PRINTERS UNDER £200

YOUR COMPUTER

Canada	C$	4.00
Denmark	DKr.	35.00
France	Fr.	50.00
Germany	DM	9.50
Greece	Dra.	290.00
Holland	DFl.	8.50
Italy	L	4200
New Zealand	NZ$	3.70
Singapore	M$	6.25
Spain	Pts.	390.00
Switzerland	SFr.	7.00
U.S.A.	$	3.95

90p

(D72163)

JANUARY 1985 BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE Vol. 5 No. 1

THE CHASE IS ON – Win a trip to Hollywood with our Fall Guy competition

CBM-64 Tiradians, Memory Manager and Screen Saver

Spectrum Evaders and Forth

BBC Caterpillar and Datacalc

Amstrad Worms and Sprites

Vic Zip Loader and Deathtrap

ORIC'S NEW WAVE

Twin Kingdom Valley

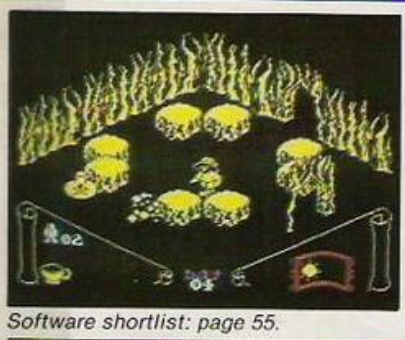
48k Spectrum

BUG-BYTE

YOUR COMPUTER

Contents

JANUARY 1985



Software shortlist: page 55.

Oric review: page 68.

Printer survey: page 73.

Cover shot — see Fall Guy Competition: page 70.

40 **EDITORIAL AND YOUR LETTERS:** Which is best — QL or BBC? Colour magnifier for Zoom and software writers sought.

42 **NEWS:** Wine 'N' dine program, Frankie's game, Acorn's avalanche of peripherals and VDU warnings.

47 **FIRST BYTES:** Operating systems and Telesoftware for beginners.

51 **COMPUTER CLUB:** Meirion Jones looks at political clubs.

53 **HARDWARE HITLIST:** Wafadrive, Microdrive, disc drives — our man with the spanner behind his ear puts Spectrum mass storage devices through their paces.

55 **SOFTWARE SHORTLIST:** New, revised, extended — our team of square-eyed reviewers sift through new releases: F-15 Strike Eagle, NATO Commander, etc.

67 **QUEST CORNER:** Hugo North keys in new adventure games.

68 **ORIC'S NEW WAVE:** The £200 Stratos, MSX and possible 68000 kit.

70 **THE FALL GUY — WIN A TRIP TO THE U.S.A.** Two trips to Disneyland and the Fall Guy film set to be won — plus runners-up prizes of BMX bikes.

73 **ECONOMIC PRINTERS:** Hard copy means hard cash. Kathleen Peel takes a long cool look at the range of computer printers currently available sub-£200.

79 **TELSOFT — DIALLING YOUR COMPUTER PROGRAMS:** Every month, selected programs published in *Your Computer* are available over the phone. Now read on.

81 **BBC CATERPILLAR:** Blast it out in the backyard as the encroaching many-legged monster threatens to hit you right in the hardy perennials. By John Wilson

87 **ZX-81 ASTEROIDS:** Michael Pike dodges space rocks.

90 **SPECTRUM SPACE EVADERS:** Security endangered by Justin Staines.

93 **VIC-20 DEATH TRAP:** Sweat trickles down your brow. Time is running out. Can you defuse the bomb in time? A real tension-builder from Richard Hamer.

97 **ORIC DOTMAN:** Klaus Pedersen gulps down a few power pills and gives you something you can really get your teeth into.

102 **DRAGON REVERSI:** Plays a really strong game — a colourful implementation of the popular Renaissance board game by Tom Fiers.

108 **TIRADIANS CBM-64:** David Rees unleashes more aliens.

112 **ZX SPECTRUM FORTH:** Kees Wiersta teaches you a new language.

116 **BOOSTING DISC STORAGE CAPACITY:** John Dawson illustrates methods you can use to double your disc storage capacity for under £40.

121 **AMSTRAD WORMS:** A diet of worms.

123 **COMPETITION RESULTS:** Winners of our MSX prize.

125 **BBC DATACALC:** Bryan Law's spreadsheet, also on Telsoft.

131 **WINDOS:** Part two of Ian Briscoe's series.

137 **CBM-64 MEMORY MANAGER:** D Maynard saves memory.

141 **CBM-64 SAVE THE SCREEN:** D Brown saves screen memory.

145 **AMSTRAD AMSPRITES:** John Charlesworth turns his attentions from the Spectrum to extend Amstrad Basic and provide the CPC-464 with a sprite facility.

151 **VIC ZIP:** Save money on cups of coffee drunk while waiting for programs to load. Your very own fast loader from John Twiddy.

155 **QL 68008:** Phil Holliday continues his series on machine code for the Sinclair QL with a look at Motorola's 68008 micro-chip.

161 **RESPONSE FRAME:** Tim Hartnell answers readers' queries.

163 **SOFTWARE FILE:** Ten pages packed with software.

208 **DATEBASE:** What's happening on the exhibition and conference front. Paul Bond rounds up micro events.

Prizes to be won valued up to

£40,000

QUO VADIS

Britain's number one best selling CBM 64 game (Gallup) has now got an even bigger prize to be won. If the winning entry is received in The Edge offices after the 100,000th copy of the game has been sold, then the winner will receive not only the Quo Vadis Sceptre (estimated value £10,000), but also £30,000 in cash!

Also for the CBM 64 from The Edge:

Fire Quest

". . . what a splendid entry into the market . . ."
". . . most impressive . . . animation . . . almost cinema cartoon quality"
"With more games of this quality,
The Edge are going to be a force to reckon with."
Rating 9/10, Personal Computer News, 3 November 1984

THE EDGE

31 Maiden Lane, Covent Garden, London WC2E 8LH Tel: 01 240 1422/7877 Tlx: 892379 SOFTEK G
The Edge is a division of Softek International Ltd.
Available from good computer stores everywhere

AIRWOLF

"SURPRISE RELEASE!"

Airwolf

'Stringfellow Hawke' is a former Vietnam chopper pilot and the only man in the free world trained to fly the billion dollar helicopter AIRWOLF. You are Stringfellow Hawke'.

Fall Guy

20th Century Fox's super-stuntman Colt Seavers in his first stunt-packed computer movie.

Dukes of Hazzard

It's the 4th of July and Bo and Luke Duke are planning their noisy, annual party, but Boss Hogg knows about the Duke boys plans and has sent Roscoe and company out to put a stop to their revelry.

Kokotoni Wilf

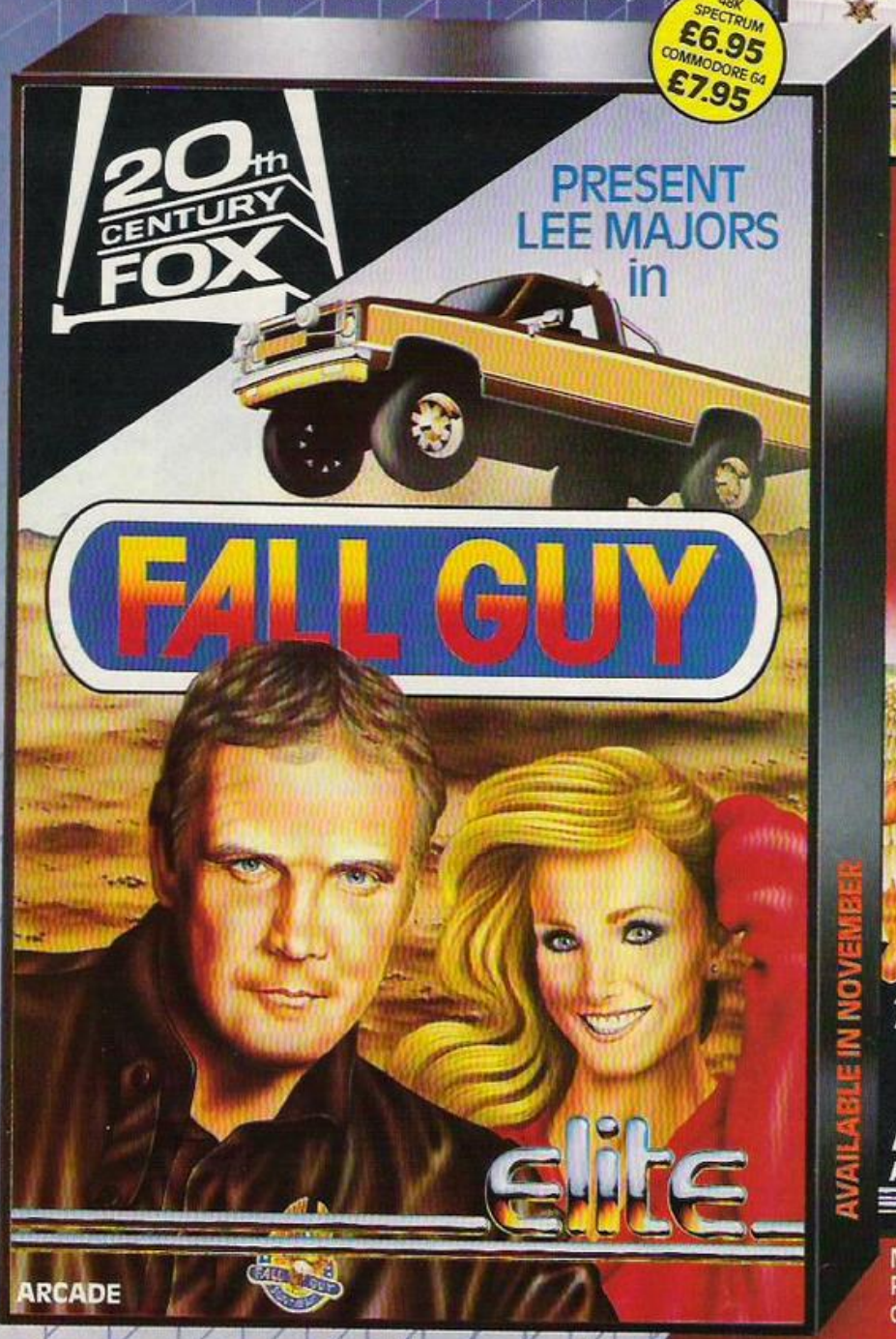
An arcade adventure worthy of comparison with 'Jet Set Willy'.

ARCADE

48K SPECTRUM £6.95 COMMODORE 64 £7.95

48K SPECTRUM £6.95 COMMODORE 64 £7.95

Coming to your Micro early 1985



AVAILABLE IN NOVEMBER

Every single ELITE product carries the unique 'ELITE' Holographic Sticker. Make sure your copy does, its your guarantee of quality.

48K SPECTRUM £5.95 COMMODORE 64 £6.95

AVAILABLE NOW

48K Spectrum and Commodore 64

Mail Order: Just send a cheque or P.O. payable to 'ELITE' or quote your credit card no.

Elite Systems Ltd., 55 Bradford Street, Walsall, England WS1 3QD. Telephone (0922) 611215. Telex 335622 SPETEL G Attention: Elite

No man's land

ORIC/ATMOS

ORIC/ATMOS

OTHER TITLES FOR CBM64/V20 SPECTRUM ZX81 AVAILABLE ON REQUEST

0503 CATEG-ORIC (action game). Take command of a cruiser engaged in battle against fighter planes and submarines. Use the radar and sonar systems to detect and destroy the enemy before you are sunk. £ 7.95

0540 STYX (arcade). Destroy the castles of the Dark One which guard the river Styx. Struggle against vultures, the eyes of the devil and his minions to vanquish evil. £ 8.50

0494 DBUG (utility). A monitor/debugger to debug your programmes in machine code: position of internal registers, set breakpoints, step through programmes. £ 11.95

0496 OPTIMUM (home). Manage up to 4 different accounts, keep track of expenditure and compare with your monthly or yearly budget. Just what you need to keep the household accounts in order. £ 9.95

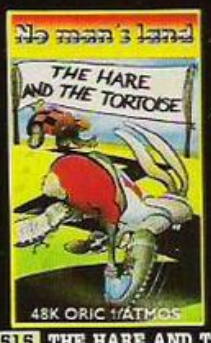
0495 FIRE FLASH (arcade). Prevent the aliens from sabotaging the fuel depot and avoid enemy fire by passing into hyper space. An attractive and challenging arcade game in 100% machine code. £ 8.50

0526 TYRANN (adventure). Can you find your way through the labyrinth and liberate Queen Tyrann from her torment? A first-class adventure game with text and graphics. £ 8.95

0514 THE DIABOLICAL TOWER (adventure). The Diabolical Tower has 60 floors, each one fraught with danger. Your mission is to seek out the treasure. £ 8.50

0510 MULTIFILER (business). A powerful programme for creating files. Choose your own criteria adapted to your requirements. Rapid sort and search features in machine code and possibility of memorising over 30000 characters. Extremely simple to use. £ 14.95

0463 PANIC (action). Catch the marauding apples by setting traps. 6 levels. £ 6.95



0515 THE HARE AND THE TORTOISE (education). A game for 3-8 year olds to teach the notions of right, left, up, down and counting. The hare and the tortoise decide to race. Who will win? The level of difficulty is adjustable to the child's ability. £ 8.50

HARD communication

OTHER ORIC/ATMOS TITLES

0497 ADDRESS BOOK	£ 9.95
0498 BANK ACCOUNT	£ 12.50
0499 BASIC PLUS	£ 9.95
0502 COMPUTER ASSISTED DESIGN	£ 8.50
0504 CHARACTER GENERATOR	£ 8.50
0465 CONCOURS HIPPIQUE	£ 5.95
0464 CW MORSE	£ 14.95
0506 FINANCIAL CALCULATOR	£ 9.95
0507 INVOICING	£ 14.95
0508 LEARNING FORTH	£ 16.95
0509 LIBRARY CATALOG	£ 9.95
0511 SCREEN KIT	£ 9.95
0513 SUPERCOPY	£ 9.95

RETAILERS CONTACT:

CentreSoft

OR ASK YOUR DISTRIBUTOR TO CONTACT US

DISTRIBUTORS AND OVERSEAS ENQUIRIES CONTACT:

JANET PELTON, INNELEC-NO MAN'S LAND 110 BIS RUE DU GAL LECLERC 93506 PANTIN CEDEX FRANCE TEL.: 33-1-840.24.31.

MAIL ORDER:

POST COUPON TO HIGH TECH UNITS 1 & 2 CONLON DEVELOPMENTS WATERY LANE DARWEN LANCASHIRE

PRICES INCLUDE POSTAGE AND PACKING FOR UK ONLY OVERSEAS ADD £2.

REF	TITLE	QTY	TOTAL PRICE

PO/CHEQUE ENCLOSED OR DEBIT ACCESS/VISA

IF CARD EXPIRY DATE:

IMPORTANT: All cheques or cards payable to NO MAN'S LAND and sent to High Tech

NAME

ADRESS

POSTCODE

YC

XLtron 25 ss/dd 5¼" diskettes in a MEGA•BOX £29

plus VAT and p&p

With RHINOKOTE – it's tough!

MEGA•BOX measures 6¼" x 8¾" x 6½"

Our Quality Promise

You can order XLtron disks with confidence. We buy our disks in bulk from international manufacturers, to our specifications, then test, grade and retest them in our London laboratories. Every order of 25 or 50 comes packed in the same top quality rigid plastic storage box, our **MEGA•BOX**. With four dividers. Every order of 10 comes packed in our **disco•box** library case.

Fully Guaranteed

The XLtron quality control is so stringent that we can give our famous 'two for one' guarantee. If you find a faulty disk, return it to us, and we'll send you two in exchange immediately. All part of our five year guarantee.

XLtron 5¼" Floppy Disks Prices

Code 3 25 ss/dd XLtron 5¼" 48tpi disks with RHINOKOTE in **MEGA•BOX** £29

Code 4 25 ds/dd XLtron 5¼" 48tpi disks with RHINOKOTE in **MEGA•BOX** £39

Code 5 50 ss/dd XLtron 5¼" 48tpi disks with RHINOKOTE in **MEGA•BOX** £50

Code 6 50 ds/dd XLtron 5¼" 48tpi disks with RHINOKOTE in **MEGA•BOX** £75

Code 1 10 ss/dd XLtron 5¼" 48tpi disks with RHINOKOTE in **disco•box** £13

Code 2 10 ds/dd XLtron 5¼" 48tpi disks with RHINOKOTE in **disco•box** £18

Features: Write protect notch, centre hubs, double and single density.
Tyvex© sleeves, and with RHINOKOTE©.

Other brands too!

We also stock 3M and Athana Disks.
Prices are for boxes of 10. All disks 48tpi

Type	Athana	3M	XLtron
ss/dd	£24.80	£19.50	£12.00 (code B1)
ds/dd	£30.80	£27.00	£17.50 (code B2)

For details of our 8" floppies ring 01-631 0255.

XLtron Drives

We stock a complete range of high quality drives. All carry our full one year 'no quibble' guarantee.

XLtron Slimlines

half height 5¼" direct drives. Complete with all cables – just plug in, no soldering or extras needed. Silent running.
Apple XLtron drive (suitable for first or second drive) **£129.50** (code D1)
BBC 'B' XLtron drive (ss) **£129.95** (code D2)
BBC 'B' XLtron drive (ds) **£170.00** (code D3)
Buy two – or more – no delivery charge.

XLtron Standard 5¼"

Tried, tested and reliable, suitable for most popular makes of computer. Complete with all cables.
ss/48tpi **£75.00** (code S1)
ds/48tpi **£85.00** (code S2)
96tpi **£135.00** (code S3)
Buy two – or more – no delivery charge.

Disk Drive Cleaning Kits

Complete with cleaning fluid and applicator **£7.50** (Code C1)

Pre-formatted Disks XLtron New!

Save yourself time and trouble – we can supply pre-formatted disks for nearly every computer. Available in boxes of 10.
Single sided for AES Plus, Olivetti ETV 300, Phillips 5002/3/4 etc. **£15.00** (Code F1) and machine name©
Double sided for DEC Rainbow/Professional, Phillips 5020 (Prospect), IBM Displaywriter, Canon AS100 etc. **£24.00** (Code F2)
Please specify your computer and machine part number when ordering.

Personal Callers Very Welcome

We're now established in our new showroom in Alfred Place. You can save our £2.00 delivery charge by calling in – you'll be welcome from 10.00 a.m. till 5.00 p.m. Saturday 10.00 a.m. – 4.00 p.m.

Help Lines

If you want help or information to place an order ring our 'hot line' on 01-631 3600 or if you need technical advice ring 01-631 0255.

Official Orders

We accept orders from all government bodies, schools, universities, libraries, armed forces etc. We despatch on receipt of an official purchase order. If you can't raise a cheque without an invoice just post or telephone your order and we'll send you a pro-forma by return.

Disco Technology Ltd., Lex House, 3-6 Alfred Place, London WC1, England.
Telephone Sales: 01-631 3600 Technical Enquiries: 01-631 0255

Disco Technology Ltd., Lex House, 3-6 Alfred Place, London WC1, England. Please send me the following:

Fill in the coupon or send written orders.

Name_____

Signature_____

Address_____

_____

Postcode_____

I enclose a cheque for £_____ **or debit my Access/Diner card number**

_____ YC

Code No.	Quantity	Product	Computer	Price
			VAT at 15%	
			Delivery	
			Total	

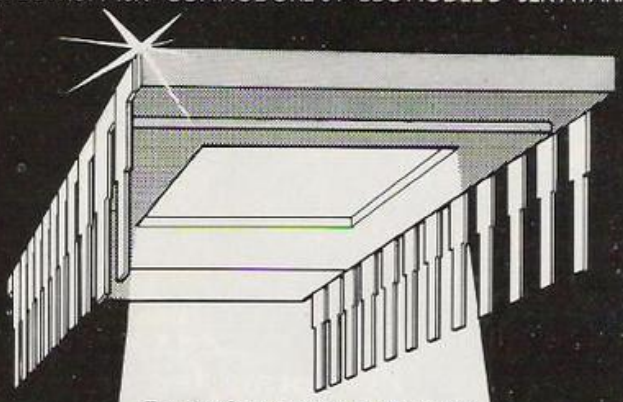
Add £2.00 delivery for disks, £5.00 for drives or £6.00 for both. Cleaning kits free delivery.

© Tyvex is a registered name of Du Pont
© RHINOKOTE is a registered name of Disco Technology Ltd
© XLtron is a registered name is a registered name of XLTRON Ltd.

The Complete

Machine Code Tutor

SPECTRUM 48K · COMMODORE 64 · BBC MODEL B · 32K ATARI



Trust New Generation to strip the mystery away from Machine Code. Now the Complete Machine Code Tutor makes learning machine code simple so there's never been a better time to discover the really great benefits of machine code programming – see what the press says:

"A colourful, clear, interactive computer teaching package – the best I've come across in any field. Jan Watterson – **Popular Computing Weekly**"

"This pair of tapes forms a worthy addition to the range, giving a thorough exposition from the most elementary level of machine code programming on the BBC Micro. **Which Micro & Software Review**"

"The best machine code tutor and no serious Spectrum programmer should learn machine code without it. **Crash**"

"By far the best attempt comes from New Generation Software who has recently issued its Complete Machine Code Tutor for the BBC and the Spectrum. **Popular Computing Weekly**"

"New Generation have got a very nice product here. It's well thought out, easy to use, aesthetically pleasing, and (as far as I could tell) bug-free and crash-proof" . . . "Overall then, an excellent idea, well executed. **Computing Today**"

Supplied with full notes, this package teaches machine code the way it should be taught – at your own pace and actually from the microcomputer, not from a book. You learn programming the professional way, plus a few tricks of the trade. Available from all good computer stores at £14.95.

New Generation Software

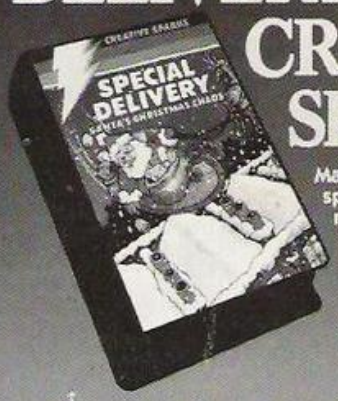
GSH

New Generation products are sold according to their terms of trade and conditions of sale.

FREEPOST, Bath BA2 4TD. Tel: 0225 316924

Selected titles of New Generation Software are available from your local computer store and larger branches of: WHSMITH · John Menzies · WOOLWORTH · Spectrum · Boots

EVERY DAY IS CHRISTMAS DAY WITH 'SPECIAL DELIVERY' FROM CREATIVE SPARKS



Make this Christmas really special with this delightful new computer game.

The ideal present to add to any software collection.

Available for Atari 32K, Spectrum 48K, Commodore 64.

CREATIVE SPARKS

HOME COMPUTING WEEKEND

AT THE

The Royal Clifton Hotel***

FROM

1st-3rd FEBRUARY

The weekend has been compiled with professional users of computers aimed at home computers for pleasure and business.

Use our computers or equipment or bring your own, whether it be a Sinclair, XZ81, Spectrum, Commodore, VIC209, or any other make.

YOUR WEEKEND INCLUDES
2 nights — Dinner, Accommodation and full English Breakfast together with Pub Lunches, Talks and Lecturers. The chance to compare notes with other computer users programming and computer games.

WHAT DOES IT COST?
£48 per person.
£35 per person for children under 12 sharing.
£38 per person for computer widows/widowers.

TELEPHONE — (0704) 33771
THE PROMENADE, SOUTHPORT,
TELEX — 677191

NEW! From XLtron

SUPERDISK

The 96 tpi 5¼" disk for any system.

with RHINOKOTE – it's tough!

SUPERDISK is suitable for any user, any computer, any format. Single sided, double sided, 48 or 96 tpi. Every SUPERDISK has been individually tested and approved in our London Laboratory. Whatever your requirement SUPERDISK is the answer.

Special introductory offer until 15th January, 1985 only – 10 SUPERDISKS in a **disco·box** **£20** plus VAT and P&P. From 16th January, 1985 prices must rise!

★ Introductory offer

The midi·box

15 ds/dd disks in our **midi·box** at a bargain price.
Our new **midi·box** has some great features. It's made of high impact PVC and holds up to 30 5¼" disks, but is one of the neatest on the market. Measuring 6¼" x 6¼" x 3¼" the ridged lid conveniently holds the disks you are working on ready to hand. And with 15 ds/dd disks with RHINOKOTE it's a bargain at only **£25.00** all in.

A Box and a half for the price of one!

'Two for one' guarantee

If you find a faulty disk, send it back and we will immediately send you two in return.

Disco Technology Ltd.,

Lex House,
3-6 Alfred Place
LONDON WC1

01-631 3600 for telephone orders
01-631 0255 for technical enquiries

Call in – Save £2.00

Our new premises at Alfred Place are within minutes of Tottenham Court Road, Goodge Street and Warren Street tube stations. Call in and save postage.

To: Disco Technology Ltd., Lex House, 3/6 Alfred Place, London W.C.1., England.

To: Disco Technology Ltd.,
Lex House, 3-6 Alfred Place, LONDON WC1

Fill in the coupon or send written order.
Please send me:
_____10 SUPERDISKS at £25 including VAT and P&P in a **disco·box**
_____15 ds/dd XLtron disks in a **midi·box** at £25.00 including VAT and P&P.

I enclose a cheque to the value of £ or debit my Access/Diners card

Number_____

Signature_____

Address_____

YC

Post code_____

© RHINOKOTE is a registered name of Disco Technology Ltd
© XLtron is a registered name is a registered name of XLTRON Ltd.

GAMES TO STIMULATE THE IMAGINATION

FROM

RUNESOFT

PARADOX:
Undoubtedly a real challenge and one with a touch of class rarely found in computer games. Paradox could well achieve cult following . . . Home Computing Weekly.

. . . A pretty interesting one . . . may well keep you occupied . . . Your Computer

SPOOF:
The adventure is well constructed . . . (a) brain-wracking experience . . . The humour gives a real lift to the program without interfering with the journey and its problems. Sinclair User.

On playing, it reveals a sometimes biting satire on the fantasy world in general and text adventures in particular . . . As a satirical piece it is often amusing . . . Crash Micro.

. . . makes a pleasant change from the usual seriousness . . . tends to make it stand out from the rest . . . one of the most playable adventures around. Your Spectrum.

One of those rare delights, a genuinely funny adventure . . . Beautifully observed and precisley anticipated — it is a real pleasure to play. Big K.

ROBYN HODE:
STAR GAME . . . A good buy for serious adventurers. VID

Addictiveness: Unsurpassable. Overall: Unsurpassable. Big K.

The adventure is massive, providing over 400 locations . . . the vocabulary is equally impressive — over 120 words . . . Odd bodkins and by my troth, this is indeed a smashing adventure, highly original and beautifully put together. Your Computer.

A massive 425+ location adventure based on the original ballads. All the locations and characters areas they actually would have been in the 13th century. ROBYN HODE comes in two parts — BOTH PARTS ON THE SAME CASSETTE! A challenge to beginners and hardened adventurers alike.

This is one strategy game that I could keep playing. I really enjoyed it . . . I am normally no fan of such games — this is an exception . . . Addictive isn't a word that normally applies to strategy games — perhaps this is the first such . . . CRASH MICRO

. . . one of the most complicated adventures ever designed . . . addiction is probably ensured. Popular Computing Weekly
Well worth checking out, for adventure fans. WHICH MICRO? & SOFTWARE REVIEW (3 thumbs up!)
. . . one of the best text adventures on the market. SHEFFIELD GUARDIAN

There is a lot of wry humour in the adventure and a lot of satire at the expense of many other well-known programs. Popular Computing Weekly.
Finding Spoof The Magic Dragon is a laugh-a-minute . . . reflecting Runesoft's high quality approach . . . great fun for those who enjoy being frustrated. SHEFFIELD GUARDIAN.

TRADE ENQUIRIES: *Overseas Distributors enquiries welcome* *Overseas mail-order — NO EXTRA CHARGE*

PRISM MICRO PRODUCTS 01-253-2277

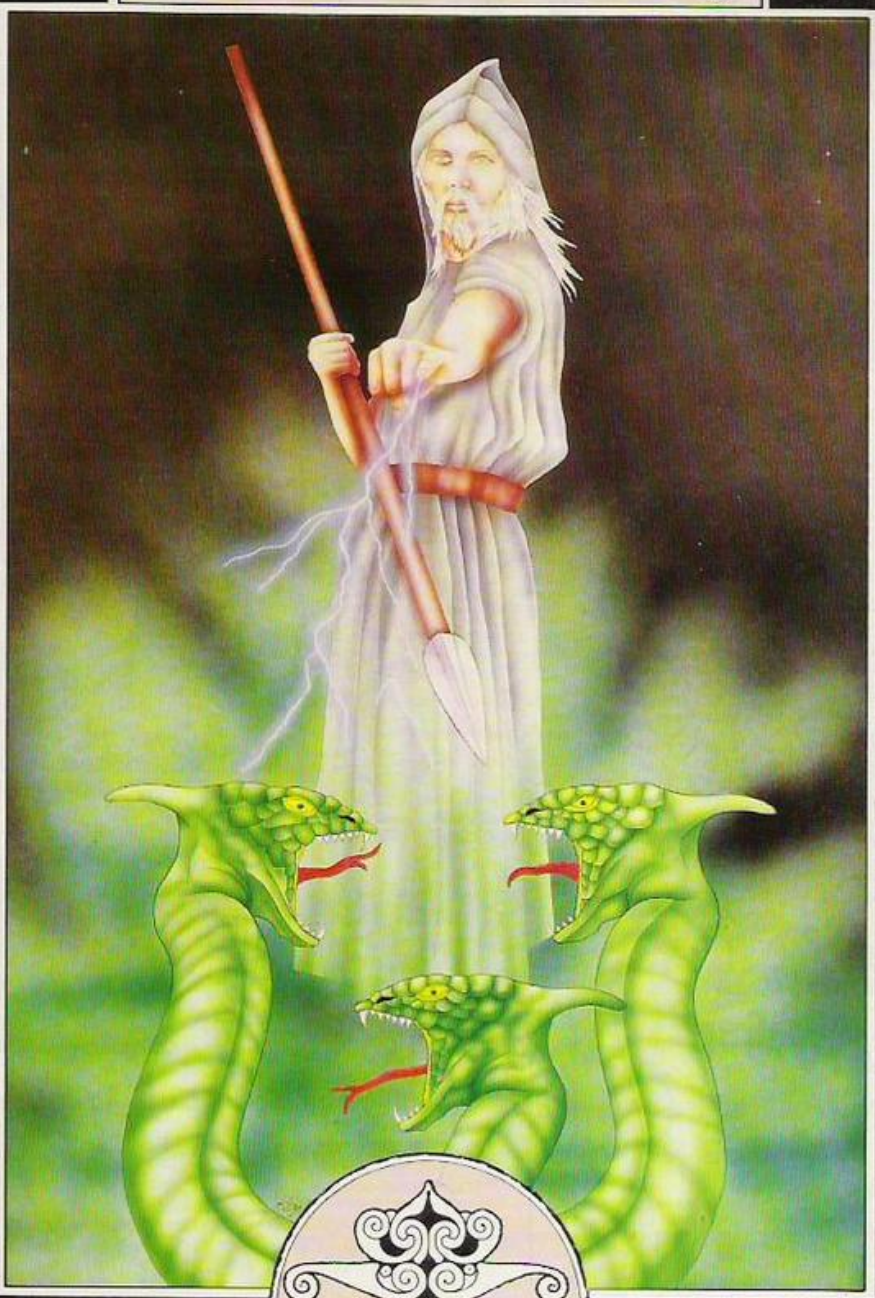
CENTRESOFT 021-520-7591

HIGH TECH DISTRIBUTION 0254-775233/4

RUNESOFT LTD,
CHARWOOD HOUSE,
CROSSGATE DRIVE,
NOTTINGHAM NG2 1LW.
0602 287667

adventure for commodore 64 and spectrum 48k

NO.1
SWORDS & SORCERY



NEW RELEASE AVAILABLE 20th OCT

WIZARDS *power level 1 — 10*

DRAGON *power level 7 — 9*

LYTCH *power level 6 — 10*

WEREWOLF *power level 4*
a selection of your opponents

the MIDAS adventure concept

SWORDS & SORCERY

Swords and Sorcery represents the first example of the ultimate in graphic adventures using the unique MIDAS system.

Swords and Sorcery differs from other adventures in that you guide your character through the unending corridors of the underworld on a quest for material, physical and/or spiritual power. The choice is yours.

You begin as a novice with limited abilities in the use of magic, sword play and stealth (lock picking, thieving etc).

As you wander the corridors, you will encounter beings meek and mighty, discover untold wealth and worthless trash. Some objects will increase your powers, whilst some will be dangerous and still others will be protected from pilferers (you!) by friendishly ingenious traps, all designed to help or hinder you on your pilgrimage to power and glory.

There are quests within quests within Swords and Sorcery, for those who want to follow them. Some are given others must be found, and some are lost causes. There are many ways of opening the gate between the levels of the dungeons. Some are obscure and easy, others obvious and dangerous. The most profitable paths are both. The Ultimate goal of many will be to find the lost armour of Zob, which was un-made by its maker, and its parts scattered across the levels. What, where, how, who and why are answers to be found. All that is known is the prayer of the seekers:

WHEN DARK CABALLUS HIS COUNCILS LEND US
LET NOT THE RED CLUPEA HARANGUE US
TURN US FROM WHAT SEEMS TREMENDOUS AND
THUS TO ZOBS GREAT TREASURE SEND US.

You need never tire of Swords and Sorcery — when this dungeon can no longer hold you, the next awaits. . . there are a series of expansion modules planned to extend your enjoyment indefinitely.

Available on Cassette £9·95

SPECTRUM 48K OR COMMODORE 64

(Multi Dimensional Animation System)

MIDAS ADVENTURE CONCEPT

Stunning 3D graphic animation simulating video disk games.

A unique fully interactive adventure language using the latest ARTIFICIAL INTELLIGENCE techniques.

State of the art data compression techniques enabling enormous scenarious and vocabularies to be incorporated.

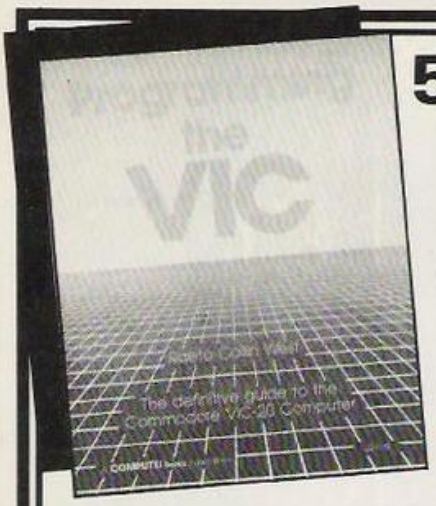
Real time Interactive Conflict Sequences.Talk to your opponent, attack them, flee them and even confuse them.

Joystick capability for movement, combat and actions through unique menu feature. Keyboard operation for more complex interaction with the adventure when time permits.

Develop your own unique player characters. For example — specialize in magic, swordplay etc.

Total expandability — your own characters can be transferred to future adventures and new opponents, scenarious and objects can be added to all the games. A series of expansion modules to increase indefinitely the playing life of each game written with MIDAS.

P.S.S. 452 STONEY STANTON RD. COVENTRY CV6 5DG. TEL: COVENTRY (0203) 667556



5000 manhours for £15.90

VIC-20 owners! Written by Raeto West, produced by the USA Compute! team, 'Programming the VIC' is essential to get the most from your VIC. There never has been a book that gives you what this one does. Throw away your pulp paperbacks and old magazine articles. Revive your VIC now!

- **NEW**
- 17 Chapters + Appendices address virtually every VIC-20 programming situation.
- Carefully designed Chapter Organisation to serve as 1 Comprehensive introduction, 2 Tutorial for experienced computerists, 3 Reference book for quick look-up.
- Every aspect of VIC-20 from elementary BASIC to advanced machine language, from sound and graphics to tape, disk, and hardware. Equivalent to countless magazine articles.
- Complete coverage gives overview essential for the level of computer literacy sought today.
- 608 pages. 7½" × 9" UK ISBN 0 9507650 1 5

Price in UK/Europe £15.90 each.

Available by post (no extra charges) from Biblios Ltd, Star Road, Partridge Green, Horsham, W. Sussex RN13 8LD.

Available from dealers/booksellers. Trade orders and general enquiries to the publishers: Level Ltd (Computer Publications), PO Box 438, Hampstead, London NW3 1BM. Tel: (01) 794-7241.

(Still available: 'Programming the PET/CBM', £14.90. 'Programming the Commodore 64' expected March 1985)

- 1 **INTRODUCTION** Aims, plan, conventions, notes, on the book; acknowledgements.
- 2 **GETTING TO KNOW YOUR VIC-20** Roundup of background; keyboard, hardware; introductory Basic.
- 3 **BASIC REFERENCE GUIDE** Syntax explained; alphabetical keyword section with examples; error messages.
- 4 **EFFECTIVE BASIC PROGRAMMING** Designing, writing, debugging, Basic; typical problems and solutions; example programs.
- 5 **VIC-20 ARCHITECTURE** Hardware concepts; memory maps; RAM and ROM expansion; Restore, reset; VIAs &c.
- 6 **BEYOND VIC BASIC** Consequences of the way Basic works; utilities, including keyboard use, UNLIST, TRACE, program recovery, block load/save &c.
- 7 **6502 MACHINE LANGUAGE** Introduction to ease you into machine code; starting examples; description of the chip's features; typical problems with solutions; monitors.
- 8 **MACHINE LANGUAGE METHODS SPECIFIC TO VIC-20** Special features — inbuilt Kernal, ROM, vectors; clock, extra commands, interrupt programs.
- 9 **MIXING BASIC WITH MACHINE LANGUAGE** Incorporating Machine language subprograms and blocks of data with Basic.
- 10 **VOCABULARY OF THE 6502 CHIP** Alphabetic quick reference with examples for all opcodes — ADC through TYA.
- 11 **VIC-20 ROM GUIDE** Detailed memory map (with 64 equivalents) of RAM and ROM locations.
- 12 **GRAPHICS** Many examples and hints in Basic and machine-language including full-screen graphics, multicolor mode, smooth motion, multiple screens, split-screens and much more.
- 13 **SOUND** Basic and machine-language techniques; interrupt-driven music; harmony.
- 14 **TAPE** Summary of commands; files; hardware notes; advanced and ML programming; standard tape format secrets; security.
- 15 **USING YOUR COMMODORE DISK DRIVE** Introduction and summary of commands; directory and channel 15; types of files; complete list of disk commands; utilities; direct access; machine language.
- 16 **THE GAMES PORT** Joysticks, paddles, lightpens, other devices; Basic and ML routines.
- 17 **MAJOR PERIPHERALS** Guide to printers, plotters, modems, interfaces.
- **APPENDICES** Seventeen appendices, including guide to accurate Basic entry, program interconversion, 6502 tables, VIC chip data, screen position information for graphics, &c.

MAIL ORDER FORM

Send orders and make cheques payable to:

Biblios Ltd, Star Road, Partridge Green, Horsham, W. Sussex RH13 8LD.

Please send ..... copies 'Programming the VIC' at £15.90 each.

NAME_____

ADDRESS_____

_____

_____

_____ YC0185

HALLÅ SKANDINAVIEN!!!

Du som bor i Skandinavien och söker bra program till din hemdator.

KONTAKTA OSS!!!

Vi har det mesta som finns i denna tidning till ***samma*** låga priser som gäller i England. Dessutom får vi in alla nyheter ***samtidigt*** som de släpps i England.

SVENSKA MASKINKODSPROGRAM

Ja, nu släpper vi även en svensk serie maskinkodsprogram.
Missa inte vår jättesuccé ***"SPELDORADO"***

OBS!!! Vid katalogbeställning v.g. medsänd 5:– Skr i frimärken för portot.

SWESCOT

Box 213
121 02 Johanneshov
Sverige
08/39 27 00 – 08/81 18 01

TRIONIC

Your *Local* Home Computer Centre

Best Shop in Town for Software, Books, Mags, Peripherals and Accessories.

We sell and support: Amstrad, Atari, BBC, Commodore C16, CBM 64, CBM Plus 4, Electron Spectrum 48K, Sony Hit-Bit (MSX).

We are one of the Largest Stockists of Games, Business and Educational Software and Utilities for all Popular Home Computers.

Amstrad CPC464 Green Monitor	£239
Amstrad CPC464 Colour Monitor	~~£349~~ £345 cash only
Commodore C16 Starter Pack	£139
Commodore 64	£199
Commodore 64 Trionic Pack	£249
Commodore 64 Business Pack	£629
BBC Model B Micro	£399
Acorn Electron	£199
Spectrum 48K	£129
Sony Hit Bit MSX Computer	£299

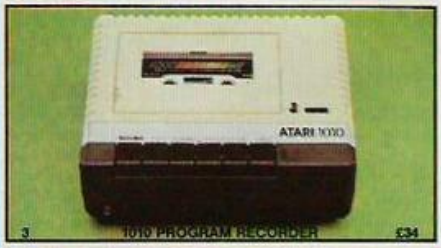
We also stock a large range of Printers, Monitors and Disk Drives to suit all applications.

OPEN 10am-8pm Mon-Sat. Tel: 01-861 0036

TRIONIC LIMITED 144 Station Road, Harrow, Middlesex

1 800XL 64K COMPUTER £169

2 800 48K COMPUTER £69


3 1010 PROGRAM RECORDER £34

4 1050 127K DISK DRIVE £199

5 1020 4 COLOUR PRINTER £99

6 LETTER QUALITY PRINTER £249

7 TOUCH TABLET PEN + CART £49

8 TRAK BALL £19.95

9 SUPER CONTROLLER £14.95

ATARI XL

THE NEW ATARI 64K 800XL £129

EVERYTHING YOU WANT FROM A HOME COMPUTER

1. **ATARI 64K 800XL - £169:** The Atari 800XL has many facilities and includes such advanced specifications that you will be amazed by its performance. At the new retail price of only £169 for a full specification 64K computer with a proper full stroke keyboard, we believe that the 800XL cannot be beaten. Just look at the following specifications:-
   COLOUR CAPABILITIES: 16 colours and 16 intensities giving 256 different colours (all of the 256 colours can be displayed at the same time).
   OPERATING SYSTEM: 24K ROM including Atari Basic programming language and a self diagnostic test program.
   KEYBOARD: Full stroke design with 62 keys including help key and 4 special function keys, international character set and 29 graphics keys.
   SOUND: 4 independent sound synthesisers each capable of producing music across a 3½ octave range or a wide variety of special sound effects. (Additional programming can achieve an octave range of up to nine octaves!)
   DISPLAY: 11 graphic modes and 5 text modes. Up to 320×192 resolution. Maximum text display 24 lines by 40 columns.
   SPECIAL ATARI INTEGRATED CIRCUITS: GTIA for graphics display, Pokey for sound and controller ports, Antic for screen control and I/O (Input/Output).
   CPU: 6502C microprocessor - 0.50 microsecond cycle and a clock speed of 1.79 MHz.
   EXTENDED GRAPHICS FUNCTIONS: High resolution graphics. Multi-coloured character set. Software screen switching. Multiple redifined character sets. Player missile (sprite) graphics. Fine screen scrolling. Changeable colour registers. Smooth character movement. Simple colour animation facilities.
   PROGRAMMING FEATURES: Built in Atari Basic programming language supporting peek, poke and USR plus at least 8 other languages available. The help key will provide additional information and menu screens with certain software. Full on-screen editing is available as well as syntax checking on entry.
   INPUT/OUTPUT: External processor bus for expansion with memory and peripherals. Composite video monitor output. Peripheral port for direct connection to Atari standard peripherals. Software cartridge slot is included as well as 2 joystick controller ports.
   SOFTWARE: Over 1,500 items of software are available including self teaching programs with unique voice over. The range of programs includes Education, Home Management & Programming aids. There is also APX (Atari Program Exchange) and of course Atari's famous entertainment software now at only £9.95. In addition there is a host of support and help available from specialist Atari magazines like Antic and Analog and from over 75 Atari books/manuals.
2. **ATARI 800 48K COMPUTER - £69:** We have a limited number of the Mk1 model 800 computer with 48K. The price is £69 (as a games machine) or £99 with the Basic Programmer Kit (Basic cartridge & 2 manuals). Both come with a full 12 months guarantee.
3. **ATARI 1010 PROGRAM RECORDER - £34:** For low cost storage and retrieval capability. Data transmission 600 baud. Storage capability 100K bytes on a sixty minute cassette. Track configuration four track, two channels (digital and audio). Auto record/playback/pause control/unique soundthrough facility. Also included is built in accidental erasure prevention and automatic shutoff after each program as well as a 3 digit tape counter.
4. **ATARI 1050 DUAL DENSITY DISK DRIVE - £199:** 5¼" disks holding 127K randomly accessible bytes provide both expansion and flexibility for your 400/800 or XL system with new 'helpful' DOS 3. All customers who purchase a Disk Drive from Silica Shop will be automatically given a FREE set of 100 programs on 3 Disks recorded on both sides.
5. **ATARI 1020 COLOUR PRINTER - £99:** Printer and Plotter with four colour graphic print capability. 40 column width printing at 10 characters per second. Can print 5, 10 and 20 characters per inch. 64 character sizes. Prints text in 4 directions. Choice of line types.
6. **ATARI 1027 LETTER QUALITY PRINTER - £249:** For word processing letters in professional type. Print speed of 20 chars per second.
7. **ATARI TOUCH TABLET - £49:** Enables you to draw and paint pictures on your T.V. screen, with the touch of a stylus.
8. **ATARI TRAK BALL CONTROLLER - £19.95:** Enables cursor movement in any direction and adds arcade realism to your games.
9. **ATARI SUPER CONTROLLER - £9.95:** The ultimate joystick with double fire button to give you a greater competitive edge in your games.

SILICA SHOP ARE THE No1 ATARI SPECIALIST

Silica Shop are now firmly established as the No 1 Atari retail/mail order and wholesale specialist in the U.K. We already offer our service to over 120,000 customers, 10,000 of whom have purchased Atari Home Computers. Because we specialise (and with a turnover of £1.5 million), we are able to keep prices low by bulk purchases. Ring one of our 45 staff and we will be glad to be of service to you. Complete the coupon below and we will send you our Atari pack with price list and colour catalogue:

EXTENDED TWO YEAR GUARANTEE: We are an Atari Service Centre, able to service and repair Atari equipment and have added a 12 month guarantee to the year offered by Atari, giving you a full 2 year guarantee on your computer if you buy it from us.

SPECIALIST SUPPORT: Our technical staff are always available on the telephone to help and advise you. We endeavour to hold stocks of every Atari compatible item available in the U.K. and we stock over 75 Atari books and manuals.

AFTER SALES SERVICE: Your name will automatically be added to our mailing list and you will receive price lists, newsletters and details of new releases and developments as well as special offers which are exclusive to Silica Atari Computer Owners.

LOW PRICES: Our prices are extremely competitive and we will normally match any lower price offered by our competitors.

FREE COMPUTER OWNERS CLUB: This is open to all Atari computer owners irrespective of where you purchased your equipment. Membership is FREE and entitles you to receive bulletins giving details of new releases and developments. Send now for your FREE information pack, price list & colour catalogue.

PAYMENT: We accept cash, cheques, postal orders and all Credit Cards. We also offer credit facilities over 1, 2 or 3 years, please write for a written quotation.

NEXT DAY DELIVERY - FREE: All goods despatched from Silica Shop are normally sent by first class post or parcel post FREE OF CHARGE. As a special introductory offer for a limited period only we will be sending all Computers and Disk Drives by a next day delivery service at our expense.

So fill in the coupon below with a literature enquiry or order and begin to experience a specialist Atari service that is second to none.

SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Tel: 01-309 1111

ORDER NOW-OR SEND FOR A FREE COLOUR BROCHURE

To: SILICA SHOP LTD, Dept YC 1/85, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX Telephone: 01-309 1111

LITERATURE REQUEST:

☐ Please send me your FREE colour brochures and 16 page price list on Atari Computers.

☐ I own a ..... Videogame ☐ I own a ..... Computer

Mr/Mrs/Ms: ..... Initials: ..... Surname .....

Address: .....

.....

..... Postcode: .....

ORDER REQUEST:

Please send me:

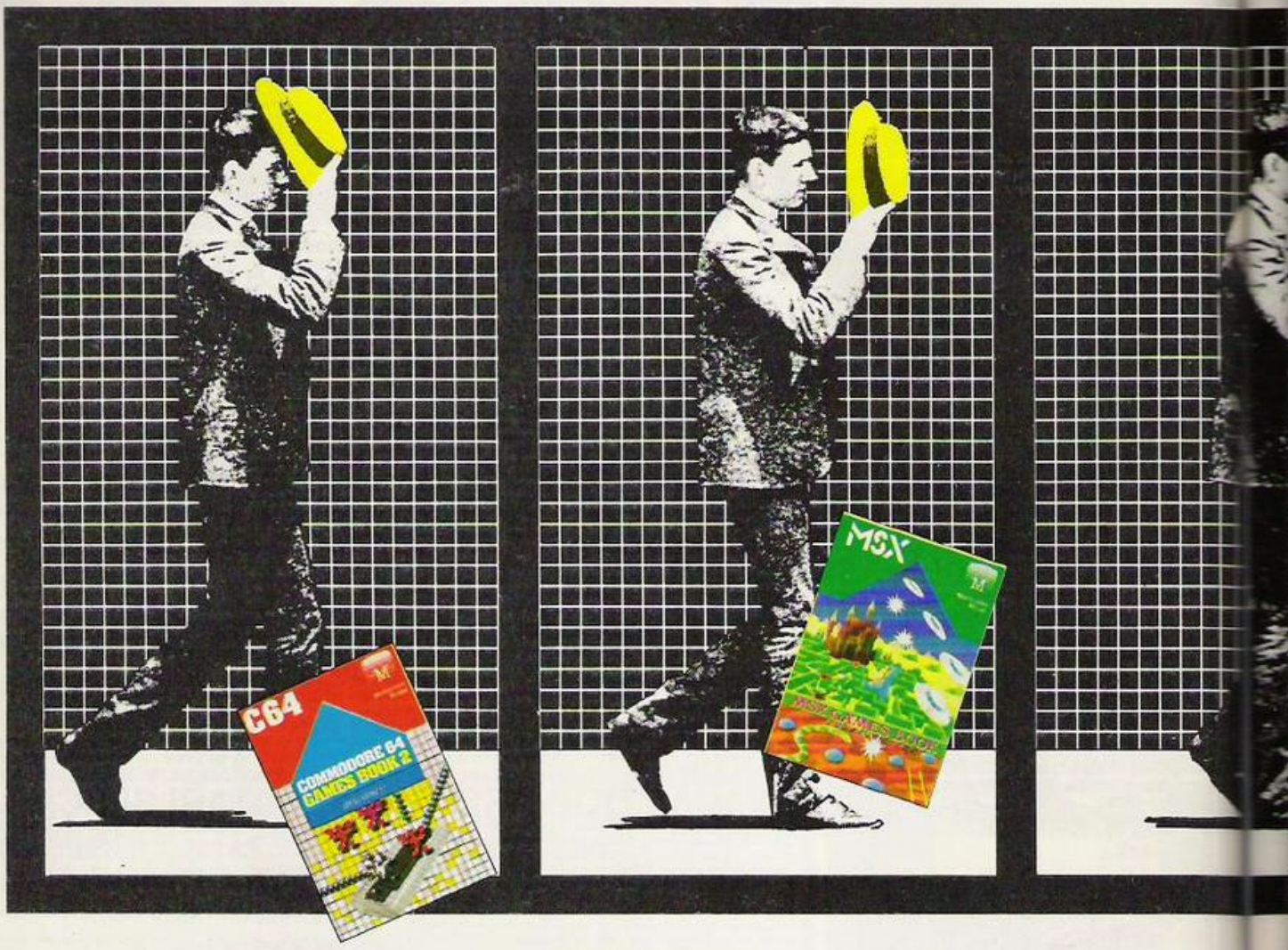
☐	800XL 64K Computer £169	☐	1020 4 Colour Printer £99
☐	800 48K Computer £99	☐	Letter Quality Printer £249
☐	1010 Program Recorder £34	☐	Touch Tablet + Cartridge £49
☐	1050 127K Disk Drive £199	☐	Trak Ball £19.95
		☐	Super Controller £9.95

☐ I enclose Cheque/P.O. payable to Silica Shop Limited for the following amount £.....

☐ CREDIT CARD - Please debit my Access/Barclaycard/Visa/American Express/Diners Club

Card Number .....

HATS OFF TO MEL



M

☐ Please send me your free catalogue.

Please send me:

COMMODORE 64

- ☐ Commodore 64 Games Book 2 ..... £6.95
- ☐ Supercharge Your Commodore 64 ..... £5.95
- ☐ Commodore 64 Software Projects £6.95
- ☐ Commodore 64 Games Book £5.95
- ☐ Commodore 64 Sound & Graphics £5.95
- ☐ Commodore 64 Exposed £6.95
- ☐ Commodore 64 Machine Language for the Absolute Beginner £6.95

MSX BOOKS

- ☐ MSX Games Book £6.95
- ☐ The Complete MSX Programmers Guide £14.95
- ☐ MSX Exposed £7.95

SPECTRUM

- ☐ Advanced Spectrum Machine Language £6.95
- ☐ Micronet Book £6.95
- ☐ Spectrum Software Projects £6.95
- ☐ Spectrum Machine Language for the Absolute Beginner £5.95
- ☐ The Complete Spectrum ROM Disassembly £9.95
- ☐ Super Charge Your Spectrum £5.95
- ☐ Understanding Your Spectrum £6.95
- ☐ Spectrum Microdrive Book £5.95

COMMODORE 16

- ☐ Commodore 16 Games Book £5.95

BBC

- ☐ Guide to BBC ROMs £9.95
- ☐ Building Blocks for BBC Games £6.95
- ☐ BBC Software Projects £6.95

Orders to:
Melbourne House Publishers
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Castle Yard House
Castle Yard
Richmond TW10 6TF

Trade enquiries welcome.

£

£ +p/p .80

Total

£

All prices include VAT where applicable.
Please add 80p for post and pack.

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5001.

I enclose my cheque/money order for £

Please debit my Access Card No. Expiry Date

Signature

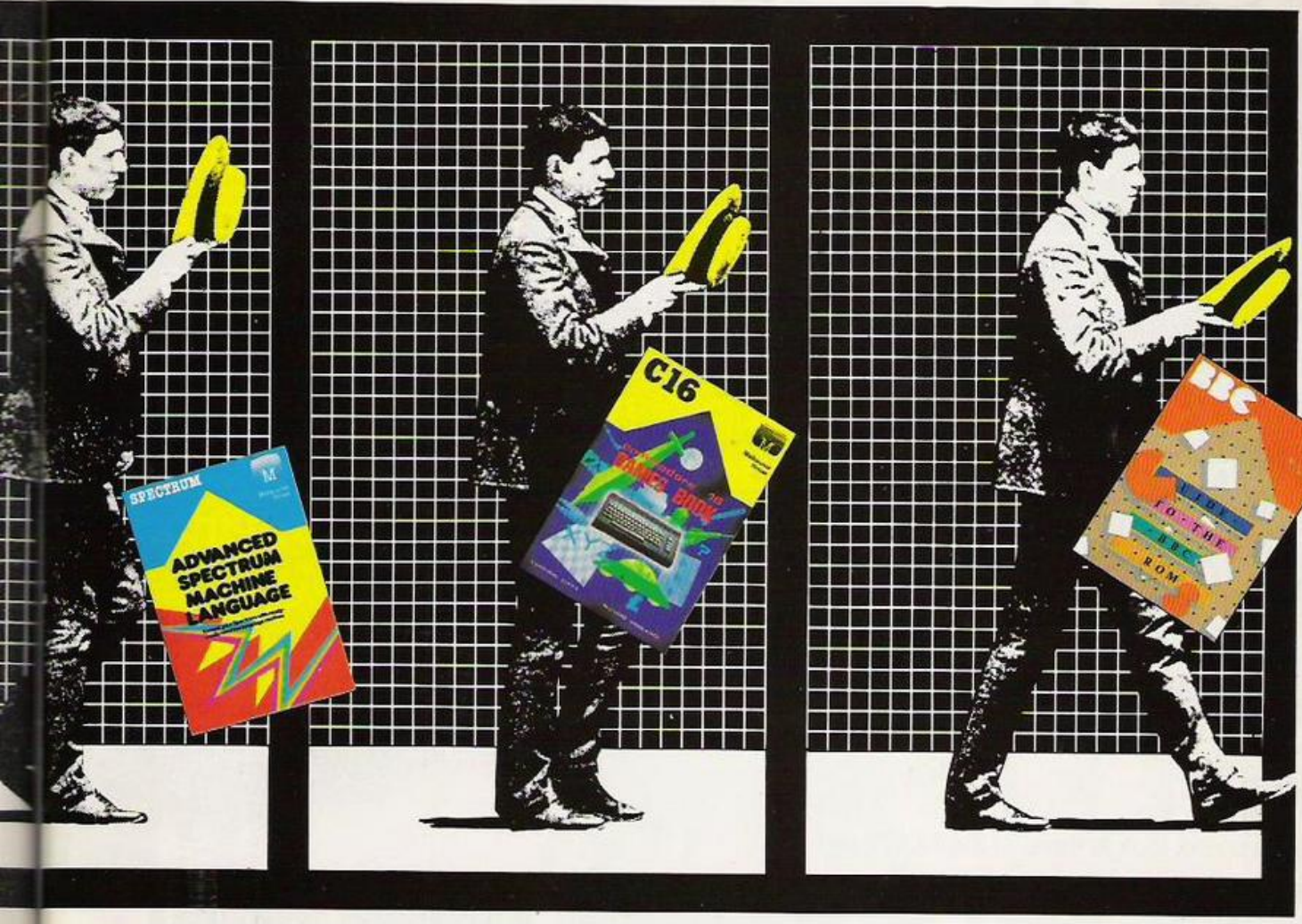
Name

Address

Postcode YC1C

GSH

LBOURNE HOUSE!



Commodore 64 Games Book 2. Just when you thought it was safe to go back to your micro . . . here's 30 more exciting, original games for your Commmodore 64. Every game is new! And every game has been specifically designed with easy to understand sub-structures so you learn programming skills as you go. There's arcade games, strategy games and games you can modify and develop yourself. With CHEXSUM typing in is easier, and mistakes are quickly located. A must for all Commodore owners.

MSX Games Book. Easy-to-enter program listings turn your MSX computer into an arcade of electronic fun and thrills. Games to test your reflexes, nerve, logic, strategy and intelligence! This book will open the door for all MSX owners to a fascinating new dimension of computer game action and excitement.

Advanced Spectrum Machine Language. This book is a collection of ready-made Machine Language routines which show how to achieve spectacular effects on the Spectrum. Most of the routines are aimed at creating visual displays that are at the frontier of Spectrum capabilities. Routines include features that have never been published before. This book gives a unique insight into the Spectrum and into a professional's Machine Language programs.

'Clear and well thought out, and excellent reading.'
YOUR SPECTRUM.

Commodore 16 Games Book. Take on a great challenge!

This new release for your Commodore 16 will test your reflexes, your nerve, your logic, your strategy and your intelligence – with education games, simulation games, gambling games and much more!

With the unique CHEXSUM verification program you can make sure your games are bug free.

All these games explore to the fullest the extended graphics and sound facilities of the new, easier to use BASIC.

Program structures are outlined and key variables are given so that you can learn how to modify and extend these games for more fun-packed action!

Guide to BBC ROMs. At last a reference book providing 'at-a-glance' pictures of the fundamental concepts of the BBC ROMs. It lists the entry address of each ROM routine, and summarises each aspect of its function.

Guide to the BBC ROMs gives you an overall view of your BBC microcomputer, showing you where to find everything you need.

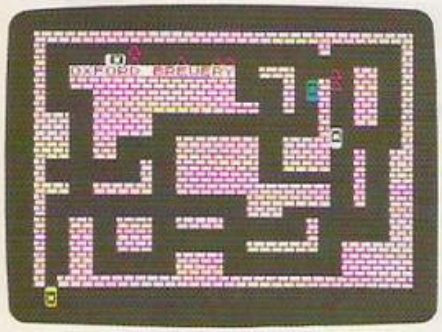
It is readily applicable to all other versions of the BBC microcomputer and its ROMs – a valuable aid to all owners of BBC microcomputers.

Seeing is

See the pack – see the screen – see the game. See the difference the moment you pick up one of the games from Firebird's new Silver Range.

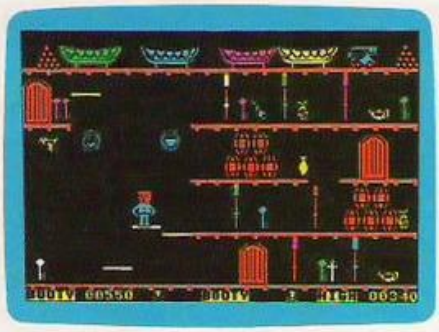
The difference is that our packs show the high quality you'll see on the screen when you play, so you know exactly what you're buying.

Here's a sneak look at three of the NEW games:



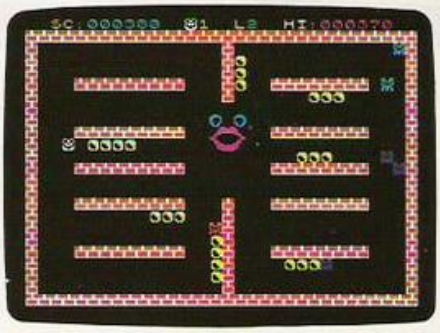
RUN BABY RUN

RUN BABY RUN is a demanding cop chase around five derelict locations. You, the getaway driver must dispose of six pursuing police cars and elude the seventh car's fire power to make good your escape. It's not as easy as it sounds...



BOOTY

Well shiver me timbers and splice the mainbrace and pass the grog, me hearties. Here be the greatest pirate adventure of them all, aboard that scourge of the Seven Seas – the dreaded Black Galleon. Feast yer eyes on the BOOTY-ful treasure stored in 20 holds. There be pirates, parrots and fun galore. If you don't like it, matey, we'll hang you by the highest yard-arm!!!



CRAZY CAVERNS

Ten Crazy Caverns, ten hungry mouths to feed. Line up the Crunchy Cubes and cannon them into the Craving Craw. Watch out for the Crazy Crashers coming to convert your little Cubey Crammer into a Crushed Crisp. It's a cracker!

Look out for these games in the FIREBIRD silver range at selected high street stores.

SPECTRUM: THE WILD BUNCH · BOOTY · MR. FREEZE · TERRA FORCE · VIKING RAIDERS · MENACE · EXODUS · RUN BABY RUN · CRAZY CAVERNS · BYTE BITTEN.
COMMODORE 64: BOOTY · MR. FREEZE · EXODUS · HEADACHE · ZULU · GOGO THE GHOST.
VIC 20: SNAKE BITE · MICKEY THE BRICKY.
BBC MICRO B: BIRD STRIKE · GOLD DIGGER · ACID DROPS · DUCK! · ESTRA · THE HACKER.

believing

The same high standard applies to all twenty games in the range and all are available at the remarkably low price of

£2.50

FIREBIRD

SOFTWARE

The new range from British Telecom. **You'd better believe it!!!**

FIREBIRD SOFTWARE, WELLINGTON HOUSE, UPPER ST. MARTIN'S LANE, LONDON WC2H 9DL. TEL: 01-379 6755/5626

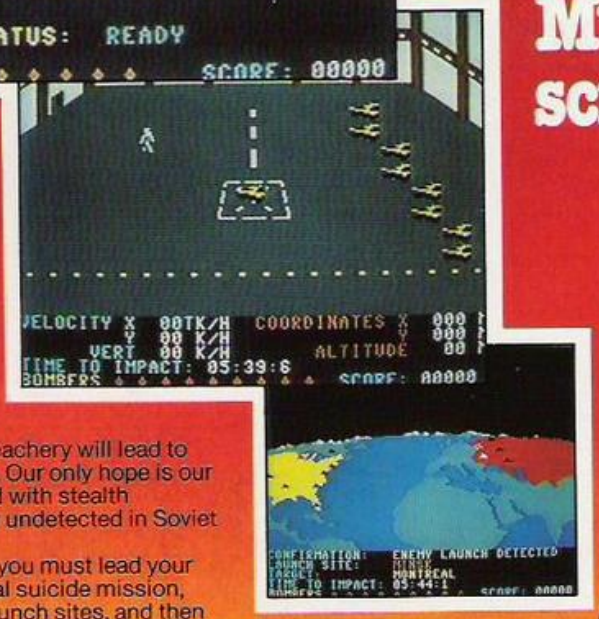
Firebird and the Firebird logo are trademarks of British Telecommunications plc.

YOU MARVELLED AT BEACH-HEAD...

NOW ACCESS PRESENT THEIR LATEST MASTERPIECE:

RAID OVER MOSCOW

commodore 64



The most breathtaking 3-D graphics yet seen on the Commodore 64!

Gripping arcade action

Multiple scrolling screens

The Soviets launch a nuclear strike against major cities in the United States and Canada. With our own nuclear arsenal dismantled, in accordance with the Salt IV Arms Agreement, the Soviets believe their treachery will lead to total world domination. Our only hope is our space station equipped with stealth bombers, which can fly undetected in Soviet airspace.

As squadron leader, you must lead your commandos on a virtual suicide mission, knock out the Soviet launch sites, and then proceed into the city of Moscow. Armed with only the weapons you can carry, you must seek and destroy the Soviet defence centre to stop the attack! Top multi-screen action!

Available on CASSETTE £9·95 DISK £12·95

BEACH-HEAD

NOW AVAILABLE FOR 48K SPECTRUM £7·95

THE FIRST 64 GAME TO REACH No.1 IN THE CHARTS

Available on CASSETTE £9·95 DISK £12·95

U.S. GOLD

All American Software

U.S. Gold is stocked by all leading computer stores including:
BOOTS WH SMITH JOHN MENZIES
WILDINGS WOOLWORTH

Dealers! For information on how to become a U.S. Gold Stockist write to: CentreSoft, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020. Telex: 337268.

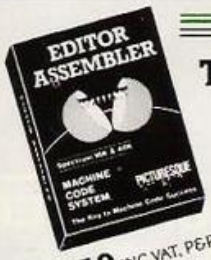
SINCLAIR
ORIC, COMMODORE
ACORN, MEMOTECH, ETC

MICRO--EXPORT

We export Microcomputers
and Peripherals to all Countries
Any make. Any Quantities
BIG DISCOUNTS

send for comprehensive price list to:
Dept M
MICRO-X LTD
765-767 HARROW ROAD, LONDON NW10 5NY
TELEPHONE 01-968 6622 TELEX 915866 MICROX G.

SPECTRUM



£8.50 INC VAT, P&P

THE MACHINE CODE SYSTEM

* "... one of the all too few jewels of Spectrum programming ... deserves a place in every serious programmer's library"
(Simon Springett—Popular Computing Weekly—June 1984)
* "... the whole package is very friendly and easy to use ... can be highly recommended for those who are just about to start programming in Machine Code."
(Phil Holliday—Your Computer —May 1983)
* Fully compatible with MICRODRIVES/NETWORK/RS232 (with Interface 1) and most popular Centronics interfaces for 80 col. printout.

£7.50 INC VAT, P&P

AMSTRAD

THE MACHINE CODE SYSTEM

* Both programs in one package
* Many NEW FEATURES
* Compatible with CASSETTE and DISC

AVAILABLE SHORTLY

* Send S.A.E. for fully detailed leaflet
* Available from many computer shops, or by FAST mail order by sending a cheque/P.O. to—

PICTURESQUE
PICTURESQUE
PICTURESQUE
PICTURESQUE

Dept YC, Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB

REMEMBER

THE WAITING IS OVER!

The long awaited follow-up to FOOTBALL MANAGER by KEVIN TOMS is now available

SOFTWARE STAR

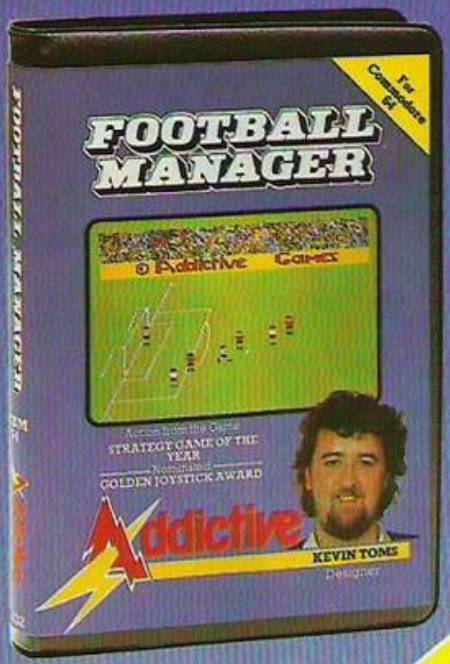
Available NOW for SPECTRUM 48K Price £6.95

SOFTWARE STAR is the NEW game from Kevin Toms, who designed the Software Classic – FOOTBALL MANAGER. SOFTWARE STAR allows *you* to try your hand at running a successful software company. You have to cope with staff problems, game launches, advertising, financial problems and more while trying to produce chart topping successful games. One other thing, SOFTWARE STAR has that *gripping* Addictive quality that all Kevin's games have!

NOW AVAILABLE FOR YOUR COMPUTER!

FOOTBALL MANAGER

by KEVIN TOMS



"Absorbing and realistic – Highly recommended" – *Sunday Times, February 1984*

"Completely fantastic – I want one!" – *Charlie Nicholas, Arsenal sriker in Big K, April 1984*

Some outstanding features of the game

- Transfer market
- Promotion and relegation
- F.A. Cup matches
- Injury problems
- Full league tables
- Four Divisions
- Pick your own team for each match
- As many seasons as you like
- Managerial rating
- 7 skill levels
- Save game facility
- Financial manipulations
- You can even be sacked!

NEED WE SAY MORE

Addictive

FOOTBALL MANAGER
is available for the following computers:–

AMSTRAD CPC 464	£7.95
COMMODORE 64	£7.95
SPECTRUM 48K	£6.95
ELECTRON	£7.95
BBC MODEL B	£7.95
ORIC 48K & ATMOS	£7.95
DRAGON	£5.95
ZX81 16K	£5.95
VIC 20+16K	£5.95

(soon for MSX)

Available from Boots WHSMITH and John Menzies (selected titles)

In case of difficulty buy by mail order.
Send Cheques/P.O.s to:–
ADDICTIVE GAMES
7a Richmond Hill, Bournemouth, Dorset BH2 6HE.

'O' LEVELS

not just revision but full tuition software (Spectrum 48K)

MATHS
8 programs
TOTAL 150K

Fractions, square roots, decimals, logarithms, areas, accuracy, bases, interest, volumes, indices, modulo standard form, number sets, pie charts, bar charts, histograms, averages, probability, algebraic laws, use of brackets, quadratics, factors, simultaneous equations, quadratics, matrices, vectors, sets, transformational geometry, angles, trigonometry, differentiation, integration, maxima and minima.

PHYSICS
7 programs
TOTAL 140K

Reflection, wavelength and frequency refraction, diffraction, lenses, colour, refractive index, the eye and its defects, ray diagrams, magnetism, induction, dynamos and motors, force, motion and current circuits, Ohm's law, amps, volts. Electronics, series, parallel gas laws, energy forms, specific heat, kinetic energy, momentum, Newton's laws, atomic structure, isotopes, radiation, half lives.

BIOLOGY
6 programs
TOTAL 120K

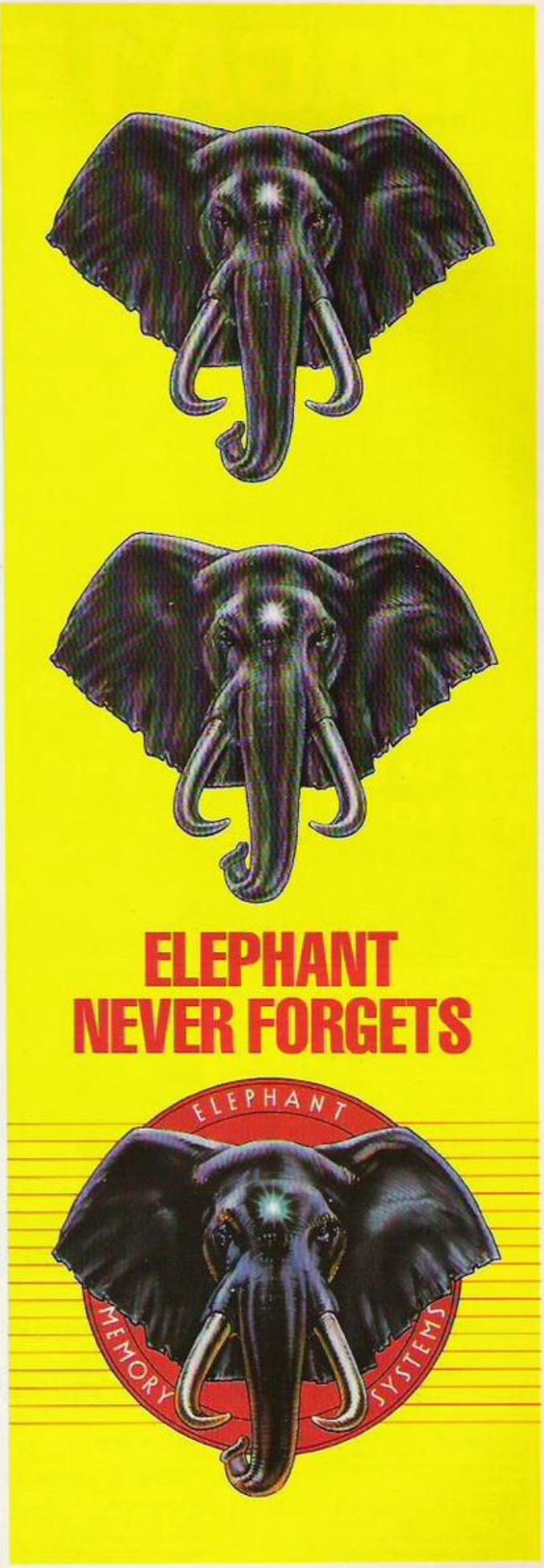
Plant and animal cells, genetics inheritance, reproduction in man, asexual and sexual reproduction, flowering plants, photosynthesis, osmosis, transpiration, transport, food classes, diet, alimentary canal, respiration, excretion, eye, skin, nervous system, ecosystem, food cycles, bacteria, fungi, ear, earthworm, amphibians, birds, mammals, response, abiotic factors.

COMP. SC.
7 programs
TOTAL 140K

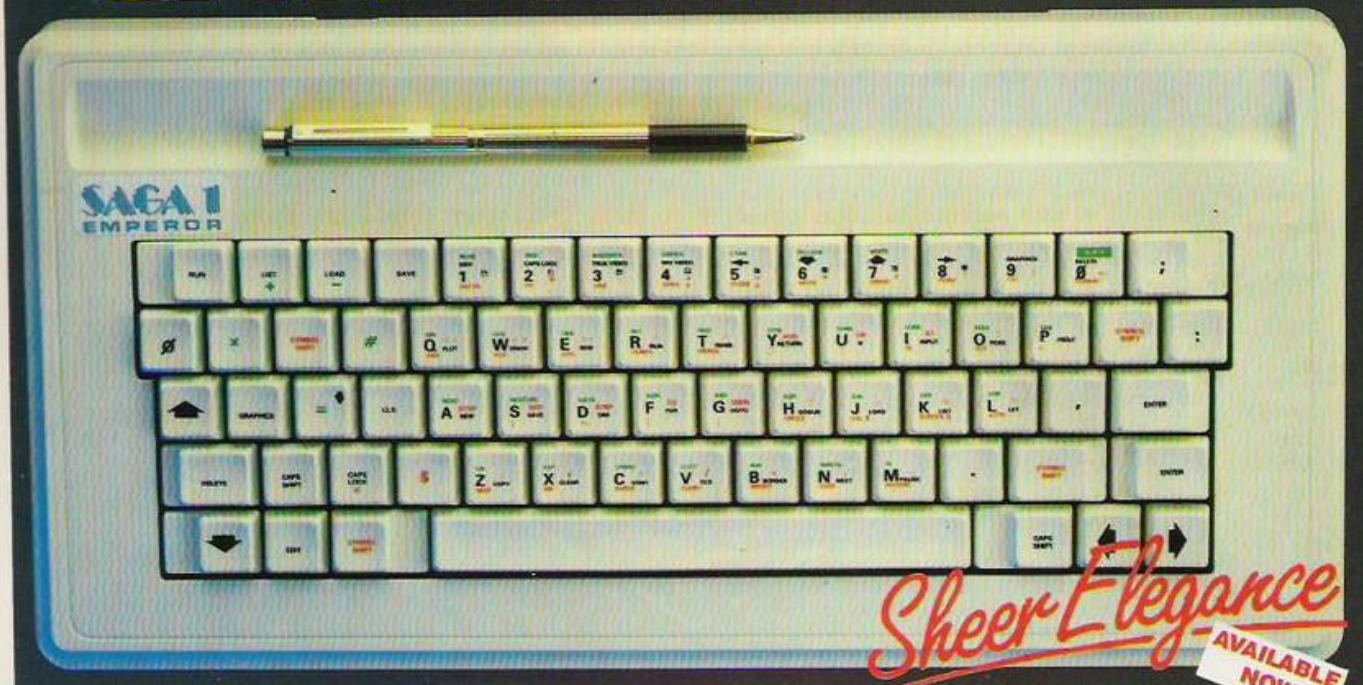
Data collection, coding, storage, processing, presentation and validation, d.p. systems, privacy, security, hardware, software, data structures, low and high level languages, OS and job control, I/O devices, backing storage, machine code, compilers, interpreters, aids and errors in programming, files.

EACH SUBJECT ONLY £7.95

GCE TUTORING, DEPT. YC1 40 BRIMMERS HILL, WIDMER END, HIGH WYCOMBE, BUCKS



SAGA 1 EMPEROR



Sheer Elegance — AVAILABLE NOW

THE KEYBOARD FOR ZX SPECTRUM COMPUTERS

- **EASY FITTING**
- **PLEASURE TO USE**
- **LONG LASTING**

The Saga 1 Emperor, equipped with 67 keys, is a carefully designed replacement keyboard incorporating many special functions for the popular Spectrum Computer. For business or pleasure, the Emperor will make your computing time more productive and enjoyable. The SAGA 1 Emperor will enable you to use the Spectrum as a powerful programming tool easier and faster.

The style is easy:- for your benefit, the SAGA 1 Emperor has been designed to ensure that available Spectrum Peripherals will fit in the usual manner.

The assembly of the keyboard is simple — and fast. No soldering required, so that within just 5 minutes you can replace your current ZX Spectrum with the new SAGA 1 Emperor.

AND ALL THIS FOR JUST £54.95 (inc. VAT)

SAGA P.C.!
Your very own Personal Carrier, partitioned to neatly accommodate your Spectrum, Saga 1 Emperor and peripherals; Tape Recorder, Power Supply, Cables, manuals and cassettes. Of solid and attractive construction the P.C. is ideal for storing and transporting your computer accessories. The case uses a strong double stitched and bound Black Calf Vinyl with a tough thick ABS inner compartment, leather buckles and a strong handle. Only **£26.95** (inc. VAT).

DUSTCOVER
Another top quality product, this expertly produced long-lasting bound and sewn dustcover has been specifically designed for the SAGA 1 Emperor, which will keep everything looking neat and dust free. Only **£4.95** (inc. VAT).

SOUNDBOOST
Hear that keyboard click . . . .
with a SAGA SOUNDBOOST
The SAGA SOUNDBOOST is a tiny electronic circuit which considerably enhances the sound volume and quality of the Spectrum sound output. Adjustable from a whisper to a roar, the SOUNDBOOST provides added realism and excitement for games players and security for programmers (Hear that Keyboard Click!). No cutting, no soldering — just connect.
Only **£9.50** (inc VAT).

FLEXICABLE
Developed to relieve your Spectrum from the pressure of life, to fit your Spectrum and your add-ons taking the load with ease. By popular demand we now have two versions of the 9 inch FLEXICABLE available to suit your needs.
Male-Female FLEXICABLE — £12.45
Female-Female FLEXICABLE — £9.50
Convertor PCB — £2.95

THE COLLECTION

The latest addition to our product range is The Collection, providing you with three money saving action packed specials containing quality products — an ideal gift.

COLLECTION 1 — SAVE £10.00!!
r.r.p £53.85
Our special price **£43.85**
includes: Saga Personal Carrier £26.95
Soundboost £9.50
Dustcover £4.95
Flexicable (M-F) £12.45

COLLECTION 2 — SAVE £20.00!!
r.r.p £108.80
Our special price **£88.80**
Collection 1 £53.85
Saga 1 Emperor £54.95

COLLECTION 3 — SAVE £30.00!!
r.r.p £238.75
Our special price **£208.75**
Collection 2 £108.80
48K Sinclair ZX Spectrum £129.95

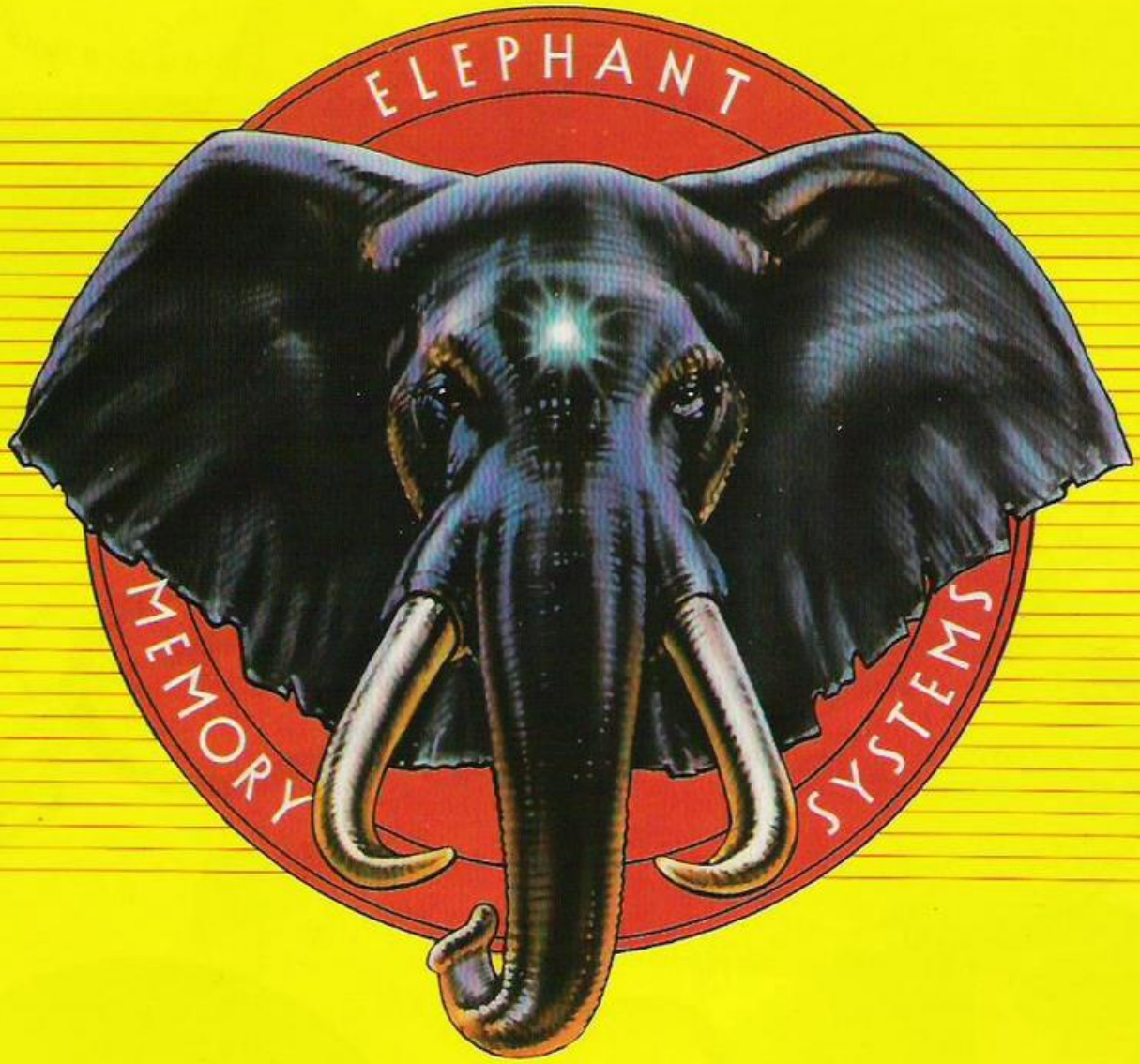
DISTRIBUTOR & TRADE ENQUIRIES CALL NOW ON WOKING (04862) 22922

Please write to: SAGA Systems Limited,
Dept. 2 Eve Road, Woking, Surrey
Telephone Woking (04862) 69527/22922
or Telex 859298
All prices include VAT
P&P free for Sound Boost and Flexicable.
P&P £1.25 for SAGA 1 Emperor U.K.
£4.00 for SAGA 1 Emperor Europe
£15.00 for SAGA 1 Emperor U.A.E.

Please send me
Name _____
Address _____
_____
The following SAGA PRODUCTS _____
_____
Total amount enclosed £ _____
Please make CHEQUES/P.O. Payable to SAGA Systems Ltd.

SSL

REMEMBER



ELEPHANT NEVER FORGETS

Get the best from your computer with ELEPHANT disks. Certified 100% error-free and problem-free, and with quality maintained for at least 12 million passes, ELEPHANT disks are guaranteed to meet or exceed every industry standard and are compatible with virtually every computer on the market.

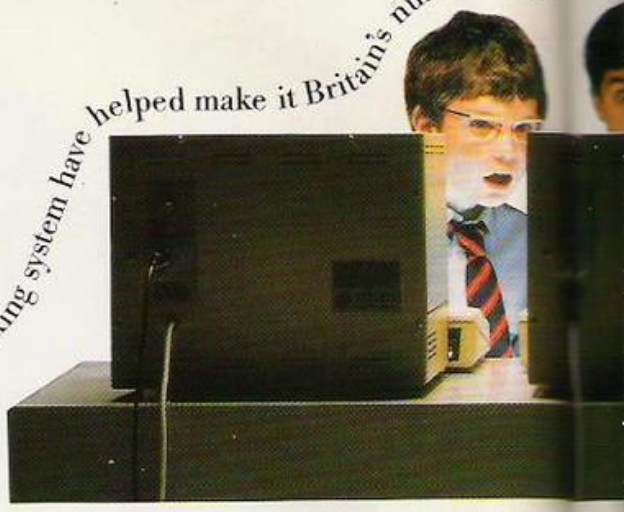
Look for the ELEPHANT sign at your local Dealers – or in case of difficulty, phone or write direct to Dennison Manufacturing Co. Ltd.

Dennison

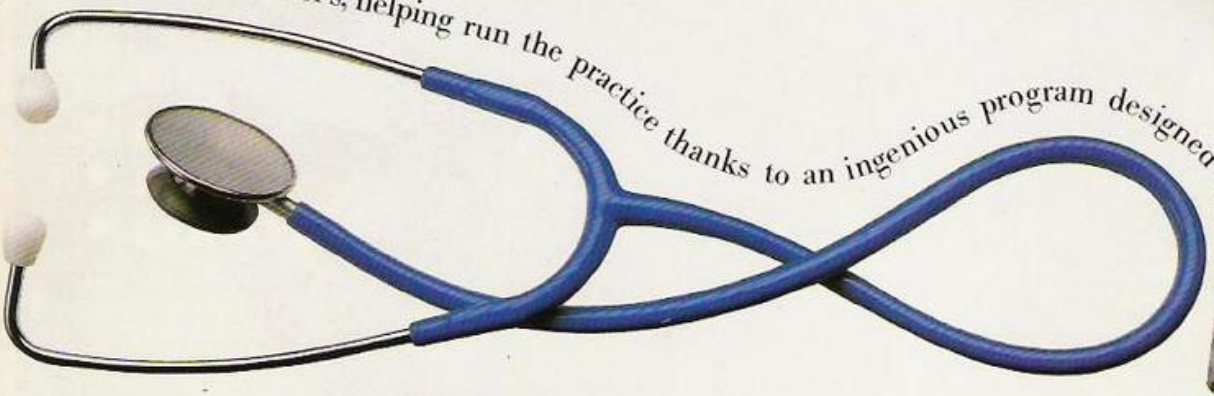
Dennison Manufacturing Co. Ltd.
Colonial Way, Watford, Herts WD2 4JY, Tel. Watford (0923) 41244, Telex: 923321
France: Soroclass, 8, Rue Montgolfier - 93115, Rosny-Sous-Bois, Tel: 16 (1) 855-73-70
Germany: Marcom Computerzubehoer GmbH, Podbielskistr. 321, 3000 Hannover 1, Telex: 923818
Other Countries: Dennison International Company, 4006 Erkrath 1, Matthias-Claudius-Strasse 9, Telex: 858 6600

The BBC Micro is only 16" long. But it stretches indefinitely.

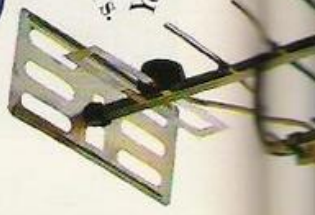
It stretches into schools where BBC Basic and the Econet networking system have helped make it Britain's number one



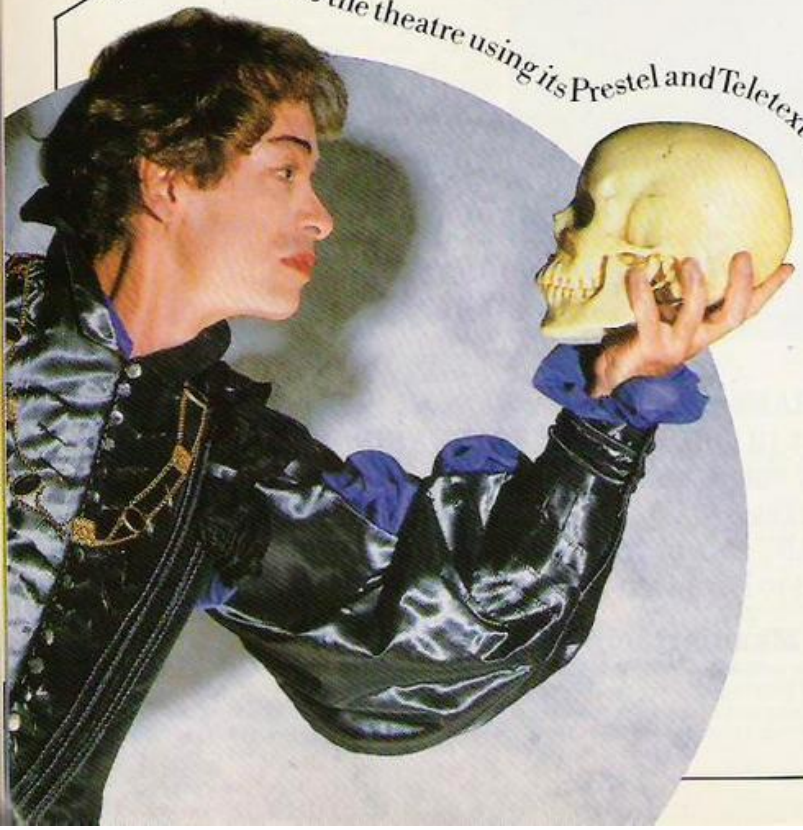
It's down at the doctor's, helping run the practice thanks to an ingenious program designed by two GPs.

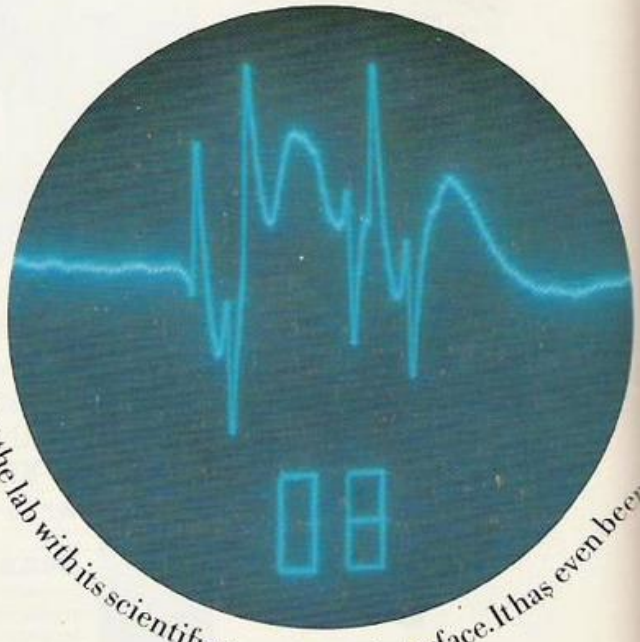


You'll catch it

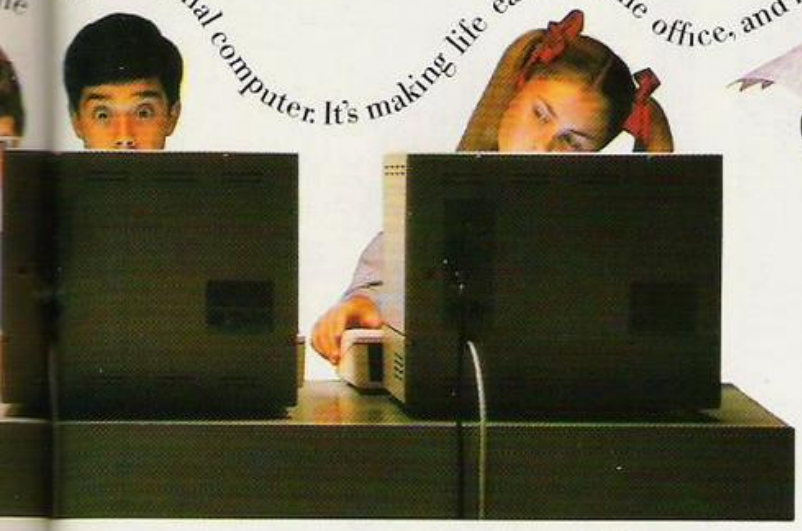


It can take you to the theatre using its Prestel and Teletext adaptors. While helping out at the lab with its scientific monitoring interface. It has even been



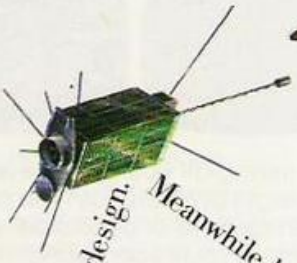


educational computer. It's making life easier in the office, and has grown into the country's top micro for small businessmen.



on TV, the star of a series of computer literacy programmes. Its colour graphics and new Bitstik make it welcome in design studios.

working in space, tracking a satellite it also helped design. Meanwhile, back on Earth at 49 Acacia Avenue, Kingsmead, Milton...



The BBC Microcomputer System. The world's best. And still growing.

The BBC Microcomputer System is designed, produced and distributed by Acorn Computers Ltd.

Spectrum + OCP me

If you've got a 48K Spectrum™ and accounts to manage, OCP will make the job easier and faster.

All our business and utility programs are Sinclair Microdrive Compatible, and the Plus 80 versions are versatile enough to drive full size 80 Column Printers through most centronics and RS 232 Interfaces including the ZX Interface 1. However, our standard programs (except Stock Manager) only work with ZX and Alphacom 32 Column printers.

The magic of MACHINE CODE has enabled us to produce the very latest "on the page" presentation which lets you enter and edit data naturally, as if filling in a form.

FINANCE MANAGER £8.95 PLUS 80 £19.95

Voted the best in its class by the Sinclair Users Annual, this easy to use program is a powerful and flexible aid to practically all domestic and business accounting applications. Show up to 255 separate accounts with running totals, and review standing orders as you scroll back and forth through your accounts. But that's not all, this program automatically raises a corresponding debit or credit for every entry, and will even open a new account if an entry features an unrecorded account name.

Having all your finance records so neatly stored is the height of efficiency! The program is entirely menu driven for ease of operation, yet the facilities are so extensive you'll soon wonder how you managed without it.

ADDRESS MANAGER £8.95 PLUS 80 £19.95

A very useful MACHINE CODE application program with limitless applications at work and at home.

Manage your address book with efficiency and speed! Address Manager stores up to 350 names, addresses, and phone numbers – depending on their length. Or up to 1200 individual names/titles/references. The Plus 80 version also embodies a comprehensive Label Printing routine.

In the office, Address Manager can store internal phone directories, store and analyse customer's records, and much much more.

If you've already got Finance Manager and/or Address Manager but in non-Microdrive format, and you'd like to update them we'll give you a £3 rebate towards the cost of a Microdrive Compatible 32 Column, or £5 off the plus 80 version. This offer is available via mail order only.

The OCP range includes: VAT Manager, Address Manager, Finance Manager, Stock Manager (80 Column only).

eans serious business!

VAT MANAGER £8.95 PLUS 80 £19.95

Your VAT 100 return need no longer be a headache! Simply key in the Gross or Net values of all the period's sales and purchase invoices and VAT Manager will check, analyse and total all the relevant details. Available in 32 Column or Plus 80 versions, VAT Manager will check all calculations automatically, and will even work out details of exempt totals where the trader is not required to pay VAT. This is performed with its CLASSIFY feature for types of transactions, and GROUP feature for more detailed analysis.

PLUS 80 STOCK MANAGER £19.95

Provides a controlled stock environment for up to 600 different product lines.

The program has facilities for the production of invoices, sales totals, price lists, and shows stock status, stock adjustment and re-order requirements.

No business should be without this crucial Microdrive program. Now you can compute your entire stock balances all on one program – Stock Management has never been so easy! Coupled with a suitable printer it will take advantage of the 80 column width printout to produce quality hard copy.

Now the most helpful aids to business efficiency are near as your local software stocklist. Call in soon and see the latest in OCP's exciting range of business software. Available form larger branches of WHSMITH or mail order direct.

For instant purchase contact the OCP Hotline with your details. Telephone: 0753 889 055

sinclair ZX, ZX SPECTRUM & ZX MICRODRIVE ARE ALL TRADEMARKS OF SINCLAIR RESEARCH LTD.

Simply The Best

4 High Street, Chalfont-St-Peter, Bucks SL9 9QB

Our Utilities include: Machine Code Test Tool, Editor/Assembler and Master Tool Kit.

THE NEW

HANTAREX BOXER

◇ *Hantarex, the name behind the screens in over 90% of professional video games machines, has come out into the open with its new BOXER range of monitors for personal computers.*

◇ *First in the range is the BOXER 12" high resolution monochrome monitor. The elegantly styled cabinet houses a black screen with an etched faceplate for minimal reflection and features a green 80 column display for clear easy viewing.*

◇ *The compact, portable BOXER is compatible with most personal computers and is unbeatable value at £99.50 inc. VAT, and has 12 months guarantee.*

£99.50

INC VAT.

Further information and illustrated leaflet available from:

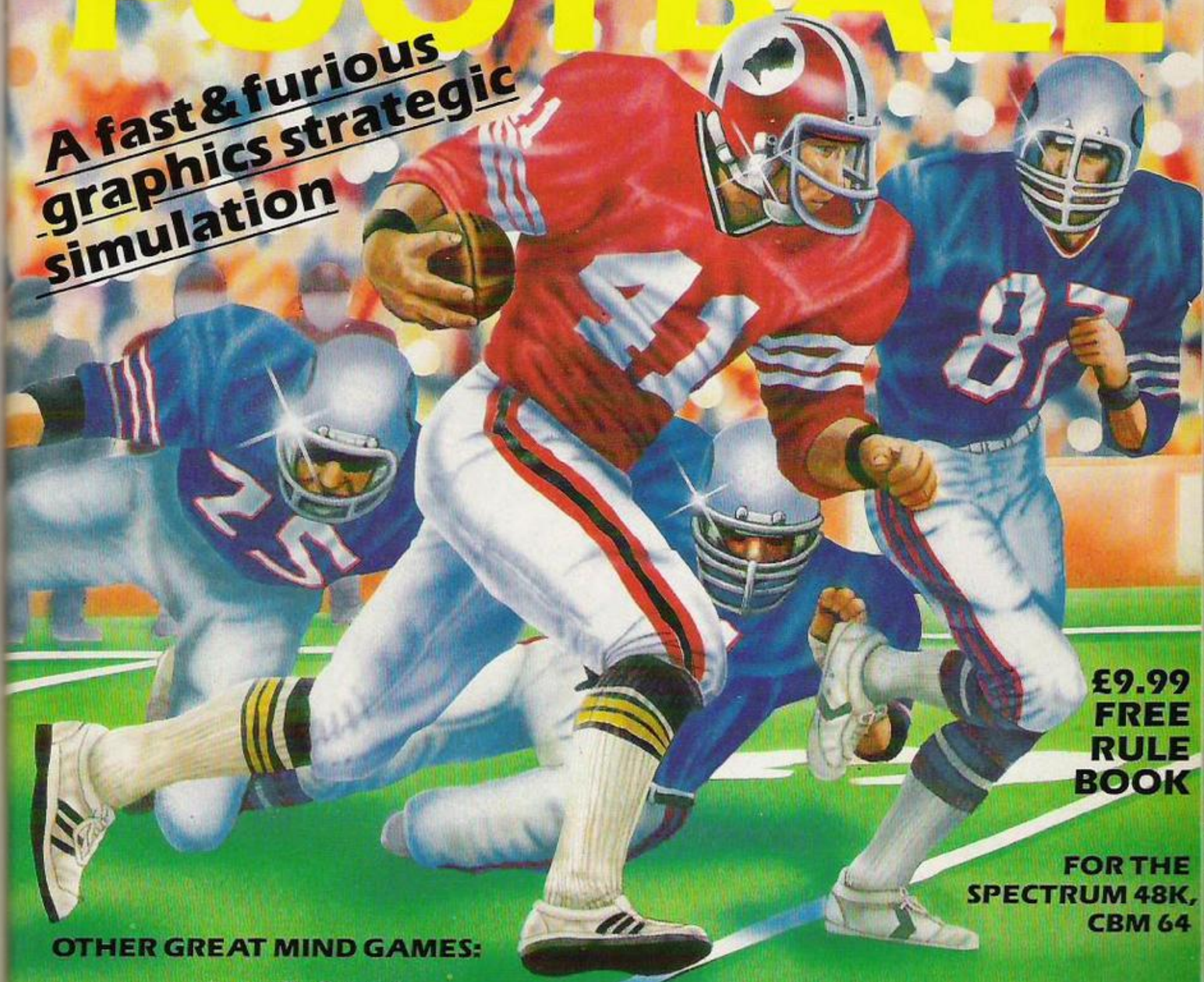
HANTAREX ®

HANTAREX (UK) LTD.,
Unit 2,
Lower Sydenham Trading Estate,
Kangley Bridge Road,
London SE26 5BA.
Tel: 01-778 1414.

MIND GAMES

AMERICAN FOOTBALL

A fast & furious graphics strategic simulation



£9.99
FREE RULE BOOK

FOR THE SPECTRUM 48K, CBM 64

OTHER GREAT MIND GAMES:

Starring The Overlords of the Universe
The candidate (you) have to get to the Chamber of Creation. It's a laugh a minute, since it's 2,000 light years away on the most horrible planet in the Universe ... and your starship doesn't work either!

A full feature adventure starring well known nasty aliens the Zarps. Can you play the hero and stop their plans to blow up the earth.

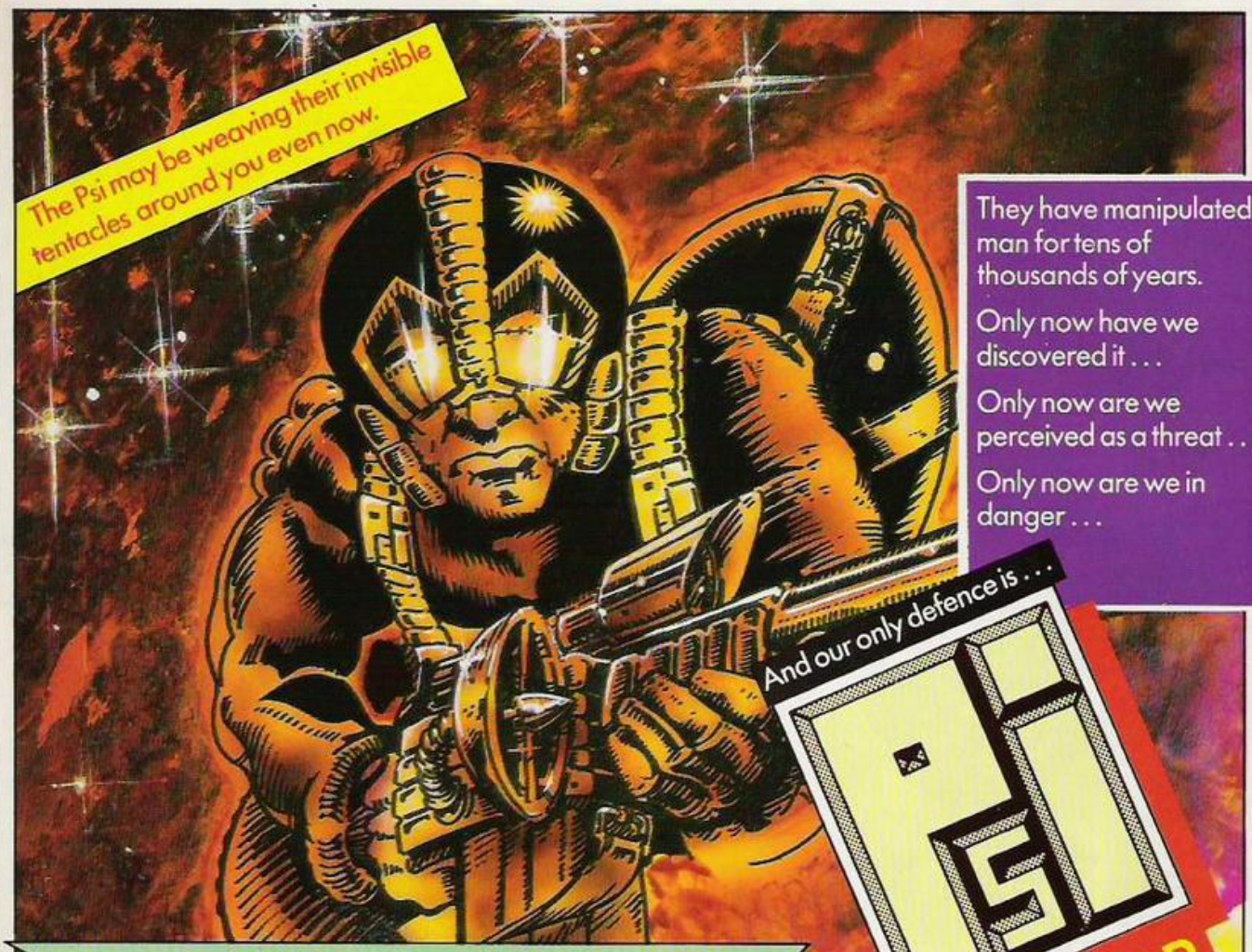
Starring The Zurgs
After a desperate space battle only one fleet of heroes remain to prevent the invasion of earth. The future of humanity lies with you!

Argus Press Software Group

For mail order, write with cheque/P.O./card No. to:
Mind Games, Argus Press Software Group, No.1 Golden Square, London W1A 3AB.

BEYOND

CHALLENGING SOFTWARE



They have manipulated man for tens of thousands of years.

Only now have we discovered it . . .

Only now are we perceived as a threat . . .

Only now are we in danger . . .

And our only defence is . . .

PSI WARRIOR

A character you can *really* control, reacting realistically to every twist of the joystick, as he jinks and leaps in and out of his 3D background.

	Quantity	
Please send me **Psi Warrior** (Commodore 64 £9.95)		
From the authors of **Psytron** (Commodore 64 £7.95)		
Order Hotline **0858 34567.** Enquiries **01-837 2899.**	Total Price £	

I enclose a Postal Order/Cheque payable to **Beyond,** or charge my credit card

Card Number _____
Access/Visa (Delete as necessary)

Name _____

Address _____

_____ Post Code _____

Signed _____ Please rush me details of the **Beyond** Club! ☐

Beyond Competition House, Farndon Road, Market Harborough, Leicestershire LE19 9NR

A NEW TYPE OF ADVENTURE GAME

Hampstead is an adventure game for would-be social climbers. Speed of reaction isn't so important. What matters is your ability to solve complex problems, which get harder the further you proceed in the game.

Hampstead is a quest, but not for gold. The aim of it is to reach the pinnacle of social status, and acquiring wealth is only one part of the problem. If you wish to go up in the world you also have to gain the admiration and respect of your fellow men, and there's more to that than a fat bank balance.

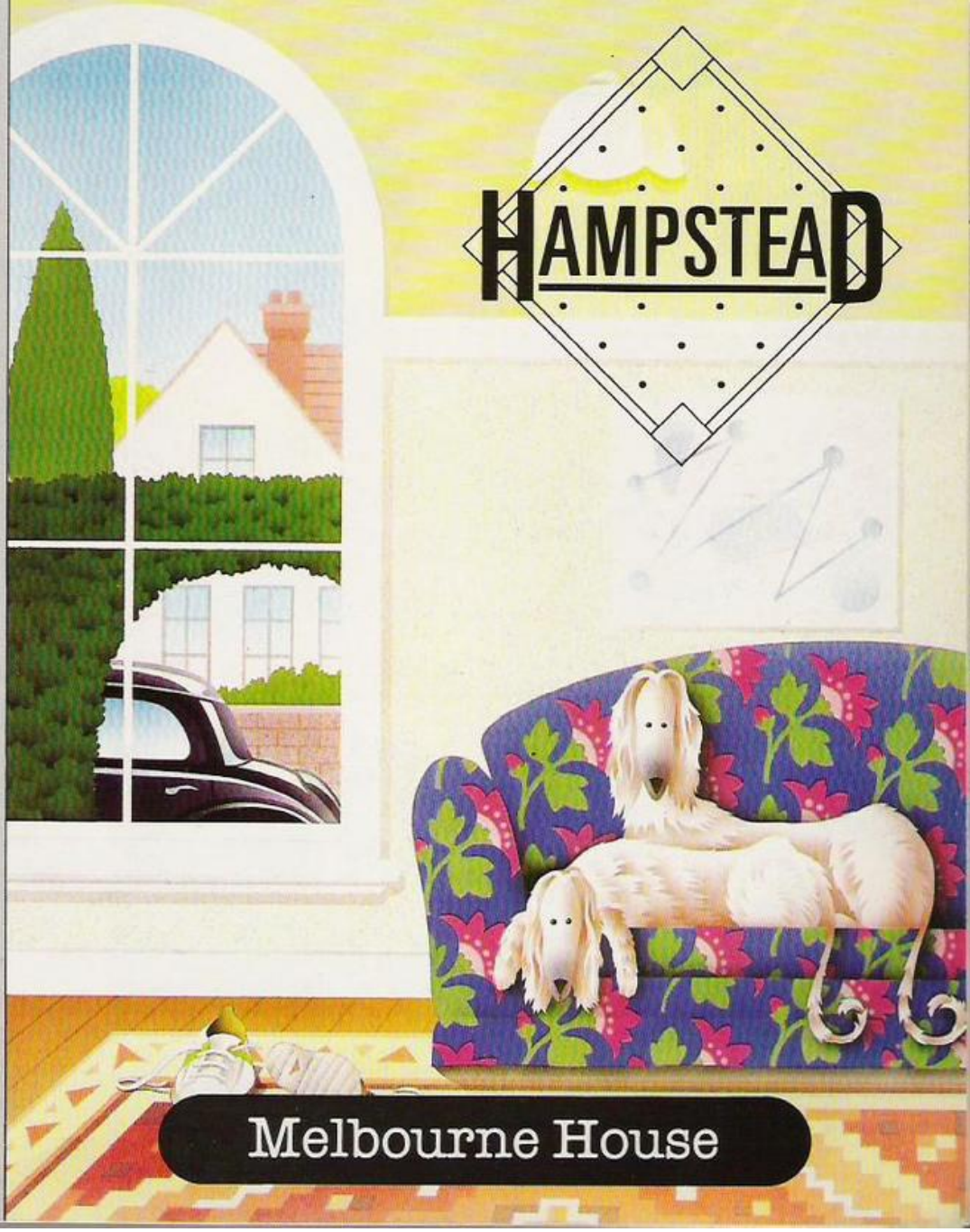
"The game itself is very funny with a joke of some description round every corner."
— TIME OUT

"A lot of thought has gone into this game. The result is one of the best adventures I have played. It's a must. Super."
— HOME COMPUTING WEEKLY

"Hampstead is an excellent example of a new type of game. It is a concept."
— COMPUTING TRADE WEEKLY

At the start of the game you are a nobody whose aim is to become a somebody. So lie, cheat, steal and defraud. You know it makes sense.

Hampstead — a new type of adventure game!



Orders to:
Melbourne House Publishers
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Castle Yard House
Castle Yard
Richmond TW10 6TF

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free catalogue.
Please send me:

SPECTRUM SOFTWARE

☐ Spectrum Hampstead 48K	£9.95
☐ Spectrum Sherlock 48K	£14.95
☐ Spectrum Sports Hero 48K	£6.95
☐ Spectrum Mugsy 48K	£6.95
☐ Spectrum Penetrator 48K	£6.95
☐ Spectrum The Hobbit 48K	£14.95
☐ Spectrum Sir Lancelot 16K/48K	£5.95
☐ Spectrum H.U.R.G. 48K	£14.95
☐ Spectrum Classic Adventure 48K	£6.95
☐ Spectrum Melbourne Draw 48K	£8.95
☐ Spectrum Abersoft FORTH 48K	£14.95

COMMODORE 64 SOFTWARE

☐ Commodore 64 Hampstead	£9.95
☐ Commodore 64 Castle of Terror	£9.95
☐ Commodore 64 The Hobbit	£14.95
☐ Commodore 64 Zim Sala Bim	£9.95
☐ Commodore 64 Classic Adventure	£6.95
☐ Commodore 64 Hungry Horace	£5.95
☐ Commodore 64 Horace Goes Skiing	£5.95
☐ Commodore 64 A.C.O.S.+	£8.95

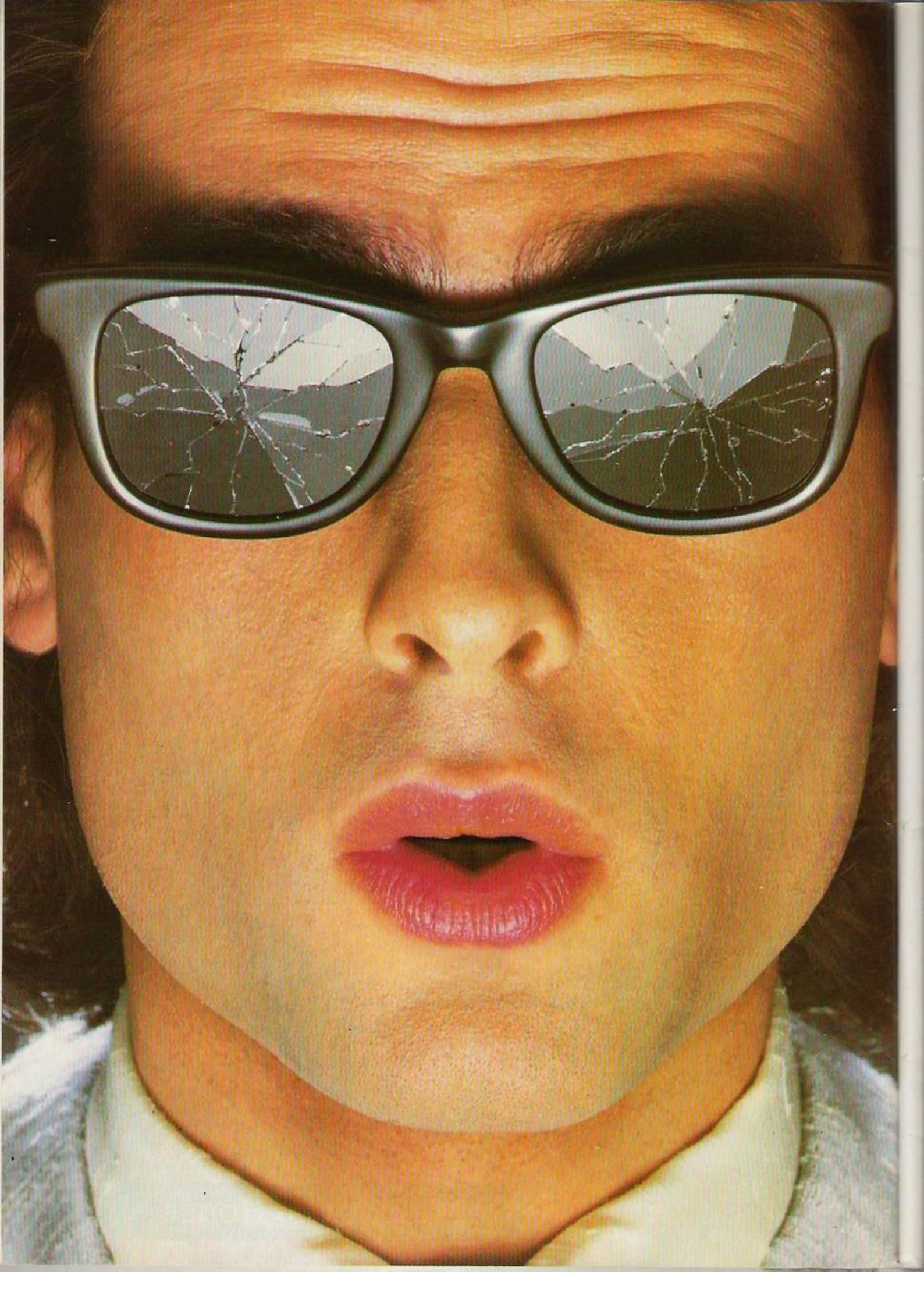
£ .....
Please add 80p for post & pack £ 80
TOTAL £ .....

I enclose my ☐ cheque
☐ money order for £ .....

Please debit my Access card No .....
.....
Expiry Date .....
Signature .....
Name .....
Address .....
.....
.....
..... Postcode .....

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5001.

YC1A



You should see what he's just seen.

Micronet 800.

Stretching the mind of your micro far beyond its limits.

Micro evolution continues with this unique communications, informations and software system. Set on our mainframes nationwide.

Includes 30,000 pages and access to Prestel™ with its full range of services.

A tremendous Communications section that networks you to thousands of other members across the country. Send and receive electronic messages and graphics at a touch of a button.

And there's the Chatline service, Swapshop and Teleshopping.

Check with daily updates on the very latest computer news.

Micronet also has its own huge facts data base.

And a choice of up-to-the-minute software to download absolutely free.

For only £13 a quarter and just a local* telephone call whenever you want to connect up (that's only 22p per half hour at cheap rates) you could be part of Micronet.

The only accessory you need is a Modem.

A small price to pay to join the other visionaries on this exciting new system.

Fill in the coupon for more details and send to Micronet 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ.

But be warned, Micronet 800's features are almost limitless and constantly updating. So maybe you'd be better to call in at Laskys, John Lewis, main Boots or your local Micronet 800 Action Station.

To feast your eyes on all the amazing things it can do.

To: MICRONET 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ. Telephone 01-278 3143.
Please send me the full facts about Micronet 800.

Name_____

Make/Model of Micro_____

Address_____

Telephone_____ YC1

*For 97% of telephone users.
™Prestel is a trademark of British Telecommunications.

The Key To Success!

Now, with the new Stonechip Spectrum Keyboard, the user has no worry of damaging the Spectrum itself as improved designing enables it to fit the case perfectly.

Assembling the case is simple as it consists of two halves, the top half containing the keyboard, with a small printed circuit board, attached by ribbon cable, plugging into the rear of the Spectrum. The lower half fits precisely around the Spectrum, thus preventing any risk of damaging through movement.

Your Sinclair guarantee need not be invalidated since the Spectrum does not require removal from its case.

THE MAIN FEATURES OF THE KEYBOARD ARE:

- ☐ No modifications to Spectrum necessary as it connects via rear port.
- ☐ Full-length space bar.
- ☐ Built-in 'Echo' amplifier and tape interface.
- ☐ RESET keys remove the need to disconnect power supply lead.
- ☐ Single key 'DELETE'.
- ☐ Single key 'Extended Mode' selection (ie one key replaces the CAPS SHIFT and SYMBOL SHIFT function).
- ☐ Fully compatible with Interface 1 and most peripherals.

BASIC KEYBOARD ONLY – NOW AVAILABLE AT £39.95

STONECHIP ELECTRONICS

Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants. Telephone: (0252) 333361

Extender unit available to use with Interface 2 and Kempston Joystick Interface. £2.50.

£59·95

DEALER ENQUIRIES WELCOME
Delivery approximately 28 days

To: Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants. Telephone: (0252) 333361

Please forward me the following products:

.....

.....

All prices are inclusive of VAT, Post & Packing for U.K. deliveries (overseas add 15%)

Name .....

Address .....

.....

Please debit my Access Card Number

I enclose Cheque/PO for £

Now on 48K Spectrum

The ultimate underground adventure

Superb scroll routine, described by experts as one of the best pieces of Spectrum programming ever! Sixteen mystical caves, 5 levels of play, joystick or keyboard options.

One of the toughest tests of strategy and reflexes ever! Starring "Rockford" TM the incorrigible burrowing bug in his restless quest for gleaming jewels.

U.S. Reviews

"... Boulder Dash should be leading contender for anybody's action-game-of-the-year award."
Burt Hochberg **GAMES Magazine**

"... a magical mix of challenge, charm and originality ... easily one of the best computer games of the year."
Michael Blanchet **Chicago Tribune Syndicate**

"This game will be mentioned in my will ... what silicon is and integrated circuits were always meant to be ... subtle brilliance and unceasing magic ... in a class by itself ..."
Craig Holyoak **Deseret News**

"First Star has done a first-rate job on BOULDER DASH ... the graphics are dazzling ..."
The Video Game Update

"BOULDER DASH takes the cake ... the overall quality is excellent ..."
John Skoog **K-Power Magazine**

This one's hot for Xmas!

FRONT Runner

FIRST STAR SOFTWARE INC™

U.S. No 1 Smash Hit

To: Front Runner, K-soft distribution, 620 Western Avenue, London W3 0TU

Tape £7.95 including VAT

Rush me_____ Tape(s)

Name _____

Address _____

_____ Post code_____

Telephone_____

I enclose a cheque/PO made payable to

K-soft distribution for £_____ (post free)

or debit my Access/Visa* _____
Delete as applicable

I would like to hear news of more Front Runner releases ☐ Yes

Please allow 21 days for delivery.

Who did you meet at the ZX Microfair?

EXHIBITORS PHONE MIKE ON 01-801 9172

"THE NEXT ZX MICROFAIR IS ON 9 FEBRUARY 1985 AT ALEXANDRA PALACE. COME ALONG AND SEE EVERYTHING NEW FOR THE SPECTRUM AND QL!"

SEND NOW FOR REDUCED PRICE ADVANCE TICKETS:

Name:

Address:

Please send me . Adult tickets @ £1.25
Please send me . Child (under 14 yrs) tickets @ £0.80p.

I enclose cheque/PO made payable to ZX MICROFAIR and I also enclose a stamped, self-addressed envelope for reply.

Post to Mike Johnston (Organiser) Dept YC, ZX MICROFAIR, 71 Park Lane, Tottenham, London N17 0HG.

15th ZX MICROFAIR
10am-6pm

BOILERHOUSE
Explosive Action!
Feel your temperature rise as you battle to control the overheating boilers. Your challenge is to fight and defeat the machinery, but the pressure can become intolerable!
Boilerhouse is an all machine code game with keyboard or joystick options.
£6.95 inc.VAT
48K Spectrum
To: Front Runner, K-soft distribution, 620 Western Avenue, London W3 0TU
Rush me _____ Tape(s) of Boilerhouse
Name _____
Address _____
_____ Post code _____
Telephone _____
I enclose a cheque/PO made payable to K-soft distribution for £_____ (post free)
or debit my Access/Visa* _____
Delete as applicable
I would like to hear news of more Front Runner releases ☐ Yes
Please allow 21 days for delivery.
YC/01/BH
FRONT Runner
Meet the Challenge

Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

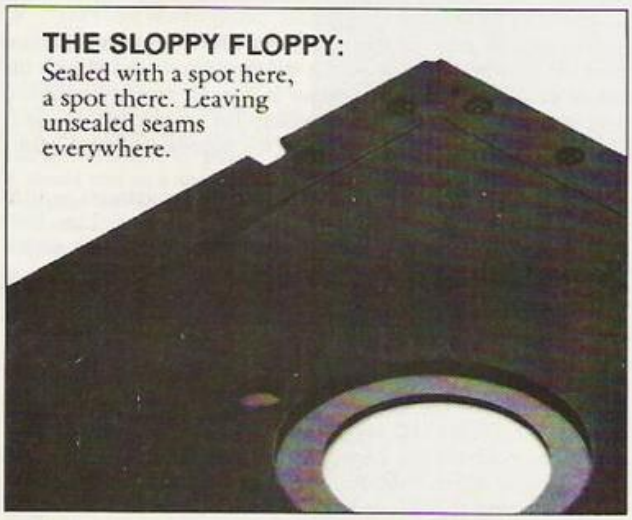
Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

So much for their seams. Ours are different.



Memorex uses a process we developed, called Solid-Seam Bonding.

Solid-Seam Bonding seals shut every inch of every seam of every Memorex* floppy disc. Tight as a drum. That makes the Memorex floppy stiffer. Stronger. And your data safer.

To resist bulging, warping, puckering, or opening up.

To resist all the things that can jam your drive, ruin your drive head, or lose your data.

Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

Solid-Seam Bonding is just one example of the extra care that goes into every Memorex floppy disc. Be it 8," 5¼" or the new 3½." Extra care that lets us guarantee every Memorex disc to be 100% error-free.

The next time you're buying a floppy disc—or a few hundred of them—just remember this:

It's always better to be safe than sloppy.

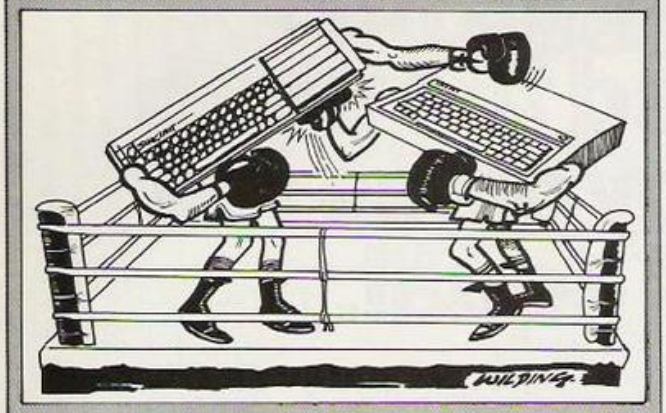
For more information on the full line of Memorex quality computer media products, including computer tape, call Memorex U.K. Ltd., 96-104 Church Street, Staines, Middlesex. Tel: 0784 51488

Your Data. When it matters, make it Memorex.™

MEMOREX

Memorex is a registered trademark of Memorex Corporation.
*1984 Memorex Corporation
A Burroughs Company

QL OR BBC — WHICH IS BEST?



I was most interested to read Stephen Corcoran's "unbiased" comparison of the QL and BBC microcomputers. Although some of his criticisms of the QL are undoubtedly valid, he spoils his case by comparing the bare QL with a BBC availed of at least a thousand pounds worth of enhancements!

The fact of the matter is, that for a mere £400 the QL has 88K of memory directly accessible from Basic, a maximum screen resolution of 512 by 256 which uses none of that 88K, and graphics which are at least four times faster than a BBC. How can the QL's fiercest critics deny the outstanding technical achievement this represents?

The thing which amuses me about all the uninformed arguments against the QL is that most of them fail to spot the thing which irritates the actual users most; that is, the present dire shortage of software for the machine. At present the only software you can get for the thing is system software, ie., languages such as Forth, Pascal, BCPL etc! Although this is certain to change soon, it does mean that at the moment there are very valid reasons for people to prefer a BBC micro to a QL.

Just because I like the QL doesn't mean I have to think there is anything particularly wrong with the BBC — far from it. To a large extent the choice between them is just a matter of taste. Does one stick to proven, reliable, established technology, or would one rather take a risk with something new and more powerful?

But remember the early days of the BBC micro, when it was new and untried, and most of its expansion options were just so much advertising copy? Where would the BBC micro be today if many of the current owners hadn't taken the same risk?

Stephen R. Hill,
Boston, Lincolnshire.

BASICALLY BAD

In the November issue of *Your Computer* Mr Sharpey — Sharpey-Schafer I suspect — launched a tirade against those who criticise the widespread use of Basic and the consequential sloppy programming techniques that can result from its uncritical use. Mr Sharpey's own letter is itself a salutary example of the very sloppiness that Basic seems to engender.

Mr Sharpey argues that the popularity of Basic on home micros testifies to its superiority. Had Mr Sharpey researched the matter properly he would have realised that Basic isn't popular by choice, but only because that is what is supplied by manufacturers as the native programming language, largely because interpreted Basic occupies comparativly little of the addressable 64K of an 8-bit micro compared with a high-level compiler. The average micro buyer simply doesn't have the choice.

Mr Sharpey is also wildly wrong over the educational value of Basic. It is a common complaint in many university departments that new students whose only computer experience has been programming home micros in Basic frequently have to be "untaught" the bad practices and sloppy thinking engendered by Basic. Mr Sharpey cannot even manage internal consistency in his letter, arguing that OU students find that home micros programmed in Basic improve their studies, followed by a statement about terrible results in computing courses.

To "prove" his point that structured languages are no better than Basic Mr Sharpey attacks the use of Pascal in the Open University's prime computing course (M252) and cites the 1983 course results and drop out rates to show that structured languages like Pascal do not help produce good programmers. It didn't use Pascal at all — it used Basic!

Basic has its place, and if Mr Sharpey wants to use Basic and stuff pundits that's his affair. Those of us who work with computers for a living will continue to use real languages and do things properly.

Alexander MacPhee,
(OU student too),
Barnton,
Edinburgh.

WRITERS SOUGHT

Many people say software writers are mad. We are in total agreement. There is one main reason that brings us to this conclusion. We do not understand why the software houses have not given the Memotech MTX computers any software support. The Memotech range of computers are without doubt the best computers for games writing. The machines have no limitations when it comes to designing games. Despite this the multitude of software writers keep their blinkers on and write for the boring few.

Let's support a British-made, British-designed computer. To help start the ball rolling, a group of current mix software writers have come together and called ourselves Megastar Games — subtle eh! We will be writing many new games and will accept anyone into our clan who can show us they have the ability to write a game which is better than the ones we have done.

We are not trying to set up another User Group as Memotech already have the best user group with Genpat. This is just a bunch of software writers who are sick to death with software houses.

We will be sending in samples of our work at regular intervals so that everyone can see the high quality of work we do.

Megastar Games,
Cheltenham,
Gloucestershire.

NO ERRORS!

With reference to my program, Aliquid Simplex, published last month, the listing is totally bug free and should work straight away. Some people had difficulty reading the first line however, which should read:

26970 00 3E 13 01 53 43 4F 52 = 89

The only thing to be careful of when typing the program in is that you don't enter one line twice, or miss out a line of data.

Having said the listing was correct, there was a small bug in the machine code itself, the high score routine. It effectively meant that even if you did beat 1000, you wouldn't beat the top score. If you want to correct this, load the program itself, without letting it autostart, and do:

POKE 24289,17:POKE 24290,132:
POKE 24291,105

Then resave the Rem line program on the final tape as before.

I also feel that I did not say quite enough about the program in the original article.

It is a machine-code game that will run on both Spectrums, which includes:

- Smooth sprite like animation

COLOUR MAGNIFIER FOR ZOOM

Congratulations to Mark Jones for his idea of the Zoom program in last month's issue. I use the program particularly for examining more closely commercial loading screen pictures such as those of Atic Atac and Sabre Wulf. However, black and white pictures sometimes get a little dull, and in certain places the removal of colour destroys the effect. I have therefore written a colour magnifier to go with the program.

The problem arises — this is possibly why the original program does not have colour — when the window is not aligned with the colour attributes. Magnifying colour in this case may be worse than no colour at all. My program therefore has several options. As it stands, the colour is only magnified if the window is aligned, otherwise the colour is removed.

However, by adding the lines under the Rem statements — 1020 and 1040 — you can alter the program in two ways. Line 1020 removes the instructions which stop the colour from being magnified when the window is in the wrong place. Adding this line causes the area nearest to the window which is aligned to be magnified with colour. Adding lines 1020 and 1040 causes the exact area in the window to be magnified, always with colour.

To use the colour program, first type in lines 10-120 inclusive of the program, and run and correct until there are no errors. Then add the other lines and save the program. Find the cassette on which you recorded the Zoom control program and position it at the beginning of the code. Run the program again, loading in the code and saving the new code in its place.

Ian Collier,
Bolton.

```
  1 BORDER 0: PAPER 0: INK 7: C
LEAR 32767: PRINT "Insert tape w
ith ZOOM code on it": LOAD ""COD
E 50000,708
  10 DATA 205,9,197,58,83,195,31
,31,31,230,31,95,83,83,83,71,58,
83,198,184,198,120,50,83,198,58,
84,198,0,31,31,31,230,31,111,83
,83,83,7,58,84,198,184,198,120
,50,84,4420
  20 DATA 198,193,125,214,25,47,
111,38,0,84,41,41,41,41,41,95,17
,0,152,25,34,94,198,58,85,198,79
,6,167,40,4,6,189,24,249,120,5
0,89,198,58,86,198,79,6,0,62,192
,4,145,32,4148
  30 DATA 252,120,254,25,56,2,62
,24,50,86,198,33,0,88,34,90,198,
6,24,58,88,198,95,217,237,75,90,
198,237,91,94,198,217,14,32,58,8
9,198,0,217,26,2,3,217,13,8,61,3
2,245,217,5137
  40 DATA 19,217,121,167,32,235,
29,217,237,67,90,198,235,42,94,1
98,1,32,0,32,10,9,34,94,198,217,
58,88,198,95,217,235,217,16,194,
198,139,195,4672,0
  50 LET c=0: LET d=10: RESTORE
  FOR x=49800 TO 49987
  60 READ a: IF a>255 THEN GO TO
  100
  70 POKE x,a: LET c=c+a: NEXT x
  PRINT : PRINT "All OK": GO TO
1000
  100 IF a<>c THEN PRINT "Error i
n line ";d: STOP
  110 PRINT "line ";d;" OK": LET
c=0: LET d=d+10: GO TO 60
1000 POKE 50040,195: POKE 50041,
194: REM alter ZOOM to use colou
r program. Enter next line if yo
u always want colour
1010 POKE 49820,0: POKE 49844,0:
 REM to neutralise  POKE 49820,1
92: POKE 49844,192
1020 REM enter next line if you
want the exact area under the wi
ndow with colour
1030 POKE 49822,50: POKE 49846,5
8: REM to neutralize: POKE 49822
,50: POKE 49846,50
2000 SAVE "ZOOM"CODE 49800,908
```

- Kempston joystick option
- High score table, and
- Amazing new type of music that is a simulation of two channels. Jingles are played during the game, and longer duets on the title screen.

If anyone should find difficulty getting into the game itself, the method is to press space, to stop the music and then 'S' immediately afterwards. Tapes of the game are still available from me for £3 at 16 Viking Way, Pilgrims Hatch, Brentwood, Essex, CM15 9HX. This will shortly be released under the label of Turtle Software.

D.R. Aspinall.

ATMOS BROOD

Thank you for publishing the Oric program Brood in the November issue of *Your Computer*.

The article suggested that for Atmos conversion, only the Plot statements had to be altered. However, for full Atmos compatibility more changes need to be made.

Change the following lines:

```
130 WAIT 7 – LE:GOTO 100
225 LI = LI – 1:PLOT 2,25,STR$(LI)
290 DOKE 634, 48040:POKE 638,27:
    END
630 DOKE 634, 48120:POKE 638,21
745 FOR A = 0 TO 9:READ B:POKE
    A,B:NEXT
765 POKE 85,59:POKE 86,191:
    POKE 87,32
770 POKE 88,21:POKE 89,165
775 POKE 15,191:POKE 16,G:POKE
    17,0:POKE 18,35: PLOT 32,0,T$
1005 FOR A = 0 TO 9:READ B : NEXT
1335 DATA 0,EO,5,DO,5,A2,55,4C,
    2,99,A2
```

T.W. Phoeng, Holland.

CURSE BUGS

With reference to my program "The Curse of Abu Simbel" for the Dragon in the November issue of *Your Computer*, a few bugs seem to have crept into the listing.

Line 600 has been tagged on to the end of line 590, so after the GOTO 3780, (Enter) should be pressed and 600 should start on a new line.

The same has happened in line 670, after the GOTO670. In line 1250 the GOTO3770 should be GOTO3780, and in line 1530 the last statement should read GOTO 470 instead of GOA.

Nick Stevens, Musselburgh, East Lothian.

CORRECTIONS

Line 60016 in December's Spectrum Telsoft program is incorrect. It should read:

60016: 50EDCD47EE38FBCD,5AF

Some people have had trouble getting the ZX-81 High-Res program to work. Try the following procedure: using Listing 2 enter eight numbers to define character code 3 as a UDG — 0,0,0,0, 30,160,160,32. When the computer asks if you want to save the program the answer is no. Now enter this Basic program and run it.

```
10 RAND USR 25614
20 FOR A=1 TO 30
30 PRINT AT 11,A;CHR$ 1;CHR$ 3
49 RAND USR 25686
50 NEXT A
60 IF INKEY$="" THEN GOTO 60
70 RAND USR 25602
```

EDITORIAL

1984 WAS THE YEAR that made the whole home-computer industry look back in angst. They swore they would never commit the errors of the past again, and then promptly went on to restage the worst and the best of 1983.

The QL gave the year an astonishingly promising false dawn. With 128K, bundled software, built-in mass storage and a 32-bit processor, it contained the very latest technology — up to four months late for those who ordered first.

But despite the delays the QL remains important: it was the first complete home computer in what became the year of the system. Coleco, Amstrad, Commodore with the Plus 4 and Tatung's Einstein produced variations on this total computing theme. Of these five manufacturers only Amstrad has found big-volume success.

If the complete computer system was a sign that the home-computer industry was growing up, software compatibility and standardisation were supposed to be all part of the same process. Microsoft and the Japanese electronics giants worked together with the MSX standard to drive out incompatibility wherever it lurked. Overpriced machines were produced by big names like Sony, Toshiba, Canon and Mitsubishi, yet the long-awaited and much-feared Japanese invasion has for the moment turned into a phoney war with the real fighting postponed for another, more distant Christmas.

As the Japanese were introducing expensive micros to fight their battle, Jack Tramiel's arrival at Atari from Commodore opened up a new front in the price war just when the market was beginning to stabilise.

Tramiel parted company with Commodore in January, had collected Atari for $240 million in the early summer, and was busy making price cuts by the autumn. The 600XL tumbled to £90, and in December the 800XL moved enticingly down to £130 from £250.

In the earlier part of the year the noise in the background was not the sound of falling prices but companies crashing. The two best known names to disappear were Dragon and Camputers but the most commotion was caused by the collapse of a software house — Imagine.

The Liverpool-based software producer was famous for its extravagant claims and continued to blow its own trumpet right up to the end, and beyond — hype after death. But it was the software makers who gave colour to the end of an otherwise dry year for computing.

Some of the products that were pushed out for the Christmas period were not only very playable but had elements of novelty — just when computer users were beginning to forget the meaning of the word. This is especially true of games like Ultimate's Knight Lore, Acornsoft's Elite, Gargoyle's Tir Na Nog and Automata's concept program Deus Ex Machina.

Excellent U.S. imports also muscled in on the British charts — Bruce Lee, Boulderdash, and Ghostbusters with its classy music and synthesised speech. Along with Dallas, Alien, Dangermouse and Fall Guy, Ghostbusters typifies the 1984 gimmick of offering the game of the film, of the TV series, of the book, of the tee-shirt.

But if 1984 scared the industry as the computer boom's exponential growth evaporated, 1985 appears even bleaker. With the disappearance of the skateboard-type fad element from home computing, any success will be hard won and well planned.

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticism of machines and software in general. If you would like to see your name in print, whether on a Software File program or a full blooded article, here is how to go about it. Ideally, all articles should be typed double-spaced on one side only of uniform sheets of paper. If listings can be dumped directly from a printer — you can always use a friend's or user group's — this minimises the risk of error. In a perfect world a cassette would accompany the article. That considerably speeds up the checking process. Not only do you get to air your own discoveries and opinions, but we will even pay you for the privilege. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Why not give it a try? You have nothing to lose but your postage.

Editor
TOBY WOLPE

Assistant Editor
MEIRION JONES

Production Editor
IAN VALLELY

Software Editor
SIMON BEESLEY

Sub-editor
PAUL BOND

Editorial Assistant
LEE PADDON

Editorial Secretary
LYNN DAWSON

Editorial: 01-661 3144

Subscriptions: U.K. £12.50 for 12 issues.

ABC
154,334
January-June, 1984.

Printed in Great Britain for the proprietors Business Press International Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Tel: 01-661 3500 Telex/grams: 892084 BIPRESG. ISSN 0263-0885. Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Instep Ltd, London EC1.

Advertisement Manager
NICK RATNIEKS 01-661 3127

Assistant Advertisement Manager
NEIL MARCHANT 01-661 8548

Advertisement Executives
NIGEL BORRELL 01-661 3660
JULIAN BIDLAKE 01-661 8458
KAY FILBIN 01-661 8484

Northern Office
GEOFF PARKER 061-872 8861

Advertisement Secretary
MAXINE GILL

Classified
LUCY O'SULLIVAN 01-661 3036

Publishing Director
CHRIS HIPWELL

Group Advertisement Manager
SHOBHAN GAJJAR

Your Computer, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

© **Business Press International Ltd 1985**

Frankie goes to Silicon

JUST BECAUSE Frankie Goes To Hollywood's computer is a £100,000 Synclavier system rather than a £100 Sinclair isn't going to stop them putting out a Pleasure Dome game of the record for the Spectrum and Commodore 64.

