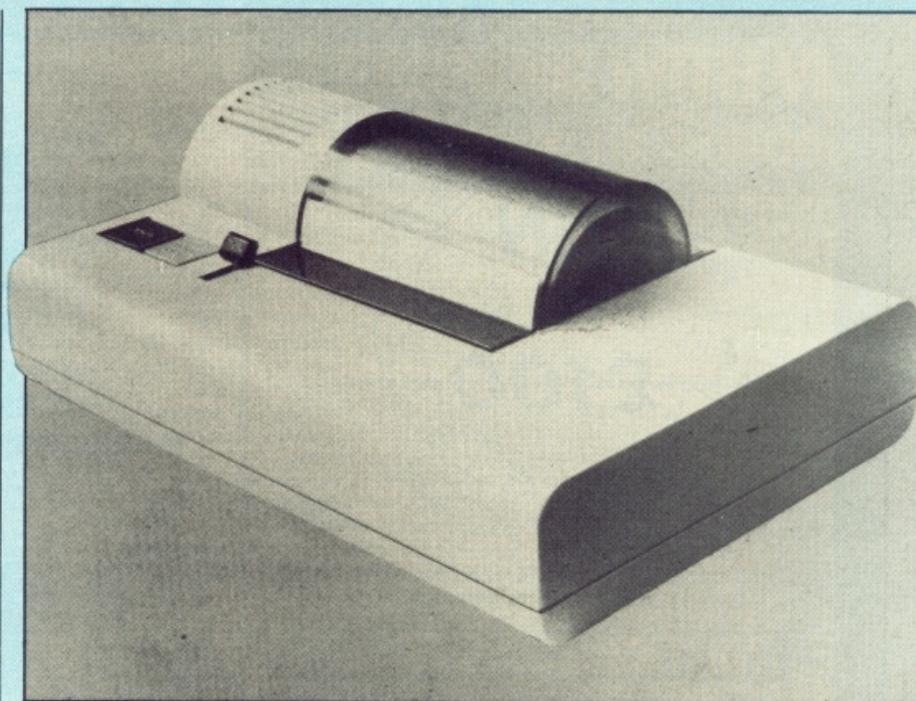
Low Cost Printer Bonanza

Two new low cost printers have recently come onto the market and should make life a little more affordable for the home computer user.

First up is a professional thermal printer for the ZX81. It prints 40 columns on paper that is 4.34 inches wide and comes complete with an interface cable that will plug into the ZX81. Also included is through-bus which will enable it to be used with a RAM pack attached to the machine. If it operates like the Sinclair printer then there should be no problem in using it with the ZX Spectrum as well.

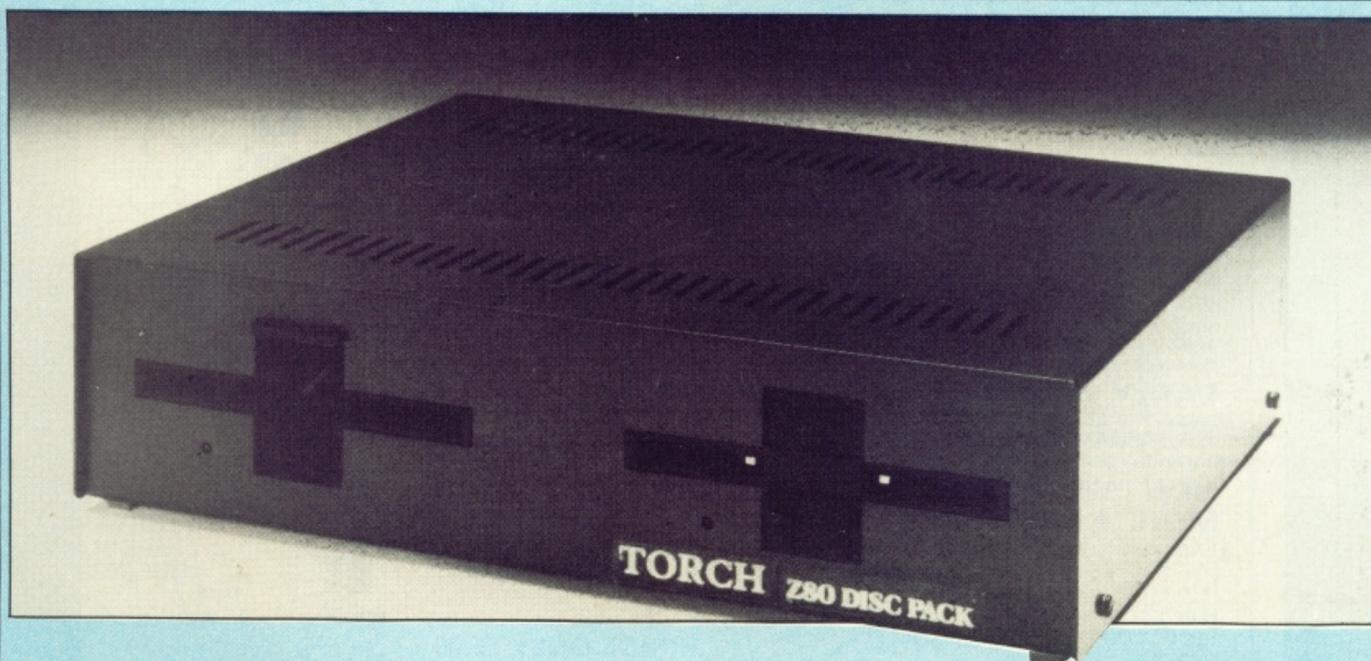
It costs £94.50 excluding VAT and is available from: the Computer Printer Division, Dean Electronics Limited, Glendale Park, Fernbank Road, Ascot, Berkshire.

Second is the 2400 printer from Amber Controls. This little baby is a 24 column dot matrix printer that uses 58mm wide paper. It has been designed with both serial and parallel interface capabilities in order that it can be driven by the widest possible range



of microcomputers. Currently it can be used by the BBC microcomputer, Acorn Atom, Dragon, VIC 20, Spectrum, TRS 80 and the UK 101. All you have to do is state which machine you want to use it with and Amber will

provide you with the suitable connecting cable. The cost is £69.95 plus VAT and further details are available from Amber Controls Limited, Central Way, Walworth Industrial Estate, Andover, Hampshire.



The BBC Gets Discs

Available now from Torch Computers of Cambridge is something for people who have bought a BBC computer and want disc drives.

The Torch Disc Pack is an 800K twin disc drive with a Z80 processor thrown in for good measure. It costs just over three times as much as the Model A

computer, weighing in at a healthy £995.00 excluding VAT.

Having the Z80 strapped to it does give the BBC the ability to run CP/M software, which could be particularly useful to people who are using the BBC as a small business micro, as it gives them access to a wide range of business software, such as accounting, financial planning and modelling

packages. Also available are FORTRAN, PASCAL, FORTH, LISP and COBAL languages for those tired of using BASIC. All the operating system software is contained in two 8K ROMs, so hopefully it will not use up any of your valuable memory space.

For further information contact: Torch Computers of Cambridge on 0223 841 000.



"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 occurs.

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)



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 missiles. 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.

Orders to A&F Software, 830, Hyde Road, Gorton, Manchester M18 7SD.
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



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, enthrall 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**

MISSILE 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 missiles 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 Text 6K Graphics **Price £3.95**

***SPECIAL OFFER, DEDUCT £1 PER ADDITIONAL CASSETTE ORDERED**

BBC MOD B ONLY

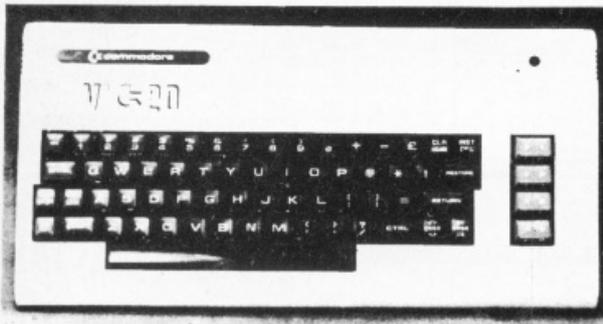
A superb reproduction of the popular arcade game. Four skill levels, realistic sound and fantastic graphics. Long range and close up Luna Landscape Displays. A safe soft landing is your target. But can you do it?

PRICE ONLY £6.00



SPECIAL FREE OFFER READ ON! VIC-20

THE FIRST FULL FEATURED COLOUR COMPUTER AT **UNDER £170**



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 incl. 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	<input type="checkbox"/> £169.99 incl. VAT*
VIC Data Cassette Deck	<input type="checkbox"/> £44.95 incl. VAT
VIC 3K RAM Cartridge	<input type="checkbox"/> £29.95 incl. VAT
VIC 8 K RAM Cartridge	<input type="checkbox"/> £44.95 incl. VAT
VIC 16K RAM Cartridge	<input type="checkbox"/> £74.95 incl. VAT
VIC Joystick Control	<input type="checkbox"/> £7.50 incl. VAT
Arfon VIC Expansion Unit	<input type="checkbox"/> £97.75 incl. VAT*
Machine Code Monitor Cartridge	<input type="checkbox"/> £34.95 incl. VAT
Programmers Aid Cartridge	<input type="checkbox"/> £34.95 incl. VAT
"Avenger" ROM Games Cartridge	<input type="checkbox"/> £19.95 incl. VAT
"Super Slot" ROM Games Cartridge	<input type="checkbox"/> £19.95 incl. VAT
"Alien" ROM Games Cartridge	<input type="checkbox"/> £19.95 incl. VAT
"Super Lander" ROM Games Cartridge	<input type="checkbox"/> £19.95 incl. VAT
"Road Race" ROM Games Cartridge	<input type="checkbox"/> £19.95 incl. VAT
Introduction to Basic (Part I)	<input type="checkbox"/> £14.95 incl. VAT
Carriage & Ins. on items marked*	<input type="checkbox"/> £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/11/82

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.

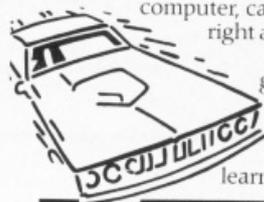
Fabulous graphics. Demanding ideas that make learning lots more fun.

All on cassette at £8.95 incl. 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.

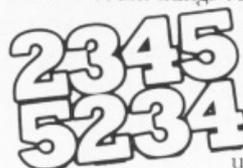
FACE MAKER. This is designed to improve spelling, to expand vocabulary and also sharpen observational skills. Designed for 5-12 year olds this is an interactive program where you draw people's faces.

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.

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

adda

PERSOFT

BBC

Peripherals and Software for the BBC Micro Computer Systems

HOME ACCOUNTS

An Accounts program specifically designed for the home user. It incorporates many features that make it the best Accounts package currently available for the BBC Microcomputer. Home Accounts is a comprehensive program allowing total control of all data and giving facilities which include scaled graphs and charts along with a statistical analysis of the entire account. All data is recorded to cassette file and can be retrieved by simply entering your account name and the date of the required month. Home Accounts comes complete with full documentation and function key labels. Available for the Model B or 32K Model A machine.

£12.50 fully inc.

POTENTIOMETER JOYSTICKS

Single or twinstick control units for direct connection to any Model B micro. Allows true analogue control via one or two high quality dual axis potentiometer driven Joysticks. The unit is encased in an elegant injection moulded case with two push buttons for use with the ADVAL(0) statement. The unit comes complete with full instructions and documentation, demonstration programs are also included in the package.

One stick unit **£27.90**
Two stick unit **£36.20**

All prices are Fully inclusive.

Send Cheques and Postal Orders made payable to:

**PERSOFT, Freepost, Baildon, Shipley,
West Yorkshire BD17 5BR** No stamp required

THE BUFFER MICRO SHOP

(NEXT TO STREATHAM STATION)

★★★

THE OLDEST 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

OPEN TUES-SATS 10.30 - 5.30. CLOSED MONDAYS

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 VDU		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	7.50A
Music, Grand National & Beetle	3.95A
Cassette 3 Mutant Invaders	5.95A
Cassette 4 Breakout	3.95A
Cassette 5 Beebunch (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
Tankwar	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

Acquire Business Game	12.96C
Bl Nuclear Bomber Pilot	10.96C
Conflict 2500	10.96C
Midway Campaign	10.96C
North Atlantic Convoy	10.96C
Nukewar	10.96C

DRAGON COMPUTERS

Dragon 32K	199.95D
Besirk ROM Cartridge	19.95B
Cosmic Invaders	19.95B
Ghost Attack	24.95B
Cave Hunter	19.95B
Dragon Cassette Selection	No 1 7.95A
Dragon Cassette Selection	No 2 7.95A
Quest	7.95A
Personal Finance	7.95A
Joystick (Per Pair)	19.95C

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

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	7.50A
Ant Raiders	7.50A
Missile Command/Sub Hunt	7.50A
Six Programmes for VIC 20	7.50A
Fly Snake	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	5.00A
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
Go!!	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

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)	49.95D
Sharp MZ80B (64K)	49.95D
Gene I Computer	339.25E
Gene 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
Gene 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.

NEXT MONTH**NEXT MONTH**

Personal Computing Today

COMING NEXT MONTH
On Sale from November 5

Jupiter Ace

Hot off the production line is the very latest personal computer from a new, but experienced team Jupiter Cantab. Called the Jupiter Ace there is bound to be a lot of talk about this new entry into the computer race because it is unconventional. The programming language of the machine is FORTH, not BASIC. (See p3 and p8 for more details).

Jupiter Cantab unveiled the Ace at the Personal Computer World Show in September and we took one away with us to scrutinise. Next month we will tell you the results and explain the language FORTH, showing how it differs from BASIC, as well as revealing the pros and cons of using it.

Win A Commodore 64

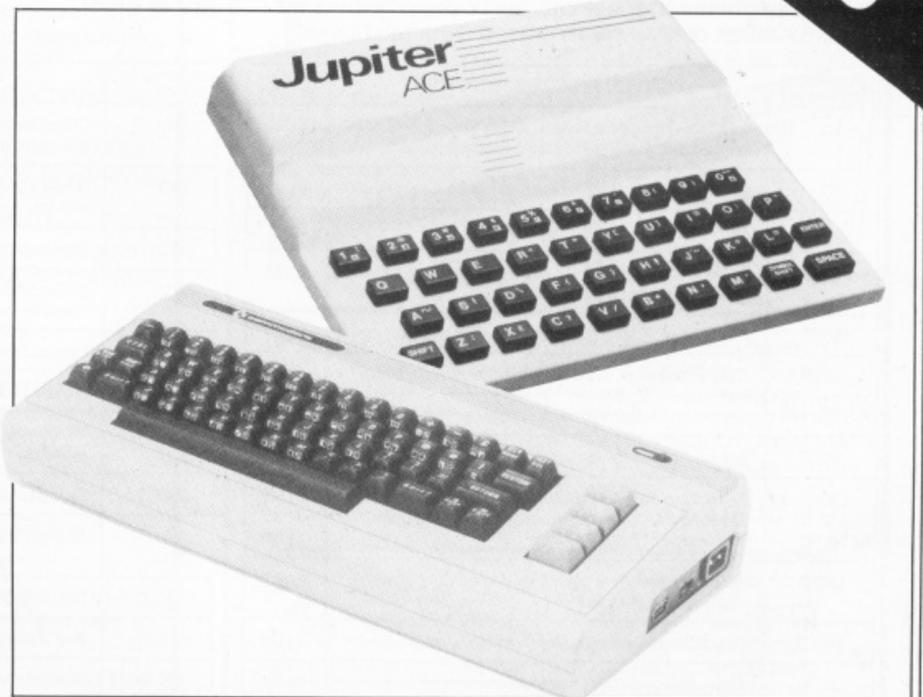
In December Personal Computing Today is giving you the chance to win one of the most exciting computers launched this year, the new Commodore 64.

Personal Computing Today's first competition is your means to that end. The 64 is in essence a bigger and better VIC 20 — it has 64K of on-board memory capacity, high resolution graphics including a 3D effect, sound facilities, and standard interfaces making the machine useful for both business and home entertainment purposes. The normal price of a Commodore 64 is about £300 so just think of the saving you could make if you enter and win our competition.

Full details of what you'll have to do to try and win your own Commodore 64 will be revealed in our next issue. Don't miss this opportunity by keeping an eye out for December's Personal Computing Today.

Programs Galore

As Pac-man fever is sweeping the country and turning into an industry in itself we are keeping up to the minute with a version running on the Nascom 2. But don't cry out in



anguish, the listing if fully documented to enable you to convert it to whatever machine you possess in as painless a way as possible. All the standard features of the popular arcade game are there, the gobbling ghosts running riot in the maze and your lone man who spends his time either fleeing from the crazy gobblers or chasing them in hot pursuit.

Ever indulged in a little wishful thinking? Like hitting fame and fortune in the guise of a music composer? Now's your chance to do so, even if using a VIC 20 program is cheating a bit, but in this technological world who cares? This particular composer program enables you to write your own melodies and if you like what you hear, save them on tape and bring them out later to entertain a few friends. VIC 20 Melody Maker is very flexible and easy to use which means it won't be long before you start taking on popstar Gary Numan, of synthesised music fame.

Sharp owners who feel they

have been hard-done-by on the programs front can take advantage of our Sharp Shooter program running next month. This speedy maze game will give you a run for your money and keep your fingers at your Sharp MZ80K's keyboard, as you blast at black and white faced enemy troops. You have to be quick off the mark to pick them off because you must beat the set time limit.

Regulars

All our monthly regular features will be there for your perusal and digestion. Clubhouse is devoted to the Acorn Atom machine and the Manchester Acorn Users Group gets space to say how it operates. Micro Factfile is full of information on computer hardware to help you make a choice of machine, or some piece of equipment to add-on to your existing computer. Software Checklist is updated with the latest programs to help you sort out your personal library. And December's Gamesboard features the thinking-man's game, Chess.

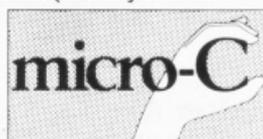
IF YOU HAVE AN ATARI MICRO YOU'LL BE IMPRESSED. IF YOU HAVEN'T YOU'LL BE AMAZED.

When you choose Micro-C for your Atari computer and software, you get more than just a great bargain.

More expertise, more thorough demonstrations and much more choice!

We've got the biggest and best range of software around - much of it newly imported from the States.

Call into your nearest branch (usually inside Currys shops) or order direct by mail. Do it now, while stocks last, and prices hold!



ORDER CODE/ DISK OR CASS.	TITLE AND DESCRIPTION	PRICE INC. VAT
1D	Software Automatic Mouth (SAM). Speech synthesiser without additional hardware.	£44.95
2D	Candy Factory. A brand-new game for Christmas.	21.95
3ROM	Blitz. Bomb the city and land safely.	24.95
4C/D	New J.V. Game (untitled). Land on the planets and meet the challenges awaiting you.	21.95
5C/D	Astrochase. Space shooting game for two players.	21.95
6C/D	Cosmic Squeeze. A fast action arcade-type game.	21.95
7D	Crypts of the Undead. A graphical adventure game.	21.95
8C/D	Astron. Brand new fantasy adventures from America.	17.95
9C/D	Adventure on a Boat/Robby the Robot Catcher/	21.95
10C/D	Sky Rescue. Three adventure education games	21.95
11C/D	for young children.	21.95
12C/D	Sunday Driver. The player drives skilfully to avoid obstacles on the road.	21.95
13C/D	Crash Dive. A submarine adventure game.	21.95
14C/D	Titan. An action adventure game.	21.95
15D	Wizard of War. An adventure game based on	24.95
16ROM	'Lord of the Rings'.	29.95
17D	Gorf. A cycle of games based on a popular	24.95
18ROM	arcade series.	29.95
19ROM	Deluxe Space Invaders. The original Space Invaders with all the exciting variations.	29.95
20D	Warlock's Revenge. Fight the monsters to reach the gold in the dungeons.	24.95
21D	Probe I. Destroy space monsters, reach the nucleus and get out alive.	24.95
22D	Bug Attack. Destroy invading insects in this fast-action game.	21.95
23C	Oswald's Adventures. An adventure game for younger children based on a popular cartoon character.	17.95
24D	Track Attack. Full sound and exciting graphics as you jump from carriage to carriage on top of the train.	21.95
25D	Labyrinth. A maze game.	21.95
26D	Star Blazer. Dramatic intergalactic action.	21.95
27D	Serpentine. Labyrinthine complications in this new U.S. game.	21.95

ORDER CODE/ DISK OR CASS.	TITLE AND DESCRIPTION	PRICE INC. VAT
28D	Choplifter. Control a helicopter to rescue the hostages, marvellous 3-D effects.	21.95
29D	David's Midnite Magic. Probably the best high-resolution adventure game.	21.95
30D	Duelling Digits. An educational program.	21.95
31D	Stellar Shuttle. Land the American space-shuttle safely in the desert.	21.95
32D	Seafox. Steer your submarine through the mines.	21.95
33D	Abuse. Pitch your wits against an abusive computer.	19.95
34D	Wordrace. An educational spelling game for all ages.	21.95
35D/C	Frogger. Help the frog safely across the road.	24.95
36D	Ultima I/Ultima II. High-resolution graphic games.	24.95
37D		38.95
38C/D	Slime. Avoid being engulfed by slime.	21.95
39C/D	Fort Apocalypse. Excitement and adventure.	21.95
40C/D	Sea Dragon. A graphic underwater arcade-style game from the author of 'PREPPIE'.	21.95

To Micro-C, 635 London Road, High Wycombe, Bucks HP1 1EZ. Please send me the following items of software:

ORDER CODE	C	D	QTY	PRICE	ORDER CODE	C	D	QTY	PRICE
TOTAL					TOTAL				

Add 60p p & p for 1 program, 90p for 2, £1.20 for 3 or more.

I enclose cheque for £ - TOTAL  

Please charge my Access/Barclaycard no.....

Signed

Address

Please allow 28 days for delivery.

**Inside Currys at: BIRMINGHAM (233 1105) LEEDS (446601) LUTON (425079)
NOTTINGHAM (412455) SOUTHAMPTON (29676) Inside Bridgers at: BRISTOL (650501)
NEW MALDEN (01-949 2091) And at: LEICESTER (546224) LONDON (387 9275) MANCHESTER (834 0144)**

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: _____

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.

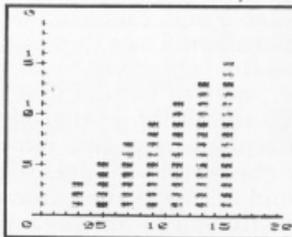


£28.95 INC VAT

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.

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

adda

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 Sirs,

I thought you might like to learn of my experience with Sinclair Research Limited.

After waiting 8 weeks to receive a 16K ZX Spectrum, I found that when the colour was used, the characters shimmered making them difficult to read. I phoned Sinclair and they told me to send the computer back; this I did.

Two weeks later I had heard nothing, so I phoned to make enquiries. I was asked by the telephone operator at Sinclair if I had received a card from them, to which I replied, no. She then told me that she could give me no information until I had received a card.

A few days later the card arrived, and I phoned Sinclair quoting the reference number on the card. I was told by the operator that although I had received the card and had quoted the reference number, she could not find out any information. She assured me that because I had the card my computer was soon to be dealt with, and I should phone back in a few days; this I did.

It was now five weeks after sending my Spectrum for repair, and feeling a little annoyed I phoned Sinclair, gave my name and reference number to the operator and waited. I was told very politely that my computer was nearing the top of the pile. I told the operator, also politely, that this was unacceptable, and asked to talk to the manager of the service department; I was then put on to someone, who said she was the supervisor.

I explained my case to her, only to be told that my computer was working its way to the top of the pile. I then asked for an immediate replacement. She refused this request, saying that because of delays in despatching new machines, and of course the infamous design fault, she had been instructed by management that no such immediate replacements would be possible. But she said she might be able to rush things along in a weeks time.

I was forced to ask for a full refund, which she immediately agreed to.

I may now never take up the hobby of home computing, because at the moment there is no comparable machine to the Sinclair ZX Spectrum in price and function available. But if Clive Sinclair thinks that he can use this fact to keep his customers happy and loyal to his company then he is sadly mistaken, and his company does not deserve to prosper.

As you may have worked out by now, I am not a very happy person, because this sort of bad service does not only reflect on Sinclair, who don't seem to care anyway, it also tends to reflect on British service as a whole as opposed to Japanese companies who have always given me excellent after sales service, i.e. Vivitar UK and Pioneer UK. If this sort of experience is widespread it must also affect the sales of your magazine.

I have sent a copy of this letter to Mr Sinclair hoping

it may help other customers and in turn Sinclair themselves in the future.

Yours faithfully,
Keith Allen
London

Editors reply: this was just one of many letters on the same subject and Clive Sinclair's reply follows below.

Dear Ms Joiner

In response to the many queries which, I understand, your magazine has received, I would like to personally explain the current delivery situation for our new ZX Spectrum personal computer.

The general public's response to our new computer has far exceeded our expectations and we have been 'swamped' with orders. This and some small initial production delays have led in turn to considerable delays in delivery.

Regrettably, many of our customers may have to wait up to 12 weeks, from our receipt of their order, for delivery of their Spectrum and we are writing to them all to apologise for the inconvenience and to offer them the chance of an immediate refund.

For those customers who continue to wait, we shall be sending out with each Spectrum, in compensation for the delay, a £10 voucher, which can be used in part-payment for a ZX Printer or to buy a complete pack of five rolls of printer paper.

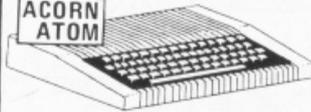
We are also providing customers with a new demonstration tape containing:

1. A complete 'keyboard trainer' to introduce the Spectrum.
2. Three major programmes – an exciting game, Through the Wall, a drafting programme, Draw, and Character Generator, which demonstrates user defined graphics.
3. A series of illustrative programmes – Bubble Sort, Evolution, Life, Monte Carlo and Waves.

Finally, I would like to assure you and all our customers that the initial problems with the Spectrum have now been completely overcome. Production is running smoothly at 5,000 units per week and will rise sharply over the coming months. We are confident that our present backlog will be cleared by the end of September and hope that you will see current delays in the context of our successful delivery of more than 500,000 computers in the last two years.

Yours sincerely
Clive Sinclair
Sinclair Research

ACORN
ATOM



VIC-20

ATOM 8K + 2K Kit	118.00
ATOM 8K + 2K Assy.	149.00
ATOM 8K + 12K Ass.	172.00
ATOM 12K + 12K Ass.	195.00
ATOM Power Supply	8.00
ATOM Disc Pack	275.00
ATOM/BBC ROM (Nov.)	43.00
Prog. Power Toolbox	24.50
ATOM Econet	70.00
2114L Memory Chips	0.89

*10% off Acorn and Bug Byte ATOM Software



A - B Expansion & Test	90.00
32K RAM + Printer I/face	
Expansion & Test	46.00
RAM Expansion Kit	24.00
Printer Interface Kit	9.83
Bus Expansion Kit	8.65
Analogue Input Kit	9.90
B.B.C. Joysticks (per pair)	16.90

B.B.C. SOFTWARE

Games Pack 1 - Bomber, Crash	
Spacebattle, Minefield and	
Music - Model 'A'	6.50
Games Pack 2 - 3D-Maze Monster,	
Dodgers and Cube - Model 'B'	6.50
Educational Geographic Quiz -	
Capitals & Towns - Model 'B'	6.50
Utility Programme - Dissambler	
and Character Builder	5.50
Acorn Soft, Bug Byte and Programme	
Power Games Cassettes	

VIC 20 CPU	143.00
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 Programmers Aid Cartridge	27.00
VIC Super Exp. High Res.	27.00
VIC Machine Code Cartridge	27.00
VIC Joystick	6.50
VIC Paddles (per pair)	11.70

*10% off VIC Tapes and Games Cartridges

PERIPHERALS

Printers - ATOM or B.B.C.	
Epson MX80T/3	299.00
Epson MX80FT/3	340.00
Epson MX82	330.00
Epson MX82/FT	362.00
Epson MX100/3	440.00
Seikosha GP100	192.00

Monitors - B.B.C.

BMC 12" black/green screen	79.00
Sanyo 12" black/green screen	99.00
BMC Colour	240.00
Microvitec Colour	260.00

- Please ADD 15% V.A.T.
- Orders over £25 Post Free
- Orders under £25 add 50p Postage

Books & Software - Spares and Repair Service
- Send for Stock/Price Lists -

D. A. COMPUTERS LTD.,
184 LONDON ROAD, LEICESTER LE2 1ND.
Tel: (0533) 549407

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

BEGINNERS BAG - VIC 20 + Cassette Drive + introduction to basic (part 1) + 3 cassette games + 10 blank cassettes £225

ECONOMY BAG - VIC 20 + cassette interface + 3 cassette games + 2 blank cassettes - £185

GAMES BAG - VIC 20 + Joystick + Cartridge game £190

VIC 20 SOFTWARE WITH A DIFFERENCE
ALL ANIROG SOFTWARE IS IN HIGH RES. GRAPHICS AND HAS FAST M/C DISPLAY.

LOST IN THE DARK - Occasional 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.

Counter service,
CO-OP CRAWLEY

Mail Order
Payment by cheque, P.O., VISA or ACCESS
26 Balcombe Gardens,
Horley, Surrey.
Phone order
Horley (02934) 2007/6083



- PIXEL PRODUCTIONS PRESENTS -

THE TRADER TRILOGY

AN EPIC ADVENTURE
FOR 16K VIC 20 OR ZX81 MICROS
IN THREE FULL 16K PROGRAMMES



THERE IS NO OTHER GAME LIKE TRADER!
4.8 K OF THRILLING GRAPHIC ADVENTURE
VIC 20 DISK OR TAPE £18.50
ZX81 TAPE £10.50

PIXEL

PIXEL PRODUCTIONS
39 Ripley Gardens London SW14

MICROSPOT

VIC 20 FUNCTION KEYS

In many manuals use of the VIC 20s function keys have been omitted but now Dave Tong shows you how to make the most of them in a simple routine.

The four function keys on the right hand side of the VIC 20 are probably the most neglected part of the whole computer. Relegated to 'PRESS F1 TO START THE GAME', and dismissed with less than a page of text and a simple basic program by two books, the VIC REVEALED and the PROGRAMMERS REFERENCE GUIDE, the only way to use them as true definable function keys has been to spend £35 on one of Commodore's utility cartridges.

That is until now!

Using a simple 160 byte routine which sits at the top of BASIC memory, you can assign a separate function up to 8 characters long to each of the 8 keys.

This routine, which is loaded by a BASIC program, becomes part of the IRQ (Interrupt ReQuest) vector. This interrupt is the one which the processor calls 60 times a second to update the jiffy clock, scan the keyboard and check the RUN/STOP key.

Enter the program below and

SAVE it before you RUN it! When the program has finished, it NEWs itself.

Now type RUN and press RETURN. All being well, the screen should clear and the messages "FUNCTION KEYS DEFINED" and "READY" should appear, along with the cursor. If you get the message "DATA ERROR", then you have made a mistake entering the data statements in lines 10-120. Check them carefully!

Assuming that you have entered the program correctly, pressing the function keys should give you the following functions:

```
F1      LIST + CHR$(13)
F2      GOSUB
F3      RUN + CHR$(13)
F4      PRINT
F5      GOTO
F6      CHR$(
F7      LOAD
F8      RETURN + CHR$(13)
```

If you wish to change any of these functions, simply alter the DATA statements in lines 300-310.

To eliminate the need to press carriage return, you can add one by simply entering '-' at the appropriate point(s).

For example: if you wish to LIST the program whenever a key is pressed, change the appropriate DATA statement to "LIST-".

The function keys can be cleared by pressing RUN/STOP and RESTORE together. To re-enable the keys, enter 'SYS 7520'.

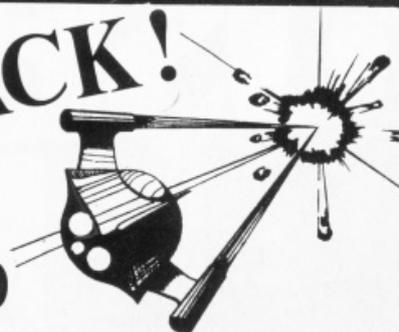
The program has two limitations:

1. You can only have up to 8 characters maximum per key. To enter longer commands use the abbreviations (such as P <SHIFT> O for POKE) listed in the manual, or allot parts to individual keys.
2. To change a function, the program must be reloaded.

Finally, to disable the RUN/STOP key while the function keys are in operation, change the last three numbers in line 120 to 194, 234, 170.

```
1  REM .....
2  REM*
3  REM*  DEFINE KEYS
4  REM*
5  REM*  BY DAVE TONG
6  REM*
7  REM*  (C) 7/7/82
8  REM*
9  REM .....
10 DATA 120,169,128,141,20,3,169,29
20 DATA 141,21,3,88,133,56,169,96
30 DATA 133,55,96,160,64,169,0,153
40 DATA 191,29,136,208,250,96,234,234
50 DATA 72,138,72,152,72,165,197,197
60 DATA 251,240,44,133,251,41,29,201
70 DATA 39,208,36,24,165,251,42,41
80 DATA 240,172,141,2,240,3,24,105
90 DATA 8,105,128,133,252,169,29,133
100 DATA 253,160,0,177,252,153,119,2
110 DATA 200,192,8,208,246,132,198,104
120 DATA 168,104,170,104,76,191,234,170
199 REM  LOAD MACHINE CODE ROUTINES
200 POKE 55,96:POKE56,29:CLR:Z = 0:FOR X = 0 TO 95
210 READ Y:Z = Z + Y:POKE 7520 + X,Y:NEXT X
220 IF Z <> 12270 THEN PRINT"DATA ERROR!
RE-ENTER":STOP
230 SYS (7520):SYS (7539)
235 REM  SYS 7520 ACTIVATES THE KEYS
236 REM  SYS 7539 ERASES THE FUNCTIONS
240 FOR X = 1 TO 8:READ NS
250 L = LEN(NS):IF L > 8 THE PRINT X:NS:PRINT"8
CHARACTERS MAXIMUM!":STOP
260 FOR Y = 1 TO L:P = ASC(MID$(NS,Y,1)):IF P = 95 THEN
P = 13
270 POKE 7607 + Y + 8 * X,P:NEXT Y:NEXT X
280 PRINT"FUNCTION KEYS DEFINED.":CLR:NEW
298 REM  PUT YOUR OWN FUNCTIONS HERE
<MAXIMUM 8 CHARACTERS!>
299 REM  FOR CARRIAGE RETURN ENTER '-'
300 DATA "LIST-", "GOSUB", "RUN-", "PRINT"
310 DATA "GOTO", "CHR$(", "LOAD", "RETURN-"
READY
```

ATTACK!



For the VIC 20

A great Arcade-Quality game. Zap the devious Aliens and blast the hurtling asteroids before you get hit by something nasty!

FEATURES: • Fast Machine Code action • Joystick option • Full-colour display • Runs in UNEXPANDED VIC • HI-RES graphics • Progressive difficulty • **£5.00**

Other VIC software from Soft Toys: • Soft Toys 1 — 8 games for 3.5k and 6.5k VIC. Killer Park, Life, Gobbler, Starseed, Musik, Musik II, Pontoon, Oxo **£6.50** • Soft Toys 2 — 5 games — Lunar Lander, Casino, Hangman, Simon, Maths Maze. For the unexpanded VIC — **£6.50** For VIC + 3k expansion — **£8.00** • Game Graphics & Graphics Editor — design and use custom character sets in your games and applications. Comes with complete User Documentation at only **£8.00**.

Send to:

Name: **ST SOFT TOYS**

Address: **VIC Software**

. **14 Lockharton Avenue,**

. **Edinburgh**

. **EH14 1AZ.**

Please send me the following programs by first-class post:

- Soft Toys 1 **£6.50**
- Soft Toys 2 for 3.5k **£6.50**
- Soft Toys 2 for 6.5k **£8.00**
- Game Graphics & Graphics Editor **£8.00**
- ATTACK! **£5.00**

I enclose a cheque/postal order for £. made payable to **SOFT TOYS**. All prices include packaging & first class postage, air-mail to Europe and surface mail elsewhere. For airmail overseas please add **£0.70** per cassette.

It's easy to complain about advertisements.

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

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

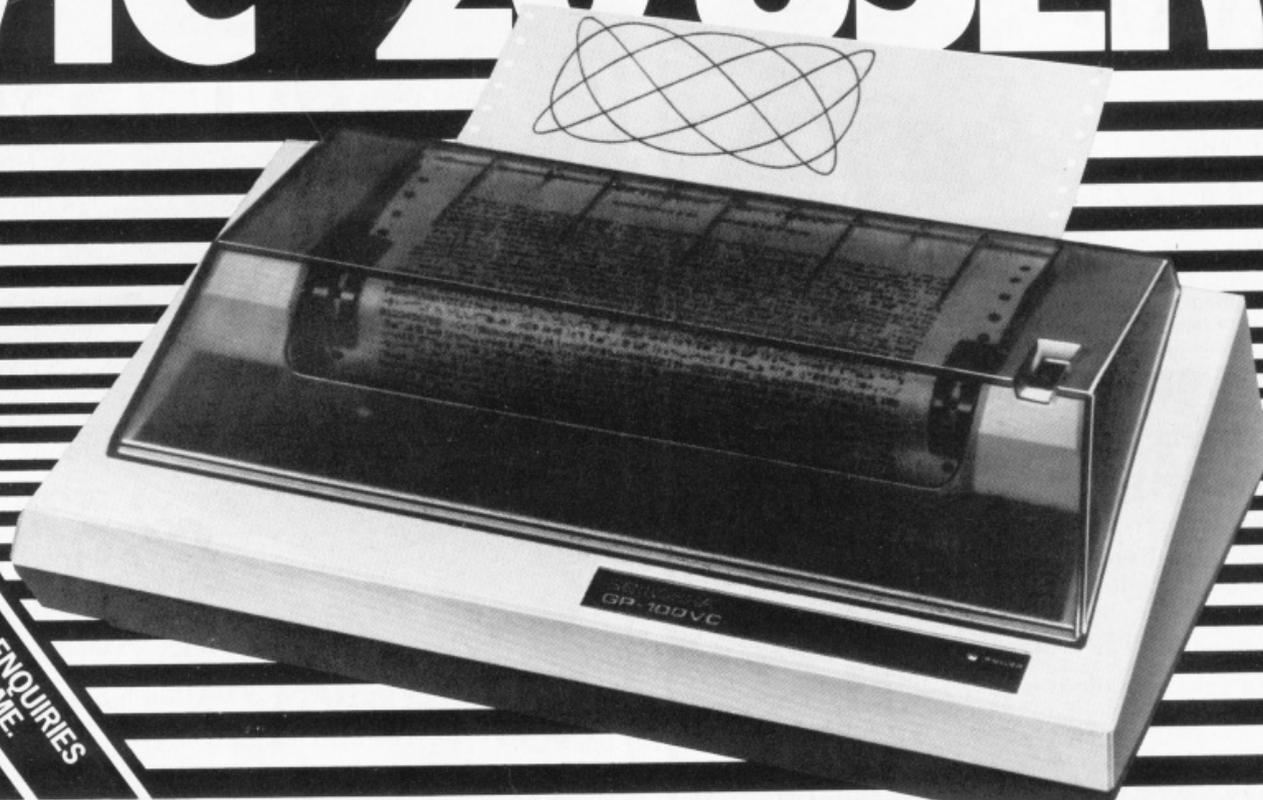
Business and home utility programs available soon. Can use VIC-20 printer and disk (with rom upgrade). Supports other languages including Comal and Pascal—has CP/M option.

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.

VIC-20 USERS



DEALER ENQUIRIES
WELCOME.

The new Seikosha GP-100VC graphics printer for around £235.^{EX. VAT.}

Offering big printer performance at a fraction of the cost, the latest addition to the famous range of Seikosha micro-printers is the 100VC. The precise match for the VIC 20.

Featuring all the VIC 20 characters, symbols and graphics as standard, the Seikosha 100VC includes full graphics capability. It enables graphic, character and double width character modes to be intermixed on a single line as well as repeating graphics data, as you want, with a single command.

Many other advanced features, plus Seikosha's proven reliability and the nationwide support of DRG's distributor network make the 100VC the natural choice for the VIC20 user.

DIMENSIONS:

Depth - 9¼" (234mm)

Width - 17¼" (420mm)

Height - 5¼" (136mm)

OPTIONS:

Interfacing for most other systems available on the GP100A model.

FEATURES INCLUDE:

- 80 col. 30 cps.
- Dot Matrix unihammer action.
- 154 characters (inc graphics)
- VIC-20 8-BIT CODE
- Full graphics.
- Double width printing.
- Automatic printing
- Up to 10" paper width.
- Original + 2 copies.
- Tractor feed.
- Self testing.

DRG
BUSINESS
MACHINES

Telephone the number below and we'll tell you where your nearest distributor is located. See the remarkable Seikosha GP100VC in action

(Peripherals & Supplies Division) 13/14 Lynx Crescent, Winterstoke Road, Weston-super-Mare, BS24 9DN. Tel: (0934) 416392.

THE FINEST WORLDWIDE SUPPORTED NATIONWIDE.

DRG (UK) Ltd, Reg No. 22419 England.

ATARI 400/800

SOFTWARE

SARDAUKAR ASSAULT

Defend the Golden Tower against hordes of attacking space warriors in this Atari game by Chris Palmer.



Trapped on a remote outpost somewhere at the edge of the galaxy you are the last remaining defender of your empire. Materialising above your base are scout ships of the dreaded Sardaukar fleet. Can you destroy them before they blast through the golden tower and damage your power base? If you succeed in wiping out one wave, then an even

stronger fleet is sent against you. See how many of them you can destroy before you are overrun.

Sardaukar Assault is written in BASIC for the Atari 400/800 with a minimum memory of 16K. The game is controlled by a joystick plugged into the lefthand port, but can be easily converted to use the keyboard.

When the game starts, the

joystick controls the movement of a gold coloured dot, which is the point to which your defence laser will fire. To destroy the alien attackers you have to hit them with the laser. The game ends when the Sardaukar's laser shots have penetrated the green power base at the bottom of the tower. After each successive wave your tower is rebuilt.

ATARI 400/800

SARDAUKAR ASSAULT



HOW IT RUNS

10-25	Sets up the position array and clears all its positions.
30-90	Prints up beginning screen and rotates the background colours.
100-130	Sets up specific variables, changes the graphics mode and sets the colours.
135-137	Goes to the routines to print the mountains and the golden tower. Also reads the joystick.
140-155	Tests for the fire button. Checks to see whether a ship has been encountered and checks to see whether all the ships have been cleared.
157-175	Plots laser track from base.
180	Plots laser aiming position.
185-200	Random jumps for alien fire and alien appearance.
999	End of main program loop.
1000-1050	Draws mountains.
1100-1180	Draws golden tower and power base.
2000-2110	Reads joystick and examines new position.
3000-3080	Plots Sardaukar ship randomly on screen.
4000-4100	Checks to see if position is occupied by an active alien and if so explodes it.
5000-5090	Changes graphic mode, prints wave number and score so far.
6000-6110	Plots Sardaukar shots from random ship position and checks to see if power base has been reached.
7000-7100	Explodes base and prints end of screen display.
7200-7260	Provides screen flash and wipes out base.

HINTS ON CONVERSION

Sardaukar Assault is written using Atari BASIC, which is quite like most forms of Microsoft, so the BASIC in the program should be easily convertible. It is run in graphics mode 7 + 16, which gives the computer a screen resolution of 160 x 96 in 4 colours. The graphics commands used are: PLOT, which turns on a single dot, DRAWTO, which draws a line from the current PLOT or DRAWTO position to the specified location, SETCOLOR, which primes a colour register with a colour and a luminosity, COLOR, which changes the PLOT or DRAWTO colour and LOCATE, which reads the value of a dot into a specified variable.

All the commands should be able to be duplicated on another machine providing it has a PLOT or DRAWTO equivalent. The one feature of the Atari that you might have trouble in duplicating is that if you change the colour or luminance in a SETCOLOR statement, then everything that has been plotted in that colour now assumes the new colour. On the BBC computer this can be achieved by using the VDU19 command.

To convert the game to run with the keyboard, change line 2010 to a keyboard GET statement and then change lines 2020-2055 to alter the values of X and Y according to which key has been pressed.