Jill Sinclair (no relation) of Frankie's record label ZTT has fixed up a deal with Ocean Software to produce a £10 game which will be released next month. Will home micro owners be as dismissive of the first Frankie computer game as FGTH's sound engineer was of micro freaks trying to make Frankie-style music at home? "Everyone else with their CX-5s and Commodore 64s will be struggling desperately hard with not really a hope in hell" as he said in our September 1984 issue.

Acorn's new spare leg stocking filler boots up Electron

ACORN'S AVALANCHE of peripherals continues unabated with disc cassette drives for the Electron, synthesisers and second processors for the BBC. The disc drive/interface unit, Plus 3, looks like a ruthless attempt to exploit parents' propensity to buy anything shaped like a leg for December 25. But at £229 it's an expensive Christmas stocking filler, even if it does have 300K storage on a single-sided 3.5in disc as well as the interface and a new disc filing system.

If only Acorn had built cartridge, joystick, printer and expansion ports into the Plus 3 it could have made the Electron look like a worthwhile purchase rather than a deliberately underspecified machine designed to milk the purchaser for every last penny on peripherals.

Acorn has also launched Music 500 — a £200 synthesiser, keyboard extra, which plugs in to the BBC. Music 500 uses a new computer language called Ample to manipulate sound and music.

Continuing Acorn's promises to make the BBC infinitely expandable 10 Megabyte and 30 Megabyte hard disc storage units are now available as well as the 32-bit architecture 32016 second processor which comes with a bundle of languages — BBC Basic, C, Fortran 77, Cambridge Lisp and Pascal. But just in case you were thinking of saving up pocket money for the ultimate add-ons for your BBC we should warn you that the 32016 second processor plus a 30 Megabyte hard disc will set you back over £3,000.

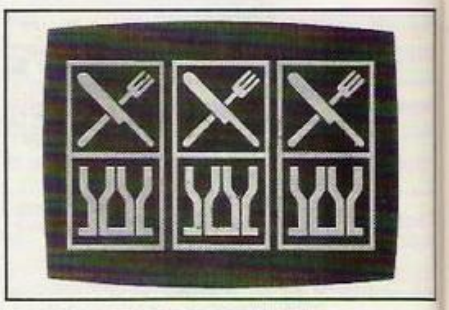
And a bottle of your Chateau Lafitte for my Spectrum . . .

NOW HIS WINE 'N' DINE program is about to put Spectrums in off licences all over the country, but one year ago Ian Hoare was just a wine connoisseur and chef who would no more have touched a computer keyboard than he would have drunk a bottle of Concorde.

Then as a result of a strange sequence of events involving a bet placed on the outcome of a Dutch theology student's examination results Ian came in contact with a Spectrum. Within months The Computer Cookbook, which was the first program he had written, was in the charts — proving that people would buy "useful" products such as recipes even if the program itself was not very sophisticated.

Since then Ian has become a machine-code fanatic — partly motivated by his colour-blindness to break into commercial programs protected by "these beastly colour code charts". Wine 'N' Dine will recommend wines to customers in branches of Peter Dominic — all they have to do is key in what sort of meal they are about to have. Christmas dinner produces three suggestions ranging in price from £2.45 to over £9 with the Lagunilla Villa Gran Reserva Rioja 1973 at £3.69 as Ian's own recommendation for value for money.

For afters the program suggests champagne, fizzy wine or Madeira with the Christmas Pudding. There are over 200 other dishes which Wine 'N' Dine matches up with a choice of 450 wines.



Seriously: computers damage your health

IF COMPUTERS were really user-friendly the first message to flash up on the screen might be "are you wearing your protective apron?". Rollenworth International is taking warnings that sitting in front of a VDU is bad for you so seriously that it is selling microwave proof aprons to computer operators.

They are a lightweight equivalent of the lead aprons radiologists wear when they give you an X-ray, although this time made of nickel-coated polyester. Rollenworth points to a series of reports suggesting that sitting close up in front of a TV screen for hour after hour can do you harm, particularly if you are a pregnant woman. A survey by the Civil Service Medical Advisory Service among 800 female employees of the Department of Employment showed that 36% of the pregnancies among VDU operators were abnormal compared to 16% among a control group. Other reports from Denmark, Canada, Australia and America have reached similar conclusions.

But computer companies do not accept these findings — pointing out that they could be statistical anomalies or that the VDU operators are not being compared with similar people working under the same conditions. Most home computer enthusiasts will not be working eight hours a day at the keyboard anyhow so are unlikely to experience problems on the same scale as professional VDU operators. But if you regularly work through the night at your micro you should take regular breaks and make sure you have a comfortable seating position as well as the best possible viewing conditions if you are to avoid more mundane problems such as eyestrain and backache.

If you either have health problems or know of someone who does, which you think might be attributable to the use of a computer, please send the details to Healthscreen, *Your Computer*, L.221 Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

My Talking Computer's new expansion cartridge includes a Story Maker which teaches the essentials of word processing but using spoken sentences rather than text on screen. The new 128K expansion Rom which costs £18 consists of 16 different programs with overlay cards for the keyboard. So far Microspeech has sold 50,000 of its £60 speech-synthesiser based Talking Computers.

One million K in every bite

WITH 1,000,000K of memory almost anything is possible. Shugart's new laser disc drive can put 1,000,000K — a Gigabyte — on every disc. You cannot erase anything from the disc so it is not as resuable as a conventional one but with so much empty space to play with you might as well keep everything for posterity.

Of course it is not going to be available tomorrow at home computer prices but the 12in Optimem 1000 is now being sold to other computer and peripheral makers — OEMs or Original Equipment Manufacturers as they are called — at a price of around £5,000. Shugart predicts that the OEM price will be down to around £1,000 in a couple of years with giga storage available to everyone at no more than the cost of an ordinary disc drive before the end of the decade.

Commodore's Apple-beater

COMMODORE IS NOT going to be sitting still while its old boss Tramiel tries to hit back at it through Atari. Commodore has a CBM-128 on the stocks for the home market as well as a cut down Macintosh clone at bargain-basement prices which used to be known as the Lorraine when the project was being developed by an independent company called Amiga.

What with that and a Commodore IBM PC compatible, not to mention a Z-8000 based micro on the stocks, the company is going to be pretty busy.

Tough Tramiel promises 8 new Ataris including QL smasher

WITH ATARI'S latest aggressive bout of price cutting setting the scene — the 64K 800XL is now £130 compared to £250 last year — Jack Tramiel jetted in to Britain to tell us what the corporation has up its sleeve for us in 1985.

Hard man Tramiel survived the Auschwitz deathcamps and then went on to acquire a ruthless reputation himself as he built Commodore up to become the biggest home computer company in the world. But he resigned from CBM in January 1984 and now that he has taken over Atari he believes he can set home-computer prices tumbling once again just as he did when he introduced the Commodore 64 at a fraction of the price of its competitors.

When he bought Atari this summer 900 people lost their jobs in the first two weeks and he has been known to sack people over the Tannoy.

Now he plans to sell four "families", as he likes to call them, of computers under the Atari name. The first family will be based on the Atari 800XL which will be redesigned to make it cheaper to produce and will be given a numeric keypad. There will be 64K and 128K versions plus a portable with 256K of memory and a 5in. screen as well as a special music computer.

The next family will be 68000-based like the QL and the Macintosh and will start at around £300. It will incorporate an advanced graphics chip aimed at giving Macintosh quality graphics but in colour and at a fraction of the price. This will run under a new operating system TOS — and yes the T does stand for Tramiel.

The eight-bit family will all be compatible with existing software and along with the new 16-bit range they will be shown at the January Consumer Electronics Show in Chicago and launched in Britain this spring. Later in the year he hopes to launch a range of work stations for less than $1,000 which will be based on the massively powerful, true 32-bit 32032 chip.

There will also be a full range of peripherals including printers ranging from £60 to £600 as well as floppy and hard discs. Further ahead Atari hopes to introduce laser disc-based micros in 1986.

Tramiel's strategy is based on cutting costs all down the line — he is currently trying to raise money to buy a totally automated factory to churn out Ataris as cheaply as possible. "The customer is much smarter than I am", or so Tramiel professes to believe "and if someone can produce something cheaper and better they'll buy it from him. Needless to say he believes the Atari 800XL "is a better product at a better price" than the Commodore 64. But then again he says "I believe computers are fun", yet he never smiled once all the time he was in Britain.

With the aid of this box I can make Duran Duran sound like Mickey Mouse backwards

WITH DATEL'S Digital Sound Sampler, Duran Duran effects, Darth Vader speak and Mickey Mouse noises are no problem. You can use the device simply as a real-time echo unit or if you want to stretch your Spectrum to the limit then according to Mike Connors of Datel "you could write a concerto from one piano note".

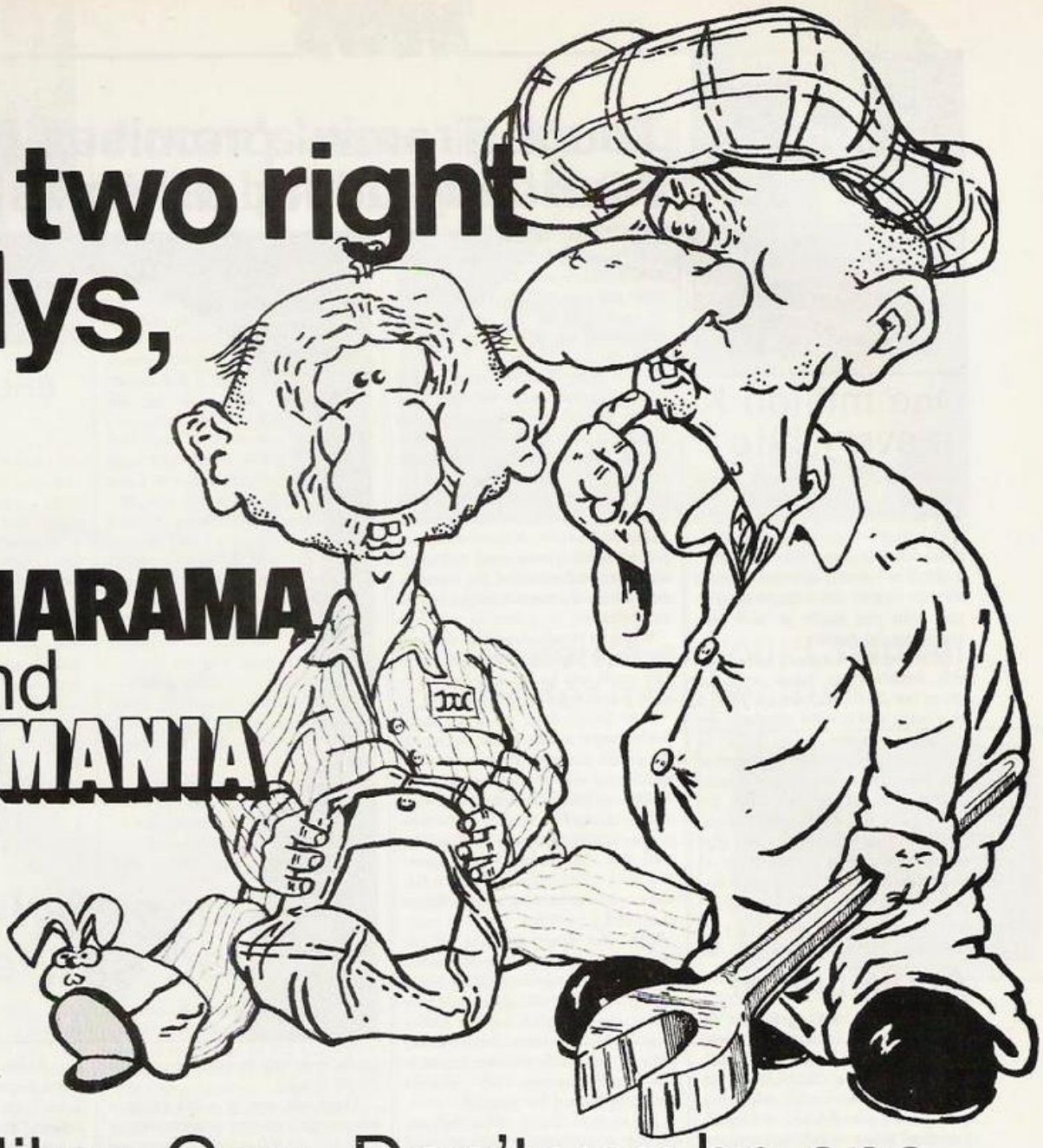
The £50 sound sampler has full eight-bit analogue to digital converters so you can feed in sound either through a microphone or from cassette recorder or other source, then play with it in digital form before outputting the result through D/A converters.

Once the sound is digitised the only problem is finding enough memory to store it. At a rate of 38,000 checks a second the Spectrum can only store about four seconds of full sound.

But this is not as much of a limitation as you would think since most of the sounds you would want to use are very much shorter than that and you repeat the same notes many times in a piece of music — so you could compose a simple piece several minutes long at one go or build a more complicated piece in shorter chunks.

You can use the unit to digitise short bursts of your speech to incorporate in games. But the most impressive part of the software that comes with the Datel device is a sampler which allows you to take a note and then sequence it to create a whole musical instrument with different notes and pitches based on that one sound. Datel is on 0782-273815.

The two right Wallys,



PYJAMARAMA and AUTOMANIA

from Mikro-Gen. Don't you be one, order your copies NOW!

● 'Automania must be a front-runner. It features Wally Week who is not a period of time but an idiotic character a la Cuthbert, and also a beautifully animated 2 inch or so sprite . . . the graphics are pretty spectacular and the game is amiably silly and good fun . . . there's no reason not to go out and buy this one.'

POPULAR COMPUTING

● 'Pyjamarama is the excellent sequel to Automania . . . The graphics are extremely good . . . Pyjamarama is a really first class, amusing and challenging game that is original in its concept and could well make the number one spot.
Highly recommended.

COMPUTER TRADE WEEKLY

Instructions	100%
Playability	100%
Graphics	100%
Value for money	100%

● 'Automania, sub-titled, Maniac Mechanic, is a must for all game players . . . invest in this colourful game with superb graphics and animation.'

SOLID GOLD

Keyboard play: very responsive
Use of colour: very good
Graphics: superb with excellent animation
Sound: great tune (continuous) with well used sound effects – sound may be switched off
Skill levels: one
Lives: three

● 'Automania has some of the best animation and realistic graphics that I have ever seen. All the graphics are large and colourful, and, needless to say, they move smoothly . . . The best game that Mikro-Gen have ever produced and worth buying.'

CRASH MICRO

What the media say about our Sensational Software

MIKRO-GEN

Commodore 64 – £7.95
Spectrum 48K – £6.95

44 The Broadway, Bracknell, Berks.
Tel: Bracknell (0344) 427317

Return of the Enterprise

THE ENTERPRISE computer is finally available after a nine-month's delay.

Available only through Prism, it may be in the high street early next year, when volume production gets underway.

According to Enterprise, the bugs in the "Dave" video chip which caused the delay have now been cured.

The 64K model is £249.95 but the 128K model is still "available soon".

The Enterprise offers 48K Rom with built-in word processor, 64K Ram, up to 256 colours, three stereo sound and one noise channel and a very comprehensive Basic on cartridge.

It also features a full keyboard with function keys and a joystick. It has a wide variety of interfaces.

Handy Spectrum may follow One Per Desk

WHILE SPECULATION increases that Sinclair is finally about to launch the portable Spectrum which he exclusively revealed to *Your Computer* back in November 1982, ICL has at last released the Sinclair-designed work station which he also told us about at the same time. Both were originally intended to hit the market before the end of 1983.

The ICL concept is remarkably similar to the artist's impression we published at the time — with phone, computer, keyboard, Microdrives and screen in one unit but in January 1983 he decided to adopt the 68000 processor for his more advanced designs. At a later stage of the project he had to abandon using his flat screen in the ICL although it may still surface on the unconfirmed £300 portable which may make do with one Microdrive.

Adam falls from grace

COLECO HAS FINALLY pulled the rug on its all-in-one Adam family computer system. The original concept of a 64K computer with a built-in word-processor program complete with disc drive and printer for around £500 sounded brilliant when it was first announced in 1983 — and it still sounds good today.

But as production delays pushed back the launch date the price started climbing and the specification dropped. Out went the disc drive to be replaced by a high-speed tape on production machines, and when the Adam finally went on sale in Britain early in 1984 the price was nearer £800.

The machine was never pushed very hard either in America or Britain and there was very little software available other than games written for the Colecovision games console on which the Adam was based.

Sinclair admits to megagames — now the truth can be told

LIKE A SIGHTING of Lord Lucan or Martin Bormann, any pretence to have seen an Imagine megagame is likely to be disputed but we are sticking by our claim that we have glimpsed Bandersnatch — and not in Patagonia but in the house of Sinclair. Sinclair has now admitted that Imagine refugees David Lawson and Mike Glover of Fireiron are about to produce Bandersnatch for him.

But with every software house now describing its latest hack offering as a megagame we asked Bruce Everiss of Tansoft — no relation of Bruce Everiss who used to work for Imagine — what the megagames were originally intended to look like: "Some other software houses have plagiarised the term. They are using it to describe their latest ordinary products. A megagame is a film which you, the player, take part in.

"You become one of the cast of characters that each have separate and identifiable personalities. What happens when you meet them depends on their personalities and also on what you do, as in real life. Characters then remember how they have been treated by the player and act accordingly on subsequent meetings."

Controls are also important, Imagine envisaged that everything would be controlled by joystick: "There are no lives or score. It is a matter of trying to achieve what you the player want. There is no status line to ruin the realism, the whole screen is action."

The characters use speech bubbles to communicate though given the extra capacity of a Microdrive or disc it could equally well be by voice. Stunning graphics were vital — the megagame team involved twice as many artists as programmers. Realistic animation is also important — especially getting rid of the artificial nature of the transition from one room to another in conventional games.

Incorporating background music also makes the game more like a film. The Imagine megagames would have achieved all this by using a plug-in 64K Rom with bank-switching for quick transitions from one part of the game to another.

There would also be a supplementary cassette tape. This arrangement would discourage pirates. "They would need to copy the Rom contents, the Ram contents and the special hardware necessary for the bank-switching and address decoding. It would be cheaper to buy the real thing."

In all probability the version of Bandersnatch which Sinclair hopes to release will be on Microdrive — perhaps primarily targeted at the QL.

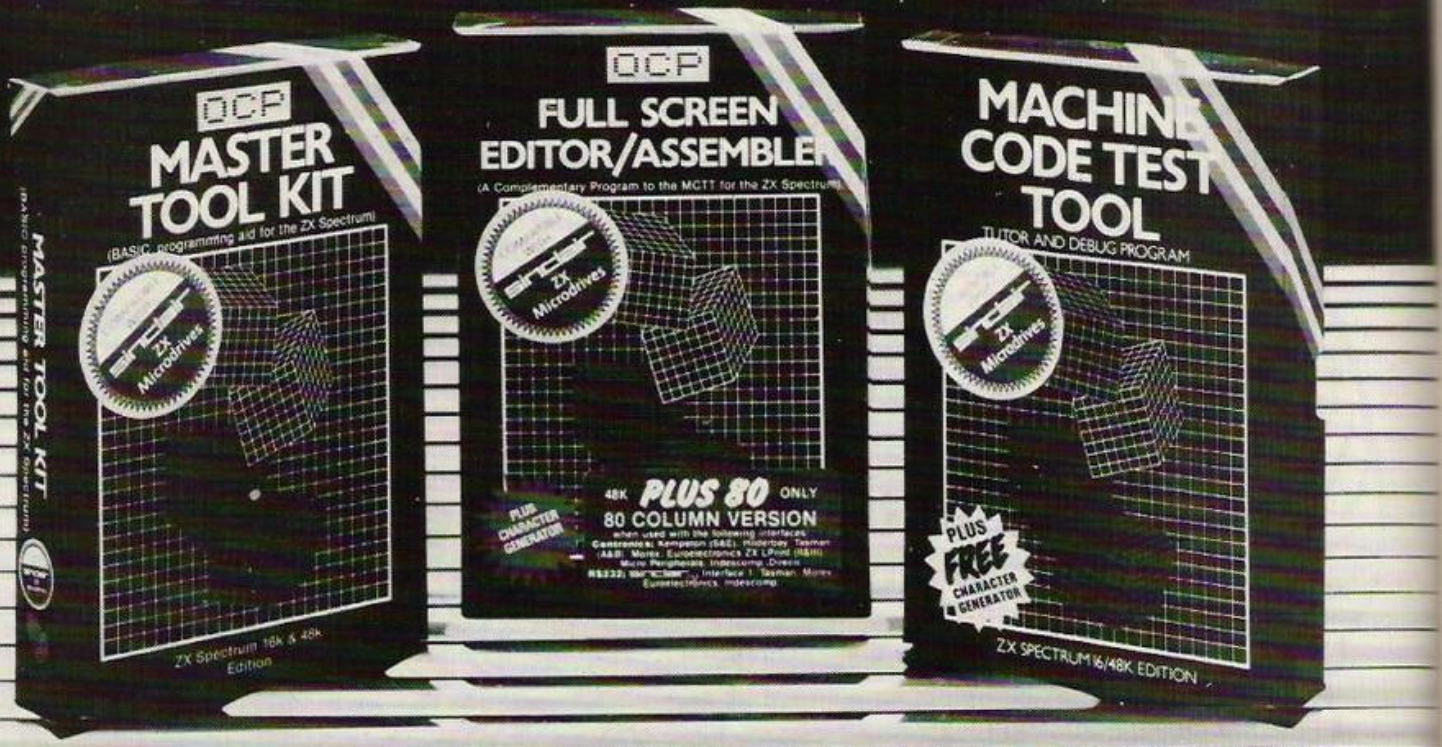
YOUR COMPUTER TOP 20

Game	Company	Machine
BC's Quest for Tires	Software Projects	BBC
Booty	Firebird	Spectrum
Bruce Lee	US Gold	CBM 64
Daley Thompson Decathlon	Ocean	Spectrum
Combat Lynx	Durrell	Spectrum
Eddie Kid Jump Challenge	Martech	Spectrum
Elite	Acornsoft	BBC
Eureka	Domark	CBM 64
Ghost-busters	Activision	CBM 64
Jet Set Willy	Software Projects	CBM 64
Knight Lore	Ultimate	Spectrum
Lords of Midnight	Beyond	Spectrum
Manic Miner	Software Projects	BBC
Pyjamarama	Microgen	Spectrum
Raid Over Moscow	US Gold	Spectrum
Steve Davis Snooker	CDS	Spectrum
Tir Na Nog	Gargoyle	Spectrum
3D Grand Prix	Software Invasion	BBC
Under-wurlde	Ultimate	Spectrum
Zaxxon	US Gold	CBM 64

For the most fun you can have for £30 on your Spectrum the DK'tronics 3 channel sound synthesiser takes some beating. It comes with a Music Designer cassette which claims to give you Beethoven to Bowie — Star Wars to splats on your Spectrum. Inside is the 3-channel AY sound chip which is used in MSX machines and many other computers with better sound than a Spectrum. Cunningly DK has also released another product which looks exactly the same even down to the speaker but which contains an SLO 256 speech chip. The £25 speech synthesiser has a text to speech facility and is at its best using deliberately misspelt English words to get the required sound.

Updated Utilities from the Best in the Business...

OCP



MACHINE CODE or BASIC we've now updated what were the best programming tools for you! Try them and see why our products are regarded by most programming as the best available – by far!

MASTER TOOL KIT £9.95
YOUR BASIC WILL NEVER BE THE SAME AGAIN!!

This program adds a whole new range of really powerful commands: Real time clock and alarm with off/on/set and print commands. BLOCK MOVE, COPY, DELETE and MERGE two lines. FIND and CHANGE character string, RENUMBER, 10 programmable keys, TRACE with execution display. VARIABLE display and dump. COMPRESS, REMKILL and PACK to minimise program bytes. CHANGE CASE upper to lower and back.

FULL SCREEN EDITOR/ASSEMBLER
16/48K £12.95

Voted the most powerful MACHINE CODE programming tool yet seen by Home Computing Weekly.

Editing facilities comparable to the most sophisticated word processor with MOVE, COPY and/or DELETE lines or blocks of code. LOCATE, CHANGE or DELETE strings/characters, full 280 set supported, syntax check, powerful expression evaluator etc. and 'SNAKE' a fully noted source code demonstration program.

Many new instructions with this latest version. Plus 80 facilities now included as standard.

MACHINE CODE TEST TOOL.
16/48K £9.95

The ultimate professional tutor and debug program. We wrote this to help us write our own MACHINE CODE programs.

£3.00 Exchange Deal
MAIL ORDER ONLY

TEST and display MACHINE CODE instructions as they're written.
Ideal for both the novice and the expert.
Fully documented with a 32 page tutorial.
HEX: DECIMAL conversion as standard.
Character Generator of unbelievable quality. Supplied free with the Spectrum™ version.
This program can co-reside in your Spectrum with the Full Screen Editor/Assembler to provide a complete MACHINE CODE environment, including 80 Column printout.

£3.00 EXCHANGE DEAL! AVAILABLE MAIL ORDER ONLY

If you want to update your software, we'll give you a £3 allowance on a standard program, and £5 on a Plus 80 version when you buy your new Microdrive Compatible programs from us, provided you return your old program cassette with your order. What's more, buy Full Screen Editor/Assembler and Machine Code Test Tool together and it'll cost you just £19.95.

- ☐ Master Tool Kit £9.95
- ☐ Replacement Master Tool Kit £6.95
- ☐ Full Screen Editor/Assembler Plus 80 £12.95
- ☐ Replacement Full Screen Editor/Assembler £9.95
- ☐ Machine Code Test Tool £9.95
- ☐ Replacement Machine Code Test Tool £6.95
- ☐ Combined Full Screen Editor/Assembler AND Machine Code Test Tool at Special price of £19.95, less exchange allowance.

Cheque/PO Made payable to OCP Ltd.

Name _____

Address _____

_____

Access Card Number _____

Signature _____ Date _____

Available from larger branches of WHSMITH, Boots or mail order direct – for instant purchase, contact The OCP Hotline with your Access details.

Telephone: 0753 889 055

sinclair ZX, ZX SPECTRUM & ZX MICRODRIVE ARE ALL TRADEMARKS OF SINCLAIR RESEARCH LTD.

OCP

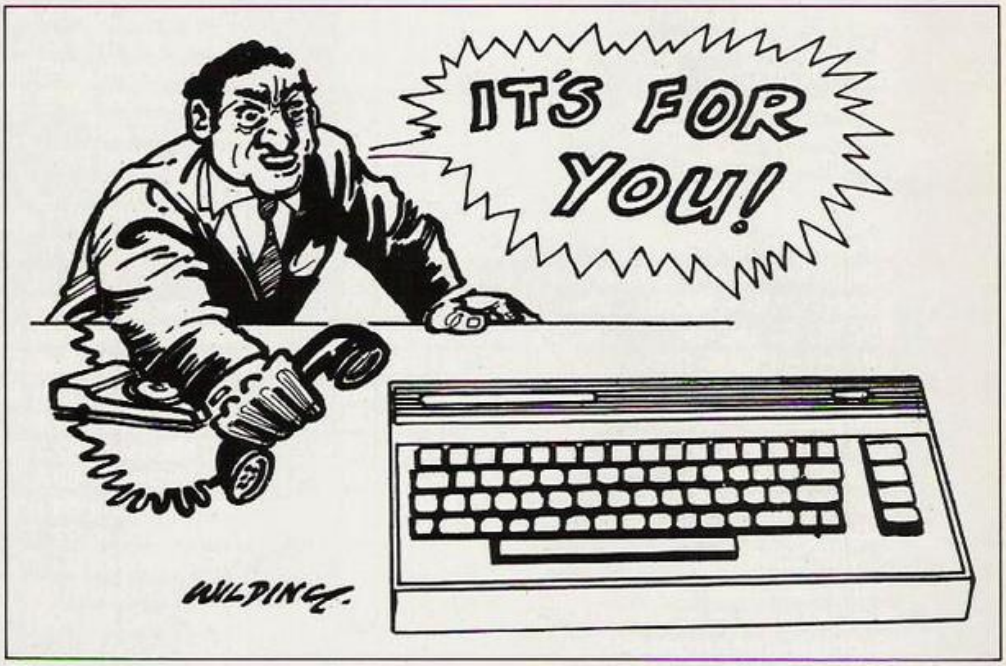
Simply The Best

4 High St, Chalfont-St-Peter, Bucks SL9 9QB

The OCP range includes: Machine Code Test Tool, Editor/Assembler and Master Tool Kit.
Our business programs include: VAT Manager, Address Manager, Finance Manager, Stock Manager (80 column only).

BEGINNERS first bytes

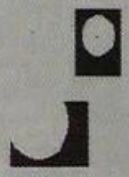
Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.



I could do that...

For November's competition we wanted you to write fill routine in Basic. The standard of entries submitted was very high indeed, displaying all sorts of fancy programming techniques. We were particularly impressed by the Spectrum program from R. Smith, 59 Bateson Road, Cambridge, CB4 3HF. He managed to squeeze a fill routine to handle convex and concave shapes alike into just two lines. It works by recursively calling itself, a technique which makes heavy demands on the Basic stack but is quite adequate for small shapes. It is not notably speedy but takes the £15 prize for sheer economy of code.

In this month's competition we would like you to produce some artwork. Write a program not longer than 10 single statement lines that creates an interesting or "artistic" pattern. If your micro only has a low resolution display don't worry — we will make allowances.



```
  10 REM Draw some tricky shapes
  20 PLOT 50,50: DRAW 50,30,PI:
DRAW 20,0: DRAW 0,-40: DRAW -70,
0: DRAW 0,10
  30 LET x=100: LET y=75: GO SUB
100
  40 PLOT 110,100: DRAW 0,50: DR
AW 40,0: DRAW 0,-50: DRAW -40,0
  CIRCLE 130,130,16
  50 LET x=115: LET y=105: GO SU
B 100: STOP
 100 IF NOT POINT (x,y) THEN PLO
T x,y: LET xxy=1: GO SUB 100: LE
T y=y-2: GO SUB 100: LET y=y+1:
LET x=x+1: GO SUB 100: LET x=x-2
: GO SUB 100: LET x=x+1
 110 RETURN
```

Programs on the air

OCTOBER'S FIRST BYTES described how free software is broadcast over the radio twice a week by the BBC. In fact there are some other free programs winging their way through the air during most of the day. To gather them is rather more expensive, though.

The system is called Telesoftware, and is literally software that comes through television. The mechanism used for getting this software to you is rather more complicated than that of Basicode. It depends on details of how television is broadcast.

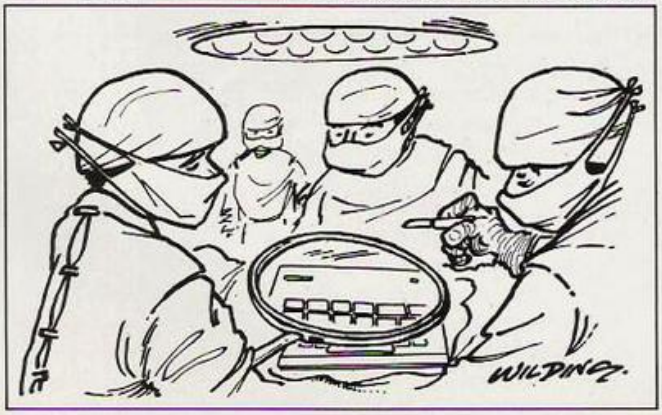
A normal TV picture is made up of some 600 lines on the screen. But in fact 625 lines' worth of information is transmitted. Some of it is technical details sent by the broadcasters and engineers for their own benefit. But some of the spare lines carry the Ceefax service.

This is a bit like Prestel, with pages of information on various topics. You can access them with a special Ceefax adaptor that is fitted to your TV. But there is an additional service that is specially for micros, and requires a Telesoftware adaptor.

This adaptor is only available for the BBC micro at the moment, and costs a rather hefty £200. It is produced by Acorn, the manufacturers of the BBC micro, and can be obtained from Vector Marketing on (0933) 228953. As well as allowing you to access the Ceefax pages on your micro, it also enables you to download software that is sent in the form of pages of Basic programs.

A complete program will typically

(continued on page 49)



Operating systems take away drudgery

MOST PEOPLE take it for granted that they can start hammering away at the keyboard as soon as they have powered up their gleaming micro. If you are playing a game you expect to find yourself instantly assailed by crazed alien beings intent on mindless destructions. You are not conscious of the actual working of the machine, except possibly during the slight — or not so slight — pause while the cassette loads.

Few realise that the initial command Load or Chain or whatever, is in fact part of a so-called "high-level" language, which happens to be Basic. Even fewer are aware that underneath all this activity is something thought about even less — the operating system.

Yet without this unsung hero/heroine, much of the power of a micro would be lost. Programming would

(continued on page 49)

LOWEST PRICES

*EXPERT ADVICE *EXPRESS DELIVERY *EXPORT ARRANGED

01-947 8562

Worldwide Computers Limited, Spa House, 11-17 Worple Road, Wimbledon, London SW19 4JS Telex: WOWICO 8955888

COMPUTERS

Apricot F1 256K RAM	£949.00
Apricot 256K 2x315 D/D+Monitor	£1399.00
Apricot 256K 2x720 D/D+Monitor	£1549.00
Apricot 256K 5 MB HD.D+Monitor	£2099.00
Apricot 256K 10MB HD.D+Monitor	£2275.00
BBC Micro Computer	£320.00
Canon MSX Computer	£259.00
Commodore VIC 20	£78.25
Commodore 64	£159.00
Commodore SX 64 (Portable)	£575.00
Commodore Plus 4	P.O.A.
Epson Portable PX8	£649.00
Epson Portable PX 8+RAM	£799.00
Epson QX10 + RX80+Cable	£1599.00
IBM PC 64 1xDisk	£950.00
IBM PC 64 10MB Disk	£1800.00
IBM PC XT 10MB Disk	£2400.00
IBM Portable 1xDisk	£1444.00
IBM Portable 10MB Disk	£2288.00
IBM PC AT 1xDisk	£2345.00
IBM PC AT 20MB Disk	£3456.00
Kaypro 2	£899.00
Kaypro 10MB	£1850.00
Sanyo MBC555 2x160K Disk Drive	£899.00
Sinclair Spectrum 48K+6 Pack	£100.00
Sinclair Spectrum 64K	**£139.00**
Sinclair Q.L. Computer	£330.00
Sirius 1 128K 1.2MB	£1650.00
Sirius '1' 256K 2.4MB	£2150.00
Sirius '1' 256K 1.2+10.6MB	£2950.00
Televideo	P.O.A.
Wren Computer	£849.00

PERIPHERALS

12in Apricot Monitor (+ £50)	£289.50
Colour Monitor for Apricot F1	£350.00
Cables	£10.00
Commodore 1701 Col Monitor	£175.00
Epson Accoustic Coupler	£130.00
F1 9" Mono Monitor	£175.00
Luxor 800 Pixal Colour Monitor	£475.00
Microvitec 20" Colour Monitor	£280.00
Sanyo 2112 Green Screen 15MHS	£65.00
Sanyo 3117 Col Hi Ress 600PISC	£279.00
Sanyo 3125 Col Med Ress 400PIS	£175.00
Sanyo 8112 Green Screen 18MHz	£85.00
Sinclair Expansion Pack	£85.00
Monitor for QL	£265.00
VM12MHI Monitor Grn Srn 4 IBM	£144.00

Keyboards, cable, interfaces, tractor feeds, sheet feeds, disks, software, up grades, listing paper, ribbons, daisy wheels available for most products.

All prices excluding VAT

DOT MATRIX

Admate JP80 Dot Matrix Printer	£169.00
Anadex DP 9000	£799.00
Brother M1009 Dot Matrix Print	£155.00
Canon PW 1080A (NLQ)	£295.00
Canon PW1156 A (NLQ)	£355.00
Commodore MPS 801	£155.00
Commodore MPS 802	£250.00
Epson RX80T	£190.00
Epson RX80 F/T	£215.00
Epson FX80	£320.00
Epson RX100 F/T Printer	£340.00
Epson FX100 F/T	£425.00
Epson LQ 1500 NLQ Printer	£895.00
Mannesmann Tally MT80	£195.00
Mannesmann Tally MT160	£399.00
Mannesmann Tally Pixy Plotter	£450.00
Mannesmann Tally MT180	£580.00
MP 165 NLQ Printer	£295.00
OKI Microline 82A Printer	£249.00
OKI Microline 83A	£389.00
OKI Microline 84 (P)	£629.00
OKI Microline 92 (P)	£365.00
OKI Microline 93 (P)	£499.00
OKI Microline 2350 (P)	£1449.00
Panasonic KP 1091 (IBM + NLQ)	£275.00
Radix 10 (NLQ)	£449.00
Radix 15 (NLQ)	£549.00
Shinwa CP80 AF/T Para	£189.00
Star Delta 10	£319.00
Star Gemini 10X	£195.00
TEC 1550 (P)	£459.00
TEC 1550 (S)	£499.00

DAISY WHEELS

Brother HR5	£130.00
Brother HR1	£255.00
Brother HR15	£325.00
Brother HR25	£555.00
Brother HR35	£695.00
Daisy Step 2000 (20CPS)	£225.00
Diablo 620 (RO)	£675.00
Diablo 630 (API)	£1310.00
EP 44 Personal Elec. Printer	£190.00
1600 Flowriter IBM-PC 8K.QD	£1449.00
Hitachi 672 Plotter	£395.00
Juki 6100	£319.00
Juki 6300 Printer (40 CPS)	£825.00
Quen-Data Daisywheel Printer	£225.00
Qume Letter Pro 20	£450.00
Qume 11/40 (RO)	£1175.00
Richo RP1300	£875.00
Ricoh RP1600	£1175.00
Smith Corona TP1	£175.00
TEC 10-40 D/W Printer	£845.00

WORLDWIDE COMPUTERS LTD.

Programs on the air

(continued from page 47)

run to several pages. These are sent out one at a time in each sweep through Ceefax, so it takes several seconds to build up all the program. Generally speaking the order in which the pages are received is irrelevant, since the programs have line numbers which allow the original to be reconstructed.

Each page is error-checked as it arrives. That is, it is scanned to see if any errors have crept in during transmission. If a page is accepted, then it is error-free. If it is not, then you have to wait for another cycle of Ceefax to pass by until the same page is broadcast again.

Once the complete program has been built up, you can run it like any other. The software itself is free, and is currently being changed every two weeks. It comes from such sources as the Chip Shop, programs sent in by the public and Telsoft, a group based at Brighton Polytechnic.

To use the service, you will need not only an adaptor, but also a TV licence. This is so even if you are using a monitor with your micro. You are allowed to make two copies of any program broadcast, and adapt or modify it, but only for private purposes.

There are about 6,000 users at the moment, and the number is growing at the rate of 300 a month. There is a possibility that more "spare" lines will be allocated to the Ceefax service, which would allow more telesoftware to be broadcast. Another future development that is being considered is to provide telesoftware on cable television if and when that arrives. Even if it doesn't, you can always be sure that there will be some interesting programs on the television.

BEGINNERS first bytes

How operating systems take away drudgery

(continued from page 47)

be back in the stone age. So just what does it do?

Operating systems are the drudges of the micro world. They do everything that no "high-level" language would stoop to, and what users and programmers take for granted.

After all, while you play that mega-galactic adventure game, or turn in a really neat piece of programming, who is looking after the screen and the keyboard? It certainly isn't you, and neither is it Basic, which is pretty good at If . . . Thens and Gotos, but not so hot at keeping the VDU going.

All the while that the micro is running, the operating system is diligently looking after the housekeeping functions. It scans the keyboard for input, it keeps the screen ticking over, and if your system extends to the full glory of a disc drive, it handles all the problems of getting information in and out of that.

Notice how these are all very "low-level" functions. The operating system is dealing with basic things to do with the hardware. Just as Basic provides a nice comfortable cushion between you and all the complications of your micro, so the operating system insulates Basic from the harsh realities of the processor, keyboard, VDU and disc drives.

Apart from shielding you from gory silicon details, there are other advantages in having this invisible servant. For example, if a programmer writing in Basic wishes to transfer software to another machine, he or she only has to worry about how the Basic changes on a different machine; the actual details of the hardware are not important.

If the Basic itself had to deal with all the nitty-gritties of a particular machine, it would be irrevocably tied to that particular model. This would make program conversion even harder.

With an operating system separating the high-level language like Basic from the hardware, it is also possible to slot in different languages. Provided their "bottom sides" match the operating system, they can ignore the finer details of the hardware. This enables you to put more exotic languages like Pascal, Forth and Lisp on micros.

They then function in exactly the same way as Basic, with relatively comprehensive commands that let you write programs, and leaving all the messy details to the operating system which they communicate with rather than directly with the keyboard and VDU.

Disc drives are becoming increasingly common on even cheap home micros. Storing 100,000 bytes of information on a 5.25in. or 8.5in. piece of plastic is a tricky business, and the operating system associated with it is quite complex. It is also generally incompatible with other operating systems. The practical effect of this is that you cannot read Commodore discs on a BBC Model B.

If, however, you choose the right operating system to begin with, you may well be able to run software from quite different machines. This is because the programs generally only deal with the operating system, so if this is the same, there will be no effective difference as far as the software is concerned.

There is one standard operating system, rather venerable now, but nonetheless usable for that, which has been very widespread in general business and "serious" applications. This is CP/M.

CP/M was initially designed to handle all the hardware details of machines built around the Z-80 processor family. Thus any micro which uses this chip could, potentially, run under CP/M. This would then give it access to the huge pool of software already written for this system.

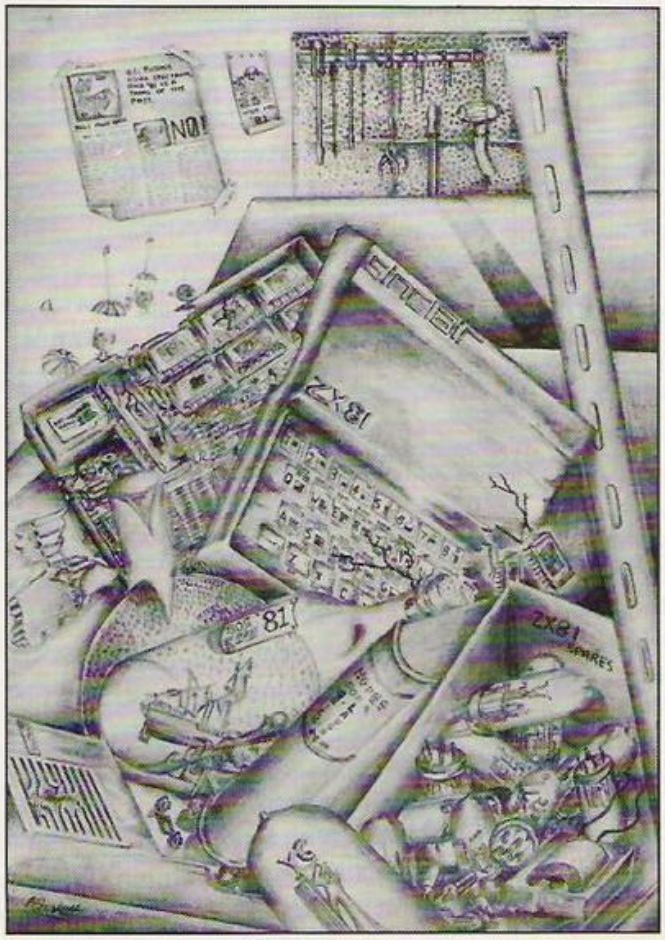
This is what the Amstrad and Tatung Einstein are designed to do. By running their discs under CP/M, they hope to tap some of this wealth of software which is already available. In this way they would leapfrog many of the problems of waiting for programs to appear on a new machine.

Normally the user is completely isolated from the operating system itself. The nearest you are likely to come to it is if you start programming in machine code. This effectively misses out part of the buffering effect of a high-level language. Instead, you talk directly to the main chip to get basic computational tasks carried out as quickly as possible.

You will, however, still have to deal with the operating system. This is because things like sending information to the screen or capturing data from the keyboard require handling in some way, and the operating system provides a quick and efficient way of doing this.

Normally the operating system is present on a special Rom chip supplied with the micro. Some systems provide it partly internally, which handles keyboard and VDU, and partly on a disc when a disc drive is added. This Rom is in addition to the Rom which often holds Basic. Sometimes the size and complexity of the operating system can cause problems, as with the QL.

Here, it proved impossible to cram all the operating system and the SuperBasic into the space available on the Rom chips. Hence the unsightly "kludge" — a small board with extra chips — that was stuck into a back socket on early machines. Mostly though, operating systems are so successful you hardly ever know they are there.



Drawing by Andrew Baskett

The Unicom Modem

- Auto Dial
- Auto Redial
- Auto Answer
- Auto Baud Rate Scan
- Full Duplex (300 baud)
- Half Duplex
- Bulletin Board Facility
- Number Memory Store
- European and U.S.A. Standards
- Complete with Power Supply Leads and Manual at a Breakthrough Price of **£49.95** EX VAT AND P & P.

We've taken the best components from the best suppliers and combined them to produce a modem with everything you could want. Modern manufacturing and quality control techniques have brought a breakthrough in price. Our philosophy is to pass those savings on to you and to recover our R & D costs across increased sales.

We've made the modem easy to understand and use, you don't need to know anything about baud rates or bits, simply plug in and talk to the world.

Features of the Unicom Modem include:

Auto Answer
Unicom automatically answers, then uploads or downloads data into your micro and printer just like a telex.

Auto Baud Rate Scan
When receiving, the modem scans the incoming data and selects the correct baud rate to receive.

Full and half duplex
One (full duplex) or two-way (half duplex) simultaneous transmission.

Full U.K. European and U.S.A. standards
V21 and 23, CCITT. Fully compatible with Termi, Communicator and other existing software.

BAUD RATES
300/300 1200/1200 1200/75 75/1200

Easy to Use
Complete with all leads, power supply, operating and reference manuals. Just plug in, no soldering required. Fits all RS232/423 interfaces. (State machine).

All major components are BT approved.

Technical Enquiries: Ring Barry Krite on 01 482 1711

Dealer Enquiries: Ring Mark Simon on 01 930 1612

Orders on Access/Visa: 01 482 1711

Software features of the Unicom Modem on ROM include:

BBC only. Electron, Amstrad, Commodore, Sinclair and IBM PC to follow.

Auto Dial Auto Redial
Redials automatically until connected.

Bulletin Board Facility
Start your own or contact all information boards throughout the world.

Printer Routines
Gives the facility to use your printer to record data in and out.

Software Commands
Commands like * Download * Dial * Answer etc. can be incorporated into your own software.

Remote Facility
* Remote enables you or your friends to dial and download or upload your micro from any other modem.

Reliable Transmission
Unique error correct protocol means you can send, store, and receive files and programs reliably with no transmission errors.

Two-Window Operation
Transmitted and received messages on your monitor at the same time.

The Unicom Auto Dial Disk
Use the Auto Dial Disk to store all your commonly dialled numbers – manually driven.

Unicom Limited, A joint Rushworth Dales – D.B. Enterprises Company 20 Orange Street, London WC2H 7ED.

To: Unicom Limited, 20 Orange Street, London WC2H 7ED. Please send me:

_____(Qnty) Unicom Modems at £60. Includes VAT and P & P (State Machine_____)

_____(Qnty) Unicom ROM's at £24. Includes VAT and P & P

_____(Qnty) Unicom disks at £4.95 includes VAT and P & P State 40_____ or 80_____ track.

I enclose cheque to the value of £_____Or debit my Access/Visa card no._____

Signature:_____ Name:_____

Address:_____

_____ Postcode:_____ YC

If you have anything of interest to tell us about your computer club why not contact us on 01-661 3144.

Local news

Guildford

The West Surrey Computer Club has changed its venue and now meets on the 2nd Thursday of the month at the Stoke Hotel, Guildford. They also run a BBC User Group which meets on the 3rd Friday of the month at the Guildford County College of Technology. The club caters for all interests and has regular illustrated lectures. Contact Jan Spencer on 0483-63512.

Newtownabbey

A White Lightning User Group is being formed in Co. Antrim for fans of the Spectrum games designer program. Do-it-yourself alien designers should contact Terry Kelly on 0232-51539, or write to him at 353A Merville Garden Village, Newtownabbey, Co. Antrim. N. Ireland.

Southampton

Southampton Amateur Computer Club has its main meeting on the second Wednesday of each month at the Medical Sciences Building, Basset Crescent East, between 7.30 and 10.30 pm. There is an active BBC group which meets at the Creastwood Centre on the last Friday of each month. Contact Paul Blitz on 04215-69050.

Crewe

The South Cheshire Atari User Group meets on the first Thursday of each month at the Earl of Crewe, Nantwich Road, Crewe. The club has over 30 members and costs £5 a year for adults, or £2.50 for children. Contact Mr. A. Davis, 48 Blagg Lane, Nantwich, Cheshire or ring 0270-626969.

COMPUTER *club*

Meirion Jones looks at how the major political parties use computer technology.

RED, YELLOW and blue, you can have any colour you like so long as it is a political computer club. Conservatives have the Conservative Computer Forum, Labour has the Labour Party Computer Action Group and the Liberals have Micro Lib.

The Conservatives started first, way back in 1978 when Michael Spicer, who is now Deputy Chairman of the party and MP for Worcester South, set up the Forum primarily to advise on technology policy in the run up to the 1979 election. But since 1981 the organisation has been more practical, giving seminars to Members of Parliament on the benefits of computerising their constituency organisations and helping local parties decide which computers they should buy and how to make best use of members' home computers.

Dr. Jeremy Bray MP, Shadow Spokesman for Information Technology, pictured here with Timothy Schoonmaker, Micronet's Managing Director.

At constituency level the CCF started off 1984 by recommending the Tycom computer, but after the problems that beset the company the Forum now has discount deals with Apricot and ICL. Gordon Ayres has set up a BBC User Group to help co-ordinate activity at ward level. In the summer Conservative students from Thames Polytechnic were sent into the backwoods of the Tory shires to preach the new technology testament.

It costs £5 to join the CCF which includes a subscription to the Forum's paper Micro News. Local Labour parties' finances rarely stretch to office-style micros although some have Apricots, but BBCs are the most common. The Labour Party Computer Action Group is particularly enthusiastic about Prestel and Micronet 800.

The membership fee for joining the LPCAG is £10 which includes a magazine called Proteus, regular news on Micronet and free access to software that was battle tested successfully in the Chesterfield bye-election which put Tony Benn back in Parliament. When LPCAG decided to open its Micro net 800 pages to the public last year British Telecom at first tried to stop it on the grounds that politics and religion should not be broadcast through Prestel.

But Jeremy Bray MP, the shadow spokesman on science and technology, objected on the grounds that Sir George Jefferson, BT's Chairman, "did not check the legality of such discrimination. To classify religion and politics with prostitution and crime while purveying share prices, exchange rates and the weather, betrays a singularly perverted view of society". At the 1984 conference the Labour Party used a BBC B to work out the results of the constituency votes for the National Executive Committee, the organisation which controls the party.

You can find out more about LPCAG from Roger Ward, Labour Party, 150 Walworth Road, SE17. The Conservative Computer Forum can be reached through Jenny Riley, Highfield, Church Road, Purley, Surrey and Micro Lib can be contacted on 0422-843785.

software that's hard to beat...

MSX
AMSTRAD
48K SPECTRUM

TASWORD TWO

The Word Processor ✸

"If you have been looking for a word processor, then look no further."
CRASH June 1984

"The number of on-screen prompts, together with the excellent manual, make it ideal – even for an absolute beginner."
PERSONAL COMPUTER WORLD September 1983

"Without doubt, the best utility I have reviewed for the Spectrum."
HOME COMPUTING WEEKLY April 1984

TASWORD TWO ZX 48K Spectrum £13.90

TASWORD MSX

The Word Processor

The Tasman Word Processor for MSX microcomputers.
All the features of the Spectrum version.

TASWORD MSX MSX Computers £13.90

TASCOPY

The Screen Copier

Screen copy software for Spectrum with Interface 1 and Amstrad CPC 464. Print high resolution screen copies (in a choice of sizes), and also large 'shaded' copies with different dot densities for the various screen colours. Tascopy supports all eight pin dot matrix printers with Epson type control codes, e.g. Epson RX-80 and FX-80, Shinwa CP-80, Mannesmann Tally MT-80, Star DMP 510/515, Brother HR5, and also Amstrad DMP 1 with the CPC 464.

TASCOPY ZX Spectrum £9.90
TASCOPY 464 Amstrad CP 464 £9.90

TASWORD 464

The Word Processor

The Amstrad implementation of Tasword Two plus many extra features.

TASWORD 464 Amstrad CPC 464 £19.95

TASMERGE

The Mail Merger

Transfer data from MASTERFILE to TASWORD TWO! Letters and forms typed on TASWORD TWO can be printed with addresses and data taken from MASTERFILE. The mail merge facility allows, for example, multiple copies of a letter to be printed, each containing a different name and address taken from your MASTERFILE data. To use TASMERGE you must have one or more microdrives as well as TASWORD TWO and MASTERFILE by Campbell Systems. (version 9 or later).

TASMERGE ZX 48K Spectrum £10.90

TASPRINT

The Style Writer

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. TASPRINT utilises the graphics capabilities of dot-matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic DATARUN to the hand-writing style of PALACE SCRIPT. TASPRINT drives all dot-matrix printers with bit image graphics capabilities and can be used to print TASWORD text files. TASPRINT gives your output originality and style!

TASPRINT ZX 48K Spectrum £9.90
TASPRINT Amstrad CPC 464 £9.90

TASWIDE

The Screen Stretcher

With this machine code utility you can write your own Basic programs that will, with normal PRINT statements, print onto the screen in the compact lettering used by TASWORD TWO. With TASWIDE you can double the information shown on the screen!

TASWIDE ZX 48K Spectrum £5.50

TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASWORD TWO. The cassette also contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Seikosha, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers. Compatible with microdrives and ZX Interface 1.

PRICE £39.90

TASMAN SOFTWARE

All prices include VAT and post and packaging.
Telephone orders: Leeds (0532) 438301

✸ Available from larger branches of Boots.

Tasman SOFTWARE

Springfield House, Hyde Terrace, Leeds LS2 9LN. Tel: (0532) 438301

If you do not want to cut this magazine just write your order and post to:
TASMAN SOFTWARE, dept. YC, Springfield House, Hyde Terrace, Leeds LS2 9LN.
I enclose a cheque/P.O. made payable to Tasman Software Ltd. OR charge my ACCESS number

NAME _____

ADDRESS _____

_____

VISA _____

COMPUTER	ITEM	PRICE
		£
		£
		£

Ouside Europe add £1 for each item airmail £ _____ TOTAL £ _____

Send me the FREE Tasman brochure describing your products. tick here: ☐
I would like to know more about your programs for:
ZX Spectrum ☐ MSX ☐ Amstrad CPC 464 ☐

HARDWARE hot list

Storage and retrieval of programs

SPECTRUM OWNERS are being faced with an ever increasing number of alternatives to the humble cassette. The three devices here all offer fast program storage at a reasonable price. The Sinclair Microdrive has been around for over a year now and has undergone various attempts to improve its reliability.

It has now appeared in a pack with the interface and some software called the ZX Expansion System priced at £100. The interface also has an RS-232 port and a network. The operating system is simple to use allowing programs and data to be saved on the Microdrive. Data is stored by opening a channel and then writing data to it. One drawback with the system is that some games cannot run with the interface attached, as the operating system will grab some of the Ram. The software comprises of the popular Tasword 2 word processor, a database, Ant Attack, Games Designer and a spare blank cartridge. The number of Microdrives can be linked up, each further drive costing £50. The cartridges cost £5 each and hold about 80K.

Along very much the same lines as the Microdrive comes the Wafadrive from Rototronics. The unit has two drives, RS-232 and Centronics ports and comes with two wafers and a word processor for £130.

Although noticeably slower than the Microdrive, this unit scores in several areas. It is said to be more reliable than the Microdrive and the operating system is more informative. The directory command gives more than a list of files like the Microdrive. The formatting command also gives a full report of the state of the wafer.

Unlike the Microdrive, it does not grab any workspace until initialised with a simple New* command. Also, should you wish to back-up a file from one drive to the other, you can do so without upsetting the contents of the memory. It saves data in a similar manner to the Microdrive.

In an attempt to make up for the slower speed, the wafers come in three sizes: 16, 64 and 128K. This obviously means that the average access time on the 16K Wafer will be lower. Thus you could load the main program from a 64K wafer in drive one, and have the data you wish to continually read and write on a 16K wafer in drive two. The wafers are also cheaper at under £4 each.

Moving away from fast tapes to discs, the Beta Disk Interface from Technology Transfer allows you to interface the multitude of disk drives available for the BBC to your Spectrum. One point to bare in mind though, if the drive uses the Beeb's power source, you will need to buy a power supply.

Having got over that hurdle, the system is fast, user friendly, and of course, at £1.50, the discs are much cheaper than wafers or cartridges. The DOS has all the usual commands you'd expect and you can switch it in and out as needed. It even has a disc password system to keep your software from prying eyes.

You also get a free utility disc with the system with the various utilities they didn't have room for in the interface's Rom. The interface can be used with single or double density, single or double sided drives, and up to four can be connected to the one interface.

The system's major limitation at the moment is that data cannot be loaded or saved on disc, but Technology Transfer promise a new Rom in the new year and will upgrade existing units. The interface costs £97.25 for single density and £109.25 for double density.

Which of these systems you go for really depends on your priorities. Although the Sinclair product is the cheapest, the cost of the cartridges makes it less competitive. The cheapest medium of all, are the discs at £1.50 each. If you've got a collection of 40 discs or so, then the disc drive will have paid off.

ADD-ON EXTRA

DK Speech

DK'tronics
Speech synthesiser
Amstrad
£40

Now speech is available for the Amstrad with DK's neat synthesiser which uses a so-called plain English entry system and also has text to speech capability — but don't expect too much. The SLO-256 chip based unit also incorporates a stereo amplifier to boost the volume compared to the internal speaker.

Phloopy

Phi Mag Systems
Stringyfloppy
Electron
£123 or less

Phi Mag's version of the tape disc compromise — stringyfloppies are high speed tape cartridges like Sinclair's Microdrive which is emulate discs — now available for the Electron at £114 if you have a Plus 1 and £123 if not. This is includes drive, interface, cables, manual and cartridge. The same pack costs £99 for the BBC.

MFD 700

Sharpsoft
Disc drive
Sharp MZ-700
£287.50

Sharpsoft's 180K single sided double-density drive comes with inbuilt disc controller and a disc Basic which is compatible with Sharp S Basic. In use it leaves 31K user-Ram free in the MZ-700.

Cobolt

Direct imports at ridiculous prices

NEW BASE-LESS JOYSTICK

£8.95

- Just tilt to operate.
- Single shot trigger.
- Auto-fire button.
- Use it single handed.
- No more wrist cramp.
- No more table suckers.
- Standard joystick connector.

BEST QUALITY DATA TAPES

Five professional C15 cassettes with Metal reels in a library case.

£2.85

Also a lower cost version, five jumbo plastic reel C15 cassettes in a library case

£2.35

COMPUTER DATA RECORDER

- For most home micros.
- 3 digit tape counter.
- Switchable monitor.
- Input, output, Din and remote sockets.

£19.95

Also a version for Vic 20 and Commodore 64. Powered and controlled by the computer.

£21.95

Not a modified Audio machine — A top quality computer data recorder.

All products have a full no-quibble guarantee.

Our Special Christmas prices include VAT and UK postage.

We have an expanding range of products — send a large SAE for latest lists.

Trade and overseas enquiries welcome.

To: **Cobolt Systems Ltd.**
37 Eastgate Pickering, YO18 7DU.
Tel: 0751-73315. TELEX 57812.

NAME: .....

ADDRESS: .....

.....

Please send me.....

I enclose: £

Star chart

Tapper

Commodore 64
Bally Midway
Arcade

★ ★ ★

Released through US Gold, this is the official computer version of the arcade game, and very good it is too. You are a bar man serving somewhat dubious drinkers who are in the habit of slinging their empty glasses at you, and, should you not serve them quickly enough, instead of waving fivers under your nose, throw you the length of the bar.

Things get progressively worse as the crush at the bar gets bigger. Good sound and graphics, fast and addictive.

Run for Gold

48K Spectrum
Hill MacGibbon
Athletics
£6.95

★ ★ ★

Any more of these Olympics follow-ups and we'll be calling this Software Sportlist. But this one's different — for a start you don't have to drum the keyboard or turn your joystick to jelly and the Pole Position style view up the track encourages a feeling of realism.

The skill lies in balancing your speed against your reserves of energy. It's so real I was even tripped up Zola Budd style.

If you are in a really talented mood you can try your hand at the triple — 400, 800 and 1500 metres all in one day.

Strontium Dog

48K Spectrum
Quicksilva
Arcade adventure
£6.95

★ ★

Do not be fooled by Quicksilva's packaging and the fatuous blurb — although eminently playable this game is scarcely original. You will need to make a map and solve a few problems but otherwise it is simply a matter of travelling from room to room and blasting away.

SOFTWARE Shortlist

Knight's Lore

■ *Spectrum*
■ *Ultimate Play the Game*
■ *Arcade adventure*
■ *£9.95*

★ ★ ★ ★ ★

QUITE SIMPLY the most enjoyable game I have played since International Soccer on the Commodore 64.

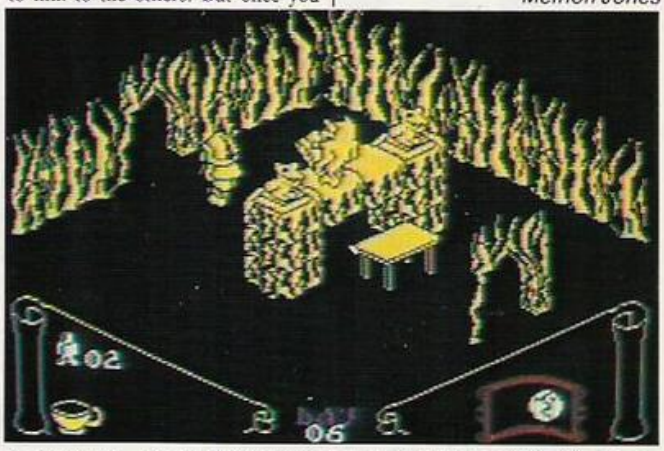
Imagine Atic Atac in three dimensions and you will have some idea of what Ultimate's latest blockbuster looks like — but what makes Knight's Lore so different is the feel of the game. You have 40 days to complete your quest.

Under attack from manic ghosts, plodding guards and killer balls you have to pick up treasures, get over apparently insuperable barriers — usually by dropping treasures as stepping stones or moving around handily placed tables — make the best use of mysteriously moving blocks and map out the maze. People have been talking about arcade adventures for years but this is the first that requires good arcade skills and presents a series of problems to be solved within a satisfying whole.

On screen your explorer — or werewolf as he turns into by night — seems to have a life of his own. At first it can be very frustrating as the computer starts you off in different parts of the maze none of which seem to link to the others. But once you make the connections and realise it is all set out on a 16×16 grid it begins to look solvable.

Yet again the feeble excuses software houses have been making for the weak games produced have been shown up by Ultimate.

Meirion Jones



3D Grand Prix

■ *BBC B*
■ *Software Invasion*
■ *Racing Simulator*
■ *£9.95*

★ ★ ★

FOR THREE years now, Pole Position has been regarded as the best motor racing simulator going. Now that Atarisoft have belatedly got around to converting it for the BBC, the program finds itself faced with very stiff opposition indeed from this program. What Dave Mendes and Mick O'Neal have done is to take the best features of Pole Position and go a stage further.

Although a great game, the old classic could not really be considered a simulation. Even Nicky Lauda never whizzed past the opposition in such easy style, on a good race you could pass over a hundred cars. Grand Prix puts a little fire in the bellies of the opposition, who now have no qualms about blocking your way very effectively; now getting in the lead and staying there becomes the challenge. There is also a complete gearbox as well as accelerator, brake and steering.

The game also avoids the pitfall of Chequered Flag, all these functions are accomplished with just five controls, so it is quite possible to keep the motor on the road with just a keyboard.

The graphics are excellent, with moving background, road markings, instruments and of course the other cars. The only criticism on this score is that the other cars do seem to approach rather quickly. The instruments are easy to read with a simple gear iondicator, speedo, rev counter and temperature gauge. The sound effects, consisting of the usual engine sound and the occasional — you hope — crash effect were a little on the loud side, but perhaps this is to induce driver fatigue — or at least ear ache — in a big race.

Our old friends the trackside signposts are still there for all the overtake on the grass freaks, but unfortunately they have rather shrunk so you can't easily see them coming.

Pole Position has retained its popularity for a long time and this successor will too. It is more demanding, requiring greater skill and patience.

Lee Paddon

(continued on page 57)

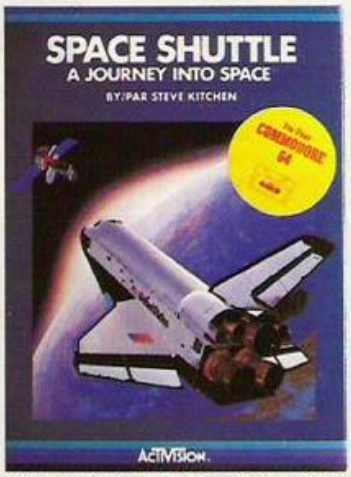
The Activision Eight.

Pitfall Harry has to recover the priceless Raj Diamond from the lost caverns. But there is a small matter of poisonous frogs. Albino Scorpions. Vampire Bats. Electric Eels. Need we go on?
Running on Commodore 64, MSX, and Spectrum

Miners are trapped deep underground. Threatened by molten lava, poisonous bats, snakes, spiders. You alone in the person of Roderick Hero – Helicopter Emergency Rescue Operation – can help.
Running on Commodore 64, Spectrum, MSX

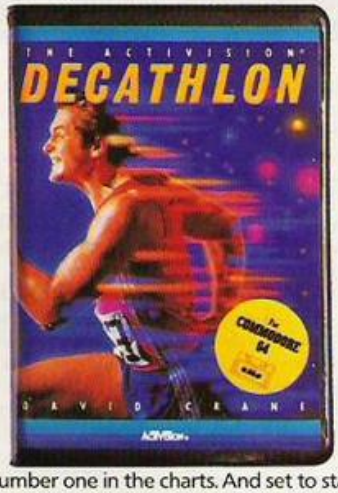
And you thought it was just a movie. But Ghostbusters is a computer game, too. Following the film with incredible accuracy. Even down to the chart topping music score.
Running on Commodore 64 and Spectrum. Soon on other systems.

With the Designers Pencil, you can draw the world – and everything that's in it. Write your own melodies. Learn to write and develope your own programs. Its scope is as broad as your own mind.
Running on Commodore 64 and Spectrum



Man's ultimate journey. You can make it, in faithful detail, from lift-off, through an outer-space rendezvous, to landing. A genuine test of your inner strength.
Available soon for Commodore 64 and Spectrum

Stay cool. Stay low. Stay alive. Your mission is to fly down the world's most heavily defended river, destroying everything the enemy hurls at you. But beware... your fuel tanks are nearly dry.
Running on Commodore 64, Spectrum, MSX



Number one in the charts. And set to stay there. Decathlon asks for total commitment. Speed. Strength. Stamina. The will to win.
Running on Commodore 64

Merton the maintenance man is set for yet another routine night in charge of the toy factory. But something has gone terribly, terribly wrong.
Running on Commodore 64. Soon on Spectrum

Eight very different titles with one thing in common.

The Activision touch of gold.

For more details contact Activision (UK) Inc, 15, Harley House, Marylebone Road, London NW1.

ACTIVISION.
Your computer was made for us.

Star chart

Backpackers Guide to the Universe

Spectrum 48K
Fantasy Software
£7.50

★ ★

A real Hitch-hiker's Guide to the Galaxy game is rumoured to be on the way from Douglas Adams. Fantasy have made an attempt to cash in on a cult — but the game and the name are mutually irrelevant. No jokes, primitive sub-Atic-Atac graphics. More complex than previous "Ziggy" games.

Havoc

CBM-64
Dynavision Productions
Shoot-'em-up
£9.95

★ ★

Graphics on the cover of this game are taken from the 64 version. This is highly misleading. Very bad use of blue and white in the Spectrum version renders this Zaxxon-type game hard on the eyes and exasperating to play. I would have raved about it two years ago.

Snow Queen

Dragon 32/64
Cambrian Computersolve
Puzzle
£5.95

★ ★

You have to save Kay from the icy grip of the Snow Queen. You do this by trying to pick out letters hidden in a frosty maze to spell the word "Eternity".

A.T.R.A.M.

Spectrum
Miles Bozeat
Wargame

★

First in a new generation of computer wargames. A rather boring board game is made even more tedious by having to enter the moves into the computer. The computer is used as a bookkeeper, the same function could be accomplished with a piece of paper and a pencil.

(continued from page 55)

SOFTWARE Shortlist

Ghostbusters

■ *Commodore 64*
■ *Activision*
■ *Sweep'em-up*
■ *£10.99*

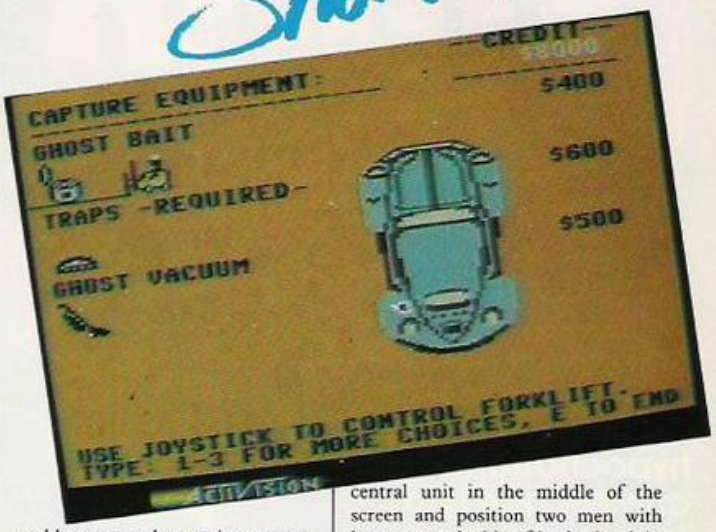
★ ★ ★ ★

"HEH-HEH-HEH! GHOST-BUSTERS!" the computer yells at you when it has finished loading. If there was as much controversy about this game as there has been about the theme music to the film — song-writer Ray Parker Jr is being sued by two different people who claim he plagiarised their music — then I suppose you would describe it as "spirited".

The real strength of this game is the music. I have never heard such a remarkable implementation of a popular song on a home computer before. It puts to shame all the tired, weedy snatches of something or other you usually have to put up with — and actually adds to the enjoyment of the game.

First, you have to outfit your ghost-catching car with things like energy detectors, image intensifiers, marshmallow sensors, ghost vacuum, ghost traps, ghost bait and a laser confinement system. You have to search for, catch and store ghosts and you can literally turn your demons into dollars. It's like a sort of Pac-Man in reverse where you chase the ghosts.

The screen display shows a maze map of New York. Afflicted blocks shine red. You direct your Ghostbusters symbol to the block. Take the shortest route possible because the screen changes to a top view of your car cruising along the highway, vacuuming up any of the ghosts you froze en route to the trouble spot on the previous screen.



There are one or two things insufficiently explained in the on-screen instructions — sometimes it says things like press space when it means press Return, and if you don't collect any traps when you're outfitting the car the game falls into a kind of loop which might lead the unwary to think they had purchased a faulty copy. Most of these problems can be overcome by examining the minute instructions minutely and using a little horse sense.

Another part of the action necessitates positioning the laser confinement system to catch Slimers. Using the joystick, you drop the central unit in the middle of the screen and position two men with lasers on each side of it. At the right moment you can suck down the spectre; if you miss, it attacks one of the men who cries out pathetically "He slimed me!"

Finally, you can sneak two Ghostbusters into the Temple of Zuul for the final battle.

If you are successful in this uniquely American commercialisation of the spirit world, you get your own Ghostbusters franchise and a secret number which you can use the next time you play the game. Apparently you can use this number on any version of Ghostbusters anywhere in the world. Eerie, huh?

Paul Bond

Travel with Trashman

■ *Spectrum*
■ *New Generation Software*
■ *Sweep'em-up*
■ *£6.95*

★ ★

GARBAGE IN, GARBAGE OUT, as we used to say at break — but Travel with Trashman is a worthy successor to the first Trashman game although not as visually revolutionary as some of the computer games we have looked at this month.

The first screen shows all the cities of the world that Trashman can travel to — but it all costs money. You can travel to America, Spain, Paris, Munich and finally, Jerusalem.

In Paris you have to collect a load of tiny bouncing green dots which are meant to be frogs loose in a cafe. If you bump into a waitress while endeavouring to recapture the rogue amphibian appetisers you lose points. In New Orleans you have to gather up money thrown at a marching jazz band, in Munich you collect the empties after a beer festival.

The deadliest early job is in Spain — and Trashman is not even a football supporter. To show their appreciation of British sanitary technology the Spaniards get Trashman to pick up roses in a bull-ring — while the bull is still in it. A news report about Trashman being killed in Spain is mysteriously followed by the information that you are stranded there without money.

If you do get Trashman to Jerusalem, his job is to mop up tears at the Wailing Wall. So, if you missed giving this game to someone for Chanukah, there's always the Jewish New Year. But I think New Generation are going to have to put in a lot of work on their graphics and brush up their ideas for games if they're going to keep ahead of some of the excellent stuff being produced by companies like Ultimate Play the Game, US Gold and Beyond Software.

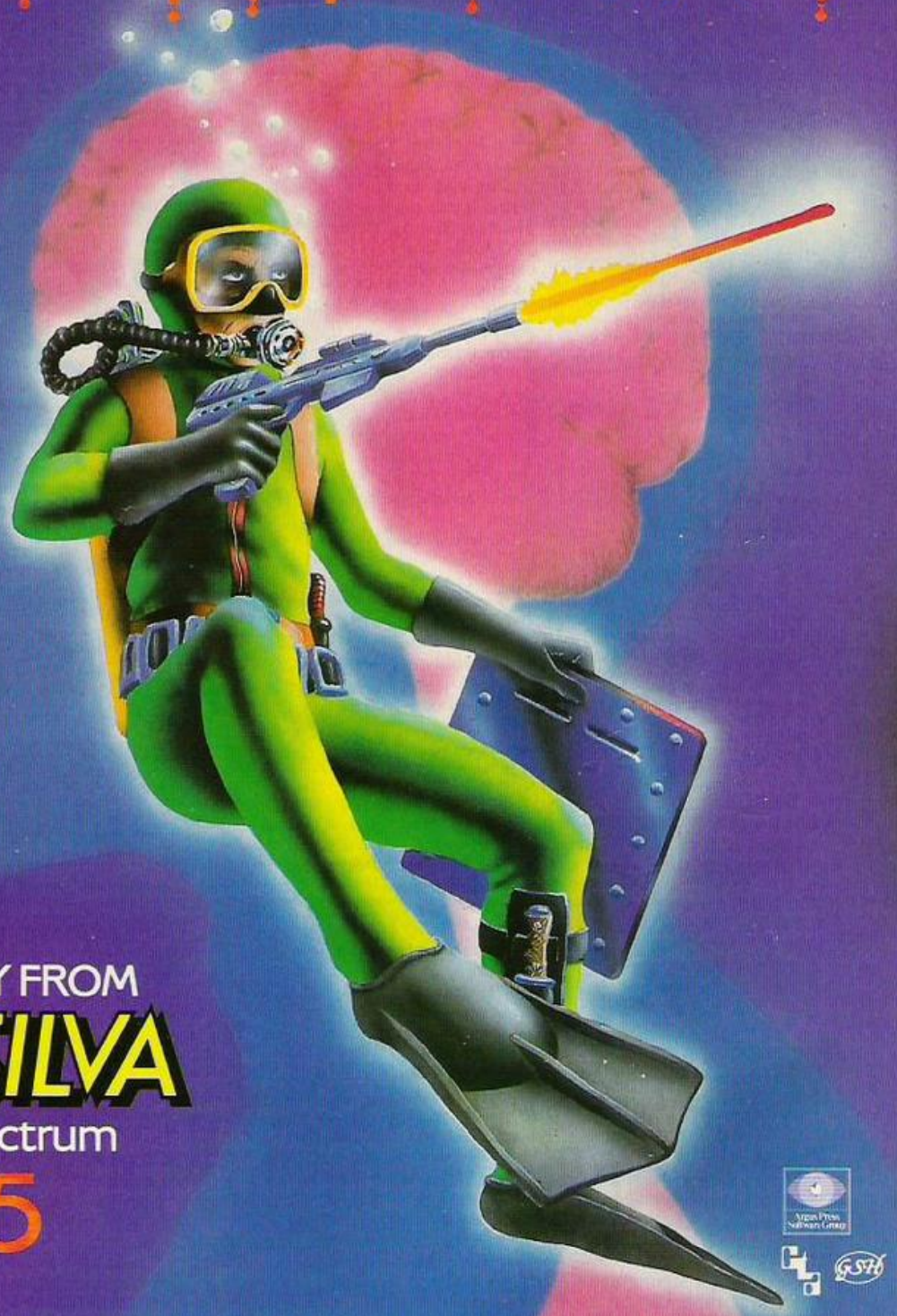
Paul Bond

(continued on page 59)

A fantastic fight to the death within your own bloodstream...

Blood'n'Guts

...Through the miracle of Dr Hackers REDUCTO-RAY you find yourself inside the body of a very sick hypochondriac Your only escape is to reassemble your submarine which has broken into eight pieces and distributed itself around the body. Not for the weak at heart!



MICRO-SURGERY FROM

QUICKSILVA

on the 48K Spectrum

£6.95

Quicksilva Mail Order, P.O. Box 6, Wimborne, Dorset BA21 7PY.
Telephone (0202) 891744.

Access BARCLAYCARD VISA

Selected titles available at:
WHSMITH Boots WOOLWORTH John Menzies
and leading multiple retailers and specialist computer stores.

Star chart

Psi Warrior

Commodore 64
Beyond
Shoot-'em-up
£9.95

★ ★ ★

The Psi warrior travels on his psi mat in the enemy silos, going to confront The Source. Nice bit of atmospheric setting, but it is really just a shoot-'em-up type maze game. The graphics are very nice even if the ethereal baddies are kind of odd sploges on the screen.

Espionage

Spectrum and Commodore
Modular Resources
Adventure
£8.95

★

You have to catch the mole in your oil company before he gives away the company secrets. You do a Bobby Ewing impersonation — this is done by answering questions of a petrochemical nature and sussing out which of the people asking the questions is the phoney.

Crypt Capers

BBC B
Software Projects
Maze
£7.95

★ ★

Utterly unorigional maze game on the now familiar Egyptian theme. There are 12 screens to complete before you reach the Pharo's chamber. On the way you have to collect such items as keys, jars and papyrus roots while shooting or avoiding a variety of nasties.

Valkyrie 17

Spectrum 48K
Ram Jam Corporation
Adventure
£9.95

★ ★ ★

A graphics text adventure tracking down Nazis who, as they are wont to do, are busy trying to take over the world. A few enigmatic clues are provided by the packing and a soundtrack on the cassette. Plenty of humour and terrible German accents.

(continued from page 57)

Raid Over Moscow

■ *Commodore 64*
■ *US Gold*
■ *Shoot-'em-up*
■ *£9.95*

★ ★ ★ ★

GOOD GAME, SHAME ABOUT the propaganda. Raid over Moscow has some excellent graphic sequences which make Zaxxonesque games appear relatively flat. Sadly, the scenario is set in the near future, just after the Salt IV arms reduction agreement between the US and the Soviet Union. Since Americans can't even get the past right — witness the "Royal Marine Spitfire"(!) in US Gold's Spitfire Ace, or the World War One RAF(!) biplane in Atari's Blue Max, we can hardly place much faith in their perception of the future.

You are the commander of the only fully operative US space station carrying Stealth aircraft — undetectable by radar. Both countries are supposed to be dismantling their nuclear stockpiles but, because the Soviets can't keep up with the new defence technology, they have hung on to a few old warheads for a rainy day. Inflamed by watching John Milius moves like Red Dawn, they decided to launch a sneak attack.

"The Soviets believe their treachery will lead to world domination", it says on the inlay. However, instead of invading Grenada or some underequipped South American democracy you, the Yank, decide to strike at the very heart of the Russian bear himself.

First screen shows the missiles leaving their bases in Minsk or Saratov and wending their way to Miami or even nuclear-free Montreal. It tells you how much time you have left to save the world. The second screen shows you the space-station hangar. You have to hit a key to get the hanger doors open as well as manoeuvre the Stealth craft with your joystick but it is an excellent 3D representation, with the pilot tromping determinedly to his ship like Sam Shepard in the Right Stuff. Unfortunately, before I discovered the key I wasted a few goes trying to fly into the pilots' locker room.

Once you've got a few ships into space — and one or two into the officers' mess — you are in a position to confront the armed might of those sneaky Reds.

Beach-head-style you return to the first screen and position the cursor over the attacking city. Then you go into low-level attack. There are three screens of Zaxxon-style action where you fly over farmhouses shooting up schoolbuses, into Siberian wastelands blasting pillboxes — very tedious screen, this — and around command posts with tanks and lorries.

Your aircraft casts a shadow — the Russian ones don't; perhaps that's as far as their Stealth technology could get — but you can bank and veer to your heart's delight. Ground vehicles are very convincing indeed.

The final screen is a kind of shoot-out in Red Square where you zap armoured vehicles with a bazooka.

Essentially a suite of games rolled together in one scenario, one can only say that it is a pity that such an apalling scenario was chosen. It is dangerous because it assumes that the Russians are evil — it is one thing for school children to knock hell out of a fictional enemy it is quite another to ascribe subhuman characteristics to a real people, with a real history and culture.

US Gold are very smug about this issue, saying essentially that no publicity is bad publicity: but like old man Reagan keeps repeating; "You ain't seen nothin' yet."

Paul Bond

SOFTWARE Shortlist

Cyclone

■ *Spectrum 48K*
■ *Vortex Software*
■ *Rescue game*
■ *£6.95*

★ ★ ★ ★

HELICOPTER GAMES are all the rage at the moment what with combat Lynx and Tomahawk — even Fort Apocalypse. But Cyclone from the people who brought you Tornado Low Level is a breath of fresh air. It has the excellent 3D graphics of TLL, with a much more praiseworthy motivation for the action.

You control a helicopter which has to recover medical supplies from islands in the path of an advancing cyclone. The screen display gives you a god's-eye view of a helicopter crouching on the pad. Press I to take off, O to P to rotate. The right-hand side of the screen shows your altitude, fuel, speed and direction — by pressing M you can call up a map which shows you the islands, the cyclone and a real-time plot of where you are.

Naturally, the air is full of planes fleeing the oncoming cyclone so watch out you don't collide with them. Your helicopter also becomes difficult to control as the windspeed strengthens. As you wrestle with the controls, the urgency of your mission is emphasised by the pathetic figures below you, waving for help. Unlike Choplifter, the pathetic figures don't seem to leap into your egg-beater when you put down but the goal of this game is to find five crates of

(continued on page 61)

KERNOW SOFTWARE SERVICES LTD

NOW BRITAIN'S LEADING SOFTWARE LIBRARY WITH THE **NATIONWIDE** SERVICE THROUGHOUT THE U.K. IS OFFERING YOU THE CHANCE OF **LIFE** MEMBERSHIP FOR ONLY **£5.**

- Low cost weekly hire of Arcade Games, Adventures, Utilities, Languages, Compilers & Business Programs.
- Program hiring from only 80p (plus p&p).
- Postage & packing costs include postage both ways, simply affix the pre-paid label provided on the package and pop it into your nearest post box — no need to visit your post office.
- New titles constantly being added monthly.
- Purchase new programs at discount prices.
- Return of post service using first class post.

AS SEEN ON TV

JOIN today by clipping the coupon below or send £1.50 for a copy of our hire lists (refundable upon joining) and see why more **SPECTRUM/COMMODORE 64/ELECTRON/VIC 20/BBC** owners are joining The Kernow Software Library.

☐ Yes, please enrol me as a member of The Kernow Software Library and rush me by return of post, my hire list & selection sheet. I enclose my Life Membership Fee of £5.00.

☐ Please send me your Hire Lists. I enclose my £1.50 (inc p&p) which I understand will be refunded to me upon joining.

Name .....

Address .....

.....

.....

..... Post Code.....

I OWN A ☐ SPECTRUM ☐ COMMODORE 64 ☐ ELECTRON ☐ VIC 20 ☐ BBC

Send to:

KERNOW SOFTWARE LIBRARY
(DEPT YC)
SOMERSET PLACE, STOKE
PLYMOUTH, DEVON PL3 4BB

PERSONAL CALLERS WELCOME

COMPUTER LINK

CONNECTORS IDC

	Card Edge	(Transition) PCB	2 Row Socket
10-way	£1.20	£0.85	£0.80
14-way	–	–	£0.90
16-way	£1.60	£1.20	£1.00
20-way	£1.90	£1.35	£1.20
26-way	£2.40	£1.60	£1.45
34-way	£3.10	£1.95	£1.60
40-way	£3.40	£2.00	£1.85
50-way	£3.85	£2.25	£2.00
60-way	£4.80	£2.60	£2.25

IDC SHROUDED HEADERS WITH EJECTING LOCKING ARMS

	Straight	Right Angle
10-way	.85	.90
14-way	£1.00	£1.20
16-way	£1.25	£1.45
20-way	£1.40	£1.60
26-way	£1.70	£1.95
34-way	£2.00	£2.30
40-way	£2.15	£2.45
50-way	£2.30	£2.65
60-way	£2.45	£2.85

IDC D CONNECTORS

	Male	Female
9-way	£2.70	£3.20
15-way	£3.20	£3.70
25-way	£3.80	£4.45
37-way	£5.90	£6.80

IDC AMPHENOL (Centronics)

36-way plug	£4.95
36-way socket	£5.95

PRINTER LEADS

ALL 1 METRE LENGTH

BBC	£9.95
BBC serial	£8.95
AMSTRAD	£16.75
MEMOTECH	£12.75
SINSTEIN	£12.75
IBM PCC	£15.95
SPECTRUM interface 1 to RS 232	£9.76
SPECTRUm interface 1 to Centronics	£10.75
CENTRONICS to Centronics	£15.20
DRAGON	£9.95
QL	£10.75

COMPUTER LEADS

Dual disk drive 1m	£10.25
Single disk drive 1m	£7.25
7 pin DIN plug to 2x3.5mm 1x2.5m Jack plugs	£2.25
5 Pin DIN plug to 2x35mm 1x2.5mm Jack plugs	£2.20
6 Pin DIN Plug to 6 Pin DIN Plug	£1.95
2x3.5mm Jack plugs to 2x3.5mm Jack plugs to	£1.25
7 Pin DIN plug to 5 pin DIN plug	£1.95
7 Pin DIN Plug to 3 pin DIN plug and 2.5mm Jack plug	£2.25
7 Pin DIN plug to 7 Pin DIN plug	£2.25
5 Pin Domino Plug to 5 pin Domino plug	£1.95
Phono Plug to Coaxial TV Aerial plug	95p

D CONNECTORS

Solder Bucket	Male	Female
9-way	.75	£1.00
15-way	.95	£1.50
25-way	£1.50	£1.90
37-way	£2.40	£3.25
HOODS .95		

RIBBON CABLE (Price per ft)

	Grey	Rainbow
9-way	.13	.24
10-way	.15	.28
14-way	.18	.32
15-way	.20	.36
16-way	.22	.40
20-way	.30	.50
24-way	.36	.60
25-way	.40	.65
26-way	.45	.70
34-way	.60	.80
37-way	.65	.85
50-way	.70	.90
50-way	.95	£1.25
60-way	£1.10	£1.40
64-way	£1.15	£1.50

DIP HEADERS

Pins	
14	90p
16	£1.00
24	£1.40
28	£3.95
40	£2.15

EDGE CONNECTORS

2x23-way (ZX81)	£1.85
2x28-way (Spectrum)	£2.10
2x6-way VIC20/64	£1.20
2x12-way	£1.60

DOUBLE SIDED PLUG BOARDS

ZX81 23-way	£1.25
Spectrum 28-way	£1.50

TELEPHONE CONNS

Surface master jack socket	£3.75
Surface extn socket	£2.50
Dual outlet adaptor	£4.25
Line jack cord 3mtr	£1.85
BT jack plug	48p
4 core cable per metre	15p

All surface units shuttered BT approved.

MONITOR LEADS

BBC 6-pin to start plug	£4.95
BNC plug to phono plug	£2.95
QL to colour monitor	£4.95
QL to mono monitor	£1.25

BBC JOYSTICK DELUXE
JOYSTICK for BBC MICRO. Fits directly into BBC Micro analogue port

£12.95

SPECTRUM EXTENSION LEADS

6 inch extension calbe M to F	£10.50
6 inch M to 2 F's	£14.75
12 inch extension cable M to F	£10.75

Other conviguarations made to order
Write or phone for quote

CUSTOM ASSEMBLIES

ANY COMBINATION OF IDC & RIBBON CABLE LEADS MADE TO ORDER

TRADE ENQUIRIES WELCOME

Please add 15% VAT *Free p&p C.W.O. or use*

COMPUTER LINK, Dept YC1, PO Box 1, Ware, Herts.
Telephone: 0920 5285

CENTRONICS PRINTER INTERFACES

ZX | QL

£39.95
Plugs directly into RS232 port on ZX INTERFACE

£39.95
Plugs directly into SER1 port on SINCLAIR QL

- 12 month guarantee
- 14 day no-satisfaction full refund guarantee
- Plug directly into any CENTRONICS compatible printer
- Includes 3 metre cable
- No software necessary
- No extras needed
- Fully compatible with all software
- No adjustments or set-up required
- Prices include p&p and VAT
- ACCESS or Cash With Order
- Adaptor to upgrade ZX version for use with QL — £7.50 inc.

Please send orders to:

MIRACLE SYSTEMS LTD
AVONDALE WORKSHOPS
WOODLAND WAY
KINGSWOOD
BRISTOL BS1S 1QL
Tel: (0272) 603871 Ext 210

ZX, SINCLAIR and QL are Trade Marks of SINCLAIR Research Ltd

Star chart

Know your Psi-Q

BBC B/Electron
Mirrorsoft
Novelty
£9.95
★ ★
Provides five simple games, which purport to test for clairvoyance and precognition, together with questionnaires which assess your psychic potential. If, like most of us, you turn out to have no psychic ability you will find the games dull and frustrating.

The questionnaires brand believers as sheep and sceptics as goats but you might also feel a bit goatish about whether computers are at all suitable for testing psychic abilities.

Fall Guy

Spectrum 48K
Elite
Arcade
£6.95
★ ★
Ever wanted to be a TV stuntman? Well now's your chance. If the job is anything like the game then don't bother. It consists of jumping off variously shaped objects, and with a bit of luck falling on another similarly shaped object. You have five "takes" to make 20 successful leaps, complete the screen, and, you've guessed it, you get something else to leap off. All this is done against the clock as the films budget runs out. Nice graphics, shame about the game.

P.C. Fuzz

Commodore 64
Anirog
Beat-'em-up
£7.95
★ ★ ★
Our friendly neighbourhood flatfoot is having a tough day. Not only are there the usual punks and drunks to deal with in his usual caring manner, but the mafia has come to town and intends to clean up in the bank minding business. All this and only a monocycle and a truncheon for protection.

(continued from page 59)
medical supplies.

You can switch from a North view to a South view when searching for crates. You hover directly over a crate to winch it aboard, and refuel at nearby landing pads to keep flying.

You have to land very gently indeed and his can be tricky when battling headwinds.
Paul Bond

SOFTWARE Shortlist

Mr Ee

BBC Micro
Micro Power
Arcade
£6.95
★ ★

THE MOST NOVEL thing about Mr Ee is its title. Unfortunately, there is no mystery about the game itself which is yet another version of the arcade game Dig Dug. In other words it is one of those games where you have to dig tunnels through the earth and collect desirable objects. In pursuit is a pack of hostile creatures which you can crush by dropping apples on them.

Mr Ee is, admittedly, a highly refined version of the game with 12 different screen layouts, excellent graphics, and a maddeningly jaunty fairground tune. If you choose to fight rather than flee, as an alternative to dropping apples you can release a crystal ball. This carries on bouncing along the tunnels until it hits something.

There is also a larger cast of creatures than usual — Umphs, Diggers, Letter Monsters, and Maras. When you eat a lump of food the Maras troop on to the pitch as the Umphs and Diggers freeze. But the game is still Dig Dug for all that.

It is a pity Micro Power did not give the action a more original twist. US Gold's superb tunnelling game. Boulder Dash — for the CBM-64 — takes up where this game leaves off. And once you have played Boulder Dash you won't dig Dig Dug no more.
Simon Beesley

Battle through time

Commodore 64
Anirog
Shoot-'em-up
£7.95
★ ★ ★

TRUNDLING ALONG in a rather innocuous looking armed, all terrain vehicle, your mission is to help mankind with the wholesale slaughter of his enemies. Whose side you're on isn't actually specified. Anyway, you have travelled back through time and your first job is to wipe out biplanes in World War 1 without getting bombed or falling into bomb craters.

Every so often artillery appears on the ground which gives you bonus points provided you run over it. You have vertically and horizontally firing runs to kill the enemy in the sky and shoot at rocks barring your way on the ground.

After you have survived 10 miles of this — indicated on a panel at the bottom of the screen — you are teleported into World War 2 in which a similar scenario ensues.

Another 10 miles and you are pitched into the heart of the battle in Korea with enemy jets firing rockets at you to the accompaniment of the theme from Mash. Next, you find yourself in Vietnam where helicopter gunships are dealing the proverbial death from the skies. Survive this and you must help to win World War 3. Blue clouds fire bolts of lightening at you and black crab-like craft do their best to scatter your component parts. Having survived this mayhem, mushroom clouds sprouted all over the screen and I was told that I was responsible for the destruction of the planet — a heavy burden to bear. However, I got the chance to redeem myself by fighting war mutations.

The last screen I reached was "In the beginning ????BC" with pterodactyls swooping down and little men on the ground throwing spears, boomerangs and clubs — yes, my armed, all terrain vehicle was even threatened by these primitive weapons. Anyway, the idea is to kill the men but not the pterodactyl — it can only be frightened away by firing at it before it reaches the ground so that it goes various shades of puce and retires in disgust.

The game has lots of different music to go with each screen as well as a high-score table, two-player option, two skill levels and a continuous play facility.
Ian Vallely

(continued on page 63)

AFGHAN ATTACK

A 96K PURE TEXT MACHINE CODE ADVENTURE FOR THE 48K SPECTRUM (IN TWO PARTS)

A large build up of Soviet troops is forming on the South Eastern Pakistan border, with probable hostile intentions. Troops and supplies travel the fragile Eastern Kabul road through unoccupied territory. Your role is to disrupt these troop movements, harass supplies and prevent the Soviets from attaining their objectives. You have British Paratroopers; ground to air missiles for attacking their airfield and destroying helicopters; plus rebel guerillas to lay ambush on troops and convoys.

Please send me ..... copy(ies) of 'AFGHAN ATTACK' at £9.95 each. I enclose a cheque/P.O. made payable to 'Southern Software' to the value of .....

Name .....

Address .....

.....

.....

.....

SOUTHERN SOFTWARE, 6 The Hillway, Fareham, Hants. PO16 8BL.

Star chart

Zen Assembler

Amstrad
Kuma
Utility
£19.95

★ ★ ★ ★

One of the best assemblers available, Zen has been around for some time on a variety of Z-80 micros. This version also benefits from an excellent disassembler which provides labels, and a full machine code monitor with the facility for inserting breakpoints.

Styx

Oric/Atmos
No Mans Land
Arcade

★ ★

Four screens of swooping aliens to annihilate. Mines are dropped which can impede movement. Fast and noisy but rather unoriginal, addicts only.

Drelbs

Commodore 64
US Gold
Arcade/Strategy
£9.95

★ ★

At first sight the screen looks like a multi-coloured printed circuit board made up of gates which you can rotate to form squares. But then you notice the traditional video nasties — refugees from so many other games in hot pursuit.

With skill you can box them in and if you complete enough squares go on to another screen. If it had appeared in the summer of 82 it might have earned rave reviews, but in 1985 it looks a little bit tired.

Zombie Zombie

Spectrum 48K
Quicksilva
Novelty
£6.95

★ ★ ★

A new game from the author of Ant Attack, which uses the same superb 3D effects. Once again you find yourself roaming around a ruined city, now fighting off zombies rather than ants. This time you can also fly over the city in a helicopter, pick up and transport bricks.

(continued from page 61)

Underwurlde

Spectrum 48K
Ultimate Play The Game
Arcade adventure
£9.95

★ ★ ★ ★

DROPPING INTO the Long Dark Palace on your way to freedom is just about as easy as negotiating a no-strings-attached pact with the devil. It could be well into 1985 before you have developed enough gremlin-zapping skills, a detailed knowledge of Underwurlde's vast labyrinth and tempered all that with a good deal of luck.

Underwurlde is an arcade adventure in the classic Ultimate mould. As in the horror movie *The Amityville Horror*, your sabreman's house seems to be a bijou residence in need of some modernisation — it's been built over a gateway to hell. Instead of rising damp, your basement is seeping all sorts of nasties, up for a night out from the Well of Evil.

With noisy neighbours like that, you can probably guess that escaping is not easy, especially as you have to go down to the devil's lair in order to climb up again to freedom.

You have a side-on view of the action, unlike Knight Lore's 3D angle or Atic Atac's ceiling perspective. So if you miss your footing you can watch as your man tumbles past gallery after gallery to his death. The correct technique to use if you don't want to squander valuable lives in the early part of the game is to lower yourself down by rope and rise up again on the giant bubbles of inert plasma. Magic gems make you invincible for short periods so they are worth grabbing whenever you can.

Weapons are absolutely indispensible if you want to make any progress at all. The catapult you find at the very start of the journey will only take you so far; you'll need daggers to cut your way past the guardians of the nether reaches of the Underwurlde.

Toby Wolpe

SOFTWARE Shortlist

Interview

Commodore 64
Front Runner
Arcade Adventure
£7.95

★ ★ ★

PART OF THE new wave of three dimensional maze-style games on the Commodore 64, Interview has that secret ingredient — added Hungarian programmers — which seems to be the touchstone of success for so many new computer games in Britain today.

The game is a race against time. You must reach a job interview punctually. Unfortunately, your journey to the office is dogged by disaster. The first screen shows a close-up, rear view of our hero walking down the street. Using the joystick, guide him around open manholes, banana-skins, dogs, pedestrians and out of the path of falling flowerpots.

The second screen shows an aerial view of the city. You must guide the interviewee from the bank where he has presumably just cashed his dole cheque to the site of the interview. The money is important, because you may have to repair your tarnished image, once the dogs and what-have-you have all had a go at you.

It is possible to waste your money — most significantly in video arcades and computer shops. We feel there is a deep moral message here. Restaurants and coffee shops don't benefit you particularly, either. Should you fritter away your DHSS money, you will have to traipse all the way back to the bank to get more money in the event of getting run over or falling down a manhole. In real life of course you would be able to take legal action against the local authority for leaving an entire street full of uncovered manholes.

There are a number of things which you need to do to get through the interview — this is the real strength of the game, quite apart from the excellent graphics. For example, if you get knocked over three times you should go to the shoemakers. Otherwise you will get a no-no letter in the post, telling you why you failed.

The third screen shows the receptionist — then a letter comes up on screen, usually telling you why you failed to get the job. But if you are lucky enough to have prised yourself free from the poverty trap, the computer then shows you a view of your nice new office. Lo and behold, it's even got a CBM-64.

Paul Bond

(continued on page 65)

University Software

UNISTAT

STATISTICAL PACKAGE

MULTIVARIATE REGRESSION: Main output consists of estimated coefficients, t-stats, standard errors, R^2, corrected R^2, standard error of regression, F stat, and Durbin-Watson stat. Further output options: multiple correlation matrix, var-covar matrix, ANOVA of regression, residuals, plot of residuals, interpolation. Data options: Log/ln option for each variable, no-constant regression, choice of dependent variable, selection of independent variables, auto-omission of linearly dependent variables.

ANALYSIS OF VARIANCE, SCATTER DIAGRAMS AND TIME SERIES PLOTS; One-way and two-way (without interaction) ANOVA tables, scatter diagrams of paired data and time series plots with auto-scaling.

STATISTICAL TESTS, CORRELATION COEFFICIENTS AND PROBABILITY DISTRIBUTIONS: Basic stats on each column of data (size, sum, mean, variance, std. dev.). Chi-square (contingency table), t (one sample, two sample, paired), F, Mann-Whitney U, and Wilcoxon signed rank tests. Pearson's, Spearman's rank and Kendall's rank corr. coefs. Chi-square, t, F, binomial, Poisson and normal (std., non-std.) distributions. Results of tests and corr. coefs are displayed with significance levels.

DESCRIPTIVE STATISTICS, FREQUENCY DISTRIBUTIONS AND HISTOGRAMS: Analysis of raw data or data with frequency counts. Raw data sorted and grouped. Choice of lower bounds and class intervals. Absolute, cumulative and relative frequencies. Histograms with up to 200 classes. Output displays sum, mean, mean deviation, median, variance, std. dev., 3rd and 4th moments, skewness, kurtosis, range, etc.

All programs are datafile compatible with Matrix Operations program in UNIMAX package. Data matrix capacity examples (columns by rows): **CBM-64;** 2x1250, 5x700, 10x380. **BBC-B;** 2x750, 5x400, 10x200. **48K Spectrum;** 2x1800, 5x900, 10x500. **CBM-64** (disk/cass): **£85, BBC-B** (disk/cass): **£85, 48K Spectrum** (mdvcart/cass): **£60**

UNIMAX

LINEAR PROGRAMMING PACKAGE

LINEAR PROGRAMMING: A powerful and instructive optimisation program capable of handling all sorts of linear programming problems (min/max, any combination of $<=$, $=$, $>=$ constraints and $x_i>=0$, $x_i<=0$, $-\alpha<x_i<\alpha$ sign constraints). Primal, canonical, dual and their solutions are displayed in standard mathematical form. Unbounded problem and no feasible solution prompts. Edit option for all inputs. Capacity examples (variables by constraints): **CBM-64;** 10x35, 25x30, 40x25. **BBC-B;** 10x25, 20x20. **48K Spectrum;** 10x45, 25x35, 50x25.

MATRIX OPERATIONS: Inversion, transposition, determinant, pre- and post-multiplication, scalar multiplication, addition and subtraction of matrices and vectors. Any output can in turn be used as the input of the next operation without re-typing. Matrices can be saved or loaded at any stage. Datafile compatible with **UNISTAT** package. Capacities: **CBM-64;** 35x35, **BBC-B;** 25x25, **48K Spectrum;** 45x45.

CBM-64 (disk/cass): **£60, BBC-B** (disk/cass): **£60, 48K Spectrum** (mdvcart/cass): **£45.**

ALSO AVAILABLE FOR 48K SPECTRUM
INTRODUCTION TO ECONOMICS SET: £25
ECONOMIC GEOGRAPHY: £9.95 • BIBLIOFILE: £9.95
POLYNOMIALS: £6.95 • INTEGRATION: £6.95

To: **UNISOFT LIMITED**
(Dept. E) 29 ST PETER'S STREET, LONDON N1 8JP.
TEL: 01-359 0978

Prices include VAT and delivery within the UK. For orders from Europe add £1.50, outside Europe £3.00 per item for airmail post. Dealers enquiries welcome.

COMMODORE 64, BBC-B, 48K SPECTRUM
*** Comprehensive user manual * Full data handling facilities (display, print, change, save, load)**
*** All results can be printed out ***

SPECTRUM 48K/DRAGON 32/COMMODORE 64/ACORN ELECTRON/BBC B

SCISOFT

New Prog's Advanced Chess Tutor Astronomy, also New Prog's for Commodore 64/BBC/Electron Send for details

TOP OF THE CLASS IN EDUCATION

WRITTEN AND APPROVED BY TEACHERS
TESTED IN SCHOOLS

Played space invaders too long? Come down to earth with Scisoft.

INTERMEDIATE PACKS

French
German
Geography
Science
Maths Plus
Electronics

£6.95

SENIOR PACKS

Maths I
Maths II
Physics
Chemistry
Biology
Computer Studies

£6.95

Makes learning more fun!

Helps you pass your 'O' Levels

FREE REVISION NOTES!

Intermediate Maths I/Intermediate Maths II £6.95 ea
Junior programs - Star Reader, Astro Maths, Wizard Box, Jungle Maths - £5 ea

SEND FOR FREE CATALOGUE NOW
– INCLUDES MANY SPECIAL OFFERS!

All programs are available for Spectrum 48K and most other computers

Selected titles available from major branches of John Menzies, WHSMITH and all good Computer Stores

Retailers contact:
Micro Dealer UK, Tiger, E. J. Arnold, Proteus, Calisto, Wyndup Records, Leisuresoft, Soloman & Peres

Also available by Cheque/P.O. from SCISOFT Limited
5 Minster Gardens, Newthorpe, Eastwood, Nottingham NG16 2AT

Ring for sample Printout, Full Spec and latest Price

PRINTER BARGAINS

CANON PW1080A	£320.00 INC VAT
STAR DP 8480 (RS232) 197	£187.00 INC VAT
STAR GEMINI 10X	£235.00 INC VAT
STAR GEMINI 15X	£580.00 INC VAT
STAR DELTA 10	£358.00 INC VAT
JUKI 6100	£380.00 INC VAT

Securicor delivery £8.00

CJE Micros BBC Printer Packs for Star, Canon & Juki Printers.
Include 1. The Printer. 2. Delivery by Securicor. 3. Cable to the BBC 1-3 Meters.
4. Screen Dump Program (M/C Source).
5. Text Dump Program.
6. Function Key Set Up Program, for use with word wise.
7. Function Key Label Printing Program for use with above.
8. View Printer Driver.
9. 100 Sheets of Paper.
10. A Mains Plug with a 3 amp plug.
11. Booklet giving details of using the Printer with a BBC.

PRINTER PACK PRICE.....Printer Price + £20.00

CJE Printer Packs for other Micros include — Printer Cable, Paper, Mains Plug & Delivery.

BBC Model B	£399.00
BBC Model B + D1	£469.00
ELECTRON	£199.00

Phone Credit card orders welcome

CJE micros

Dept. YC, 78 Brighton Rd, Worthing, West Sussex. (0903) 213900

Star chart

Designer's Pencil

Commodore 64
Activision
Graphics Designer
£11.99

★ ★ ★ ★

There are already a number of drawing and painting programs for the CBM-64 but this is something different.

Completely menu driven it provides an extensive but simple Logo-style programming language. Selecting a command is just a matter of nudging the joystick. There is also scope for freehand drawing and adding sound.

When you have entered your program a moving pencil rapidly draws your picture. Great fun to use, these facilities are exceptionally well implemented.

Trouble in Store

Oric 1/Atmos
Orpheus
Platform
£6.95

★ ★ ★

Ten screens to complete in this platform game. There are no conveyor belts or crumbling ledges but a good assortment of mutant tvs, flared trousers, flamingos, and suchlike, along with a tremendous ragtime soundtrack. On the Spectrum this would be nothing new but by Oric standards it is good value.

Pacmania

Commodore 64
Mr Chip Software
Gobble-em-up
£5.99

★ ★

As far as graphics and speed are concerned this Pacman variant is superior to Atari's version. But it contains an alarming feature which Pacman purists will deplore. At the touch of a key you can disappear and re-materialise elsewhere in the maze; in other words, a hyperspace option. Whatever next? How long will it be before we see Pacmen armed with missiles or smart bombs?

(continued from page 63)

Lode Runner

■ *Spectrum 48K*
■ *Software Projects*
■ *Platform game*
■ *£9.95*

★ ★ ★

THERE IS A JUSTIFIABLE awe of American software in this country with consistent scare stories being put about by the computer trade press that this particular software invasion will do for British companies what a cruise missile would do for Minsk.

This is a Broderbund game under license — and Broderbund brought us the memorable Choplifter on the Apple II and in various forms for other home computers.

Sadly, this is unlikely to set the world on fire. All of that blurb about being a highly trained Galactic Commando deep in enemy territory is not going to disguise the fact that this is just another platform game, albeit complex and with neatly executed graphics.

In the traditional way, you climb ladders, grab gold, swing on ropes — nice touch, this — and dig holes to get rid of your assailants. Later screens involve you in passage-way mazes and necessitate a certain amount of drilling with your laser pistol. The real strength of this game is that, like Beyond's Mr Robot, it is also a game generator. You can stick in loads of ladders, floors, trap doors, gold bars and enemies as you like.

. So, while not being part of the striking graphics trend, this game may well turn out to appeal to a new market for "kit" computer games.

Paul Bond

NLQ

■ *BBC Micro*
■ *Watford Electronics*
■ *Utility*
■ *£18.40*

★ ★ ★ ★

IS YOUR Epson printer beginning to show its age? Do you hanker after those new printers with fancy type styles? If you have a BBC Micro, you could revitalise your RX or FX model without breaking the bank by adding Watford's NLQ package.

NLQ — it stands for "near letter quality" — comes in an 8K Eprom, which fits not in the printer but in one of the paged Rom sockets of the computer. From there you can call it from Basic or even through commands set in Wordwise text.

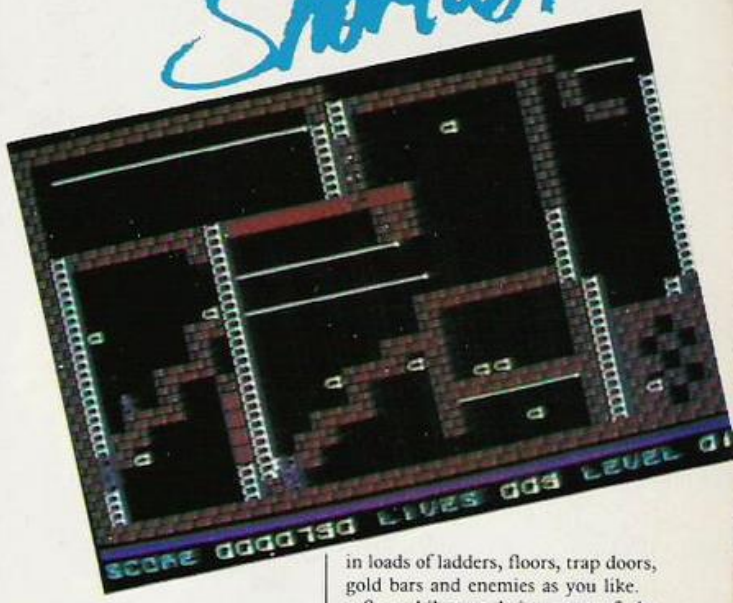
Besides plain text printing, NLQ offers some trick features: proportional spacing, underlining, enlarged letters or all of them together. A built-in help page provides a ready reminder of the codes to type.

Printing is somewhat slower with NLQ: to give high resolution the print head has to make at least two passes of every line. And it's a little noisier because of the extra line feeds.

There's a limit to what can be squeezed into 8K, of course, so you don't get an italic font; but you do get some exotica and there is a choice of crossed or plain zeros.

Since printing is carried out in a graphics mode, the proportional spacing feature works even on the RX range of printers. The Rom claims a workspace in page &A00 but this can be moved easily if necessary.

SOFTWARE Shortlist



Besides plain text printing, NLQ offers some trick features: proportional spacing (see?), underlining, enlarged letters or all of them together. A built-in help page provides a ready reminder of the codes to type.

Doomdarks Revenge

■ *Spectrum 48K*
■ *Beyond*
■ *Adventure*
■ *£9.95*

★ ★ ★

SO YOU THOUGHT Lords of Midnight was difficult? This, the latest in the series makes its predecessor look like a bunfight in a Brighton tea-room.

The game is a graphics adventure featuring the unique "landscaping" feature which very quickly draws in the features in front of your character. There are 6,000 locations altogether and over a hundred characters, making it vastly more complex than Lords.

Obviously, Mike Singleton has decided that having whetted your appetite, he must now give the punters a real run for their money. For a start, you only have the bare outlines of the map given to you and the characters are far more complex than before.

Every character you meet, instead of being simply friend or foe is trogging around the place bent on his own little scheme, and if you go up to him suggesting he might like to join your merry band, he may either join you, ignore you or turn on you.

The plot is that after the defeat of Doomdark, his daughter is bent on revenge and seduces Luxor's son Markin and takes him off to her castle in the frozen empire. Luxor rides off in pursuit to rescue his son.

The politics of the place are far more complex than Midnight, there are five kingdoms, each of which dislikes the other to a certain degree. These rivalries must be exploited by Luxor.

This game is a worthy successor to Lords of Midnight. Mike Singleton hasn't just revamped the plot and changed all the names, he has given us a logical extension of the LOM system with many improvements and refinements. The player has a whole set of new problems and victory conditions to achieve and I'm sure all LOM fans will want to add this one to their collection.

Lee Paddon

MAY WICO BE WITH YOU

When you're up against all the evil in the universe, you need the finest joystick. Weak, sticky, slow controls can only lead you to your doom.

You need a Wico.® The controls in more than 500 modern arcade games are actually made by Wico.® They set the industry standard for durability and performance. And the same arcade quality goes into the Wico® you take home.

Wico® joysticks work directly with the Commodore 64,™ Vic 20,™ all Atari® Home Computers and Atari® Video Games.

Add an interface, and you can connect into a Sinclair Spectrum or Apple II® and IIe.® If you have a new MSX computer there's the just released MSX Grip Handle for you.

What do you get? A man-sized handle on a virtually unbreakable shaft. Tough, ultra-sensitive Wico® switchgear. A heavy-weight base. A year's guarantee. And more sheer dodging, chasing and blasting power than ever before.

The Wico® range includes the famous Red Ball,™ straight out of the arcades. The Three Way Deluxe with interchangeable handles. The light but rugged Boss. And check out the state-of-the-art Trackball: many owners use it for serious programming, where it gives them effortless cursor control.

Ask your dealer to let you handle a Wico.® Quality (you'll find) costs money.

But if you want to have less trouble fighting your controls, and more power for fighting the forces of darkness . . . only Wico® is worthy of your hand.

WICO®

THE FINEST HAND CONTROLS IN THE KNOWN UNIVERSE

CGL HOUSE, GOLDINGS HILL., LOUGHTON, ESSEX IG10 2RR. 01-508 5600. LOOK FOR THE WICO NAME IN ALL GOOD SHOPS AND CATALOGUES.

NEWS oaeo rssu ttttt h h

The crystal ball

The latest release from those master adventurers at Infocom is The Hitch Hikers Guide To The Galaxy. This hilarious radio series subsequently appeared on TV, in book form, on record and even as a stage play. It just had to become a computer text adventure.

Written by Douglas Adams, the original author, and programmed by Infocom, HHGG is a completely new tale in the Arthur Dent saga. It promises to be both challenging and comical. On disc only and likely to be priced at around £40, HHGG will be available for Atari, Apple and Commodore 64 micros.

A helping hand

If, like Ian Fisher of Huddersfield, you're sinking into the pits of despire over ZORK I, read on.

Can't cross the rainbow in Frigid River Canyon?
ERTPECS EHT EVAW

Grating in the forest clearing unlockable?
EZAM EHT NI EN OG — WOLEB MORF DEKCOLNU EB YLNO NAC TI

Mr A. Lusher of Kent cannot find the large emerald in ZORK I.
YOUB EHT EDISNI KOOL

Some players are finding it tough to get going in Artic's Espionage Island.

Can't escape from the plane?
ARAP PARTSNU : DROC LLUP : REVEL LLUP : ARAP RAEW : ARAP TEG

Richard Shepherd's Urban Upstart is causing a bit of head scratching.

Building site a problem?
RAEWTOOF TUOTS DEEN UOY

Football fan giving trouble?
KNIRD A MIH REFFO : SFRACS GNISOPPO DIOVA.

Yours in traps and terros,
HUGO NORTH

QUEST corner

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Return to Eden

Various
£9.95
Level 9

THIS IS Level 9's sequel to the smash-hit Snowball. As ever with this company's adventures, the plot is exciting, the prose detailed and imaginative, the locations numerous — over 250 — and the adventure awash with stimulating puzzles.

Forced by damning evidence to flee from the interstar transport Snowball 9, Kim Kimberley is the first human to land on the Planet Eden. However, Eden is not uninhabited but populated by robots who live in an eastern city which is constantly under attack from hostile beings of all types. Will the good name of Kim Kimberley be cleared? Will Kim even survive? Play on!

For the first time, Level 9 have included graphics — but only if you've got a Commodore 64, Spectrum or Amstrad. For the rest it's text only, though the BBC B version has a separate program displaying the picture. Not being a company to stint on quality or quantity, they have crammed in about 240 first rate and fast drawn pictures. If you buy no other adventure, you must buy this — Level 9 have come up trumps again.

The Wheel of Fortune

BBC B
£9.95
Epic Software

TO COMPLETE this roundup of excellent adventures comes, appropriately, The Wheel of Fortune. Containing both graphics and text, this adventure has an interesting plot and many impressive features. Here's a few to whet your appetite: 250 locations, every one with a rapidly drawn, half-screen picture; a sophisticated command analyser allowing complex input and swift response; intelligent characters who live in real time and who can be talked to and asked questions of; a function key set-up facility accessible from within the game itself. Definitely one to feed your Beeb.

Cuddles, and Ice Station Zero

Spectrum 48K
£1.75
Eighth Day Software

NOW TO WHAT must the adventuret's bargain of the year. Eighth Day Software have released a series of Quilled text adventures for the 48K Spectrum, and each of them only costs £1.75. You'd be forgiven for thinking that they can't be much cop for that sort of money — but you'd be dead wrong. The adventures are good quality with interesting themes.

For example Cuddles has you as a precocious baby trapped in a playpen, guarded by a nanny and with nothing but a bowl of sloppy food and a building block to experiment with. In Ice Station Zero you're on the trail of an international terrorist who is holed out in a polar research station yet holding New York to ransom.

Other titles in the collection are Quann Tulla and, the two most difficult, Faerie and Four Minutes to Midnight. Available only by mail order from Eighth Day, 18 Flaxhill, Moreton, Wirral, these adventures are excellent value for money.

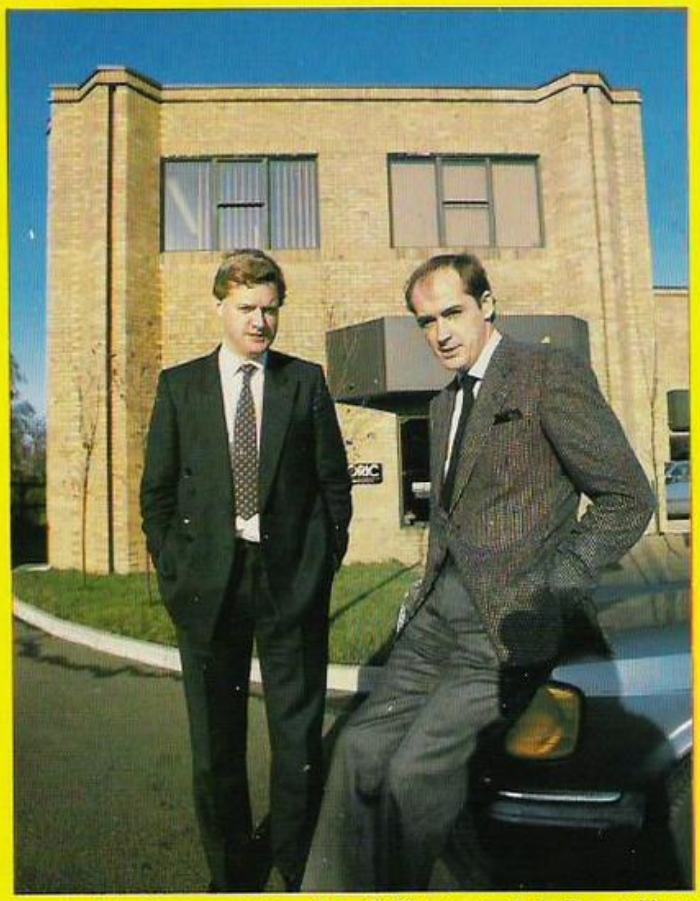
Danger Mouse in the Black Forest Chateau

Various
£7.95/£6.95
Creative Sparks

BACK TO GRAPHICS and text adventures, Danger Mouse in the Black Forest Chateau is just the thing for the younger or novice adventurer. The graphics are delightful featuring as they do those lovable heroes, Danger Mouse and Penfold.

Entering commands couldn't be simplier; you're presented with a choice of actions at every stage. Select the one you want and the story progresses. The adventure is in two separately loadable parts: you can't start part two until you've finished part one. Danger Mouse is a non-violent, warm and humourous adventure.

ORIC'S NEW WAVE



How long can Oric old hand Barry Moncaster keep that long wheel base Mercedes hidden from dark-suited Bruce Everiss.

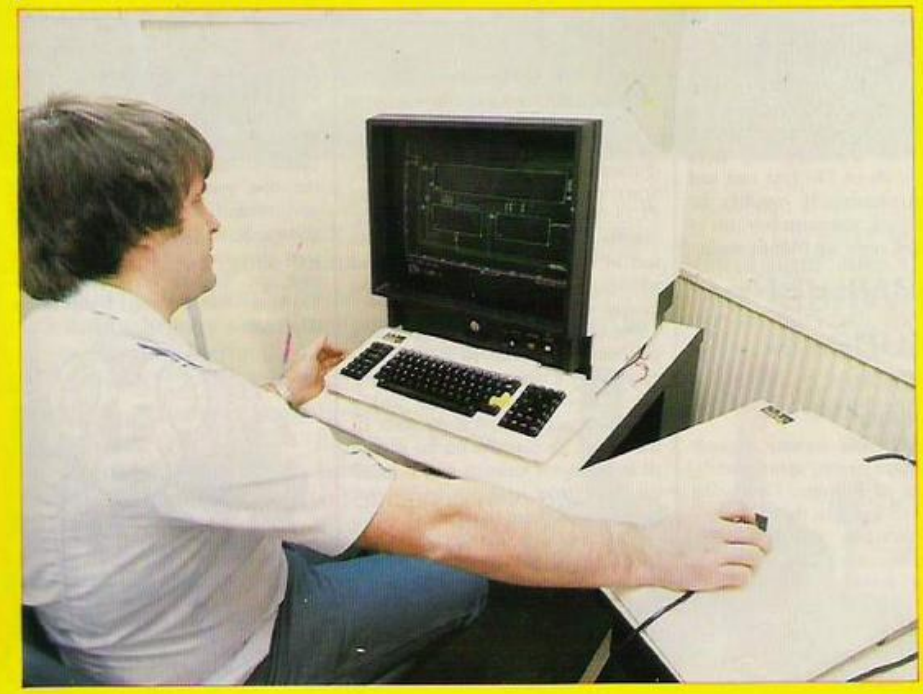
ON THE STARTING BLOCKS in Oric's Cambridge based research and development department are five new computers and the company is brave enough to believe that it can launch at least three of them by next summer.

They range from the Stratos, a £200 machine based around the Atmos, through an MSX, to a QL-style 68008 computer, with an IBM PC compatible and a lapheld at the top of the range. Ambitious indeed considering that since the launch of the company with the Oric 1 over two years ago the only new computr from the company has been the Atmos — a revamped Oric 1.

Although 1984 was the year that Oric almost disappeared from the British micro market, confidence for 1985 is based on two assets, a booming European sales — in France even in the sleepiest villages a card in the window of every moped repair shop invites you to buy an Oric Ordinateur Individuel — and expertise in uncommited logic array design.

Using ULAs you can cut down on the number of components in a computer and hence make a cheaper more efficient design. But putting what can be a whole circuit board on to a single chip can create problems as companies like Acorn and Enterprise have learnt to their cost. Much of the year's delay in the production of the Enterprise has been blamed on the difficulties of debugging the 'Nick' chip — the ULA which gives the Enterprise such advanced graphics specification. Acorn's Electron had similar problems with the big ULA which was supposed to replace a large slice of the BBC board.

"We could solve Acorn's problems at a stroke" boasts Oric's Barry Moncaster — an offer Acorn is unlikely to take up. Although Barry stresses the achievements of Oric in such a short time — 350,000 sold in the first two years "by then Sinclair hadn't got round to the ZX-81, Acorn hadn't got round to the Atom" Oric motivators Paul Johnson and Barry Moncaster have a long history in the micro business.



ic's Daisy is a £100,000 machine for designing ULAs.

Design of printed circuit boards is also automated — using a Racal unit. Far right: the new Quick Disc units — the first disc drives to break the £50 barrier.

Barry claims to have produced the first commercial use of a microprocessor in Britain — a digital taxi meter which appeared on Tomorrow's World way back in 1974, and both were heavily involved in Tangerine, one of Britain's first micro makers set up during the fruity phase when people thought that if you were going to compete with Apple you had to sound like them.

Like Sinclair and other companies Tangerine was angry with the way Acorn was given the BBC contract. Paul and Barry now run Oric but the rancour survives especially with Acorn's Customer Services Department on the same industrial estate, literally overshadowing Oric's Cambridge base. "We share the same dustbin" says Barry "that's why we both have shredders."

Not impressed with Sinclair

Barry is not over impressed with Sinclair either "look at the Spectrum Plus. It comes out, you turn it over, tap the back and all the keys fall out. It was withdrawn a fortnight later. And he was knighted as a technological bloody genius — no wonder we are in a mess". Of course Oric had its own problems with returns in the early days which led to a crop of bad jokes on the lines of "Definition of an Oric 1 — prototype for Oric 2." But now Oric seems to have sorted out those problems along with the financial difficulties which have haunted it ever since it was launched on £1250 of capital. "If we go down" says Barry "it won't be because we've got an unreliable bad product."

The first new product which will go on sale in France from February is the Stratos — but in this country it's likely to be sold as an own brand under the name of a high street chain store. In effect it is a re-engineered Atmos with a reduced chip count, enhanced speed improved graphics and a built-in disc controller. This will allow you to plug in a cheap off the shelf drive costing as little as £120. Like the old Atari 800 the Stratos comes with no onboard language. Instead it has two cartridge ports and it will come with a Basic cartridge and optional Logo.

Inside this innocent-looking black case Oric's new Stratos and MSX machines are lurking. Meirion Jones steals a glance at what else is in the Atmos makers' research and development cupboard.

The Stratos will have an Atmos command so you can run existing software. Some of the prototype Stratoses have a built-in Modem but this is unlikely to appear in the production version, because of the delays that submitting the whole machine for British Telecom approval might cause. Also Oric is uncertain how many potential owners would rather have the choice left to themselves — "you put up your costs to 100,000 when there's only demand from 10,000."

The same plastic box that houses the Stratos will be used for the MSX Oric. Again Oric expects this to do particularly well in France where the Government resorts to non-tariff barriers such as routing all video recorder imports through a small office in Poitiers against Japanese electronic consumer goods. In this country it is unlikely to appear under the Oric label.

Perhaps Oric's most interesting idea for next year is a cheap QL-basher. This would make sense — after all the Oric 1 was designed as a Spectrum basher. In kit form Oric could produce a 68008-based computer for less than £100 — but the question is whether computer buyers are still interested in kits or whether they have become used to buying a box off the shelf and just plugging it in?

Another plain clothes Oric which will appear next year under someone else's name is their IBM PC lookalike. This 8086-based machine will come with a suite of applications programs from a British software house. It will have a fraction of the number of chips an IBM has and will have "a full WIMP environment" — that does not mean you should be embarrassed to have one but that like a Macintosh it will have a window, icon, mouse program. The graphics chip designed for the PC lookalike is being sold to other companies separately.

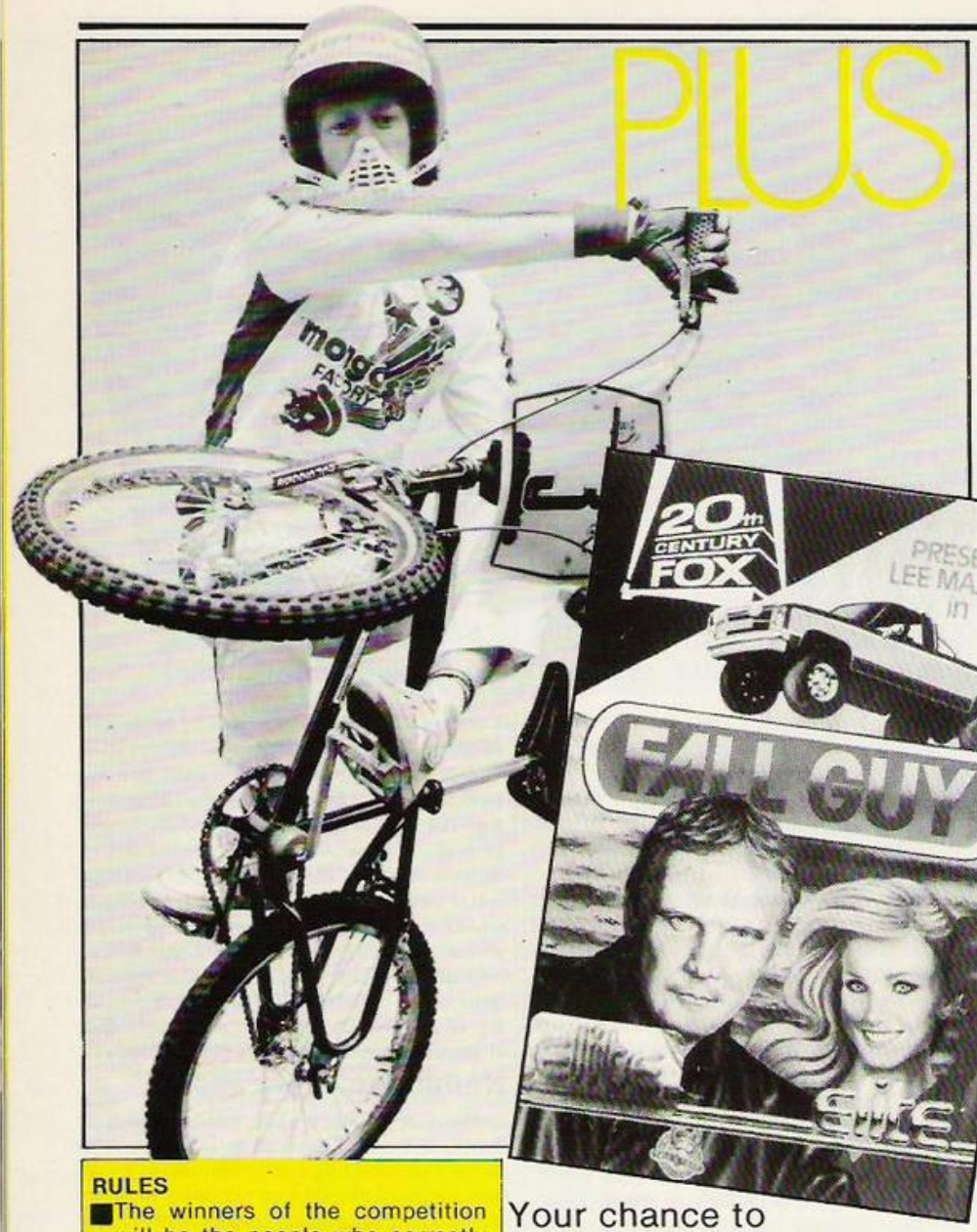
Even further from the home market is the £3,000 portable Oric is developing, but around the laboratories are clues to products the company is planning to introduce to the home. One of them is the Radofen Quick Disc a new storage device introduced by the makers of the Aquarius computer.

This looks like a small disc drive and has 64K of memory on each side of a cheap disc. But the Quick Disc is not random access. Instead of the concentric tracks on a conventional disc the Quick Disc has a single spiral track — like a record — and the stylus moves sideways across the disc. This makes access times of the order of 7 seconds so perhaps Slow Disc would be a more accurate description but the Quick Disc with a price tag of £50 or less looks like a more reliable alternative to stringyfloppies and waferdrives.

Nothing to worry about

Many a company has collapsed despite having a research laboratory full of promise but if Oric can bring these products to market, the company should have nothing to worry about. Diversification into other fields such as medical electronics, selling custom chip designs to larger corporations, and the continuing strength of the Atmos in France gives Barry Moncaster confidence that Oric has a solid base from which to launch its new wave in the 1985 Spring offensive. ■

PLUS



WIN A T

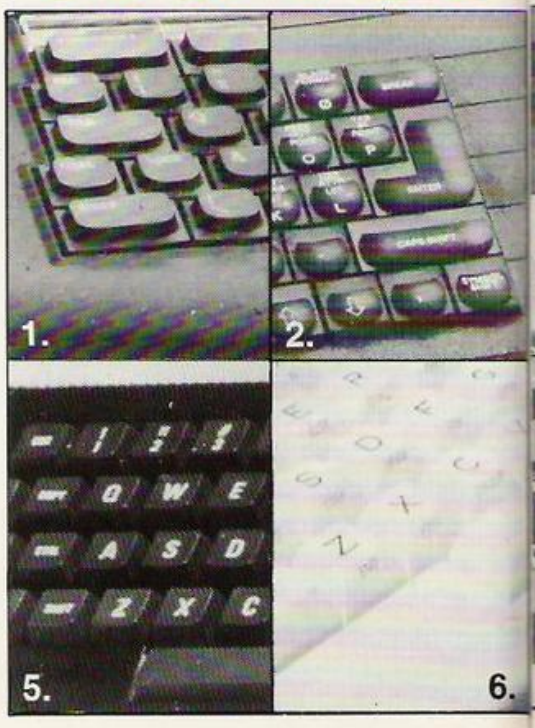
RULES

- The winners of the competition will be the people who correctly identify the computers and in the view of the Editor, come up with the most amusing suggestion for a computing film or TV series title.
- The name of the winners will be printed in the March issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in January 1985.
- Each person may enter, the competition only once.
- Entries to the competition cannot be acknowledged.
- No employee of Business Press International or their relatives may enter the competition.
- The decision of the Editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

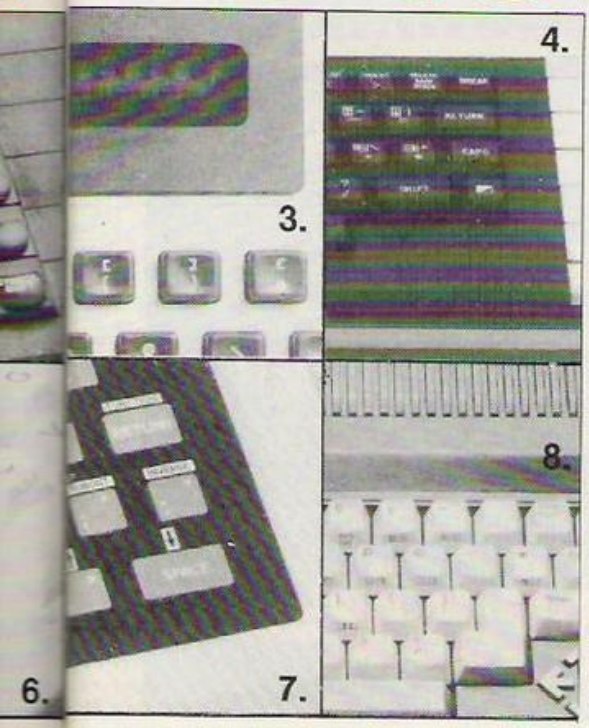
Your chance to win a fabulous trip to Hollywood. Two lucky winners of the *Your Computer* Elite competition will be flown in a British Caledonian jet to LA to visit Disneyland and the film set where Fall Guy is made.

Boots

British Caledonian Airways



A TRIP TO HOLLYWOOD



YOUR COMPUTER COMPETITION

- ☐ Acorn Atom
- ☐ Acorn Electron
- ☐ Atari 600XL
- ☐ Commodore Plus 4
- ☐ Enterprise
- ☐ NewBrain
- ☐ Spectrum +
- ☐ Texet TX-8000

If you can identify the computers on the left, you could win a trip to Hollywood. Just put the number on the photo in the box next to the machine you think it belongs to. Now put yourself in the shoes of a big-time Hollywood producer about to launch a new block-buster TV series or film about computers. What would you call it?

What would be the title of your new blockbuster?

_____

_____

Name _____

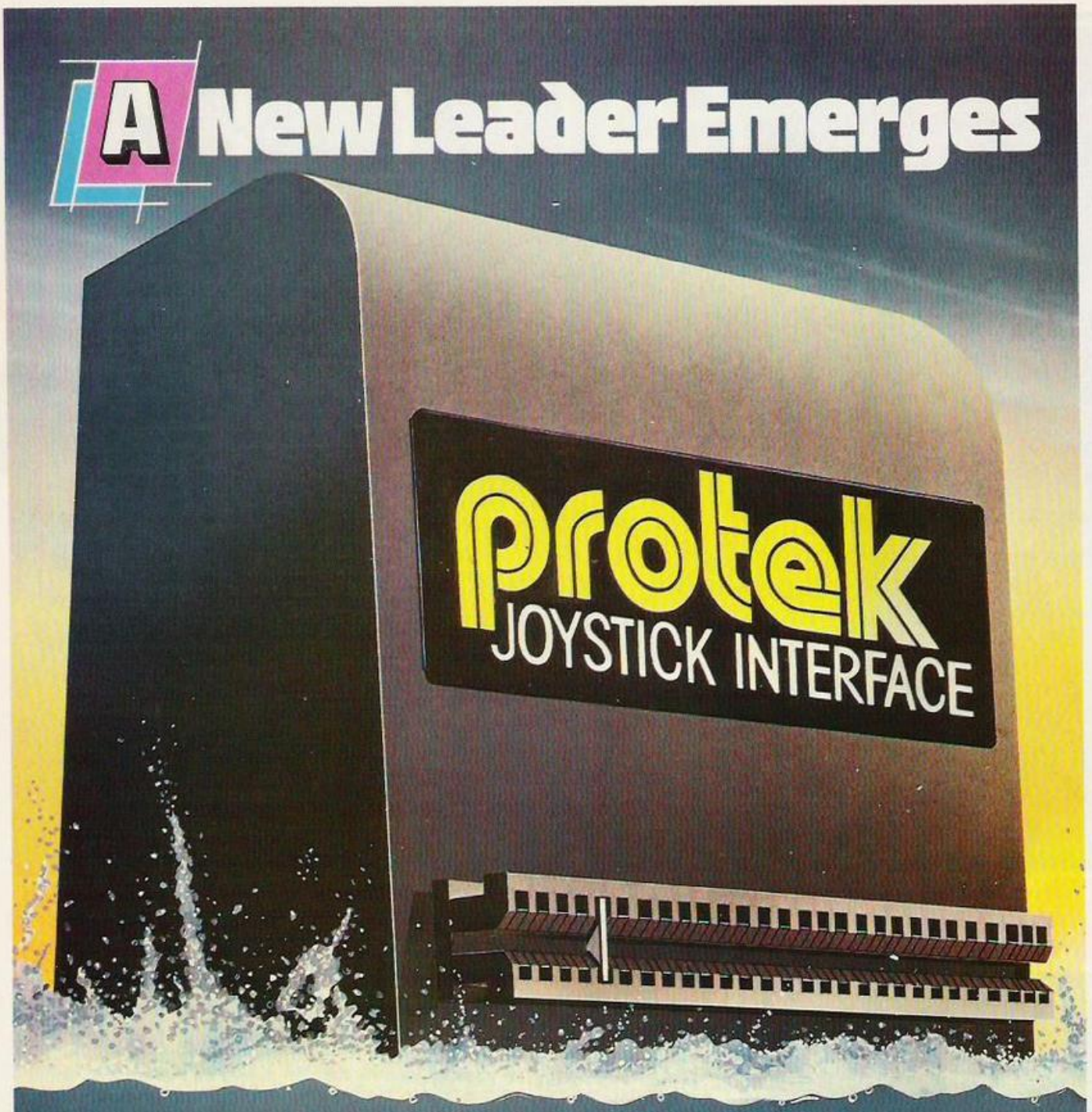
Address _____

_____

_____

Age _____

A New Leader Emerges



Protek Switchable Joystick Interface

It is so easy to use–there's no software patch tapes or programming required. Simply plug in and flick the switch for compatability with all games requiring a joystick.

Available for immediate delivery, retailing at **£19.95**

AVAILABLE FROM LEADING COMPUTER STORES

Protek

Protek Computing Ltd, 1A Young Square,
Brucefield Industrial Park, Livingston, West Lothian. 0506 415353.

PRINTERS

If it grates to spend more on a printer than you did on your micro, there's no need to worry. Kathleen Peel prints out the answers.

UNDER £200

Printer	Paper width	Speed cps	Normal print density	Printer noise level	Char quality wxh	No. off pins	Facilities	Min cost £
Battery operated printers								
Epson P40	4" t	45	5	3	5x9	9	c,e,g	100
Epson P80	8"	@15	4	5	9x9	9	?	160
Brother HR5	8"	30	6	4	9x9	9	c,e,g,s	145
Mains powered printers								
Brother M-1009	10"	50	5	6	9x9	9	c,e,g,s	
Smith Fastext 80	10"	80	8	7	9x8	8	c,e,g	175
Shinwa CPA 80	10"	100	9	8	7x8	9	c,e,g,p,s,u	199
Seikosha GP-500	10"	50	5	6	5x7	7	c,e,g	160

t = thermal paper
p = proportional spacing
ch = foreign character sets

e = enlarged print
g = graphics
i = italic

c = condensed print
s = skip perforation
u = user defined

THERE ARE three major factors in the choice of a printer for use at home by the hobbyist, they range from the type of use envisaged for the machine, the environment in which it will work and the physical aspects of connecting the printer to your computer.

The *Your Computer* review is limited to classes of machines that sell for under £200, which this year encompass machines that are capable of producing very reasonable quality print and graphics.

The principal uses of a printer are either producing listings of programs being developed or of printed text, either letter or manuscript. Other more exotic requirements range from modern art to hard copy of household budget details.