PROGRAM LISTING

```

10 REM SARDAUKAR ASSAULT
20 CLR : DIM P(20,2):KILL = 4
25 FOR I = 0 TO 20:FOR T = 1 TO 2:P(I,T) = 0:NEXT
  T:NEXT I
30 GRAPHICS 2 + 16
40 POSITION 16,0
50 PRINT #6, "SARDAUKAR"
60 POSITION 17,2
70 PRINT #6, "ASSAULT"
75 FOR P = 1 TO 3
80 FOR I = 1 TO 14:SETCOLOR 4,I,10:SOUND P,I*
  10 + P,10,12:FOR T = 1 TO 50:NEXT T:NEXT I
90 NEXT P
100 REM SET UP VARIABLES
110 Z = 1:X = 80:CO = 0:PL = 1
120 GRAPHICS 7 + 16
130 SETCOLOR 4,0,0:SETCOLOR 0,1,12:SETCOLOR
  1,6,12:SETCOLOR 2,11,12
135 GOSUB 1000
137 GOSUB 2000
140 IF STRIG(0) < > 0 THEN 175
150 IF L < > 0 THEN GOSUB 4000
155 IF CO > = KILL THEN GOTO 5000
157 SOUND 0,150,8,15
160 COLOR 1:PLOT 80,60:DRAWTO X,Y
165 SOUND 0,200,8,15
170 COLOR 0:PLOT 80,60:DRAWTO X,Y
175 SOUND 0,0,0,0
180 COLOR 1:PLOT X,Y:COLOR 0:PLOT X,Y
185 O = INT(RND(1)* 20 + 1)
190 IF O > 16 AND O < 18 THEN GOSUB 3000
200 IF O < 15 AND O > 8 THEN GOSUB 6000
999 GOTO 137
1000 REM DRAW MOUNTAINS
1005 PLOT 1,75
1010 FOR I = 1 TO 159 STEP 5
1020 Y = INT(RND(1)* 20 + 76)
1030 COLOR 2
1040 DRAWTO I,Y
1050 NEXT I
1100 REM DRAW BASE
1105 COLOR 1
1110 FOR I = 70 TO 80
1120 PLOT I,95:DRAWTO I,96 - (I - 68) 2/4
1130 PLOT 160 - I,95:DRAWTO 160 - I,96 - (I - 68) 2/4
1140 NEXT I
1145 COLOR 3
1150 FOR Y = 90 TO 95
1160 PLOT 78,Y:DRAWTO 82,Y
1170 NEXT Y:Y = 50
1175 FOR P = 1 TO 3:SOUND P,0,0,0:NEXT P
1180 RETURN
2000 REM READ JOYSTICK
2010 S = STICK(0)
2020 IF S = 7 THEN X = X + 2
2030 IF S = 11 THEN X = X - 2
2040 IF S = 13 THEN Y = Y + 2
2050 IF S = 14 THEN Y = Y - 2
2055 IF S = 15 THEN RETURN
2060 IF X > 159 THEN X = 159
2070 IF X < 1 THEN X = 1
2080 IF Y > 70 THEN Y = 70
2090 IF Y < 1 THEN Y = 1
2100 LOCATE X,Y,L
2110 RETURN
3000 REM PLOT SARDAUKAR
3010 IF PL > KILL THEN RETURN
3020 A = INT(RND(1)* 140 + 5)
3030 B = INT(RND(1)* 20 + 5)
3040 P(Z,1) = A:P(Z,2) = B:Z = Z + 1:IF Z > 20 THEN 7000
3050 COLOR 3:FOR P = 1 TO 6
3060 PLOT P/2 + A,B + P:DRAWTO (A + 6) - P/2,B + P
3065 SOUND 0,200,10,7 + P:SOUND 1,201,12,7 - P
3070 NEXT P:PL = PL + 1
3075 SOUND 0,0,0,0:SOUND 1,0,0,0
3080 RETURN
4000 REM ALIEN HIT
4010 FOR I = 1 TO Z
4020 IF X > = P(I,1) AND X < P(I,1) + 6 AND Y > = P(I,2) AND
  Y < P(I,2) + 6 THEN 4040
4030 NEXT I:RETURN
4040 A = P(I,1):B = P(I,2)
4060 COLOUR 0:FOR P = 1 TO 6
4070 PLOT P/2 + A,B + P:DRAWTO (A + 6) - P/2,B + P
4075 SOUND 0,200 - P* 20,10,15
4080 NEXT P
4090 P(I,1) = 0:P(I,2) = 0:SC = SC + 10:CO = CO + 1
4095 SOUND 0,0,0,0
4100 RETURN
5000 REM END OF WAVE
5010 GRAPHICS 1 + 16:WA = WA + 1
5020 POSITION 0,0
5030 PRINT #6:"WAVE ";WA;" COMPLETED"
5040 PRINT #6:"SCORE = ";SC
5045 KILL = KILL + 2:CO = 0:PL = 1:FT = 0
5050 FOR T = 1 TO 1000:NEXT T
5060 FOR I = 1 TO 20:FOR T = 1 TO 2
5070 P(I,T) = 0
5080 NEXT T:NEXT I
5090 GOTO 100
6000 REM SARDAUKAR FIRE
6010 FP = INT(RND(1)* Z + 1)
6015 IF P(FP,1) = 0 THEN RETURN
6020 COLOR 2
6025 SOUND 0,100,6,15
6030 PLOT P(FP,1) + 3,P(FP,2) + 5
6040 DRAWTO 80,62 + FT
6045 SOUND 0,50,6,15
6050 COLOR 0
6060 PLOT P(FP,1) + 3,P(FP,2) + 5
6070 DRAWTO 80,62 + FT
6100 FT = FT + 1:IF FT > 28 THEN 7000
6105 SOUND 0,0,0,0
6110 RETURN
7000 REM END
7010 FOR I = 5 TO - 10 STEP - 0.5
7020 FOR T = 1 TO 14
7025 SOUND 0,T + 200 - I* 2,10,T
7030 SETCOLOR 0,1,T
7040 FOR P = 1 TO I:NEXT P:NEXT T:NEXT I
7045 SOUND 0,0,0,0:GOSUB 7200
7050 GRAPHICS 1 + 16
7060 POSITION 0,0:PRINT #6:"GAME OVER"
7070 PRINT #6:"SCORE = ";SC
7080 PRINT #6:"PRESS FIRE TO START"
7090 IF STRIG(0) < > 0 THEN 7090
7100 RUN
7200 FOR I = 0 TO 14:SETCOLOR 4,0,I:NEXT I :SOUND
  0,10,4,15
7210 FOR I = 14 TO 0 STEP - 1
7215 SOUND 0,10,4,I
7220 SETCOLOR 4,0,I:FOR T = 1 TO 3*I
7230 NEXT T:COLOR 0
7240 PLOT 70,90 - I:DRAWTO 90,90 - I
7250 NEXT I
7260 RETURN

```

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. Tel: (0293) 545630

Please send me further information

Name _____

Address _____

PCT/11

SUSSEX SHARP MAIN DEALER



MZ80A
Latest Model
£425 + VAT



MZ80B
Our Price
£825 + 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

21st CENTURY SOFTWARE AT 20th CENTURY PRICES



EXTENDED VIC SPECIAL OFFER

Purchase any two VIC programs from Titan before 30/11/82 and we will send one of your choice **FREE!**

MISSILE PANIC Unexpanded Vic **ONLY £6**
Never in the world of computer software has such a game been produced for such an outstanding machine! The panic starts when you take delivery. First the panic to unpack and load, then the panic in play. You will capture crossoids and will have to stay clear of the missile's venomous path in the Maze of Death. See it to believe it!!!

ROAD RUNNER Unexpanded VIC **ONLY £5**
A most incredible, nerve testing game of superb arcade quality. As the name suggests you control the Road Runner through his journey across the space warp of vehicle molecular. Once again Titan make maximum use of 6502 Machine Code programming to an unrivalled degree!

ANDROID ATTACK Unexpanded VIC **ONLY £5**
The Androids of Jupiter (an ever growing race) are on your path, in the Maze of the Lose Isle. They look more menacing every second and will attack without mercy. Run to stay alive!

SPACE HOPPER Unexpanded VIC **NOW ONLY £5**
Once there was Invaders, then Packmen, now there's Space Hopper. Can you guide your Space Frog through the hustle and bustle of space traffic without being crushed by intergalactic space trains, can you avoid being shot by hidden laser guns and are you able to hop through the space warp. If you think so order it today!

SPACE WARS/BATTLEZONE Unexpanded VIC **NOW ONLY £5**
Two very exciting, hi-resolution, fast action, two player games that can be played simultaneously for the price of one. Space Wars (like the arcade game) is a typical dog fight. In Battle Zone strategy is the name of the game.

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 Astronaut.

NAVAL ATTACK Unexpanded VIC **NOW ONLY £5**
With 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.

SPECTRUM SOFTWARE!!
The Ground Force Zero 16K or 48K Spectrum **ONLY £5**
The Ground Force has been defeated so the air attack must begin and you are in control.

TEXAS INSTRUMENTS T199/4A



Here now is the game every owner of this outstanding machine has been waiting for!

MISSION 99 (Standard Machine) **ONLY £6**

It's sunset in Manhattan when you are sent on a merciless bombing raid; the only way down is to flatten the city. Runs on the standard machine. Supplied on cassette for this unbeatable price.



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 laser fields, through rock valley and into the unknown. You will have to see it to believe it!! Supplied on cassette with full instructions.

DEALER ENQUIRIES WELCOME — Unbeatable Discounts with no minimum orders. **APPLY TODAY!**

DRAGON and more software should be available when you read this **PHONE OR WRITE FOR DETAILS**

GO TO YOUR LOCAL DEALER FOR **TITAN SOFTWARE** OR . . .

ACCESS holders Tel: 0249 3241 Ext 39 **BARCLAYCARD** holders Tel: 0225 61676

24 HOUR DESPATCH ON ALL MAIL ORDER!!!
OVERSEAS ORDERS WELCOME add £1 per tape outside Europe.

SEND CHEQUE/P.O. TO: **TITAN PROGRAMS**
83 Ashwood Road, Rudloe, Corsham, Wiltshire SN13 0LG.

TITAN PROGRAMS 24 HOURS A DAY / 7 DAYS A WEEK
Simply the best Software in the world. **TITAN HOTLINE**
0225 810132

**IF THE CLOUDBOPPERS,
WASPS, SPIDERS, METEORS,
OR SATELLITES DON'T
BEAT YOU...**

**...RENAISSANCE
WILL**



CLOUDBURST
meteor run
Renaissance
SPIDERS OF MARS
satellites
and meteorites

**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.

COMPUTER USERS CLUB

Starting a computer club yourself is not as difficult as you might at first think. Neville Ian Ash goes through the motions with you giving useful advice throughout.

Microcomputers are selling so fast, that in a radius of just one mile, there are almost bound to be enough people interested in forming their own computer club. Someone needs to take the first step and because it appears complicated, many people never set up or join a computer club. But it's still the best way to find out more about micro-computing in a non-commercial atmosphere.

And apart from the people in your area who already own their own micros, there will be lots more who are interested but haven't bought their first machine.

Finding Members

How do you go about finding members? Once people know you are forming a club, there will be no shortage of potential members.

Contact your local dealer who will tell you about his customers in your immediate area and will be interested in your club as a potential market.

Visit your local library, who will be willing to put a message on their notice board. Your local town hall often offers the same service.

Write to your local newspapers telling them of your intention, explaining that the area needs a computer club, and become local news. You can also take classified advertisements in local papers, although you will find this is fairly expensive.

Newsagents have card advertisements which cost only a few pence a week and produce

surprising results for the low outlay.

Don't forget to write in to Personal Computing Today and we will print your request on our club page.

Next you must decide what sort of group you would like to run. Micro computer organisations can be split into two broad categories, clubs and user groups.

The club will have a general interest in micro computing and when its membership grows, special sub-groups often form according to the special interests of the members. But in the beginning you need the club approach because it appeals to as many people as possible.

While a group is specialised according to a particular brand of micro like the ZX81, VIC, BBC or Dragon, it can also be concerned with a special interest

like the PASCAL language, the 6502 chip or robotics.

It's important to make all types of people welcome, especially the ones who have yet to make that final decision and buy a micro computer. So don't try and take a complicated approach to computing.

Premises - where?

You could hold your first meeting at home, but it's rather crowded when you have ten people and their micro-computers.

You really need somewhere special for your meetings and as finance is always a problem, costs must be kept as low as possible.

Logical low cost places for holding your meetings can be the local dealer, or arrange to hire a room over a pub, a church hall, or the local library. Looking further



afield technical colleges and town halls are also possibilities. Your main consideration must be low cost combined with continued availability on a regular basis.

Meetings – monthly, fortnightly, weekly?

Clubs and groups make lots of work and its extremely important at the earliest stage to spread the load. Otherwise your club can literally take you over and run your life... Keeping things informal, come to an agreement with people to handle each aspect of the proceedings.

Equipment for the meetings will have to come from your members unless a local dealer agrees to use his premises and equipment. Make sure they have insurance cover for their equipment when it is used out of the house. Many people add them to the contents policy but some have no cover at all. Once your membership is large enough approach an insurance broker who could produce a special policy for the club or special rates for your members.

Once you have delegated the jobs involved consider how often your club will hold meetings. Remember that people are coming along specially for the evening, so you need to plan a program for each meeting. You could have meetings once a week, but its better to start off once a month, until you have gauged the demand.

Starting off the program seems quite a problem, but lets break it down. Everyone likes to see new hardware and software, so your first contact must be the loal dealer. Your club represents potential business and he will probably be quite willing to demonstrate the latest product. In fact he may become a valuable member of your club.

The ACC – Amateur Computer Club can also help you. They act as a co-ordinating body for the clubs and regional groupings. They can also help you set up your own club and can be contacted at: – Amateur Computer Club, St. Johns College, Oxford, OX1 3JP.

The micro computer distributors also have information they can supply and may even arrange demonstrations, if their main one is in your area.

Don't forget the expertise in your own club. There's bound to be a wide range of knowledge from the real beginner to the computer buff. He will be delighted to explain the finger points and solve those problems that kept you up all night.



What To Charge Members

While you are setting up the club it's best to take a small fee at the door for each meeting, so the running costs are covered. Once things become stable, arrange a formal meeting and set an annual subscription, payable in advance. If you have plans for a newsletter and a software library, remember they all cost money, and the best way to get it is from an annual subscription.

As a guide membership ranges from £2.50 upwards purely according to the frequency of the meetings and the services offered by the club.

If you offer a software library, it may just cost you the time to make copies, but people are usually quite willing to pay a fee for each tape or disc. Put a margin on these copies

and it all helps club expenses. After all, one club offers a disc full of programs for £3 – a bargain – and if the disc costs the club £1.50, its a fair return to running expenses.

If you decide to run a newsletter and it gets off the ground, you can sell advertising space to local dealers and suppliers. Some of your members can become advertisers as well.

Costs will always rise more than you expect and one area to keep a close eye on is postage and stationary.

Now you know how simple it can be to set up your own club, take the plunge and start tomorrow by writing to your local paper.

If you have any problems setting up your computer club don't hesitate to let us know and we will try and help you out.

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!*

£ 20
Only

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



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	£8.50
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

Cambridge Computer Store

Two Great Micros in stock now!

BBC
Computer



**NOW
DOWN TO
£49.95**



**Sinclair
ZX81**

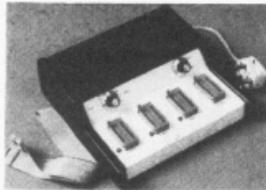
Price includes VAT

Cambridge Computer Store

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

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

LANSLOWNE



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.

ZX81 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.

MZ 80K ATOM SPECTRUM EPROM PROGRAMMERS

Programs 2716, 2732, 2764, 2516, 2532, 2564. Single rail Eproms under full software control. The software is on board in Eprom. On board 25 volt. PSU 28 pin ZIF socket. Write for full details and prices. Coming soon for NASCOM.

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 1K (2114s) Ram or fully expanded - 1K of 2114s and 16K of 6116s for lower power consumption.

ATOM ROM BOARD

£15.75 incl.

Holds up to 4 x 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 x 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.

LANSLOWNE ELECTRONIC SYSTEMS

Unit 21, Borough Road Industrial Estate, Steeplejack Way,
Darlington, Co. Durham, DL1 1TG. Tel: (0325) 486000

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.

OUR REGULAR CUSTOMERS PLEASE NOTE A SMALL CHANGE IN OUR NAME AND A NEW SHOWROOM ADDRESS.

**WEST COAST
PERSONAL COMPUTING
47 KYLE STREET
AYR KA7 1HB
Tel: (0292) 285082**

Windsor Computer Centre

FOR ACORN/BBC IN BERKSHIRE

ON DISPLAY IN OUR SHOWROOM:—

- BBC MODEL A & B
- ACORN ATOM
- DRAGON 32
- COMPLETE RANGE OF TANDY MICRO COMPUTERS
- L.S.I. SYSTEM M3

STOCKISTS FOR:—

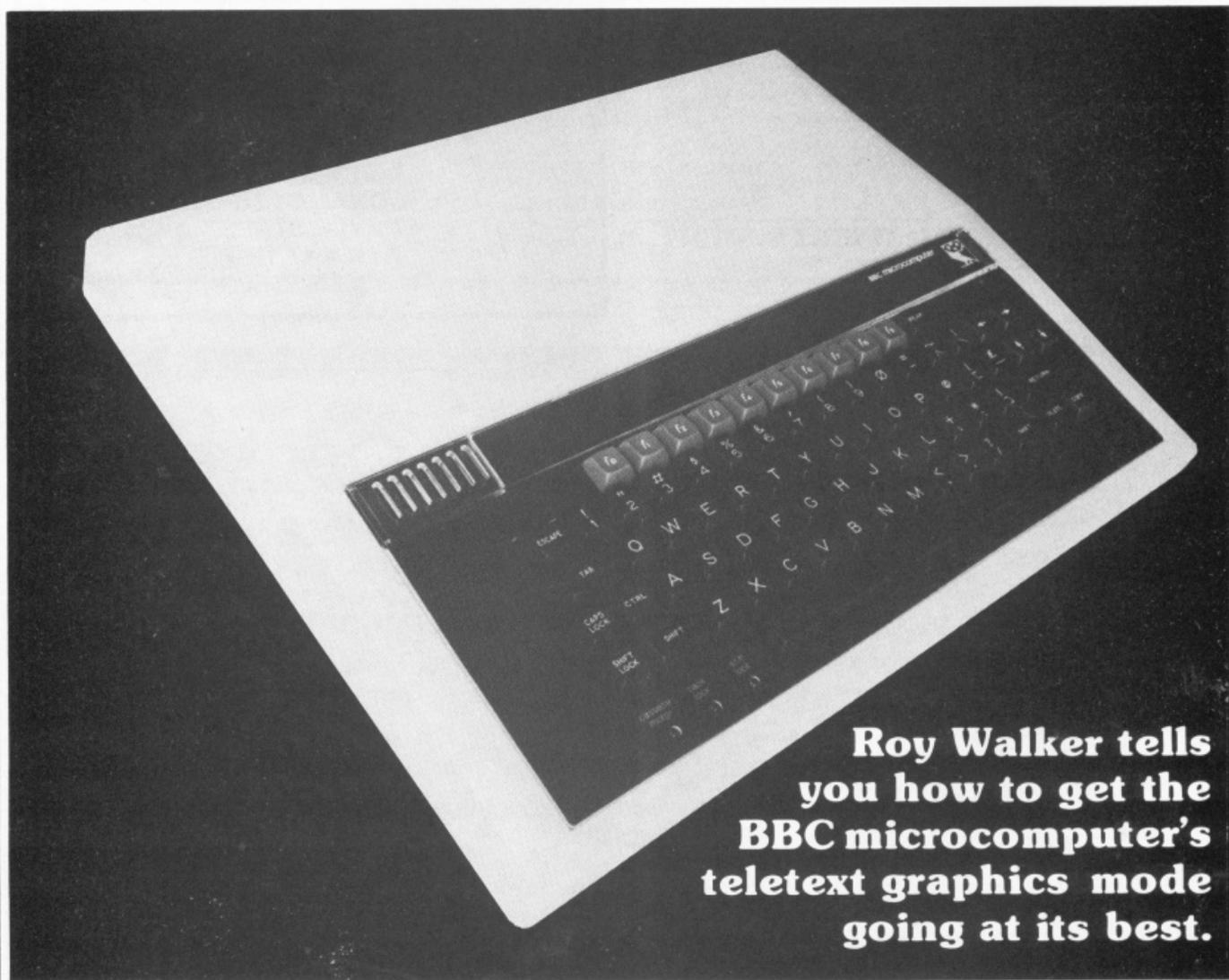
- ACORN/BBC SOFTWARE
- EDQUEST SOFTWARE
- EPSON PRINTERS
- SEIKOSHA PRINTERS
- PHOENIX MONITORS
- CASSETTE RECORDERS

WE SPECIALISE IN EDUCATIONAL SYSTEMS

- We are proud to have installed the two largest BBC Econet Network Systems in the country
- Our representatives will be pleased to visit your school or college to discuss your requirements
- Special educational users purchase schemes available
- Telephone us for advice and help
- We don't need to advertise our prices as we know they are the most competitive

Open Weekdays 9.30am-6pm 1 Thames Avenue, Windsor, Berkshire. Telephone (07535) 58077
Saturday 10am-5pm

TUNE INTO TELETEXT



Roy Walker tells you how to get the BBC microcomputer's teletext graphics mode going at its best.

The BBC computer has some sophisticated graphics capabilities; but unfortunately using 'high resolution' often means wasting too much RAM on the display, and not having enough left over for the program itself. The 'cheapest' mode, in terms of memory, is

MODE 7 — which uses a full teletext characters set. But nowhere in the Provisional User Guide are you told how to make use of the functions supplied.

A good way to get ideas is to look through the programs on the 'Welcome' cassette which comes

with the computer, and see how they work. Although these programs have an irritating 'mugtrap' making it impossible to break out of the chain-loading, there is a way around it.

(By pressing BREAK the screen clears, and the program is

supposedly erased. But now type OLD, press RETURN, and the program is ready to LIST for your examination.

The way in which the internal organs of the BBC computer work are quite complex. As well as printing characters on the screen, it is possible to print control codes. When a control code is printed, an 'invisible' character is put on the screen, while the computer reads the code and executes the implied command. For instance:

```
PRINT CHR$(7)
```

will print a space, but will also sound a short beep. The VDU command (Visual Display Unit) does just the same, except it does not return a line-feed to the cursor. Briefly, this is the Mode 7 character set:

TABLE A

- 0-31 See User Guide Page 188.
- 32 Space.
- 33-90 Upper case characters.
- 91-126 Lower case characters.
- 127 Delete previous character.
- 129-135 Set text colour.
- 136 Text flash on.
- 137 Text flash off.
- 141 Double height.
- 145-151 Define graphic character.
- 156 Background off.
- 157 Background on.
- 160 Space.
- 161-218 Upper case characters.
- 219-254 Lower case characters.
- 255 Inverse space.

The colours available in Mode 7 are as follows:

TABLE B

- 1 RED
- 2 GREEN
- 3 YELLOW
- 4 BLUE
- 5 MAGENTA
- 6 CYAN
- 7 WHITE

A more detailed explanation for some of the character functions is needed:

129-135

Using these codes it is possible to set the colour of the text following. The colour code is only valid for the single line after it, i.e. a maximum of 39 characters. The codes are used in the form PRINT CHR\$(128 + n); , where 'n' is a colour value from Table B.

Thus: PRINT CHR\$(130); "GO

AWAY!" will print the cordial greeting in green.

136

This provides an automatic flash for the text of the following line, e.g. PRINT CHR\$(136); "GO AWAY!" makes the text flash on and off about once a second.

137

This is used to disable the effect of code 136, PRINT CHR\$(136); "GO"; CHR\$(137); "AWAY!" will only flash the 'GO' and not the 'AWAY'.

141

Using this code gives you a 'double height' function. The code and text must be entered twice; once for the top half and once for the bottom.

e.g. PRINT CHR\$(141); "DOUBLE HEIGHT"; CHR\$(141); "DOUBLE HEIGHT"

It is also possible to create your own characters by printing the top half of one with the bottom half of another.

145-151

These codes allow user-definable graphics in the seven colours. The graphics are built up on a six unit grid;

1	2
4	8
16	32

Any character is defined by filling in certain units.

e.g. (a)

1	2
4	8
16	32

1 + 8 + 16 = 25

(b)

1	2
4	8
16	32

2 + 4 + 32 = 38

Each character defined must have its own code in the ranges 160-191, and 224-255. This means that if the unit number is less than 32, it gets 160 added to it, and if it's greater than 32 it gets 192 added to it. Therefore the code for (a) is 160 + 25 = 185, and the code for (b) is 38 + 192 = 230

The colour for the defined character depends on the first control code.

e.g. To print (a) in red;

```
PRINT CHR$(145); CHR$(185)
```

and to print (b) in blue;

```
PRINT CHR$(148); CHR$(230)
```

This short program will show you all the possible characters:

```
10 N=160: PROCCHR
20 N=224: PROCCHR
30 END
40 DEFPROCCHR
50 C=1
60 FOR Q=N TO (N+31)
70 PRINT Q, CHR$(144+C);
CHR$(Q)
80 REPEAT UNTIL INKEY$(0)<>" "
90 C=C+1: IF C=8 C=1
100 NEXT Q
110 ENDPROC
N.B. "" = null string.
```

157

This fills a single line with a background in the most recently defined colour - if no colour has been defined it uses white. e.g. To fill the line with red;

```
PRINT CHR$(129);
CHR$(157)
```

156

This code is used to turn the background mode off.

e.g. PRINT CHR\$(130);CHR\$(157); TAB(20);CHR\$(156) will print half a line of green.

One advantage of using CHR\$ rather than VDU is that a long command can be set up as a single string, and can then be called simply by typing the string name. Many of the control codes can be built up into a compound function, providing quite a complex text display. Try this for a farewell:

```
100 A$=CHR$ 134 + CHR$ 157
+ CHR$132 + CHR$
136 + CHR$ 141
+ "GOODBYE!!!" + CHR$156
110 PRINT A$:PRINT A$
120 GOTO 120
```

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

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



IMPACT SOFTWARE

From Scotland's Capital comes quality software for the

ZX Spectrum and VIC 20

The Quest (48K-Spectrum only)

(One of the most exciting adventure games currently available). Fight your way into the depths of the complex in your Quest for the Holy Grail. Discover Gold and Precious stones, buy weapons and Magic wares from a trader. Battle with one of the many Monsters. Up to 1500 locations may be searched in the course of a game. Full sound effects and save game facility. - Only £5.00

Starfighter (16K-Spectrum only)

All action, full-colour, graphic machine-code, Space-battle with devastating explosions. On screen scoring and high score kept. The longer you survive the more difficult it becomes. - Only £5.00

Orb (48K-Spectrum ; 16K-VIC 20)

Make your way through the underground labyrinth in your search for the dreaded Orb, which you must destroy. Encounter many Monsters, discover Treasure and try to remember your route so that you can get out again. Full sound effects and save game facility. - Only £5.00

Star Trek (16K-Spectrum; 8K-VIC 20)

Save the Galaxy from the Klingons using your rapid-fire phasers and photon torpedos. Automatic short-range scan, Galaxy map and Star-bases. Full sound effects and 10 levels of difficulty! - Only £5.00

Games Pack (Unexpanded VIC 20)

Alien * Road Race *
The Island * Pontoon *
- Only £5.00

Dealers

Attractive Discounts & Exclusive Agencies available in most areas.



Please Supply:

The Quest (£5.00) Orb (£5.00)
Starfighter (£5.00) Star Trek (£5.00)
Games Pack (£5.00)

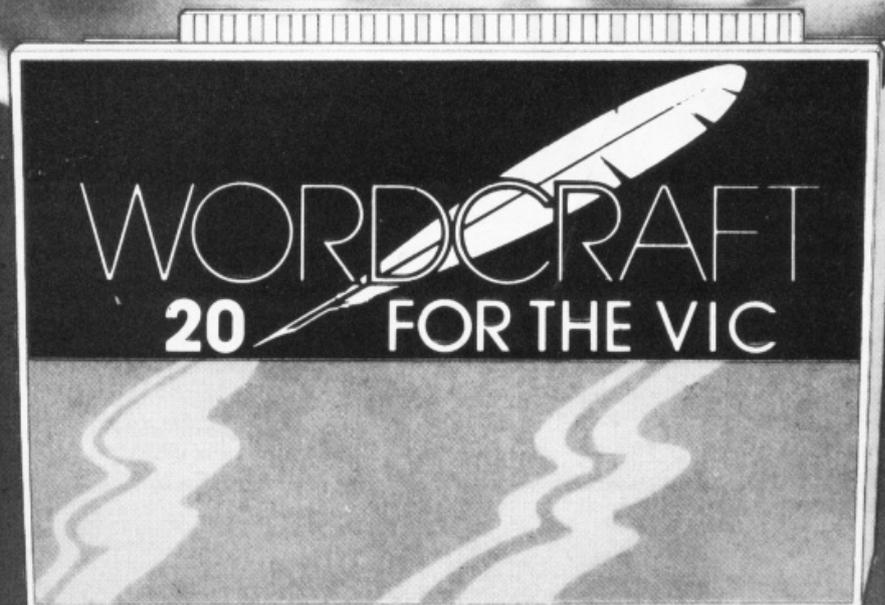
Please state machine type: _____

I enclose a Cheque/P.O. for £

Name _____
Address _____
Post Code _____

All prices include P&P and VAT
IMPACT SOFTWARE
70, Redford Avenue,
EDINBURGH EH13 0BW
TEL 031-441-4257

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 boldening.
- ★ 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.

Probably the fastest microcomputer in the universe

the **JUPITER ACE** only £89.95.



Key Features

- Revolutionary microcomputer language FORTH.
- Full-size moving-key keyboard.
- User-defined high-resolution graphics.
- Programmable sound generator.
- Floating point arithmetic.
- Fast cassette interface.
- Upper and lower case ascii character set.
- 24 x 32 character flicker-free display.

The Jupiter Ace uses FORTH

The Ace is set apart from all other personal computers on the market by its use of a revolutionary language called 'FORTH'. Some computer languages are easy for humans to understand, others are easy for computers; FORTH is most unusual in being both. Its underlying principles are so simple that it takes even a newcomer to computers only a few minutes to learn how to do calculations on the Ace, yet the very same principles are powerful enough to allow you to invent your own extensions to the language itself.

At the same time, the memory-saving coded form used to store your programs inside the Ace allows it to obey them very fast — typically in less than a tenth of the time it would take to do the same thing using a different language. Amongst other things, this makes the Ace ideal for games.

FORTH's unique combination of speed, versatility and ease of programming has already made it a prime choice for professional applications as diverse as pub games and radio telescopes, and gained it an enthusiastic national user group. Now the Jupiter Ace can bring this addictive language into your own home.

Designed by Jupiter Cantab

Leading computer Designers Richard Altwasser and Steven Vickers have a reputation for pushing technology forwards. After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace.

All inclusive Price

For £89.95 you receive your Jupiter Ace, a mains adaptor, all the leads needed to connect to most cassette recorders and T.V.s (colour or black and white), a software catalogue and a manual.

The manual is a complete introduction to the world of personal computing and a course in FORTH programming on the Ace.

Even if you are a complete newcomer to computers, the manual will guide you step by step from first principles to confident programming.

The price includes postage packing and V.A.T.

Technical Specification

Hardware

Processor/Memory

Z80A running at 3.25 MHz.
8K bytes ROM 3K bytes RAM.

Input

40 moving-key keyboard with auto-repeat on every key.

Output

Memory-mapped 32 x 24 character display with high resolution user graphics. Output to drive normal UHF TV set on channel 36.

Sound

Provided by internal loudspeaker.

Cassette

Load Save & Verify at 1500 baud, separate data storage.

Software, FORTH

Data Structures

Integer, Floating point and String data may be held as constants, variables or arrays with multiple dimensions and mixed data types.

Control Structures

IF-THEN-ELSE, DO-LOOP, BEGIN-WHILE-REPEAT, BEGIN-UNTIL, all may be mixed and nested to any depth.

Operators

Mathematical +, -, X, ÷.
Logical AND, OR, NOT, XOR.
Comparison <, >, =.

Program Editing

FORTH words may be listed, edited and redefined. Comments are preserved when words are compiled.

Order Form

The **Jupiter Ace** is available only by mail order. Please allow up to 28 days for delivery.

Send cheque or postal order with the form to:—

JUPITER CANTAB, 22 FOXHOLLOW, BAR HILL, CAMBRIDGE CB3 8EP

Please send me:—

JUPITER ACE MICROCOMPUTER(S) @ £89.95.

Name. Mr/Mrs/Miss

Address

PCT 11

DEALER**DEALER****SPECTRUM COMPUTER GROUP**

LOOK BEFORE YOU LEAP

This month the Spectrum Computer Group is under scrutiny for its selling techniques.

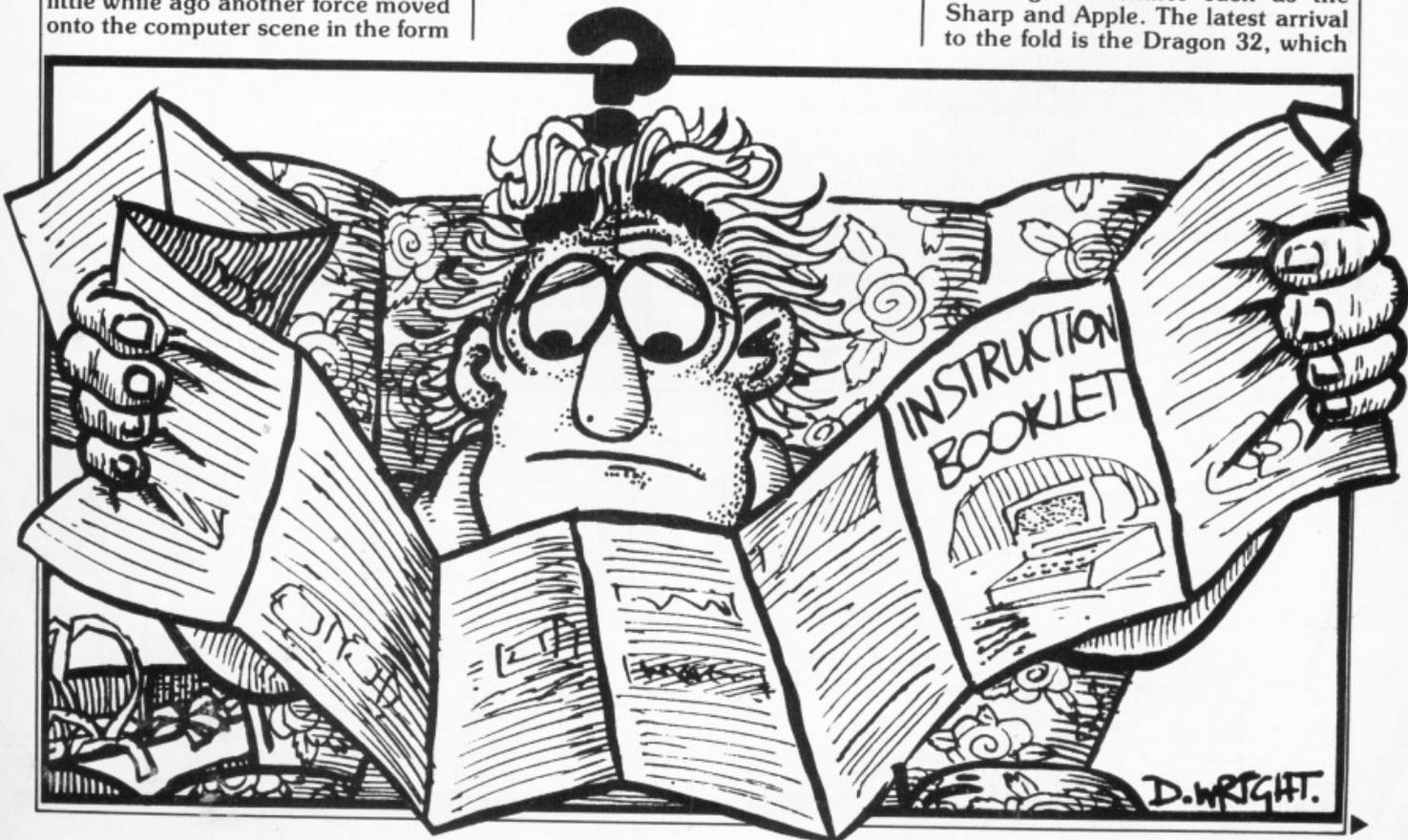
One of the biggest problems facing the first time computer buyer is the decision of where to go when they decide to take the plunge. Until now the choice has been between the specialist computer shops and the high street chain stores. On the one hand the specialist stores provide the buyer with a lot of technical information, but are a little daunting for the novice, while the high street stores are almost the opposite. A little while ago another force moved onto the computer scene in the form

of the Spectrum Computer Group. Despite its name, the Spectrum group has not nothing to do with Uncle Clive and his cohorts. The Computer group is in fact a division of the successful Spectrum (UK) Ltd, Britain's largest photographic retailers.

Spectrum (UK) is a voluntary trading group which dealers can join in order to share in the benefits given by a large group with the

power to offer discounts through bulk buying. Spectrum has a large number of photographic retail outlets and it was through twenty of these that they made their first steps into the computer marketplace.

The shops that are involved with the Spectrum organisation carry a wide range of computers, from the old standards such as the VIC 20 and the Atari 400/800, to the larger machines such as the Sharp and Apple. The latest arrival to the fold is the Dragon 32, which



LOOK BEFORE YOU LEAP

by all accounts is selling like hotcakes. Although the project was started using already established Spectrum photographic dealers they are now moving towards computer dealers who have not before considered carrying such a range of small microcomputers.

To someone used to the usual format of computer shops the Spectrum group of dealers might come as a bit of a surprise. For instance, Andrews in Teddington has been a Spectrum photographic dealer for a long time and recently decided to sell a computer range. Andrews has two photographic shops in Teddington although the computer section is at the moment residing in their third shop, which is yet another sort of retail shop.

No Demos

It is very strange walking into the shop and finding state of the art technology nestling on the shelves with the latest prints from Athena. At the moment the shop does not carry the full range of Spectrum computers but are concentrating on the VIC, Atari, Sharp and Nascom to get a feel for the market. All the machines were on display but sadly they weren't being demonstrated for two reasons. First, there is the problem of local kids treating the shop as a free arcade, making it difficult for the staff to discriminate between potential buyers and time-wasters. And second, the trained member of staff dealing with the computers had just left, leaving them in the lurch until another member of staff is retrained.

This situation brings to the fore one of the criteria that Spectrum apply to their dealers. When a dealer is accepted into the group at least one of their staff must go along to an existing dealer to receive full

training on the machines sold and follow this up by attending training sessions for new products. The training sessions that Spectrum run are usually carried out with assistance of the manufacturers to make sure that the dealers are up to date on the various machines' latest developments.

In Andrews, the machines had a varied but not comprehensive range of software and peripherals, although anything out of stock can quickly be ordered from the main warehouse if required. From studying the groups adverts it seems that it does carry most of the main titles from the manufacturer and also some from independent suppliers. They also carry a standard range of computer books.

Another type of Spectrum dealer is Surrey Micro Systems of Wallington. Before becoming Spectrum dealers this firm were business computer system dealers, specialising in the Tandy TRS-80. Alongside the Tandy they now carry the Atari 400/800, VIC 20, Nascom 'Special Edition', Sharp MZ80A, Dragon 32, Apple and the Texas TI 99/4a.

The fact that they are a Tandy dealer has stood them in good stead for Dragon sales. It is not common knowledge but the Dragon can run the Tandy Color Computers software. So you can imagine their delight when they discovered that they had a ready made software base from which to sell the Dragon.

Surrey Micro Systems carried a more professional air than Andrews in Teddington, although I expect this will change soon, as Andrews are thinking about opening two more shops that will be more heavily biased towards computers. Both shops offer an extended warranty on the computers they sell. The structure of the extended



warranty is that for a certain percentage of the price of the computer you will receive a two year cover, instead of the obligatory one year period during which you can return your computer, if it is faulty, to the centre from which you bought it. There it will be repaired or replaced within three or four days. At the moment Spectrum runs a 'Flying Engineer' service, where the engineer is mobile and calls into the shop as soon as a faulty machine is reported. This gives a remarkably fast turn around time with none of the delays of sending the machine back to the factory for repair or replacement.

So what does all this add up to in terms of a place to buy your home computer? Because of the Spectrum Computer Group's relative youth it is difficult to assess whether or not it will work. Certainly the idea of making computers a lot more accessible to the public is a good one, but the dividing line between technical overkill and the blind leading the blind is a narrow one. The one point about the Spectrum group is whether in the developing price-slashing war it can still maintain the admirable standards already set and remain competitive.

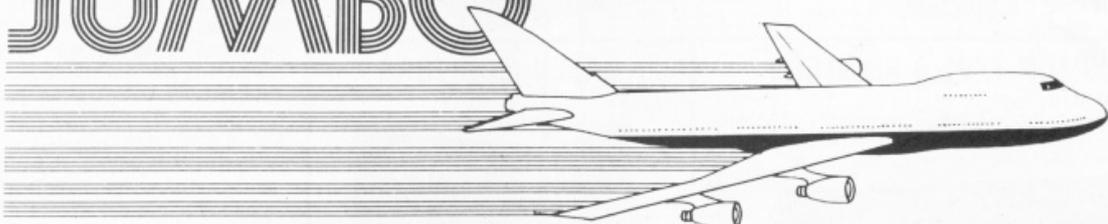
On the whole the Spectrum stores I visited were quite adequate for the job they are undertaking. Although the more expertise available the better equipped Spectrum will be to help you.



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

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.



SEIKOSHA GP-100A GRAPHIC PRINTER

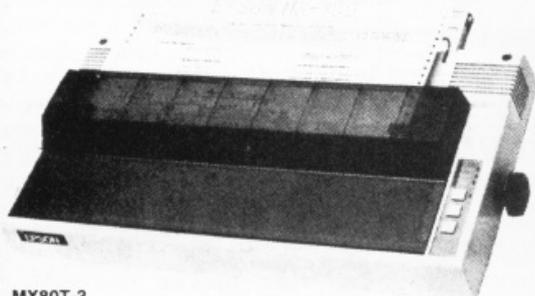
Features: Graphics, double width char., standard char., speed CPS, selectable line spacing, adjustable paper width up to 10 inches, 80 columns, centronics compatible parallel interface. 90 day warranty.



SPECIAL OFFER

Price
£179 + VAT + £4.50 Carr.

NEW EPSON TYPE 3 PRINTERS



MX80T-3

Features: 80 columns, 80 CPS, Bit image printing, super and sub scripts, Auto-underlining, tractor feed, 32 print fonts, Bi-directional, logic seeking, 9x9 matrix, centronics parallel interface.

PRICE £319 + VAT + £4.50 Carr.

MX80 F/T-3

Features: As above but with tractor or friction paper feed.

PRICE £325 + VAT + £4.50 Carr.

MX100-3

Features: 136 columns, 100 CPS, Auto-underlining, 32 print fonts, friction or tractor paper feed, Bi-directional logic seeking, true decenders, adjustable paper width up to 15 inches, Centronics parallel interface.

PRICE £429 + VAT + £4.50 Carr.

MX82

Features: 80 CPS, plotter print, bit image printing, bi-directional printing with logic seeking.

PRICE £329 + VAT + £4.50 Carr.

MX82 F/T

PRICE £339 + VAT + £4.50 Carr.

CASIO AX-210/AX-250 ANALOG AND DIGITAL WATCHES



Dual time, 12 or 24 hour option, countdown timer with memory function, chronograph with lap time, optional hourly time signal, daily alarm, 3 optional melodies or ordinary bleeper. Calendar display, lithium battery. Stainless steel brcl.

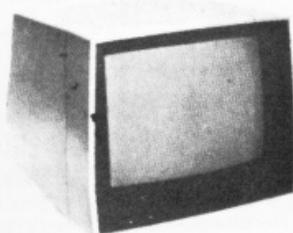
THE BEST SELLING WATCH

AX-210 or AX-250 £21 + VAT + 50p Carr.

WATER RESISTANT ALARM CHRONO

W20 Black resin case £10 + VAT + 50p Carr.
W30 Metal case £16 + VAT + 50p Carr.

GREEN MONITORS



SANYO PROFESSIONAL MONITOR

SM12H — Green/black 12 inches screen, 18 MHz bandwidth, removable antiglare filter, ideal for high res graphics, attractive beige case — illustrated above.

1 year warranty (SANYO)

PRICE £89 + VAT + £4.50 Carr.

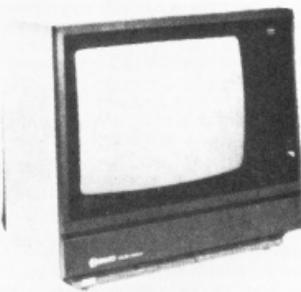
BMC 12A GREEN MONITOR

12 inch green/black screen, 80 x 24 char. format, composit video input. 15 MHz bandwidth.

1 year warranty (BMC)

PRICE £69 + VAT + £4.50 Carr.

COLOUR MONITOR



BM1401 RGB COLOUR

Medium resolution RGB colour monitor, 15 MHz.

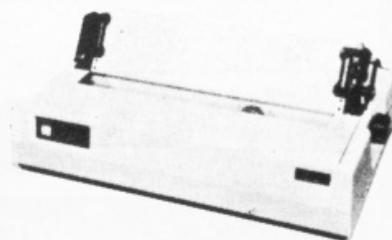
400 dots (at the centre)

40 x 25 characters, 5 x 7 dot format.

1 year warranty (BMC)

PRICE £219 + VAT + £4.50 Carr.

OK1 MICROLINE PRINTERS



90 day warranty on all Microline printers (OK1)

MICROLINE 80

Features: 80 columns, 80 CPS, friction and pin feed, Unidirectional block graphics, Centronics parallel interface.

PRICE £249 + VAT + £4.50 Carr.

MICROLINE 82A

Features: 80 columns, 80 CPS, friction and pinfeed, bi-directional printing, parallel and serial (1200 bauds) interface.

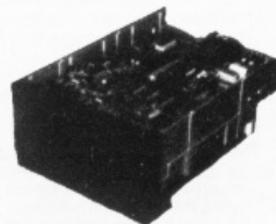
PRICE £379 + VAT + £4.50 Carr.

MICROLINE 83A

Details as 82A but 120 CPS and includes tractor up to 15 inches width.

PRICE £569 + VAT + £4.50 Carr.

TOSHIBA DOUBLE SIDED/DOUBLE DENSITY 5 1/4" DISK DRIVES FOR THE PRICE OF A SINGLE SIDED/SINGLE DENSITY.



Industry standard interface, compatible with VIDEO GENIE, ATOM, TRS80, BBC COMPUTER, SUPER BRAIN, NASCOM, and lots of others. 3.5 MEGABITS. Unformatted storage capacity, track density 48 TPI. Daisy chain up to 4 drives.

90 day warranty.

DISK DRIVE ND-02D

£169 + VAT + £2.50 Carr.

SINGLE BOXED WITH POWER SUPPLY

£199 + VAT + £4.50 Carr.

DUAL BOXED WITH POWER SUPPLY

£369 + VAT + £4.50 Carr.

2 DRIVE CABLE

£15 + VAT + £1 Carr.

DOUBLE SIDED/DOUBLE DENSITY DISKETTES

1 - 9 **£2.75 + VAT + 50p Carr.**

10-49 **£2.50 + VAT + £1 Carr.**

SILENT ALARM/POCKET PAGER

This is an individually coded 4 WATTS Radio transmitter and pocket pager receiver. The alarm system has connections for door contacts and vibration sensors. 2 vibration sensors are included. It has a range of 2 miles. Ideal for protection of vehicle or property. Power requirements for transmitter is 12V dc. Not licensible in UK.

PRICE £78 + VAT + £2.95 Carr.



RECHARGEABLE BATTERIES

CODE	TYPE	CAPACITY	PRICE
S401	AAA	200 mA	£1.10
S101	AA	500 mA	£0.75
C1200	C	1200 mA	£1.90
D1200	D	1200 mA	£2.05
RX22	PP3	110 mA	£3.50
BC2204	Universal Charger for AA, C,D & PP3		£9.50

Please add VAT to all above prices plus 75p Carr per order.

6809 BASE MICRO COMPUTER

COMPLETE WITH 32K RAM

Extended micro soft, colour Basic parallel printer Interface. High resolution colour graphics (256 x 192) UHF or colour monitors, cassette recorder interface and mains adapter included.



£169 + VAT + postage £4.50

AKHTER INSTRUMENTS LTD,
DEPT PCT
UNIT 19, ARLINGHYDE ESTATE,
SOUTH ROAD, HARLOW, ESSEX, UK.
TEL: HARLOW (0279) 412639.

ORDERING INFORMATION:
Please add 15% VAT to all prices. All orders which accompany a cheque or cash are carriage free. Please add carriage for all other orders as specified on each item.
WE ACCEPT BARCLAYCARD AND ACCESS

SUPER SOFTWARE FOR TRS-80 I/III & VIDEO GENIE II

NEWSSCRIPT (w.p. program).....	from	£69.95
NEWSSCRIPT + LABELS.....	from	£79.95
FASTER.....		£17.95
QUICK COMPRESS.....		£12.95
FASTER + QUICK.....		£27.95
XTEND 40.....		£12.95
R.P.M.....		£13.95
GRAPHICS EDITOR + JOINER.....		£29.95
DOCUMENTER (cass).....	£14.95	(disk) £17.95
TRAKCESS.....		£19.95
DOHNE BUGG.....		£10.95
DDSD/CMD (for NEWDOS).....		£14.95
SUBPACKER.....		£15.95
KEEPIT.....		£7.95
GRBASIC.....		£17.95
MICROWORLD.....		£13.95
BETTER TEXT.....		£13.95
QWERTY (for Scripts).....		£33.95
PACKER.....		£19.95
DOS RANDOM ACCESS & BASIC FILE HANDLING.....		£18.95
DISK FOR THE ABOVE BOOK.....		£17.95
10 VERBATIM DISKS S/S D/D 40 TRACK.....		£21.95

Teac Disk Drives, Epson & Nec Printers, Interfaces & other Hardware — Callers please phone first.

PRICES TOTALLY INCLUSIVE: S.A.E. FOR DETAILS



WORDSWORTH

6 Grant Road
Banchory
AB3 3UR
03302 - 4168



GENERAL NORTHERN MICROCOMPUTERS LTD
Unit 8, Whitworth Road, South West Industrial Estate, Peterlee.

VIDEO GENIE & TRS 80

THE ROM

Are you fed up with loading a lower case driver program every time you switch on? 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 for old style TRS80's
 - 4) Alleviates keybounce
 - 5) Checks for feature ROMs
- £14.95 + (80p) P&P + VAT. State model & please telephone re TRS80 Model differences.

PLUG ON FEATURE FOR ROMS

Now you can simply plug on to the back of your computer, insert ROM & Go!

VG £29.95 inc. feature ROM + (80p) P&P
TRS80 £34.50 inc. feature ROM + 80p P&P

48K RAM INTERNAL

TRS80 & VG £43.50 + P&P + VAT

Plug in our Modules. Connect 3 wires (VG) or 5 (TRS80) — keep your old RAM or sell it — a full 48K.

LOWER CASE HARDWARE VG & TRS

Unplug 2 IC's, plug in 2 Modules — Connect 3 wires — Easy. £19.00 + P&P + P&P

SPECIAL OFFER EPSON PRINTER

MX80T3 £285 + Carr + VAT
MX80FT3 £315 + Carr + VAT
The above 2 Csh/Chq only

FEATURE ROMS

£18.95 each + (80p) P&P + VAT (15%).

A series of Enhancements to LZ Basic.

ROM A

- 1) Single keystroke commands e.g. shift, Ac Auto etc
- 2) Flashing Cursor (can be toggled on or off)
- 3) Repeating characters — with delay (Toggle)
- 4) Machine Code Monitor & Editor
- 5) System Load & Save for backing up these system programs — uses no RAM and so can deal with FULL 16K programs.
- 6) Keyboard inverter (for lower case) (toggle)

ROM B

- 1) Merge — Two Basic programs to one
- 2) Renumber
- 3) ScreenPrint
- 4) Flashing Cursor (Toggle)
- 5) Keyboard Inverter (Toggle)

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 ?????? 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. Plus much else in each volume. Various Books — Lists on application.

Tantel Prestel Adaptor (colour)

£160 + Carr + VAT.

COME AND SEE US!

SIR Computers Ltd

Cardiff

BBC Microcomputers, Available Direct from Stock

BBC Microcomputer Model A	£320
BBC Microcomputer Model B	£395
Conversion of your Model A to B	£80

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	£345.00

Large Range of Atom & BBC Software in Stock

REDUCED DRAGON NOW IN STOCK £190

8 Bit Input/Output Port with LED Display	£19.00
4 Channel Analogue Port	£19.95
One Pair of corresponding Joysticks	£19.95
"Centronics" Printer Interface	£24.95

ALL ADD-ONS ARE ZX81 COMPATIBLE

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 LTD

38 DANYCOED ROAD, CYNCOED,
CARDIFF CF2 6NB, WALES.

Tel: 0222 — 759015

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 A and B and the 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 system connects easily to your 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



Telephone orders welcome.

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

TRS 80 TIPSTER

Some useful tips for TRS-80 owners to help their programming have been gathered together by David Bell.

During the two years, or so, that I have been using my Model 1 TRS-80, I have picked up a number of tips to assist my BASIC programming.

I do not pretend that any of these are of my own origin, most have been discovered by reading the many computer journals that are freely available, either from the bookstall or by mail order. In addition to these journals there is one book available that deserves a special mention, this is "Basic Faster and Better and Other Mysteries" by Lewis Rosenfelder. This is available through Molimerx Ltd at a price of £19.90 plus postage. I wouldn't say that this book was for a beginner, in fact a great deal of it requires some knowledge of a Disc Operating System (DOS), but it's 290 pages are packed with useful tips and subroutines, and is well worth the money.

One of the earliest tips that I picked up was a way of disabling the BREAK Key. If you are not using a DOS system this will work by placing the following at the start of your program:—

```
POKE 16396,23
```

Once this is added you will be unable to stop your program running (without doing a reset) unless you provide a suitable

subroutine, say, using a GOSUB 20000 with the following at line 20000:—

```
POKE 16396,20:RETURN
```

When, at a later stage, I could afford to have a line-printer added to my system, I found the following routine useful. It alerts the user if the printer is not ready, thus avoiding your program going into that endless 'limbo' when it reaches the first LPRINT.

```
IF (PEEK(14312) AND 240) <> THEN PRINT
" * * PRINTER NOT READY * *
```

While on the subject of printers, if you POKE 16414,141 and POKE 16415,5 this will change PRINT statements to LPRINT. POKEing 16414,88 and 16414,4 will return the command to PRINT. This could be incorporated into the earlier printer checking routine in the form of a conditional GOSUB.

POKE 16421,0 will disable the printer, while POKE 16421,6 will return to normal operation. Both pokes assume DOS not present.

This tip is probably very obvious, but, if you enter the command RUN you erase all of the programme variables, rather a nuisance if you have only interrupted the program to do some editing. Instead if re-RUNning the program, enter

GOTO nnnn (where nnnn is a suitable line number), your program will commence at that line number with your variables still intact.

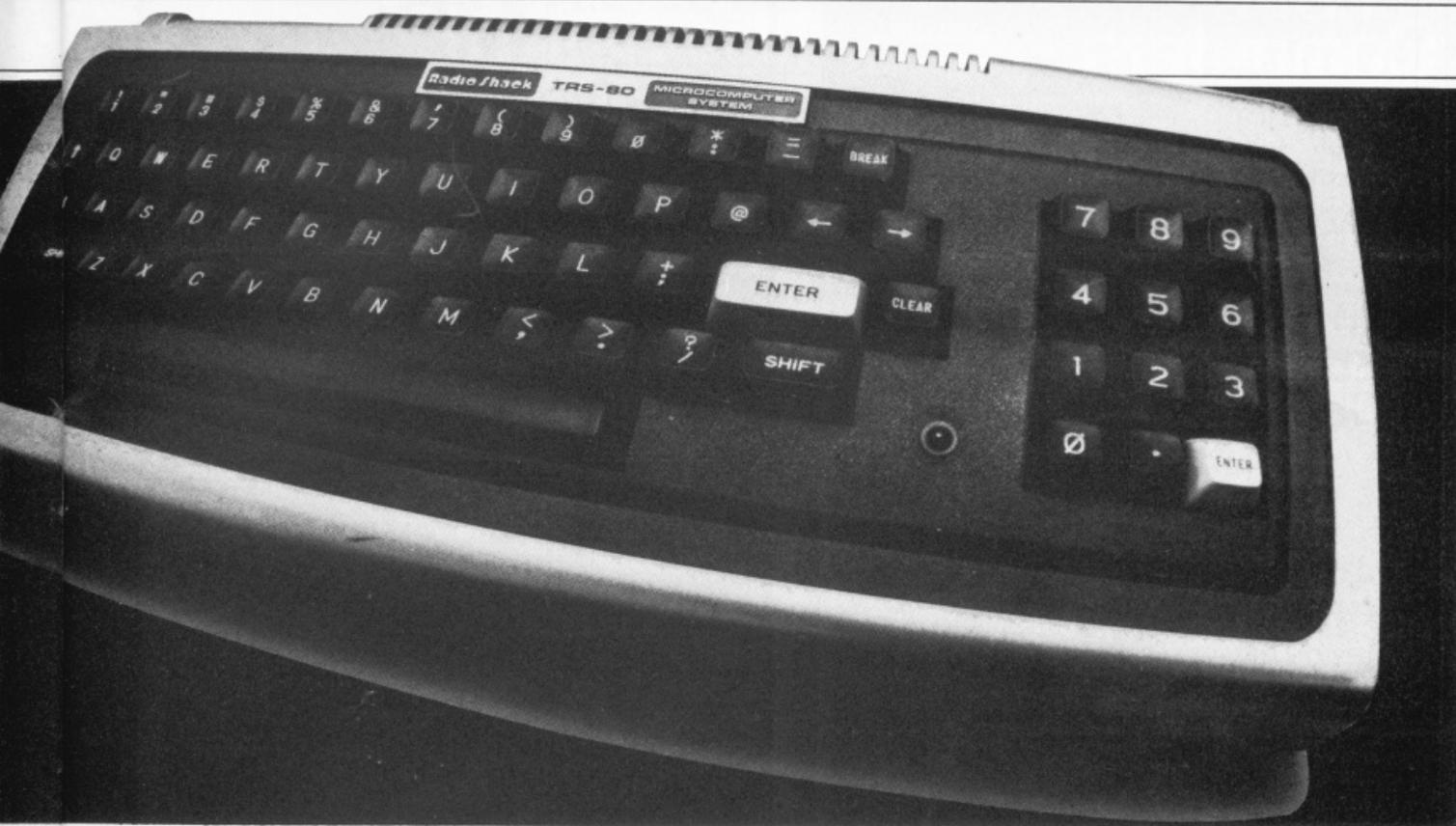
If you should have a system tape whose name you have forgotten, the following one-line program should display it, without you having to make hundreds of futile attempts to do so:

```
INPUT # - 1, A$:PRINT A$.
```

Type and RUN this program, start the tape recorder with the unknown system tape on it and press play. Providing you have the correct volume setting you will get the tapes file-name with the letter U added to the beginning eg, UGALAXY. If you ignore the U the rest of the name is the file-name.

Whenever you are in Level II Basic, and try to insert a comma or colon into a data string you will get the response "EXTRA IGNORED". You may overcome this by using the INKEY\$ function in the following fashion:

```
10 REM INPUT A STRING TO
INCLUDE COMMAS AND
COLONS
20 PRINT "INPUT A
STRING: - >";
30 S$ = INKEY$:IF S$ = " "GOTO
30
40 PRINT S$;:IF S$ = CHR$(13)
THEN 60
50 A$ = A$ + S$:GOTO 30
60 PRINT A$
```



Now something to help with BASIC program protection. A nice little routine that will stop certain program lines being viewed on the video screen. I will use the test line `PRINT"THIS IS A TEST LINE":REM ***`

Enter the line in the normal way then go into the EDIT mode for that line. Space along until the cursor is over the last character (the third *) and press 'C' to change the character. Press the shift key and the up-arrow together and the cursor will jump to the top of the line and the character will disappear. Press <ENTER> to finish editing the line. Now if you type RUN the message "THIS IS A TEST LINE" will be displayed, but if you try and LIST the program the line will only flash on the screen briefly. The disadvantage to this is that the line would still print out on a line printer.

A rather more devious method of hiding a basic program line is this. Type in the same line again and, again, enter the line EDIT mode. Press X to position the cursor at the end of the line and press the SHIFT KEY. While holding the shift key down press the LEFT ARROW until the cursor is over the first letter of the line (the P of PRINT), none of the other characters should have been erased. Release the keys and type

in anything over the top of the characters on your original line. Once you are at the end of the line press the <ENTER> key to end the editing session. When you now list the line, only the characters you typed in during the edit session will be displayed (something rude maybe!) but if you run the program, the original PRINT line will be shown.

One final tip. You can change your 'Protected Memory' from BASIC by using the following program line, but this must be followed by a CLEAR command to get the computer to read the new setting. In this program line (I suggest line number 1), M! is equal to your desired memory size minus 1.
`M! = 59999: POKE16562,M!/256:
 POKE165 61,M! - INT(M!/256)
 *256:CL-
 EAR50`

Have you ever heard the word GARBAGE COLLECTION or STRING SPACE COMPRESSION? I have an economy priced database that appears to take forever to run, simply because of this problem. Every so often you may wonder what this is. Sometimes the machine just sits there and appears to do nothing while the keyboard and everything else is locked out.

To understand what is happening — if you defined 20

strings as three characters in length and later redefined those same strings as two characters in length, you would expect those 20 strings to take up a total of 40 bytes but this is not so! They actually take up 100 bytes as the newly defined strings are added to the old usable ones. Eventually the computer runs out of free string space and has to clear out this 'garbage' to release new space. This is what is known as garbage collection.

For those fortunate enough to own a Model II or Model III, Molimerx Ltd advertises a program called 'Garbage Collection' which retails at round the £50 mark. I have not tried this product, but from the description it looks impressive and I have never known this company to misrepresent a product. Those with the Model I are stuck with a machine that appears to 'lock-up' while clearing out its memory of unwanted string space. A few of the Disc Operating Systems have a facility built in to them whereby you may activate an 'ALIVE' facility. This shows a moving graphic symbol at the top right of the screen to show that your computer is still processing.

The above mentioned firm Molimerx can be contacted at Buckhurst Road, Town Hall Square, Bexhill-on-Sea, East Sussex.

AB & C Computers

MAIL ORDER SPECIALISTS



DRAGON 32K



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



MP

B.B.C. MICRO SOFTWARE

'INVADERS' (NEW) £6.50 A fast moving space game, compiled in machine code. It utilises Mode 2 colour graphics and sound.

'SHOOTOUT' £5.00 Pit your wits against the western gunfighter out to kill. Run and dodge behind the wagons and cactus while shooting at this killer. Full colour graphics and sound.

'HANGMAN' £4.00 A colourful and entertaining version of this well known word game. Three levels of play against the clock. As you improve your score the response time is reduced.

'SPACE FIGHTER' £8.50 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.

'CHARACTER GENERATOR' £3.00 No more designing characters on paper. This useful tool program makes it simple. Ideal for defining various character sets. Space invader symbols etc. Store on tape for future use.

'STOP PRESS' **Special Offer** — Deduct 10% off list price for three or more program tapes ordered.

Coming Soon — A new adventure game — Watch this space for **FIRIENWOOD**.

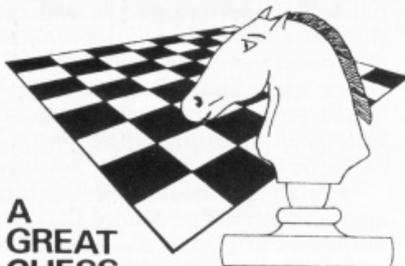
'PROGRAMS' A 32K memory required unless *

ALL PRICES INCLUDE POSTAGE: CHEQUES AND POSTAL ORDERS PAYABLE TO: "M P SOFTWARE"

MP SOFTWARE & SERVICES

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

Push your Sinclair to the limit



A GREAT 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**
Spectrum Chess..... **£13.95**

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**

*Spectrum Chess 48K

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

PLANET OF DEATH (Adventure A)
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**.



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

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.



SPECTRUM SOFTWARE SPECIALISTS

BBC ELTEC SERVICES LTD



BBC MICROCOMPUTERS

BBC Model "A" (in stock now).....	£299.00
BBC Model "B" (in stock now).....	£399.00
BBC Model "A" plus extra 16K memory	£330.00

16K Hitachi memory (as fitted by ACORN)..... £31.00

FULL UPGRADE KIT (Genuine ACORN issue)	£90.00
UPGRADE KIT fitting charge.....	£10.00

14" Full colour MONITOR (used in BBC computer programmes).....	£309.35
12" Green Screen MONITOR.....	£126.00
RGB Monitor lead.....	£5.00
Monitor lead.....	£5.00
Cassette Recorder (recommended).....	£28.00
Cassette lead (7 pin DIN/3 jacks PLUS matching resistor for reliable saving).....	£5.00
Blank Cassettes SCOTCH 3M C-10.....	£0.80

SOFTWARE

Sinclair (IJK) Software cassettes 1-7	from £3.95
AGENTS for BUG BYTE software	
AGENTS for PROGRAM POWER software	
FULL RANGE of ACORNSOFT BBC CASSETTES.....	all £9.95
ELTEC PRO-DIS Disassembler.....	£6.85

SEND SAE FOR OUR SOFTWARE PRICE LIST

BOOKS

NEC 30hr Basic.....	£5.50
Practical Programmes for the BBC Computer Johnson-Davies.....	£5.95
Basic Programming on the BBC Microcomputer, Cryer.....	£5.95

WIDE RANGE OF BOOKS on the PROGRAMMING of the 6502

SEND SAE FOR OUR BOOK LIST

ELTEC SERVICES LTD

231 Manningham Lane, Bradford BD8 7HH Tel: (0274) 491372

OPEN: Mon-Fri 9am-5pm Sat 9am-12 noon

16K Hitachi memory (as fitted by ACORN).....	£31.00
FULL UPGRADE KIT (Genuine ACORN issue)	£90.00
UPGRADE KIT fitting charge.....	£10.00

PRINTERS

Seikosha GP100A.....	£225.00
EPSON MX80 F/T III.....	£390.00
EPSON MX100 F/T III.....	£530.00
SMITH CORONA Daisy Wheel Printer.....	£557.00
Printer Cable.....	£18.40

ATOM MICROCOMPUTER

Extra Memory (2114L).....	per K £2.20
Floating point ROM.....	£21.00
ACORN 96K DiskPack.....	£343.00
Disk Buffer Pack.....	£11.20
DISATOM SUPER ROM — The most powerful toolkit yet.....	£29.85
4 Socket software utility switch.....	£22.95

Prices are VAT INCLUSIVE

P&P £1.00 for orders under £100.00:

Orders over £100.00 add

£10.00 for a Securicor Delivery

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 Disk
£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.



The specialists in internal plug-in memories for ZX computers announce:

80K SPECTRUM

now attainable for the price of a 48K model! with our SP80 low-power Sinclair look-alike.

Functionally identical to the Sinclair 32K internal plug-in expansion but with double the capacity (64K) the SP80 plugs into the sockets provided on the 16K SPECTRUM by Sinclair for his 32K expansion board. Instructions to our usual high standard makes fitting very simple indeed.

The SP80 in no way interferes with Sinclair add-ons — ZX Printer, RS232 interface, Microdrive...

New low prices on our highly successful internal memories for ZX81

To: East London Robotics, 'Finlandia House', 14 Darwell Close, LONDON E6 4BT.

Item	Item Price	Quantity	Total
CHIPSWITCH kit doubles your ZX81 memory to 2K. (this kit requires soldering)	4.70		
INCREMENTAL internal 2K plug-in memory extension for ZX81 expandable to 16K.	17.75		
Additional 2K chips for above (HM6116P-3).	4.50		
MAXIMEM 64K internal plug-in memory for ZX81.	49.95		
SP80 64K internal plug-in memory extension for ZX SPECTRUM giving 80K of user RAM.	50.00		
SP80 Kit version with full instructions.	44.00		
SP80 fitting service (price includes excess P&P).	9.00		
	Postage and Packing		0.45
	TOTAL £		

Telephone enquiries on 01 471 3308.

All prices already include VAT.

Please tick if you require a VAT receipt.

Refunds less £1.50 handling on all items returned within 14 days of receipt. Send stamped addressed envelope plus additional 12½p stamp for catalogue.

Cheque/Postal Order payable to: EAST LONDON ROBOTICS £.....

Name: Mr/Mrs/Miss

Address:

STOP PRESS!!! Transfer all your ZX81 BASIC and Machine code programs and data onto your SPECTRUM in minutes with our new SLOWLOADER available soon!!

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: Horizons
Type: Tape
Supplier: Sinclair
Machine: ZX Spectrum
Price: Supplied Free

This tape is a compendium of various programs for the ZX Spectrum and is included with every Spectrum sold and supplied to anyone lucky enough to already have one.

The tape starts, not suprisingly, with a program entitled 'Introduction' which is broken down into three parts. The first is a loading check which makes sure you have the tape volume set correctly, the second part loads two high-resolution pictures directly onto the Spectrum screen. These two on their own should prove that the Spectrum is well up in the graphic and colour stakes. The final section of this program gives a graphic breakdown of the machine and attempts to put each

component in perspective as to its function. The remainder of this side of the tape contains four keyboard trainer programs and a keyboard dictionary.

Side B contains eight programs which show different facets of the Spectrum's capabilities. It kicks off with the compulsory game, in this case a version of the bat and ball game Breakout. Next comes a program entitled Bubblesort. A slightly strange choice this, but I suppose it would be useful to someone writing a home database or even a business program needing a sort routine. The next program is a simulation entitled Evolution in which you can observe the population changes of a colony of rabbits and their predators, foxes.

The fifth program is a version of Conway's classic game Life. You set up colonies of organisms and watch them grow, stabilise and die from the comfort of your favourite armchair. Sixth on the list is a slightly odd one. Called Monte-Carlo, it bears little

resemblance to the racing car game you would expect. Instead it displays on the screen the results of throwing two dice and gradually compiles a histogram, which it compares with a chart of the expected results.

Finally the last program is very useful to anyone writing games or graphics software. Called Character Generator, it does just that. With this program you can call up, change or create your own custom characters and store them on tape.

C.P.

Ratings Table

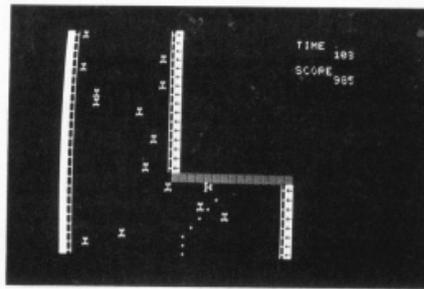
Program Quality	****
Value for Money	N/A
Presentation on Screen	***
Ease of Use	****
Crashproofing	***
Supplied Instructions	***
Overall	75%

Title: Monaco Grand Prix
Type: Tape
Supplier: Knights Computers
Machine: Sharp MZ - 80K
Price: £5

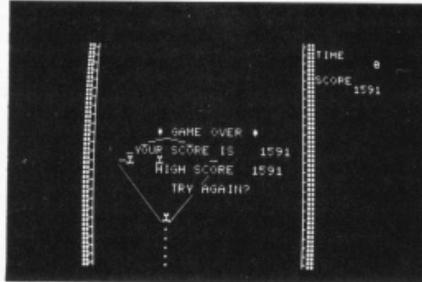
No prizes for guessing what this game is about. You have to steer your Sharp symbol of a car through a track filled with other Sharp symbols of a car, all moving slower than you are.

The idea is to keep going as long as possible, without running up the exhaust pipe of one of the others. The Sharp keeps score of how you're doing and writes up rude messages if you aren't doing very well.

The only controls are left, right and speed. There are five levels of difficulty and each one puts more cars on the track and moves you quicker towards them. The race track twists and winds, changing width drastically as it goes and for a final killer, there



Two Sharp Racetracks



are tunnels to navigate!

Once in one of these your car's headlights come on and all you can see is what appears in the cone of light produced by them. Time to react is thus dramatically reduced and crashing is almost inevitable. Not much fun.

Overall not a bad race game, but limited as all these types are. After all, there are only so many ways of running into something! Good fun for a while though and handy to have around for passing the odd minute or six.

R.H.

Ratings Table

Program Quality	****
Value for Money	***
Presentation on Screen	***
Ease of Use	****
Crashproofing	****
Supplied Instructions	**
Overall	65%

Title: Alien Defense
Type: Tape
Supplier: Microdeal
Machine: TRS-80 Models I and III

This is an arcade style game with fast action, reasonable graphics and good sound effects.

Alien Defense is a shoot the aliens game played in the horizontal mode rather than the vertical mode. You control a space ship that travels horizontally across a moving landscape. Above this landscape are scattered a liberal helping of aliens, and hidden in the mountains of the landscape are a number of your men (15 to start with).

Occasionally an alien lander will carry off one of your men, and if you destroy the lander while it is accomplishing this, and you catch your

falling man you score 500 points. Different point values are scored for the differing alien craft that you destroy, but for every 25 aliens destroyed you obtain a further bonus of 100 points for each of your men that you have left. As well as firing at the aliens you start with three Smart Bombs. These bombs will destroy everything on the screen except your ship, and this includes your men. There is also a Warp Drive facility that you can activate to get you out of tight positions. While you are firing upon the aliens, they, of course, are firing at you. The missiles that they fire can only be destroyed by one of your Smart Bombs, though their bombs can be destroyed by your fire.

Overall I enjoyed the game and its complexity, but I did find the control keys difficult to manage. The number keys 1,2 and 3 control your ship by

changing its direction, moving it up and down respectively. The number keys 8 and 9 move it forward and fire your gun. The space bar drops a Smart Bomb and the ENTER key activates Warp Drive. All this, I found, quite a lot to handle, though all except the ENTER key felt comfortable under the hand.

Up to two people can play the game and there is a top ten score board in true arcade style. Well worth buying this one.

D.B.

Ratings Table

Program Quality	****
Value for Money	****
Presentation on Screen	***
Ease of Use	****
Crashproofing	**
Supplied Instructions	***
Overall	70%

Title: Desk Diary
Type: Tape
Supplier: Acornsoft
Machine: BBC Micro Models A and B
Price: £9.95

Acornsoft's Desk Diary cassette contains two essential programs for the minor business tycoon with a BBC Micro.

The Diary itself, known as a 'Planner', looks after appointments while 'Address Book' takes the tedium out of filing, in the form of a simple database storing a large number of files alphabetically. Each file consists of a name, address, post code and telephone number. It is possible to amend the files and space is provided in each for extra information which can

be used to code the entries. This is a very useful feature as it allows selective searches (e.g. for 'mailshots' or for finding birthdays by the month) and the program will display all or part of the required files on screen with an optional output to a printer.

Anyone needing a personal secretary will be pleased with Acornsoft's Planner. It displays a very flexible appointments and reminders diary on screen and uses the computer's built-in clock to give an alarm at the time of each appointment on the day of use. The program will cope with single or recurring commitments and 'unavailable' days. It is easy to page forwards and backwards through the diary and review future reminders such as holidays and bill repayments. A

'coming soon' option shows all the entries in the diary for up to 30 days.

Both programs run in the teletext mode and make good use of the BBC Micro's colour and sound capabilities.

C.W.

Ratings Table

Program Quality	****
Value for Money	*****
Presentation on Screen	****
Ease of Use	****
Crashproofing	****
Supplied Instructions	***
Overall	85%

100 FREE PROGRAMS

FROM SILICA SHOP — WITH EVERY PURCHASE OF AN

ATARI 400

800




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	Mountain Shoot Rearguard Star Flite Sunday Golf AUTOMATED SIMULATIONS Crush Crumble Cmp Datesstones of Ryn Dragons Eye Invasion Orion Rescue at Riglet Ricochet Star Warrior Temple of Apsah Upper Reaches Aps	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 Telexlink 1 Visicalc Weekly Planner Word Processor	DYNACOMP Alpha Fighter Chompelo Crystals Forest Fire Intruder Alert Monarch Moonprobe Moving Maze Nominos Jigsaw Rings of The Emp Space Tilt Space Trap Stud Poker Triple Blockade	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	Scram States & Capitals Touch Typing EMI SOFTWARE British Heritage Cribbage/Dominos Darts European Scene Jig Hickory Dickory Humpty Dumpty Jumbo Jer Lander Snooker & Billiards Submarine Commdr Super Cubes & Tilt Tournament Pool	Castle Centurion Checker King Chinese Puzzle Space Chase Space Trek Sultans Palace Tact Trek Terry Wizards Gold Wizards Revenge Downhill Eastern Front Galahad & Holy Grl Graphics/Sound Jax-O Jukebox Lookahead Memory Match Midas Touch Minotaur Alien Egg Anthill Attank Avalanche Babel Blackjack Casino Block Buster Block 'Em Bumper Pool	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	Jawbreaker Mission Asteroid Mouskattack Threshold Ulysses/Golden Fl Wizard & Princess PERIPHERALS Centronics Printers Disk Drive Epson 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 (APX) Dasmblr (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
--	--	--	---	--	--	--	--	--	--

FOR FREE BROCHURES - TEL: 01-301 1111

For free brochures and reviews on our range of electronic products, please telephone 01-301 1111. To order by telephone, just quote what 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 10pm, Friday 4pm).
- **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 1.5" games for personal computers.
- **COMPETITIVE PRICES** - our prices, offers and service are very competitive. We are well known, understood and well 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 1182 1-4 The Mews, Hatherley Road, Sidcup,
Kent DA14 4DX Telephone 01-301 1111 or 01-309 1111



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

(PCT1182)-PCT-NOV 1982

VIC-20

OWNERS

Fully Assembled, Cased and Guaranteed

MASSIVE 16K RAM MEMORY EXPANSION

PLUGS DIRECTLY INTO YOUR VIC-20 OR MOTHERBOARD

£39.95

EXPAND YOUR VIC-20 WITH

Tandem

3+1 EXPANSION UNIT
FOR USE WITH MEMORY AND GAMES CARTRIDGES
MORE THAN 1 UNIT CAN BE USED IN TANDEM TO GIVE
EVEN MORE EXPANSION
INCLUDES ROM SOCKET
PLUGS DIRECTLY INTO YOUR VIC-20 EXPANSION PORT
ATTRACTIVELY CASED

£34.95

ZX81 USERS THE ZX-PANDA



UNIQUELY EXPANDABLE 16K RAM PACK
EXPANDABLE INTERNALLY BY PLUG-IN MODULE TO FULL 32K
ATTRACTIVE CUSTOM MADE CASE CONTOURED TO REAR OF ZX81 FOR MAXIMUM STABILITY
COMPACT SIZE. LED POWER INDICATOR
COMPATIBLE WITH MOST EXPANSION SYSTEMS
ZX-PANDA 16K EXPANDABLE ROM £25.00
ZX-PANDA 16K EXPANDABLE MODULE £19.95
OR FULL 32K EXPANDED

GIANT PANDA £39.95

ZX SPECTRUM OWNERS

UPGRADE YOUR 16K SPECTRUM TO A FULL 48K WITH OUR FULLY ASSEMBLED AND GUARANTEED

MASSIVE 32K RAM MEMORY EXPANSION

EASILY FITTED INTERNALLY. SUPPLIED WITH FULL INSTRUCTIONS

£39.95

SPECTRUM ECHO

MAKE FULL USE OF YOUR SPECTRUM'S SOUND FACILITY BY AMPLIFYING IT! ENABLES LOADING AND SAVING TO TAPE WITHOUT SWITCHING LEADS
NO ADDITIONAL POWER SUPPLY REQUIRED

OTHER FEATURES INCLUDE:

- TONE AND VOLUME CONTROL
- AUDIBLE CUEING FACILITY
- DIN COMPATIBILITY
- ATTRACTIVELY CASED

£23.50

PLEASE SEND ME:

.....

.....

I enclose £

NAME

ADDRESS

.....

.....

Send now to:
STONECHIP ELECTRONICS,
UNIT 4, HOSKINS PLACE, WATCHETTS RD, CAMBERLEY,
SURREY. TEL: (0276) 681131
MAKE CHEQUES OR P.O.'s PAYABLE TO: STONECHIP LTD

ALL PRODUCTS FULLY ASSEMBLED, TESTED AND GUARANTEED
ALL PRICES FULLY INCLUSIVE
ALLOW 28 DAYS DELIVERY

ZX81 SPECTRUM HARDWARE/SOFTWARE

SPECIAL OFFER
ONLY
£199
+ VAT

Floppy DISK Interface for ZX81

Features as reviewed in this issue

See it working
on Stand 241
at the PCW show

for orders received during September, 1982 only.

A complete working system is yours for only £199 + VAT and includes:

FIZ Interface Card, lead and connector.
Disk Drive (40-track) with power supply.
ZX Adaptor to allow use of 16K Ram pack and ZX printer.

Two 'Hard Sected' diskettes (10 sections per track). User manual.

FOR SEPTEMBER ONLY

FOR SEPTEMBER ONLY

SPECTRUM SOFTWARE NEW!!!

Three entertaining — Great fun to play games for the 16K owner:

DRAGON MAZE.....a game of patience £4.95

SPACE RESCUE a game of skill £4.95

STAR QUEST.....a game of control £3.95

(All three for £12.00)

and for the 48K Owner: a more serious programme of text storage, text manipulation, text printing, with amend and delete facilities.

TEXT PROCESSOR for serious use £6.95

ZX81 games
Unrepeatable OFFER
Only While Stocks Last

GAMES →

Startrek 16K and Space Invaders 3K normally sold individually at £4.95 and £5.95
ONLY £5.00 on one cassette

Startrek 16K and Mission of the Deep 16K normally sold individually at £4.95 and £5.95
ONLY £5.00 on one cassette

Startrek 16K and Nightmare Park 14K normally sold individually at £4.95 and £5.95
ONLY £5.00 on one cassette

BUY NOW! this offer will not be repeated

LOTS OF OTHER ZX81 SOFTWARE, SEND S.A.E. FOR CATALOGUE.

Remittance with order, by Cheque, Bank Draft, Mastercard/Visa Card
Post and Packing free on all UK orders

Please allow up to 28 days delivery

26 Spiers Close, Knowle, Solihull,
West Midlands B93 9ES, England

MACRONICS

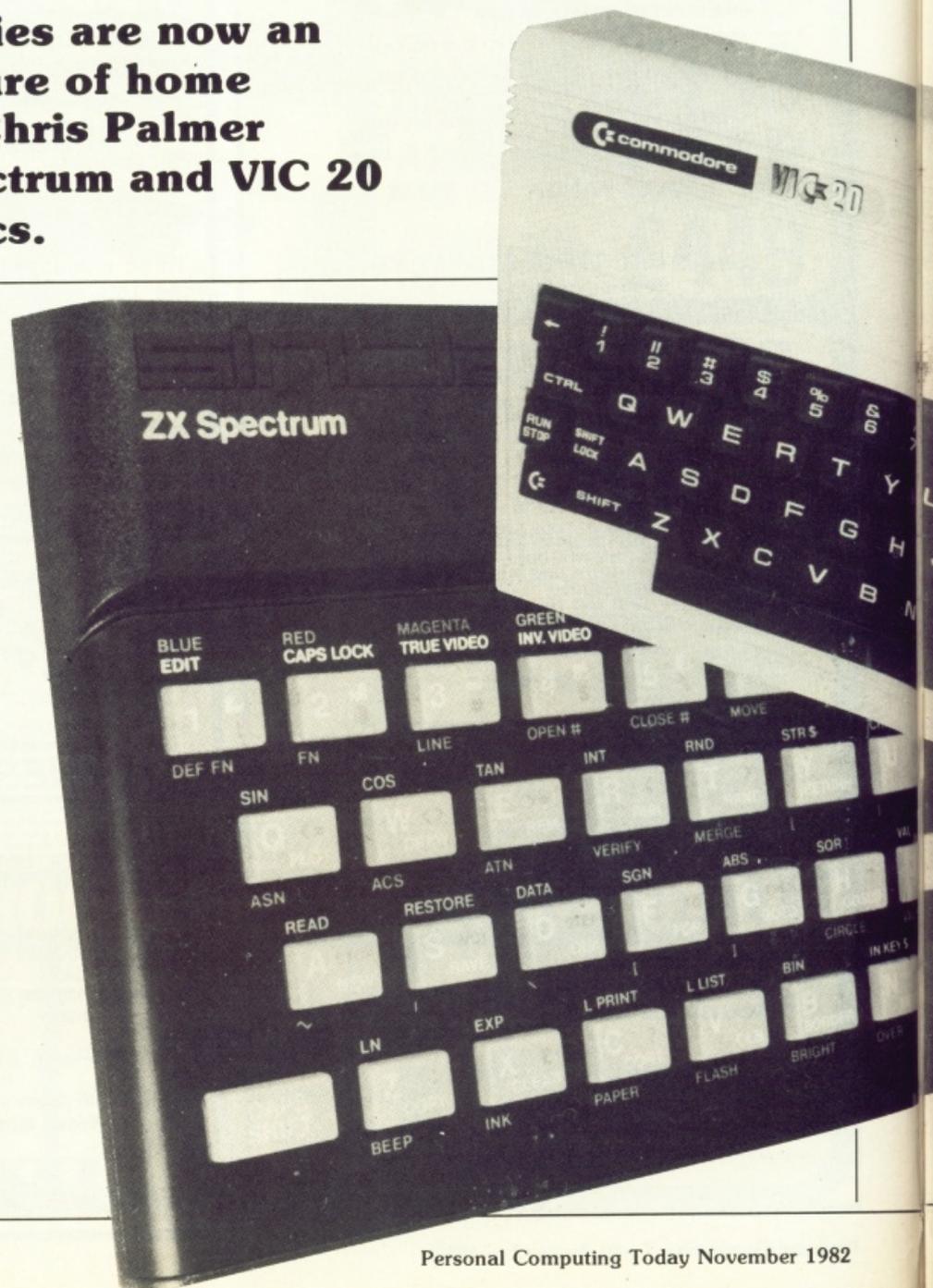
SHAPING UP GRAPHICALLY

Graphics capabilities are now an all-important feature of home computers. Here Chris Palmer compares the Spectrum and VIC 20 computers graphics.

If you observe the more recent technology battles, such as Hi-Fi or Video, you may have noticed a trend in the manufacturers advertising towards highlighting minor changes in their products that are supposed to make them streets ahead of the competition, whereas often you only benefit from such changes if you happen to be a bat, or have an oscilloscope handy.

The computer industry seems to be heading for the same sort of confrontation waving its favourite battle standard, graphics capability. For an example, if you study the Sinclair Research brochure surrounding the Spectrum launch, you will notice that in the comparison chart, the machine's graphic capabilities occupied nine out of 20 criteria.

Graphics are a very important part of a computer's facilities and in this review we take the Commodore VIC 20 and the Sinclair Spectrum to find out how they fair against each other in a graphical sense, as well as seeing how their high-resolution graphics work. Because the Vic 20 doesn't have high resolution graphics in its standard form, the system used in this review included the Super Expander cartridge. This cartridge provides the computer with an extra 3K of memory as well as adding the high-resolution commands to the machine's



vocabulary. The Spectrum used was the standard 16K model.

Before looking at the machines and their graphics power it is as well to set the stage and examine the needs and uses of high-resolution graphics.

In its simplest incarnation, high-resolution graphics are a method by which a computer can display information with great accuracy and, because of its purely visual nature, that information can be quickly understood by the user. These standards still hold true, even in the field of video games.

If you think about it, in the game *Space Invaders* the computer is placing targets on the screen and then converting the keyboard input you are giving it into the position of the laser base. The introduction of high-resolution graphics into this

game means that the characters can be made more easily recognisable by drawing them in greater detail. Their movements can also be made smoother. It is true that these games can be played on machines without high-resolution graphics but they lose a lot of their appeal due to poor displays and jerky movements.

Graphics Other Uses

So high-resolution graphics make games a lot more interesting and demanding, what else can they be used for? Because these graphics allow the computer to display information with great accuracy they are ideally suited to producing graphs and charts. This application places the computer in the realms of the scientist and the teacher where the result of the computer's calculations needs to be displayed quickly and with great accuracy, without having to resort to tables of figures.

beautiful and can even be considered to be an art form in itself. Having now outlined some of the uses of high-resolution graphics we can now look at the two machines and see how they acquit themselves.

First up is the VIC 20, costing £199.95 for the standard model. As mentioned earlier the VIC does not come with high-resolution graphics built into it, these have to be added separately in the form of a cartridge.

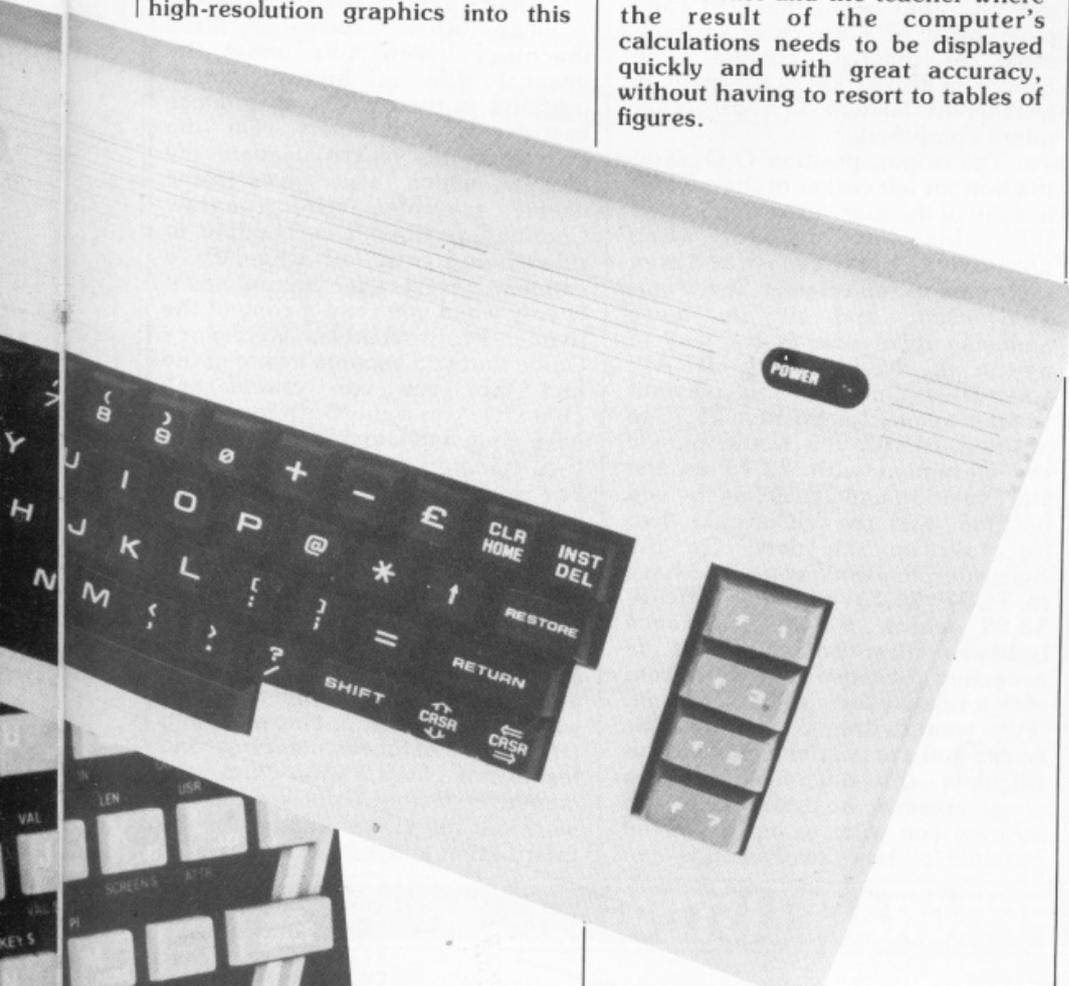
This cartridge, the Super Expander, costs £34.95 from most Commodore dealers and plugs directly into the expansion socket on the back of the VIC. The resolution of the screen, when one of the graphics modes is selected, is 160 X 160 pixels. It is worth pointing out at this moment that the VIC uses an indirect method of accessing these screen positions. The actual values that you use in the graphics statements range from 0 to 1023 in the X and Y directions, which means that if you plot a point at 500,500 on the screen and another at 501,501 you will not actually see two separate points because of the scaling factor involved in changing the values in the statement to the actual screen resolution.

The graphics commands that the Super Expander make available are fairly comprehensive and allow most shapes to be plotted. One aspect of the graphics which takes a bit of getting used to is the way in which colour is handled. First off, the colour command is spelt COLOR, which, if you are like me and only give the manual a cursory glance before launching into the program, can provide some baffling syntax errors from the work go.