The printer parameters that are relevant to the type of use are:

(continued on page 75)

DANGER MOUSE

BRITAIN'S NUMBER ONE CARTOON CHARACTER ON COMPUTER GAMES FROM CREATIVE SPARKS

DANGER MOUSE
IN DOUBLE TROUBLE

The evil Baron Silas Greenback has built an android Danger Mouse which must be destroyed and there is not a moment to lose. Guide Danger Mouse and Penfold through the deep jungle to the layer of the Baron and then halt the loading sequence before it's too late.
Can you help Danger Mouse save the world?
Fast loading cassette (C-64 version).

WIN
A Rolls Royce and helicopter trip to meet Cosgrove Hall the creators of Danger Mouse. Each pack contains full details.

DANGER MOUSE
IN THE BLACK FOREST CHATEAU

This adventure program is no piece of cake!
As Danger Mouse, the World's Greatest Secret Agent, you will need all your wits about you to track down the fiendish Pi-beam operator....and will develop a range of useful skills as you go.

- *for early adventurers of any age*
- *no typing skills required*
- *lots of superb graphics*

"The graphics...are stunning on the Spectrum and even better on the C64"
Computer and Video Games (Sept '84)

TWO GREAT NEW GAMES FOR THE C-64 AND SPECTRUM 48K

CREATIVE SPARKS

Available from All good computer software stockists.

Send me (tick as required)

- ☐ **DM IN DOUBLE TROUBLE** TNCC221 (SPECTRUM) **£6.95**
- ☐ **DM IN DOUBLE TROUBLE** TNCE223 (C64) **£7.95**
- ☐ **DM IN THE BLACK FOREST CHATEAU** TNCC231 (SPECTRUM) **£6.95**
- ☐ **DM IN THE BLACK FOREST CHATEAU** TNCE233 (C64) **£7.95**
- ☐ My local stockist's address
- ☐ Your full list of games

Game/s at £6.95/ £7.95 each £ : p
+ single P&P sum : 30p
Total to send £ : p

Method of payment
By cheque or PO (no cash) made payable to **TECS**

or
Enter card no.

☐ By Access
☐ Barclaycard

Sign below:

Credit card sales: UK buyers only.
Response within 21 days.

Creative Sparks,
Department MO,
296 Farnborough Road,
Farnborough, Hampshire, GU14 7NF.
Telephone: (0252) 518364.

Name

Address

YC0185

(continued from page 73)

Printer paper width: 4in., 8in. or computer paper.
Print type, matrix, thermal or biro.
Printer consumables cost.

Although the 4in. wide paper is perfectly adequate for listings and sending in magazine articles, it is not really practical for letters. The 8in. paper printers use A4 sheets and roll paper, which are not suitable for printing the manuscript of your latest novel, but are ideal for letters. The 9in. wide computer paper printers are capable of meeting most requirements.

The running costs vary with the type of use envisaged for the printer.

A case can be made for each type of printer for average types of usage and the choice will depend on many factors.

A printer subject to considerable use should under normal circumstances be a dot matrix which in eneral is capable of running faster than the other types of low cost printer.

One comment here on the point of speed, unless you have used a much faster printer, it is unlikely that you will be bothered much by a "slow" printer. What you do not know, you will not miss.

Print quality can vary significantly and the following points should be noted.

Generally, black thermal paper provides a much better print quality than the mauve paper that is sometimes available. Many manufacturers supply the 4 inch wide thermal paper now and they are not all of the same quality. If you can, sample different makes.

Several of the matrix printers are capable of providing draft copies of text and a better quality "Elite" print mode where each character is formed by writing the horizontal dots closer together. The printers differ considerably in the standard number of dots used across a character.

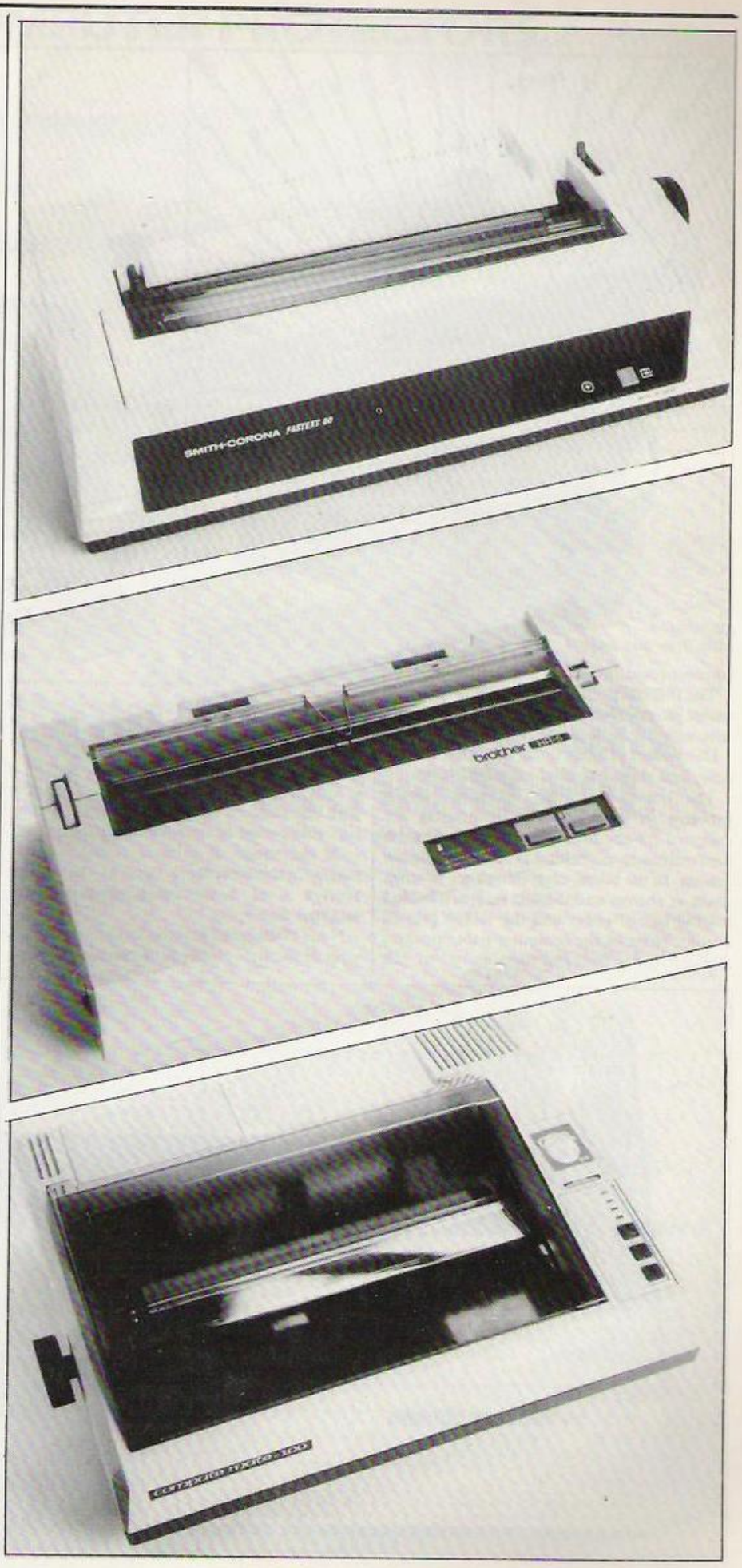
A further improvement in quality is perceived with proportional spacing of text, the I's and the M's etc take up different character space lengths giving a much cleaner look to the text, although you pay for it in terms of what proportional spacing does to right justified text.

A very important aspect of print quality is the number of pins in the matrix head. There should be nine for true lowercase descenders, otherwise with seven pins the g, y, q and the p sit on lines and look very odd. Printers that use eight pins have a half way position which is perfectly acceptable where the character sits one position above the line with the descender dangling one position below the line.

Where the thermal printer uses a ribbon, the thermal ribbons are normally single pass and have a very limited life. Printer portability without a portable computer is illogical and can become an expensive means of printing if the batteries are not rechargeable, we would suggest that the optional mains supply power unit is a very worthwhile investment if you consider buying a non-rechargeable portable. Getting caught short without a battery is no fun.

Generally, the faster the machine, the noisier it is likely to be. In the home environment, a dot matrix printer of speed greater than 30 cps is likely to annoy people in an

(continued on next page)



(continued from previous page)

adjacent room if running continuously.

The thermal printers are quiet and some are usable in the same room as other occupants without disturbance.

Daisywheel printers break the rules, they're noisy and slow, but produce quality print.

The home computing enthusiast has a problem in that virtually all printers are designed for the office environment where a desk with a space behind is allocated for the printer. In the home, everything goes on small desks or shelves and there is no space behind for the box of paper and the folded printed output. None of the computer paper printers allowed tractor feed and front entry and exit for the paper as they invariably snagged the paper perforations.

The Smith-Corona Fastext 80 was used with friction feed and front access for a considerable period of time without problems.

Of the range of printers tested, all the battery portables were smaller than the average sized home computer taking up minimal desk space.

None of the small printers has any problems with additional space requirements as they are not capable of handling the fanfold sprocketted computer paper.

Generally, printers are fitted with a Centronics interface as the standard, an RS-232 version being available either as an alternative or as an optional extra. Buying a printer with a standard interface makes sense as it can probably be used on any computer that you might buy in the future. Several computers have their own special printer interface and use of these special printers with other computers is unlikely.

The printers are all in the range of about £100 to £200 and provide a wide selection of facilities. The additional cost of running the printer should be seriously considered when evaluating which machine to buy as unlike a computer, as you use the printer, it costs money.

May not be typical

Note that figures are our assessment and based on a survey of one, which may or may not be typical, but they are as supplied.

The Epson P40 is a true thermal printer using thermal paper, the 8in. wide paper printers are thermal transfer printers that use ordinary paper and a thermal ribbon.

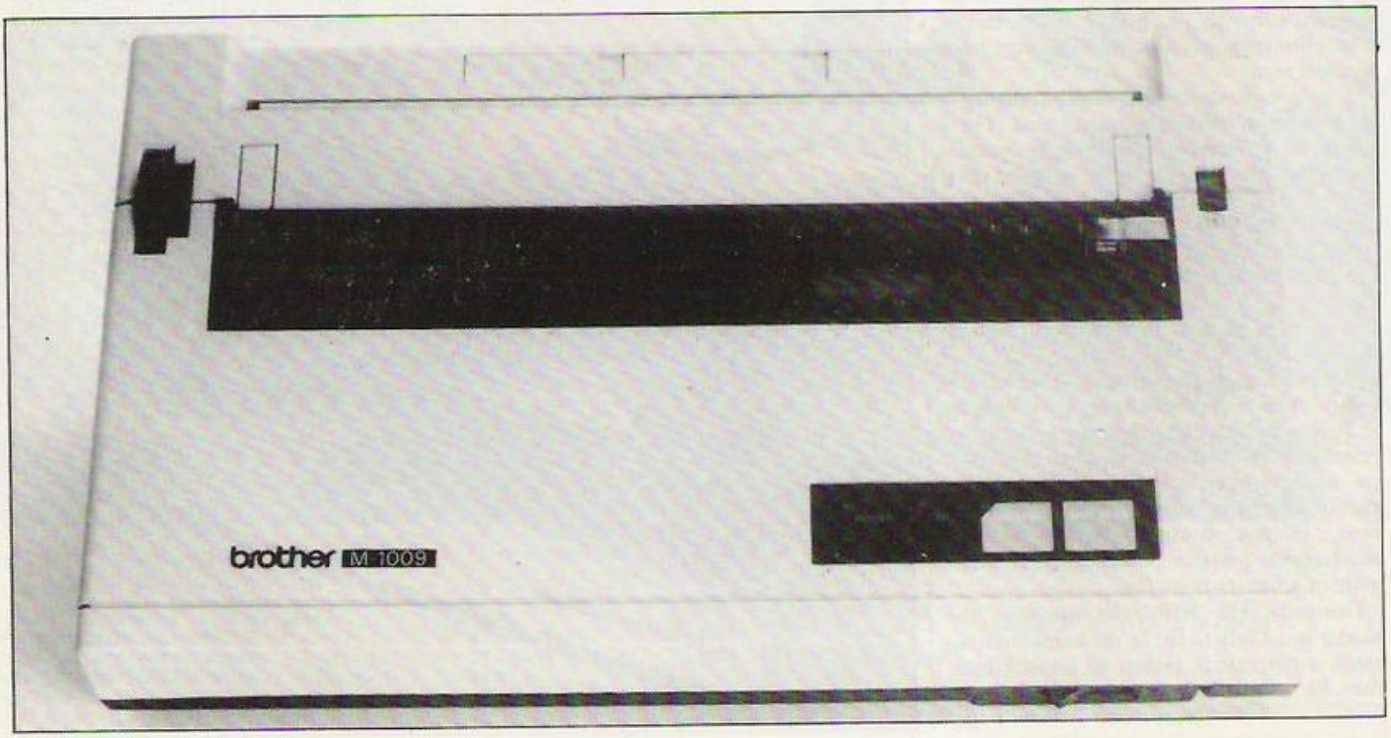
The speed is given for normal draft quality text. Printing "elite" chracters sometimes results in reduced speed of operation.

Print density is for normal print, the printers are capable of double strike/emphasised print modes for darker printing. Higher values are best.

Printer noise is for the printer running at standard speed. Lower values are best.

All the printers are capable of double density graphic printing, the Brother M-1009 has a quadruple density graphic mode with 1920 dots per 8in. line.

Asked to make a choice we would probably choose the Brother HR5 portable with mains unit or any of the mains powered dot matrix printers except the Seikosha. They each represent value for money. ■



THE COMPUTER PROTECTORS.

Keep everything you want in.

Static and dust, the biggest enemies of the home computer. Fortunately there are now Targus computer bags.

Thanks to the protectastat, specially treated material, these unique bags give your computer total anti-static and dust protection. Only Targus can do this.

COMPLETE PROTECTION

And that's not all. Beneath the hard wearing nylon outer, is a high-density, impact-proof, foam padding and a thermal lining to stop the build up of condensation.

It's also fire-retardent and once sealed with the heavy-duty nylon zips, rain-proof as well.

A PLACE FOR EVERYTHING

There's also a handy compartment for your programmes, joy-sticks, cables, leads, accessories and manuals; so it's ideal for neat home storage, as well as transportation between home and work or school.

FITS ANY COMPUTER

These sturdy, attractive bags are black with a red trim and come in 3 sizes, fitting any model. Just check the list to see which bag you need.

And everything you don't, out.

FREE MICROWIPES

Order any bag and we'll also send you a dispenser of microwipe anti-static treated screen cleaners – absolutely free.

ONLY AVAILABLE DIRECT

Targus computer bags aren't on sale in the shops, so order direct from us now.

Simply tick box A, B, or C, clip the coupon and send it with the correct remittance, plus £1.75 to cover postage, to: Personal Purchase Ltd., Engineers Way, Wembley, Middlesex HA9 0EB.
Allow 21-28 days for delivery.

Check this list for the bag to fit your model of computer:

A. SINCLAIR QL
A. AMSTRAD CPC 464
B. BBC MICRO B
B. DRAGON 64
B. ATARI 800 48K
B. ATARI 800 XL 64K
B. ENTERPRISE 64
B. MITSUBISHI – MSX ML – 8000
B. SANYO – MSX WAVY 10
B. SONY – MSX HB – 75
B. TOSHIBA – MSX – 64K
B. SHARP – MZ – 700
C. COMMODORE 64
C. COMMODORE – C – 16
C. VIC 20
C. ORIC ATMOS
C. ACORN ELECTRON
C. SORD

RECORDERS

C. TR – 17
C. TR – 30
C. SAISNO DR 70
C. COMMODORE 1530

PRINTERS

B. COMMODORE MPS 801
C. ORIC

DISCS

C. ORIC
C. ZX SPECTRUM
C. ZX INTERFACE
C. COMMODORE 1541

Personal Purchase Limited
Engineers Way, Wembley, Middlesex HA9 0EB.

Please send the Targus bag to fit my home computer (tick either box A, B, or C) at £_____ plus £1.75 p&p. I enclose my cheque/PO for £_____ payable to Personal Purchase Ltd., or please debit my Access/Diners Club/Visa/American Express.

Card Number_____ Expiry Date_____

Signature_____ A. £19.95 ☐

Name_____ BLOCK LETTERS PLEASE

Address_____ B. £24.95 ☐

_____

_____ Postcode_____ C. £29.95 ☐

Your remittance should be made payable to Personal Purchase Ltd., at the address specified. Delivery on UK mainland only. Allow 21-28 days for delivery. Registered Office, Personal Purchase Ltd., Engineers Way, Wembley, Middlesex HA9 0EB. Reg. No. 1573900.
If not fully satisfied return your Targus bag within 28 days of delivery for a full refund.

COMCON

Programmable Joystick Interface for the Spectrum

Simple and fast programming: Plug the six function connectors into the required Spectrum key positions — Ready!

Two independent fire actions: Photon Blasters and Neutron Bombs at the touch of your fingertips.

Extension port for Currah Micro-speech unit: Combine joystick with sound and speech for ultimate arcade action.

Compatible with all Atari type joysticks including Quickshot II (without rapid fire action).

Interface operates joystick parallel to keyboard: Joystick action compatible with any add-ons including Microdrives.

The affordable alternative: Lowest price yet for programmability.

Crash Readers Awards 1984 Winner BEST HARDWARE ADD-ON

£19.95
incl. VAT and P & P

QUICKSHOT 2+2 JOYSTICK
modified to incorporate 2 independent fire actions and no rapid fire option
£13.95 incl. VAT and P & P

CURRAH µSPEECH UNIT
fits into COMCON extension slot
£29.95 incl. VAT and P & P

FLIGHTLINK JOYSTICK
with 2 independent fire actions
£10.50 incl. VAT and P & P

ALSO AVAILABLE FROM SELECTED RETAIL OUTLETS

Dealer Enquiries Welcome
Phone Ludlow (0584) 4894

FREL LTD. Hockeys Mill, Temeside, Ludlow, Shropshire SY8 1PD

Mr/Mrs/Miss _____

Address _____

Postcode _____

Qty	Code	Item	Item Price	Total £
	01	Comcon Interface	@ £19.95	
	02	Flightlink Joystick	@ £10.50	
	03	Quickshot 2+2 Joystick	@ £13.95	
	04	Comcon + Quickshot 2+2	@ £31.90	
	05	Comcon + Flightlink	@ £28.45	
	06	Currah µSpeech unit	@ £29.95	
I enclose a cheque/postal order made payable to FREL LTD for				£

COMCON

TELSOFT

A reminder of how to use the Telsoft service.

THE PROGRAMS given here will enable Spectrum and BBC owners to download via *Your Computer's* Telsoft service. First type the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. On the BBC you call the service by entering

CALL &6A00

while Spectrum owners must type

RANDOMIZE USR 60000

So far OE Ltd's Telemod 2 and VTX 5000 modems have been tested with the service, but it also works with a number of other makes.

To find out what is available on Telsoft and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is available, make sure your modem is set up and dial the number appropriate to your modem's speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received, you will see "OK" printed if there were no errors, otherwise the program will wait for the blocks to come round again.

When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A%&6FB7 THEN 200
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT "A" ";
80 INPUT ";" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 X$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=B*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6FB7
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9CBA0FEA20120F4,4C6
6A08 :FF20616C2048D6DC9,38A
6A10 :31F00DC934F0E9C9,4CB
6A18 :35F0064C0C6A4C47,200
6A20 :6AA9BC20E3FFA9E8,4D2
6A28 :A000A2FF20F4FFA9,4FD
6A30 :03A2002DF4FFA902,363
6A38 :A20220F4FFA9CBA0,4C0
6A40 :FEA2002DF4FF60A9,4BC
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120F4FFA000,3EB
6A58 :A9FF0099056FD0FA,587
6A60 :A9154201 20F4FF20,394
6A68 :0C6C90FD200C6C00,348
6A70 :FBA0008477B478B4,416
6A78 :79B47A847B857020,388
6A80 :D56DA57029F0C900,489
6A88 :D0E2200C6CD0D099,46B
6A90 :7100C820D56DC009,364
6A98 :D0F0A000A5742908,422
6AA0 :D00BA91CB57618A5,354
6AA8 :106573857720C6C,289
6AB0 :00B520E3FFC020D5,524
6AB8 :6DC010D0F0A57320,435
6AC0 :B26D200C6CB0A0C5,3CC
6AC8 :7AF00BA95820E3FF,478
6AD0 :20C7FF4C676A200C,34F
6AD8 :6CB00CC57DF00BA9,40C
6AE0 :50200E3FF20E7FF4C,4AC
6AE8 :676AA573A0B9B54F,43E
6AF0 :D00E20E7FFA99B20,3B0
6AF8 :E3FF4CB36B4C676A,46D
6B00 :A000847A847B200C,2C9
6B08 :6C80F2917620D56D,477
6B10 :C8C475D0F1200C6C,45A
6B18 :00E3C57AF00BA950,4CE
6B20 :20E3FF20E7FF4C67,48B
6B28 :6A200C6CB0CFC57B,3C1
6B30 :F00BA95820E3FF4C,447
6B38 :676A20C76B20E7FF,42Y
6B40 :A573A0A9009956F,3F6
6B48 :A5BAC9020D5820D7,419
6B50 :6BA9CB20556CA955,3BB
6B58 :20386EA95020556C,298
6B60 :A9154201 20F4FF20,394
6B68 :F76BA471C88B9B05,505
6B70 :6FD0519BD0F7A90C,4A4
6B78 :20E3FF20A56DA95A,437
6B80 :B582A96F858BA907,3D7
6B88 :20006E20F86D20AB,2DB
6B90 :6DA9B520006EA90B,2DA
6B98 :20E3FF20F86DA9D2,502
6BA0 :20E0FF4C0C6AA955,3BF
6BA8 :20386EA99620556C,2DE
6BB0 :4C6A6BA4752000C6C,2D2
6BB8 :B8D0F A200C6C200C,316
6BC0 :6C4C48A8A4C6C6AA9,336
6BC8 :2020E3FFA9F28E3,43D
6BD0 :FFA96B20E3FF6BA9,51E
6BD8 :9CA000A6BAE002D0,41E
6BE0 :08A21320F4FFA212,387
6BE8 :20F4FF60A29720F4,4C8
6BF0 :FFA29620F4FF60A9,553
6BF8 :9CA000A6BAE002D0,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6010A99685,44F
6C10 :0F047EA991A20020,38D
6C18 :F4FFB009C007D005,448
6C20 :68684C0C6AA47E20,2D4
6C28 :496CC60FD0023860,374
6C30 :A5BAC902D0062079,369
6C38 :6E08EC60A991A201,447
6C40 :20F4FF90A47E80DF,55C
6C48 :600AA2D2CAE8CAD0,50A
6C50 :FBAA60A9900847EA8,458
6C58 :20496C08D0FAA47E,449
6C60 :60A9EB0800A2FF20,452
6C68 :F4FFA900858AA98C,460
6C70 :20E3FF20A86DA984,3E4
6C78 :20006EA989B582A9,2F0
6C80 :6FB583A00020F86D,39C
6C88 :20156DC941F00BC9,370
6C90 :42F011C943F0174C,3A2
6C98 :616CA908A20120F4,335
6CA0 :FF4CB76CA908A203,3C4
6CA8 :20F4FF4CB76CA908,433
6CB0 :A20420F4FFE68AA5,4CE
6CB8 :7C20E3FFA47E20AD,46D
6CC0 :6DA9B020006E20FB,2C4
6CC8 :6DAB172015A6DC941,2D0
6CD0 :F00BC942F011C943,413
6CD8 :F0174C616CA907A2,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C09,314
6CF0 :6DA907A28420F4FF,3D6
6CF8 :E6BAA50AC902D009,443
6D00 :A9E0A000A20120F4,3E0
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020AB6D,2E3
6D18 :A9052000E20F86D,2C1
6D20 :20AB6DA9052000E,274
6D28 :20F86D20AB6DA905,36B
6D30 :20006E20F86D20AB,2DE
6D38 :6D847EA9032006E,2A9
6D40 :A9D220E0FF857C60,4DB
6D48 :A98C20E3FF20A0D,3EF
6D50 :A9072000EA99A85,306
6D58 :02A96E0583A00020,361
6D60 :FD6D20A86D20996D,3C0
6D68 :20996D20996D20AB,317
6D70 :6DA98A20006E20FB,2C6
6D78 :6D20AB6DA9022000,270
6D80 :6E20FB6D20AB6D20,34B
6D88 :E7FFA9D220E0FF4C,5A0
6D90 :A90FA20020F4FF60,3D5
6D98 :60A9802000 6E20FB,2B7
6DA0 :6D20AB6D6020A86D,33A
6DA8 :20AB6D20E7FF20E7,445
6DB0 :FF604829F06A6A6A,3FE
6DB8 :6A0930C93A30C310,1F1
6DC0 :69720E3FFA8290F,312
6DC8 :0930C93A30C31869,1F0
6DD0 :0720E3FF60457B03,3AE
6DD8 :78A200A57D2A900C,30B
6DE0 :A57B49B0B57BA57A,398
6DE8 :4910B57A267A267B,299
6DF0 :CAD0EB6B20E3FFC8,5AC
6DF8 :B102C900D0F6CB60,4F7
6E00 :B67DAAA92020E3FF,47B
6E08 :CAD0FAA67D60C97F,55F
6E10 :D00BA90620F4FFE0,4FD
6E18 :00F012A97FC920B0,3C3
6E20 :0EC90AF00AC900F0,3A1
6E28 :06C907F002A900B0,2D1
6E30 :857CB67D847EA991,540
6E38 :A20120F4FFA903A2,404
6E40 :0720F4FFA996A200,403
6E48 :20F4FF9B2902F0F4,4BA
6E50 :A47CA997A20920F4,41F
6E58 :FFA903A20420F4FF,464
6E60 :A991A20020F4FFB0,49F
6E68 :09C007D00568684C,2C1
6E70 :0C6A57CA67DA47E,3DC
6E78 :60047E867DA996A2,446
6E80 :0020F4FF902901F0,3CD
6E88 :00A996A20920F4FF,400
6E90 :9B109B0130A67DA4,340
6E98 :7E60444F574E4C4F,281
6EA0 :41444494E47204D45,215
6EA8 :4E550D3120202052,193
6EB0 :4543454954654B034,1F2
6EB8 :2020205345542042,1AE
6EC0 :617564205261746 5,2E6
6EC8 :0D3520202045584 9,188
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :204E554D42455220,1F6
6EE8 :2020555345204354,1EC
6EF0 :524C2D4720544F20,1F5
6EF8 :5245545552 4E2054,254
6F00 :4F204D454E552029,1ED
6F08 :0D5345542045241,200
6F10 :4E534D4954204261,24E
6F18 :756420526174650D,292
6F20 :4120202037352042,16F
6F28 :617564D4220203 3,1FC
6F30 :3030204261756 4D,209
6F38 :4320313230302042,188
6F40 :617564053455420,253
6F48 :5245434549564520,223
6F50 :4261756420526174,2C3
6F58 :650D50524F475241,23D
6F60 :4D20204C4F414445,1F2
6F68 :4420206F6D0D5052,20D
6F70 :4553532041 4E5920,213
6F78 :4B4559204647 5220,210
6F80 :4D454E550D202020,1A2
```

Figure 1. Spectrum.

```
  5 REM SPECTRUM 48k      fig 1
 10 REM Hex Code Loader
 15 CLEAR 59000
 20 POKE 23658,8: CLS : PRINT
 30 INPUT "Start Address ";a
 50 IF a>61135 THEN GO TO 200
 60 IF a<60000 THEN GO TO 20
 70 PRINT a;
 80 INPUT " :";b$
 85 IF B$="END" THEN GO TO 280
 90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,0: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :EDCD36ECCD66EDCD,631
60016 :50EDCD47EE38FBCD,5AF
60024 :8BEDFE31CA99EAFE,69A
60032 :35CA07EAC366EACD,5D0
60040 :15ED3EFACD84EDCD,5FD
60048 :15EDC9CD15EDC366,553
60056 :EACD66ED11E5E606,58C
60064 :003EFF121310FCCD,458
60072 :15EE11CDEE0617 3E,3D2
60080 :2012130FCCD1FED,3DA
60088 :30F0CD50EDCD1FED,5BB
60096 :38FB3265EF3E0032,3E9
60104 :6CEF326FEF3270EF,544
60112 :3A65EFCDEBEC3A65,5A1
60120 :EFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDEBEC0D,552
60144 :20F23A69EFE60020,51A
60152 :0D214B5C3A6BEF0E,36C
60160 :004709226BEF0E00,1DA
60168 :11CDEECD1FED309A,47F
60176 :1213 0CDEBEC79FE,45C
60184 :1020F03A6BEFCD81,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEFBE2B133E5011,326
60208 :E0EE12133E0012CD,340
60216 :D7ECCDA6ECC3AAEA,6B1
60224 :CD1FEDDAAAEA2170,510
60232 :EFBE20E121E5EE3A,524
60240 :6BEFB56F3E000C67,3CC
60248 :3E00BE200ECDD7EC,40F
60256 :3E2132005CC3FFEB,462
60264 :3C00326FEF3270EF,3C7
60272 :ED5B6BEF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :EBEC3A68EFFE0020,586
60296 :053A69EFE6003A73,432
60304 :EF12130C3A6AEFB9,3FC
60312 :20DCCD1FEDDAAAEA,5DB
60320 :216FEFBEC22DEBCD,584
60328 :1FEDDAAAEA2170EF,5A2
60336 :0EC22DEB3E6F32E2,509
60344 :EE3E6B32E3EE3E00,490
60352 :32E4EE3A005CFE21,501
60360 :200 CD15EECDD7EC,553
60368 :CDA6EC21E5EE3A60,5C5
60376 :EFB56F3E000C6736,422
60384 :0021E5EED4B66EF,561
60392 :0C7EFE00C2BDEA23,4FC
60400 :0D20F63EFACD04ED,5D9
60408 :3E01D3FEC366EACD,5EB
60416 :1FED30FBC3BDEAF3,594
60424 :0603AFD3FF10FB3E,3DB
60432 :40D3FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,385
60448 :320D5C32405C3E01,250
60456 :D3FE21915CCB9EFB,56B
60464 :CD50EDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD04ECCDA3ECCDA6,654
60496 :EC23CD77ECCD77EC,5BF
60504 :CDA0ECCD04ECCDA6,661
60512 :EC233E0DCD0FECCD,4CF
60520 :04EC23CDA3EC3E03,498
60528 :CD0FECCD04ECC9CD,68B
60536 :A3EC3E07CD0FECCD,561
60544 :04EC23C97EFE00C8,520
60552 :CD0BED23C384ECFE,651
60560 :F13DC38FECCDA0EC,65D
60568 :CDA3ECCDA6EC3E0D,5A6
60576 :CD0BED3EFF320C5C,574
60584 :C9F513E6F0CB1FCB,60C
60592 :1FCB1FCB1FF630FE,4CF
60600 :3AFAC6ECC6071213,498
60608 :F1E60FF630FE3AFA,686
60616 :D4ECC6071213C921,46C
60624 :CDEEE5CD04ECE106,69C
60632 :173E20772310FC3E,339
60640 :0077C9E52170EFAE,538
60648 :77C50E007EA7CD17,449
60656 :300D7EEE0877 3A6F,3C9
60664 :31D3FF3E0F320F5C,385
60672 :EFEE10326FEF3721,3D5
60680 :6FEFCB1623CB160D,350
60688 :20E2C1E1C9110501,394
60696 :216A00CDB503C93E,32F
60704 :963277EFCD47EDDA,529
60712 :2EEDF1C366EACDAC,5C0
60720 :ED7BE601F602D3FE,548
60728 :AF2177EF35200237,2FC
60736 :C9CD77ED3DE8C9CD,DF0
60744 :47EED0FECB0837C9,5E6
60752 :F5DBFF3A01EFFE00,5C7
60760 :20043E361002E37,187
60768 :D3FFDB7FF1C9F53A,675
60776 :01EFFE002004 3E36,376
60784 :D3FFCD50EDF1C93E,644
60792 :00D0FFE60037C8D8,59.
60800 :FFE60237C8DBFFE6,626
60808 :302004DB7FA7C93A,3E0
60816 :01EFFE002004 3E37,397
60824 :10023E36D3FFDB7F,452
60832 :C9CD47ED3A73EFD0,5DE
60840 :F1C366EAF53ED23D,5EE
60848 :20FDF1C9CDACED3D,62A
60856 :20FAC9C5D5E5F5FE,70D
60864 :7F2813CDF9EDFE0C,537
60872 :200CFE0D20053E20,20A
60880 :D73E00DD710103E20,34F
60888 :D73E00D73A005CFE,3E9
60896 :2120033E00D73E5F,2E6
60904 :D73E00D7F1E1D1C1,648
60912 :C9FE072811FECD20,4F3
60920 :19FE0C2814FE0820,388
60928 :10FE0D200CFE20FA,367
60936 :0FEEFE80FA11EE3E,4BA
60944 :00C93E07C9CD6B0D,32C
60952 :3E02CD01163E1032,1C4
60960 :095CC93E121601CD,302
60968 :1122C93E121600CD,257
60976 :1122C9C5D5E533E02,3EB
60984 :CD0116CD47EE38FB,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CCB6F200C3A00,20F
61008 :5CF5213B5CCBAEF1,4C3
61016 :A7C937C9F5111000,3DE
61024 :CD10EDF1C9444F57,4D6
61032 :4E4C4F4144494E47,284
61040 :204D454E55003120,216
61048 :20205245434549 56,276
61056 :4500335020202057 0,217
61064 :697420746F204261,328
61072 :736963002020557 3,20F
61080 :652053796D626F6C,393
61088 :2053368696742020,388
61096 :2047007467205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E552029 0045,279
61120 :4E5445552047 5220,1E1
61128 :4245522000000000,1C1
```

FIRST AID

for your 64

Computers, like people, are fallible. They need the right combination of code and care to perform effectively in the business or the home. And that requires first hand knowledge from you to create a healthy operating environment for your Commodore 64.

Knowledge about machine language, about the lesser known qualities of the 64, about the disc drives, graphics, and about the tricks and tips to keep your 64 on line. That's why First Publishing has now launched in the UK a series of high quality books and software packages to provide a complete health care kit for your 64. Commodore 64 users throughout Europe have already found it a tonic. We think you will, too.

For a brochure on all the Commodore 64 books and software packages available from First Publishing, please fill in the coupon and send to: Amanda York, First Publishing, Unit 20B, Horseshoe Road, Horseshoe Park, Pangbourne, Berkshire.

Name _____

Address _____

Or ring *Amanda York* (07357) 5244 or Calco Software at 01-546 7256 YC/1

1st FIRST PUBLISHING LTD

CATERPILLAR

JR Wilson with an arcade-type game for the BBC.

CATERPILLAR IS A GAMES program for the BBC Micro model B or model A with 32k Ram. The program makes extensive use of machine code and the BBC's graphics to make a high speed arcade type game.

You control Fred, from the local pest control department, and are faced with a terrible task. Armed only with your trusty spray gun, you must face a garden full of mutated mushrooms and bugs.

There are 15 different options available from an option page, which can be accessed at any time by pressing the Escape key.

The program includes a pause facility to stop the game at any stage for more pressing interruptions. The initial control keys are as follows:

Z	=	Left
X	=	Right
:	=	Up
/	=	Down
Return	=	Fire spray gun
P	=	Pause on
S	=	Pause off

One final note. Fred earns another charge for his antidote when your score reaches 5,000 points.

The first program to be typed out is the large assembly language program, and is shown in listing four. It will take a lot of time and effort

to get through this program without making mistakes, so take your time. Before you attempt this, I suggest that you reset page to &1B00 by typing

PAGE = &1B00 then Return

then type New and Return.

You will then have to reset page to &1B000 after pressing the Escape key. The program as listed will assemble machine code from &D00 upwards, so for disc users, the Break key must be pressed and page reset before the program can be saved. Once you have finished typing it in, save the program on a separate cassette for a backup copy. Then run the program, but press the Escape key when asked whether to save the machine code.

It is now time to type out listing 1.

Once this program is working correctly it should be saved onto a separate cassette, at the beginning by

SAVE "CENTI"

The second program shown in listing 2 can now be typed out, and can be saved after 'Centi' by

SAVE "Centi1"

Once the program has been typed out, it should be saved after "Centil" by

SAVE "Centi2"

The third program will only work if the machine code is also in memory. Therefore, it is now time to save the machine code following this program on tape. So, load in the assembler program again and run it. Allow the program to record the machine code by pressing the Break key when told.

The game was written on a BBC fitted with the 1.2 Operating System, but should work on any non-0.1 O.S. The programs are also suitable for use with disc or tape systems without modifications.

This article is available on the Telsoft.

Listing 1.

```
10REM
20REM  Centipede
30REM
40REM  By  J.R.Wilson
50REM
60MODE7
70VDU23;8202;0;0;0;
80CX=&7C00
90FORYX=0TO48
100READ A$
110FORXX=0TO19
120?CX=EVAL("&"+MID$(A$,XX*2+1,2))
130CX=CX+1
140NEXT
150NEXT
160VDU28,12,16,26,13
170CLS
180PAGE=&5800
190CHAIN"Centi1"
200DATA 20202020202020202020202020202020202020202020
210DATA 20202020202020202020202020202020202020202020
220DATA 949D932020F0F020202020202020202020202020202020
230DATA 20202020202020202020202020202020202020202020
240DATA 949DY3L0A62020A920202020202020202020202020
250DATA 20202020202020202020202020202020202020202020
260DATA 949DY3EA20202020202020202020202020202020E820
270DATA 20202020202020202020202020202020202020202020
280DATA 949DY3EA20202020202020202020202020A0EEAC
290DATA 20202020202020202020202020202020AA8020202020
300DATA 949DY5EA20202020202020202020202020202020EA20
310DATA 20A120202020202020202020202020202020A5202020
320DATA 949D93EA20202020202020F0A5A3E420B0A5A3B4EA20
330DATA 20B5209DA5A9B0E0B0A5A9B0E0A6A9B5E0B6A3EA
340DATA 949D93AA80202020E020B5A5A3A520B5209DB5EA20
350DATA 20B5209D5209DB5EA0A5A5A1EA209DB5EAA2A5A5
360DATA 949D9520A2ACACA120A2ACACA120B5209DA5A2AC
370DATA 20A9209D7ACA6209DA9ACA6209DA9ACA120A9ACA1
380DATA 949D9320202020202020202020202020202020202020
390DATA 20202020202020202020202020202020202020202020
400DATA 949D9320202020202020202020202020202020202020
410DATA 20202020202020202020202020202020202020202020
420DATA 949D9520202020202020202020202020202020202020
430DATA 20202020202020202020202020202020202020202020
440DATA 20209520202020202020E0ACACACACACACACACAC
450DATA ACACACACACACACACB4B620202020202020202020
460DATA 20202020204D617920295EA0720202020202020202020
470DATA 20202020202020295B5B6220202B6329202020202020
480DATA 20202020202020202095EA0720202020202020202020
490DATA 20202020202020295B5B6220202020202020202020
500DATA 20202020313938342095EA0720202020202020202020
510DATA 20202020202020295B5B3576C736F6E736F6674
520DATA 20202020202020202095EA0720202020202020202020
530DATA 20202020202020295B5B6220202020202020202020
540DATA 20209520202020202020AAACACACACACACACACAC
550DATA ACACACACACACACACA5B620202020202020202020
560DATA 919D94E0F0F0F0F0F0B0202020202020E0202020
570DATA 20202020202020202020202020202020202020202020
580DATA 919D9420202020EA20202020B520202020EA20B020
590DATA B4202020202020202020202020202020202020202020
600DATA 919D942020202020A020202020E920202020B4202020
610DATA B520B0ACE4202020F020200F0F020202020202020
620DATA 919D9420202020EA20202020AA80B0E4E0A5208520
630DATA B520A2ACD020B0A620E920B720208520202020202020
640DATA 919D94A2E4F0A620EBB4202085A5AABA2020E520
650DATA E5B0A0F0BA20A9F0A620B5202085202020202020
660DATA 919D9420202020202020202020202020202020202020
670DATA 20202020202020202020202020202020202020202020
680DATA 20202020202020202020202020202020202020202020
```

Listing 2.

```
10REM
20REM  Centipede part 2
30REM
40REM  By J.R.Wilson
50REM
60*L.Centi2 1B00
70*L.Centi3 3000
80*TAPE
90MODE7
100PROCL(5,5,CHR$132+CHR$157+CHR$134+"C E N T I P E
   D E  "+CHR$156)
110PROCL(7,10,"By  J.R.Wilson")
120FORIX=0 TO &DF8 STEP 4
130!IX!&D00=!IX!&3000
140NEXT
150FORIX=&DF1 TO &DFF
160IX%&D00=IX%&3000
170NEXT
180PROCset_up
190PROCL(13,14,"Do you want instructions ?")
200REPEAT A$=GET$
210UNTIL A$="Y" OR A$="N" OR A$="y" OR A$="n"
220IF A$="Y" OR A$="y" THEN PROCinstructions
230ON ERROR PROCerror
240REPEAT
250CLS
260PROCL(5,0,"Current control keys:")
270PROCF(5,"Pause on  = ",PX)
280PROCF(7,"Pause off = ",SX)
290PROCF(9,"Left      = ",LX)
300PROCF(11,"Right     = ",RX)
310PROCF(13,"Up        = ",UX)
320PROCF(15,"Down      = ",DX)
330PROCF(17,"Fire      = ",FX)
340PROCL(5,20,"Define your own ?")
350REPEAT A$=GET$
360UNTIL A$="Y" OR A$="N" OR A$="y" OR A$="n"
370IF A$="Y" OR A$="y" THEN PROCkeys:UNTIL FALSE
380UNTIL TRUE
390CLS
400*FX15,1
410RESTORE
420FORIX=0 TO 18
430READ A$
440AX=136:XX=0:YX=ASC(A$)
450IF A$="!" THEN YX=13
460CALL&FFF4
470NEXT
480END
490DATA P,A,S,E,-,&,!,@,#,$,[,D,],R,U,N,!
500DEF PROCL(XX,YX,A$)
510PRINTTAB(XX,YX)CHR$141;A$
520PRINTTAB(XX,YX+1);CHR$141;A$;
530ENDPROC
540DEF PROCset_up
550*FX4,1
560X%=-98:RX=-67:UX=-73:DX=-105:FX=-74:PX=-56:SX=-92
570ENVELOPE1,2,-1,-1,-1,20,20,20,120,0,0,0,120,120
580ENVELOPE2,1,-1,20,0,20,1,1,120,0,0,0,120,120
590ENVELOPE3,1,0,0,0,0,0,0,120,-1,-2,-3,127,127
600ENVELOPE4,1,-1,-1,-1,50,50,60,120,0,-2,-5,120,120
610REM User characters
620REM Man
630VDU23,250,24,60,60,60,24,24,126,189
640VDU23,251,189,189,189,36,36,36,36,102
650ENDPROC
660DATA 48,33,41,114,42,115,43,116,44,21
670DATA 45,117,46,118,47,23,48,119,49,120
680DATA A,66,B,101,C,83,D,51,E,35,F,68
690DATA G,84,H,85,I,38,J,70,K,71,L,87,M,102
700DATA N,86,O,55,P,56,Q,17,R,52,S,82,T,36
710DATA U,54,V,100,W,34,X,67,Y,69,Z,90,1,49
720DATA 2,50,3,18,4,19,5,20,6,53,7,37,8,22
730DATA 9,39,0,48,-,24,^,25,\,121,@,72,[,57
740DATA ;,41,:,00,],73,_,89,',',103,.,104
750DATA /,105,TAB,97,CAPS LOCK,65,CTRL,2
760DATA SHIFT LOCK,81,SHIFT,1,SPACE BAR,99
770DATA DELETE,98,COPY,106,RETURN,74
780DATA CURSOR UP,58,CURSOR DOWN,42,CURSOR LEFT,26,C
   URSOR RIGHT,122
790DEF fnread
800RESTORE 660
810I=0
820REPEAT
830I=I+1
840IF I=72 THEN I=1:RESTORE 660
850READ A$,A%
860UNTIL INKEY(-A%)
870=-A%
880DEF PROCkeys
890CLS
900PROCL(3,0,"Press your required key for:")
910PROCL(5,3,"Left  =")
920LX=fnread
930PROCL(13,3,A$)
940PROCL(5,6,"Right =")
950REPEAT
960RX=fnread
970UNTIL !IX=RX
980PROCL(13,6,A$)
990PROCL(5,9,"Up    =")
1000REPEAT
1010UX=fnread
1020UNTIL UX<>LX AND UX<>RX
1030PROCL(13,9,A$)
1040PROCL(5,12,"Down  =")
1050REPEAT
1060DX=fnread
1070UNTILDX<>LX AND DX<>RX AND DX<>UX
1080PROCL(13,12,A$)
1090PROCL(5,15,"Fire  =")
1100REPEAT
1110FX=fnread
1120UNTIL FX<>LX AND FX<>RX AND FX<>UX AND FX<>DX
1130PROCL(13,15,A$)
1140REPEAT
1150PROCL(2,18,"Pause on =")
1160PX=fnread
1170UNTIL PX<>LX AND PX<>RX AND PX<>FX AND PX<>DX AND
PX<>UX
1180PROCL(13,18,A$)
1190PROCL(1,21,"Pause off =")
1200REPEAT
1210SX=fnread
1220UNTIL SX<>PX AND SX<>LX AND SX<>RX AND SX<>FX AND
SX<>UX AND SX<>DX
1230PROCL(13,21,A$)
1240PROCspace
1250CLS
1260ENDPROC
1270DEF PROCerror
1280IF ERR=17 THEN ENDPROC
1290REPORT:PRINT" in line ";ERL
1300*FX4,0
1310END
1320DEFPROCspace
1330PRINTTAB(0,24);"Press the SPACE BAR to continue..
";
1340REPEAT UNTIL GET=32
1350ENDPROC
1360DEF PROCF(XX,A$,TX)
```

(continued on next page)

(continued from previous page)

```
1370RESTORE 660
1380REPEAT
1390READ B$,AX
1400UNTIL AX=-1%
1410PROCL(10,XX,A8+B8)
1420ENDPROC
1430DEF PROCinstructions
1440CLS
1450PRINT"    You control Fred, from the local pest"
1460PRINT"control, and are faced with a terrible"
1470PRINT"task. Armed only with your trusty spray"
1480PRINT"gun, you must face a garden full of"
1490PRINT"mutated mushrooms and bugs. Keep Fred"
1500PRINT"alive as long as possible by spraying "
1510PRINT"all the giant pests that occupy the"
1520PRINT"garden. Defend yourself against the"
1530PRINT"marauding centipede covered in poisonous"
1540PRINT"hairs by shooting all the segments"
1550PRINT"before you are touched."
1560PROCspace
1570CLS
1580PRINT"Dodge giant spiders or blast them with"
1590PRINT"your gun for bonus points. Collect even"
1600PRINT"more bonus points by killing the snail"
1610PRINT"and spraying the ants.Dodge the mushroom"
1620PRINT"laying bug if you want, or give it a"
1630PRINT"quick blast with your spray gun. Points"
1640PRINT"are awarded as follows:"
1650PRINT'SPC5"Centipede segment      = 25  Points"
1660PRINTSPC5"Mushroom dropper        = 50  Points"
1670PRINTSPC5"Spider                  = 200 Points"
1680PRINTSPC5"Ant                     = 250 Points"
1690PRINTSPC5"Snail                   = 500 Points"
1700PROCspace
1710CLS
1720PRINT"   Just when you thought you had the"
1730PRINT"game licked, the ants and spiders start"
1740PRINT"spitting acid at you, which is as lethal"
1750PRINT"as your own gun. Fred has one last line"
1760PRINT"of defence. He is carrying a special"
1770PRINT"antidote that can counteract any poison"
1780PRINT"that the nasties are using, but he only"
1790PRINT"has enough for two applications. So Fred"
1800PRINT"will be killed if he is hit three times."
1810PRINT"The game includes many variations and"
1820PRINT"skill levels to change the game from"
1830PRINT"hard to virtually impossible."
1840PROCspace
1850CLS
1860PRINT"    There are 15 different options"
1870PRINT"available from an option page, which can"
1880PRINT"be accessed at any time by pressing the"
1890PRINT"ESCAPE key. They are as follows:"
1900PRINT'CHR$138"A"CHR$129"Start game:"CHR$135"Start
s the game, setting"
1910PRINT"up all the options as previously chosen."
1920PRINTCHR$138"B"CHR$129"Save high score table:"CHR
$135"This option"
1930PRINT"allows you to save the high score table"
1940PRINT"onto tape."
1950PRINT'CHR$138"C"CHR$129"Load high score table:"C
HR$135"This can load"
1960PRINT"a pre-recorded high score table from"
1970PRINT"tape into memory."
1980PROCspace
1990CLS
2000PRINT'
2010PRINT'CHR$138"D"CHR$129"Overall game speed:";CHR$
135"This selects the"
2020PRINT"initial overall speed of the game, and"
2030PRINT"can be in the range 1 to 8."
2040PRINT'CHR$138"E"CHR$129"Number of mushrooms:"CHR
$135"This selects the"
2050PRINT"initial relative number of mushrooms,"
2060PRINT"and can also be in the range 1 to 8."
2070PRINT'CHR$138"F"CHR$129"Speed of snail:"CHR$135"Y
ou can change the"
2080PRINT"speed of the snail with this option in"
2090PRINT"the range 1 to 8 where 1 is fast.This is"
2100PRINT"usually left at 3 or 4 for most players."
2110PROCspace
2120CLS
2130PRINTCHR$138"G"CHR$129"Speed of ant:"CHR$135"This
option selects the"
2140PRINT"speed of the ant in the range 1 to 8."
2150PRINT"It is usually set to 2 or 3."
2160PRINT'CHR$138"H"CHR$129"Speed of spider:";CHR$135
"This changes the"
2170PRINT"speed of the spider in the range 1 to 8."
2180PRINT"It is usually set to 1 or 2 for most"
2190PRINT"players"
2200PRINT'CHR$138"I"CHR$129"Height of spider:";CHR$13
5"This changes the"
2210PRINT"initial maximum height which the spider"
2220PRINT"reaches and can be in the range 1 to 8."
2230PRINT"where 8 is the highest. It is usually"
2240PRINT"set to 8 unless you are good at dodging."
2250PROCspace
2260CLS
2270PRINT'CHR$138"J"CHR$129"Acid spitting spider:"CHR
$135"This option can"
2280PRINT"enable or disable the acid spitting"
2290PRINT"spider. Some players may wish to disable"
2300PRINT"this option to avoid the low, spitting"
2310PRINT"spiders."
2320PRINT'CHR$138"K"CHR$129"Acid spitting ant:";CHR$1
35"Similarly, this"
2330PRINT"option controls the acid spitting ant."
2340PRINT'CHR$138"L"CHR$129"Mushroom dropper:";CHR$13
5"This option can"
2350PRINT"enable or disable the mushroom dropper"
2360PRINT"to avoid any extra obstacles appearing"
2370PRINT"during the game."
2380PROCspace
2390CLS
2400PRINT'''CHR$138"M"CHR$129"Mushroom dropper speed:
";CHR$135"This changes"
2410PRINT"the speed of the mushroom dropper in the"
2420PRINT"range 1 to 8."
2430PRINT'CHR$138"N"CHR$129"Sound:";CHR$135"This opti
on can turn on or off"
2440PRINT"all the sound within the game, for quiet"
2450PRINT"play if necessary."
2460PRINT'CHR$138"O"CHR$129"Joystick:";CHR$135"This o
ption selects between"
2470PRINT"joystick and keyboard controls. The"
2480PRINT"keyboard controls can be freely selected"
2490PRINT"at the beginning of the game if required"
2500PROCspace
2510CLS
2520PRINT"    The program also includes a pause"
2530PRINT"facility to stop the game at any stage"
2540PRINT"for more pressing interuptions."
2550PRINT"The initial control keys are as follows:"
2560PRINT'SPC10CHR$129"I"CHR$135"= Left"
2570PRINTSPC10CHR$138"I"CHR$135"= Right"
2580PRINTSPC10CHR$151"I"CHR$135"= Up"
2590PRINTSPC10CHR$132"/"CHR$135"= Down"
2600PRINTSPC5CHR$133"RETURN"CHR$135"= Fire spray gun"
2610PRINTSPC10CHR$134"P"CHR$135"= Pause on"
2620PRINTSPC10" S = Pause off"
2630PRINT'''   One final note. Fred earns another"
2640PRINT"'charge' for his antidote when your score"
2650PRINT"reaches 5,000 points."
2660PROCspace
2670ENDPROC
```

Listing 3.

```
   10a=&1021:b=&1053:c=&1114:d=&14AE:e=&132F:f=&1687:g
=&1130:h=&13DF:i=&141A:j=&144F:l=&19DC:m=&199C:n=&1633
:o=&1A7E
   20*MODE7:PROCL(5,5,CHR$132+CHR$157+CHR$134+"C E N T
I P E D E  "+CHR$156)
   30PROCL(9,12,CHR$129+"By"+CHR$138+"J.R.Wilson")
   40Toad=&6F0:CLD=&FB0:CHD=&FBC:Mdata=&EA0
   50CX=&900:CY=CX+15:XM=CY+15:YM=XM+1
   60CT=YM+1:MX=CT+15:MY=MX+1:SP=MY+1
   70CO=SP+1:LK=CO+1:RK=LK+1:UK=RK+1
   80DK=UK+1:FK=DK+1:PK=FK+1:SK=PK+1
   90SL=SK+1:ST=SL+1:SX=ST+1:SY=SX+1
   100SPX=SY+1:SPY=SPX+1:SPD=SPY+1:NM=SPD+1
   110SH=NM+1:DOU=SH+1:JOY=SOU+1
   120SC=JOY+1:DF=SC+3:AX=DF+1:AY=AX+1
   130AD=AY+1
   140CD=AD+1:SNP=CD+15:SPP=SNP+1:ASP=SPP+1
   150SPH=ASP+1:SSPY=SPH+1
   160GX=SDY+1:GY=GX+2
   170SSPD=GY+2:ASPD=SSPD+1:DX=ASPD+1
   180DY=DX+1:DD=DY+1:DS=DD+1
   190DO=DS+1
   200IH=5:SD=1:IH=28:INM=5
   210?LK=L%:?RK=R%:?UK=U%:?DK=D%:?FK=F%:?PK=P%:?SK=S%
   220?JOY=0
   230?ASPP=3:?SPP=3:?SNP=7
   240?DD=1:?ASPD=1:?SSPD=1:?DS=3
   250PROCL(1,17,"Do you want to change an option ?")
   260REPEATA$=GET$:UNTILA$="Y"ORA$="N":IFA$="Y"GOTO320
   270MODE2:ONERRORGOTO310
   280VDU23;8202;0;0;0;
   290FORIX=0TO15
   300VDU19,IX,IX%AND7,0,0,0
   310NEXT
   320COLOUR130
   330PRINTSPC(08);
   340COLOUR3
   350PRINTTAB(1,1)"SCORE"
   360PRINTTAB(7,1)"WAVE"
   370COLOUR6
   380FORIX=0TO2
   390PRINTTAB(IX*2+12,1);
   400VDU230,10,8,231
   410NEXT
   420?SP=15+IS:?MY=8:?SPH=IH
   430?SC=0:SC?1=0:SC?2=0:?ST=8:?SPD=8:?NM=8
   440CALLb
   450?SH=3:?SOU=SO:?AD=8
   460?GY=8:GY?1=8
   470?DY=8
   480?BD=8:NM=INM+15
   490COLOUR130
   500?YM=20:?XM=38
   510?&70=?XM:?&71=?YM:?&72=Mdata:?&73=Mdata/256:?&74=
40:CALLa
   520?&71=?YM+1:?&72=Mdata+40:?&73=(Mdata+40)/256:CALL
a
   530COLOUR130
   540FORIX=0TO14:IX%CI=0:NEXT
   550FORI=0 TO NM
   560IF IX%OD3=0THENPROCa
   570?&70=RND(18)+4:?&71=RND(23)+6
   580?&72=Toad:?&73=Toad/256:?&74=32
   590CALLa:NEXT
   600A=RND(2):IFA=2A=-1
   610PRINTTAB(0,2);RIGHT$("0"+STR$(?NM),2)
   620FORIX=0TO14:IX?CT=0:NEXT
   630FORIX=0TO14
   640IF IX%OD2=0THENPROCa
   650I=IX%OD3 +1
   660CD?IX=A:CT?IX=I:?&72=CLB?I:?&73=CHB?I:?&74=32
   670?&70=IX+4+10:?&71=5:CX?IX=?&70:GY?IX=5
   680CALLa:NEXT:?SL=15
   690?DF=0:CALLf
   700IF ?DF=1 THEN 810
   710FORIX=0TO100
   720PROCa:IF?DF=1THENIX=100
   730FORI=1TO50:NEXT:NEXT
   740IF?DF=1THEN810
   750?NM=?NM+1
   760IF(?NM)MOD3=0AND?SPH<28THEN?SPH=?SPH+1
   770IF ?SP>5THEN?SP=?SP-1
   780VDU19,1,(?NM)MOD6 +1,0,0,0
   790IF(?NM)MOD3=0THENVDU20,0,31,19,4:COLOUR128:CLS:VD
U26:NM=NM+5:?MY=0:GOTO510
   800GOTO640
   810SOUND&12,0,0,0:SOUND&13,0,0,0:SOUND&10,17+(?SOU),
3,255
   820FORI%=255 TO 0 STEP -1
   830SOUND&13,0,I%,1
   840VDU19,0,RND(7),0,0,0
   850NEXT
   860VDU20,0,31,19,4:COLOUR128:CLS
   870?ST=0:?DY=0:?GY=0:GY?1=0:?SPD=0
   880?MY=0:?AD=0
   890VDU19,0,0,0,0,0,26:SOUND&10,0,0,0
   900COLOUR130
   910?SH=?SH-1
   920PRINTTAB(12+(?SH)*2,1);" ";TAB(12+(?SH)*2,2);" "
   930IF?SH>0THEN940
   940FORI=0TO5000:NEXT
   950SX=VAL(RIGHT$("0"+STR$~(SC?2),2)+RIGHT$("0"+STR$~
(SC?1),2)+RIGHT$("0"+STR$~(?SC),2))
   960FL%=1
   970FORI=?TOB STEP-1
   980IF SX%VAL("&"+STR$~I)THEN1150
   990NEXT
   1000IF FL%=1THEN1130
   1010IFFL=9THEN1060
   1020FORIX=9TO FL STEP-1
   1030$(&D8A+IX%A)=$(&D80+IX%A)
   1040$(&D6A+IX%16)=$(&D50+IX%16)
   1050NEXT
   1060COLOUR128:COLOUR5:PRINTTAB(3,10)"You are ranked"
   1070PRINTTAB(5,12)"number : ";FL+1
   1080COLOUR3:PRINTTAB(3,14)"Enter your name"
   1090COLOUR4:PRINTTAB(3,16)"................"
   1100COLOUR7:PRINTTAB(3,16);:*FX15,1
   1110X%=8:Y%=9:AX=0
   1120?&900=&50+FL+16:?&901=&D:?&902=15
   1130?&983=32:?&984=128:CALL&FFF1
   1140$(&D80+FL*A)=RIGHT$("0000"+STR$GX,5)
   1150VDU22,7:PROCL(5,1,CHR$130+"Centipede "+CHR$129+"H
all of fame")
   1160FORIX=0TO9:PRINT'SPC5;$(&D80+IX*6);"  -  ";$(&D58
+IX*16)
   1170NEXT:PRINT"Press the SPACE BAR to play again.."
   1180*FX15,1
   1190REPEATUNTILINKEY0=32OR(ADVAL(0)AND1)=1:GOTO270
   1200DEFPROCa
   1210CALLd:CALLg:YX=0:CALL1:YX=1:CALL1
   1220IF?ST<>0CALLh
   1230IF?AD<>0CALLi
   1240IF?SPD<>0CALLj
   1250IF?MY<>0CALLk ELSECALLn
   1260IF?DY<>0CALLo
   1270ENDPROC
   1280DEFPROCL(XX,YX,A$)
   1290PRINTTAB(XX,YX)CHR$141A$;TAB(XX,YX+1)CHR$141A$
   1300ENDPROC
   1310IFERR<>17ORINKEY-1REPORT:PRINT" in line ";ERL:END
   1320VDU22,7
   1330PROCL(10,1,CHR$131+"Option page")
   1340PRINTTAB(10,3)CHR$141B;STRING$(13,CHR$163)
   1350PRINT''"  A  -  Start game"
   1360PRINT"  B  -  Save high score table"
   1370PRINT"  C  -  Load high score table"
   1380PRINT"  D  -  Overall speed"
   1390PRINT"  E  -  Number of mushrooms"
   1400PRINT"  F  -  Speed of snail"
   1410PRINT"  G  -  Speed of ant"
   1420PRINT"  H  -  Speed of spider"
   1430PRINT"  I  -  Height of spider"
   1440PRINT"  J  -  Acid spitting spider"
   1450PRINT"  K  -  Acid spitting ant"
   1460PRINT"  L  -  Mushroom dropper"
   1470PRINT"  M  -  Mushroom dropper speed"
   1480PRINT"  N  -  Sound"
   1490PRINT"  O  -  Joystick controls"
   1500PRINTTAB(0,22)"Press the required letter : ";
   1510REPEAT A#=GET$:UNTILA#>="A"ANDA#<="O"
   1520PRINTTAB(1,AGC(64)-59);CHR$134;A$;CHR$137
   1530PRINTTAB(0,22)SPC40
   1540IFA$="A"GOTO270
   1550IFA$="B"CLD:*SAVE CD4+1DC D00+FF
   1560IFA$="C"CLD:*LOAD CD4+1DC
   1570IFA$="D"IS=FNA
   1580IFA$="E"INM=FNA
   1590IFA$="F"?SNP=(2*FNA)-1
   1600IFA$="G"?ASP=(2*FNA)-1
   1610IFA$="H"?SPP=(2*FNA)-1
   1620IFA$="I"IH=28-2*FNA
   1630IFA$="J"?SSPD=FNB
   1640IFA$="K"?ASPD=FNB
   1650IFA$="L"?DD=FNB
   1660IFA$="M"?DS=(2*FNA)-1
   1670IFA$="N"SO=FNB
   1680IFA$="O"?JOY=FNB
   1690GOTO1320
   1700DEFFNA:PRINTTAB(0,22)"Enter number in range 1 to
8 ; ";
   1710REPEATA#=GET#:UNTILVALA#)0ANDA#<)"0":=VALA#-1
   1720DEFFNB:PRINTTAB(5,22)"Enter Enable or Disable ; " ;
   1730REPEATB$=GET$:UNTILB$="E"ORB$="D":=INSTR("DE",B$) -1
```

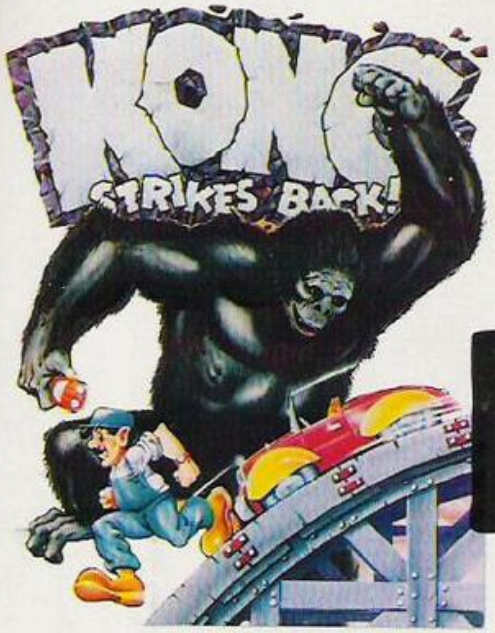
Listing 4.

```
10REM
20REM  Centipede
30REM
40REM  By J.R.Wilson
50REM
60*FX4,1
70ENVELOPE1,2,-1,-1,-1,20,20,20,120,0,0,0,129,120
80ENVELOPE2,1,-1,20,0,20,1,1,120,0,0,0,0,120,120
90ENVELOPE3,1,0,0,0,0,0,0,0,120,-1,-2,-3,127,127
100ENVELOPE4,1,-1,-1,-1,-1,50,50,60,120,0,-2,-5,120,120
110MODE7
120PRINT'''"Have you saved this program ?"
130PRINT'''"Press the SPACE BAR if you have.."
140REPEAT UNTIL GET=32
150CLS
160IX=&F00
170LSB=IX
180MSB=LSB+32
190Cdata=MSB+32
200Mdata=Cdata+96
210Toad=Mdata+80
220Sdata=Toad+32
230bullet=@%data+&4
240spider=bullet+8
250ant=spider+64
260OLD=ant+32
270CHB=CLB+4
280SLB=CHB+4:SHB=SLB+3:SDI=SHB+3
290Soundfire=SDI+3
300Soundendfire=Soundfire+8:Soundspider=Soundendfire+8
310Soundendspider=Soundspider+8:Soundbang=Soundendspider+8
320Soundbonus=Soundbang+8
330Soundspit=Soundbonus+8
340drop=Soundspit+8
350IX%=drop+32
360CX=&900:CY=CX+15:XM=CY+15:YM=XM+1
370CT=YM+1:MX=CT+15:MY=MX+1:SP=MY+1
380CO=SP+1:LK=CO+1:RK=LK+1:UK=RK+1
390DK=UK+1:FK=DK+1:PK=FK+1:SK=PK+1
400SL=SK+1:ST=SL+1:SX=ST+1:SY=SX+1
410SPX=SY+1:SPY=SPX+1:SPD=SPY+1:NM=SPD+1
420SH=NM+1:DOU=SH+1:JOY=DOU+1
430SC=JOY+1:DF=SC+3:AX=DF+1:AY=AX+1
440AD=AY+1
450CD=AD+1:SNP=CD+15:SPP=SNP+1:ASP=SPP+1
460SPH=ASP+1:SSPY=SPH+1
470GX=SDY+1:SY=GX+2
480SSPD=GY+2:ASPD=SSPD+1:DX=ASPD+1
490DY=DX+1:DD=DY+1:DS=DD+1
500DO=DS+1
510REM Graphics data
520REM Centipede 1
530DATA 0,64,192,192,192,192,5,0
540DATA 192,192,192,192,192,192,64,10
550DATA 192,192,192,192,192,192,128,5
560DATA 0,128,192,192,192,192,10,0
570REM Centipede 2
580DATA 0,64,192,192,192,192,5,5
590DATA 192,192,192,192,192,192,64,0
600DATA 192,192,192,192,192,192,128,0
610DATA 0,128,192,192,192,192,10,10
620REM Centipede 3
630DATA 0,64,192,192,192,192,5,10
640DATA 192,192,192,192,192,192,64,0
650DATA 192,192,192,192,192,192,128,0
660DATA 0,128,192,192,192,192,10,5
670FORIX=0TO95
680READ A%
690@%=A%:IFA%=64THENREM+1
700IFA%=128THENBX=2
710IFA%=192THENBX=3
720IX?Cdata=@%
730NEXT
740REM Man 1
750DATA 0,0,0,0,0,0,0,0
760DATA 0,0,0,0,0,0,17,51
770DATA 15,15,15,15,15,15,15,15
780DATA 0,0,0,34,51,20,0,0
790DATA 0,0,0,0,0,40,80,20
800REM Man 2
810DATA 20,40,40,40,40,20,0,0
820DATA 40,0,0,0,17,56,56,60,0
830DATA 0,0,51,51,48,48,48,60
840DATA 0,0,0,34,52,52,60,0
850DATA 20,20,20,60,60,40,0,0
860FORIX=0TO79
870READ A%
880IX?Mdata=A%
890NEXT
900REM Teadatool
910DATA 0,1,3,3,0,0,0,0
920DATA 1,3,43,3,20,20,20,20
930DATA 2,23,3,3,40,40,40,40
940DATA 0,2,3,43,0,0,0,0
950FORIX=0TO31
960READ A%
970IF A%<>0 THEN A%=A% OR 192
980IX?Toad=A%
990NEXT
1000REM Snail 1
1010DATA 0,0,1,3,3,3,35,51
1020DATA 0,3,3,3,3,3,3,51
1030DATA 0,0,2,3,3,19,51,34
1040DATA 5,10,51,51,34,34,0,0
1050FORIX=0TO31
1060READA%
1070IX?Sdata=A%
1080NEXT
1090REM Bullet
1100DATA 7,11,7,11,7,11,7,11
1110FORIX=0TO7
1120READA%
1130IX?bullet=A%
1140NEXT
1150REM Snail 2
1160DATA 10,5,51,51,17,17,0,0
1170DATA 0,0,0,1,3,35,51,17
1180DATA 0,1,3,3,3,3,3,51
1190DATA 0,0,2,3,3,3,19,51
1200FORIX=32TO63
1210READA%
```

(continued on page 84)

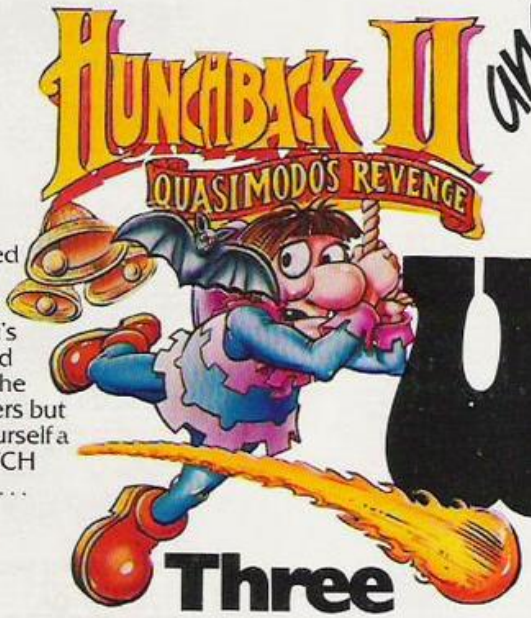
the good

Yeh, only the good will survive in this the Superstar's,(that's me), first supa-game. . . **"Roland's Rat Race"**. Yeh, I'll really need your help, Rat Fans, to wind my way through the underground Rodent World of ladders, lifts, bats and all kinds of creepy crawlies, where I must find the keys to free my furry friends. I can't wait to use my glue gun . . . "Stick 'em down!" . . . on those monster meanies. See you on your screen, from your cuddly, adorable me. . . . Roland Rat, Superstar.



the BAD

The fun of the fair and the fury of Kong! Now you can know what it feels like to be a dodgem, only this time you're running up and down the Roller Coaster dodging the cars, giant buns and jumping springs. But the fun has only just begun!...wait until the fury starts! The wacky Waltzer and the zany Swinging Gym are enough to unhinge the sanest fun fair fanatic. **Kong Strikes Back** is all good fun but it's bound to bring out the bad in you!



Ugh! The Hunch is back! Your favourite bell ringer, the all-conquering Quasimodo, swings into action on another breathtaking, action- packed extravaganza. Set the bells sounding and Esmerelda's heart pounding with Quasi's astounding derring dos and athletic antics. The bats in the belfry may send you bonkers but be as bold as brass, give yourself a pat on the hump and, WATCH THAT FIREBALL! . . . phew! . . . Our hero's revenge is a winner all the way, yes, it's definitely for you . . hoo!

and the Ugly!

Three great games of real character from

SPECTRUM 48k **6.90**

ocean

COMMODORE 64 **7.90**

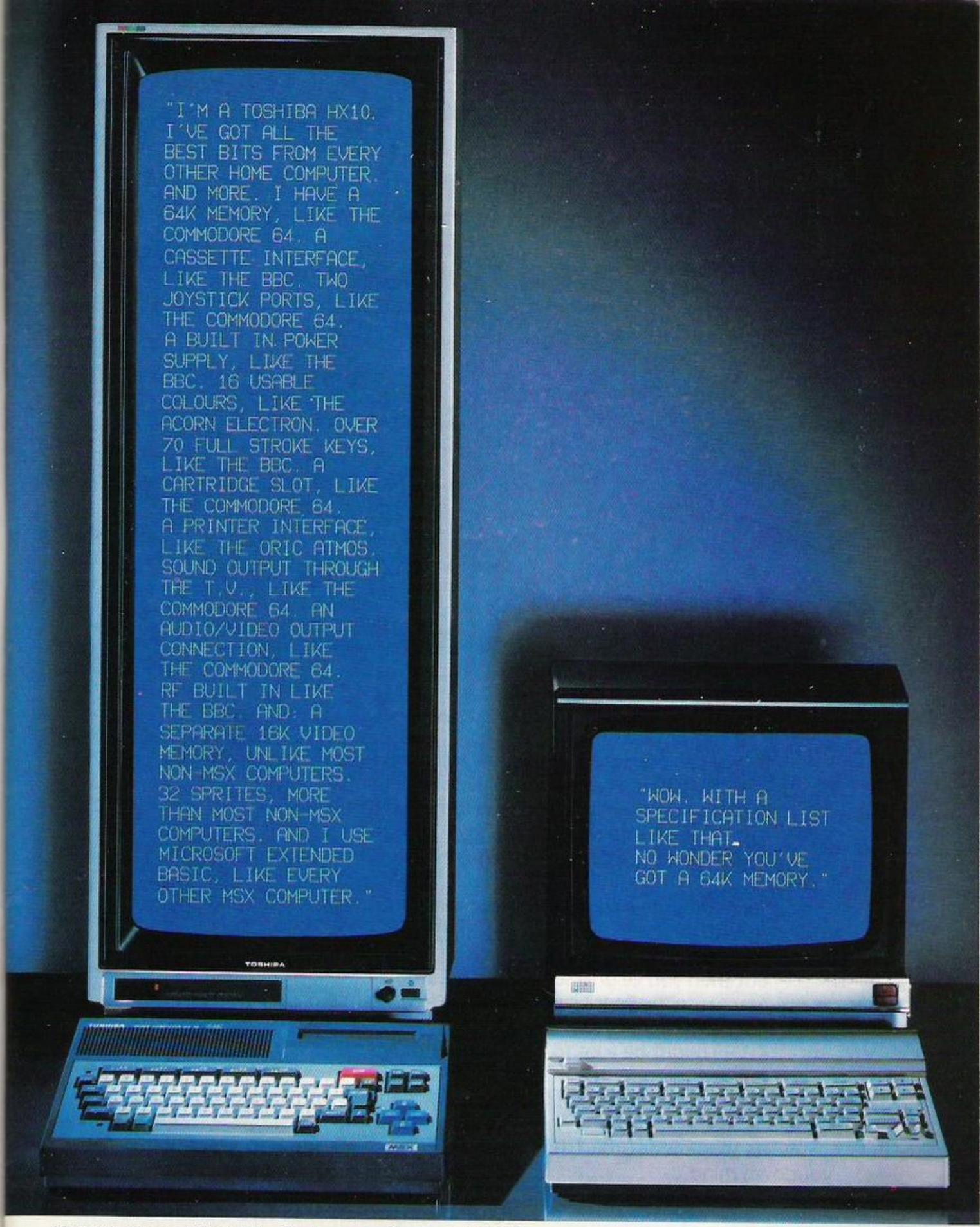
Ocean House · 6 Central Street · Manchester · M2 5NS · Telephone 061 832 6633 · Telex 669977

Ocean Software is available from selected branches of: **WOOLWORTH**, WHSMITH, Boots, John Menzies, **LASKYS**, **Rumbelows** and Spectrum Shops

Spectrum Shops and all good software dealers. Trade enquiries welcome.

(continued from page 82)

```
1220IX?$data=A%
1230NEXT
1240REM Spider
1250DATA 0,0,0,1,2,0,1,2
1260DATA 0,0,0,2,1,2,1,1
1270DATA 0,21,55,51,39,51,0,1
1280DATA 17,59,49,51,51,27,19,0
1290DATA 34,55,50,51,51,39,35,0
1300DATA 0,42,39,51,27,51,0,2
1310DATA 0,0,0,1,2,1,2,2
1320DATA 0,0,0,2,1,0,2,1
1330FOR I%=0TO63
1340READ A%
1350I%?spider=A%
1360NEXT
1370REM Ant
1380DATA 0,0,17,34,0,0,17,34
1390DATA 20,20,35,1,1,35,16,16
1400DATA 40,40,19,2,2,19,32,32
1410DATA 0,0,34,17,0,0,34,17
1420FOR I%=0TO31
1430READ A%
1440NEXT
1450I%?ant=A%
1460REM User characters
1470REM Man
1480VDU23,230,24,60,60,60,24,24,126,189
1490VDU23,231,189,189,189,36,36,36,36,102
1500FOR I%=0 TO 31
1510L%=7*I%+43000+I%+640
1520M%=7*I%-(I%3000+I%+640)/256
1530NEXT
1540FOR I%=0 TO 7
1550READ A%
1560I%?Soundfire=A%
1570NEXT
1580DATA &11,0,1,0,150,0,1,0
1590FOR I%=0 TO 7
1600READ A%
1610I%?Soundendfire=A%
1620NEXT
1630DATA &11,0,0,0,0,0,0,0
1640FOR I%=0TO7
1650READ A%
1660I%?Soundspider=A%
1670NEXT
1680DATA &12,0,2,0,150,0,1,0
1690FOR I%=0 TO 7
1700READ A%
1710I%?Soundendspider=A%
1720NEXT
1730DATA &12,0,0,0,0,0,0,0
1740FOR I%=0TO7
1750READ A%
1760I%?Soundbang=A%
1770NEXT
1780DATA &10,0,3,0,6,0,6,0
1790FOR I%=0 TO 7
1800READ A%
1810I%?Soundbonus=A%
1820NEXT
1830DATA &12,0,3,0,120,0,6,0
1840FOR I%=0TO7
1850READ A%
1860I%?Soundspit=A%
1870NEXT
1880DATA &13,0,4,0,200,0,30,0
1890FOR I%=0TO3
1900A%=I%-I%
1910I%?O.B=A%*32+Cdata
1920I%?O+B=(A%*32+Cdata)/256
1930NEXT
1940FOR I%=0TO2
1950A%=I%-I%
1960B%=!&:IF I%=2B%=-1
1970I%?BLB=A%*32+$data
1980I%?BHB=(A%*32+$data)/256
1990I%?SGI=B%
2000NEXT
2010REM Dropping data
2020FOR I%=0TO31
2030READ A%
2040I%?drop=A%
2050NEXT
20600DATA 31,31,31,23,23,1,0,0
20700DATA 34,31,31,49,59,19,3,1
20800DATA 17,31,31,30,30,35,3,2
20900DATA 31,31,31,43,43,2,0,0
2100FOR I%=0 TO 3 STEP3
2110P%=5%
2120[OPT I%
2130\
2140\ Poke on screen
2150\
2160.poke PHA:TYA:PHA
2170LDY#71:LDA LSB,Y:STA&80
2180LDA MSB,Y:STA&81:LDY#0
2190.P1 CLC:LDA&80:ADC&70:STA&80
2200LDA&81:ADC#0:STA&81
2210DEY:BNE P1
2220LDY#0
2230.P2 LDA(&80),Y:EOR(&72),Y:STA(&80),Y
2240INY:CPY&74:BNE P2
2250PLA:TAY:PLA:RTS
2260\
2270\ Update score
2280\
2290.score PHA:LDA#17:JSR&FFEE:LDA#130:
    JSR&FFEE:LDA#17:JSR&FFEE:LDA#4:JSR&FFEE
2300LDA#31:JSR&FFEE:LDA#1:JSR&FFEE:LDA#2:JSR&FFEE
2310LDA SC+2:AND#15:CLC:ADC#48:JSR&FFEE
2320LDA SC+1:JSR bcd:LDA SC:JSRbcd
2330LDA SG:CMP#1:BNE UB1:PLA:RTS
2340.UB1 LDA SC+1:CMP#&50:BCS UB2:PLA:RTS
2350.UB2 LDA#1:STA SG:LDA SGU:CMP#1:BNE UB3
2360TXA:PHA:TYA:PHA:LDA#7:LDX#Soundbonus MOD256
2370.DLY#Soundbonus DIV256:JSR&FFF1:PLA:TAY:PLA:TAX
2380.UB3 LDA#17:JSR&FFEE:LDA#4:JSR&FFEE
2390INC SH:LDA SH:ASLA:CLC:ADC#10:STA&93
2400LDA#31:JSR&FFEE:LDA#93:JSR&FFEE:LDA#1
2410JSR&FFEE:LDA#230:JSR&FFEE:LDA#31:JSR&FFEE
2420LDA#53:JSR&FFEE:LDA#2:JSR&FFEE:LDA#231
2430JSR&FFEE:PLA:RTS
2440\
2450\ Print a bcd number
2460\
2470.bcd PHA:LSRA:LSRA:LSRA:LSRA:CLC
2480ADC#48:JSR&FFEE:PLA:PHA:AND#15:CLC
2490ADC#48:JSR&FFEE:PLA:RTS
2500.add PHA:CLC:BED:ADC SC:STA SC:LDA SC+1
2510ADC#0:STA SC+1:LDA SC+2:ADC#0:STA SC+2
2520CLD:PLA:RTS
2530\
2540\ Pause if necessary
2550\
2560.pause LDX PX:JSR test_key:BEQ PA1:RTS
2570.PA1 LDA#129:LDX SK:LDY#255:JSR&FFF4
2580CPX#255:BEQ PA2:LDA&FF:AND#128:CMP#128:BNE PA1
2590.PA2 RTS
2600\
2610\ peek on screen for mushrooms
2620\
2630.peek PHA:TYA:PHA:LDA#0:STA&7F
2640LDY&71:LDA LSB,Y:STA&80:LDA MSB,Y:STA&81
2650LDY#0
2660.PE1 CLC:LDA&80:ADC&70:STA&80:LDA&81
2670ADC#0:STA&81:DEY:BNE PE1:LDY#0
2680.PE2 LDA(&80),Y:AND#4:CMP#4:BEQ PE3
2690LDA(&80),Y:AND#128:CMP#128:BEQ PE3
2700.PE4 INY:CPY&74
2710BNE PE2:PLA:TAY:PLA:RTS
2720.PE3 INC&7F:JMP PE4
2730\
2740\ Test if hit a segment
2750\
2760.test_if_hit_segment PHA:LDX#0
2770.TIH2 LDA CT,X:CMP#0:BED TIH:LDA CY,X:CMP&71
2780BNE TIH:LDA CX,X:CLC:ADC#3:CMP&70
2790BCC TIH:LDA CX,X:BEC:SBC&75:CMP&70
2800BCS TIH:PLA:RTS
2810.TIH INX:CPX#18:BNE TIH2:LDX#255:PLA:RTS
2820\
2830\ Test and kill extra objects
2840\
2850.test_and_kill PHA:TXA:PHA:LDA SY:CMP#0:BED TAK1
2860LDA SY:CMP&71:BNE TAK1:LDA SX:CLC:ADC#4
2870CMP&70:BCC TAK1:LDA SX:BEC:SBC#1
2880CMP&70:BCS TAK1:JSR kill_snail:JMP TAK2
2890.TAK1 LDA AD:CMP#0:BEQ TAK3:LDA AY
2900CMP&71:BNE TAK3:LDA AX:CLC:ADC#4:CMP&70
2910BCC TAK3:LDA AX:BEC:SBC#1:CMP&70:BCS TAK3
2920JSR kill_ant:JMP TAK2
2930.TAK3 LDA SPD:CMP#0:BED TAK4:LDA SPY:CMP&71
2940BNE TAK4:LDA SPX:CLC:ADC#8:CMP&70
2950BCC TAK4:LDA SPX:BEC:SBC#1:CMP&70
2960BCS TAK4:JSR kill_small_spider:JMP TAK2
2970.TAK4 LDA DY:CMP#0:BED TAK5
2980LDA DY:CMP&71:BNE TAK5
2990LDA DX:CLC:ADC#4:CMP&70:BCC TAK5
3000LDA DX:BEC:SBC&75:CMP&70:BCS TAK5
3010JSR kill_drop
3020.TAK2 JSR score
3030.TAK5 PLA:TAX:PLA:RTS
3040\
3050\ Kill snail
3060\
3070.kill_snail JSR bang:LDX ST:LDA SLB,X
3080STA&72:LDA SHB,X:STA&73:LDA SX:STA&70
3090LDA SY:STA&71:LDA&32:STA&74:JSR poke
3100LDA#0:STA ST:LDX#10
3110.KS1 LDA&50:JSR add:DEX:BNE KS1:LDA#1
3120STA&82:RTS
3130\
3140\ Make explosion sound
3150\
3160.bang PHA:LDA SGU:CMP#1:BEQ BA1:PLA:RTS
3170.BA1 TXA:PHA:TYA:PHA:LDA#7
3180LDX#Soundbang MOD256:LDY#Soundbang DIV256
3190JSR&FFF1:LDA#7
3200LDX#Soundendfire MOD256:LDY#Soundendfire DIV256
3210JSR&FFF1:PLA:TAY:PLA:TAX:PLA:RTS
3220\
3230\ Kill ant
3240\
3250.kill_ant JSR bang:LDA AX:STA&70
3260LDA AY:STA&71:LDA#ant MOD256:STA&72
3270LDA#ant DIV256:STA&73:LDA#32:STA&74
3280JSR poke:LDA#0:STA AD:LDX#5
3290.KA1 LDA#&50:JSR add:DEX:BNE KA1
3300LDA#1:STA&82:RTS
3310\
3320\ Kill small spider
3330\
3340.kill_small_spider JSR bang:LDA SPX:STA&70
3350LDA SPY:STA&71:LDA#spider MOD256:STA&72
3360LDA#spider DIV256:STA&73:LDA#&4:STA&74
3370JSR poke:LDA#0:STA SPD:LDX#4
3380.KSS1 LDA#&50:JSR add:DEX:BNE KSS1
3390LDA#1:STA&82:LDA#7
3400LDX#Soundendspider MOD256
3410LDY#Soundendspider DIV256:JMP&FFF1
3420\
3430\ Move centipede
3440\
3450.move_centipede LDI#0
3460.MC2 LDA CT,X:CMP#0:BNE MC1
3470.MC9 INX:CPX#15:BNE MC2:RTS
3480.MC1 TAY:LDA CX,X:STA&70:LDA CY,X:STA&71
3490LDA CL,Y:STA&72:LDA CHB,Y:STA&73
3500LDA#32:STA&74:JSR poke:CLC:LDA&70:ADC CD,X
3510STA&70:JSR peek:LDA&7F:CMP#0:BCS MC100
3520LDA&70:CMP#1:BCC MC100:CMP#74:BCS MC100:JMP MC3
3530.MC100 LDA CX,X:STA&70:INC&71:LDA&71:CMP#32
3540BNE MC5:LDA#FE64:AND#1:CLC:ADC#20:STA&71
3550LDA CD,X:CMP#255:BEQ MC4:LDA#0:STA&70:JMP MC5
3560.MC4 LDA#74:STA&70:JMP MC3
3570.MC5 LDA CD,X:CMP#255:BED MC6
3580LDA#255:JMP MC7
3590.MC6 LDA#1:.MC7 STA CD,X
3600.MC3 LDA CT,X:CLC:ADC#1:CMP#4:BNE MC8
3610LDA#1:.MC8 STA CT,X:TAY:LDA CLB,Y
3620STA&72:LDA CHB,Y:STA&73:JSR poke:LDA&70
3630STA CX,X:LDA&71:STA CY,X:JMP MC9
3640\
3650\ Move snail
3660\
3670.move_snail LDA SX:STA&70:LDA SY:STA&71
3680LDY ST:LDA SLB,Y:STA&72:LDA SHB,Y:STA&73
3690LDA&32:STA&74:JSR poke:LDA&70:CLC
3700ADC SD1,Y:STA&70:CMP#0:BED MS2:CMP#75
3710BCS MS2:STA SX:JSR poke:RTS
3720.MS2 LDA#0:STA ST:RTS
3730\
3740\ Move ant
3750\
3760.move_ant LDA AX:STA&70:LDA AY:STA&71
3770LDA#ant MOD256:STA&72:LDA#ant DIV256
3780STA&73:LDA#32:STA&74:JSR poke:LDA&70
3790CLC:ADC AD:CMP#0:BED MA1:CMP#75
3800BED MA1:STA&70:STA AX:JMP poke
3810.MA1 LDA#0:STA AD:RTS
3820\
3830\ Move small spider
3840\
3850.move_small_spider LDA SPX:STA&70
3860LDA SPY:STA&71:LDA#spider MOD256:STA&72
3870LDA#spider DIV256:STA&73:LDA#4:STA&74
3880JSR poke:LDA&70:CLC:ADC SPD:CMP#0:BED MSSP1
3890CMP#71:BEQ MSSP1:STA&70:STA SPX
3900LDA&71:CLC:ADC SDY:STA&71:STA SPY:CMP#31:BNE MSSP2
3910LDA#255:STA SDY:JMP MSSP2
3920.MSSP1 CMP SPX:BNE MSSP3
3930LDA#1:STA SDY
3940.MSSP2 JSR poke:RTS
3950.MSSP3 LDA#0:STA SPD
3960LDA#71:LDX#Soundendspider MOD256
3970LDY#Soundendspider DIV256:JMP&FFF1
3980\
3990\ Move man
4000\
4010.move_man LDA#0:STA&90:STA&91:STA&92
4020LDA JOY:CMP#1:BED MM1:LDX LX:JSR test_key
4030BNE MM2:LDA#255:.MM3 STA&90:LDA#1:STA&92:JMP MM4
4040.MM2 LDX RX:JSR test_key:BNE MM4:LDA#1:JMP MM3
4050.MM4 LDX LSX:JSR test_key:BNE MM5:LDA#255
4060.MM5 STA&71:LDA#1:STA&72:JMP MM7
4070.MM5 LDX BK:JSR test_key:BNE MM7
4080LDA#1:JMP MM6
4090.MM1 LDA#128:LDX#1:JSR&FFF4:CPY#30
4100BCS MM8:LDA#1:.MM9 STA&90:LDA#1:STA&92:JMP MM10
4110.MM8 CPY#210:BCC MM10:LDA#255:JMP MM9
4120.MM10 LDA#128:LDX#2:JSR&FFF4:CPY#30
4130BCS MM11:LDA#1:.MM12 STA&91:LDA#1:STA&92:JMP MM7
4140.MM11 CPY#200:BCC MM7:LDA#255:JMP MM12
4150.MM7 LDA XM:STA&70:LDA#4:STA&75:LDA YM
4160STA&71:LDA#40:STA&74:JSR test_if_hit_segment
4170CPX#255:BEQ MM13:.MM14 LDA#1:STA DF:RTS
4180.MM13 LDA#0:STA&82:JSR test_and_kill
4190LDA&82:CMP#1:BED MM14:INC&71
4200JSR test_if_hit_segment:CPX#255:BNE MM14
4210JSR test_and_kill:LDA&82:CMP#1:BEQ MM14
4220LDA&92:CMP#1:BEQ MM15:RTS
4230.MM15 DEC&71:LDA#data MOD256:STA&72
4240LDA#data DIV256:STA&73:JSRpoke
4250INC&71:LDA#(data+40) MOD256:STA&72
4260LDA#(data +40)DIV256:STA&73:JSRpoke
4270LDA&70:CLC:ADC#90:CMP#0:BNE MM16:LDA#1
4280.MM16 CMP#74:BNE MM17:LDA#73.
4290.MM17 STA&70:LDA YM:CLC:ADC#1:CMP#31
4300BNE MM18:LDA#30
4310.MM18 CMP#20:BNE MM19:LDA#21
4320.MM19 STA&71:INC&71:JSR peek:LDA&7F:DEC&71
4330CMP#0:BCS MM20:LDA&70:STA XM:LDA&71:STA YM
4340.MM20 LDA XM:STA&70:LDA YM:STA&71
4350LDA#data MOD256:STA&72:LDA#data DIV256
4360STA&73:JSRpoke:INC&71
4370LDA#(data+40) MOD256:STA&72
4380LDA#(data+40) DIV256:STA&73:JSRpoke
4390DEC&71:JSR test_if_hit_segment:CPX#255
4400BEQ MM21:.MM22 LDA#1:STA DF:RTS
4410.MM21 LDA#0:STA&82:JSR test_and_kill
4420LDA&82:CMP#1:BED MM22:INC&71
4430JSR test_if_hit_segment:CPX#255
4440BNE MM22:JSR test_and_kill:LDA&82
4450CMP#1:BEQ MM22:RTS
4460\
4470\ Test key
4480\
4490.test_key LDA#129:LDY#255:JSR&FFF4
4500CPX#255:RTS
4510\
4520\ Fire spray
4530\
4540.fire_spray LDA JOY:CMP#1:BEQ FS1
4550LDX FK:JSR test_key:BEQ FS2:RTS
4560.FS1 LDA#128:LDX#0:JSR&FFF4:TXA:AND#1
4570CMP#1:BED FS2:RTS
4580.FS2 LDA XM:CLC:ADC#2:STA MX:STA&70:LDA YM:STA MY
4590STA&71:LDA#0:STA&74:LDA#bullet MOD256
4600STA&72:LDA#bullet DIV256:STA&73:JSR poke
4610LDA SGU:CMP#1:BNE FS3
4620LDX#Soundfire MOD256:LDY#Soundfire DIV256
4630JSR&FFF1
4640.FS3 JMP move_spray
4650\
4660\ Main program
4670\
4680.main_prog INC CG:JSR pause:JSR move_man
4690JSR move_centipede:LDA MY:CMP#0:BEQ MP1
4700JSR move_spray:JMP MP2
4710.MP1 JSR fire_spray
4720.MP2 LDA CG:AND 3NP:CMP#0:BNE MP3
4730LDA ST:CMP#0:BEQ MP3:JSR move_snail
4740.MP3 LDA CG:AND 5FF:CMP#0:BNE MP3:LDA SPD
4750CMP#0:BEQ MP3:JSR move_small_spider
4760.MP3 LDA CG:AND A6F:CMP#0:BNE MP6
4770LDA AD:CMP#0:BEQ MP6:JSR move_ant
4780.MP6 LDA CG:AND D5:CMP#0:BNE MP300
4790LDA DY:CMP#0:BEQ MP300:JSR move_drop
4800.MP300 LDA CG:CMP#30:BNE MP100
4810LDA ST:CMP#0:BNE MP100
4820LDA#FE44:AND#1:CLC:ADC#1:STA ST:TAY
4830LDA#0:STA&70:STA SX:CPY#2
4840BNE MP101:LDA#74:STA&70:STA SX
4850.MP101 LDA#FE44:AND#15:ADC#5:STA&71:STA SY
4860LDA#32:STA&74:LDA SLB,Y:STA&72:LDA SHB,Y
4870STA&73:JSR poke
4880.MP100 LDA CG:CMP#1:BNE MP10:LDA#PD:CMP#0:BNE MP10
4890LDA#FE44:AND#1:CMP#1
4900BED MP11:LDA#0:STA SPX:LDA#1:STA SPD:JMP MP12
4910.MP11 LDA#71:STA SPX:LDA#255:STA SPD
4920.MP12 LDA SPX:STA&70:LDA#255:STA SDY
4930LDA#31:STA SPY:STA&71:LDA#64:STA&74
4940LDA#spider MOD256:STA&72:LDA#spider DIV256
4950STA&73:JSR poke:LDA SGU:CMP#1:BNE MP10
4960LDA#7:LDX#Soundspider MOD256
4970LDY#Soundspider DIV256:JSR&FFF1
4980.MP10 LDA WN:CMP#21:BCC MP13:LDA AD
4990CMP#0:BNE MP13:LDA CG:CMP#5
5000BNE MP13:LDA&FE44:AND#1:CMP#1:BEQ MP14
5010LDA#0:STA AX:LDA#1:JMP MP15
5020.MP14 LDA#74:STA AX:LDA#255
5030.MP15 STA AD:LDA AX:STA&70:LDA&FE64
5040AND#15:CLC:ADC#4:STA&71:STA AY
5050LDA#ant MOD256:STA&72:LDA#ant DIV256
5060STA&73:LDA#32:STA&74:JSR poke
5070.MP13 LDY SP
5080.MP19 LDX#255:.MP20 NOP:DEX:BNE MP20
5090DEY:BNE MP19
5100LDY#0:JSR move_spit:LDA CD:AND#1:CMP#1
5110BNE MP21:LDY#1:JSR move_spit
5120.MP21 LDA WN:CMP#4:BCC MP22:LDA GY:CMP#0
5130BNE MP22:LDA SSP0:CMP#1:BNE MP22:LDA SPD:CMP#0:BEQ MP22:LDA SPX
5140CLC:ADC#5:STA &70:STA GX:LDA SPY:CLC:ADC#1
5150STA&71:STA GY:LDA#0:STA&74:LDA#bullet MOD256
5160STA&72:LDA#bullet DIV256:STA&73:JSR poke
5170LDA SGU:CMP#1:BNE MP22:LDA#7
5180LDX#Soundspit MOD256:LDY#Soundspit DIV256
5190JSR&FFF1
5200.MP22 LDA WN:CMP#3:BCC MP23:LDA GY:CMP#0
5210BNE MP23:LDA AGP:CMP#1:BNE MP23:LDA AD:CMP#0:BEQ MP23:LDA AX
5220CLC:ADC#2:STA &70:STA GX:LDA AY:CLC
5230ADC#1:STA&71:STA GY:LDA#0:STA&74
5240LDA#bullet MOD256:STA&72:LDA#bullet DIV256
5250STA&73:JSR poke:LDA SGU:CMP#1:BNE MP23
5260LDA#7:LDX#Soundspit MOD256:LDY#Soundspit DIV256
5270JSR&FFF1
5280.MP23 LDA CG:CMP#1:BNE MP200
5290LDA DY:CMP#0:BNE MP200
5300LDA#5:STA&71:STA DY:LDA#32:STA&74
5310LDA#FE44:AND#3:CLC:ADC#8:STA&70:STA DX
5320LDA#drop MOD256:STA&72:LDA#drop DIV256:STA&73:JSR poke
5330.MP200 LDA DF:CMP#1:BED MP24
5340LDA SL:CMP#0:BEQ MP24
5350LDA&FF:AND#128:CMP#128:BEQ MP24
5360LDX#0
5370.MP300 LDA CT,X:CMP#0:BED MP301
5380JMP main_prog
5390.MP301 INX:CPX#15:BNE MP300
5400LDA#0:STA SL
5410.MP24 RTS
5420\
5430\ Move spit
5440\
5450.move_spit LDA GY,Y:CMP#0:BNE MSP1:RTS
5460.MSP1 STA&71:LDA GX,Y:STA&70:LDA#0:STA&74
5470LDA#bullet MOD256:STA&72:LDA#bullet DIV256
5480STA&73:JSR poke:LDA&71:CMP YM:BNE MSP2
5490.MSP4 LDA&70:CLC:ADC#1:CMP XM:BCC MSP3
5500LDA&70:BEC:SBC#4:CMP XM:BCS MSP3
5510.MSP9 LDA#0:STA GY,Y:LDA#1:STA DF:RTS
5520.MSP2 CLC:ADC#1:CMP YM:BNE MSP3:JMP MSP4
5530.MSP3 LDA GY,Y:CLC:ADC#1:STA GY,Y:STA&71
5540CMP#32:BCC MSP5:LDA#0:STA GY,Y:RTS
5550.MSP5 LDA&71:CMP YM:BNE MSP6
5560.MSP7 LDA&70:CLC:ADC#1:CMP XM:BCC MSP8
5570LDA&70:BEC:SBC#4:CMP XM:BCS MSP8:JMP MSP9
5580.MSP6 CLC:ADC#1:CMP YM:BNE MSP8:JMP MSP7
5590.MSP8 JMP poke
5600\
5610\ Move spray
5620\
5630.move_spray LDA MY:STA&71:LDA MX:*TAL70
5640LDA#bullet MOD256:STA&72:LDA#8:STA&74
5650LDA#bullet DIV256:STA&73
5660LDA#1:STA&75:JSR test_if_hit_segment
5670CPX#255:BEQ MR1:JSRpoke
5680.MR9 LDA CX,X:STA&70:LDA CY,X:STA&71:LDA#32
5690STA&74:LDA CT,X:TAY:LDA CLB,Y:STA&72
5700LDA CHB,Y:STA&73:JSRpoke:LDA#0:STA MY
5710STA CT,X:LDA#&25:JSRadd:JSR bang:JSR score
5720DEC SL:JMP MR7
5730.MR1 LDA#0:STA&82:JSR test_and_kill
5740LDA &82:CMP#1:BNE MR2
5750LDA MX:STA&70:LDA MY
5760STA&71:LDA#bullet MOD256:STA&72:LDA#bullet DIV256
5770STA&73:LDA#0:STA&74:JSR poke:JMP MR7
5780.MR2 JSRpoke:LDA MY:SEC:SBC#1:STA&71:STA MY
5790CMP#3:BNE MR3
5800.MR7 LDA#0:STA MY:LDA SGU:CMP#1:BEQ MRA:RTS
5810.MR4 LDA#7:LDX#Soundendfire MOD256
5820LDY#Soundendfire DIV256:JSR&FFF1:RTS
5830.MR3 JSR peek:LDA&7F:CMP#1:BCC MR5
5840LDY#0:LDA#0
5850.MRA STA(&80),Y:INY:CPY#8:BNE MRA
5860JMP MR7
5870.MR5 JSR test_if_hit_segment:CPX#255:BEQ MR8
5880JMP MR9
5890.MR8 LDA#0:STA&82:JSR test_and_kill
5900LDA&82:CMP#1:BNE MR10:JMP MR7
5910.MR10 JMP poke
5920\
5930\ Move dropping
5940\
5950.move_drop LDA DY:STA&71:LDA DX:STA&70
5960LDA#32:STA&74:LDA#drop MOD256:STA&72
5970LDA#drop DIV256:STA&73:JSRpoke:LDA&FE64:AND#3
5980CMP#0:BNE MD1:LDA DY:CMP#30:BCS MD1
5990CMP#6:BCC MD1:LDA#7oad MOD256
6000STA&72:LDA#7oad DIV256:STA&73:JSRpoke
6010.MD1 INC&71:LDA&71:CMP#32:BED MD2
6020STA DY:LDA#drop MOD256:STA&72:LDA#drop DIV256
6030STA&73:JSRpoke:RTS
6040.MD2 LDA#0:STA DY:RTS
6050\
6060\ Kill dropping
6070\
6080.kill_drop JSRbang:LDA8X:STA&70:LDA DY:STA&71
6090LDA#drop MOD256:STA&72:LDA#drop DIV256:STA&73
6100LDA#32:STA&74:JSRpoke:LDA#0:STA DY
6110LDA#1:STA&82:LDA#&50:JMP add
6120]
6130NEXT
6140L%=-98:R%=-67:U%=-73:D%=-105:F%=-74:F1=-56:E%=-82
6150FOR I%=0TO9
6160!(&5000+I%*4)=RIGHT$("0000"+STR$(((10-I%)*500),5)
6170!(&5050+I%*4)=STRING$(15,"-")
6180NEXT
6190CLS
6200PRINT''"Are you ready to save the machine code?"
6210PRINT''"Press then SPACE BAR if ready.."
6220REPEAT UNTIL GET=32
6230*FX18
6240*SAVE Centi5 5000+E000M
6250FOR I%=0TO&E00
6260I%?&5000=I%?&D00
6270NEXT
6280PRINT''"Press the BREAK key"
```



You'd expect one of the best-selling home computers in Japan to have a specification list as big as its memory.

But the Toshiba HX10 doesn't just limit itself to that.

It was developed along with other Japanese home computers to operate on one language: MSX. You can swap programs, games, cassettes, even peripherals like disk drives, printers, and joysticks: they're all compatible with every other MSX computer.

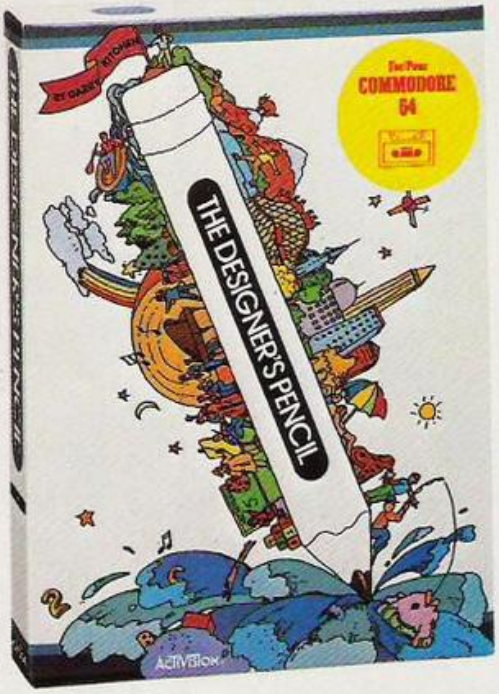
All of which makes MSX the system of the future.

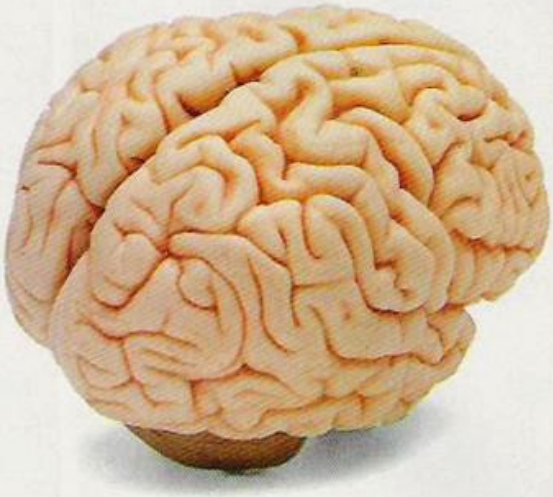
So if you want a computer that won't be obsolete in a few years, buy an MSX. If you want one of the best-selling MSX computers in Japan, buy a Toshiba HX10.

TOSHIBA MSX

FOR MORE INFORMATION ON THE TOSHIBA HX10 CONTACT TOSHIBA (UK) LTD., TOSHIBA HOUSE, FRIMLEY ROAD, FRIMLEY, SURREY GU16 5JJ. TEL: (0276) 681691.

Our new software makes the most of yours.





By any standards, the Activision Designer's Pencil is a unique piece of software. With it, you can design, draw, plan.

You can draw the world and everything that's in it.

And then set it to music.

You can produce complex designs in no less than sixteen different colours.

You can write and develop your own programs, without having to understand Basic.

You can do all this with a joystick.

But then you've only scratched the surface.

As you use the Pencil, it will reveal the full potential of your computer, in the most entertaining way possible.

£11.99 might be a lot to pay for a pencil.

But not this one.

When you've done zapping the world, rebuild it with the Designer's Pencil.

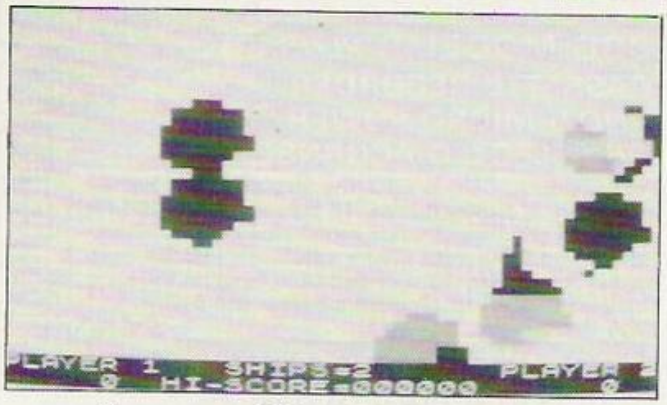
Its scope is as broad as your own mind.

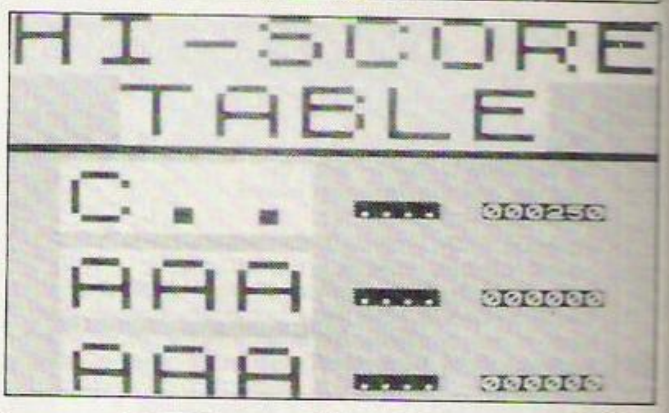
ACTIVISION®

Your computer was made for us.

£11.99 Commodore 64, £9.99 Sinclair Spectrum. Available soon for all popular systems.

FROM SELECTED BRANCHES OF BOOTS, JOHN MENZIES, AND GOOD COMPUTER SOFTWARE STORES EVERYWHERE.





ASTEROIDS

Mike Pike steers a dangerous path.

I HAVE USED the method of entering machine code adopted several times by *Your Computer* i.e., look at the Froggie game for the ZX-81 in the February 1985 issue. My programs 1 and 2 are identical to the programs 1 and 2 in this issue. A hex dump should be obtained in identical format to that in the Froggie program by typing Run 1000.

Obtain a listing of the hex dump on the printer before running the program as running will change the values of the addresses in the Rem used for storing data. These data addresses will be set to zero before running. Changing the values in the data addresses will not affect the running of the program but it may confuse anyone checking the listing, if they have entered it incorrectly and run it, as they may think that its failure is due to the fact that they have entered these data addresses incorrectly.

Program 1 can be obtained from the listing at line 100 and program 2 from the listing at 300. Line 1000 when run will Llist the hex dump on the printer.

The machine code is contained in a Rem statement in line 0, this should contain at least 4542 bytes: Start address — 16514; Finish address — 21055.

The Rem is obtained by typing:

1 REm 160 characters

This is five full lines of X's or any other single character. Edit line 1 and change it to line 2, edit line 2 and change it t line 3 and so on until you have entered lines 1 to 29 in this way. Then type in:

```
POKE 16510,0
POKE 16511,202
POKE 16512,18
```

You now have one Rem at line 0 with more than enough room for the machine code. Now enter the hexidecimal loader, program 1. Run it and type in the machine code in the hex dump. Do not enter the numbers in the left column as these are the addresses of the next hex codes. Enter the hex codes in eight pairs at a time and then enter the number on the far right of each row when prompted by the equals sign. If the number does not match the hex codes you will be asked to enter the last line of hex again.

The hex between addresses 16581 and 16930 are used for data storage and need not be 00, they change after the program has been run once. If the program works after entering the following lines and saving a few times, the hex loader can be deleted.

Enter the following lines, Save and Run:

```
 8 RAND
10 LET L = USR 20336
15 IF INKEY$<> "" THEN GOTO 15
```

If the program crashes or fails to work properly the reload it from tape and enter the hex checker, program 2. Type Run 300 and inut the start and finish address and check that the hex agrees with the listing. When using the hex checker type Cont when the screen is full to continue. Change any mistake by using the hex loader and re-enter the line of hex containing the mistake.

The controls are: 1/3 rotate left/right; 9 fire; 7 thrust; Y hyperspace.

The game gives instructions when run, contains a 1/2 player option and a high score table of the three highest scorers.

Hex dump.

```
16514-E5D52A3240545D29 = 816
16522-291929292919E232 = 2E8
16530-407CD1E1C9000701 = 559
16538-0101800183A38101 = 683
16546-8001800180A38001 = 678
16554-8001801800105A4 = 5E6
16562-8401800180101A2 = 5E4
16570-020101003101821 = 42D
16578-8401010000000000 = 134
16586-0000000000000000 = 0
16594-0000000000000000 = 0
16602-0000000000000000 = 0
16610-0000000000000000 = 0
16618-0000000000000000 = 0
16626-0000000000000000 = 0
16634-0000000000000000 = 0
16642-0000000000000000 = 0
16650-0000000000000000 = 0
16658-0000000000000000 = 0
16666-0000000000000000 = 0
16674-0000000000000000 = 0
16682-0000000000000000 = 0
16690-0000000000000000 = 0
16698-0000000000000000 = 0
16706-0000000000000000 = 0
16714-0000000000000000 = 0
16722-0000000000000000 = 0
16730-0000000000000000 = 0
16738-0000000000000000 = 0
16746-0000000000000000 = 0
16754-0000000000000000 = 0
16762-0000000000000000 = 0
16770-0000000000000000 = 0
16778-0000000000000000 = 0
16786-0000000000000000 = 0
16794-0000000000000000 = 0
16802-0000000000000000 = 0
16810-0000000000000000 = 0
16818-0000000000000000 = 0
16826-0000000000000000 = 0
16834-0000000000000000 = 0
16842-0000000000000000 = 0
16850-0000000000000000 = 0
16858-0000000000000000 = 0
16866-0000000000000000 = 0
16874-0000000000000000 = 0
16882-0000000000000000 = 0
16890-0000000000000000 = 0
16898-0000000000000000 = 0
16906-0000000000000000 = 0
16914-0000000000000000 = 0
16922-0000000000000000 = 0
16930-0000000000000000 = 0
16938-0000003062614142 = 332
16946-8201A1A20F0A0207 = 616
16954-2684128138021301 = 6E8
```

(continued on page 89)

MICROPOWER MICROPOWER MICROPOWER MICROPOWER MICROPOWER MICROPOWER

LOOKING FOR A HOME COMPUTER?

ALL ROADS LEAD TO MICRO POWER

ONLY £275 **£189**

MEMOTECH MTX500

MEMOTECH MTX512 ▸

ONLY £315 **£260**

An excellent choice for both the beginner and the Spectrum owner wishing to upgrade.

Features: Z80A processor, SN76489A sound chip (the same as in the BBC Micro), 256 x 192 graphics resolution, 16 colours, 32 sprites two Atari-type joystick ports, composite video socket, number pad. Sophisticated utilities to aid programming include built-in Assembler/Disassembler and monitor.

COMMODORE 64 PLUS COMPATIBLE CASSETTE RECORDER

SPECIAL PRICE ~~£268.95~~ **£219.95**

Features: 64K, Microsoft BASIC, 16 colours, 8 multi-coloured sprites, sound synthesiser (producing the best sound on any micro), 320 x 200 graphics resolution, four function keys, two Atari-type joystick ports, cartridge slot, parallel printer interface.

AMSTRAD CPC464 WITH BLACK AND WHITE MONITOR **£249**

AMSTRAD CPC464 WITH COLOUR MONITOR **£359**

Features: built-in cassette recorder, 64K of memory, 27 colours, 80 column text mode, 640 x 200 graphics resolution, joysticks port, separate number pad.

We also stock a wide range of monitors, disk drives, printers, joysticks, light pens, books, software and much more! Please send for our complete list.

SPECIAL OFFER! **£399**

BBC MODEL B *PLUS* CASSETTE RECORDER *AND* 5 MICRO POWER *OR* SELECTED ACORNSOFT TAPES

Features: 32K, BBC BASIC (the fastest on any home computer), 8 display modes, 16 colours, 640 x 256 high resolution graphics, 3 voice sound plus noise channel, RS423 and Centronics printer interfaces, joystick port, built-in Assembler, 10 user definable function keys. Complete with a 16 program cassette and 512 page User Guide.

ACORN ELECTRON *PLUS* CASSETTE RECORDER *OR* 5 MICRO POWER TAPES

SPECIAL OFFER! **£199**

The scaled down version of the BBC Micro. Features: BBC BASIC, 32K, 7 display modes (including 80 column text mode and 640 x 256 graphics resolution), 16 colours, 9 octave sound plus noise channel, built-in Assembler. Complete with an Introductory Cassette containing 16 programs, a User Guide, and a book: "Start Programming on the Electron".

SINCLAIR SPECTRUM 48K PLUS FREE 6-PACK SOFTWARE **£118**

PRICES CORRECT AT TIME OF GOING TO PRESS. ALL PRICES INCLUSIVE OF VAT. HIRE PURCHASE AVAILABLE. PLEASE CONTACT US FOR FURTHER DETAILS. CARRIAGE FREE FOR BBC AND MEMOTECH. ALL OTHER COMPUTERS £5.00. U.K. MAINLAND ONLY.
AMPLE FREE PARKING!

MAIL ORDER ADDRESS:
DEPT. YC12
MICRO POWER LTD.
SHEEPSCAR HOUSE
SHEEPSCAR STREET SOUTH
LEEDS LS7 1AD
Tel: (0532) 434006

SHOWROOM ADDRESS:
MICRO POWER LTD.
NORTHWOOD HOUSE
NORTH STREET
LEEDS LS7 2AA
Tel: (0532) 458800

MICRO POWER

VISA

MICROPOWER MICROPOWER MICROPOWER MICROPOWER MICROPOWER MICROPOWER

Please ring for Availability

Hexloader

```
100 REM ***HEX LOADER***
105 CLS
110 PRINT "START ADDRESS"
115 INPUT S
120 PRINT "FINISH ADDRESS"
125 INPUT F
130 FOR N=S TO F STEP 8
135 LET T=0
140 SCROLL
145 PRINT N;"-";
150 INPUT A$
155 PRINT A$;"=";
160 INPUT TOT
165 PRINT TOT
170 LET Z=0
175 FOR K=1 TO LEN A$ STEP 2
180 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
185 LET T=T+C
190 POKE N+Z,C
195 LET Z=Z+1
200 NEXT K
205 IF TOT=T THEN GOTO 225
210 SCROLL
215 PRINT "ERROR-PLEASE INPUT A
GAIN"
220 GOTO 135
225 NEXT N
230 STOP
```

(continued from page 87)

```
16962-4041018180A12102 = 503
16970-0000000006160308 = 45
16978-0905090409050A12 = 69
16986-0901030CEC1C5A400 = 576
16994-0200010203040506 = 63
17002-07878685848380281 = 931
17010-8016132197401110 = 450
17018-8ACDC54E234623E5 = 859
17026-CD1443D5CDFA4278 = 1146
17034-CB7F28042FD67047 = 818
17042-7ECB7F2809FE8830 = 943
17050-092FD67018062FE08 = 674
17058-38023E00605F1600 = 413
17066-E5216342197EE177 = 922
17074-C1C1C10D20C4C9C5 = 1266
17082-4E2E623E5CD1443 = 709
17090-D5CDFA4278CB7F28 = 1224
17098-042FD67047FEC67F = 904
17106-2809FE8830092FD6 = 757
17114-701806FE08380203E = 524
17122-00F5A047F1A05F16 = 1002
17130-00E521634219 7EE1 = 849
17138-77D1E1C10020C0C9 = 1184
17146-21010014152804A7D = 850
17154-C6216F7CCE006718 = 799
17162-F3160019ED5B0C40 = 594
17170-19C9C579CB6F200C = 902
17178-E61F03FE20380206 = 950
17186-205F180CE61F4F7B = 626
17194-91FE203802C6205F = 814
17202-C1CB792005CB7120 = 902
17210-08C97A3CFE163802 = 728
17218-3E0057C97A3DFEFF = 1042
17226-20023E1557C9ED5B = 730
17234-624CCB4E20052ICC5 = 709
17242-4010803217417EE05 = 437
17250-0823C9417200E5E1F = 588
17258-10F7C9E5E5F57EF5 = 1505
17266-3E08904F06002A62 = 439
17274-42CB4D2005210E40 = 586
17282-1003217D41090955E = 1268
17290-E523565D50E132197 = 1268
17298-40CDB942D1E1F1E5 = 1424
17306-212E42056F4ECD14 = 692
17314-43E173237201E1021 = 582
17322-9740CD7C42F1C1E1 = 1269
17330-1684EDSB6242CB4B = 974
17338-200521C5401803211 = 391
17346-74417E0608CB4720 = 647
17354-05C81F10F5C9E5C5 = 1130
17362-F53E08904F06002A = 586
17370-624ACB4D200521CE = 720
17378-4018003217D41090 = 332
17386-5E23560E1321974 = 496
17394-CD7C42F1C1E1181C = 1267
17402-ED5B6242CB4B2009 = 1007
17410-210E4010803218D41 = 586
17418-7E234E061083CB47 = 570
17426-2007CB19CB1F10F5 = 1003
17434-C9E5C5F57EF53E10 = 1381
17442-904F06002A6242CB = 1004
17450-4D200521FE4010003 = 478
17458-219F4109095EE523 = 1003
17466-56D50E0421BD40CD = 808
17474-B942D1E1F1E5212E = 1234
17482-42B56F1ECD144381 = 909
17490-7C42F1C20ED42180 = 1268
17498-4C1C1E1188A = 1258
17506-ED5B6242CB4B2009 = 1007
17514-21DE4010032183A1 = 586
17522-7E234E0610CB4720 = 647
17530-07CB19CB1F10F5C9 = 1003
17538-E5C5F53E10904F06 = 1381
17546-002A6242CB4D2005 = 1004
17554-21F0401803219F41 = 1381
17562-09095EE5D50E0421 = 1284
17570-BD40CD7C42F1C1E1 = 1307
17578-18CFED5B6242CB4B = 1001
17586-200521C5401803211 = 391
17594-74417EE506082100F = 600
17602-380510FAE177C9E5 = 1101
17610-C5F57EF53E08904F = 1004
17618-06002A6242CB4D20 = 994
17626-0521CE4018032177 = 493
17634-4109095E2356D50F = 525
17642-1E1E1181A = 1022
17650-E5C01443D5CDA342 = 1046
17658-E6D0ED5B2A0D2162 = 688
17666-42CBEEC0FA427EFE = 1409
17674-1E1E1181C20D20 = 1022
17682-DB1F1F1C1E1188AA = 1022
17690-2156426B4E2005E5 = 848
17698-2B4A4D0324E5D5E5 = 900
17706-5E23560E1321974 = 1113
17714-E1F1C1E1181C20D2 = 1148
17722-E1C1D1C9217400E = 1102
17730-1C0B9A1A1E1E5D5 = 1001
17738-CB4E200521CB4B2A = 1001
17746-03218D41E1E5D5E5 = 1064
17754-4E0006C0CB19CB1F = 1096
17762-10FA7D1E1E1E1E1E = 1105
17770-CB19CB1F10F5C5E5 = 1096
17778-CB4E200521CB4B2A = 1001
17786-10FA7D1E1E1E1E1E = 1105
17794-CB19CB1F10F5C5E5 = 1096
17802-EBCDB942D1E1F1E5 = 1424
17810-CD6240D5E5D5E5C5 = 1000
17818-FE063814E5E0038 = 1087
17826-0FCD6240D5E5D5E5 = 1000
17834-95FE0838003E07E5 = 1001
17842-E5216342CB4E2005 = 1000
17850-E1E1E1E1E1E1E1E1 = 1024
17858-E1E1E1E1E1E1E1E1 = 1024
17866-E1E1E1E1E1E1E1E1 = 1024
17874-21F0401803219F41 = 1381
17882-09095EE5D50E0421 = 1284
17890-0E01CD144381F5F1 = 1307
17898-0240E6034F3E0CCD = 845
17906-144310F9773A79E = 1030
17914-0421804D0CD7C42E1 = 1010
17922-C1C1F1370C9ED5B62 = 1325
17930-4BCB4E200521DE40 = 1000
17938-1803218D417EEE20 = 1006
17946-4E0610CB19CB1F38 = 1018
17954-0B10F8E1CB19CB1F = 1068
17962-7725710C9E5CBE5E = 1201
17970-10904F06002162A2 = 442
17978-CB4E200521F04018 = 679
17986-03219F4109095E23 = 407
17994-56D50E0421BD40CD = 800
18002-4E23235E5CD1443D5 = 882
18010-2A3642C600ED5220 = 711
18018-052162A2CEEECDFA = 1098
18026-427EFE1B280CD1E1 = 959
18034-C10D20DB01F1C1E1 = 1325
18042-18A7216242CB4E20 = 701
18050-052126A2180321289 = 843
18058-42EE5E2356210A00 = 563
18066-19EBE1723572CDAF = 1129
18074-4E1E1C1C1218040 = 1195
18082-0E04CD894EF1C1E1 = 1133
18090-C6000C3E1216242 = 698
18098-CB4E200521CB4B2A = 1001
18106-03219F4109095E23 = 479
18114-624ACB4E200521FB = 1041
18122-0218032110003ED4B = 393
18130-0C4009EBCDDA46C9 = 1014
18138-3EFF011027C600ED = 808
18146-483C30FB09C69C12 = 806
18154-133EFF011E00C6000 = 770
18162-ED423C30FB09C69C = 1025
18170-12133EFF016400C6 = 693
18178-00ED423C30FB09C6 = 869
18186-9C12133EFF010A00 = 521
18194-C000ED423C30FB09 = 699
18202-C69C12133EFF64C12 = 888
18210-C9B5B1A8EAAB780 = 1396
18218-9D5B5B5B5B5B4B4EB5 = 1253
18226-B5B4B4B4B5B5B5B5B5 = 1500
18234-B5B5B1A8EAAB780 = 1383
18242-9E5B5B5B5B5B5B5B = 1054
18250-B8ADAE9E5B5B5B5E = 1340
18258-AA945B5B5B5B5B9C = 1344
18266-B5B5B5B5B5B5B9C80 = 1052
18274-80ACA6EAAB6B6B9 = 1312
18282-B6B6B6B6B6B6B6B6 = 1542
18290-B4BBAAB7216242CB = 1120
18298-4E2005217411003 = 1054
18306-21C54036FF230003 = 652
18314-CD8240E607772310 = 806
18322-F7060BCD8240E61F = 981
18330-772310F0C9210000 = 559
18338-2542228942228C540 = 540
18346-220E4022744228D = 710
18354-4181844CB6ECD76 = 994
18362-4721844CB6ECD76 = 936
18370-4721844CB6ECD76 = 936
18378-CB4E200521CB4B2A = 1001
18386-0C4010732CB4B0120 = 568
18394-0021E5177EBED8003 = 568
18402-2000135EB0006162A = 524
18410-0C400E2023600D = 524
18418-20FA2310F5CDB443 = 1030
18426-CD624AA0C4011558 = 594
18434-0119112347EB0107 = 592
18442-00EDB021624CB4E = 991
18450-2004069010020E9E = 1003
18458-2A0C401167011970 = 368
18466-0104002A0C4011199 = 699
18474-0119112347EBEDB0 = 861
18482-2186422EE6037721 = 708
18490-6242CB4E20052A2C = 1068
18498-4A2180D2CE1484206 = 1006
18506-0C4011E80219 = 550
18514-77EDB021624CB4E = 991
18522-0100002A0C4011A6 = 550
18530-210F0C9210000 = 604
18538-0C70FEFF20F5CDDB = 1308
18546-03C70FEFF20F5CD = 1161
18554-4D3600234E0C4011 = 1434
18562-0119060830002310 = 1448
18570-FB2A0C4011990119 = 1668
18578-060A360023107EB11 = 1389
18586-F4002A0C4010900C7 = 1400
18594-1607EFE0123011115 = 496
18602-4E0623E4E0623E4E = 1113
18610-1A4EDCDDA46C9CD = 1113
18618-CDDA46C9CD1A4EDC = 1113
18626-46C9CD1A4EDCDDA4 = 1113
18634-CD1A4EDCDDA46C9C = 1113
18642-DA46C9CD1A4EDCDD = 1113
18650-501107FFA2310F5CD = 1113
18658-CDDA46C9CD1A4EDC = 1113
18666-46C9CD1A4EDCDDA4 = 1113
18674-1A4EDCDDA46C9CD = 1113
18682-DDA46C9CD1A4EDCD = 1113
18690-C9CD1A4EDCDDA46C = 1113
18698-4EDCDDA46C9CD1A4 = 1113
18706-A46C9CD1A4EDCDDA = 1113
18714-1A4EDCDDA46C9CD = 1113
18722-DDA46C9CD1A4EDCD = 1113
18730-C9CD1A4EDCDDA46C = 1113
18738-4EDCDDA46C9CD1A4 = 1113
18746-A46C9CD1A4EDCDDA = 1113
18754-1A4EDCDDA46C9CD = 1113
18762-DDA46C9CD1A4EDCD = 1113
18770-C9CD1A4EDCDDA46C = 1113
18778-4EDCDDA46C9CD1A4 = 1113
18786-A46C9CD1A4EDCDDA = 1113
18794-CB6E2014E5E5E5E4 = 1113
18802-E5E5E5E5E5E5E5E5 = 1113
18810-E5E5E5E5E5E5E5E5 = 1113
18818-E5E5E5E5E5E5E5E5 = 1113
18826-E5E5E5E5E5E5E5E5 = 1113
18834-E5E5E5E5E5E5E5E5 = 1113
18842-E5E5E5E5E5E5E5E5 = 1113
18850-E5E5E5E5E5E5E5E5 = 1113
18858-E5E5E5E5E5E5E5E5 = 1113
18866-2A0D3742A3339 = 1113
18874-3926873124D52A0C = 1113
18882-4011220019112C4D = 1113
18890-0606EEBCD174F2160 = 1113
18898-42CB4E200521134D = 1113
18906-4803113E4D2A0C40 = 1113
18914-013E0009EB0601CD = 1113
18922-174F2A0C4011CD00 = 1113
18930-1911374EB0606CD = 1113
18938-174F2A0C4011CC01 = 1113
18946-19113C4DEB0606CD = 1113
18954-174F2A0C4011902 = 1113
18962-19E5061036002310 = 1113
18970-FE0101210009E01 = 1113
18978-CB4E200521F04018 = 1113
18986-03219F4109095E23 = 1113
18994-56D50E0421BD40CD = 1113
19002-4E23235E5CD1443D5 = 1113
19010-E1F13CFE0838C906 = 1051
19018-060EFF0D20FD10F9 = 1113
19026-C11087216242CB4E = 1113
19034-2005210C4218032I = 1113
19042-2D427E3577203582A = 1113
19050-0C4011E801119122 = 1113
19058-47EE010700ED5021 = 1113
19066-5242CB4E20040690 = 1113
19074-1802069EEA0C4011 = 1113
19082-5F011970A0C4011 = 1113
19090-09011911810D17EB01 = 1113
19098-0900ED5021624CB = 1113
19106-4EA0A0A2180321624 = 1113
19114-2A6242ED4B0C4011 = 1113
19122-00ED42181039EB21 = 1113
19130-2346733732A0C40 = 1113
19138-010903009EDCDDA46 = 1113
19146-160106FFCEFF0D20 = 1113
19154-FD10F9112C0F42162 = 1113
19162-42CB4E200521C4E = 1113
19170-7EFE01383D03E747 = 1113
19178-CB4E200521CB4B2A = 1113
19186-FE01381EC3E74721 = 1113
19194-CEC3E74721C427E = 1113
19202-FE01381EC3E74721 = 1113
19210-2C427EFE01380021 = 1113
19218-624ACB4E200521E = 1113
19226-2D427EFE01380C0 = 1113
19234-4E2005217411003 = 1113
19242-42CB4D2005ED42B = 1113
19250-6918010ED4B2942 = 1113
19258-C600EC42300460 = 1113
19266-1801092A0C4011 = 1113
19274-624ACB4E200521 = 1113
19282-B802EEC85D2008C = 1113
19290-4C2010213842E3D = 1113
19298-FEFF2803771802 = 1113
19306-07E1E5C85C2006E21 = 1113
19314-38427E3CFE083003 = 1113
19322-771802006E1C855 = 1113
19330-2021CB64201DED5B = 1113
19338-3642D5CDFA4236 = 1113
19346-2138424E2141420 = 1113
19354-00094ED1CD1443ED = 1113
19362-5D3642211384206 = 1113
19370-0021394209442ED5B = 1113
19378-3642CDFA4271C921 = 1113
19386-6142CB4E2014F4206 = 1113
19394-42CB6D5FE0756238 = 1113
19402-0CDDF6062A2B0F10 = 1113
19410-FCE177131442FCD = 1113
19418-FA427EFE1E2004E3 = 1113
19426-F1185E6F1C1B2A = 1113
19434-E021614B7EF50606 = 1113
19442-214F421F5E23623 = 1113
19450-380410F71814F5E5 = 1113
19458-2A3642C600ED5220 = 1113
19466-05CDFA423600E1F1 = 1113
19474-10E10606E1177F5F1 = 1113
19482-4E1EF50C7122A005 = 1113
19490-10EE1F1F1F2161 = 1113
19498-10EE1F1F1F2161 = 1113
19506-4277F52346C65020 = 1113
19514-46CDFBB02CB652041 = 1113
19522-CB54200CE1484206 = 1113
19530-00F11FE2300410FA = 1113
19538-1E3DFE7E3E0E904F = 1113
19546-5B0D0E0C1C3321 = 1113
19554-4F4200905EE5D3321 = 1113
19562-72A377221E5B4D0938 = 1113
19570-14C13E0280477F137 = 1113
19578-1F10FD2161427718 = 1113
19586-05F1E1E1427E0606 = 1113
19594-1F360410FB1837C5 = 1113
19602-FE3E06004FD60021 = 1113
19610-4942095E16002141 = 1113
19618-42109E214F420909 = 1113
19626-4D5EEE5236CD1443 = 1113
19634-E1702E3264C6 = 1113
19642-00ED5220E0CDFA42 = 1113
19650-361BF1C110C2C9CD = 1113
19658-5E40E6034704100 = 1113
19666-1807E0E10C1443D5 = 1113
19674-FE0D2E24005E3704 = 1113
19682-100E2A0C4011CD14 = 1113
19690-4218E2A0C4011CD14 = 1113
19698-21BD4DCD7A42E1C2 = 1113
19706-C1F137C9AE8889AA = 1113
19714-B7D4AEA9E8A7BE80 = 1113
19722-80B2AE80A80B5AE = 1113
19730-80AA9A8918080B2 = 1113
19738-BEBE809D4BA4A02C = 1113
19746-2E1638B9A37AA86 = 1113
19754-2E2E6B3D1263E2A37 = 1113
19762-380F1C1E1E2A3339 = 1113
19770-2A0726E3A3E3926 = 1113
19778-213B8B9D9F9E67 = 1113
19786-B4B5A8B9AA80B1AA = 1113
19794-BEB99B87AEACADB9 = 1113
19802-80B0A9B6ABAEB7AA = 1113
19810-80B0B0B0B0B0B0E96 = 1113
19818-DDEB5AAE7B5B5AE = 1113
19826-B5AB0B0B0B0B0396 = 1113
19834-B9ADE7BAB5B0B0B0 = 1113
19842-B0B0B5B5B5B5000025 = 1113
19850-2626B0B0B0B0B0B0 = 1113
19858-181F5B2A3C312E39 = 1113
19866-2A0394A2A3339 = 1113
19874-3926873124D52A0C = 1113
19882-4011220019112C4D = 1113
19890-0606EEBCD174F2160 = 1113
19898-42CB4E200521134D = 1113
19906-4803113E4D2A0C40 = 1113
19914-013E0009EB0601CD = 1113
19922-174F2A0C4011CD00 = 1113
19930-1911374EB0606CD = 1113
19938-174F2A0C4011CC01 = 1113
19946-19113C4DEB0606CD = 1113
19954-174F2A0C4011902 = 1113
19962-19E5061036002310 = 1113
19970-FE0101210009E01 = 1113
19978-CB4E200521F04018 = 1113
19986-03219F4109095E23 = 1113
19994-56D50E0421BD40CD = 1113
20002-4E23235E5CD1443D5 = 1113
20010-19113E4C01003DEB = 1113
20018-ED5B2A0C4011CD00 = 1113
20026-19119140EB010300 = 1113
20034-EDB002A0C40114B02 = 1113
20042-1911944DEB010700 = 1113
20050-EDB02A0C40116E02 = 1113
20058-19119B4CED5B0200 = 1113
20066-EDB02A0C4011BE02 = 1113
20074-19119D4DEB010200 = 1113
20082-EDB0CDBB027DFEFF = 1113
20090-20F8060320A0C4011 = 1113
20098-3B0219D1EB0E2579 = 1113
20106-FE2B20037118D236 = 1113
20114-1B3E5E5D5601CD17 = 1113
20122-4FCD004FCDB02CB = 1113
20130-5D2010CB4C20043E = 1113
20138-1D1818CB5C20023E = 1113
20146-1F180A0B7B2006CD = 1113
20154-4C20023E7D1E1C1 = 1113
20162-FE2D2B0DFE1F2527 = 1113
20170-00EBDDEBFDE5E5CDBB = 1113
20178-027FFEFF28F5CDBB = 1113
20186-027FFEFF28F5CDBB = 1113
20194-1110A0C4D21DFE20 = 1113
20202-3002E3FF1F1F1F29 = 1113
20210-3CFE4030203E254F = 1113
20218-188D06182A0C400E = 1113
20226-2023360002B2AE3 = 1113
20234-10F5C9063200EFFFD = 1113
20242-20FD10F9C9C5E5D5 = 1113
20250-D57EA7171717160 = 1113
20258-CB125F21001E190E = 1113
20266-0406045623BE2322 = 1113
20274-7B40AFCB121FCB12 = 1113
20282-1FCB131FCB131FC6 = 1113
20290-001F1F1F1F216342 = 1113
20298-856F7EE1723E510 = 1113
20306-E1E1C5D11D0009C1 = 1113
20314-ED5B7B40EB050D20 = 1113
20322-C8D1E1010400D9D1 = 1113
20330-13EBC1108C92A0C = 1113
20338-4006180E2023600 = 1113
20346-0D20FA2310F50109 = 1113
20354-002A0C4011200019 = 1113
20362-11FE4CEDED5B0100 = 1113
20370-002A0C4011400019 = 1113
20378-1107A0EBED5B0109 = 1113
20386-002A0C4011BC0019 = 1113
20394-11144DEBED5B0064 = 1113
20402-0EFF0D20FD10F92A = 1113
20410-0C4011360119369 = 1113
20418-ED5B234223EB05CD = 1113
20426-0A46F1110500936 = 1113
20434-9C0E082A0C4011A6 = 1113
20442-00191112A4DEBCD17 = 1113
20450-4F06032A0C401155 = 1113
20458-0119112944DEB0CD17 = 1113
20466-4F06640EFF0D20FD = 1113
20474-10F906602A0C4011 = 1113
20482-CF0119112C4DEBCD = 1113
20490-174F06032A0C4011 = 1113
20498-5D2191134 4DEBCD = 1113
20506-174F2A0C4011D702 = 1113
20514-1911444DEB012000 = 1113
20522-EDB0131C1200ED5B0 = 1113
20530-CDEB02CB52CF9CB = 1113
20538-4C20043E0D1B06CD = 1113
20546-5420ED3E01216242 = 1113
20554-77CDA6472A2342ED = 1113
20562-4B2642C600ED4230 = 1113
20570-0460691801109ED4B = 1113
20578-2942C600ED42304 = 1113
20586-6069180109EB2A0C = 1113
20594-4001003009EDCDDA = 1113
20602-4600A4C52A0C4006 = 1113
20610-0F1100031965 7ED6 = 1113
20618-5D7721107906640E = 1113
20626-FF0D20FD10F906F = 1113
20634-E17EC6607721 0F9 = 1113
20642-06640EFF0D20FD10 = 1113
20650-F5C110CFCD2F522A = 1113
20658-2842ED5B2942C600 = 1113
20666-E5D5CDBB0ED5B2642 = 1113
20674-21624CBE1180521 = 1113
20682-624ACB4E200521CB = 1113
20690-5242CB4E2008ED5B = 1113
20698-2942C0CE1806CD8E = 1113
20706-ED5B2642CD2F52CD = 1113
20714-C0512A0C40061806 = 1113
20722-2023360002B0FA23 = 1113
20730-10F52A0C4003121 = 1113
20738-4DEB0608CC174F2A = 1113
20746-0C4011B8D1911A2 = 1113
20754-4DEB0605CD174F2A = 1113
20762-0C4011B2D191129 = 1113
20770-4DEB0603CD174F2A = 1113
20778-0C4011702190604 = 1113
20786-369B2310FB2323E5 = 1113
20794-ED5B2342EEDCDDA46 = 1113
20802-E1110B0023369C2A = 1113
20810-0C4011B2D191184 = 1113
20818-4DEB0600CD174F2A = 1113
20826-0C4011280219060 = 1113
20834-369B2310FB2323E5 = 1113
20842-ED5B074DEBCDDA46 = 1113
20850-E1110500193690 2A = 1113
20858-0C4011770219189 = 1113
20866-4DEB0603CD174F2A = 1113
20874-0C4011070219060 = 1113
20882-369B2310FB2323E5 = 1113
20890-ED5B8C4DEBCDDA46 = 1113
20898-E1110500193690 2A = 1113
20906-0C4011090119620 = 1113
20914-369B2310FB11CF01 = 1113
20922-19062036892310FB = 1113
20930-C9BA2342ED5B00ED52 = 1113
20938-302EDE1184D2184 = 1113
20946-4D0105000ED5B0E52 = 1113
20954-2342EDE5B7ED5B0E = 1113
20962-2940 3A284DED4384 = 1113
20970-4D32864D01E5B3 = 1113
20978-42112294DCDA74DC9 = 1113
20986-2A074DC600ED5230 = 1113
20994-16B51184D21844D = 1113
21002-0105000ED5B01ED53 = 1113
21010-874D11844DCDA74D = 1113
21018-C9BA8C4DC600ED52 = 1113
21026-300HED538C4D1189 = 1113
21034-4DCDA74DC9BA0C40 = 1113
21042-06100E2023360000 = 1113
21050-20FA2310F5C9 = 1113
```

```
24500: 3E0000000000000000 = 62
24508: 0000000000000000 = 0
24516: 0000000000000000 = 0
24524: 0000000000000000 = 0
24532: 0000000000000000 = 0
24540: 0000000000000000 = 0
24548: 0000000000000000 = 0
24556: 0000000000000000 = 0
24564: 0000000000000000 = 0
24572: 0000000219C7E11 = 332
24580: 0004B7ED5244021 = 776
24588: 080ED50C9050504 = 757
24596: 0402020703000000 = 18
24604: 0005050500000000 = 15
24612: 0000000079E800 = 593
24620: C21C733AF68CE680 = 1139
24628: CA2773CD00000000 = 561
24636: 0000000000000000 = 0
24644: 7319E8C9CDFB723A = 1204
24652: 0000010101000000 = 3
24660: 0305000037080808 = 96
24668: 0808050505050505 = 52
24676: 0505050505000004 = 29
24684: 0100080808000000 = 196
24692: 0000000000000000 = 0
24700: 0000007C0F76CD = 996
24708: 1F7CCD9D1CCDCA61 = 1120
24716: CD0361CDE660CD96 = 1191
24724: 69CD8C62CD5569CD = 1148
24732: CC7ACD6379CD1162 = 1071
24740: CC0662CDC667CDB6 = 1202
24748: 653A2760B7CA5761 = 863
24756: CD6C64280A3A2360 = 652
24764: B7CA1A8CDCA61CD = 1264
24772: 5263CDDE60A2360 = 905
24780: B7CA48623A2560B7 = 929
24788: C24862C32461003A = 750
24796: DA603D32DA60C0CD = 1136
24804: 69783A2760CB3FCB = 919
24812: 3F47CB3F80C60432 = 780
24820: DA60C9214E601110 = 768
24828: 00104000ED00C921 = 794
24836: 3A41603E0701279D = 376
24844: EDB03A20603CC832 = 909
24852: 2060FE320DFE09D8 = 1119
24860: 3A24603C322460C9 = 633
24868: 3A4D60B720063A1D = 539
24876: 60CD4C613A4000B7 = 875
24884: 20063A1E60C04C61 = 600
24892: 3A4160B762A1603A = 911
24900: 1F60CD4C61C3A160 = 957
24908: 47C5060000180FD1 = 736
24916: 10F7C93A26603CFE = 970
24924: 0820013D322660C3 = 481
24932: 0C6000326661C5CD = 887
24940: 7F7D3A6661ED44C6 = 1012
24948: 05200D3D23D20FD = 650
24956: DD7E0000234CD9F7D = 1092
24964: C1539A1CD7D137E = 953
24972: 3A66613D32666120 = 599
24980: E7AFCD9F7DC1C313 = 1302
24988: 7EED5B1860281960 = 740
24996: 87ED523004EDD319 = 899
25004: 602100002181860CD = 491
25012: 2E7E150048494748 = 481
25020: 200D1A0D2A21940 = 1277
25028: 3E0C3C3761001100 = 479
25036: 40CD94653A23603D = 769
25044: 2820FA036232C961 = 784
25052: ED5B3E60D5AF323F = 987
25060: 603E4D323E60CD55 = 728
25068: 693A3E60C618323E = 655
25076: 603ACD9E3D3D32C961 = 861
25084: 1F60CD1ED5233E0CCD = 1100
25092: 63612A1860010000 = 442
25100: 3E0C367613A2160 = 649
25108: B7C02A1B60010400 = 641
25116: ED42D33E01322160 = 761
25124: 3A23603C32236006 = 436
25132: 003A485CC608E638 = 722
25140: 32485CDD7CDC228 = 808
25148: 12181843000A0010 = 166
25156: E8C3CA61CD2E7E00 = 1103
2516-: 17474145D4204F58 = 502
25172: 4552202020202020 = 343
25180: 20484954202464952 = 516
25188: 4520544F20504C41 = 517
25196: 59000619CD37C23 = 732
25204: 2820FA0281E31423 = 900
25212: 0A0010F0CDDB67DA = 851
25220: 4C60B728F7C37F60 = 1060
25228: 3A1160E63932485C = 671
25236: 3A1160010030021 = 200
25244: 5B772310FC0D20F9 = 804
25252: CDF37C6464000100 = 773
25260: 013A2160FE1620C0 = 931
25268: 3A7A0100173A1760 = 381
25276: 9F1620C03A7A0000 = 824
25284: 0001130114020303 = 57
25292: 07030C0311031503 = 69
25300: 020407040C041104 = 54
25308: 1604030507050C05 = 63
25316: 1105150514061307 = 100
25324: FF0301020010305 = 872
25332: 0203A0D3E0D3E0D3 = 56
25340: 040504A0D33A7967 = 899
25348: 040105050500A050F = 50
25356: 05130502060307FF = 302
25364: 0401030202030003 = 24
25372: 0B031003140301004 = 61
25380: 0604080410041504 = 70
25388: 0205060505051005 = 55
25396: 1A0B050604077FF14 = 320
25404: 011502040303003D = 85
25412: 0312031603030408 = 64
25420: 0400041204170404 = 74
25428: 0508050D05120516 = 81
25436: 0515061407FF3A40 = 449
25444: 60B720283A397DFE = 845
25452: FFC03A3A7DFE32C0 = 1175
25460: 3A7DFE2803FE = 1036
25468: 0132A060AF32C362 = 742
25476: C93EFF324D603EE9 = 1036
25484: 32C362C93AC562ED = 1134
25492: 4432C562F21C64DD = 1004
25500: 21C3623A4D60FE01 = 812
25508: 280E21C662DD3500 = 657
25516: AFFDBE0028019100 = 880
25524: 211463CD14003EEA = 721
25532: DD8E0020AAF3240 = 755
25540: 60112040C3946503E = 715
25548: 01CDD87CAFCDD87C = 1266
25556: 3A416087C8DD2142 = 922
25564: 60DD7E01FE10003A = 980
25572: C362DDBE00C0C617 = 1133
25580: DDBE00D8CDF863AF = 1354
25588: 324D60C9CDC163CD = 1126
25596: 28646FF37CAAFF0A = 990
25604: C8149605C8149614 = 765
25612: 781464145143C14 = 440
25620: 2800112040C39465 = 597
25628: CDF37C021902320C = 653
25636: 1900C905050A143A = 324
25644: 3A7D1FE603212764 = 619
25652: CD5664E7E70A1B60 = 753
25660: C056642210603AC3 = 801
25668: 62CB3FCB3FCB3F4F = 975
25676: 0626000603E02C3 = 408
25684: 6761856FD024C900 = 889
25692: 0000000000000100 = 1
25700: 0200030004000SFF = 269
25708: 3E04325E64DD2144 = 632
25716: 60DD7E01B72005CD = 877
25724: FD641003CD9564CD = 1039
25732: 896420EDC9DD23DD = 1184
25740: 233A5E643D325E64 = 592
25748: C9CD3B7D3A377D47 = 899
25756: 3A2460B7C8B8D83A = 1031
25764: 3A6032585643A3E60 = 611
25772: C60747A3B7DE50F4 = 761
25780: 80325C643A387DFE = 868
25788: 7F30063A397D325C = 563
25796: 643A5B64DDE5CDD9 = 1221
25804: 69DD7E01325D643A = 754
25812: 5C64CD2A66DDE120 = 1019
25820: 0B3A5B643D325B64 = 582
25828: F2C5E64C93A5D643C = 1051
25836: 3CCB277CB27DC = 1007
25844: 77013A5C64A07700 = 710
25852: C9215F643E01CDD8 = 913
25860: 7CDD7E013CFEB9D2 = 1131
25868: B165FEB1D22065DD = 1286
25876: 7701C60547DD4E00 = 693
25884: DDE5CD277BDDE1C2 = 1457
25892: B165215F64AFC3D8 = 1092
25900: F6DD7E0047DD7700 = 788
25908: B83053C61388384E = 850
25916: AF323E6006003A48 = 527
25924: 5CC608E63832485C = 798
25932: CDF37C200A2814028 = 722
25940: 2828500010E8CD01 = 758
25948: 65CDF37C32FFFF32 = 1283
25956: 32FF003A23603D32 = 605
25964: 2360C455569CD7865 = 943
25972: F60E1E1C93EE043285E = 883
25980: 64DD214460CDA465 = 988
25988: CD896420FF8C9DD7E = 1270
25996: 013CC3136511E050 = 697
26004: 0E08AF0020D51213 = 485
26012: 10FCD1140D20F4C9 = 987
26020: DD7E01B7C8215F64 = 959
26028: 3E01CDD07CDD2041 = 804
26036: 00C93A4160B7C8CD = 1008
26044: C165C37A673A4360 = 935
26052: CB3FCB3FCB3F3C32 = 908
26060: F5653A43A6032F365 = 952
26068: CDD9693AF565DDBE = 1342
26076: 0128003AF3653DF2 = 754
26084: D165C93A4260CD2A = 978
26092: 66CBC3716600003 = 712
26100: 0000000000001000 = 144
26108: 0910492026401080 = 376
26116: 0000108056600930 = 527
26124: 0980108000000000 = 281
26132: 0000000000000000 = 0
26140: 0000000000000000 = 0
26148: 00000000000032F1 = 291
26156: 65D08F79DD2107C9 = 1076
26164: 3AF3653C7CB3FCB3F = 1003
26172: CB3F3E4565DD9604 = 1036
26180: 3829CB472804CB50 = 698
26188: 2021DDBE05301CE6 = 787
26196: FED0B6432F465DD = 1229
26204: 960232F2654F0600 = 630
26212: DD2A8379DD09DD7E = 1092
26220: 32B7C9AFC9CDD066 = 1277
26228: 21FA6522F665210A = 808
26236: 6622F965CDE166CD = 1222
26244: 4369CDF37C105020 = 872
26252: 28401480A00CD60 = 563
26260: 67211A662AF66522 = 879
26268: F365CDE1663A2760 = 1074
26276: 3D322760C2076CD = 755
26284: 706960203A405CC6 = 637
26292: 08E63832485CCDF3 = 956
26300: 7C1064203241092 = 443
26308: 320010E8CDC163CD = 1000
26316: 9165E1C906201116 = 749
26324: 00AFDD7702DD7703 = 860
26332: DD1910F6C9ED4BF4 = 1265
26340: 65CDF37DDA4F65CD = 1279
26348: F966ED4BF465D4CD = 1117
26356: FE7D2AF8650608ED = 1021
26364: A0EDA01818030314 = 637
26372: 10F5C921286D3AF3 = 932
26380: 65CD7467352120660 = 752
26388: DD2183793AF265CB = 1110
26396: 3FCD7467352128660 = 709
26404: 3A3A60C247CD7467 = 727
26412: AF2805B628FB7832 = 866
26420: 3A8006FF212D60AF = 764
26428: 2823D4B628FB7832 = 725
26436: 3C6022D603E0B47 = 474
26444: 04CD7467AF2B5B6 = 833
26452: 28FB7832D60C903 = 922
26460: 0202010103AF3552 = 441
26468: 5B67DD7467FEE2B = 713
26476: 60CD7467221B60C9 = 878
26484: 656FD024C900DD21 = 943
26492: 44603E043279 7ED = 741
26500: 48426ED07E01B728 = 808
26508: 20DD7E00B9201ADD = 843
26516: 7E0190E44FE0630 = 884
26524: 10CDA465FC0D2F0F1 = 1062
26532: 180E0C100600C343 = 328
26540: 69DD23DD233A7967 = 899
26548: 3D327967206CDED4B = 884
26556: 426005CD277BC8C3 = 929
26564: 4369CDDB67CD3368 = 1059
26572: 3A1160B7C2248693A = 795
26580: 4C60B7C8C3036901 = 859
26588: FEFE0E5D1FF7CD = 1572
26596: 503A3E600E00CB4B = 568
26604: 2804CB4220048728 = 572
26612: 010DC053200420 = 621
26620: 2005FEEB28010C79 = 700
26628: 32406001FE7FED5B = 917
26636: CB43200EC8622208A = 675
26644: 3E0132161BAFF324C = 815
26652: 60C9CB6320026269 = 1027
26660: 3A616087C7A196832 = 823
26668: 4C60AF32616BC93A = 857
26676: 4060B7C8F23C68AF = 1124
26684: DD213E60CD5B683E = 871
26692: 01CDD87CAFCDD87C = 1266
26700: 3A406473A3E6080 = 633
26708: 323E60C9216206B7 = 827
26716: CD21AC68CD0D0A00 = 712
26724: 0901010209021302 = 45
26732: 0103090313030104 = 43
26740: 0604120401050106 = 45
26748: 0606120601070707 = 58
26756: 1307FF0B000C0102 = 307
26764: 020C021402020100 = 55
26772: 0314030303040514 = 72
26780: 0414050306F0814 = 79
26788: 0602070E071407FF = 318
26796: 0A000B0101020E02 = 38
26804: 1302010300031303 = 61
26812: 02040E0413041305 = 71
26820: 02060E0613060107 = 61
26828: 0D071307FF090008 = 318
26836: 0100020002120200 = 33
26844: 0300031203000405 = 44
26852: 0411040005000605 = 41
26860: 0611060007060712 = 67
26868: 07FF0000000010002 = 265
26876: 0003000400005FFCD = 472
26884: F37C14320A840SC8 = 752
26892: 003E013241603A3E = 394
26900: 60DD214260C60ADD = 941
26908: 7700DD3601B01818 = 619
26916: DD2142602F6683E = 861
26924: 01CDD87CDD7E01D6 = 1108
26932: 04FE042816DD7701 = 665
26940: 21F668AFC3D87CDD = 1314
26948: 21426021F6683E01 = 641
26956: CDD87CAF324160C9 = 1132
26964: 00DDE5E5DEFF3240 = 1110
26972: 603A3E60325469C6 = 749
26980: 28323E60CD3368CD = 813
26988: F37C010F003A5469 = 630
26996: DDBE0020EFE1DDE1 = 1353
27004: C90E205E23562306 = 503
27012: 0DD7300DD23DD72 = 938
27020: 00DD2310F40D20E2 = 736
27028: C9003A2660C60332 = 644
27036: B66A21D96A22B76A = 943
27044: 3E0432956960D21BF = 815
27052: 6ADD360005DD233A = 700
27060: BE6ADD7700DD233C = 952
27068: 3C328E6A2AB76A7E = 863
27076: 2322876ACDEA69CD = 1107
27084: 7D623A95693D3295 = 802
27092: 69F2D69D0C0C021BF = 1271
27100: 6AB7C8C501C202DD = 1104
27108: 093D20FBC1C921F7 = 1027
27116: 69B7C80140000093D = 623
27124: 20FCC91F803FC07F = 1026
27132: E0FFF0DEF0DEF0DE = 1885
27140: F0FFF03F803C060 = 1262
27148: 60C03000000000000 = 336
27156: 0000001F803FC07F = 541
27164: E0FFF0F7B0F7B0F7 = 1812
27172: B0FFF01F80198019 = 1008
27180: 8019800000000000 = 281
27188: 0000000C030C030F = 735
27196: F0E610E7980610FF = 1170
27204: F02F404F20861040 = 676
27212: 2020400000000000 = 128
27220: 0000000C030C030FF = 1375
27228: F0E6100E780610FF = 1065
27236: F02F402F40264020 = 596
27244: 4020400000000000 = 160
27252: 0000003C030C009 = 489
27260: 000F001F803FC07F = 556
27268: E0B0D03F90090010 = 935
27276: 0000000000000000 = 137
27284: 0000000C030C03020 = 512
27292: 4010801F803FC0FF = 883
27300: F030C01F80090010 = 664
27308: 8020400000000000 = 224
27316: 0000000000020101 = 4
27324: 000000C313524E6F = 485
27332: 20002046617446166C = 552
27340: 2065726F722E73 = 743
27348: 2900020576172666F69 = 586
27356: 6E672873290000E0 = 423
27364: 3A130C47CD5C6BC3 = 887
27372: 7E7CCD297E21E27D = 1006
27380: CD2C7ECDDE6AC310 = 1119
27388: 7E3245550542F4952 = 643
27396: 502F495250432F40 = 553
27404: 4143524F005956E74 = 604
27412: 6572606966E617465 = 853
27420: 642000CD297E2139 = 594
27428: 7ECD2C7ECDDE6A3E = 1096
27436: 0DCD106A3E0ACD10 = 633
27444: 6A3A248E3CCD3E60 = 1097
27452: CDDA933E0ACJDA93 = 1202
27460: 21F67DE5CD8B6AE1 = 1308
27468: 3A248E3CCD3D9992 = 846
27476: 436F6E6469746953F = 825
27484: 6E616C0053796D62 = 726
27492: 6F6C733A0D0A004D = 492
27500: 6163726F733A0D0A = 617
27508: 0021E2FF39EB2ABF = 1039
27516: 80CD965ED27823A = 1100
27524: 908DB721000022B9 = 720
27532: 8022B8B8E2A8B8CD = 1522
27540: 7F7E2ABF8D2B3C32 = 780
27548: 900DAF2E915D329B = 1001
27556: 8DEB2A8B58D24CD96 = 1131
27564: 5ED29A7EEB228E8D = 1136
27572: C925EDE5CDA09E1 = 1429
27580: C38A7ECD2F56C07E = 1115
27588: 873CF0CDF5EE2A8CA = 1237
27596: 7E7E3A90B0C3C329B = 981
27604: 8DF1E608EE08C03A = 1116
27612: 9B8DB7C83A9B8D3D = 1094
27620: 329B8D3CC9237EFE = 1022
27628: 18C28A7E3A9B8DB7 = 1070
27636: C28A7E3AB58DB7C2 = 1247
27644: B47EF137C9225E6D = 1126
27652: 3A908D3D32908D3C = 940
27660: CDFD5BFE26C22D7F = 1207
27668: 2A8D8B7EFE22C20A2B = 974
27676: 7FFE09CA2B7FE5C5 = 1188
27684: CD685CCD397FC1E1 = 1208
27692: 28688BC22B7F3E26 = 773
27700: 32928DC39A7FFE26 = 1105
27708: C22D7F3A928DB7C2 = 1088
27716: 3A7F2E2B7FE22D7F = 941
27724: F8F5AF32928DF1C9 = 1447
27732: 2A9D8D06007EB7CA = 857
27740: 677F11298C1ABEC2 = 995
27748: 5C7F4F28131ABEC2 = 770
27756: 5C7F0DC24C7F78F6 = 995
27764: 80BFC32B7EFE07D2 = 1160
27772: 5C7F04C43E7F3AA8 = 831
27780: 6DB7C2D28D0E0 = 1064
27788: 7EB7CA987F11298C = 988
27796: 1ABEC28D7F4F2813 = 819
27804: 1ABEC28D7F0DC27F = 1012
27812: 7FAF78C928E7EFE07 = 1053
27820: D28D7F04C3717F3C = 977
27828: C92A8B8E5CD685C = 1148
27836: F5C03E7F32928DF1C = 1237
27844: F1E1F57E23FE20CA = 1360
27852: 687FFE09C2C07FE5 = 1316
27860: CD2D7FE1C3AC7F78 = 1216
27868: CD2D7FF147F5F1C2 = 1369
27876: 1F7FFE26C21F7FC3 = 997
27884: 495CF1E1F5228B8B = 1185
27892: CDFD5BFE20CAEC7F = 1480
27900: FED9CAEC7FCD495C = 1199
27908: C3F27FCD2D7FC3D9 = 1353
27916: 7FCDC45CC2C77FC3 = 1335
27924: 0180CDC45CFAC77F = 1198
27932: CD2D7FC3FB7FCDFD = 1408
27940: 5BFE3BCA2380C315 = 985
27948: 80CD1789CD2D7FFE = 1124
27956: 0DCAEF88CDFC5BC3 = 1334
27964: 1580CD1789CD1789 = 879
27972: FE20CA2658FE09CA = 1119
27980: 2600B7C2D7FC2B8B = 1240
27988: 8DCAEF88FE0DCAEF = 1426
27996: 883E0DCD8C03CE3EF = 1126
28004: 88E5F53AA66DB7CA = 1360
28012: 5B80D5E82AB38D19 = 1054
28020: 34D1F1E67FF587FA = 1489
28028: A5802AA18D7E87CA = 1148
28036: 9480F1C547042B05 = 837
28044: CA7F907ED52F5F19 = 958
28052: FF19D1C37807EB7 = 1233
28060: CAA2803D472B7E04 = 797
28068: 05CAA280CD3402805 = 689
28076: C38680F1283C3DCA = 1064
28084: 9F802BC3978D7EE1 = 1155
28092: C9C1E1C93E2ECD34 = 1185
28100: 82CD3482F1E63FC5 = 1248
28108: 2AAE8D4F06000944 = 519
28116: CDCA6045CDCA68C1 = 1204
28124: E11B1AC9E5CD685C = 1109
28132: E1C4DE80F511298C = 1214
28140: 1A3C4F1A771328D0 = 385
28148: C2D400F1C9FE6DC8 = 1443
28156: FE3BC8D1C3A655D6 = 1174
28164: 00C5E528CDDB5CFE = 1239
28172: 27CAD981FE22CAD9 = 1294
28180: 81FE3CCAF781FE3E = 1337
28188: CA0282FE25CA2F81 = 1003
28196: FE2CCA02C82FE20CA = 1130
28204: 0C82FE09CA0C82FE = 1003
28212: 3BCA00C82FE21CC3C = 954
28220: 5CFE0DCA2982772B = 894
28228: CDFD5BC3F00822D7 = 1361
28236: 81C501CD81C5CD76 = 1181
28244: 77EB0E003A3D8CFE = 881
28252: 20C292813A338BFE = 1003
28260: 10CA8A81FE08CA0A = 1055
28268: 8101F6FF50580913 = 827
28276: DA5781E5E3B7C3C4 = 1199
28284: 55813E3AC181C3C2 = 1045
28292: 81AF29CE30CDAE81 = 1107
28300: 3E05F3AF0603298F = 680
28308: 05C27701C630CDAE = 1072
28316: 81F13DC27381C392 = 1210
28324: 8144CD9A8145CD9A = 1113
28332: 810C0DC03E30C3C2 = 845
28340: 8170IF1F1F1FE0A3 = 1241
28348: 8170E60FC630FE3A = 1052
28356: DAAE81C670C0DC2 = 945
28364: C281FE30C84FFE3A = 1216
28372: DAC2813E30CDC281 = 1179
28380: 79E52AD781772B22 = 932
28388: D781E1C9C1CD495C = 1333
28396: 2AD781032981C000 = 751
28404: 4F772BCDFD5B89CA = 1177
28412: EB81FE0DCA2E82C3 = 1204
28420: DA81772BCDFD5B89 = 1243
28428: CADA81C3F0000405 = 1121
28436: CAFE81772B04C329 = 987
28444: 6105CA2901FA1182 = 903
28452: C327810405C22781 = 734
28460: D17B9503D12C1E82A = 1030
28468: 808D2D7EFE20CC49 = 1007
28476: 5CFE09CC495CEBC9 = 1160
28484: 0405CA1182CDEE55 = 886
28492: C31182F5E5210C8C = 1001
28500: CD965ED247822336 = 949
28508: 0D2BEBE1F1C9E1F1 = 1424
28516: 1213C9CD9A7FFE26 = 1016
28524: CC9A7FFE3ACA9A7F = 1280
28532: FE21D0FE80DC8F5CD = 1412
28540: 215DCA6C82CD2F56 = 904
28548: CA7D68FC139A7F21 = 1181
28556: 7368237C5E3F5374 = 923
28564: 616368206F766572 = 779
28572: 666C6F772C207472 = 746
28580: 79206D6F72652050 = 700
28588: 207277697465865 = 791
28596: 730D0A00CD76773A = 638
28604: 3D8CFE20CAAB8211 = 1007
28612: 0000EB22938DCD5A = 852
28620: 7EC1D1E101BF82C5 = 1272
28628: D53E0DC36555C101 = 863
28636: BA02C5CD685CFE3A = 1226
28644: CC685CCDA47ECAE0 = 1321
28652: 82110A0081ACD8CB = 931
28660: 13FF0DC2D5B2C9AF = 1199
28668: CD8C88CDEF88C1D1 = 1463
28676: E121DB53ED52AB9 = 1229
28684: 8DE5E52A938DE521 = 1191
28692: DB53E521020ED5C5 = 1123
28700: C9CD5583C1E1D1CD = 1464
28708: 965EC231833A0C8D = 973
28716: B7C21A8378B1C231 = 1074
28724: 832A8E8DE5CDE587 = 1254
28732: E1CDE67EAF329C8D = 1308
28740: D1D5A9558DE5EBE9 = 1451
28748: D5CDC38887CA6483 = 1365
28756: 118A88CDD98CD34 = 1109
28764: 82FE0CC23C83E5CS = 1208
28772: 2A978DE52A938DE5 = 1128
28780: 2A958D8D1E1F1E1 = 1105
28788: 8DE122998DE12297 = 1104
28796: 8DEBE908626BC307 = 1027
28804: 833A908DB7CAEE55 = 1182
28812: 329C8DC1E1D11187 = 1126
28820: 83D5E5C5AF329D8D = 1291
28828: C3535CC3CA553A9C = 1066
28836: 8D87CAE663C101ED = 1318
28844: 52CBC4D695CFE2D6 = 1215
28852: 695CCD2F56C0B7F0 = 1149
28860: 4FE608C28A0379E6 = 1179
28868: 10C2C28379E620C2 = 1112
28876: CA0379E640C2D783 = 1288
28884: C93A98B03D329B8D = 962
28892: C93A98B03C329B8D = 961
28900: C93A9B8DB7C03A95 = 1041
28908: 88B7C8329C773AB = 1105
28916: 8DB7C0237EFE08C8 = 1139
28924: 3EFFC30278C101E1 = 1261
28932: 21DB53E5D5C5C9B7 = 1358
28940: F5CD5A7E2298D8CD = 1203
28948: C5804F3A3D8CFE20 = 949
28956: CD6542A9B8DCDE6 = 1121
28964: 7EF1C2933602BFE = 1146
28972: 82C4A855F1F85CA48 = 1251
28980: 64CD3C5CFE3CC4A6 = 1165
28988: 58F177E5F50E002B = 976
28996: 3A3D8CFE20C2A384 = 1034
29004: F1F547CA5684CDE8 = 1414
29012: 800CFE00CAA884FE = 1155
29020: 3ECAA384C33784CD = 1146
29028: 36CCD6C3F2A48CC = 979
29036: FD5B32284CDFE6C4A6 = 1254
29044: FE0DCA9984F53AA4 = 1221
29052: 8DB7CA7B04F111A3 = 1202
29060: 840SFE20C8FE09C8 = 1294
29068: FE3BC8FE2CC8D1C3 = 1415
29076: 9384F1FE3CC8F84 = 1311
29084: FE3EC2938404E5CA = 1000
29092: A38405C3938404C3 = 973
29100: 9384DC772BC35684 = 956
29108: 3AA18DB7C2B3D5AD = 1240
29116: D65536002BCD8A7E = 865
29124: 78D7C4A055F1E122 = 1250
29132: 9F8D2600592938D = 765
29140: C1D1E101C984C3B8 = 1340
29148: 82AFC23E01C3F883 = 1128
29156: C101BA82C52ABB8D = 1077
29164: 8E1328A69DDE5CA4C = 930
29172: 82F5CDA67ECA0D85 = 1218
29180: F1E1FE0DCA1280FE = 1335
29188: 3BCA0780FE27CAFD = 1144
29196: 84FE22CAFD84CD9A = 1366
29204: 7FC3E3844C7DF17E = 1324
29212: FE0DCA1280B8CAF7 = 1248
29220: 84C3FE84F1E122BB = 1400
29228: 8DAFCD6C88CDEFB8 = 1377
29236: C1D1E1210B53E5D5 = 1404
29244: 2AB98DE5E52A9F0D = 1168
29252: E52A938DE521DB53 = 1123
29260: E5213885E5C5C9CD = 1283
29268: 5503C1E1D13E0132 = 956
29276: A68D28A18DE1CD96 = 1223
29284: 5EC2698533A9C8DB7 = 1064
29292: C2598578B1C26985 = 1145
```

SPACE EVADERS

THIS GAME for the 16K or 48K Spectrum is based on the popular arcade game Space Invaders. The object as usual is to stop the five attack waves of aliens, each of which vary in speed and fire power from reaching Earth. You, as the sole survivor of the first attack wave, have to destroy all the aliens while avoiding their bombs.

Hexloader.

```
  5 CLEAR 24449
 10 DEF FN x(a$)=CODE a$-48-7*(
a$>"9")
 20 INPUT "Start Address ";s
 30 FOR n=s TO 32404 STEP 8
 40 PRINT n;": ";: LET tot=0
 50 INPUT a$: IF a$="END" THEN
STOP
 60 PRINT a$;" = ";: INPUT t: P
RINT t
 70 FOR k=1 TO LEN a$ STEP 2: L
ET z=0
 80 LET c=16*FN x(a$(k))+FN x(a
$(k+1)): LET tot=tot+c
 90 POKE n+z,c: LET z=z+1:NEXT k
100 IF tot<>t THEN PRINT "Error
 - input again": GO TO 40
110 NEXT n
```

Justin Staines evades the invaders.

The number of space ships you have depends on the amount of skill shown on the first game, ie. reasonably good, three ships — excellent, two ships.

To move use Z — left, X — right, Space — fire. You can, if you have one, use the Sinclair ZX Interface Two (R) which, by the way, uses keys 1, 2 and 5.

When entering the program, type and run listing one — the loader and then you can enter the code in figure 2. After you have entered the, approximately, 8167 bytes, you can Save the code with

SAVE "EVADERS" CODE 24500,8167

then Verify it with

VERIFY "" CODE

You can now play the game with

RANDOMIZE USR 24703

Of course, if you don't want to have to load the game and then type the above you could have a small program before the code — for example:

```
10 LOAD "" CODE
20 RANDOMIZE USR 24703
```

and save it with

SAVE "EVADERS" LINE 10

```
29300: 2AA18D23237EFE08 = 802
29308: 23D25E852803C31D03 = 870
29316: EBD5CDC388D7CA9B = 1513
29324: 85118A88CDC388B7 = 1146
29332: FC4A80CD3E89CD34 = 1116
29340: 82FE0DC27585E52A = 1112
29348: A18DE5C5C349B30B = 1138
29356: 626BD1C34D85CDDB = 1243
29364: 5CFE0DCAA655A4FCD = 1096
29372: DA93CD3C5CFE0DCA = 1191
29380: B285CDDA93B9C2A3 = 1423
29388: 853E0DCDDA933E0A = 850
29396: CDDA933A3D8CFE20 = 1115
29404: C0C3535CCDDB5CFE = 1332
29412: 0DCAA6553A3B04F = 899
29420: CDFD5BFE0DCAE005 = 1375
29428: B9CA535CC3C185E1 = 1324
29436: D1C101E985C3B88D = 1278
29444: C101BA82C5210A0B = 1017
29452: 3AA3B04F7EB9CA01 = 955
29460: 86FE0DC823C3F585 = 1209
29468: C1D1E121DB53E5D5 = 1404
29476: C5C987CDDD5EC21C = 1323
29484: 86E523235E2356CD = 853
29492: E5E7E1232B2BCBD7E = 1065
29500: F62877CD5A7E2290 = 1017
29508: 8D0E00C5CDC588C1 = 1075
29516: 0CFE2CCA2C86AF77 = 984
29524: 2B32A58D32ABAD3C = 821
29532: 772B22A78D22A98D = 848
29540: 36007932B08DCD8C = 867
29548: 88AFCD8C88C1D1E1 = 1419
29556: B1606E5D5C5C9C1 = 1296
29564: 01BA82C52ABB8DE5 = 1113
29572: AF32A58D32A68DCD = 1093
29580: 4C82F5CDA47EDA85 = 1297
29588: 86CA8886F132A58D = 1251
29596: E1C3E384F1CD685C = 1421
29604: C4A6552AA98DF5C2 = 1238
29612: 2AB863AB8D3C32AB = 939
29620: 8D112980C1A3C4F1A = 530
29628: 772B130DC2A08636 = 736
29636: 0022A98DF1FE2CDA = 1085
29644: 8686E122B88DC9F1 = 1297
29652: E1AF22B88DCD8C88 = 1243
29660: CDEF882A898D1105 = 970
29668: 0019EB2A838D193A = 705
29676: ABDD772AB98DE82A = 1076
29684: 8C8D237323732A98D = 779
29692: 8DCDE67EC1D1E121 = 1362
29700: DB53E5D5C5C9E537 = 1426
29708: CD9C5ECD5A7E3600 = 930
29716: 2B3601228A18D2B0E = 491
29724: 00CDE880470CCD49 = 926
29732: 5CDDB5CFE0DCA2A = 1119
29740: 87FE38CA2A87FE2C = 1125
29748: CA028778FE20CA82 = 949
29756: 87FE09C4D655C302 = 1090
29764: 87E323235E2356EB = 882
29772: CDD988E3B7CA4787 = 1376
29780: B9CA4787DA478736 = 1071
29788: 0628D0C23987E600 = 496
29796: 2BC20A7EFE1CC1CDD9 = 1352
29804: 88E52AAC8DE5CE4F = 1225
29812: 06000922AC8DC12A = 597
29820: A18DE521DB53E511 = 1112
29828: 6E87D5C5C9CD5583 = 1277
29836: E122A18DE122AE8D = 1135
29844: E1AF32A68DCD3C88 = 1293
29852: B7CAA687118A88CD = 1185
29860: C3D88B7FC1A98CD3E = 1235
29868: 89CD3482FE0DCC288 = 1121
29876: 87E52AAE8DE52AA1 = 1151
29884: 8DE5C349932AA18D = 1113
29892: 23AF329C8DC3228D = 917
29900: 7D93SF7C9A57C93A = 991
29908: 258CB7C2D855CD76 = 1170
29916: 77A3D8CFE20C032 = 906
29924: 258C2A148CEBCD81 = 996
29932: 87ED22268CC95A25 = 978
29940: 8CB7CCD655AF3225 = 1030
29948: 8CC3535C21B78D4E = 945
29956: 73234672CDF787CD = 1126
29964: 0088712378C92AB3 = 816
29972: 8D195E2356286C92A = 807
29980: B3DD19223235E2356 = 838
29988: 2BC92AB78D7DA4CA = 1117
29996: 2088E8D5CD0088E5 = 1192
30004: 22B78DD1C34C882A = 1018
30012: 858D112000EB1922 = 665
30020: B58DD5EB2ABF8DCD = 1349
30028: 95ED1DA9A89AA8E = 1146
30036: 8D253A908DB7CD96 = 1059
30044: 5ED4A8978D7DA4CA = 1200
30052: CDB187D5CCF787E6 = 1552
30060: 2AB88DEB78E6E05F = 1277
30068: 7BB2C26088D1D573 = 1264
30076: 2372233E00772377 = 519
30084: CD0088D1CA768873 = 1121
30092: 2372C378B8EB22B9 = 1057
30100: 8DFB2AB98DD5EBCD = 1397
30108: F787D173237278F6 = 1224
30116: 045FC9C5F52AB58D = 1128
30124: E878E61FCCDB882A = 1012
30132: B38D19F1F5777BE6 = 1303
30140: 1FFE1FCAA88813CC = 1045
30148: B288EB222B8DF1D1 = 1361
30156: C97BE6E05FCD0088 = 1214
30164: 7A83CA8B8131313 = 707
30172: 13C9D5E82AB38DEB = 1265
30180: 7DE661FC2387D7F6 = 1298
30188: 046FEB197EE0D1C9 = 1145
30196: CDC388F5D5EB7BE6 = 1582
30204: 1FFE1FCAE88813CC = 1109
30212: B288EBD1F1C9EB7B = 1558
30220: E6E05FD5CD00887B = 1226
30228: B2C1C8AF7723772A = 1061
30236: B38D197323728C5CD = 1011
30244: E587C12AB98DEBCD = 1365
30252: F787712378C92ABB = 1072
30260: 8DD5EB7BE61F1BFE = 1254
30268: 04CC32092AB38DEB = 992
30276: 22B88DEB197EEBD1 = 1192
30284: C97BE6E05FCDF787 = 1450
30292: 7BF61F5FC9D5F5EB = 1389
30300: 7BE61FFE1FCA4A89 = 1082
30308: 13CCB288EBF1D1C9 = 1423
30316: 2AB58DFB2AB58D3A = 982
30324: 908DB7C263092ABF = 1131
30332: 8D25CDB187D479E = 1128
30340: 7AB7CA795E1F5778 = 963
30348: 1F5FD52AB38DEB2A = 978
30356: B58DCDB1874248D1 = 1189
30364: 2AB58DEB1922B58D = 980
30372: 78B1CA9689281B1A = 882
30380: 77B0C3B8D52AB38D = 953
30388: C9CDA089C32085D5 = 1279
30396: 2A838EB2AB38DCD = 1144
30404: B187DA795E7AFE03 = 1124
30412: DA795E1F5778B1F5F = 800
30420: E1C5E52AB38DEBE3 = 1475
30428: CDB187424BD12AB3 = 1088
30436: 8DE52A838B19E522 = 970
30444: B38D892205BDE1D1 = 1119
30452: 78B1CAE6090B1A77 = 1022
30460: 2313C3D989C1C932 = 1047
30468: EE0C32EF8C4F061E = 922
30476: 5E235623E5C5CD00 = 889
30484: 8AC1E105C2F1893A = 1191
30492: EE6CB9C4106AC901 = 1083
30500: 0000C57AB3CA7D66 = 929
30508: EBE55E2356788226 = 1174
30516: 118AE17DB4C5CD36 = 1144
30524: 8A2B562B5E7B82CA = 907
30532: 1B8AAF7723772B2B = 699
30540: 2BE5C3118A010400 = 627
30548: 097E2281B8E67FC8 = 994
30556: FE40D877237EE680 = 1164
30564: C4160B2B46237EF5 = 876
30572: 2356788226118AE1 = 481
30580: 23CD019505C3588A = 815
30588: F1F5E600C2968ACD = 1411
30596: 8C8ACD0288F1F55F = 1253
30604: E600C2C18A7BE604 = 1240
30612: C2C78A7BE640C4D2 = 1354
30620: 8A78E6A0CAC8A7B = 1316
30628: E5035F160021186B = 517
30636: C9788779D9F1211EE = 1018
30644: 8C35C2B13A3AEFFCC = 1139
30652: 77CD106A21758834 = 787
30660: 3A7488BECC266AAF = 1026
30668: C4BC8A2A818B7EF6 = 1204
30676: 4077C93E09C30195 = 800
30684: 3E2ACA3E4DCA3E43 = 776
30692: CA38E55CD8185C395 = 1049
30700: 8AD5C52A8185AB5EB = 1122
30708: 7BE60347BE07235E = 577
30716: 235623D5BE2356E8 = 819
30724: 22208CD1CD3668E1 = 1006
30732: 22818B237EE620C4 = 921
30740: 5C6BC1D13E49C301 = 932
30748: 9521308C223B8CCD = 821
30756: 7F62A3B8C3600221 = 559
30764: 3D8CC38B6AC5E57F = 1193
30772: E603470E6235E23 = 488
30780: 56CD5C6BE1C1C945 = 1170
30788: 0000000000020000 = 2
30796: 0000A80000000000 = 10
30804: 0000000000000000 = 0
30812: 0000000000000000 = 0
30820: 0000000000000000 = 0
30828: 0000000000000000 = 0
30836: 0000000000000000 = 0
30844: 0000000000000000 = 0
30852: 0001010021A3A860 = 245
30860: 47343A6088301532 = 586
30868: 38603A3960B7200C = 590
30876: 3A3860CDD969CD8F = 1085
30884: 79CDEF783A3860B7 = 1078
30892: 2006CDF37C0AFA00 = 870
30900: CDD969CD8F793A39 = 1111
30908: 6007281ACD13793A = 748
30916: 3860B7200C323960 = 582
30924: 3A3B60ED44323B60 = 723
30932: C93D323860C9CD58 = 958
30940: 793A3860473A3A60 = 614
30948: 882808A3B803CD32 = 552
30956: 1860C93A3B60FE01 = 821
30964: 280C3A8779B72012 = 599
30972: 3E01323960C93A87 = 660
30980: 79473A887980FE20 = 921
30988: 28EEAF323860C9CD = 1061
30996: F37CD8FA003A8679 = 930
31004: FE1204AF7A3A8679 = 1014
31012: FE15281E470E00CD = 635
31020: FE7DCD9465ED4B5B = 1478
31028: 7904DD2A0379DD71 = 974
31036: 00DD7001CD8F79C3 = 998
31044: DE793E01322560CD = 794
31052: F37CFA64FAC8FAFA = 1667
31060: FAFA00C9ED4B8579 = 1267
31068: 3A3860814F18C33E = 718
31076: 04323860CDD969CD = 938
31084: 8F79CDDE79CDF37C = 1394
31092: 19F0647819F0003A = 808
31100: 38603DFA6579C900 = 878
31108: 0000000000000000 = 0
31116: 000000DD22837900 = 728
31124: 4E00DD4560ED4385 = 807
31132: 7934326037CCB274F = 716
31140: 0600DD093A857911F = 579
31148: 3005016001DD00DD = 602
31156: 228A793A857947A = 724
31164: 3C60CB2780328779 = 832
31172: 3A3C60473A3D6090 = 644
31180: CB27328079473A87 = 813
31188: 7980D620ED443289 = 987
31196: 79C90C4779ED4B85 = 1165
31204: 79CDED79ED4B8579 = 1250
31212: 043E08328E790E00 = 401
31220: CDFE7DED530C79CD = 1370
31228: 197A2A8A79011600 = 471
31236: 09228A792A8C7924 = 641
31244: 228C793A8E793D32 = 727
31252: 8E7920E3C9ED5B8C = 1191
31260: 793A8779CD317A2A = 853
31268: 8A79ED4B3B790600 = 834
31276: EDB03A8979B7C847 = 1183
31284: AF121310FCC9CD57 = 973
31292: 7E3EF8A6B3772315 = 956
31300: 20F7C9ED4B85790E = 1060
31308: 00211200D3386085 = 490
31316: 6F3001247E5F1640 = 503
31324: C33A7A79AF2A8679C8 = 946
31332: 110050CD9465114A0 = 856
31340: 50CD9465114050CD = 1028
31348: 9465AF322260CDF3 = 1052
31356: 7CC00A0AC8C80A0A = 754
31364: C8C80A32FA00C9FF = 1166
31372: FFFFFFFFFFFFFF03 = 1788
31380: 0F1F3F7FFFFFFFC0 = 1065
31388: F0F8FCFEFFFFFFFC = 2010
31396: F0E0C0800000003F = 975
31404: 0F070301010000FF = 282
31412: FFFFFFFFFF000031 = 1324
31420: 0303020003030030 = 338
31428: 00353334350000000 = 209
31436: 3A2260B7C022A365C = 751
31444: E5E1CD7922355C3E = 636
31452: 0332C7AB1051421 = 436
31460: B87AC53E0332CB7A = 944
31468: CD377E0D0D0D0D04 = 442
31476: 3AC87A3D32CB7A20 = 851
31484: EFC179C6094F3ACA = 1099
31492: 7A3D32CA7A20D8E1 = 1030
31500: 7E0363E01322260 = 423
31508: C9800FE000FF0001 = 711
31516: 000200FFFF01FFFF = 1023
31524: 010101AA2260B7C8 = 574
31532: ED43157B78FEA238 = 1040
31540: 5BFEB83057CDA57B = 1157
31548: C0CD3D7DDD211778 = 989
31556: 3E0832CA7A3A157B = 646
31564: DD36004F3A167BDD = 858
31572: 86147DD23DD2D3A = 776
31580: 377D1732377DDCB = 805
31588: 783ACA7A3D32CA7A = 940
31596: 20DBED4B157BCD98 = 1064
31604: 7BED4B157B04CD98 = 940
31612: 7BED4B157B05CD98 = 941
31620: 78CDF37C04141E = 753
31628: 00F801C9AFC9CDB2 = 1207
31636: 7CB677C9CDB27C2F = 1130
31644: A677C9CDB27CAE77 = 1286
31652: C9CDB27CA8C98040 = 1267
31660: 2010080402010008 = 71
31668: 1018202830380109 = 226
31676: 111921293139020A = 234
31684: 121A222A323A030B = 242
31692: 131B233B333B848C = 250
31700: 141C242C343C050D = 258
31708: 151D252D353D060E = 266
31716: 161E262E363E070F = 274
31724: 171F272F373F4048 = 394
31732: 505860687078414 = 738
31740: 5159616971794248A = 746
31748: 525A626A727A434B = 754
31756: 535B636B737B444C = 762
31764: 545C646C747C454D = 770
31772: 555D656D757D464E = 778
31780: 565E666E767E474F = 786
31788: 575F676F777F8088 = 906
31796: 9098A0A8B0B88189 = 1250
31804: 9199A1A9B1B9828A = 1258
31812: 929AA2AAB2BA838B = 1266
31820: 939BA3ABB3BB848C = 1274
31828: 949CA4ACB4BC858D = 1282
31836: 959DA5ADB5BD868E = 1290
31844: 969EA6AEB6BE878F = 1298
31852: 979FA7AFB7BF0008 = 1034
31860: 1010202830380109 = 226
31868: 111921293139020A = 234
31876: 121A222A323A030B = 242
31884: 131B233B333B848C = 506
31892: 949CA4ACB4BC858D = 1282
31900: 959DA5ADB5BD868E = 1290
31908: 969EA6AEB6BE878F = 1298
31916: 979FA7AFB7BF2182 = 1237
31924: 7B5816001966669A7 = 632
31932: C81CCB1D37CB1CCB = 952
31940: 1DA7CB1CCB1DEB21 = 927
31948: AA7B78E6074F0600 = 736
31956: 09787EE60FC957E7E = 1146
31964: 23B7F8DD360047E = 1026
31972: 23DD860147E5CD6A = 1002
31980: 7EE118EB000000ED = 847
31988: 53F07CD1C5F5E53A = 1385
31996: 485CE6380F0F0FF6 = 741
32004: 0832F27C1A138728 = 692
32012: 0C6F1A134FCD22D = 611
32020: 2D20FA18EFFE1F21 = 1249
32028: D5ED5BF07CC93AF2 = 1406
32036: 7CCD2C7D000410FE = 778
32044: 41000000010F8FE10 = 886
32052: D3FEC9BA5D6C4D2A = 1172
32060: 397DCB15CD14CB15 = 853
32068: CB144C3A377D1747 = 631
32076: ED5B377DCB13CB12 = 952
32084: CBBA2A2C7D0022D7 = 709
32092: 7DA2397DED5ACBBC = 1067
32100: 22397DF021377D23 = 704
32108: C02319FB3A0DD0B9 = 934
32116: 98270300000010E8 = 474
32124: 640A01DD21707D06 = 608
32132: 08CD5605CD5E0AF6 = 883
32140: FE23C230FB19DC = 1179
32148: 7700DD2D15C2BBC = 1067
32156: 707DC9214AE7DCB27 = 1012
32164: CB27CB27856F3001 = 477
32172: 24C97E7E66666666 = 897
32180: 7E7E1818181818 = 396
32188: 18187E7E667E7E60 = 654
32196: 7E7E7E7E607E7E66 = 768
32204: 7E7E6606067E7E6 = 912
32212: 0C0C7E7E607E7E06 = 630
32220: 7E7E7E7E607E7E66 = 954
32228: 7E7E7E7E06060606 = 528
32236: 06067E7E667E7E66 = 924
32244: 7E7E7E7E667E7E06 = 864
32252: 7E7E5EAFCB181FCB = 968
32260: 181FCB181FCB7A7B = 651
32268: 3E18A2F64057C9CD = 1021
32276: FE7D06087E231214 = 461
32284: 10FAC9210004D0E18 = 602
32292: AF47772310FC0D20 = 771
32300: F9C9E1CD337EE94E = 1268
32308: 2346237E23B7C8C5 = 881
32316: E5CD8E7ECD137EE1 = 1147
32324: 10C37EF2A2A0ECD8 = 1384
32332: 00047BFE1020E4D6 = 668
32340: 0013E070F6C06F26 = 955
32348: 02292929292979B5 = 1161
32356: 6FD024C900002A68 = 702
32364: 7EE0927B907B9F7B = 1135
32372: A57BE5C5E6036F26 = 1196
32380: 00290185E2A2A0ECD8 = 1384
32388: 7E7E0A2A2A7E0A2A = 1064
32396: E1C9C55F26003E29 = 881
32404: 29ED4B5B6CD9C1C9 = 1002
```

Multiple Combat Scenarios
Full Aerobatics
3-D Graphics

F-15 STRIKE EAGLE

MicroProse Software

U.S. GOLD
All American Software

64 ATARI

F-15 Strike Eagle features superb 3-D graphics, F-15 manoeuvreability, computer assisted targetting including modern fighter Heads Up Display, airborne radar, air to air missiles, surface to air missile defence, ground target bombing, full aerobatics, and multiple combat scenarios.

DISK/CASSETTE £14.95

SOLO FLIGHT: Take off with this user friendly flight simulator which includes 3-D graphics, full cockpit instrumentation, dual VORs, ILS, 21 different airports, and real life challenges from weather and mechanical emergencies. **DISK/CASSETTE £14.95**

SPITFIRE ACE: Save London during the Blitz in your RAF Spitfire! Outstanding out-of-the-cockpit 3-D graphics; 14 different combat senarios. **DISK £12.95, CASSETTE £9.95**

NATO COMMANDER: Defend Europe in an accelerated real-time war situation! Full scrolling battle map, includes infantry, armour, helicopters, airforces and tactical nuclear weapons. **DISK £12.95, CASSETTE £9.95**

U.S. Gold is stocked by all leading computer stores including:

Boots / John Menzies WHSMITH WILDINGS WOOLWORTH

U.S. Gold Limited, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020. Telex: 337268.

DEATH TRAP

Richard Hamer shows you how to get blown up by a Vic-20 with 16K expansion.

DEATH TRAP 20 is written for the Vic-20 with 16K expansion, and is similar to the arcade game Gridtrap, in which you control a man who has to defuse bombs before they explode.

Before loading or typing in the game, you must type

POKE 642,32:SYS64824

This is to make room for the user-defined graphics and extra screen memory.

Once loaded and run you will be presented with an options page which will, after a while, change to show the high scores.

Pressing 1 will print out sparse instructions — another key press will return you to the title page.

Pressing 2 allows you to redefine the movement keys — except the transporter key. You are asked, for example, Left? and you are expected to reply with your choice of key and Return.

The keys default to: I-Up; J-Down; D-Left; F-Right; f1-Pause; f1 again-Unpause; f5-Transport; f7 with Shift-Abort — The game ends, and the program returns to the title screen, without going through the high-score process.

Pressing 3 starts the game; pressing 4 alters the time decrease rate — 1 to 4; the lower the number, the faster the time goes down; pressing 5 alters the starting level — 1 to 15; 15 is hardest. If you start on a number, you work your way up through the levels from there.

The object of the game is to pass over the blocks and get to the bomb to defuse it in time, collecting flags for bonus points on the way. Coming into contact with a skull or the block hopper, will be fatal, as is letting the bomb explode. You have three lives. You can move off the side of the screen, and transport yourself out of a nasty situation. You cannot move over blank spaces but, unlike the arcade game, there is no "row scrolling". Defusing five bombs gets you onto the bonus screen.

In the bonus screen you must press space when you are above the flag. If you do so over a

(continued on next page)

```
0 POKE36879,25:PRINT"□":FORT=7168TO7647:READA:POKET,A:NEXT
1 O=1:V=0
10 DATA 55,255,255,255,255,255,255,255,,60,36,36,60,36,36,,,56,36,36,56,36,56,,,
60,32
20 DATA32,32,32,60,,,56,36,36,36,36,56,,,60,32,32,56,32,60,,,60,32,32,56,32,32,,
,60
30 DATA32,32,44,36,60,,,36,36,36,60,36,36,,,56,16,16,16,16,56,,,60,8,8,8,8,48,,,
36,40
40 DATA48,48,40,36,,,32,32,32,32,32,56,,,66,102,90,66,66,66,,,66,98,82,74,70,66,
,,60
50 DATA36,36,36,36,60,,,60,36,36,60,32,32,,,126,66,66,74,70,126,,,60,36,56,48,40
,36,,
60 DATA60,32,32,60,4,60,,,56,16,16,16,16,16,,,36,36,36,36,36,60,,,60,60,40,40,16
,16,,
70 DATA68,68,84,84,40,40,,,40,40,16,16,40,40,,,34,34,28,8,8,8,,,60,4,8,16,32,60,
,,1,3
80 DATA7,15,7,3,1,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,,6
3,80
90 DATA212,80,76,3,4,8,248,40,172,40,200,,128,72,,,,,,,,7,8,10,8,8,11,72,39,,,,
,,,,
91 DATA224,16,80,16,16,208,10,228,17,15,3,3,3,3,2,12,136,240,192,192,192,192,64,
48,7,8
92 DATA10,16,17,20,19,8,224,16,80,8,136,40,208,16,196,243,15,3,3,12,240,192,35,2
07,240
93 DATA192,192,48,15,3,,,,,31,31,63,63,,,,,254,254,250,250,63,127,127,255,255,12
8,128
94 DATA255,244,244,232,232,208,80,96,224,3,4,2,1,7,31,63,63,196,56,,128,224,248,
252,252
95 DATA,60,36,36,36,36,60,,,0,24,8,8,8,28,,,60,4,4,60,32,60,,,60,4,4,28,4,60,,,3
2,40,40
```

```
0 POKE36879,25:PRINT"□":FORT=7168TO7647:READA:POKET,A:NEXT
1 O=1:V=0
10 DATA 55,255,255,255,255,255,255,255,,60,36,36,60,36,36,,,56,36,36,56,36,56,,,
60,32
20 DATA32,32,32,60,,,56,36,36,36,36,56,,,60,32,32,56,32,60,,,60,32,32,56,32,32,,
,60
30 DATA32,32,44,36,60,,,36,36,36,60,36,36,,,56,16,16,16,16,56,,,60,8,8,8,8,48,,,
36,40
4

0 POKE36879,25:PRINT"□":FORT=7168TO7647:READA:POKET,A:NEXT
1 O=1:V=0
10 DATA 55,255,255,255,255,255,255,255,,60,36,36,60,36,36,,,56,36,36,56,36,56,,,
60,32
20 DATA32,32,32,60,,,56,36,36,36,36,56,,,60,32,32,56,32,60,,,60,32,32,56,32,32,,
,60
30 DATA32,32,44,36,60,,,36,36,36,60,36,36,,,56,16,16,16,16,56,,,60,8,8,8,8,48,,,
36,40
40 DATA48,48,40,36,,,32,32,32,32,32,56,,,66,102,90,66,66,66,,,66,98,82,74,70,66,
,,60
50 DATA36,36,36,36,60,,,60,36,36,60,32,32,,,126,66,66,74,70,126,,,60,36,56,48,40
,36,,
60 DATA60,32,32,60,4,60,,,56,16,16,16,16,16,,,36,36,36,36,36,60,,,60,60,40,40,16
,16,,
70 DATA68,68,84,84,40,40,,,40,40,16,16,40,40,,,34,34,28,8,8,8,,,60,4,8,16,32,60,
,,1,3
80 DATA7,15,7,3,1,128,128,128,128,128,128,128,128,128,128,128,128,128,128,128,,6
3,80
```

(listing continued on next page)

(continued from previous page)

skull, you will die.

After pressing the space bar, you will glide down vertically. Lives lost here come off your overall number of lives. If you succeed in reaching the flag, you will receive a bonus, the value of which depends on what level you are on, and how quickly you reached the flag. At the end of all this, you return to the main game.

If you cannot/do not want to type in this game, but would like a copy of it, send £1.50 to 26 St. Barnabas Road, Emmer Green, Reading, Berkshire RG4 8RA. Please remember that the game requires 16K memory expansion.

One last point — the purple bar along the bottom of the screen represents the time left, while the red one underneath the score shows how much transporter power you have left — it is worth 100 points per unit left at the end of the level.

Also, flags are worth 250 points, bombs 500 points plus bonus, and each square "used" is worth 10 points. ■

(listing continued from previous page)

```
90 DATA212,80,76,3,4,8,240,40,172,40,200,,128,72,,,,,,,,7,8,10,8,8,11,72,39,,,,,,
91 DATA224,16,80,16,16,200,10,220,17,15,3,3,3,3,2,12,136,240,192,192,192,192,64,48,7,8
92 DATA10,16,17,20,19,8,224,16,80,8,136,40,200,16,196,243,15,3,3,12,240,192,35,207,240
93 DATA192,192,48,15,3,,,,,31,31,63,63,,,,,254,254,250,250,63,127,127,255,255,128,128
94 DATA255,244,244,232,232,208,80,96,224,3,4,2,1,7,31,63,63,136,36,,128,224,240,252,252
95 DATA 60,36,36,36,36,60,,,8,24,8,8,8,28,,,60,4,4,60,32,60,,,,60,4,4,28,4,60,,,32,40,40
96 DATA60,8,8,,,60,32,32,60,4,60,,,60,32,32,60,36,60,,,60,4,4,8,8,8,,,60,36,36,60,36,60
97 DATA ,,60,36,36,60,4,4,,63,63,63,63,63,31,15,7,252,252,252,252,252,252,240,240,224
98 FORT=0TO9:READHS(T),H$(T):NEXT:POKE36869,192
99 L$="D":R$="F":U$="I":D$="J":LL$="S":RR$="L"
100 POKE36866,PEEK(36866)AND128OR26:POKE36867,PEEK(36867)AND129OR66:POKE648,18:PRINT"□"
101 POKE648,17:PRINT"□":POKE648,16:POKE36865,19:POKE36864,PEEK(36864)AND128OR8
102 POKE36869,192:PRINT"□"
110 DATA1000,D0,900,YOU,800,HATE,700,TYPING,600,IN,500,LONG,400,"PROGRAMS?",300,,200,"DO!"
120 DATA1,"G.ANDH!"
130 POKE37154,255
131 PRINT"■ ■DEATHTRAP 2000":PRINTSPC(8)"□PTIONS":PRINTSPC(12)"■1■ INSTRUCTIONS";
132 PRINTSPC(12)"■2■ DEFINE KEYS"SPC(13)"■3■ START GAME"SPC(14)"■4■ DECREASE RATE";
133 PRINTSPC(8)"■5■ SKILL□"G"■ ":FORT=1TO500:GETR$:N=VAL(R$):IFNC1ORN>5THENNEXT:GOTO130
134 ONNGOSUB140,160,198
135 IFN<>5THEN145
136 G=G+1:IFG>15THENG=1
137 GOTO131
140 POKE36869,207:PRINT"□UIDE !■ OVER THE BLOCKS■+ %" ,"
141 PRINT"■TO DEFUSE THE BOMB,/BEFORE ; THE TIME RUNS OUT AVOIDING";
142 PRINT"THE SKULLS AND THE BLOCKHOPPER"
143 FORT=1TO5000:GETA$:IFA$=""THENNEXT
144 POKE36869,192:RETURN
145 IFN<>4THEN180
146 V=V+1:IFV>4THENV=1
147 GOTO131
150 PRINT"□■ HIGH SCORES■"
151 POKE36864,12:POKE36865,38:POKE36866,22:POKE36867,46:FORT=0TO9:PRINTHS(T),H$(T):NEXT
152 FORT=1TO1000:GETA$:IFA$=""THENNEXT
153 PRINT"□":GOTO100
160 A$="□■■■■■■■■":PRINTA$"UP";:INPUTU$:PRINTA$"DOWN";:INPUTD$:PRINTA$"LEFT";:INPUTL$:PRINTA$"RIGHT";
161 INPUTR$
162 RETURN
198 POKE36869,207:POKE37139,0:POKE650,255
199 SC=0:ME=3:BT=25:SX=0:S=0:POKE36878,15:BF=0
200 POKE648,18:PRINT"□":POKE648,17:PRINT"□":POKE649,16:B=4148:BC=37940:XX=0:YY=0:L=0:R=0
202 PRINT"□ ■PLAY PLAYER 1":BD=0
209 A$="■■■■■■■■■■■■■■■■":PRINTA$"4"
210 FORM=0TO14:FORT=4148+M*52TO4172+M*52STEP2:POKET,42:NEXTT,M:PRINTA$"3"
211 FORM=0TO14:FORT=4149+M*52TO4173+M*52STEP2:POKET,43:NEXTT,M:PRINTA$"2"
215 FORM=0TO14:FORT=4174+M*52TO4198+M*52STEP2:POKET,44:NEXTT,M:PRINTA$"1"
220 FORM=0TO14:FORT=4175+M*52TO4199+M*52STEP2:POKET,45:NEXTT,M:PRINTA$"0"
230 FORT=3794OTO38719:POKET,2:NEXT
231 PRINT"■
232 PRINT"■■SCORE"0" - ","■■■■EN 3"
233 FORT=4122TO4116+SK/2:POKE36876,240:POKET+33792,2:POKET,0:POKE36876,0:NEXT:G=T-1
240 FORT=4928TO4963-SK:POKE36876,128:POKET,0:POKET+33792,4:POKE36876,0:NEXT
250 BT=35-SK:FORT=1TOSK:SX=INT(RND(1)*13):SY=INT(RND(1)*15):IFSX=0ANDSY=0THEN250
260 POKE36876,240:D=B+SY*52+SX*2:E=BC+SY*52+SX*2:POKEE,0:POKEE+1,0:POKEE+26,0:POKEE+27,0:POKED,38
270 POKED+1,39:POKED+26,40:POKED+27,41:POKE36876,0:NEXT:FORT=1TOINT(RND(1)*6)
280 SX=INT(RND(1)*13):SY=INT(RND(1)*15):IFSX=0ANDSY=0THEN280
290 POKE36876,220:D=B+SY*52+SX*2:E=BC+SY*52+SX*2:POKEE,2:POKEE+1,0:POKEE+27,0:POKED,27
300 POKED+1,28:POKED+26,32:POKED+27,29:POKE36876,0:NEXT
301 POKE36876,200:SX=INT(RND(1)*13):SY=INT(RND(1)*15):IFSX=0ANDSY=0THEN301
302 C=B+SY*52+SX*2:D=C+33792:POKED,0:POKED+1,0:POKED+26,0:POKED+27,0:POKEC,46
303 POKEC+1,47:POKEC+26,58:POKEC+27,59:POKE36876,0:HY=SY:HX=SX
305 IFBF=THEN331
310 SY=INT(RND(1)*13):SY=INT(RND(1)*15):IFSX<2+SY*52=YYOR(SX=HXANDSY=HY)THEN310
320 POKE36876,220:D=B+SY*52+SX*2:E=BC+SY*52+SX*2:POKEE,0:POKEE+1,0:POKEE+26,2:POKEE+27,2
330 POKED,38:POKED+1,31:POKED+26,44:POKED+27,45:EX=SX:EY=SY
331 J=XX+B:POKEJ,33:POKEJ+1,35:POKEJ+26,36:POKEJ+27,37:J=YY+B+33792:POKEJ,6:POKEJ+1,6
332 POKEJ+27,6:POKEJ+26,6
340 GH=R:POKE37154,255:GETA$:IFA$=""THEN100
341 IFCYY-L+2)/52<>INT((YY-L+2)/52)THENL=YY-((INT(YY/52))*52)+2
343 IFA$="■"RND(0)*412ITHENPOKED,32:G=0-1:GOSUB10000:R=L:GOTO470
350 IFA$<>"■"THEN370
360 GETA$:IFA$<>"■"THEN360
370 X=0:R=L:IFA$=L$OR((PEEK(37137)AND16)=0)THENR=R-1:X=-2
380 IFA$=U$OR((PEEK(37137)AND4)=0)THENX=-52
390 IFA$=D$OR((PEEK(37137)AND8)=0)THENX=52
400 POKE37154,127:IFA$=R$OR((PEEK(37152)AND128)=0)THENX=2:R=R+1
430 POKE36876,0
431 IFR<0THENX=24
432 IFR>12THENX=-24
450 B=4148:YY=YY+X:XY=PEEK(YY+B)
451 IFXY=38ORXY=39ORXY=42ORXY=27ORXY=46THEN456
452 YY=YY-X
455 R=0H:GOTO505
456 L=R:IFL<0THENL=12
457 IFL>12THENL=0
460 R=L:J=XX+B:POKEJ,32:POKEJ+1,32:POKEJ+26,32:POKEJ+27,32:XX=YY
470 J=YY+B:POKE198,0:BE=0:IFXY=30THENPOKEJ+26,36:POKEJ+27,37:POKEJ+33818,6:POKEJ+33819,6:BE=1:GOTO1000
471 A$=""
480 IFXY=38THENPOKEJ,33:POKEJ+1,35:POKEJ+33792,6:POKEJ+33793,6:GOTO1000
490 SC=SC+10
491 J=YY+B:POKEJ,33:POKEJ+1,35:POKEJ+26,36:POKEJ+27,37:J=YY+B+33792:POKEJ,6:POKEJ+1,6:POKEJ+26,6
492 POKEJ+27,6
493 IFXY=27THENFORT=128TO253:POKE36876,T:NEXT:POKE36876,0:SC=SC+250
494 IFXY<>46THEN505
495 FORT=128TO253:POKE36876,T:NEXT:FORT=253TO127STEP-1:POKE36876,T:NEXT:SC=SC+500
496 FORT=BTTO0STEP-1:POKE36876,240:POKE4928+T,32:POKE36876,0:SC=SC+25:PRINT"■■■■■■"SC:NEXT
497 M=36876:BD=BD+1:IFBD=5THEN2000
498 FORT=4928TO4963-SK:POKEM,128:POKET,0:SC=SC+(SK-9)*10:PRINT"■■■■■■"SC:POKET+33792,4:POKEM,0:NEXT
499 BT=35-SK:POKE36876,200:SX=INT(RND(1)*13):SY=INT(RND(1)*15):C=SX*2+SY*52
500 IFC=YYORC=BX*2+BY*52THEN499
501 HX=SX:HY=SY:C=B+C:D=C+33792:POKED,0:POKED+1,0:POKED+26,0:POKEE+27,0:POKEC,46
502 POKEC+1,47:POKEC+26,58:POKEC+27,59:POKE36876,0
505 F=1
506 PRINT"■■■■■■SC" ","■■ME
507 POKE4928+BT,32:BT=BT-1/V:IFBT<0THENGOSUB3000
600 Z=INT(RND(1)*4)
601 CX=BX:CY=BY:CX=CX-(Z=0)+(Z=1):CY=CY-(Z=2)+(Z=3):IFCX=13THENCX=0:GOTO603
602 IFCX<0THENCX=13
603 P=PEEK(B+CX*2+CY*52):IF(P<>33ANDP<>42)OR(CY<0ORCY>14)OR(CX=0ANDCY=0)THEN340
604 POKE36875,100:BB=BX*2+BY*52+B:POKEBB,42:POKEBB+1,43:POKEBB+33792,2:POKEBB+33793,2:BX=CX:BY=CY
605 POKEBB+26,44:POKEBB+27,45:POKEBB+33818,2:POKEBB+33819,2
607 BB=BX*2+BY*52+B:EC=BB+33792:POKEBB,30:POKEBB+1,31:POKEBC,6:POKEBC+1,6:POKE36875,0
608 IFF=33THEN1000
609 GOTO340
1000 ME=ME-1
1010 FORT=250TO126STEP-2:POKE36876,T:POKE36875,T:POKE36877,T:POKE36874,T:NEXT:IFME=0THEN9000
1020 IFPEEK(YY+B)=30THEN310
1030 GOTO331
2000 FORT=0TO4122STEP-1:POKET,32:SC=SC+100:PRINT"■■■■■■"SC:NEXT
2005 SK=SK+2:FORT=32TO1STEP-1:POKE36876,240:POKE36867,PEEK(36867)AND129OR(T*2):POKE36876,0
2006 SC=SC+50:PRINT"■■■■■■"SC
2010 FORM=1TO100:NEXTM,T:POKE648,18:PRINT"□":POKE648,17:PRINT"□":POKE648,16:PRINT"□ ■BONUS SHEET"
2020 FORT=4876TO4900STEP2:POKET,38:NEXT
2030 FORT=4877TO4901STEP2:POKET,39:NEXT
2040 FORT=4902TO4926STEP2:POKET,40:NEXT
2050 FORT=4903TO4927STEP2:POKET,41:NEXT
2070 X=INT(RND(1)*13):II=4876+X*2:POKEII,27:POKEII+1,28:POKEII+26,32:POKEII+27,29:II=II+33792
2080 POKEII,2:POKEII+1,7:POKEII+27,7
2085 POKE36879,8
2090 FORT=1TO33:POKE36876,128:POKE36867,PEEK(36867)AND129OR(T*2):POKE36876,0:FORM=1TO100:NEXTM,T
2100 YY=0:PRINT"□ ■HIT F1 TO START AND SPACE TO DESCEND"
2110 GETA$:IFA$<>"■"THEN2110
2120 TI$="000000":A$="":L=0
2130 W=YY+B:POKEW,32:POKEW+1,32:POKEW+26,32:POKEW+27,32:YY=YY+2:L=L+1
2131 IFL>12THENL=0:YY=YY+26
2132 W=YY+B:P=PEEK(W):IFP=32THEN2140
2134 GOTO2500
2140 POKEW,33:POKEW+1,35:POKEW+26,36:POKEW+27,37
2150 GETA$:IFA$<>" "THEN2130
2160 POKEW,32:POKEW+1,32:POKEW+26,32:POKEW+27,32
2170 W=W+52:P=PEEK(W):IFP=32THEN2200
2190 GOTO2500
2200 POKEW,33:POKEW+1,35:POKEW+26,36:POKEW+27,37:GOTO2160
2500 FORT=32TO1STEP-1:POKE36876,240:POKE36867,PEEK(36867)AND129OR(T*2):POKE36876,0
2510 FORM=1TO100:NEXTM,T:POKE648,18:PRINT"□":POKE648,17:PRINT"□":POKE648,16
2520 IFP=38THEN2600
2550 R1=VAL(TI$):POKE36879,25:PRINT"□ ■WELL DONE":FORT=1TO1000:NEXT
2560 R1=30-R1:R1=R1*2■SK:PRINT"□ BONUS"R1:FORT=1TO1000:NEXT:SC=SC+R1:GOTO2700
2600 ME=ME-1
2610 FORT=250TO126STEP-2:POKE36876,T:POKE36875,T:POKE36877,T:POKE36874,T:NEXT
2620 POKE36879,25:PRINT"□ ■BAD LUCK":FORT=1TO1000:NEXT
2700 FORT=1TO33:POKE36876,128:POKE36867,PEEK(36867)AND129OR(T*2):POKE36876,0
2710 FORM=1TO100:NEXTM,T:PRINT"□":IFME=0THEN8000
2720 GOTO200
3000 GX=L:GY=INT(YY-L*2)/52
3001 HZ=HX*2+HY*52
3006 IFHX=GXANDHY=GYTHEN3500
3010 HZ=HZ+B:POKEHZ,32:POKEHZ+1,32:POKEHZ+26,32:POKEHZ+27,32
3011 IFHY<GYTHENHY=HY+1
3012 IFHX>GXTHENHX=HX-1
3013 IFHX<GXTHENHX=HX+1
3014 IFHY>GYTHENHY=HY-1
3015 HZ=HX*2+HY*52+B
3018 POKEHZ,46:POKEHZ+1,47
3020 POKEHZ+26,58:POKEHZ+27,59:HZ=HZ+33792:POKEHZ,0:POKEHZ+1,0:POKEHZ+26,0:POKEHZ+27,0
3030 GOTO3001
3500 POKE36876,200:TX=INT(RND(1)*13):TY=INT(RND(1)*15):IFTX=GXANDTY=GYTHEN3500
3501 C=B+TY*52+TX*2:D=C+33792:POKED,0:POKED+1,0:POKED+26,0:POKED+27,0:POKEC,46
3502 POKEC+1,47:POKEC+26,58:POKEC+27,59:POKE36876,0:HY=TY:HX=TX:BT=35-SK
3510 FORT=4928TO4963-SK:POKE36876,128:POKET,0:POKET+33792,4:POKE36876,0:NEXT
3520 POKE36877,248:FORT=15TO0STEP-.5:POKE36878,T:POKE36864,PEEK(36864)AND128ORINT(RND(1)*10)+1
3523 POKE36865,INT(RND(1)*40)+10:NEXT:POKE36877,0:POKE36878,15:POKE36866,PEEK(36866)AND128OR25
3525 POKE36864,PEEK(36864)AND128OR8
3530 POKE36865,19:HH=YY+B:POKEHH,33:POKEHH+1,35:POKEHH+26,36:POKEHH+27,37:HH=HH+33792:POKEHH,6
3540 POKEHH+1,6:POKEHH+26,6:POKEHH+27,6
3550 ME=ME-1:IFME=0THEN8000
3560 RETURN
8000 PRINT"□":POKE36864,12:POKE36865,38:POKE36866,22:POKE36867,46:R$="■■■■■■":FORM=1TO3:FORT=1TO7
8001 POKE37154,255
8010 POKE36876,200:PRINTMID$(A$,T,1)" GAME OVER":POKE36876,0:FORK=1TO10:NEXTK,T,M
8020 PRINT"■":FORT=0TO20:POKE36876,200:PRINT" ":FORK=1TO10:POKE36876,0:NEXTK,T
8040 PRINT"□":POKE36864,12:POKE36865,38:POKE36866,22:POKE36867,46:R$="■■■■■■":FORM=1TO3
8045 FORT=1TO7
8050 POKE36876,200:PRINTMID$(A$,T,1)" SCORE"SC:POKE36876,0:FORK=1TO10:NEXTK,T,M
8060 PRINT"■":FORT=0TO20:POKE36876,200:PRINT" ":FORK=1TO10:POKE36876,0:NEXTK,T
8070 POKE36869,192:IFSC>HS(9)THENPRINT"□■ELL DONE!!!A HIGH SCORER!!!"
8080 FORM=0TO9:IFSC>HS(M)THENPRINT"□YOUR RANKING IS"M+1:GOTO8100
8090 NEXT:GOTO100
8100 FORT=9TOM+1STEP-1:HS(T)=HS(T-1):H$(T)=H$(T-1):NEXT:HS(M)=SC:PRINT"■■ENTER YOUR NAME
8110 INPUTH$(T):IFLEN(H$(T))>10THENPRINT"MAX.10 CHARACTERS":GOTO8110
8120 GOTO150
10000 J=XX+B:POKEJ,32:POKEJ+1,32:POKEJ+26,32:POKEJ+27,32
10010 J=36874:FORT=128TO253:POKEJ,T:POKEJ+1,T:POKEJ+2,T:NEXT
10020 FORT=253TO127STEP-1:POKEJ,T:POKEJ+1,T:POKEJ+2,T:NEXT
10030 L=INT(RND(1)*15):K=INT(RND(1)*15):VV=L*2+K*52:XV=PEEK(VV+B):XX=VV:IFXV=46THEN10030
10035 R1=L:R=L:RETURN
```

TELEGRAM

URGENT!

DOC SOFT Simulations

"The best simulation around . . . A mu for budding pilots" – P.C.N.

"I would choose Doctor Soft's 747 . instrumentation clear and unfussy . graphics are good . . . smooth an realistic" – Software Today

NO. 1 BBC FLIGHT SIMULATOR*, 747, NOW AVAILABLE ON COMMODORE 64 STOP SPECIAL 64K VERSION EXPLOITS FULL COMMODORE GRAPHICS AND SOUND CAPABILITIES STOP OVER 60 NAVIGATIONAL AIDS STOP OVER 12 AIRFIELDS STOP EXTENDED GROUND DETAIL COVERS UK – N.W. EUROPE STOP COMPREHENSIVE PILOT WRITTEN FLYING MANUAL & CHART STOP DAY/NIGHT & VARIABLE WEATHER MODES STOP ILS VOR DME NAVIGATION STOP

747 and other Doctor Soft programs are available from:
● W H SMITH ● BOOTS ● JOHN MENZIES ● MOST LEADING DEALERS ● BY DIRECT MAIL ORDER (SEE BELOW).

BBC
ELECTRON
COMMODORE

'747 is no ordinary flight simulator, BBC owners know it as the program that topped the BBC charts month after month last year.

Now for 1985 The Doctor Team (including a B.A. Captain, Professional Flight Simulator Programmers & Aerodynamists) have produced this extended and enhanced Commodore 64 version.

DIRECT MAIL ORDER

Prices include V.A.T., Postage & Packing Free

please circle computer and format required.

	Commodore 64	BBC 32	Electron
Cassette	£12.95*	£8.95	£7.95
Disk	£15.00*	£10.00	£10.00

I enclose £..... for ..... copies of the above. *Special extended 64K Version

NAME .....

ADDRESS .....

.....

Cut out and send to: DOCTOR SOFT, PO BOX 66, EAST PRESTON, WEST SUSSEX Tel 09062 70044

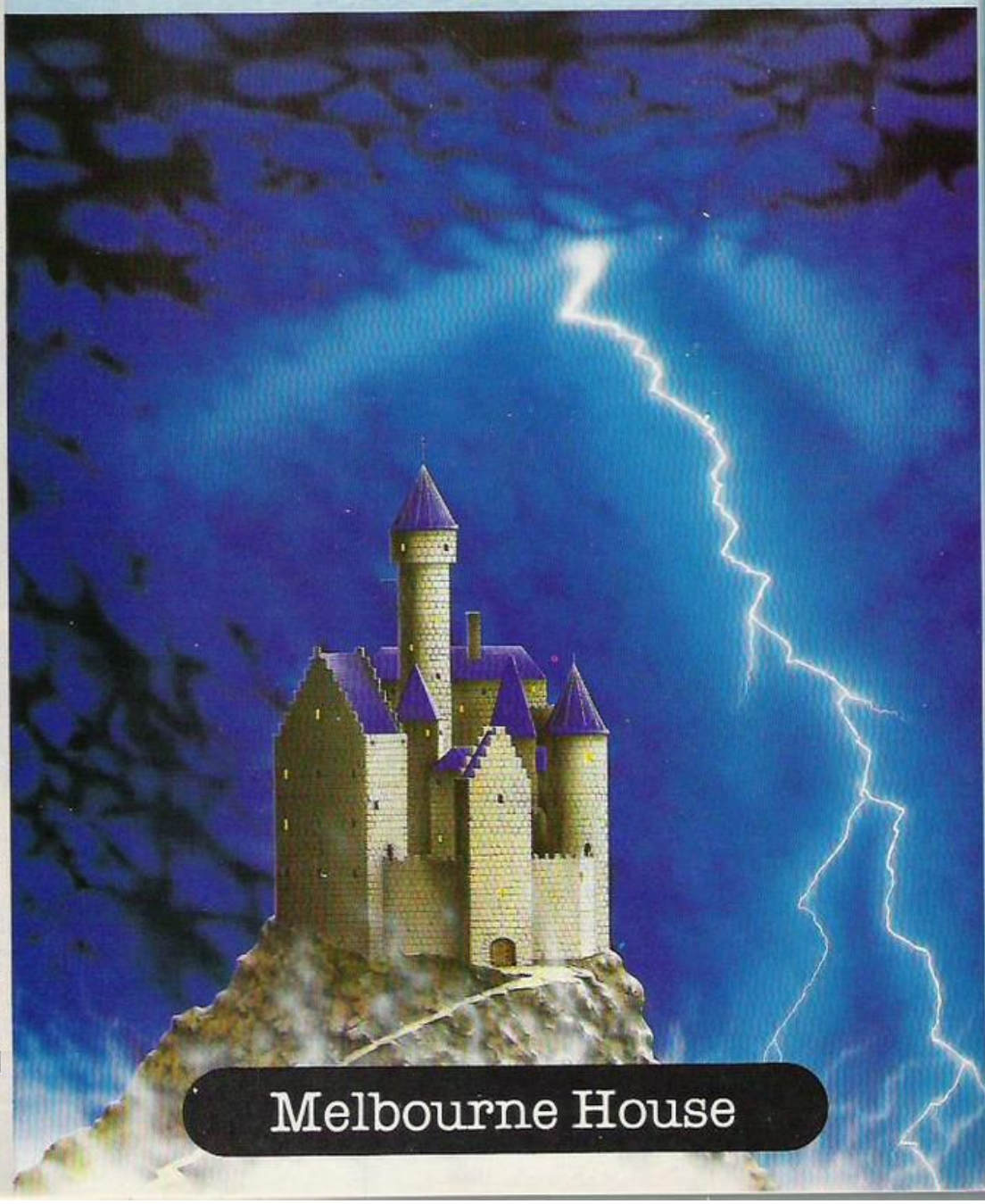
Castle Of Terror is a suberb graphic adventure game set in the 1880's when and where "Dracula" stories abounded. You are in a village near a large Castle in which the secretive Count lives. You must travel about the village, collecting items which may be of use to you on your bold mission.

You must also find out what your mission is by talking to the right people. But don't be fooled!

- ★ Multi-word "English Language" style input
- ★ Superb, highly detailed graphics
- ★ Animated characters, special effects and sound.

Surviving is success enough, but escaping with the treasure is the ultimate achievement and won't be easily accomplished!

CASTLE·of·TERROR



Orders to:
Melbourne House Publishers
9 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Church Yard
Tring
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free catalogue.

Please send me:

COMMODORE 64 SOFTWARE

☐ Castle of Terror	£9.95
☐ Commodore 64 Sherlock	£14.95
☐ Commodore 64 Hampstead	£9.95
☐ Commodore 64 The Hobbit	£14.95
☐ Zim Sala Bim	£9.95
☐ Commodore 64 Classic Adventure	£6.95
☐ Commodore 64 Hungry Horace	£5.95
☐ Commodore 64 Horace Goes Skiing	£5.95
☐ Commodore 64 FORTH	£14.95
☐ A.C.O.S.+	£8.95
☐ Commodore 64 Penetrator	£7.95

SPECTRUM SOFTWARE

☐ Spectrum Sherlock 48K	£14.95
☐ Spectrum Hampstead 48K	£9.95
☐ Spectrum Sports Hero 48K	£6.95
☐ Spectrum Mugsy 48K	£6.95
☐ Spectrum Penetrator 48K	£6.95
☐ Spectrum The Hobbit 48K	£14.95
☐ H.U.R.G. 48K	£14.95
☐ Spectrum Classic Adventure 48K	£6.95
☐ Melbourne Draw 48K	£8.95
☐ Abersoft FORTH 48K	£14.95
☐ Sir Lancelot 16K & 48K	£5.95

BBC SOFTWARE

☐ BBC The Hobbit, Model B	£14.95
☐ BBC/Electron Classic Adventure	£6.95

All versions of 'The Hobbit' are identical with regard to the adventure program. Due to memory limitations, BBC cassette version does not include graphics.

£ .....

Please add 80p for post & pack £ 80

TOTAL £ .....

I enclose my ☐ cheque
☐ money order for £ .....

Please debit my Access card No .....

.....

Expiry Date .....

Signature .....

Name .....

Address .....

.....

.....

..... Postcode .....

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5001.

YC12b

DOTMAN

Klaus Pederson presents a fast machine code version of an old arcade favourite.

DOTMAN IS A GAME for the Oric-1. It is written in machine-code and is therefore very fast. Unfortunately this also means that it is hard to type in, even though I have tried to make it simple with checksums, two programs to enter the code and strings instead of a lot of numbers separated by commas.

Dotman is a cute little fellow who must travel around the different mazes and eat dots.

The game contains different features like power dots, ghosts with double score — first ghost score 10 points, second score 20, third score 40 and the four ghost eaten scores 80 points. At every 1,000 points you gain an extra life — you start with three. If the telephone rings during a game, there is a pause button.

First type in the loader — if you are lazy don't, the game works without it. Save the loader with

CSAVE"PROLOAD"

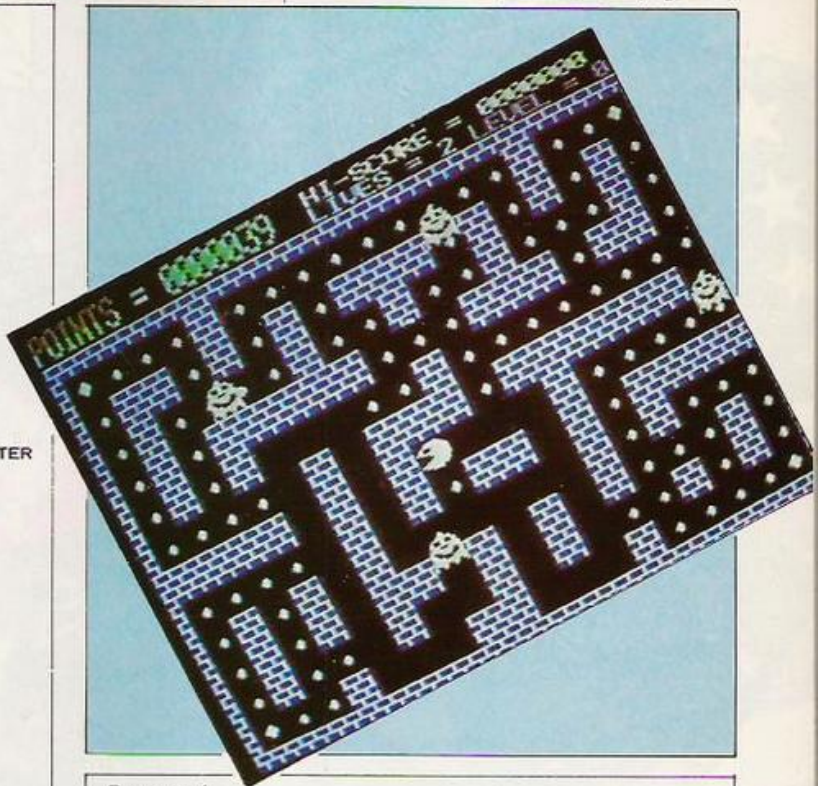
Then type in program 1. If you have confidence in yourself you can omit the checksum — lines 10, 20, 80, 110 and the lines 130-190.

Run the program and, if any errors should

(continued on page 100)

Loader program.

```
10 POKE#26A,10
20 CLS
30 PAPER0:INK6
40 GOSUB450
50 FORI=22TO26:PLOT1,I,9:NEXT
60 PLOT0,1,1:PLOT0,2,1
70 PRINT:PRINTSPC(11);CHR$(4);
80 PRINTCHR$(27);"NDOT-MAN";CHR$(4)
90 PRINT
100 PRINTSPC(6)"Welcome to Dotland."
110 PRINTSPC(5)"You as Dotman has to"
120 PRINTSPC(6)"clear the Dotmazes"
130 PRINTSPC(6)"for the  evil dots,"
140 PRINTSPC(3)"and eat the dotty ghosts"
150 PRINTSPC(5)"to get extra DotBonus
160 PRINT:PRINTSPC(11)CHR$(135)"SCORES
170 PRINTSPC(4)"Dots.........1 Point
180 PRINTSPC(4)"Power Dots...2 Points
190 FORI=0TO3
200 PRINTSPC(4)I+1"Ghost....."2^I*10"Points"
210 NEXT
215 REM TYPE POUND SIGN FOR "_" (UNDERLINE) CHARACTER
220 PRINT:PRINTSPC(8)CHR$(135)"CONTROL KEYS"
230 PRINTSPC(8)"P To Halt Game";CHR$(137)
240 PRINTSPC(8)"Cursor Keys To";CHR$(137)
250 PRINTSPC(8)"Control Dotman";CHR$(137)
260 PLOT4,24,CHR$(3)+"H_?T    "+CHR$(4)+"J]>\_"
270 PLOT4,25,CHR$(3)+"__W     "+CHR$(4)+"J?S;_"
280 PLOT4,26,CHR$(3)+"*__     "+CHR$(4)+"J'O'O"
290 PLOT12,23,CHR$(4)+" X_]0"
300 PLOT30,26,CHR$(5)+"____"
310 FORI=19TO25:PLOT31,I,CHR$(5)+"__":NEXT
320 A$=CHR$(2)+CHR$(9)+"__________"
330 PLOT29,11,LEFT$(A$,6)
340 PLOT28,12,LEFT$(A$,8)+CHR$(16)
350 PLOT27,13,LEFT$(A$,10)
360 PLOT26,14,LEFT$(A$,12)+CHR$(16)
370 PLOT26,15,LEFT$(A$,12)+CHR$(16)
380 PLOT27,16,LEFT$(A$,10)
390 PLOT28,17,LEFT$(A$,8)
400 PLOT29,18,LEFT$(A$,6)
410 PLOT32,12,17:PLOT33,15,17
420 PLOT30,14,17
430 CLOAD"DOTMAN"
450 FORI=#400TO#44F:READA$:A=VAL("#"+A$):POKEI,A:NEXT
460 CALL#400
470 RETURN
480 DATA A2,6,A9,0,95,0,CA,10,FB,A9,B9,85,4,A6,5,B5
490 DATA 0,A8,BD,4A,4,AA,B9,46,4,A4,6,91,3,C8,CA,D0
500 DATA FA,B4,6,A6,5,BD,4D,4,85,5,D0,E1,C0,0,D0,2
510 DATA E6,4,A2,FF,E8,B4,0,C8,98,29,3,95,0,F0,F5,A5
520 DATA 4,C9,BB,D0,C8,60,0,38,7,3F,3,2,3,1,2,0
```



Program 1.

```
10 DIM SUM(90)
20 FORI=0TO89:READSUM(I):NEXT
30 ADR=#4000
40 FORI=0TO89
50 READ A$
60 FORJ=1TO64STEP2
70 A=VAL("#"+MID$(A$,J,2))
80 OP=OP+A
90 POKEADR,A:ADR=ADR+1
100 NEXT:IFOP<>SUM(I)THENPRINT"ERROR IN "190+I*10:END
110 OP=0:NEXT
120 DATA 2750,3071,2665,3758,4241,3202,3885,3426,3355
```

(Listing continued on page 99)

HOT FROM

SEGA®

THE ARCADE WINNERS

U.S. Gold is stocked by
Boots, John Menzies, WILDINGS
WOOLWORTH, WHSMITH,
Rumbelows
and Spectrum Shops

released
NOW

TAPPER™

SIDE-SPLITTING, SODA-SLINGING LAUGHS AND SPILLS!

THE OFFICIAL HOME VERSION OF BALLY MIDWAY'S ARCADE HIT

Belly-busting Soda Fountain Fun, including:
- *Mad-capped, soda-starved, clammering cowboys, sports fans, punks and space creatures*
- *Plus a head-spinning Soda Bandit Bonus Round Awesome color-packed action graphics Just try to keep your cool as hot-headed, crazy customers blitz your bar for another cold one.*

64
COMMODORE CASSETTE 9·95
DISK 12·95

SPECTRUM CASSETTE 7·95

U.S. GOLD
At American Software

Exclusive manufacturers for SEGA and Bally MIDWAY

For release schedule and trade details contact:
Centre Soft, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020. Telex: 337268.

(Program 1 continued from page 97)

```
,3767,3737,4021,4207
 130 DATA 1641,178,77,77,82,167,211,451,1183,1008,937,
834,1027,1323,1502,593
 140 DATA170,190,508,1352,1652,1533,1194,1562,1006,159
0,2513,3283,1512,399
 150 DATA1569,3673,3097,3358,3649,3462,3240,3138,3498,
3126,2559,3034,4786
 160 DATA4755,2967,3323,2216,2726,2941,3387,3123,2429,
2552,4206,3509,3929
 170 DATA3319,3580,3334,2952,3265,3034,2902,2755,2869,
2617,3843,3378,4331
 180 DATA2731,3048,3164,3630,4194,3481,3756,3234
 190 DATA 20164BA90A8D6A02A900853785490540A937854E8552
20E240207E4120654120
 200 DATA 2E41202E4A209C4AA9008549854F203141A9D88538A9
BD8539A917854A90085
 210 DATA 00853685542O2D47206541207E4120A940204F4720C3
40207C4AA64FE8865120
 220 DATA BB47C651D0F9202C48EAA554F01FC654A9518555A20B
A90920CF4AA902A65520
 230 DATA CF4AA64ECAD0FDC655D0F0F005A64E2053485BA5494A
AAA500DDAA41D00BA649
 240 DATA 205C484C31404C4840ADDF02C9D0D00848209C4A2021
4A68C9879006C98CB002
 250 DATA 853660A536C988F00DC989F00CC98AF00EC98BF00760
4C73454CD8454C54464C
 260 DATA 1046A9008500A9B58501A202A000B10085024A050291
00C8D0F4E601CAD0EFA0
 270 DATA 00A9B7B501A9088500A998B502A942850318B1029100
3009C8D0F7E601E603D0
 280 DATA F160A851B90844997FBB88D0F760202241A649A9BB85
01A9D08500BD00508502
 290 DATA BD01500503A000B102C977D00209B0910OC05FD006A5
01C9BFF009C0D0E9E601
 300 DATA E603D0E360A6351004A2008635A000BD894399E0B6CB
E8C020D0F4B63560A204
 310 DATA A90A20CF4AA905A20120CF4AA648A000BDBB4199C0B6
E8C8C020D0F4E0E09002
 320 DATA A2008648A90420CF4A608BBC8A8AB1000000000000000
0000000000000010303
 330 DATA 0000000000020303001000000000000020000000000
0000000000000030707
 340 DATA 0000000000002020030000000000000000000000000
0000000000000000307
 350 DATA 0000000000000020070300000000000200000000000
0000000000000000003
 360 DATA 0000000000000000070703000000000202000000000
0000000000000000001
 370 DATA 0000000000000020030301000000000030302000000
0000000000000000000
 380 DATA 0000000000000030010100000000000038383000000
0000000000000000001
 390 DATA 0000000000003038010000000000000038300000000
0000000070F1F3F3F3F
 400 DATA 0000383C26273F3E3F3F1F1F0F0300003F3F3E3E3C30
000000003B3C26273C30
 410 DATA 20303C3F3E3B000000000070F19393F1F0000383C3E3F
3F3F0000070F19390F03
 420 DATA 01030F3F1F0700000000303C3E3E3F3F0000060F1F33
333F3F3F3F1F0F070000
 430 DATA 3F3F3E3E3C3000000000040C1E32333F00000460E0F
1F3F3F1F0F0E0640000
 440 DATA 3F33321E0C040000000303C3E3E3F3F0000070F1F3F
3F3F3F33331F0F060000
 450 DATA 3F3F3E3E3C300000002F2F2F003D3D3D01030F09191F
3E3F3733383E3F3F2E24
 460 DATA 20303C24263E1F3F3B33071F3F3F3B113E3833373F3F
2E241F07333B3F3F3B11
 470 DATA 33331E0C0C0C0C00FF0000000000010307000000000
2030380703010000000
 480 DATA 003830200000000000000000000000000010000000000
0000200100000000000
 490 DATA 0020000000000000000000000000001030700000000
2030380703010000000
 500 DATA 003830200000000000000000010307OF1F000000203O
383C3E1F0F0703010000
 510 DATA 003E3C383020000000010A504F494E5453063D023030
3030303030030848492D
 520 DATA 53434F5245203D2030303030303030202002OA504F49
4E5453033D023030303O
 530 DATA 3030300608B4C495645532O3D2033054C4556454C203D
2030312011202020202O
 540 DATA 2020202020202020202020102011150408E47414D4520
4F5645522008031102O
 550 DATA 1115040E47414D45204F5645522008031110201115O0
2050524553532O414E7E
 560 DATA 2020031110201115012020202O4B457E202020202003
1110201120202020202O
 570 DATA 2020202020202020202010071431203920544F205345
4C4543542053504545 44
 580 DATA 20302C203020544F2053454520 4C41427E5367686364
69686A6461626364616 5
 590 DATA 63666C6B6D6E6F706D6E747372717473757620202020
787A797B787A7C7D5859
 600 DATA 5A5BFFFDFE00F7000000FB01020408020401080804O2
01020104080A01000000
 610 DATA 0100381000040A0800960000000001003810000040A02
0000000000000000370A
 620 DATA 0000000000320064003201003810101000A0804A44088
B13830252OB047B13830
 630 DATA 1EC95BF007C95FD01120B048C640C64020C246E640E6
4020D34620C246C64018
 640 DATA A9F2653748A9444CA0468541864218A503650285 43A5
0469008544A000B14191
 650 DATA 43A001B1419143A002B141A0289143A003B141A02991
4360A440C8C8B13B3025
 660 DATA 20B047B138301EC95AF007C95ED01120B048E640E640
20C246C640C64020D346
 670 DATA 20C246E64018A9FA653748A9444CA046A540186950AB
B138302FCBB138302AC9
 680 DATA 59F007C95DD01420B0481BA5404869508540 20C2466B
854020D34620C24618A5
 690 DATA 38692B8538902E6391BA90A65374BA9454CA04638A5
38E9288545A539E90085
 700 DATA 46A440B145302EC8B14530294820C2466BC95BF007C9
5FD01420B04838A538E9
 710 DATA 50853BB002C63920C24620D346A5458538A546853918
A90265374BA9454CA046
 720 DATA 6900AA6820AA464CC946201E474CAA459D0004A90185
4B9D0404A9009D03044C
 730 DATA 6F47A912A2454CAA461BA537690429078 53760E600A5
54F0092O944AA207C654
 740 DATA F004E654A207FE8ABBFEB2BBBD8ABBC93AD012A9309D
BABB9DB2BBCAE004D003
 750 DATA 20A548D0E1A200E8BD8ABBDD9EBBF0F7900BA207BD8A
BB9D2744CAD0F76048A5
 760 DATA 388503A5398504A5408502686020DA4820EB4820FC48
200D49A900854AA213A0
 770 DATA 03B91E459D1304CA88 10F6CA10F160A20F205F478A20
4B4938E985AA10F360BD
 780 DATA 0048502BD01048503BD02048504602O5F47A402B103
9D1404C8B1039D150420
 790 DATA B047B1039D17048BB1039D160460B10308C9619007C9
77B00328 3B602B186020
 800 DATA S649A64ABD0404A8A54B392245854B604B9818 6928A8
6B6020684AA64A289F47
 810 DATA AD7602290FA8B92B45254BD00588981890F1A64A9D04
04C901F01DC902F01FC9
 820 DATA 04F035C908F01D206F4718A54A6905C914D002A90085
4A60FE00044CE747DE00
 830 DATA 044CE7471 8BD01046928 9D0104BD02046900 9D02044C
E74738BD0104E9289D01
 840 DATA 04BD0204E9009D02044CE747A20F864C205F47BD0304
F005A904DE030418 6916
 850 DATA 48A9456900AA6820AA4538A54CE905AA10DC60A00088
D0FDCAD0F860E8E8E00A
 860 DATA D00AE64FA54F2903854FA2008649203141 20004B4C77
48A201FECEBBBDCEBBC9
 870 DATA 3AD008A9309DCEBBCA10EE60CEC4BB202C4820DC4AAD
C4BBC930F0062031414C
 880 DATA 31404CD949ADC4BBC939F003EEC4BB60A9648D03048D
08048D0D048D1204A00F
 890 DATA B90404AABD224549FF99040498 38E905A8B0EDA90185
4D4CD346A9B88D0204A9
 900 DATA F88D0104A905A2004C2046A9BB8D0704A9F88D0604A9
23A2054CB046A9BF8D0C
 910 DATA 04A9688D0B04A905A20A4CB046A9BF8D1104A9688D10
04A923A20F4CB046BD03
 920 DATA 04D0096868686868684C8C488A48200E4A68AAE00FF0
0BE00AF00AE005F0094C
 930 DATA DA484C0D494CFC484CEB484B6914A20420AA456860
A900854B205F47A402C8
 940 DATA C820BE47B070300E20B04720BE47B0663004A901854B
A402B8208E47B0583010
 950 DATA 20B047208E47B04E3006A902054B054BA40220B04720
B047208E47B039300EC8
 960 DATA 20BE47B0313006A908054B054B38A503E9288541A504
E9008542A402B1412090
 970 DATA 47B0133010C8B14120904 7B0093006A904054B854B60
4C1E49A0008400A200A9
 980 DATA 138501BD59449943BDC8E8C601D0F418A5006928850O
A8C0F0D0E4A20020534B
 990 DATA 202E4A4C2B40AD0802C938D0F960A44D845320BC4AA2
0620E646C653D0F7264D
 1000 DATA 60A9008DDF02ADDF02297FF0F960A226BDCB449DD1B
BCA10F7A5528DE7BB2021
 1010 DATA 4AC930D008A649205C484C2E4A9012C93AB00E85522
90F2A2A1869052A854ED0
 1020 DATA CDA90085494C2E41A20F205F478A855020564 9A5503
8E905AA10EF60A20F205F
 1030 DATA 47206F47BA38E905AA10F360A20020AF4A4CBE4AA20
E20AF4A4CBE4AA00DA900
 1040 DATA 995004 8B10FAA9388D570420BE4A60A000BD3B45995
004E8C8C00ED0F460A250
 1050 DATA A004AD00D0C9A6D0034C6CFA4C86FAAC00D0C0A6D00
34C35F54C90F5A9008557
 1060 DATA A21C20AF4A20BE4AA906A21420534 8A65720CF4AE65
7A557C920D0EC209C4A60
 1070 DATA A22A20AF4A20BE4AA9038558A20020534 8C65BD0F76
0AD00D0C9A6D00620A9E9
 1080 DATA 4C7FF92021EC4CC9F955555555555555555555555555
555555555555555555555
```

(continued from page 97)

occur, correct them and rerun the program. Save it with:

CSAVE"PROG1"

Now type in program 2. It is not necessary to enter all the mazes — just alter the number in line 15. If you like, you can also make your own mazes — max 10-11. Then save it with:

CSAVE"PROG2"

When you have typed in all the programs and found no errors, you can start mixing them using this method:

Find a new tape and rewind it to start. Load the loader — if it is typed in — save it on the new tape:

CSAVE"LOADER",AUTO

Then clear the memory with New. Load program 1 and run it, then load program 2, run it. When it stops, it will print how to save the final program.

To start the game, enter skill level and press any key except keys 1 and 0. If you press 0, you will see the mazes.

Then you are to guide Dotman around the mazes and eat all the dots. But — beware of the evil ghosts. If you get too close to one of them, they will eat you alive. Of course, you can defend yourself by eating a power dot. By eating one of these the ghosts become angry but harmless and then you can eat them.

If you send £3.50 to me, I can supply you with a copy on tape of Maxi-Dotman. Just send to: Klaus Pedersen, Sondervej 9, Gundsomagle, DK-4000 Roskilde, Denmark.

The underline should be read as a £.

■

Program 2.

```
 5 CLS
 10 ANT=5:LOOK=#5000
 20 ADR=LOOK+ANT*2
 30 POKE#485F,ANT*2
 40 FOR NR=1TOANT
 50 DOKE LOOK,ADR
 60 LOOK=LOOK+2:DOT=4
 70 FOR I=0TO25
 80 READ PA,IN,LA$
 82 POKE ADR,PA
 84 POKE ADR+1,IN
 90 FOR P=2TO39
 100 A=ASC(MID$(LA$,P-1,1))
 110 IFA=88THENDOT=DOT+1ELSEIFA=92THENDOT=DOT+2
 120 POKEADR+P,A:NEXT
 130 ADR=ADR+40:NEXT
 140 DOKE#41A9+NR,DOT:NEXT
 150 PRINT"NOW TYPE :"
 160 PRINT"CSAVE";CHR$(34);"DOTMAN";CHR$(34);",A#4000,
E";HEX$(ADR);",AUTO"
 165 END
 170 REM      **** FIRST MAZE ****
 171 REM TYPE POUND SIGN FOR "_" CHARACTER
 180 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
 190 DATA 0,3,w\]xzXYXYwwXYXYXYXYXYXYXYXYwwXYxz\]w
 200 DATA 0,3,w^_y{ZCZCZCwwZCZCZCZCZCZCZCZCZCwwZCy{^_w
 210 DATA 0,3,wXYwwwwXYwwXYwwXYwwwwwwXYwwXYwwXYwwXYw
 220 DATA 0,3,wZCwwwwwZCwwZCwwZCwwwwwwZCwwZCwwZCwwZCw
 230 DATA 0,3,wXYwwXYXYXYXYwwXYXYwwXYXYwwXYXYXYwwXYw
 240 DATA 0,3,wZCwwZCZCZCZCwwZCZCwwZCZCwwZCZCZCwwZCw
 250 DATA 0,3,wXYwwXYwwwwwwwwwwXYXYXYwwwwwwXYwwwwXYw
 260 DATA 0,3,wZCwwZCwwwwwwwwwwZCZCZCwwwwwwZCwwwwZCw
 270 DATA 0,3,wXYwwXYwwXYXYXYXYXYwwXYXYXYXYXYXYXYXYw
 280 DATA 0,3,wZCwwZCwwZCZCZCZCZCZCwwZCZCZCZCZCZCZCw
 290 DATA 0,3,wXYXYXYXYXYXYwwXYwwwwwwXYwwwwwwwwwwXYw
 300 DATA 0,3,wZCZCZCZCZCZCwwZCwwwwwwZCwwwwwwwwwwZCw
 310 DATA 0,3,wwwwwwwwwwXYwwXYwwXYXYghXYwwXYXYXYXYXYw
 320 DATA 0,3,wwwwwwwwwwZCwwZCwwZCZCcdZCwwZCZCZCZCZCw
 330 DATA 0,3,wXYXYXYXYXYXYwwXYwwXYwwwwXYwwXYwwwwwwww
 340 DATA 0,3,wZCZCZCZCZCZCwwZCwwZCwwwwZCwwZCwwwwwwww
 350 DATA 0,3,wXYwwXYwwXYwwXYXYXYXYXYXYwwZCwwZCZCZCZw
 360 DATA 0,3,wZCwwZCwwZCwwZCZCZCZCZCZCZCwwZCwwZCZCZCw
 370 DATA 0,3,wXYwwXYwwXYwwwwXYwwXYwwXYwwXYXYXYwwXYw
 380 DATA 0,3,wZCwwZCwwZCwwwwZCwwZCwwZCwwZCZCZCwwZCw
 390 DATA 0,3,wXYwwXYXYXYXYwwXYXYwwXYwwXYXYXYwwXYwwXYw
 400 DATA 0,3,wZCwwZCZCZCZCwwZCZCwwZCwwZCZCZCwwZCwwZCw
 410 DATA 0,3,w\]xzXYwwXYXYXYwwwwXYXYXYwwXYXYXYxz\]w
 420 DATA 0,3,w^_y{ZCwwZCZCZCwwwwZCZCZCwwZCZCZCy{^_w
 430 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
 440 REM      ****  2. MAZE ****
 450 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
 460 DATA 0,3,w\]xzXYXYXYwwXYXYXYXYXYXYwwXYXYXYXYxz\]w
 470 DATA 0,3,w^_y{ZCZCZCwwZCZCZCZCZCZCwwZCZCZCZCy{^_w
 480 DATA 0,3,wXYwwwwwwXYwwXYwwwwwwXYwwXYwwXYwwwwXYw
 490 DATA 0,3,wZCwwwwwwZCwwZCwwwwwwZCwwZCwwZCwwwwZCw
 500 DATA 0,3,wXYXYXYXYXYXYwwXYXYXYXYXYXYXYwwXYXYwwXYw
 510 DATA 0,3,wZCZCZCZCZCZCwwZCZCZCZCZCZCZCwwZCZCwwZCw
 520 DATA 0,3,wwwwwwwwwwXYwwXYwwwwwwXYwwwwwwwwwwXYwwXYw
 530 DATA 0,3,wwwwwwwwwwZCwwZCwwwwwwZCwwwwwwwwwwZCwwZCw
 540 DATA 0,3,wXYXYXYwwXYXYXYwwXYXYXYwwXYXYXYXYXYXYw
 550 DATA 0,3,wZCZCZCwwZCZCZCwwZCZCZCwwZCZCZCZCZCZCw
 560 DATA 0,3,wXYwwXYwwXYwwXYwwXYwwwwwwXYwwwwwwwwXYw
 570 DATA 0,3,wZCwwZCwwZCwwZCwwZCwwwwwwZCwwwwwwwwZCw
 580 DATA 0,3,wXYwwXYwwXYwwXYXYXYwwabXYXYXYXYXYXYXYw
 590 DATA 0,3,wZCwwZCwwZCwwZCZCZCwwcdZCZCZCZCZCZCZCw
 600 DATA 0,3,wXYXYXYXYXYXYwwXYwwwwwwXYwwXYwwXYwwwwww
 610 DATA 0,3,wZCZCZCZCZCZCwwZCwwwwwwZCwwZCwwZCwwwwww
 620 DATA 0,3,wwwwwwwXYwwwwXYwwXYXYXYwwXYwwXYXYXYwww
 630 DATA 0,3,wwwwwwwZCwwwwZCwwZCZCZCwwZCwwZCZCZCwww
 640 DATA 0,3,wXYXYXYXYXYXYXYXYXYXYwwXYXYXYwwXYwwXYXYw
 650 DATA 0,3,wZCZCZCZCZCZCZCZCZCZCwwZCZCZCZCwwZCwwZCZCw
 660 DATA 0,3,wXYwwXYwwXYwwwwwwXYwwXYwwwwwwXYwwwwXYw
 670 DATA 0,3,wZCwwZCwwZCwwwwwwZCwwZCwwwwwwZCwwwwZCw
 680 DATA 0,3,w\]xzXYwwXYXYXYXYXYwwXYXYXYXYXYXYxz\]w
 690 DATA 0,3,w^_y{ZCwwZCZCZCZCZCZCwwZCZCZCZCZCZCy{^_w
 700 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
 710 REM      ****  3. MAZE ****
 720 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
 730 DATA 0,3,w\]xzXYXYXYwwXYXYXYXYXYwwXYXYXYwwXYxz\]w
 740 DATA 0,3,w^_y{ZCZCZCwwZCZCZCZCZCwwZCZCZCZCwwZCy{^_w
 750 DATA 0,3,wXYwwwwwwXYwwXYwwwwwXYwwXYwwXYwwXYwwXYw
 760 DATA 0,3,wZCwwwwwwZCwwZCwwwwwZCwwZCwwZCwwZCwwZCw
 770 DATA 0,3,wXYwwXYXYXYXYXYwwXYXYXYXYwwXYXYXYwwXYw
 780 DATA 0,3,wZCwwZCZCZCZCZCwwZCZCZCZCZCwwZCZCZCwwZCw
 790 DATA 0,3,wXYwwXYwwwwXYwwwwXYwwXYwwwwwwwwXYwwXYw
 800 DATA 0,3,wZCwwZCwwwwZCwwwwZCwwZCwwwwwwwwZCwwZCw
 810 DATA 0,3,wXYwwXYXYXYXYXYwwXYwwXYwwXYXYXYXYXYXYw
 820 DATA 0,3,wZCwwZCZCZCZCZCZCwwZCwwZCwwZCZCZCZCZCZCw
 830 DATA 0,3,wXYwwwwwwXYwwXYXYXYXYXYwwXYwwXYwwwwXYw
 840 DATA 0,3,wZCwwwwwwZCwwZCZCZCZCZCZCwwZCwwZCwwwwZCw
 850 DATA 0,3,wXYXYXYwwXYwwwwXYwwwwabwwXYwwXYwwXYXYw
 860 DATA 0,3,wZCZCZCwwZCwwwwZCwwwwcdwwZCwwZCwwZCZCw
 870 DATA 0,3,wwwwwXYwwXYXYXYXYXYwwXYXYXYXYXYwwXYwww
 880 DATA 0,3,wwwwwZCwwZCZCZCZCZCZCwwZCZCZCZCZCZCwwZCwww
 890 DATA 0,3,wXYXYXYXYXYwwXYwwXYwwwwwwwwwwXYXYw
 900 DATA 0,3,wZCZCZCZCZCZCwwZCwwZCwwZCwwwwwwwwwwZCZCw
 910 DATA 0,3,wXYwwXYwwXYwwXYwwXYwwXYwwXYXYXYwwwwXYw
 920 DATA 0,3,wZCwwZCwwZCwwZCwwZCwwZCwwZCZCZCwwwwZCw
 930 DATA 0,3,wXYwwXYwwXYwwXYwwXYwwXYwwXYwwXYXYXYwwXYw
 940 DATA 0,3,wZCwwZCwwZCwwZCwwZCwwZCwwZCwwZCZCwwZCw
 950 DATA 0,3,w\]xzXYXYXYXYXYXYXYwwXYXYXYwwwwXYxz\]w
 960 DATA 0,3,w^_y{ZCZCZCZCZCZCZCZCwwZCZCZCZCwwwwZCy{^_w
 970 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
 980 REM      ****  4. MAZE ****
 990 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
1000 DATA 0,3,w\]xzXYXYXYwwXYXYXYXYXYXYwwXYXYXYxz\]w
1010 DATA 0,3,w^_y{ZCZCZCwwZCZCZCZCZCZCZCwwZCZCZCZCy{^_w
1020 DATA 0,3,wXYwwXYwwXYwwXYwwwwXYwwXYwwXYwwXYwwXYw
1030 DATA 0,3,wZCwwZCwwZCwwZCwwwwZCwwZCwwZCwwZCwwZCw
1040 DATA 0,3,wXYXYXYXYXYXYXYXYXYXYwwXYXYXYwwXYXYXYw
1050 DATA 0,3,wZCZCZCZCZCZCZCZCZCZCZCwwZCZCZCwwZCZCZCw
1060 DATA 0,3,wwwwwwwwwwXYwwwwXYwwwwwwXYwwwwwwXYwwXYw
1070 DATA 0,3,wwwwwwwwwwZCwwwwZCwwwwwwZCwwwwwwZCwwZCw
1080 DATA 0,3,wXYXYXYXYXYXYwwXYXYXYXYXYXYXYwwXYXYXYwwXYw
1090 DATA 0,3,wZCZCZCZCZCZCwwZCZCZCZCZCZCZCwwZCZCZCwwZCw
1100 DATA 0,3,wXYwwwwwwwwwwXYwwwwwwXYwwwwXYwwXYXYXYw
1110 DATA 0,3,wZCwwwwwwwwwwZCwwwwwwZCwwwwZCwwZCZCZCw
1120 DATA 0,3,wXYXYXYXYXYXYXYXYwwXYXYabXYXYXYwwwwwwXYw
1130 DATA 0,3,wZCZCZCZCZCZCZCZCwwZCZCcdZCZCZCwwwwwwZCw
1140 DATA 0,3,wXYwwXYwwwwwwXYXYXYwwXYwwwwwwwwwwXYXYw
1150 DATA 0,3,wZCwwZCwwwwwwZCZCZCwwZCwwwwwwwwwwZCZCw
1160 DATA 0,3,wXYwwXYwwXYXYXYwwXYwwXYwwXYXYXYwwXYwww
1170 DATA 0,3,wZCwwZCwwZCZCZCZCwwZCwwZCwwZCZCZCwwZCwww
1180 DATA 0,3,wXYXYXYXYXYXYwwXYwwXYwwXYXYXYXYXYXYw
1190 DATA 0,3,wZCZCZCZCwwZCwwZCwwZCwwZCZCZCwwZCZCZCZCw
1200 DATA 0,3,wXYwwXYwwXYwwXYwwXYwwwwwwwwwwwwwwXYw
1210 DATA 0,3,wZCwwZCwwZCwwZCwwZCwwwwwwwwwwwwwwZCw
1220 DATA 0,3,w\]xzXYXYXYXYXYwwXYXYXYXYXYXYXYXYxz\]w
1230 DATA 0,3,w^_y{ZCZCZCZCZCZCwwZCZCZCZCZCZCZCZCZCy{^_w
1240 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
1250 REM      ****  5. MAZE ****
1260 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
1270 DATA 0,3,w\]xzXYXYXYXYXYXYXYXYXYXYXYXYXYxz\]w
1280 DATA 0,3,w^_y{ZCZCZCZCZCZCZCZCZCZCZCZCZCZCy{^_w
1290 DATA 0,3,wXYwwwwwwwwwwwwwwwwwwwwwwwwwwwwwXYw
1300 DATA 0,3,wZCwwwwwwwwwwwwwwwwwwwwwwwwwwwwwZCw
1310 DATA 0,3,wXYwwXYXYXYXYXYXYXYXYXYXYXYXYXYwwXYw
1320 DATA 0,3,wZCwwZCZCZCZCZCZCZCZCZCZCZCZCZCwwZCw
1330 DATA 0,3,wXYwwXYwwXYwwwwwwwwwwwwwwwwwwXYwwXYw
1340 DATA 0,3,wZCwwZCwwZCwwwwwwwwwwwwwwwwwwZCwwZCw
1350 DATA 0,3,wXYwwXYwwXYXYXYXYXYXYXYXYXYwwXYwwXYw
1360 DATA 0,3,wZCwwZCwwZCZCZCZCZCZCZCZCZCZCwwZCwwZCw
1370 DATA 0,3,wXYwwXYwwXYwwwwXYwwwwXYwwwwXYwwXYwwXYw
1380 DATA 0,3,wZCwwZCwwZCwwwwZCwwwwZCwwwwZCwwZCwwZCw
1390 DATA 0,3,wXYwwXYwwXYwwwwXYwwwwghwwwwXYwwXYwwXYw
1400 DATA 0,3,wZCwwZCwwZCwwwwZCwwwwcdwwwwZCwwZCwwZCw
1410 DATA 0,3,wXYwwXYwwXYXYXYXYXYXYXYXYXYXYwwXYwwXYw
1420 DATA 0,3,wZCwwZCwwZCZCZCZCZCZCZCZCZCZCwwZCwwZCw
1430 DATA 0,3,wXYwwXYwwwwwwwwwwwwwwwwwwwwwwXYwwXYw
1440 DATA 0,3,wZCwwZCwwwwwwwwwwwwwwwwwwwwwwZCwwZCw
1450 DATA 0,3,wXYwwXYXYXYXYXYXYXYXYXYXYXYXYXYXYwwXYw
1460 DATA 0,3,wZCwwZCZCZCZCZCZCZCZCZCZCZCZCZCZCwwZCw
1470 DATA 0,3,wXYwwwwwwwwwwwwwwwwwwwwwwwwwwwwwXYwwXYw
1480 DATA 0,3,wZCwwwwwwwwwwwwwwwwwwwwwwwwwwwwwZCwwZCw
1490 DATA 0,3,w\]xzXYXYXYXYXYXYXYXYXYXYXYXYXYxz\]w
1500 DATA 0,3,w^_y{ZCZCZCZCZCZCZCZCZCZCZCZCZCZCy{^_w
1510 DATA 0,3,wwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww
```

···SAVING·WITH···ADDED·INTEREST·

Open a NatWest savings account and open the pages of a rather exclusive publication.

"ON LINE MAGAZINE". A glossy and exciting journal reflecting today's fashions, street sounds, careers and money management.

However, unlike other magazines, you won't find it for sale on the news-stand, because this publication is only available to ON LINE savers. A select group who not only receive ON LINE MAGAZINE regularly, but have the chance to buy the things they want through our special telephone ordering system.

Naturally, you can't buy what you can't afford. And that's why the first thing we give you when you join the ON LINE Savers Club, is a continuous memory calculator that retains your balance even when switched off.

To join, just drop into any NatWest branch with £5 (£2 covers membership), alternatively for an application form, send the coupon to National Westminster Bank PLC, ON LINE, FREEPOST 2, London EC2B 2GN.

NatWest
The Action Bank

ON LINE SAVERS CLUB

Name

Address

Postcode

Send to: National Westminster Bank PLC, ON LINE, FREEPOST 2, London EC2B 2GN.

YC1B

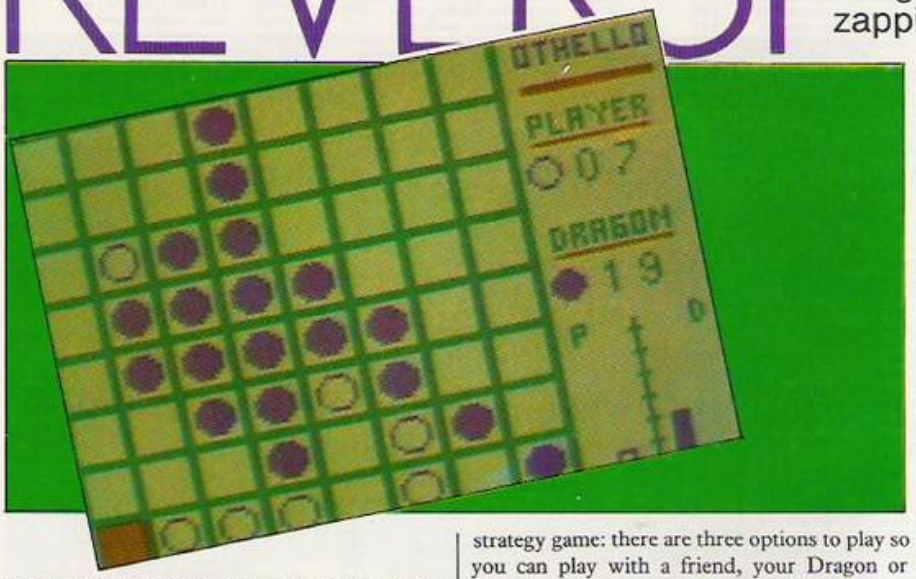
All orders for goods supplied through the On Line system will be fulfilled by Empire Stores Ltd., at 18 Canal Road, Bradford, West Yorkshire. This scheme is available to any applicant under the age of 19. For current interest rate please ask at your local NatWest branch.

Hex dump.

```
4608 : BB224F3154345632 = 618
4616 : 3546563135465631 = 516
4624 : 3046563235415631 = 507
4632 : 3541563130414F32 = 495
4640 : 5632354356313543 = 511
4648 : 5631354356323546 = 509
4656 : 5631354656313046 = 511
4664 : 5635465632462200 = 449
4672 : ECECE4E4ECE40000 = 1392
4680 : 0000000000000000 = 0
4688 : 0A010504040501 0A = 40
4696 : 0001000203030200 = 11
4704 : 0100050206050506 = 30
4712 : 0205000403050000 = 19
4720 : 0503040004030500 = 24
4728 : 0005030400050206 = 25
4736 : 0505060205000100 = 24
4744 : 0203030200010000A = 21
4752 : 0105040405010A02 = 32
4760 : 0201000000010202 = 8
4768 : 02E640AA01420081 = 662
4776 : 4800214800214800 = 282
4784 : 2148002142000140 = 397
4792 : AA0140AA0142AA81 = 771
4800 : 4AAAA14AAAA14AAA = 1054
4808 : A14AAAA142AA8140 = 995
4816 : AA017E1A617E18C0 = 762
4824 : 7E1BDC7E19053939 = 643
4832 : 397E1B357E16E67E = 764
4840 : 16727E1BE97E1D92 = 823
4848 : 7E1CC680F1E3D380 = 1287
4856 : 9383F3E2D2800802 = 1343
4864 : F3E3D3C292000000 = 1405
4872 : D2000000F1E3D380 = 1401
4880 : 0000FA0000CA0085 = 1225
4888 : 0000DBC3938AFBE3 = 1433
4896 : 00009A0000000DA00 = 1140
4904 : B000FA0000CA0000 = 1220
4912 : FA0000CA00050000 = 1225
4920 : DA00000AFA000000 = 1246
4928 : 9A0000000DA000000 = 1140
4936 : FA0000CA0000F4EC = 1444
4944 : DC0000040000D000 = 1200
4952 : 0000FCECDCCC89C0C = 1468
4960 : FCE0DCCC9C00F4EC = 1680
4968 : DC0000B0224F3256 = 909
4976 : 3235454546474746 = 523
4984 : 4544434344454443 = 543
4992 : 43220000DF202028 = 428
5000 : 43292020544F4D20 = 444
5008 : 2046494552532020 = 473
5016 : 3139383420200DF = 501
5024 : 534F5252592C5351 = 623
5032 : 5541524520414C52 = 556
5040 : 4541445920F4343 = 536
5048 : 5550494544000D53 = 679
5056 : 4F5252592C544841 = 597
5064 : 5420444F45534E27 = 532
5072 : 5420464C414E4B20 = 512
5080 : 4120524F5700594F = 513
5088 : 55275245204E4F54 = 548
5096 : 204E4558542054EF = 546
5104 : 204D592050494543 = 519
5112 : 4553000D5505245 = 596
5120 : 53532041 4E59204B = 537
5128 : 455920544F205345 = 537
5136 : 4520424F41524400 = 461
5144 : 3749204841564520 = 484
5152 : 544F20464F524641 = 561
5160 : 4954204D59204D4F = 543
5168 : 5645003737373750 = 455
5176 : 5245553320454E54 = 508
5184 : 455220544F20504C = 534
5192 : 415900597E1CAE59 = 660
5200 : 4F5520481564520 = 520
5208 : 2020205049454345 = 454
5216 : 532C49204B415645 = 524
5224 : 0037534F5252592C = 514
5232 : 4920574F4E205448 = 537
5240 : 4154204F4E450037 = 462
5248 : 4120544945005 94F = 491
5256 : 5520574F4E005448 = 517
5264 : 4154205741532041 = 513
5272 : 0050455246454354 = 521
5280 : 2047414D45000757 = 408
5288 : 414C4B4157415900 = 522
5296 : 464947485 42E2E2E = 508
5304 : 00404F5420474140 = 408
5312 : 4500564552592043 = 494
5320 : 4C4F53452047414D = 552
5328 : 4500144141414141 = 414
5336 : 1404140404040404 = 64
5344 : 1441010410405514 = 275
5352 : 4101140141140410 = 192
5360 : 4044550404554054 = 458
5368 : 0101411414414054 = 320
5376 : 4141145501010410 = 257
5384 : 4040144141144141 = 420
5392 : 1414414115014114 = 277
5400 : 444F20594F552057 = 551
5408 : 414E5420544F2047 = 525
5416 : 4F2046495253542D = 535
5424 : 28592F4E29001212 = 331
5432 : 128D15E2BD1F37BD = 918
5440 : BA778E040006CFA7 = 959
5448 : 8901A0A78901E0A7 = 994
5456 : 8900A0A7808C0420 = 768
5464 : 25EDA784A789001F = 908
5472 : 3089002080C060025 = 400
5480 : F14F108E12F30E84 = 885
5488 : 21EEA1EF814C810F = 1020
5496 : 25F730890000 24F8C = 690
5504 : 04A125ED8E05C3BF = 972
5512 : 00888E13B4BD90E5 = 991
5520 : 7E1F51BF008B8E15 = 728
5528 : 178D90E5BDBBE527 = 1229
5536 : 05B7761A2073BD1F = 699
5544 : 0912121212121 28E = 259
5552 : 04225FA68481F025 = 837
5560 : 04803020020B10A7 = 536
5568 : 805CC11C25ED3089 = 900
5576 : 00040C04A225E320 = 686
5584 : CB8E8600108E2A00 = 551
5592 : EC81EDA18C120025 = 958
5600 : F7398E0600108E2A = 652
5608 : 00ECA1ED818C1200 = 921
5616 : 25F739B7FFC5B7FF = 1414
5624 : C2B7FFC0B7FFC9B7 = 1646
5632 : FFC7B6FF2284CF8A = 1402
5640 : C8B7FF227F760539 = 979
5648 : 00888E13FCBD90E5 = 1111
5656 : 397E222DBE00A634 = 657
5664 : 108E1201BF00A6A6 = 700
5672 : 841CFEBDADBD3510 = 1034
5680 : BF00A6BD2501108E = 742
5688 : 00010AF810C75FA = 827
5696 : 25FB8602B775FB7C = 1093
5704 : 75F9B675F8B7755C = 1305
5712 : B77567B675F9B775 = 1251
5720 : 5DB77566CC0202FD = 956
5728 : 75FA8604B775FC7F = 1184
5736 : 75FDBD15F3BD12EA = 1264
5744 : 201F3402863FB7FF = 752
5752 : 237FFF2086C873FF = 1153
5760 : 20C6C85A26FD4A26 = 923
5768 : FS0637B7FF233502 = 962
5776 : 397E230D014E2703 = 600
5784 : 7E12D27E235E108E = 767
5792 : 7594EC81EDA18C75 = 1285
5800 : 9425F70602B775FE = 1122
5808 : B614B775FF7F7600 = 954
5816 : 7F76017F7602B675 = 792
5824 : F9877603B675F8B7 = 1283
5832 : 76047F76058611F = 538
5840 : B9FD7606B67607C6 = 1019
5848 : 0A3DC37594F37605 = 897
5856 : 1F01A604273A7C76 = 669
5864 : 07B676070 10925E4 = 717
5872 : 7C7606B67606B109 = 692
5880 : 2407B601B7760720 = 518
5888 : D3B67600270 37E12 = 697
5896 : D5BD12D8B6760827 = 983
5904 : 07810126037E12ED = 559
5912 : B601B776087E12D2 = 798
5920 : BD133B67600927BE = 801
5928 : B601B7760A8D12DB = 872
5936 : 7E17B4CC0000FD76 = 856
5944 : 0BB7760DB675FE81 = 1007
5952 : 01270FB676074A0B = 623
5960 : 760DC60A3DC37593 = 959
5968 : 200DB676074A0B76 = 731
5976 : 0DC60A3DC3752FF3 = 884
5984 : 7605F3760B1F01A6 = 693
5992 : B4B176042703 7E1A = 625
6000 : 428601B77609390D = 581
6008 : 20C27F760939B601 = 672
6016 : B7760939B6760E26 = 719
6024 : 037E12E10601B776 = 808
6032 : 00B67607C6093DC3 = 770
6040 : 1246F376051F01A6 = 652
6048 : B4B7760FBB760E8B = 906
6056 : 64B776107E2377B6 = 879
6064 : 75F8B77603B675F9 = 1217
6072 : B77604B601B77613 = 760
6080 : B776147F76128676 = 884
6088 : 14C60A3DC37594F3 = 992
6096 : 76121F01A6841027 = 521
6104 : 006E7C7614B67614 = 692
6112 : B10925E27C7613D6 = 844
6120 : 7613810924070601 = 453
6128 : B7761420D1B675FE = 1115
6136 : 2709B67610B0 7611 = 675
6144 : B7761 0B675F9B776 = 1166
6152 : 03B675FBB7760 4B6 = 1037
6160 : 7610B175FF251EB1 = 927
6168 : 75FF2207B6011384 = 747
6176 : 012712B67610B775 = 674
6184 : FFB67606B7760 1B6 = 1045
6192 : 7607B77602100E75 = 703
6200 : 940E7530EC81EDA1 = 1218
6208 : 8C759425F77E16E6 = 1067
6216 : FC7606FD7615FC76 = 1138
6224 : 13FD7606BD1733FC = 911
6232 : 7615FD7606B67609 = 825
6240 : 26837E17DA6800B7 = 853
6248 : 760AFC7606FD7615 = 896
6256 : FC7613FD7606BD12 = 973
6264 : DBFC7615FD7606B6 = 1169
6272 : 760E26037E17DAB6 = 722
6280 : 7614C6093DC37780 = 856
6288 : F376121F01A684B7 = 892
6296 : 760FBB760EB7760E = 767
6304 : B176112700B17611 = 671
6312 : 220D7E17DAB60113 = 616
6320 : B40127037E17DAB6 = 724
6328 : 760EB776117E17DA = 817
6336 : 7F7600FC7601FD76 = 995
6344 : 06BD1F840601B776 = 794
6352 : 0AB775FEBD12DBB6 = 1172
6360 : 75FABB760E4CB775 = 1062
6368 : FAB675FBB0760EB7 = 1291
6376 : 75FB7C75FC0D12EA = 1302
6384 : B675FB26037E12ED = 972
6392 : B675FCB1402603 7E = 911
6400 : 12ED7E12D27F760E = 868
6408 : B601B7761D4FF676 = 908
6416 : 1DC312981F01A684 = 724
6424 : B7761E7F76204FF6 = 933
6432 : 761DC312961F01A6 = 708
6440 : 84B7761FBB76074A = 850
6448 : B77624B6761EBB76 = 972
6456 : 064AB776217F7622 = 693
6464 : B675FE81012720B6 = 936
6472 : 7624C60A3DC37594 = 883
6480 : F376201F01A684B1 = 900
6488 : 760427207C761DB6 = 646
6496 : 761D810925A739B6 = 728
6504 : 7624C60A3DC37530 = 783
6512 : F376201F01A684B1 = 900
6520 : 760426E07C7622B6 = 842
6528 : 7621BB761E4AB776 = 861
6536 : 21B67624BB761F4A = 779
6544 : B77624B675FEB101 = 1020
6552 : 271BB6724C60A3D = 671
6560 : C37594F376201F01 = 885
6568 : A684B176032723B1 = 799
6576 : 0027A920C7B67624 = 775
6584 : C60A3DC37530F376 = 990
6592 : 201F01A684B17603 = 660
6600 : 270B81001027FFBC = 626
6608 : 20AAB6760EBB7622 = 855
6616 : B7760EB6760A8101 = 755
6624 : 27037E195CFC7606 = 661
6632 : B77621F776247F76 = 980
6640 : 23B675FE81012733 = 810
6648 : B67624C60A3DC375 = 917
6656 : 94F376201F01B676 = 873
6664 : 03A784B6761EBB76 = 937
6672 : 214AB77621B67624 = 777
6680 : BB761F4AB776247C = 871
6688 : 7623B67623B17622 = 817
6696 : 23C77E195CB67624 = 813
6704 : C60A3DC37530F376 = 990
6712 : 201F01B67603A784 = 666
6720 : 20C97C760DB6760D = 801
6728 : 81031025FCEE7F76 = 920
6736 : 0D7C760CB6760CB1 = 708
6744 : 031025FCDF7F7609 = 785
6752 : 39100E7594BE7530 = 787
6760 : EC81EDA18C759425 = 1205
6768 : F7B602B775FE7E21 = 1096
6776 : 57FD76038E10A0CC = 983
6784 : 0108FD76187F7617 = 672
6792 : 3410BD1FD6351081 = 700
6800 : 00272481SE275EB1 = 568
6808 : 0A276B810827 7AB1 = 583
6816 : 0910270085810D10 = 355
6824 : 270DAC810C27317E = 566
6832 : 1FF7047E153939A6 = 709
6840 : B4818F260377E1A0B = 781
6848 : 4F1F12BD1ACC7E1A = 699
6856 : 08CC20BC63A463A9 = 1091
6864 : 000163A9000024C31 = 396
6872 : A9002081 0A25ED39 = 671
6880 : BD1BCDBD25248101 = 813
6888 : 26037E12ED8601B7 = 740
6896 : 760B7E214AB67619 = 684
6904 : 4A27567A76191F12 = 513
6912 : 3089FEB02035B676 = 952
6920 : 194C81092743 7C76 = 587
6928 : 191F12308981 0020 = 420
6936 : 22B676184A27327A = 643
6944 : 761B1F123089FF76 = 884
6952 : 2811B676184C8189 = 587
6960 : 271F7C761B1F1230 = 433
6968 : B90003BD1B67A6A4 = 789
6976 : 1212B1BF1026FF40 = 729
6984 : 4F1212BD1ACC7E1A = 686
6992 : B8BD12E77E1A88A6 = 1028
7000 : B4840F810F25274F = 578
7008 : 1F12BD1ACC201F34 = 583
7016 : 02863FB7FF237FFF = 1054
7024 : 20866473FF20C664 = 966
7032 : 5A2AFD4A26F58637 = 927
7040 : B7FF23358239FC76 = 955
7048 : 18FD7606B67607C6 = 986
7056 : 0A3DC37530F37605 = 797
7064 : 1F01A684274B0E13 = 602
7072 : 9FBD1BA77E1A88BD = 1019
7080 : 1D7D108E0501108F = 525
7088 : 0088BD90E58E05C3 = 1040
7096 : BF00B08E13FCBD90 = 1073
7104 : E58DBBE527FBBD15 = 1334
7112 : F3BE7635394F1F12 = 789
7120 : BD1ACCBD1B673912 = 813
7128 : 12121239BE141BBD = 486
7136 : 12F0BD1FCB397E1C = 892
7144 : FA100E753B5F8E06 = 827
7152 : 407E20BD12810127 = 598
7160 : 0D3434108E12A2BD = 644
7168 : 1C1335342022343 4 = 322
7176 : 108E12BABD1C1335 = 651
7184 : 3420155FEEA1EF04 = 970
7192 : A6A0A70900023089 = 817
7200 : 00205CC10825ED39 = 656
7208 : 31A9000130890003 = 407
7216 : 5CC10825BC5F3089 = 798
7224 : 016831A90002108C = 481
7232 : 758A25ADB675FABD = 1203
7240 : 1CE58E0C5BBD1C73 = 834
7248 : B675FAC6AABE11DD = 1297
7256 : BD1C9F8675FBBD1C = 1143
7264 : E58E095DBD1C730E = 945
7272 : 11DAC682B675FB8D = 1302
7280 : 1C9F39B6761BBD1C = 788
7288 : B4B6761C30890002 = 647
7296 : BD1CB439C6073DC3 = 867
7304 : 14D21F0234105FA6 = 592
7312 : A0A7843089002085C = 768
7320 : C10725F3351039BD = 795
7328 : 1D6A4426028601E7 = 609
7336 : 847E1CFD04398E00 = 918
7344 : A63410BE136CBF00 = 694
7352 : A6A6841CFEBDADBD = 1297
7360 : 3510BF00A6393406 = 541
7368 : B63FB7FF237FFF20 = 1084
7376 : B63273FF20C6325A = 924
7384 : 26FD4A26F50637B7 = 1020
7392 : FF23350639E00000 = 548
7400 : BF761B810A25077C = 643
7408 : 761B800A20F5B776 = 861
7416 : 1C397E1D0B3089FF = 691
7424 : E04A1026FFA1C6AA = 1136
7432 : E78439BD1733B676 = 983
7440 : 09B101270 98E13DD = 569
7448 : BD1BA77E1A888680 = 933
7456 : B7760ABD12DBB676 = 1037
7464 : 0E26098E13BEBD1B = 628
7472 : A77E1A887E244286 = 817
7480 : 01B7760AB775FEBD = 1055
7488 : 2094B675FBBB760E = 1049
7496 : 4CB775FBB675FAB0 = 1352
7504 : 760EB775FA7C75FC = 1175
7512 : 7E242AB675FA2732 = 842
7520 : B675FC8140272B7E = 952
7528 : 213D3416CC0000A7 = 539
7536 : 843089FFE05CC120 = 1113
7544 : 25F5351639BD1672 = 739
7552 : CC8F8F108E0501ED = 891
7560 : A1100C051E25F839 = 694
7568 : A4396D1CAEB7FFC4 = 1246
7576 : B6FF22040FB7FF22 = 1090
7584 : B7FFC9B7FFC6BDBA = 1650
7592 : 77BE040086DF1F89 = 790
7600 : EDB901E8EDB10C04 = 1109
7608 : 2025F53089FFFFED = 1246
7616 : 843089002080C05FF = 749
7624 : 25F5A7848E0442BF = 984
7632 : 00B87E239CBD90E5 = 1015
7640 : B675FBBD1CE5FC76 = 1366
7648 : 1BBB70CB70FD044B = 925
7656 : B675FABD1CE5FC76 = 1365
7664 : 1BBB70CB70FD045C = 942
7672 : 7E23DABF0088B675 = 1085
7680 : FBB175FA270AB175 = 1138
7688 : FA220A8E14692008 = 601
7696 : BE147F20038E1485 = 619
7704 : BD90E5B675FAB175 = 1405
7712 : FB2505B075FB2006 = 875
7720 : B675FBB075FA8E05 = 1240
7728 : 0DBF0000810B2520 = 549
7736 : B1192517812725 0E = 433
7744 : B13525058E149820 = 570
7752 : 128E14A6200D0E14 = 553
7760 : AF20088E14B82003 = 596
7768 : 8E14C1BD90E58E05 = 1064
7776 : 02BF00888E148DBD = 821
7784 : 90E58E0586BF0088 = 981
7792 : 8E1436BD2108BDBB = 825
7800 : E527FB810D27047E = 830
7808 : 1E76397E15393120 = 490
7816 : 504C41594552202F = 540
7824 : 20504C4159455200 = 493
7832 : 3220504C41594552 = 543
7840 : 202F20445241474F = 476
7848 : 4E0000000033 2044 = 229
7856 : 5241474F4E202F20 = 486
7864 : 445241474F4E0000 = 443
7872 : 00594F5552204348 = 506
7880 : 4F49434503F80044 = 451
7888 : 4946464943554C54 = 598
7896 : 59204C4556454C20 = 529
7904 : 28312D332900504C = 382
7912 : 4159455231 3A2020 = 476
7920 : 2020202020202050 = 304
7928 : 4C4159455220 3230 = 463
7936 : 151101041 5F4F6F6 = 802
7944 : F4B6FF23BA00B7FF = 1302
7952 : 23B6FF0184F7B7FF = 1290
7960 : 01B6FF0384F7B7FF = 1258
7968 : 038E0000308900 01 = 331
7976 : B6FF20BB0113B7FF = 1114
7984 : 208C232025EE397F = 706
7992 : 76317F763E8E1246 = 704
8000 : 108E7708A600A7A0 = 1034
8008 : 8C129725F70D0012 = 928
8016 : 398E04C2BF00888E = 866
8024 : 1E85BD90E58E04E2 = 1097
8032 : BF00888E1E97BD90 = 983
8040 : E58E0502BF00888E = 847
8048 : 1EAC7E24588E0562 = 697
8056 : BF00888E1EC0BD90 = 1024
8064 : E57E159CB6760748 = 911
8072 : C6C03DC3849DFD76 = 1170
8080 : 33B67606C6033DF3 = 862
8088 : 76331F017F76321F = 527
8096 : 12BD12F04FBD1ACC = 963
8104 : BD1FDD7C7632B676 = 1033
8112 : 32B10A25EA394FEE = 834
8120 : 81EFA14CB13225F7 = 1068
8128 : 39CC562583000126 = 554
8136 : FB3939B676300103 = 845
8144 : 2703BD1BA739BF76 = 791
8152 : 35BDB8E53638463 = 1045
8160 : 0900016389000263 = 475
8168 : 0901286309012163 = 539
8176 : 090122BD1FC13981 = 771
8184 : 5427118103270781 = 447
8192 : 4327317E20D2BD20 = 744
8200 : 687E15397E212DBD = 701
```

REVERSI

Easy to learn but hard to master, Reversi is a board game implemented on the Dragon. A change from all that zapping.



Is YOUR Dragon overheated? Tired of zapping nasty aliens into hyper-space? Are your nerves breaking? Here is the solution: Reversi, a game to relax and to test your brains instead of the strength of your joystick.

Reversi is a computerised version of an old Chinese board game. The program offers almost every feature you would expect in a strategy game: there are three options to play so you can play with a friend, your Dragon or leave it playing on its own. I included three difficulty levels, the third one being the toughest. The program will warn you and tell you what you did wrong if you made a mistake — so cheating is almost impossible.

Using Takeback you can re-run your last move. With Change you can give your positions to the computer and take over his game. Not fair but quite satisfying if you can't stand to lose.

Full instructions are included in the program so if you are not familiar with the game, a brief explanation should suffice. Taking turns, you place checkers on the board in an attempt to have more than your opponent at the end. Each time you trap a row of your opponent's counters between two of yours, they change colour to show they now belong to you.

To enter the program just follow the instructions given in the hexloader program. You can save the program in parts, saving each part with CSAVEM"Reversi",4608,X,O where X is the address you reached. Don't forget to load previous parts before typing in a new one. Save the complete program with CSAVEM"Reversi",4608,13823,5430 before executing it. To play type CLOADM:EXEC

Hexloader.