Hectic High-resolution

The other colour problem is unfortunately caused by the way in which the VIC generates its high-resolution screen. To enable you to display single pixels on the screen the VIC uses the same technique as for creating definable characters. It fills the screen with characters and then blanks out the pixel information within each. Then, when you give it a command to plot a point or draw a line it calculates which character occupies that position on the screen and which part of the character contains the dot you want accessed, then modifies that position in memory.

This method works very well except when you want to colour a dot in. Because the VIC is only set up to think about character sized



The other use to which these graphics are put to, which is not particularly serious in nature, but still has some relevance, is the production of designs and patterns on the screen. If some thought is given to the use of graphics in this way then the result can be quite

SHAPING UP GRAPHICALLY

pieces of screen colour memory, when it comes to changing the colour of two dots inside that character it just gives up. The VIC does offer some compensation in the form of its second graphics mode, the multi-colour mode. This mode does allow you more control over the on-screen colours but at a price. Without getting too technical, in this mode the VIC now interprets the character data in a different fashion, reading two bits in the character byte to represent one on the screen as opposed to a direct one to one correlation. The result of all this memory juggling is that your horizontal resolution is halved but your colour power is doubled.

Two commands which warrant a bit of special attention are the circle and paint commands. The first command, circle, does as its name suggests, draw a circle. What makes it special is that it also allows you to draw ellipses and arcs. This is made possible by allowing you to specify the radius in both X and Y directions as well as letting you specify how much of the circle is to be drawn, in gradians. A gradian is one-hundredth of the circumference of the circle, with 0 gradians being at the three o'clock position.

The paint commands function once again reflects its name. It allows you to fill an area on the screen with a specified colour between either lines you have drawn or the edge of the screen. One point that is worth noting is that this command leaks! For instance, if you have plotted a circle and there is a small break in its circumference then when you paint inside the circle it will leak out and fill up the rest of the screen, so beware.

The last point about the VIC which I am going to mention is that if you are going to use the VIC with the Super Expander to write software for anyone else's use, then bear in mind that this software will only run on another machine if it has the Super Expander fitted. So if you are thinking of making your

fortune writing high-resolution games for the VIC using the Super Expander then your market is going to be restricted to people who also own one.

Spectrum

Sinclair's Spectrum, however, does not suffer from this problem as it has its high-resolution graphics already built in. The graphic command set is not so extensive but this is compensated for by the fact that you have a greater overall screen resolution, 255 X 175 to be precise. The colour control is also a little more accessible with the colour command and on the VIC being replaced with three separate commands BORDER, PAPER and INK. It still suffers from the same colour problems as mentioned for the VIC, that being that you can't plot points or lines close to each other in different colours. The Spectrum also arranges its screen in a different fashion to most other micro computers.

The origin, position 0,0, is at the bottom left corner of the screen, instead of the more usual top left, so take this into account when converting other machines programs to run on your Spectrum. The other, and slightly more annoying difference, is the way in which it handles its DRAW statements. On the VIC, if you want to draw a line from position 25,73 to position 78,102 you would phrase the statement with 23,73 as the start position and 78,102 as the end position, and the VIC would then just join up the dots. On the Spectrum, however, you would have to PLOT 25,73 and then DRAW 53,29 which is the difference between the points. This is necessary because the Spectrum uses a relative form of line drawing. If you want to draw lines around the screen you are continually having to calculate the difference between your current position and the position you want to be in. For an example of how involved this can

become, compare the listings program 1, for the VIC and the Spectrum.

Once more the Spectrum offers compensation for this, in that you can draw curves and arcs using the DRAW statement by specifying the number of radians through which the line must turn while it is being drawn. Overall the Spectrum does have better quality graphics than the VIC, but to let you make your own evaluations I have included three programs that were written and run on both machines and the screen displays they produced. This should give you an indication of the way in which the graphics commands are used and what you can expect to get out at the other end.

User Defined Graphics

The other aspect of these machines which falls under the general title of high-resolution graphics is their ability to produce user-defined characters. On the Spectrum this is explained in the manual which also gives some useful examples. Unfortunately Commodore doesn't even admit to this being one of the VIC's capabilities in its user manual and it is only when you read a copy of the firm's Programmers Reference Guide that you become aware of the fact that you can create any character you want. Both machines have good and bad points in the way they handle user-defined graphics. For instance, the VIC allows you to redefine the whole of one character set, providing you have enough memory, whereas the Spectrum only allows you to redefine 21 characters.

In its favour, the Spectrum allows you to input the character data in binary form, meaning that you break down your character into eight rows of ones and zeros and feed that information into the computer. With the VIC you have to work out the values and feed in the information in decimal.

PROGRAM LISTING

VIC GRAPHICS COMMANDS

GRAPHIC	Sets the graphic mode between normal, multi-colour and mixed.
COLOUR	Sets the screen, border character and auxiliary colours.
REGION	Changes the character colour.
POINT	Plots a single point on the screen in a specified colour.

DRAW	Draws a line in a specified colour between two or more points.
CIRCLE	Draws a circle of specified radius about a centre.
PAINT	Fills in an area with a specified colour.
CHAR	Places text on a graphics screen.
SCNCLR	Clears the graphics screen.

COLOURS AVAILABLE IN HI-RES

Black	White
Red	Cyan
Purple	Green
Blue	Yellow
Orange	Light Orange
Pink	Light Cyan
Light Purple	Light Green
Light Blue	Light Yellow

SPECTRUM GRAPHICS COMMANDS

PLOT	Plots a single point in the current INK colour.
DRAW	Draws a line from the current screen position a specified amount in the X and Y direction.
CIRCLE	Draws a circle of a specified radius around an origin.
POINT	Reads an X,Y co-ordinate giving different values for a point set or unset.
PAPER	Sets the background colour of the screen.
INK	Sets the printing or plotting colour.
BORDER	Sets the colour of the border.

COLOURS AVAILABLE IN HI-RES

Black	Blue
Red	Purple
Green	Cyan
Yellow	White

SPECTRUM

```

10 REM WINDOW & CIRCLES
20 PAPER 0: BORDER 0: INK 7: CLS
30 FOR I=0 TO 255 STEP 10
40 PLOT I,0: DRAW 255-I, I * .686
50 DRAW -I, 174-I * .686
70 DRAW I,I * .686 - 174
80 NEXT I
90 FOR I=30 TO 60 STEP 15
100 CIRCLE 127,87,I
110 NEXT I
    
```

Program 2

```

10 REM SIN, COS, AVERAGE
20 PAPER 0: BORDER 0: INK 7: CLS
30 PLOT 10,10: DRAW 0,155
40 PLOT 10,87: DRAW 235,0
50 FOR I=10 TO 245
60 LET X=I: LET Y=SIN(I/20) * 80 + 87
70 LET Y1=COS(I/20) * 80 + 87
80 LET Y2=(Y+Y1)/2
90 PLOT X,Y
100 PLOT X,Y1
110 PLOT X,Y2
120 NEXT I
    
```

Program 3

```

10 REM OCR CHARACTERS
20 FOR I=65 TO 74
30 FOR T=0 TO 7
40 READ A
    
```

```

50 LET A$=CHR$I: POKE USR A$+T,A
60 NEXT T: NEXT I
70 STOP
100 DATA 126,66,66,66,66,66,66,126
110 DATA 12,4,4,4,4,4,6,6
120 DATA 7,1,1,1,7,4,4,7
130 DATA 14,2,2,2,15,3,3,15
140 DATA 24,24,24,24,27,31,3,3
150 DATA 7,4,4,4,7,1,1,7
160 DATA 14,10,8,8,15,9,9,15
170 DATA 15,9,1,1,2,4,4,4
180 DATA 30,18,18,18,63,51,51,63
190 DATA 31,17,17,17,31,3,3,3
    
```

VIC 20

Program 1

```

10 REM WINDOW & CIRCLES
20 GRAPHIC 2
30 COLOUR 0,0,1,0
40 FOR I=0 TO 1023 STEP 30
50 DRAW 2,I,0 TO 1023,I TO 1023-I,1023
   TO 0,1023-I TO I,0
60 NEXT I
70 CIRCLE 2,512,512,300,300
80 CIRCLE 2,512,512,200,200
90 CIRCLE 2,512,512,100,100
    
```

Program 2

```

10 REM OCR CHARACTERS
20 CG=7168+8*48
30 FOR I=0 TO 79
40 READ A
50 POKE CG+I,A
60 NEXT I
100 POKE 36869,255
110 END
200 DATA 126,66,66,66,66,66,66,126
210 DATA 12,4,4,4,4,4,6,6
220 DATA 7,1,1,1,7,4,4,7
230 DATA 14,2,2,2,15,3,3,15
240 DATA 24,24,24,24,27,31,3,3
250 DATA 7,4,4,4,7,1,1,7
260 DATA 14,10,8,8,15,9,9,15
270 DATA 15,9,1,1,2,4,4,4
280 DATA 30,18,18,18,63,51,51,63
290 DATA 31,17,17,17,31,3,3,3
READY.
    
```

Program 3

```

10 REM SIN COS AVERAGE
20 GRAPHIC 2
30 COLOR 0,0,1,0
40 DRAW 2,10,10, TO 10,1013
50 DRAW 2,10,512, TO 1013,512
60 FOR I=10 TO 1013 STEP 5
70 X=I: Y=SIN(I/80)*400+512
80 Y1=COS(I/80)*400+512
90 Y2=(Y+Y1)/2
100 POINT 2,X,Y
110 POINT 2,X,Y1
120 POINT 2,X,Y2
130 NEXT I
READY.
    
```

PRESENTING
THE NEW...

KEMPSTON (Micro) ELECTRONICS ZX SPECTRUM HARDWARE

See us at the
PCW Show
(Also at
ZX Microfair)

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

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

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

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

ZX Spectrum PPI port. £16.50

ZX 2 slot Motherboard. £16.95

ZX Stackable connector. £ 5.50

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

KEMPSTON (Micro) Electronics

60 Adamson Court, Hillgrounds Road, Kempston, Bedford MK42 8QZ.
Please allow 21 days for delivery. S.A.E. in all correspondence.



Your name _____
Your address _____

Date _____

Quantity	Description	Unit price	Amount
	ZX Spectrum PPI Port	£16.50	
	2 Slot Motherboard	£16.95	
	Stackable Connector	£5.50	
		Postage	
		Total	

SU6

B B C SOFTWARE

ASTEROIDS — Model A or B £7.80 + VAT

Probably the best space game available for the BBC machines — very similar to the arcade original. Written entirely in machine code to make it both compact and fast. Makes full use of the high resolution graphics.

SNAKE — Modek B £7.80 + VAT

This highly colourful arcade game has been acclaimed by all those who have reviewed it — see Beebug User Group magazine " - - - the game is really fun and very, very addictive."

HITCH-HIKER'S GUIDE — Model B £5.80 + VAT

An adventure based on the characters of the book 'Hitch-Hiker's Guide to the Galaxy'. Hours can be spent exploring such places as the restaurant at the end of the Universe, Betelguese Spacedome, etc. searching for objects that have to be returned to the Five Artefacts Inn.

Computer Concepts has the largest range of quality software for the BBC machine and unlike most other software on the market **ALL** our programs run on both the old and new operating systems. Write for details of our ever growing range.



Dept PCT
16 Wayside
Chipperfield
Herts WD4 9JJ
Tel: (09277) 69727

Spectrum MONITOR

MACHINE CODE DEBUG/DISASSEMBLER

- Enter, Run, Debug machine code programs
- Compatible with Basic
- Breakpoint & Register Display
- Disassembly to Screen and/or ZX Printer
- Number converter — Hex/Dec/Hex
- 16K and 48K versions on one cassette + 30 page Manual.

£7.50

EDITOR/ASSEMBLER available soon — please send SAE for details

ZX81

SCREEN KIT 1 MORE POWER TO YOUR SCREEN

In all your BASIC Programs

4K to 64K

£5.70

BORDERS any size, anywhere on screen. **SCROLL** in all 4 directions. **CLEAR** and **REVERSE PART OF SCREEN**. **FLASHING CURSOR** anywhere on screen — simulates INPUT. **DATA FILES** Save & Load Basic variables: Double Speed.

880 bytes machine code for INSTANT RESPONSE. Becomes part of Basic Program.

ZX-MC MACHINE CODE DEBUG/MONITOR

COMPLETE FREEDOM FROM BASIC for machine code programmers

4K to 64K

£7.50

ENTER, RUN, DEBUG machine code. SAVE, LOAD, VERIFY at double speed. BREAKPOINTS and REGISTERS DISPLAY. Self-contained - cannot be used with Basic. Cassette plus 36 page Manual.

RELOAD MACHINE CODE ENTRY/DEBUG

16K to 64K

£6.95

Version of ZX-MC without the Save/Load/Verify facility. ENTER, RUN, DEBUG machine code. Instantly CREATE A REM LINE of any length. Compatible with Basic. Switch between Program & RELOAD Screen displays. Breakpoints and Registers displays

Picturesque

6 Corkscrew Hill, West Wickham, Kent.

Mail order only — 14 days delivery.
SAE for more details — Cheques/POs to
PICTURESQUE

MICROSPOT

TI PRINTER SIMULATOR

This short, sharp program by Mike O'Regan instantly allows you to use your TI99/4A as a message teleprinter.

```

80  REM set message to string variable M$ (28 characters or
less)
90  REM set line number to variable Y
100 FOR I = 1 TO LEN(M$)
110  a = asc (seg$ (M$,i,1))
120  Call CHAR (104, "0000001818")
130  Call COLOR (10,2,16)
140  Call HCHAR (y,i + 2,104)
150  Call HCHAR (y,i + 2,A)
160  Call SOUND (20, - 3,0)
170  NEXT I
180  RETURN

```

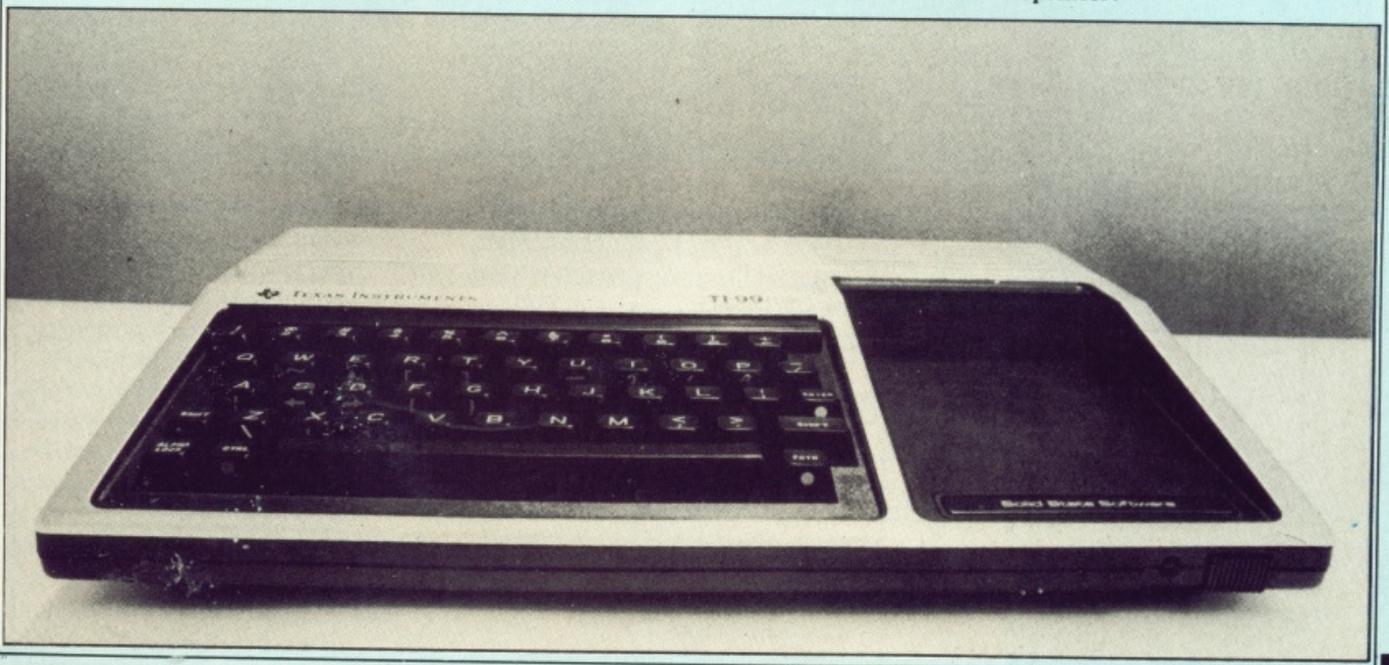
If you ever wanted to use your computer to transmit messages, read on.

This is a routine to simulate a teleprinter and print a message on any line specified. It prints a white square with a large black dot in the centre, which marks the

position of each character in the message before moving along the line to reveal the next character, at the same time making a realistic imitation of the sound of a teleprinter.

PROGRAM NOTES

- Line 110 sets each character of the message to the variable A (for line 150).
- Line 120 defines the 'moving dot', character.
- Line 130 sets the colour of the 'dot' to black on white.
- Lines 140 and 150 print the 'dot' followed by the message character.
- Line 160 produces 20 milliseconds of white noise to simulate a teleprinter.



ENTER THE DRAGON



HARDWARE SPECIFICATION

- ★ 6809E Microprocessor, a great advance on the original 6502 — still used by PET, Apple, Atom, Atari 400, BBC Micro, VIC 20.
- ★ 32K RAM memory as standard — At least twice as powerful as other computers at the same price, expandable to 64K.
 - 26K user available after 4 pages of high resolution graphics.
- ★ DRAGON 32, unlike most units, gives EXTENDED MICROSOFT COLOUR BASIC as standard.
 - Microsoft basic has become the industry standard (e.g. IBM, Apple, Commodore, Tandy, Atari).
- THIS HAS: —
 - Advanced graphics features — set, line, draw, circle, paint, print using.
 - Advanced sound feature.
 - Automatic control of cassette recorder.
 - Full editing features — insert, delete, change.
- ★ DISPLAY:
 - 9 Colours.
 - 5 Different resolutions from 512 points of text (16 x 32) to 49152 points (256 x 192) at high resolution.
 - Home UHF TV set and/or colour monitor.
- ★ KEYBOARD:
 - Professional quality keyboard to the standard on data entry terminals.
 - Typewriter layout and feel.
 - Guaranteed for 20 million key depressions.
- ★ SIMPLE PLUG-IN CONNECTION FOR: —
 - Joystick controllers.
 - Audio cassette recorder (inc. Stop/Start).
 - Printer (Centronics parallel).
 - Games cartridges.
- ★ 160 page "BASIC" training manual — FREE.

PROGRAMMING STATEMENTS AND COMMAND

MATHEMATICAL AND LOGICAL OPERATORS

Symbol	Operation
^	Exponentiation
-	Unary minus
*	Multiplication
/	Division
+	Addition
-	Subtraction
>	Greater than
<	Less than
=	Equal to
<>	Not equal to
>=	Greater than or equal to
<=	Less than or equal to
NOT	logical NOT
AND	logical AND
OR	logical OR

BASIC LANGUAGE STATEMENTS

CLEAR	LINE INPUT
CLS	ON . . . GOSUB
DATA	ON . . . GOTO
DEF	POKE
DEFUSR	PRINT
DIM	PRINT TAB
END	PRINT USING
EXEC	PRINT @
FOR TO STEP NEXT	READ
GOSUB	REM
GOTO	RESTORE
IF	RETURN
INPUT	STOP
LET	

SOUND GENERATION STATEMENTS

PLAY	SOUND
CASSETTE RECORDER CONTROL STATEMENTS	
AUDIO	CLOSE EOF (- 1) OPEN
CLOAD	CSAVE INPUT PRINT
CLOADM	CSAVEM MOTOR SKIPF

PRINTER CONTROL STATEMENTS

LLIST	OPEN	PRINT
SYSTEM COMMANDS		
CONT	LIST	RUN
DEL	NEW	TROFF
EDIT	RENUM	TRON

GRAPHICS STATEMENTS

CIRCLE (x,y)	LINE	PCOPY	PUT
COLOUR	PAIN	PMODE	RESET
DRAW	PCLEAR	PRESENT	SCREEN
GET	PCLS	PSET	SET

STRING FUNCTIONS

ASC	INKEY\$	LEN	STRING\$
CHR\$	INSTR	MID\$	STR\$
HEX\$	LEFT\$	RIGHT\$	VAL

NUMERIC FUNCTIONS

ABS	INT	POINT	SQR
ATN	JOYSTK	POS	TAN
COS	LOG	PPOINT	TIMER
EXP	MEM	RND	USR
FIX	PEEK	SGN	VAPTR

ALL THIS FOR £195
(VAT INCLUSIVE IN ALL PRICES)

SOFTWARE AVAILABLE NOW!

CARTRIDGES

- Ghost Attack* — A Pacman type game for one or two players, fifteen skill levels.
- Berserk* — A challenging shooting game for one or two players.
- Cosmic Invaders* — The infamous game on your own set — 15 levels, 1/2 players.
- Meteoroids* — Pick your way through the treacherous asteroid belt.

CASSETTES

- Compendium of Games* — A broad range of games to illustrate the abilities of Dragon 32.
- Compendium of Applications* — A selection of routines to get the most from your Dragon.
- Quest* — An adventure game — defeat the dreaded morlock.
- Madness and the Minotaur* — An adult strategy game in real time.
- Computavoice* — Allow you to instruct Dragon 32 how to speak using phoenetic sounds.
- Graphic Animator* — Create simple animated colour cartoons on the screen.

SEE THE DRAGON
ON JADE COMPUTER
STAND AT THE
NORTHERN
COMPUTER SHOW

jade

BELLE-VUE
MANCHESTER
Nov 25 — 27th

To: JADE COMPUTERS, MAIL ORDER DIVISON, COOMBEND, RADSTOCK, BATH BA3 3AN.
TELEPHONE (0761) 32570 FOR MORE DETAILS.

Please send me:

Enter quantity in box
Dragon 32k Colour Computer £195

CARTRIDGES

Ghose Attack <input type="checkbox"/>	£24.95
Berserk <input type="checkbox"/>	£19.95
Cosmic Invaders <input type="checkbox"/>	£19.95
Meteoroids <input type="checkbox"/>	£19.95
Joysticks <input type="checkbox"/>	£19.95
Cassette Recorder <input type="checkbox"/>	£39.95

CASSETTES

Games Compendium <input type="checkbox"/>	£7.95
Application Compendium <input type="checkbox"/>	£7.95
Quest <input type="checkbox"/>	£7.95
Madness and the Minotaur <input type="checkbox"/>	£7.95
Computavoice <input type="checkbox"/>	£7.95
Graphic Animator <input type="checkbox"/>	£7.95

I enclose Cheque/PO Number for £ made payable to
JADE COMPUTERS LIMITED (Plus £4.50 P&P for Great Britain + Northern Ireland).

Name

Address



TI's Home Computer. Unbeatable value. Unrivalled software.

When you choose a TI Home Computer you're choosing a "real" computer. A computer that can grow with you and your family. A computer that lets you play, invent, discover... that lets your imagination soar.

What makes this possible is our wide range of software. You'll find subjects as simple as "Early Reading" and as complex as "TMS 9900 Assembler Editor." Many of our programs are packaged in our unique Solid State Software™ Command Modules. Some have sound. Others have superb colour graphics. Simply plug them in and begin.

When you want to learn to

program for yourself, the TI 99/4A is ready too. TI BASIC is built in. The programming manual is easy to understand, easy to follow every step of the way. You will be amazed

to discover how much fun programming can be.

And when you're ready to expand your system, we're ready too. Our unique Peripheral Expansion System can house up to seven peripherals without extra cables or clutter. There is even a speech synthesiser that gives your computer a voice.

Sound impressive? Try the TI Home Computer for yourself at your nearest dealer. At around £200 you'll look no further.



WHAT THE PROFESSIONALS LOOK FOR IN A HOME COMPUTER	
Feature	Texas Instruments TI 99/4A
Microprocessor	TMS 9900 16 BIT
Graphics	16 colour, high resolution
Languages	TI-BASIC (built-in), extended BASIC, UCSD-PASCAL, TI-LOGO, Assembler
Memory	16K RAM standard—expandable to max ROM/RAM of 110K
Keyboard	Full size, standard typewriter style
Software	1000 programs to choose from worldwide
Solid State	Yes
Speech Capability	Yes

TEXAS INSTRUMENTS

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 PCT

I have an unexpanded VIC 20, a tape recorder, and a 1515 Printer. I have a tape on file of a three column list from this with a program to open the tape to the printer I can print one copy at a time, but for more copies I must rewind the tape every time. I want to make several copies continuously. Common sense tells me the way to do this is to put the file into the computer memory in a program with a loop, and print the output of the program. I just cannot find out how to do this, please help me — it's driving me mad.

D D Knight
Birmingham

The answer to your problem is to read the data from the tape into an array. Once the information is in the computer you can process it or print it out as many times as you like.

For further information on how to create and use arrays consult Appendix C: VIC BASIC in the VIC manual.

Dear Sirs,

Having the intention of purchasing a microcomputer I bought the first issue of your magazine and found it most informative.

It is apparent in the article therein that the Sinclair ZX81 or ZX Spectrum would be more than adequate for the work in mind, except for the printer. I need to print at least a 64 character line with upper and lower case, including descenders.

Would you please advise me if it is possible to use another printer with either of these computers and if so, suggest suitable equipment?

W G H Wye
Hemel Hempstead

I am afraid to tell you that there are, as far as we know, no printers directly compatible with the ZX81 or Spectrum that can handle 64 characters per line. In order to print out that number of characters you would need to use a Centronics parallel printer, but you would need to buy an interface to connect it to the computer. A firm called Memotech produce this sort of device and it costs about £35.

Dear Sir

I am very interested in computing and I would like to find out about machine code programming, as the whole thing is a total mystery! I have heard several good reports about 'Mastering Machine Code on your ZX81 by Toni Baker.

I have, however, on order a Sinclair ZX Spectrum. I

was wondering if this book would also serve as an introduction to machine code on the Spectrum (I believe they use the same processor the Z80A), or should I wait for a book on machine code for the Spectrum?

Stuart Slicer
Bradford

Unfortunately, Toni Baker's book about machine code programming is not much use with regard to the Spectrum because it is aimed specifically at the ZX81. There is a book soon to be published by Melbourne House Publishers entitled 'Spectrum Machine Language for the Absolute Beginner'. It costs £6.95 and is available from the firm at 131, Trafalgar Road, Greenwich, London SE10.

Dear Sir,

Please could you tell me if I bought the black and white Acorn Atom and the BBC ROM would I now have a colour computer with 16K RAM (the same as the BBC Microcomputer Model A)? i.e. could the BBC ROM turn it a colour computer and expand the memory without any other add-ons?

G J Bees
Swansea

The straight answer is no. But if you didn't buy last month's PCT I suggest you try and get hold of a copy now. We reviewed the Atom with the BBC Basic board in October to find out exactly what the configuration could do.

Dear Sirs,

I would be most grateful, as a newcomer to computer programming if you could help with the following problem.

I own a VIC 20, fully expanded to 32K, and as you know, when this occurs, the screen address starts from location 4096 (decimal) instead of 7680 and the colour address also changes from a starting point of 38400 to 37888. The start of BASIC moves from 4096 to 4608.

I do not want to continually remove the plug-in board (quite a difficult task), as the computer is intended for mainly business use. If a program is published for an unexpanded machine e.g. a games program, is it possible to insert a subroutine at the beginning of the program that will allow the computer to re-calculate the difference in screen addresses? (For example, if the CPU is "informed" that location 7680 really means location 7680 minus 3584 and so on throughout the addresses, I reason that it should then be possible to type in the "unexpanded" program exactly as written for automatic conversion in the subroutine.

Is such a program possible and if so, would you please publish a listing?

Without wishing to appear greedy, may I request that sometime in the future you publish a "sort" program that allows sorting into alphabet order, a list of names that have just been "READ" from a tape bearing in mind that after READING, no cursor appears!!

Many thanks in anticipation.

Yours Sincerely

A E Sellive

Shropshire

P.S. Looks like the best computer magazine so far!

The problem you have is quite common amongst VIC 20 owners but happily it can be solved by using a very clever little software package that has been developed by Arfon Microelectronics. The program, called Min Vic is loaded in before you load any other program and when run fools the VIC into thinking that it is a standard system. The result of this is that you can run standard Vic programs in an expanded system without all the problems of having to change all the screen POKE statements.

Dear PCT

I am planning to buy a computer in December, I would like to know how much memory the Commodore 64 has and how much it will cost. I read the article about it in the September issue and was most impressed.

I have had access to a VIC 20 and liked it very much. Also, can you buy a VIC 20 cassette recorder plug as I would like to convert my domestic recorder to do the job, or is this impossible?

Dane Smith

London

As it stands, the Commodore 64 has a standard 64K of memory space on board which is more than adequate for the majority of applications. The price of the machine is not yet definite but is reported to sell for around the £300 mark, when it is finally released.

It is impossible to convert your own domestic recorder for use with a VIC 20. Commodore sell its own brand of cassette recorder for use with the VIC as part of the system for a very good reason. All the software produced by Commodore is recorded at the correct volume levels which makes it much more reliable and a lot easier to use. It's much better to stick to the proper machine.

Dear Sir

I am currently developing a program, which will be my first practical outside application, for an outside voluntary organisation and would welcome your assistance in the solution of the final (I hope) problem.

The problem is written in BBC basic and the following is an outline:— following the input of a set of data common to all the program requests the input of a name (N\$) and a set of variables relevant to that person from which it then calculates value (Z). Storing both into a one dimensional array it then proceeds to request the next name and variables thus giving at the completion a list of names and values from the array which has been incremented by one at each return. Viz:

N\$ (1) Fred	...	Z(1) 1000
N\$ (2) Joe	...	Z(2) 1234
N\$ (3) Tony	...	Z(3) 1500

I now require to list the 'result' from the information in store preferably without re-inputting the data. The result will be the list of values in descending order with the associated name to that value, i.e. for the data overleaf.

1. Tony	1500
2. Joe	1234
3. Fred	1000

A standard sort for the values of Z in the array will produce the right hand list but a similar sort applied to N\$ could obviously result in an alphabetical list with the order of names not relative to their values. i.e.

1. Fred would become paired with 1500 not the actual 1000.

What system is required to associate N\$(x) and Z(x) in order to achieve a satisfactory sort and listing?
Keith Worthington
Cheshire

The easiest way to produce the sorted list that you require is to change the numeric variables into string variables and then place both sets of data into a two-dimensional string array. Even though the numbers are now in the form of strings they will still sort true.

If you need to do any calculations with these numbers this will have to be done before or after you change them into strings. Having now placed the two lists in the one array when you do the sort on the numbers you will also be able to swap the names over at the same time, thus keeping the order correct.

PRIORITY REPLY

November 1982 Issue

Personal Computing Today Reader Enquiry Service

Name

Address

.....

.....

.....

.....



NEW

SPECTRUM GAMES

Two 16K programmes on cassette

AIRPORT This could be a nightmare! As a member of the airport groundstaff your task is to assist in the successful landing of an aircraft but beware, there are many obstacles in your path!

Full animated instructions included with each game

BOTH ON ONE CASSETTE FOR ONLY £4.95**BATTLESHIPS & CRUISERS** 16K - ZX81

First computer version of this popular game of strategy and tactics. Both grids on view together. Establish the position of your fleet then locate and

destroy the computer's fleet. Visual display shows hits and misses made and gives running score.

ONLY £4.95 (\$9.90)**GRAPHICS TOOLKIT** 22 exciting MACHINE CODE routines that give you control over your screen as never before!**(ZX81 - 16K RAM ONLY)**

Draw/Undraw	Print position controls	Scroll Facilities	Oscreen/Offscreen
Foreground On/Off	- UP, DOWN, LEFT, RIGHT	- UPSCROLL, RIGHTSCROLL, LEFTSCROLL	Background On/Off
Border/Unborder			Search and replace
Fill screen	Editprint - moves next		Square draw
Reverse screen	PRINT position to first edit line		

All these routines are in machine code for SUPER-FAST response! GRAPHICS TOOLKIT uses only 2K of your RAM and that includes space to load the programmer's TOOLKIT described below.

ALL FOR ONLY £5.95 (\$11.90)

An ESSENTIAL addition to your 16K RAM ZX81

TOOLKIT

Provides the following additional facilities

Renumber - including GOTO's and GOSUB's	Hyper graphics mode	code and together take up only 1K of your precious RAM - an incredible achievement!!
Search and list	Fillscreen	
Search and replace	Reverse screen	
Free space	Tape wait	
	All these routines are written in machine	

FOR 16K - ONLY £4.95 (\$9.90)

NEW

16K SPECTRUM + £42.50 = 48K SPECTRUM

We did it for the ZX81 - we've now done it for the ZX SPECTRUM! Add on memory at an amazingly low price. Increase your 16K to a massive 48K with the

32K RAM BOARD

Using quality components on a high quality double sided board to give you top performance, reliability and economy. You can carry on writing larger programmes in sections ready to

MERGE when your extra 32K RAM BOARD arrives within 21 days. Installation is simple - the entire fitting is completed in just a few minutes (with the aid of a screwdriver - NO SOLDERING!)

FOR 16K SPECTRUM - ONLY £42.50

NEW

ECONO TECH 16K RAM PACK

We believe the Econo Tech is the lowest priced 16K RAM available.

No frills - just a reliable and economical way to expand your ZX81.

ONLY £20.95 (\$39.95)

With advances in microtechnology we are now able to offer the **64K RAM PACK** Same quality as the 16K RAM below but giving massive memory to your

ONLY £62.95 (\$119.95)

As reviewed in "Your Computer" March 82

16K RAM PACK

Quite simply the best available plus FREE 'Alien Attack' (7K M/code) on cassette value £5.75 (\$11.00)

Fully built, tested and guaranteed. Uses existing power supply (Min. 600 m.a.)

Compatible with printer. No wobble problems

Gold plated edge connector for perfect contact with your ZX81

Normally despatched within 10 days of receipt of your order.

**ONLY £26.50 (\$49.95)**

All prices are fully inclusive of post and packing. OVERSEAS CUSTOMERS PLEASE NOTE: ALL PRICES ARE APPLICABLE FOR EXPORT, INCLUDING AIRMAIL POSTAGE. PAYMENT MAY BE MADE IN STERLING (MONEY ORDER AVAILABLE AT YOUR BANK) OR YOUR OWN U.S. \$ CHEQUE, MADE PAYABLE TO JRS SOFTWARE. DESPATCH NORMALLY 7 DAYS FROM RECEIPT OF YOUR ORDER

JRS SOFTWARE

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

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 txlpx 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 4x4x4 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)

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:

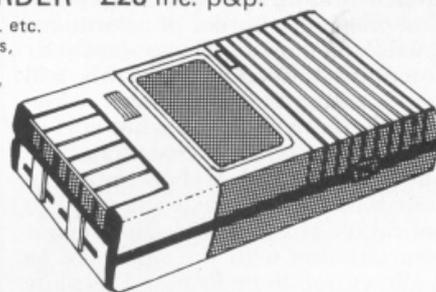
- * Stock Control (October)
- * Sales Ledger (November)
- * Business Accounts
- * Debtors Ledger
- * Tax Accounting

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



● 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.

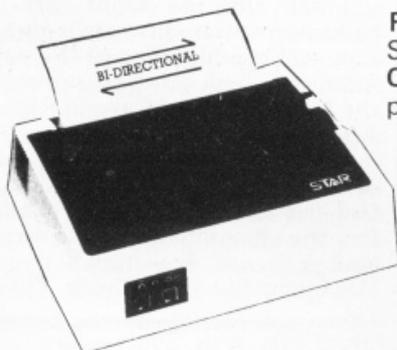


- STAR DP8480 RS232C (SERIAL) **£285** plus £6 Securicor delivery
- CENTRONICS (PARALLEL) **£265** plus £6 Securicor delivery

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.

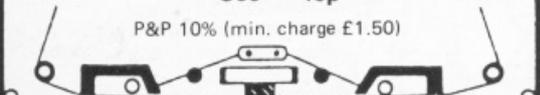
Other leads available — please telephone.

COMPUTER CASSETTES

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

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

P&P 10% (min. charge £1.50)



ORDER FORM Dept. PC4 Data — Assette, 44 Shroton St., 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 _____

MICRO BUYING

GET IT RIGHT FIRST TIME

If you want to venture into the world of computing but are unsure about how to take those first steps our feature on microcomputer buying will help you get it right first time.

Buying a microcomputer is a unique experience. Unlike buying a car or a record player many people do not really know what they will use their computer for once they have bought it. Because you don't know what you want it for, it is very difficult to decide what to look for in the computer when you look round the shops. We have put together some of the major and minor points to look out for when you take your wallet in your hands and buy a microcomputer.

The first thing to do is to try and give yourself an order of priority for the different functions you want your computer to perform, as this will avoid embarrassing silences when the salesman asks you what sort of computer you want. Secondly, you have to decide just how much of your hard earned cash you want to get rid of. This is also useful in your confrontation with the salesman as it allows you to be firm and resolute when you see hoards of bright, shiny computers that cost just that little bit more than you can afford.

So, to establish your priorities you have to decide whether you want to play games, work out your

home accounts, teach your children to speak French (like in the TV advert) or just explore the wonderful world of home computing. If you can arrange these sorts of criteria in an order that satisfies you then half the battle is won.

The salesman will then most probably show you the computer which he thinks is most suited to your ideas, but beware of the dealer who appears to be deaf when you state your purpose and then bases his judgment of your requirements on the size of your wallet and how easily he can get you to sign on the dotted line.

The first way to establish whether or not the computer you are being shown will do what you want it to is to ask to see a software demonstration. This has two benefits, first you will be able to see how the computer copes with the task and also it should give you a good idea of what software is available for that machine.

This is an important point because if it is your first computer and you haven't any programming knowledge then you will be relying on commercially written software

until you have gained enough experience to write it yourself. If the salesman can't show you the application you want try to find out why this is and do not be put off by avoidance tactics.

Games People Play

If you want to use the computer as a games machine then check on what sort of screen display it produces. Is it colour, does it support high resolution graphics and how easy are these features to use when you get round to writing your own games? Also find out whether or not you use joysticks or paddles and if so, how much software is around that will use these features, or how easy it is to write software for them yourself. If in doubt ask the salesman to demonstrate a game — they will usually jump at the opportunity to show off their prowess at the latest verion of Cosmic Rhino or Attack of the Space Gerbils.

Following on from the question of software it is important that you find out what software is available for the computer, what form it comes in and how much it costs. Machines like the Texas TI99/4a



have quite a limited range, where as the Tandy TRS-80 machines have perhaps one of the best software libraries in existence. A sure-fire way of finding out how well your machine is supported is to consult our Software Checklist at the back of the magazine. Another useful way to find out about any machine you are thinking of buying is to contact some of the computer users clubs in your area and find out if there are any members that already own the machine you are interested in.

Beginners Beware

If you are a complete beginner, ask to be shown the manuals and documentation that comes with the computer. See if you can understand them easily and make sure that the documentation is complete. Bear in mind that you will be living by this manual for the first couple of months after you buy your computer. If the manual does not come up to scratch, but you still want the computer, find out if there are any independent books that will give you the help you require. Some manufacturers produce self-teaching guides that are based around their own makes of computers.

One point that is usually overlooked by people when they buy a computer is the after sales service and support the dealer can give. If you buy your micro from a high street chain store then it is unlikely that they will be able to give anything more than the standard warantee period and this usually means sending the computer back to the manufacturer. Find out the dealer's attitude to you ringing them up or calling round with problems other than hardware faults on the machine. It is very reassuring to know that there is a friendly voice on the end of a telephone who can help you out of any jams.

Where To Buy

Buy where can you buy your computer from? Remember that you are buying a piece of complex technology and not something simple like a clock radio. Unless you know exactly what you want and are sure that you can handle all the problems on your own I would be wary of high street stores and mail order operations. It is usually worth paying the recommended price for your computer and going to a specialist computer dealer because they will have a lot more understanding of what you want and the best way for you to get it. Remember, if you are buying a cut-price computer then the money that the company loses on the discount has got to be recouped somewhere and this usually means lack of support.

We have compiled a checklist of points to watch out for when you are evaluating a computer. They are not hard and fast rules because every computer is different and they may have particular features that outweigh some of their disadvantages.

CHECKLIST

Standard Home Computer

Memory: At least 16K. If this memory size isn't standard then the memory expansion should be cheap and easily fitted.

Screen Format: At least 30 columns, although 40 columns is a more acceptable standard.
Tape Recorder: If the Computer uses a domestic tape recorder then it should come with all the necessary connecting leads. If it uses its own tape recorder then check the price because its virtually essential to have one.

Display Unit: If the computer doesn't contain its own then find out what it needs e.g. domestic televi-

sion or video monitor. Once again check that you will get the necessary leads and modulator.

Language: Most machines will come with BASIC built in, find out whether other languages can be added later.

Expansion: The computer should contain at least a printer socket.

Games Computer

Screen Format: The machine should be able to run a colour screen and support high resolution graphics.

Expansion: The computer should have at least one port for attaching joysticks or paddles.

Sound: Sound should be available either through the television speaker or through an internal speaker.

Cartridges: These are not essential but they are a very quick and safe method of using games.

Home-Business Computer

Memory: Definitely 16K, although 32 or 48K is more useful.

Screen Format: The computer should have the ability to run either a 40 or an 80 column screen.

Expansion: The computer should be able to support a range of printers as well as a disc drive unit.

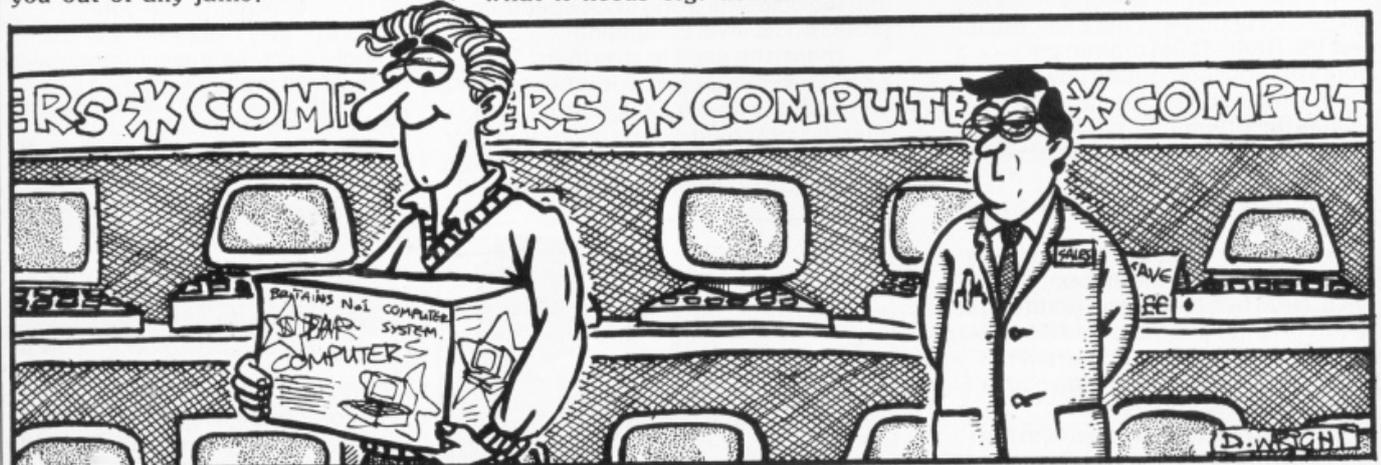
Software: The computer should have a wide range of business software that is tried and tested.

Educational Computer

Keyboard: The keyboard should preferably be laid out like a typewriter qwerty style and have moving keys.

Expansion: The computer should be able to link up to a network of other computers, thus cutting costs on printers and discs.

Display Unit: The computer should be able to drive a cheap monitor or television set.



Sinclair ZX Spectrum

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

**From only
£125!**

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

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

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

Professional power – personal computer price!

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

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

You have the facility to support separate data files.

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

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

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

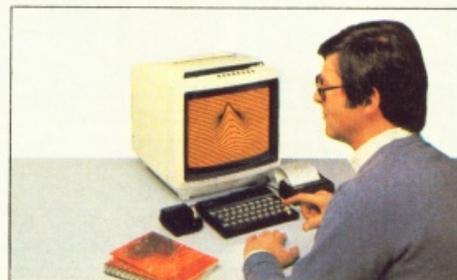


Ready to use today, easy to expand tomorrow

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

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

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



Key features of the Sinclair ZX Spectrum

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

rum

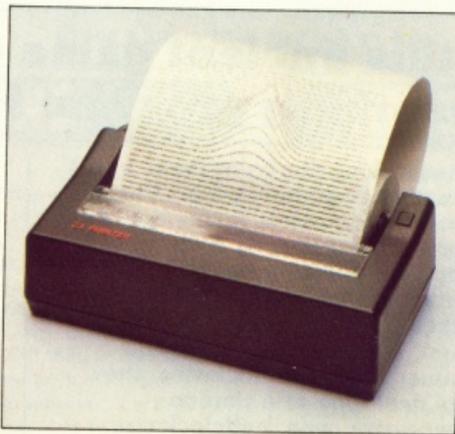


The ZX Printer - available now

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

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

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



The ZX Microdrive - coming soon

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

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.

ZX Spectrum

Available only by mail order and only from

sinclair

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

How to order your ZX Spectrum

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

Access or Trustcard.

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

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

Qty	Item	Code	Item Price £	Order 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 _____

PCT811

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

AYO!

A.E. Ward brings this ancient game of Tactics up to date with an absorbing program for you to run.

If you were to search for the oldest board game in the world it would be difficult to find one older than Mancala, popular in ancient Egypt. It is not a single game but a class of games which all involve the movement of pieces (anything from stones to seashells), distributing them amongst rows of cups.

Ayo (pronounced: eye oh) is a Nigerian version of Mancala which is played with two rows of six cups and 48 identical pieces, referred to as stones.

At first glance Ayo may seem very simple, almost on a par with noughts and crosses, but it can be fully as tactical as chess if played well. It takes a good memory to analyse more than one move ahead due to the fact that some moves change the whole face of the board. If you were brought up on chess and draughts then you could find Ayo mind-expanding, and very infuriating.