```
10 REM HEXLOADER - ENTER THE
20 REM STRING OF HEX DIGITS FIRST
30 REM AND THEN THE CHECKSUM
40 PRINT "ENTER START ADDRESS ";:INPUT START
50 PRINT "ENTER FINISH ADDRESS ";:INPUT FINISH
60 FOR N = START TO FINISH STEP 8
65 PRINT N;": ";
70 T1=0:INPUT A$:Z=0
80 FOR G=1 TO LEN(A$) STEP 2
90 P=VAL("&H"+MID$(A$,G,2))
100 T1=T1+P:POKE N+Z,P
110 Z=Z+1:NEXT
120 PRINT " - ";
130 INPUT T$
150 IF VAL(T$)<>T1 THEN PRINT "ERROR - ENTER LINE AGAI
N":GOTO 70
160 NEXT
```

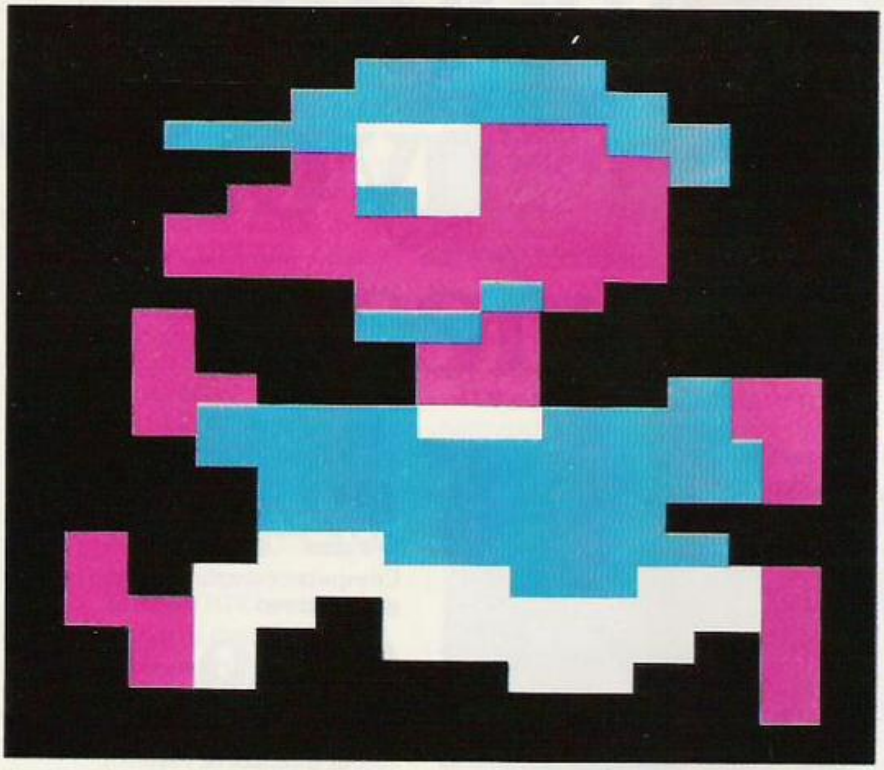
```
8208 : 1ACCBD20687E23F1 = 957
8216 : FD75FAB6762CB775 = 1264
8224 : FC7F76088E772410 = 818
8232 : 0E7530BD1FB6BD12 = 916
8240 : EA7E1A617E2448F6 = 966
8248 : 75FBF775FAB775FB = 1333
8256 : BD20688E7530A680 = 926
8264 : 8101270C8102710 = 367
8272 : 8C759425F17E20AE = 1015
8280 : B602A789FFFF20F0 = 1222
8288 : B601A789FFFF20E8 = 1213
8296 : B63FB7FF23C66486 = 1102
8304 : 50F7762F7FFF2073 = 1021
8312 : FF201F095A26FD73 = 951
8320 : FF207A762FF6762F = 985
8328 : 5A26FD4A26E98637 = 915
8336 : B7FF23398E753010 = 853
8344 : BE7724BD1FB6FC75 = 1068
8352 : FAFD762AB675FCB7 = 1397
8360 : 762CBD12DB39BE76 = 953
8368 : 351F124FBD1ACCBD = 789
8376 : 12EA7E241AA6A427 = 809
8384 : 037E1BF53434108E = 663
8392 : 2A40BD1C1335347E = 573
8400 : 1C2881532703 7E1A = 474
8408 : B7BD20E2BD20687E = 1081
8416 : 1AB7B616B81C827 = 789
8424 : 07BD20F9B6C82005 = 848
8432 : BD210286C0B7160B = 763
8440 : 39B6FF228A08B7FF = 1112
8448 : 2239B6FF2284F7B7 = 1124
8456 : FF2239BD90E5BD20 = 1129
8464 : F9393420494E5354 = 708
8472 : 52554354494F4E53 = 631
8480 : 00504C4159455220 = 493
8488 : 3100FFFFFFB675FC = 1365
8496 : 810522037E1AB74F = 585
8504 : 1F127E200FB67630 = 570
8512 : 810226037E169B7E = 601
8520 : 1A61B67630810227 = 641
8528 : 037E1A617E169B86 = 737
8536 : 7630810127300103 = 515
8544 : 2719FC75F87E1A79 = 954
8552 : FC75F8B775F9F775 = 1530
8560 : F8FC75FAB775FBF7 = 1665
8568 : 75FA39BD21688E9C = 1048
8576 : 403089FFFF3D8C00 = 960
8584 : 0026F67E169BBD21 = 809
8592 : 60BD2060BD21F2B6 = 1075
8600 : 7631810127 1E8601 = 501
8608 : B776318E305B108E = 786
8616 : 0C58BD21CFFC75F8 = 1146
8624 : FD76038E10B5CC08 = 925
8632 : 087E1A82BD23EABE = 890
8640 : 2D58108E0958BD21 = 610
8648 : CFFC75F87E1A794F = 1176
8656 : E684E7A4E6890001 = 1125
8664 : E7A90001E6890002 = 770
8672 : E7A900023089 0020 = 619
8680 : 31A900204C810025 = 500
8688 : DF39CC0000BE0C58 = 726
8696 : ED890001 0A40A784 = 876
8704 : 308900204FBC0D30 = 505
8712 : 25EE8E0958ED8900 = 888
8720 : 810A40A784308900 = 687
8728 : 204FBC0A3B25EE39 = 649
8736 : 7F760B7C763EB676 = 857
8744 : 3E81032742BD227E = 648
8752 : 810127097E246ABD = 635
8760 : 16727E159CBD2068 = 764
8768 : B6763E81022734B6 = 766
8776 : 761AB77630810227 = 663
8784 : 037E161C8D251ABD = 620
8792 : 22B38E0522BD22B3 = 796
8800 : 8E0502BF00888E1E = 648
8808 : CEBD98E57E159CBD = 1260
8816 : 2068B6761AB7762E = 809
8824 : 7E161C7E22C1B676 = 829
8832 : 1AB131250C813322 = 467
8840 : 088030B7761AB601 = 646
8848 : 394F39BE0561BD22 = 660
8856 : B3B67630103270A = 700
8864 : 81012709B6762E7E = 650
8872 : 16947E169BBD22ED = 933
8880 : 7E2499108E8F8F5F = 854
8888 : 10AFB15CC10E25F8 = 904
8896 : 39B6761AB103271F = 585
8904 : 8103270E8E778886 = 716
8912 : 01A788BC77DA25F9 = 1059
8920 : 200D4FB777928777 = 874
8928 : 99B777D1B777D88E = 1324
8936 : 05017E236E8E14D9 = 656
8944 : 100E003F8D2338BE = 651
8952 : 1F00100E00B3FBD23 = 487
8960 : 388E0DD9100E0DDF = 822
8968 : BD2349E0039108E = 662
8976 : 0B39CE00005FEE84 = 739
8984 : EFA4EE090002EFA9 = 1188
8992 : 0002EE8900004EFA9 = 709
9000 : 0004308900203 1A9 = 439
9008 : 00205CC10525DF39 = 639
9016 : CC0000A6B0A7A431 = 878
9024 : A900205CC10525F3 = 771
9032 : 39CC0000A604A7A4 = 890
9040 : 5C3089002031A900 = 527
9048 : 20C10525EF39BDBB = 939
9056 : E5810326037E1539 = 606
9064 : BE75307E169EB676 = 913
9072 : 1AB7763D7E1593B6 = 864
9080 : 763D8101270 67F76 = 599
9088 : 117E17AFFC7606FD = 970
9096 : 76017E17018E04E2 = 641
9104 : BD22B38E0522BD22 = 806
9112 : B37E2293B6763081 = 963
9120 : 0127068E144E7E1D = 441
9128 : D58E1EE5BD250CB6 = 1034
9136 : 763126037E1DD8B6 = 761
9144 : 75FBBD1CE5FC761B = 1211
9152 : 8B70CB70FD045CB6 = 1097
9160 : 75FABD1CE5FC761B = 1210
9168 : 8B70CB70FD044B7E = 1024
9176 : 1DF8B6763081022 6 = 794
9184 : 068E04A27E1DFB7E = 846
9192 : 24B37F7631BD12EA = 950
9200 : 39B6763081012706 = 580
9208 : FC762A7E20107C76 = 836
9216 : 41B6764181022506 = 604
9224 : BE76357E1A88FC76 = 1019
9232 : 2AB775FBF775FA7E = 1333
9240 : 201BB6763081012 7 = 576
9248 : 037E1A61BE76357E = 739
9256 : 1A88B6763081012 7 = 679
9264 : 06BD12EA7E1D5BB6 = 875
9272 : 7631260 3BD12EA7E = 775
9280 : 1D5B7F76417F7608 = 683
9288 : 7E1D37B676300101 = 688
9296 : 27D2B675FA7E2037 = 1011
9304 : BD90E58E0522BF00 = 934
9312 : B88E2111BD90E57E = 1016
9320 : 1F757A763E86761A = 776
9328 : 813427037E2237BD = 627
9336 : 20688E25FF8D24A4 = 959
9344 : BDBBE527FBBD2068 = 1220
9352 : BE27FFBD24A4BDBB = 1201
9360 : E527FBBD2068 7E15 = 991
9368 : 39BD2168B601B776 = 819
9376 : 317E12D2100E0400 = 565
9384 : A680A7A0100C0600 = 783
9392 : 25F6398101270 7E = 638
9400 : 1E1B0E04A2BF0088 = 692
9408 : 8E1485BD90E58E04 = 1003
9416 : AABF0088B675FBB1 = 1224
9424 : 75FA271BB175FA22 = 1011
9432 : 0FB6763127058E21 = 583
9440 : 20201B8E1EF62013 = 557
9448 : B6763126F620EF8E = 1046
9456 : 04A2BF0088BD22B3 = 895
9464 : 8E147FBD90E57E1E = 1007
9472 : 1B0E04C2BD22B38E = 911
9480 : 753039F2BD90E586 = 1160
9488 : 7AB7045A8672B704 = 834
9496 : 59398E04C2BD22B3 = 888
9504 : 8E04E2398601B776 = 865
9512 : 41B6760839F2F2F2 = 1156
9520 : F2F2F2F2F2F2F2F2 = 1936
9528 : F2F2F2F2F2F2F2F2 = 1936
9536 : 0202020202020202 = 16
9544 : 0202020202020202 = 16
9552 : 0202020202020202 = 16
9560 : 0202020202020202 = 16
9568 : 0202020202020202 = 16
9576 : 0202020202020202 = 16
9584 : 0202020202020202 = 16
9592 : 0202020202020282 = 192
9600 : FFFFFFFFFFFFFFFF = 2040
9608 : FFFFFFFFFFFFFFFF = 2040
9616 : FFFFFFFFFFFFFFFF = 2040
9624 : FFFFFFFFFFFFFFFF = 2040
9632 : FFFFFFFFFFFFFFFF = 2040
9640 : FFFFFFFFFFFFFFFF = 2040
9648 : FFFFFFFFFFFFFFFF = 2040
9656 : FFFFFFFFFFFFFFFF = 2040
9664 : 0F0F0F0F0F0F0F0F = 120
9672 : 0F0F0F0F0F0F0F0F = 120
9680 : 0F0F0F0F0F0F0F0F = 120
9688 : 0F0F0F0F0F0F0F0F = 120
9696 : 0F0F0F0F0F0F0F0F = 120
9704 : 0F0F0F0F0F0F0F0F = 120
9712 : 0F0F0F0F0F0F0F0F = 120
9720 : 0F0F0F0F0F0F0F60 = 201
9728 : 6060606060606060 = 768
9736 : 6060606060606060 = 768
9744 : 6060606060606060 = 768
9752 : 6060606060606060 = 768
9760 : 604F5448454C4C4F = 631
9768 : 6049536050 4C4159 = 658
9776 : 4544604F4E6B414E = 629
9784 : 607B6A7B60606060 = 826
9792 : 6043484543 4B4552 = 597
9800 : 424F4152446E6060 = 662
9808 : 6060606060606060 = 768
9816 : 6060606060606060 = 768
9824 : 6054484560494E49 = 641
9832 : 5449414C60434F4E = 618
9840 : 4649475552415449 = 603
9848 : 4F4E6049536060 60 = 697
9856 : 60414C4C60424C41 = 616
9864 : 4E4B6C4558434550 = 634
9872 : 5460464F52605448 = 663
9880 : 4560606060606060 = 741
9888 : 6043454E54455260 = 641
9896 : 464F555260535155 = 661
9904 : 415245536E606060 = 697
9912 : 6060606060606060 = 768
9920 : 6054525960544F60 = 706
9928 : 504C41434560594F = 621
9936 : 5552605049454345 = 621
9944 : 60534F6060606060 = 738
9952 : 6054484154604954 = 654
9960 : 60674F5554464C41 = 658
9968 : 4E4B5367604D494E = 663
9976 : 456C606060606060 = 753
```

(continued on next page)

(continued from previous page)

```
9984 : 6043524541544946 = 614
9992 : 476041604B4F5249 = 634
10000 : 5A4F4E54414C6C56 = 666
10008 : 4552544943414C60 = 612
10016 : 604F526044494147 = 630
10024 : 4F4E414C6052554E = 639
10032 : 604F46604D596050 = 683
10040 : 4945434553606060 = 649
10048 : 60424F554E444544 = 689
10056 : 6041546045414348 = 614
10064 : 604454E4460425960 = 658
10072 : 4154606060606060 = 725
10080 : 604C45415354604F = 648
10088 : 4E45604F4660594F = 656
10096 : 5552605049454345 = 621
10104 : 536E606060606060 = 769
10112 : 60544B4953605749 = 664
10120 : 4C4C6067464C4950 = 650
10128 : 67604D5960504945 = 683
10136 : 4345536C60606060 = 711
10144 : 605455524E494E47 = 647
10152 : 60544B454D60494E = 645
10160 : 544F60594F555253 = 677
10168 : 6E6060606060606060 = 782
10176 : 6060606060606060 = 768
10184 : 6060606060606060 = 768
10192 : 6060606060606060 = 768
10200 : 6060606060606060 = 768
10208 : 6060606060606060 = 768
10216 : 5052455535604E4E = 636
10224 : 5960484559606060 = 706
10232 : 606060606060609F = 831
10240 : 9F9F9F9F9F9F9F9F = 1272
10248 : 9F9F9F9F9F9F9F9F = 1272
10256 : 9F9F9F9F9F9F9F9F = 1272
10264 : 9F9F9F9F9F9F9F9F = 1272
10272 : 6060606060606060 = 768
10280 : 6060606060606060 = 768
10288 : 6060606060606060 = 768
10296 : 606060606060609F = 894
10304 : 606D425245414B7A = 684
10312 : 6052455554415254 = 645
10320 : 53604F544B454C4C = 635
10328 : 4F6060606060609F = 877
10336 : 606D436060606070 = 778
10344 : 60434B414E474560 = 614
10352 : 46524F4D60534944 = 628
10360 : 45605B6D45609F9F = 855
10368 : 606D536060606070 = 794
10376 : 60434B414E474553 = 601
10384 : 6053435245454E60 = 640
10392 : 434F4C4F52539F9F = 784
10400 : 606D546060606070 = 795
10408 : 6054414B45424143 = 587
10416 : 4B604C4153546040 = 652
10424 : 4F5645606060609F = 840
10432 : 6060606060606060 = 768
10440 : 6060606060606060 = 768
10448 : 6060606060606060 = 768
10456 : 606060606060609F = 894
10464 : 606D504F53495449 = 677
10472 : 4F4E60544B456043 = 641
10480 : 5552534F52605749 = 667
10488 : 544B606060609F9F = 858
10496 : 6060544045604152 = 660
10504 : 524F57604B455953 = 660
10512 : 60414E4460505245 = 634
10520 : 53536060606609F9F = 860
10528 : 60607C454E544552 = 690
10536 : 7E6049466059 4F55 = 714
10544 : 6752456052454144 = 634
10552 : 596E606060609F9F = 901
10560 : 6060606060606060 = 768
10568 : 6060606060606060 = 768
10576 : 6060606060606060 = 768
10584 : 606060606060609F = 894
10592 : 606D505245535360 = 698
10600 : 7C434C4541527E60 = 705
10608 : 494660594F556043 = 655
10616 : 414E675460609F9F = 840
10624 : 6060444F60414E59 = 667
10632 : 604D4F56456E6060 = 709
10640 : 6060606060606060 = 768
10648 : 606060606060609F = 894
10656 : 6060606060606060 = 768
10664 : 6060606060606060 = 768
10672 : 6060606060606060 = 768
10680 : 606060606060609F = 894
10688 : 6060606060606060 = 768
10696 : 6050524553536041 = 654
10704 : 4E59604B45596060 = 688
10712 : 606060606060609F = 894
10720 : 9F9F9F9F9F9F9F9F = 1272
10728 : 9F9F9F9F9F9F9F9F = 1272
10736 : 9F9F9F9F9F9F9F9F = 1272
10744 : 9F9F9F9F9F9F9FFF = 1368
10752 : 5555555555555555 = 680
10760 : 5555555555555555 = 680
10768 : 5555555555555555 = 680
10776 : 4000000000000000 = 64
10784 : 4000014000014000 = 194
10792 : 0140000140000140 = 195
10800 : 0001400001400001 = 131
10808 : 4000000000000000 = 64
10816 : 4000014000014000 = 194
10824 : 0140000140000140 = 195
10832 : 0001400001400001 = 131
10840 : 40A0A0A0A0000A0 = 1120
10848 : 4000014000014000 = 194
10856 : 0140000140000140 = 195
10864 : 0001400001400001 = 131
10872 : 4000208080000888 = 888
10880 : 4000014000014000 = 194
10888 : 0140000140000140 = 195
10896 : 0001400001400001 = 131
10904 : 400828A0A0000888 = 952
10912 : 4000014000014000 = 194
10920 : 0140000140000140 = 195
10928 : 0001400001400001 = 131
10936 : 4008208080000888 = 888
10944 : 4000014000014000 = 194
10952 : 0140000140000140 = 195
10960 : 0001400001400001 = 131
10968 : 40A0208080A0A0A0 = 1072
10976 : 4000014000014000 = 194
10984 : 0140000140000140 = 195
10992 : 0001400001400001 = 131
11000 : 4000000000000000 = 64
11008 : 4000014000014000 = 194
11016 : 0140000140000140 = 195
11024 : 0001400001400001 = 131
11032 : 4000000000000000 = 64
11040 : 4000014000014000 = 194
11048 : 0140000140000140 = 195
11056 : 0001400001400001 = 131
11064 : 4000000000000000 = 64
11072 : 4000014000014000 = 194
11080 : 0140000140000140 = 195
11088 : 0001400001400001 = 131
11096 : 4000000000000000 = 64
11104 : 5555555555555555 = 680
11112 : 5555555555555555 = 680
11120 : 5555555555555555 = 680
11128 : 40FFFFFFFFFFFFFC = 1846
11136 : 5555555555555555 = 680
11144 : 5555555555555555 = 680
11152 : 5555555555555555 = 680
11160 : 40FFFFFFFFFFFFFC = 1846
11168 : 4000014000014000 = 194
11176 : 0140000140000140 = 195
11184 : 0001400001400001 = 131
11192 : 4000000000000000 = 64
11200 : 4000014000014000 = 194
11208 : 0140000140000140 = 195
11216 : 0001400001400001 = 131
11224 : 4000000000000000 = 64
11232 : 4000014000014000 = 194
11240 : 0140000140000140 = 195
11248 : 0001400001400001 = 131
11256 : 4000000000000000 = 64
11264 : 4000014000014000 = 194
11272 : 0140000140000140 = 195
11280 : 0001400001400001 = 131
11288 : 4000000000000000 = 64
11296 : 4000014000014000 = 194
11304 : 0140000140000140 = 195
11312 : 0001400001400001 = 131
11320 : 4054405441151500 = 485
11328 : 4000014000014000 = 194
11336 : 0140000140000140 = 195
11344 : 0001400001400001 = 131
11352 : 4044404411101100 = 314
11360 : 4000014000014000 = 194
11368 : 0140000140000140 = 195
11376 : 0001400001400001 = 131
11384 : 4054405404141400 = 340
11392 : 4000014000014000 = 194
11400 : 0140000140000140 = 195
11408 : 0001400001400001 = 131
11416 : 4040404404101100 = 297
11424 : 4000014000014000 = 194
11432 : 0140000140000140 = 195
11440 : 0001400001400001 = 131
11448 : 4040544404151100 = 322
11456 : 4000014000014000 = 194
11464 : 0140000140000140 = 195
11472 : 0001400001400001 = 131
11480 : 4000000000000000 = 64
11488 : 5555555555555555 = 680
11496 : 5555555555555555 = 680
11504 : 5555555555555555 = 680
11512 : 40FFFFFFFFFFFF00 = 1594
11520 : 5555555555555555 = 680
11528 : 5555555555555555 = 680
11536 : 5555555555555555 = 680
11544 : 4000000000000000 = 64
11552 : 4000014000014000 = 194
11560 : 0140000140000140 = 195
11568 : 0001400001400001 = 131
11576 : 4000000000000000 = 64
11584 : 4000014000014000 = 194
11592 : 0140000140000140 = 195
11600 : 0001400001400001 = 131
11608 : 40A0000000000000 = 232
11616 : 4000014000014000 = 194
11624 : 0140000140000140 = 195
11632 : 0001400001400001 = 131
11640 : 4202000000000000 = 68
11648 : 4000014000014000 = 194
11656 : 0140000140000140 = 195
11664 : 0001400001400001 = 131
11672 : 4000000000000000 = 200
11680 : 4000014000014000 = 194
11688 : 0140000140000140 = 195
11696 : 0001400001400001 = 131
11704 : 4000000000000000 = 200
11712 : 4000014000014000 = 194
11720 : 0140000140000140 = 195
11728 : 0001400001400001 = 131
11736 : 4000000000000000 = 200
11744 : 4000014000014000 = 194
11752 : 0140000140000140 = 195
11760 : 0001400001400001 = 131
11768 : 4202000000000000 = 68
11776 : 4000014000014000 = 194
11784 : 0140000140000140 = 195
11792 : 0001400001400001 = 131
11800 : 40A0000000000000 = 232
11808 : 4000014000014000 = 194
11816 : 0140000140000140 = 195
11824 : 0001400001400001 = 131
11832 : 4000000000000000 = 64
11840 : 4000014000014000 = 194
11848 : 0140000140000140 = 195
11856 : 0001400001400001 = 131
11864 : 4000000000000000 = 64
11872 : 5555555555555555 = 680
11880 : 5555555555555555 = 680
11888 : 5555555555555555 = 680
11896 : 4000000000000000 = 64
11904 : 5555555555555555 = 680
11912 : 5555555555555555 = 680
11920 : 5555555555555555 = 680
11928 : 4000000000000000 = 64
11936 : 4000014000014000 = 194
11944 : 0140000140000140 = 195
11952 : 0001400001400001 = 131
11960 : 4000000000000000 = 64
11968 : 4000014000014000 = 194
11976 : 0140000140000140 = 195
11984 : 0001400001400001 = 131
11992 : 4000000000000000 = 64
12000 : 4000014000014000 = 194
12008 : 0140000140000140 = 195
12016 : 0001400001400001 = 131
12024 : 4000000000000000 = 64
12032 : 4000014000014000 = 194
12040 : 0140000140000140 = 195
12048 : 0001400001400001 = 131
12056 : 4000000000000000 = 64
12064 : 4000014000014000 = 194
12072 : 0140000140000140 = 195
12080 : 0001400001400001 = 131
12088 : 4050545454544100 = 545
12096 : 4000014000014000 = 194
12104 : 0140000140000140 = 195
12112 : 0001400001400001 = 131
12120 : 4044444444445100 = 481
12128 : 4000014000014000 = 194
12136 : 0140000140000140 = 195
12144 : 0001400001400001 = 131
12152 : 4044505454544500 = 517
12160 : 4000014000014000 = 194
12168 : 0140000140000140 = 195
12176 : 0001400001400001 = 131
12184 : 4044444444441100 = 469
12192 : 4000014000014000 = 194
12200 : 0140000140000140 = 195
12208 : 0001400001400001 = 131
12216 : 4050444454544100 = 513
12224 : 4000014000014000 = 194
12232 : 0140000140000140 = 195
12240 : 0001400001400001 = 131
12248 : 4000000000000000 = 64
12256 : 5555555555555555 = 680
12264 : 5555555555555555 = 680
12272 : 5555555555555555 = 680
12280 : 40FFFFFFFFFFFF00 = 1594
12288 : 5555555555555555 = 680
12296 : 5555555555555555 = 680
12304 : 5555555555555555 = 680
12312 : 4000000000000000 = 64
12320 : 4000014000014000 = 194
12328 : 0140000140000140 = 195
12336 : 0001400001400001 = 131
12344 : 4000000000000000 = 64
12352 : 4000014000014000 = 194
12360 : 0140000140000140 = 195
12368 : 0001400001400001 = 131
12376 : 40A8000000000000 = 232
12384 : 4000014000014000 = 194
12392 : 0140000140000140 = 195
12400 : 0001400001400001 = 131
12408 : 42A0000000000000 = 236
12416 : 4000014000014000 = 194
12424 : 0140000140000140 = 195
12432 : 0001400001400001 = 131
12440 : 4AAA800000000000 = 372
12448 : 4000014000014000 = 194
12456 : 0140000140000140 = 195
12464 : 0001400001400001 = 131
12472 : 4AAA800000000000 = 372
12480 : 4000014000014000 = 194
12488 : 0140000140000140 = 195
12496 : 0001400001400001 = 131
12504 : 4AAA800000000000 = 372
12512 : 4000014000014000 = 194
12520 : 0140000140000140 = 195
12528 : 0001400001400001 = 131
12536 : 42A0000000000000 = 236
12544 : 4000014000014000 = 194
12552 : 0140000140000140 = 195
12560 : 0001400001400001 = 131
12568 : 40A8000000000000 = 232
12576 : 4000014000014000 = 194
12584 : 0140000140000140 = 195
12592 : 0001400001400001 = 131
12600 : 4000000000000000 = 64
12608 : 4000014000014000 = 194
12616 : 0140000140000140 = 195
12624 : 0001400001400001 = 131
12632 : 4000000000000000 = 64
12640 : 5555555555555555 = 680
12648 : 5555555555555555 = 680
12656 : 5555555555555555 = 680
12664 : 4000000000000000 = 64
12672 : 5555555555555555 = 680
12680 : 5555555555555555 = 680
12688 : 5555555555555555 = 680
12696 : 4000000000000000 = 64
12704 : 4000014000014000 = 194
12712 : 0140000140000140 = 195
12720 : 0001400001400001 = 131
12728 : 4000000000000000 = 64
12736 : 4000014000014000 = 194
12744 : 0140000140000140 = 195
12752 : 0001400001400001 = 131
12760 : 4054000000000050 = 228
12768 : 4000014000014000 = 194
12776 : 0140000140000140 = 195
12784 : 0001400001400001 = 131
12792 : 4044000040000044 = 264
12800 : 4000014000014000 = 194
12808 : 0140000140000140 = 195
12816 : 0001400001400001 = 131
12824 : 4054000040000044 = 280
12832 : 4000014000014000 = 194
12840 : 0140000140000140 = 195
12848 : 0001400001400001 = 131
12856 : 4040000150000044 = 277
12864 : 4000014000014000 = 194
12872 : 0140000140000140 = 195
12880 : 0001400001400001 = 131
12888 : 4040000840000050 = 272
12896 : 4000014000014000 = 194
12904 : 0140000140000140 = 195
12912 : 0001400001400001 = 131
12920 : 4000000040000000 = 128
12928 : 4000014000014000 = 194
12936 : 0140000140000140 = 195
12944 : 0001400001400001 = 131
12952 : 4000000040000000 = 128
12960 : 4000014000014000 = 194
12968 : 0140000140000140 = 195
12976 : 0001400001400001 = 131
12984 : 4000000040000000 = 128
12992 : 4000014000014000 = 194
13000 : 0140000140000140 = 195
13008 : 0001400001400001 = 131
13016 : 4000000150000000 = 145
13024 : 5555555555555555 = 680
13032 : 5555555555555555 = 680
13040 : 5555555555555555 = 680
13048 : 4000000040000000 = 128
13056 : 5555555555555555 = 680
13064 : 5555555555555555 = 680
13072 : 5555555555555555 = 680
13080 : 4000000040000000 = 128
13088 : 4000014000014000 = 194
13096 : 0140000140000140 = 195
13104 : 0001400001400001 = 131
13112 : 4000000040000000 = 128
13120 : 4000014000014000 = 194
13128 : 0140000140000140 = 195
13136 : 0001400001400001 = 131
13144 : 4000000040000000 = 128
13152 : 4000014000014000 = 194
13160 : 0140000140000140 = 195
13168 : 0001400001400001 = 131
13176 : 4000000150000000 = 145
13184 : 4000014000014000 = 194
13192 : 0140000140000140 = 195
13200 : 0001400001400001 = 131
13208 : 4000000040000000 = 128
13216 : 4000014000014000 = 194
13224 : 0140000140000140 = 195
13232 : 0001400001400001 = 131
13240 : 4000000040000000 = 128
13248 : 4000014000014000 = 194
13256 : 0140000140000140 = 195
13264 : 0001400001400001 = 131
13272 : 4000000040000000 = 128
13280 : 4000014000014000 = 194
13288 : 0140000140000140 = 195
13296 : 0001400001400001 = 131
13304 : 4000000040000000 = 128
13312 : 4000014000014000 = 194
13320 : 0140000140000140 = 195
13328 : 0001400001400001 = 131
13336 : 4000000150000000 = 145
13344 : 4000014000014000 = 194
13352 : 0140000140000140 = 195
13360 : 0001400001400001 = 131
13368 : 4000000040000000 = 128
13376 : 4000014000014000 = 194
13384 : 0140000140000140 = 195
13392 : 0001400001400001 = 131
13400 : 4000000040000000 = 128
13408 : 5555555555555555 = 680
13416 : 5555555555555555 = 680
13424 : 5555555555555555 = 680
13432 : 4000000040000000 = 128
13440 : 5555555555555555 = 680
13448 : 5555555555555555 = 680
13456 : 5555555555555555 = 680
13464 : 4000000040000000 = 128
13472 : 4000014000014000 = 194
13480 : 0140000140000140 = 195
13488 : 0001400001400001 = 131
13496 : 4000000150000000 = 145
13504 : 4000014000014000 = 194
13512 : 0140000140000140 = 195
13520 : 0001400001400001 = 131
13528 : 4000000040000000 = 128
13536 : 4000014000014000 = 194
13544 : 0140000140000140 = 195
13552 : 0001400001400001 = 131
13560 : 4000000040000000 = 128
13568 : 4000014000014000 = 194
13576 : 0140000140000140 = 195
13584 : 0001400001400001 = 131
13592 : 4000000040000000 = 128
13600 : 4000014000014000 = 194
13608 : 0140000140000140 = 195
13616 : 0001400001400001 = 131
13624 : 4000000040000000 = 128
13632 : 4000014000014000 = 194
13640 : 0140000140000140 = 195
13648 : 0001400001400001 = 131
13656 : 4000000150000000 = 145
13664 : 4000014000014000 = 194
13672 : 0140000140000140 = 195
13680 : 0001400001400001 = 131
13688 : 4000000040000000 = 128
13696 : 4000014000014000 = 194
13704 : 0140000140000140 = 195
13712 : 0001400001400001 = 131
13720 : 4000000040000000 = 128
13728 : 4000014000014000 = 194
13736 : 0140000140000140 = 195
13744 : 0001400001400001 = 131
13752 : 4000000040000000 = 128
13760 : 4000014000014000 = 194
13768 : 0140000140000140 = 195
13776 : 0001400001400001 = 131
13784 : 4000000040000000 = 128
13792 : 5555555555555555 = 680
13800 : 5555555555555555 = 680
13808 : 5555555555555555 = 680
13816 : 4155555555555550 = 655
```

Make new friends,



With Mirrorsoft games, you can make loads of new friends like Mr. Bounce and Ceasar the Cat. Or, now, like Dr. Frankenstein, you can create your very own monsters and aliens. As well as friends and heroes to defeat them.

GAMES CREATOR

Invent your own games. As simple or as complex as you care to make them. The only real limit is your imagination.

For the CBM64, the Games Creator comes with a step-by-step manual and three ready-to-play games. Each demonstrates some of the programs exceptional features: shapes, movement, speed, scrolling backgrounds, scoring, music, sound effects and many more. And you don't need to know any program language to work it.

On fast loading cassette for the CBM64. **£12.95.**

STAR EGGS

A space fantasy. Earth is threatened by attack from Alien life-forms hatching out in space. You must first overcome the Guardians. Then into the Hatchery, up and down escalators and ladders to crack the eggs before the aliens escape.

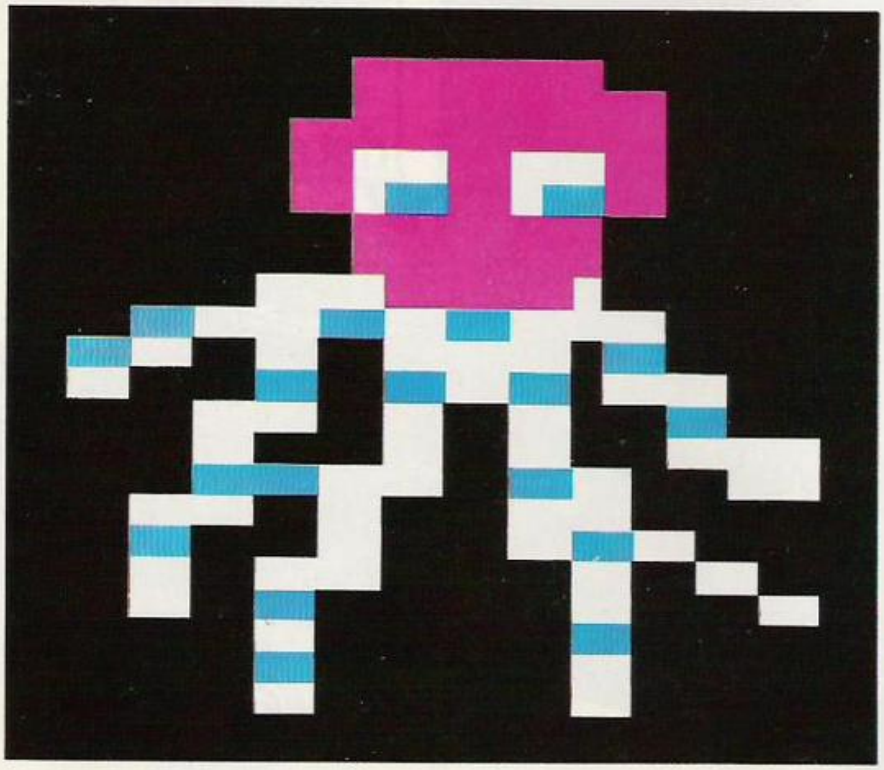
On fast loading cassette for the CBM64. **£6.95**

CATASTROPHES

Use a helicopter to build a hotel on an island paradise. But you have to move fast and design your building carefully because earthquakes, floods, storms and lightning can strike at any moment.

For one or two players. On fast loading cassette for the CBM64. **£6.95**

and enemies.



HI-BOUNCER

An arcade type game featuring Mr. Bounce and the Mr. Men. But don't get the idea that it's just a kids' game. Far from it. There are four main screens each with eight levels of difficulty and complexity. Don't worry, there's also a practice program with slower speeds.

On cassette for the BBC B. **£6.95.**

CEASAR THE CAT

Ceasar's cute and quick. Help him hunt the crowded shelves for mice who eat all the food. He must catch the mice before the food disappears. Outstanding graphics, animation and sound.

On cassette for the CBM64, Spectrum 48K, BBC B. **£6.95.**

MIRRORSOFT

SOFTWARE FOR ALL THE FAMILY

Available from Boots, W.H. Smith, Spectrum and all good software stockists. Write for a free catalogue to: Mirrorsoft, Holborn Circus, London, EC1P 1DQ.

Before you compare our new computer system with any other, double the price.

£249
Computer complete with green screen VDU (GT64)

£359
Computer complete with colour monitor (CTM640)

CPC 464 complete with monitor and datacorder

The first low-cost personal computer to be approved by the British Electrotechnical Approvals Board.

Other computer systems that get anywhere near the new CPC464 on specification cost around twice as much.

Which other home computer, for instance, gives you 64K of RAM (42K available), 32K of ROM and a colour monitor or VDU?

Which other home computer, gives you a built-in cassette data recorder, typewriter style keyboard, numeric keypad and a very fast extended BASIC?

And which other home computer offers it all for £359 with colour monitor or £249 with green screen VDU?

What's more, the CPC464 comes complete and ready-to-go. Just plug it in.

64K RAM.

Pound for pound, other micros can't match the CPC464's memory. Over 42K is available to users, thanks to the implementation of ROM overlay techniques.

So there's plenty of room for sophisticated and complex programs.

High resolution graphics. Stereo sound.

The monitor drives each colour on the screen directly from the computer. There's no unnecessary circuitry to distort your view. No tuning problems. And no arguments about who's using the computer and who's watching TV.

Sounds good, doesn't it?

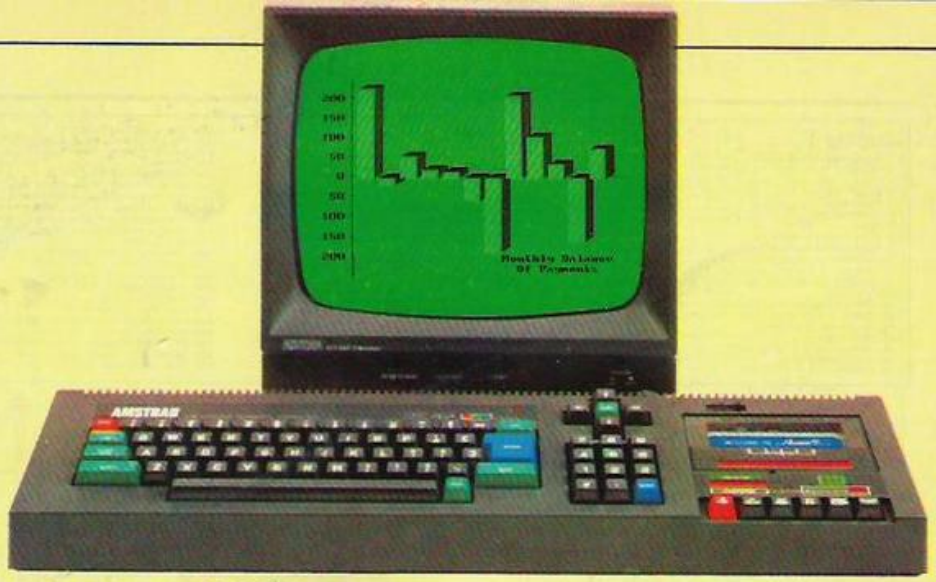
So does the CPC464 with its 3-voice, 7-octave stereo output fed through a hi-fi amplifier and speakers.

Amsoft. High quality software.

A rapidly expanding range of programs is already available. High quality software that takes full advantage of the CPC464's high specification and speed-loading capability.

Which means even complex programs can be loaded quickly.

Arcade games, educational programs and business applications are all designed to utilise the CPC464's impressive graphics, sound and processing abilities.



CPC464 green screen VDU (GT64)

Green screen VDU.

Text and numerical data are bright, sharp and easily read at a glance. Which is invaluable for word processing, accounting, budgeting and developing programs. And this purpose designed visual display system has an 80 column text display.

Green screen versions of the CPC464 can be used with a colour TV by connecting the optional power supply and modulator MP-1.

Amstrad. User Club.

The CPC464 User Club is run by Amsoft, our software division, which provides software, peripherals and publications for members.

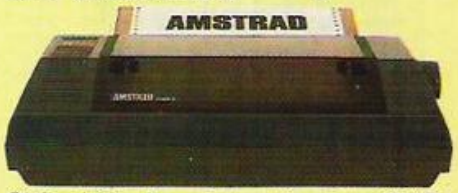
As a member, you'll enjoy immediate benefits like the privilege card, Club binder, regular magazine, competitions for valuable prizes and contact with other Amstrad users.

Whether you're interested in commercial applications or you're a games fanatic, you'll want to join the Club.

CPC464. Unlimited scope for expansion.

At Amstrad, we try to anticipate your future requirements. That's why there's a built-in parallel printer interface. A low cost optional disk drive system including CP/M* and LOGO. A joystick port. And the virtually unlimited potential of the Z80 data bus with sideways ROM support.

Optional disk drive DDI-1 including interface CP/M* and LOGO £199.95



Optional 80 column dot matrix printer DMP-1. Offers high performance computerised text processing for only £199.95.

BOOTS *COMET* **Dixons**
Menzies **RUMBELOWS** AND OTHER COMPUTER STORES

AMSTRAD

ONE GREAT IDEA AFTER ANOTHER

*Trade mark Digital Research

I'd like to know more about the quite exceptional CPC464 complete computer system. Please send literature right away.

NAME

ADDRESS

POSTCODE

To: Amstrad Consumer Electronics plc, Brentwood House, 169 King's Road, Brentwood, Essex CM14 4EF. Tel: Brentwood (0277) 228888.

YC5

Listing 1.

```
10 REM*****************
11 REM**  CODE INPUT  *
12 REM**   PROGRAM    *
13 REM**  BY LUDWIG  *
14 REM** ROUTINES FOR *
15 REM**HEDGES, +/-W/I&H*
16 REM**     BY       *
17 REM**  DAVID REES  *
18 REM*****************
19 REMENTER NUMBERS#
20 POKE51,4:POKE55,0
21 POKE52,50:POKE56,50:DIM#(15):GOSUB500
25 GOTO200
30 B=0:X=65536:Y=B2*256-1
40 INPUT"START POSITION";AB
45 IFLEN(AB$)<>4THEN30
50 GOSUB500
60 FORN=1TO4
65 B=#(ASC(AB$(N,N)))
70 FORM=0TO15
80 IFB=M:B=N:NEXTN
90 NEXTN
100 GOTO40
110 B=B*2^4+N:B(I)=B
120 NEXTN
130 IFB<>0ORI>7THEN20
140 RETURN
200 POKE52,54:POKE56,54:GOSUB20
210 GOSUB500:PRINT#8,
220 GOSUB550:IFN=16THEN220
230 C=A#16:PRINT#8,
240 GOSUB550:IFN=16THEN240
250 POKE8,C+A+B+I:PRINT#8
260 IFB<>I+1THEN210
270 END
280 FORN=AT09:AB(N)=RIGHT$(STR$(N),1):NEXT
290 FORN=10T015:AB(N)=CHR$(N+55):NEXT
300 RETURN
310 GETA$:IFA$=""THEN310
320 FORN=0T015:IFA$=AB(N)THENRETURN
330 NEXT
340 N=16:RETURN
400 C=PEEK(15)*16+PEEK(14)
410 E=(PEEK(2049)+256*PEEK(2050)-2049)/4096
420 B=#(F)+#(E)+#(D)+#(C)+" "
430 RETURN
440 REMCHECKSUM#
450 A=0:FORI=32768TO33023:A=A+PEEK(I):NEXT
460 IFA<>PEEK(33024)+256*PEEK(33025)THEN490
470 PRINT"CORRECT":RETURN
480 PRINT"ERROR IN DATA":STOP
490 REMPEEK CHECK#
500 POKE52,54:POKE56,54:DIM#(15):GOSUB500
510 GOSUB20:B=PEEK(15)*16+PEEK(14)
520 GOSUB500
530 FORM=0TO15
540 IFB=M:B=N:NEXTN
550 PRINT#8,B#;
560 IFI=I+1:RETURN
570 GETA$:IFA$=""THEN570
580 N=16:RETURN
```

TIRADIANS

David Rees with a CBM-64 program to save the world.

TIRADIANS IS another chapter in the Galaxians saga. A fleet of alien spacecraft shaped in the aliens' own image have grouped over part of planet earth. Swooping down, smaller groups enter the atmosphere to destroy industrial and population centres. You have Earth's only laser base, and your task is to destroy as many alien waves as possible.

You score when your laser bolt hits a Tiradian. Troops — blue ships with yellow eyes — are worth 20 points; Troop supervisors — troops with yellow moustaches — are worth 40 points; Flight leaders — colourful troops — are worth 80 points; and wave leaders — with the large guns — are worth 160 points. If you manage to hit them while they are swooping down, the above scores are doubled.

Tiradians comes in two parts, a Basic section which sets up registers, updates the scores etc., and a code section which contains graphics and machine code. The code length is rather long, so listing 1 contains a hex loader program. Type in and save this, and save the Basic program — listing 2 — afterwards.

Then, run the program in listing 1. This now allows you to type the code in the hex form of listing 3. The first prompt after running allows you to enter the location from which code will be typed in, the location being in the same form as the locations in listing 3. This allows you to start or resume at any location in the code section. If you have had enough for one day,

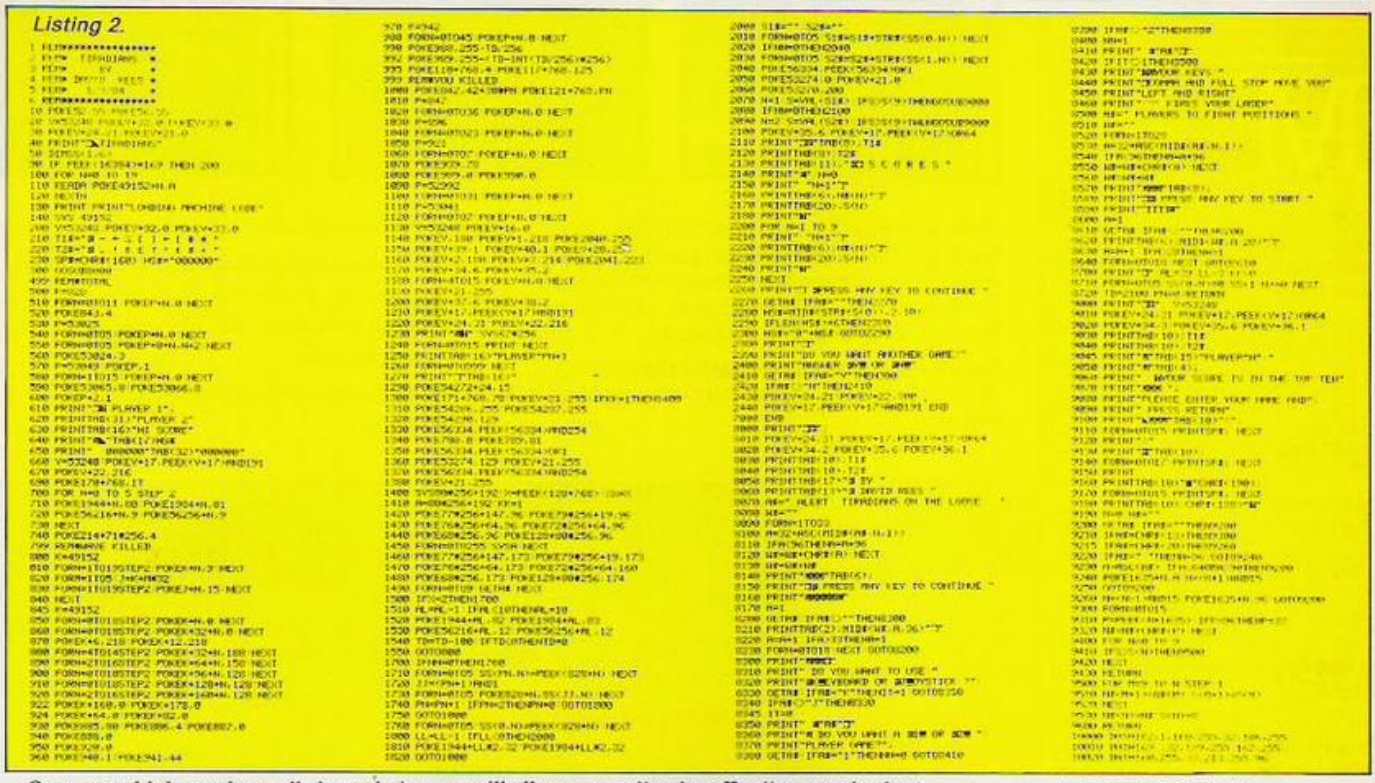
RUN 1100

will save the code. To resume, load the main Basic program — to load the code — and then load the hex input program.

Hex dump.

```
3680 A0 74 74 A0 61 6C 65 72
3688 74 BA A0 74 69 72 61 64
3690 69 61 6E 73 A0 6F 6E A0
3698 A0 A0 61 6C 65 72 74 BA
36A0 A0 74 69 72 61 64 69 61
36A8 6E 73 A0 6F 6E 6E A0 61
36B0 6C 65 72 74 BA A0 74 69
36B8 72 61 64 69 61 6E 73 A0
36C0 6F 6F A0 61 6C 65 72 74
36C8 BA A0 74 69 72 61 64 69
36D0 61 6E 73 A0 A0 A0 61 6C
36D8 65 72 74 BA A0 74 69 72
36E0 61 64 69 61 6E 73 73 A0
36E8 61 6C 65 72 74 BA A0 74
36F0 69 72 61 64 69 61 6E 6E
36F8 A0 61 6C 65 72 74 BA A0
3700 74 69 72 61 64 69 61 61
3708 A0 61 6C 65 72 74 BA A0
3710 74 69 72 61 64 69 69 A0
3718 61 6C 65 72 74 BA A0 74
3720 69 72 61 64 69 61 6E 6E
3728 A0 61 6C 65 72 74 BA A0
3730 74 69 72 61 64 69 61 61
3738 A0 61 6C 65 72 74 BA A0
3740 74 69 72 61 64 69 69 A0
3748 61 6C 65 72 74 BA A0 74
3750 69 72 61 64 64 A0 61 6C
3758 65 72 74 BA A0 74 69 72
3760 61 61 A0 61 6C 65 72 74
3768 BA A0 74 69 72 72 A0 61
3770 6C 65 72 74 BA A0 74 69
3778 69 A0 61 6C 65 72 74 BA
3780 74 69 72 61 64 69 61 61
3788 A0 61 6C 65 72 74 BA A0
3790 74 69 72 61 64 69 69 A0
3798 61 6C 65 72 74 BA A0 74
37A0 72 61 64 69 61 6E 6E A0
37A8 A0 A0 61 6C 65 72 74 BA
37B0 74 69 72 61 64 69 61 6E
37B8 73 A0 6F 6E 6E A0 61 6C
37C0 65 72 74 BA A0 74 69 72
37C8 61 64 69 61 6E 73 A0 6F
37D0 6E 6E A0 61 6C 65 72 74
37D8 BA A0 74 69 72 61 64 69
37E0 61 6E 73 A0 A0 A0 61 6C
37E8 65 72 74 BA A0 74 69 72
37F0 61 64 69 61 6E 73 73 A0
37F8 61 6C 65 72 74 BA A0 74
3800 69 72 61 64 69 61 6E 6E
3808 A0 61 6C 65 72 74 BA A0
3810 74 69 72 61 64 69 61 61
3818 A0 61 6C 65 72 74 BA A0
3820 74 69 72 61 64 69 69 A0
3828 61 6C 65 72 74 BA A0 74
3830 69 72 61 64 69 61 6E 6E
3838 A0 61 6C 65 72 74 BA A0
3840 74 69 72 61 64 64 A0 61
3848 6C 65 72 74 BA A0 74 69
3850 72 61 61 A0 61 6C 65 72
3858 74 BA A0 74 69 72 72 A0
3860 61 6C 65 72 74 BA A0 74
3868 69 A0 61 6C 65 72 74 BA
3870 A0 74 74 A0 61 6C 65 72
3878 74 BA A0 A0 A0 61 6C 65
3880 72 74 BA BA A0 61 6C 65
3888 72 74 74 A0 61 6C 65 72
3890 72 A0 61 6C 65 65 A0 61
3898 6C 6C A0 61 61 A0 A0 A0
38A0 AD 76 03 85 1C A5 19 4A
38A8 18 4A 18 4A 18 4A 18 4A
38B0 18 AA AD 75 03 E0 00 F0
38B8 0B 18 69 50 90 03 18 E6
38C0 1C CA D0 F5 85 1B A5 1D
38C8 29 1E 85 1A 0A 18 65 1A
38D0 18 4A 18 65 1B 90 03 18
38D8 E6 1C 85 1B A0 00 A9 20
38E0 91 1B C8 91 1B C8 91 1B
38E8 60 00 FF FF 00 00 FF FF
38F0 00 00 FF FF 00 00 FF FF
38F8 00 00 FF FF 00 00 FF FF
3900 00 00 FF FF 00 00 FF FF
3908 00 00 FF FF 00 00 FF FF
3910 00 00 FF FF 00 00 FF FF
3918 00 00 FF FF 00 81 FF F7
3920 85 FE A5 FE 18 69 02 18
3928 AA C8 C8 B9 F8 07 60 00
3930 FF FF 00 00 00 00 FF FF
3938 06 0C 18 00 00 00 00 00
3940 0C 18 30 30 30 18 0C 00
3948 30 18 0C 0C 0C 18 30 00
3950 3C 3C 66 66 60 60 3C 3C
3958 06 06 66 66 3C 3C 00 00
3960 00 00 00 00 00 18 18 30
3968 7E 7E 18 18 18 18 18 18
3970 18 18 18 18 18 18 00 00
3978 00 03 06 0C 18 30 60 00
3980 3C 66 6E 76 66 66 3C 00
3988 18 18 38 18 18 18 7E 00
3990 3C 66 06 0C 30 60 7E 00
3998 3C 66 06 1C 06 66 3C 00
39A0 06 0E 1E 66 7F 06 06 00
39A8 7E 60 7C 06 06 66 3C 00
39B0 3C 66 60 7C 66 66 3C 00
39B8 7E 66 0C 18 18 18 18 00
39C0 3C 66 66 3C 66 66 3C 00
39C8 3C 66 66 3E 06 66 3C 00
39D0 00 00 18 00 00 18 00 00
39D8 00 00 18 00 00 18 18 30
39E0 01 03 07 0F 1F 3F 7F FF
39E8 00 00 7E 00 7E 00 00 00
39F0 80 C0 E0 F0 F8 FC FE FF
39F8 3C 66 06 0C 18 00 18 00
3A00 00 00 00 00 00 00 00 00
3A08 03 03 03 03 00 00 00 00
3A10 00 00 00 00 03 03 03 03
3A18 00 00 00 00 00 00 00 00
3A20 00 00 00 00 00 00 00 00
3A28 0C 0C 0C 0C 00 00 00 00
3A30 00 00 00 00 0C 0C 0C 0C
3A38 00 00 00 00 00 00 00 00
3A40 00 00 00 00 00 00 00 00
3A48 30 30 30 30 00 00 00 00
3A50 00 00 00 00 30 30 30 30
3A58 00 00 00 00 00 00 00 00
3A60 00 00 00 00 00 00 00 00
3A68 C0 C0 C0 C0 00 00 00 00
3A70 00 00 00 C0 C0 C0 C0 C0
3A78 00 00 00 00 00 00 00 00
3A80 00 00 00 00 0C 0C 37 37
3A88 15 19 08 2A 2E 0C 3F 33
3A90 00 00 00 01 0D 3D 3D 0D
3A98 01 01 01 01 01 01 01 00
3AA0 00 01 05 15 15 05 01 00
3AA8 00 00 40 50 50 40 00 00
3AB0 01 05 16 5A 5A 16 05 01
3AB8 00 40 50 94 94 50 40 00
3AC0 02 06 2B AF AF 2B 06 02
3AC8 00 80 A0 E8 E8 A0 80 00
3AD0 03 0F 3C F0 F0 3C 0F 03
3AD8 00 C0 F0 3C 3C F0 C0 00
3AE0 00 00 00 00 00 00 00 00
3AE8 00 00 00 00 00 00 00 00
3AF0 01 01 00 05 40 00 05 40
3AF8 00 1D D0 00 45 44 00 15
3B00 01 00 00 05 40 00 05 40
3B08 00 19 90 00 45 44 00 15
3B10 50 00 44 44 00 04 40 00
3B18 00 00 00 00 00 00 00 00
3B20 00 00 00 00 00 00 00 00
3B28 00 00 00 00 00 00 00 00
3B30 00 00 00 00 00 00 00 00
3B38 00 00 00 00 00 00 00 00
3B40 04 40 00 05 40 00 59 94
3B48 00 15 50 00 25 60 00 A5
3B50 68 00 81 08 00 00 00 00
3B58 00 00 00 00 00 00 00 00
3B60 00 00 00 00 00 00 00 00
3B68 00 00 00 00 00 00 00 00
3B70 00 00 00 00 00 00 00 00
3B78 00 00 00 00 00 00 00 00
3B80 0C C0 00 0F C0 00 FB BC
3B88 00 3F F0 00 3F F0 00 1F
3B90 D0 00 53 14 00 40 04 00
3B98 00 00 00 00 00 00 00 00
3BA0 00 00 00 00 00 00 00 00
3BA8 00 00 00 00 00 00 00 00
3BB0 00 00 00 00 00 00 00 00
3BB8 00 00 00 00 00 00 00 00
3BC0 00 00 00 42 04 00 4A 84
3BC8 00 6B A4 00 6F E4 00 1F
3BD0 D0 00 03 00 00 03 00 00
3BD8 00 00 00 00 00 00 00 00
3BE0 00 00 00 00 00 00 00 00
3BE8 00 00 00 00 00 00 00 00
3BF0 00 00 00 00 00 00 00 00
3BF8 00 00 00 00 00 00 00 FF
3C00 01 05 03 1D 45 15 44 04
3C08 00 40 40 D0 44 50 44 40
3C10 00 00 00 00 00 00 00 00
3C18 00 01 01 07 11 05 11 01
3C20 40 50 50 74 51 54 11 10
3C28 00 00 00 00 00 00 00 00
3C30 00 00 00 01 04 01 04 00
3C38 10 54 54 DD 54 55 44 44
3C40 00 00 00 00 40 00 40 00
3C48 00 00 00 00 01 00 01 00
3C50 04 15 15 77 15 55 11 11
3C58 00 00 00 40 10 40 10 00
3C60 00 00 00 00 00 00 00 00
3C68 01 05 05 1D 45 15 44 04
3C70 00 40 40 D0 44 50 44 40
```

Listing 2.



Once you think you have all the code in,

RUN 700

will give the actual and correct totals for sections of the code, to give an idea as to whether there are any errors. If any sections are wrong,

RUN 900

will allow you to list the offending area in the same format as the magazine listing. You can then run the hex loader, and correct any mistakes. If you want to save and load the code on disc, change the following lines:

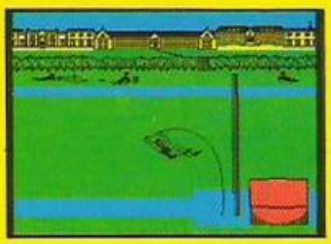
Hex loader: 1220 DATA
162,8,160,255,32,186,255

Basic: 10000 DATA
162,8,160,255,32,186,255

One final note. Check, by Peeking locations 788 and 789, whether the values contained within them are 49 and 234 respectively. If your values differ from those above, then lines 1330-1350, and line 1370 may all be omitted.

```
3C78  01 05 45 1D 45 15 04 04
3C80  00 40 44 D0 44 50 40 40
3C88  00 00 00 00 00 00 00 00
3C90  00 01 11 07 11 05 01 01
3C98  40 50 51 74 51 54 10 10
3CA0  00 00 00 00 00 00 00 00
3CA8  00 00 04 01 04 01 00 00
3CB0  10 54 54 DD 54 55 44 44
3CB8  00 00 40 00 40 00 00 00
3CC0  00 00 01 00 01 00 00 00
3CC8  04 15 15 77 15 55 11 11
3CD0  00 00 10 40 10 40 00 00
3CD8  00 00 00 00 00 00 00 00
3CE0  01 05 45 1D 45 15 04 04
3CE8  00 40 44 D0 44 50 40 40
3CF0  04 05 5D 15 35 F5 C1 00
3CF8  40 40 D4 50 70 7C 0C 00
3D00  00 00 00 00 00 00 00 00
3D08  01 01 17 05 0D 3D 30 00
3D10  10 50 75 54 5C 5F 43 00
3D18  00 00 00 00 00 00 00 00
3D20  00 00 05 01 03 0F 0C 00
3D28  44 54 DD 55 57 57 10 00
3D30  00 00 40 00 00 C0 C0 00
3D38  00 00 01 00 00 03 03 00
3D40  11 15 77 55 D5 D5 04 00
3D48  00 00 50 40 C0 F0 30 00
3D50  00 00 00 00 00 00 00 00
3D58  04 05 5D 15 35 F5 C1 00
3D60  40 40 D4 50 70 7C 0C 00
3D68  04 05 5D D5 F5 35 01 00
3D70  40 40 D4 5C 7C 70 00 00
3D78  00 00 00 00 00 00 00 00
3D80  01 01 17 35 3D 0D 00 00
3D88  10 50 75 57 5F 5C 40 00
3D90  00 00 00 00 00 00 00 00
3D98  00 00 05 0D 0F 03 00 00
3DA0  44 54 DD 55 57 57 10 00
3DA8  00 00 40 C0 C0 00 00 00
3DB0  00 00 01 03 03 00 00 00
3DB8  11 15 77 55 D5 D5 04 00
3DC0  00 00 50 70 F0 C0 00 00
3DC8  00 00 00 00 00 00 00 00
3DD0  04 05 5D D5 F5 35 01 00
3DD8  40 40 D4 5C 7C 70 00 00
3DE0  02 0A AE 2A 2A 1A 52 40
3DE8  80 80 E8 A0 A8 90 14 04
3DF0  00 00 00 00 00 00 00 00
3DF8  02 02 2B 0A 0A 06 14 10
3E00  20 A0 BA A8 A8 A4 95 01
3E08  00 00 00 00 00 00 00 00
3E10  00 00 0A 02 02 01 05 04
3E18  88 A8 EE AA AA A9 21 00
3E20  00 00 80 00 00 00 40 40
3E28  00 00 02 00 00 00 01 01
3E30  22 2A BB AA AA 6A 48 00
3E38  00 00 A0 80 80 40 50 10
3E40  00 00 00 00 00 00 00 00
3E48  08 0A AE 2A 2A 1A 52 40
3E50  80 80 E8 A0 A0 90 14 04
3E58  08 0A AE 2A 6A 5A 12 00
3E60  80 80 E8 A0 A4 94 10 00
3E68  00 00 00 00 00 00 00 00
3E70  02 02 2B 0A 1A 16 04 00
3E78  20 A0 BA A8 A9 A5 84 00
3E80  00 00 00 00 00 00 00 00
3E88  00 00 0A 02 06 05 01 00
3E90  88 A8 EE AA AA A9 21 00
3E98  00 00 80 00 40 40 00 00
3EA0  00 00 02 00 01 01 00 00
3EA8  22 2A BB AA AA 6A 48 00
3EB0  00 00 A0 80 90 50 40 00
3EB8  00 00 00 00 00 00 00 00
3EC0  08 0A AE 2A 6A 5A 12 00
3EC8  80 80 E8 A0 A4 94 10 00
3ED0  00 43 4F 7E 7A 1A 02 02
3ED8  00 04 C4 F4 B4 90 00 00
3EE0  00 00 00 00 00 00 00 00
3EE8  00 10 13 1F 1E 06 00 00
3EF0  00 C1 F1 BD AD A4 80 80
3EF8  00 00 00 00 00 00 00 00
3F00  00 04 04 07 07 01 00 00
3F08  00 30 FC EF AB A9 20 20
3F10  00 40 40 40 00 00 00 00
3F18  00 01 01 01 01 00 00 00
3F20  00 0C 3F FB EA 6A 08 08
3F28  00 10 10 D0 D0 40 00 00
3F30  00 00 00 00 00 00 00 00
3F38  00 43 4F 7E 7A 1A 02 02
3F40  00 04 C4 F4 B4 90 00 00
3F48  00 43 4F 7E 7A 1A 02 02
3F50  00 04 C4 F4 B4 90 00 00
3F58  00 00 00 00 00 00 00 00
3F60  00 10 13 1F 1E 06 00 00
3F68  00 C1 F1 BD AD A4 80 80
3F70  00 00 00 00 00 00 00 00
3F78  00 04 04 07 07 01 00 00
3F80  00 30 FC EF AB A9 20 20
3F88  00 40 40 40 40 00 00 00
3F90  00 01 01 01 01 00 00 00
3F98  00 0C 3F FB EA 6A 08 08
3FA0  00 10 10 D0 D0 40 00 00
3FA8  00 00 00 00 00 00 00 00
3FB0  00 43 4F 7E 7A 1A 02 02
3FB8  00 04 C4 F4 B4 90 00 00
3FC0  26 00 00 26 00 00 26 00
3FC8  00 95 80 00 9D 80 00 9D
3FD0  80 00 0C 00 00 3F 00 00
3FD8  3F 00 00 FF C0 00 FF C0
3FE0  00 EA C0 00 22 00 00 22
3FE8  00 00 A2 80 00 80 80 00
3FF0  00 00 00 00 00 00 00 00
3FF8  00 00 00 00 00 00 00 00
4000  A9 01 85 FB A0 00 AD 10
4008  D0 25 FB F0 02 A9 01 85
4010  FC B9 00 D0 BE 01 CF E0
4018  00 F0 0C 18 79 00 CF 90
4020  03 18 E6 FC 18 90 09 38
4028  F9 00 CF B0 02 C6 FC 18
4030  99 00 D0 A5 FC 29 01 F0
4038  08 A5 FB 0D 10 D0 18 90
4040  07 A5 FB 49 FF 2D 10 D0
4048  8D 10 D0 B9 01 D0 BE 11
4050  CF E0 00 F0 07 18 79 10
4058  CF 18 90 04 38 F9 10 CF
4060  18 99 01 D0 06 FB C8 C0
4068  C0 10 D0 9A 60 FF 00 00
4070  FF FF 00 00 FF FF 00 00
4078  FF FF 00 00 FF FF 00 80
4080  FF FF 00 00 FF FF 00 00
4088  FF FF 00 00 FF FF 00 00
4090  FF FF 00 00 FF FF 00 00
4098  FF FF 00 00 FF FF 00 00
40A0  FF FF 00 00 FF FF 00 00
40A8  FF FF 00 00 FF FF 00 00
40B0  FF FF 00 00 FF FF 00 00
40B8  FF FF 00 00 FF FF 00 02
40C0  FF FF 00 00 FF FF 00 00
40C8  FF FF 00 00 FF FF 00 00
40D0  FF FF 00 00 FF FF 00 00
40D8  FF FF 00 00 FF FF 00 00
40E0  FF DA 00 00 FF FF 00 00
40E8  FF FF 00 00 FF FF 00 00
40F0  FF FF 00 00 FF FF 00 00
40F8  FF FF 00 00 FF FF 00 00
4100  AD 20 CF 29 07 8D 20 CF
4108  A0 00 84 02 B9 21 CF C9
4110  08 F0 6F 18 0A 18 A8 18
4118  4A 18 AA A9 01 E0 00 F0
4120  06 18 0A 18 CA D0 FA 2D
4128  10 D0 F0 02 A9 80 85 FB
4130  B9 00 D0 18 4A 18 65 FB
4138  18 8D FA CF B9 01 D0 18
4140  4A 18 8D FB CF A4 02 B9
4148  29 CF 18 0A 18 A8 18 4A
4150  18 AA A9 01 E0 00 F0 06
4158  18 0A 18 CA D0 FA 2D 10
4160  D0 F0 02 A9 80 85 FB B9
4168  00 D0 18 4A 18 65 FB 18
4170  8D FC CF B9 01 D0 18 4A
4178  18 8D FD CF 18 90 06 18
4180  90 88 18 90 4D AD FA CF
4188  38 ED FC CF B0 02 49 FF
4190  18 AC 20 CF C0 00 F0 05
4198  4A 18 88 D0 FB C9 00 F0
41A0  05 A9 00 18 90 02 A9 01
41A8  85 FD AD FB CF 38 ED FD
41B0  CF B0 02 49 FF 18 AC 20
41B8  CF C0 00 F0 05 4A 18 EC
41C0  D0 FB C9 00 F0 05 A9 00
41C8  18 90 02 A9 01 25 FD 18
41D0  90 02 A9 00 A4 02 99 31
41D8  CF C8 C0 08 D0 A1 A0 00
41E0  A9 00 18 79 31 CF 18 C8
41E8  C0 08 D0 F6 60 00 FF FF
41F0  00 00 FF FF 00 00 FF FF
41F8  00 00 FF FF 00 00 FF FF
4200  A9 01 85 FB A0 00 84 02
4208  B9 39 CF F0 31 AD 10 D0
4210  25 FB F0 02 A9 80 85 FC
4218  B9 00 D0 18 4A 18 65 FC
4220  38 E9 14 18 6D 49 CF 18
4228  4A 18 4A 18 85 FC B9 01
4230  D0 18 4A 38 E9 21 18 6D
4238  4A CF 18 4A 18 4A 18 A8
4240  AD 88 02 85 FD A5 FC C0
4248  00 F0 0B 18 69 28 90 03
4250  18 E6 FD 88 D0 F5 85 FC
4258  A0 00 B1 FC A4 02 99 3A
4260  CF 06 FB C8 C8 84 02 C0
4268  10 D0 9D 60 FF FF 00 00
4270  FF FF 00 00 FF FF 00 00
4278  FF FF 00 00 FF FF 00 00
4280  FF FF 00 00 FF FF 00 00
4288  FF FF 00 00 FF FF 00 00
4290  FF FF 00 00 FF FF 00 00
4298  FF FF 00 00 FF FF 00 00
42A0  FF FF 00 00 FF FF 00 00
42A8  FF FF 00 00 FF FF 00 00
42B0  FF FF 00 00 FF FF 00 00
42B8  FF FF 00 00 FF FF 00 02
42C0  FF FF 00 00 FF FF 00 00
42C8  FF FF 00 00 FF FF 00 00
42D0  FF FF 00 00 FF FF 00 00
42D8  FF FF 00 00 FF FF 00 00
42E0  FF 9A 00 00 FF FF 00 00
42E8  FF FF 00 00 FF FF 00 00
```

(continued on page 111)



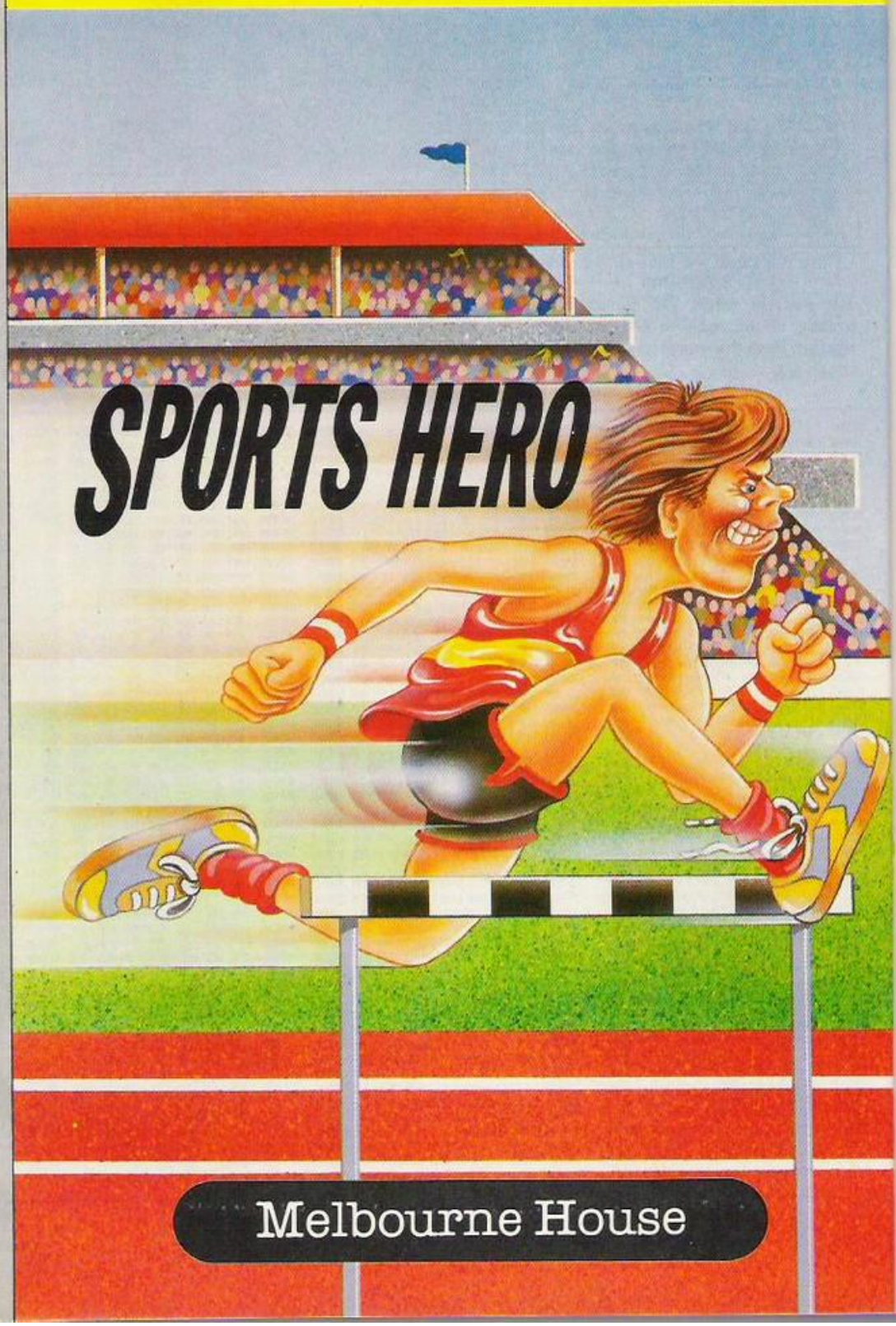
Work your way through the most challenging track and field events. As you gain experience and confidence you begin to excel in the four exciting events: 100 metre sprint, 110 metre hurdles, long jump and pole vault.

Here's your chance to be part of the winning team. Pit yourself against the clock and beat the record.

Sports Hero includes:

- ★ Multi level competition
- ★ Spectacular graphics
- ★ Smooth animation
- ★ Real time action

Can you surpass your personal best!



Orders to:
Melbourne House Publishers
39 Milton Trading Estate
Abingdon, Oxon OX14 4TD

Correspondence to:
Church Yard
Tring
Hertfordshire HP23 5LU

All Melbourne House cassette software is unconditionally guaranteed against malfunction.

Trade enquiries welcome.

☐ Please send me your free catalogue.
Please send me:

SPECTRUM SOFTWARE

☐ Spectrum Sports Hero 48K	£6.95
☐ Spectrum Sherlock 48K	£14.95
☐ Spectrum Hampstead 48K	£9.95
☐ Spectrum Mugsy 48K	£6.95
☐ Spectrum Penetrator 48K	£6.95
☐ Spectrum The Hobbit 48K	£14.95
☐ H.U.R.G. 48K	£14.95
☐ Spectrum Classic Adventure 48K	£6.95
☐ Melbourne Draw 48K	£8.95
☐ Abersoft FORTH 48K	£14.95
☐ Sir Lancelot 16K & 48K	£5.95

COMMODORE 64 SOFTWARE

☐ Castle of Terror	£9.95
☐ Commodore 64 Sherlock	£14.95
☐ Commodore 64 Hampstead	£9.95
☐ Commodore 64 The Hobbit	£14.95
☐ Zim Sala Bim	£9.95
☐ Commodore 64 Classic Adventure	£6.95
☐ Commodore 64 Hungry Horace	£5.95
☐ Commodore 64 Horace Goes Skiing	£5.95
☐ Commodore 64 FORTH	£14.95
☐ A.C.O.S.+	£8.95
☐ Commodore 64 Penetrator	£7.95

£ .....
Please add 80p for post & pack £ 80
TOTAL £ .....

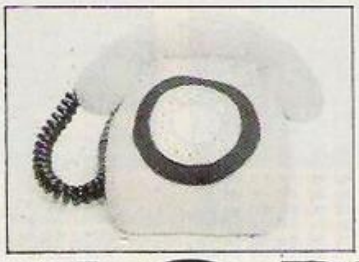
I enclose my ☐ cheque
☐ money order for £ .....
Please debit my Access card No .....
.....
Expiry Date .....
Signature .....
Name .....
Address .....
.....
.....
..... Postcode .....

Access orders can be telephoned through on our 24-hour ansafone (0235) 83 5001.

YC1A

(Hex dump continued from page 109)

```
42F0  FF FF 00 00 FF FF 00 00
42F8  FF FF 00 00 FF FF 00 00
4300  AD 75 03 85 FB 85 FD AD
4308  76 03 85 FC 18 69 D4 18
4310  85 FE A9 00 8D A6 03 8D
4318  A3 03 A9 00 8D A4 03 AD
4320  A3 03 18 0A 18 0A 18 0A
4328  18 0A 18 0A 18 85 19 A9
4330  00 85 1A A4 19 B9 00 C0
4338  F0 08 EE A4 03 18 6D 77
4340  03 18 A4 1A 99 00 C4 A4
4348  19 B9 01 C0 A4 1A 99 01
4350  C4 E6 19 E6 19 E6 1A E6
4358  1A C0 12 D0 D6 AD A6 03
4360  18 6D A4 03 18 8D A6 03
4368  A9 00 85 02 8D A7 03 AC
4370  A7 03 B9 00 C4 F0 12 A4
4378  02 91 FB C8 18 69 01 18
4380  91 FB C8 18 69 01 18 91
4388  FB AC A7 03 B9 01 C4 A4
4390  02 91 FD C8 91 FD C8 91
4398  FD A5 02 18 69 03 18 85
43A0  02 AD A7 03 18 69 02 18
43A8  8D A7 03 C9 14 D0 C0 A5
43B0  FB 18 69 50 90 05 18 E6
43B8  FC E6 FE 85 FB 85 FD EE
43C0  A3 03 AD A3 03 C9 06 F0
43C8  03 4C 1A 43 18 AD A6 03
43D0  C9 00 F0 01 60 A0 00 B9
43D8  99 03 F0 01 60 C8 C0 06
43E0  D0 F5 A9 01 8D 80 02 60
43E8  00 FF FF FF 00 00 FF FF
43F0  00 00 FF FF 00 00 FF FF
43F8  00 00 FF FF 00 00 FF FF
4400  AD AA 03 F0 78 A5 C5 C9
4408  2F D0 0C AD AB 03 38 E9
4410  01 B0 01 60 18 90 10 C9
4418  2C D0 2C AD AB 03 18 69
4420  01 18 C9 9F D0 01 60 8D
4428  AB 03 18 69 0C 18 0A 2D
4430  00 D0 E0 09 AD 10 D0 29
4438  FE 8D 10 D0 60 18 AD 10
4440  D0 09 01 8D 10 D0 60 C9
4448  37 F0 01 60 AD 12 CF D0
4450  FA A9 00 8D 04 D4 A9 0A
4458  8D 05 D4 A9 01 8D 06 D4
4460  A9 81 8D 04 D4 A9 32 8D
4468  01 D4 AD AB 03 29 03 8D
4470  73 03 A9 01 8D 71 03 A9
4478  03 8D 12 CF 60 AD 79 03
4480  F0 06 AD 00 DC 18 90 03
4488  AD 01 DC 85 FB 29 04 C9
4490  00 D0 06 20 0B 44 18 90
4498  0B A5 FB 29 08 C9 00 D0
44A0  03 20 1B 44 A5 FB 29 10
44A8  C9 00 F0 01 60 4C 4C 44
44B0  FF FF 00 00 FF FF 00 00
44B8  FF FF 00 00 FF FF 00 02
44C0  20 00 40 20 00 41 20 00
44C8  42 20 00 44 AD 71 03 D0
44D0  20 AD AB 03 18 69 0C 18
44D8  8D AB 03 D0 B0 09 AD 10
44E0  D0 29 FD 8D 10 D0 60 18
44E8  AD 10 D0 09 02 8D 10 D0
44F0  60 AD 03 D0 38 E9 42 B0
44F8  12 A9 D6 8D 03 D0 A9 00
4500  8D 71 03 A9 00 8D 12 CF
4508  4C D1 44 18 AD 10 D0 85
4510  FB 29 02 85 FC AD 02 D0
4518  18 4A 18 A2 00 E4 FC F0
4520  02 09 80 18 69 02 18 85
4528  FD AD 03 D0 85 FE A9 04
4530  85 02 A0 00 A5 FB 25 02
4538  85 FC B9 04 D0 18 4A 18
4540  E4 FC F0 02 09 80 38 E5
4548  FD 18 49 FF 29 FB C9 00
4550  D0 10 B9 05 D0 38 E5 FE
4558  18 29 F8 C9 00 D0 03 4C
4560  C0 47 C8 C8 D6 02 C0 0C
4568  D0 CA AD 3C CF 85 FB 29
4570  80 C9 00 D0 01 60 A5 FB
4578  29 7F A2 01 85 FB 38 E9
4580  1E 90 05 18 E8 18 90 F6
4588  18 69 0F B0 03 18 69 0F
4590  18 C9 02 D0 01 60 C9 0C
4598  D0 01 60 4C C0 45 FF FF
45A0  00 00 FF FF 00 00 FF FF
45A8  00 00 FF FF 00 00 FF FF
45B0  00 00 FF FF 00 00 FF FF
45B8  00 00 FF FF 00 00 FF FF
45C0  C9 00 F0 68 C9 03 F0 64
45C8  C9 06 F0 60 C9 0D F0 5C
45D0  C9 0A F0 58 85 FB AD 02
45D8  D0 29 07 4A 18 AA A5 FB
45E0  E0 00 D0 11 C9 01 F0 44
45E8  C9 04 F0 40 C9 07 F0 3C
45F0  C9 0E F0 38 E0 00 D0 D0
45F8  11 C9 01 F0 2F C9 04 F0
4600  2B C9 07 F0 27 C9 0E F0
4608  23 E0 00 D0 11 C9 07 F0
4610  F0 1A C9 09 F0 16 C9 0C
4618  F0 12 C9 0F F0 0E E0 00
4620  D0 F0 09 C9 09 F0 05 C9
4628  0C F0 01 60 8E F0 02 01
4630  20 00 47 A6 FD A9 01 F0
4638  00 F0 05 0A 18 CA D0 FB
4640  85 FD AD 46 03 18 65 FD
4648  18 8D 46 03 38 E9 0A 90
4650  07 18 8D 46 03 EE 45 03
4658  A9 D6 8D 02 D0 AD 10 D0
4660  29 01 F0 0B AD 10 D0 09
4668  02 8D 10 D0 18 90 08 AD
4670  10 D0 29 FD 8D 10 D0 A5
4678  FC 38 ED 76 03 18 85 FE
4680  A5 FB 38 ED 75 03 E0 02
4688  C6 FE 10 A4 FE C8 A2 00
4690  38 E9 50 E8 B0 FB 88 D0
4698  F7 18 69 50 18 CA A0 00
46A0  38 E9 03 C8 C8 B0 F9 88
46A8  88 A9 C0 85 FE 8A 0A 18
46B0  0A 18 0A 18 0A 18 0A 90
46B8  03 18 E6 FE 85 FD 98 29
46C0  1F A8 A9 00 91 FD AD 00
46C8  D0 8D 02 D0 A9 00 8D 71
46D0  03 8D 12 CF 60 FF 00 00
46D8  FF FF 00 00 FF FF 00 00
46E0  FF BA 00 00 FF FF 00 00
46E8  FF FF 00 00 FF FF 00 00
46F0  FF FF 00 00 FF FF 00 00
46F8  FF FF 00 00 FF FF 00 00
4700  8A A8 A9 01 E0 00 F0 05
4708  0A 18 CA D0 FB 2D 1C D0
4710  AA 98 18 0A 18 A8 B9 00
4718  D0 4A 18 E0 00 F0 02 09
4720  80 38 E9 08 10 FA 4A 18 4A
4728  18 85 FE B9 01 D0 38 E9
4730  32 18 4A 18 4A 18 4A 18
4738  A8 A9 04 85 FC A5 FB C0
4740  00 F0 0E 18 69 28 90 03
4748  18 E6 FC 38 E9 01 F5 85 FB
4750  A0 00 B9 82 03 F0 07 C8
4758  C8 C8 C0 15 D0 F4 A5 FD
4760  99 81 03 A5 FC 99 82 03
4768  A9 54 99 83 03 A9 00 8D
4770  04 D4 8D 02 CF A9 0A 8D
4778  05 D4 A9 01 8D 06 D4 A9
4780  0F 8D 18 D4 A9 81 8D 04
4788  D4 A9 28 8D 01 D4 A5 FB
4790  38 E9 02 B0 02 C6 FC 18
4798  85 FB A9 20 A0 00 91 FB
47A0  C8 91 FB A0 04 91 FB A5
47A8  FB 18 69 02 90 03 18 E6
47B0  FC 85 FB 60 A0 00 80 FF
47B8  00 00 FF FF 00 00 FF FD
47C0  84 FD 98 4A 18 AB AA 20
47C8  B0 37 38 E9 EC 18 85 FF
47D0  20 00 47 A6 FF A9 04 E0
47D8  00 F0 05 0A 18 CA D0 FB
47E0  85 FF AD 46 03 18 65 FF
47E8  18 8D 46 03 38 E9 0A 90
47F0  13 18 8D 46 03 EE 45 03
47F8  38 E9 0A 90 07 18 8D 46
4800  03 EE 45 03 A9 D6 8D 02
4808  D0 AD 10 D0 29 01 F0 08
4810  AD 10 D0 09 02 18 90 05
4818  AD 10 D0 29 FD 8D 10 D0
4820  A4 FE A9 00 8D 12 CF 99
4828  99 03 8D 71 03 A4 FD 99
4830  05 D0 99 04 CF 99 14 CF
4838  AD 00 D0 8D 02 D0 60 00
4840  F0 00 E3 31 CF C9 01 F0
4848  08 C8 C0 06 D0 F4 18 90
4850  0B A2 00 20 00 47 A9 02
4858  8D 80 03 60 AD 3A CF 85
4860  FB 29 F0 C9 40 F0 01 60
4868  A5 FB 29 03 C9 00 D0 01
4870  60 C9 03 D0 01 60 A2 00
4878  20 00 47 A9 02 8D 80 03
4880  60 FF 00 00 FF FF 00 00
4888  FF FF 00 00 FF FF 00 00
4890  FF FF 00 00 FF FF 00 00
4898  FF FF 00 00 FF FF 00 00
48A0  FF FF 00 00 FF FF 00 00
48A8  FF FF 00 00 FF FF 00 00
48B0  FF FF 00 00 FF FF 00 02
48B8  AD 4A 03 85 FB AD 4B 03
48C0  85 FC A2 00 A0 05 B9 2C
48C8  03 18 79 42 03 19 E0 00
48D0  F0 06 A2 00 18 69 01 18
48D8  99 3C 03 38 E9 08 90 05
48E0  18 99 3C 03 E8 B9 3C 03
48E8  18 69 30 18 91 FB 88 C0
48F0  FB D0 F3 60 FF FF 00 00
4900  EE 79 03 AD 79 03 29 07
4908  F0 01 60 8D 79 03 A9 00
4910  85 FB AD AC 03 F0 51 A0
4918  AD 03 18 69 01 18 C9 57
4920  D0 0D A9 00 8D AC 03 A9
4928  0C 8D 77 03 4C 00 43 8D
4930  AD 03 29 01 F0 0C A9 0F
4938  85 FB AD AD 03 29 06 4A
4940  18 AA A9 03 E0 00 F0 07
4948  18 69 03 18 CA D0 F9 18
4950  65 FB 18 8D 77 03 AD AD
4958  03 4A 18 4A 18 4A 18 69
4960  78 18 8D 75 03 4C 00 43
4968  AD AD 03 38 E9 01 D0 0D
4970  A9 01 8D AC 03 A9 00 8D
4978  77 03 4C 00 43 18 8D AD
4980  03 29 01 F0 02 A9 0F 85
4988  FB AD AD 03 29 06 4A 18
4990  AA A9 00 18 90 AE FF FF
4998  00 00 FF FF 00 00 FF FF
49A0  00 00 FF FF 00 00 FF FF
49A8  00 00 FF FF 00 00 FF FF
49B0  00 00 FF FF 00 00 FF FF
49B8  00 00 FF FF 00 00 FF FD
49C0  EE DD 03 AD DD 03 29 01
49C8  F0 01 60 A0 00 84 FD B9
49D0  82 03 F0 0A 18 85 FC B9 81
49D8  03 85 FB B9 83 03 A0 00
49E0  91 FB 18 69 01 18 C8 91
49E8  FB A5 FC 18 69 D4 18 85
49F0  FC A0 00 A9 0F 91 FB C8
49F8  91 FB A4 FD B9 83 03 18
4A00  69 02 18 C9 5E D0 05 A9
4A08  00 99 82 03 99 83 03 C8
4A10  C8 C8 84 FD C0 18 D0 B7
4A18  60 FF 00 00 FF FF 00 00
4A20  FF FF 00 00 FF FF 00 00
4A28  FF FF 00 00 FF FF 00 00
4A30  FF FF 00 00 FF FF 00 00
4A38  FF FF 00 00 FF FF 00 00
4A40  EE DE 03 AD DE 03 29 01
4A48  F0 01 60 A0 00 84 FD B9
4A50  54 03 D0 03 4C D9 4A 85
4A58  FC B9 53 03 85 FB B9 55
4A60  03 85 FE 29 03 18 69 01
4A68  18 85 FF A5 FE 29 FC 18
4A70  65 FF 18 99 55 03 A0 00
4A78  91 FB A5 FC 18 69 D4 18
4A80  85 FC A9 01 91 FB A4 FD
4A88  A5 FF C9 02 D0 4E B9 54
4A90  03 85 FC C9 07 D0 10 A5
4A98  FB 38 E9 78 90 09 18 A9
4AA0  00 99 54 03 18 90 32 A5
4AA8  FE 29 FC 18 09 01 99 55
4AB0  03 85 FE A5 FB 18 69 28
4AB8  90 03 18 E6 FC 85 FB 99
4AC0  53 03 A5 FC 99 54 03 A0
4AC8  00 A5 FE 91 FB A5 FC 18
4AD0  69 D4 18 85 FC A9 01 91
4AD8  FB E6 FD E6 FD E6 FD A4
4AE0  FD C0 18 F0 03 4C 4F 4A
4AE8  60 00 00 FF FF FF 00 00
4AF0  FF FF 00 00 FF FF 00 00
4AF8  FF FF 00 00 FF FF 00 00
4B00  A0 00 A9 C0 85 1E A2 08
4B08  AD 1E D4 29 E0 C9 E0 D0
4B10  02 A9 00 C9 C0 D0 02 A9
4B18  20 85 19 AD 1E D4 29 0E
4B20  C9 0E D0 02 A9 08 C9 0C
4B28  D0 02 A9 06 C9 0A D0 02
4B30  A9 04 18 65 19 18 65 20
4B38  18 85 1D C8 B1 1D 29 07
4B40  85 1F 88 B1 1D D0 06 CA
4B48  D0 EE A2 01 60 A2 00 60
4B50  00 00 FF FF 00 00 FF FF
4B58  00 00 FF FF 00 00 FF FF
4B60  00 05 FF FF 00 00 FF FF
4B68  00 00 FF FF 00 00 FF FF
4B70  00 00 FF FF 00 00 FF FF
4B78  00 00 FF FF 00 00 FF FF
4B80  85 1A A4 FF 29 7F A2 EC
4B88  38 E9 1E E8 B0 FA CA 98
4B90  99 FA 07 A5 1F 99 29 D0
4B98  A9 01 99 99 03 A0 00 A4
4BA0  00 91 1D A5 FF 0A 18 6E
4BA8  A9 C0 99 AF 03 A9 00 85
4BB0  1C A5 1D 99 AE 03 29 1E
4BB8  0A 18 69 04 18 0A 18 85
4BC0  18 0A 90 03 18 E6 1C 18
4BC8  65 1B 90 03 18 E6 1C 99
4BD0  EA 02 A5 1C 99 BB 03 AD
4BD8  AD 02 EA 18 79 BA 03 90
4BE0  03 18 E6 1C 90 04 D0 00
4BE8  1C D0 00 A9 FF 45 FF 20
4BF0  10 D0 18 90 05 AD 10 D0
4BF8  05 02 8D 10 D0 A5 19 EA
4C00  EA 99 C7 03 A5 19 4A 18
4C08  69 4A 18 99 C6 03 99 05
4C10  D0 4C 00 37 DF 03 00 00
4C18  FF FF 00 00 FF FF 00 00
4C20  FF FF 00 00 FF FF 00 00
4C28  FF FF 00 00 FF FF 00 00
4C30  FF FF 00 00 FF FF 00 00
4C38  FF FF 00 00 FF FF 00 00
4C40  AD 1E D4 29 07 A0 F0 01 60
4C48  A2 00 A9 00 85 FF 85 1E
4C50  B9 99 03 F0 19 98 0A 18
4C58  A8 B9 05 D0 38 E5 FF 90
4C60  09 18 98 85 1E B9 05 D0
4C68  85 FF 98 4A 18 A8 C8 E8
4C70  E0 03 D0 DC A5 FF 38 E9
4C78  AE B0 01 60 A5 FF 38 E9
4C80  DA 90 02 18 60 A0 00 B9
4C88  54 03 F0 08 C8 C8 C8 C0
4C90  18 D0 F4 60 84 1D A4 1E
4C98  B9 04 D0 85 1B B9 05 D0
4CA0  38 E9 32 18 4A 18 4A 18
4CA8  4A 18 85 1C A5 1E 4A 18
4CB0  A8 A9 04 C8 A0 F0 85 0A
4CB8  18 8B D0 F8 2D 10 D0 AA
4CC0  A5 1B 4A 18 E0 00 F0 02
4CC8  09 80 38 E9 08 18 4A 18
4CD0  4A 18 85 1B 38 E9 28 90
4CD8  02 18 60 A4 1C A9 04 85
4CE0  1C A5 1B C8 00 F0 0B 18
4CE8  69 28 90 03 18 E6 1C 88
4CF0  D0 F5 A4 1D 99 53 03 A5
4CF8  1C 99 54 03 4C C0 51 55
4D00  A2 00 98 4A 18 A8 B9 99
4D08  03 85 FF 98 0A 18 A8 A5
4D10  FF F0 18 A5 FB 99 04 CF
4D18  A5 FC 49 01 99 05 CF A5
4D20  FD 99 14 CF A5 FE 49 01
4D28  99 15 CF C8 C8 E8 E0 03
4D30  D0 D0 60 FF C9 05 00 FF
4D38  FF C9 05 D0 01 60 A9 00
4D40  C9 05 D0 01 60 A9 00 8D
4D48  0B D4 A9 0A 8D 0C D4 A9
4D50  01 8D 0D D4 A9 11 8D 0B
4D58  D4 A9 FF 38 F9 6F 03 18
4D60  4A 18 69 05 18 8D 08 D4
4D68  C8 00 F0 02 A0 03 20 48
4D70  4C AD 4F 03 A0 00 60 FF
4D78  00 00 FF FF 00 00 FF 7F
4D80  A9 00 85 FC 85 FE A9 01
4D88  85 FD A9 03 85 FB AD 6D
4D90  03 D0 52 AD 1B D4 29 1F
4D98  F0 01 60 AD 1B D4 29 01
4DA0  18 69 01 18 8D 6D 03 18
4DA8  69 01 18 8D A3 03 A9 00
4DB0  85 FF 85 20 A9 04 85 02
4DB8  20 00 4B E0 00 D0 03 20
4DC0  80 4B CE A3 03 E6 FF 06
4DC8  02 AD A3 03 D0 EA A0 00
4DD0  A9 4A 8D 6F 03 A9 01 8D
4DD8  4F 03 85 FB 85 FC 85 FD
4DE0  85 FE 20 00 4D AD 4F 03
4DE8  A0 00 20 40 4D C9 04 F0
4DF0  5E C9 05 F0 73 AD 4F 03
4DF8  C9 01 D0 19 CE 6F 03 AD
4E00  6F 03 C9 3C F0 01 60 EE
4E08  4F 03 A9 00 85 FB 85 FC
4E10  85 FE 4C 00 4D EE 6F 03
4E18  C9 02 D0 21 AD 6F 03 C9
4E20  88 F0 01 60 AD 6D 03 49
4E28  03 18 6D 4F 03 18 8D 4F
4E30  03 AD 6D 03 18 69 01 18
4E38  85 FB 4C 00 4D AD 6F 03
4E40  C9 C8 F0 01 60 A9 01 85
4E48  FC EE 4F 03 4C 00 4D EE
4E50  6F 03 AD 6F 03 C9 F8 F0
4E58  01 60 A9 00 85 FB A9 02
4E60  85 FD EE 4F 03 4C 00 4D
4E68  A9 04 85 FC FE 6F 03 EE
4E70  6F 03 A0 00 AD AD 03 29
4E78  FF 85 FB A9 BB 03 AD B9
4E80  BA 03 18 85 FE 90 02 12
4E88  E8 99 04 D0 E0 00 D0 D0
4E90  A9 FF 45 FC 20 10 D0 18
4E98  90 05 AD 10 D0 05 FF 8D
4EA0  10 D0 C8 C8 D6 FC C0 DC
4EA8  D0 D1 AD 6F 03 C9 4A F0
4EB0  01 60 A9 00 8D 6D 03 A0
4EB8  00 B9 99 03 F0 7E 38 E9
4EC0  99 99 02 99 00 18 80 D9
4EC8  C7 03 85 FB B9 AE 03 85
4ED0  FC B9 AF 03 85 FD A9 00
4ED8  99 05 D0 99 14 CF 99 4A
4EE0  18 A8 84 FF A0 00 A5 FE
4EE8  91 FC A4 FF C8 C0 83 D0
4EF0  C8 60 00 00 D0 C9 00 AA
4EF8  B9 C2 03 18 65 FB 90 02
4F00  A9 01 85 FD 85 FC A9 03
4F08  85 FB A9 D0 85 FE A0 5E
4F10  03 D0 54 AD 1F D4 29 1F
4F18  F0 01 60 AD 1F D4 29 01
4F20  18 69 01 18 8D 6E 03 18
4F28  69 01 18 8D A2 03 A9 03
4F30  85 FF A9 0A 85 20 A9 20
4F38  85 02 20 00 4E E9 00 D0
4F40  03 20 80 4E E6 FF 06 02
4F48  CE A2 03 A0 00 A2 03 D0 EA
4F50  A0 06 A9 4A 8D 70 03 A9
4F58  01 8D 51 03 85 FB 85 FE
4F60  A9 00 85 FC 20 00 4D AD
4F68  51 03 A0 01 20 40 4D AD
4F70  51 03 A0 06 C9 04 D0 5E
4F78  C9 05 F0 73 AD 51 03 C9
4F80  01 D0 19 CE 70 03 AD 70
4F88  03 C9 3C F0 01 60 EE 51
4F90  03 A9 00 85 FB 85 FC 85
4F98  FE 4C 00 4D EE 70 03 C9
4FA0  02 D0 21 AD 70 03 C9 98
4FA8  F0 01 60 AD 6E 03 49 03
4FB0  18 6D 51 03 18 8D 51 03
4FB8  AD 6E 03 18 69 01 18 85
4FC0  FB 4C 00 4D AD 70 03 C9
4FC8  C8 F0 01 60 A9 00 85 FC
4FD0  EE 51 03 4C 00 4D EE 70
4FD8  03 AD 70 03 C9 FA F0 01
4FE0  60 A9 00 85 FB A9 02 85
4FE8  FD EE 51 03 4C 00 4D A9
4FF0  20 85 FC EE 70 03 EE 70
4FF8  03 A0 00 AD AD 03 29 FF
5000  85 FB B9 C1 03 AA B9 C0
5008  03 18 65 FB 90 02 18 E8
5010  99 0A D0 E0 00 D0 0A A9
5018  FF 45 FC 20 10 D0 18 90
5020  05 AD 10 D0 05 FC 8D 10
5028  D0 C8 C8 C6 FC C0 06 D0
5030  D1 AD 70 03 C9 4A F0 01
5038  60 A9 00 8D 6E 03 A0 00
5040  B9 9C 03 F0 2E A9 00 99
5048  9C 03 98 0A 18 A8 B9 CD
5050  03 85 FB B9 B4 03 85 FC
5058  B9 B5 03 85 FD A9 00 99
5060  0B D0 99 1B CF 98 4A 18
5068  A8 B4 FF A0 00 A5 FB 91
5070  FC A4 FF C8 C0 03 D0 C8
5078  60 D0 60 00 00 FF 00 00
5080  AE DC 03 AC DD 03 C9 EA
5088  EA C8 00 D0 F9 E0 00 D0
5090  01 60 E8 E0 00 D0 EF 60
5098  FF FF 00 00 FF FF 00 00
50A0  FF FF 00 00 FF FF 00 00
50A8  FF FF 00 00 FF FF 00 00
50B0  FF FF 00 00 FF FF 00 00
50B8  FF FF 00 00 FF FF 00 02
50C0  20 C0 44 20 40 48 20 C0
50C8  48 A9 00 A0 00 99 42 03
50D0  C8 C8 D6 D0 F8 20 C0 49
50D8  20 40 4A 20 80 4D 20 00
50E0  4F 20 00 49 20 80 50 A5
50E8  C5 C9 3F D0 01 60 20 80
50F0  51 AD 80 03 F0 CA 60 00
50F8  00 00 00 00 20 C0 A1
5100  A0 19 D0 29 88 C9 80 F0
5108  03 4C 31 EA AD 00 C1 18
5110  69 01 18 29 01 8D 00 C1
5118  C9 01 D0 22 A9 FF 8D 19
5120  D0 A9 00 8D 15 D0 AD 16
5128  D0 29 EF 8D 16 D0 A9 41
5130  8D 12 D0 AD 11 D0 29 7F
5138  8D 11 D0 4C 31 EA A9 FF
5140  8D 19 D0 A9 1B 8D 15 D0
5148  AD 16 D0 A9 10 8D 16 D0
5150  A9 FA 8D 12 D0 AD 11 D0
5158  29 7F 8D 11 D0 A9 FF 8D
5160  19 D0 68 A8 68 AA 68 40
5168  00 00 FF FF 00 00 FF FF
5170  00 00 FF FF 00 00 FF FF
5178  00 00 FF FF 00 00 FF FF
5180  AD 6D 03 F0 12 AD 99 03
5188  D0 0D AD 9A 03 D0 08 AD
5190  98 03 D0 03 4C E2 4E AD
5198  6F 03 F0 12 A9 00 8D 6F 03
51A0  A9 02 8D D0 03 A9 0F 8D
51A8  00 D0 A9 00 85 FB 85 FC
51B0  85 FD A9 4C C0 51 FF FF
51B8  A9 45 99 55 03 60 FF FF
51C0  00 00 FF FF 00 00 FF FF
51C8  00 00 FF FF 00 00 FF FF
```



FORTH

K. Wierstra shows you how to get a fairly complete version of Forth on a Spectrum.

This article is available on the Telsoft service.

Figure 1.

```
  1 PRINT : RANDOMIZE USR 37036
: STOP
  2 PRINT : RANDOMIZE USR 37030
: STOP
  3 LOAD "CODE"CODE
  4 CLEAR 25111
  5 GO TO 2
```

Figure 3. Hex dump.

THE PROGRAM PRESENTED here is a fairly complete version of the Forth language, written for the Spectrum 48K. This article is not meant to teach you Forth. You may learn Forth from one of the many available books. Once you've grasped the concept of the stack and the way of adding and removing numbers to and from the stack, you'll quickly find your way through the dictionary by experiment and a little thought.

The compiler shown here is very well suited for this purpose. The main omissions of my version from Standard Forth are:

- There are no defining words like Create and Does>, but there is no problem creating constants, variables and arrays.
- There are no double precision numbers.

The object of this article is to explain some of the functions of the compiler, particularly the — non-standard — compiler commands and some Forth words which I included to reflect the possibilities of the Spectrum. But first of all you will have to cope with the task of entering the program. Start with typing the Basic Interference given in figure 1 and save it with:

SAVE "FORTH" LINE 3

Now enter the hexloader listed in figure 2. The machine code in figure 3 may now be entered starting with address 37032. Type a whole line of nine hexadecimal numbers without spaces. The ninth number is a control code. If you made a mistake the last starting address will be shown on the screen and you may try again. Once it all has been typed in save the code with:

SAVE "CODE" CODE 37033,3666

After rewinding the tape and typing

LOAD "FORTH"

the whole system should start. You will now see the title of the program and a flashing cursor, a black square which may be considered as a disguise of the C cursor.

In alphanumerical form

As you will expect all input have to be in alphanumerical form, so a Forth word like Then should be entered by pressing four different keys. All words and numbers have to be separated by at least one space or a Return.

Inserting and deleting is done in the usual way, moving the cursor with the cursor keys and deleting with Delete. Just like in Basic the editor is at the same time ready to accept commands and new definitions, variables etc. A direct command may be one of the editor commands listed in figure 4, or a sequence of one or more Forth words or numbers. An example of an editor command is DList. Type this in and you'll see a list of all predefined Forth words.

After the execution of your command the cursor will reappear on the bottom of the screen, indicating that all is OK, as far as the computer is concerned.

I have refrained from constantly reporting OK — or fine, excellent — since such a message will soon lose its encouraging

(continued on next page)

Figure 2. Hexloader.

```
  10 REM ns (obase)
  20 DEF FN n(ns)=CODE ns-48-7*
ns>9
  30 INPUT "START ADDRESS ";a
  40 FOR n=a TO 40700 STEP 9
  50 PRINT n;
  60 LET tot=0
  70 INPUT as
  80 IF as="END" THEN STOP
  90 PRINT as
 100 FOR i=0 TO 7
 110 LET z=FN n(as(i+1))*16+FN n a
s(i+2)
 115 LET tot=tot+z
 120 POKE (n+i),z
 130 LET as=as(3 TO )
 140 NEXT i
 150 LET tot=tot-(INT (tot/256
*256))
 160 LET z=FN n as(1)*16+FN n as
(2)
 170 IF tot<>z THEN PRINT "DATA
INPUT ERROR": GO TO 60
 180 NEXT n
```

Figure 4. Editor commands.

LIST	—	lists all word definitions. List Example will list from the word Example.
LLIST	—	the listing will be sent to the printer — (also Llist Example is possible).
VLIST	—	this lists all constants and variables, together with their values and memory addresses respectively; a comparison of the addresses gives you the opportunity to inspect the reserved room for arrays.
DLIST	—	lists the whole dictionary.
FORGET	—	clears all word definitions from the source but leaves the compiled words in trhe dictionary. Forget Example clears the word definitions from the strt of the source to the word Example inclusive.
CLEAR	—	clears the stack.
EDIT EXAMPLE	—	this gives the possibility to edit the word definition.
RESET	—	clears the whole system and will perform a restart.
EXIT	—	return to Basic, you can restart the compiler using Run — leaving all definitions etc. intact — or Run 2 — resetting everything.
SAVE NAME	—	saves the source to tape — don't use quotation marks.
LOAD NAME	—	loads the source and compiles it into dictionary — this may take one or two seconds; if you omit the filename, then the first file found will be loaded.

(continued from previous page)

meaning. All input will be screened by the editor, lines containing non-acceptable items — undefined words, numbers out of range — will be sent back to the screen together with an error message. The cursor will be positioned just before the unacceptable word or digit to enable you to correct your input. A list of all the error messages is given in figure 5.

The definition of a word starts with : and ends with ; don't forget the spaces.

A word may consist of several lines separated by Returns. Variables and constants are defined using Variable and Constant, e.g.

```
3 CONSTANT THREE
```

If you know anything about Forth you probably wonder how to create arrays, lacking the words Create and Does>. The point is that you have to define every array again. You need for instance an array of 20 bytes, then tyhpe.

```
VARIABLE INSTANCE 18 ALLOT
```

The operation of Variable reserves 2 bytes of Instance and 18 Allot adds another 18 bytes.

The array is defined by:

```
: ARRAY + * INSTANCE + 1 ;
```

Now if you type 3 Array the address of the Fourth component of the array (2 bytes) will be pushed on the stack.

You may inspect the values of the defined constants and the addresses of the variables by giving the command Vlist — see also figure 4.

Editing a word is done as follows: Since there are no line or word numbers the Spectrum Edit key has been disabled, instead you have to type Edit Array and you'll find the definition back on the screen, together with the cursor, willing to accept your editing commands. If the word consists of several lines, the lines will be shown successively and you can step through the word pressing Return.

Comments may be included using (and). Returns are now allowed inside a comment. It is possible to insert machine-code in a word or a direct command. The code should start with # and has to be entered in hexa-decimal form. As an example I give the definition of the Standard Forth word 1+:

```
: 1+ #CD119923CDEC98
```

(no spaces allowed after # , in mnemonics: CALL POPSTACK, INC HL, CALL PUSHSTACK) ;

When the computer is executing a command and it does not produce the expected output — or no output at all — it is usually possible to interrupt the system by pressing Caps Shift and Break. During every loop (Do . . . Loop, Do . . . +Loop, Begin . . . Until, Begin . . . While . . . Repeat) a check is made whether Break has been pressed, and the machine will halt accordingly. If a definition does not contain any loops, but has for instance a recursive structure — which means a word calling itself, see also figure 6 — you may insert — during testing and debugging — the word Break. This word will perform the same operation as the automatic loop control.

In figure 6 I have given a few examples to illustrate the use of the compiler. In figure 7 some special Forth words are described.

Some additional information concerning the compiler — e.g. making it Microdrive compatible — I can supply if you send an envelope with your address to K. Wierstra, Hertogstraat 42, EV Arnhem, Holland. Please include £1. For £3.50 I will send you a tape of the Forth compiler. ■

Figure 5. Compiler error messages.

Integer out of range	—	a number outside the range −32768 to 65535
Undefined word	—	a word is not recognised.
Illegal name	—	the name of a word is not available — e.g., try Variable I, I is a predefined word.
Pardon?	—	given on various occasions, e.g. Save without a filename.
Out of memory	—	this is just a warning, the last word will usually be entered, but memory is scarce and you should do something about it, perhaps by forgetting some words.

Runtime error messages.

Stack empty
Stack overflow
Division by zero
Break (the program has been interrupted, or an illegal command has been given e.g. 30 30 AT)

Figure 6.

Example 1.

```
: PLANE 176 0
    DO I 256 0
       DO DUP I SWAP PLOT
       LOOP DROP
    LOOP
(THIS WORD FILLS THE SCREEN WITH
PLOT) ;
```

Example 2.

```
VARIABLE N  VARIABLE F
: FAC  N @  1
  IF N @ 1 - N ! FAC (RECURSION)
     N @ 1 + DUP N !
     F @ * F !
ELSE 1 F !
THEN ;
: FACTORIAL ."GIVE A NUMBER <9"
  KEY 48 - N ! FAC
  CR N @ . ."! = " F @ U.
  (THESE WORDS CALCULATE THE FAC
TORIAL OF A NUMBER) ;
```

Example 3.

```
VARIABLE LINE$ 30 ALLOT
: STR! (THESE WORDS SHOW THE USE
 OF SOME STRING HANDLING WORDS!
  OVER C@ 1 + CMOVE ;
: INPUT  ."TYPE SOME LINE"
  QUERY 13 WORD
  LINE$ STR! ;
: .STR COUNT TYPE CR
  (THIS WORD PRINTS THE LINE)
: REVERSE COUNT 1 - -1 SWAP
  DO DUP I + C@ EMIT
  -1 +LOOP DROP
  (THE LINE WILL BE WRITTEN IN R
EVERSE ORDER)
: SHOW INPUT CR
  LINE$ .STR
  LINE$ REVERSE ;
```

Figure 7. Non-standard — Spectrum — Forth words.

UDG	—	pushes the address of the first user-defined graphic on the stack.
CLS	—	clears the screen.
10 10 BEEP	—	equivalent to ZX Basic's Beep 1,10 — mind the difference between the first parameters; in Forth the duration of the beep has to be given in tithes of seconds.
10 20 PLOT	—	equivalent to Plot 10,20.
3 7 AT	—	equivalent to Print AT 7,3;.
RANDOM	—	puts a pseudorandom number betwen 0 and 127 on the stack — you should judge the randomness yourself.
24 EMIT	—	output will be sent to the printer if the screen is in use or vice versa.

MODEM.

HIGH-SPEED COMPUTER TALK FROM PROTEK

Inter-computer communication is easy in anyone's language, thanks to the Protek Modem. Acoustic coupling provides a reliable link between the computer and the telephone line. There are no connection charges, the unit is totally portable. The flexible link between the mouth and ear-pieces ensures a reliable connection between most telephones.

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

AVAILABLE FROM LEADING COMPUTER STORES

VISA

Protek

Protek Computing Ltd, 1A Young Square, Brucefield Industrial Park, Livingston, West Lothian. 0506 415353.

DOUBLE DENSITY

Too good to be true — an extra disc drive's capacity for £40? John Dawson makes light work of BBC interfaces.

IBM BUILT THE FIRST floppy disc drives to allow its engineering and maintenance staff to exchange data and programs between mainframe computers. The first floppies were eight inches in diameter and, because it was IBM, the electronic protocol for recording data and the physical number and spacing of the tracks became a standard.

Someone thought they could pack the same amount of data on to a smaller disc and the 5.25 inch floppy was born. The number of disc drives that were being sold attracted the semiconductor manufacturers and microprocessors with built-in Rom were programmed to do nothing but record data in the right position on the disc, ready for it to be retrieved later on. It's the job of the disc filling system to act as a go-between, translating the file handling commands issued by the Machine Operating System (MOS) into as series of instructions that can be carried out by the floppy disc controller.

Disc controller knows

For example, *Cat is a MOS command. The BBC computer doesn't know how the disc controller obtains the right information — it is the disc filing system that tells the disc controller to move to track 0, wait until the index hole in the disc passes the photocell and then read the information from the disc.

The disc controller, using its very primitive built-in program, knows when it has reached track 0, when the photocell turns on, and it can separate the important data that the computer wants from the other data recorded on the disc that is there to keep.

The Intel 8271 chip was chosen by Acorn as the floppy disc controller for the BBC microcomputer. The 8271 has several desirable features, and was a perfectly sound choice at the time that the machine was designed. However, there was a delay between the formulation of the design and the launch of the machine, and between the appearance of the BBC computer and the large-scale use of floppy disc drives.

In that interval the Intel 8271 became obsolescent and expensive. Like everything else in microcomputing it is all a matter of fashion; the 8271 is a perfectly adequate chip that will control a number of disc drives to store large quantities of information.

But other companies, Western Digital in particular, have developed cheaper and more sophisticated chips. Some of these chips will record data on a floppy disc in what is known as "double density". But like all the best things in life that description is slightly larger than the reality.

Double density recording is a method of storing information on a floppy disc more compactly than is possible using single density. The two methods of recording information are quite different. Most of the Western Digital chips can cope with both single and double density recordings. The disc rotates at a constant speed regardless of which recording method is in use.

Some BBC double density disc interfaces record 18 sectors around each track on the disc while others record 16 sectors. The single density Acorn disc interface using the 8271 chip records 10 sectors.

Consequently, it is possible for a double density interface to read either 16 or 18 sectors of 256 bytes in the same time that the Acorn interface will read 10 sectors of 256 bytes. The rate of data transfer between the floppy disc and the computer is increased. Not only is the speed of transfer increased but the total storage capacity of the disc is increased by either 60 or 80 per cent.

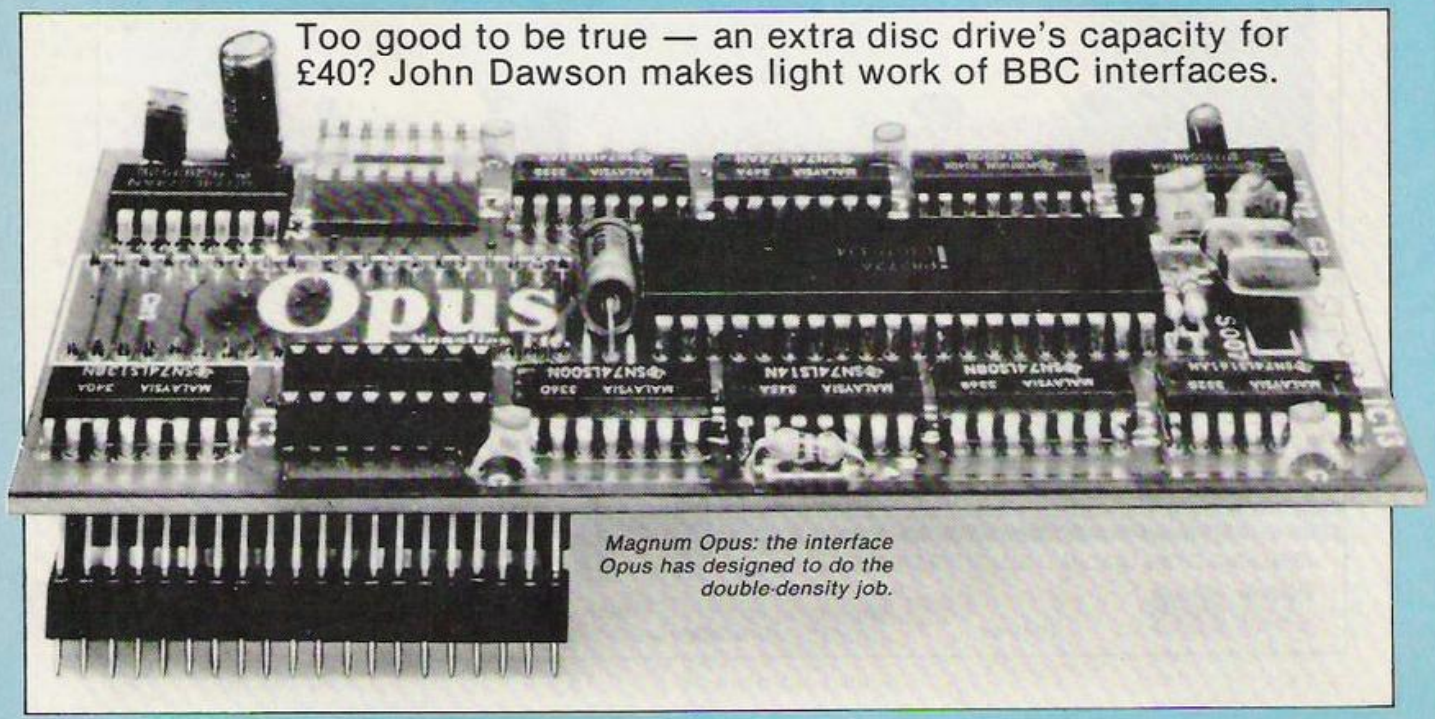
The floppy disc interfaces reviewed in this article will store either 320K or 360K on a single sided 80-track drive where the Acorn interface will store 200K. In fact, the formatting of the disc takes up a small number of bytes and the actual storage capacity is about one 1K less than the nominal totals.

Table 1 lists some of the characteristics of five currently advertised double density disc interfaces. Three other double density interfaces are advertised — Kenda, Microware and Gnomic. A great deal of work is being done by different companies to get their disc interface on to the market ahead of their rivals. Advertisements for a particular disc interface may not reflect the actual availability of the product. I was unable to review the Merlin disc interface although it is potentially the most exciting double density interface for the BBC Micro as it combines both surfaces of a single disc into one storage area.

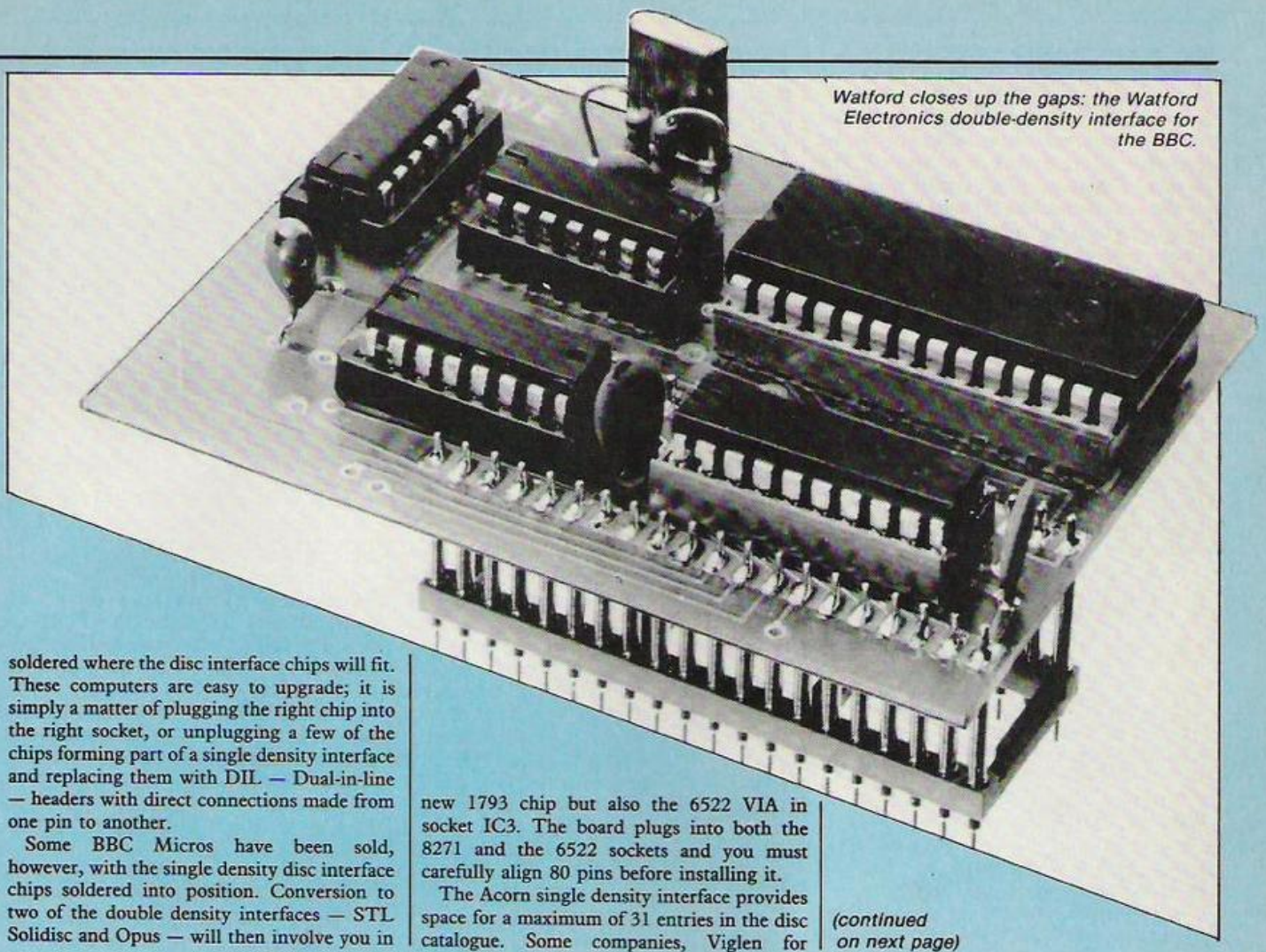
Straightforward in theory

In other words, where other products treat the second side of the disc in Drive 0 as Drive 2, the Merlin interface simply sees Drive 0 as a very large capacity drive.

Fitting the disc interfaces is straightforward in theory but you may encounter problems with some versions of the BBC Micro. Many machines have been sold with IC sockets



Magnum Opus: the interface Opus has designed to do the double-density job.



Watford closes up the gaps: the Watford Electronics double-density interface for the BBC.

soldered where the disc interface chips will fit. These computers are easy to upgrade; it is simply a matter of plugging the right chip into the right socket, or unplugging a few of the chips forming part of a single density interface and replacing them with DIL — Dual-in-line — headers with direct connections made from one pin to another.

Some BBC Micros have been sold, however, with the single density disc interface chips soldered into position. Conversion to two of the double density interfaces — STL Solidisc and Opus — will then involve you in the nail-biting business of unsoldering chips from the main board of the computer.

You can probably get away with short circuiting the right pins of the chips while they remain in the board, but that isn't in the instruction manuals. The Watford Electronics manual gives no fitting instructions. You are offered instead the instruction to "Take it back to whoever fitted your disc upgrade and get it done properly" if you fail to get the correct message on screen.

The LVL board is the largest of the four I examined, measuring 14.5cm by 10cm. The STL Solidisc board — the smallest — sits comfortably in the BBC Micro alongside a Sidewise Rom expansion board. None of the other interfaces — Opus, Watford, LVL — were physically compatible with the ATPL Sidewise board.

The Opus board required the removal of the A-D converter chip and two Roms before it could be plugged in, while the Watford board blocked off only the two Rom sockets. The STL, Opus and Watford systems worked successfully with the ATPL Rom board.

The LVL disc interface board has sockets for not only the old 8271 controller and the new 1793 chip but also the 6522 VIA in socket IC3. The board plugs into both the 8271 and the 6522 sockets and you must carefully align 80 pins before installing it.

The Acorn single density interface provides space for a maximum of 31 entries in the disc catalogue. Some companies, Viglen for

(continued on next page)

ITY FOR THE BBC

Table 1. Comparison of BBC double density disc interfaces.

Name	Price £	Capacity 80 tracks	Drives	Cont. disc surface	Format in Rom
Acorn SD	95.00	200K	4	NO	NO
LVL	115.00	360K	8 logical	NO	NO
Merlin	109.25	-	-	YES	-
Opus	102.95	360K	4	NO	YES
Solidisk	39.95	320K	5	NO	YES
Watford	97.00	360K	4	NO	YES

Name	Manual	Disc controller
Acorn SD	***	8271
LVL	***	FDC 1793
Merlin	-	-
Opus	****	WD 7291
Solidisk	*	WD 1770
Watford	**	Erased

Thanks to the following companies who loaned products for review:

LVL
Scientific House, Bridge Street,
Sandiacre, Nottingham NG10 5BA.
Tel: 0602 394000.

Watford Electronics,
250 High Street,
Watford,
Tel: 0923 40588.

Opus Supplies Ltd,
158 Camberwell Road,
London SE5 0EE.
Tel: 01 701 8668.

(continued from previous page)

example, has produced disc utility programs that reserve space on a disc for a second catalogue giving a total of 62 entries. The Watford Electronics single density disc filing system — this uses the 8271 controller and the company's own disc controller software in an Eprom — also provides space for 62 entries in the catalogue, albeit at the expense of non-standard coding on the disc and a slight loss of speed when saving a file.

For many purposes the standard number of catalogue entries will be sufficient but short games or individual letters tend to use up precious space in the catalogue while the disc remains half empty. Clearly this problem becomes more important when the capacity of the disc is increased by 60 or 80 per cent. Opus has increased the number of files that can be held on one disc by creating eight volumes.

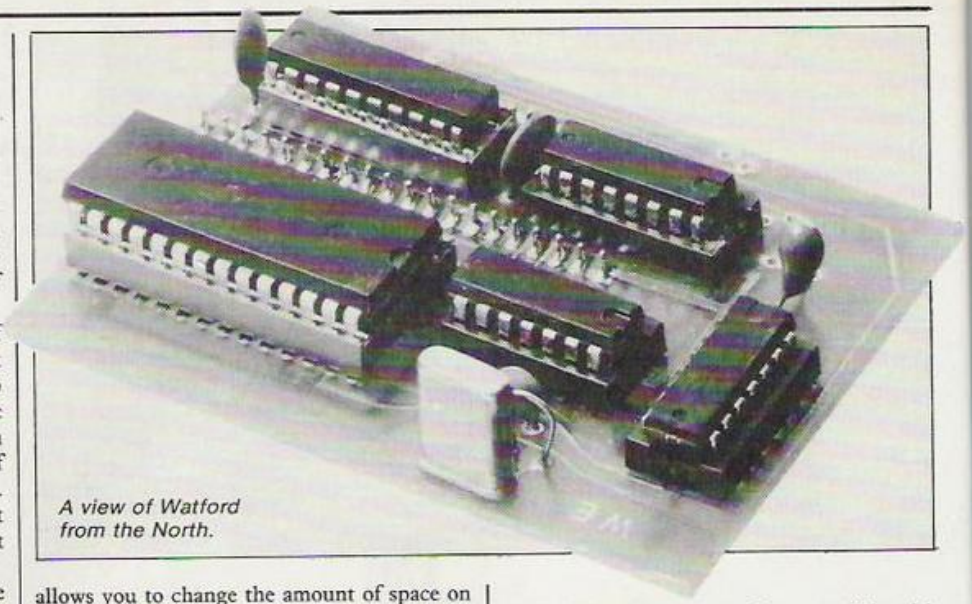
Each volume acts as a separate catalogue holding 31 files; a maximum of 248 files on one disc. Watford Electronics has carried forward the arrangement that allows you to produce a second catalogue giving a maximum of 62 files. The STL manual was clearly a pre-production version and beyond referring to "extended cataloguing" makes no mention of the number of catalogue entries that the system will handle.

Space is fixed

The LVL disc interface operates quite differently. The manual says:

- 100K drives: In double density . . . You will have only one drive to access, which remains drive, 0. It can hold up to 31 different files and 180K of data storage.
- 400K drives: You have four drives to access; 0, 1, 2 and 3. There is a capacity for 124 separate files and 720K of data storage.
- 800K drives: There are eight drives numbered 0 to 7. With 80-track double density, the number of sectors exceeds the current directory limitations. To retain compatibility each disc surface is split into two logical drives. Add 4 to the normal drive number, so that logical drive 4 is the second half of drive 0, each of 720 sectors . . . hence there is a total capacity of 248 separate files and 1,474,560 bytes of on-line storage if all drives are fully utilised.

The amount of space taken up by each logical drive in the LVL system is fixed in comparison to the volumes generated by the Opus system. The Opus command *Volgen allows you to change the amount of space on the disc allocated to each volume. Reallocation of space erases any existing catalogue entries so the facility is only of practical use immediately after the disc has been formatted.



A view of Watford from the North.

At present LVL provides a disc which holds programs to format and verify your own program and data discs. The system is being enhanced at present and the company is moving to 16K Eproms for the filing system. The other double density disc interfaces have format and verify routines held in the operating system Eprom — Watford and Opus use 27128 16K Eproms.

Only the Watford Electronics system explicitly states that the format program will not affect a program already in the computer's Ram. I use the Pace Toolstar chip to format discs for the Acorn single density system and it is useful to be able to get a new disc ready for use at any time, even in the middle of word processing a book chapter.

The STL Solidisk system will address four floppy disc drives numbered 0 to 3. Additionally, you can address a fifth drive (number 4) with the STLDisk DFS to save or load data to the Solidisk Sideways Ram board. Opus has a tape to disc routine in the operating system Eprom, a command which "selects the sideways Rom from which memory is saved when a *Save command is issued which requires memory from &8000 to &BFFF to be saved."

In other words you can save the contents of CMOS Ram chips occupying one of the sideways Rom sockets. The Opus system has been designed to cope as far as possible with protected discs. Two commands *4080 and *Density change the response of the system to stop the automatic identification of density and number of tracks.

Of the systems that I have seen, the Opus and LVL interfaces have the clearest documentation, although the Watford manual is the largest. The STL manual is poorly laid out and omits basic information about the disc filing system that would help new disc users in particular.

Watford manual extensive

The Watford manual is extensive and contains more information than the others although it is confusing in places because the single density manual has had additional sections dropped casually into the existing text. You must keep a close eye on the brackets to understand what you are reading.

Advertisements for the double density disc interfaces for the BBC Micro all claim some degree of compatibility with the standard Acorn single density interface. However, there is compatibility and compatibility. All the interfaces that I tried would read a straightforward single density disc formatted for the Acorn disc filing system and used to store Basic programs and View documents.

All the double density systems will check the density of the disc in a drive and alter their characteristics automatically. So you can copy a single density disc to a double density disc without trouble even using one drive. The problems arise with protected software.

The results of trying to run Viewfinder, Clares Replica II and the new Acornsoft game Elite using the various interfaces were not encouraging. The Opus system did read and Run Viewindex correctly. None of the interfaces would load Lisp or Forth from the Replica disc, and Elite baffled them all.

Opus says it is talking to Acorn to try to establish a standard for double density operation, and to agree how protected discs may be read by these new, non-standard disc interfaces. STL is now advertising a new system that uses the 8271 chip as well as a double density controller; presumably you can switch between the two, maybe that's the answer if you can afford or find the 8271. ■

CONCLUSIONS

- Commercial microcomputers don't make a fuss about splitting up disc surfaces, the limited numbers of catalogue entries and so on. Nobody wants to know about problems in the disc operating system when they are word processing, budgetting or preparing invoices. I don't care if a file is split up between two sides of one disc; all I want is to be able to use the data held on the disc in a drive.
- The present disc filing systems available for the BBC would be unattractive to business users because they demand too much attention and care. The Merlin system may break out of this low-level trap.
- All the interfaces work and do offer a major increase in disc capacity. If you are buying the BBC machine simply for word processing, and you don't want to use Viewfinder or, I suspect, the View Printer Drive Generator, then the cheap STL double density interfaces will serve you very well.
- If you don't really understand disc filing systems and you do want to be able to play games occasionally then you should ask yourself whether it is worth spending more money for a clearer manual and a more compatible system or whether you want increased storage capacity.
- For myself, I shall soldier on with my ageing 8271 for a little longer.

'Another winner in The Hobbit class. It's a complex real time adventure which will keep devotees puzzled for hours.' *DAILY EXPRESS*

'Sophisticated, rich in atmosphere and amazingly detailed, Sherlock is a game which no Spectrum owner will want to be without.' *MICRO ADVENTURER*

'Sherlock is a long way ahead of the rest of the competition.' *PERSONAL COMPUTER NEWS*

'In Sherlock you can not only talk to other characters, of whom there are at least thirteen, and ask them to do things for you, but you can also interrogate them and even discuss the case.' *SINCLAIR USER*

'Sherlock Holmes has been well worth waiting for with an 800 word vocabulary, real Victorian transport system – cabs and trains and all, and a cast of characters, peopling screens of graphics designed by Mugsy man Russell Comte.' *YOUR COMPUTER*

'An intriguing and absorbing game.' *COMPUTER AND VIDEO GAMES*

'I have been totally enthralled with this new brilliant adventure. I thought The Hobbit was good, but the added vocabulary and the even more intelligent characters, makes Sherlock number one in my software collection.' *MR. ROGERS, BATH*

'Sherlock must be the most complex adventure ever created.

The creation of atmosphere is superb (more like that of a novel, than a computer game) in fact playing the adventure feels more like acting than playing a computer adventure.

The characters in Sherlock behave just as they would in real life and have a very human feel to them, not only in the way they react to situations, but also in their displaying of human emotions.' *MR. STERN, HERTS.*

'Rich mental imagery.' *CRASH*

'Sherlock is an adventure which has yet to be beaten.' *YOUR SPECTRUM*

'Sherlock is a superb program and will provide many hours (hours? months more likely) of stimulating entertainment.' *PERSONAL COMPUTER NEWS*

'Sherlock is an excellent adventure bursting with atmosphere, challenge and inventiveness.' *PC GAMES*

'Sherlock the adventure is about as devious as Sherlock Holmes the master sleuth.' *POPULAR COMPUTING WEEKLY*

Available for C64 and Spectrum 48K

Melbourne House

YC18

New Releases

TOM THUMB

Within the scrolling mazes of the six pyramids lie the 48 keys which will unlock the secrets of the ancient Egyptians. Each maze can be viewed as a whole to help you plan your strategy and chart your way. You need superb timing to acquire the keys and fit them in the correct keyholes. The Vic 20 version also has six scrolling mazes and numerous perils to be faced as you collect the treasures in order to survive.

J.S. COMMODORE 64 VIC 20 16K £5.95

BATTLE THROUGH TIME

This non-stop action adventure takes off with World War II spitfires, jet fighters in Korea and helicopter attacks in the Vietnam war, moving on through time to the murderous weapons of World War III. The mutant offensive brings about the end of civilisation followed by the dawn of pre-historic times and the vicious pteradacktyls. Excellent graphics and sound effects bring this seven stage "Battle Through Time" to life.

J.S. COMMODORE 64 £7.95

ZAGA MISSION

A diagonally scrolling maze lies ahead of you. There are no enemy fighters or ground fire to destroy you. You have total speed control of a highly manoeuverable helicopter and it will hover while you work out your approach. Absolute concentration is essential to complete ten stages of the "Zaga Mission".

J.S. COMMODORE 64 £7.95

CATACOMBS

A sealed door bars your entry to an intriguing role playing adventure. Sequence of appropriate words swings the door open to another location. Each location is shown in superb graphics to assist you in your fight for survival. Save adventure facility.

K.B. COMMODORE 64 £7.95

P.C. FUZZ

P.C. Fuzz has nothing but his flying truncheon to capture the money being literally spirited away by the local mafia. Jostled by punks on pogo sticks and wobbled by well oiled patrons of the local inns at the closing time, he pursues the villains with vigour.

J.S. COMMODORE 64 £7.95

ANIROG

Trade Enquiries: ANIROG SOFTWARE LTD. UNIT 10 VICTORIA IND. PARK VICTORIA ROAD DARTFORD KENT (0322)92513/8

Mail Order: 8 HIGH STREET HORLEY SURREY 24 HOUR CREDIT SALES HORLEY 02934 6083

Payment by: P.O. - ACCESS - VISA - 50p POSTAGE & PACKAGING

Fast moving action on the Amstrad with MK Mostowys.

WAR OF THE WORMS

IN THIS GAME you must guide a snake around the screen using a joystick or keys of your own choice. The object is to collect all the yellow bags of gold and, if possible, the white goblets that appear at random intervals. On no account must you try to collect a red goblet.

You are awarded 10 points for every bag collected and one hundred points for a white goblet. If you manage a high enough score you will be invited to enter it in the high score table provided.

If you ever manage to reach screen 15 and onwards things get rather difficult.

The program is reasonably short and the breakdown of lines give a good idea of how it works. The program could be shortened slightly by substituting various CHR$ references with control codes entered direct.

Do not try to run the program until you have typed in and Saved the entire program on tape. The reason being that the call BB03 statement used within the program not only flushes the keyboard buffer as required but also partially disables the Escape key as well. The only way to stop the program once it is running is to wait until you are confronted with the high score table, then ignore the two options given i.e., C to continue and O for key options, and press E instead.

60-220 Main routine. Scans keyboard or joystick. Checks for collisions. Print snake. Decides whether or not to place goblet.

230-240 Increments score and produces sound when goblet collected. Also increases tail length.

250-260 Increments score and produces sound when bag collected. Also increases tail length.

270-280 Produces sound and decrements lives when wall, snake or red goblet are hit.

290 Blanks out goblet after delay.

300-310 Places goblet of a random colour at a random position on the screen.

320-500 High score routine.

510 Decrements time scale and checks for end.

520-630 Prints screen.
Line 540 prints length of wall.
Line 550 prints number of columns.

640 Routine to print columns.

650-780 Gives keyboard or joystick options and allows user-defined keys.

790-820 Sets up user-defined symbols.

830 Defines three strings to print column.

850 Sets variables, envelopes, and dimension arrays for tail position.

860-960 Sets high scores.

970 Defines functions to check screen positions. ■