The Rules

The board is made of two rows of six cups each. There are two players and each player has a territory consisting of one of the rows of cups. Points are scored, one for each stone captured from your opponents row. The aim is to have the highest score you can at the end of the game. Figure 1 shows the graphics representation of the board that the computer will print on the screen at the beginning of a game. It is the starting position with each cup dressed with 4 stones. The cups are lettered from A to L for identification.

When playing the computer you will have row A to F. The computer will have row G to L. When it is a players move he

chooses one cup from those in his row that contains stones. The movement process is like dealing cards only it is done in the opposite direction, ie. anticlockwise. All the stones are taken from the chosen cup and then, starting with the cup immediately anticlockwise, they are dealt one at a time to successive cups, anticlockwise around the board.

As an example, Fig. 2 shows the position reached if from Fig. 1 the computer were to play cup K. There is an important rule about playing cups containing large numbers of stones. Stones must not be dealt back into the cup they came from within the same move. This means that if there are more than 11 stones in the cup played then the 12th and if applicable the 23rd and even the 34th stones go, not into the cup they came from, but into the next cup after that.

The source cup is skipped over.

Stoned At Last

However many stones there are in the chosen cup the dealing goes on until the last stone is dealt to another cup. Capturing is carried out after movement has finished. It is best described via the flow chart algorithm in Fig. 3. As an example, Fig. 4 a,b, and c shows the three phases of an imaginary move in which you capture some stones. One point to notice is that capturing goes clockwise, opposed to the preceding movement. Notice also that there are three conditions to fulfil before capturing from a cup. Two are obvious from Fig. 3. First, the cup must be in your opponents row. Second, the stones in it must total either 2 or 3 after the movement phase of your turn.

The third condition follows from the structure of Fig. 3. You can see that if for a cup that is being examined one of the first two conditions is not fulfilled then it is the next players move. All cups clockwise at this point are left unexamined.

The capturing has not reached them. This is the third condition.

A cup must have been reached to have its contents captured. Put another way, you cannot skip over uncapturable cups in order to capture from cups further clockwise. Of course in most moves the last cup dealt to does not fulfill one of the first two conditions. Then no capturing takes place at all. Yet it is not impossible to clear out your opponents row completely. However this is not always a good idea.

If you leave your opponent without a stone in his row then all the rest on the board are forfeit to him. Finally, if a movement is made and afterwards captures are possible then they must be made. They cannot be left out for tactical reasons.

Tactics

In Ayo, tactics are usually dependant on situation. Yet there are a few general principles. Cups with 1 and 2 stones are vulnerable, and it is usually good play to think first about defending any of these that are attacked.

Some players aim at developing a cup with more than 11 stones. This is known as an Odu (pronounced: oh do). The advantage of an Odu is that it will pass around the board and then return to an opponents row so that two stones are played into some cups. Thus empty cups become

vulnerable to an Odu.

In the short term try to attack two or more of your opponents vulnerable cups at the same time. Or set traps by attacking empty cups which your opponent must eventually play into.

Running The Program

When you run the program the computer will choose who goes first randomly. The current board position is printed on the screen at each juncture, along with the score and whose move it is. The computer will tell you which move it has made after it has played.

Simply enter the letter of the cup you have chosen when it is your move, and press NEWLINE when it is the computer's turn. You may end the game at any time by entering "END". The program will not crash easily or accept illegal moves, so try experimenting to get to know the rules.

The end of the game in Ayo is brought about when neither player can make any more captures because there are too few stones left on the board. Among human players an agreement is made that this is so and each player gets those stones that are left in his

row. Program lines 1970 onward end the game on condition that there are less than 9 stones left on the board and neither player has captured for the last 20 moves.

Conclusion

Unless you are already proficient at Ayo you may have to wait a few games before you get a victory from this program. Unlike Chess, Draughts, or Othello, you don't just win or lose at Ayo. Losing by two points is hardly losing at all, whereas getting 12 points or less is known as being in the "idiot house". Beware!

HOW IT RUNS

How It Runs

Wherever possible variable names give an idea of their function. The movemaking subroutine is at the front of the program for speed.

Three arrays have been used as boards. N(1) to N(12) holds the current game position. M(1) to M(12) is used to make moves on, and O(1) to O(12) stores game tree positions. The program is 3K long without the REM statements, 3½K with them. If you are short of memory try replacing lines 720 to 830, 880 to 990, and 1040 to 1150 with FOR NEXT loops like that at line 1570 to 1590. Don't change them unless you need to however, because they reduce the response time by about 10 seconds to a maximum of about 13 seconds.

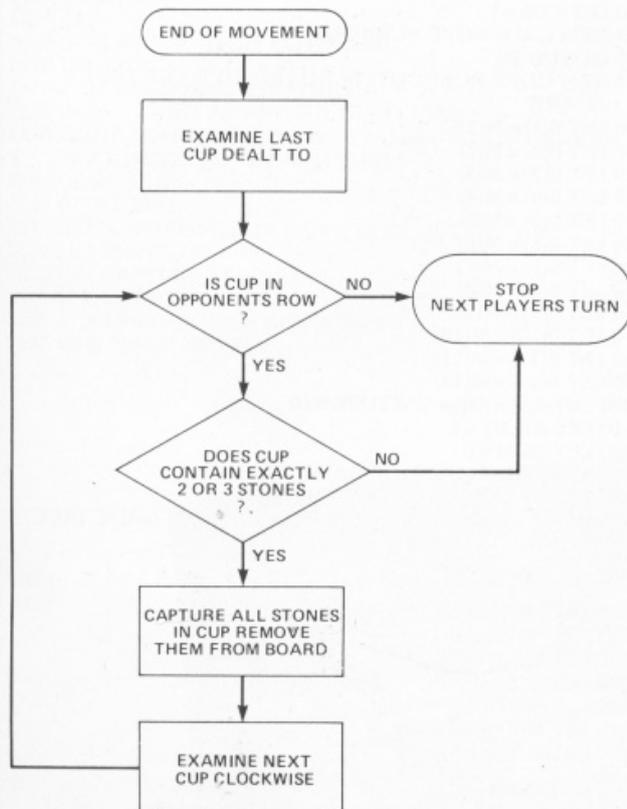


Figure 3.

HINTS ON CONVERSION

Hints On Conversion

Conversion should not be difficult. Only the graphics symbol and the codes within CHR\$()'s are unique to Sinclair. These occur only in the board printing subroutine (lines 1870 to 1960). Figures 1, 2 and 4 illustrate the function of these lines. Lines 510 and 690 use the integer basic of the ZX80 to ensure that NN and X are reduced to a number between 1 and 12 by subtracting the right multiple of 12. If you are using point arithmetic then you may replace the lines with:-

```

505 IF NN < 13 THEN GOTO 520
510 LET NN = NN - 12
512 GOTO 505
and
685 LET X = 1 + N(I)
687 IF X < 13 THEN GOTO 700
690 LET X = X - 12
695 GOTO 687
  
```

Here is a list of the variables used in the program:-

Move subroutine variables:-

MOVE — The move being made
 CUP — The cup being dealt to
 STONES — The number of stones left to deal
 CAPTURE — The number of stones captured this move
 IDENT — The identifying number of the player making this move

Arrays:-

N(1 to 12) — Game board
 M(1 to 12) — Move subroutine board
 O(1 to 12) — Game tree board
 A(7 to 12) — Assessment of game tree moves
 S(1 to 2) — Players scores

Tactical variables:-

X, NN, Y

For loop variables:-

N, Q

Other variables:-

P — The player whose move it is
 PLAYER1 — The first player to move
 Z\$ — The letter of the chosen cup
 ZS — The number of the chosen cup
 CHOICE — The computers move choice
 OBM — The computers opponents best move at game tree level 2
 BESTMOVE — The best move from the game tree
 COUNT — The end of game countdown after less than 9 stones are left

GAMESBOARD

AYO

PROGRAM LISTING

```
10 GOTO 210
15 REM MOVE MAKING SUBROUTINE
20 LET MOVE = CUP
25 REM TAKE STONES OUT OF CUP
30 LET STONES = M(CUP)
40 LET M(CUP) = 0
50 IF STONES = 0 THEN GOTO 130
55 REM DEAL ONE STONE
60 LET STONES = STONES - 1
65 REM MOVE ANTICLOCKWISE ONE CUP
70 LET CUP = CUP + 1
80 IF CUP = 13 THEN LET CUP = 1
85 REM SKIP OVER SOURCE CUP
90 IF CUP = MOVE THEN LET CUP = CUP + 1
100 IF CUP = 13 THEN LET CUP = 1
105 REM PUT STONE IN CUP
110 LET M(CUP) = M(CUP) + 1
120 GOTO 50
125 REM CAPTURE PHASE
130 IF NOT (M(CUP) = 2 OR M(CUP) = 3) THEN RETURN
140 IF CUP > 6 AND IDENT = 1 THEN RETURN
150 IF CUP < 7 AND IDENT = 2 THEN RETURN
160 LET CAPTURE = CAPTURE + M(CUP)
170 LET M(CUP) = 0
180 LET CUP = CUP - 1
190 IF CUP = 0 THEN LET CUP = 12
200 GOTO 130
205 REM INITIALISE POGRAM
210 DIM S(2)
220 DIM N(12)
230 DIM M(12)
240 DIM O(12)
250 DIM A(12)
260 LET S(1) = 0
270 LET S(2) = 0
280 FOR N = 1 TO 12
290 LET M(N) = 4
300 LET N(N) = 4
310 NEXT N
320 RANDOMISE
325 REM CHOOSE 1ST PLAYER
330 LET PLAYER1 = RND(2) choose player
340 FOR P = 1 TO 2
350 IF PLAYER1 = 2 THEN GOTO 1410
360 IF S(1) + S(2) > 39 THEN GOSUB 1970 ← 9 stones
365 REM CHECK THAT NEXT PLAYER HAS A MOVE TO MAKE
370 IF (P = 1 AND NOT (N(7) + N(8) + N(9) + N(10) + N(11) + N(12) = 0)) OR (P = 2 AND NOT (N(1) + N(2) + N(3) + N(4) + N(5) + N(6) = 0)) THEN GOTO 430
380 LET S(P) = S(P) + (48 - S(1) - S(2))
390 IF P = 2 THEN PRINT "I HAVE LEFT YOU WITH NO STONES TO PLAY. ALL THE REST ARE FORFEIT TO YOU AND"
400 IF P = 1 THEN PRINT "YOU HAVE LEFT ME WITH NO STONES TO PLAY. ALL THE REST ARE FORFEIT TO ME AND"
410 PRINT "THE GAME IS ENDED."
420 GOTO 1630
425 REM PRINT BOARD GRAPHICS
430 GOSUB 1870
440 IF P = 2 THEN GOTO 1430
450 PRINT "MY TURN. PRESS NEW/LINE PLEASE."
460 INPUT Z$
470 CLS
480 IF Z$ = "END" THEN GOTO 1850
485 REM TACTICAL ASSESSMENT OF MOVES
490 FOR N = 7 TO 12
500 LET NN = N(N) + N + 1
510 LET NN = NN - 12 * ((NN - 1) / 12)
515 REM RESET GAME TREE MOVE ASSESSMENT
520 LET A(N) = 0
530 IF N(N) + N > 18 OR N(N) + N < 12 THEN GOTO 590
540 IF N = 7 THEN GOTO 590
550 IF N(N) > 1 THEN GOTO 590
560 FOR Q = 7 TO N - 1
570 IF N(Q) + Q > 12 THEN LET A(Q) = 11
580 NEXT Q
590 NEXT N
600 IF N(2) = 0 AND N(12) > 0 AND N(11) = 1 THEN LET A(11) = -6
610 IF N(1) + N(2) + N(3) + N(4) + N(5) + N(6) = 0 THEN GOSUB 1710
620 IF N(1) + N(2) + N(3) + N(11) + N(12) = 0 AND N(4) < 6 AND N(5) < 5 AND N(6) < 4 THEN GOSUB 1750
625 REM GAME TREE
630 FOR I = 7 TO 12
640 IF NOT N(I) = 0 THEN GOTO 670
650 LET A(I) = -999
660 GOTO 1220
670 IF NOT N(I) = 0 THEN GOTO 690
680 IF N(1) > 12 - 1 THEN LET A(I) = A(I) - 5
690 LET X = (I + N(I) - ((I - 1 + N(I)) / 12) * 12)
700 IF X < 7 AND N(X) = 0 THEN LET A(I) = A(I) - 2
710 IF N(I) = 1 THEN LET A(I) = A(I) + I - 7
715 REM COPY GAME BOARD TO SUBROUTINE BOARD
720 LET M(1) = N(1)
730 LET M(2) = N(2)
740 LET M(3) = N(3)
750 LET M(4) = N(4)
760 LET M(5) = N(5)
770 LET M(6) = N(6)
780 LET M(7) = N(7)
790 LET M(8) = N(8)
800 LET M(9) = N(9)
810 LET M(10) = N(10)
820 LET M(11) = N(11)
830 LET M(12) = N(12)
835 REM INITIALISE FOR MOVE SUBROUTINE
840 LET CAPTURE = 0
850 LET IDENT = 1
860 LET CUP = I
865 REM CALL MOVE SUBROUTINE
870 GOSUB 20
875 REM COPY SUBROUTINE BOARD TO GAME TREE BOARD
880 LET O(1) = M(1)
890 LET O(2) = M(2)
900 LET O(3) = M(3)
910 LET O(4) = M(4)
920 LET O(5) = M(5)
930 LET O(6) = M(6)
940 LET O(7) = M(7)
950 LET O(8) = M(8)
960 LET O(9) = M(9)
970 LET O(10) = M(10)
980 LET O(11) = M(11)
990 LET O(12) = M(12)
1000 LET A(I) = A(I) + CAPTURE * 10
1010 LET IDENT = 2
1020 LET OBM = 0
1025 REM NEXT LEVEL OF GAME TREE
1030 FOR G = 1 TO 6
1035 REM COPY SUBROUTINE BOARD FROM GAME TREE BOARD
1040 LET M(1) = O(1)
1050 LET M(2) = O(2)
1060 LET M(3) = O(3)
1070 LET M(4) = O(4)
1080 LET M(5) = O(5)
1090 LET M(6) = O(6)
1100 LET M(7) = O(7)
1110 LET M(8) = O(8)
1120 LET M(9) = O(9)
1130 LET M(10) = O(10)
1140 LET M(11) = O(11)
1150 LET M(12) = O(12)
1155 REM INITIALISE FOR MOVE SUBROUTINE
1160 LET CAPTURE = 0
1170 LET CUP = G
```

```

1175 REM CALL MOVE SUBROUTINE
1180 GOSUB 20
1185 REM FIND OPPONENTS BEST REPLY
1190 IF CAPTURE > OBM THEN LET OBM = CAPTURE
1200 NEXT G
1210 LET A(I) = A(I) - 10 * OBM
1215 REM FIND BEST MOVE ASSESSMENT
1220 IF I = 7 THEN LET BESTMOVE = A(7)
1230 IF A(I) > BESTMOVE THEN LET BESTMOVE = A(I)
1240 IF A(I) = BESTMOVE THEN LET CHOICE = I
1250 NEXT I
1255 REM CHOOSE BETWEEN EQUAL BEST ASSESSMENTS
1260 FOR N = 7 TO 11
1270 IF A(N) = BESTMOVE AND RND(N - 5) = 2 THEN LET
    CHOICE = N
1280 NEXT N
1285 REM INITIALISE FOR MOVE SUBROUTINE
1290 LET IDENT = 1
1300 LET CAPTURE = 0
1310 LET CUP = CHOICE
1315 REM COPY GAME BOARD TO SUBROUTINE BOARD
1320 FOR N = 1 TO 12
1330 LET M(N) = N(N)
1340 NEXT N
1345 REM MAKE CHOSEN MOVE
1350 GOSUB 20
1355 REM COPY SUBROUTINE BOARD TO GAME BOARD
1360 FOR N = 1 TO 12
1370 LET N(N) = M(N)
1380 NEXT N
1385 REM ADJUST SCORE
1390 LET S(1) = S(1) + CAPTURE
1400 PRINT "I PLAYED CUP..."; CHR$(37 + CHOICE)
1410 LET PLAYER1 = 1
1420 NEXT P
1430 PRINT "YOUR MOVE. ENTER THE CUP LETTER
    PLEASE."
1435 REM INPUT OPPONENTS MOVE
1440 INPUT Z$
1450 CLS
1460 IF Z$ = "END" THEN GOTO 1850
1470 LET ZS = CODE(Z$) - 37
1475 REM VERIFY MOVE VALIDITY
1480 IF ZS < 7 AND ZS > 0 THEN GOTO 1520
1490 PRINT "THE RULES DO NOT ALLOW YOU TO MAKE
    THAT MOVE. PLEASE REENTER."
1500 GOSUB 1870
1510 GOTO 1440
1515 REM INITIALISE FOR MOVE SUBROUTINE
1520 LET IDENT = 2
1530 LET CAPTURE = 0
1540 LET CUP = ZS
1550 IF N(CUP) = 0 THEN GOTO 1490
1555 REM MAKE MOVE
1560 GOSUB 20
1565 REM COPY SUBROUTINE BOARD TO GAME BOARD
1570 FOR N = 1 TO 12
1580 LET N(N) = M(N)
1590 NEXT N
1595 REM ADJUST SCORE
1600 LET S(2) = S(2) + CAPTURE
1610 NEXT P
1620 GOTO 340
1625 REM GAME ENDING SECTION
1630 IF S(1) > S(2) THEN PRINT "I WIN..."
1640 IF S(1) = S(2) THEN PRINT "ITS A DRAW..."
1650 IF S(1) < S(2) THEN PRINT "YOU WIN..."
1660 PRINT
1670 PRINT "YOUR SCORE", "MY SCORE"
1680 PRINT
1690 PRINT S(2), " ", S(1)
1700 STOP
1705 REM TACTICAL SUBROUTINE 1
1710 FOR N = 7 TO 12
1720 IF N(N) > 12 - N THEN LET A(N) = A(N) + 50
1730 NEXT N
1740 RETURN
1745 REM TACTICAL SUBROUTINE 2
1750 FOR N = 7 TO 12
1760 LET Y = N + N(N)
1770 IF Y < 13 THEN LET A(N) = A(N) + N(N) * 5
1780 NEXT N
1790 RETURN
1800 CLS
1805 REM END OF GAME SHARE OUT
1810 FOR N = 1 TO 6
1820 LET S(1) = S(1) + N(N + 6)
1830 LET S(2) = S(2) + N(N)
1840 NEXT N
1850 PRINT "THE GAME IS ENDED."
1860 GOTO 1630
1865 REM BOARD GRAPHICS SUBROUTINE
1870 PRINT "_____"
1880 FOR N = 1 TO 6
1890 PRINT "____"; CHR$(37 + N); "@"; N(N); "____";
    N(13 - N); "@"; CHR$(50 - N); "@"
1900 PRINT "_____"
1910 NEXT N
1920 PRINT
1930 PRINT "YOUR SCORE", "MY SCORE"
1940 PRINT
1950 PRINT S(2), " ", S(1)
1960 RETURN
1965 REM END GAME SUBROUTINE
1970 IF CAPTURE > 0 THEN LET COUNT = 0
1980 IF CAPTURE = 0 THEN LET COUNT = COUNT + 1
1990 IF COUNT > 19 THEN GOTO 1800
2000 RETURN

```

Stops
 < 9 Stops



AYO

Figure 1.

```

@@@@@@@@@@@@@@@@@@@@
@A@4 @@@@@4 @L@
@@@@@@@@@@@@@@@@@@@@
@B@4 @@@@@4 @K@
@@@@@@@@@@@@@@@@@@@@
@C@4 @@@@@4 @J@
@@@@@@@@@@@@@@@@@@@@
@D@4 @@@@@4 @I@
@@@@@@@@@@@@@@@@@@@@
@E@4 @@@@@4 @H@
@@@@@@@@@@@@@@@@@@@@
@F@4 @@@@@4 @G@
@@@@@@@@@@@@@@@@@@@@
    
```

Relates to page 2 lines 2 and 13.

Figure 2.

```

@@@@@@@@@@@@@@@@@@@@
@A@5 @@@@@5 @L@
@@@@@@@@@@@@@@@@@@@@
@B@5 @@@@@0 @K@
@@@@@@@@@@@@@@@@@@@@
@C@5 @@@@@4 @J@
@@@@@@@@@@@@@@@@@@@@
@D@4 @@@@@4 @I@
@@@@@@@@@@@@@@@@@@@@
@E@4 @@@@@4 @H@
@@@@@@@@@@@@@@@@@@@@
@F@4 @@@@@4 @G@
@@@@@@@@@@@@@@@@@@@@
    
```

Relates to page 2 line 12.

Figure 4.

(A)

```

@@@@@@@@@@@@@@@@@@@@
@A@0 @@@@@5 @L@
@@@@@@@@@@@@@@@@@@@@
@B@0 @@@@@0 @K@
@@@@@@@@@@@@@@@@@@@@
@C@3 @@@@@2 @J@
@@@@@@@@@@@@@@@@@@@@
@D@4 @@@@@1 @I@
@@@@@@@@@@@@@@@@@@@@
@E@6 @@@@@3 @H@
@@@@@@@@@@@@@@@@@@@@
@F@4 @@@@@1 @G@
@@@@@@@@@@@@@@@@@@@@
    
```

Before movement.

(B)

```

@@@@@@@@@@@@@@@@@@@@
@A@0 @@@@@5 @L@
@@@@@@@@@@@@@@@@@@@@
@B@0 @@@@@0 @K@
@@@@@@@@@@@@@@@@@@@@
@C@3 @@@@@3 @J@
@@@@@@@@@@@@@@@@@@@@
@D@4 @@@@@2 @I@
@@@@@@@@@@@@@@@@@@@@
@E@6 @@@@@4 @H@
@@@@@@@@@@@@@@@@@@@@
@F@0 @@@@@2 @G@
@@@@@@@@@@@@@@@@@@@@
    
```

After movement of cup F.

(C)

```

@@@@@@@@@@@@@@@@@@@@
@A@0 @@@@@5 @L@
@@@@@@@@@@@@@@@@@@@@
@B@0 @@@@@0 @K@
@@@@@@@@@@@@@@@@@@@@
@C@3 @@@@@0 @J@
@@@@@@@@@@@@@@@@@@@@
@D@4 @@@@@0 @I@
@@@@@@@@@@@@@@@@@@@@
@E@6 @@@@@4 @H@
@@@@@@@@@@@@@@@@@@@@
@F@0 @@@@@2 @G@
@@@@@@@@@@@@@@@@@@@@
    
```

After captures 5 stones taken.

Relates to page 2 line 24.

I have used a @ symbol to represent a CHR\$(9) graphics symbol.

Figures 1 and 2 demonstrate movement.

Figures 4 A, B and C demonstrate capturing.

PROGRAMS SUBMITTED

PROGRAMS SUBMITTED

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.

Why not send them to us, no matter what machine you have written it for and regardless of its length and complexity. Not all complex programs are good ones so don't be put off if you think your program appears too simple to come up to scratch.

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 you 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 features 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.

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.

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.

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.

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.

Games to Play on your ZX Spectrum

Martin Wren-Hilton

£2.50 ISBN 0 906812 28 3

Computer Puzzles: For Spectrum and ZX81

Ian Stewart & Robin Jones

£2.50 ISBN 0 906812 27 5

Easy Programming for the ZX Spectrum

Ian Stewart & Robin Jones

£5.95 ISBN 0 906812 23 2

Further Programming for the ZX Spectrum

Ian Stewart & Robin Jones

£7.50 (approx) ISBN 0 906812 24 0

Spectrum in Education

Eric Deeson

£6.50 (approx) ISBN 0 906812 29 1

Easy Programming for the BBC Micro

Eric Deeson

£4.95 (approx) ISBN 0 906812 21 6

Further Programming for the BBC Micro

Alan Thomas

£7.50 (approx) ISBN 0 906812 20 8

Machine Code and better Basic

Ian Stewart & Robin Jones

with an educational program by Eric Deeson

£7.50 ISBN 0 906812 18 6

The ZX81 Add-On Book

Martin Wren-Hilton

£6.50 ISBN 0 906812 19 4

**PEEK, POKE, BYTE & RAM:
Basic Programming for the ZX81**

by Ian Stewart & Robin Jones

£4.95 ISBN 0 906812 17 8

Published by:

Shiva Publishing Limited

4 Church Lane, Nantwich, Cheshire CW5 5RQ

Telephone: (0270) 628272



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

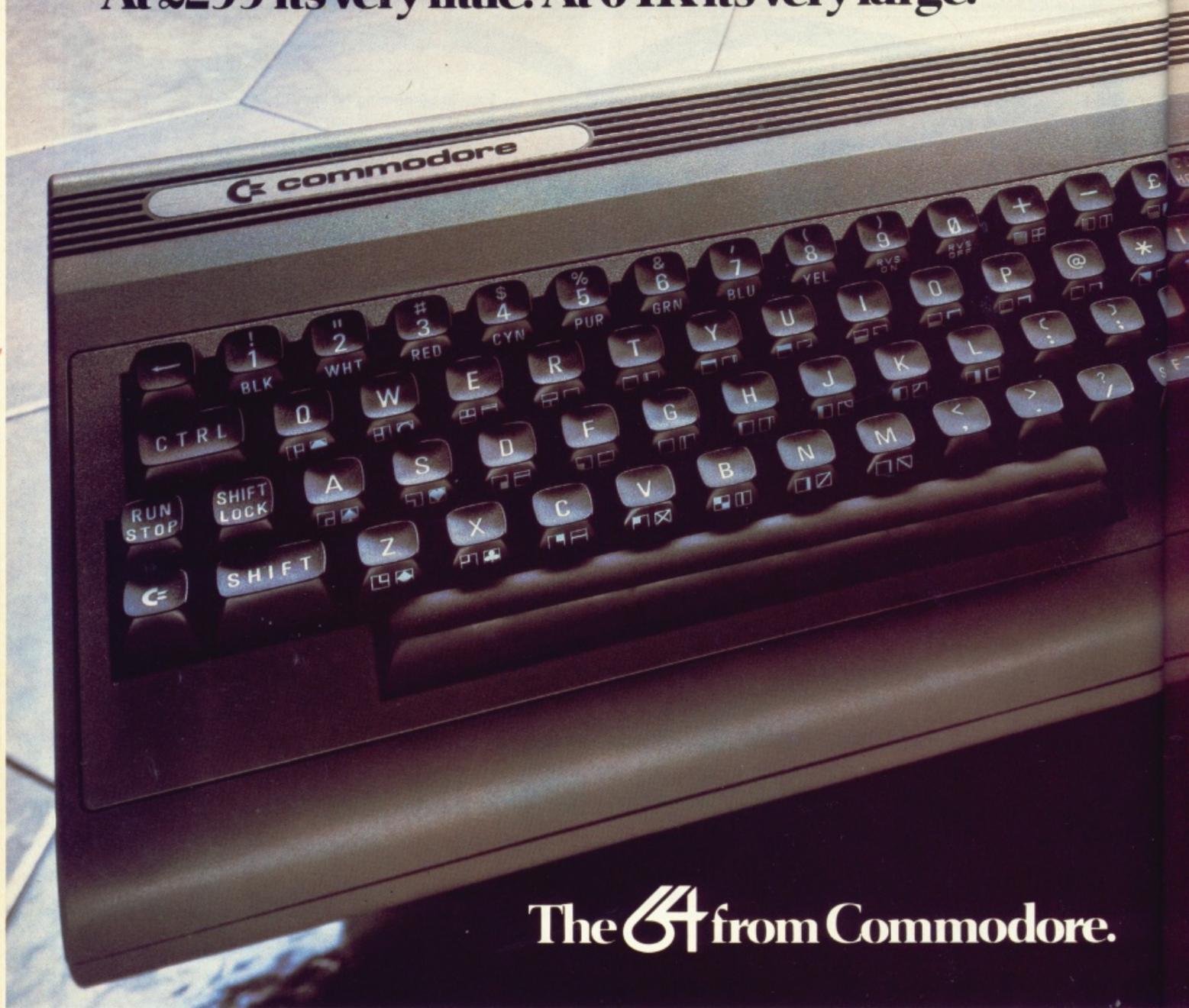
Name _____

Address _____

Postcode _____

PCT/11/82

At £299 it's very little. At 64K it's very large.



The 64 from Commodore.

This is the new Commodore 64 Personal Computer.

It costs £299. Not bad for a brilliant piece of technology with a 64K memory.

But then, it's a Commodore.

And as one of the world's leading high-performance micro-computer companies, we're not exactly unknown when it comes to outstanding achievements.

The Commodore 64's nearest rival – if that's the word – costs over half as much again.

Here is the specification, a comparison with the Apple II, and a coupon.

The rest is up to you.

1. A total memory capacity of 64K; 38K directly available to BASIC. When not using BASIC a full 54K is available for machine code programs.

2. Interface adaptors will allow the use of a

complete range of hardware peripherals including disk units, plotter, dot matrix and daisy wheel printers, Prestel communications, networking and much, much more.

3. A complete range of business software including word processing, information handling, financial modelling, accounting and many more specific application packages will be available.

4. Other computer languages such as LOGO, UCSD PASCAL, COMAL and ASSEMBLER are being developed. Existing VIC and 40 column PET BASIC programs can be easily converted.

5. The powerful sound chip gives 3 totally independent voices each with a range of 9 octaves. User control over music envelope, pitch and pulse shapes provides the ability to make your Commodore 64 sound like a variety of musical instruments, solo or in harmony.

6. 62 predefined graphic characters plus



full alpha numerics with upper and lower case letters, all available directly from the keyboard and displayable in normal or reverse video in any of 16 colours.

7. 40 column by 25 lines colour display. In high resolution graphics mode, a bit mapped screen gives 320 x 200 individually addressable pixels.

8. The dedicated video chip allows the use of high resolution multi-coloured "Sprites" (moveable object blocks). Sprites can be moved pixel by pixel, independently of anything else on the screen.

9. Sprites can also be set up in 8 "layers" giving full 3 dimensional effects with, if required, automatic collision detection between sprites and any other screen object.

10. Machine bus port will accept ROM cartridges for many applications, including

business, educational, home and leisure software.

11. A second processor option using the Z80 gives the Commodore 64 the ability to support CP/M.[®]

HOW COMMODORE PIPS APPLE.

FEATURES	COMMODORE	APPLE II+
Base Price	£299*	£499*
ADVANCED FEATURES		
Built-in user memory	64K	48K
Programmable	YES	YES
Real typewriter keyboard	YES (66 keys)	YES (52 keys)
Graphics characters (from keyboard)	YES	NO
Upper & lower case letters	YES	NO**
Function keys	YES	NO
Maximum 5¼" floppy disk capacity per drive	170 K.B. to 1 M.B.	143 K.B.
AUDIO FEATURES		
Sound Generator	YES	YES
Music Synthesizer	YES	NO
Hi-Fi Output	YES	NO
VIDEO OUTPUT		
Monitor Output	YES	YES
T.V. Output	YES	EXTRA
INPUT/OUTPUT FEATURES		
Cassette Port	YES	YES
Intelligent Peripherals	YES	YES
Serial Peripheral Bus	YES	NO
ADDITIONAL SOFTWARE FEATURES		
CP/M [®] Option (over 1000 packages)	YES	YES
External ROM cartridge slot	YES	NO

*EXC. VAT - DETAILS CORRECT AT TIME OF GOING TO PRESS
**UPPER ONLY
CP/M[®] IS A REGISTERED TRADEMARK OF DIGITAL RESEARCH, INC.

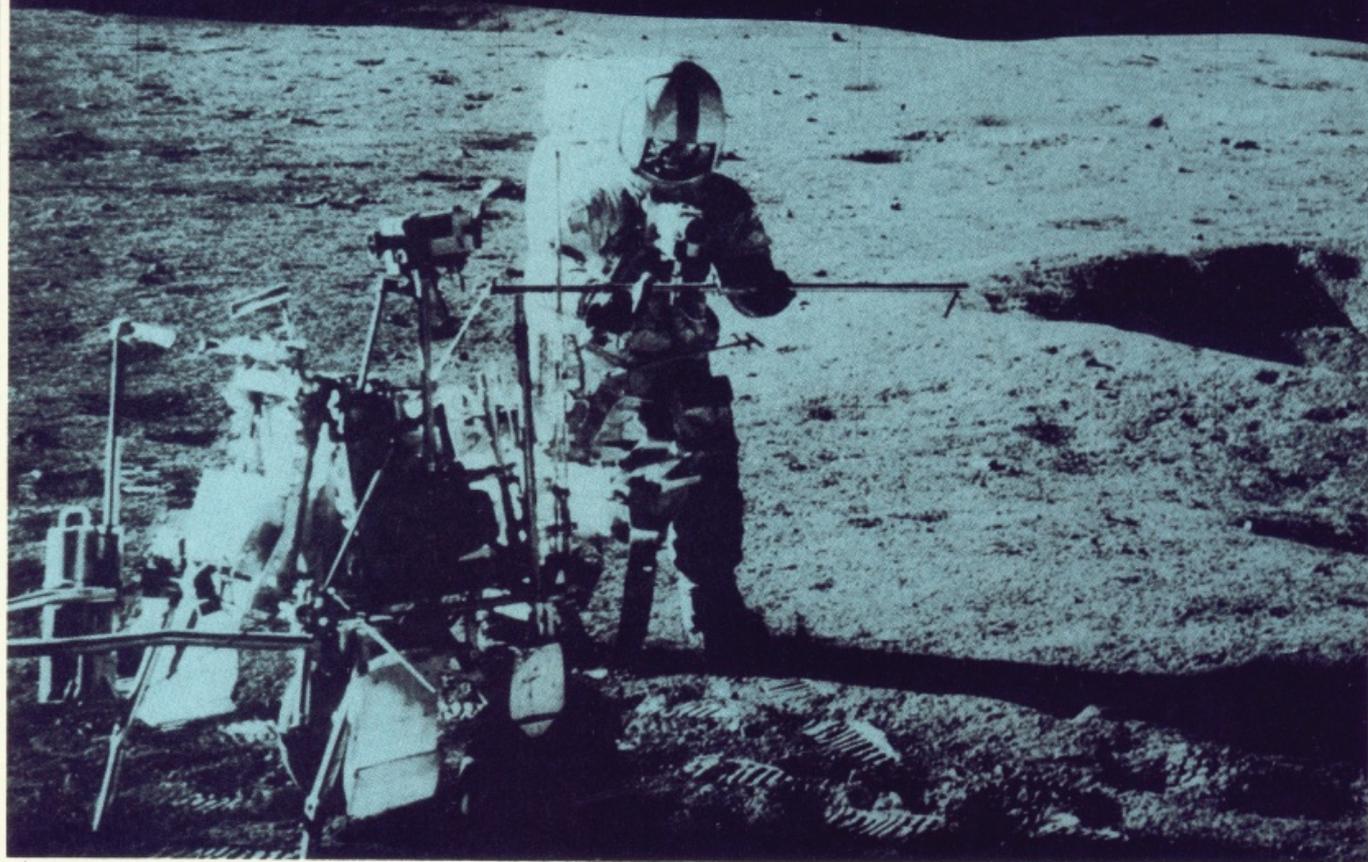


For more information on the powerful new Commodore 64, and the address of your nearest Commodore dealer, telephone or write to us at:
The Commodore Information Centre,
675 Ajax Avenue, Slough, Berkshire SL1 4BG.
Telephone: Slough (0753) 79292.

NAME _____
POSITION _____
COMPANY _____
ADDRESS _____

TEL _____

SATURN ATTACK



Exploring the surface of alien planets is hazardous at the best of times, not least when you have to fight off the native Titans. Simon Goodwin takes you and your TRS-80 into the outer galaxy in search of valuable minerals. Can you survive the tortuous ordeal?

As captain of the probe 'Ringreaper' you aim to collect as many valuable mineraloids as possible in the ramscoop of your craft. The snag is that the hideously alien lifeforms of the moon Titan resent your activities on their 'doorstep' — they have seeded the rings with spacemines in the hope of detecting and destroying your probe. If a robot

mine (" *") finds you it will call up a formation of 'Space Sweepers' which will scan along the ring, attempting to destroy you. Only by pinpoint manoeuvring can you avoid the Sweep — but beware, if you run-over another mine as you take avoiding action you'll end up with two Space Sweepers to contend with . . .

To adjust the difficulty of the

program type from 4 to 8 spaces in the gap between the words GAME and OVER in line 100. The more spaces you enter the easier it will be to avoid the Sweep.

Saturn Attack is a graphic game for users of the TRS-80 Model 1, Video Genie, PMC-80, or System 80 microcomputers. It runs in less than 4K of memory under Microsoft Level 2 BASIC.

HOW IT RUNS

- Lines 100-110 These tell BASIC how much space to reserve for string variables and declare all other variables as 'integer' (whole-number only) for speed.
- Lines 120-130 Set up BL as the numeric coordinate of the bottom line of the display and clear the screen.
- Line 140 Assembles the graphic display of the probe.
- Line 150 Selects the probe starting position.
- Line 160 Prints the probe (with the graphic border either side).
- Line 170-190 Check for the presence of objects in front of the probe.
- Lines 200-220 Scan the keyboard and move the probe left or right if it is not at the screen edge.
- Lines 230-240 Randomly print either a mine or a mineraloid on the bottom row of the display, scrolling all the other objects towards the probe.
- Line 250 Is only called if the probe has collided with an object. The character code of the object is read.
- Line 260 If the object is a mine a formation of Space Sweepers is displayed at a random position.
- Line 270 A mineraloid has been found — increase the score.
- Lines 280-300 Disaster — the Space Sweepers have captured the probe. Flash the final score.

HINTS ON CONVERSION

Lines 100-110 are not needed in most versions of BASIC. The value of BL will have to be changed to the printing coordinate of the first character on the last line of your display. It is only used in line 230. The STRING\$(X,Y) function returns X copies of character Y. If your computer does not have this function a loop could be used to build up the string. MID\$(A\$,B,C) returns C characters of string A\$, starting from character B. PRINT @N causes printing to occur at position N on the display. The PEEK in line 180 relies upon the fact that the Video Genie display is memory-mapped between locations 15360 and 16383 — if your computer display is mapped elsewhere line 170 should be modified so that J scans the addresses of the characters on the line below the probe.

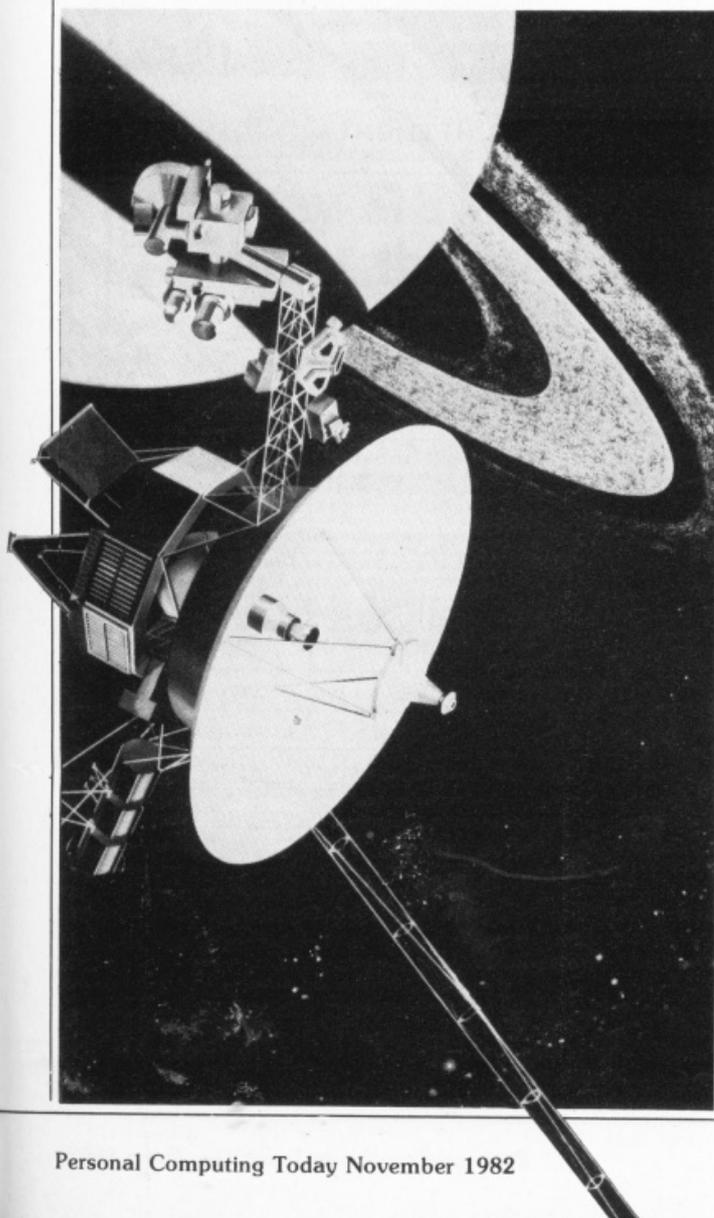
Saturn Attack uses PEEK(14400) to continually test the computer keyboard. If your computer does not have adjacent TAB and BACKSPACE keys (left/right arrow on TRS-80) change if P = 32 . . . to IF P = 2 . . . to manoeuvre with CLEAR and TAB instead. If your computer does not use a keyboard mapped to this address either change the address or use the INKEY\$ function to poll the keyboard. Either way the tests for specific values of P will have to be modified. RND(N) returns a random whole-number value between 1 and N. Other computers may require INT(RND(0) * N + 1) or RND (N) + 1.

The IF . . . THEN . . . ELSE statement works like the standard BASIC IF . . . THEN test but if (and only if) the condition is false the statement after ELSE is executed. CHR\$(23) is used to select double-width characters on the TRS-80, and may be omitted if not required.

PROGRAM LISTING

```

10 CLEAR400 : DEFINT A - Z : BL = 960 : CLS :
  A$ = STRING$(60,131) + CHR$(152) + CH
  R$(139) + CHR$(175) + CHR$(159) + CHR$(135)
  + CHR$(164) + STRING$(60,131) : I = 30
30 PRINT @0, MID$(A$, I, 59) : SC : : for J = 15486 - I TO
  15489 - I : IF PEEK (J) < > 32 GOSUB : 100
  NEXT ELSE NEXT
50 P = PEEK(14400) : IF P = 32 IF I < 60 THEN I = I + 3
60 IF P = 64 IF I > 8 THEN I = I - 2
80 IF RND(2) = 1 THEN PRINT @BL + RND(63), " *"
  ELSE PRINT @BL + RND(63), CHR$(128 + RND(15))
90 GOTO 30
100 CLEAR 400
110 DEFINT A - Z
120 BL = 960
130 CLS
140 A$ = STRING$(60,131) + CHR$(152) + CHR$(139)
  + CHR$(175) + CHR$(159) + CHR$(135) + CHR$(164)
  + STRING$(60,131)
150 I = 30
160 PRINT @0, MID$(A$,I,59):SC:
170 FOR J = 15486 - I TO 15489 - I
180 IF PEEK(J) < > 32 GOSUB 250
190 NEXT J
200 P = PEEK(14400)
210 IF P = 32 THEN IF I < 60 THEN I = I + 3
220 IF P = 64 THEN IF I > 8 THEN I = I - 2
230 IF RND(2) = 1 THEN PRINT @BL + RND(63), " *"
  ELSE PRINT @BL + RND(63), CHR$(128 + RND(15))
  GOTO 160
240 K = PEEK(J)
260 IF K = 42 THEN W = RND(44) + 2 : PRINT @BL,STR-
  ING$(W,166) + "GAME OVER?" + STR-
  ING$(47 - W,153) : RETURN
270 IF K > 128 THEN IF K < 153 THEN SC = SC + 1 :
  RETURN
280 CLS
290 PRINT @535,CHR$(23)"BOOM":;SC
300 GOTO 280
  
```



20 BEST PROGRAMS for the ZX SPECTRUM £7.95

20 BEST PROGRAMS for the ZX SPECTRUM WITH EXPLANATORY TEXT



Mr HELPLINE — the man who answers your ZX queries in his column in *Sinclair User*, the author of HINTS & TIPS FOR THE ZX80 and HINTS & TIPS FOR THE ZX81 now presents his 20 BEST PROGRAMS FOR THE ZX SPECTRUM.

- * 20 original programs for you to load into your Spectrum.
- * 20 interesting programs for you to enjoy and learn from.
- * 20 great programs to teach you about fixed and variable length records, binary searches, bubble sorts, floating point arithmetic, graphic displays and much, much more . . .

*** 20 BEST PROGRAMS FOR THE ZX SPECTRUM.**

Program Titles Include:
Machien code editor —

Write, modify, extend and load machine code using this all-Basic machine code editor. No need to use an Assembler when you have this program.

Index file —

Learn about fixed length records, save numeric and string fields, add to, sort, modify, delete and print your records. Ideal as a computer based card index.

Duckshoot —

Learn how to manipulate the attribute file *and* have fun at the same time.

Diary —

Binary searches and variable record lengths are explained with this useful and interesting program.

PLUS: FOOTBALL, DIGITISER, DATA PLOT, FUNCTION PLOT, REGRESSION, HISTOGRAM and many more . . .

Z80 OP CODES £1.45

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

PROGRAMMERS TOOLKIT ZX81 £6.50

Toolkit functions include:

- * RENUMBER including the destination lines of GOTO's and GOSUB's
- * START and Finish lines and Step size specified by you
- * DELETE part or all of a program at your command
- * REPLACE characters or tokens with an equal number of others specified by you
- * EDIT to create sub routines at a stroke by moving blocks of basic program lines
- * FIND a basic program string specified by you
- * INPUT prompts for a two digit hexadecimal code and pokes it in at a specified address
- * Separate version available for 48 + 8 and 64K memories (resides at B192)

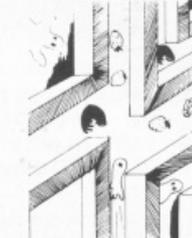
PILOT ★ ZX81 £5.95

New and exciting. Pilot challenges you to take off, fly between beacons, then land whilst watching wind speed and dodging craggy mountains — either could lead to disaster! If you take the challenge you may soon learn to fly solo — so detailed are the flying instructions. Coast along in Autopilot — just to gain confidence, then battle your way through 5 further modes, 6 different ways of trying to steer your plane safely back to base, increasing in difficulty, testing your skills. Good luck with your fight against the unpredictable elements!