```
10 INK 1,24:INK 0,1:INK 2,20:INK 3,6
20 RANDOMIZE TIME:CALL &BB03
30 GOSUB 790
40 GOSUB 650
50 CLS:GOTO 410
60 IF INT (RND*100)>98 AND fg=1 THEN GOSUB 300
70 IF fg=0 THEN cou=cou-1:IF cou=0 THEN GOSUB 290
80 IF wi<1 THEN  SOUND 131,0,50,7,0,0,3:fred=REMAIN (1
):lives=lives-1:IF lives>0 THEN 540 ELSE GOTO 320
90 LOCATE a,b:PEN 1:PRINT CHR$(240);PRINT CHR$(22);CHR
$(1);LOCATE a,b:PEN 3:PRINT CHR$(241);PEN 1:PRINT CHR$
(22);CHR$(0)
100 IF e>0 THEN LOCATE c(e),d(e):PRINT " "
110 IF e>100 THEN e=0
120 e=e+1
130 IF f<100 THEN f=0
140 f=f+1:c(f)=a:d(f)=b
150 x$=UPPER$(INKEY$):IF x$="" THEN x$=z$
160 IF x$=L$ THEN t=FN t1:Z=-L:A=A-1:GOTO 210
170 IF x$=R$ THEN t=FN t1:Z=R:A=A+1:GOTO 210
180 IF x$=U$ THEN t=FN tu:Z=-U:B=B-1:GOTO 210
190 IF x$=D$ THEN t=FN td:Z=D:B=B+1:GOTO 210
200 GOTO 60
210 IF t=0 GOTO 60 ELSE ON t GOSUB 230,250,270
220 ON ff GOTO 540,320,60
230 IF t=1 THEN fg1=0:SOUND 4,0,10,5,0,0,0:FOR n=1 TO
3:ff=ff+1:IF f>101 THEN f=1
240 c(f)=a:d(f)=b:NEXT:sc=sc+100:LOCATE #1,10,1:PRINT#
1,USING"######";sc:ff=3:RETURN
250 IF t=2 THEN SOUND 4,0,10,5,0,0,0:FOR n=1 TO 3:f=f+
1:IF f>101 THEN f=1
260 c(f)=a:d(f)=b:NEXT:sc=sc+10:LOCATE #1,10,1:PRINT#1
,USING"######";sc:MEN=MEN+1:IF MEN=20 THEN SH=SH+1:fre
d=REMAIN (1):ff=1:RETURN ELSE ff=3:RETURN
270 IF t=3 THEN SOUND 131,0,50,7,0,0,3:fred=REMAIN (1)
:lives=lives-1:IF lives>0 THEN ff=1 ELSE ff=2
280 RETURN
290  fg=1:IF fg1=1 THEN LOCATE aa1,bb1:PRINT " ":RETUR
N ELSE RETURN
300 aa1=INT (RND*37)+2:bb1=INT(RND*18)+2:IF FN CH=2 OR
 FN CH=3 THEN RETURN ELSE SOUND 1,30,0,0,1:LOCATE aa1,
bb1:IF RND<0.5 THEN PEN 1 ELSE PEN 3
310 PRINT CHR$(245):fg=0:fg1=1:cou=100:RETURN
320 MODE 0:IF sc)VAL(MID$(a$(1),13)) THEN PEN 15:PRINT
"YOUR SCORE IS IN THE";TAB(7);CHR$(10);"TOP  TEN" ELSE
 GOTO 410
330 LOCATE 6,6:PEN 13:PRINT"YOUR NAME?";CHR$(10);TAB(3
)"(Max 10 letters)":LOCATE 6,10:PRINT STRING$(13," ");
LOCATE 6,10:CALL &BB03:INPUT "",n$:n$=UPPER$(n$)
340 IF LEN(n$)>10 OR LEN(n$) <1 THEN 330
350 CHECK=10
360 WHILE sc<VAL(MID$(a$(check),13))
370 CHECK=CHECK-1
380 WEND
390 IF CHECK>1 THEN FOR N=1 TO CHECK-1:A$(N)=A$(N+1):N
EXT
400 A$(CHECK)=n$+STRING$(11-(LEN(n$))+(7-LEN(STR$(SC))
),"")+STR$(SC)
410 CLS:PEN 15:PRINT TAB(5)"HIGH  SCORES":CHR$(10):FOR
 N=10 TO 1 STEP -1
420 PEN INT(RND*4)+1:PRINT TAB(2) A$(N);CHR$(10);
430 NEXT
440 CALL &BB03
450 LOCATE 1,24:PEN 12:PRINT"PRESS ";:PEN 11:PRINT"C "
;:PEN 12:PRINT"TO CONTINUE";LOCATE 1,25:PRINT"OR ";:PE
N 11:PRINT"O ";:PEN 12:PRINT"FOR KEY OPTIONS";
460 sc=0:sh=0:lives=3
470 IF INKEY(62)<>-1 GOTO 520
480 IF INKEY(34)<>-1 THEN GOSUB 650:CLS:GOTO 410
490 IF INKEY(50)<>-1 THEN INK 0,13:INK 1,0:PAPER 0:PEN
 1:BORDER 13:MODE 2:LIST
500 GOTO 470
510 DI:wi=wi-1:PLOT wi,4,1:DRAWR 0,0,1:IF wi=100 THEN
SOUND 2,150,0,0,2:EI:RETURN ELSE EI:RETURN
520 INK 2,0:INK 0,0:INK 1,0:INK 3,0:BORDER 0:PAPER 0:M
ODE 1:WINDOW 1,40,1,21:WINDOW #1,1,40,23,23:WINDOW#2,2
,39,2,20:PAPER #1,0
530 CLS:PEN 3:PAPER 0:FOR n=2 TO 20:LOCATE 1,n:PRINT C
HR$(254);:LOCATE 40,n:PRINT CHR$(247);:NEXT:LOCATE 1,1
:PRINT CHR$(249);STRING$(38,CHR$(240));CHR$(250);:LOCA
TE 1,21:PRINT CHR$(251);STRING$(38,CHR$(253));CHR$(252
)
540 INK 2,0:INK 0,0:INK 1,0:INK 3,0:CLS#2:PEN 3:PAPER
1:LOCATE 2,6:PRINT STRING$((SH MOD 6)*4,CHR$(244));:LOC
ATE 40-((SH MOD 6)*4),15:PRINT STRING$((SH MOD 6)*4,CH
R$(244))
550 IF sh>5 THEN PEN 3:PAPER 0:LOCATE 38,2:GOSUB 640:L
OCATE 10,15:GOSUB 640:IF sh>11 THEN LOCATE 35,2:GOSUB
640:LOCATE 5,15:GOSUB 640:IF sh>17 THEN LOCATE 25,2:GO
SUB 640:LOCATE 15,15:GOSUB 640
560 PAPER 0:LOCATE 10,5:PEN 1:PRINT CHR$(240);PRINT CH
R$(22)+CHR$(1);:LOCATE 10,5:PEN 3:PRINT CHR$(241)
570 FOR v=1 TO 20
580 aa1=INT (RND*37)+2:bb1=INT(RND*18)+2:IF FN CH=2 OR
 FN CH=3 GOTO 580
590 LOCATE aa1,bb1:PEN 2:PRINT CHR$(242);:LOCATE aa1,bb
1:PEN 3:PRINT CHR$(243):NEXT:PRINT CHR$(22)+CHR$(0):OR
IGIN 0,0,0,100,12,4:CLG 3:ORIGIN 0,0,101,640,12,4:CLG
2:ORIGIN 0,0,0,640,400,0
600 PEN#1,1:CLS #1:PRINT#1,TAB(4)"SCORE":LOCATE #1,10,
1:PRINT#1,USING "######";sc;:LOCATE#1,30,1:PRINT#1,"LI
VES ";lives:INK 2,24:INK 0,0:INK 1,26:INK 3,6
610 MEN=0:Z=0:I$="":e=0:f=0:a=10:b=5:c(1)=10:d(1)=5:fg
=1:wi=639:EVERY 4,1 GOSUB 510
620 CALL &BB03
630 GOTO 60
640 PRINT c1I$;:PRINT c12$;:PRINT c12$;:PRINT c12$;:PR
INT c12$;:PRINT c13$:RETURN
650 MODE 0:PAPER 13:CLS:BORDER 22:PEN 5:LOCATE 7,6:PRI
NT"KEYBOARD":PRINT:PRINT TAB(10)"OR":PRINT:PRINT TAB(7
)"JOYSTICK":PRINT:PRINT TAB(8)"(K..J)"
660 CALL &BB03
670 IF INKEY(37)<>-1 THEN du$=INKEY$:GOTO 700
680 IF INKEY(45)<>-1 THEN l$=CHR$(0):r$=CHR$(9):u$=CHR
$(11):d$=CHR$(10):GOTO 700
690 GOTO 670
700 CLS:PEN 6:PRINT "DEFINE YOUR OWN KEYS":PRINT TAB(5
)"AS  PROMPTED":PEN 5:LOCATE 7,7:PRINT"LEFT:  ";:CALL &
BB03
710 L$=UPPER$(INKEY$):IF L$="" GOTO 710 ELSE PRINT L$
720 PEN 7:LOCATE 6,9:PRINT"RIGHT:  ";:CALL &BB03
730 R$=UPPER$(INKEY$):IF R$="" OR R$=l$ GOTO 730 ELSE
PRINT R$
740 PEN 3:LOCATE 9,11:PRINT"UP:  ";:CALL &BB03
750 U$=UPPER$(INKEY$):IF U$="" OR u$=l$ OR u$=r$ GOTO
750 ELSE PRINT U$
760 PEN 8:LOCATE 7,13:PRINT"DOWN:  ";:CALL &BB03
770 D$=UPPER$(INKEY$):IF D$="" OR d$=l$ OR d$=r$ OR d$
=u$ GOTO 770 ELSE PRINT D$
780 FOR n=1 TO 200:NEXT:INK 0,0:INK 1,24:BORDER 0:PAPE
R 0:RETURN
790 SYMBOL AFTER 199:SYMBOL 200,255,192,127,63,26,26,2
6,26:SYMBOL 201,255,3,254,252,88,88,88,88:SYMBOL 202,2
6,26,26,26,63,127,192,255:SYMBOL 203,88,88,88,88,252,2
54,3,255:SYMBOL 204,26,26,26,26,26,26,26,26:SYMBOL 205
,88,88,88,88,88,88,88,88
800 SYMBOL 249,255,198,205,182,157,210,172,187:SYMBOL
250,255,37,203,187,213,95,169,149:SYMBOL 251,169,149,2
50,171,221,211,164,255:SYMBOL 252,221,53,75,185,180,17
9,45,255:SYMBOL 253,0,48,102,210,89,213,117,255
810 SYMBOL 254,148,252,198,248,154,228,140,248:SYMBOL
240,255,117,213,89,210,102,48,0:SYMBOL 247,21,63,99,31
,89,39,49,15:SYMBOL 242,0,126,24,60,126,126,126,60:SYM
BOL 243,0,0,29,2,0,0,0,0
820 SYMBOL 240,0,24,60,102,102,60,24,0:SYMBOL 241,0,0,
0,24,24,0,0,0:SYMBOL 244,230,230,0,187,187,0,238,238:S
YMBOL 245,126,126,126,126,60,24,24,126:SYMBOL 246,0,42
,84,42,0,0,0,0
830 c1I$=CHR$(200)+CHR$(201)+CHR$(0)+CHR$(0)+CHR$(10):
c12$=CHR$(204)+CHR$(205)+CHR$(0)+CHR$(0)+CHR$(10):c13$
=CHR$(202)+CHR$(203)
840 REM
850 DEFINT a-r,t-z:DIM c(101),d(101):SC=0:sh=0:lives=3
:ENV 2,127,6,1:ENV 1,1,15,1,14,-1,5,5,0,1
860 DIM a$(10)
870 a$(10)="MOSSOFT        5000"
880 a$(9)="WILLY WHO?      4500"
890 a$(8)="SPRIG           4000"
900 a$(7)="SPROG           3500"
910 a$(6)="MR TRAIN        3000"
920 a$(5)="ARNOLD          2500"
930 a$(4)="PSYCHO          2000"
940 a$(3)="STAN STILL      1500"
950 a$(2)="CHAS WHAT?      1000"
960 a$(1)="LITTLE BID       500"
970 DEF FN tr=TEST ((a*16)+7,((25-b)*16)+8):DEF FN tl=
TEST ((a*16)-25,((25-b)*16)+8):DEF FN tu=TEST ((a*16)-
9,((25-b)*16)+24):DEF FN td=TEST ((a*16)-9,((25-b)*16)
-8):DEF FN CH=TEST ((aa1*16)-7,((25-bb1)*16)+8)
980 RETURN
```

REWRITE HISTORY THIS WEEKEND!

All action strategy games from SSI- -the world's No.1 war game company

At last here is your chance to see how you shape up as a General in a real battle! The pages of history record the triumphs and failures as Eisenhower, Montgomery, Rommel and Von Rundstedt battled in Europe and North Africa. But with a clear thinking strategist like yourself in command perhaps the historians would have had a different story to write!

U.S. Gold is proud to present four of the best strategy games by Strategic Simulations Incorporated:

KNIGHTS OF THE DESERT pitches the British Forces of Montgomery against the might of Rommel and his Panzer Divisions in the classic North African campaign of 1941.

BATTLE FOR NORMANDY commences on 'D-Day' June 6th 1944 and relives the Allied Forces attempt to smash Hitler's Atlantic Wall.

TIGERS IN THE SNOW reconstructs the legendary Battle of the Bulge as in December 1944 the Panzer Divisions of Von Rundstedt try one last gamble in a desperate attempt to halt Eisenhower's advancing Allied lines.

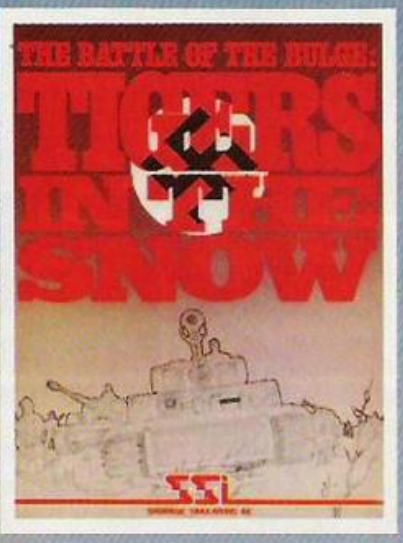
Who will be the victor and who the vanquished?

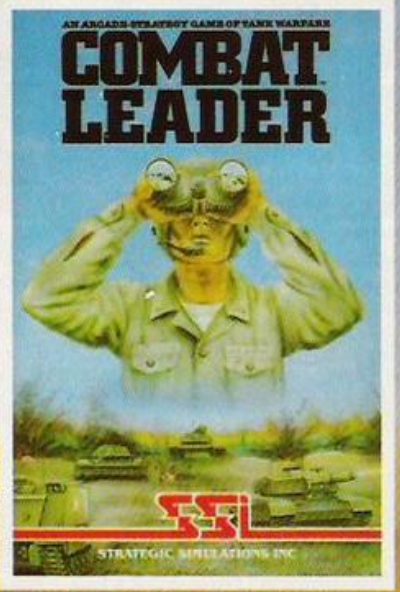
Only you have the answers!

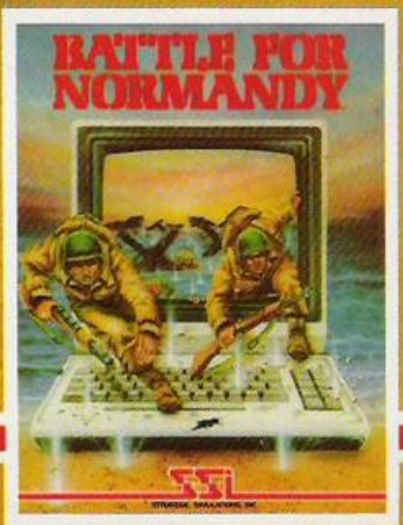
And if you're looking for strategy with arcade action then COMBAT LEADER will test all your wits, depth of thought and reflexes in this toughest of battle challenges!

64 ATARI

Spectrum versions available soon!







£14.95 disk & cassette

THE ULTIMATE IN AMERICAN SOFTWARE FOR YOU ON U.S. GOLD

U.S. Gold is stocked by all leading computer stores including:
BOOTS WHSMITH JOHN MENZIES WILDINGS WOOLWORTH

DEALERS! For information on how to become a U.S. Gold Stockist write to: CentreSoft Ltd., Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020.

U.S. GOLD All American Software

SSI STRATEGIC SIMULATIONS INC.

SONY MSX HIT BIT competition RESULTS

IF THE NUMBER of entries for our competitions is anything to go by MSX would seem to be on course for success. November's competition to win a Sony MSX Hit Bit drew one of the largest responses ever, with almost 2000 entries.

You were asked to put five of the computer's features in order of importance, and then tell us what you would connect it up to, what you would use it for and what you would call it. Software compatibility is obviously the machine's most significant feature, and was the one most people gave priority to. Without it MSX computers would probably be seen in the same light as many earlier micros from the Fast East — well constructed but rather dull.

Our panel went on to place MSX Basic in second place. Calling it powerful may be excessive but it is certainly a highly competent version of Microsoft Basic, more powerful, at least, than Sinclair Basic. Our final list was as follows:

1. MSX software compatibility.
2. Powerful MSX Basic.
3. Professional keyboard.
4. Built-in electronic diary, address book and memo pad.
5. Nifty Sony styling.

With five features to put in order there are only 120 different combinations, so quite a few people came up with the same preference as our panel. Of these we chose the entry from B. Mason, "Highlands", Bromsash, Ross-on-Wye, Herefordshire, as the winner. He suggested that he would connect the Hit Bit up to a baby alarm and bottle heater which would prepare the baby's feed on demand. What would he call it? — the Sony Tit-Bit.

Compared to some of the other suggestions this was relatively practical. Although what babies will think of this development is anybody's guess.

Feeding, in fact, was one of the most popular themes among the tiebreakers. J. Draper wanted to connect up to a cat food dispenser. Naturally, he would call it the Kit Bit. Cocktail makers, cookers, and Teasmaids were also common. The other entries covered almost every conceivable appliance: central heating systems, knitting machines, dishwashers, fish aquariums, terrapin aquariums, car tuning kits, burglar alarms, electric toothbrushes, laser discs, video recorders, model railways, robots, soil monitoring devices for the garden, electric blankets, light switches, jacuzzi controls, neck massagers, milking machines, hi-fi systems, and the front door bell — you name it, someone wants to connect up to it.

Whether it is feasible or desirable to link up a computer to these items is open to doubt. It came as a refreshing change to read D. Sewell's tiebreaker. He suggested connecting the Hit Bit to a cardboard box. As to what he would use it for, he confessed he had not the faintest idea.

The Illustrator is imminent .....

Now you can add graphics to your
Quill Written Adventure.
For use in conjunction with
The Quill Adventure Writing System on the
48K Spectrum.

Please rush me an order form and full details of
The Illustrator for the 48K Spectrum.
I enclose a stamped addressed envelope.

Name .....

Address .....

.....

.....YC1

Send to;

GILSOFT
30 Hawthorn Road
Barry
South Glamorgan
CF6 8LE

GET SET FOR ACTION

Protek Joysticks and Joystick Interfaces give you arcade-quality on the ZX SPECTRUM, BBC MODEL 'B', ORIC ATMOS & ELECTRON COMPUTERS. The perfect Christmas gift for the computer buff.

GIFT SETS INCLUDE:—
BBC MODEL 'B' GIFT SET
INCLUDES
- Quickshot I Joystick
- Protek BBC Interface

£19.95

ZX SPECTRUM—
GIFT SET
INCLUDES
- Quickshot I Joystick
- Protek Switchable Joystick Interface and a Free Games Cassette

£24.95

ZX SPECTRUM "SWITCHABLE INTERFACE" £19.95

A new Joystick Interface that's compatible with all Joystick controllable software. There's no programming or software patch tapes required. Just flick the switch to select the system you require.

ORIC ATMOS 48K PROGRAMMABLE
£29.95

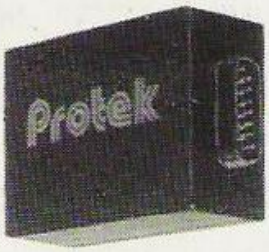
Now you can use any 'ATARI-TYPE' Joystick including Quickshot II Joystick to control your arcade software. You can select up to nine keyboard functions and programme these into your Interface. No software tapes or patch programmes required.

ELECTRON PROGRAMMABLE JOYSTICK INTERFACE (Available November)

Now you can use any 'ATARI-TYPE' Joystick including Joystick II to control your arcade software. You can select up to nine keyboard functions and programme these into your interface. No software tapes or patch programme required.

BBC MODEL 'B' JOYSTICK INTERFACE
£11.95

Just plug this Interface into your 'ANALOGUE-IN' port and you can now use any standard 'ATARI-TYPE' Joystick including Quickshot II Joystick.

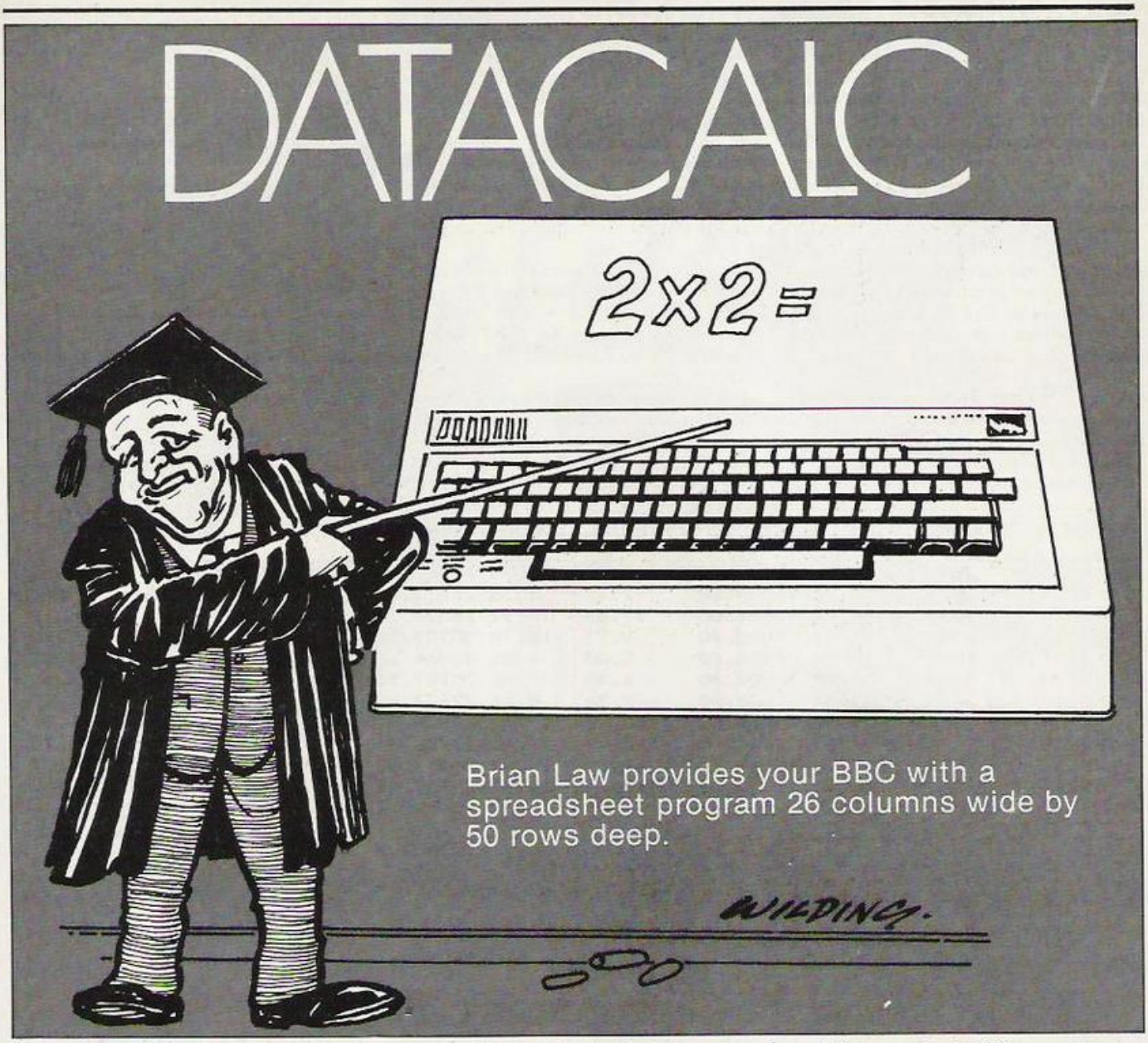


Protek

VISA

Protek Computing Ltd, 1A Young Square,
Brucefield Industrial Park, Livingston, West Lothian. 0506 415353. Telex No. 727559

DATACALC



DATACALC IS A simple to use spreadsheet program for the BBC Model B. In operation it will give you a worksheet that is 26 columns wide and 50 rows deep — if the DFS is not fitted then this can be increased up to 70 rows. In a standard spreadsheet program you can enter either data, text or a formula into any cell on the spreadsheet, Formulae can usually be extended in any direction and contain either relative or absolute values.

This versatility carries a price in the form of the complexity of entering formulae and also the lack of certain fundamental functions. Datacalc aims to overcome these problems by allowing only one formula to be entered for each column, this formula then applies to each operative row within that column.

Because of this simplification in the design of the program structure it has been possible to incorporate such functions as the summing of all values in a column and sorting values into ascending order.

When loaded using

```
Chain "DATACALC"
```

or

```
Chain ""
```

a short menu of three items is presented. Entering 2 when first loading the program will give you a clean worksheet. Entering 1 will return you to the existing worksheet if it already exists, otherwise it does nothing. Entering 3 allows you to load previously stored data.

If you enter 2 then a clean worksheet will be printed on the screen, the rows are numbered from 1 to 9 down the left hand side of the screen, and the columns are numbered from K1 to K4 along the top. The small v in the top left hand corner shows the direction in which the cursor will move after the data or text have been entered.

The direction can be altered by using function key F0. The number at the top right is the number of decimal places that will be used in the calculation and display. This can be changed betweeon 0 and 3 using the function key F7.

The dotted line at location K1, 1 is the cursor and is controlled by using the normal cursor keys. When the cursor hits the edge of the screen it will move the sheet along by either 1 row or 1 column.

To demonstrate a typical use for the program, the example shown above is for a small factory producing 12 items and is set up to calculate the profit made by each item and the total profit.

The way in which this example was entered is as follows:

Use the function keys to have the 'direction of cursor after entry pointer' pointing down, and the number of decimal places set to 2. Move the cursor down to position K1, 1 and type in "PRODUCT" followed by Return. You will have noticed two things at this stage. First, the word Product was printed in the top left hand corner as you typed it in, this will always happen and gives you the opportunity to correct any mistakes.

Secondly, the cursor moves down one row ready to accept the next entry. In this case the next entry is the underline symbol, there is no need to count an exact eight symbols, just keep the key depressed until you look to have sufficient, the computer will knock off any extra ones. Carry on down the column entering the product numbers until you reach row 14 and then move the cursor back to position K2, 1. You can now repeat the previous process for columns K2 and K3.

(continued on next page)

(continued from previous page)

Column 4 is somewhat easier to enter because it only requires a formula. T/Over is of course Volume X Price, so what we want to do is to multiply each value in column two, by its corresponding value in column 3. All we do therefore is to ensure the cursor is somewhere in column 4 then press F1 to indicate a formula is to be entered and then enter "K2*K1" followed by return.

The word calculating will start flashing in the top left corner followed by the printing of the results down to column 4. To obtain the total Turnover we need to add together all the values in column 4, this is done for you if you place the cursor in column 4 then press F2. The result is printed at the bottom of the column, below the dotted line. Now enter columns 5 and 6 as columns 2 and 3 were entered.

Column 7 requires another formula, this time we have a lump sum of overheads that has to be apportioned over all of the products, this can be done in many ways, and in fact the spreadsheet is the ideal way to find out the effect on profits by apportioning overheads in different ways.

In this instance we will apportion the overheads relation to turnover i.e. Total overhead × Turnover/Total Turnover or in Datacalc terms 300,000 × K4/S4 NB! The S4 signifies that the sum value of column 4 is to be used.

Column 8 is for total costs i.e. Overheads + (Material + Labour) * Volume or K7 + (K5 + K6) × K2. Column 9 is for profit i.e. Turnover − T/Costs or K4 − K7. Column 10 is for profit % i.e. Profit / T/Over * 100 or K9/K4 × 100.

The spreadhseet only really comes into its own at this point because you can now go back and change anything you wish and have the whole sheet recalculated for the new values.

For example move the cursor to column 2

and change the value in row 3 to 3000. Now press F1 and the whole shset will be recalculated. A more powerful example is to reduce all the values in column 2 by 10 percent to see the effect on profits.

Move the cursor to column 2 enter F1 for formula then enter K2 × .9. This will multiply all existing values in the column by

(continued on page 128)

PRODUCT	VOLUME	PRICE	T/OVER	MATERIAL	LABOUR	OVERHEAD	T/COSTS	PROFIT	PROFIT%
KB123	2000	34.00	68000.00	8.06	10.78	21783.24	59463.24	8536.76	12.55
KB124	2500	32.00	80000.00	7.45	9.36	25627.34	67652.34	12347.66	15.43
KB125	1800	46.00	82800.00	11.62	13.12	26524.29	71056.29	11743.71	14.18
KB126	2300	35.00	80500.00	9.74	10.78	25787.51	72983.51	7516.49	9.34
KB127	4000	18.00	72000.00	5.08	6.56	23064.60	69624.60	2375.40	3.30
KB128	3500	23.00	80500.00	6.45	7.86	25787.51	75872.51	4627.49	5.75
KB129	2000	35.00	70000.00	7.34	8.76	22423.92	54623.92	15376.08	21.97
KB130	1500	56.00	84000.00	13.98	15.65	26908.70	71353.70	12646.30	15.06
KB131	1800	47.00	84600.00	12.49	13.45	27100.91	73792.91	10807.09	12.77
KB132	1200	63.00	75600.00	17.56	19.67	24217.83	68893.83	6706.17	8.87
KB133	1500	54.00	81000.00	14.73	16.87	25947.68	73347.68	7652.32	9.45
			936500.0			300000.0		108108.9	

```
   10REM:DATACALC:::::
   11*FX21,0
   12P$=CHR$(118)+CHR$(221)+CHR$(222)+CHR$(219)+CHR$(4
3)
   130X=&10
   15*TV255
   16MODE7
   17*KEY0 '
   18*KEY1 @
   19*KEY2 )
   20*KEY3 #
   21*KEY4 %
   22*KEY5 &
   23*KEY6
   24*KEY7 =
   25*KEY8 (
   26*KEY9 @
   28CC=0:PD=0:C=1:K=1:HL=1:M=1:KP=1:DP=1:ONERRORGOTO1
0
   30PRINTTAB(13,2);CHR$141;CHR$130;"DATACALC"
   40PRINTTAB(13,3);CHR$141;CHR$130;"DATACALC"
   50PRINTTAB(2,7);CHR$129;"1";CHR$135;"RETURN TO WOR
KSHEET"
   60PRINTTAB(2,9);CHR$129;"2";CHR$135;"CLEAN WORKSHE
ET"
   65PRINTTAB(2,11);CHR$129;"3";CHR$135;"LOAD DATA FR
OM TAPE"
   67X#=GET$
   70IF X#<>"2" AND X#<>"3" THEN CLS:PROCPRINT_SHEET:S
OUND1,-5,75,3:SOUND1,-7,65,5:GOTO500
   75IF X#="3" THEN GOTO 5200
   80CLS
   90CLEAR
   95CC=0:PD=0:C=1:K=1:HL=1:M=1:KP=1:P%="y)^{+"
   100 N1=50:M=N1+1:L=9:J=L:N2=0:C1=26:LAST=0:CN2=0:DP=
0
   120DIMF$(N):DIMA#(C1)
   140
   150
   160REM LOAD COLUMN NUMBERS
   170FOR XX=1 TO C1
   180X$=" "+STR$ EVAL"(XX)"+STRING$(4- LEN STR$ EVA
L"(XX)","_")+" "
   190C$=C$+X$
   200NEXT
   220
   230
   240REM LOAD MAIN STRINGS
   250REM
   260 FOR R=1 TO N
   270X$=STR$ EVAL "R"
   280F$(R)=X$+STRING$(3-LEN$," ")+STRING$(C1,"
")
   330NEXT
   340PROCPRINT_SHEET
   350SOUND1,-5,75,3:SOUND1,-7,65,5
   360
   500REM CURSOR CONTROL
   505PROCDIRECTION_OF_CURSOR_AFTER_ENTRY
   507PROCDECIMAL_PLACE_CHANGE
   510VDU23,1,0;0;0;0;
   520*FX4,1
   530C=3:R=5
   535REPEAT
   537ONERRORGOTO10
   540X=POS:Y=VPOS
   550IF INKEY(-122) THEN C=C+9:IF C>30 THEN C=30
   560IF INKEY(-26) THEN C=C-9:IF C<3 THEN C=3
   570IF INKEY(-42) THEN R=R+2:IF R>21 THEN R=21
   580IF INKEY(-58) THEN R=R-2:IF R<5 THEN R=5
   590PRINTTAB(X,Y);STRING$(D," ");PRINTTAB(C,R);STRING
$(D,"_")
   595IF K=C AND Y=R AND KP>135 AND KP<140THEN PROCCURS
OR_MOVES_WINDOW
   610PP=GET
   620IF KP<136 OR KP>139 THEN PROCCOMMAND_DISTRIBUTION
:SOUND1,-5,75,3
   630UNTIL K=0
   639
   649
   6500DEF PROCCURSOR_MOVES_WINDOW
   655X=C:Y=R
   660*FX21,0
   670IF X=C AND INKEY(-122) AND K<C1-3 THEN K=K+1
   680IF X=C AND INKEY(-26) AND K>1 THEN K=K-1
   690IF Y=R AND INKEY(-42) AND M<N1-L+1 THEN M=M+1
   700IF Y=R AND INKEY(-58) AND M>1 THEN M=M-1
   710PROCPRINT_SHEET
   720ENDPROC
   790
   799
   800DEF PROCCOMMAND_DISTRIBUTION
   805*FX21,0
   810IF KP=33 THEN PROCDIRECTION_OF_CURSOR_AFTER_ENTRY
   815IF KP=61 THEN PROCDECIMAL_PLACE_CHANGE
   820IF KP=13 OR KP>47 AND KP<58 OR KP>64 AND KP<123 T
HEN PROCENTER_A_VALUE
   825IF KP=125 THEN PROCPRINTER
   830IF KP=35 THEN GOSUB1600
   835IF KP=64 THEN PROCSAVE
   840IF KP=126 THEN PROCSUM_A_COLUMN
   850IF KP=36 THEN GOSUB2500
   860IF KP=37 THEN PROCSORT:PROCPRINT_SHEET
   870IF KP=38 THEN PROCOVER_PRINT_LABELS
   880IF KP=39 THEN PROCJUMP:PROCPRINT_SHEET
   885PRINTTAB(0,0)"";SPC 37
   890ENDPROC
   990
   999
   1000DEF PROCPRINT_SHEET
   1020PRINTTAB(3,2)MID$(K$,K*9-8,35)
   1022LOCAL R
   1025I=2
   1030FOR R=M TO M+8
   1035X=X+2
   1040PRINTTAB(0,X)MID$(F$(R),1,3);MID$(F$(R),K*9-5,35)
   1050NEXT
   1052IF D=-8 THEN PROCOVER_PRINT_LABELS
   1055PRINTTAB(0,22)STRING$(39,"_")
   1060PRINTTAB(3,23)MID$(F$(N),K*9-5,35)
   1070ENDPROC
   1080
   1090
   1100DEF PROCENTER_A_VALUE
   1110LAST=1:PROCFIND_CELL_IN_STRING
   1120IF FP=15 THEN X$="                ":GOTO 1160 ELSE X$=""
   1130REPEAT
   1140IF LP=127 THEN X$=LEFT$(X$,LEN X$-1) ELSE X$=X$+C
HR$(LP
   1145PRINTTAB(0,0);":";X$;SPC(38-LEN(X$)
   1150LP=GET
   1155UNTIL LP=13
   1160X$=LEFT$(X$,0):X$=STRING$(8-LEN(X$)," ")+X$
   1170F$(R)=LEFT$(F$(R),FP)+X$+RIGHT$(F$(R),LEN F$(R)
-FP-8)
   1180PROCMOVE_CURSOR_AFTER_ENTRY:ENDPROC
   1190
   1199
   1200DEF PROCMOVE_CURSOR_AFTER_ENTRY
   1210K=C:Y=R:IF R<5 AND PD=1 OR R>21 AND PD=1 R=21:K=
C+3:GOTO1230
   1220IF PD=1 THEN R=R+2:IF R>21 THEN R=21
   1230IF PD=2 THEN C=C+9:IF C>30 THEN C=30
   1240IF PD=3 THEN R=R-2:IF R<5 THEN R=5
   1250IF PD=4 THEN C=C-9:IF C<3 THEN C=3
   1260PRINTTAB(X,Y);STRING$(D," ");PRINTTAB(C,R);STRING
$(D,"_");
   1270ENDPROC
   1280
   1290
   1300DEF PROCMOVE_WINDOW_WITH_CURSOR
   1310IF PD=1 AND R>21 AND M<N1-L+1 THEN M=M+1
   1320IF PD=2 AND C=30 AND K<C1-3 THEN K=K+1
   1330IF PD=3 AND R=5 AND M>1 THEN M=M-1
   1340IF PD=4 AND C=3 AND K>1 THEN K=K-1
   1350PROCPRINT_SHEET
   1360ENDPROC
   1398
   1399
   1400REM ::::::::::FORMULA ENTRY:::::::
   1410PROCFIND_CELL_IN_STRING
   1415R2=R
   1420PRINTTAB(0,0);CHR$130;"@";
   1430INPUT"" A$(CN)
   1440GOSUB 1700
   1442PRINTTAB(0,0);STRING$(39," ");:PRINTTAB(0,0)CHR$13
0;CHR$136;"CALCULATING"
   1445HL=1
   1450FOR R=HL TO N2
   1452IF ASC MID$(F$(R),FP+8,1)>57 OR ASC MID$(F$(R),FP
+8,1)>32 AND ASC MID$(F$(R),FP+8,1)<46 THEN GOTO1490
   1455ON ERROR GOTO 9000
   1460B$=EVAL A$(CN)*10^DP+.5:X$=STR$(B%/10^DP):X$=LEFT
$(X$,8):X$=STRING$(8-LEN(X$)," ")+X$
   1480F$(R)=LEFT$(F$(R),FP)+X$+RIGHT$(F$(R),LEN F$(R)-(
FP+8))
   1490NEXT
   1492R=R2
   1495PROCPRINT_SHEET
   1496PRINTTAB(0,0)">";SPC 37
   1497RETURN
   1498
   1499
   1700REM::::::::::::::FORMULA ENCODE:::::::::::::::::
   1710X=1:A=LEN A$(CN):B$=A$(CN):C$=""
   1720IF X>A THEN A$(CN)=C$:RETURN
   1730IF MID$(B$,X,1)<>"K" AND MID$(B$,X,1)<>"@" THEN C
$=C$+MID$(B$,X,1):X=X+1:GOTO 1720
   1740IF MID$(B$,X,1)<>"K" THEN X$="N" ELSE X$="R"
   1745SUB$=MID$(B$,X+2,1)
   1750IF SUB$=")" OR SUB$="+" OR SUB$="-" OR SUB$="*" O
R SUB$="/" OR SUB$="^" OR SUB$="" THENF=EVAL MID$(B$,X
+1,1)*9-5:C$=C$+"EVAL MID$(F$("+X$+",)"+STR$EVAL"(F)"+
",0)":X=X+2:GOTO 1720
   1760F=EVAL MID$(B$,X+1,2)*9-5
   1770C$=C$+"EVAL MID$(F$("+X$+"),"+STR$ VAL"F"+",8)"
   1780X=X+5:GOTO 1720
   1998
   1999
   2000DEF PROCSUM_A_COLUMN
   2010IFKP<>36 THEN PROCFIND_CELL_IN_STRING:PRINTTAB(0,
0)CHR$130;CHR$136;"SUMMING"
   2020LOCAL R
   2030S$=0
   2040FOR R=1 TO N2
   2042IF ASC MID$(F$(R),FP+8,1)>57 OR ASC MID$(F$(R),FP
+8,1)<46 THEN GOTO 2055
   2045S$=MID$(F$(R),FP+1,8)
   2050S$=S$+EVAL(S$)*10^DP+.5
```

(continued on next page)

MICROPOWERMICROPOWERMICROPOWERM

(continued from page 126)

.9 i.e. reduce them by 10 percent. Now enter F1 for formula again and enter K2. This will do nothing to the values already in column 2 but it does remove the previous formula from the column. This is only necessary when you use a formula to act on values in its own column, otherwise each time F3 recalculate is used the values in column 2 would be reduced by a further 10 percent.

The previous example showed how the formula command can be used to carry out arithmetical calculations on columns e.g. K2 × K3. You can also use it for calculations of the type (28 × 10? + 5 or π × 17/4. In fact any of the computers own functions can be used e.g. INT (π*30) is quite valid.

However, this sort of formula will produce the same answer in each row of a column so its use is limited. An interesting variation is achieved however if the letter R is used in a formula. Now R is the variable used in the program to denote the row number so if R is used on its own it will result in the row number being printed in each operative row in a column.

If it is used in combination with some other function or number it can be used to increment. e.g. 10 + (R*.1) will progressively increase the value of 10 by 10 percent. The reverse of this formula will of course decriment the value. R is therefore a powerful tool for loading and manipulating data in the worksheet.

I have used the term operative rows a couple of times within the text and I feel now that I should explain it. When you first enter the sheet it has in fact no size at all, it does however grow as you enter values so that its maximum depth of anytime is only as deep as the last value entered down a column, this is also true for the length of the sheet. The reason for this is to ensure that the calculating functions are not operating needlessly on empty cells.

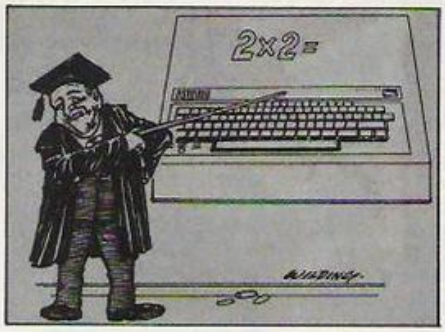
It also ensures that only the necessary cells are stored when the Save F9 is used. The self expansion of the sheet therefore saves considerable computer time, so it is unwise to use more of the sheet than is necessary as it will only cause delays in the calculations.

If the Escape key is pressed at any time you will be taken to the initial menu.

If a formula is entered incorrectly this will generate an error and again send you to the initial menu.

If the return key is pressed on its own the value above the cursor will be deleted.

If you have difficulty in getting the program to work or simply can't stand the thought of typing in the whole listing, I can supply the program on cassette for £4 if you write to me at 11 Meadhurst Road, Leicester.



Function keys.

F0 — ←+→ This key is used to change the pointer in the top Left hand corner. The direction in which the arrow points is the direction in which the cursor will move after an entry has been made. A plus sign "+" means the cursor will remain stationary.

F1 — Formula This key is used to enter a formula into a column. Before using ensure that the cursor is somewhere within the column that the formula is required in.

F2 — Sum This key is used to sum all the values in a column that the cursor resides in.

F3 — Re-calculate This key is used to re-calculate the whole sheet after a change has been made.

F4 — Sort This key will sort a column in which the cursor resides into ascending order and move all the other columns with it.

F5 — Over Print This key offers the option of over printing either Titles or Labels or both when the screen is showing any position on the sheet.

F6 — Jump This key allows you to move rapidly to any position on the sheet by entering the column and row location.

F7 — Decimal Places This key changes the number of decimal places in use between 0 and 3. The number of places in use is displayed at the top Right hand corner.

F8 — Printer This key brings a printer into operation, you need to say how many columns you can fit onto a sheet. Eight columns will normally fit onto A4 size paper.

F9 — Save This key allows the data on the sheet to be saved.

(continued from previous page)

```
 2055NEXT
 2060X$=STR$(SZ/10^DP):X$=LEFT$(X$,8):X$=STRING$(8-LEN
X$," "):+X$
 2070F$(N)=LEFT$(F$(N),FP)+X$+RIGHT$(F$(N),LEN F$(N)-(
FP+8))
 2075IF KP=36 THEN ENDPROC
 2080PROCPRINT_SHEET
 2090ENDPROC
 2490
 2499
 2500REM:::::::::::CALCULATE WHOLE SHEET:::::::::::
 2502PRINTTAB(0,0)CHR$130;CHR$136;"RE-CALCULATING"
 2505R3=R
 2507CL=1
 2510FOR CN=CL TO  CN2
 2520FP=CN*9-8:IF LEN A$(CN)=0 THEN GOTO2600
 2530HL=1
 2540FOR R=HL TO N2
 25501F ASC MID$(F$(R),FP+8,1)>57 OR ASC MID$(F$(R),FP
+8,1)<46 AND ASCMID$(F$(R),FP+8,1)>32 THEN GOTO 2598
 2560ON ERROR GOTO 9100
 2570SX=EVAL  A$(CN)*10^DP+.5:X$=STR$(SX/10^DP):X$=LEFT
$(X$,8):X$=STRING$(8-LENX$," "):+X$
 2585F$(R)=LEFT$(F$(R),FP)+X$+RIGHT$(F$(R),LEN F$(R)-(
FP+8))
 2598NEXT R
 25951F MID$(F$(N),FP+1,8)<>"          " THEN PROCBUM_A_
COLUMN
 2600NEXT
 2605R=R3
 2610PROCPRINT_SHEET
 2620RETURN
 2998
 2999
 3000DEF PROCSORT
 3005PRINTTAB(0,0)CHR$130;CHR$136;"SORTING"
 3010PROCFIND_CELL_IN_STRING
 3020LOCAL R
 3025R=1
 30301F 2^R>N2 THEN GOTO 3040 ELSE R=R+1:GOTO3030
 3040F1=2^R-1
 3050F1=INT(F1/2)
 3060IF F1=0 THEN ENDPROC ELSE D=N2-F1:D=1
 3080R=R+F1
 31001F ASC MID$(F$(R),FP+8,1)>57 OR ASC MID$(F$(R),FP
+8,1)<46 ORASC MID$(F$(E),FP+8,1)>57 OR ASC MID$(F$(E)
,FP+8,1)<46 THEN GOTO3120
 31101F EVAL MID$(F$(R),FP+1,8)>EVAL MID$(F$(E),FP+1,8
) THEN GOTO 3140
 31200=0+1
 31301F B>D THEN GOTO 3050 ELSE GOTO 3080
 3140N$=RIGHT$(F$(R),LEN F$(R)-3):N$=RIGHT$(F$(E),LEN
F$(E)-3)
 3150X$=N$:N$=N$:N$=X$
 3160F$(R)=LEFT$(F$(R),3)+N$:F$(E)=LEFT$(F$(E),3)+N$
 3170R=R-F1:IF R<1 THEN GOTO 3120 ELSE GOTO3090
 3190
 3199
 3200DEF PROCOVER_PRINT_LABELS
 3205IF OP<>0 AND KP<>30 THEN GOTO3235
 3220PRINTTAB(0,0)CHR$134;">";"HEADINGS/TITLES/BOTH/C
ANCEL ";
 3230INPUT""X$
 3235PROCFIND_CELL_IN_STRING
 3240IF X$="B" OR OP=1 THEN PROCOVER_PRINT_HEADINGS_AN
D_TITLES
 3250IF X$="T" OR OP=2 THEN PROCOVER_PRINT_TITLES
 3255PRINTTAB(0,0);">";SPC(20)
 3260IF X$="H" OR OP=3 THEN PROCOVER_PRINT_HEADINGS
 3270IF X$="C" THEN OP=0:PROCPRINT_SHEET
 3290ENDPROC
 3298
 3299
 3300DEF PROCOVER_PRINT_HEADINGS_AND_TITLES
 3305LOCAL R
 3310X=2:FOR R=H TO M+8:X=X+2:PRINTTAB(3,X);MID$(F$(R)
,4,8):NEXT:PRINTTAB(3,4);MID$(F$(1),K+9-5,35)
 3320OP=1
 3330ENDPROC
 3398
 3399
 3400DEF PROCOVER_PRINT_TITLES
 3405LOCAL R
 3410X=2:FOR R=H TO M+8:X=X+2:PRINTTAB(3,X);MID$(F$(R)
,4,8):NEXT
 3420OP=2
 3430ENDPROC
 3498
 3499
 3500DEF PROCOVER_PRINT_HEADINGS
 3510PRINTTAB(3,4);MID$(F$(1),K+9-5,35)
 3520OP=3
 3530ENDPROC
 3698
 3699
 3700DEF PROCJUMP
 3710PRINTTAB(0,0)+CHR$132;"ENTER COLUMN THEN ROW > ";
 3720INPUT""X
 3722PRINTTAB(29,0);
 3725INPUT""Y
 3727IF X=0 THEN X=1:IF Y=0 THEN Y=1
 3730M=Y:IF M>N1-L+1 THEN M=N1-L+1
 3740K=X:IF K>C1-3 THEN K=C1-3
 3760ENDPROC
 3998
 3999
 4000DEF PROCDIRECTION_OF_CURSOR_AFTER_ENTRY
 4010PD=PD+1:IF PD>5 THEN PD=1
 4020PRINTTAB(0,3);CHR$11;CHR$130;MID$(P$,PD,1);CHR$13
5
 4030ENDPROC
 4198
 4199
 4200DEF PROCFIND_CELL_IN_STRING
 4210Fn=(R-3)/2+M-1:FP=C+(K*9)-9:CN=(C-3)/9+K
 4220IF ASC MID$(F$(Fn),FP+1,8)=32  AND Fn>N2 AND LAST
=1 THEN N2=Fn
 4230IF ASC MID$(F$(Fn),FP+1,8)=32  AND CN>CN2 THEN CN
2=CN
 4240LAST=0
 4250ENDPROC
 4600DEF PROCDECIMAL_PLACE_CHANGE
 4610DP=DP+1:IF DP>3 THEN DP=0
 4615ON%=&10
 4620PRINTTAB(38,3);CHR$11;CHR$130;DP;CHR$135
 4630IF DP=0 THEN ?&4B102000=0A
 4640IF DP=1 THEN ?&4B102010=0A
 4650IF DP=2 THEN ?&4B102020=0A
 4660IF DP=3 THEN ?&4B102030=0A
 4670ENDPROC
 4800DEF PROCPRINTER
 4802PRINTTAB(0,0);CHR$129;"IS PRINTER CONNECTED ? ";
 4804INPUT""X$:IF X$="N" OR X$="NO" THEN ENDPROC
 4805PRINTTAB(0,0);CHR$129;"NUMBER OF COLUMNS PER PAGE
";
 4806INPUT""X$
 4810W=EVAL X$+9:WIDTH W+3:VDU2:M2=-(W-4):*FX3,10
 4815REPEAT
 4817M2=M2+W:IFM2+M>237 THEN M2=237-W
 4820LOCAL R
 4830FOR R=1 TO N2
 4840PRINT MID$(F$(R),M2,W):NEXT
 4845PRINT:STRING$(W+3,"-")
 4850PRINT MID$(F$(N),M2,W)
 4857PRINT ''
 4860UNTIL (N2-3)/9>=CN2-(W/9)
 4870VDU3:*FX3,0
 4875VDU3
 4880ENDPROC
 5000DEF PROCSAVE
 5002*OPT1,1
 5005PRINTTAB(0,0);CHR$130;
 5010X=OPENOUT("CALCDATA")
 5012PRINT#X,CC,PD,C,K,HL,M,KP,P$,R
 5015PRINT#X,K9,N1,N,L,J,N2,C1,LAST,CN2,DP,DP,F$(N)
 5020FOR Y=1 TO N2
 5030PRINT#X,F$(Y)
 5040NEXT Y
 5050 FORY=1 TO CN2
 5060PRINT#X,A$(Y)
 5070NEXT Y
 5080CLOSE#X
 5087PRINTTAB(0,1)SPC 37
 5090ENDPROC
 5200REM:::::::LOAD DATA FROM TAPE:::::
 5201*OPT1,1
 5202CLS:PRINTTAB(1,5);CHR$129;"LOAD DATA TAPE AND PRE
SS RETURN":KP=GET:PRINTTAB(0,10);CHR$130;"O/P  ";
 5205CLEAR
 5210DIMF$(51):DIMA$(24)
 5230X=OPENIN("CALCDATA")
 5232INPUT#X,CC,PD,C,P,HL,M,KP,P$,R
 5235INPUT#X,K9,N1,N,L,J,N2,C1,LAST,CN2,DP,DP,F$(N)
 5240FOR Y=1 TO N2
 5250INPUT#X,F$(Y)
 5260NEXTY
 5272FOR Z=1 TO CN2
 5273INPUT#X,A$(Z)
 5274NEXTZ
 5290CLOSE#X
 5295*OPT1,0
 5300FOR X=N2+1 TO N1
 5310X$=STR$ EVAL "X"
 5320F$(X)=X$+STRING$(3-LEN X$," ")+STRING$(C1,"
 ")
 5330NEXT
 5340CLS:PROCPRINT_SHEET:SOUND1,-5,75,3:SOUND1,-7,65,5
:PD=PD-1:DP=1:GOTO500
 9000REM:::::::ERROR TRAPPING(FORMULA)::::::::
 9010ON ERROR OFF:HL=R+1
 9020IF HL<=N2 THEN GOSUB1650 ELSE PROCPRINT_SHEET
 9040HL=1:R=R2:PRINTTAB(0,0);">";SPC(30-LEN(X$));SOUND1,
-5,150,3:GOTO 535
 9100REM:::::::ERROR TRAPPING(CALCULATE SHEET):::::::
 9110ON ERROR OFF:HL=R+1
 9120IF HL<=N2 AND CN<=CN2 THEN GOSUB 2540
 9140HL=1:R=R+1
 9150IF R>N2 ON ERROR GOTO 2510
 9160R=R3:PRINTTAB(0,0);">";SPC(30-LEN
 ):SOUND1,-5,150,3:GOTO 25
 9180REM:::::::ERROR TRAPPING(LOAD):::::::
```

MICRODRIVE VERSION
available for transfer onto 3 cartridges.
Write even bigger programs faster.
(Upgrade your existing White Lightning for just £5)

MICRODRIVE COMPATIBLE

WHITE LIGHTNING

MACHINE LIGHTNING

LIGHTNING STRIKES TWICE

OASIS SOFTWARE

TWO HIGH POWERED GRAPHICS DEVELOPMENT SYSTEMS FOR THE SPECTRUM 48K.

White Lightning is a complete games writing system comprising a high level, Forth based, multi-tasking games writing language and a powerful Sprite Generator Program. No knowledge of machine code is required and the final machine code game, which can run independently of White Lightning, can be marketed with no restrictions whatsoever. Also, with the standard tape version, programs can even be written in a combination of Forth and BASIC.

Up to 255 sprites, each with its own user defined dimensions, can be scrolled, spun, reflected, enlarged or inverted with amazing speed and smoothness. Sprites can even stretch across several screens so scrolling landscapes are easy to achieve. Sinclair's own sound and graphics commands such as CIRCLE, DRAW and BEEP are fully supported.

MULTI-TASKING Without doubt White Lightning's most innovative feature is its use of interrupts to effectively run two programs at once. This means that while one program smoothly scrolls a landscape in the background, a second can animate the characters.

SPRITE DESIGN White Lightning comes complete with a separate 20k program for developing sprites used in the main system. Not only can you use this to design your own sprites from scratch, it also comes complete with 168 pre-defined characters covering games like Asteroids, Pac-Man, Assault Course, Defender, Space Invaders, City Bomber, Lunar Lander, Frogger, Centipede, Donkey Kong and many, many more. These characters are ready to use or can be enhanced. And sprites can be saved to tape between editing sessions before being finally loaded into the main program.

Machine Lightning is an advanced games writing utility which includes a full Macro Assembler, a Monitor/Disassembler, a Sprite Generator Program and the object code for the White Lightning graphics routines which have almost 100 documented entry points in 3k of code. The comprehensive manual explains how to use two copies of the object code to run machine code routines concurrently using the Z80 interrupts. Games written using Machine Lightning can be marketed with no restrictions.

THE MACRO ASSEMBLER This is arguably the most comprehensive assembler yet available for the Spectrum 48k. It supports Macros, conditional assembly and a full screen editor, and occupies 16k of memory.

THE MONITOR/DISASSEMBLER As well as all the usual monitor features, Spectre-Mac allows up to 10 breakpoints in ROM or RAM, has front panel display and single stepping.

THE SPRITE GENERATOR This is the same Sprite Designer/Editor supplied with White Lightning and can be used to design up to 255 sprites, up to a maximum of 12k.

AND . . . LOOK OUT FOR THE LIGHTNING **COMMODORE** SERIES

Basic Lightning, White Lightning and Machine Lightning, all available on tape or disk. Ask your local stockist for details, contact us direct or watch out for our advertisements.

Available from Boots John Menzies and all good software suppliers.

OASIS SOFTWARE
9a Alexandra Parade, Weston-super-Mare, Avon BS23 1QT Telephone: (0934) 419921.
Every product carries a lifetime guarantee.
All prices include comprehensive manuals, VAT and p&p.
(includes manuals and p&p overseas)
24-hour Access
Tele-ordering on (0934 419921)

SYC

Please send me the following Lightning System Pack(s)

White Lightning £14.95

White Lightning (Microdrive) £19.95

White Lightning (Microdrive Upgrade)* £5.00

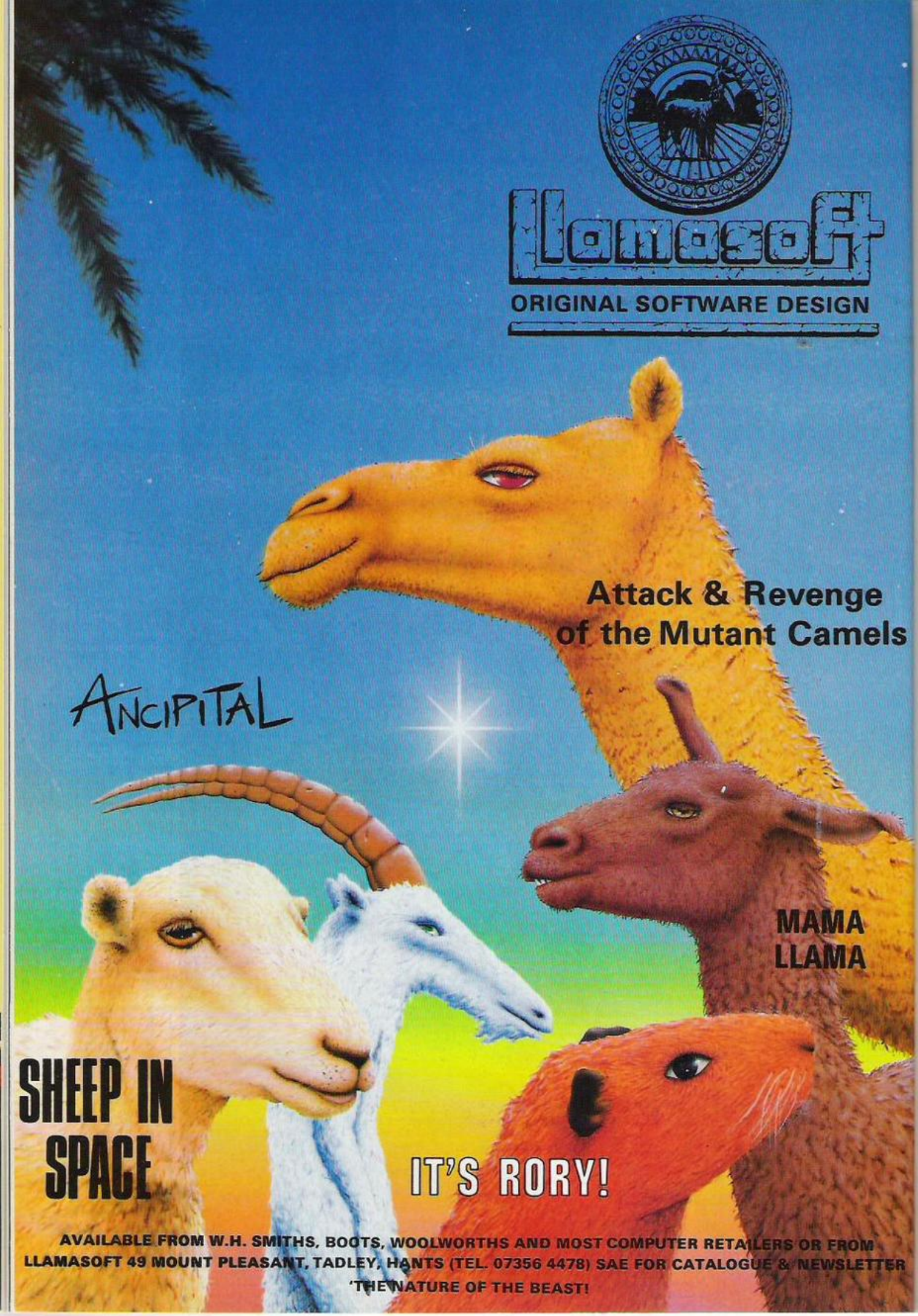
Machine Lightning £19.95

I enclose my cheque/P.O. for £_____
(*plus my existing White Lightning Cassette)

Name_____

Address_____

Telephone_____


Llamasoft
ORIGINAL SOFTWARE DESIGN
Attack & Revenge
of the Mutant Camels
ANCIPITAL
MAMA
LLAMA
SHEEP IN
SPACE
IT'S RORY!
AVAILABLE FROM W.H. SMITHS, BOOTS, WOOLWORTHS AND MOST COMPUTER RETAILERS OR FROM
LLAMASOFT 49 MOUNT PLEASANT, TADLEY, HANTS (TEL. 07356 4478) SAE FOR CATALOGUE & NEWSLETTER
'THE NATURE OF THE BEAST!

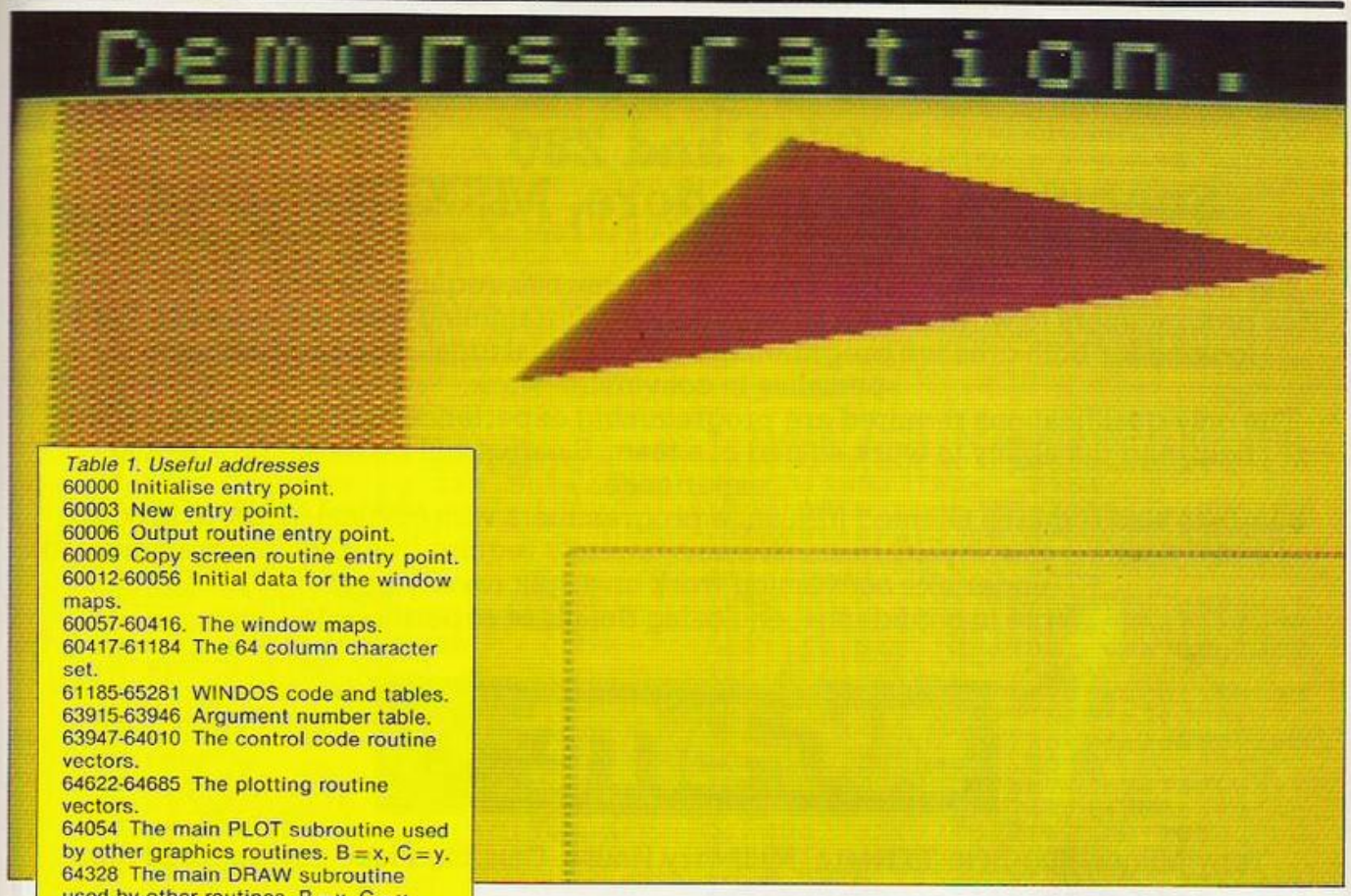


Table 1. Useful addresses

60000 Initialise entry point.
60003 New entry point.
60006 Output routine entry point.
60009 Copy screen routine entry point.
60012-60056 Initial data for the window maps.
60057-60416. The window maps.
60417-61184 The 64 column character set.
61185-65281 WINDOS code and tables.
63915-63946 Argument number table.
63947-64010 The control code routine vectors.
64622-64685 The plotting routine vectors.
64054 The main PLOT subroutine used by other graphics routines. B = x, C = y.
64328 The main DRAW subroutine used by other routines. B = x, C = y.
64684 Equivalent to PLOT k,x,y A = k, B = x, C = y.
23728 The base address of the current window map.

WINDOS

Ian Briscoe continues his explanation of Windos.

Listing 1.

```
  10 REM
  20 REM New CHR$ 29
  30 REM Written by Ian Briscoe
  40 REM August 1984.
  50 REM
  60
  70 PRINT "Make sure that WINDOS
     is in memory.If not BREAK
     and LOAD"
  80 PAUSE 0
  90 FOR a=65300 TO 65318
 100 READ data
 110 PRINT a;TAB 16;data
 120 POKE a,data
 130 NEXT a
 140
 150 REM Now change the vector
 160 REM Low byte first
 170 POKE 64005,20
 180 REM High byte next
 190 POKE 64006,255
 200
 210 PRINT "Finished."
 220 STOP
 230
1000 REM
1010 REM Data for code.
1020 REM
1030
1040 DATA 221,102,44,221
1050 DATA 110,43,1,0
1060 DATA 24,126,47,119
1070 DATA 35,11,120,177
1080 DATA 32,247,201
```

IF YOU TYPED in last month's listings, and managed to get them to work perfectly, then you should by now have realised that used properly, Windos is a pretty powerful aid to graphics creation. There are a few quirks that I neglected to point out last month — if you try to List with the new routines, you will not have a chance to stop the listing, and also no tokens will be printed as tokens, but instead as odd characters. This is not as hopeless as it seems, because you can now set up a character set in Ram, and use codes 128-255 as the user-definable characters.

The normal system variable CharS is the system's character set pointer, except in 64 column mode, as this has its own font near the start of Windos. In addition, you may have discovered that the Plot command works on a full 256 by 192 grid.

Now to the main business. This article is aimed primarily at hackers — ie. fanatical machine-code buffs who delight in nosing their way through other people's programs and systems, and altering them to their own tastes — and ordinary machine-code addicts. You will see in table 1 that there are a few vector tables, which hold addresses of plotting routines, control codes etc. To start with, we'll look at the control code vectors. Remember the window map and the parameter queue?

Well, this is where they comes in. Throughout the following, the byte numbers refer to bytes in the window map, numbered 0-44. When a character gets sent to be printed, it first goes into the A register, then through the current channel until it reaches the output routine.

When it reaches the one in Windos, one of two things can happen. If A is 32 or above, then an ASCII character is output. However,

(continued on page 133)

PROGRAMMERS

6502 and Z80
Spectrum, Commodore, MSX, Amstrad

Bug-Byte Software, one of the UK's top software houses, requires experienced Z80 and 6502 programmers to work as part of its in-house programming team in Liverpool. We are looking for both creative programmers with original ideas, and programmers to specialise in conversion work.

The only qualifications required are programming experience in the computer games field, and the ability to work as part of a team. Salaries will be based on age and experience.

Bug-Byte also requires talented freelance programmers with original ideas, to produce top quality games on a royalty basis. We also urgently require freelance programmers to undertake conversion work on a split royalty basis.

Write in confidence, enclosing details of experience to:–

Tony Milner, Bug-Byte Software, Mulberry House, Canning Place, Liverpool L1 8JB.

HIRE SPECTRUM SOFTWARE

OVER 280 different tapes for hire including **ARCADE, ADVENTURE, BUSINESS, EDUCATIONAL**, etc.–even an m/c Compiler. **FREE** 26 page catalogue. **FREE** newsletter, with hints, tips and our top tape chart.

OVER 3000 tapes in stock, with up to 60 copies of each title for fast service. All tapes sent by 1st class post.

LOWEST PRICES – hire up to 3 tapes at a time, from 63p each for two weeks hire. (Plus p&p and VAT). European members welcome.

Tapes for sale at DISCOUNT prices. Telephone 01-661 9240 (9am - 5pm) or write for further details, or complete the coupon and **JOIN TODAY** – you've nothing to lose!

SAVE £3.00!!

For a limited period, we are offering **HALF-PRICE** membership to readers of this magazine. Join now, **LIFE** membership is only £3.00 (normally £6.00).

SWOP SHOP

A new service from N.S.L. **SWOP** your unwanted tapes with tapes from other members for a small handling charge of only 60p (plus p&p and VAT)

NATIONAL SOFTWARE LIBRARY

42 Harefield Avenue, Cheam, Surrey SM2 7NE.

I enclose cheque/postal order for £3.00 for LIFE membership. Please rush my membership kit to me. If, within 28 days, I'm not delighted with your service you'll refund my membership fee..

Name _____

Address _____

_____

_____ YC/1

is independent software

INDEPENDENT SOFTWARE
presents

THE TRIAL OF ARNOLD BLACKWOOD

Dragon 32 and Amstrad 464 ..... £6.50

"A very worthwhile addition to the adventurer's library" C.P.C. 464 User

ARNOLD GOES TO SOMEWHERE ELSE

Amstrad 464 ..... £6.50

"The best title of the week award" Brian Skinner PCN

THE WISE AND FOOL OF ARNOLD BLACKWOOD

Amstrad 464 ..... £6.50

"With originality and some fiendishly difficult problems" Brian Skinner PCN

NOSFERATU: QUEST FOR THE VAMPIRE

Spectrum 48K £5.95

"I look forward to seeing this adventure become the hit that it deserves to be" Tony Bridge PCW

POP QUIZ 85

CBM 64 and Spectrum 48K £5.95

Includes Name That Tune with over 40 tunes.

THE SHOWBIZ QUIZ

Spectrum 48K £5.95

A game to test your knowledge of T.V. and film personalities, full use of colour and sound.

All trade inquiries welcome

INDEPENDENT SOFTWARE
Goldstar House, 198-200 Queenswood Drive, Leeds LS6 3ND. Tel: (0532) 788757

(continued from page 131)

if A is 31 or below, a fair amount of work gets done before anything happens. First the number of parameters it has are checked, by referring to the 32 byte argument table, one byte for each control code.

If this is zero, then the execution address is found by doubling A, adding this to the base address of the control code table, then, in effect, an indirect Call to the appropriate routine occurs. However, if the number of parameters is more than 0, then first the queue is initialised. This is where all the parameters are going to be stored before execution.

Byte 30 becomes A, and byte 33 becomes the number of parameters left to arrive before execution of the control code. Then, on subsequent outputs, the parameters are queued, from byte 15 onwards and byte 33 decremented by 1. When this reaches 0, then the code is executed. The code routine uses (IX+15) etc to fetch the parameters since IX holds the base address of the current window map. Then the whole show starts again when the next character comes through. Confused?

An example of how to alter one of these codes will show the potential of altering these tables. The control code to be changed is CHR$ 29. Normally, this transfers the screen memory to the display memory, but usually these are one and the same. So, to change it to a code which inverts the whole screen, we first need a screen invert routine. See listing 1.

Now we need to change the appropriate vector in the control code vector table. Its address is Base Address, which is 63947, plus two times the code number, so in this case this is 63947 + (2*29) = 64005.

Now using the normal Intel format, 64005 becomes the low byte and 64006 the high byte

(continued on page 135)

Listing 2.

```
  10 REM
  20 REM Loader for EXTBASIC.
  30 REM Written by Ian Briscoe.
  40 REM August 1984.
  50 REM
  60:
  65 CLEAR 58999
  70 LET line=1000
  80 RESTORE 1000
  90 LET address=59000
 120 FOR a=1 TO 18
 130   GO SUB 500
 135   PRINT line;" OK."
 140   LET line=line+10
 150 NEXT a
 152 CLS
 155 PRINT "Code in memory."
 157 PRINT "Insert cartridge & p
ress a key."
 160 PAUSE 0
 165:
 170 PRINT "Saving ""LOADER"""
 180 SAVE *"m";1;"LOADER"
 190 PRINT "Verifying...";
 200 VERIFY *"m";1;"LOADER": PRI
NT " OK."
 230 PRINT "Saving ""BASIC"""
 240 SAVE *"m";1;"BASIC"CODE 590
00,901
 250 PRINT "Verifying...";
 260 VERIFY *"m";1;"BASIC"CODE 5
9000: PRINT " OK."
 270 PRINT "Finished saving."
 280 STOP
 500 REM
 510 REM Reader and poker.
 520 REM
 530 READ a$: READ checksum
 535 LET total=0
 540 FOR i=1 TO LEN a$ STEP 2
 550   LET high=CODE a$(i)-48
 560   LET low=CODE a$(i+1)-48
 570   LET high=high-39*(high>9)
 580   LET low=low-39*(low>9)
 590   LET byte=(16*high)+low
 600   LET total=total+byte
 610   POKE address,byte
 620   LET address=address+1
 630 NEXT i
 640 IF total<>checksum THEN PRI
NT "Error in line ";line;"."''"Ch
eck and re-run.": STOP
 650 RETURN
 660:
1000 DATA "cf312183e622b75cc9000
02a5d5c2281e6dd213be92a81e6225d5
cdd4600dd23d71800f620ddbe00280f0
404dd2310fcafdd",5404
1010 DATA "be0020dfc3f001d72000d
d2310e0dd6e00dd6601e90000d77a1cc
db705d7d52ddaf00132c0e6d7d52ddaf
00132bfe616005f",6194
1020 DATA "2a535c18107223733ac0e
6471310fd234e234609233a4b5cbd20e
a3a4c5cbc20e4c3c105cdb7053e1fd76
6eac3c105d77a1c",5164
1030 DATA "cdb705d7d52ddaf001f5d
7d52ddaf001f53e07d766eaf1d766eaf
1d766eac3c105d77a1cd71800fe2cc2f
001d72000d77a1c",7293
1040 DATA "cdb7050604c5d7d52ddaf
001c1f510f53e01d766ea0604f1c5d76
6eac110f8c3c105d7821ccdb705d7d52
ddaf001f53e00d7",6914
1050 DATA "66eaf1d766eac3c105003
e01327be7d7821cd71800fe2c200cd72
0003a7be73c327be718eafe0d2807fe3
a2803c3f001cdb7",5816
1060 DATA "053a7be747c5d7d52ddaf
001c1f510f53a7be747f1d766ea10fac
3c105d77a1cd71800fe2cc2f001d7200
0d7821ccdb705d7",6815
1070 DATA "d52ddaf001f5d7d52ddaf
001f5d7d52ddaf001f53e0ed766eaf1d
766eaf1d766eaf1d766eac3c105cdb70
5dd2ab05cddcb0c",8072
1080 DATA "b6c3c105cdb705dd2ab05
cddcb0cf6c3c105cdb705d760eac3c10
5cdb705d763eac3c105d7821ccdb705d
7a22ddaf001ed43",7190
1090 DATA "3de8d70000c3c105d77a1
ccdb705d7a22ddaf001c5d7a22ddaf00
1c5e1d1732372c3c105cdb705dd2ab05
cddcb0ceec3c105",6897
1100 DATA "cdb705dd2ab05cddcb0ca
ec3c105d77a1ccdb705d7d52ddaf001f
5d7d52ddaf001f53e1cd766eaf1d766e
af1d766eac3c105",7657
1110 DATA "cdb705dd2ab05cddcb0dd
eddcb0d96c3c105cdb705dd2ab05cddc
b0dd6ddcb0ddec3c105cdb705dd2ab05
cddcb0d9eddcb0d",7146
1120 DATA "d6c3c105cdb705dd2ab05
cddcb0d9eddcb0d96c3c105d7821ccdb
705d7d52ddaf001f5dd2ab05cdd7705c
3c105d7821cfe2c",6989
1130 DATA "c2f001d72000d7821cfe2
cc2f001d72000d7821ccdb705d7d52df
5d7d52df5d7d52ddd2ab05cdd7729f1d
d772a3e02d766ea",6860
1140 DATA "f1d766eac3c105042a707
5747ce7042a7664757ce7052a706c6f7
4c1e7072a73637265656e62e7062a777
06f6b650be7072a",5492
1150 DATA "7363726f6c6cfde8062a6
373697a657ae8032a75709ee8052a646
f776eb0e8052a6c656674c2e8062a726
9676874d4e8062a",5625
1160 DATA "6c617267655ee8072a6e6
f726d616c6ce8062a3332636f6cfee70
62a3634636f6c0ce8052a696e69741ae
8042a6e657723e8",4939
1170 DATA "052a646f6b6542e8052a6
3616c6c2ce8062a72656e756dc1e6072
a77696e646f772fe7042a636c7300e70
52a67636f6ce6e800",5041
```

BLABY COMPUTER GAMES

SPECTRUM DRAGON 32 ATARI VIC 20

GAMES FROM £1.99

HUBERT — Jump for your life, can Hubert change the pyramid colours.
Spectrum 48K m/c £1.99

TRON — You've seen the film, no try your skill against your partner, can you stay the pace on your light cycle?
Spectrum 48K m/c £1.99

WHIRLWIND — SPECTRUM 48K

CHALLENGE — SPECTRUM 48K

KILLER KONG — Featuring five screens of arcade action. Elevators — Kong — Mario — Barrels — Hamburgers — and even Mario's girlfriend.
Spectrum 48K m/c £1.99

BARMY BURGERS — Baps, Bugers, Cheese and Lettuce — they are all here, all you have to do is to put them all together. It sounds easy doesn't it, but not when you're being chased by a fried egg and sausages.
Spectrum 48K m/c £1.99

GOTCHA — After escaping from the local nick, Ernie is soon back up to his old tricks again.
Spectrum 48K m/c £1.99

THE CRISP FACTORY — SPECTRUM 48K

ICICLE WORKS — SPECTRUM 48K

PERILOUS PIT — Deep underground in the crystal mines roams the dreaded Orbis and his cronies, who are hell bent on stopping the attempts of Boris the miner to fill his truck full of crystals — 4 screens.
Dragon 32 £1.99

BOMBS AWAY BASIL — Sir Basil is trying to defuse the bombs before he is attacked by his only known fear, SPIDERS. Yes, the truth is finally out and, the cunning natives place Spiders near the bombs they plant.
Dragon 32 £1.99

DARTS — Open a couple of cans of beer, sit back, and get all the excitement of an evening in the local.
Dragon 32 £1.99

BORIS THE BOLD — Urgent telegram for Boris, Stop. Please come home, Stop. Beware ofthe patrollers, lasers and bombs, Stop. Please grab a few dimands on your way, Stop.
Dragon 32 £1.99

THE BELL — You have probably read the novel or seen the film — now you can play the game. Rescue Esmeralda from the bell tower. 14 screens of danger for you to challenge.
Dragon 32 £1.99

MCDOUGALS LAST STAND —

GUIDO — Guido is a small ravenous Rabbit who's sole aim in life is to fill his little tummy full of the farmers best carrots. Can you help him in his ravenous rampage? One small tip — watch out for the bouncing balls, this farmer is as crafty as that darn Rabbit.
Spectrum 48K m/c £1.99

ANDROID ATTACK — A nuclear reactors has malfunctioned and is in danger of melting down. The only way it can be saved is by sending in a brave volunteer to release the water reservoir manually — congratulations, you've got the job! Except that the andoids have other ideas.
Atari 16K £1.00

GOBBLER/LASER BLAST — Run around the maze eating the oxygen pills but watch out for the galactic guard of these oxygen pills who will destroy you if he catches you.
Blast the last few laser implacements left on the planet Genymed it's either them or you!
Vic 20 unex £1.99

MORBID MANSION — Ten rooms in this old Mansion must be negotiated before you come face to face with the dreaded Morbid. You are alone then suddenly the clock gets to 12! 10 screens arcade adventure.
Dragon 32 £3.99

BUG ATTACK — It was a nice peaceful afternoon in the garden then suddenly all hell let loose, there were BUGS everywhere all I had to combat these fiends were 3 cans of anti Bug Power.
Vic 20 unex £1.99

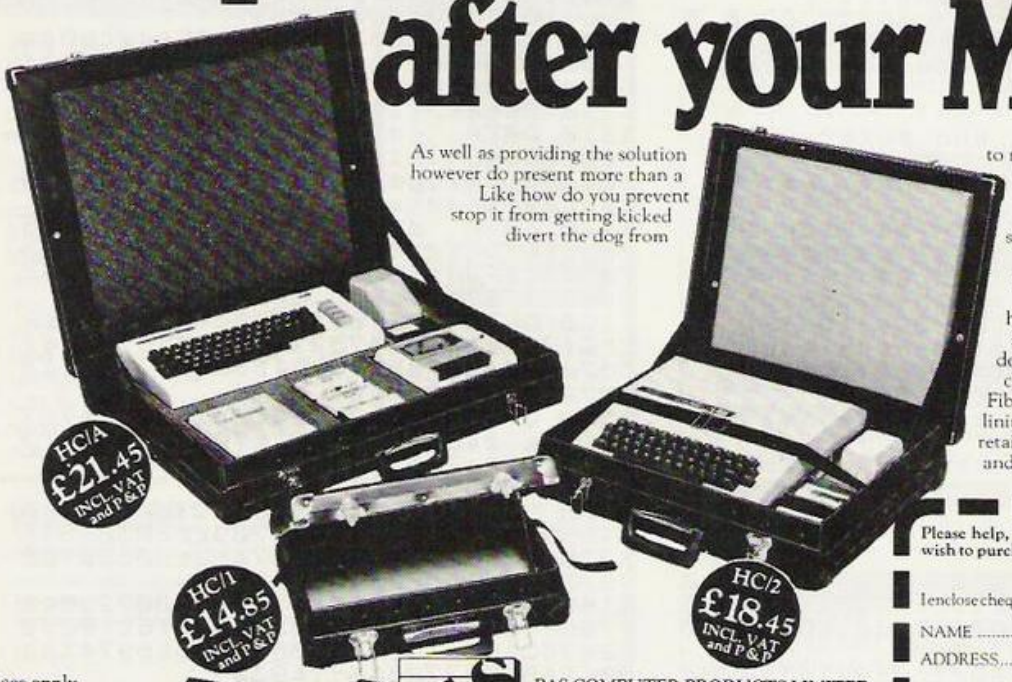
Send sae for full list.

Any of these games are obtainable direct from the company or shortly from Your Computer, Video Shop or where you see the Slush Puppie sign.

Please add 50p Post & Packing.

BLABY COMPUTER GAMES, DEPT YC, LUTTERWORTH ROAD, BLABY, LEICESTER.
TELEPHONE 0533 773641 TELEX 342629 JRHHG

The problems of looking after your Micro...



As well as providing the solution to many a problem, Micro's however do present more than a few of their own.
Like how do you prevent it gathering dust when not in use, stop it from getting kicked when Mum's cleaning the lounge, divert the dog from showing it his affections, or even ensure it at least "arrives" safely when Dad decides to take it down to the local.

We at P.A.S. realising these needs, have now developed a range of three superbly made protective cases designed specifically for Micro's. Each case is constructed from Solid Resin Fibreboard has a fully protective foam lining a carrying handle internal retaining strap, a double snap-fastening lid and a price that defies even Micro logic.

Prices apply to U.K. only.

PAS COMPUTER PRODUCTS LIMITED
UNIT 18, CENTRAL TRADING ESTATE,
STAINES, MIDDLESEX TW18 4UX.
Telephone Staines (STD 0784) 62781

Please help, I am a long suffering Micro owner and wish to purchase ..... case/s (tick appropriate box)
HC/1 HC/2 HC/A
I enclose cheque/P.O. to the value of .....
NAME .....
ADDRESS .....
.....
Please allow 21 days for delivery. Trade enquiries welcome

CASE HC/1 Takes Micro's — ZX81, ZX Spectrum, Oric 1, CGL MS. **CASE HC/2** Takes Micro's — VIC20, BBC 'B', Commodore 64, Texas TI/99, Oric 1, Dragon 32, Colour Genie, Sharp MZ700, Acorn Electron, Lynx, Tandy Colour, Atari 600XL, Acorn Atom. **CASE HC/A** Can be adapted to take any of the above computers and various accessories such as Tape Recorder, printer etc.

Listing 3.

```
5000 REM
5002 REM Extended Basic demo.
5004 REM MERGE with the main
5006 REM WINDOS demo.
5007 REM The main demo must be
     in memory before this one.
5008 REM
5010 REM Picture 2.
5020 REM
5030
5040 PAUSE 0
5042 LOAD *"p";1;"BASIC"CODE
5044 RANDOMIZE USR 59000
5050 *SCREEN 3
5052 *WPOKE 4,85
5054 *WINDOW 0,2,31,23
5056 *GCOL 86
5058 *WPOKE 40,248
5060 *PLOT 3,10,17
5062 *WPOKE 38,BIN 11001100
5064 *PLOT 20,79,100
5066 *VDU 7,38,255
5068 *PLOT 3,150,25
5070 *PLOT 3,250,50
5072 *PLOT 16,100,75
5074 *PLOT 8,200,50
5076 *PLOT 3,110,110
5078 *PUT 7,38,BIN 10101010
5080 *PLOT 12,255,180
5082 *PLOT 3,1,16
5084 *WPOKE 38,BIN 11110000
5086 *PLOT 21,255,191
5088 *WPOKE 38,15
5090 *PLOT 3,1,16
5092 *PLOT 21,255,191
5094 *WPOKE 38,255
5096 *PLOT 3,0,16
5098 *PLOT 22,255,191
5100 *LARGE:*CSIZE 2,10:*RIGHT
5102 *PLOT 24,0,45
```

(continued from page 133)

of the routine address, in this case 65300. The listing shows how its all done. If we wanted to add a routine which needed parameters then we would have had to have changed the appropriate byte in the argument number table.

Providing you know Z-80 assembly language, altering Windos is not at all difficult. At the start of Windos there are four JP addresses. The first two you know, at 6000 and 60003, but 60006 is the entry point to Windos' output routine. Just LD A,n and Call 60006 within your routines. Every single register is saved, except the I and R registers. Obviously, this slows things down a bit, but the peace of mind of knowing that no registers will be corrupted is worth it.

This vector can be altered so that before outputting a character, something else can be done, like a beep, before jumping back to the output routine. This might be useful to someone. The fourth jump is to the copy screen routine. This normally points to a Copy routine for the ZX Printer, which incidentally copies all 192 pixel lines.

However, this can be altered so that it jumps to a full-size printer copy outline instead, and this will be useful to those fortunate enough to have real printers. CHR$ 15 uses this, so any change to this would affect CHR$ 15.

Determined hackers may like to look around the graphics area of Windos. All the relevant addresses are to be found in table 1.

Hopefully, after reading this you will understand and appreciate more fully the thinking behind Windos. I have tried to make it as expandable as possible while still leaving plenty of memory to work with.

You may be cursing the inadequacies of Sinclair Basic which make many programs using Windos fairly bulky or tedious to write. Here is a partial solution which will help Interface 1 owners no end. In a mere 901 bytes I have added 23 commands to the Spectrum's vocabulary using the very well documented method of extending the Basic, which will not be described here.

To keep the size of the Basic down, I used a list to hold the addresses, the command name itself and the length of the name, and I will show you how to add to this list at the end of this article. This method makes adding commands easy.

First of all, to get the Basic going type in and save the loader program. Then Run it. If there are no errors, Saving will begin automatically on Microdrive cartridge. Then, to initialise the Basic, type

RANDOMIZE USR 59000

This must be typed every time you load in the Basic, or want to re-initialise, possibly after a New. Now, making sure Windos is in memory, type the following command line:

*NEW:*INIT:OPEN # 2,"p"

Windos has just been initialised. If the system crashes, check your listing for errors that the checksuims were not able to detect. The full list of commands is as follows:

*PUT n,n,n . . . or *VDU n,n,n . . . n

These are exactly the same and simply output the character codes n directly through the Windos output routine — this is necessary because of the weird things that happen if you don't! — Careful of too many parameters, since the machine stack is used to hold them.

*PLOT mode + routine,x,y: This is exactly the same as CHR$ 14, except it looks much better!

*WPOKE byte, value: This is the window poke. Beware of byte numbers over 44 — you will be poking another window map.

*CSIZE width, height: The same as the QL command, and the same as CHR$ 28.

*UP, *DOWN, *LEFT, *RIGHT: These four commands set the direction of the large printing. Careful use can lead to some very professional effects.

*LARGE: Sets large characters mode.

*NORMAL: Resets to either 32 or 64 column mode, depending on what bit 6 of byte 12 is.

*32COL: Sets the 32 column mode.

*64COL: Sets the 64 column mode.

*INIT: Initialises Windos, and interfaces it to the standard Spectrum system. Equivalent to RANDOMIZE USR 60000.

*NEW: Resets all eight window maps. Equivalent to RANDOMIZE USR 60003.

*DOKE address, contents: This is a two byte Poke, nothing to do with Windos.

*CALL address: Calls the machine-code routine at the specified address.

*RENUM start, increment: At last, a renumber command. No Gotos or Gosubs done, and the parameters are 8 bit not 16. *RENUM 10,10 is valid, but *RENUM 1000,300 is not.

*SCROLL byte 41, byte 42, repeat no: This is a very useful command for setting up first the pixel scroll register and then the attribute register. Then the actual scrolling takes place. The registers remain altered after this command so *VDU 2, number would result in the same scroll taking place.

*WINDOW tlx,tly,brx,bry: This is the same as CHR$ 1, ie. it defines the window size.

*CLS: This is obvious!

GCOL: This sets the graphics attribute. Note: All of the commands must be preceded by a '' but thereafter, Upper or lower case may be used in any order, eg. *Large is valid. Also because of the Rom routine NXTCHR, a command spaced out eg.

*Normal would be accepted. The demonstration is a copy of the subroutine 'picture 2' in the main demo of Windos, and shows how concise programming may be achieved. Obviously, the *Plot, *VDU, *Put and *WPoke commands will be used most often and these will cut the size of your programs down a great deal.

There now follows an explanation of the method used to enable lots of commands to be added in a relatively small amount of memory. There is a list at the end of the Basic starting at 59707 and finishing at 59900 and it takes the form:-

```
LIST DEFB length of following string
     DEFM "*command"
     DEFW address of syntax and runtime
     routine

     DEFB 0 terminates the list
```

Now, the final 0 which terminates the list is at address 59900. There are 99 bytes spare between here and the start of Windos, plenty of room in which to place (a) new command description(s), but make sure that the DEFB always contains the full length of the string following, and that the list is terminated by a 0. To get the base address of the current window map into IX just use in assembly language,

LD IX,(23728)

Of course, you need a lot of information and a good assembler before you can start creating the Basic of your dreams. I would suggest that, money permitting, Hisoft's Devpac and Dr Ian Logan's books, *Spectrum Microdrive Book* and *The Complete Spectrum Rom Disassembly* are absolute essentials, not forgetting the trusty old Spectrum Manual.

If you run out of list space, the address which holds the list pointer is 59019, but take care when changing this, and transferring the old list to its new location, unless of course you don't need the commands for Windos, or Windos, in which case you have 5K of list space available.

I hope that you will find a use for Windos and the extended Basic, but to give you some ideas, why not write a 64 column word processor, or spreadsheet, or try your hand at a text and graphics adventure, using the various graphics routines, and remember that the Sinclair graphics routines still work.

Other ideas are a drawing program making use of the alternative screen facility, or for the very ambitious, a multi-tasking language in machine code making use of the windows, which have completely separate identities.

Once again, if you haven't the time or the energy to type in the listings or you have lost the relevant issues, a tape is available for £3.50 from Ian Briscoe, 32 York Road, Maidstone, Kent, ME15 7QY, which has all the programs and a few extra character sets thrown in. ■

Advicewise and pricewise, you'll find it hard to beat Streetwise.

Sinclair QL and Spectrum+ · Robotics · Software · Communications · Peripherals · Accessories · The lot

At Streetwise you know where you stand. If a product's worth buying, we make sure we stock it. So you get what you want everytime, without the hassle of waiting for your order.

You can buy the complete Sinclair range over the counter – including the new QL, Spectrum, Spectrum +, and the spectacular Wren Executive System. And as part of our enormous range of peripherals we've made a big feature of communications and viewdata.

Our demo facilities let you try before you buy so you can match up a modem to your micro, let a robot run around, or check out items from the vast range on offer –

Sinclair QL · Spectrum · Spectrum + Wren Executive System · Movit self-assembly robots · Software · Viewdata and communications · Printers · Monitors · Interfaces · Joysticks · Light rifles · Data recorders · Keyboards · Microdrives · Accessories · The lot.

Streetwise MICROS

Lion House, 227 Tottenham Court Road, London W1.

A COVER UP

Protect your computer with a cover

HARD COVERS

Made from High Quality ABS
Designed with thought
Matching colour: Perfect fit

BBC	12.50
Electron	8.95
CBM 20/64	10.95
Spectrum	4.95
Oric Atmos	4.95

ALLCOM
for your computer supplies

SOFT COVERS

Made from soft PVC
Bound and Sewn

Available for ALL popular micros and peripherals

BBC	3.95
Microvitec	4.95
Electron	3.25
Spectrum	1.95
Vic 20/64	2.95
Oric	2.45
Epson	4.45
Seikosha	3.75

ON RECEIPT OF S.A.E.
FREE CATALOGUE Containing:
A WIDE RANGE OF ACCESSORIES –
PRINTERS RIBBONS BISKETTES JOYSTICKS SOFTWARE
& MUCH MORE!

JUST SOME EXAMPLES FROM OUR RANGE

ALLCOM FREEPOST (no stamp required)
HARWOOD ROAD LICHFIELD STAFFS WS 13 6BR

MICRO ANSWERS

70-71 Wilton Road, Victoria, SW1
(Three minutes walk from Victoria Station)

* All popular Home Computers including BBC, Spectrum, Commodore, Oric, Amstrad etc.
* Software (over 1500 popular titles)
* Accessories (Printers, Disk Drives, Monitors, Joysticks etc., etc.)

*** SPECIAL OFFERS ***

BBC 'A' 1.20S BASIC 2	£249.00
MEMOTECH (MTX 512)	£249.00
ATARI 400	£ 79.00
DRAGON 32	£129.00
APPLE IIe + DISK DRIVE + CONTROLLER	£749.00

Bargain prices on selected software

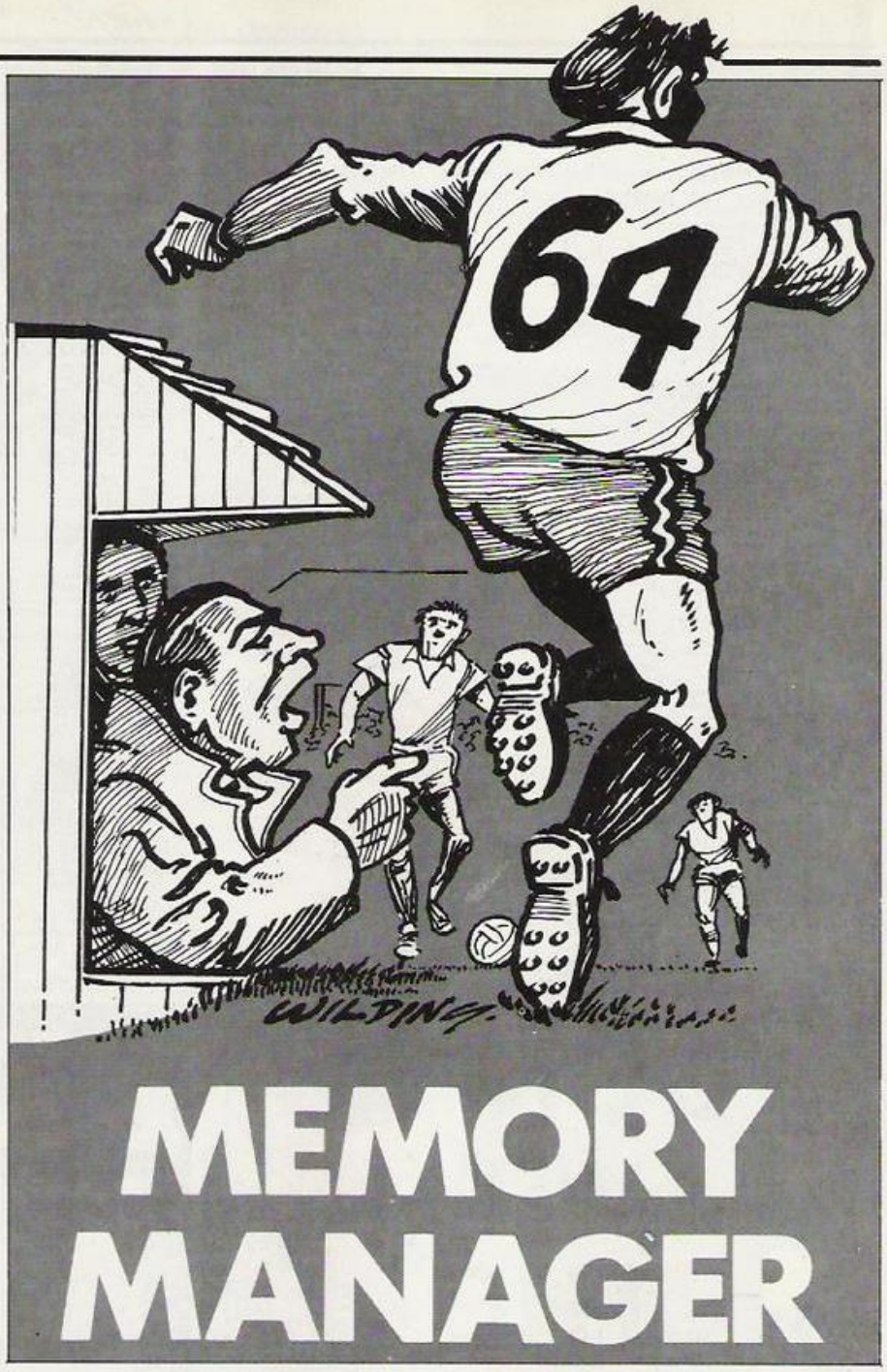
All offers subject to availability, prices inclusive of V.A.T.

(HURRY! LIMITED STOCK!)

Open Monday-Saturday 10am to 6.30pm
Telephone 01-630 5995

MEMORY MANAGER

D M Brown with an aid to saving memory on the CBM-64.



MEMORY MANAGER provides a number of extra facilities for saving blocks of memory for both machine code and basic manipulation.

To understand how it works we must first have a look at the way information is stored on tape. Figure 1 shows this in diagramatic form. The program or data file has at the start a "header". This tells the computer what type of information follows, where it should be located in memory as it is loaded, and what name it has, if any. The possible identities (ID) are as follows:-

1. Program header.
2. Data set.
3. Binary data.
4. Data header.
5. End of tape marker.

The ID is the first byte in the header. Then there are two numbers — four bytes — defining the memory locations to be used. Remember, the numbers are nearly always stored with the low byte first followed by the high byte. The first number is the starting address, the second is the finish or end address and the data following the header will normally be sent to successive locations from the start address to the end address.

Occasionally it may be required to load the data into an area of memory different from that specified by the header. In this case the destination is defined immediately following the header.

Data can be put on tape by the Save or Print# commands in Basic or by transferring information using machine code. Both the Print and machine code methods are available in this program. In general Method 1 is used to define a Basic language process and Method 2 a machine language version.

In general, the Basic version is protected by various automatic checks in the operating system while the machine code version is not. The machine code version takes typically one third of the time to execute.

So how do we use the program? Figure 2 shows the available menu. Decide on the area of memory you wish to save. All addresses are decimal. A hex to decimal or decimal to hex conversion can be done using options 3 and 4 from the menu respectively. When you enter "1" from the menu indicating "Save" you will then be asked to choose Method 1 or Method 2 for a Basic save or a machine code save.

With either method you will need to enter the start address and the finish address of the section of memory you wish to save plus the name you wish to allocate to the file. Do not be surprised if having decided on a Method 1 save the tape keeps stopping and starting. This happens every time the tape buffer is transferred to the tape and has to be refreshed. When the tape stops the screen also flashes to the normal display. At the end of the save the program returns to the menu.

To get the file from tape back into memory enter 2 from the menu. Again you have to say whether you wish to use Method 1 or Method 2. You must use a Method 1 load for a program saved by Method 1 and a Method 2 load for one saved by Method 2. What happens if you forget what you used? This is where the header routines, called from number 5 on the menu, are useful.

Figure 2: Available menu.

Menu	
1. Save	4. Dec to hex
2. Load	5. Header
3. Hex to dec	6. Free bytes
	7. Exit

The clue is the ID. Look at the header using Method 1 or Method 2. At this stage beware, a header Method 1 used for a program saved by Method 2 will give a "string too long" error. This is not too bad as you will immediately use Method 2 header to get the necessary information. More misleading is the problem of using the Method 2 header routine with a tape saved by a Method 1 save. In this instance you appear to have the correct information.

As far as the header is concerned this is true, but the addresses are not the addresses where the data will be sent, rather they are the addresses where the Basic program resides. The memory addresses you need actually follow the header and you must use a Method 1 header routine to display them. How do you know then what to use? Look at the ID. A

(continued on next page)

Figure 1: Format of a header.

Start of header

ID	START ADDRESS	END ADDRESS	N	A	M	E	32	32

1st Byte ← 4 Bytes → File name up to 16 characters. Names less than 16 characters in length are extended by spaces.

(continued from previous page)

header showing an ID of 1 is a program header so a Method 2 header and load routine should be used.

A header showing an ID of 3 is most likely to be a machine-code program. Use Method 2 again. An ID of 4 is the one you get when the program was saved using Method 1, therefore use Method 1 header and load. These are the ID's you will come across using this program. ID's of 2, indicating the start of a data set — Method 1 — and 5, indicating an End of Tape signal also occur.

If you cannot face typing in all the program, a cassette containing this and the screen save facility, is available from: P and D Computers, 80 Coombe Park Road, Coventry CV3 2PE at a cost of £3.50 including P&P.

```
1 REM **********************
2 REM **  MC MANAGER  **
3 REM ** BY D M BROWN **
4 REM **    © 1984    **
5 REM **********************
10 POKE 53280,11: POKE 53281,7: PRINT "■"
11 RESTORE
12 FOR I=49156 TO 49216: READ D: POKE I,D:NEXT I
15 DEFFN HEX(I) = (I AND 15)+48-((I AND 15)>9)*7
16 DEFFN DEC(I) = I-48-(I>57)*7
20 PRINT "■■";TAB(16)"■MENU■■": PRINT
30 PRINT TAB(13)"■1. SAVE"
40 PRINT TAB(13)"2. LOAD"
50 PRINT TAB(13)"3. HEX TO DEC"
60 PRINT TAB(13)"4. DEC TO HEX"
62 PRINT TAB(13)"5. HEADER"
65 PRINT TAB(13)"6. FREE BYTES"
70 PRINT TAB(13)"7. EXIT": PRINT
80 INPUT "■■■■■■■NUMBER OF FACILITY REQUIRED";N
90 ON N GOTO 200,400,600,800,1450,1300,1000
200 REM ■■■SAVE ROUTINE■■■
202 PRINT"■": INPUT "SAVE METHOD 1 OR 2";M
204 IF M=2 THEN 1100
206 PRINT"■■METHOD 1 SAVE■■": F$=""
210 INPUT "FILE NAME ";F$:L=LEN(F$)
220 IF L>16 THEN PRINT "■■■AME TOO LONG■": STOP
230 PRINT: INPUT "START ADDRESS";SA
240 PRINT: INPUT "FINISH ADDRESS ";FA
250 IF FA<SA THEN PRINT"■■■■■■■■■■■■■■ADDRESS WRONG■": FOR I=0TO2000:NEXT:GOTO10
270 PRINT: OPEN 1,1,2,F$: PRINT#1,SA:PRINT#1,FA
280 FOR I=SA TO FA: PRINT#1,PEEK(I):NEXT
290 PRINT#1:CLOSE 1: GOTO 20
400 REM ■■■LOAD ROUTINE■■■
402 PRINT"■": INPUT"LOAD METHOD 1 OR 2";M
404 IF M=2 THEN 1400
510 PRINT"■■METHOD 1 LOAD■"
520 OPEN1,1,0: INPUT#1,SA,FA:IF ST THEN PRINT"■TAPE ERROR■": STOP
530 FOR I=SA TO FA: INPUT#1,P: POKE I,P:NEXT:CLOSE 1
540 PRINT TAB(14) "■■■LOAD COMPLETE■"
550 FOR I=1 TO 2000:NEXT:GOTO 20
600 REM ■■■HEX TO DEC ROUTINE■■■
605 PRINT"■■ENTER 0 TO EXIT. (DEC 0 = HEX 0)■■■"
610 INPUT "HEX NUMBER";H$
620 GOSUB 700
625 IF D=0 THEN 20
626 FOR I=1TO4: IF ASC(MID$(H$,I,1))>70THEN PRINT"■■■HEX NUMBER WRONG■": STOP
627 NEXT I:IF LEN(H$)>4 THEN H$=CHR$(118)+H$:GOTO 626
630 PRINT "■HEX ";H$;" = DEC ";D:GOSUB 1700 :GOTO 600
700 REM ■■■HEX/DEC S/ROUTINE■■■
710 D=0: FOR I=1 TO LEN(H$)
720 E = FNDEC (ASC(MID$(H$,I,1))): D=D*16+E: NEXTI
730 RETURN
800 REM ■■■DEC TO HEX ROUTINE■■■
805 PRINT"■■ENTER 0 TO EXIT. (HEX 0 = DEC 0)■■■"
810 INPUT "DECIMAL NUMBER";D
815 IF D>65535 THEN PRINT"■■■NUMBER TOO LARGE■": STOP
820 GOSUB 900
825 IF D=0 THEN 20
830 PRINT "■DEC ";D;" = HEX ";H$
840 GOSUB 1700
860 GOTO 800
900 REM ■■■DEC TO HEX S/ROUTINE■■■
910 E=D: H$=""
920 H$=CHR$(FNHEX(E-INT(E/16)*16))+H$
930 E=INT(E/16): IF E>0 THEN 920
940 RETURN
1000 REM ■■■EXIT■■■
1010 END
1100 REM ■■■METHOD 2 SAVE ROUTINE■■■
1105 PRINT"■■METHOD 2 SAVE■■"N$=""
1110 INPUT "FILE NAME";N$
1115 PRINT"L=LEN(N$):IFL>16THEN PRINT "■NAME TOO LONG■": STOP
1120 FOR I=49231 TO 49246:POKEI,32:NEXT
1130 POKE 49228,L
1140 IF L=0 THEN 1145
1142 FOR I= 1 TO L:POKE 49230+I,ASC(MID$(N$,I,1)):NEXT
1145 PRINT
1150 INPUT "START ADDRESS";S:PRINT
1160 POKE49153,INT(S/256):POKE49152,S-INT(S/256)*256
1180 INPUT "FINISH ADDRESS";F:PRINT
1185 IF F<S THEN PRINT"■■■ADDRESS WRONG■": STOP
1190 POKE49154,F-INT(F/256)*256
1200 POKE49155,INT(F/256)
1210 SYS49156
1220 GOTO20
1300 REM ■■■ FREE BYTES ROUTINE ■■■
1310 PRINT"■■■■■■■■■■■■■■FREE BYTES = ";FRE(0)+(FRE(0)<0)*65536
1320 GOSUB 1700
1340 GOTO 20
1400 REM ■■■METHOD 2 LOAD ROUTINE■■■
1410 PRINT"■■METHOD 2 LOAD■": SYS49192
1420 PRINT TAB 15; "■■■LOAD COMPLETE■"
1430 FOR I=1 TO 2000:NEXT
1440 GOTO 20
1450 REM ■■■HEADER ROUTINE■■■
1460 PRINT"■": INPUT"METHOD 1 OR METHOD 2";M
1470 GOSUB1600
1490 PRINT"■ID.              = ";ID
1491 PRINT"■START ADDRESS    = ";SA
1492 PRINT"■END ADDRESS      = ";FA
1494 PRINT"■FILE NAME        = ";N$
1496 IF PEEK(SA+5)=22 THEN PRINT "■■■NO NAME FOUND■"
1497 GOSUB 1700
1498 GOTO 20
1499 REM ■■■ DATA FOR MACHINE CODE ■■■
1500 DATA 162,1,169,1,160,3,32,186,255,173,70,192,162,79,160,192,32,189,255,173
1510 DATA 0,192,133,20,173,1,192,133,21,174,2,192,172,3,192
1520 DATA 169,20,32,216,255,96
1530 DATA 160,1,169,1,162,1,32,186,255,169,0,32,189,255,169,0,32,213,255,96
1600 REM ■■■HEADER SUBROUTINE■■■
1610 PRINT"■■METHOD";M,"■■ HEADER■■■": A=SA:N$=""
1620 OPEN 1
1630 ID = PEEK(A) :SA=PEEK(A+1)+256*PEEK(A+2): FA=PEEK(A+3)+256*PEEK(A+4)
1640 FOR I=A+5 TO A+20: IF N$=N$+CHR$(PEEK(I)): NEXT
1645 IF M=1 THEN INPUT#1,SA,FA :IF ST THEN PRINT "TAPE ERROR■": STOP
1650 CLOSE 1
1660 RETURN
1700 REM ■■■WAIT FOR KEY SUBROUTINE■■■
1710 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■PRESS ANY KEY TO CONTINUE■"
1720 GET A$: IF A$="" THEN 1720
1730 RETURN
```


DON'T VAT THE PRESS

There are strong reasons to believe the Chancellor of the Exchequer is planning to impose VAT on your magazine.
Such a move would turn the clock back 130 years — the last tax on newspapers and journals was repealed in 1855. Since then 'No tax on knowledge' has been a principle agreed by all Governments, even in the darkest days of war.
A free Press is a tax-free Press.
No Government should be given the power to impose financial pressure on a Press it may not like.
Tell your MP to say 'NO' to any tax on reading.

Issued by the Periodical Publishers Association, London

EXPORT

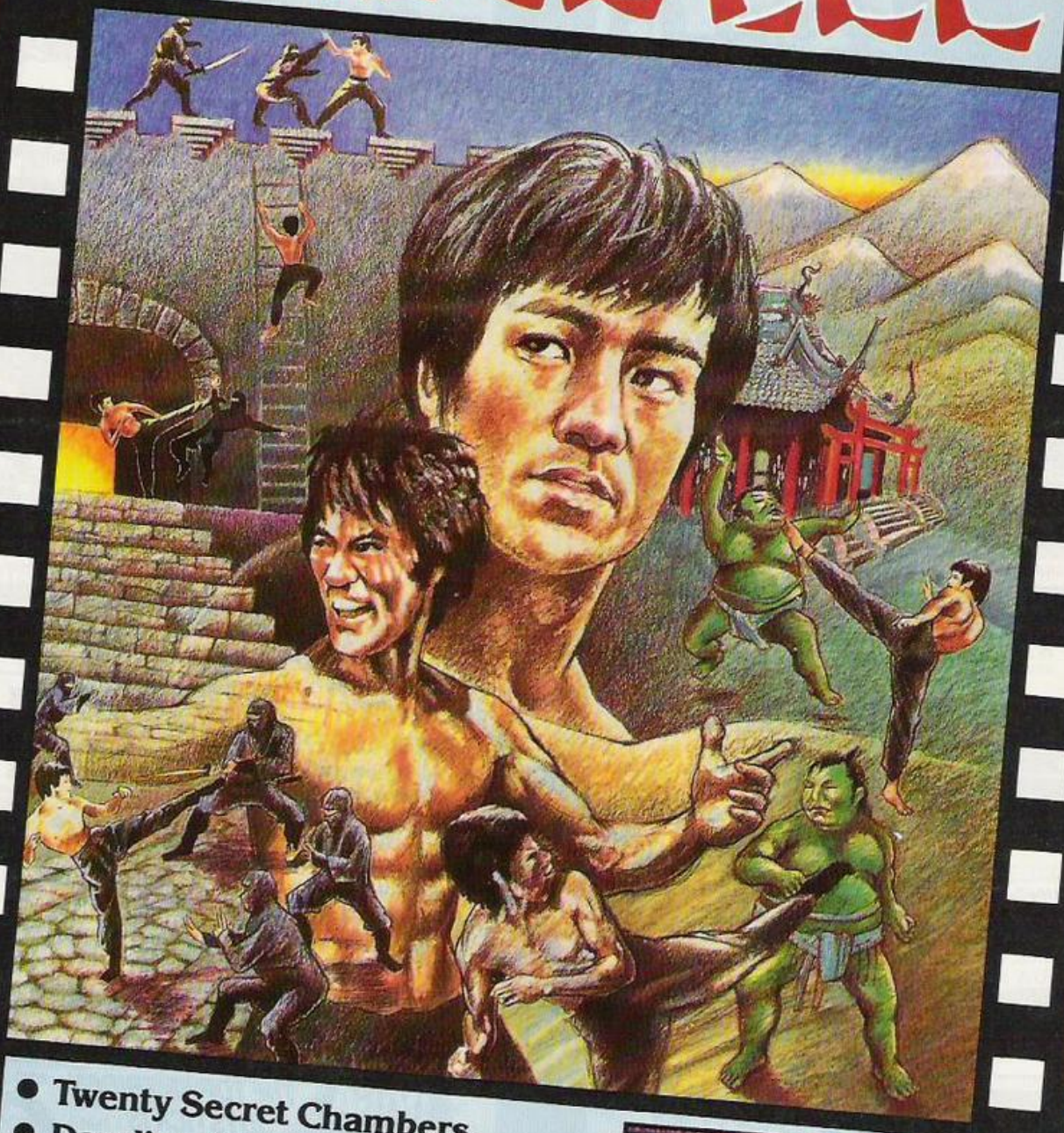
ALL MAKES
OF
MICROCOMPUTERS
PRINTERS
PERIPHERALS
AND
SOFTWARE
SUPPLIED AT
DISCOUNT PRICES

MICROGOLD
UNICOM HOUSE
182 ROYAL COLLEGE STREET
LONDON NW1 9NN

Telex: 295931 UNICOM G **Tel: 01-482 1711**

Your chance to relive the deadly skills and awesome power of

THE LEGENDARY BRUCE LEE



- **Twenty Secret Chambers.**
- **Dazzling Graphics and Animation**
- **Unique Multiple Player Options.**

Spectrum 48K Disk and Cassette **£7.95**
Commodore Disk **£14.95** Cassette **£9.95**
Atari Disk and Cassette **£14.95**

★★★

...LET US BROADEN YOUR HORIZONS

SPECTRUM

Digital Sound Sampling Technology. NOW Available on your Spectrum

Complete unit and Software Package

£49.99 POST FREE

• Digital Sound Sampling has only previously been available for large micros and costing at least 10 times the amount. • The Sound Sampler allows you to record 'Digitally' any sound into memory and instantly replay it at any pitch, forwards, backwards, ascending scale, compressed, expanded, with echo, endlessly looped etc. • Supplied complete with Software package to facilitate the above operations, plus on screen 'Voice Prints' + Frequency Plotting. • With on screen keyboard + drum kit a whole symphony could be produced from a single Sample Sound. • This is a professional unit featuring 8 Bit D to ADC converters as used in Digital equipment now sweeping the music world. • Although the unit is not a toy, giving truly astounding results for the musically inclined, we have incorporated a games interface to allow you to use Sound Sampling in your own games etc., so the Sound Sampler would be of interest to everyone.

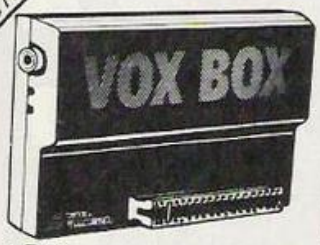
SPECTRUM

NOW! You can connect your Spectrum to a full sized printer...

ONLY **£34.99** POST FREE

- The Datel Interprinter is a Centronics Interface which allows the Spectrum to be connected to a whole range of full sized printers.
- Comes complete with connecting cables and 36 way plug to fit most printers including Epsons, Seikoshas, Star, Tandy, Shinwa etc.
- Complete with software to generate text copys plus additional software to facilitate hires screen dumps.
- The Interprinter plugs straight into the expansion port. • **Available Now!**

SPECTRUM



ONLY **£34.99** POST FREE

THE ULTIMATE SPEECH SYNTHESIZER Plus built in Joystick Interface

- Easily program any word from a unlimited vocabulary.
- Joystick Interface accepts any standard type (Kempston compatible) including Rapid Fire.
- Also boosts Spectrums sound through your TV.
- All in one unit, no messy wires. • **Available Now!**

COMMODORE

NOW for the Commodore 64 The COMMVERSA © SPEECH SYNTHESISER CARTRIDGE

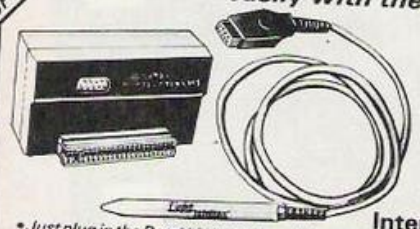
£24.99 POST FREE

PRICE BREAKTHROUGH.

• Simply plug into the exciting world of Speech Synthesis. • The Commversa has an unlimited vocabulary using the now standard Allophone System. • Programming is so easy and sentences can be made up in minutes! • Comes complete with full instructions + Free Demo Tape. No extras required. • **Available Now!**

SPECTRUM

Now you can create Superb Graphics easily with the New Lightwriter



ONLY **£16.99** POST FREE

Lightpen comes complete with Interface & Software

• Just plug in the Datel Lightwriter and draw circles, squares, rectangles, make superb hand drawings, paint, fill, erase, choose inks, paper, colours. • Save your results into memory (48K) and use in animation or save onto tape to use in your own games. • All functions selected from screen menu with the lightpen. • Unbeatable value. • Nothing more to buy.

SEND NOW AVAILABLE FOR IMMEDIATE DELIVERY

SPECTRUM

NEW ALL SYSTEMS GO!! SWITCHABLE JOYSTICK INTERFACE

With built in Sound Booster for "On Screen" sound

ONLY **£22.99** POST FREE

UNBEATABLE VALUE MULTI-FEATURE UNIT!

The TURBO ACE gives maximum joystick compatability by simply switching through all systems ie, Kempston , Cursor , Interface 2.

- The all in one unit also features an Amplifier which delivers the sound from your games etc., directly through your T.V. (also gives keyboard click which helps when typing data etc.).
- These features make the TURBO ACE the number one add on for the games player.
- Accepts any 'Atari' compatible joystick.
- Available now.

SPECTRUM

Games ace

The ultimate add on for the keen games player!

Joystick Interface Plus Spectrum Soundbooster

Actually Amplifies through your TV Speaker

ONLY **£17.99** POST FREE

FEATURES INCLUDE

• Joystick interface compatible with a huge range of games (Kempston system) • Compatible with any Atari type joystick including auto rapid fire models. • Amplifies Spectrums 'Beep' into a roar through your TV speaker! (fully controllable). • Stylish all in one unit, no messy wires. • **Available Now!**

SPECTRUM

At last, the first joystick that puts the firing button where it should have been in the first place.

TRIGA COMMAND IS HERE

THE TOP AMERICAN JOYSTICK IS NOW AVAILABLE IN THE U.K....

£19.99 ONLY POST FREE

- Including Interface to plug straight into the Spectrum. • The first Joystick to give you "Arcade" feel and control. • "Jet Style" heavy duty, diamond cut grip. • Fire Trigger placed under your index finger... the finger with the fastest reflex action. • Self centering, 360° action. • Compatible with most of the latest Software (Kempston system).

Also available for Commodore/Atari £9.99

Dealer Enquiries Welcomed

ALSO AVAILABLE FROM GOOD COMPUTER SHOPS

Send Cheque/P.O.s to:— Allow 7 Days

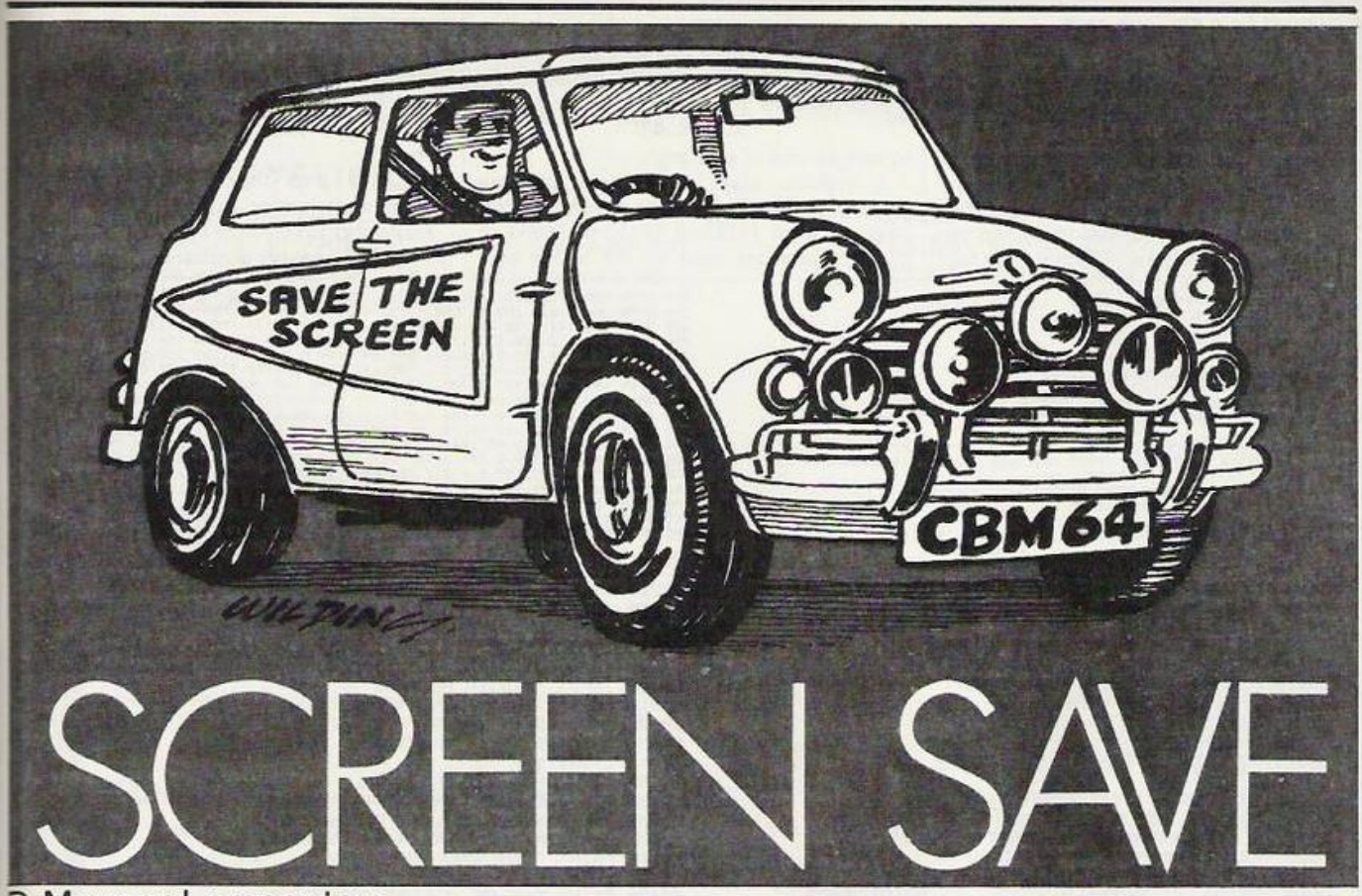
DATEL ELECTRONICS

UNIT 8, FENTON INDUSTRIAL ESTATE, DEWSBURY ROAD, FENTON, STOKE-ON-TRENT
TEL: 0782 273815

Send for Dealer Pack NOW!

or Telephone 24 HRS CREDIT CARD LINE FOR INSTANT DESPATCH

Access BARCLAYCARD VISA



SCREEN SAVE

D Maynard presents a program which allows you to save what is on your tv screen.

THIS PROGRAM allows you to save what is on the monitor or television screen of your Commodore 64 and load it back at a later stage. All colours and characters are saved. All the VIC registers are saved.

The problem with saving a screen is that the tape operating instructions corrupt what is there. We therefore have to save the screen information into an area of memory that is not corrupted. This is done in a machine-code routine and another machine-code routine then saves this area of memory to tape. Although the tape operating instructions appear on the screen they are not saved.

In the load condition the screen data is loaded from tape into an area of memory and then transferred into video memory. In order to reproduce the whole screen and prevent the "Ready" signal appearing, the program is looped so that the "Ready" signal does not appear until a key is pressed.

The program is in two parts. Lines up to 190 are necessary to load the data into memory for the machine code routines. When this is run the lines are removed by the New statement in line 190. Then lines 60000 on are entered together with the program that produces the screen to be saved. If you change line 60120 to Return a member of screens can be saved using

GOSUB 60000

When the program runs, nothing happens!

This is because it is waiting for you to press S for save or L for load. No prompts are given because they would appear across the screen you are trying to save. When you press S the prompt Press Record and Play on Tape appears.

Figure 1: New Screen Memory Area.

Dec	Hex	Description
50944	C700	Screen Ram location LO
50945	C701	Screen Ram location HI
50946	C702	Current character colour code
50947	C703	Colour under cursor
50948	C704	Top of screen memory
50949	C705	)
		|)
		|)
		|) Screen character memory
		|)
51972	CB04	)
51973	CB05	)
		|)
		|) Vicchip registers
		|)
52018	CB32	)
52019	CB33	)
		|)
		|) Colour memory
		|)
53019	CF1B	)

Figure 2: Memory Map — Screen Save

Dec	Hex	Description
49152	C000	Start LO
49153	C001	Start HI
49154	C002	End LO
49155	C003	End HI
49156	C004	)
		|)
		|) Save routine
		|)
49196	C02C	)
49197	C02D	)
		|)
		|) Load routine
49216	C040	)
49217	C041	)
		|)
		|) Unallocated
		|)
49229	C04D	)
49230	C04E	File name length
49231	C04F	)
		|)
		|) File name
		|)
49246	C05E	)
49248	C060	)
		|)
		|) Screen save routine
		|)
49387	C0EB	)
49392	C0F0	)
		|)
		|) Screen load routine
		|)
49512	C168	)

Saved to another area

In the instant between pressing S and the prompt appearing all of the screen and colour memory has been saved to another area of memory. The memory map of this area is shown in figure 1. When you press Play and Record the screen data is transferred from the new location to tape.

If, after running the program you press L the press play on tape prompt appears and the data can then be loaded from tape into memory and afterwards transferred to screen

(continued on next page)

(continued from previous page)

memory. When you wish to continue press any key and the Ready prompt will appear. The last screen saved or loaded can always be recalled to the screen using

SYS 49395

If you wish to save sprite data it is necessary to save the area of memory where the data resides. This must be done so that when you wish to recall the screen you must first load the sprite data. When saving you are prompted to provide a file name, a start address (decimal) and a finish address of the area in memory to be saved. Use

RUN 60200

to save an area of memory.

A problem may arise if the program generating the screen to be saved occupies locations from 49152 to 49512 or 50944 to 53019. These are used by the screen save routine. When relocating the machine code the bytes that are underlined will need changing. In the program, bytes 49152 to 49155 (C000 to C003 hex) are used as stores. The relocation must allow space for these four bytes.

Figure 2 gives the memory map of all machine code routines and registers.

Remember to save lines up to 190 first, then lines 60000 onwards afterwards. ■

```
10 REM ************************
20 REM ***   DATASCREEN   ***
30 REM ***      BY        ***
40 REM ***   D MAYNARD    ***
50 REM ***      1984      ***
60 REM ************************
100 RESTORE:PRINT"J": C=0
110 FOR I=49156 TO 49216:READ D:POKE I,D:C=C+D:NEXT
120 IF C<>7419 THEN PRINT"DATA IN LINES 200 TO 230 INCORRECT":STOP
130 C=0
140 FOR I=49248 TO 49387: READ D:POKE I,D:C=C+D:NEXT
150 IF C<>19316 THEN PRINT "DATA IN LINES 230 TO 310 INCORRECT":STOP
160 C=0
170 FOR I=49392 TO 49512:READ D:POKE I,D:C=C+D:NEXT
180 IF C<>17317 THEN PRINT "DATA IN LINES 310 TO 370 INCORRECT":STOP
190 PRINT"■DATA LOADED":NEW
200 DATA 162,1,169,1,160,3,32,186,255,173,78,192,162,79,160,192,32,189
210 DATA 255,173,0,192,133,20,173,1,192,133,21,174,2,192,172,3,192,169
220 DATA 20,32,216,255,96,162,1,169,1,160,1,32,186,255,169,0,32,189
230 DATA 255,169,0,32,213,255,96,165,243,141,0,199,165,244,133,4,173,134
240 DATA 2,141,2,199,173,135,2,141,3,199,173,136,2,141,4,199,162,0
250 DATA 189,0,4,157,5,199,232,208,247,189,0,5,157,5,200,232,208,247
260 DATA 189,0,6,157,5,201,232,208,247,189,0,7,157,5,202,232,208,247
270 DATA 189,0,208,157,5,203,232,224,46,208,245,162,0,189,0,216,157,51
280 DATA 203,232,208,247,189,0,217,157,51,204,232,208,247,189,0,218,157,51
290 DATA 205,232,208,247,189,0,219,157,51,206,232,224,232,208,245,169,0,141
300 DATA 0,192,169,199,141,1,192,169,27,141,2,192,169,4,141,3,192,32
310 DATA 4,192,96,32,45,192,173,0,199,133,243,173,1,199,133,244,173,2
320 DATA 199,141,134,2,173,3,199,141,135,2,173,4,199,141,136,2,162,0
330 DATA 189,5,199,157,0,4,232,208,247,189,5,200,157,0,5,232,208,247
340 DATA 189,5,201,157,0,6,232,208,247,189,5,202,157,0,7,232,208,247
350 DATA 189,5,203,157,0,208,232,224,46,208,245,162,0,189,51,203,157,0
360 DATA 216,232,208,247,189,51,204,157,0,217,232,208,247,189,51,205,157,0
370 DATA 218,232,208,247,189,51,206,157,0,219,232,224,232,208,245,96
```

```
60000 REM ************************
60001 REM *** SCREEN SAVE/LOAD ***
60002 REM ***  BY D. MAYNARD   ***
60003 REM ***      1984        ***
60004 REM ************************
60010 GET A$:IF A$<>"S" AND A$<>"L" THEN60010
60020 IF A$="L" THEN 60100
60030 SYS49248:STOP
60100 SYS49392
60110 GET A$: IF A$="" THEN 60110
60120 STOP
60200 REM ****************************
60201 REM *** MEMORY SAVE ROUTINE ***
60202 REM ****************************
60210 PRINT"■■MEMORY SAVE■■":N$=""
60220 INPUT"FILE NAME";N$
60230 PRINT:L=LEN(N$):IF L>16 THEN PRINT"■NAME
      TOO LONG■":STOP
60240 FOR I=49231 TO 49246: POKE I,32: NEXT
60250 POKE 49230,L:IF L=0 THEN 60270
60260 FOR I=1 TO L:POKE 49230+I,ASC(MID$(N$,I,1)):NEXT
60270 PRINT
60280 INPUT "START ADDRESS";S:PRINT
60290 POKE 49153,INT(S/256):POKE 49152,S-INT(S/256)*256
60300 INPUT "FINISH ADDRESS";F
60310 IF S>F THEN PRINT"■■■ADDRESS WRONG■":STOP
60320 POKE 49154,F-INT(F/256)*256
60330 POKE 49155,INT(F/256)
60340 SYS49156
60350 RETURN
60400 REM ****************************
60401 REM *** MEMORY LOAD ROUTINE ***
60402 REM ****************************
60410 PRINT "■■MEMORY LOAD■■■"
60420 SYS49197
60430 PRINT TAB 15 ;"■LOAD COMPLETE■"
60450 FOR I=0 TO 2000: NEXT
60460 RETURN
```


HISOFT

ULTRAKIT £9·45

The most powerful toolkit yet for ZX BASIC. All the features you will ever need; AUTO insert, full RENUMBER, block DELETE, CLOCK, ALARM, error trapping, break trapping. Full TRACE with single-step and much, much more. Makes ZX BASIC easy-to-use and powerful.

DEVPAC £14

An excellent assembler, an advanced line-editor, a comprehensive disassembler and a superb 'front panel' debugger all in one package. Used by many leading software houses to write their games. "Buy it!" Adam Denning 1984.

PASCAL £25

A powerful and almost full implementation of Pascal - not a Tiny Pascal. A valuable educational and development tool, programs typically run 40 times faster than a BASIC equivalent. Spectrum version includes Turtle Graphics package. "I haven't seen any other compiler that could match Hisoft's Pascal"

HISOFT
180 High Street North
Dunstable, Beds. LU6 1AT
Tel: (0582) 696421

HISOFT

C

for the ZXSpectrum

Hisoft is pleased to announce a new compiler for this popular and effective systems programming language. Not a tiny-C but an extensive, easy-to-use implementation of the language. Allows direct execution of compiled statements. Supplied with function library. Available direct from Hisoft for £25, or write for further details.

All prices, UK delivered, relate to 48K ZX Spectrum versions. Our software is available for many other Z80 machines e.g. Amstrad CPC 464, MSX, Memotech, SHARP MZ700, New-Brain, CP/M etc. Please write for details.

MICROPRIDE LTD.

ORIC JOYSTICK

Suitable for use with Commodore 64, Vic 20 and Atari **£9.95**
For use with Oric/Atmos Oric Interface required **£11.50**
For use with Spectrum ZX81 Interface required **£7.95**
Tip Fire Button and side fire button fast action.

TRACKBALL

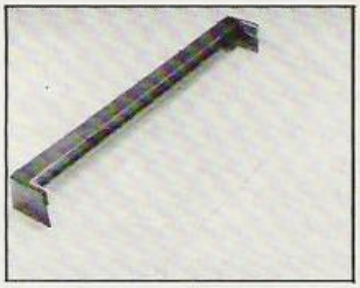
Improve your scores and skills with the Computek Trackball. Suitable for use with Commodore 64, Vic 20, Atari, Oric 1, Atmos and Spectrum use interface. **£17.95**

COMPUTEK JOYSTICKS

For use with the BBC Computer. Metal shaft, 2 fire buttons **£12.95**

PM C16 CASSETTE DATA UNIT

Designed for use with Commodore +4, Commodore 64 and Vic 20. This cassette unit is a device for storing and recalling computer programs on ordinary cassette tapes. It can be used for saving programs you have written and want to recall for later use. It can also be used to read pre-recorded programs that you have purchased. **£24.95**



DUST COVER

Clips onto the back of the Commodore 64. Pivits up to allow use of keyboard, fully moulded, clear plastic dust cover. **£7.95**

ORIC ATMOS	**£125.95**
ORIC DISC DRIVE	**£225.00**
ORIC PRINTER	**£129.95**
ORIC MODEM	**£99.95**
ORIC MODEM INTERFACE	**£99.95**

Please send me the following .....
I enclose my cheque/P.O. made payable to:

MICROPRIDE LTD for £.....

NAME .....

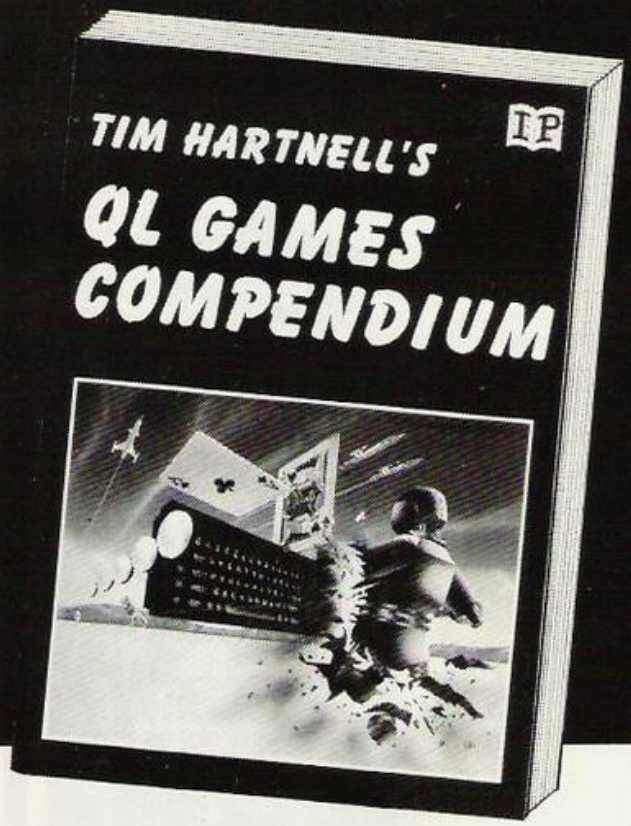
ADDRESS .....

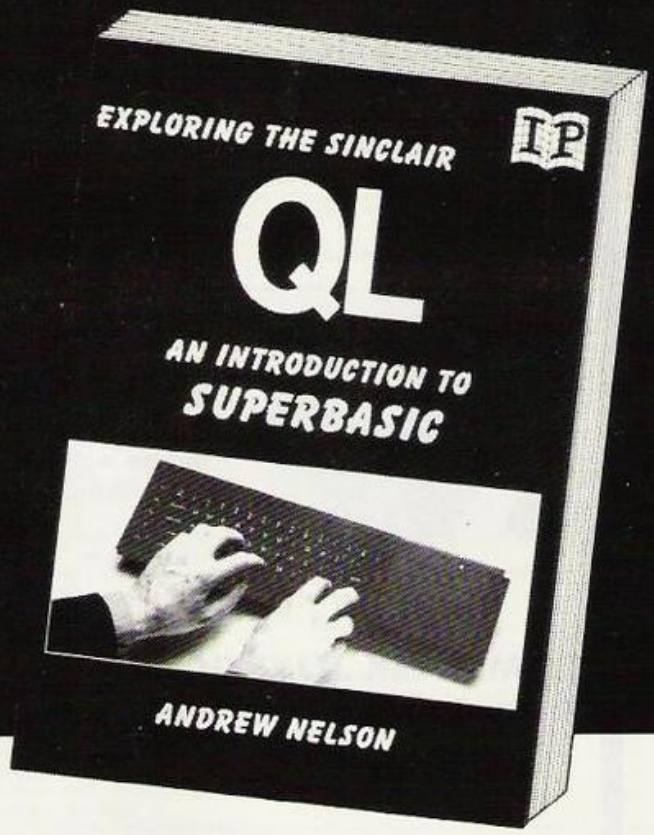
.....

* ALL PRICES INCLUDE POSTAGE & PACKING *

MICROPRIDE LTD.
UNIT 16, SHIPYARD INDUSTRIAL ESTATE,
BRIGHTLINGSEA, ESSEX CO7 0AR.

TWO GREATS FOR THE SINCLAIR QL





Tim Hartnell's QL Games Compendium

From Tim Hartnell (the author, PCW magazine called 'Mr Sinclair'), comes this major games book for the QL . . .

Not only does it contain listings for more than 20 complete games, but the detailed instructions and ideas will help you develop your own games, whilst improving your programming as you do so. There is even a complete chapter to teach you how to create moving graphics games on your QL!

The Programs include:

ELIZA — in which your QL acts as a psychiatrist and talks to you.

QTHELLO — challenge your QL to a round of Reversi/Othello.

MAGICIAN'S MAZE — high adventure exploring ruins after gold.

DETECTIVE Q — solve the murder; different each time it runs.

STOCKBROKER — a challenging simulation puts thousands in your control as you work towards getting a million.

TRYST WITH MEPHISTOPHELES — nearly 20K of challenging adventure.

QL RACER — real-time moving graphics, in a game few will win.

Exploring the Sinclair QL An Introduction to SuperBASIC

Here's your chance to explore the potential of SuperBASIC, the sophisticated language supplied with the Sinclair QL.

Designed to help you write better, clearer programs, Sinclair SuperBASIC is a state-of-the-art programming language, a language which keeps pace with the hardware innovations of the computer.

Andrew Nelson, author of several popular computer books, explains all the important concepts, key words, commands and statements of SuperBASIC. In this book, he explains that many of the programming skills you have from the Spectrum can be directly transferred to the QL, and show how — as you learn the new words in the QL's vocabulary — your programs can gradually be made more complex and sophisticated, by incorporating the new commands and statements.

Interface Publications, Department QYC
9-11 Kensington High Street, London W8 5NP.

Please send me the following books. I enclose a total of £_____

- ☐ **Tim Hartnell's QL Games Compendium** — Tim Hartnell, ISBN 0 947695 04 4 — £5.95
- ☐ **Exploring the Sinclair QL — An Introduction to SuperBASIC** — Andrew Nelson, ISBN 0 907563 84 8 — £4.95
- ☐ **Mastering Machine Code on your ZX Spectrum** — Toni Baker — £9.95
- ☐ **Spectrum Machine Code Made Easy, Volume One for beginners** — James Walsh — £5.95
- ☐ **Spectrum Machine Code Made Easy, Volume Two for advanced programmers** — Paul Holmes — £5.95
- ☐ **The Spectrum Machine Code Reference Guide** — Richard Ross-Langley — £4.95
- ☐ **Creating Adventures on your ZX Spectrum** — Peter Shaw and James Mortleman — £4.95
- ☐ **Putting Your Spectrum to Work (including 15 major programs, a word processor and spread-sheet calculations)** — Chris Callender — £4.95
- ☐ **Creating Arcade Games on the ZX Spectrum** — Daniel Haywood — £3.95
- ☐ **Programming Your ZX Spectrum** — Hartnell/Jones — £6.95
- ☐ **60 Games and Applications for the ZX Spectrum** — David Harwood — £4.95
- ☐ **Beyond Simple BASIC — Delving Deeper into your ZX Spectrum** — Dilwyn Jones — £7.95
- ☐ **Instant Spectrum Programming (tape and book)** — Tim Hartnell — £4.95
- ☐ **20 Simple Electronic Projects for the Spectrum** — Stephen Adams — £6.45

Interface Publications, Department QYC
9-11 Kensington High Street, London W8 5NP.

Name.....

Address.....

.....

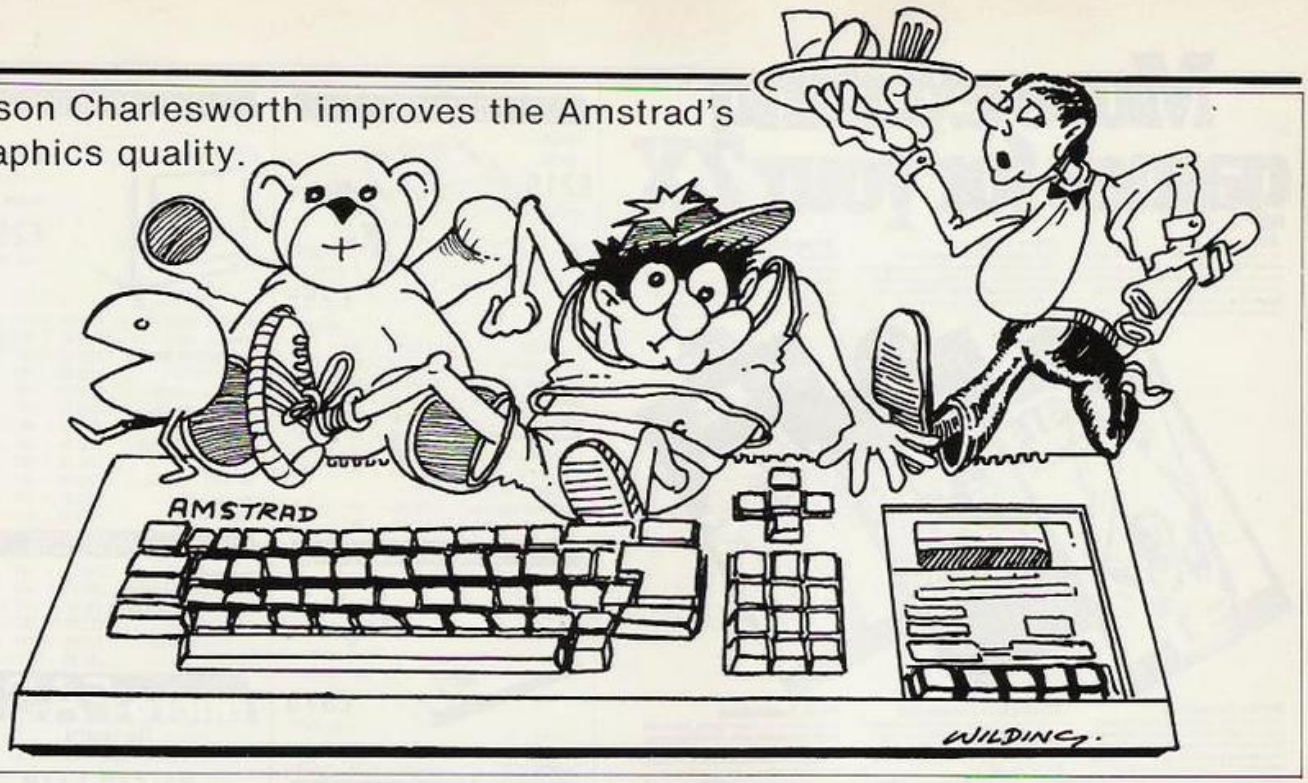
.....

(TRADE ONLY. Interface Publications are distributed exclusively in the UK and Eire by WHS Distributors. Export trade handled by Interface Publications.)

INTERFACE PUBLICATIONS

We're the experts!

Jason Charlesworth improves the Amstrad's graphics quality.



AMSTRAD SPRITES

THE AMSTRAD is a very well designed computer which is extremely strong in all areas except that of graphics. It has the usual Plot and Draw commands but does not contain any sprite routines, Fill commands or Scroll command unlike most recent computers. This article should rectify this by adding five new Basic commands to Amstrad Basic. These are actually new commands, not just a sequence of Pokes and Calls.

Listing 1, when entered and run will provide these commands but before the commands can be used they must be activated by Call 37000. The commands provided are:

SPRITEON,X,Y,Z — This works only in mode 0. X is the X axis co-ord (0-143) and Y is the Y axis — top = 0, bottom = 183 — and Z is the Sprite number — 1 to 15. If any of these are out of range, the routine will return, having done nothing.

(continued on page 147)

Listing 1.

```
10 MEMORY 36999
20 CLS:PRINT "Poking in progress,do not disturb !"
30 x=37000:RESTORE
40 READ a$:IF a$="9999" THEN GOTO 80
50 FOR a=1 TO LEN (a$) STEP 2:POKE x,VAL("&"+MID$(a$,a
,2))
60 x=x+1:NEXT a
70 GOTO 40
80 CLS:PRINT "Finished"
90 DATA 01929021C890CDD1BCC9A390C3D090C35091C35B91C345
92C3519253505249544 54FCE5350524954
100 DATA 454F46C646494CCC5343524F4C4CD55343524F4C4CC40
0000000929000000000DD7E00DD4602DD4E
110 DATA 04FE00C8FE10D03D677BFEB9D079FE91D07CB787876
F117C9219E53EC7906F5997675779E60120
120 DATA 1ACD1DBC545DE13E10F5D5010000EDB0D1EBCD26BCEBF
13D20EFC9CD1DBC545DE1D5110000019D13E
130 DATA 10F5D51AE6AA4F7EE655B11223130107 00EDB01AE6554
F7EE6AAB11223D1EBCD26BCEBF13D20DAC9
140 DATA 3E0FDD4600DD4E02C3E090DD7E00FE10D04FDD6603DD6
E027CFE0238047DFE90D0DD5605DD5E047A
150 DATA FE0338047BFE80D079F5
160 DATA CD11BCFE0020020E04FE0120020E02FE0220020E01060
0CDE1BB322B92F1CDDEBBE5CDC491CDE991
170 DATA CD139228F5E1CD2D922008CDC491CDE99118F33A2B92C
DDEBBC9E5D5E5D5C5CDF0BBC1D1E1FE0020
180 DATA 13E5D5C5CDEABBC1D1E1EBA7ED42EB7AFEFF20E0D1E1C
9E5D5EB09EB7AFE0220057BFE803018E5D5
190 DATA C5CDF0BBC1D1E1FE00200BE5D5C5CDEABBC1D1E118DBD
1E1C92B2B7CFEFF280CE5D5C5CDF0BBC1D1
200 DATA E1FE00C93E03FE04C9010023237CFE0120057DFE8F30E
DE5D5C5CDF0BBC1D1E1FE00C9060 1CD99BB
210 DATA CD2CBCCD4DBCC9060018F2000000000000000000000000
0000000000000000000000000000000000000000
220 DATA 00000000000000000000000
230 DATA 9999
```

More exciting games for your ZX

Athlete
So you didn't make the Olympics? Never mind, here's a selection of track and field events where you can show the selectors how you compare against some tough opposition. Sprints (100m & 400m), Hammer Throw, Hurdles (110m & 400m).

Super Bridge
For beginners and experts alike. Designed to give above average players a good run for their money and to give beginners an excellent introduction without the worry of an impatient partner.

Make Music
A music synthesizer program designed to compose 3 part harmonies when used with the Zon Fuller and Timedata sound boxes or any other using the AY-3-8912 chip where the 'OUT' command is known. 'Brilliant – ZX Computing'

Buffer Adventure
Featuring the real life characters who work at Buffer Micro. Dare you unravel the mysteries behind the shop? Are the people who serve you quite as weird as they seem? An amusing pun laden adventure.

Mysterious Fairground
All the fun of the fair, plus unimaginable terrors in the House of Horror and the Ghost Train before you can find the five items of treasure hidden somewhere in the Fairground.

Pools Predictions
Score draws, no-score draws, home and away wins in this menu driven program to help you fill in that winning coupon. English/Scottish leagues and Australian leagues for all year round success.

Racing Predictions
Covers the flat racing season at the touch of the keyboard – all the major courses catered for in this user friendly prediction program. Pick the first three home with confidence – not a pen!

Card Games
CRIBBAGE is the most fascinating of the series, produced in response to Cribbage addicts' requests. Also on the same cassette are PAIRS, BINGO and PATIENCE.

Loony Bin
Mad adventure requiring cool logical thinking to escape from the asylum and travel the world following the clues. Uses all but 8 bytes of the Spectrum's 48k memory.

FREE Blank Tape with every purchase

All prices include VAT. Add 75p p&p or call in person at Buffer. Trade enquiries welcome. Visa. Access. American Express. Diners Club.

Please send me the following games:
☐ Athlete ☐ S. Bridge ☐ Music ☐ Adventure
☐ Myst. Fair. ☐ Pools Pred. ☐ Racing Pred.
☐ Card Games ☐ Loony Bin

Name _____

Address _____

_____

_____

_____

I enclose cheque/PO for

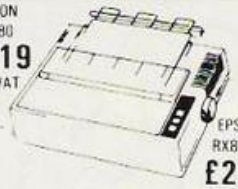
£_____ YC

BUFFER MICRO SHOP

310 Streatham High Road London SW16 6HG Tel: 01-769 2887
Open Tues-Sat 10.30-5.30 (Closed Mon)

DOT MATRIX

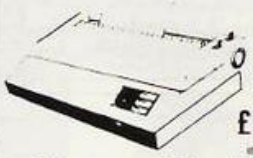
EPSON RX80 **£219** inc VAT



EPSON RX80 F/T **£255** inc VAT

Epson RX80	£190.43	+ VAT	£219
Epson RX80 F/T	£221.74	+ VAT	£255
Epson FX80	£329.57	+ VAT	£379
Epson FX100	£511.30	+ VAT	£588
KDC FT 5001	£203.48	+ VAT	£234
Mannesmann Tally MT80	£195.65	+ VAT	£225
Canon PW1080A	£227.39	+ VAT	£319
Star Delta 10	£317.39	+ VAT	£365
(With Serial/Parallel I/F & Buffer)			
RS232 Interfaces from	£26.09	+ VAT	£30
Printer cables from	£10.43	+ VAT	£12

DAISYWHEEL



JUKI 6100 **£375** inc VAT

JUKI 6100	£326.09	+ VAT	£375
Daisystep 2000	£216.52	+ VAT	£249

PROCESSORS

BBC Model B + Recorder	£320.87	+ VAT	£369*
BBC 'B' with DFS	£399.13	+ VAT	£459
Amstrad CPC464	£139.13	+ VAT	£160
8v power + UHF	£24.35	+ VAT	£28
ISL 8083 (IBM Comp)	£1173.91	+ VAT	£1350
DEC 11/23 + 40 MB	£6086.96	+ VAT	£7000
DEC 11/73 + 170 MB	£10434.78	+ VAT	£12000

PHONE FOR QUOTATION ON BESPOKE ACCOUNTING SOFTWARE INVOICING/LEDGERS/PAYROLL

* While stocks last

colour MONITORS

MICROVITEC 1451/DL Medium Res **£255** inc VAT

Amstrad CTM640	£146.96	+ VAT	£169
Microvitec 1431	£169.57	+ VAT	£195
1431 (RGB/PAL/AUDIO)	£195.65	+ VAT	£225
Kaga Vision Ex	£186.96	+ VAT	£215
JVC 1302.1 (DL/BBC)	£169.57	+ VAT	£195
Microvitec 1451/DL	£221.74	+ VAT	£255
Microvitec 1451	£239.13	+ VAT	£275
1451 (RGB/PAL/AUDIO)	£295.65	+ VAT	£340
Kaga Vision II	£234.78	+ VAT	£270
JVC 1302.2 (DL/BBC)	£220.00	+ VAT	£253
Microvitec 1441	£433.91	+ VAT	£499
Kaga Vision III	£321.74	+ VAT	£370

mono MONITORS

Amstrad GT64	£60.00	+ VAT	£69
Sanyo DM2112 (15MHz)	£65.22	+ VAT	£75
Sanyo DM8112CX (18MHz)	£86.10	+ VAT	£99
ISL 18 (18MHz)	£53.91	+ VAT	£62
ISL 20 (swivel 80 col)	£63.48	+ VAT	£73
Teco with Zoom	£91.30	+ VAT	£105

microFAST
The Experts
57 Hoxton Square London N1
01-729-1778
Prices are for cash and carry sale and are correct at time of going to press in September

---

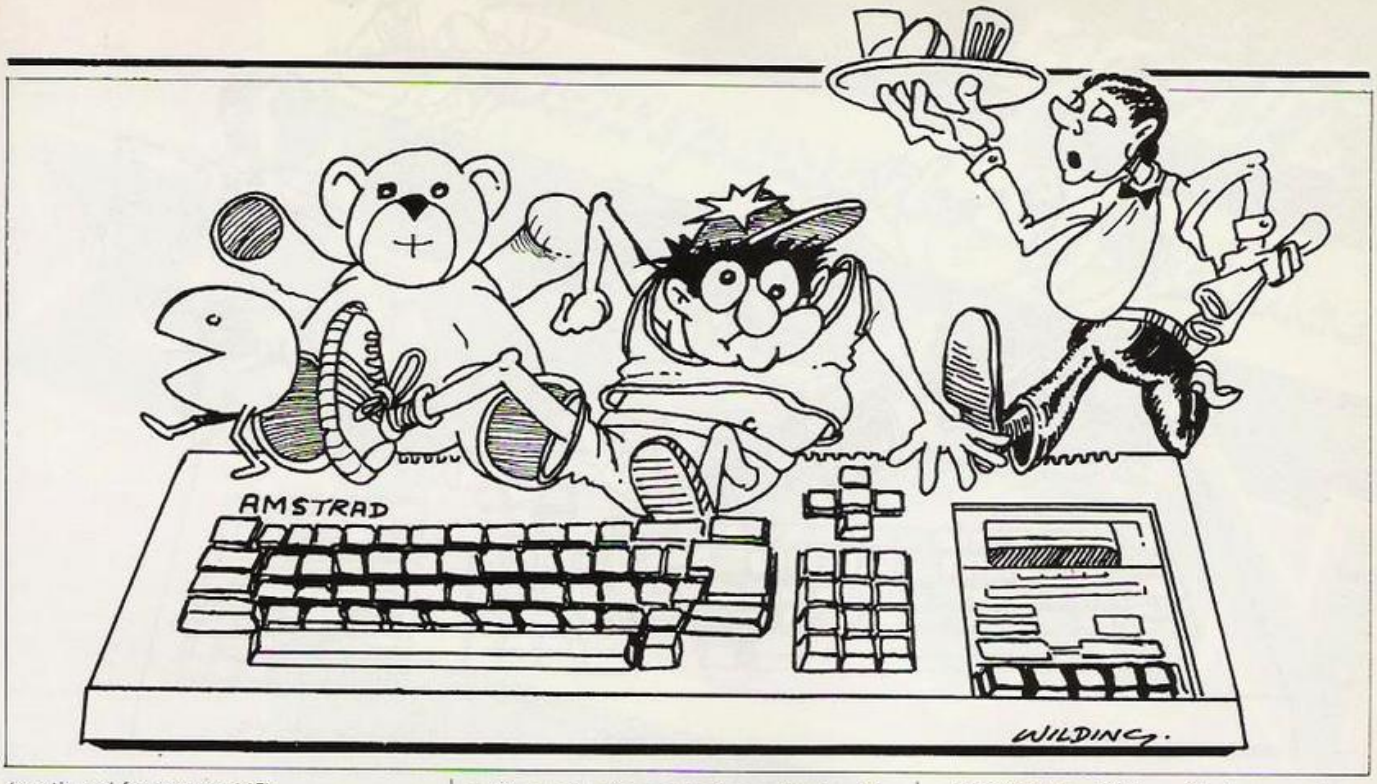
PRINTERS — BEST EVER PRICES

CANON TW 1080A — £273 + VAT
SHINWA CP80 — £173 + VAT
THE NEW SHINWA CPA 100CPS £195 + VAT
DAISYSTEP 2000 — £195 + VAT
MP165 A new standard for Dot Matrix — £275 + VAT
80 column 165 CPS with an incredible 75 CPS NLQ
STAR GEMINI + DELTA — Ring for best UK price
MANNESMAN TALLY — All models best UK price
MANNESMAN TALLY PIXY PLOTTER — £495 + VAT
incl. free BBC, IBM, or Apple Software
ALL ORDER + £9.50 DELIVERY + VAT

FOLLY MICRO

0730 894078
0730 67057

10 College Street, Petersfield, Hampshire
9am-9pm every day or send SAE for full range
We have no connection with any other retailer
SHOW ROOM NOW OPEN



(continued from page 145)

SPRITEOFF,X,Y — This is the same as for Spriteon except that as it removes a Sprite instead of printing it, no sprite number is needed. FILL,X,Y,Z — X = X co-ord and Y = Y co-ord using normal co-ordinates. Z = pen in which the filling is to be done. This works on any mode.

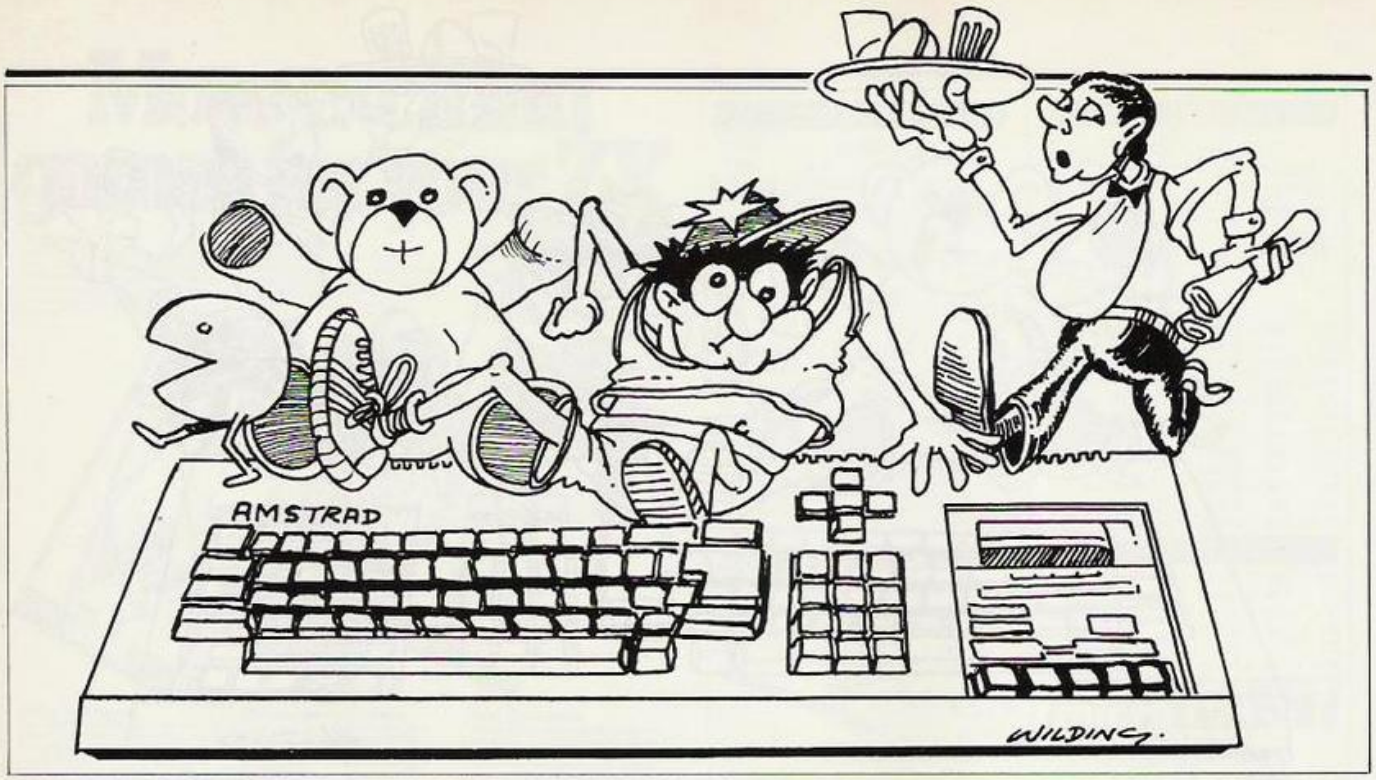
SCROLLU — This scrolls the screen up one line.

SCROLLD — This scrolls the screen down one line. All the commands need to be prefixed by the extended colon — character above the @ on the keyboard. This is the

(continued on next page)

Listing 2.

```
10 MODE 1:INK 1,13:INK 0,1:PAPER 0:PEN 1
20 MEMORY 36999
30 PRINT"Sprite designer by J.Charlesworth":LOCATE 1,1
0
40 INPUT "How many sprites (1 to 15) ",spr
50 IF spr<>INT(ABS(spr)) OR spr>15 OR spr<1 THEN 40
60 spr=spr-1:DIM sp%(spr,15,15)
70 KEY DEF 72,1,&F0,&F4,&F8
80 KEY DEF 75,1,&F3,&F7,&FB
90 KEY DEF 73,1,&F1,&F5,&F9
100 KEY DEF 74,1,&F2,&F6,&FA
110 KEY DEF 76,1,&E0,&E0,&E0
120 tsp=0:pn=1:xp=0:yp=0:GOSUB 550
130 GOSUB 490:GOSUB 140:GOTO 130
140 REM KEYSCAN
150 IF INKEY(62)=0 THEN 280
160 IF INKEY(27)=0 THEN 320
170 IF INKEY(60)=0 THEN 360
180 IF INKEY(46)=0 THEN 400
190 IF INKEY(35)=0 THEN 440
200 a$=INKEY$:IF a$="" THEN RETURN
210 IF a$<>CHR$(&E0) THEN 250
220 IF sp%(tsp,xp,yp)=0 THEN sp%(tsp,xp,yp)=pn:GOTO 24
0
230 sp%(tsp,xp,yp)=0
240 GOSUB 520:RETURN
250 x=xp+(a$=CHR$(&F2))-(a$=CHR$(&F3)):y=yp+(a$=CHR$(&
F1))-(a$=CHR$(&F0))
260 IF x>15 OR y>15 OR x<0 OR y<0 THEN RETURN
270 GOSUB 520:xp=x:yp=y:RETURN
280 REM CLEAR
290 a$=INKEY$
300 CLS#1:INPUT #1,"Confirm (y or n) ";a$:IF a$<>"y" T
HEN GOSUB 770:RETURN
310 FOR a=0 TO 15:FOR b=0 TO 15:sp%(tsp,a,b)=0:NEXT b:
NEXT a:GOSUB 550:GOSUB 740:RETURN
320 REM PEN
330 a$=INKEY$
340 CLS#1:INPUT#1,"Which ink";a:IF a>15 OR a<0 OR a<>I
NT(ABS(a)) THEN 340
350 pn=a:GOSUB 770:LOCATE 8,8:PAPER pn:PRINT" ":PAPER
0:RETURN
360 REM SAVE
370 GOSUB 780
380 SAVE "spritecode",b,37500,4352
390 RETURN
400 REM SPRITE
410 a$=INKEY$
420 CLS#1:INPUT #1,"sprite ";a:a=a-1:IF a>spr OR a<0 O
R a<>INT(ABS(a)) THEN 400
430 tsp=a:GOSUB 550:GOSUB 740:RETURN
440 REM INK
450 a$=INKEY$
460 CLS#1:INPUT#1,"Ink ";a:INPUT #1,"New colour ";b
470 IF a>15 OR a<0 OR a<>INT(ABS(a)) OR b>26 OR b<0 OR
 b<>INT(ABS(b)) THEN 460
480 INK a,b:GOSUB 770:RETURN
490 REM PCURSER
500 PLOT xp*16+4,yp*16+2,1:DRAWR 8,12:PLOT xp*16+12,yp
*16+2:DRAWR -8,12
510 RETURN
520 REM PSPLOT
530 FOR a=4 TO 12 STEP 4:PLOT a+xp*16,yp*16+2,sp%(tsp,
xp,yp):DRAWR 0,12:NEXT a
540 PLOT 304+4*xp,272+2*yp:RETURN
550 REM SCREEN
560 MODE 0
570 FOR a=0 TO 256 STEP 16
580 PLOT a,0,1:DRAWR 0,256
590 PLOT 0,a:DRAWR 256,0
600 NEXT a
610 FOR a=0 TO 15:LOCATE 14,a+9
620 PRINT a:PAPER a:LOCATE 18,a+9:PRINT"  ":PAPER 0
630 NEXT a
640 LOCATE 15,7:PRINT"Inks"
650 PLOT 639,0:DRAW 639,316
660 DRAW 416,316:DRAW 416,0
670 DRAW 639,0
680 WINDOW#1,2,19,2,4
690 PLOT 0,399:DRAW 639,399:DRAW 639,320
700 DRAW 0,320:DRAW 0,399
710 GOSUB 770
720 LOCATE 1,7:PRINT"Sprite";tsp+1:PRINT"Pen     ";:PAP
ER pn:PRINT" ":PAPER 0
730 RETURN
740 x=xp:y=yp:FOR xp=0 TO 15:FOR yp=0 TO 15:IF sp%(tsp
,xp,yp) THEN GOSUB 520
750 NEXT yp:NEXT xp
760 xp=x:yp=y:RETURN
770 PRINT#1,"P Pen       C ClearS Save","N Sprite   I I
nk":RETURN
780 'compile
790 FOR a=0 TO spr:CLS:PRINT:PRINT:PRINT:PRINT"COMPILI
NG IN":PRINT"PROGRESS"
800 FOR b=0 TO 15:FOR c=0 TO 15:PLOT 4*b,368+2*c,sp%(a
,b,c):PLOT 4*b+101,368+2*c,sp%(a,b,c):NEXT c:NEXT b
810 FOR c=0 TO 7:FOR b=0 TO 7:POKE 37500+272*a+b+8*c,P
EEK(49152+b+2048*c):NEXT b:NEXT c
820 FOR c=0 TO 7:FOR b=0 TO 7:POKE 37500+272*a+b+8*(c+
8),PEEK(49232+b+2048*c):NEXT b:NEXT c
830 FOR c=0 TO 7:FOR b=0 TO 8:POKE 37628+272*a+b+9*c,P
EEK(49164+b+2048*c):NEXT b:NEXT c
840 FOR c=0 TO 7:FOR b=0 TO 8:POKE 37628+272*a+b+9*(c+
8),PEEK(49244+b+2048*c):NEXT b:NEXT c
850 NEXT a
860 FOR a=(SPR+1)*272+37500 TO 41852:POKE A,0:NEXT A
870 RETURN
```



(continued from previous page)
method of telling the Amstrad that the new commands exist.

If you have typed in the run listing 1, save the resultant code with save "commands",b, 37000,500 and any time you need these commands, load them in with memory 36999: Load"":Call37000. The second listing, listing 2 is a sprite editor and this creates the code for the sprite design — without it the first two commands are almost useless.

Type in and run listing 2 and type how many sprites you want to define. You will then be presented with a grid, a list of the colours to one side and a list of the commands at the top. You can move your cursor round the grid — using joystick 1 or cursor keys — and setting or resetting the colour to Pen colour or background colour respectively using the fire or Copy key..

This means pressing the fire or copy key will set a cell to the present pen colour and pressing it again will return the cell to background colour. The commands at the top are:

P — Change the present pen — the colour of the pens are printed to the right of the screen.
I — Change the colour of one of the pen's ink.
N — Start working — or continue working — on another sprite.
C — Clears a sprite and returns to a clear grid.
S — Saves the sprites to tape.

Using all these commands, complex sprites can be designed and saved to tape. In future they may be loaded into memory using Load"" and used by the sprite commands as previously described. The final listing — listing 3 gives a demo of the commands. To run this, type in the program then load in the new commands with Memory 36999:Load"": Call 37000 and then run it.

This demo illustrates how to use all the commands but the most interesting is the sprite demonstration. By using the Amstrad interrupt facility, the Amstrad keeps removing the sprite, moving it a bit then replacing it, animating it. If, however, several sprites are used and/or the amount they move is large the movement is jerky — the first sprite demonstration. However if a limited number of sprites are used and these move perhaps 1 pixel at a time, the movement is very smooth — sprite demonstration 2.

Finally, it should be noted that the Fill and the Spriteon commands assume that the background colour is pen 0 and unpredictable events may occur if this is not so but this should be no major problem as on switching on, the computer immediately makes pen o the paper colour. ■

Listing 3.

```
10 MEMORY 36999:CALL 37000
20 x=37500:PRINT"please wait,poking in progress"
30 READ a$:IF a$="9999" THEN 210
40 FOR a=1 TO LEN(a$) STEP 2:POKE x,VAL("&"+MID$(a$,a,
2)):x=x+1:NEXT
50 GOTO 30
60 DATA 0044CCCCCCCC88004499333333336688993333333333333
669932303132303166993330B172303366
70 DATA 993332B172313366443333333333338800993333333366
0000449933336688000000044333388000O
80 DATA 00449933336688000099336699336600443366 9C6C9933
889933883C3C443366996600142800 9966
90 DATA CC8800000000044CC0000CCCCCCCCCC000000CC33333333
33CC00443333333333333384433303033
100 DATA 3030338844333270333B0313388443333703338033333880
099333333333366000044333333333338800
110 DATA 0000CC333333CC000000000099336600000000000CC333
333CC000000443333CC33333800000 9933CC
120 DATA 3CCC33660044336614 3C2899338844338800 3C0044338
844CC0000000000CC88
130 DATA 00000050A000000000000F0F000000000050F0F0A0
0000000055AA50A000000000 05AA5000000
140 DATA 00000050A000000000000050A000000000000050A0000
00000F0F0F0F0F00050CCCCCCCCDC26A0
150 DATA E4CCCCCCCCB94CD8E4CCCCCCDC26CCD850CCCCCCB94CC
CA000F0F0F0F0F0F000003000000003000
160 DATA 10002000001000200000000F000000000000000050F0
A000000000000F0F0F000000000000FF0
170 DATA 0F000000000000005F00A000000000000F0000000000
0000000F000000000000000F000000000
180 DATA 0050F0F0F0F0A00000E4CCCCCCCCB9580050CCCCCCC
CDC26CCA050CCCCCCCCB94CCCA000E4CCCC
190 DATA DC26CCD8000050F0F0F0F0A0000001020000000102000
0002010000000201000
200 DATA 9999
210 FOR a=41580 TO 41851:POKE a,0:NEXT a
220 MODE 0:a=2:b=40:c=1:p=2:q=100:r=2:x=2:y=140:z=3
230 PRINT"Jerky sprites"
240 EVERY 3,3 GOSUB 260
250 FOR t=0 TO 2000:NEXT t:GOTO 310
260 DI:!SPRITEOFF,x,y:x=x+z:!SPRITEON,x,y,1:!SPRITEOFF
,p,q:p=p+r:!SPRITEON,p,q,2
270 !SPRITEOFF,a,b:a=a+c:!SPRITEON,a,b,1:IF a=142 OR a
=1 THEN c=-c
280 IF p=142 OR p=0 THEN r=-r
290 IF x=143 OR x=2 THEN z=-z
300 EI:RETURN
310 Z=REMAIN(3):DI:CLS:r=1:z=1:y=180:q=60:PRINT"Smooth
 sprites":EI
320 FOR a=0 TO 600:CALL &BD19:GOSUB 390:NEXT a
330 CLS:PRINT"Fill and Scrolling":FOR t=0 TO 5000:NEXT
 t:CLS
340 FOR a=0 TO 640 STEP 40:PLOT a,0:DRAWR 0,400,1:NEXT
350 PLOT 0,0:DRAW 636,0,1:DRAW 636,398,1:DRAW 0,398,1:
DRAW 0,0,1
360 FOR a=0 TO 15:!FILL,a*40+20,200,a:NEXT
370 FOR a=1 TO 24:FOR b=0 TO a:!SCROLLD:NEXT b:FOR b=0
 TO a:!SCROLLU:NEXT b:NEXT a
380 STOP
390 DI:!SPRITEOFF,x,y:x=x+z:!SPRITEON,x,y,1:IF x=0 OR
x=142 THEN z=-z
400 !SPRITEOFF,p,q:p=p+r:!SPRITEON,p,q,2:IF p=0 OR p=1
42 THEN r=-r
410 EI:RETURN
```

The Official

ZAXXON

SEGA

The Unsurpassable Experience.

SYNSOFT

Now you can play one of the most challenging arcade games on your home computer. ZAXXON's incredible 3-D graphics, diagonally scrolling screen and supersound are reproduced in great detail. Everything you love about the arcade game is here – and much more. ZAXXON is now more difficult than ever before! So hang onto your joystick and keep firing. Then practice. You may eventually encounter the deadly ZAXXON himself.

48K Spectrum **£7.95**
C64 Cassette **£9.95**
C64 Disk **£14.95**

U.S. GOLD
All American Software

CentreSoft Limited,
Unit 10, The Parkway Industrial Centre,
Heneage Street, Birmingham B7 4LY.
Telephone: 021-359 3020.
Telex: 337268.

SPECTRUM 48K

commodore 64

NOW 3RD GREAT YEAR!

HIRE

SPECTRUM 2X81 and COMMODORE 64 TAPES

LIFE MEMBERSHIP £5·00

TAPE HIRE FROM 50P INCLUDING VAT

HUGE RANGE!
ADVENTURE GAMES
ARCADE and SIMULATION GAMES
BUSINESS and PRACTICAL PROGRAMS
UTILITIES
M/C COMPILERS
EDUCATIONAL
FROM OVER 60 TOP SUPPLIERS

FREE ILLUSTRATED QUARTERLY MAGAZINE WITH TIPS, NEWS, REVIEWS DISCOUNT OFFERS

OVER 4,000 DELIGHTED MEMBERS!

SPECIAL OFFER! YOUR FIRST TWO TAPES FREE

IF YOU JOIN FROM THIS ISSUE or send 9"x6" sae for free details. Directors ALEC FRY, ARPS FRSA and ERNA FRY, BA

■ The first true software library to be set up in the world—and still the largest ■ Unrivalled tape stock, as you'd expect from our head start ■ Run on a 16-bit micro with **10 million bytes** of program and data on Winchester! aided by six less able but more friendly mere humans. ■ Often imitated (sometimes almost to the letter—flattery indeed!) but never equalled ■ Friendly, helpful service—at the end of a phone if needed ■ **Free** membership of our Discount Club: pounds off peripherals and top-of-the-chart tapes ■ Any loading problems (rare!) automatically credited ■ Shop now open (next to Post Office) for rental and discount sales of tapes and peripherals ■ Branches throughout the world ■ No complicated schemes, no commitment to quantity ■ New tapes arriving all the time ■ Printed, illustrated magazine "Computerchat" packs in more than any more typed newsletter ■ Keenest-ever rates ■ ACCESS holders can join by telephone on 0730 892732 ■ **NO RIVAL can offer all this....**

To: **SOFTWARE LIBRARY**, Farnham Road, West Liss, Hants GU33 6JU.

NAME.....Machine.....

ADDRESS.....

.....

THE ORIGINAL SOFTWARE LIBRARY!

Special offer from this issue: LIFE MEMBERSHIP £5

(normally £9.50). Overseas (Europe only) £8, or join local branch in W. Germany, France, Holland, Belgium, Scandinavia, South Africa, Ireland—send Int. Reply Coupon and we'll forward your enquiry.

YC

Access

Miles Better Software

221 Cannock Road, Chadsmoor, Cannock
Staffs WS11 2DD. Tel: (05435) 3577

U.S. Gold Software

	ZX CASS	CBM or ATARI CASS	CBM or ATARI DISC
Beach Head*	6.95	8.95	11.95
Raid on Moscow	6.95	8.95	11.95
Strip Poker	6.95	8.95	11.95
Forbidden Forest*		7.95	11.00
Aztec Challenge*		7.95	11.00
Slinky*		7.95	11.00
Caverns Khafka*		7.95	11.00
Pooyan		8.95	11.95
Bruce Lee*	6.95	8.95	12.95
Dallas Quest*			12.95
Snokie*		8.95	11.95
Flak*		8.95	12.95
Stellar 7		8.95	11.95
Mystic Mansion		7.95	11.00
Solo Flight*	8.95	12.95	12.95
Spitfire Ace*		8.95	11.95
F15-Eagle*	8.95	12.95	12.95
NATO Commander*		8.95	11.95
Indiana Jones		8.95	
Tapper	6.95	8.95	11.95
Congo Bongo	6.95	8.95	11.95
Up n Down	6.95	8.95	11.95
Spy Hunter	6.95	8.95	11.95
Buck Rogers	6.95	8.95	11.95
Knights Desert*		12.95	12.95
Combat Leader*		12.95	12.95
Battle Normandy*		12.95	12.95
Fort Apocalypse*	6.95	8.95	12.95
Drelbs*	6.95	8.95	12.95
Blue Max*	6.95	8.95	12.95
Sentinal		8.95	12.95
Zaxxon*	6.95	8.95	12.95

Available for the Atari

Please phone for software availability and software lists for the 64 and Atari

ADD £1 for overseas orders. ACCESS/VISA

RS 232 & PARALLEL PRINTER INTERFACE for ZX SPECTRUM

Connect to professional printers with this improved and cheaper printer interface.

£34.95 cable £9.95 inc. VAT

ZX Lprint III interface enables your ZX Spectrum computer (16 or 48K) to print on almost any dot matrix or daisywheel printer with RS 232 or Centronics input. Just plug in ZX Lprint III and LPRINT and LLIST commands will work. COPY works without any additional software on Seikosha 100 & 250, hi-res Epsons, Star 510, 515, STX 80 Gemini & Delta, Walters WM80, Shinwa and CTI...Plus Seikosha GP 700 in full colour.
COPY on CGP115 and Microline is optional.
And because NO additional software is needed all of your RAM is free to take Tasword 2 or Kemp Business Accounts, Viewfile etc.

- WORD PROCESSING
- HIGH RESOLUTION SCREEN DUMPS
- PRINTS SPECTRUM AND USER DEFINED GRAPHICS
- JUST PLUG IN FOR LPRINT LLIST and COPY
- COMPATIBLE WITH MICRODRIVES & PRESTEL ADAPTOR

EUROELECTRONICS

DEALER ENQUIRIES WELCOME

ORDER: To EUROLECTRONICS, 26 Clarence Square, Cheltenham, Glos. GL50 2JP Tel: (0684) 292448.

From: Name: _____

Address: _____

_____

This order is for: (Quantity)

ZX LPRINT III at £34.95 _____

Centronics Cable at £9.95 _____

RS 232 Cable at £9.95 _____

Tasword 2 at £13.90 _____

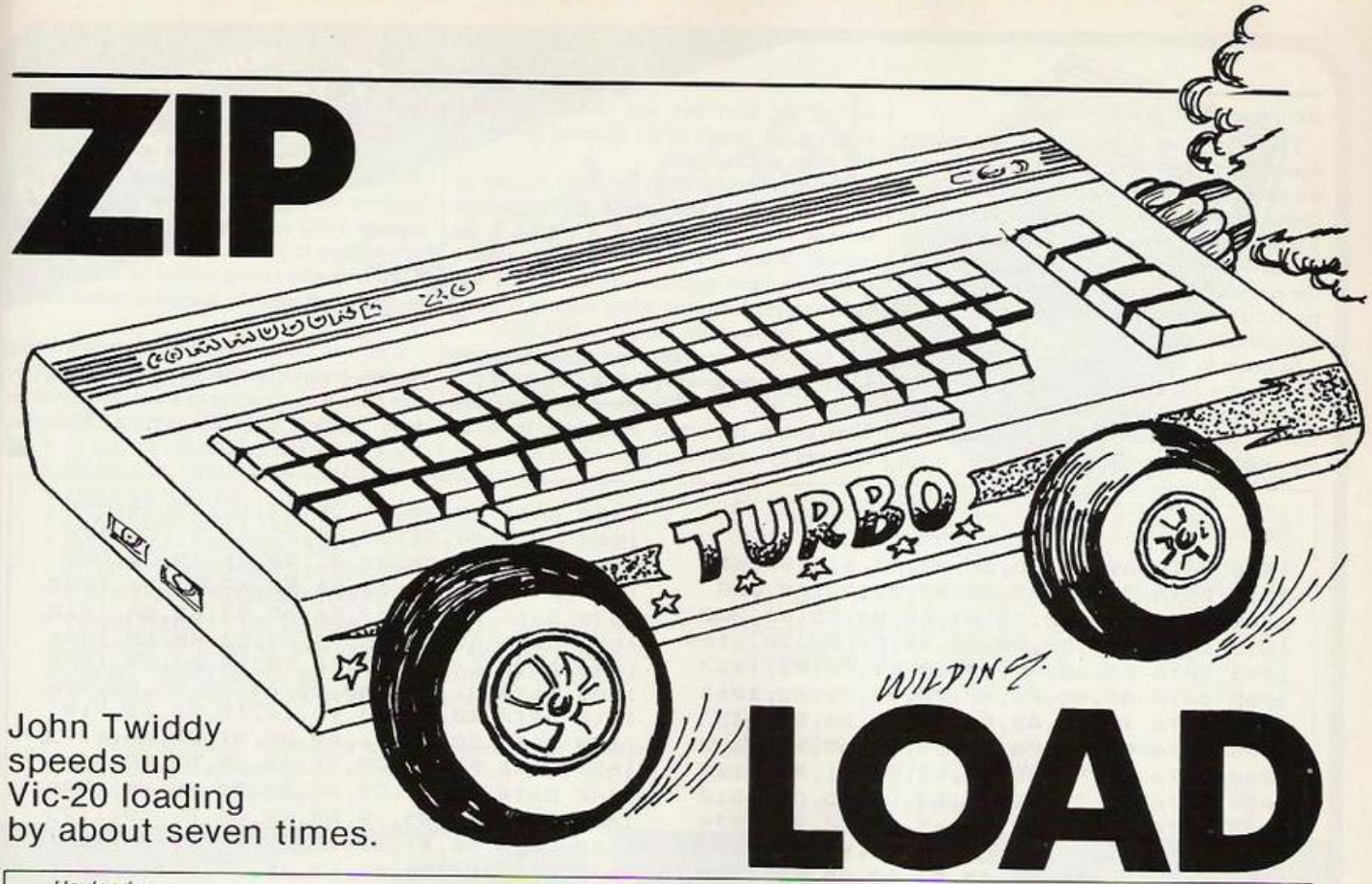
Please add £1.45 p&p

Cheques/PO payable to EUROELECTRONICS

Amount enclosed _____

Microdrives adaptor for ZX Lprint I and II £4.50 + 70p p&P

ZIP



LOAD

John Twiddy speeds up Vic-20 loading by about seven times.

Hexloader.

```
100 PRINT"{CLR}{CUR DN}{CUR DN}{CUR DN}{CUR DN}"
105 PRINT"START ADDRESS OF TURBO ";:INPUT S
110 IF S>1023 AND S/256=INT(S/256) THEN 140
120 PRINT"MUST BE AT A MULTIPLE OF 256":GOTO105
140 PRINT"{CUR DN}{CUR DN}":N=0:AD=0
150 T=0
160 READ A$:IF A$="END" THEN 480
165 PRINT "{CUR UP)";S+N
170 H=ASC(A$)-48:L=ASC(MID$(A$,2))-48
180 V=16*(H+7*(H>9))+L+7*(L>9)
185 T=T+V:AD=AD+V
190 IF RIGHT$(A$,1)="*" THEN V=V+INT(S/256)
200 POKE S+N,V:N=N+1
210 IF N AND 7 THEN 160
220 READ TT:IF TT=T THEN 150
230 PRINT"CHECKSUM ERROR IN LINE";990+10*N/8
240 END
480 READ TC:IF TC=AD THEN 500
490 PRINT"OVERALL CHECKSUM ERROR":END
500 READ TN:IF TN=N THEN 520
510 PRINT"NOT ENOUGH DATA":END
520 PRINT"{CUR DN}{CUR DN}DO YOU WISH TO SAVE IT ?"
530 GET A$:IF A$="Y" THEN 560
540 IF A$<>"N" THEN 530
550 END
560 REM SET UP SAVE PARAMETERS
570 N$="TURBO"
580 FOR I=1 TO LEN(N$)
590 POKE 703+I,ASC(MID$(N$,I)):NEXT
600 POKE 183,LEN(N$)
610 POKE 185,1:POKE 186,1
620 POKE 187,192:POKE188,2
630 POKE 193,S-256*INT(S/256)
640 POKE 194,INT(S/256)
650 POKE 174,S+N-256*INT((S+N)/256)
660 POKE 175,INT((S+N)/256)
670 SYS (PEEK(818)+256*PEEK(819))
680 END
```

ALL VIC-20 owners will, at one time or another, have envied the loading speed of other computers and more recently the new Turbo load used on some games. It was because of this dramatic difference in speed from the normal cassette operation that I attempted to write my own Zip-loader with the result of a program which will Load and Save reliably at a faster speed than the Commodore disc drive — about seven times faster than normal.

The difference in speed is due to two main factors:

- The data is stored at about 3200 baud compared with the normal rate of 1150 baud.
- No error checking other than a checksum is carried out, hence no redundant data is saved along with the program — unlike the normal situation where sync bits, parity bits, parity bytes and repeat blocks are used.

Despite this lack of error checking and correction, the recording is very reliable and I have yet to get a load or verify error. Since the program records at about 400 bytes a second it is recommended to use fairly high quality cassettes, as you should with all computer programs, because only a little dropout on the tape could render the recording useless.

Once the program has been initialised by a Sys to its start address then the Load, Save and Verify commands make use of the Zip program. The commands operate exactly as normal with the exception that when saving, a secondary address of two does not produce an end of file header. For example:

SAVE "TEST PROGRAM",1,2

has the same effect as

SAVE "TEST PROGRAM",1,1

All the normal error messages remain the same with the exception that if it is unable to understand a file header it gives File Data Error.

The Zip operation will also work with all decent monitors etc. for saving machine code if they use the standard jump vectors.

There are also a few refinements over the normal cassette operation:

- The program flashes the border colour while loading data to indicate error free operation.
- The normal limit of 16 characters for a filename no longer exists and up to 186 are recorded. This may be used to good effect to produce entire title screens from the filename alone.

To enter the program type in listings 1 and 2. Listing 1 is of a hex loader which I would recommend typing in, even if you have a monitor, because it allows you to locate the program anywhere in memory. Recommended places would be 23552 onwards on a Vic-20 with 16K expansion. One word of warning is that the Zip program does not protect itself from being overwritten by your program, variables or strings. Hence, if required, you should move the top of memory pointers down to protect it.

The listings should cause no problem when entering since the Zip program is only about 860 bytes long and each line of data has a checksum which allows the hex loader to identify any errors when it is run. Once the entire program has been typed in, it should be first saved, then run. It will ask for the address where the machine code is to be put and if no errors exist it will give you the option of saving the machine-code Zip program. A Sys to the start address will initialise the Zip program while pressing Run/Stop, and Restore reverts the cassette operation back to its normal slow mode.

(continued on next page)

(continued from previous page)

The functioning of the reading and writing operations require very precise timing, hence the program makes extensive use of the count-down timers which exist in the Vic's VIA. These counters allow you to load them with a two-byte number which is then decremented at the system clock speed — 1MHz — until they reach zero, at which point an interrupt flag is automatically set.

In order to save a program, the Zip-loader first saves a 192 byte header followed by the appropriate block of memory, as does the normal save routine. Within the header is contained the secondary address used when saving, the start and end addresses of the program, the length of the filename and up to 186 bytes of filename.

The header is saved in the same manner as the memory block that follows it. First, several seconds of binary 00001111 is output — 10 seconds before the header and two seconds before the main section — to enable the Zip loader to get into sync when reading it back. This is followed by the bytes $0E,$0D, ... $02,$01,$00. The next byte output is one which indicates whether the data following is a header — $F0 — or the main program — $0F. Next comes the actual data, byte by byte, followed by a checksum digit which is the sum total of all the bytes loaded.

The Zip-loader program can also be used to speed up the loading of most bought software. All that is required is to save each section of the program via Zip and then just set up the Zip prior to trying to load the game. You would, of course, have to put the Zip-loader program in a block of memory not occupied by the game and be able to get past the normal auto-run feature of the game.

If anyone has a problem or query concerning the Zip-loader program, I will quite happily sort them out on receipt of a SAE addressed to: John Twiddy, 65 Holly Avenue, Wallsend, Tyne and Wear. ■

Hex dump.

```
1000 DATA A9,B3,8D,30,03,A9,01*,8D,851
1010 DATA 31,03,A9,22,8D,32,03,A9,618
1020 DATA 00*,8D,33,03,A2,00,BD,9A,700
1030 DATA 01*,F0,06,20,D2,FF,E8,D0,1184
1040 DATA F5,60,A5,BA,C9,01,F0,03,1137
1050 DATA 4C,85,F6,A9,00,85,90,A2,1063
1060 DATA 1E,20,AB,F8,F0,07,20,B7,943
1070 DATA F8,B0,E6,A2,B4,86,A5,20,1327
1080 DATA 28,F7,A0,00,A5,B9,91,B2,1120
1090 DATA A5,C1,C8,91,B2,48,A5,C2,1312
1100 DATA C8,91,B2,48,A5,AE,C8,91,1279
1110 DATA B2,48,A5,AF,C8,91,B2,48,1185
1120 DATA 20,54,F8,A5,B7,A0,05,91,1022
1130 DATA B2,A2,00,A9,20,E4,B7,B0,1128
1140 DATA 0C,88,88,88,88,88,B1,BB,1056
1150 DATA C8,C8,C8,C8,C8,C8,91,B2,1523
1160 DATA E8,C0,BF,90,E6,A5,A5,A2,1481
1170 DATA F0,20,A4,00*,68,85,AF,68,952
1180 DATA 85,AE,68,85,C2,68,85,C1,1168
1190 DATA B0,07,A9,14,A2,0F,20,A4,745
1200 DATA 00*,A9,00,60,85,A5,86,AA,867
1210 DATA 20,60,01*,A5,C1,85,C3,A5,980
1220 DATA C2,85,C4,A9,64,8D,16,91,1100
1230 DATA A9,00,8D,15,91,A9,FF,8D,1041
1240 DATA 26,91,8D,25,91,A9,FF,8D,1071
1250 DATA 25,91,A9,0F,20,28,01*,B0,615
1260 DATA 49,AD,2D,91,29,40,F0,F2,1023
1270 DATA AD,24,91,C6,A5,D0,E6,A2,1317
1280 DATA 0F,8A,20,28,01*,CA,10,F9,693
1290 DATA A5,AA,20,28,01*,A9,00,85,710
1300 DATA BD,A5,C3,C5,AE,D0,06,A5,1299
1310 DATA C4,C5,AF,F0,18,A0,00,B1,1169
1320 DATA C3,48,20,28,01*,68,B0,12,638
1330 DATA 65,BD,85,BD,E6,C3,D0,E1,1470
1340 DATA E6,C4,18,90,DC,A5,BD,20,1200
1350 DATA 28,01*,A5,B4,8D,0F,90,A9,855
1360 DATA 00,8D,A0,02,58,4C,CF,FC,926
1370 DATA A0,08,0A,48,A9,40,2C,1D,556
1380 DATA 91,F0,FB,90,08,A9,0C,85,1102
1390 DATA BE,C6,BE,D0,FC,A9,00,8D,1348
1400 DATA 15,91,AD,20,91,49,08,8D,738
1410 DATA 20,91,29,08,D0,07,20,59,562
1420 DATA 01*,90,D9,68,60,68,88,D0,1010
1430 DATA D1,AD,21,91,49,01,4A,60,804
1440 DATA 78,AD,0F,90,85,B4,AD,1C,966
1450 DATA 91,29,FC,8D,1C,91,A9,F7,1168
1460 DATA 8D,20,91,A9,C0,85,C0,A9,1173
1470 DATA 40,8D,1E,91,A9,42,8D,2E,802
1480 DATA 91,A9,00,8D,1B,91,8D,2B,811
1490 DATA 91,8D,15,91,8D,25,91,A2,937
1500 DATA FF,A0,FF,88,D0,FD,CA,D0,1677
1510 DATA F8,60,93,11,56,49,43,20,766
1520 DATA 54,55,52,42,4F,20,28,43,535
1530 DATA 29,20,4A,2E,54,57,49,44,505
1540 DATA 44,59,00,85,93,A5,BA,C9,989
1550 DATA 01,F0,03,4C,4B,F5,A9,00,809
1560 DATA 85,90,20,94,F8,A9,00,B0,1050
1570 DATA D0,20,47,F6,A5,93,85,0A,1012
1580 DATA A9,00,85,93,A5,C3,48,A5,1046
1590 DATA C4,48,20,54,F8,A9,F0,20,1073
1600 DATA 81,02*,68,85,C4,68,85,C3,996
1610 DATA B0,36,24,9D,10,15,A0,63,719
1620 DATA 20,E6,F1,A0,05,B1,B2,AA,1193
1630 DATA F0,09,C8,B1,B2,20,D2,FF,1301
1640 DATA CA,D0,F7,A9,00,85,9E,A9,1286
1650 DATA 06,85,9F,A4,9E,C4,B7,B0,1175
1660 DATA 0E,B1,BB,A4,9F,D1,B2,D0,1296
1670 DATA BB,E6,9E,E6,9F,D0,EC,18,1432
1680 DATA A5,0A,85,93,A5,90,F0,03,1007
1690 DATA A9,18,38,90,01,60,20,6A,628
1700 DATA F6,A0,00,B1,B2,D0,04,A5,1138
1710 DATA B9,F0,0A,C8,B1,B2,85,C3,1318
1720 DATA C8,B1,B2,85,C4,A0,03,B1,1224
1730 DATA B2,38,A0,01,F1,B2,AA,A0,1144
1740 DATA 04,B1,B2,A0,02,F1,B2,A8,1108
1750 DATA 18,8A,65,C3,85,AE,98,65,1018
1760 DATA C4,85,AF,A5,C3,85,C1,A5,1355
1770 DATA C4,85,C2,A9,0F,20,81,02*,870
1780 DATA A5,90,F0,08,A9,1D,A6,93,1068
1790 DATA F0,02,A9,1C,A6,AE,A4,AF,1118
1800 DATA 60,85,AA,20,60,01*,A9,0C,709
1810 DATA 8D,16,91,A9,01,8D,15,91,785
1820 DATA A9,FF,8D,26,91,8D,25,91,1071
1830 DATA A9,FF,85,A9,20,59,01*,B0,1024
1840 DATA 10,20,43,03*,26,A9,A5,A9,659
1850 DATA C9,0F,D0,F0,20,33,03*,90,894
1860 DATA 03,4C,FB,02*,C9,0F,F0,F4,1032
1870 DATA A2,0E,E4,A9,D0,DA,20,33,1082
1880 DATA 03*,CA,10,F6,C5,AA,D0,D0,1250
1890 DATA A9,00,85,BD,A5,C1,85,C3,1177
1900 DATA A5,C2,85,C4,A5,C3,C5,AE,1419
1910 DATA D0,24,A5,C4,C5,AF,D0,1E,1215
1920 DATA 20,33,03*,C5,BD,18,F0,13,755
1930 DATA A9,20,05,90,85,90,A5,AA,962
1940 DATA C9,F0,D0,06,A9,10,05,90,989
1950 DATA 85,90,38,4C,1A,01*,20,33,519
1960 DATA 03*,B0,F8,A0,00,A6,93,D0,1108
1970 DATA 04,91,C3,F0,0C,D1,C3,F0,1240
1980 DATA 08,AA,A9,10,05,90,85,90,789
1990 DATA 8A,18,65,BD,85,BD,AD,0F,962
2000 DATA 90,29,FC,09,02,49,04,8D,666
2010 DATA 0F,90,E6,C3,D0,A6,E6,C4,1384
2020 DATA 4C,D4,02*,A0,08,20,43,03*,560
2030 DATA 26,A9,88,D0,F8,20,59,01*,921
2040 DATA A5,A9,60,A9,42,2C,2D,91,899
2050 DATA F0,FB,AD,1D,91,0A,0A,A9,1027
2060 DATA 01,8D,15,91,A9,FF,8D,25,910
2070 DATA 91,AD,21,91,60,END,109201,861
```

THE INCREDIBLE

Micro Speech Module

Speakeasy

JUST £29.95

AVAILABLE AT YOUR LOCAL spectrum STORE

* *UNLIMITED VOCABULARY*
* *CLEAR AUDIBLE SPEECH*
* *COMPACT, STURDY & BUILT TO LAST*
* *USER FRIENDLY*
* *COMPREHENSIVE MANUAL INCLUDED*
* *SELF CONTAINED SPEAKER*
* *FULLY GUARANTEED FOR ONE YEAR*
* *POWERED FROM HOST COMPUTER*
* *VERSATILE! - the standard SPEAKEASY module can be programmed to speak in any language, for example ENGLISH, GERMAN, NORWEGIAN etc..... THE SCOPE OF THIS PRODUCT IS ONLY LIMITED BY YOUR IMAGINATION!*

* *COMPATIBLE with most popular micros. The standard module can be connected to virtually any computer via our large range of interface cables.*

INTERFACE CABLES CURRENTLY AVAILABLE		
**CBM 64*	**BBC*	**AMSTRAD CPC464*
**VIC 20*	**ORIC/ATMOS*	**MSX RANGE*
**CBM PLUS 4*	**CBM 16*	**CBM 116*
**DRAGON 32/64*	**MEMOTECH 500/512*	**SHARP MZ 700*

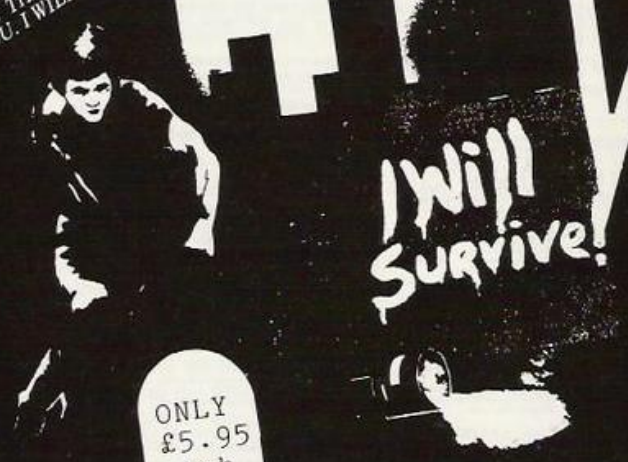
REMEMBER!... If you change your computer, you only need to change the interface cable!

PLEASE STATE INTERFACE LEAD REQUIRED

Access

NEW

A FANTASTIC NEW ADVENTURE GAME BASED ON THE POSSIBILITY OF A NUCLEAR WAR. WE'VE GIVEN YOU ALL THE INFORMATION YOU NEED. THE REST IS UP TO YOU. I WILL SURVIVE..... BUT WILL YOU?

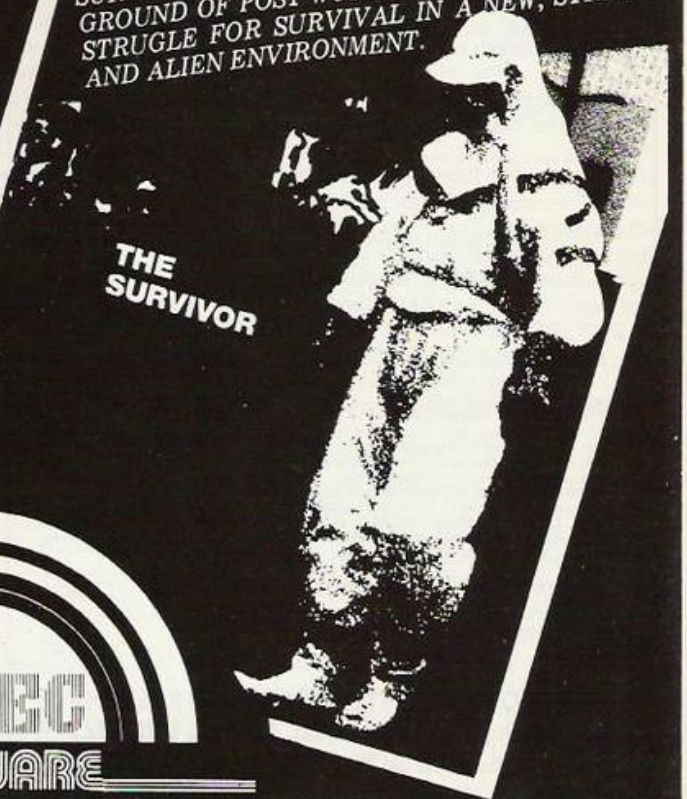


ONLY £5.95 each

SPECTRUM
48k ADVENTURE GAME

OUT NOW!

SO YOU SURVIVED THE WAR..... CAN YOU NOW SURVIVE THE PEACE ?..... AGAINST THE BACKGROUND OF POST WORLD WAR THREE BRITAIN STRUGLE FOR SURVIVAL IN A NEW, STRANGE AND ALIEN ENVIRONMENT.



AZTEC SOFTWARE

AZTEC SOFTWARE LIMITED, 17A STATION ROAD, MIRFIELD, WEST YORKSHIRE. TELEPHONE: (0924) 492826

THE TYPING MASTER

(The Keyboard Skills program that puts you in a class of your own)

- **'The Typing Master'** program exists to teach you to type. The easily met target is 30 words per minute with 95% accuracy after 30 half-hour sessions. The following facilities help you to accomplish this standard.
- **'Sight & Type'** introduces you to the keyboard with the correct finger for each key and takes you to a speed of around 12 words per minute.
- **'Touch-Typing'** takes your speed to around 24 words per minute at the same time ensuring that you learn the peripheral keys to the same standard as those more commonly used.
- **'Practice Exercises'** gives Non-Timed accuracy oriented exercises and Timed speed/accuracy exercises. Your results are given in words per minute and percent accuracy. The target standard of 30 words per minute (and far beyond) is achieved with this module.
- **'Session Monitor'** overlays the whole program to hold your hand all the way through the course from first use of the program to that final, very useful result.
- To back up this Basic version you get documentation on how to approach the course and a record card to fill-in as you progress through the sessions.
- **'The Typing Master'** is not a toy. It is a professionally-written program which has as its sole purpose the teaching of typing/keyboard skills in a way that is friendly and fun. It was written by a typing instructor and it has been marketed world-wide on CP/M, MSDOS, PCDOS and other operating system-based machines over the past three years. It has also been available on Newbrain and BBC Micro (Model A or B) for over a year and is now being released for Amstrad CPC (mono or colour), Commodore 64 and Sinclair QL!
- TAPE formats of the Basic version are available from the following selected list of distributors (media and prices are shown in brackets).

NEWBRAIN (Cassette: £15.00 (no VAT)):
GFG Microsystems, 36 Armitage Way, King's Hedges, Cambridge, CB4 2UE. Tel. (0223) 315120.

BBC MICRO (model A or B) (Cassette, usable with disk: £15.00+VAT)
AMSTRAD CPC (mono or colour) (Cassette: £15.00 + VAT).
E.C.H. Hobday, The Chestnuts, Rodmersham, Sittingbourne, Kent ME9 0PL. Tel. (0795) 24191.
COMMODORE 64 (Cassette: £15.00 + VAT).
SINCLAIR QL (Cartridge: £20.00 + VAT).
P. Ashpitel, 36 Athlone Avenue, Bury, Lancashire, BL9 5EE. Tel. (061-797) 5214.

Please send me_____copies of **THE TYPING MASTER (Basic Version)**

for the _____computer at £_____per copy (+VAT where shown). I enclose cheque/postal order for total amount:

£_____

NAME:_____

ADDRESS:_____

PLEASE SEND THE COMPLETED COUPON AND PAYMENT DIRECT TO THE DISTRIBUTOR FOR *YOUR COMPUTER* AS SHOWN ABOVE.

- DISK formats of the Basic program may be obtained from the following suppliers. They also supply a Business/Schools version which incorporates record keeping and many other facilities. Prices shown below are for the Basic version.

APRICOT, SIRIUS & VICTOR (tailored versions). (Disk: £50.00 + VAT).
Anglia Business Computers, 1 Milton Road, Cambridge, CB4 1UY. Tel. (0223) 315580.
CP/M80, CP/M86, MSDOS, PCDOS. (Disk. £50.00 + VAT).
Microcomputer Products International Limited, Central House, Cambridge Road, Barking, Essex, IG11 8NT. Tel. (01-591) 6511.
or,
Software Limited, No. 2 Alice Owen Technology Centre, 251 Goswell Road, London, EC1. Tel. (01-833) 1173.

In case of difficulty contact:

ANTHONY ASHPITEL SOFTWARE SYSTEMS
56 London Road, Harleston, Norfolk, IP20 9BZ, England. Tel. (0379) 852807 (answer phone).

ORIC AND SINCLAIR COMPUTERS

Oric 1 computer 48K £85 (£82) £92. Oric Atmos computer 48K £171 (£158) £168. Oric colour printer £134 (£123) £140. Sinclair Flat Screen TV £113 (£105) £115. Sinclair Spectrum Plus Computer £182 (£176) £187. Sinclair QL Computer £406 (£385) £410. Sinclair Spectrum 48K £131 (£131) £143. Microdrive £51 (£50) £60. RS232 interface 1 £51 (£50) £60. Special offer:- Microdrive + Interface 1 + 4 cartridges £102 (£100) £120. Blank microdrive cartridges £5-50 (£6) £7. Standard floppy disc interface for Spectrum £102 (£92) £112. (See Cumana disc section for suitable disc drives). Fuller FDS keyboard for Spectrum £52 (£52) £62. Fuller master unit £56 (£56) £62. Interface 2 £20-45 (£20) £24. 32K memory upgrade kit for 16K Spectrum (issue 2 and 3 only) £31 (£28) £30. Spectrum Centronics printer interface £51 (£47) £52. ZX printer has been replaced by the Alphacom 32 £71 (£69) £82. 5 printer rolls (State whether Sinclair or Alphacom) £13 (£16) £21. ZX81 computer £45 (£44) £54. 16K ram packs for ZX81 £28 (£25) £30.

COMMODORE COMPUTERS

Commodore C16 Starter Pack £145 (£142) £162. Commodore Plus/4 £305 (£281) £301. Commodore 64 £222 (£215) £235. Convertor to allow most ordinary mono cassette recorders to be used with the Vic 20 and the Commodore 64 £9-78 (£9) £11. Bargain package:- cassette convertor + compatible cassette recorder £37 (£38) £44. Commodore cassette recorder £43 (£44) £50. Printer interfaces for Vic20 and the Commodore 64: Centronics £45 (£41) £46, RS232 £45 (£41) £46. Disc drive £233 (£209) £234. 1520 printer/plotter £165 (£149) £159. MPS801 Printer £235 (£220) £245. Light pen £29 (£29) £33.

ACORN COMPUTERS

Electron £173 (£179) £199. BBC Model B £404 (£357) £387. Kenda double density disk interface system £149 (£131) £141. See below for suitable disc drives.

CUMANA DISC DRIVES

To suit disc interfaces of Sinclair spectrum, BBC B and Videogenie. Single:- 40 track single sided £176 (£158) £178, 40 tr double sided £218 (£195) £215, 80tr ss £207 (£186) £206, 80tr ds £234 (£209) £229. Dual:- 40tr ss £299 (£280) £320, 40tr ds £395 (£353) £393, 80tr ss £372 (£334) £374, 80tr ds £437 (£390) £430.

PRINTERS

Oki Microline 80 £138 (£135) £165. Brother HR5 £162 (£146) £170. Shinwa CTI CP80 £225 (£218) £248. Cannon PW1080A £332 (£299) £329. Epson RX80 £277 (£251) £282. Epson RX80F/T £314 (£286) £316. Epson FX80 £339 (£358) £388. Combined matrix printers and electric typewriters:- Brother EP22 £173 (£166) £186, Brother EP44 £258 (£235) £260. MCP40 Oric Colour printer/plotter £134 (£123) £140. Interfaces to run the above printers from Vic and the Commodore 64 £45 (£41) £46. We can supply interfaces to run the above printers from Sharp computers £58 (£52) £55.

UK101, SUPERBOARD AND VIDEOGENIE

We still support these Computers. Write for our list.

COMPUTER REPAIRS

We offer a world-wide repair service. Write for a quotation.

SWANLEY ELECTRONICS
The Computer Export Specialists.
Dept YC, 32 Goldsel Rd., Swanley, Kent BR8 8EZ, England.
Tel: SWANLEY (0322) 64851.

Official orders welcome. UK prices are shown first and include post and VAT. The second price in brackets is for export customers in Europe and includes insured airmail postage. The third price is for export customers outside Europe (including Australia etc) and includes insured airmail postage.

BETA BASIC 1.8

ENHANCED BASIC FOR SPECTRUM 48K
FOR GRAPHICS – STRUCTURED PROGRAMMING – DATA HANDLING

Release 1.8 is more powerful than ever! We don't have space to do this program justice – if you can't believe the ad, send us a large S.A.E. for further information.

Features: Commands are single-entry keywords in graphics mode. Syntax is checked on entry. Fully compatible with Spectrum Basic. Microdrive compatible. Comprehensive manual.
NOTE: Release 1.0 is still available for 16/48K Spectrum at £11.00.

ALTER screens colours (general or specific)
AUTO line numbering
BREAK out of code loops
CLOCK digital clock
CURSOR CONTROL CODES allow strings to have complex shapes
DEF KEY user definable keys
DELETE a block of lines
DO-LOOP structure
DPOKE double poke
EDIT specified line
ELSE used with IF ... THEN
EXIT leave DO LOOP
FILL enclosed area with specified ink or paper
GET wait for keypress
JOIN two program lines
KEY$ a string
KEYWORDS new keywords on/off
LIST/LLIST line TO line
USED (used with GOTO, GOSUB)
ON ERROR trap errors (with LINE, STAT and ERR$)
PLOT a string (may contain cursor control codes)
POKE a string
POP (basic's stack
PROC, DEF PROC, END PROC (for named procedures)
RENUM versatile renumber
ROLL all or part of screen in any direction by specified number of pixels, with or without attributes
SCROLL like ROLL, but without wrap-round
SORT arrays (very fast)
SPLIT program lines
TRACE program execution
UNTIL used with DO or LOOP
USING used with PRINT
WHILE used with DO or LOOP
XOS, YOS move PLOT origin
XRG, YRG change PLOT scale

FUNCTIONS

AND (bit by bit)
BIN$ decimal to binary
CHAR$ number to 2 characters
COS$ fast cosine
DEC hexadecimal to decimal
DPEEK double PEEK
FILLED filled area
HEX$ decimal to hexadecimal
INSTRING string search
MEM free memory
MEMORY$ all of memory as a string
MOD modulus
NUMBER 2 characters to number
OR (bit-by-bit)
RND# fast RND
SCRN$ recognises user graphics
SIN$ fast sine
STRING$ repeats strings
TIME$ current time
USING$ formats numbers
XOR (bit-by-bit)

Only £11.00 inclusive! (Upgrade price for Release 1.0 owners is £4.00. This includes a 12-page supplement to your manual. Please quote date of purchase. If you did not purchase from us, state supplier and return original cassette.)

Please send me:
Beta Basic, Release 1.8. Payment of £11.00 is enclosed.
(or £11.50 for foreign orders). Cheques payable to BETASOFT.

I don't believe it! Please send me full details of Beta Basic 1.8. I enclose a stamped addressed envelope.

NAME: .....

ADDRESS .....

.....

BETASOFT
92 OXFORD ROAD, MOSELEY, BIRMINGHAM B13 9SQ.

QL 68008 QL

Phil Holliday and assembly language

TUTORIAL

PROGRAMMING IN assembly language is the natural next step for those who are proficient in Basic and who feel a need to extend their skill for whatever reason, whether it is to increase speed of program execution or maybe to make better use of the available memory. Just as different micros have their own versions of Basic, so different microprocessors have their own assembly language.

The Sinclair QL is based on a Motorola 68008 microprocessor and this short series of articles is intended as an introduction to 68008 assembly language specifically on the QL. Those who already have some assembly language programming experience on another processor should find the conversion quite painless, while those who have no previous experience may find the going a little bit tough to start off with.

If this is the case then please stick with it — the benefits are well worth the effort, and this series includes several different examples of assembly language programs with assembled listings containing explanations of not only how the program works but also why a particular approach has been adopted in the first place.

Before getting down to the nitty gritty there are a few items worthy of mention. Firstly, the 68008 is a member of the 68000 family of microprocessors, which are all based on the same instruction set, and so the 68008 and the 68000 are 100 percent sofware compatible.

There are three essentials needed before attempting any serious assembly language programming on the QL. The first is a reference manual on the 68008 itself. The bible is *MC68000 16 Bit Microprocessor User's Manual — Motorola* published by Prentice-Hall. Another book which I have found very useful is *68000 Assembly Language Programming* by Kane, Hawkins and Leventhall published by Osborne/McGraw-Hill.

Secondly, we need a reference manual on QDOS, the QL operating system. We need this because the programs we write will use the resources of QDOS, partly to save us from writing routines which already exist within QDOS, and also so that we can use the much talked about multi-tasking abilities of the QL. Both the *QL Advanced User Guide* by Dickens, published by Adder, and *QL Assembly Language Programming* by Opie, published by McGraw-Hill are highly recommended as a reference manual on QDOS.

They both list all the QDOS system calls provided by QDOS and show how to interface our programs to the QL. System calls are primitive procedures which mean that we don't have to invent our own ways of doing these things. More of these topics later.

Finally, we need an assembler. Strictly speaking it is possible to hand assemble your programs, but this is a much more difficult task on a 16 bit processor than it is on 8 bit machine and is only recommended to the dyed-in-the-wool sadist. I have two assemblers which I can recommend: The QL Assembler Development Kit from Metacomco and the QL Assembler from Computer One.

Both are excellent products and include their own full screen editors. The Metacomco product has more features, most important of which are its support of macros, conditional assembly and include files, which are almost essential when writing large programs.

Before we are able to start to write in assembly language there are certain fundamental facts which must be presented and understood. These are:

- The 68008 programming model.
- The 68008 addressing modes.
- The 68008 instruction set.

These topics will be discussed in that order with the instruction set covered mainly in the next article.

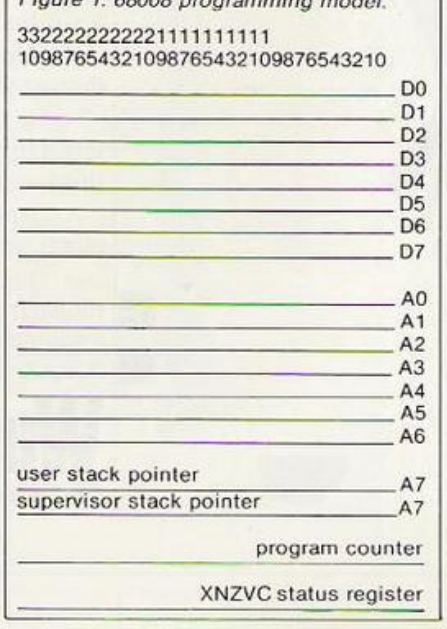
The programming model is the way that the 68008 looks to the programmer and is illustrated in figure 1. It can be seen that the 68008 contains eight 32 bit — equal to four bytes, or two words or one long word — data registers, labelled D0 to D7. These data registers can be used to hold byte, word or long word values depending upon the instruction which operates on it.

If a byte or word operation on a data register takes place then only the low order byte or word contents of that register is affected. There are also eight 32 bit address registers, labelled A0 to A7.

Address registers do not support single byte operations. They are normally used as their name implies to hold addresses which point to memory locations — although they can also be used to hold data. Therefore, word operands are automatically sign extended to long words by the processor before being used. A0 to A6 are general purpose address registers. A7 is the system stack pointer, used to hold return addresses of subroutine branches — calls —

(continued on page 157)

Figure 1. 68008 programming model.



THE ELECTRONICS MAGAZINE PROFESSIONALS CAN'T RESIST.

Electronics and Wireless World is the only electronics magazine to really tempt the professionals.

It's the only one they take the trouble to pick up for themselves.

That's because it's written for the engineer who sees electronics not only as a job, but also as a hobby.

It's written on a technical level that doesn't talk down to you.

It keeps you up to date with all the latest products and processes, applications and equipment.

And it covers every industry where electronics is involved.

Just one look at the new look magazine and you'll see why it gets professionals like you out of the office, and down to the newsagents.

ELECTRONICS & Wireless world

The leading magazine for electronics engineers.

(continued from page 155)

for example.

In fact, there are two A7 stack pointers known as user stack and supervisor stack pointers which are selected depending upon the mode of operation of the processor. We will normally be in user-mode and this need not concern us any more for the moment. There is a 32 bit program counter, which contains the address of the next instruction to be executed.

It will be realised that not all of the 32 bits of the program counter and address registers S— when being used to hold an address — are used, since the 68008 can only address 1 megabyte of memory, and so only the lower 20 bits are actually relevant. Finally, the 68008 contains a 16 bit status register.

For low order five bits are of most interest to us. They contain condition code flags to indicate when there has been a carry (C), overflow (V), zero (Z) or negative (N) result from an operation. There is also an extend (X) flag which is used to implement multi-precision arithmetic. It is always set by the same operations that sets the carry flag.

Instructions for the 68008 contain two kinds of information — the type of operation to be performed and the location of the operand or operands on which that instruction operates. Most instructions specify the location using what Motorola refer to as an effective address and the different effective address modes will now be explained, with examples using the Move instruction. The Move instruction is used to move the contents of the source effective address to the destination address and the syntax of the instruction is . . .

MOVE source, destination

Before we start you must be aware that not all effective address modes can be used with all instructions — the manuals mentioned above give these details for each instruction individually.

■ Data register direct mode. The operand is in the data register specified in the instruction, so

MOVE.L D0,D1

will copy the contents of data register D0 into D1. Note that the ".L" appended to the Move instruction indicates that the "long word" contents, i.e. all 32 bits, will be moved. To move just the lower byte we would write Move.B and to move the lower word we would write Move.W or just Move as the default size for unspecified length is always word.

■ Address register direct mode. The operand is in the address register specified in the instruction. Note that there is a special version of the Move instruction — MoveA — Move address — which is used in this case, so

MOVEA.L D0,A0

will copy the contents of data register D0 into address register A0.

■ Address register indirect mode. The address of the operand is in the address register, and this mode is indicated by placing the address register in parenthesis, so that

MOVE.W D0,(A0)

will copy the lower 16 bits of D0 to the address held in A0, so that if D0 holds 1 and A0 holds $20000 (20000 hex) then the effect of this instruction is to copy 1 to memory location $20000.

■ Address register indirect with post-increment mode. This is similar to the previous — register indirect — mode, but with the added feature that after the move has taken place the contents of the address register is incremented. Note that the increment is by 1 if the move was of size byte, 2 for size word and 4 for size long.

This mode is indicated by placing the address register in parenthesis and followed by a plus sign. So if D0 contains 1 and A0 contains $20000 then

MOVE.W D0, (A0) +

will copy 1 to address $20000 and after the instruction A0 will contain $20002. When the address register is A7 this mode is equivalent to a stack Push instruction. Also note that when the address register is A7 and the size of the move is byte that the contents of A7 will be incremented by 2 instead of by to ensure that it always contains an even address, necessary as all instructions must start at even addresses.

■ Address Register Indirect with Predecrement mode. Very similar to the post-increment mode, except as you will already have guessed the address register specified is decremented according top the size of the instruction before copying the contents. This provides the equivalent of a stack Pop instruction if A7 is used, and the syntax is equally what would be expected, so

MOVE.W – (A0),D0

will have exactly the opposite effect of the previous example.

■ Address register indirect with displacement mode. In this mode the effective address is the sum of the contents of the specified address register and a fixed signed 16 bit displacement — i.e., the displacement can have a value of from −32768 to +32767.

The displacement is given before the parenthesis around the address register. This mode is extremely useful for accessing a particular element of an array or list. So if D0 contains 1 and A0 contains $20000 then

MOVE.B D0,$23(A0)

will copy 1 into the byte at address $20023.

■ Address register indirect with index mode. In this mode the effective address is the sum of the address in the address register specified, the word or long word contents of an index register which can be either a data or an address register and a signed 8 bit displacement — i.e., the displacement can have a range from −128 to +127. The syntax is of the form . . .

displacement (address reg,index reg.size)

and so if D1 contains $23,A0 contains $20000, A3 contains $10000 then the instruction

MOVE.W D1,$56(A0,A3.L)

will copy $23 to address $30056.

■ Absolute short address mode. In this mode the effective address specified is a signed word which is sign extended before it is used. So

(continued on page 159)

```
LOC        OBJECT          STMT    SOURCE STATEMENT

                             1 *Listing 1
                             2
      =00020000              4 scr       equ $20000
      =8000                  5 scr_size  equ $8000
      =1FFF                  6 count     equ scr_size/4-1    loop count
      =FFFF                  7 this_job  equ -1
      =0000                  8 no_err    equ 0
      =0005                  9 fr_job    equ 5               QDOS force
job call
                            10
                            11 *Firstly initialise pointer variables
                            12
0000'  41F9 0002 0000      13 start     lea scr,a0          a0 points to
 of screen                                                    start
0006'  303C 1FFF            14          move.w #count,d0    initialise d0
 loop counter
                            15
                            16 *next write all zeros to screen memory
                            17
000A'  20FC 0000 0000       18 loop      move.l #0,(a0)+     clear 4 bytes
 incr pointer
0010'  51C8 FFF8            19          dbf d0,loop         decr d0 & if
 -1 loop
                            20
                            21 *now remove the job using QDOS manager
                            22                                  trap
0014'  72FF                 23          moveq #this_job,d1
0016'  7600                 24          moveq #no_err,d3
0018'  7005                 25          moveq #fr_job,d0
001A'  4E41                 26          trap #1
                            27
                            28 *lastly return with d0 cleared
                            29
001C'  7000                 30          moveq #no_err,d0
001E'  4E75                 31          rts
                            32
                            33          end

No errors found in this Assembly
```

Cash & Carry COMPUTERS

TOP SHOWROOM SERVICE

ROCK BOTTOM PRICES

PERSONAL CALLERS WELCOME AT OUR EXTENSIVE SHOWROOMS MOST EQUIPMENT ON DEMONSTRATION

The UK's Best Printer Prices

Only a sample of our massive range of printers shown here — phone for further details

DAISYWHEEL LETTER QUALITY		
Smith Corona TP1 (P or S)	£189.00 + VAT =	**£217.35**
Juki 6100 (P)	£335.00 + VAT =	**£385.25**
Brother HR15 (Pors)	£329.00 + VAT =	**£378.35**
Daisystep 2000 (P)	£239.95 + VAT =	**£275.94**
PRINTER/TYPEWRITERS		
Brother EP22 Dot Matrix (S)	£119.00 + VAT =	**£136.85**
Brother EP44 (S)	£189.00 + VAT =	**£217.35**
Modems available for Easylink and Telecom Gold		
Juki 2200 Daisywheel (P or S)	£239.95 + VAT =	**£275.94**
DOT MATRIX PRINTERS		
Brother HR5 (P or S)	£125.00 + VAT =	**£143.75**
Canon 1080A NLQ (P)	£279.00 + VAT =	**£320.85**
Canon 1156A NLQ (P)	£349.00 + VAT =	**£401.35**
EPSON RX80 (P)	£195.00 + VAT =	**£224.25**
EPSON RX80 F T PLUS (P)	£220.00 + VAT =	**£253.00**
EPSON FX80 (P)	£324.00 + VAT =	**£372.60**
EPSON RX100 F T (P)	£339.96 + VAT =	**£390.95**
EPSON FX100 F T (P)	£430.00 + VAT =	**£494.50**
Seikosha GP100A (P)	£129.90 + VAT =	**£149.39**
Seikosha GP50A (P)	£79.90 + VAT =	**£91.89**
Seikosha GP50S (Spectrum)	£79.90 + VAT =	**£91.89**
Seikosha GP500A (P)	£139.90 + VAT =	**£160.89**
Seikosha GP550A (P)	£179.90 + VAT =	**£206.89**
Seikosha GP700A Colour (P)	£279.90 + VAT =	**£321.89**
Shinwa CT80 (P)	£175.00 + VAT =	**£201.25**

(P) = Parallel Centronics (S) = Serial RS232

Smith Corona range of printers Now in Stock — Phone or write for details

INSTANT CREDIT Up to 36 months to pay
All items over £150 available on our easy credit terms. Written details available on request.

SUPERDISKS

LONDON'S LOWEST PRICES ON FLOPPY DISKS

Prices per box of ten ex VAT

	SSDD 40TR	DSDD 40TR	SS96TP1 80TR	DS96TP1 80TR
BASF 5¼"	**£10.95**	**£18.20**	**£19.80**	**£22.50**
3M 5¼"	**£13.55**	**£19.50**	**£20.05**	**£24.00**
VERBATIM 5¼"	**£15.50**	**£23.50**	**£22.50**	**£30.50**
DYSAN 5¼"	**£16.80**	**£24.90**	**£24.90**	**£32.00**
TDK 5¼"	**£17.50**	**£25.50**	—	**£33.00**
BASF 3½"	**£34.90**	—	—	—

Add 70p for P&P per box of 10 disks

CASH & CARRY COMPUTERS

53-59 High Street, Croydon, Surrey CR0 1QD.

12" MONITORS — GREEN SCREEN		
Sanyo 2112 Med Res	£65.00 + VAT =	**£74.75**
Sanyo 8112 High Res	£88.00 + VAT =	**£101.20**
14" MONITORS — COLOUR		
Commodore 1701 Composite/Sound	£173.00 + VAT =	**£198.95**
Fidelity CM14 RGB/Comp/Sound	£179.00 + VAT =	**£205.85**
Microvitec 1431MS Norm Res RGB	£173.00 + VAT =	**£198.95**
Microvitec 1431MZ for ZX Spectrum	£199.00 + VAT =	**£228.85**
Microvitec 1451MS Med Res RGB	£229.00 + VAT =	**£263.35**
Microvitec 1451DQ for Sinclair QL	£234.74 + VAT =	**£269.95**
Microvitec 1441MS High Res RGB	£379.00 + VAT =	**£435.85**
Sanyo 3125 Norm Res RGB	£173.00 + VAT =	**£198.95**
Sanyo 3117 Med Res RGB	£285.00 + VAT =	**£327.75**
Sanyo 3115 High Res RGB	£399.00 + VAT =	**£458.85**
Commodore		
Plus 4 NEW 64K Computer	£243.43 + VAT =	**£279.95**
C16 Starter pack inc. cassette deck	£113.00 + VAT =	**£129.95**
Commodore 64	£165.17 + VAT =	**£189.95**
SX64 Portable inc D. Drive and Col. Monitor	£478.22 + VAT =	**£549.95**
C2N Cassette	£32.61 + VAT =	**£37.50**
1541 Disk Drive	£182.57 + VAT =	**£209.95**
DPS1101 Daisywheel Printer (by Juki)	£309.95 + VAT =	**£356.44**
801 Tractor Printer	£165.17 + VAT =	**£189.95**
802 Friction Tractor Printer	£260.83 + VAT =	**£299.95**
1520 Colour Printer Plotter	£60.83 + VAT =	**£69.95**
1701 Colour Monitor	£173.00 + VAT =	**£199.00**
Amstrad		
Amstrad CPC464 Green Monitor	£209.00 + VAT =	**£240.35**
Amstrad CPC464 Colour Monitor	£301.00 + VAT =	**£346.15**
SANYO MBC 555 Business Computer		
128K including Wordstar, Calcstar, Infostar	£795.00 + VAT =	**£914.25**
BBC		
BBC Model B	£339.09 + VAT =	**£389.95**
Model B inc Disk I F	£399.96 + VAT =	**£459.95**
Cumana 1x100K DD CSX100	£105.00 + VAT =	**£120.75**
Cumana 1x200K DD CSX200	£191.26 + VAT =	**£219.95**
Cumana 2x100K DD inc PSU	£321.70 + VAT =	**£369.95**
Cumana 2x200K DD inc PSU	£347.78 + VAT =	**£399.95**
Cumana 2x400K DD inc PSU	£434.74 + VAT =	**£499.95**
All above Cumana Disk Drives include Cable, Manual + form. disk.		
Sinclair		
QL 128K Computer	£334.74 + VAT =	**£384.95**
NEW Spectrum 48K PLUS inc. 6 Free Programs	£147.78 + VAT =	**£169.95**
Spectrum 48K + 6 Free Games (worth £56)	£106.91 + VAT =	**£122.95**
Microdrive + Interface 1 + 4 Free Programs	£82.60 + VAT =	**£95.00**
16K-48K Upgrade	£21.70 + VAT =	**£24.95**

Apricot Computers — Fantastic Prices — Phone NOW!

MSX Computers — In Stock Now

Toshiba HX10 64K	£217.35 + VAT =	**£249.95**
Sanyo MRC10 64K	£234.74 + VAT =	**£269.95**
Sony HB75B 64K	£252.13 + VAT =	**£289.95**
JVC HC7GB 64K	£226.04 + VAT =	**£259.95**

Full range of MSX accessories available

Mail Order + Export + Trade Hot Line Phone 01-686 6362

Delivery by Securicor (3 day) please add £5.00 + VAT per item.
Delivery by T.N.T. (overnight) please add £9.50 + VAT per item.

Send off the coupon or order by 'phone quoting your Access, Barclaycard No. 'Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance.

Or you can Telex your order on: 946240 Attn 19001335

We accept official orders from PLC's, Government Departments and Educational establishments

These prices correct until superceeded by next advertisement

To: Cash & Carry Computers, 53-59 High Street, Croydon, Surrey CR0 1QD.

Please supply _____

_____

I enclose my cheque for £_____ including delivery by Securicor/T.N.T.*

or charge my Access/Barclaycard No. _____

Name _____ Signature _____

Address _____

_____ YC 1

*Please Delete

(continued from page 157)

addresses can be specified in this mode in the range 0 to $7FFF — which is all in the QL Rom — and $F8000 to $FFFFF. So the instruction

MOVE.L $7000,D4

will copy the long word starting at address $7000 into data register D4.

■ Absolute long address mode. In this mode the effective address is a long word. It is not necessary to sign extend it as is the case for absolute short address mode of course, but it operates in the same way in other respects. So the instruction

MOVE.W D4,$20000

will copy the word in data register D4 to address $20000.

■ Program counter with displacement mode. This is a most important effective addressing mode as it allows us to write position independent programs, i.e., programs that can run anywhere in memory, as opposed to having to be loaded at a specific address.

In this mode the effective address is the sum of the contents of the program counter, which of course points to the instruction about to be executed, and a signed 16 bit displacement. The assembler format is basically the same as the address register indirect with displacement mode but in this case the program counter is used instead of an address register, so the instruction

MOVE.W $8(PC),D0

will move the word 8 bytes past the instruction into D0.

will move the -word 8 bytes past the instruction into D0.

■ Program counter with index mode. This is again almost identical to the address register indirect with index, using the program counter instead of the address register. Comments made to the previous mode about positon independent code apply equally to this mode, so the instruction

MOVE.L $26(PC,A4.L),D0

will copy the contents of the address formed from the sum of the program counter plus the long word contents of A4 plus the displacement of $26 to data register D0.

■ Immediate data mode. In this effective address mode the operand specifies immediate data rather than the address of that data. The immediate data is indicated by a hash (#) symbol preceeding it. So the instruction

MOVE.B #$44,D0

will move the value $44 into the low order byte of D0.

The main instruction set of the 68008 is tabulated in table 1.I have listed the mneumonic and a brief description of the operation. I have not included all the variants of the different instructions. Of course you need to know a lot more about the various instructions before you can use them, but it does give the general flavour of the 680008.

I do not intend to discuss every instruction in detail, but rather to expand on those which are more frequently used and to use them in various examples of routines which can be tried on the QL. This will form the subject of the next article in this series, but before starting on that it is a useful exercise to show how we can use these routines from Basic.

To illustrate this listing 1 is a simple routine

Table 1. 68008 instruction set.

Mnemonic	Description
ABCD	add decimal byte with extend bit
ADD	add
AND	logical and
ASL	arithmetic shift left
ASR	arithmetic shift right
Bcc	branch conditional
BCHG	bit test and clear
BCLR	bit test and clear
BRA	branch always
BSET	bit test and set
BSR	branch to subroutine
BTST	bit test
CHK	check register against bounds
CLR	clear operand
CMP	compare
DBcc	test condition, decrement and branch
DIVS	signed divide
DIVU	unsigned divide
EOR	exclusive or
EXG	exchange registers
EXT	sign extend
JMP	jump
JSR	jump to subroutine
LEA	load effective address
LINK	link stack
LSL	logical shift left
LSR	logical shift right
MOVE	move
MOVEM	move multiple registers
MOVEP	move peripheral data
MULS	signed multiply
MULU	unsigned multiply
NBCD	negate decimal with extend
NEG	negate — 2's complement
NOP	no operation
NOT	1's complement
OR	logical or
PEA	push effective address
RESET	reset external devices
ROL	rotate left without extend
ROR	rotate right without extend
ROXL	rotate left with extend
ROXR	rotate right with extend
RTE	return from exception
RTR	return and restore
RTS	return from subroutine
SBCD	subtract decimal with extend
Scc	set conditional
STOP	stop
SUB	subtract
SWAP	swap data register halves
TAS	test and set operand
TRAP	trap
TRAPV	trap on overflow
TST	test
UNLNK	unlink
Condition codes — cc in above table.	
CC	carry clear
CS	carry set
EQ	equal
F	false
GE	greater than or equal
GT	greater than
HI	high
LE	less than or equal
LS	low or same
LT	less than
MI	minus
NE	not equal
PL	plus
T	true
VC	no overflow
VS	overflow

to clear the whole of the screen by writing all zeros to the screen memory which resides from address $20000 to $27FFF inclusive.

The program will be a loop which is initialised with a0 pointing to the bottom of screen memory, and d0 holding the number of times we go round the loop. within the loop we will clear some memory, increment a0 to point to the next memory location, and decrement d0 and test it to see if we have reached the top of the screen memory.

Obviously we will use the Move instruction which has already been described in the section on addressing modes. The LEA — load effective address — instruction is used to initialise a0.

The looping instruction we will use is DBcc where cc is one of the 16 condition codes included in the instruction set table.

This instruction decrements the specified data register and also tests to see if a condition specified is met. In this program we have set the condition to false so that this test will always fail.

If the condition was met then the next instruction would be executed, i.e., it would exit the loop. If the condition is not met and the specified data register has reached a value of −1 then the loop will be exited. In the example this occurs when the whole of screen memory has been cleared.

Having cleared the screen we need to return back to Basic. If this program is invoked by an Exec command then it will be created as a job under QDOS and so it is necessary to remove this job. A system call is used — see the QDOS manuals — which requires small values being placed in data registers, and to do this we use a special version of the move instruction, MoveQ — most quick — which sign extends a number lying between −128 and +127 to a 32 bit number.

The trap instruction is a call to an address locted in a table of address pointers which are set up in the QL Rom and actually causes the job to be removed. Finally we return using the RTS instruction, having first of all cleared data register 0 in case the program is invoked with a Call.

If you have an assembler you can of course enter the program and automatically generate an executable file. Alternatively, you can enter the assembled code which is shown in hex in the listing after the address field using a hex loader, and either place it in the resident procedure area using RESPR, and then Call it, or save it using Sexec as described in the QDOS entry of the concepts section in the QL User Guide. ■

Q MOD
V23 modem. Direct telephone line connection, 1200/75 baud full duplex operation for Prestel and other database access, 1200/1200 baud half-duplex operation for user-to-user communication.

Q CALL
Auto dial/answer unit for attended or unattended operation.

Q CON
Asynchronous multi-speed interface, single chip micro based with software on microdrive cartridge. Operates at 9600, 4800, 2400, 1200, 300 and 75 baud. Independent Tx and Rx rates. 25-way D-type, SER 2, power and expansion connectors, Provides VT100 emulation and software support for Q MOD and Q CALL. Can be used with any modem.

Recommended by Sinclair Research Limited. Guaranteed, designed and manufactured by O.E. Ltd, Cumbria

Now the QL has got connections in all the right places.

This modular communications package gives your QL more versatility and potential than probably any other add-on.

Using expansion connectors, the units stack on top of each other to provide a universal communications facility for VT100 emulation, telex, electronic mail, and access to the international PSS network and databases like Prestel and Micronet 800.

The modules can also be purchased individually, starting with the Q CON for interfacing, I/O control, and support for subsequent modules. It accepts any modem, including of course the Q MOD V23 modem. Q CALL provides unattended or attended auto-dial and answer facilities.

It all stacks up to universal communications – at a down to earth price. You'll find price and order details in the coupon.

Tick	Quantity	Module Price*	Value
☐		Q CON £79.95	
☐		Q MOD £79.95	
☐		Q CALL £49.95	
		Total order value	

☐ I enclose a cheque/P.O.† made payable to O.E. Ltd.
☐ Please charge my Visa/Access† card
Card No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
Signed

☐ Please send me more information.
Name
Address
Tel:

O.E. Ltd, North Point, Gilwilly Industrial Estate, Penrith, Cumbria CA11 9BN. Tel: 0768 66748 Telex: 64157

oel

*Inc. VAT and P&P. Please allow 28 days for delivery
†Please delete as appropriate.

RESPONSE FRAME

Do you have a problem? Your manual is incomprehensible or you just cannot get the hang of that programming trick you tried — whatever it is, Tim Hartnell will do his best to answer your queries. Please include only one question per letter and mark them "Response Frame".

MONITOR OR TV?

I own a Spectrum 48K micro and am wanting to purchase a colour monitor. I have seen a feature in a recent magazine which shows how simple the modification is to provide a composite video signal and it is this which has prompted me to consider a monitor rather than a TV. What is confusing me is that I have seen advertisements for a colour monitor designed to accept signals from the Spectrum "direct" — the Microvitec — and I assume "direct" to mean unmodified. Is this a true monitor, or am I misinterpreting the meaning of "direct". I note also there are colour monitor/colour TV composite models available. I would greatly appreciate some guidance on selecting the most suitable type for my computer.
Derek Cale,
Grimsby,
South Humberside.

ACCORDING TO a Mr Hardy at Microvitec, the monitor you've seen advertised — model number 1431/MZ3 — is a true monitor, that includes all the modifications within the monitor itself. This monitor is driven from the Spectrum edge connector, not from the TV output port. If you connected any standard monitor to the "TV" socket, you would not get a picture.

The Microvitec monitor allows other peripherals to be connected to the Spectrum by duplicating the edge connector. This monitor is "standard resolution" — that is, 452 horizontal pixels — and will therefore work as well with any RGB computer, such as the BBC Micro.

AMSTRAD SYMBOL

I have been having trouble with defining some characters on the Amstrad using the Symbol command. I've followed the instructions in the manual, but it just doesn't seem to work. When I print the characters which I thought I had defined, they just come out the same as they were when I turned the computer on. What am I doing wrong?
William Dodd,
Southampton.

ACCORDING TO Clive Gifford, author of *50 Dynamic Games for the Amstrad,* the problem may well be occurring because the manual does not fully explain the use of the Symbol After command. Before you start using Symbol, you need to use Symbol After, which makes it possible to use Symbol with a group of character numbers. That is, if you wanted to redefine one or more characters whose numbers were greater than 127, you'd need to include the line Symbol After 127 in your program. This would then allow you to redefine characters 128, 129 and so on.

AUTOMATIC RUN

Many of my friends have programs on their Spectrums which run automatically when they load them. I would like to be able to do this on my Amstrad. I have read through the manual several times, but it does not seem to include this information. What can I do to solve my problem?
Terry Stickles,
Birmingham.

IT APPEARS that you have not been looking carefully enough in the manual. Save the program as normal. Then, when loading it back, type in Run "nameofprogram" instead of Load "nameofprogram". This will load and auto-Run your program.

COMPILER QUERY

If I understand it correctly, the purpose of a compiler is to convert Basic to machine code. I have a Vic-20 and plan to buy a Super-Extender Cartridge. Will a normal compiler be able to function on the Vic-20 with the Expander operating?
Pramod K Joshi,
West Bridgford,
Nottinghamshire.

COMPILERS HAVE been developed for the Vic-20, but the are only designed to cater for the commands supplied as standard in Vic-20 Basic. There is no way an ordinary Vic-20 compiler could cope with the additional commands — such as extra graphics words — in an Expander's vocabulary. So the answer, Pramod, is — I'm afraid — no.

LANGUAGES

Most microcomputers are programmable in some sort of Basic. For many of them, it is possible to buy other languages, such as Forth and Pascal. I know that both of these run much more quickly than Basic because they are compiled rather than interpreted. I have been told that each language has its own particular field in which it is most powerful. Can you tell me something about the applications of Pascal and Forth, and possibly about some other interesting languages?
S Klaassens,
Nijkerk,
Holland.

SPECIFIC LANGUAGES are usually created for specific needs. A general purpose language like Basic, which was created mainly to be easy to learn, is usually all right at many things, but not very good at any of them. Forth, which was created by Charles Moore originally to control a radio telescope, is a fairly primitive language in its supplied form, with a very limited vocabulary.

However, its immense strength is that it allows you to create new words of your own, and use them from then on as though they were part of the language, even to the extent of using your own words in the creation of others. For example, if you invented the word Dash to draw 20 hyphens on the screen, you could invent a word called, say, Lottadashes to equal Dash being executed 20 times. Dash and Lottadashes could stay in your Forth vocabulary for ever. Basic has no such capability.

Pascal was developed by N Wirth with the intention of creating a language which would enforce disciplined programming techniques.

Pascal programs can, in some cases, read almost like a statement of the problem in English. They are usually "transparent" to people other than the programmer — which is rarely true of Forth programs, and only true of well-structured Basic programs — and are consequently easy to maintain and modify. It is interesting to note that QL Super-Basic — and to a lesser extent BBC Basic — incorporate some of the better features of Forth and Pascal.

Other languages, such as Logo and Lisp, have found applications in specific fields. Experience with any language in additon to Basic will help you to become a better programmer, as you'll start thinking more in terms of what you want the program to achieve rather than in terms of what lines of program will do this.

Most languages have strong, if not fanatical, adherents. Forth programmers, in particular, defend Forth most ardently. I was being interviewed on Capital Radio once with a Forth programmer who nearly punched me in the face when I tried to make a case for Basic being a good language to start programming with, because it was so easy to get positive feedback from the computer.

COLOUR OR NOT?

I would be most grateful if you could explain the problem which I am experiencing with my ZX Spectrum 48L. When connected to my Philips TV it functions normally and responds to all the colour instructions, but when connected to an Hitachi 12in. portable it will only produce black and white signals. I have, of course, adjusted the necessary pre-set tuner controls without any improvement. I have seen in a previous reader's query a similar problem which necessitated the reader making an adjustment within the Spectrum.
R L Turner,
Redditch.

EARLY SPECTRUMS, in particular, were a little choosy regarding the colour TV's they would work well with. A spokesman for Sinclair Research said there was no evidence that any particular model or make refused to generate colour signals when fed by a Spectrum. The easiest answer I can give you is to wait until the warranty period is over, open the Spectrum, and turn the little screws on one of the flat potentiometers you can see, which controls colour intensity. Apart from that, I'd stick to the Philips.

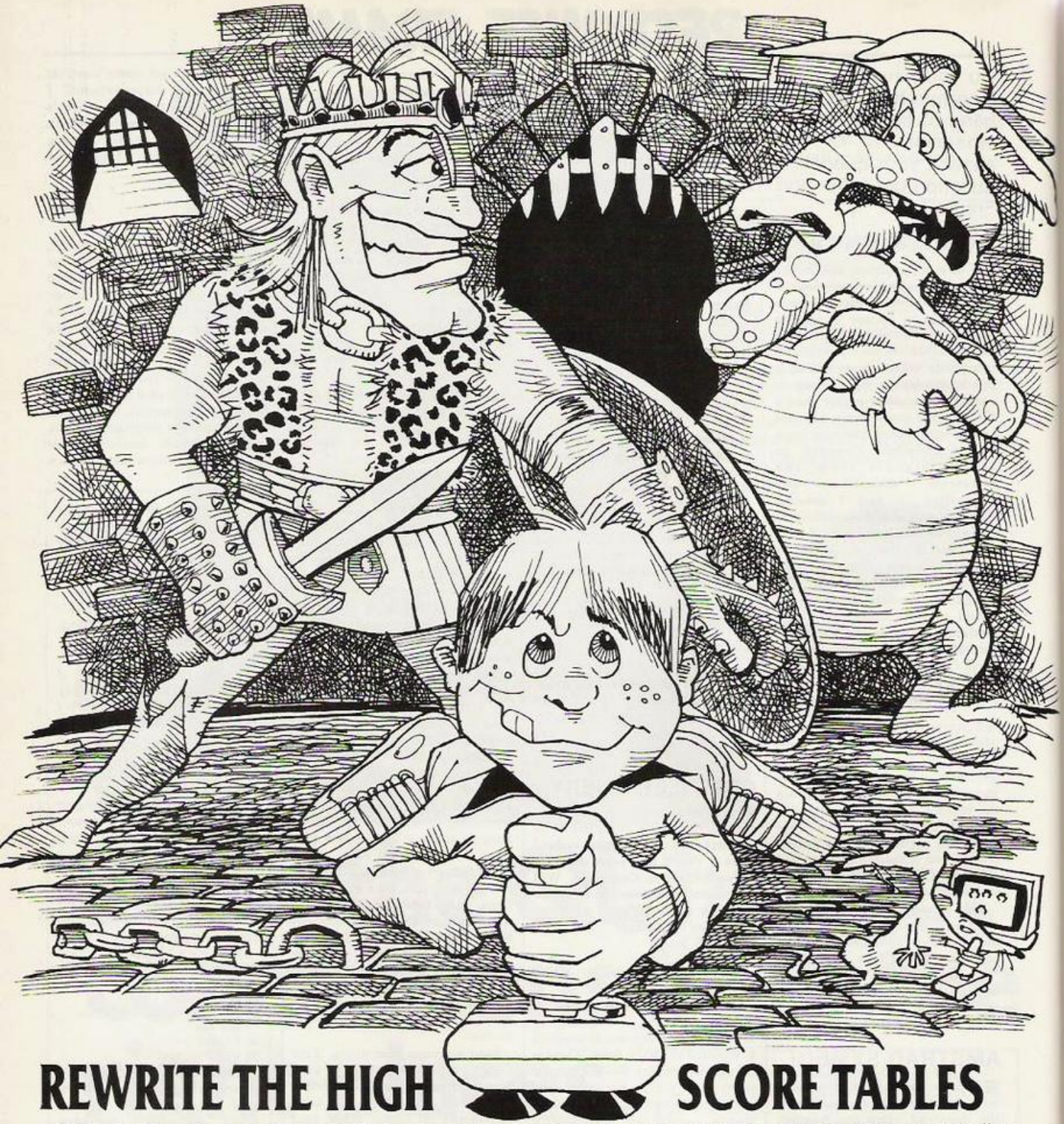
In a recent issue of Your Computer *a reader asked about including Verify within a Spectrum program. A number of people wrote to me regarding their experiences with this. Ian Philpot from Tonbridge, Kent writes:*

I have been using the Verify command in a program in exactly the way your correspondent describes. What may be the significant difference is that I have been saving data in a character array (in fact, the league tables of my local badminton league) and then verifying the saved array. This seems to work perfectly. However, I had not, until I read your comments, tried to Save and Verify the main program in this way. I then tried the following program:

```
 5 FOR n = 1 TO 96
10 PRINT "a"
20 NEXT n
22 SAVE "test" LINE 1
25 PRINT "Rewind and press
   any key"
30 PAUSE 0
35 VERIFY "test"
```

This worked perfectly every time. It seems to work just as well with further lines added. It appears therefore that any problem would lie with the saving routine, rather than in the use of the Verify command in the program.

M R Trevarthen of Alexandria, Dunbartonshire, points out in reference to the same query, that you should not *include user-friendly inputs like "Do you wish to Verify" ;Z$ between the Save and Verify lines in the program, as this adds to or changes part of the program already saved. This Verify will fail. Using Inkey$ does the same thing.*



REWRITE THE HIGH SCORE TABLES

With the Gunshot, you'll have all your enemies cowering in corners. 8-directional action and an all-in-one moulded stem allows accurate annihilation and strength to survive those all-night sessions. Dual fire buttons for fading fingers (and a rapid fire version when they're really coming thick and fast). And, if you break it (and we know you'll try) our 12 month guarantee will prove invaluable. The Gunshot plugs directly in to practically all popular home computers (ask about Vulcan interfaces for the BBC, Spectrum, Electron, C16, Plus 4). Only £8.95.

See the range of Vulcan joysticks and interfaces at your local stockist ... we'll see you on the high score tables.

VULCAN ELECTRONICS LTD

Joystick Genius

200 BRENT STREET HENDON NW4 1BH TEL: 01-203 6366

SOFTWARE FILE

Software File gives you the opportunity to have your programs, ideas and discoveries published. We will accept contributions for any home computer provided they are submitted to *Your Computer* exclusively. Please double-check your programs and specify the memory they require before sending them, preferably on cassette. We pay between £6 and £36 for contributions published.

Moon Rescue

T Loton,
Stoke-on-Trent,
Staffordshire.

AMSTRAD

YOU ARE the commander of the Intergalactic Rescue Service. You are informed that four scientists are stranded on the moon's surface and it is your job to rescue them. As you hover above the moon's surface in your spaceship you see below you a dangerous asteroid belt which separates you from the stranded scientists.

When you think the time is right you must launch your rescue pod and guide it through the asteroid belt to pick up one of the scientists. Watch out when returning to your spaceship because the asteroid belt has now been replaced by a fleet of enemy flying saucers. You get 10 points added to your score every time you rescue a scientist successfully.

If, however, you hit an asteroid, a flying saucer or the moon's surface or fail to re-dock with your spaceship you lose a life. You start each game with three lives, 25 fuel units, and four scientists to rescue. At the start of each game a tune is played.

Keys to use are: Z = left; X = right; \ = launch pod/thrust.

No loading instructions are needed, just type in the program and save it normally.

```
5 MODE 0:PRINT "RESCUE"
10 ENV 1,7,2,1:ENV 2,15,-1,8:ENV 3,7,-2,1,7,2,1,7,-2,1
,7,2,1
20 READ NO,DU:IF NO=-1 THEN 50
30 SOUND 1,NO,-DU,15,3
40 GOTO 20
41 DATA 159,3,213,1,190,3,213,1,119,1,127,1,142,1,159,
1,142,3,213,1,119,1,127,1,142,1,159,1,142,2,213,2,106,
8
42 DATA 95,2,106,1,159,1,106,2,119,2,127,2,190,1,159,1
,127,2,142,2
43 DATA 127,4,119,1,127,1,142,1,159,1,142,4,127,1,142,
1,159,1,169,1,159,8
49 DATA -1,-1
50 SYMBOL AFTER 97
60 FOR i=20000 TO 20048:READ a:POKE i,a:NEXT
70 FOR i=20500 TO 20526:READ a:POKE i,a:NEXT
80 FOR i=20550 TO 20576:READ a:POKE i,a:NEXT
90 DATA &dd,&21,&30,&75,&06,&05,&dd,&7e,&00,&3d,&fe,&f
f,&c2,&31,&4e,&3e,&14,&dd,&77,&00,&dd,&23,&10,&ee
100 DATA &dd,&21,&35,&75,&06,&05,&dd,&7e,&00,&3c,&fe,&
15,&c2,&49,&4e,&3e,&00,&dd,&77,&00,&dd,&23,&10,&ee,&c9
110 DATA &06,&05,&dd,&21,&30,&75,&0e,&05,&dd,&66,&00,&
69,&cd,&75,&bb,&3e,254,&cd,&5a,&bb,&dd,&23,&0c,&0c,&10
,&ee,&c9
120 DATA &DD,&21,&35,&75,&0E,&06,&06,&05,&DD,&66,&00,&
69,&CD,&75,&BB,&3E,&FF,&CD,&5A,&BB,&DD,&23,&0C,&0C,&10
,&EE,&C9
130 FUEL=25:SCORE=0:LI=3:MEN=4
140 MODE 0:FUEL=25:INK 0,0:INK 2,2:INK 3,9:INK 4,15:BO
RDER 0:INK 1,26:INK 5,24:INK 6,8,26:FOR i=30000 TO 300
09:POKE i,INT(RND*20):NEXT:WINDOW #1,1,20,4,14
150 SPEED INK 5,5
160 SYMBOL 254,56,126,127,255,255,255,124,56:SYMBOL 25
5,120,252,252,254,254,63,63,31
170 SYMBOL 97,0,0,7,15,31,63,127,255:SYMBOL 98,0,0,255
,165,165,255,255,129:SYMBOL 99,0,0,&X11100000,240,248,
252,254,255:SYMBOL 100,255,243,243,255,255,127,63,31:S
YMBOL 101,255,&X11001111,&X11001111,255,255,254,252,24
8
180 SYMBOL 102,192,240,240,248,248,248,254,255:SYMBOL
103,1,15,31,31,31,127,255,255:SYMBOL 104,255,255,255,2
55,255,255,255,255
190 SYMBOL 240,24,36,66,66,36,60,90,195
200 PEN 3:LOCATE 1,15:PRINT"f                    ghf
          ghhhf              ghhhhhf              ghhh
hhhhf          ghhhhhhhhhf          ghhhhh";
210 PRINT "hhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhhh"
220 PEN 4:LOCATE 7,20:PRINT CHR$(250);" ";:IF MEN>1 TH
EN PRINT CHR$(248);"  ";:IF MEN>2 THEN PRINT CHR$(248)
;" ";:IF MEN>3 THEN PRINT CHR$(251)
230 A=1:D=1
240 REM
250 IF D=1 AND A<16 THEN A=A+1 ELSE D=0
260 IF D=0 AND A>1 THEN A=A-1 ELSE D=1
270 PEN 2:LOCATE A,1:PRINT " abc ":LOCATE a,2:PRINT "
d e "
280 PEN 1:CALL 20000:CLS #1:CALL 20500:CALL 20550
290 IF INKEY(22)=0 THEN SOUND 1,120,12,0,1:GOTO 310
300 GOTO 250
310 X%=A*32+32:Y%=400-33
320 REM ********** MAIN LOOP **********
330 CALL 20000:CLS #1:PEN 1:CALL 20500:CALL 20550
340 IF INKEY(71)=0 AND THRUST=0 AND X%>0 THEN GOSUB 45
0:X%=X%-32
350 IF INKEY(63)=0 AND THRUST=0 AND X%<607 THEN GOSUB
450:X%=X%+32
360 IF INKEY(22)=0 AND FUEL>0 THEN SOUND 1,0,25,7,0,0,
2:FUEL=FUEL-5:THRUST=1 ELSE THRUST=0
370 IF THRUST=0 THEN GOSUB 450:Y%=Y%-16
380 CH=TEST (X%+15,Y%-7)
390 IF CH=3 THEN 460
400 PLOT X%,Y%,5:TAG:PRINT CHR$(240);:TAGOFF
410 IF CH=1 THEN 460
420 IF CH=4 THEN 540
430 LOCATE 1,23:PEN 7:PRINT "FUEL:";FUEL
440 GOTO 330
450 MOVE X%,Y%:TAG:PRINT " ";:TAGOFF:RETURN
460 PLOT X%,Y%,6:TAG:PRINT CHR$(238);:TAGOFF
470 SOUND 1,0,0,15,2,0,7
480 LOCATE 1,24:PEN 8: LI=LI-1:PRINT"LIVES:";LI:FOR I=
1 TO 500:NEXT
490 IF LI=0 THEN 500:ELSE  140
500 LOCATE 6,10:PEN 1:PRINT "GAME OVER"
510 LOCATE 6,11:PRINT "SCORE:";SCORE
520 LOCATE 6,13:PRINT "HIT SPACE"
530 IF INKEY(47)<>0 THEN 530 ELSE RUN
540 INK 1,6:SYMBOL 254,0,60,126,165,165,126,60,0:SYMBO
L 255,0,60,126,165,165,126,60,0
550 REM ********** UP **********
560 PEN 1:CALL 20000:CLS #1:CALL 20500:CALL 20550
570 GOSUB 450
580 IF INKEY(71)=0 AND X%>0 THEN X%=X%-32
590 IF INKEY(63)=0 AND X%<607 THEN X%=X%+32
600 Y%=Y%+16
610 CH=TEST (X%+15,Y%-2)
620 PLOT X%,Y%,5:TAG:PRINT CHR$(240);:TAGOFF
630 IF CH=1 THEN 460
640 IF Y%>368 THEN IF X%<>A*32+32 THEN 460 ELSE 660
650 GOTO 560
660 SOUND 1,60,25,15:MEN=MEN-1:SCORE=SCORE+10:IF MEN=0
 THEN 670 ELSE 140
670 MEN=4:GOTO 140
```

Sheepdog

Neil Ghani,
Gosforth,
Newcastle-upon-Tyne.

SPECTRUM

YOU CONTROL a sheepdog and the objective is to muster a small flock of six dirty yellow sheep through a sheep dip and then the clean white sheep must be chased through the gate into the next field. For every unclean sheep you have 25 seconds added onto your time.

There are also bushes dotted about around the right-hand side of the field and the sheep may stop to graze at these. Keys 5, 6, 7, and 8 control the sheepdog.

```
  10 INK 0, PAPER 5: BORDER 1: C
LS : GO SUB 7000
1000 FOR f=1 TO 11 STEP 2: IF (a
(f)=6 OR a(f)=7) AND a(f+1)>5 AN
D a(f+1)<12 THEN LET sx=1: LET a
d=1: LET sy=0: LET a$(f)="7": LE
T a$(f+1)="0": FOR g=1 TO 5: BEE
P .01,10-RND*9: NEXT g: GO TO 10
60
1010 LET sy=SGN (a(f)-y) AND ABS
 (a(f+1)-x)<4 AND ABS (a(f)-y)<4
1020 LET sx=SGN (a(f+1)-x) AND A
BS (a(f)-y)<4 AND ABS (a(f+1)-x)
<4
1030 LET sx=sx+INT (RND*3)/2-.5:
 LET sy=sy+INT (RND*3)/2-.5: IF
(a(f)=6 OR a(f)=7) AND a(f+1)<14
 AND a(f+1)>10 THEN LET sx=ABS s
x
1040 LET sx=sx+(a(f+1)<1)+2-(a(f
+1)>29)*2-(a(f+1)>22 AND a(f+1)<
27 AND (a(f)<9 OR a(f)>12))+(a(f
+1)>25 AND a(f+1)<27)*2
1050 LET sy=sy+(a(f)<2)*2-(a(f)>
19)*2+(a(f+1)>5 AND a(f+1)<9 AND
 a(f)=9)
1060 IF ATTR (a(f)+sy,a(f+1)+sx)
=96 THEN LET sx=0: LET sy=0
1070 LET a(f)=a(f)+sy: LET a(f+1
)=a(f+1)+sx: PRINT AT a(f)-sy,a(
f+1)-sx;" "
1080 PRINT INK VAL a$(f);AT a(f)
,a(f+1);CHR$ 146: IF ad THEN GO
SUB 8520: LET ad=0
1090 IF a(2)>25 AND a(4)>25 AND
a(6)>25 AND a(8)>25 AND a(10)>25
 AND a(12)>25 THEN GO TO 4000
1500 PRINT AT y-y1,x-x1;" "; INK
 0;AT y,x;CHR$ (144+di)
2000 LET x1=(INKEY$="8")-(INKEY$
="5")+(x<1)-(x>23): LET y1=(INKE
Y$="6")-(INKEY$="7")+(y<1)-(y>20
): LET di=(INKEY$="5")
2010 IF ATTR (y+y1,x+x1)=96 THEN
 LET x1=0: LET y1=0
2020 LET x=x+x1: LET y=y+y1
2030 NEXT f: LET go=go+1
```

(continued on page 165)

CAMEL PRODUCTS

PRINT-SP | ROM 81 | PROMER 81 S | MONITOR STANDS | MULTEPROM | BLOPROM-SP | DHOBI | PRINTER STANDS

PROMER 81 | P10 81 | NIKE 81 | P10 SP | MEMIC | CRAMIC-SP | ROM SP | CRAMIC 81 | BLOPROM-81 | PROMER SP

NIKE POWER BUFFERS

WAITING TILL YOU GET CAUGHT OUT?

Nickel Cad. batteries with ON-OFF switch.

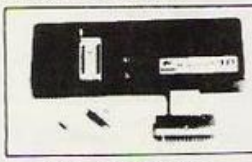
Versions for Spect., ZX81, ATMOS. Gives time to save program on tape.

Visible status warning by LEDs £17.35.

DEALER ENQUIRIES WELCOME.

EPROM PROGRAMMER

BLOPROM-SP A uniquely sophisticated EPROM PROGRAMMER



Eprom programmer for the 2516, 2716/32/32A/64/64A/28/128A, yes even the 64A/128A from Intel. Check, Read, Progam & Verify all or part of Eprom.
So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-SP. No Personality Cards, or other additions, just a Spectrum. Several inbuilt safety features. On-board Vpp generation. 28pin ZIF socket. Cabled connector and extender plug. ABS case. £89.95

BLOPROM-81
As above but for ZX81. Programs 2516, 2716/32/32A/64 & 27128 £79.95

AT LAST! for the Spectrum user. Put your programs, utilities, Assemblers into EPROMS for instant load from the unique ROM-SP

ROM-SP for Spectrum
Ingenious unit for Spectrum, with 2×28 pin sockets and a Reset button allows up to 16K of Basic or M/C program to RUN or LOAD instantly from EPROMS. Cabled connector and full extender card. NOTE: Does not disable Sinclair ROM. £29.95

PROMER-SP for Spectrum
A brand new Spectrum programmer for 2764/128. Zero insertion force socket & software on tape. £29.95

PROMER 81-S for Spectrum
The very popular PROMER-81 for the ZX81 has been adapted to the Spectrum and the price kept low. NEW PRICE £24.95

ROM-81
Provides two 24 pin sockets for up to 8K of EPROM memory in the 8-16K area. Can use 2516/32 or 2716/32 £14.95

PROMER-81
A low cost reliable programmer for 2516/32, 2716/32 EPROMS. Require 4×PP3 batteries NEW PRICE £24.95

DHOBI 1 UV ERASER
Compact. Mains powered. Safe. Fully cased. Up to 3 EPROMS £18.95

DHOBI 2 With automatic timer £22.95

CRAMIC-SP NEW for Spectrum
Ingenious software paged 16K non-volatile CMOS RAM to co-exist in the same area as Spectrum ROM. Easy storage and retrieval of BASIC, M/C or DATA on a 48K Spectrum £89.95

PRINT-SP NEW for Spectrum
Centronics Interface with standard centronics Cable. Plus free introductory offer SP WRT1E text processor. £31.25

DREAM-81 for ZX81
64K Rampack with link options to disable 0-8-16K. Plus a 28 pin EPROM socket for 2716, 2732/2764 and 27128. £59.95

MEMIC-81 for ZX81
4K CMOS RAM with lithium battery. Easy SAVEing, 10yr storage and instant retrieval of programs. £29.95

INTRODUCING MULTEPROM
The most economical, sophisticated gang copier in the world. Based on BLOPROM £199.95

UK. VAT extra. No VAT on exports P+P UK Free Europe +5% — Overseas +10% TLX 81574 CML
Cambridge Microelectronics. One Milton Road.

Cambridge Microelectronics Ltd One Milton Rd Cambridge CB4 1UK Tel (0223) 314 814

SPECTRUM
RAINBOW COPIA

★QUITE SIMPLY THE BEST BACK-UP COPIER EVER FOR THE SINCLAIR SPECTRUM
★ALMOST ANY PROGRAM IS REPRODUCED ON BLANK TAPES
★TESTED ON OVER 100 TOP GAMES WITH A 98% SUCCESS RATE
★MULTIPLE PART PROGRAMS BACKED UP IN ONE GO
★ALSO BACKS-UP HEADER LESS PROGRAMS
★FULL INSTRUCTIONS WITH THIS EASY TO USE PROGRAM
★THIS INCREDIBLE MACHINE CODE PROGRAM IS EXCELLENT VALUE @ £5.95 incl. P&P

★ ★ ★ ★ ★ ★ ★

COMMODORE 64
BRING YOUR 64 TO LIFE WITH.....
LIGHTNING LOAD

★CONVERTS ALMOST ALL YOUR FAVOURITE SOFTWARE & GAMES INOT A SUPERFAST LOADING VERSION
★YOUR CASSETTE PROGRAMS WILL INDEPENDENTLY LOAD FASTER THAN THE COMMODORE DISC DRIVE!!
★LIGHTNING LOAD HAS SOPHISTICATED FEATURES WHICH LEAVE OUR COMPETITORS LIGHT YEARS BEHIND
★COLOUR & SOUND ARE USED IN SPECTACULAR & UNIQUE WAYS TO ENHANCE THE PROGRAM
★100% MACHINE CODE, FLEXIBLE MENU SYSTEM ALLOWS SAVING OF MORE THAN 48K CONTINUOUS RAM
★THIS AMAZING PROGRAM IS NOW ON SPECIAL OFFER £7.95 NOW £6.95 incl. P&P

★ ★ ★ ★ ★ ★ ★

COPYCAT
THE ULTIMATE BACK-UP TAPE COPIER

★MAKES BACK-UP COPIES OF ALMOST ALL SOFTWARE
★SPECTACULAR MULTICOLOURED LOAD AND SAVE
★WIZARD AUDIO SOUND EFFECTS
★CASSETTE MAGIC SENSE
★100% MACHINE CODE TAPE COPIER WITH FULL INSTRUCTIONS
★CAN YOU FIND A BETTER COPIER? — WE CAN'T!
★SUPERB VALUE AT £5.95 inc. P&P
DISPATCH OF THESE PROFESSIONAL PROGRAMS WITHIN 24 HOURS!
CHEQUES/P.O.'s TO:

WIZARD SOFTWARE (Dept. YC)
59 THE MARLES, EXMOUTH, DEVON EX8 4NE

Subscribe to Computer Magazines

1985 Special Offer (6 months trial)

Copies sent by AIR-MAIL

	Europe	*Other Countries*
BYTE	£24	£32
COMPUTER ANSWERS	16	27
MICRO COMPUTING	22	31
MICRO DECISION	19	28
MICRO SYSTEMS	36	44
PERSONAL COMPUTER WORLD	17	24
POPULAR COMPUTING	23	29
SINCLAIR PROGRAMS	16	25
SINCLAIR USERS	15	24

Read each month up-to-date information, Product News, Programming and understand more about computers.
Subscribe for Yourself or make a GIFT to friends.
Please fill in the coupon and send it to:

HAULSTERMM LTD
Subscription Dept.
500 Chesham House, 150 Regent Street, London W1
Tel: 01-788 8746—01-439 6288

NAME.....PHONE:.....
ADDRESS:.....
.....COUNTRY.....
I wish to subscribe to the following magazines:
1..... £.....
2..... £.....
3..... £.....
4..... £.....
Enclosed please find a cheque for Total £.....

(continued from page 163)

```
2500 PRINT INK 0;AT 0,27;INT (go
*3)
2510 IF go/10=INT (go/10) THEN G
O SUB 8510
2520 GO TO 1e3
4000 INK 0: PRINT AT 10,2;"You h
ave penned all";AT 11,2;"the she
ep."
4010 LET sc=FN c(): PRINT AT 13,
2;"You took ";sc;" Seconds."
4020 INK 0: FOR f=-25 TO 25: BEE
P .1,f: BEEP .1,25-f: NEXT f
4030 LET sd=0: FOR f=1 TO 6: LET
 sd=sd+VAL a$(f-2): NEXT f
4040 PRINT AT 15,2;6-sd;" Sheep
were cleaned"
4050 PRINT AT 17,3;"Penalty = ";
sd*25
4060 LET sc=sc+25*sd
4100 IF hs>sc THEN LET hs=sc: PR
INT AT 18,1;"Well done - a new r
ecord!"
4110 PRINT AT 19,1;"Top score =
";hs
4120 PRINT AT 21,3;"Another game
? (y/n)"
4130 IF INKEY$="y" THEN GO TO 42
00
4140 IF INKEY$="n" THEN PAPER 7:
 BORDER 7: CLS : STOP
4150 GO TO 4130
4200 GO SUB 8100: GO TO 1000
8000 FOR f=32600 TO 32631: READ
a: POKE f,a: NEXT f
8010 LET hs=500
8100 DIM a(12): DIM a$(12): FOR
f=1 TO 11 STEP 2: LET a(f)=8+f:
LET a(f+1)=5
8110 LET a$(f)="6": LET a$(f+1)=
"1": NEXT f
8120 LET x=1: LET y=1: LET d=0
8130 LET x1=0: LET y1=0: LET go=
0
8140 LET ad=0
8200 DEF FN a(m,n)=(m+n+ABS (m-n
))/2: DEF FN b()=(PEEK 23672+256
*PEEK 23673+65536*PEEK 23674)/50
: DEF FN c()=FN a(FN b(),FN b())
8210 POKE 23672,0: POKE 23673,0:
 POKE 23674,0
8500 PAPER 4: BORDER 5: CLS : FO
R f=1 TO 10: LET rs=INT (RND*20)
: LET pr=12+INT (RND*8): PRINT I
NK 0; BRIGHT 1;AT rs,pr;CHR$ 147
: NEXT f
8510 INK 2: FOR f=1 TO 4: PLOT 2
00+f*2+(f>2)*2,0: DRAW 0,72: DRA
W INK 4;0,32: DRAW 0,71: NEXT f
8520 PRINT PAPER 5; INK 1;AT 5,8
;"###";AT 6,8;"   ";AT 7,8;"   "
;AT 8,8;"###": RETURN
9000 DATA 0,2,134,125,124,194,12
9,0,0,64,97,190,62,67,129,0
9010 DATA 0,7,255,252,252,68,68,
0
9020 DATA 0,16,84,56,146,84,56,1
6
```

Sprinter

Nicholas Giacoumatos,
Shoreham by Sea,
West Sussex.

VIC-20

THE OBJECT of the game is to run as fast as you can in two races. The first is the qualifying race, the second is the final. Your power increases and so does your speed when you hit the key. You can win gold, silver bronze or nothing but watch out — the more power the more energy is used. At the end of the first race you are awarded bonus energy to see you though the final, but if you run too fast you will collapse of exhaustion.

Type in the first part of the program and save it. Do the same with part two — be careful with the data — and save it after part 1 on the same tape. After part 2 type in and save part 3. You should then have a copy of Sprinter. To load hold down Shift and hit Run/Stop, and press play on the tape deck. The program should load automatically. At the start of the game you will see a track, a crowd and a 10 second countdown in the top left corner to give you time to build up a start, good luck. 3K expansion is needed.

Parts 1 and 2 of the program have an auto load system at the end of them. When you type them in save them first. Do not run them until they are saved. If an error occurs note it down and load the part in again. Type the correction in and save the program once again. Do this until the two parts of the program are perfect.

Part 1.

```
1 PRINT"■"
2 GOSUB100:GOSUB110:GOSUB10
3 GOSUB100:PRINT"■"
4 POKE631,76:POKE632,111:POKE633,13:POKE634,82:POKE635,85:POKE636,78:POKE637,13
5 POKE198,7:NEW
10 POKE36878,15
11 READN,D
12 IFN=-1THENPOKE36875,0:RETURN
13 POKE36875,N:FORT=1TOD:NEXT
14 GOTO11
20 DATA215,300,223,250,220,250,231,250,220,350,223,450
21 DATA215,250,225,250,220,250,231,250,220,550
22 DATA215,250,223,250,220,250,231,250,220,250,223,450
24 DATA225,100,225,100,223,100,223,100,215,600,-1,-1
99 RETURN
100 PRINT"■■■■     N.G PRESENTS    ",
101 PRINT"■"
102 PRINT"     ■■■■■■■■■■■■"
103 PRINT"    ■■■"
104 PRINT"   ■■■"
105 PRINT"  ■■■  O M P U T H O N■"
106 PRINT"  ■■■"
107 PRINT"  ■■■■■■■■■■■■"
108 PRINT" ■   ■■  ■■■■ ■■■■"
109 PRINT"     ■ ■  ■ ■ ■ ■  ■"
110 PRINT"       ■  ■ ■ ■ ■  ■"
111 PRINT"       ■  ■ ■ ■ ■  ■"
112 PRINT"       ■  ■ ■ ■ ■  ■"
113 PRINT"       ■  ■ ■ ■ ■  ■"
114 PRINT"     ■■■■ ■■■■ ■■■■"
115 PRINT"■■"
116 PRINT"■      M E T R E S"
117 FORT=1TO5000:NEXTT:RETURN
118 PRINT"■■■■■■■■■■■■
```

(continued from previous page)

```
5026 IF PB=2THENBS=20
5027 IFPB>2THENBS=00
5028 PRINT"YOUR POSITION BONUS ":PRINT
5029 PRINT"IS ";BS;" ENERGY UNITS":PRINT
5030 JB=INT(RND(1)*50)
5031 PRINT"NUDGES BONUS =";JB:PRINT:PRINT
5032 TB=JB+BS:LETRC=RC+1
5033 PRINT"      TOTAL =";TB
5039 PRINT"  PREPARE FOR  FINAL"
5040 FOR TW=1TO700:NEXT TW
5041 LETE=E+TB:LETPO=0:LETPW=190+INT(RND(1)*60):LP=0
5042 PRINT"":POKE36869,255:GOSUB1000:GOTO10
5999 GOTO5999
6000 PRINT""
6001 POKE36869,240
6002 IF DM/2.5=<10THENGOTO6500
6003 IF DM/2.5=<10.8ANDM/2.5>10THEN6600
6004 IF DM/2.5=<11.2ANDM/2.5>10.8THEN6700
6005 IF DM/2.5>11.2THEN6800
6006 GOTO6002
6500 PRINT"":GOSUB2000
6501 PRINT"";
6502 PRINT"      "
6503 PRINT"      "
6504 PRINT"      "
6505 PRINT"      "
6506 PRINT"      "
6507 PRINT""
6508 PRINT"      GOLD"
6509 PRINT"      "
6510 PRINT"      "
6511 PRINT""      YOU  GOT":PRINT
6512 PRINT"
6513 PRINT"
6514 PRINT"
6515 PRINT"
6516 PRINT"
6517 PRINT"
6518 PRINT"
6519 PRINT"  DO YOU WANT TO RUN"
6520 PRINT"    AGAIN (Y OR N)"
6521 GET Q$
6522 IF Q$="Y"THENRUN
6523 IF Q$="N"THENPRINT"":END
6525 GOTO6521
6599 END
6600 PRINT"":GOSUB2000
6601 PRINT"";
6602 PRINT"      "
6603 PRINT"      "
6604 PRINT"      "
6605 PRINT"      "
6606 PRINT"      "
6607 PRINT""
6608 PRINT"        ISV I"
6609 PRINT"        I   I"
6610 PRINT"        \__/":PRINT
6611 PRINT"     YOU GOT THE"
6612 PRINT:PRINT"     SILVER  MEDAL":PRINT
6613 GOTO6519
6699 GOTO6699
6700 PRINT"":GOSUB2000
6701 PRINT"";
6702 PRINT"      "
6703 PRINT"      "
6704 PRINT"      "
6705 PRINT"      "
6706 PRINT"      "
6707 PRINT""      I   I"
6708 PRINT"      BRNZE"
6709 PRINT"      I   I"
6710 PRINT"      \_ _/"
6711 PRINT:PRINT"  YOU GOT BRONZE MEDAL":PRINT
6712 GOTO6519
6799 GOTO 6799
6800 PRINT"":GOSUB2000
6801 PRINT"      I I"
6802 FORWS=1TO8
6803 PRINT"      I I"
6804 NEXTWS
6805 PRINT"      I_I"
6806 PRINT"      I|||"
6807 PRINT"      I|||"
6808 PRINT"      \|/"
6809 PRINT"WOODPPPPPPPPWON"
6810 PRINT"  THE WOODEN SPOON"
6811 PRINT:PRINT"  YOU DIDN'T MAKE A":PRINT
6812 PRINT"    MEDAL POSITION":PRINT
6813 GOTO6519
6899 GOTO6899
9000 PRINT"      HIT SPACE"
9001 FORT=1TO500:NEXTT
9002 PRINT"      HIT SPACE"
9003 FORT=1TO500:NEXTT
9004 PRINT"";
9005 GETKEY$:IFKEY$=""THEN9005
9006 RETURN
9050 FORG=1TO2
9051 FORSC=212TO165STEP-1:POKE36874,SC:FORT=1TO20:NEXTT:NEXTSC
9052 POKE36874,0
9054 NEXTG
9055 RETURN
```

Picasso's paintbrush

Matthew Sillett,
Dulwich,
London SE21.

BBC

PICASSO'S PAINTBRUSH is a multi-feature drawing program for the BBC Micro. Impressive pictures can be created quickly and easily using the many built-in functions.

- Automatic circle, triangle, semi-circle, rectangle and elipse drawing routines.
- Extensive colour mixing.
- Three cursor speeds.
- Three line thicknesses.
- Rubber band facility.
- Load and Save screens.
- Spray colour option.
- Print text anywhere on the screen.
- Colour-fill routine.
- Full MODE2 colour graphics.

Program 1 contains full instructions of how to operate these functions and the keys involved — all 30 of them. There are three methods of colour mixing provided, all of which are very easy to use.

The first way is to fill the area involved in one of the two colours to be mixed — e.g., red — and then to overlay it with alternate pixels of the second colour — e.g., yellow. The combination of Red and yellow produces a very good orange.

The second way is the same as above, but to overlay with horizontal lines — e.g., A darker orange may be produced using this method. The final method is to use high GCOL values to produce "hatching". On pressing the specified key, you must enter this value — e.g., 198 produces a good brown, when the colour is set to white.

Copies of the program are available for £3.50 from: M. J. Sillett, 41, College Rd., Dulwich, London SE21.