PUCKMAN NEW! ZX81 £5.95

- * All action display
- * Scour the maze for food
- * Dodge the ghosts who come to devour you
- * Automatic option — the machine plays itself
- * Full keyboard display
- * Full instruction display
- * Continuous scoring
- * Beat the best score to date
- * Super graphics when used with Quick Silva graphics board



ZX81 HARDWARE

16K MEMOPAK (expandable) £29.90
32K MEMOPAK (expandable) £49.90
64K MEMOPAK £79.00
56K Ram pack £54.95
HRG MEMOPAK Hi Res Graphics MEMOPAK Centronics printer interface £59.80

ZX81 CASSETTES

SPACE INTRUDERS (16K) £5.95
STATISTICS (1K) £3.75
LANGUAGE DICTIONARY (16K) £3.75
LINE RENUMBER (16K) £4.95
NAVAL BLOCKADE (16K) £5.95

ZX81 BOOKS

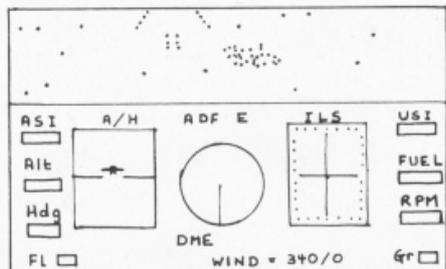
HINTS & TIPS for the ZX81 £3.95

ZX SPECTRUM CASSETTES

MACHINE CODE EDITOR £4.95
MUSIC & SKETCH £4.95
ASSEMBLER £4.95
DISASSEMBLER £4.95

NIGHT FLIGHT £5.95

For the 16K or 48K SPECTRUM



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

QUANTITY	PRODUCT	COST
	TOTAL	

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

NAME
(block capitals please)
ADDRESS

My Access/Barclaycard No. is

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

Mysterious Adventures



WE PROUDLY PRESENT, FOR THE VIC 20

THE INTERNATIONALLY SUCCESSFUL MYSTERIOUS ADVENTURE

These superbly written, Machine Code Adventures have been enjoyed by TRS80-VIDEO GENIE owners in Britain for well over a year now and are currently taking the U.S. by storm. The Author has now implemented these absorbing programs on the COMMODORE VIC 20 FITTED WITH 8K RAM PACK.

ALL ADVENTURES IN THIS SERIES INCLUDE:

Split screen display, Ultra fast Machine code response, Save game to cassette feature, Simple two word command entry, approx. 70 Locations to visit, 30 Objects to manipulate, 20 or more "problems" to overcome.

ADVENTURES PRESENTLY AVAILABLE:

- 1) THE GOLDEN BATON — venture into a strange province of danger and evil magic to retrieve the stolen Baton of King Ferrenull.
- 2) THE TIME MACHINE — As a newspaper reporter you have been sent to the old house on the moors to investigate the eccentric Dr. Potter.
- 3) ARROW OF DEATH (Part 1) — In the first part of this epic Adventure you must find and destroy the source of the evil blight which has befallen your homelands.

These are the first three of a series which could ultimately total more than 20 Adventures.

WARNING! — Only supreme courage and low cunning can ensure eventual success on these dangerous missions.

SEND CHEQUE OR P.O. FOR JUST £9.95 INC. VAT + 50p POST & PACKING TO:

AVAILABLE SOON

- Escape From Pulsary
- Arrow of Death Part 2
- Circus
- Feasibility Experiment

ALSO RAM CARTRIDGES

- 3K £24.95
- 8K £39.95
- 16K £69.95 + 50p P&P Inc. VAT.



BLACKPOOL COMPUTER STORES

Leisuronic

64 Abingdon Street,
Blackpool,
Lancashire FY1 1NH
Telephone (0253) 27091

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.

**Stripeland Ltd., 111 Liverpool Road, Formby,
Merseyside L37 6BR Tel: (07048) 78062**

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

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

PCT/11/82

**The capital's
longest running
Hobby Electronics
Show**

**BREAD
BOARD**

Breadboard '82

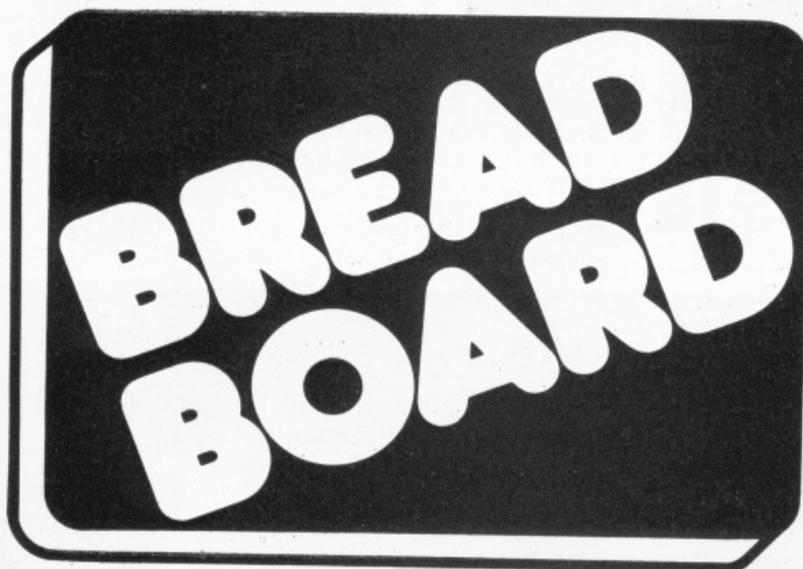
10-14 November

The Royal Horticultural Halls

Vincent Square London SW1

Admission £1.00 (50p under 16's & OAP's)

Open Wednesday 10 November	1000-1800
Thursday 11 November	1000-2000
Friday 12 November	1000-1800
Saturday 13 November	1000-1800
Sunday 14 November	1000-1600



Enquiries: Administration & Publicity

Peter Evans
0747-840722

Space Sales
Colin Mackenzie
01-286 9191

Supported by Electronics Today International . Hobby Electronics . Personal Computing Today .

Computing Today . Personal Software with a combined circulation of 230,000 copies a month

MICROSPOT

SOUND ENVELOPE

Confusion surrounds the use of the BBC micro computer's 'ENVELOPE' command. Gary Heayes overcomes this problem with his custom routine.

The command 'ENVELOPE' defines the form of the sound produced in the SOUND command of the BBC Micro computer.

ENVELOPE is followed by 14 numbers. The first is the envelope number, or reference number (n). The second determines the size of the lumps in which the sound is executed. (st) 1 is the most common and gives a nice flowing sound. 10 is quite lumpy and, beyond 10 is very tedious. Increasing this number is like putting the sound under a microscope and increasing the power of magnification. Imagine the intensity of it!

The next 12 numbers come in two groups of six. The first group is the 'frequency' or 'pitch' envelope. The first three numbers (fg1,fg2,fg3) define the gradient of the change in pitch (fd1,fd2,fd3) in three segments of the sound. The next three numbers determine the length of each segment.

The second group is the 'amplitude' or 'volume' envelope and determines how the loudness of the sound will change as the sound is played. The first four numbers define attack, decay, sustain and release (ADSR). Attack is the rate at which the volume changes to the next level. Sustain and release are the rates at which the noise dies away. Then follow the two volume levels.

Each of these numbers is separated by a comma thus the syntax is:

```
ENVELOPE
n,st,fg1,fg2,fg3,fd1,fd2,fd3,a,d,s,r,v1,v2.
```

```
10 ENVELOPE 1,1,0,0,0,0,0,0,127,-1,-2,-2,100,50
15 REPEAT
20 A$ = INKEY $ (1) : 1DAS$ = "" THEN 20
30 SOUND 1,1,ASC (A$),2
40 UNTIL FALSE
```

In the above program line 10 defines the envelope. As you can see the pitch envelope is left undefined, so in the noises, produced pitch will not vary.

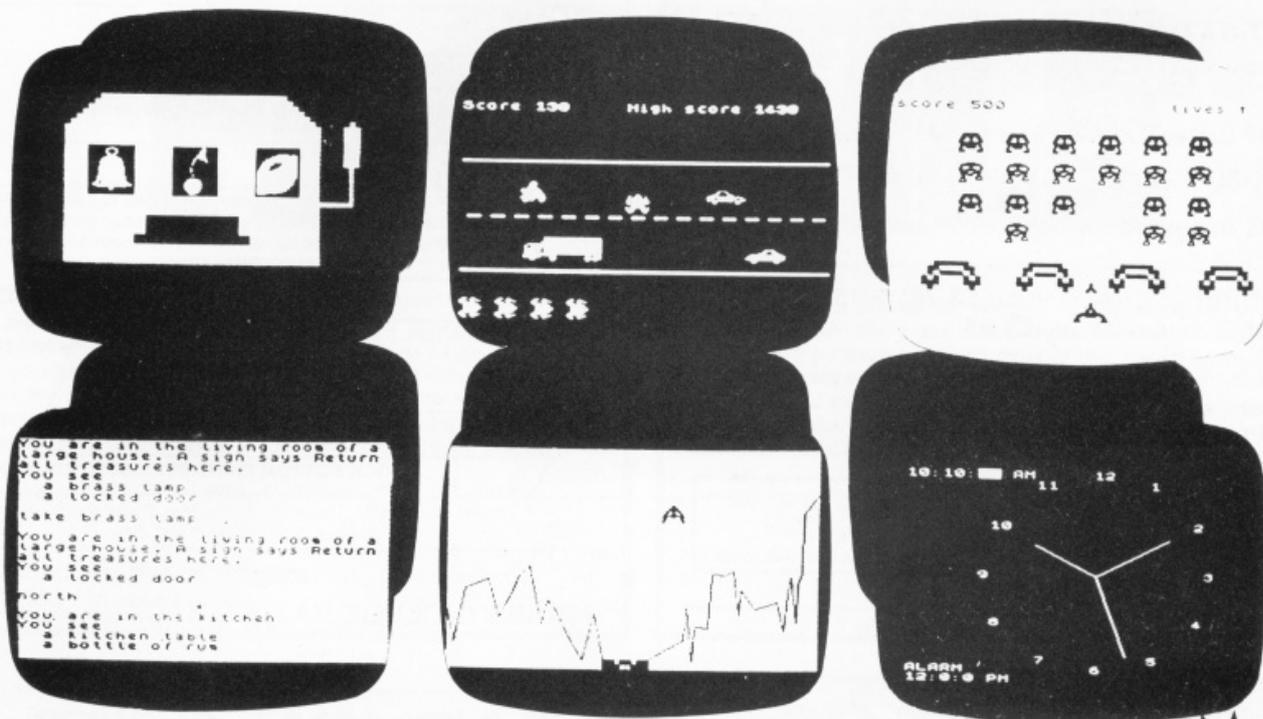
Attack is set at 127 which means the volume will reach the first level (100) immediately a key is pressed. Decay will bring this gradually down to 50, and sustain and release continue to fade the noise out. You will note that the second number in SOUND, which was volume, is now the envelope number. There are 15 possible numbers (1-15).

Try these sounds in your space invader games.

```
ENVELOPE 1,1,20,-15,-15,90,90,127,100,-1,
-1,126,126
SOUND 1,1,100,10
ENVELOPE 2,1,11,-6,1,10,30,60,127,0,0,-127,126,0
SOUND 1,2,100,20
ENVELOPE 3,3,0,0,0,0,0,0,5,-1,-5,-1,100,50
SOUND 1,3,70,60
SOUND 0,3,4,70
SOUND 0,3,3,60
SOUND 0,3,71,60
```



Over The SPECTRUM...



Where Your Dreams Really Will Come True

Actual
Spectrum
Screens

Over The Spectrum A book to amaze you with programming techniques that go beyond your wildest expectations! With the full listings of over 30 programs for your Spectrum you will find ready-made professional programs whatever your interest or application.

The listings are printed in a specially designed easy-to-read format and each program has detailed notes. You'll find exciting arcade favourites like Freeway Frog, Meteor Storm, Eliminator and Spectrum Invaders, strategy games like Chess and Adventure, utilities, business and educational programs, plus programming hints, tips on extending the Spectrum, and more, which all combine to make this the definitive book for every Spectrum user. Incredible value—over 160 pages including 8 pages in full colour. **Only £6.95.**

All of these programs are also available on cassette.

Melbourne House Publishers

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

- Please place me on your Spectrum mailing list to receive Spectrum catalogue and information.
- Please send me OVER THE SPECTRUM book @ £6.95.

Please add 80p for post, pack and VAT.

Name

Address

Post Code **PCT11**



MELBOURNE HOUSE PUBLISHERS

NOBODY DOES IT CHEAPER!

than MICRO CITY

EPSON MX-80 F/T type 3 only £328

with BBC cable £345; with VIC cable (for Wordcraft) £355; with PET interface/cable £398

VERBATIM single-side, double-density 40 track £15

double-sided £23; single-sided 77 track £25; double-sided 77 track only £33!

PAPER box of 2000 sheets 9½ by 11 only £12

MX-80 ribbon cartridges £5; refills only £2

VIC Software all Audiogenics cassettes and cartridges in stock

CHIPS! 2532 (4k EPROM) **£3.75**; 2716 (2k EPROM) **£2.45**; 6116 RAM only **£3.95**

ZIFS 24-pin zero insertion force sockets (economy model) only **£2.95**

MICRO CITY
P.O. Box 226, Watford.

Please add postage as follows:
Printer £4 Paper £3
Disks £1
Add 15% VAT to ALL prices!

CAMEL MICROS

33A Commercial Road, Weymouth, Dorset. Tel: (03057) 70092

TRS 80 SOFTWARE

FREE PROGRAM IF YOU ARE GETTING TRSDOS
PARITY ERRORS. SEND A BLANK CASSETTE &
POSTAGE FOR A FREE MOD.

ORIGINAL
APPLICATIONS

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)

DISCOPT. Adds 10 extra disc commands to Disk or Level 2 Basic, for accessing disc by track, sector and byte. Speed up data/program access, read/write diskette name, lock-out tracks etc. Model 1 only (32/48K) **Price £9.90**

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

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.

SATURN SOFT

**SPECTRUM ZX81
NEW — NEW — NEW
PROGRAMMES NOW AVAILABLE FOR
DRAGON 32. SEND SAE FOR DETAILS**

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

FACTFILE

MICRO FACTFILE

Factfile is our regular buyer's guide to microcomputers. Herein you will find all the important facts and figures on 27 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.

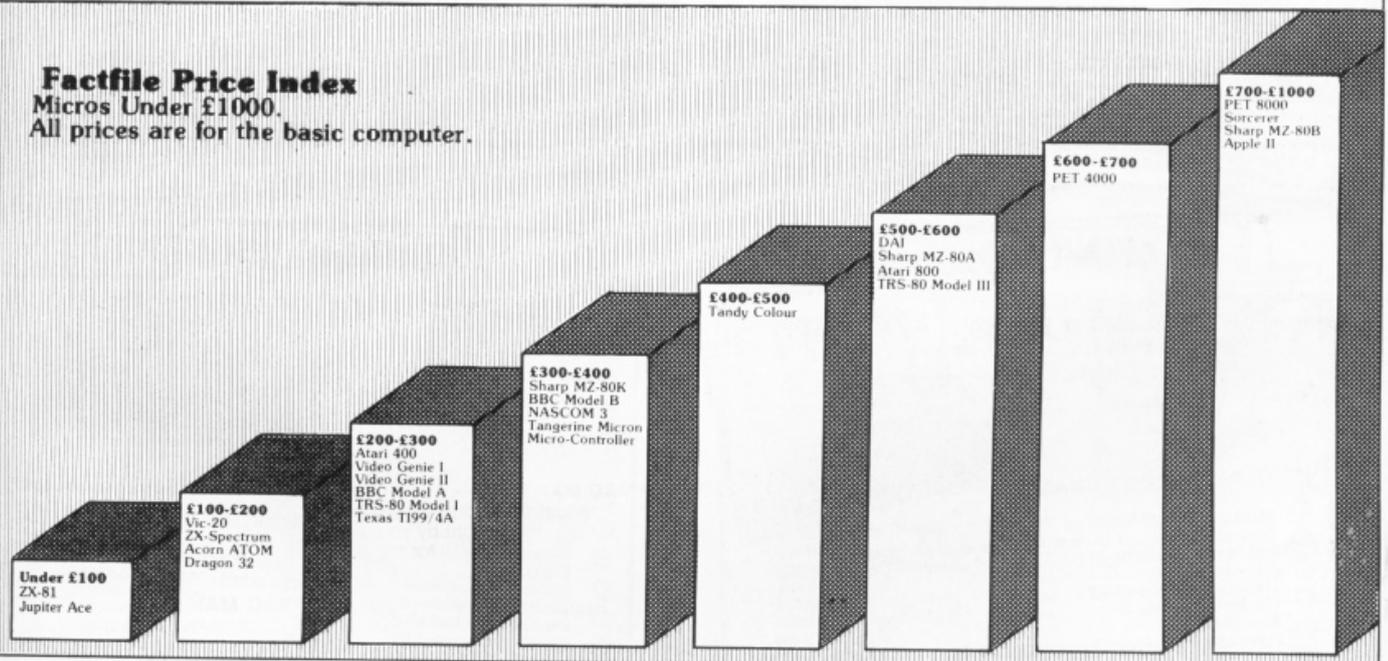
Factfile sorts it all out for you! Just look down the price index to discover which machines are in your price-range and then consult the 'cards' on each. All the information is in a standard form and has all been checked by our technical staff. The section is presented alphabetically.

As new machines become available, we will add them into the FACTFILE as soon as we can.

Factfile Price Index

Micros Under £1000.

All prices are for the basic computer.



Factfile

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.

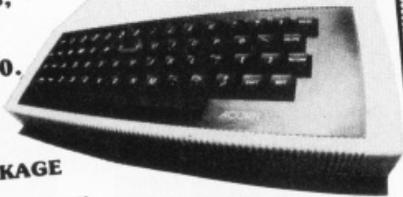
BUS CONNECTION: A socket on the micro which allows it to be linked up to various add-ons. This can take the form of many various items, ie, expansion box, printer, disc drives, plotting device. In short a BUS is an information 'window' through which the micro communicates with the outside world.

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.

ACORN ATOM

Acorn Computers,
4A Market Hill,
Cambridge.
Tel: 0223-245200.



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	£299
Disc Drives	Yes	£11.50
Other Languages	Yes	—
Multi-user Capabilities	Yes	£50
BASIC extensions (Toolkits)	Yes, BBC BASIC	—

OTHER ADD-ONS:

Centronics-type connector, Technomatic Ltd, 17 Burnley Road, London NW10.
TMS 5100 Talking Board, GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; DUO-1 64K add-on, £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, £8.50; 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



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	No	—
Monitor	Yes various	£200-1700
Disc Drives	Yes	£134
Other Languages	Yes	£379
Multi-user Capabilities	Yes	£84-500
BASIC extensions (Toolkits)	No	—
	Yes	£26

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; Multifunction Card, Datas Micros, 193 Touring Road, Worthing, W. Sussex, £85; 5 1/4" Winchester 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, Winstanley Industrial estate, Long Lane, Warrington, Cheshire, WA2 8PR, £195.

ATARI 400

Atari UK Ltd, PO Box 59,
Alperton Lane,
Wembley, Middx.



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	No	—
Monitor	Yes	£265
Disc Drives	No	—
Other Languages	Yes	£345
Multi-user Capabilities	Yes	£39-79
BASIC extensions (Toolkits)	No	—
	Yes	—

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtronics 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



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

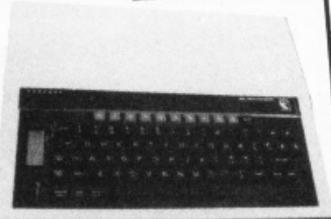
	DETAILS	PRICE
RAM	optional 16K RAM packs (to 48K Max)	£65
Printer	Yes	£265
Monitor	No	—
Disc Drives	Yes	£345
Other Languages	Yes	£39-79
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtronics 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**

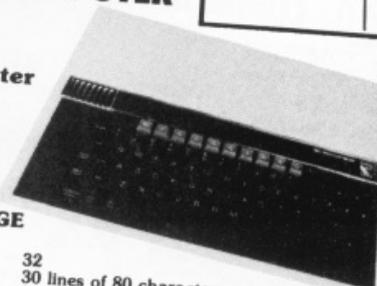
	DETAILS	PRICE
RAM	up to 32K	£100
Printer	TBA	£200
Monitor	Yes	—
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-user	Yes	—
Capabilities	TBA	—
BASIC extensions (Toolkits)	Yes	—

● **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,** Surrey GU1 4UN, Tel: 0483 50321, £199-799; **Colour Monitor,** 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**



● **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	—
Monitor	Yes	TBA
Disc Drives	TBA	£200
Other Languages	TBA	TBA
Multi-user	Yes	TBA
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, Edgeware, Middx, HA8 9QP, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Staines 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**



● **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	Yes	—
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	Yes	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

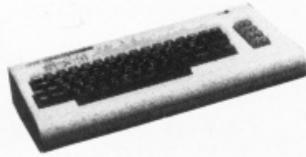
● **OTHER ADD-ONS:**

● **Universal Interface,** Technomatic Ltd, 17 Bunley Road, London NW10, £149;
● **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, 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

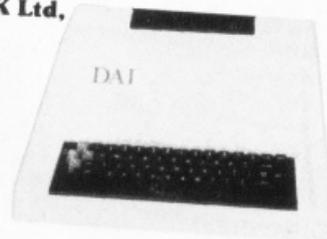
	DETAILS	PRICE
RAM	3K, 8K, 16K expansion options	£270
Printer	No	—
Monitor	Yes	£396
Disc Drives	Yes	£38.95
Other Languages	—	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	—	—

OTHER ADD-ONS:

VCR-20. Audio Computers, 87 Bournemouth Park Road, Southend
20K RAM cartridge. £39 klt, £45 built; **Expansion Board.** 3K-16K, Arfon on Sea SS5 2JJ, £39 klt, £45 built; **Expansion Board.** Caernafon, Gwynedd, Wales LL55
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



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

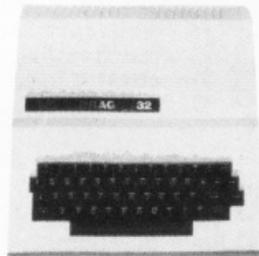
	DETAILS	PRICE
RAM	No	—
Printer	No	—
Monitor	No	—
Disc Drives	No	—
Other Languages	Yes	TBA
Multi-user	No	—
Capabilities	—	—
BASIC extensions (Toolkits)	No, maths pack	£149

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

JUPITER ACE

Jupiter Cantab
22 Foxhollow
Bar Hill
Cambridge
CB3 8EP



STANDARD PACKAGE

Memory Size (RAM) 3K
Screen Size 24 lines of 32 characters
Expansion Sockets Not known
Tape Included? No
Display Unit Included? No
Usable Domestic TV? Yes
Size of BASIC Resident language is FORTH at 8K
Average Price **£89.95**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	TBA	—
Printer	TBA	—
Monitor	TBA	—
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-User Capabilities	TBA	—
BASIC extensions (toolkits)	N/A	—

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	No	—
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)	—
Printer	Yes	£130
Monitor	Yes	£215-1285
Disc Drives	Yes	£99-120
Other Languages	Yes, single or dual	£470-685
Multi-user	Yes	£50
Capabilities	No	—
BASIC extensions (Toolkits)	Yes	—

OTHER ADD-ONS:

—15-50
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, Cwmnathen, Dyfed, £99 + VAT; Disc drives, single and dual, Micro-Spares, 19, Roseburn Terrace, Edinburgh, EH12 5N9, £199-279.

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 Price £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	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

SHARP MZ-80B

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester M10 9BE



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	No	—
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	Yes	—
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	No	—
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; Maxmem 1.1, East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London, E84 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



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	TBA
Disc Drives	ZX Microdrive	—
Other Languages	No	—
Multi-user	No	TBA
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

SORCERER

EMG, Microcentre,
47 Lower Belgrave
Street,
London, SW1



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	No	—
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.



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	Yes	£100
Capabilities	No	—
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



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	No	—
Capabilities	Yes	£100
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, 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 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



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	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

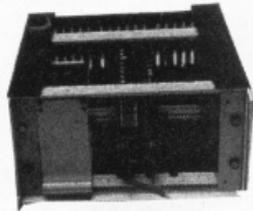
OTHER ADD-ONS:

Olivetti disc drives single and dual, Kran 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

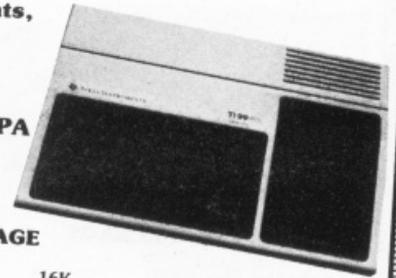
	DETAILS	PRICE
RAM	48K in system rack	£144
Printer	No	—
Monitor	No	TBA
Disc Drives	Yes	£40
Other Languages	Yes	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

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 TI99/4A

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	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

None Reported

VIDEO GENIE I

Low Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire,
DE4 5LE



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

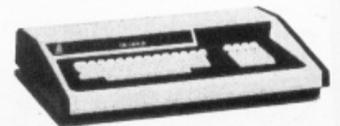
	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

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, Leicester LE1 4PF, £179-349; EG3014 Expansion box with 16K/32K RAM, Swanley Electronics, 32 Goldse 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 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

VIDEO GENIE II

Low Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire DE4 5LE



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	No	—
Capabilities	No	—
BASIC extensions (Toolkits)	No	—

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, Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179-349; EG3014 Expansion box with 16K/32K RAM, Swanley Electronics, 32 Goldse 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.

Electronequip

(Authorised BBC and Acorn Dealer, stockists and repair centre)

BBC1	BBC Micro Model A	£260.00	ATM1	Atom assembled 2Kram	£140.00
BBC2	BBC Micro Model B	£346.96	ATM2	Atom assembled 12Kram	£160.00
BBC21	Upgrade Model A to B	£100.00	ATM3	Atom assembled 5Kram colour	£158.00
BBCxx	Other Upgrades Phone for price		ATM10	Atom kit 2Kram	£110.00
BBC32	14" Colour Monitor	£250.00	ATM11	Atom kit 12Kram	£130.00
BBC35	BBC Cassette Recorder	£26.00	ATM25	New PAL Colour Encoder	£38.00
BBC36	Cassette Lead DIN to Jack	£4.00	ATM 26	New 1.8A Power Supply	£8.40
BBC40	Single 5.25" Disc Drive	£230.43	ATM53	Atom Cassette lead	£2.00
Epson	Printer MX80T type 3	£325.00	BMC	12A Black/Green Monitor	£79.00
Epson	Printer MX80FT type 3	£345.00	BMC	12E Black/Green Monitor	£99.00
Epson	Printer MX100 type 3	£445.00			

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



Electronequip



128 West Street, Portchester (A27 opp. RUBY) Hants PO16 9XE Tel: 0705-325354

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**

MICROWARE

NOTE

NEW
ADDRESS

Unit 5, St. Peters Lane, Leicester
(Close to Clock Tower, Bus Station
& Large Car Parks.)

Tel: 0533
681812

THE "FRIENDLY TO USER STORE"

Specialising in **SINCLAIR** Computer Accessories
NOW IN STOCK:

ZX81 £49.95 and **NEW DRAGON 32 £199.50**
Plus supporting Hardware/Software/Books/Magazines

Reliable Cassette Recorder	• SOFTWARE AND BOOKS FOR
Tested for Loading/Saving	•
on	• BBC MICRO
ZX81, Spectrum, Dragon and	• and
BBC.	•
ONLY £18.50	• VIC 20

If the product is good and the price is right then
MICROWARE STOCK IT!

MICROWARE SOFTWARE

Allen Command — (16K) Testing invaders style game making full use of colour, sound and graphics..... **£5.50**

BACKGAMMON — (16K) Play against your micro in this version of the popular board game..... **£5.00**

Both games are for SPECTRUM and available from shop or mail order.

SOFTWARE WRITERS — Good Spectrum and Dragon Software required. Excellent Royalties.

New New New New New New New

BBC MICRO COURSEWARE WRITER (Teacher's Toolkit)

Build up your own library of teaching and testing routines. Automatic scoring. Pattern matching diagnostic facility. Up to eight alternative correct answers allowed. Start after 30 minutes practice.

£25.00



Available on cassette for the BBC Micro Model B, Vic-20, Pet (new ROM)

On disk for the Apple II PET (3.0, 4.0)

Credit cards accepted.

Ask also about: Apfelddeutsch, French and German routines, Timetabling, ZX81 Wordpack, Storyboard, Master Maths, Micro Maths, Physics, Chemistry.

Send 9 x 6 s.a.e. for catalogue to

Educational Software Development

WIDA SOFTWARE

2 Nicholas Gardens, London W5 5HY
Tel: (01) 567 6941 (062 882) 5206

BBC MICRO Software

Quality programs written by professional computer programmers using every aspect of BBC MICRO. Each games cassette contains 3 extra super games. All programs are written efficiently as possible and uses graphics, sound and colour.

SPACE TREK (For Model B) with INVADERS BLITZ PINBALL £6.00
Not only has it got all the standard features of Startrek but this version includes additional secret weapon plus extra astronomical phenomena. Destroys the enemy battle cruisers and dodge the fast moving asteroids

ADVENTURE (For Model B) with INVADERS PONTOON LUNARLANDER £6.00
Enter the DUNGEON at your peri' but you have been warned: you are likely to get killed if you don't use your imagination. Use your weapon, magic, food and treasure efficiently or else. Don't enter the RANDOM MAZE for you'll be shouting for help.

SCRAMBLE (For Model A and B) with INVADERS BREAKOUT BATTLESHIP £6.00
Written in machine code this fast moving action game will require your total concentration. Every game is different. Superb sound effects. Multiple players.

DISASSEMBLER (For Model A and B) £5.00
Look into BBC BASIC ROM and use machine code software. Full instruction on how to use the DIS-ASSEMBLER will be supplied.

All Prices Include VAT and Postage and Packing. Send cheque or Postal Order made payable to:

ORCHESTRATED COMPUTING

ORCHESTRATED COMPUTING!! 37B NEW CAVENDISH ST LONDON W1M 8JR

BBC

COMPATIBLE

software

BEBUG MEMBERS

5% discount

MAIL ORDER LIST SEND LARGE S.A.E.

ELECTRONICS APPLIED, MAIL ORDER ONLY
4, DROMORE ROAD,
CARRICKFERGUS, Co. ANTRIM BT38 7PJ
Please add 55p/order P & P

Envelope and Character

Definer. (32k.)

Together these utility programs offer a complete character and sound envelope defining package for the BBC Micro. Even if you fully understand both the envelope and character defining commands, these programs will make their definition quicker and more accurate.

side 1	side 2
<p>ENVELOPE DEFINER</p> <ul style="list-style-type: none"> ★ Excellent use made of graphics windows and colour to display pitch and volume. ★ Database containing 20 predefined envelopes of everything from phasers to explosions. ★ Example graphs and step by step prompts allow easy defining of your own sound envelopes. 	<p>CHARACTER DEFINER</p> <ul style="list-style-type: none"> ★ 'A very nice VDU23 character definition program' — <i>Computer Users Club (GB)</i>. ★ Shows both magnified and true size characters as they are defined. ★ All other definable characters can be called up for display. ★ Easy to use and check performed on all input.
Recorded on quality cassettes, sent by first class post	

Introductory Price - £4.95

Dealer Enquiries Welcome

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

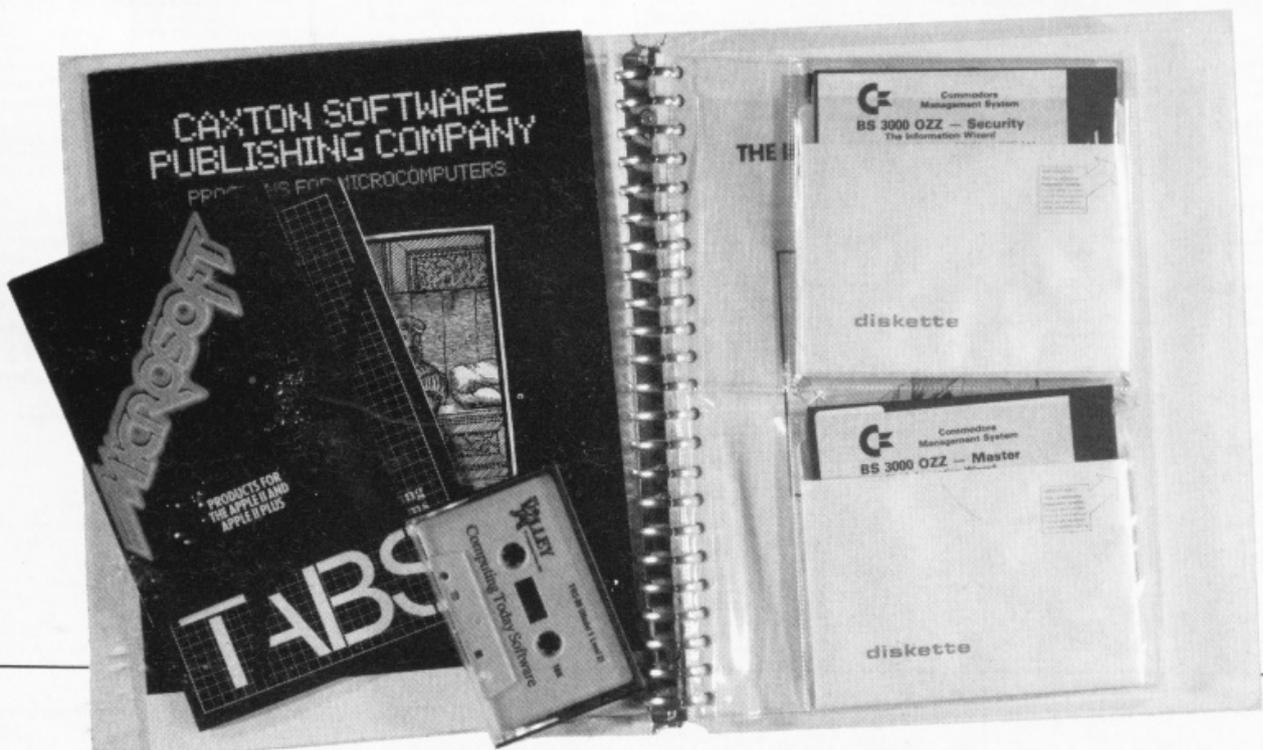
- R = Cartridge (may include memory)
- C = Tape (cassette)
- D = Disc (for expanded systems)
- L = Listing (sold as print-out)

Due to overwhelming response we have been forced to alternate

machines included in our checklist each month. Out this month are the ZX81, Atari and Texas. But don't panic, they will be featured in December for you to make your software selection.

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

ATOM

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Price
3-D Asteroids	Gm	Program Power	5K	C	GK	£6.85
747 Flight Simulator	Gm	Bug Byte	12K	C	CH,GA,GB	£8.00
Adventure	Gm	Program Power	12K	C	CH,GK	£9.15
Adventures	Gm	Acornsoft	12K	C	EJ	£30.00
Air Attack	Gm	Program Power	12K	C	CH,GK	£9.15
Air Attack	Gm	Program Power	12K	C	GK	£7.95
Alien Maze	Gm	Program Power	8K	C	GK	£5.69
Astrafire	Gm	Program Power	5K	C	GK	£4.54
Astro Birds	Gm	Program Power	12K	C	CH,GK	£9.15
Atom: Adventure	Gm	Acornsoft	12K	C	GA,AL	£11.50
Atom Breakout	Gm	Bug Byte	4K	C	HO	£4.00
Atom Business Games	B/G	Program Power	12K	C	GK	£7.99
Atom Business Cassette	Bs	Acornsoft		C	AL	£7.50
Atom Business Pack	Bs	Acornsoft		C	AY,FA	£11.50
Atom Chess	Gm	Acornsoft	12K	C	GA,EA,AL	£11.50
Atom Chess	Gm	Program Power	12K	C	GK	£11.44
Atom Forth	Ut	Acornsoft		C	GA,EJ,AL	£11.50
Atom Invaders	Gm	Bug Byte	12K	C	HO	£8.00
Atom Life Category	Bs	Acornsoft		C	AL,GA	£11.50
Atom List	Ut	Acornsoft		C	AL	£17.25
Atom Store	Bs	Program Power	12K	C	GK	£9.15
Atom Synthesiser	Gm	Acornsoft	12K	C	AL,GA	£11.50
Atomic Cube	Gm	A&F S/W	12K	C	GE	£4.95
Backgammon	Gm	Bug Byte	7K	C	GA	£7.00
Chess	Gm	Bug Byte	12K	C	CH,GA,GB	£9.00
Chess	Gm	Program Power	12K	C	GK	£9.15
Constellation	Gm	Program Power	12K	C	GK	£7.99
Constellation	Ed	Program Power	12K	C	GK	£7.99
Cowboy Shootout	Gm	Program Power	12K	C	CH,GK	£7.99
Cylon Attack	Gm	A&F S/W	12K	C	GE	£4.95
Dambusters	Gm	Program Power	10K	C	GK	£5.69
Data Base	Ut	Acornsoft	6K	C	EJ,FZ,FA,GA	£11.50
Death Satellite	Gm	A&F S/W	12K	C	GE	£6.00
Demon Dungeon	Gm	Program Power	5K	C	GK	£6.85
Derby, Blitz and Rat Race	Gm	Program Power	12K	C	GK	£6.84
Desk Diary	Bs	Acornsoft	12K	C	FA,EJ,AL,GA	£11.50
Disassemble Program	Ut	Program Power	4K	C	GK	£6.85
Dragon's Lair	Gm	Program Power	12K	C	GK	£6.85
Early Warning	Gm	A&F S/W	12K	C	GE	£4.95
Easy Talker	Ed	Acornsoft	16K	C	AW	£5.00
Escape	Gm	A&F S/W	8K	C	GE	£4.95
Fall of Rome	Gm	Program Power	12K	C	GK	£7.99
Forth Tape	Ut	Acornsoft		C	FA	POA
Forth, Theory & Practice	Bs	Acornsoft		C	AL	£6.00
Fruit Machine	Gm	Bug Byte	8K	C	HO	£4.00
Galactica	Gm	Program Power	12K	C	GK	£5.69
Galaxian	Gm	Bug Byte	12K	C	CH,GA,GB	£8.00
Galaxian War and Invasion	Gm	Program Power	2K	C	GK	£6.84
Golf	Gm	Bug Byte	6K	C	HO	£5.00
Games Pack 1:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Asteroids			10K		EJ,AL,CH	
Sub Hunt			6K		FZ	
Break Out			4K			
Games Pack 2	Gm	Acornsoft		C	AY,FA,GA	£11.50
Dog Fight			10K		EJ,AL,CH	
Mastermind			4K		FZ	
Zombie			4K			
Games Pack 3:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Rat Trap			10K		EJ,AL,CH	
Lunar Lander			6K		FZ	
Black Box			10K			
Games Pack 4:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Star Trek			8K		EJ,AL,CH	
Four Row			12K		FZ	
Space Attack			10K			
Games Pack 5:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Invaders			10K		EJ,AL,CH	
Wumpus			3K		FZ	
Reversi			4K			
Games Pack 6:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Dodgems			10K		EJ,AL,CH	
Simon			8K		FZ	
Amoeba			6K			
Games Pack 7:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Life Forms			8K		EJ,AL,CH	
Ballistics			10K		FZ	
Snake			10K			
Games Pack 8:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Star Date			8K		EJ,AL,CH	
Gomoku			8K		FZ	
Robots			10K			

SOFTWARE DEALERS

Supplier Code	Supplier	AS	Supplier
AA	Micro Centre Ltd 30 Dundas Street Edinburgh EH3 6JN 031 556 7354	AS	Lucas Logic Ltd Nasco Microcomputers Division Welton Road Wedgcock Industrial Estate Warwick CV34 5PZ
AB	Micro and Video Palace 62-64 Kensington High Street London W8 01 937 8587	AT	Atlantic Micro System 70-72 Honor Oak Park London SE23 1DY 01 699 2202
AC	Laskys 7-9 Queensway London W23RX 01 200 0444	AU	TCL Software 59/61 Theobalds Road London WC1 405 5240/2113
AD	Datarite Terminals Ltd Caldare House 144-146 High Street Chadwell Heath Essex RM6 6NT 01 590 1155	AV	I A S Cambridge Road Orwell Royston Herts 0223 207689
AE	Vincelord Ltd Suite 2 26 Charing Cross Road London WC2 240 0213/0217	AW	Intelligent Artefacts Ltd Cambridge Road Orwell Royston Herts 0223 207689
AF	MicroComputerLand Shropshire House 2-10 Capper Street London WC1E 6JR 01 637 4078/948 6411	AX	Kuma Computers 11 York Road Maidenhead Berks 0628 71778
AG	Comart Ltd St Neots Cams PE19 3JG (0480) 215005	AY	Microstore 327 Kings Road London SW3 352 9291
AH	Cream Computer Shop Rabbit Software 380 Station Road Harrow Middlesex 863 0833	AZ	London Retail 98 Moysen Road London SW16 6SH 01 677 2052/7341
AI	Microvalue Computer Interfacing & Equipment Ltd The Micro Spares Shop 19 Roseburn Terrace Edinburgh EH12 5NG (031) 337 5611	BA	Micro-Spares 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	BB	CAPS Ltd 28 The Spain Petersfield Hampshire GU32 3LA
AK	GW Computers Ltd 55 Bedford Court Mansions Bedford Avenue London WC1 01 636 8210/631 4818	BC	Maplin PO Box 3 Rayleigh Essex 0702 552911/554155
AL	Acornsoft Ltd 4a Market Hill Cambridge CB23NJ 0223 316039	BD	Caxton Software Publishing Co. 10-14 Bedford Street Covent Garden London WC2 01 379 6502
AM	Acorn Computers Fulbourne Road Cherry Hinton Cambridge	BE	Cornshall Ltd 32-34 Great Peter Street London SW1
AN	Microcomputers Products Int. Rm PCW 8 Cambridge House Cambridge Road Barking Essex IG11 8NT 591 6511	BF	Micro Technology Royal Sussex Assembly Rooms The Pantiles Tunbridge Wells Kent 0892 32116
AO	Xitan Systems 23 Cumberland Place Southampton S01 0703 38740	BG	Elcon Research Ltd Viking Way Banhill Cambridge CB3 8EZ 0954 81825
AP	KGB Micros Ltd 14 Winsor Road Slough Berks Slough (0753) 38581/38319	BH	Avalon Hill Games 650 High Street North Finchley N12 445 3044
AQ	Broadside 2 The Spinney North Cray Kent	BI	Call Apple (UK) c/o SBD Software, Freeport Richmond Surrey 940 5194
AR	Software Ltd 387 8832/388 9927	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

Games Pack 9: Snapper Minotaur Babies	Gm	Acornsoft	8K 12K 8K	C AY,FA,GA EJ,AL,CH FZ	£11.50
Games Pack 10: 10 Games for minimum Atom	Gm	Acornsoft	2K	C AY,FA,GA EJ,AL,CH, FZ	£11.50
Games Pack 11: Missile Base Snooker Dominoes	Gm	Acornsoft	12K	C AY,FA,GA EJ,AL,CH FZ	£11.50
High Stats Hyper Fire	Bs Gm	Program Power Program Power	12K 12K	C GK C GK	£7.99 £9.15
Introductory Pack Invader Force Invaders	Ed Gm Gm	Acornsoft Program Power Bug Byte	3K 12K 12K	C GA,FA,AL C GK C CH,GA,GB	£23.00 £9.15 £8.00
Labrynth Last Run Lunar Lander Lunar Lander	Gm Gm Gm Gm	Bug Byte Bug Byte Program Power Bug Byte	12K 7K 12K 12K	C HO C HO C GK C HO	£6.95 £3.00 £7.99 £5.50
Martians Maths Pack 1:	Gm Ed	Program Power Acornsoft	12K 4K	C GK C EJ,FA,FZ,AL, GA	£7.99 £11.50
Maths Pack II:	Ed	Acornsoft	6K	C EJ,FA,FZ, AL,GA	£11.50
Maze Ball Microbudget Mine Field Missile Command Mode 4 VDU Munchy Man Music Box	Gm Bs Gm Gm Ut Gm Gm	Program Power Program Power A&F S/W A&F S/W Program Power Program Power Program Power	12K 12K 6K 12K 12K 5K 12K	C GK C GK C GE C GE C GK C GK C GK	£5.69 £9.15 £4.95 £4.95 £7.99 £5.69 £7.99
Peeko Computer Pinball Polaris Polecat Pontoon Programmer's Toolkit	Ed Gm Gm Gm Gm Gm	Acornsoft Bug Byte A&F S/W A&F S/W A&F S/W Program Power	6K 6K 12K 12K 12K C GK	C GA,FA,AL C HO C GE C GE C GE C GK	£11.50 £4.50 £3.95 £4.95 £3.95 £28.15
Reversi Rhino and Wiggle Robot Cptrol Robot Nim	Gm Gm Ed Gm	Program Power Bug Byte Acornsoft A&F S/W	8K 10K 16K 6K	C GK C HO C AW C GE	£5.69 £5.00 £35.00 £3.95
Sketch Pad Program Softscreen Space Fighter Space Invaders Space Storm Star Trek Star Trek Statistics Pack Stockbroker Super Race Track Squares, Simon and Parachute	Gm Ut Gm Gm Gm Gm Gm Ut Gm Gm Gm	Program Power Computer Concepts Program Power Computer Concepts Program Power Program Power Bug Byte Bug Byte Program Power Program Power Bug Byte	5K 12K 12K 12K 4K 5K 12K 12K 5K 12K 7K	C GK C GJ C GK C GJ C GK C GK C HO C HO C £4.54 C GK C HO	£5.69 £11.50 £9.15 £7.80 £5.69 £6.85 £5.00 £20.00 £5.69 £5.00
Tangle The Soft VDU	Gm Gm	A&F S/W Acornsoft	6K 8K	C GE C AY,FA,GA, EJ,AL,CH,FZ	£3.95 £11.50
The Park Time Tutor 2K Programs (1) 2K Programs (2) 2K Programs (3) Typist	Gm Ed Gm Gm Gm Ut	Program Power A&F S/W Bug Byte Bug Byte Bug Byte Bug Byte	12K 6K 2K 2K 2K 6K	C GK C GE C HO C HO C HO C HO	£5.69 £3.95 £4.50 £4.50 £4.50 £4.00
UFO Bomber Utility Pack 1	Gm Ut	Bug Byte Acornsoft	7K 2K	C HO C FA,GA,AL,GA	£4.00 £11.50
Warlords Word Pack ROM Word Processing Pack Word Tutor	Gm Ut Bs Bs	Program Power Acornsoft Acornsoft Acornsoft	12K 8K 8K 12K	C GK C AL,EJ,GA C FA C GA,EJ,FA,AL	£7.99 POA POA £11.50
Yan	Gm	Program Power	3K	C GK	£5.69

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 Applied	32K	C	IF	£4.50
Beebunch	Gm	I.J.K. S/W	32K	C	IT	£5.95
Bounty Pirates	Gm	Aztec S/W	16K	C	IB	£5.50
Breakout	Gm	I.J.K. S/W	16K	C	IT	£3.95
Characters	Ut	Computer Concepts	16K	C	GJ	£6.67
Characters & Envelope	Ut	Electronics	16K	C	IF	£4.50

SOFTWARE DEALERS

BL	Peach Tree Software International (Susan Jane) MSA House 99 King Street Maidenhead Berks 0628 71011	CD	Omega Plus 2c Graham Road London E8 1BZ
BM	ACT (Microsoft) Ltd Freepost Birmingham B16 8BR (David Low) 021 454 8585	CE	Southern Software PO Box 39 Castleigh Hants SO5 5WQ
BN	Personal Computer Palace 4-6 Castle Street Reading Berks 0734 589249	CF	Sigma Systems 54 Park Place Cardiff Cardiff 21515/34869
BO	Sinclair Software Sinclair Research Ltd 6 Kings Parade Cambridge CB2 1SN 0276 66104	CG	Planet Software 10 Norton Drive Eaton Norwich
BP	Leicester Computer Centre Ltd 67 Regent Road Leicester LE16YF 0533 556268	CH	Brighton Gamer 24 Gloucester Road Brighton Sussex 0273 698424
BQ	TABS Ltd Sopers House Chantry Way Andover Hants SP10 12U 0264 58933	CI	Picturesque 6 Corkscrew Hill West Wickham Kent BR4 9BB
BR	IBR Microcomputers Suttons Industrial Park London Road Earley Reading 0734 664111	CJ	ACS Software 7 Lidgett Crescent Roundhay Leeds
BS	Computer Plus 47 Queens Road Watford Herts WD1 2LH 0923 33927	CK	Chrisalid 13 High Street Berkanstead Herts 74569
BT	The Essential Software Co Dept BT (Visconti Ltd) 47 Brunswick Centre London WC1 866 5445	CL	MED 1736 Church Hill Road Thurmaston Leicester Leic. 704492
BU	Guestel 8-12 New Bridge Street London EC4 583 2255	CM	Simple Software 15 Havelock Road Brighton Sussex 0273 504879
BV	Low Electronics Chesterfield Road Matlock Derbyshire DE4 5LE 0629 4995	CN	Buffer Micro Shop 374A Streatam High Road London SW16 769 2887
BW	Gate Micro System Ltd The Nethergate Centre 35 Yeaman Shore Dundee 0382 28194	CO	Pixel Productions 39 Ripley Gardens London W1 48HF
BY	Almarc Data Systems Ltd Great Freeman Street Nottingham NG3 1FR 0602 52457/8/9	CP	Computics Microsoft 1 Bell Lane Wheatley Oxford OX9 1XY
BZ	Interam Computer Systems Ltd 46 Balham High Road London SW12 675 5325/6/7	CQ	KW Software 155 Ronginglow Road Sheffield S11 7PS
CA	Terodec Ltd Unit 58 Suttons Park Avenue Earley Reading 0734 664343/6	CR	Sideline Freepost Oxford OX2 8BR
CB	Poolsoft 17 Blatchington Road Safford East Sussex 0323 890604	CS	IQ Services Canal House Ardinghaig Argyll Scotland 0546 3212
CC	Highlight Software 3 Nether Court Halstead Essex 0787 475714	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

REFERENCE

SOFTWARE LISTING

BBC

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Definer		Applied				
Code Race	Gm	Computer Concepts	16K	C	GJ	£6.67
Creative Graphic Pack	Ut	Acronsoft	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	Acronsoft	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	Acronsoft	16K	C	AL,GA	£9.95
Hangman	Gm	Aztec S/W	16K	C	IB	£5.50
Lisp	Bs	Acronsoft	16K	C	AL,GA	£16.85
Minefield	Gm	A&F Software	16K	C	GE	£6.00
Mixed Games	Gm	L.J.K. S/W	16K	C	IT	£3.95
Multifile	Bs	Bug Byte	16K	C	EA	£25.00
Mutant Invaders	Gm	L.J.K. S/W	16K	C	IT	£5.95
Othello	Gm	Computer Concepts	16K	C	GJ	£8.95
Peeko Computer	Bs	Acronsoft	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
Model A Invaders	Gm	L.J.K. S/W	16K	C	IT	£4.95
Model B Invaders	Gm	L.J.K. S/W	32K	C	IT	£6.95
Monsters	Gm	Acronsoft	32K	C	AL,GA	£9.95
Othello	Gm	Computer Concepts	32K	C	GJ	£8.95
Othello	Gm	Computercat	16K	C	IJ	£8.95
Peeko Computer	Ut	Acronsoft	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	Acronsoft	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
Startrek/Candy Floss	Gm	L.J.K. S/W	16K	C	IT	£5.95
Super Hangman	Gm	L.J.K. S/W	32K	C	IT	£3.95
Teacher's Toolkit	Ed	Wida Software	32K	C	FY	£30.00
3D Maze	Gm	L.J.K. S/W	32K	C	IT	£3.95
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	Acronsoft	32K	C	AL,GA	£9.95
Defender	Gm	Acronsoft	32K	C	AL,GA	£9.95
Desk Diary	Bs	Acronsoft	32K	C	AL,GA	£9.95
FORTH	Ut	Acronsoft	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
Allen 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 Wolsencroft	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

SOFTWARE DEALERS

CX	Microdeal Deal House Bridges Bodmin Cornwall	HM	Gemini electronics 2-4 Enfield Place London NW6 01-328-7145
CY	Prof. F H George Bureau of Information Science Commerce House High Street Chalfont St Giles Bucks	DQ	Woodland Software 103 Oxford Gardens W10 6NF 01 960 4877
CZ	J Wolstencroft Sagar Fold Preston Chipping (09956) 327	DR	Telesystems Ltd PO Box 12 Great Missenden Bucks HP16 9DD
DA	Ground Control Alfreda Avenue Hullbridge Essex SS5 6LT Southend (0702) 230324	DS	Macronics 26 Spiers Close Knowle Solihull West Midlands B93 9ES
DB	Mick Bignell 01 953 8385	DT	Hewson Consultants Dept PCW 7 Graham Close Blewbury Oxon (0235) 850075
DC	Giltrole Ltd Dept PCW, PO Box 50 Rugby Warks CV21 4DH	DU	Silicon Office Services 240 Durants Road Enfield Middx EN3 7AZ 01 805 0903
DD	Deep Thought Software 20 Chauntsingers Alton Hants	DV	Sirton Computer Systems Unit 14 29 Willow Lane Mitcham Surrey 01 640 6931
DE	Silversoft (Dept PCW) 40 Empress Avenue Ilford Essex	DW	Psion Ltd 2 Hunsworth Mews Gloucester Place NW1 6DD
DF	Michael Orwin 26 Brownlow Road Willesden London NW10	DX	JRS Software 19 Wayside Avenue Worthing Sussex Worthing 65691 (evenings and weekends only)
DG	Hisoft 60 Hallam Moor Liden Swindon Wiltshire	DY	Calisto Computers Ltd 119 John Bright Street Birmingham B1 1BE 021 632 6458
DH	The Soft Option Bamberplan Ltd PO Box 11 Cranbrook Kent 058080 310	DZ	Micro Gen (Dept PCI) 24 Agar Crescent Bracknell Berks 0344 27317
DI	Wild Bills Computer Rodeo PO Box 721439A London 01 246 8000	EA	Anglia Computer Centre 88 St. Benedicts Street Norwich NR2 4AB 0603 26002
DJ	Microcomputer Spacedrome 3 Westholm London NW11 01 458 5845	EB	SBD Software 15 Jocelyn Road Richmond TW9 2JT 01 948 0461
DK	Spider Software 98 Avondale Road South Croydon Surrey 01 680 0267	EC	Abacus Software PO Box 7211 Grand Rapids Michigan 49510
DL	Xavier Business Systems 7 North Lane Clayton Scarborough Yorkshire (0723) 583509	ED	Qdos Business Software 9 Tintern Close Streetly Birmingham 021 353 0058
DM	Camden Electronics (Systems Division) 462 Coventry Road Small Heath Birmingham 021 773 8240/021 772 5718	EE	dK'ronics 23 Sussex Road Gorleston Great Yarmouth Norfolk (0493) 602453
DN	Sumlock Electronic Services Royal London House 198 Deansgate Manchester M3 3NE	EF	Computech Systems 168 Finchley Road London NW3 6HP 01 794 0202
DO	Microstyle 29 Belvedere Lansdowne Road Bath (0225) 334659	EG	Electronics Experts Avondale Workshops Woodland Way Kingswood Bristol BS15 1QH
DP	Small Systems Engineering Ltd 2-4 Canfield Place London NW6 01 328 7145		

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 England	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

SOFTWARE DEALERS

EH	Artic Computing 396 James Reckitt Avenue Hull HU8 0JA	FA	Control Universal Ltd Unit 2 Andersons Court Newnham Road Cambridge 0223 358757
EI	Knights TV & Computers 108 Rosemount Place Aberdeen 0224 630526	FB	Pete & Pam Computers 98 Moyser Road London SW16 01 677 2052/7341
EJ	Microage Electronics 135 Hale Lane Edgware Middx 01 959 7119	FC	Zenith Data Systems Bristol Road Gloucester 0452 29451
EK	Holly Products Blackthorn House Dukes Lane Gerrards Cross Bucks	FD	Commodore Information 675 Ajax Avenue Slough Berks Slough 79292
EL	I O Systems 6 Laleham Avenue Mill Hill London NW7 01 959 0106	FE	Logic Computers 31 Palmer Street London SW1H 0PR 01 222 1122/5492
EM	Merton Electronics (Dept PW) 85/87 Station Road W Croydon 680 8606	FF	Overseas Computer Systems Cons. 182a Queens Road Watford Watford 48580
EN	Davinci Computer Shop 65 High Street Edgware Middx	FG	Blyth Computers Wenhaston Halesworth Suffolk 050 270 565
EO	Calco Software Lakeside House Kingston Hill Surrey 01 546 7256	FH	Taurus Computer Design 47 High Street Baldoek Herts SG7 6BG
EP	Richard Francis (Dept PCW) 22 Foxhollow Barhill Cambridge	FI	HITEC (Austria) Zollergasse 15 A-1070 Vienna Austria 01043 222 934331
EQ	Microtek Ltd 15 Lower Brook Street Ipswich Suffolk (0473) 50512 or 52466	FJ	Graffcom Systems 102 Portland Road Holland Park London W11 01 727 5561
ER	Diskwise Ltd 25 Fore Street Callington Cornwall 05793 3780	FK	Electronic Aids (Tewkesbury) Mythe Crest The Mythe Tewkesbury Glos GL20 6EB 0386 831020
ES	Control Technology 39 Gloucester Road Gee Cross Hyde Cheshire SK14 5JG 061 368 7558	FL	BUG-BYTE 98-100 The Albany Old Hall Street Liverpool
ET	Comp Shop 311 Edgware Road London W2 01 262 0387	FM	Learning Computer Systems 37 St Andrews Drive Seaford Sussex BN25 2SB
EU	Micro Computer Prods (Room PC) Cambridge House Cambridge Road Barking Essex IG11 8NT 01 591 6511	FN	Jentech Services Ltd Nordley Bridgnorth Shropshire WV16 4SU 07462 5287
EV	GW Computers 55 Bedford Court Mansions Bedford Avenue London WC1 01 636 8210	FO	Dept ZM Work Force 140 Wilsden Avenue Luton Beds LU1 5HR
EW	C/WP Computers 108 Rochester Row London SW1P 1JP 01 828 3127	FP	Twickenham Computer Centre 72 Heath Road Twickenham Middx 892 7896 or 891 1612
EX	Metrotech Mail Order Waterloo Road Uxbridge Middx 0895 58111 x 274/269	FQ	Sbd Software 15 Jocelyn Road Richmond 948 0461
EY	Microsystems Ltd Summerfield House Vale Guernsey 0481 47377	FR	Beebug PO Box 50 St Albans Herts (Independent User Group for BBC Micro)
EZ	Superior Systems Ltd 178 West Street S14ET 0742 755005		

REFERENCE

SOFTWARE LISTING

SHARP MZ-80K

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
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	C	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 1	Gm	Cload Inc	16K	C	IA	£11.95
Advanced Programming Aid	Ut	Kansas	16K	C	IH	£12.50
Adventureland	Gm	Adventure Int.	16K	C	IS	£12.50
					AJ	£18.99
Adventure Mysterious	Gm	Adventure Int.	16K	C	AJ	£10.06

SOFTWARE DEALERS

FS	RAM Computer Services Ltd 15-17 North Parade Bradford 0274 391166	GL	Syrtris Software 23 Quantock Road Bridgewater Somerset
FT	Ozwise Computers 28 Crofts Road harrow Middx HA1 2PH 01 863 2309	GM	Lutterworth Software 6 Cromwell Close Walcote Lutterworth LE17 4JJ
FU	Compusense PO Box 169 Palmer's Green London N13 4HT 01 882 0681	GN	Collins Computing The Gatehouse Whinburgh Dereham, Norfolk
FV	The Avery Computer Company 13 The Mall Bar Hill Cambridge (Crafts Hill 80991)	GO	Datafax (Dept CT) Riviera House Queens Road Buckhurst Hill Essex
FW	Hilderbey Ltd 8/10 Parkway Regents Park London NW1 01 485 1059	GP	CCSoft 83 Longfield Street Southfields London SW18
FX	Micromedia Vine Cottage Tentelow Lane Norwood Green Middx 01 843 9457	GQ	Microx 52 The Strand Worthing Sussex Worthing 49584
FY	Wida Software 2 Nicholas Gardens London W5 5HY 01 567 6941	GR	Pro Software 121 Tyn-Y-Twr Baglan Port Talbot West Glamorgan SA12 8YE
FZ	Superior Systems Ltd 178 West Street Sheffield 0742 755005	GS	Sussex Software Wallsend House Pevensey Bay East Sussex
GA	Eltec Services Limited 231 Manningham Lane Bradford BD8 7HH (0274) 491372	GT	Rose Cassettes 148 Widney Lane Solihull West Midlands B91 3LH
GB	Anglo American Software 138a Stratford Court Sparkhill Birmingham 021 771 2995	GU	Axis (YC2) 71 Brockfield Avenue Loughborough Leics LE11 3LN
GC	Castle Electronics 15 Castle Street Hastings East Sussex 0424 437875	GV	PR Software 28 the Fairway South Ruislip Middx HA4 0RY
GD	Quicksilver 95 Upper Brownhill Road Maybush Southampton Hants 0703 771248	GW	Bridge Software 36 Fernwood Marple Bridge Stockport Cheshire SK6 SBE
GE	A&F Software 10 Wilshire Avenue Longsight Manchester 061 320 5482	GX	Video Software Limited Stone Lane Kinver Stourbridge West Midlands Kinver 2462
GF	SRS Microsystems 161 Bramley Road Oakwood London N14 4XA 01 363 8060	GY	J M Steadman 6 Carron Close Leighton Buzzard Beds LU7 7XB
GG	Stirling Microsystems 241 Baker Street NW1 01 486 7671	GZ	Transform Ltd 41 Keats House Porchester Mead Beckenham Kent 01 658 1661
GH	Microtanic Software 235 Dulwich Road London OBD 01 693 7659	HA	Baust Computing Consultants 31 Peak Lane Fareham Hants PO14 1RX 0329 281480
GI	Lander Microsystems 32 Clockhouse Lane Collier Row Romford Essex Romford 26325	HB	University Computers 5 St Barnabas Road Cambridge CB1 2BU
GJ	Computer Concepts 16 Wayside Chilperfield Herts 09277 62955	HC	Educare 139a Sloane Street London SW1X 9AY
GK	Program Power 5 Wensley Road Leeds LS7 2LX 0532 683186		

Adventure Mysterious	Gm	Adventure Int.	32K	D	AJ	£13.50
Air Raid	Gm	MA	16K	C	IS	£7.50
Air Traffic Control	Gm	MA	16K	C	IS	£9.50
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	IS	£11.50
					AJ	£10.06
					AJ	£13.23
Alien Armada	Gm	Molimerx	32K	D	AJ	£8.50
Alien Attack Force	Gm	Instant S/W	16K	C	GB,AB	£9.50
Alien Attack	Gm	Kansas	16K	C	IH	£11.50
Alien Defence	Gm	Soft Sector Mkting	16K	C	IS	£15.50
					GB	£11.95
Alien Defence	Gm	Soft Sector Mkting	16K	D	IA	£26.50
All Stars	Gm	Instant S/W	16K	D	GB	£28.95
					AB	£8.50
All Turret Gunner	Gm	Instant S/W	16K	C	GB,AB	£18.40
Amateur Log	Ut	Molimerx	32K	D	AJ	£7.50
Amazing Maze						
Touchdown	Gm	Kansas	16K	C	IH	£14.35
Angel Worms	Gm	Adventure Int.	8K	C	AB	£17.20
Animation	Ut	Molimerx	16K	C	AJ	£20.65
Animation	Ut	Molimerx	32K	D	AJ	£7.50
Android Nim	Gm	Molimerx	16K	C	IS	£10.06
					AJ	£9.50
Arcade Invaders	Gm	Kansas	16K	C	IH	£9.50
Arcade Scramble	Gm	Kansas	16K	C	IH	£15.00
Armoured Patrol	Gm	Adventure Int.	16K	C	IS	£18.99
					GB	£6.25
Armoured Patrol	Gm	Adventure Int.	16K	D	AB	£74.75
Ascertain	Ut	Kansas	16K	C	IH	£10.06
Assemble Package	Ut	Molimerx	32K	D	AJ	£13.50
Asteroids	Gm	Molimerx	16K	C	AJ	£14.95
Asteroids	Gm	Molimerx	32K	D	AJ	£13.77
Astro Navigator	Gm	Molimerx	16K	C	AJ	£10.93
Astrobball	Gm	Molimerx	16K	C	AJ	£10.93
Astrolog	Ed	Molimerx	16K	C	AJ	£9.50
Astronomical Calendar	Ed	Molimerx	16K	C	AJ	£12.00
Asylum	Gm	Med Systems	16K	C	IS	£11.50
					BT	£19.75
Atlantian Odyssey	Gm	Guild	16K	C	IS	£21.50
					GB	£10.95
Atlantian Odyssey	Gm	Guild			D GB	£11.50
					GB,BT	£12.50
Attack Force	Gm	Big 5 S/W	16K	C	IS	£12.95
BI Nuclear Bomber	Gm	Instant S/W	16K	C	GB	£79.95
					BT	£10.06
BQ81	Bs	Baust Computing	48K	D	HA	£13.50
Back 40	Gm	Molimerx	16K	C	AJ	£14.35
Back 40	Gm	Molimerx	32K	D	AJ	£7.50
Back 40 III	Gm	Adventure Int.	16K	C	AB	£7.99
Backgammon	Gm	Adventure Int.	16K	C	IS	£8.50
					AB	£33.70
Backgammon	Gm	Kansas	16K	C	IH	£7.49
Balrog Sampler	Gm	Adventure Int.	16K	D	AB	7.50
Bandito	Gm	Acorn	16K	C	AJ	£7.50
Barricade	Gm	MA	16K	C	IS	£7.50
Bandit/Maze Chase	Gm	Kansas	16K	C	IH	£7.50
Banner	Ut	Kansas	16K	C	IH	£9.00
Basic Bidding	Gm	Bryants S/W	16K	C	HW	£22.94
Basic Compiler Accel.	Ut	Microsoft	16K	C	AJ	£45.95
Basic Compiler Accel. 3	Ut	Microsoft	16K	C	AJ	£49.95
Basic Compiler Accel. 3	Ut	Microsoft	16K	D	AJ	£10.95
Basic Insert	Ut	Molimerx	16K	C	AJ	£14.39
Basic Insert	Ut	Molimerx	32K	D	AJ	£12.50
Basic Programming System	Ut	Instant S/W	16K	C	AB	£10.95
Basketball	Gm	Molimerx	16K	C	AJ	£14.39
Basketball	Gm	Molimerx	32K	D	AJ	10.50
Battle Bastogne	Gm	MA	16K	C	IS	10.50
Battle St. Vith	Gm	MA	16K	C	IS	£15.55
Battle of Britain	Gm	Molimerx	16K	C	AJ	£8.50
Battle Ground	Gm	Instant S/W	16K	C	GB,AB	£3.75
Bearings	Ed	Bryants S/W	16K	C	HW	£20.95
Bedchest III	Gm	Adventure Int.	16K	C	AB	£7.50
Beewary	Gm	Molimerx	16K	C	IS	£10.06
					AJ	£8.50
Beginner's Russian	Ed	Instant S/W	16K	C	GB,AB	£8.63
Biorhythm	Ed	Molimerx	16K	C	AJ	£7.50
Biorhythms	Do	Kansas	16K	C	IH	£11.95
B-1 Nuclear Bomber	Gm	Avalon Hill	16K	C	IA	£10.06
Blackboard	Ut	Molimerx	16K	C	AJ	£21.15
Blackjack Master	Ut	Molimerx	16K	C	AJ	£25.42
Blackjack Master	Gm	Molimerx	32K	D	AJ	£17.00
Blink 1	Ut	Molimerx	32K	D	AJ	£7.48
Blockade	Gm	Molimerx	16K	C	AJ	£10.00
Bradley Estate Mystery	Gm	Ogre	16K	C	IC	£13.50
Bridge Partner	Gm	MA	16K	C	IS	£13.50
Bridge 2.0	Gm	MA	16K	C	IS	£13.50
Bright & Early	Ed	Molimerx	16K	C	AJ	£8.90
Build High						
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

SOFTWARE DEALERS

HD	Simon Software Freeport New End Redditch	HW	Bryants (Educational) Software 1 The Hollies Chalcroft Lane North Berstead Bognor Regis West Sussex PO21 55X
HE	Docimodus 161 Walmersley Road Bury Lancashire BL9 5DE	HX	Abersoft 7 Maes Afallen Bow Street Dyfed SY24 5BA
HF	M C Associates 4 Granby Road Cheadle Hulme Cheshire SK8 6LS	IC	Ogre Games & Software Fantasy Department 47 Chislehurst Avenue Liverpool 25 Merseyside
HG	Addictive Games Dept YC PO Box 278 Conniburrow Milton Keynes MK14 7NE	ID	Tridata Micro's Ltd Smithfield House Digbeth Birmingham B5 6BS 021-622 6085/6
HH	J K Greye Software Dept YC 16 Park Street Bath Avon BA1 2TE	IE	Plympton Computer Services 5 Turbill Gardens Plympton Plymouth Devon PL7 3XF 0752-330176
HI	John Prince 29 Brook Avenue Levenshire Manchester M19	IF	Electronics Applied 4 Dromore Road Carrickfergus Co Antrim BT38 7PJ
HJ	Titan Programs 83 Ashwood Road Rudloe Corsham Wiltshire SN13 0LG (0225) 810132	IG	Emjay 17 Langbank Avenue Rise Park Nottingham NG5 5BU
HK	Micro Computer Software Unit D6 Pear Industrial Estate Stockport Road Lower Bredbury Stockport SK6 2BP 061 494 2441	IL	V&H Computer Services 182c Kingston Road Staines Middlex
HL	Phipps Associates 99 East Street Epsom Surrey KT17 1EA	IM	AVC Software PO Box 415 Harborne Birmingham B17 9TT
HM	Gemini Electronics 50 Newton Street Manchester M1 061 236 3083	IN	Computator 3 Thalia Close Greenwich SE10 4NA
HN	The Vic Centre 154 Victoria Road Acton London W3 6UL 01-992-9904	IO	Ohmega Electronics 37 Chichester Square Carrickfergus Co Antrim BT38 8JU
HP	R & R Software 34 Bourton Road Gloucester GL4 0LE 0452-502819	IP	A.V.O. Software Distribution 131 Lord Street Hoddesdon Hertfordshire EN11 8NG
HQ	Town Book & Toys 15 Eastgate Street Gloucester Glos	IQ	Big Sofite 5 Aston Park Finaghy Belfast BT10 0JQ
HR	Screen Scene 144 St Georges Road Cheltenham Glos	IR	Adamssoft 18 Norwich Avenue Rochdale Lancs OL11 5JZ
HS	Software Masters Ltd 30 Lincoln Road Olton Birmingham	IS	Microcomputer Applications 41 Queens Road Blandford Forum Dorset DT11 7LA
HT	John Prince Software 29 Brook Avenue Levenshulme Manchester M19	IT	L.J.K. Software 55 Fitzroy Road Bispham Blackpool Lancs
HU	Nick Godwin 4 Hurkur Crescent Eyemouth Berwickshire TD14 5AP	PF	CT Software ASP Ltd 145 Charing Cross Road London WC2H 0EE 01-437 1002
HV	A.Parsons 23 Coxhill Gardens River Dover Kent		

REFERENCE

SOFTWARE LISTING

TRS 80

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Price
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
Chess Partner	Gm	MA	16K	C	IS	£9.50
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	C	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	AJ	£12.50
Company Director	Gm	Molimerx	16K	C	AJ	£17.19
Compression Utility	Ut	Instant S/W	16K	C	GB	£15.75
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	Gm	MA	16K	C	IS	£10.50
Conflict 2500	Gm	Avalon Hill	16K	C	IA	£12.95
Conquest 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	16K	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	16K	C	IA	£10.95
Cosmic Fighter	Gm	MA	16K	C	IS	£11.50
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 Player	Gm	MA	16K	C	IS	£9.50
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
Crowley Manor	Gm	MA	16K	C	IS	£15.00
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
Crusaders	Gm	Molimerx	16K	C	AJ	£13.51
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
DSM	Ut	Racet Computers	32K	D	AJ	£16.50
D-Day	Gm	MA	16K	C	IS	£46.00
Danger in Orbit	Gm	Instant S/W	16K	C	AB	£10.50
Danger in Orbit	Gm	Instant S/W	16K	D	GB	£12.50
Daredevil	Gm	Instant S/W	16K	D	GB	£15.50
Dark Void	Gm	Molimerx	16K	C	IA	£8.50
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	IS	£9.50
Datestone of Ryn	Gm	Automated Simulation	16K	C	GB	£13.50
Datestone of Ryn	Gm	Automated Simulation	16K	C	IS	£14.50
Dataquiz	Ut	Bryants S/W	16K	C	HW	£3.75
Day of the Week	Bs	Molimerx	4K	C	AJ	£5.75
Death Dreadnaught	Gm	MA	16K	C	IS	£10.50
Deathmaze	Gm	MA	16K	C	IS	£10.50
Deathmaze 5000	Gm	Med Systems	16K	C	IA	£10.95
Decision Master	Ut	Sytonic S/W	32K	D	GB	£35.50
Decimal Dan	Ed	Bryants S/W	16K	C	HW	£3.75
Defence Command	Gm	Big 5 S/W	16K	C	IS	£11.50
Defend	Gm	Molimerx	16K	C	AJ,CH	£10.95
Defend	Gm	Molimerx	32K	D	AJ	£14.95
Deflections	Gm	Adventure Int.	8K	C	AB	£14.35
Delay	Ut	Kansas	16K	C	IS	£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
Disassembler	Ut	Kansas	16K	C	IS	£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	IA	£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
Domes of Kilgari	Gm	MA	16K	C	IS	£11.50
Dominoes	Gm	Molimerx	16K	C	AJ	£9.15
Dominoes	Gm	Molimerx	32K	D	AJ	£12.65
Doomwatch	Do	Kansas	16K	C	IS	£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	IS	£6.25
Dragon Quest	Gm	Instant S/W	16K	C	IS	£10.50
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	IS	£9.50
Dungeon Escape	Gm	Computer Shack	16K	C	GB	£10.93
Dungeon Escape	Gm	Computer Shack	16K	D	GB	£11.95
Dynamic Device Driving	Ut	Instant S/W	16K	D	GB	£15.50
Dynamic Device Driving	Ut	Instant S/W	16K	C	GB	£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	IS	£19.50
Edjst	Ut	Molimerx	32K	D	AJ	£18.40
Eights	Gm	Enjay	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
Elemental Maze	Ed	Molimerx	16K	C	AJ	£40.95
Eliminator	Gm	Adventure Int.	16K	C	IS	£10.93
Eliminator	Gm	Adventure Int.	16K	D	AB	£15.00
Emperor	Gm	Molimerx	16K	D	AB	£18.99
Empire	Gm	MA	16K	C	AJ	£15.53
Empire of the Overmind	Gm	Avalon Hill	16K	C	IS	£10.50
Enhanced Basic	Ut	Molimerx	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	C	IS	£15.00
Everest Explorer	Gm	Molimerx	16K	C	AJ	£18.99
Escape	Gm	Kansas	16K	C	IS	£10.06
Everest Explorer	Gm	Molimerx	16K	C	IS	£7.50
Everyday Russian	Ed	Instant S/W	16K	D	AB	£13.50
F for Freddie	Gm	Kansas	16K	C	IS	£18.50
Facto Bingo	Ed	Bryants S/W	16K	C	HW	£8.50
Facto Finder	Ed	Bryants S/W	16K	C	HW	£3.75
Fairytales Adventure	Gm	Molimerx	16K	C	AJ	£10.06
Fastgammon	Gm	MA	16K	C	IS	£14.00
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
Flight Path	Gm	Instant S/W	16K	C	GB,AB	£40.95
Flight Plan	Ut	Molimerx	32K	D	AJ	£8.50
Flippy	Gm	MA	16K	C	IS	£20.70
Flight Simulator	Gm	MA	16K	C	IS	£10.50
Flying Circus	Gm	Instant S/W	16K	D	AB	£20.00
Forbidden City	Gm	Fantastic S/W	16K	D	IA	£24.50
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 Mktg	16K	D	IA	£15.50
Fortress	Gm	Soft Sector Mktg	16K	C	IA	£11.95
Fortress	Gm	MA	16K	C	IS	£10.50
Fortress	Gm	Molimerx	16K	C	AJ	£7.48
Fox and Hounds	Ed	Molimerx	16K	C	AJ	£17.19
French Vocabulary	Gm	Adventure Int.	16K	C	AB	£12.50
Frog	Gm	Molimerx	16K	C	AJ	£7.48
Frog	Gm	Kansas	16K	C	IS	£7.50
Frogs/Logic	Gm	Kansas	16K	C	IS	£10.50
Galactic Empire	Gm	Adventure Int.	16K	C	IS	£9.78
Galactic Empire	Gm	Adventure Int.	32K	D	AB	£18.99
Galactic Firebird	Gm	Kansas	16K	C	IS	£9.50
Galactic Revolution	Gm	Adventure Int.	16K	C	AB	£18.99
Galactic Revolution	Gm	Adventure Int.	16K	C	IS	£10.50
Galactic Trader	Gm	Adventure Int.	16K	C	IS	£10.50
Galactic Trader	Gm	Adventure Int.	32K	D	AB	£18.99
Galaxy Invasion	Gm	Big 5 S/W	16K	C	IS	£11.50

Game Of Life	Gm	MA	16K	C	IS	£6.50	Meteor Mission II	Gm	MA	16K	C	IS	£11.50
Gammon Challenger	Gm	MA	16K	C	IS	£10.50	Microcosm I	Gm	Basic & Beyond	16K	C	IA	£11.95
Gammon Challenger	Gm	Molimerx	16K	C	AJ	£10.06	Microcosm 2	Gm	Basics & Beyond	16K	C	IA	£19.95
Gammon Challenger	Gm	Molimerx	32K	D	AJ	£13.51	Microcosm 3	Gm	Basics & Beyond	16K	C	IA	£19.50
Gauntlet of Death	Gm	Programmer's Guid	16K	C	GB	£15.50	Microtype	Do	Kansas	16K	C	IH	£12.50
Gauntlet of Death	Gm	Programmer's Guid	16K	C	GB	£15.50	Midway Campaign	Gm	Avalon Hill	16K	C	IA	£10.95
G.C.E. O'Levels							Minicrossword	Ed	MA	16K	C	IS	£12.50
Tape 1	Ed	Bryants S/W	16K	C	HW	£9.00	Minotaur	Gm	Instant S/W	16K	C	AB	£8.50
Tape 2	Ed	Bryants S/W	16K	C	HW	£9.00	Missile Attack	Gm	Adventure Int.	16K	C	AB	£12.50
Gencop	Ut	Molimerx	16K	C	AJ	£10.06	Mission Impossible	Gm	Adventure Int.	16K	C	IS	£12.50
Geography Explorer	Ed	Instant S/W	16K	AB		£40.95	Model 1 to 3	Ut	Kansas	16K	C	IH	£8.50
Ghost Town	Gm	Adventure Int.	16K	C	IS	£12.50	Monopolist	Gm	Baust Computing	4K	C	HA	£7.95
Golfers Challenge	Gm	MA	16K	C	IS	£10.50	Monopolist	Gm	Baust Computing	4K	D	HA	£10.95
Golden Voyage	Gm	Adventure Int.	16K	C	IS	£15.00	Morloc's Tower	Gm	MA	16K	C	IS	£14.50
Golf	Gm	Molimerx	32K	D	AJ	£17.19	Mortgage Calculator	Do	MA	16K	C	IS	£5.00
Good Games No.1	Gm	Cload Inc	16K	C	IA	£11.95	Mountain Shoot	Gm	Adventure Int.	16K	D	AB	£18.99
Guns of Fort Defiance	Gm	Avalon Hill	32K	C	IA	£12.95	Multiple Choice Creation	Ed	Kansas	16K	C	IH	£12.50
Guns of Fort Defiance	Gm	Avalon Hill	32K	D	IA	14.95	Multiprint	Ut	Kansas	16K	C	IH	£8.50
Gun World	Gm	Ogre	16K	C	IC	£10.00	Music Master	Gm	Instant S/W	16K	C	GB,AB	£8.50
Graphics Assembler	Ut	Kansas	16K	C	IH	£7.50	Musical Yat-C	Gm	Adventure Int.	16K	C	AB	£12.50
Graphs	Ed	Bryants S/W	16K	C	HW	£3.75	Money Box	Ed	Bryants S/W	16K	C	HW	£3.75
Graphit	Ut	Molimerx	48K	D	AJ	£19.55	Mystery Funhouse	Gm	Adventure Int.	16K	C	IS	£12.50
Gridref	Ed	Bryants S/W	16K	C	HW	£3.75	Newdos-80 Ver 2.0	Ut	MA	16K	D	IS	£110.00
Gridref	Ed	Bryants S/W	16K	C	HW	£3.75	Newdos +	Ut	MA	16K	D	IS	£45.00
Hellfire Warrior	Gm	MA	16K	C	IS	£21.00	Newdos + 40 Track	Ut	MA	16K	D	IS	£47.50
Highway Code	Do	Bryants S/W	16K	C	HW	£3.75	News 80	Bs	Baust Computing	48K	D	HA	POA
HMS Impetuous	Gm	Adventure Int.	32K	D	AB	£18.99	Night Flight	Gm	Instant S/W	16K	C	GB,AB	£8.50
Home Budget Planner	Bs	Emjay	16K	C	IG	£8.00	Nominal	Bs	Tridata	48K	D	ID	£170.00
House of 30 Gables	Gm	Instant S/W	16K	C	AB	£8.50	Norton Forth	Gm	Adventure Int.	32K	D	AB	£33.70
Hyperlight Patrol	Gm	Fantastic S/W	16K	D	GB	£11.25	North Atlantic Raiders	Gm	Tridata	16K	C	IA	£11.95
ID Mailing List	Ut	Instant S/W	16K	D	GB	£19.50	Number Bonds	Ed	Bryants S/W	16K	C	HW	£3.75
IRV	Ut	Instant S/W	16K	D	GB	£20.50	Number Series	Ed	MA	16K	C	IS	£12.50
IRV	Ut	Instant S/W	16K	C	IS	£16.50	Nuke War	Gm	Avalon Hill	16K	C	IA	£10.95
Infinite Startrek	Gm	Kansas	16K	C	IH	£9.50	Office Accounting	Bs	MA	16K	C	IS	£15.00
Inventory Control	Bs	MA	16K	C	IS	£11.00	Oil Tycoon	Gm	Instant S/W	16K	C	AB	£8.50
Inventory Control	Bs	MA	32K	D	IS	£50.00	Old McDonald's Farm	Gm	Adventure Int.	16K	C	AB	£9.95
Inventory'S'	Bs	MA	16K	C	IS	£17.00	Olympic Decathlon	Gm	MA	16K	C	IS	£14.35
Invoicing	Bs	Tridata	48K	D	ID	£140.00	On Guard	Ed	Bryants S/W	16K	C	HW	£15.50
Instant Calculator	Do	MA	16K	C	IS	£8.50	Pascal-80	Gm	MA	48K	D	IS	£75.00
Interlude	Gm	Syntonic S/W	16K	C	GB	£20.25	Paraform	Ut	Molimerx	32K	D	AJ	£18.98
Interlude	Gm	MA	16K	C	IS	£14.00	Patience	Gm	Bryants S/W	16K	C	HW	£3.75
Invaders From Space	Gm	MA	16K	C	IS	£10.50	Payroll	Bs	Tridata	48K	D	ID	£170.00
Invasion Orion	Gm	Automated Simulation	16K	C	IS	£18.50	Perfect Pong	Gm	Instant S/W	16K	C	GB,AB	£12.75
Invasion Orion	Gm	Automated Simulation	16K	D	GB	£15.75	Periodical X-Ref	Do	MA	16K	C	IS	£9.50
Investor's Paradise	Gm	Instant S/W	16K	C	AB	£8.50	Personal Bill Paying	Do	Instant S/W	16K	C	AB	£6.50
Jabbertalky	Gm	Automated Simulation	16K	D	GB	£18.95	Personal Accounts	Do	Kansas	16K	C	IH	£9.50
Jet Fighter Pilot	Gm	Instant S/W	16K	C	GB,AD	£12.50	Personal Finance	Do	MA	16K	C	IS	£8.50
Jumbo	Gm	Molimerx	16K	C	AJ	£17.25	Pinball	Gm	MA	16K	C	IS	£10.50
Jumbo	Gm	Molimerx	32K	D	AJ	£19.55	Pinball Bounce/Robots	Gm	Kansas	16K	C	IH	£7.50
Jumbles	Ed	Bryants S/W	16K	C	HW	£3.75	Pirate Adventure	Gm	Adventure Int.	16K	C	IS	£12.50
KFS-80	Ut	MA	32K	D	IS	£75.00	Pilot	Ut	MA	16K	C	IS	£18.99
Keyboard 80	Do	MA	16K	C	IS	£7.50	Pits of Angband	Ut	MA	16K	C	IS	£23.00
KVP	Ut	MA	16K	C	IS	£10.50	Planet Miners	Gm	Kansas	16K	C	IH	£9.50
KVP Disk	Ut	MA	16K	D	IS	£18.50	Planetoids	Gm	Avalon Hill	16K	C	IA	£10.95
Keyspeed	Ut	Kansas	16K	C	IH	£6.25	Plus Sound	Gm	Adventure Int.	16K	C	IS	£15.00
Kid's Gallery	Gm	Instant S/W	16K	C	AB	£8.50	Pre Flight	Ut	Kansas	16K	C	IH	£7.50
Kid Venture I	Gm	MA	16K	C	IS	£12.50	Programmer and Primer	Do	MA	16K	C	IS	£7.50
Kreigspiel II	Gm	MA	16K	C	IS	£10.50	Programmer's Converter	Ut	Instant S/W	16K	C	AB	£8.50
Label	Gm	Instant S/W	16K	C	GB	£18.75	Pontoon	Gm	Kansas	16K	C	IH	£8.50
Labyrinth	Gm	Med Systems	16K	C	IA	£11.75	Pork Barrel	Gm	MA	16K	C	IS	£6.50
Labyrinth	Gm	MA	16K	C	IS	£10.95	Punctuation	Ed	Bryants S/W	16K	C	HW	£3.75
Laser Defence	Gm	Med Systems	16K	C	GB	£11.95	Purchase	Bs	Tridata	48K	D	ID	£170.00
Laser Defence	Gm	Med Systems	16K	D	GB	£14.50	Pyramids of Doom	Gm	Adventure Int.	16K	C	IS	£12.50
LED	Ut	Molimerx	48K	D	AJ	£19.55	QSL Manager	Do	Instant S/W	16K	AB		£18.99
Life Two	Gm	MA	16K	C	IS	£7.50	Quick Change	Bs	Baust Computing	16K	C	HA	£16.50
Little Red Riding Hood	Gm	Adventure Int.	16K	C	AB	£14.35	Quick Change	Bs	Baust Computing	16K	D	HA	£9.95
Local Call for Death	Gm	Adventure Int.	32K	D	AB	£18.99	Random Dungeons	Gm	Ogre	16K	C	IC	£12.95
Lords of Karma	Gm	Avalon Hill	40K	D	IA	£14.95	Random Dungeons	Gm	Ogre	4K	C	IC	£10.00
Lord of the Rings	Gm	Kansas	16K	C	IH	£9.50	Renumber and Compress	Ut	Instant S/W	16K	C	AB	£5.75
Lost Dutchmans Gold	Gm	MA	16K	C	IS	£9.50	Renumber	Ut	MA	16K	C	IS	£8.50
Lunar Lander	Gm	Adventure Int.	16K	C	IS	£11.50	Re-Number	Ut	Kansas	16K	C	IH	£6.25
Lunar Lander	Gm	Adventure Int.	16K	D	AB	£18.99	Remodel & Proload	Ut	MA	16K	C	IS	£26.00
Lprint	Ut	Kansas	16K	C	IH	£6.25	Repeat	Ut	Kansas	16K	C	IH	£6.25
Level III Basic	Ut	MA	16K	C	IS	£34.00	Rescue	Ut	Kansas	16K	C	IH	£6.25
Magic Paper Calculator	Do	MA	16K	C	IS	£9.50	Rescue At Rigel	Gm	MA	16K	C	IS	£18.50
Mail File	Ut	Instant S/W	16K	D	GB	£75.25	Robot Attack	Gm	Big 5	16K	C	IS	£11.50
Maillist Mod III	Bs	MA	48K	D	IS	£55.00	Roots	Do	MA	32K	D	IS	£17.00
Martian Adventure	Gm	Emjay	16K	C	IG	£12.00	RPN Calculator	Do	MA	16K	C	IS	£7.50
Master Cab	Ut	Bryants S/W	16K	C	HW	£3.75	RSM 2 Monitor	Ut	MA	16K	C	IS	£16.00
Master Directory	Ut	Instant S/W	16K	D	GB	£21.00	RSM 2D Monitor	Ut	MA	16K	D	IS	£20.00
Master Reversi	Ut	Instant S/W	16K	D	GB	£23.75	SDM	Gm	Adventure Int.	16K	C	AB	£20.12
Matchmaker	Gm	Adventure Int.	16K	C	AB	£14.35	Sales	Bs	Tridata	48K	D	ID	£170.00
Maths Master	Ed	Instant S/W	16K	C	AB	£8.50	Santaparavia	Gm	Instant S/W	16K	C	AB	£8.50
Maxi-Micro Manager	Bs	Adventure Int	48K	R	AB	£84.50	Sargon II	Gm	MA	16K	C	IS	£20.50
Memdump	Ut	MA	16K	C	IS	£6.00	Sargon II Disk	Gm	MA	32K	C	IS	£23.50
Mean Checkers	Gm	MA	16K	C	IS	£11.50	Savage Island I	Gm	Adventure Int.	16K	C	IS	£12.50
Merge	Ut	Kansas	16K	C	IH	£6.25	Savage Island II	Gm	Adventure Int.	16K	C	IS	£18.99
Meteor Mission	Gm	Big 5 S/W	16K	C	IA	£10.95	Scarfan	Gm	Adventure Int.	16K	C	IS	£11.50
							Scientific Calculator	Ed	MA	16K	C	IS	£14.50
							Screen Print	Ut	Kansas	16K	C	IH	£6.25
							Screenhold	Ut	MA	16K	C	IS	£6.00

REFERENCE

SOFTWARE LISTING

TRS 80

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Seadragon	Gm	MA	16K	C	IS	£15.00
Sea Wolf	Gm	Kansas	16K	C	IH	£9.50
Sea Wolf	Gm	Molimerx	16K	C	AJ	£10.06
Sea Wolf	Gm	Molimerx	32K	D	AJ	£12.65
Semi Conductor Theory	Ed	MA	16K	C	IS	£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
Simplify It	Ut	MA	32K	D	IS	£12.00
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	C	IS	£11.50
Slag	Gm	Adventure Int.	16K	C	IS	£18.99
slam-LDOS	Ut	Molimerx	16K	D	AJ	£10.50
Smartwork	Gm	Instant S/W	16K	C	IA	£14.35
Snake Eggs	Gm	MA	16K	C	IS	£8.00
Space Castle	Gm	Instant S/W	16K	C	IA	£7.50
Space Intruder	Gm	Adventure Int.	16K	C	AB	£11.95
Space Intruders	Gm	MA	16K	C	IS	£14.35
Space Intruders	Gm	MA	16K	C	IS	£15.00
Space Shuttle	Gm	Instant S/W	32K	C	IS	£18.50
Special Sampler	Gm	MA	16K	C	AB	£12.50
Star Fighter	Gm	Adventure Int.	16K	C	AB	£6.50
Star Scout	Gm	Adventure Int.	16K	C	AB	£20.95
Star Trek 3.5	Gm	Adventure Int.	16K	C	AB	£14.35
Space Trek	Gm	Instant S/W	32K	D	AB	£18.99
Speechparts	Ed	Bryants S/W	16K	C	IA	£6.50
Spelling Builder	Ed	MA	16K	C	HW	£3.75
Spellsort	Ed	Bryants S/W	32K	C	IS	£15.00
Spelltest	Ed	Bryants S/W	16K	C	HW	£3.75
Spider Mountain	Gm	MA	16K	C	IS	£3.75
Starfighter	Gm	MA	16K	C	IS	£9.50
Starfleet Orion	Gm	MA	16K	C	IS	£18.50
Starlite	Gm	MA	16K	C	IS	£18.50
Starlord	Gm	Bryants S/W	16K	C	IS	£10.50
Statistics	Ed	MA	16K	C	IS	£10.00
S.T.A.D	Ut	MA	16K	C	IS	£6.50
Storybuilder	Ed	Bryants S/W	16K	C	IS	£15.00
Stock	Bs	Tridata	48K	D	ID	£12.50
Stock or Bonds	Gm	Avalon Hill	16K	C	IA	£3.75
Stone of Sisuyth	Gm	Adventure Int.	32K	D	AB	£170.00
ST-80	Ut	MA	16K	C	IS	£12.95
ST-80D	Ut	MA	16K	C	IS	£33.70
Strange Odyssey	Gm	Adventure Int.	16K	D	IS	£34.00
Sunday Golf	Gm	Adventure Int.	16K	D	AB	£45.00
Surveyor's Apprentice	Ed	Instant S/W	16K	C	IS	£12.50
Super Breakthrough	Gm	Kansas	16K	C	IH	£18.99
Super Copy	Ut	Kansas	16K	C	IH	£18.99
Super Nova	Gm	Big 5	16K	C	IS	£9.50
Super Pims Data Base	Do	MA	16K	C	IS	£11.50
Super T-Legs	Ut	MA	16K	C	IS	£10.50
Superscript	Ut	MA	32K	D	IS	£7.50
Superkeys	Ut	MA	32K	D	IS	£21.00
Super Simon	Ut	MA	16K	C	IS	£35.00
Swamp War	Gm	Instant S/W	16K	C	AB	£7.50
Swords and Socery	Gm	Kansas	16K	C	IH	£12.50
Sword Of Zedek	Gm	MA	16K	C	IS	£9.50
System Copy Mod 1	Ut	MA	16K	C	IS	£11.50
System Master Monitor	Ut	Kansas	16K	C	IH	£9.50
System to Basic	Ut	Kansas	16K	C	IH	£17.00
Tecopy III Mod III	Ut	MA	16K	C	IS	£8.50
T-Step	Ut	MA	16K	C	IS	£10.50
TL DIS	Ut	Instant S/W	16K	C	AB	£7.50
TRS Test	Ut	Instant S/W	16K	C	AB	£12.50
TRS-80 Opera	Do	MA	16K	C	IS	£8.50
Tables Test	Ed	Bryants S/W	16K	C	HW	£7.50
Tanktics	Gm	Avalon Hill	16K	C	IA	£3.75
Targetounds	Ed	Bryants S/W	16K	C	IS	£15.95
Teachers Assistant 1	Ed	MA	16K	C	IS	£3.75
Teachers Assistant 2	Ed	MA	16K	C	IS	£9.50
Teachers Assistant 3	Ed	MA	16K	C	IS	£9.50
Teacher's Aid	Ed	Instant S/W	16K	C	AB	£9.50
Temple Of Apshai	Gm	MA	16K	C	IS	£34.50
Temple of the Sun	Gm	Instant S/W	16K	C	AB	£18.50
The Count	Gm	Adventure Int.	16K	C	IS	£16.50
The Mean Checkers Machine	Gm	Adventure Int.	16K	C	AB	£12.50
The Congo Mission	Gm	Bryants S/W	16K	C	IC	£18.99
The Quest	Gm	Bryants S/W	16K	C	IC	£14.35
The Secret Wilderness	Gm	Ogre	16K	C	IC	£10.00
Toolkit	Ut	Kansas	16K	C	IC	£12.00
Time Traveller	Gm	MA	16K	C	IS	£6.50
Time Trek	Gm	MA	16K	C	IS	£12.00
Tiny Pascal	Ut	MA	16K	C	IS	£10.50
Timser	Ed	MA	16K	C	IS	£17.00
						£10.50

Tiny Compiler	Ut	MA	16K	C	IS	£12.50
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
Turret & Track	Gm	MA	16K	C	IS	£7.50
Two Heads of the Coin	Gm	Adventure Int.	32K	D	AB	£18.99
Typing Teacher	Ed	Instant S/W	16K	C	AB	£8.50
Typing Tutor	Do	MA	16K	C	IS	£12.00
Typewriter	Ut	Kansas	16K	C	IH	£6.25
Ultra Man	Ut	Instant S/W	16K	C	AB	£21.50
Ultra Mon	Ut	MA	16K	C	IS	£17.00
Up Periscope	Gm	MA	16K	C	IS	£10.50
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
Vocabulary Builder 1	Ed	MA	16K	C	IS	£12.50
Vocabulary Builder 2	Ed	MA	16K	C	IS	£12.50
Voodoo Castle	Gm	Adventure Int.	16K	C	IS	£12.50
Voyager	Gm	Avalon Hill	16K	C	IA	£18.99
What Next?	Gm	Baust Computing	4K	D	HA	£12.95
What Next?	Gm	Baust Computing	4K	C	HA	£6.95
Word Processor	Bs	Kansas	16K	C	IH	£3.95
Word Watch	Ed	Instant S/W	16K	C	IA	£19.50
X-Wing Fighter II	Gm	MA	16K	C	IS	£6.50
X-Ref	Ut	MA	16K	C	IS	£7.50
Y-Y Bar	Bs	MA	16K	C	IS	£10.50
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
9 Kid's Games	Ed	MA	16K	C	IS	£12.50
76 Basic Programs	Do	MA	16K	C	IS	£23.00

VIC20

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
3-D Maze	Gm	Adcom	8K	C	AB	£7.50
3-D Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
A-Maz-Ing	Gm	Audiogenic	8K	C	AA,CH,HM	£8.62
Alien	Gm	Commodore	3K	R	FZ,AB,GF	£6.99
					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 Invasion	Gm	Computermat	3K	C	IP	£8.95
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	£19.95
					CF,DM,CH	
					FD,FP,AA	
A.V.I.T.W.	Gm	Bug Byte	5K	C	HN	£8.99
Balloon Bomber	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Bill Sowerbutts	Do	Micro Computer S/W	16K	C	HK	£4.99
Gardening Hints	Do	Micro Computer S/W	16K	C	Hk	£4.99
Bill Sowerbutts	Do	Micro Computer S/W	16K	C	Hk	£4.99
Gardening Hints	Do	Micro Computer S/W	16K	C	Hk	£4.99
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
Cattle Roundup	Gm	Computermat	3K	C	IP	£8.95
Charset 20	Gm	Adcom	8K	C	AB	£8.00
Charset 20	Gm	Rabbit S/W	3K	C	AH	£4.99
Chase	Gm	Computermat	3K	C	IP	£8.95
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	Rugby Game	Gm	ADcom	5K	C AB	£7.00
Deflection	Gm	Hi-Tech	3K	C CF,AO	£8.62	Rugby Game	Gm	Hi-Tech	3K	C CF,AO	£8.62
Diggles Kitchen Vol 1	Do	Micro Computer S/W	16K	C HK	£4.99	Seawolf/Bounceout	Gm	Audiogenic		C AA,HM	£8.99
Diggles Kitchen Vol 2	Do	Micro Computer S/W	16K	C HK	£4.99	Simple Simon	Gm	Audiogenic	5K	C AA,HM	£6.99
Diggles Kitchen Vol 3	Do	Micro Computer S/W	16K	C HK	£4.99	Six Program Pack; War Game	Gm	PR Software	3K	C GV	£7.50
Dragon Maze	Gm	Adcom	8K	C AB	£7.50	Smash Out					
Dragon Maze	Gm	Hi-Tech	3K	C FZ	£8.30	Black Jack					
Dune Buggy	Gm	Rabbit S/W	3K	C AH	£4.99	Logic					
Duplicate	Gm	Paysoft	5K	C FP	£5.25	Pick Up Game					
Explosion	Gm	Big Softie	3K	C IQ	£4.50	Alarm Clock					
Fire Trek	Gm	Hi-Tech	3K	C AY	£7.80	Ski Run	Gm	Rabbit S/W	3K	C AH	£4.99
Fly Snatcher	Gm	PR Software	3K	C HN	£7.95	Skier	Gm	Hi-Tech	3K	C CF,AO	£8.62
Frogger	Gm	Rabbit S/W	8K	C AH	£7.99	Skimmetts	Gm	Audiogenic	3K	C AA	£6.99
Game Graphics & Graphics Editor	Ut	Soft Toys	3K	C IG	£8.00	Slot Machine	Gm	Hi-Tech	3K	C CF,AO	£8.62
Games Tape 1	Gm	Titan	3K	C HJ	£5.00	Snakeout	Gm	Computermat	3K	C IP	£8.95
Grand Prix	Gm	Hi-Tech	3K	C FZ, 8.30	£7.80	Soft Toys 1	Gm	Soft Toys	3K	C IG	£6.50
Graphvics	Ut	Adamssoft	3K	C IR	£19.00	Soft Toys 2	Gm	Soft Toys	3K	C IG	£6.50
Graphvics	Ut	Adamssoft	8K	C IR	£19.00	Soft Toys 2	Gm	Soft Toys	5K	C IG	£8.00
Gun Men	Gm	Hi-Tech	3K	C AY	£7.80	Space Defence	Gm	Adcom	5K	C AB	£10.00
Hangman	Gm	Paysoft	5K	C FP	£5.25	Space Defender	Gm	Hi-Tech	3K	C CF,AO,FZ	£8.62
Hangman Maths	Gm	Audiogenic		C AA,HM	£7.99	Space Devision	Gm	Audiogenic	3K	C AA	£6.99
Head On	Gm	Computermat	3K	C IP	£8.95	Space Invaders	Gm	Hi-Tech	3K	C CF,AO,FZ	£8.62
Hesdon	Gm	Hi-Tech	3K	C CF,AO	£8.62	Space Storm	Gm	Rabbit S/W	3K	C HA	£6.99
Highways Plot	Gm	Adcom	8K	C AB	£5.00	Space Wars/Battle Zone	Gm	Titan	3K	C HJ	£6.00
Hires/Multicolor	Ut	Adamssoft	3K	C IR	£13.00	Spiders from Mars	Gm	Audiogenic	5K	R CH,AA	£24.99
Utilities	Gm	Hi-Tech	3K	C CF,AO	£8.62	Spiders of Mars	Gm	Anglo American	3K	R AA,CH,AB	£19.95
ICBM	Gm	Hi-Tech	3K	C FZ	£8.30	Star Wars	Gm	Audiogenic	3K	C AA	£6.99
Invader Fall	Gm	Hi-Tech	3K	C FZ, AO	£8.62	Star Wars II	Gm	Titan	3K	C HJ	£7.00
Indi 500	Gm	Hi-Tech	3K	C CF,AO	£8.62	Stella Shootout	Gm	Adcom	5K	C AB	£15.00
Intro. to Basic 1	Ed	Commodore	3K	C AA,AB	£14.95	Stunt Cycle	Gm	Coloursoft	5K	C FP	£7.75
Invader Fall	Gm	Adcom	8K	C AB	£7.50	Sub Attack/Missile Command	Gm	PR Software	3K	C HN	£7.95
Invader Fall	Gm	Audiogenic	3K	C AA	£6.99	Submarine	Gm	Hi-Tech	3K	C CF,AO,FZ	£8.62
Jelly Monsters	Gm	Commodore	3K	R AB,CF,DM	£19.95	Super Breakout	Gm	Adcom	5K	C AB	£7.00
Jungle	Gm	Adcom	5K	C AB	£6.00	Super Breakout	Gm	Coloursoft	5K	C FP	£7.75
Jungle	Gm	Rabbit S/W	3K	C AH	£4.99	Super Breakout	Gm	Hi-Tech	3K	C CF,AO	£8.62
Kiddy Checkers	Gm	Audiogenic	3K	C AA,HM	£6.99	Super Expander High Resolution Pack	Ut	Commodore	3K	R AA,AB,FZ	£34.95
King	Gm	Big Softie	3K	IR £13.00	Super Lander	Gm	Commodore	3K	R AA,AB,FZ	£19.95	
Life	Gm	Big Softie	3K	C IO	£4.50	Super Moonlander	Gm	Hi-Tech	3K	C CF,AO	£8.62
Lunar Lander	Gm	Adcom	5K	C AB	£7.00	Super Snake	Gm	Adcom	5K	C AB	£7.00
Lunar Lander	Gm	Hi-Tech	3K	C CF,AO	£8.62	Super Snake	Gm	Hi-Tech	3K	C CF,AO	£8.62
Lunar Maths	Ed	Titan	3K	C HJ	£6.00	Super Worm	Gm	Rabbit S/W	3K	C AH	£4.99
Machine Code Monitor	Ut	Commodore	3K	R AA,AB	£34.95	Target Command	Gm	Computermat	3K	C IP	£8.95
Machine Code Monitor	Ut	Commodore	3K	R GF	POA	The Alien	Gm	Audiogenic	88K	C AB	£5.00
Mastermind	Gm	Big Softie	3K	C IQ	£4.50	Treasure Carrying	Gm	Hi-Tech	3K	C CF,AO	£8.62
Master Wits	Gm	Audiogenic	3K	C AA,HM	£6.99	UFO Shooting	Gm	Adcom	5K	C AB	£7.00
Maths Hurdler/Monster Merge	Gm	Audiogenic		C AA,HM	£7.99	UFO Shooting	Gm	Hi-Tech	3K	C CF,AO	£8.62
Maze Men	Gm	Titan	3K	C HJ	£6.00	VIC Code Monitor	Ut	Commodore	3K	R FZ	£34.95
Memory Pack	Ut	Commodore	16K	R FZ	£74.95	VIC Forth	Ut	Datatron	3K	R Hn	£38.95
Memory Pack	Ut	Commodore	3K	R FZ	£24.95	VIC Graf	Ut	Datatron	3K	R Hn	£28.95
Memory Pack	Ut	Commodore	8K	R FZ	£44.95	VIC Men	Gm	Coloursoft	5K	C FP	£7.00
Meteor Run	Gm	Anglo American	3K	R HN	£24.99	VIC Stat	Ut	Datatron	3K	R Hn	£29.95
Meteoroid	Gm	Adcom	5K	C AB	£10.00	VICalc	Ut	Audiogenic	3L	C AA,HM	£6.99
Missile Command	Gm	Adcom	3K	C HN	£7.95	Vicgammon	Gm	Bug Byte	8K	C CH	£7.00
Missile Commander	Gm	Hi-Tech	3K	C CF	£8.62	Vicmen	Gm	Anglo American	3K	C GB	£7.00
Moak	Gm	Audiogenic	5K	C CH	£6.99	Vicmen	Gm	Bug Byte	5K	C CH	£7.99
Mole Attack	Gm	Hi-Tech	5K	C CF,AO,AB	£8.62	Vic Cube	Gm	Hi-Tech	3K	C CF,AO	£8.62
Music Maker	Gm	Adcom	5K	C AB	£10.00	Vigil	Ut	Adamssoft	8K	C IR	£25.00
Music Tutor	Ed	Micro Computers S/W	3K	C HK	£7.95	Wall Street	Gm	Audiogenic	3K	C AA,HM	£6.99
Music Tutor de Luxe	Ed	Micro Computer S/W	8K	C HK	£8.95	3D Xeosy	Gm	Big Softie	3K	C IQ	£4.50
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						
Pack Man	Gm	Hi-Tech	3K	C GZ	£8.30						
Piper	Gm	Adamssoft	3K	C IR	£19.00						
Pontoon	Gm	Big Softie	3K	C IR	£4.50						
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						
Reversi	Gm	Big Softie	3K	C IQ	£4.50						
Road Race	Gm	Commodore	3K	R FZ,AB,GF	£19.95						
Robot Zap	Gm	Paysoft	5K	C FP	£5.25						
Rogue Elephant	Gm	Micro Computer S/W	3K	C CF,DM,CH,GC,FD,FP	£4.95						

ZX SPECTRUM

Title	Program Type	Program Produced By	Memory Used	How Sold	Supplier Codes	Prices
Adventure	Gm	Abersoft	48K	C HX		£9.95
Angles	Ed	AVC Software	16K	C IM		£3.00
Arcade Pack 1	Gm	Omega Electronics	16K	C IO		£4.82
Assembler	Ut	Artic	16K	C EH		£9.95
Count-down	Ed	AVC Software	16K	C IM		£3.00
Fortune	Do	AVC Software	16K	C IM		£3.00
French	Ed	AVC Software	16K	C IM		£3.00
Galaxian	Gm	Artic	16K	C EH		£3.95
Gobbleman	Gm	Artic	16K	C EH		£3.95
Graph	Ed	AVC Software	16K	C IM		£3.00
Hangperson	Ed	AVC Software	16K	C IM		£3.00
Learning	Ed	AVC Software	16K	C IM		£3.00
Mazeman	Gm	Abersoft	16K	C HX		£4.95
Namitar Raiders	Gm	Artic	16K	C EH		£3.95
Payroll	Bs	V&H Computer	48K	C IL		£14.65
Physprob	Ed	AVC Software	16K	C IM		£3.00
Space Inturders	Gm	Quicksilver	16K	C GD		£5.85
Spectral Invaders	Gm	Bug Byte	16K	C CH		£5.00
Tables	Ed	AVC Software	16K	C IM		£3.00
Turtle	Ed	AVC Software	16K	C IM		£3.00

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	Sales Ledger
Credit Sales	Purchase Ledger
Cash Sales	Bank Account
Credit Purchases	Year to Date Summary
Purchases - other	

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

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.

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

ATARI 400/ 800

PROGRAMS AND GAMES

Cassette 1: GALAXY TREK

Rid the galaxy of the Klingon menace before your time runs out. You have Phasers, Photon Torpedoes, Shields, Warp drive and Impulse Drive.

Cassette 2: HEXAPAWN, NOUGHTS AND CROSSES

(Artificial Intelligence? Well not quite, but these programs play better the more you play them!)

TOWER OF BRAHMA (Can you crack the ancient puzzle?)

Cassette 3: KING (Could you manage the economy for eight years without getting lynched by the population?)

MAGICIANS CAVES (Explore the caves and get out alive! A different complex each time it is played.)

Cassette 4: MAZE (Can you find the way through before the monster reaches you?)

ROBOT CHASE and **TANK BATTLE**

Cassette 5: NUMERICAL INTEGRATION, SOLVING SIMULTANEOUS EQUATIONS and **BEST FIT POLYNOMIAL**

All cassettes are **£9.95 each inclusive**.

Special Offers: 3 cassettes for **£24.95**, 5 cassettes for **£37.95**.

Mr. M. Ward, 9 St. Andrews Ave., Crewe, Cheshire CW2 6JJ.

(UK101 and Superboard owners: Send S.A.E. for details of our wide range of programs.)

BBC MICRO (A & B)

SPACE INVADERS MODE 5 M/C (MACHINE CODE) £8

Probably one of the best 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 game with colour and sound.

MIDDLE KINGDOM MODE 7 BASIC & M/C £8

Real time adventure game with over 300 rooms and six scenarios. Fight the many monsters and retrieve the lost treasure of Hylem. Many levels of play.

REVERSI & GOMOKO 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.

WORD PROCESSOR PACKAGE £19.95

Easy to use but with powerful comprehensive features, on screen editing with insert, delete, search, right, left or fill. Justification. Complete with manual and help programme. SAE for full details.

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.

AIR STRIKE (9K gr.3 m/c) £6

Attack the enemy but watch out for flak and enemy planes.

ELIZA (7K gr.0 m/c) £3

Converse with your sympathetic computer. With excess of 100 replies.

All programmes with sound and supplied on quality C15 cassettes.

SPECIAL OFFER. Buy any two cassettes from the BBC ATOM range 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.**

EDUQUEST

"THE PROFESSIONAL SOFTWARE PEOPLE"

BBC MICRO SOFTWARE

MINEFIELD

- An entertaining family game.
- Try and cross the minefield without blowing yourself up!
- 3D Graphics on Model B version!
- For BBC Model A & B (state which required)

**ONLY
£5.95
INC V.A.T.
P&P**

MULTIPLE CHOICE QUESTION & ANSWER PACK

- Specially designed for educational users.
- PACK CONTAINS
- Instruction Manual
 - Master Input Module
 - 3 Reception Modules, each display questions and answers in a format suitable for students of different abilities and age groups
 - Blank tape for data
 - For the BBC Model B

**£25.00
inc V.A.T. P&P**

WORD PROCESSING PACK

- A simple to use tape based word processing package
- Ideal for the small business or home user
- For use with BBC Model B

**ONLY
£10.00
INC V.A.T.
P&P**

EDQUEST, 1 THAMES AVENUE, WINDSOR, BERKSHIRE SL4 1QP. TEL: WINDSOR (07535) 58079

Please supply me with _____

Cheques should be made payable to **EDQUEST**

For payment by Access/Barclaycard

NAME (Capitals please) _____

Card No. _____

Full postal address _____

Signature _____

let the
DRAGON 32
fire your
imagination . . .



for only **£199.50**

Plus £5 Post & Packing

*No other computer offers
you all these features
at any price . . .*

- 32K RAM MEMORY
- PROFESSIONAL STANDARD KEYBOARD
- 1 YEAR WARRANTY
- 9 DISPLAY COLOURS
- 5 DISPLAY RESOLUTIONS
- EXCEPTIONAL GRAPHICS CONTROL
- 5 OCTAVE SOUND GENERATOR
- DIRECT MUSIC COMMANDS
- REAL-TIME CLOCK/TIMER
- MICROSOFT EXTENDED COLOUR BASIC
- PLUG-IN CARTRIDGES AVAILABLE
- CENTRONICS PARALLEL PRINTER PORT
- SOCKETS FOR JOYSTICKS
- SOCKETS FOR FULL CASSETTE CONTROL
- EXCELLENT CASSETTE FILE HANDLING
- COMBINED AUDIO/DATA INPUT FACILITY
- AUDIO OUTPUT VIA T.V.
- EXPANDABLE TO 64K RAM
- POWERFUL 6809E MICROPROCESSOR
- FREE 160 PAGE TRAINING MANUAL
- BRITISH MADE

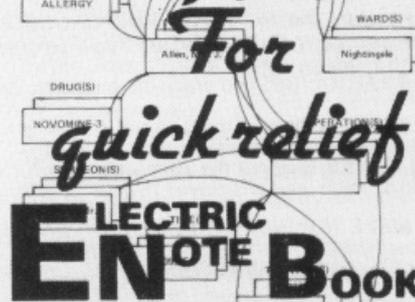
Available *now* from:

ComServe

98 TAVISTOCK STREET, BEDFORD MK40 2RX.
TELEPHONE: BEDFORD (0234) 216749

Software for TRS80®

Data Dyspepsia?



*For
quick relief*

**ELECTRIC
ENOTE BOOK**

You name it... ENB can tame it!

The All-Purpose Data Manager for TRS-80 £69.95
Minimum System-48K, 1 DISK, Mod I or III, or Video Genie

**southern
software**

PO Box 39, Eastleigh, Hants, England, SO5 5WQ



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.



**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 10⁶ operations.

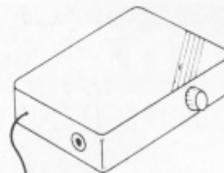
INSTALLATION - Simply unscrew the ZX printed circuit board from its case and screw it into the FD case, plug in the keyboard and that's it. No technical know how or soldering required, the built unit is tested and comes with a money back guarantee.

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.



First Anniversary Offer

The FD System is now one year old and Fuller are celebrating with this amazing offer on the FD42 Professional Keyboard and Case.

Makes an ideal Christmas present to expand the new low priced Sinclair ZX81. Or why not buy a new ZX81 based system directly from us, consisting of ZX81, FD42 keyboard and case with power supply and reset switch, leads and manual **£69.95 + £2.50 p & p**

FD42 Keyboard and Case Kit £24.95 + £2.50 p & p

FD42 Keyboard kit £14.95.80p p & p

£29.95

+ £2.50 p & p

STAR TREK FOR ZX 16K SPECTRUM

Play this popular adventure game on your Spectrum with ship display and sound **£5.00 + 50p p & p**

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.

Please Supply:-

Name

Address

AD Code	
---------	--

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

FULLER FD SYSTEM

DON'T BUY A WORD PROCESSOR....

until you're sure that all you need is word processing. Most companies needs include payroll, accounts, etc., etc., so why not use that hard won word processing budget to buy a system that will suit *all* your needs, and probably have some money left over?

- If you are looking for:-
- Real support
 - A company that cares about you, the customer
 - A system that will suit *your* needs, and budget
 - Nationwide service
 - A choice of software (over 2,000 suites available)
 - Single & multi user systems
 - Sound advice.

Then ring or write now!



QUARTZ COMPUTER SYSTEMS LTD.,

7 Margravine Road, Barons Court, London W6 8LS.

Tel: 01-385 6261 (24 hours)

and let us show you how to make those pounds go much further.

In Association with OCEANIC LTD.



ATARI



NEW LOW PRICES

DRAGON 32

32K + COLOUR + HIGH RES. GRAPHICS + SOUND + TYPEWRITER KEYBOARD + SLOTS FOR JOYSTICKS + CARTRIDGES EXPANDABLE TO 64K

ALL FOR **£173.00** + VAT

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

NEW ATARI SOFTWARE

Tumblebugs, Canyon Climber, Shooting Arcade, Pacific Coast Highway, Clowns and Balloons, Protector, Chicken, Slime, Apple Panic, Track Attack — ALL AT **£17.35**

Micropainter **£19.56**

Shamus (16K/cass) **£17.35**

+ ATARI, INTELLIVISION & HANIMEX TV GAMES + CARTRIDGES BY IMAGIC & ACTIVISION

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 Disks + 3 Apx Programs	£734.78

SHARP

MZ80A	£434
MZ80B	£899

VIC 20 Now only	£129.95
GENIE 1 & 2	£289
ATOM	from £150



24 GLOUCESTER ROAD

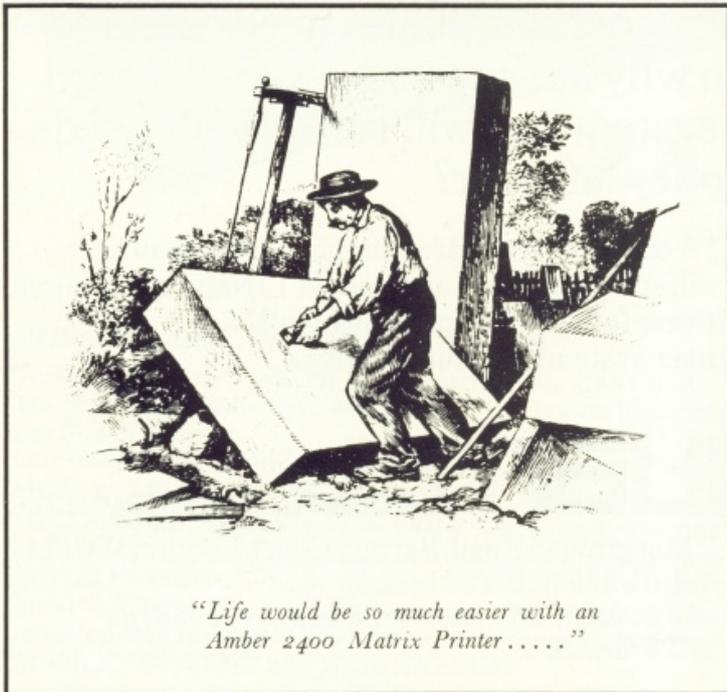
Tel: (0273) 698424

BRIGHTON

PLEASE ADD 15% VAT TO ALL PRICES

+ PERIPHERALS + SOFTWARE + BOOKS + MAGAZINES + CHESS COMPUTERS + GAMES FOR ZX81 and APPLE

PRINT OUT



"Life would be so much easier with an Amber 2400 Matrix Printer....."

AMBER 2400 MATRIX PRINTER

LOW RUNNING COST USING
PLAIN PAPER
FITS BBC, DRAGON, SPECTRUM
ATOM, TRS 80, UK101, VIC-20
AND MOST OTHERS

£69.95

excluding VAT
SEND LARGE STAMPED
ADDRESSED ENVELOPE FOR
DETAILS TO:

AMBER CONTROLS LIMITED
Central Way
Walworth Industrial Est.
Andover
Hampshire SP10 5AL



What are you... Barbarian or Wizard?

Choose your character type carefully... Barbarians recover quickly but their magic doesn't come easily. A Wizard? Slow on the draw and slow to mature...but live long enough and grow wise enough and your lightning bolts are almost unstoppable...

The Valley is a real-time game of adventure and survival. You may choose one of five character types to be your personal 'extension of self' to battle and pit your wits against a number of monsters. Find treasure, fight a Thunder-Lizard in the arid deserts of the Valley, conquer a Kraken in the lakes surrounding the dread Temples of Y'Nagioth or cauterise a Wraith in the Black Tower. In fact, live out the fantasies you've only dared dream about. **BUT BEWARE...** more die than live to tell the tale.

You've read the program (Computing Today — April '82) ... now buy the tape. PET and TRS-80, BBC and Sharp tapes are available at £10.95 per tape plus 50p postage and packing. 16K minimum ... Commodore PET (New ROMs), TRS-80 Model 1, Level 2, BBC Model B and Sharp MZ-80K. Now ready for the VIC-20 (16K), Atari (32K) and Sharp MZ-80A.

Fill in the coupon and return it to **CT Software, ASP Ltd., 145 Charing Cross Road, London WC2H 0EE** and become one of the many to play... The Valley...

Computing Today Software

PCT4

Please send me... tape(s) of The Valley
 PET VIC-20
 Sharp MZ-80K MZ-80A
 TRS-80 BBC 'B' Atari
 at £10.95 plus 50p postage and packing.

I enclose my cheque/Postal Order/
 International Money Order (delete as necessary) for:
 £..... (Made payable to ASP Ltd)
 or Debit my Access/Barclaycard
 (delete as necessary)



Please use **BLOCK CAPITALS**

NAME (Mr/Mrs/Miss)

ADDRESS

POSTCODE

Signature

Date

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.

Array

A special variable that is used to hold large amounts of string or numeric information in a row and column format.

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* statements 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'.

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 storing either ROM or RAM which 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 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 kilobytes but in either case the capacity is being increased all the time.

Dummy Variable

This is a variable that is defined at the beginning of a program that has no use until later on in the program.

Endproc

This is part of a program. PROC stands for PROCEDURE which is part of a program designed to improve the readability, reliability and structure of a program. END speaks for itself and tells the computer to stop that particular procedure and return to the main body of the program.

EPROM

Erasable Programmable Read Only Memory. Writing typically takes one minute and erasing, by ultra-violet light, 10 minutes or longer.

Get

A BASIC command. It tells the computer to search the keyboard and bring back the value of the first key pressed.

Gosub

A BASIC command telling the computer to go to a subroutine within a program.

Gcol

A colour command used in BBC Basic.

Graphics

Literally — drawings; a method of producing graphs or pictorial figures on a suitable output device, usually a video monitor or television set, but sometimes a chart recorder or printer.

Grid

To enable graphics or text to be

displayed on a TV screen or monitor the screen has to be divided into a grid. Each point in the grid corresponds to a position in the computer's memory. When data is placed in one of these positions it is then transferred to the corresponding position on the screen.

Hard Copy

A computer printout or listing on paper.

Hardware

All the electronic and mechanical components making up a computer 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.

Inkey\$

Another BASIC command which looks at the keyboard and returns a value assigned to the key pressed. You don't have to use the ENTER key to input values so it is a very quick process. It is often used in video games like space invaders, pacman, or tennis, and is usually part of a loop.

Instruction

A set of bits which causes the CPU to carry out a particular task in a program.

Interface

Circuit which connects different parts of system together and performs any processing of signals in order to make transfer possible (ie serial-parallel conversion).

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 input or 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.

Location

Physical position; *memory* location is the same as *address*.

Loop

Program technique where one section of program (the loop) is performed many times over.

Loop Counter

This is a register used for carrying out high-speed branching (jumping to another sequence in a program).

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.

Menu

A set of options displayed on-screen by a computer program from which the computer user can make a selection to implement.

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.

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*.

Octal

Base 8 number system. Character set is decimal 0-7.

Pascal

A very powerful, structured computer language, available on a variety of microcomputers.

Peek

This BASIC 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.

Print At

A BASIC command telling the computer where to begin printing.

Printer

A device for producing typed or printed copy (*hard copy*).

Print Out

Same as *hardcopy*.

Proc (Procedure)

See ENDPROC.

Program

A set of *instructions*, 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.

Qwerty

The traditional typewriter keyboard layout adopted by computer designers.

RAM

Random Access Memory. *Data* may be written to or read from any location in this type of memory.

Reset

Simply — go back to the start. 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.

RND

In BASIC it stands for RANDOM and instructs the computer to select random numbers and is often used in games programs. Because the numbers thrown up are mathematically related to the number preceding they are called pseudo-random numbers, not true random-numbers.

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*.

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 used in a program.

Subroutine

A part of a *program* which performs a specific task and which is available for use elsewhere in a program, as often as you like.

Variable

A symbol used in programming which is assigned a numeric memory address. You can change the value of variable at will to suit the program you are writing.

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.

MAIL ORDER MADE EASY

PLEASE USE THE COUPON BELOW WHEN ORDERING FROM ADVERTISEMENTS IN PERSONAL COMPUTING TODAY

Dear Sirs, with reference to your advertisement on page ... of **Personal Computing Today**

Please state type of Computer required

Please send me your Brochure

Tick Box

Please send me the following goods

Tick Box

Quantity	Description	Price	Postage	Total
		£	£	
		£	£	£
		£	£	£
DELETE AS NECESSARY			GRAND TOTAL	£

I enclose Cheque/Postal Order/Debit my Access/Barclaycard No.

NAME _____ ADDRESS _____

Dear Sirs, with reference to your advertisement on page ... of **Personal Computing Today**

Please state type of Computer required

Please send me your Brochure

Tick Box

Please send me the following goods

Tick Box

Quantity	Description	Price	Postage	Total
		£	£	
		£	£	£
		£	£	£
DELETE AS NECESSARY			GRAND TOTAL	£

I enclose Cheque/Postal Order/Debit my Access/Barclaycard No.

NAME _____ ADDRESS _____

Dear Sirs, with reference to your advertisement on page ... of **Personal Computing Today**

Please state type of Computer required

Please send me your Brochure

Tick Box

Please send me the following goods

Tick Box

Quantity	Description	Price	Postage	Total
		£	£	
		£	£	£
		£	£	£
DELETE AS NECESSARY			GRAND TOTAL	£

I enclose Cheque/Postal Order/Debit my Access/Barclaycard No.

NAME _____ ADDRESS _____

PCT/10/82




CLASSIFIED
**THE PATH TO
 SUCCESSFUL SALES!**
01-437 1002
 Extension 213

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.

7RS 80 ADVENTURERS! Discover my secret and earn a rich reward. Can you unravel the 'Bradley Estate Mystery'? £10 from Ogre, 47 Chiselhurst Avenue, Gateacre, Liverpool 25.

ZX SPECTRUM Graphic Games (Cassette), Set One - Five great games including break-out, £5.00 inclusive first class return postage. More available soon, S.A.E. details, Mike O'Neill, 5 Castlefields Rd., Cheltenham, Glos GL52 6YW.

SINCLAIR ZX81 with 16K Ram Pack, £80. Tel: 0476 75797 evenings (Grantham). Very good condition.

SPECTRUM VENTURE

The longest and most exciting adventure type game available for the Spectrum, with colour and sound and fantastic screen effects, setting a new high standard in programming. 16K & 48K versions supplied on one cassette.

POST **£6 FREE**
 (ZX82 VERSION **£5**)

G. A. BOBKER, DEPT PCT.
 29 Chadderton Dr., Unsworth, Bury, Lancs.

MZ80K HORSERACE ANALYSIS. Winners galore. A serious program. Not a game. Cassette: £5.75. Details: Paragon, "Moor-side", 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.

SINCLAIR ZX81/SPECTRUM business programs: Mailing Lists, Stock Control, Accounts, Reports etc. SAE details - Datafax(PC), 287-291 High Street, Epping, Essex.

BBG MICRO A OR B POOLS PREDICTOR PROGRAM

Easy to use, menu-driven data entry. Uses powerful mathematical and statistical forecasting model. Six methods of prediction. User tunable for maximum performance. On cassette with full instructions.

£4.99
Mayday Software, 181 Portland Crescent, Stanmore, Middlesex HA7 1LR.

TRS80 M.1., L.2., 16K, £235 including software, sound and cassette recorder etc. Ring Brighton 38510.

adventure SPECTRUM ZX81 BBG 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. Face 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

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** (17K 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, Resources, 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

TRS-80 L2 16K. Software, Manuals, £230. Phone 222-7979, Extension 2125. Mr. P. Hodgson, Office Hours Only.

"ON YOUR MARKS". Set of five graphic ZX81 16K games for juniors. £5.95. From Computator, 3 Thalia Close, Greenwich, SE10 9NA.

EPSON TYPE 3 PRINTERS. Improved performance, many new features and lower prices from the world's largest manufacturer. For free brochure and special Epson offer write, stating your computer, to: Datatech Ltd, Dept PCT, FREEPOST, Altrincham, Cheshire WA15 0BR.

MZ-80K CASSETTES £3.00. Games, business, educational, copier. S.A.E. D.C.S., 38 South Parade, Bramhall, Stockport, SK7 3BJ.

TWO ACTION GAMES for BBC 16K. Race-tracks and Grandprix. Excellent sound and graphics. Cassette £4 from M. Whiteside, 15 Rich Close, Warwick CV34 4QH.

MARATHON MAN and Creatures. Two great new games for the SHARP MZ80K, £4 each. Fantastic sounds. Train Games Ltd., 799 Dagenham Road, Dagenham, Essex RM10 7UJ. Tel: 01-592 7618.

SPECTRUM — 16K

CAP-MAN: Help Cap-Man to eat his lunch (dare we say his 'packed' lunch?) before the ghosts eat him. **£4.95**

ZX81 — 16K

MOONBASE BETA: A fantastic adventure set on a deserted moonbase. Can you escape alive? **£4.95**

STAR TREK: Our fully featured version of this classic game is the best value for money around at only **£3.95**

AQUARIUS SOFTWARE

53 Towncourt Crescent, Petts Wood, Kent BR5 1PH

Send SAE for free catalogue. High quality ZX81 / Spectrum programs wanted — very good royalties paid.

16K SPECTRUM. We will write your programs (Basic only), £3.00. Racing game, £3.50. Satisfaction guaranteed. A. J. Rose, 425 Chester Road North, Kidderminster, Worcs DY10 1TB.

T199/4A SOFTWARE on tape, from £1.95. Send S.A.E. for list. Apex Trading Ltd., (PCT), 115 Crescent Drive South, Brighton BN2 6SB.

ZX81 Spectrum 16K MANAGEMENT GAMES

AUTOCHIEF. As MD you must negotiate for leases, decide on menu prices, level of wages, advertising and dividends and forecast levels of inflation. If you are not successful you will be made to resign!

AIRLINE. You must decide on number of aircraft to operate, loan and fuel contracts, whether to buy or charter, and levels of staffing and maintenance.

PRINT SHOP. As owner of a printing company you have to decide on staffing, paper stocks, quotations, work schedule and cash requirements.

£5.00 for one. £8.50 for any two or £12.00 for three.

C.C.S.

Please state computer type and send cheque to: DEPT P
CASES COMPUTER SIMULATIONS
14 Langton Way
London SE3 7TL

PRINTER TANDY VII Centronics and RS232 compatible, £140. Also Creed Teletypewriter with interface and software for TRS80, £50. 0676 33181 (Coventry).

COMPUTER PARTIES. Own or interested in VIC or Atari? Live in Beds or Herts? Call your local agent. Free home demonstrations. Best prices. Luton 594740.

ACORN ATOM 12K + 12K. F.P. ROM + Tool-box. Separate 5V3A PSU, over 20 professional games. £400 cost, £300 sell. Reading 690032.

AD INDEX

A B & C COMPUTERS	42
ACORN SOFT	69
ADDA COMPUTERS	11, 15, 19
ADAPTERS ELIMINATIONS LTD	6
A & F SOFTWARE	14
AHKTER INSTRUMENTS	38
ALADDINS CAVE	104
AMBER CONTROLS	108
ANIROG COMPUTERS	17
ARTIC COMPUTING	42
AUDIO GENIE	25, 33
BI-PAK	105
BUFFER MICRO SHOP	12
CAMBRIDGE COMPUTER STORE	47
CAMEL MICROS	80
CASTLE ELECTRONICS	116
COMMODORE	70 & 71
COMPUTER CONCEPTS	52
COMP SHOP	115
CONSERVE	104, 105
CROWN BUSINESS CENTRE	54
CSL MICRODATA	39
CURRIES	10
DATA ASSETTE	58
D. A. COMPUTERS	17
DRG BUSINESS SYSTEMS	20
EAST LONDON ROBOTICS	43
ELECTRONEQUIP	89
ELECTRONICS APPLIED	90
ELTEC SERVICES	43
FULLER MICRO SYSTEMS	32, 106
GAMER	107
GEMINI MARKETING	102
GENERAL NORTHERN MICRO	39
HEWSON	74
IBEK SYSTEMS	11
JADE COMPUTERS	24
JRS SOFTWARE	56
KEMPSTON ELECTRONICS	52
LANDSDOWN ELECTRONICS	29
LEISURONIC COMPUTER STORES	75
MACRONICS	47

MARTIN WARD	103
MELBOURNE HOUSE PUB.	79
MICHAEL ORWIN	58
MICROCOMPUTER SOFTWARE	6
MICROWARE	89
MICRO CITY	80
MICROWORD COMPUTER	54
MICROCOMPUTER APP.	46
M. P. SOFTWARE	42
MOLIMEX	37
NORMAN AUDIO LTD	43
ORCHESTRATED COMPUTING	90
PCP	19
PEARL SOFTWARE	2
PERSONAL COMPUTING	29
PERSOFT	12
PHILIP COPLEY	89
PICTURESQUE	52
PIXEL PRODUCTION	17
PRO SOFTWARE	103
QUARTZ COMPUTER SYSTEMS	107
RICHARD ATTWASSER	15, 34
SATURN SOFT	80
SHIVA PUBLISHING	69
SILICA SHOP	28
SINCLAIR RESEARCH	62 & 63
SIR COMPUTERS	39
SOFT TOYS	19
SOUTHERN SOFTWARE	104
STONE CHIP ELECTRONICS	46
STRIPELAND LTD	75
SUNLOCK	7
SUPERIOR SYSTEMS	12
3D COMPUTERS	32
TAURUS COMPUTER DESIGN	47
TEXAS INSTRUMENTS	55
TIMEDATA LTD	105
TITAN	54
VIDEO SOFTWARE	32
WIDA SOFTWARE	90
WINDSOR COMPUTER CENTRE	29, 103
WORDSWORTH	39

CLASSIFIED ADVERTISEMENT — ORDER FORM

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.
13.	14.	15.

Advertise nationally in these columns to over 100,000 readers for only 30p per word (minimum charge 15 words). Simply print your message in the coupon and send with your cheque or postal order made payable to Argus Specialist Publications Ltd to:

CLASSIFIED DEPT., PERSONAL COMPUTING TODAY
145 Charing Cross Rd., London WC2H 0EE.

Tel: 01-437 1002

Name

Address

Tel.No.(Day)

Please place my advert in Personal Computing Today for months. Please indicate number of insertions required.

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

New
products
arriving
daily

'Phone
your order
to
reserve

Many items
over stocked
on Sale Offer

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

"Europes Largest Discount
Personal Computer Stores"

TELEPHONE SALES
OPEN 24 hrs. 7 days a week
01-449 6596

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



MASTERCARD
VISA

AMERICAN EXPRESS

Home Computer - Starter Packs

AT ROCK BOTTOM PRICES



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.



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

VIC 20



VIC 20 - £169.00
Cassette Unit - £44.95
Printer - £219.95
Single Floppy - £349.95

STARTER PACK 1.
VIC 20 + Cassette Unit + Intro to Programming + 10xC12 Cassettes + Blitz Cassette - £215.00

STARTER PACK 2.
VIC 20 + Floppy + Printer - £675.00

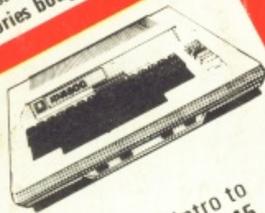
Full range of Accessories Available.
20% off games cartridges with any starter pack.

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.



BBC

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

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

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



(0424) 437875

CASTLE ELECTRONICS Dept.PCT.
7 CASTLE STREET, HASTINGS, E.SUSSEX