```
  10*KEY10OLD:MRUN:M
  20ONERROR RUN
  30MODE7:DIMA%(9,10),H%(8),AD%(8),B%(3,1),C%(2,1,3),D%(1,1,1),E%(1),V%(8),F%(1
,1):QZ%=0:GS=0:CM%=0:OO%=4:O%=4:Q%=0:PA%=0:C=0:HH%=1:SS%=0:FS%=0:*FX4,1
  40VDU23,241,255,254,254,252,252,248,248,240,23,240,255,127,127,63,63,31,31,15
,23,242,15,7,7,3,3,1,1,0,23,243,240,224,224,192,192,128,128,0
  50FF%=1:CP%=1:Y$="Green":B$="Pink"
  60VDU23,244,1,3,15,31,63,63,127,127,23,245,128,192,224,248,252,252,254,254,23
,246,127,127,255,255,255,255,127,127
  70VDU23,247,254,254,255,255,255,255,254,254,23,248,127,127,63,63,31,15,3,1,23
,249,254,254,252,252,248,224,192,128
  80PRINT:PRINTSPC(12)CHR$(141)CHR$(134)"FOUR IN A ROW":PRINTSPC(12)CHR$(141)CH
R$(133)"FOUR IN A ROW":FORX=1TO20:PRINTCHR$(131)"*";:NEXT:FORX=4TO20:PRINTTAB(0,
X)CHR$(131)"*"
  90PRINTTAB(38,X)CHR$(131)"*":NEXT:PRINTTAB(0,20)"":FORX=1TO20:PRINTCHR$(131)"
*";:NEXT:VDU28,2,20,38,4
  100PRINTTAB(10,4)"BY MARTIN ROBERTS":PRINTTAB(12,8)"COPYRIGHT 1984"
  110PRINTTAB(6,14)"Do you want instructions";
  120A$=GET$:IFA$="N"THEN140
  130IFA$<>"Y"ANDA$<>"N"THENPRINTTAB(6,14)SPC(8)"Y/N Please"SPC(6):PROCDELAY:GOT
O110
  140CLS
  150IFA$="N"THEN220
  160PRINT:PRINT"  This two player game consists of    stacking coloured discs i
n a 9 by 8  grid.":PRINT
  170PRINT" The object of the game is for you    to get four of your discs in a
row,  vertically, horizontally or          diagonally."
  180PRINT:PRINT" The cursor is moved by pressing the  left and right arrow keys
 and a      move is made by pressing the         downward arrow key."
  190PRINT:PRINT" Press any key to continue";:A$=GET$:CLS
  200PRINT:PRINT" In two player mode, a move may be    retracted by pressing the
 upward     arrow key."
  210PRINT:PRINT" Press any key to continue";:A$=GET$:CLS
  220PRINTTAB(6,1)"Are you using a colour":PRINTTAB(12,3)"television?";:A$=GET$:
PRINTA$:IFA$<>"N"ANDA$<>"Y"THENCLS:PRINTTAB(11,1)"(Y/N) Please":PROCDELAY:GOTO22
0
  230IFA$="N"THENB$="White":Y$="Grey":Q%=1
  240PRINTTAB(10,5)"(1=";B$;",2=";Y$;")":PRINTTAB(7,7)"First players colour?";:A
$=GET$:NB%=VAL(A$):PRINTA$:IFNB%<>1ANDNB%<>2THENPRINTTAB(7,7)"    1 or 2 please
   ":PROCDELAY:GOTO240
  250K8%=1:F$=Y$:S$=B$:IFNB%=1THENF$=B$:S$=Y$:K8%=2
  260PRINTTAB(1,9)"Do you want to play the computer?";:A$=GET$:PRINTA$:PRINT:IFA
$<>"N"ANDA$<>"Y"THENPRINTTAB(1,9)SPC(10)"(Y/N) please"SPC(12):PROCDELAY:GOTO260
  270IFA$="N"THENPRINT:PRINTSPC(6)"Press any key to begin -";:A$=GET$:GOTO310
  280PRINTTAB(6,11)"Do you want to go first?";:A$=GET$:PRINTA$:IFA$<>"N"ANDA$<>"
Y"THENPRINTTAB(1,11)SPC(10)"(Y/N) please"SPC(11):PROCDELAY:GOTO280
  290I%=1:IFA$="Y"THENCP%=2:I%=0
  300PRINT:PRINTTAB(5,13)"Type difficuty factor (1-5)";:DF$=GET$:DF%=VAL(DF$):PR
INTDF$:CM%=1:IFDF%>5ORDF%<1THENPRINTTAB(5,13)SPC(3)"Between 1 and 5 please"SPC(1
1):PROCDELAY:GOTO300
  310RESTORE:FORR%=0TO9:FORJ%=0TO10:A%(R%,J%)=0:NEXT:NEXT:FORR%=0TO8:AD%(R%)=0:H
%(R%)=0:NEXT:LF%=0
  320FORI%=0TO10:A%(9,I%)=3:A%(0,I%)=3:NEXT
  330FORI%=0TO9:A%(I%,0)=3:A%(I%,10)=3:NEXT
  340FORI%=0TO3:READB%(I%,0):READB%(I%,1):NEXT
  350FORI%=0TO1:FORJ%=0TO1:FORK%=0TO1:READC%(I%,J%,K%):NEXT:NEXT:NEXT
  360FORI%=0TO1:FORJ%=0TO1:FORK%=0TO1:READD%(I%,J%,K%):NEXT:NEXT:NEXT
  370READE%(0),E%(1)
  380READF%(0,0),F%(1,0),F%(0,1),F%(1,1)
  390IFFF%=1THENFF%=Z ELSEFF%=1
  400MODE5:VDU19,3,4,0,0,0,19,2,2,0,0,0,19,1,3,0,0,0,23;8202;0;0;0;
  410IFY$="Grey"THENVDU19,1,7,0,0,0
  420VDU28,0,28,19,2:COLOUR131:CLS:COLOUR0
```

```
430FORX=1TO17STEP2:FORY=2TO23STEP3:PROCDISK:NEXT:NEXT
440Y=0:FORX=1TO18STEP2:PROCPOINTER:NEXT:MX=0
450X$=FF$:X=OX*2+1:GOTO530
460IFCMX=1ANDCP$=X$THEN920
470A$=INKEY$(0):IFASC(A$)=137THENOX=OX+1:IFOX=9THENOX=0
480IFASC(A$)=139ANDHMX=0ANDCMX=0THENAS(MS(EX),EX+1)=0:MX(EX)=MX(EX)-1:X=EX*2+1
:FORY=23-MS(EX)*3TO2STEP-3:PROCC:PROCDISK:COLOUR0:PROCDISK:SOUND1,-10,Y*30,1:NEX
T:HMS=1:LFX=LFX-1:OX=EX:PROCC1
490IFASC(A$)=136THENOX=OX-1:IFOX=-1THENOX=0
500IFASC(A$)=138ANDHX(OX)<8THENEX=OX:GOSUB560:OOX=OX:HMX=0:GOTO530
510IFOX<>OOXTHENCOLOUR0:X=OOX*2+1:PROCPOINTER:X=OX*2+1:COLOURHCX:PROCPOINTER:O
OX=OX
520GOTO460
530IFX$=1THENCOLOURK0$:HC%=K0%:X$=2 ELSECOLOURNB$:HC%=NB%:X$=1
540PROCPOINTER
550GOTO460
560HX(OX)=HX(OX)+1
570AX(HX(OX),OX+1)=X$:X=OX*2+1:FORY=2TO26-HX(OX)*3STEP3:COLOURHCX:PROCDISK:COL
OUR0:PROCDISK:NEXT:COLOURHCX:Y=26-HX(OX)*3:PROCDISK
580SOUND1,-15,HX(OX)*30;2:Y=0
590FORY=1TO1000:NEXT
600*FX21,0
610QS=0
620KS=1:VLX=0
630PX=AX(HX(OX)+BX(QX,1)*KX,(OX+1)+BX(QX,0)*KX)
640IFPX<>X$THEN670
650IFKX>OTHENKX=KX+1:GOTO630
660KX=KX-1:GOTO630
670IFKX>OTHENVLX=KX:TPX=KX-1:KX=-1:GOTO630
680VLX=VLX-KX
690IFVLX>4THEN730
700QX=QX+1:IFQX<4THEN620
710LFX=LFX+1:IFLFX=72THENMODE7:PRINTTAB(0,0)"The game is drawn":GOTO850
720RETURN
730FORYX=1TO110STEP20:SOUND1,-15,YX,YX/20+2:NEXT:FORYX=110TO1STEP-20:SOUND1,-1
5,YX,7-YX/20+2:NEXT:EX=0
740RX=KX+1
750IFEX=OTHENCOLOUR0:GOTO270
760COLOURHC%
770X=1+(OX+BX(OX,0)*RX)*2:Y=26-(HX(OX)+BX(QX,1)*RX)*3:PROCDISK
780FOR1=1TO200:NEXT
790IFINKEY$(0)<>-1THEN830
800RX=RX+1:IFRX<TPX+1THEN750
810IFEX=OTHENEX=1:GOTO740
820EX=0:GOTO740
830MODE7:IFX$=1THENFS%=FS%+1:W$=F$ ELSEW$=S$:SS%=SS%+1
840PRINTTAB(1,6)W$" Wins":PRINT:PRINT"The score is "F$"="STR$(FS%)","S$"="STR$
(SS%):PRINT
850GS=1:PRINTTAB(0,10)"Would you like another go?";:A$=GET$:IFA$<>"Y"ANDA$<>"N
"THENPRINTTAB(0,10)SPC(8)"Y/N Please"SPC(8):PROCDELAY:GOTO850
860IFA$="Y"THEN310
870MODE7:END
880DATA1,-1,1,1,0,-1,1,0
890DATA10,12,30,35,5,6,20,25
900DATA29,33,20,31,125,1625,175,2125,625,625,13000,6000,-2000,-6000
910DEFPROCDELAY:SOUND1,-15,50,10:FORX=1TO1000:NEXT:ENDPROC
920DB%=0:HVX=-30000
930IFLFX=OTHENHPX=INT(RND(1)*2)+4:GOTO1980
940PS%=0:C2%=1:WX=2
950IFXX=2THENC2%=2:WX=1
960FORIX=0TO8:VX(IX)=0:NEXT
970FORIX=0TO8:HX=HX(IX)+1
980IFDFX<2THEN1000
990PRX=0:PAX=Q:C%=WX:C3%=C2%:GOSUB1150
1000PRX=1:C%=C2%:C3%=WX:GOSUB1150
1010IFDFX<2THEN1060
1020HX=HX+1:PAX=1
10301FHX>6ORDFX<3THEN1060
1040GOSUB1150
1050PRX=0:C%=WX:C3%=C2%:GOSUB1150
1060NEXTIX
1070FORIX=0TO8:VX(IX)=VX(IX)+AD%(IX):NEXT
1080FORIX=0TO8
1090IFHVX=VX(IX)ANDRND(1)>.5THENHPX=IX
1100IFHVX<VX(IX)THENHVX=VX(IX):HPX=IX
1110NEXTIX
1120IFDB%=1ANDHPX=PBXTHENAD%(TYX)=625:DB%=0
1130GOTO1980
1140REMFINDVAL
1150IFAX(HX,IX+1)=3THENVX(IX)=-30000:RETURN
1160FORJX=0TO3
1170AX=BX(JX,1):BX=BX(JX,0)
1180KX=0:DX=0:NX=-1:BLX=0
1190PX=AX(HX+AX*KX,IX+1+BX*KX)
1200DX=DX+1
1210IFPX=30RPX=CXTHENDX=DX-1:GOTO1960
1220IFPX=C3XTHENNX=NX+1
1230IFNX=4THEN1920
1240IFDX=4THEN1280
1250IFKX>-1THENKX=KX+1:GOTO1190
1260KX=KX-1:GOTO1190
1270REMNO BOUNDRY
1280M1X=0:M2X=0:CTX=0:RX=0
1290IFNX>3THEN1920
1300IFDFX<4THEN1620
1310IFKX=3THENMX=0:SFX=3:GOTO1330
1320MX=MX-3:RX=MX
1330MX=MX-1:CTX=CTX+1:IFCTX>SFXTHEN1430
1340QX=AX(HX+AX*MX,IX+1+BX*MX)
1350PX=AX(HX+AX*(MX+d),IX+1+BX*(MX+4))
1360IFQX=3ORQX=C THEN1430
1370IFQX=C3XANDPX=OTHEN1400
1380IFQX=0ANDPX=C3XTHENM1X=M1X-1
1390GOTO1330
1400M1X=M1X+1
1410IFM1X>M2XTHENM2X=M1X:RX=MX
1420GOTO1330
1430NX=NX+M2X:IFNX<2THEN1640
1440IFNX>3THEN1920
1450FOX=0:H1X=HX:N7X=0:FORKX=RXTORX+3:IFAX(HX+AX*KX,IX+1+BX*KX)=OTHENPROCU:IFN1
X>N7XTHENN7X=N1X
1460IFAX(HX-1+AX*KX,IX+1+BX*KX)<>OTHENBLX=1
1470NEXT:IFN7X>3THENFOX=1
1480BS=0:TX=0:KX=1:MX=1:DPX=0:BFX=1
1490PX=AX(HX+AX*KX,IX+1+BX*KX)
1500IFPX=OTHEN1550
1510IFPX=CXORPX=3THENBFX=0:GOTO1550
1520MX=MX+1
1530IFKX>OTHENKX=KX+1:GOTO1490
1540KX=KX-1:GOTO1490
1550IFKX>OTHENBS=KX:KX=-1:GOTO1490
1560TX=KX:IFBFX=0ANDFOX=1THEN1640
1570IFN%<>MXORBFX=OTHEN1610
1580IFAX(HX-1+AX*BX,IX+1+BX*BX)<>0ANDAX(HX-1+AX*TX,IX+1+BX*TX)<>0THENDPX=1
1590IFPAX=1THENVX(IX)=VX(IX)-DX(NX-2,PRX,DPX):GOTO1610
1600VX(IX)=VX(IX)+DX(NX-2,PRX,DPX)
1610IFNX=3THEN1820
1620IFNX<2THEN1640
1630IFPAX=1THENVX(IX)=VX(IX)-CX(BLX,NX-2,PRX) ELSEVX(IX)=VX(IX)+CX(BLX,NX-2,PRX
)
1640NEXTJX:RETURN
1650DEFPROCUIN1X=0:LX=0
1660MX=0:L3X=0
1670PX=AX(H1X+KX*AX+BX(LX,1)*MX,IX+1+BX*KX+BX(LX,0)*MX)
1680IFPX<>0ANDMX=OTHENENDPROC
1690IFMX=0THEN1710
1700IFPX<>C3XTHEN1740
1710L3X=L3X+1
1720IFMX>-1THENMX=MX+1:GOTO1670
1730MX=MX-1:GOTO1670
1740IFMX>-1THENMX=-1:GOTO1670
1750IFN1X<L3XTHENN1X=L3X
1760LX=LX+1:IFLX<4THEN1660
1770IFN1X>3THENDPX=1:ENDPROC
1780DPX=0:ENDPROC
1790DEFPROCT:H1X=HX+1:PROCU
1800IFDPX=1THENENDPROC
1810H1X=HX-1:PROCU:ENDPROC
1820DPX=0
18301FDFX<5THEN1640
1840AX(HX,IX+1)=C3X
18501FAX(HX+AX*BX,IX+1+BX*BX)=OTHENKX=BX:PROCT:IFDPX=1THENGX=KX:GOTO1880
18601FAX(HX+AX*TX,IX+1+BX*TX)=OTHENKX=TX:PROCT:IFDPX=1THENGX=KX:GOTO1880
1870AX(HX,IX+1)=0:GOTO1630
1880IFPAX=OTHENVX(IX)=VX(IX)+EX(PRX):GOTO1900
1890VX(IX)=VX(IX)-EX(PRX)*.7
1900AX(HX,IX+1)=0:PBX=IX:TYX=IX+BX*OX:IFPAX=0ANDPRX=OTHENBBX=1
19100GOTO1640
1920VX(IX)=VX(IX)+FX(PRX,PAX)
19301FPAX=0ANDPRX=OTHENIX=0
194000TO1640
1950REM HIT
19601FKX>-1THENMX=KX-1:SFX=MX:KX=-1:GOTO1190
197000TO1640
1980JX=-1
19901FHPX>OXTHENJX=1
2000FORIX=0XTOHPXSTEPJX
2010X=IX*2+1:PROCPOINTER
2020COLOUR0
2030FORY=1TO100:NEXT
2040X=IX*2+1:PROCPOINTER
2050COLOURHC%
2060NEXT
2070X=(IX-JX)*2+1:PROCPOINTER
20800X=HPX:GOSUB560:GOTO530
2090DEFPROCPOINTER:PRINTTAB(X,0)CHR$(240)CHR$(241):PRINTTAB(X,1)CHR$(242)CHR$(2-
43):ENDPROC
2100DEFPROCDISK:PRINTTAB(X,Y)CHR$(244)CHR$(245):PRINTTAB(X,Y+1)CHR$(246)CHR$(24
7):PRINTTAB(X,Y+2)CHR$(248)CHR$(249):ENDPROC
2110DEFPROCC:IFXX=1THENCOLOURK0$ ELSECOLOURNB$
2120ENDPROC
2130DEFPROCC1:IFXX=1THENCOLOURK0$:HC%=K0%:X$=2 ELSECOLOURNB$:HC%=NB%:X$=1
2140X=OX*2+1:COLOURHCX:PROCPOINTER
2150ENDPROC
```

QL Trace

B J White,
Wirral,
Merseyside.

THOSE OF YOU who know what a trace is may skip this paragraph. A trace shows the line number and line details which the program is using at that instant and at the same time allows the program to proceed normally or if wished slower — down to frame by frame to use a video recorder analogy. Thus the programs of others may be followed for quicker understanding and one's own followed at leisure to find where a problem occurs. Errors in typing out printed listings can also be most readily found with a trace particularly if the programs are not fully understood. This program uses as narrow a window as possible at the top of the screen to show the instantaneous listing, long lines are not shown in full.

A trace showing where you were in a program along with control of speed of the program is, or was, the province of machine code and a fairly long one at that. Trace was supposed to be on the early QLs but it is not there now and I have not seen one for sale. This QL trace is so much easier than guessing where to put all the prints and stops to find out where one is in a program.

The typing amount is not as bad as it looks because Del-Trace is constructed from a renumbered d-lined Init-Trace and merged back with first parts. Take care with the string statements, it is easiest to think out the "" and $ rather than copy. Remember you can join any $ with anything within "" and the join must be &, nothing else can be joined or used for joining. The QL reads the instruction as if none of the "" nor the $ nor the & were there. There is only one character recorded in a line that you do not get printed on screen and that is the CHR$(10) forcing new line hence its appearance in the program when additional lines are put in by program and its presence being used to determine the end of a program line so a new one may be collected.

Init-Trace: These headings are procedures and called by entering like a direct command. QLTrace requires a blank line after every program line so it can insert its call for tracing. Renumber your program line so it can insert its call for tracing. Renumber your program on the QL if necessary. Load QLTrace and put cassette with your program in either drive. Run and answer questions, which drive your prgram is in, name of your program, and final line you wish to trace — QLTrace stops at the end anyway. The modified program will now be on the same cassette and named the same except it has a T in front for trace. Note the T program is not

(continued on next page)

(continued from previous page)

in the computer.

Trace 1 or 0: Load the program when required. Enter Trace 1 for trace on, Trace 0 for trace off. Run your Tprogram. The stepping is by holding down Shift and Ctrl with Press of V.

Del-Trace: After modification using QLTrace you can strip the Tprogram clean if wished. Place a cassette with Tprogram in any drive, run QLTrace and find similar questions to Init-Trace. The new ordinary program will be on the same cassette, the old one is deleted, but the Tprogram is kept ready for future use.

Other windows can interfere, so modify either position. Inkey$ polls covering the weird choice of CHR$(182) used in program will need modifying. Trace 1 or Trace 0 must be entered before running the Tprogram or it will stop. Progress of Init- and Del-Trace is shown on screen so hic-cups can be seen. Lines jumped from are not shown.

```
20000 REMark COMPACT "QL" TRACE
20010 REMark ********************
20020 REMark COPYRIGHT B.J.WHITE 1984
20030 REMark ************************
20040 REMark ENTER INIT_TRACE if not done before to the exact listing.
20050 REMark ****************************
20060 REMark  ENTER TRACE 1 for trace and TRACE 0 for trace off.
20070 REMark ****************************
20080 DEFine PROCedure init_trace
20090 REMark ************************
20100   LOCal asc,char$,Prog$,lines$,drive$,linenumber$,count,lnum,nlnum,nlnum$
20110 INPUT #0,"In which drive is Program ? " ! ; drive$
20120 INPUT #0,"What is name of Program ? "; ! Prog$
20130 INPUT #0,"Final linenumber to trace ? "; ! flinenumber
20140 DELETE "mdv"&drive$&"_"&"t"&Prog$
20150 OPEN #10,"mdv"&drive$&"_"&Prog$
20160 OPEN_NEW #11,"mdv"&drive$&"_"&"t"&Prog$
20170 REPeat text_loop
20180   lines$ = "" : linenumber$ = "": count = 1
20190 REPeat line_loop
20200   char$ = INKEY$(#10,-1)
20210   asc = CODE(char$)
20220     SELect ON asc
20230     ON asc = 48 TO 57
20240     IF count <= 5
20250       linenumber$ =linenumber$&char$
20260     END IF
20270     END SELect
20280   count = count + 1
20290   lnum = linenumber$ : nlnum = lnum + 1 : nlnum$ = nlnum
20300    lines$ = lines$&char$
20310   SELect ON asc = 10 : PRINT #11,lines$: PRINT lines$   : PRINT #11, nln
um$&" TRACK "&linenumber$&CHR$(10)$ : EXIT line_loop
20320 END REPeat line_loop
20330   IF EOF(#10)  THEN EXIT text_loop
20340   IF lnum >= flinenumber THEN EXIT text_loop
20350 END REPeat text_loop
20360 CLOSE #11
20370 CLOSE #10
20380 END DEFine init_trace
20390 DEFine PROCedure trace(n)
20400 REMark ********************
20410  IF n = 1 THEN control = 1: ELSE control = 0
20420 END DEFine trace
20430 DEFine PROCedure track(n)
20440 REMark ********************
20450 IF control = 1
20460 OPEN #12,scr_480x10a30x15
20470 PAPER #12,4:INK #12,0:CLS #12
20480 LIST #12,n
20490 CLOSE #12
20500 REPeat step_loop
20510   stp$ = INKEY$(#1,-1)
20520   IF  stp$ = CHR$(182) THEN EXIT step_loop
20530 END REPeat step_loop
20540 END IF
20550 END DEFine track
20560 DEFine PROCedure del_trace
20570 REMark ************************
20580   LOCal asc,char$,tProg$,Prog$,lines$,drive$,linenumber$,count,lnum,olnu
m,olnum$
20590 INPUT #0,"In which drive is Program for delete trace ? " ! ; drive$
20600 INPUT #0,"What is the name of tProgram for del_trace ? "; tProg$
20610   Prog$ = tProg$(2 TO )
20620 INPUT #0,"Final linenumber to del_trace ? "; ! flinenumber
20630 DELETE "mdv"&drive$&"_"&Prog$
20640 OPEN #10,"mdv"&drive$&"_"&tProg$
20650 OPEN_NEW #11,"mdv"&drive$&"_"&Prog$
20660 REPeat text_loop
20670  lines$ = "" : linenumber$ = "": count = 1
20680 REPeat line_loop
20690   char$ = INKEY$(#10,-1)
20700   asc = CODE(char$)
20710     SELect ON asc
20720     ON asc = 48 TO 57
20730     IF count<= 5
20740       linenumber$ =linenumber$&char$
20750     END IF
20760     END SELect
20770   count = count + 1
20780   lnum = linenumber$ : olnum = lnum - 1 : olnum$ = olnum
20790    lines$ = lines$&char$
20800   SELect ON asc
20810   ON asc = 10
20820     IF lines$ = linenumber$&" track "&olnum$&CHR$(10)
20830       lines$ = ""
20840     ELSE  PRINT #11,lines$;
20850     PRINT lines$;
20860     END IF
20870     EXIT line_loop
20880   END SELect
20890 END REPeat line_loop
20900   IF EOF(#10)  THEN EXIT text_loop
20910   IF lnum >= flinenumber THEN EXIT text_loop
20920 END REPeat text_loop
20930 CLOSE #11
20940 CLOSE #10
20950 END DEFine del_trace
```

Lightcycle

Andy Sheppard,
Burnkey,
Lancashire.

SPECTRUM

THE PROGRAM is in two parts: A short Basic controller program and 2K of machine code, containing the game routine, and various other routines for instructions etc. plus data for a redefined character set.

Loading and Saving instructions: Type in the Basic program — listing 1 — and Save it — without attempting to Run it — by using

SAVE "LIGHTCYCLE" LINE 9997

Next, either: Enter the machine code from the assembly listing — listing 2 — or enter the machine code from the hex-dump — listing 3 — using the hex-loader — listing 4:

If by this time you have had enough of typing in the hex., then you have no need to enter listing 5, which is data for a new character set : if this is the case, then delete the statement

POKE 23607,116

from line 9997 in listing 1.

If you *do* want to use the new character set, then type in the hex. from listing 5 using the hex-loader, inputting "7580" as the start address.

When all the code has been entered and checked, save the code using

SAVE "0" CODE 28672,2100

immediately after where listing 1 was Saved. After Verifying , type

RANDOMIZE USR 0

to clear the computer. Rewind the tape and type

LOAD "LIGHTCYCLE"

The Basic will auto-Run, Loading the machine code. If the program crashes, reload the hex-loader and further check the code using the List option of the loader.

Keyboard layout.
Either:

1) Joysticks in ports 1 and 2 of the ZX Interface II

or 2) Direction	Player 1	Player 2
Up	W	P
Down	Z	Space
Left	A	L
Right	S	Enter

```
   0>REM ------------------------
   0>REM     BASIC control for
   0>REM       "LIGHTCYCLE" by
   0>REM         Andy Sheppard
   0>REM       December 1983
   0>REM ------------------------
   0>REM
  10 LET s1=0: LET s2=s1: BORDER
 0: POKE 23693,7: CLS : PRINT #0
;AT 1,0; FLASH 1; BRIGHT 1;"  PR
ESS SPACE KEY TO CONTINUE.  ": P
RINT : LET z=USR 29359: PRINT #0
;AT 1,0,,
  20 PRINT AT 3,5;"PLAYER 1 COLO
UR ? [1-7]": PAUSE 0: LET a$=INK
EY$: IF a$<"1" OR a$>"7" THEN GO
 TO 20
  30 POKE 28671,VAL a$: POKE 286
76,VAL a$: LET z=USR 29799
  40 PRINT AT 5,5;"PLAYER 2 COLO
UR ? [1-7]": PAUSE 0: LET a$=INK
EY$: IF a$<"1" OR a$>"7" THEN GO
 TO 40
  50 POKE 28671,VAL a$: POKE 286
77,VAL a$: LET z=USR 28824
  60 PRINT AT 7,5;"SPEED ? [0-9,
0=FASTEST]": PAUSE 10: LET a$=IN
KEY$: IF a$<"0" OR a$>"9" THEN G
O TO 60
 100 RANDOMIZE : POKE 28679,4+VA
L a$: PRINT : LET z=USR 29471: P
AUSE 0: LET z=USR (28680+33*(RND
>.49)): LET s1=s1+(PEEK 23681=2)
: LET s2=s2+(PEEK 23681=1): PRIN
T AT PEEK (28673+2*(PEEK 23681=2
)),PEEK (28672+2*(PEEK 23681=2))
; BRIGHT 1; FLASH 1; PAPER 6; IN
K 2;"R": BEEP 1,-40: GO SUB 1000
: IF s1=10 OR s2=10 THEN PAUSE 1
: CLS : GO TO 130
 120 GO SUB 2000: GO TO 100
 129 REM Game over
 130 GO SUB 1000: PRINT AT 21,5;
"PLAYER ";1+(s2=10);" IS THE WIN
NER!";#0;AT 1,0;"PRESS SHIFT KEY
 FOR ANOTHER GAME": LET z=USR 29
674: RUN
 999 REM Print scores
1000 PRINT AT 6,11;"PLAYER 1:";s
1;AT 15,11;"PLAYER 2:";s2: RETUR
N
2000 PRINT AT 21,0; PAPER RND*7;
 INK 9; FLASH 1; BRIGHT 1;"  PRE
SS ANY KEY FOR NEXT DUEL.  ": PA
USE 0: CLS : RETURN
9990 REM ----------------------
9991 REM AUTORUN FROM LINE 9997
9992 REM ----------------------
9993 REM
9994 REM Miss out POKE in line
```

(continued on next page)

(continued from previous page)

```
            9997 if new character
            set is not to be used.
9995 REM
9996 REM
9997 CLEAR 28000: LOAD "0"CODE 2
8672,2100: POKE 23607,116: RUN
9998 PAUSE 100: POKE 23736,181:
SAVE "LIGHTCYCLE" LINE 9997: POK
E 23736,181: SAVE "0"CODE 28672,
2100: GO TO 9998
9999 VERIFY "LIGHTCYCLE": VERIFY
 "0"CODE 28672,2100
```

```
28672: 040A180A01046500 = 157
28680: CD7671CD9470CD4E = 1184
28688: 707D2A0070FE01CA = 848
28696: EA70FE02CAF070FE = 1410
28704: 03CAED70FE04CAF3 = 1257
28712: 70CDBF70CD71707D = 1175
28720: 2A0270FE01CA0D71 = 739
28728: FE02CA1371FE03CA = 1049
28736: 1071FE04CA1671CD = 929
28744: 541FD8C30870FD6E = 1009
28752: 763EF7DBFECB5F20 = 1230
28760: 022E01CB4F20022E = 411
28768: 02CB5720022E03CB = 578
28776: 4720022E04FD7576 = 643
28784: C9FD6E773EEFDBFE = 1457
28792: CB4F20022E01CB5F = 661
28800: 20022E02CB572002 = 406
28808: 2E03CB6720022E04 = 439
28816: FD7577C9FD6E763E = 1233
28824: FBDBFECB4F20022E = 1086
28832: 013EFDDBFECB4F20 = 1095
28840: 022E04CB4F20022E = 414
28848: 023EFEDBFECB4F20 = 1105
28856: 022E03FD7576C9FD = 993
28864: 6E773EDFDBFECB47 = 1251
28872: 20022E013EBFDBFE = 807
28880: CB4F20022E04CB47 = 640
28888: 20022E023E7FDBFE = 744
28896: CB4720022E03FD75 = 727
28904: 77C9251807241804 = 452
28912: 2C18012D220070E5 = 489
28920: CD3071E1200A3A04 = 695
28928: 705FCD4471C32970 = 941
28936: FD364701C9251807 = 648
28944: 2418042C18012D22 = 212
28952: 0270E5CD3071E120 = 966
28960: 0A3A05705FCD4471 = 666
28968: C30870FD364702C9 = 896
28976: 457C0F0F0F4FE6E0 = 771
28984: 486F79E603EE5867 = 1062
28992: 7ECB77C93E11D77B = 1066
29000: 73E13D73E01D73E = 851
29008: 16D77CD77DD73E20 = 1010
29016: D724E5CD3071E1C0 = 1263
29024: 3E11D77BD73E13D7 = 928
29032: 3E00D73E16D77CD7 = 915
29040: 7DD73E20D7C9ED4B = 1162
29048: 06700B78B120FBC9 = 910
29056: 1F4720202054849 = 427
29064: 532049532043204 = 484
29072: 2047204820542043 = 422
29080: 20592043204C2045 = 429
29088: 2021202020202020 = 257
29096: 2020205448452040F = 432
29104: 424A454354204F46 = 541
29112: 204C49474B544359 = 564
29120: 434C45204953205 = 516
29128: 4F2053544554552 = 530
29136: 594F555220435943 = 590
29144: 4C4520415245554E = 566
29152: 442054484520475 = 510
29160: 4944205749544844F = 568
29168: 5554204352415348 = 570
29176: 494E4720494E544F = 568
29184: 204549544845220 = 513
29192: 5448452057414C4C = 561
29200: 204F52204120564 = 473
29208: 504F55522054524 = 589
29216: 494C2E2020202020 = 355
29224: 202020202020424F = 337
29232: 5448204359434C45 = 556
29240: 53204C4541564520 = 512
29248: 41205645204F5552 = 574
29256: 20545241494C2041 = 509
29264: 4E44204E45495448 = 554
29272: 4552204359434C45 = 551
29280: 2043414E2053544F = 520
29288: 5020554E54494C20 = 540
29296: 4F4E4520504C4159 = 568
29304: 4552204841532043 = 502
29312: 5241534845442E20 = 517
29320: 2020202020202020 = 256
29328: 2020202020202020 = 256
29336: 2020202020202020 = 256
29344: 2020202020202020 = 256
29352: 20202020202023CD = 432
29360: 7673CDFC72118271 = 1064
29368: 3E7FDBFE1F30153E = 824
29376: 16D73E00D73E1FD7 = 822
29384: 1AFE2328E813D7CD = 1026
29392: E27218E43E16D7AF = 1066
29400: D7AFD73E06D73E06 = 956
29408: D7C90608C52A8071 = 910
29416: 0E08E50620A7CB16 = 681
29424: 2B10FBE1250D20F2 = 859
29432: C110E9C9260E0602 = 703
29440: C51E920602C52E1C = 652
29448: 3E16D77CD77DD706 = 984
29456: 047BD71C10FB24C1 = 866
29464: 10EB24C110E2C9CD = 1128
29472: 76731101132121 8F = 479
29480: 3E16D7AFD7AFD7CD = 1284
29488: 6C73CD6673CD7173 = 1078
29496: 211E91CD66730612 = 654
29504: C5CD6C7321026FCD = 1008
29512: 6673CD7173211E90 = 857
29520: CD6673C110EACD6C = 1178
29528: 7321216FCD667321 = 779
29536: 2091CD6673C9457C = 993
29544: D710FCC97AD77BD7 = 1359
29552: C97AD7AFD7C92100 = 1162
29560: 7011967306041A77 = 549
29568: 231310FA219A73FD = 875
29576: 7541FD7442FD3676 = 1042
29584: 02FD367704C9040A = 647
29592: 180A0101010101 01 = 43
29600: 01FF55AA55AA55AA = 1021
29608: 55AA0000000030 7F = 280
29616: 1C31031F7FBFCEF1 = 876
29624: 1FC7B0DFEF7FFFFF = 1457
29632: FCF10000C0E0F8FC = 1409
29640: 1FC727474F0F0F07 = 455
29648: 0701F7F3FB7BFBF0 = 1363
29656: F0C0E7E7EFEFCF07 = 1586
29664: 0701F7F0F878F8F0 = 1351
29672: F0C021005811015 8 = 659
29680: A73A047017171701 = 411
29688: 500177EDB03A0570 = 804
29696: 17171701A00177ED = 587
29704: B07B3A0470110E04 = 503
29712: CD2074D03A057011 = 753
29720: 0004CD2074D018E9 = 822
29728: D3FE1B7AB320FB3E = 1136
29736: FEDBFE1FC93AFF6F = 1383
29744: 21205A0502C50#20 = 398
29752: 772310FCC1C64010 = 893
29760: F40600C5215F57CD = 867
29768: 5474213F57CD5474 = 788
29776: C110F0C90E08E506 = 907
29784: 20A7CBC6CB162B10 = 884
29792: FBE1250D20F0C911 = 1016
29800: 0574213174CD9174 = 913
29808: 214574CD91742148 = 792
29816: 74CD9174CD2D74C9 = 1149
29824: 118B7418E5C059FF = 1061
29832: 4FDF4F205A5F573F = 748
29840: 5706021A77231310 = 310
29848: FAC9 = 451
```

Raid

G Dobbing,
Stockton on Tees,
Cleveland.

DRAGON

THE OBJECT of the game is to move your shuttle down between the shields and capture the parts that are being sent to the humans own space station.

This may seem easy enough but the shields get faster and the more parts you collect the more shields appear. The parts also increase in speed as the game progresses.

There is also an "on screen" fuel gauge and this is used up each time you have to hit your rockets. The numbers of parts you have collected and how many ships you have left is shown on screen along with the remaining fuel.

The game also incorporates a freeze frame to allow you to leave your game for a while without coming back to find you have been destroyed. Instructions are included within the program.

If you find this too difficult you can make it easier by altering the number of parts you need to collect by changing the 'TP' variable in line 1250 to a smaller amount.

```
10 REM***TITLE PAGE***
20 CLS0
30 FORR=96 TO 100
40 PRINT@R,"r";
50 IF R>=97 THEN PRINT@R-1,CHR$(128);
60 PLAY"T25501V31CV21CV11C"
70 NEXTR
80 FORA=14 TO 131 STEP32
90 PRINT@A,"a";
100 IF A>=32 THEN PRINT@A-32,CHR$(128);
110 PLAY"T25501V31DV21DV11D"
120 NEXTA
130 FOR I=126 TO 112 STEP-1
140 PRINT@I,"i";
150 IFI<=125 THEN PRINT@I+1,CHR$(128);
160 PLAY"T25501V31EV21EV11E"
170 NEXTI
180 FOR D=498 TO 97 STEP-32
190 PRINT@D,"d";
200 IF D<=466 THEN PRINT@D+32,CHR$(128);
210 PLAY"T25501V31FV21FV11F"
220 NEXTD
230 PRINT@295,"press"+CHR$(128)+"the"+CHR$(128)+"space
bar";
240 FORR=0 TO 31
250 PRINT@R,CHR$(147);
260 PLAY"T255048"
270 NEXTR
280 IF PEEK(345)=223 THEN 650
290 FORR=63T04478TEP32
300 PRINT@R,CHR$(159);
310 PLAY"T25504A"
320 NEXTR
330 IF PEEK(345)=223 THEN 650
340 FORR=479T0448STEP-1
350 PRINT@R,CHR$(156);
360 PLAY"T255046"
370 NEXTR
380 IF PEEK(345)=223 THEN 650
390 FORR=416T0328TEP-32
400 PRINT@R,CHR$(159);
410 PLAY"T25504F"
420 NEXTR
430 IF PEEK(345)=223 THEN 650
440 FORR=0TO31
450 PRINT@R,CHR$(243);
460 PLAY"T25504C"
470 NEXTR
480 IF PEEK(345)=223 THEN 650
490 FORR=63T04478TEP32
500 PRINT@R,CHR$(255);
510 PLAY"T25504D"
520 NEXTR
530 IF PEEK(345)=223 THEN 650
540 FORR=479T0448STEP-1
550 PRINT@R,CHR$(252);
560 PLAY"T25504E"
570 NEXTR
580 IF PEEK(345)=223 THEN 650
590 FORR=416T0329TEP-32
600 PRINT@R,CHR$(255);
610 PLAY"T25503F"
620 NEXTR
630 IF PEEK(345)=223 THEN 650
640 IF PEEK(345)<>223 THEN 240
650 CLS0
660 SOUND180,1
670 PRINT@131,"do"+CHR$(128)+"you"+CHR$(128)+"want"+CH
R$(128)+"instructions";
680 PRINT@237,CHR$(123)+"y"+CHR$(124)+"n"+CHR$(125);
690 IF PEEK(339)=223 THEN GOSUB 2360 ELSE IF PEEK(344)
<>247 THEN 690
700 CLS0
710 SOUND210,1
720 PRINT@234,"please"+CHR$(128)+"wait";
730 REM***SET UP SCREEN***
740 BR$="BM126,10;R5D2R4D2R4D2R4D2R3U1BR1D4R1D4R1D4R1D
4R2D2R2D4R2D3R2U7R4D2L4D14R5U4R4U4R2D1L5D1L4D2L6D4L2D
2L4D2L2D2L2D6R5U5R5D5R3U5R2D4R5D3L14D9R5U4R3D4R6D5L19U
5L3D3L5U5L3D5L5U9L3D9L5U5L3D5L4U3L2U1R2D4R4U4R2U4R4U3
L6D4L3U4L5D4L3U4L3"
750 SB$="BM126,10;L6D2L4D2L4D2L4D2L3U18L1D4L1D4L1D4L1D
4L2D2L2D6L2D4L2U8L6D2R4D14L5U4L4U4L23D1R5D1R6D1R6D4R2D
2R4D2R2D2R2D8L5U5L5D5L3U5L2D4L5D3R14D9L5U4L3D4L6D5R21U
3R3D3R4U5R3D5R5U9R3D9R5U5R3D5R4U3R2U10L2D4L4U4L2U4L4U3
R6D4R3U4R5D4R3U4R2"
760 CY$="BM100,30;R11D2R2D3R2D3L9U2L2U2L4U3"
770 YE$="BM150,30;L11D2L2D3L2D3R9U2R2U2R4U3"
780 FU$="BM5,109;U3R5L5U3R5BR3D6R5U4BR3R5L5D3R5L5D3R5B
R3R5L5U6"
790 MO$="BM0,167;R12F3D4F3R4E3R2E2R2F2R2F2R2F1R2E1R1E1
R1E1R1E1R2F2R5F3R4E2R4E3R3F3R6F2R3E3R7E2R5F1R3F1R3F3R7
E2R2F2R2E3R5E1R2E1F5R1E5R4F3R7F2E2R2E3R3E1F4R3F1R3E3R3E
3F3R4F3R5E3R4E1R1E1R1E1R2F2R2F2R2F2R2E4R5E1"
800 DIM A(10,10),B(10,10)
810 DIM C(10,5),D(10,5),E(10,10)
820 S3=1:S2=254:LV=4:BO=34:SP=2:H#=6:G4=255
830 X=123:Y=50:X1=123:Y1=50:BO=255
840 Z=0:T=160:Z1=0:T1=160:FU=253
850 PMODE4,1:PCLS
860 LINE(40,187)-(FU,184),PSET,BF
870 DRAW"BM205,0;D10U5L5R10L5E3G6E3F3H6"
880 GET(200,0)-(210,10),E,G
890 LINE(200,0)-(210,10),PRESET,BF
900 DRAW"BM120,50;L10D3R1E2F1D1G1D1R3U1H1U1E1F2R1U5H4
L1"
910 PAINT(129,52),1
920 DRAW BO$
930 DRAW SB$
940 DRAW CY$+YE$
950 PAINT(120,11),1
960 DRAW FU$
970 DRAW MO$
980 DRAW"BM0,160;R10D5L10U5"
990 PAINT(2,162),1
1000 LINE(0,160)-(256,160),PSET
1010 PAINT(0,170),1
1020 GET(123,50)-(133,60),A,G
1030 GET(0,160)-(10,165),C,G
1040 PUT(0,0)-(10,10),A,PSET
1050 PUT(12,0)-(22,10),A,PSET
1060 PUT(24,0)-(34,10),A,PSET
1070 PSET(10,20):PSET(15,22):PSET(20,33):PSET(42,35):P
SET(200,10):PSET(205,3):PSET(240,20)
1080 PSET(15,40):PSET(10,45):PSET(30,50):PSET(210,50):
PSET(204,44):PSET(250,63)
1090 CIRCLE(240,40),4
1100 PAINT(240,40),1
1110 SCREEN1,1
1120 REM***MAIN LOOP***
1130 PSET(11,111):PSET(21,110):PSET(120,138):PSET(130,
145):PSET(124,90):PSET(133,85):PSET(200,83)
1140 PSET(60,99):PSET(63,113):PSET(50,87):PSET(200,90)
:PSET(233,110):PSET(245,122):PSET(153,100):PSET(160,13
0):PSET(220,144):PSET(220,139)
1150 IF YC=55 THEN Y=55
1160 IF PEEK(341)=223 THEN Y=Y-4:FU=FU-.3:PRESET(FU,18
5):PRESET(FU,186)  ELSE Y=Y+4
1170 IF PEEK(343)=223 AND Y>=70 THEN X=X-6:FU=FU-.85:P
RESET(FU,185):PRESET(FU,186)
1180 IF PEEK(344)=223 AND Y>=70 THEN X=X+6:FU=FU-.85:P
RESET(FU,185):PRESET(FU,186)
1190 IF FU<40 THEN PLAY"T5004V31C"
1200 PUT(X1,Y1)-(X1+10,Y1+10),B,PSET
1210 PUT(X,Y)-(X+10,Y+10),A,PSET
1220 IF X<=122 AND YC=67 THEN Y=67
1230 IF X+10>=134 AND YC=67 THEN Y=67
1240 IF YC=51 THEN GOSUB 1560
1250 IF TP=6 THEN GOSUB 2210
1260 IF TP=2 THEN BB=1
1270 IF TP=4 THEN TT=1
1280 IF X+3>=Z AND X+7<=Z+18 AND Y+9>=T AND Y+9<=T+2 A
ND FA=0 THEN GOSUB 1630
1290 IF FU<=40 THEN GOTO 1960
```

(continued on next page)

(continued from previous page)

```
1300 IF X>=243 THEN X=243
1310 IF X<=3 THEN X=3
1320 IF Y>=168 THEN GOSUB 1800
1330 LINE(0,120)-(63,120),PSET
1340 LINE(255,90)-(52,90),PSET
1350 IF BB=1 THEN LINE(0,70)-(51,70),PSET
1360 IF TT=1 THEN LINE(255,153)-(84,153),PSET
1370 IF BB=1 THEN B1=B1+5:IF B1>=255 THEN GOSUB 1730
1380 IF TT=1 THEN B4=B4-3:IF B4<=0 THEN GOSUB 1760
1390 IF PA=0 THEN Z=Z+GP
1400 IF Z>=245 THEN Z=0
1410 IF S3<=128 THEN S3=63+HN ELSE S3=83+2
1420 IF S2>=128 THEN S2=52-(HH-2) ELSE S2=82-2
1430 IF S3>=255 THEN GOSUB 1670
1440 IP S2<=0 THEN GOSUB 1700
1450 IF X<=63 AND Y<=128 AND Y+8>=128 THEN GOSUB 1800
1460 IF X+18>=S2 AND Y<=98 AND Y+8>=98 THEN GOSUB 1800
1470 IF BB=1 THEN IF X<=B1 AND Y<=70 AND Y+8>=70 THEN
GOSUB 1800
1480 IF TT=1 AND X>=84 AND Y<=153 AND Y+8>=153 THEN GO
SUB 1820
1490 PUT(Z1,T1)-(Z1+18,T1+5),D
1500 IF PA=0 THEN PUT(Z,T)-(Z+18,T+5),C,PSET
1510 Z1=Z:T1=T1
1520 X1=X:Y1=Y
1530 IF PEEK(341)=239 THEN SOUND200,3:SOUND100,2:GOSUB
2720
1540 GOTO1130
1550 REM***DELIVER SPARE PART***
1560 IF Y<=51 AND PA=1 THEN PLAY"T5V5AV7BV9CV11DV13EV1
5FV178" ELSE RETURN
1570 TP=TP+1:BO=BO-8
1580 LINE(80,2)-(80+4,10),PSET,BF
1590 GP=GP+3:PA=0
1600 Y=51:HH=HH+2
1610 RETURN
1620 REM***COLLECT SPARE PART***
1630 PLAY"O3T4L5V30CTBCT&CD3T4GTBGT&GT4ETBET&ET3O":PA=
1
1640 LINE(Z,T)-(Z+18,T+5),PRESET,B:Z=0
1650 RETURN
1660 REM***ERASE SHIELDS***
1670 LINE(0,128)-(255,128),PRESET
1680 S3=1
1690 RETURN
1700 LINE(255,98)-(0,98),PRESET
1710 S2=255
1720 RETURN
1730 LINE(0,70)-(255,70),PRESET
1740 B1=0
1750 RETURN
1760 LINE(255,153)-(0,153),PRESET
1770 B4=255
1780 RETURN
1790 REM***CRASH***
1800 FORC=1TO3
1810 PUT(X,Y)-(X+10,Y+10),E,PRESET
1820 PLAY"T255V30O81CDEFG"
1830 PUT(X,Y)-(X+10,Y+10),E,PSET
1840 PLAY"T255V30O82CDEFG"
1850 NEXTC
1860 PLAY"T50O81V30DV25DV20DV15DV10DV5DV4DV3DV2DV1DDDD
D"
1870 LINE(X,Y)-(X+10,Y+10),PRESET,BF
1880 IF Y>=170THEN LINE(X,Y+3)-(X+10,Y+10),PSET,BF
1890 LV=LV-1:X=123:Y=52
1900 PA=0
1910 IF LV=0 THEN GOTO 1960
1920 BS=BS-12
1930 LINE(BS,0)-(BS+10,10),PRESET,BF
1940 RETURN
1950 REM***ALL SHIPS LOST***
1960 CLS
1970 PRINT:PRINT
1980 FOR EN=1 TO 10
1990 CLS0
2000 PRINT@234,"you"+CHR$(128)+"blew"+CHR$(128)+"it";
2010 PLAY"T255V25O1CDEFG"
2020 CLS
2030 PLAY"T255V20O1CDEFG"
2040 NEXTEN
2050 CLS:PRINT:PRINT" DUE TO YOUR INCOMPETANCE THE
ENTIRE CREW OF YOUR BASE SHIP    HAVE PERISHED."
2060 FORL=160TO191
2070 PRINT@L,CHR$(131);
2080 NEXTL
2090 PRINT@288," TOTAL NO. OF PARTS OBTAINED:";TP;
2100 PLAY"O2L2T5V30CCT10CT5CD4T10DT5DT10CT5CD1T10B02T3
C"
2110 FORL=416TO447
2120 PRINT@L,CHR$(131);
2130 NEXTL
2140 PRINT@448,"DO YOU WANT TO TRY AGAIN? (Y/N)"
2150 IF PEEK(339)=223 THEN SOUND150,5:RUN 650 ELSE IF
PEEK(344)<>247 THEN 2150
2160 CLS0
2170 SOUND1,8
2180 END
2190 GOTO2150
2200 REM***YOU DID IT***
2210 CLS0:PRINT:PRINT" WELL DONE."
2220 PRINT" YOU HAVE SUCCESSFULLY COMPLETED YOUR MISSI
ON. YOU CAN NOW      INSTALL THE PARTS AND GET HOME
SAFELY."
2230 PRINT
2240 FORL=224TO479
2250 PRINT@L,CHR$(148);
2260 NEXTL
2270 B#="L15O3D0#AD4FP15O3A04FP15O3A04FP5"
2280 B#="F0#AFAP15EBP15FP5"
2290 C#="04DCO3B04DFAP12DEDGP5"
2300 D#="04F0#AFAP15FBP15AFAP15FBP15"
2310 E#="AFBAP15EBP15F"
2320 PLAY"T2"
2330 PLAY"XB#;XB#;XB#;XC#;XB#;XB#;XD#;XE#;"
2340 GOTO2140
2350 REM***INSTRUCTIONS***
2360 CLS0:PRINT:SOUND100,1:PRINT"YOUR BASE SHIP IS IN
DESPERATE";SOUND100,1
2370 PRINT"NEED OF REPAIR. YOU MISSION IS";SOUND100,1
2380 PRINT"TO OBTAIN SIX PARTS FROM THE";SOUND100,1
2390 PRINT"HUMANS WHO ARE SENDING THEM TO ";SOUND100,1
2400 PRINT"THEIR OWN SPACE STATION. YOU";SOUND100,1
2410 PRINT"MUST AVOID THE SHIELDS THAT ARE";SOUND100,1
2420 PRINT"CONTINUALY OPENING AND CLOSING";SOUND100,1
2430 PRINT"OVER THE VITAL PARTS YOU REQUIRE";SOUND100,
1
2440 GOSUB 2670
2450 CLS0:PRINT:PRINT"YOU HAVE 4 SHIPS IN WHICH TO";SO
UND100,1
2460 PRINT"TRY AND COMPLETE YOUR TASK.";SOUND100,1
2470 PRINT"REMEMBER-GRAVITY WILL ALWAYS";SOUND100,1
2480 PRINT"PULL YOU DOWN. IF YOU HIT THE ";SOUND100,1
2490 PRINT"SURFACE OR THE SHIELDS YOU WILL";SOUND100,1
2500 PRINT"LOSE 1 OF YOUR SHIPS.";SOUND100,1
2510 PRINT"DUE TO THE SIZE OF YOUR CRAFT";SOUND100,1
2520 PRINT"YOU CAN ONLY CARRY 1 LOAD PER";SOUND100,1
2530 PRINT"TRIP.AFTER YOU OBTAIN 1 OF THE";SOUND100,1
2540 PRINT"PARTS YOU MUST RETURN IT TO THE";SOUND100,1
2550 PRINT"MOTHER SHIP.A NOTE WILL TELL ";SOUND100,1
2560 PRINT"YOU,IF YOU ARE SUCCESSFUL.";SOUND100,1
2570 PRINT:SOUND100,1
2580 GOSUB 2670
2590 CLS0:PRINT@10," CONTROLS. ";
2600 PRINT@128," <-LEFT ";
2610 PRINT@151," RIGHT-> ";
2620 PRINT@172," ^ UP ";
2630 PRINT@299," S=STOP ";
2640 PRINT@393," C=CONTINUE ";
2650 GOSUB 2670
2660 RETURN
2670 FOR T=1 TO 200:NEXT T
2680 PRINT@486,"PRESS THE SPACEBAR";
2690 IF PEEK(345)<>223 THEN 2690
2700 RETURN
2710 REM***PAUSE***
2720 IF PEEK(341)<>251 THEN 2720
2730 SOUND200,3:SOUND100,2
2740 RETURN
```

Four in a row

Martin Roberts,
Dewsbury,
West Yorkshire.

BBC

FOUR IN A ROW is exactly the same as the popular Connect Four game. The game can be played either against the computer or against another human being. The rules are very simple.

The game is played — in this case — on a 9 by 8 board. The player makes his move by dropping coloured disks down the board. The disk always falls to the bottom of each column. The next player then makes his move by dropping a different coloured disk.

The winner is the player who gets four of his disks in a row. The row can be either horizontal, vertical or diagonal. In computer play mode, the user is asked which level of difficulty he would like to play at. The levels are from 1 to 5. In level 1 the computer will only play defensively and so does not play a very good game. In level 5 however the computer will provide a challenge to most players. The speed of play varies with difficulty. The computer can take up to 40 seconds to make a move in difficulty factor 5.

A detailed description of the workings of the program would be beyond the scope of this article but there is a brief description of what each section of the program does.

Lines	Operation
30 to 70	initialisation of variables and characters.
160 to 200	instructions.
310 to 390	initialisation of arrays.
460 to 550	main loop of program.
610 to 720	check for win.
890 to 900	program data.
920 to 1970	computer move section.

Briefly the computer move making section operates as follows. The computer scans each column from left to right and calculates the numbers of disks in a straight line which would result in going in that column. Different values are assigned to each number in the row. So two in a row might be worth 10 points whereas three in a row might be worth 30 points — four in a row is of course given the maximum of 13000 points as this wins the game.

Things do not stop there though, the computer must then calculate the values for stopping the opponent from going in that particular column. This is done in the same way but these values are negative since they are defensive.

But what about the position above? This must also be considered or there would be danger of letting the opponent in i.e. there would be no point in going in a column which lead to three in a row if the position above lead to your opponent getting his four in a row. So the position above is also examined in the way previously described.

When the computer has finished calculating the values it then simply scans all the columns to find the one with the highest value. This is the computers move. Readers may like to experiment with the computers play by changing the data in lines 890-900.

```
   10*KEY10OLD:MRUN:M
   20ONERROR RUN
   30MODE7:DIMAX(9,10),HX(8),AD%(8),BX(3,1),CX(2,1,3),
DX(1,1,1),EX(1),VX(8),FX(1,1):GOX=0:BB=0:CMX=0:OOX=4:O
X=4:OZ=0:PAX=0:C=0:HX=-1:S6X=0:FSX=0:*FX4,1
   40VDU23,241,255,254,254,252,252,248,248,240,23,240,
255,127,127,63,63,31,31,15,23,242,15,7,7,3,3,1,1,0,23,
243,240,224,224,192,192,128,128,0
   50FFX=1:CPX=1:Y$="Green":B$="Pink"
   60VDU23,244,1,3,15,31,63,63,127,127,23,245,128,192,
224,240,252,252,254,254,23,246,127,127,255,255,255,255
,127,127
   70VDU23,247,254,254,255,255,255,255,254,254,23,240,
127,127,63,63,31,15,3,1,23,249,254,254,252,252,240,224
,192,128
   80PRINT:PRINTSPC(12)CHR$(141)CHR$(134)"FOUR IN A RO
W":PRINTSPC(12)CHR$(141)CHR$(133)"FOUR IN A ROW":FORX=
1TO28:PRINTCHR$(131)"=";:NEXT:FORX=4TO28:PRINTAB(0,X)
CHR$(131)"=
   90PRINTAB(38,X)CHR$(131)"=";:NEXT:PRINTAB(0,20)"":
FORX=1TO28:PRINTCHR$(131)"=";:NEXT:VDU28,2,20,30,4
   100PRINTAB(10,4)"BY MARTIN ROBERTS":PRINTAB(12,8)"
COPYRIGHT 1984"
   110PRINTAB(6,14)"Do you want instructions";
   120A$=GET$:IFA$="N"THEN140
   130IFA$<>"Y"ANDA$<>"N"THENPRINTAB(6,14)SPC(8)"Y/N P
lease"SPC(6);:PROCDELAY:GOTO110
   140CLS
   150IFA$="N"THEN220
   160PRINT:PRINT" This two player game consists of
 stacking coloured discs in a 9 by 8  grid.":PRINT
   170PRINT" The object of the game is for you    to ge
t four of your discs in a row,  vertically, horizontal
ly or,          diagonally."
   180PRINT:PRINT" The cursor is moved by pressing the
 left and right arrow keys and a      move is made by
pressing the          downward arrow key."
   190PRINT:PRINT" Press any key to continue";:A$=GET$:
CLS
   200PRINT:PRINT" In two player mode, a move may be
 retracted by pressing the upward     arrow key."
   210PRINT:PRINT" Press any key to continue";:A$=GET$:
CLS
   220PRINTTAB(6,1)"Are you using a colour":PRINTTAB(12
,3)"television?";:A$=GET$:PRINTA$:IFA$<>"N"ANDA$<>"Y"T
HENCLS:PRINTTAB(11,1)"(Y/N) Please":PROCDELAY:GOTO220
   230IFA$="N"THENB$="White":Y$="Grey":GX=1
   240PRINTTAB(10,5)"(1=";B#;",2=";Y$;")";:PRINTTAB(7,7)
"First players colour?";:A$=GET$:NBX=VAL(A$):PRINTA$:I
FNBX<>1ANDNBX<>2THENPRINTTAB(7,7)"     1 or 2 please
":PROCDELAY:GOTO240
   250KEY1=1:F$=Y$:S$=B$:IFNBX=1THENF$=B$:S$=Y$:KBX=2
   260PRINTTAB(1,9)"Do you want to play the computer?";
:A$=GET$:PRINTA$:PRINT:IFA$<>"N"ANDA$<>"Y"THENPRINTTAB
(1,9)SPC(10)"(Y/N) please"SPC(12):PROCDELAY:GOTO260
   270IFA$="N"THENPRINT:PRINTSPC(6)"Press any key to be
gin ~";:A$=GET$:GOTO310
   280PRINTTAB(6,11)"Do you want to go first?";:A$=GET$
:PRINTA$:IFA$<>"N"ANDA$<>"Y"THENPRINTTAB(1,11)SPC(10)"
(Y/N) please"SPC(11):PROCDELAY:GOTO280
   290IX=1:IFA$="Y"THENCPX=2:IX=0
   300PRINT:PRINTTAB(5,13)"Type difficuty factor (1-5)"
;:S%=GET:DFX=VAL(DF$):PRINTDF$:CMX=1:IFDFX>50RDFX<1T
HENPRINTTAB(5,13)SPC(3)"Between 1 and 5 please"SPC(11)
:PROCDELAY:GOTO300
   310RESTORE:FORRX=0TO9:FORJX=0TO1:AX(RX,JX)=0:NEXT:N
EXT:FORRX=0TO8:AD%(RX)=0:HX(RX)=0:NEXT:LFX=0
   320FORIX=0TO10:AX(9,IX)=3:AX(8,IX)=3:NEXT
   330FORIX=0TO9:AX(IX,0)=3:AX(IX,10)=3:NEXT
   340FORIX=0TO3:READBX(IX,0):READBX(IX,1):NEXT
   350FORIX=0TO1:FORJX=0TO1:FORKX=0TO1:READCX(IX,JX,KX)
:NEXT:NEXT:NEXT
   360FORIX=0TO1:FORJX=0TO1:FORKX=0TO1:READOX(IX,JX,KX)
:NEXT:NEXT:NEXT
   370READEX(0),EX(1)
   380READFX(0,0),FX(1,0),FX(0,1),FX(1,1)
   390IFFFX=1THENFFX=2 ELSEFFX=1
   400MODE5:VDU19,3,4,0,0,0,19,2,2,0,0,0,19,1,5,0,0,0,2
3;8202;0;0;0;
   410IFY$="Grey"THENVDU19,1,7,0,0,0
   420VDU28,0,20,19,2:COLOUR131:CLS:COLOUR0
   430FORX=1TO17STEP2:FORY=2TO23STEP3:PROCDISK:NEXT:NEX
T
   440Y=0:FORX=1TO18STEP2:PROCPOINTER:NEXT:NX=0
   450X$=FF$:X=OOX*2+1:GOTO530
   460IFCMX=1ANDCP%=XXTHEN920
   470A%=INKEY$(0):IFA&C(A%)=137THENOX=OX+1:IFOX=9THENO
X=0
   480IFA&C(A%)=139ANDHX=0ANDCMX=0THENAX(HX(EX),EX+1)=
0:HX(EX)=HX(EX)-1:X=EX*2+1:FORY=23-HX(EX)*3TO2STEP-3:P
ROCC:PROCDISK:COLOUR0:PROCDISK:SOUND1,-10,Y*30,1:NEXT:
HX=1:LFX=LFX-1:OZ=EX:PROCC1
   490IFA&C(A%)=136THENOX=OX-1:IFOX=-1THENOX=0
   500IFA&C(A%)=13&ANDHX(OX)<8THENEX=OX:BOX=B%64:OOX=OX
:HX=0:GOTO530
   510IFOX<>OOXTHENCOLOUR0:X=OOX*2+1:PROCPOINTER:X=OX*2
+1:COLOUR0:CX:PROCPOINTER:OOX=OX
   520GOTO460
   530IFXX=1THENCOLOURKBX:HCX=KBX:XX=2 ELSECOLOURNBX:HC
X=NBX:XX=1
   540PROCPOINTER
   550GOTO460
   560HX(OX)=HX(OX)+1
   570AX(HX(OX),OX+1)=XX:X=OX*2+1:FORY=2TO26-HX(OX)*3ST
EP3:COLOURHCX:PROCDISK:COLOUR0:PROCDISK:NEXT:COLOURHCX
:Y=26-HX(OX)*3:PROCDISK
   580SOUND1,-15,HX(OX)*38,2:Y=0
   590FORY=1TO1000:NEXT
   600*FX21,0
   610QX=0
   620HCX=1:VA X=0
   630PX=AX(HX(OX)+BX(OX,1)+KX,(OX+1)+BX(OX,0)+KX)
   640IFPX<>XXTHEN670
```

(continued on page 172)

THOUGHTS & CROSSES

37 MARKET STREET, HECKMONDWIKE, WEST YORKS.
Telephone 0924-402337
Access Visa order 0924-409753

ALL PRICES INCLUDE VAT AND DELIVERY

COMPUTERS

BBC B.....£399
(Free software £50 + Free)
BBC B with DFS.....£469
Electron.....£189
Spectrum 48K.....£125
(Free software worth £57)
Memotech 512.....£275
Commodore 64.....£189
Amstrad (green).....£239
Amstrad (colour).....£349
Apple IIe with Disk Drives 2 & Controller.....£985

PRINTERS

Canon PW1080A NLQ.....£305
Canon PW1080A NLQ + QL RS232 Interface.....£350
Canon PW1156A NLQ.....£380
Canon RS232 Interface.....£80
Epson RX80.....£269
Epson RX80FT.....£299
Epson FX80.....£389
Epson FX100.....£520
Brother HR5.....£155
Brother EP44.....£235
Juki 6100.....£375
NEC PC8023.....£210
Shinwa CP80 Serial.....£215
Shinwa CPA80 RS232.....£235
Shinwa RS232 + 2K buffer.....£54
Commodore 1520 p/p.....£95
Commodore MPS801.....£210
Alphacom 32.....£69
MCP 40.....£119

Riteman A1.....£249
Riteman RS232 Interface.....£39
Epson RS232 Interface.....£29
Epson RS232 with 2K buffer£65

DISK DRIVES

Sinclair Microdrive.....£45
Sinclair Interface 1.....£45

Pace or Cumana

All with separate PS
100K S/S 40T.....£149
200K D/S 40T.....£173
400K D/S 40T.....£215

Double Drives

200K S/S 40T.....£295
400K D/S 40T.....£329
800K D/S 80T.....£417
800K D/S 40/80T.....£478
3" 200K D/S.....£125
Commodore 154210
Torch Disk Pack with free software.....£800
Memotech Single inc free software.....£410
Memotech Double inc free software.....£800
6502 2nd processor.....£195
Z80 2nd processor inc free software.....£295

Wabash or 3M Disks

5¼" or 8"

S/S S/D 40 track.....£17
D/S S/D 40 track.....£20
D/S D/D 40 track.....£22
D/S D/D 80 track.....£28
3" Maxwell.....£4.50
3½" Hewlett Packard.....£4.50
Further discounts for quantity.
50+ 10% discount.
100+ 15% discount.

MONITORS

Microvitec 1431MS (std).....£199
Microvitec 1451MS (med).....£290
Microvitec 2031 20".....£299
Microvitec 1451MZ.....£245
Microvitec QL (med).....£275
Philips 80 Green 20MHZ.....£78
Commodore 1701.....£210
Fidelity.....£210

JOYSTICKS & INTERFACES

Quickshot II.....£11
Sure Shot.....£15
Stak: BBC Dragon, Spectrum or Commodore
Pro Ace.....£9
Zip Stick.....£12
Kempston 5000.....£11.50
Cambridge Joystick.....£29
+ interface and program
Kempston Interface.....£11.50
DK Tronics Programmable.....£22
DK Tronics Dual Part.....£12

Shure Shot Interface.....£20
First Byte Interface.....£24

BBC

Electron Plus 1.....£65
The Key (disk).....£11.50
Replica 2 (disk).....£10.50
Replica 2 (3" disk).....£13
Grafkey.....£8
Grafdisk.....£11.50
Beta-Base (disk).....£22
Beta-Base (3" disk).....£22
Wordwise.....£40
Disk Doctor.....£30
Gremlin.....£30
Caretaker.....£32
B.C.P.L.....£95
Acorn Speech Rom.....£54
View.....£65

P.V.C. COVERS

BBC.....£3.99
Microvitec 14".....£4.80
Acorn Electron.....£2.99
BBC Cassette Rec.....£2.90
Spectrum.....£1.99
VIC 20/64.....£2.99
Epson FX80.....£4.80
Epson RX80.....£4.30
Apple.....£4.50
Apple + Monitor.....£5.75
Seikosha 80.....£3.50
Seikosha 100.....£3.75

RIBBONS

Epson MX/FX/RX80.....£6

Epson MX/FX100.....£15
Seikosha GP.....£4.50
Microline.....£2.30
Anodex.....£12.50
MPS801.....£6.50
NEC 8023.....£7
Canon PW1080.....£11
Canon PW1156.....£11
Epson 100 Refill.....£3.30

LEADS

BBC to Parallel Printer.....£10
BBC to Serial Printer.....£10
Memotech Printer Lead.....£10
Dragon to Parallel Printer£13.50
Commodore to Parallel Printer.....£13.50
Oric to Parallel Printer.....£13.50
Pet to Parallel Printer.....£13.50
Atari to Parallel Printer.....£13.50
7pin DIN to DIN & jack.....£2.40
7pin DIN to 3 jacks.....£2.40
5pin DIN to 5pin DIN & jack.....£2.40
5pin DIN to 3 jacks.....£2.40
Sinclair 48K cassette lead.£1.80
RGB monitor (6pin DIN).....£3.20
The Plug suppressor and RFI filter.....£16
Spectrum on/off switch.....£3.99

SPECTRUM

Spectrum Amplifier.....£10
Light Pen.....£18
Keyboard.....£45
Microdrive Car.....£4.50

COMMODORE 64

Title	Company	RRP	Our price
Krystals of Zong	PSS	7.95	7.15
Neochips	PSS	7.95	7.15
China Miner	Interceptor	7.00	6.30
Heroes of Kam	Interceptor	7.00	6.30
Town of Gnaii	Interceptor	7.00	6.30
Aquanaut	Interceptor	7.00	6.30
International soccer	Commodore	9.95	8.95
Blagger	Alligata	7.95	7.15
Damsel in Distress	Alligata	7.95	7.15
Aztec Tomb	Alligata	7.95	7.15
Voodoo Castle	Adventure	9.95	8.95
The Pyramid	Fantasy	6.50	5.85
Super Cogtight	Terminal	7.95	7.15
Revenge Mutant Camels	Llama	7.50	6.75
Attack Mutant Camels	Llama	7.50	6.75
Laser Zone	Llama	7.50	6.75
Purple Turtles	Qrsilver	7.95	7.15
Booga Boo	Qrsilver	7.95	7.15
Aquaplane	Qrsilver	7.95	7.15
3D Time Trek	Anirog	7.95	7.15
Indian Attack	Anirog	5.95	5.35
Zodiac	Anirog	7.95	7.15
Galaxy	Anirog	7.95	7.15
Cosmic Commando	Anirog	5.95	5.35
Hexpert	Anirog	7.95	7.15
Moon Buggy	Anirog	7.95	7.15
Flight Path 737	Anirog	7.95	7.15
Kong	Anirog	7.95	7.15
Hunchback	Ocean	6.90	6.20
Chinese Juggler	Ocean	6.90	6.20
Maniacs	DKT	6.95	6.25
Cosmic Convoy	Taskset	6.90	6.20
Super Pipeline	Taskset	6.90	6.20
Gyropod	Taskset	6.90	6.20
Forbidden Forest	Cosmi	9.95	9.00
Fire Ant	Mogul	7.95	7.15
Transylvanian Tower	Shepherd	6.50	5.85
Ship of the Line	Shepherd	6.50	5.85
Hustler	Bubblebus	6.99	6.30
Widows Revenge	Bubblebus	5.99	5.35
Exterminator	Bubblebus	5.99	5.35
Bumping Buggies	Bubblebus	6.99	6.30
Kick off	Bubblebus	6.99	6.30
3D Speed Duel	DKT	6.95	6.25
Johnny Reb	Lothlorien	6.95	6.25
Twin Kingdom Valley	Bugbyte	9.50	8.50
Quasar	Voyager	5.99	5.35
Attak 4	Voyager	5.99	5.35
Cosmic Cruiser	Imagine	5.50	4.95
Pedro	Imagine	5.50	4.95
Arcadia	Imagine	5.50	4.95
Armaggedon	Ocean	6.90	6.20
Rollerball	Ocean	6.90	6.20
Scuba Dive	Durrell	6.95	6.25
Megahawk	Big G	6.95	6.25
Fab Wanda	Games	7.95	7.15
Pilot 64	Abbex	7.50	6.75
Manic Miner	Softvi	7.95	7.15
Horace goes Skiing	MiHouse	5.95	5.35
Zykron	Big G	6.95	6.25
Attac Challenge	Cosmu	6.95	6.00
Megawarz	Paramount	7.50	6.75
Brands	Alligata	7.95	7.15
Mr Wimpy	Ocean	6.90	6.30
Omega Run	CRL	7.95	7.15
Derby Day	CRL	7.95	7.15
Grandmaster	Audiogenic	17.95	16.00
Gloweb	Commodore	9.99	8.99
Jupiter Landing	Commodore	9.99	8.99
Lazarian	Commodore	9.99	8.99
Sea Wolf	Commodore	9.99	8.99
Omega Race	Commodore	9.99	8.99
Le Mans	Commodore	9.99	8.99
Pinball Spectacular	Commodore	9.99	8.99
The Inkbird	MiHouse	14.95	13.50
Word Power	Sublis	9.95	8.95
First Steps	Mirrorsoft	8.95	8.00
Ultimate 64	Qrsilver	14.95	13.50
Colossus Chess	CDS	9.95	8.95
Adventure Quest	Level 9	9.90	8.90
Colossal Adventure	Level 9	9.90	8.90
Lords of Time	Level 9	9.90	8.90
Dungeon Adventure	Level 9	9.90	8.90
Snowball	Level 9	9.90	8.90
Space Pilot	Anirog	7.95	7.15
Physics	Ivan Berg	9.99	8.99
English Language	Ivan Berg	9.99	8.99
Biology	Ivan Berg	9.99	8.99
History 20th cent.	Ivan Berg	9.99	8.99
Maths 1	Ivan Berg	9.99	8.99
Maths II	Ivan Berg	9.99	8.99
Geography	Ivan Berg	9.99	8.99
Chemistry	Ivan Berg	9.99	8.99
High Flyers	Commodore	11.95	10.75
Tank Attak	Supersoft	9.95	8.00
Crazy Kong	Supersoft	7.95	7.15
3D Glooper	Supersoft	9.95	8.00
Stix	Supersoft	9.95	8.00
Meteobitz	PSS	7.95	7.15
Decator 64	DKT	5.95	5.35
Dinky Doo	S/W Proj	7.99	7.15
Valhalla	Movisoft	14.95	13.00
Splat	Incentive	6.50	5.85
Simons Basic	Commodore	50.00	45.00
Easy Calc	Commodore	70.00	57.50
Easy File	Commodore	50.00	45.00
Practicalc	CSA	39.95	32.00
Practifile	CSA	39.95	32.00
Transact	Dialogue	30.00	25.00
Invoistat	Dialogue	30.00	25.00
DFM Database	Dialogue	24.00	20.00
Son of Blagger	Alligata	7.95	7.15
Bathtime	PSS	7.95	7.15
Egbert	Games wiz	7.95	7.15
Outback	Paramount	7.50	6.75
Star Trooper	MiHouse	7.95	7.15
Slinky	Cosmi	6.95	6.00
Beach Head	Access	9.95	8.95
Arabian Nights	Interceptor	6.95	6.25
Space Pilot	Anirog	7.95	7.15
Sheep in Space	Llamasoft	7.50	6.75
The Boss	Peaksoft	6.95	6.00
Quest for Quintana	Sunrise	8.95	8.00
Rollowerture	Sunrise	8.95	8.00
Caesar the Cat	Mirrorsoft	8.95	8.00
Solo Flight	Microprose	14.95	13.00
Who Dares Wins	DKT	5.95	5.35
Loco	Alligata	7.95	7.15
Zodiac	Interceptor	7.00	6.30
Hulk	Adv Int	9.95	8.95
Arcle +	MiHouse	8.95	8.00
House of Usher	Anirog	7.95	7.15
Word Wizard	Bubblebus	7.00	6.30
Gilligans Gold	Ocean	6.90	6.20
Trashman	New Gen	7.95	7.15
Road Roller	Knight	7.95	7.15
Scope	ISP	17.95	16.00
The Quill	Gilsoft	14.95	13.00
Quicksi Egg	A & F	7.95	7.15
Splat	Incentive	6.50	5.85
Star Trooper	MiHouse	6.95	6.25
Oracles Cave	Doric	7.95	7.15
Machine Code Tutor	New Gen	14.95	13.00
Strip Poker	US Gold	9.95	8.95
Mystic Mansion	US Gold	8.95	8.00
Monty Mole	Gremlin	7.95	7.15
Evil Dead		6.99	6.30
Beam Rider	Activision	9.99	8.99
Pitfall	Activision	9.99	8.99
Decathlon	Activision	9.99	8.99
Hero	Activision	9.99	8.99
Potty Pigeon	Gremlin	7.95	7.15
Android 2	Vortex	6.90	6.20
Fred	Qrsilver	7.95	7.15
Traffic	Qrsilver	7.95	7.15
Mission 1	Project Vol	8.95	8.00
Football manager	Addictive	7.95	7.15
Flip Flop	Statesoft	8.95	8.00
Astro Chase	Statesoft	8.95	8.00
Micro Olympics	Database	5.95	5.35
Jeepers Creepers	Softek	5.95	5.35
Revelation	Softek	5.95	5.35
Pitfall	Activision	9.95	8.95
Pitfall II	Activision	9.95	8.95
River Raid	Activision	9.95	8.95
Toy Bizarre	Activision	9.95	8.95
Zenji	Activision	9.95	8.95
The Sorceror of Claymore Castle	Ad. Int'national	9.95	8.95
Chartbuster	Alligata	9.95	8.95
Rocket Rodger	Alligata	7.95	7.15
PC Fuzz	Anirog	7.95	7.15
Las Vegas	Anirog	7.95	7.15
Gumshoe	A & F	7.95	7.15
Ankh	Beyond	8.95	8.05
Aztec	Beyond	8.95	8.05
Mr Robot	Beyond	8.95	8.05
Psytron	Beyond	8.95	8.05
Jaws Jim	Creative Sparks	7.95	7.15
Wing Commander	Creative Sparks	7.95	7.15
Havoc	Dynavision	9.95	8.95
Kickaboni Will	Elite	6.95	6.25
Booty	Firebird	7.95	7.15
Return to Eden	Level 9	9.90	8.90
Silk The Viking	Level 9	9.95	8.95
Turbo Racer	Limbic	7.95	7.15
Ancipital	Llamasoft	7.50	6.75
Zim Zala Bim	Melbourne		
Jinn Genie	House	9.95	8.95
American Football	Microvega	6.95	6.25
Games Creator	Mind Games	9.99	8.99
Cliff Hanger	Mirrorsoft	12.95	11.65
Short Blkkr	New Generation	0.00	0.00
Daly Thompson's	Ocean	6.90	6.20
Decathalon	Ocean	7.90	7.10
High Noon	Ocean	7.90	7.10
Johnny & The Jimpys	Ocean	6.90	6.20
Battle for Midway	PSS	9.95	8.95
Magic Micro Mission	Quicksilva	7.95	7.15
Summer Games	Quicksilva	14.95	13.50
Steel Rat Saves the World	Shards	9.95	8.95
Death Star Interceptor	System 3	9.95	8.95
Archipelago	Talent	7.95	7.15
Kalah	Talent	7.90	7.10
West	Talent	9.90	8.90
Pancrama	Talent	17.95	16.00
Lazy Jones	Terminal	7.95	7.15
Duo Vadin	The Edge	9.95	8.95
Five Quest	The Edge	9.95	8.95
NATO Commander	US Gold	9.95	8.95
Snokie	US Gold	9.95	8.95
Zaxxon	US Gold	9.95	8.95
Fort Apocalypse	US Gold	9.95	8.95
Drell's	US Gold	9.95	8.95
Ignorie Ace	US Gold	9.95	8.95
Flak	US Gold	9.95	8.95
Bruce Lee	US Gold	9.95	8.95
Beach Head	US Gold	9.95	8.95
Falcon Patrol 2	Virgin Games	7.95	7.15

SPECTRUM

Title	Company	RRP	Our price
Aquaplane	Qrsilver	6.95	4.95
3 D Ant Attack	Qrsilver	6.95	6.25
The Snowman	Qrsilver	6.95	5.95
Fred	Qrsilver	6.95	6.25
Games Designer	Qrsilver	14.95	13.00
Chess II	Artic	9.95	8.95
Invaders	Artic	4.95	4.50
Golden Apple	Artic	6.95	6.25
Chess Tutor	Artic	6.95	6.25
Forth	Artic	14.95	12.00
Bear Bovver	Artic	6.95	6.25
Mr Wong's Laundry	Artic	6.95	6.25
Snooker	Artic	6.95	6.25
World Cup Soccer	Artic	6.95	6.25
Hulks of Things	Crystal	7.50	6.75
Rommels Revenge	Crystal	5.50	5.85
Invasion of Body	Crystal	5.50	5.85
Dungeon Master	Crystal	7.50	6.75
Collectors Pack	Sinclair	6.95	6.25
Vu File	Psion	9.95	8.00
Vu Calc	Psion	9.95	8.00
Vu 3D	Psion	9.95	8.95
Backgammon	Psion	5.95	5.35
Club Record Cont	ICL	6.95	6.25
Flight Simulation	Psion	7.95	7.15
Small Bus atc	Sinclair	12.95	11.80
Cyrils IS Chess	I.S.	9.95	8.95
Scrabble	Sinclair	15.95	14.20
Chequered Flag	Psion	6.95	6.25
Horace goes skiing	Psion	5.95	5.35
Learn to Read	S/MacMillan	9.95	8.95
Learn to Read 2	S/MacMillan	9.95	8.95
Learn to Read 3	S/MacMillan	9.95	8.95
Learn to Read 4	S/MacMillan	9.95	8.95
Learn to Read 5	S/MacMillan	9.95	8.95
Cargo	S/MacMillan	9.95	8.95
Glider	S/MacMillan	9.95	8.95
Survive	S/MacMillan	9.95	8.95
Early Punctuation	Sinclair	7.95	7.15
Speech Maths	Sinclair	7.95	7.15
The Apocalypse	Sinclair	7.95	7.15
Capital Letters	Sinclair	7.95	7.15
Alphabet Games	Sinclair	7.95	7.15
Castle Spellerious	Sinclair	7.95	7.15
Micro Prolog	Sinclair	24.95	22.00
Jet Pac	Ultimate	5.50	4.95
Lunar Jetman	Ultimate	5.50	4.95
Atic Atac	Ultimate	5.50	4.95
Trans Am	Ultimate	5.50	4.95
Sabre Wolf	Ultimate	9.95	8.95
Stonkers	Imagine	5.50	4.95
Pedro	Imagine	5.50	4.50
Jumping Jack	Imagine	5.50	4.95
Arcadia	Imagine	5.50	4.95
Cosmic Cruiser	Imagine	5.50	4.95
Birds & Bees	Bug Byte	5.95	5.35
Mr Wimpy	Ocean	5.90	5.30
Eskimo Eddie	Ocean	5.90	5.30
Royal Birkdale	Ocean	5.90	5.30
Digger Dan	Ocean	5.90	5.30
Pogo	Ocean	5.90	5.30
Hunchback	Ocean	5.90	6.20
Moon Alert	Ocean	5.90	5.30
Kong	Ocean	5.90	5.30
Cavelon	Ocean	5.90	5.30
Chinese Juggler	Ocean	5.90	5.30
Fighter Pilot	Digital	7.95	7.15
Night Gunner	Digital	6.95	6.25
3D Death Chase	Digital	6.95	6.25
Code name Mat	Micromega	6.95	6.25
Haunted Hedges	Micromega	6.95	6.25
Splat	Incentive	5.50	4.95
Mountains of Ket	Incentive	5.50	4.95
1984	Incentive	5.50	4.95
Millionaire	Incentive	5.50	4.95
Temple of Vran	Incentive	5.50	4.95
Meteoroids	DKT	4.95	4.50
Dictator	DKT	4.95	4.50
Maziacs	DKT	6.95	6.25
Speed Duel	DKT	5.95	5.35
Jet Set Willy	Softvi	5.95	5.35
Trouble Trouble	Softvi	5.95	5.35
Manic Miner	Softvi	5.95	5.35
The Pyramid	Fantasy	6.50	5.85
Doomsday Castle	Fantasy	6.50	5.85
Beauty & Egg Snatch	Fantasy	5.50	4.95
Classic Adventure	MiHouse	6.95	6.25
4D Terror Daktil	MiHouse	6.95	6.25
Mugsy	MiHouse	6.95	6.25
Absorbit Forth	MiHouse	14.95	13.00
Metabunne Draw	MiHouse	5.95	5.35
Hurg	MiHouse	14.95	13.00
Hatbill	MiHouse	14.95	13.00
Blade Alley	P.S.S.	5.95	5.35
M. Coder II	P.S.S.	9.95	8.95
Electro Storm	P.S.S.	5.95	5.35
Lak Filos	P.S.S.	6.95	6.25
3D Seiddab Attack	Hewson	5.95	5.35
Heathrow	Hewson	7.95	7.15
Nightflite II	Hewson	7.95	6.95
3D Lunar Attack	Hewson	7.95	7.15
Fantasia Diamond	Hewson	7.95	7.15
3D Space Wars	Hewson	6.95	5.35
Superchess	Sheperd	6.50	5.85
Ship of the Line	Sheperd	6.50	5.85
Invincible Island	Sheperd	6.50	5.85
Urban Upstart	Sheperd	6.50	5.85
Transylvanian Tower	Sheperd	6.50	5.85
Ugh	Softek	5.95	5.35
Confrontation	Lothlorien	7.95	7.15
Special Operations	Lothlorien	5.95	5.35
Johnny Reb	Lothlorien	6.95	6.25
Paras	Lothlorien	6.95	6.25
Micro Mouse	Lothlorien	5.95	4.95
Tyrant of Athens	Lothlorien	5.50	4.95
Deadthoughts	Lothlorien	5.50	4.95
Olympics	CRL	6.95	5.35
Derby Day	CRL	5.95	5.35
Omega Run	CRL	5.95	5.35
Stargazer Secrets	CRL	5.95	5.35
Fitts	CRL	5.95	5.35
Great Detective	CRL	5.95	5.35
Scuba Dive	Durrell	5.95	5.35
Jungle Trouble	Durrell	5.95	5.35
Hamlet Attack	Durrell	5.95	5.35
Skuls	Gilsoc	6.95	6.25
Blue Thunder	R Wilcox	5.95	5.35
Android Two	Vortex	5.95	5.35
T.L.L.	Vortex	5.95	5.35
Superchess 3	C.P.	9.95	8.00
Wheelie	Microsphere	5.95	5.35
Train Game	Microsphere	5.95	5.35
Countabout	Longman	7.90	7.10
3D Tanner	New Gen	5.95	5.35
Trashman	New Gen	5.95	5.35
Jack & Beanstalk	Thor	6.95	5.35
Football Manager	Addictive	6.95	6.25
Krakatoa	Abbex	5.95	5.35
Chuckie Egg	A & F	6.90	6.20
Oracles Cave	Doric	7.95	7.15
The Forest	Phipps	9.95	8.95
Snooker	Visions	6.95	6.25
Taswide	Tasman	5.50	4.96
Tasword 2	Tasman	13.90	12.50
Hunter Killer	Protek	7.95	7.15
Airliner	Protek	9.95	8.95
Spectrum Monitor	Picturesque	7.50	6.75
Ed Assembler	Picturesque	8.50	7.66
HiSoft Pascal	HiSoft	25.00	22.00
Dev Pack 3	HiSoft	14.00	12.50
Valhalla	Legend	14.95	13.00
Snowball	Level 9	9.90	8.90
Dungeon Adventure	Level 9	9.90	8.90
Colossal Adventure	Level 9	9.90	8.90
Adventure Quest	Level 9	9.90	8.90
Lords of Time	Level 9	9.90	8.90
Hat Stogia Mr Men	Mirrorsoft	6.95	6.00
Psytron	Beyond	7.95	7.15
Lords of Midnight	Beyond	9.95	8.95
Word Spell	Softvi	9.95	8.95
DFM Database	Dialogue	14.95	13.00
The Quill	Gilsoft	14.95	13.00
Pheenix	Megaclade	5.50	4.95
Hewcat	Wyvern	5.50	4.95
Ad Astra	Gargoyle	5.95	5.35
Mummite	ISP	9.95	8.95
Olympics 84 is a Database	Stoem	14.95	13.00
Paintbox	P. Plotter	8.25	7.40
Screen Machine	P. Plotter	8.25	7.40
Quest of Holy Grail	Dream	5.95	5.35
Dungeon Builder	Dream	9.95	8.95
Incredible Hulk	Adventure	9.95	8.95
Pinball Wizard	CP	5.95	5.35
Bridge Player	CP	8.95	8.00
Inferno	Visions	6.95	5.85
War of Worlds	CRL	7.95	7.15
Pixeleer	Lothlorien	4.50	4.05
Antics	Bug Byte	6.95	6.25
Worse ThingsSea	Silversoft	5.95	5.35
Micro Olympics	DB	5.50	5.33
Match Point	Sinclair	7.95	7.15
Odyssey of Hope	Martech	9.95	9.95
Factory Breakout	Poppysoft	5.50	4.95
Death Chess 5000	Artic	6.95	6.25
Spanish Tutor A	Koomes	9.95	8.95
Spanish Tutor B	Koomes	9.95	8.95
Full Throttle	Micromega	6.95	6.25
MWC Code Tutor	New Gen	14.95	13.00
Air Traffic Control	Micrigen	9.95	8.95
City of Eidolan	Quicksilver	9.95	8.95
Omnicalc 2	Microsphere	14.95	13.00
Gatecrasher	Quicksilver	6.95	6.25
Stop the Express	Sinclair	6.95	6.25
Enduro	Activision	9.95	8.95
Zenji	Activision	9.95	8.95
H.E.R.O.	Activision	9.95	8.95
River Raid	Activision	9.95	8.95
Masterfile	Campbell Systems	0.00	0.00
Block Buster	Composound	5.95	5.35
Stagecoach	Creative Sparks	6.95	6.25
Blackhawk	Creative Sparks	6.95	6.25
Delta Wing	Creative Sparks	6.95	6.25
Great Detective	CRL	5.95	5.35
Dark Star	Design	10.00	10.00
Quest of the Holy Grail	Dream	5.95	5.35
Dungeon Builder	Dream	9.95	8.95
Kokoboni Wat	Elite	5.95	5.35
Avalon	Hewson Con.	7.95	7.15
Ultraxti	Hisoft	9.95	8.95
Hampstead	Melbourne H.	9.95	8.95
Sherlock	Melbourne H.	14.95	13.50
Kenilis	Micromega	6.95	6.25
Graxx Blurf	Micromega	6.95	6.25
Pyjamarama	Mikro-Gen	6.95	6.25
Auto Mania	Mikro-Gen	6.95	6.25
American Football	Mind Games	9.99	8.99
Quick Thinking	Mirrorsoft	9.95	8.95
Gilligans Gold	Ocean	5.95	5.35
Zombie Zombie	Ocean	5.95	5.35
Mega Phot	Thor	5.95	5.35
Underwurlde	Ultimate	9.95	8.95
Knight Lore	Ultimate	9.95	8.95
Kung Fu	Bug Byte	6.95	6.25
Turmoil	Bug Byte	6.95	6.25
Tir Na Nog	Gargoyle	9.95	8.95
Steve Davis Snooker	CDS	7.95	7.15
Astro Nut	Software Proj	5.95	5.35
Erik The Viking	Mosaic	9.95	8.95
Jasper	Micromega	6.95	6.25
Eddie Kidds Jump	Martech	6.95	6.25
Combat Lynx	Martech	9.95	8.05
Travel with Trashman	New Gen.	5.95	5.35
Danger Mouse Double Trouble	Creative	6.95	6.25
Danger Mouse Black Forest	Creative	6.95	6.25
Ghost Busters	Activision	0.00	0.00

NEW

White Lightening	Oasis	14.95	13.00
Beta Basic 1.8	Beta	14.95	9.90
Red Riding Hood	Arrow	9.95	8.95
Enormous Turnip	Arrow	9.95	8.95
The Magic Shoe	Arrow	9.95	8.95
Mr Mel's Day	Arrow	9.95	8.95
Nine Current Buns	Arrow	9.95	8.95
Five Little Ducks	Arrow	9.95	8.95
Goldilocks	Arrow	9.95	8.95
Supercode II	CP	9.95	8.95
Extended Basic	CP	9.95	8.95
Zeus Assembler	Sinclair	14.95	11.50
Musicmaster	Sinclair	9.95	8.95
Test Match	CRL	5.95	5.35
3D Tank Duel	Realtime	5.95	5.35
Muggsy	MiHouse	9.95	6.25
Spec Mac Man	Oasis	14.95	13.00
Daly Thompsons Dec	ocean	6.90	6.20
Project Volcano	Mission	7.95	7.15
Mind Games	Oasis	14.95	13.00
The Pulsar	Arcade	5.95	5.35
3D Tank Duel	Realtime	5.95	5.35
Star Trader	Bug Byte	6.95	6.25
Strider Tanks	Sinclair	5.95	5.35
Black Tower	Durrell	5.95	5.85
Mindy Mole	Gremlin	5.95	5.35
Giants Revenge	Thor	5.95	5.35
Olympicon		5.95	5.35
Eye of Bain	Artic	6.95	6.25
Frank 'n Stein	PSS	5.95	5.35

Range of programs available for MTX, BBC, Electron and Amstrad
Please order stating (1) Programs required; (2) Computer; (3) Amount enclosed; (4) Name & Address.
All prices include, packing & VAT. Overseas orders welcome.

(continued from page 170)

```
650IFKX>0THENKX=KX+1:GOTO630
660KX=KX-1:GOTO630
670IFKX>0THENVL%=KX:TP%=KX-1:KX=-1:GOTO630
680VL%=VL%-KX
690IFVL%>4THEN730
700Q%=Q%+1:IFQ%<4THEN620
710LF%=LF%+1:IFLF%=72THENMODE7:PRINTTAB(8,8)"The gam
e is drawn":GOTO850
720RETURN
730FORY%=1TO110STEP20:SOUND1,-15,Y%,Y%/20+2:NEXT:FOR
Y%=110TO1STEP-20:SOUND1,-15,Y%,7-Y%/20+2:NEXT:EX=0
740RX=KX+1
750IFEX=0THENCLOURB:GOTO770
760COLOURHC%
770X=1+(OX+BX(QX,0)*RX)*2:Y=26-(HX(OX)+BX(QX,1)*RX)*
3:PROCDISK
780FORI=1TO200:NEXT
790IFINKEY(0)<>-1THEN830
800RX=RX+1:IFRX<TP%+1THEN750
810IFEX=0THENEX=1:GOTO740
820EX=0:GOTO740
830MODE7:IFX%=1THENFS%=FS%+1:W$=F$ ELSEW$=G$:GS%=GS%
+1
840PRINTTAB(1,6)W$" Wins":PRINT:PRINT"The score is "
F$"="STR$(FS%)","G$"="STR$(GS%):PRINT
850GS=1:PRINTTAB(8,10)"Would you like another go?":
A$=GET$:IFA$<>"Y"ANDA$<>"N"THENPRINTTAB(8,10)SPC(8)"Y/
N Please"SPC(8):PROCDELAY:GOTO850
860IFA$="Y"THEN310
870MODE7:END
880DATA1,-1,1,1,0,-1,1,0
890DATA10,12,30,35,5,6,20,25
900DATA29,33,20,31,125,1625,175,2125,625,625,13000,6
000,-7000,-6000
910DEFPROCDELAY:SOUND1,-15,50,10:FORX=1TO1000:NEXT:E
NDPROC
920D8X=0:HVX=-30000
930IFLFX=0THENHPX=INT(RND(1)*2)+4:GOTO1980
940PSX=0:C2%=1:WX=2
950IFXX=2THENC2%=2:WX=1
960FORIX=0TO8:VX(IX)=0:NEXT
970FORIX=0TO8:HX=HX(IX)+1
980IFDFX<2THEN1000
990PRX=0:PAX=0:CX=WX:C3%=C2%:GOSUB1150
1000PRZ=1:CX=C2%:C3%=WX:GOSUB1150
1010IFDFX<2THEN1060
1020HX=HX+1:PAX=1
1030IFHX>6ORDFX<3THEN1060
1040GOSUB1150
1050PRX=0:CX=WX:C3%=C2%:GOSUB1150
1060NEXTIX
1070FORIX=0TO8:VX(IX)=VX(IX)+ADX(IX):NEXT
1080FORIX=0TO8
1090IFHVX=VX(IX)ANDRND(1)>.5THENHPX=IX
1100IFHVX<VX(IX)THENHVX=VX(IX):HPX=IX
1110NEXTIX
1120IFD8X=1ANDHPX=PSXTHENAD%(TYX)=625:D8X=0
1130GOTO1980
1140REMFINDVAL
1150IFAX(HX,IX+1)=3THENVX(IX)=-30000:RETURN
1160FORJX=0TO3
1170AX=BX(JX,1):BX=BX(JX,0)
1180KX=0:DX=0:NX=1:BLX=0
1190PX=AX(HX+AX*KX,IX+1+BX*KX)
1200D8X=DX+1
1210IFPX=30RPX=CXTHENDX=DX-1:GOTO1960
1220IFPX=C3XTHENNX=NX+1
1230IFNX=4THEN1920
1240IFDX=4THEN1200
1250IFKX>-1THENKX=KX+1:GOTO1190
1260KX=KX-1:GOTO1190
1270REMND BOUNDRY
1280M1X=0:M2X=0:CTX=0:RX=0
1290IFNX>3THEN1920
1300IFDFX<4THEN1620
1310IFKX=3THENMX=0:SFX=3:GOTO1330
1320MX=MX-3:RX=MX
1330MX=MX-1:CTX=CTX+1:IFCTX>GFXTHEN1430
1340GX=AX(HX+AX*MX,IX+1+BX*MX)
1350PX=AX(HX+AX*(MX+4),IX+1+BX*(MX+4))
1360IFGX=3ORGX=C THEN1430
1370IFGX=C3XANDPX=0THEN1480
1380IFGX=0ANDPX=C3XTHENM1X=M1X-1
1390GOTO1330
1400M1X=M1X+1
1410IFM1X>M2XTHENM2X=M1X:RX=MX
1420GOTO1330
1430NX=NX+M2X:IFNX<2THEN1640
1440IFNX>3THEN1920
1450FGX=0:H1X=HX:N7X=0:FORKX=RXTORX+3:IFAX(HX+AX*KX,I
X+1+BX*KX)=0THENPROCU:IFN1X>N7XTHENN7X=N1X
1460IFAX(HX-1+AX*KX,IX+1+BX*KX)<>0THENBLX=1
1470NEXT:IFN7X>3THENFDX=1
1480GX=0:TX=0:KX=1:MX=1:DPX=0:BFX=1
1490PX=AX(HX+AX*KX,IX+1+BX*KX)
1500IFPX=0THEN1550
1510IFPX=CXORPX=3THENDFX=0:GOTO1550
1520MX=MX+1
1530IFKX>0THENKX=KX+1:GOTO1490
1540KX=KX-1:GOTO1490
1550IFKX>0THENSX=KX:KX=-1:GOTO1490
1560TX=KX:IFBFX=0ANDFGX=1THEN1640
1570IFNX<>MXORDFX=0THEN1610
1580IFAX(HX-1+AX*SX,IX+1+BX*SX)<>0ANDAX(HX-1+AX*TX,IX
+1+BX*TX)<>0THENDPX=1
1590IFPAX=1THENVX(IX)=VX(IX)-DX(NX-2,PRX,DPX):GOTO161
0
1600VX(IX)=VX(IX)+DX(NX-2,PRX,DPX)
1610IFNX=3THEN1820
1620IFNX<2THEN1640
1630IFPAX=1THENVX(IX)=VX(IX)-CX(BLX,NX-2,PRX) ELSEVX(
IX)=VX(IX)+CX(BLX,NX-2,PRX)
1640NEXTJX:RETURN
1650DEFPROCU:N1X=0:LX=0
1660MX=0:L3X=0
1670PX=AX(H1X+KX*AX+BX(LX,1)*MX,IX+1+BX*KX+BX(LX,0)*M
X)
1680IFPX<>0ANDMX=0THENENDPROC
1690IFMX=0THEN1710
1700IFPX<>C3XTHEN1740
1710BL3X=L3X+1
1720IFMX>-1THENMX=MX+1:GOTO1670
1730M3=MX-1:GOTO1670
1740IFMX>-1THENMX=-1:GOTO1670
1750IFN1X<L3XTHENN1X=L3X
1760LX=LX+1:IFLX<4THEN1660
1770IFN1X>3THENDPX=1:ENDPROC
1780DPX=0:ENDPROC
1790DEFPROCT:H1X=HX+1:PROCU
1800IFDPX=1THENENDPROC
1810H1X=HX-1:PROCU:ENDPROC
1820DPX=0
1830IFDFX<5THEN1640
1840AX(HX,IX+1)=C3X
1850IFAX(HX+AX*SX,IX+1+BX*SX)=0THENKX=SX:PROCT:IFDPX=
1THENSX=KX:GOTO1800
1860IFAX(HX+AX*TX,IX+1+BX*TX)=0THENKX=TX:PROCT:IFDPX=
1THENGX=KX:GOTO1800
1870AX(HX,IX+1)=0:GOTO1630
1880IFPAX=0THENVX(IX)=VX(IX)+EX(PRX):GOTO1900
1890VX(IX)=VX(IX)-EX(PRX)*.7
1900AX(HX,IX+1)=0:PSX=IX:TYX=IX+BX*6%:IFPAX=0ANDPRX=0
THENDX=1
1910GOTO1640
1920VX(IX)=VX(IX)+FX(PRX,PAX)
1930IFPAX=0ANDPRX=0THENIX=0
1940GOTO1640
1950REM HIT
1960IFKX>-1THENMX=KX-1:SFX=MX:KX=-1:GOTO1190
1970GOTO1640
1980JX=-1
1990IFHPX>0XTHENJX=1
2000FORIX=0XTOHPXSTEPJX
2010X=IX*2+1:PROCPOINTER
2020COLOUR0
2030FORY=1TO100:NEXT
2040X=IX*2+1:PROCPOINTER
2050COLOURHC%
2060NEXT
2070X=(IX-JX)*2+1:PROCPOINTER
2080OX=HPX:GOSUB560:GOTO530
2090DEFPROCPOINTER:PRINTTAB(X,0)CHR$(240)CHR$(241);PR
INTTAB(X,1)CHR$(242)CHR$(243):ENDPROC
2100DEFPROCDISK:PRINTTAB(X,Y)CHR$(244)CHR$(245);PRINT
TAB(X,Y+1)CHR$(246)CHR$(247);PRINTTAB(X,Y+2)CHR$(248)C
HR$(249):ENDPROC
2110DEFPROCC:IFXX=1THENCOLOURK8X ELSECOLOURNB%
2120ENDPROC
2130DEFPROCC1:IFXX=1THENCOLOURK8X:HC%=K8X:XX=2 ELSECO
LOURNB%:HC%=NB%:XX=1
2140X=OX*2+1:COLOURHC%:PROCPOINTER
2150ENDPROC
>D
```

VDU 19

Andrew Daines,
Bungay,
Suffolk,

SPECTRUM

THESE MACHINE-CODED routines are designed to emulate the VDU 19 command found on BBC and Electron computers. The first routine performs a universal ink change without disturbing the text already on the screen. It will not search for and replace any colour but it will change all the text to blue, for example.

The second routine is similar to the first but changes the paper colour instead of the ink, again this routine leaves any text unchanged. After this comes the third routine, this is more complex than the previous two. It searches through the text and if it finds a certain colour it will change it to another, again this leaves all text unchanged.

Finally comes the fourth routine which searches through paper colours and if it finds a specific colour it changes it.

Now you know exactly what each routine does you must type them in. First type in and run the program provided. This will ask you for the address you want the machine code to start from, on a 16K machine 30000 is a good origin and 60000 on a 48K machine. When this address has been entered ten more addresses will be displayed, the meanings of which are given here:

Address 1: Poke this with the new ink colour.
Address 2: Randomize USR for routine one.
Address 3: Poke this with the new paper colour.
Address 4: Randomize USR for routine two.
Address 5: Ink colour to search for.
Address 6: New ink colour.
Address 7: Randomize USR for routine three.
Address 8: Paper colour to search for.
Address 9: New paper colour.
Address 10: Randomize USR for routine four.
Addresses 1 and 2 refer to routine one.
Addresses 3 and 4 refer to routine two.
Addresses 5, 6 and 7 refer to routine three.
Addresses 8, 9 and 10 refer to routine four.

After printing these addresses the program will proceed to poke the machine code and after a few seconds you will either see the message "code O.K. . . ." in which case you can save and verify the code or the message, or "Check sum error; check data" which means that you have mis-typed one or more of the numbers and the program will stop allowing you to check and rectify the data. When you are satisfied the data is correct, re-run the program.

The basic programme will then re-new itself, you can then type:

CLEAR ST — 1

where ST is the origin. And then type Load"" Code and load back the machine code in memory, then you are free to use the routines.

```
10 REM ** M/C Loader **
20 REM **A.Daines '84**
30 INPUT"Enter Origin ";ST
40 DIM A(10)
50 LET A(1)=ST
60 LET A(2)=ST+1
70 LET A(3)=ST+25
80 LET A(4)=ST+26
90 LET A(5)=ST+60
100 LET A(6)=ST+61
110 LET A(7)=ST+62
120 LET A(8)=ST+96
130 LET A(9)=ST+97
140 LET A(10)=ST+98
150 FOR N=1 TO 10:PRINT AT N,1;"Address ";N;"=";A(N):NEXT N
160 PRINT''"Write down these addresses"
170 LET TOT=0
180 FOR N=ST TO ST+152
190 READ B:POKE N,B:LET TOT=TOT+B
200 NEXT N
210 IF TOT<>16085 THEN PRINT AT 20,0;"Checksum Error:Check Data":STOP
220 PRINT AT 15,0;"Code O.K....."
230 PRINT'"Prepare to save....."
240 SAVE "VDU 19" CODE ST,152
250 PRINT'"Verify....."
260 VERIFY "" CODE
270 PRINT'"Verified O.K."
280 PAUSE 0
290 NEW
300 DATA 0,33,0,88,17,192,2,126,230,248,71,58,96,234,128,119,35,27,122,179,32,24
1,201,0,0,0
310 DATA 58,121,234,23,23,23,230,56,50,121,234,33,0,88,17,192,2,126,230,199,71,5
8,121,234,128,119
320 DATA 35,27,122,179,32,241,201,0,0,0,33,0,88,17,192,2,58,156,234,71,126,230,7
,184,32,9
330 DATA 58,157,234,71,126,230,248,128,119,35,27,122,179,32,231,201,0,0,0,0,58,1
92,234,23,23,23
340 DATA 230,56,50,192,234,58,193,234,23,23,23,230,56,50,193,234,33,0,88,17,192,
2,58,192,234,71
350 DATA 126,230,56,184,32,9,58,193,234,71,126,230,199,128,119,35,27,122,179,32,
231,201
```

Shape, draw and fill

Carl Ellis,
Swindon,
Wiltshire.

AMSTRAD

THE AMSTRAD CPC-464 has some excellent facilities for graphics — with a resolution of 640 by 200 pixels in Mode 2. Although the excellent Basic includes a comprehensive suite of graphics commands there are one or two useful commands that are not present in Amstrad BASIC — a circle drawing command and a command for colouring large areas of screen.

The Circles program draws the outline of a circle with a radius of 100 pixels and with its centre in the middle of the screen. To change this, alter variables r — the radius — ,x and y — the centre.

The second program — concentric circles — draws two circles — both with the same centre. One has a radius of 100 pixels and the other a radius of 50 pixels. The variables used are r and r2 — radii of circles — ,x and y — centre of circles.

It is also possible to draw solid — coloured in — circles on the CPC-464. All we need to do is to draw lines across the circle.

The Solid Circles program draws a coloured-in circle with a radius of 50 pixels in the centre of the screen — see variables s,x and y. The program draws a line in the top half of the circle which is then reflected in the bottom half.

Run the solid circles program again and type:

```
INK 1,1
```

The circle — and the cursor — has now disappeared! To get them back again type:

```
INK 1,24
```

Make the following alterations to the solid circles program:

```
25 INK 1,1
40 IF s=0 THEN INK 1,24:END
70 IF s=0 THEN INK 1,24:END
```

In Mode 1, up to 4 Inks are available, after switching-on or resetting the CPC-464 defaults to Mode 1. Ink 0 is the background — paper — and Ink 1 is the foreground — pen — you could change this though. The circle "disappeared" because it was the same colour as the background. Inks can be used to create the effect of animation.

It is also possible to draw ovals on the CPC-464. The program is similar to that for drawing circles, after all, an ellipse is only an elongated circle.

The oval is twice as high — 100 pixels — as it is wide (50 pixels). To change this, alter the variable r in line 40 and the number of r's in line 70.

Ink-swap circles demonstrates the use of filling-in circles and Inks. I have used Mode 0 because it offers most Inks (16) although it has a fairly low resolution of 160 by 200 pixels. A circle is drawn at a random position on the screen and with a random radius. Then the Border and Inks are changed and another circle is drawn.

This is done repeatedly to create a pleasing effect. To change the maximum radius of the circle alter variable R in line 40. "Ink-swap circles" is a "sit and watch" program.

Program 1.

```
10 REM Circles
20 MODE 1:CLS:CLG
30 r=100:x=320:y=200
40 DEG
50 ORIGIN x,y
60 FOR a=1 TO 360
70 PLOT r*COS(a),r*SIN(a)
80 NEXT a
```

Program 2.

```
10 REM Concentric circles
20 MODE 1:CLS:CLG
30 r=100:r2=50:x=320:y=200
40 DEG
50 ORIGIN x,y
60 FOR a=1 TO 360
70 PLOT r*COS(a),r*SIN(a)
80 PLOT r2*COS(a),r2*SIN(a)
90 NEXT a
```

Program 3.

```
10 REM Solid Circles
20 MODE 1:CLS:CLG
30 x=320:y=200:s=50
40 IF s=0 THEN END
50 r=s*s
60 s=s-1
70 IF s=0 THEN END
80 z=SQR(r-s*s)
90 l=z+z
100 sl=x-z
110 IF sl<0 THEN l=l+sl:sl=0
120 PLOT sl,y+s:DRAWR l,0
130 IF y-s<0 GOTO 60
140 PLOT sl,y-s:DRAWR l,0
150 GOTO 60
```

Program 4.

```
10 REM Ovals
20 MODE 1:CLS:CLG
30 DEG
40 x=320:y=200:r=50
50 ORIGIN x,y
60 FOR a=1 TO 360
70 PLOT r*COS(a),r*2*SIN(a)
80 NEXT a
```

Program 5.

```
10 REM Ink-Swap Circles
20 MODE 0:CLS:CLG
30 FOR n=1 TO 15:INK n,INT(RND*27):NEXT n
40 x=INT(RND*639):y=INT(RND*399):r=INT(RND*80)
50 ci=INT(RND*15)
60 BORDER INT(RND*27)
70 IF r=0 THEN 30
80 s=r*r
90 r=r-1
100 IF r=0 THEN 30
110 z=SQR(s-r*r)
120 l=z+z
130 sl=x-z
140 IF sl<0 THEN l=l+sl:sl=0
150 PLOT sl,y+r,ci:DRAWR l,0,ci
160 IF y-r<0 THEN 90
170 PLOT sl,y-r,ci:DRAWR l,0,ci
180 GOTO 90
```

MC Mover

P J Mew,
West Molesey,
Surrey.

VIC-20

HAVE YOU NOTICED that all those useful machine-code routines published in magazines are always located at the top of unexpanded Vic-20 memory. This is extremely inconvenient if you want to have, more than one routine in memory at a time.

Here is a Basic program to help you move "un-relocatable" machine-code routines around in memory. It occupies just over 2K and with very little alteration will also work on the Commodore 64.

The program will recompute all "JSR" "JMP" and absolute instructions to addresses within the subroutine and move the machine code anywhere in user Ram. Be sure to protect the new area of memory before loading any other programs.

The program was written only as an aid and should be used with care. For example numbers loaded via the accumulator into the zero page for subsequent use as an indirect address back into the subroutine will not be altered by the program and will still have to be changed by hand. Any text or data contained within the machine code may also cause confusion and the best way to handle this is to poke data or text bytes to zero before moving the code, then poking back the correct values in the new memory locations.

The program works by first setting up three arrays containing all valid 6502 op codes, with zero, one and two byte operands in separate arrays.

The user is then asked to input the old start address, old end address of the code to be moved and the new start address it is to be moved to.

The program then compares the first byte to be moved with the list of op codes until it finds a match, if the op code has no operands

(continued on next page)

(continued from previous page)

or one operand, the code is transferred directly by the for next loop in line 390.

If the op code has a two byte operand, the address the instruction points to is compared with the start and end addresses of the code being moved and if it is in range the address is recomputed before being moved. All other instructions are moved without alteration.

Once the code has been moved it can easily be turned back into data statements using the program "self writing" published in *Your Computer* in October 1983. Because it is written in basic the program is not very fast, in fact if you are considering moving more than about 1K you might as well go and do the shopping while the conversion is done. However, it does work and is still quicker than recomputing jumps by hand.

Vic machine-code mover.

```
10 POKE36879,25:PRINT"■"
20 DIMS(31),D(75),T(50)
30 F=0
40 I=0
50 READS:S(I)=S:IFS=-1THEN70
60 I=I+1:GOTO50
70 I=0
80 READD:D(I)=D:IFD=-2THEN100
90 I=I+1:GOTO80
100 I=0
110 READT:T(I)=T:IFT=-3THEN130
120 I=I+1:GOTO110
130 PRINT"■"
140 POKE19,1
150 INPUT"■OLD START ADD-  ";OS$:PRINTCHR$(13):OS=VAL(OS$)
160 INPUT"■OLD END ADD-    ";OE$:PRINTCHR$(13):OE=VAL(OE$)
170 INPUT"■NEW START ADD-  ";NS$:NS=VAL(NS$)
180 POKE19,0
190 IFNS>655360RO9>655360ROE>65536THEN130
200 IFOE<OSTHEN550
210 IFN8=>OSANDNS=<OETHEN590
220 I=0:OP=0
230 PRINT"■■■■■■ ■ THE MACHINE CODE      ■INSTRUCTION AT        ■ADDRESS-"
240 PRINT"■  IS BEING RELOCATED"
250 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"OS+I"■":A=0:OB=PEEK(OS+I)
260 IFS(A)=OBTHENOP=1:GOTO390
270 IFS(A)=-4THEN290
280 A=A+1:GOTO260
290 A=0
300 IFD(A)=OBTHENOP=2:GOTO390
310 IFD(A)=-4THEN330
320 A=A+1:GOTO300
330 A=0
340 IFT(A)=OBTHENOP=3:GOTO380
350 IFT(A)=-4THEN370
360 A=A+1:GOTO340
370 OP=1:GOTO390
380 IFOP=3THEN430
390 FORQ=0TOOP:POKENS+I+Q,PEEK(OS+I+Q):NEXT
400 I=I+OP
410 IFOS+I=>OETHEN520
420 GOTO250
430 X=256*PEEK(OS+I+2)+PEEK(OS+I+1)
440 IFX=>OSANDX<OETHEN460
450 GOTO390
460 Y=X-OS
470 Z=NS+Y
480 V=INT(Z/256)
490 W=Z-V*256
500 POKENS+I+1,W:POKENS+I+2,V:POKENS+I,OB
510 I=I+OP:F=F+1:GOTO250
520 PRINT"■■■■■■■■"FTAB(6)"ADDRESSES HAVE       ■ BEEN RENUMBERED"
530 PRINT"■■■■  PROGRAM FINISHED"
540 END
550 PRINT"■■■■■■■START ADDRESS MUST BE ■LESS THAN END ADDRESS"
560 PRINT"■■■■■■■■■■■■■■HIT ANY KEY■■"
570 GETA$:IFA$=""THEN570
580 GOTO130
590 PRINT"■■■■■■■ YOU CANNOT RELOCATE  ■NEW CODE INTO THE AREA   ■ALREADY OCCUPIE
D"
600 PRINT"■   BY THE OLD CODE"
610 PRINT"■■■■■■■■■■■■■■HIT ANY KEY■■"
620 GETA$:IFA$=""THEN620
630 GOTO130
640 DATA170,138,154,186,168,152,232,202,200,136,
650 DATA24,56,216,248,184,88,120
660 DATA0,96,64
670 DATA10,74,42,106,72,104,8,40,234,-4,-1
680 DATA169,165,181,161,177,133,149,129,145
690 DATA105,101,117,97,113,233,229,245,225,241
700 DATA201,197,213,193,209,41,37,53,33,49
710 DATA9,5,21,1,17,73,69,85,65,81
720 DATA162,166,182,136,150,160,164,180,132,148
730 DATA224,228,192,196,208,240,16,144,48,80,112,176
740 DATA6,2,70,86,38,54,102,118,230,246,198,214,36,-4,-2
750 DATA173,189,185,141,157,153,109,126,121,237,253,249
760 DATA205,221,217,45,61,57,13,29,25,77,93,89
770 DATA174,190,142,172,188,140,236,204,76,108,32
780 DATA14,30,78,94,46,62,110,126,238,254,206,222,44,-4,-3
```

Program Loader

Colin McShane,
Coatbridge,
Lanarkshire.

ORIC

THIS PROGRAM will display the contents of a personal cassette. It also allows the selection of the contents of the cassette. New files of programs can be added to the utility program itself.

By moving the cursor up to the appropriate line number where the arrays A$(1-10) display the program names, copy the whole line using Ctrl-A and type in the new program name. When you have finished typing in the program name, press return and continue to add other program names.

If you have finished entering new files then re-Run the program. Leave some space on the tape after saving the Program Loader. This is due to extra memory space being required by the program when new files are added.

Up to 10 program files can be utilised but with a few modifications, extra files can be added. Prompts throughout the program will guide you through the loading and saving procedures.

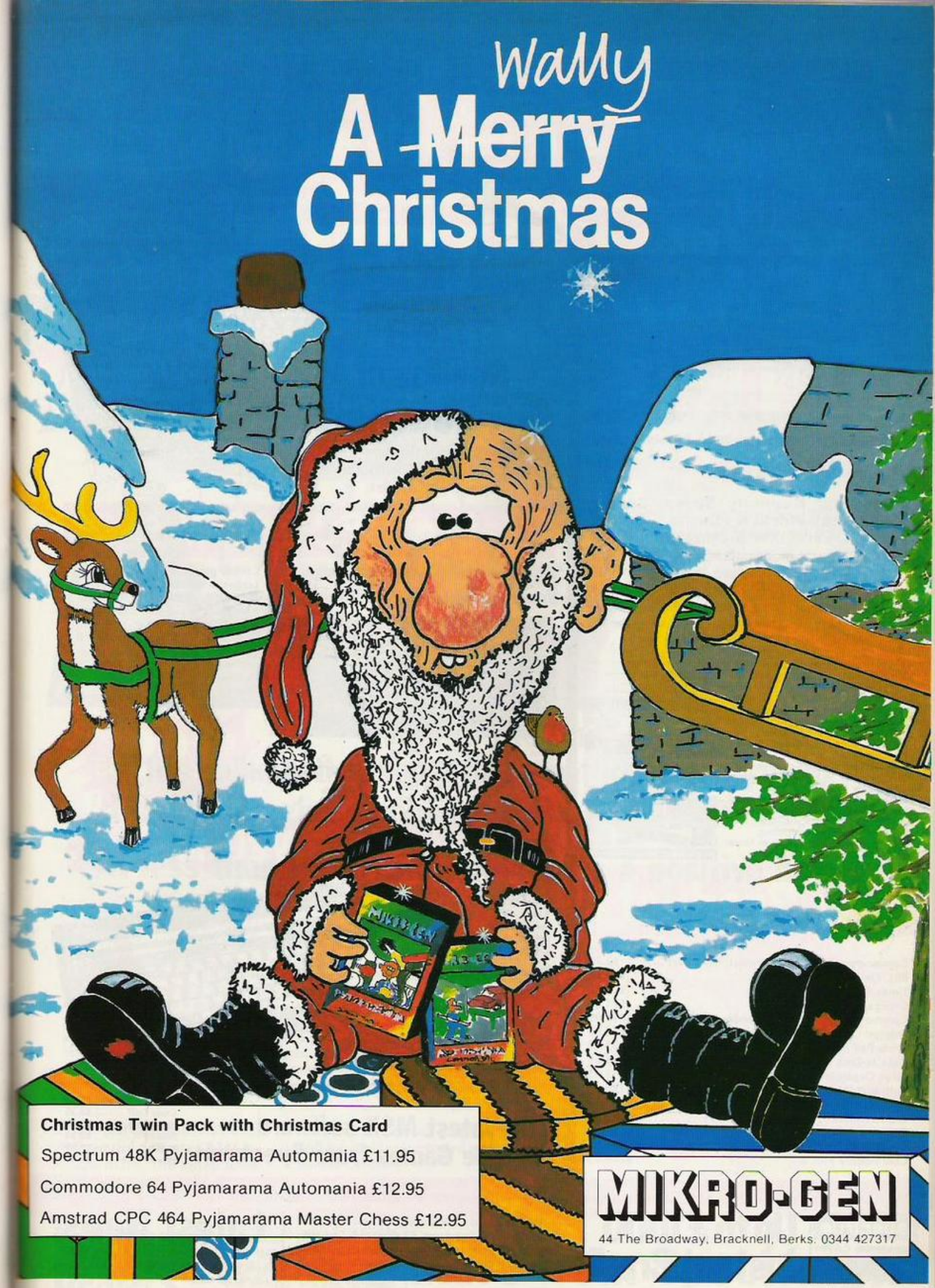
Program rundown.

Lines

1—4 : Initialisation and screen set-up.
30—50 : Program selection screen.
60: Load routine
100—145 : Program name filespace.
150—170 : Extra filespace.
1000— : Editing files routine.

Oric program loader.

```
1 DIM A$(10):CLS:POKE#26A,10
2 PLOT4,3,CHR$(1)+CHR$(10)+"PROGRAM LOADER"
3 PLOT4,4,CHR$(1)+CHR$(10)+"PROGRAM LOADER"
4 PLOT6,6,"TAPE-*1*.....DEMONSTRATION"
8 GOSUB 100
9 A1$="NEW PROGRAM (Y/N) ?"
10 WAIT175
20 PLOT6,10,A1$
25 GET X$:IF X$="Y"THEN 1000 ELSE 30
30 CLS
35 FOR X=1 TO 10
40 PRINT:PRINTX;A$(X)
45 NEXT X
50 PLOT11,22,CHR$(12)+"CHOOSE PROGRAM":GET X
60 CLOAD A$(X)
100 A$(1)="EXAMPLE-1"
105 A$(2)="EXAMPLE-2"
110 A$(3)="EXAMPLE-3"
115 A$(4)="EXAMPLE-4"
120 A$(5)="EXAMPLE-5"
125 A$(6)="....................."
130 A$(7)="....................."
135 A$(8)="....................."
140 A$(9)="....................."
145 A$(10)="....................."
150 REM
160 REM
170 REM
180 RETURN
1000 CLS:PRINT:PRINT"ENTER NEW PROGRAM
     NAME":PRINT
1005 LIST100-145
```



Christmas Twin Pack with Christmas Card

Spectrum 48K Pyjamarama Automania £11.95

Commodore 64 Pyjamarama Automania £12.95

Amstrad CPC 464 Pyjamarama Master Chess £12.95

MIKRO-GEN

44 The Broadway, Bracknell, Berks. 0344 427317

spectrum

NEWS!

WIN!

A fabulous holiday for you and 3 friends in sunny

Florida

Including: Kennedy Space Centre, Disney World & Florida Keys
with **SPECTRUM & COMMODORE**

★★★★★★★★★PLUS★★★★★★★★★

£2,500 Spending Money

★★★★★★★★★PLUS★★★★★★★★★

The 10 runner up each get a £100 Voucher to spend in any Spectrum store – anywhere in the UK.

Pick up an entry form from your local Spectrum now— no purchase required!

MICRO UPDATE

Spectrum's own magazine for home and small business computers

Have you seen our MICRO UPDATE magazine yet! It's Spectrum's own computer guide, published by the experts for YOU.

It's packed with illustrations and descriptions of just about everything you're likely to need in home micro hardware, add-ons and accessories. Plus there's information on current software, and hints and tips from experts about home computing.

Call in to your local Spectrum dealer and get YOUR copy - It's great!

New Products

Commodore C16/Plus 4 Joystick Converter	£3.75
BBC Emulator for CBM 64	£13.95
Timex Spectrum Keyboard	£14.95
Omega Data Recorder	£24.95
Commodore 1531 Data Recorder	£44.99
Entrepo Quick Data Drive for CBM 64	£79.95
Koala Pad for CBM 64	£79.95
Datafax Disk Interface	£79.95
Psion Organiser	£99.95
Rotronics Wafadrive	£129.95
ZX Spectrum Plus	£179.95
Goldsatr MSX	£239.99
Canon V20 MSX	£279.95
Sanyo MPC 100 MSX	£299.95
Commodore Plus 4	£299.99

A Gifted idea

Spectrum Gift Vouchers

Available in values of £5 and over from your local Spectrum dealer

Sanyo MPC 100 MSX

- Central processing Z80A
- Language MSX-Basic (built-in)
- 32KB MSX - Basic ROM 16KB user RAM (28,815 programmable when using MSX basic)
- 73 Key, alphanumeric, graphics & code combinations giving 256 symbols
- 16 colours
- Sound 3 channels, 8 octaves

This smart, superbly finished Sanyo PMC100 MSX micro is an exciting addition to the range of MSX computers available today. Ask to see it at your local Spectrum dealer NOW!

Spectrum Price

£299.95

NEW Canon V20 MSX

An excellent 64K RAM MSX micro with 32K of ROM and a 16K Video RAM. All the benefits of standardised MSX software, 8-octave sound and super colour graphics!

Spectrum Price

The latest MSX software Arcade Games from Spectrum

Cubit	£8.95
Crazy Golf	£8.95
Humphrey	£8.95
Punchy	£8.95
Hustler	£8.95
Hunch Back	£8.95

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

"Without doubt the best value MSX Machine"

GOLDSTAR MSX

"This is the one"

"It's unlikely that you'll find a better MSX bargain"

"I could imagine choosing this as my MSX machine"

(MSX user Dec '84)

"At less than £240 the Goldstar is a positive bargain"

(What MSX Nov/Dec '84)

Yes—the exciting new world of MSX computing is now here, with the superb new Goldstar MSX micro! And just look at the rave reviews it's received from the press.

MSX micros are made to a standard specification—but some things do vary and that's where the Goldstar comes out on top. It's POWERFUL—a full 64K of user RAM, 32K of ROM AND a 16K video RAM. Its sixteen vivid colours and eight octaves of sound make it a great games player's micro, and there's a powerful Z-80A processor to take on a world of home or office tasks.

But it's the price tag that's really special—just £239.99, a lot less than most of the others. Take a look at the superb Goldstar MSX, at your Spectrum dealer NOW!

SENSATIONAL VALUE

£239.99

- General purpose MSX micro
- Powerful 64K user RAM
- 32K ROM, 16K video RAM
- Hi-resolution colour graphics
- Full typewriter keyboard and cursor controls

Spectrum Computer Centres have no connection whatsoever with the ZX Spectrum Computer manufactured by Sinclair Research Ltd

Computer Dealers

Or prospective dealers. If you'd like to know more about becoming a SPECTRUM APPOINTED DEALER, please write to: BOB CLEAVER, Spectrum Group PLC, Hunting Gate, Hitchin, Herts. SG4 0TJ; Tel (0462) 37171

More from Spectrum...

spectrum

Sensational ZX Spectrum offer

ZX Spectrum 48K

Including

FREE!

Software 6 pack

Containing:

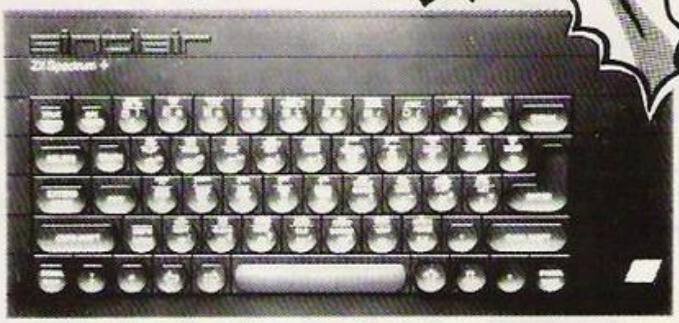
- Computer Scrabble
- Computer Chess
- Chequered Flag Game
- Horace goes skiing game
- Make-a-Chip

Worth £56.70

SPECTRUM PRICE

£129.95

The very latest



ZX Spectrum+

Here's the brand new Spectrum micro. The 'Plus' boasts a new, professional typewriter-action keyboard, plus all the Spectrum's top selling features like powerful 48K RAM, 8 colours, 10-octave sound and full compatibility. AND you get a super 80-page User Guide PLUS SIX FREE SOFTWARE PACKAGES - unbeatable value-for-money!

SPECTRUM PRICE

£179.95

Timex Spectrum Keyboard

Push-button keyboard for the ZX-Spectrum makes programming and game playing much easier. Full travel keys are designed to last for 3 million operations, and it can be fitted in minutes.

SPECTRUM PRICE

£14.95

Rotronics Wafadrive

At last a versatile, flexible twin data drive for the ZX Spectrum! The Wafadarive features twin 128K drives that take the compact wafers (choose from 16K, 64 K or 128K sizes) - The dual drive means professional-style ease of use, with easy copying of files or whole wafers. There are no cables to connect - and there's RS232 PLUS Centronics ports to take a host of extra peripherals. For super reliability, the tape has been designed for extra long life and a top data intergrity. And it's incredible value-for-money!

Plus FREE Softeks Special Writer an excellent word processor program

SPECTRUM PRICE

£129.95

SPECTRUM PRICE

£79.95

Datafax Disk Interface

For ZX Spectrum
ZX Spectrum Plus

Disk interface allows you to run 3"/3½" or 5¼" Disk Drives with your ZX Spectrum or ZX Spectrum Plus. Ask to see it at your local Spectrum Dealer NOW.

£99.95

Sinclair Expansion Pack

Increase the power of your Sinclair 16K Spectrum dramatically—with this neat expansion pack. Boosts the RAM capacity to a powerful 48K to run the top games software.

Not all stores carry every advertised item: please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

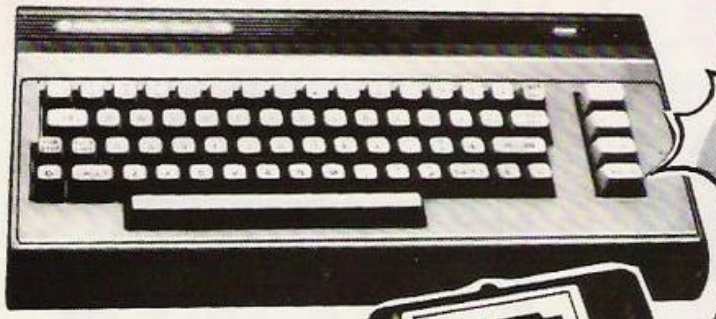
Up to £1000 Instant Credit

- There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

Commodore 16
Package offer



Including
Commodore 1531 Cassette Recorder

Introducing the new Commodore 16 - the advanced micro that's designed with the beginner in mind. This brand new micro features a powerful 16K RAM, a full professional keyboard, superb graphics with 121 colours, plus terrific built-in sounds. In its 32K ROM is a new BASIC 3.5 with over 75 commands including graphics plotting and editing. There's a unique HELP key that highlights errors when you're learning to program. It's a tremendous new micro and the Spectrum package includes a Commodore Model 1531 Cassette Data Recorder too. See it at your local Spectrum dealer now!

SPECTRUM PRICE

£139.99

Commodore Plus/4

Commodore's new, advanced Plus 4 bridges the gap between home and business micros in a way that's unique - and at a price that's unbelievable!

The Plus/4 features, beside its powerful 64K of RAM memory, has a host of features to make computing easier.

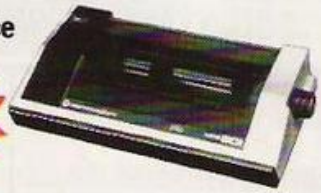
For starters there are four popular software packages built-in Word Processing, Spreadsheet, Database and a Business Graphics program. That's all small businesses needs - in a budget-priced micro!

Besides that, there's a HELP key that highlights errors in program lines, plus built-in graphics, advanced BASIC 3.5 with over 75 commands, separate cursor controls, a full 32K ROM and 4 programmable function keys.

SPECTRUM PRICE

£299.99

Commodore MPS801 Printer
Plus FREE!
Easy Script and Future Finance



SPECTRUM PRICE **£230**

Commodore 16/Plus 4 Joystick Converter

NOW you can use Britain's best-selling QUICKSHOT II JOYSTICK with your Commodore 16 or Plus 4!

SPECTRUM PRICE **£3.75**

Koala Touch Pad for CBM64

Lets you control your computer without using keyboard commands, by simply moving your finger across the touch-sensitive surface.

SPECTRUM PRICE **£79.95**

Commodore 64
Package offer

Including:
- Commodore 64
- A Joystick
- C2N Cassette Recorder
- 4 Cassette Games

SPECTRUM PRICE **£249.95**

£4.95

Plus 4 Data Recorder Adapter

Allows you to use the Shado Commodore compatible recorder with the plus 4

Spectrum Computer Centres have no connection whatsoever with the ZX Spectrum Computer manufactured by Sinclair Research Ltd.

Computer Dealers

Or prospective dealers. If you'd like to know more about becoming a SPECTRUM APPOINTED DEALER, please write to: BOB CLEAVER, Spectrum Group PLC, Hunting Gate, Hitchin, Herts. SG4 0TJ; Tel (0462) 37171

More from Spectrum...

spectrum

PSION Organiser

An easy to use personal computer that fits in the palm of you hand and slips in your pocket

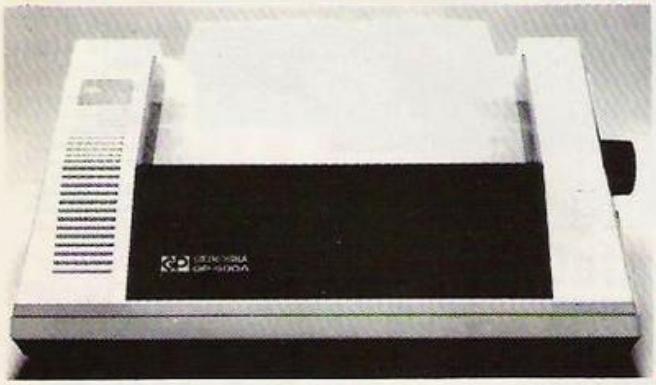
Includes FREE 8K Datapak - Utility pack ● Built-in database stores information such as names & addresses, diary appointments, price lists and timetables ● Automatic cross referencing of records when using the 'Find' command ● Permanent slide storage of information in thumb sized datapaks which slot discreetly into unique 'Solid state drives' ● Range of comprehensive software packs solve finance, maths & science problems ● Create your own programs using P.O.P.L -The easy to learn 'Psion Organiser programming language' ● Communication pack links the Psion Organiser to a wide range of printers and other computers.

£99.95

PSION ACCESSORIES

16K Data Pack	£19.95
8K Data pack	£12.95
Finance Program	£29.95
Maths Program	£29.95
Science Program	£29.95
Formatter	£44.95

Spectrum Scoop Purchase



Seikosha GP500A

Dot Matrix Printer

INCLUDING

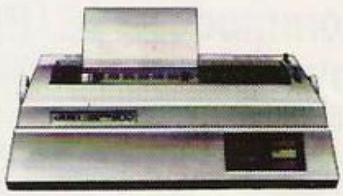
FREE!

2000 sheets of Tractor Feed Paper

- Printing speed 20cps
- Full Graphics capability
- In the graphic mode, a column of graphic data can be repeated as many times as you want with a single command.
- Double width character output under software control.
- Print position addressable by character or dot. (positioning control).
- 8 European country character sets.
- Graphic, character, and double width character modes can be intermixed on a single line.
- Automatic Printing. When the text exceeds the maximum line length no data is lost due to overflow.
- Self-test printing is available.
- Centronics parallel interface.
- Paper width is adjustable up to 10 inches.

£159.95

Other Printer Bargains



Timex 2040	£77.50
Quendata	£289.95
Juki 6100	£399.00
SEIKOSHA	
Friction Feed GP100/250X	£28.75
GP50A	£99.95
GP50S Spectrum	£99.95
GP500A	£159.95
GP100A MkII	£199.95
GP100VC VIC 20/64	£199.95
GP550A	£299.00
EPSON	
RX80T	£286.35
RX80FT	£327.75
FX80	£503.70
BROTHER	
HR-5	£159.95
EP-44	£249.95
HR-15	£458.85
SMITH CORONA	
D100	£286.35

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

● There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

Superb value and Service in
Personal Computers
from selected Spectrum Stores Nationwide

Apricot F1E/F1 System

These stylish new personal computers are among the best of the new generation of business micros. Powerful and versatile, the F-1 features a standard 256K OF RAM (expandable to 768K), with a 16-bit 8086 CPU running MS-DOS and Concurrent CP/M. That's backed up by a built-in 3½" floppy disk drive providing 720K on double-sided disks (you can add another floppy or Winchester drive later). The economical F1E has a 128K RAM and a single-sided 360K disk drive -with the same 92-key professional infra-red keyboard on the F1. And don't forget - when you buy from Spectrum you get the assurance of our trained, expert staff to help and advise you!

F1E SPECTRUM PRICE £955

F1 SPECTRUM PRICE £1095

Excluding VAT. Monitor extra.

Plus Free!

On-site service contract worth £175

Spectrum give you peace of mind with your new computer! There's a twelve month on-site service contract, worth £175, ABSOLUTELY FREE when you buy either a Sanyo 550/555 computer or an Apricot F1E/F1.

Plus Free Business Software.

Both the Sanyo and Apricot computers come complete with a superb pack of comprehensive business software worth hundreds of pounds. The packs contain virtually everything you're likely to need to get the very best from your computer -from Day one!

SEE YOUR NEAREST SPECTRUM PERSONAL COMPUTER STOCKIST FOR DETAILS OF BOTH OFFERS

Sanyo 550/555

Among the very best value in personal computers is the excellent Sanyo 550/555 Series. They feature high performance, 16-bit CPU that runs on MS/DOS, with a RAM that's expandable up to 256K bytes. The 550 has one 160K byte 5¼" floppy disk drive while the 555 has dual drives for professional flexibility. There's a choice of superb hi-resolution Colour or B&W Monitors too (not included). Both come with a comprehensive package of business software, and a very special free maintenance offer. - Take a look at these superb micros at Spectrum NOW!

Sanyo 550 Monitor extra SPECTRUM PRICE £749 Excluding VAT.

Sanyo 555 Monitor extra SPECTRUM PRICE £999 Excluding VAT.

Your local Spectrum Personal Computer Stockist

Aberystwyth **Aberdata Ltd**
Accrington **P.V.Tubes**
Alfreton **Gordon Harwood**
Bexhill-On Sea **Computerware**
Bognor Regis **Bits & Bytes**
Bolton **Wildings**
Bromley **Computers Today**
Canterbury **Jones Computers Ltd**
Chelmsford **Maxton Hayman**
Chesterfield **Computer Centre**
Chorley **Wildings**
Crawley **Gatwick Computer Services**
Darlington **McKenna & Brown**
Epsom **The Micro Workshop**
Exmouth **Open Channel**
Fakenham **Fastview**
Guernsey **Gruts**
Hull **Computer Centre**
Ipswich **Brainwave Micros Ltd**
Kidderminster & Dudley **Central Computers**
London NW11 **Computers Inc.**
London EC2 **Devron**
London SE1 **Vic Odden**
London SE9 **Square Deal**
London N14 **Logic Sales**
London W1 **Computers of Wigmore Street**
Lowestoft **John Wells Limited**
Liverpool **Hargreaves**
Luton **Terry-More Photo**
Morpeth **Telerents (Northern)**
Norwich **Norwich Camera Centre**
Norwich **Brainwave Micros Ltd**
Nuneaton **Micro City**
Peterborough **Logic Sales**
Plymouth **Syntax**
Potters Bar **Software Agents Ltd**
Preston **Wildings**
Rainham **Microway Computer**
Romford **Brainwave Micros Ltd**
Shrewsbury **Computerama**
Sittingbourne **Computers Plus**
Southampton **L.T.C. Ltd**
Stafford **Computerama**
St Austell **A B & C Computers**
Stevenage **D.J Computers**
Seven Oaks **Ernest Fielder**
Thetford **Thetford C.B & Micro**
Warrington **Wildings**
Walsall **New Horizon Computer**
Waterlooville **GB Microland**
Watford **SRS Microsystems Ltd**
West Bromwich **Bell & Jones**
Whitehaven **P.D.Hendren**
Wigan **Wildings**
Woking **Harpers Computers**
York **York Computer Centre**

See our address page for full addresses and phone Numbers

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd

Computer Dealers

Or prospective dealers. If you'd like to know more about becoming a SPECTRUM APPOINTED DEALER, please write to: BOB CLEAVER, Spectrum Group PLC, Hunting Gate, Hitchin, Herts. SG4 0TJ; Tel (0462) 37171

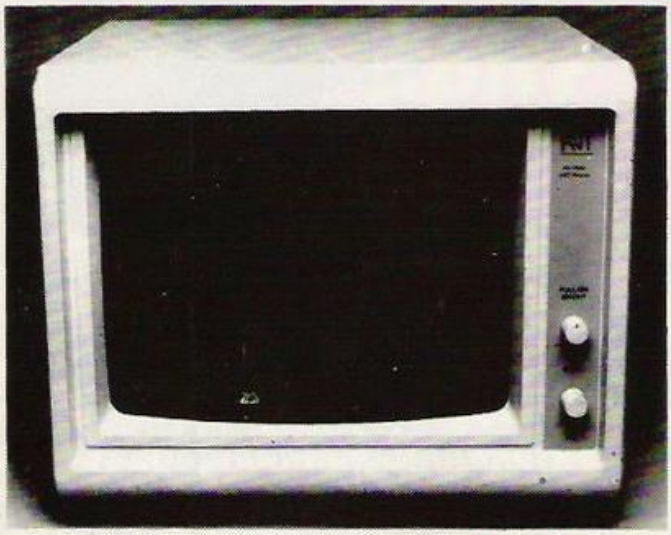
More from Spectrum...

spectrum

Incredible value for money

AVT Monitors

DM-216G or DM-216/0



- Available in Green or Orange
- Glare or Non-Glare screens
- For office micros, or Personal Computers

SPECTRUM PRICE **£99.95**

Brother HR-5 Printer

A great printer at a top-value price from Spectrum. Here's what you get:

- Letter-quality daisy-wheel printing
- Between 13 and 18cps
- Bi-directional printing
- Tractor-fed paper or single sheets
- Super low price!

SPECTRUM PRICE **£159.95**

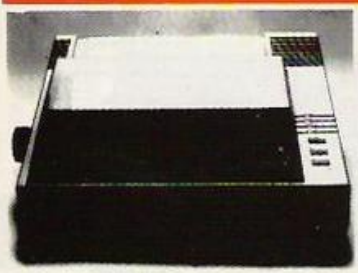
Brother EP-44

'Transforming Office Machines', runs Brother's slogan – with these super-compact battery powered typewriters, it's easy to see why!

- Top quality thermal head
- 4K of text memorise (3 A4 pages)
- Centering if required
- 15-digit LCD display for pre print corrections
- Line-by-line edit facility

SPECTRUM PRICE **£249.95**

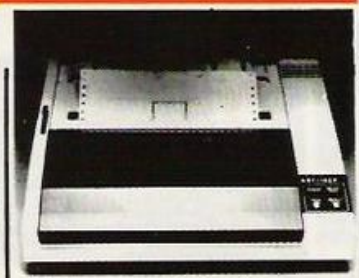
AVT Printer Bargains



80cps Printer

• 228 ASCII characters • 640 dots/line . p/sec • Centronics Parallel • Opt. RS232C Serial • Sprocket & Friction feed • Semi-graphics • Normal & italic fonts

SPECTRUM PRICE **£199.95**



100cps Printer

• Letter Quality dot matrix • 80/132 cols • Serial & Parallel • Tractor & Friction feed • Graphics

SPECTRUM PRICE **£249.95**

NEW! Music Maker

For Commodore 64

A superb new music system for the Commodore 64 micro, with everything that's needed for high qualiy music making. The package price includes Software (on either Disk or Cassette), a 24-key piano-style keyboard which fits over the computer keyboard, and a songbook containing 28 popular songs. Music Maker is versatile, but simple to use it suits both beginners and experienced musicians. There are 8 voices to simulate instruments (including piano, guitar and synthesiser); all the sound parameters can be varied, to create any sound within the 64's capabilities. Different menu-selected modes include one which creates rhythms, from waltzes to disco, and pre-programmed bass patterns that you can create around the tune. The Music Maker is an incredible addition to the Commodore 64 superb music for everyone!

£29.95

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

MASSIVE SAVINGS
ON THESE TOP SELLING MICROS

BBC Model B
With Speech Synthesiser fitted

The BBC MODEL B probably the most flexible personal microcomputer available today. Using powerful BBC BASIC, the BBC B is widely accepted as providing the educational standard for computer learning.

The Model B features a variety interface ports allowing easy connection of both standard peripherals (like disk drives and printers) and second processors or other devices to give you access to Teletext or Prestel services.

SAVE £55

Total Normal Price £454

SENSATIONAL PRICE

£399

Atari 800XL

Plus!
Atari 1010
Data Recorder
Plus!
Basic Tutor

SAVE £50

This powerful and versatile home computer packs the punch of a full 64K of user RAM memory, to make the most of exciting games and educational software. Among its up-to-date features are a high quality full-stroke keyboard, three-and-a-half octaves of sound synthesis and a superb dscreen display capability that includes 11 Graphic Display modes and a palette of 256 colours—128 of which can be displayed together at any one time. Ask your local Spectrum dealer to show you the amazing Atari today!

Normally £249.99

SENSATIONAL PRICE

£199.95

Acorn Electron
Plus 5 Software Cassettes

The Electron gives high quality graphics output to either colour TV or monitor. Sound can be generated through the internal loudspeaker. The Electron comes complete with a free introductory cassette, containing 19 free programmes & two manuals—the User Guide and 'Start Programming With The Electron'.

£199

Spectrum Computer Centres have no connection whatsoever with the ZX Spectrum Computer manufactured by Sinclair Research Ltd

Computer Dealers

Or prospective dealers. If you'd like to know more about becoming a SPECTRUM APPOINTED DEALER, please write to: BOB CLEAVER, Spectrum Group PLC, Hunting Gate, Hitchin, Herts. SG4 0TJ; Tel (0462) 37171

More from Spectrum...

spectrum

Micro Dealers UK's Top 50

Britain's No.1 Software Chart

Program	Supplier	Machine	Price
Underwurlde	Ultimate	Spectrum	£9.95
Tir Na No	Gargoyle Games	Spectrum	£9.99
Eureka	Domark	CBM 64	£14.95
Eureka	Domark	Spectrum	£14.95
Fort Apocalypse	Synsoft/US Gold	CBM 64	£9.95
Daley Thompson's Decathlon	Ocean	Spectrum	£6.90
Raid Over Moscow	Access/US Gold	CBM 64	£9.99
Knight Lore	Ultimate	Spectrum	£9.95
Psi-Warrior	Beyond	CBM 64	£9.95
Backpackers Guide	Fantasy	Spectrum	£7.50
Travels with Trashman	New Generation	Spectrum	£9.95
Bruce Lee	Datasoft/US Gold	CBM 64	£9.95
Jasper	Micromega	Spectrum	£8.95
Eddie Kid Jump Challenge	Martech	Spectrum	£6.95
Combat Lynx	Durell	Spectrum	£8.95
Cyclone	Vortex	Spectrum	£6.95
Jinn Genie	Micromega	CBM 64	£8.95
Pyjamarama	Micro Gen	Spectrum	£6.95
Suicide Express	Gremlin	CBM 64	£7.95
Elite	Acornsoft	BBC	£14.95
Select 1	Computer Records	Spectrum	£12.49
Fighter Pilot	Digital	CBM 64	£9.95
Select 1	Computer Records	CBM 64	£12.49
Steve Davis Snooker	CDS	Spectrum	£6.95
Cliffhanger	New Generation	CBM 64	£7.95
Havoc	Dynavision	Spectrum	£7.95
Jet Set Willy	Software Projects	CBM 64	£7.95
Aztec (Hunt for the Sun God)	Hill MacGibbon	Spectrum	£7.95
King Arthur's Quest	Hill MacGibbon	Spectrum	£7.95
Skool Daze	Microsphere	Spectrum	£6.95
Sherlock	Melbourne House	CBM 64	£14.95
Valkyrie 17	Ram Jam	Spectrum	£9.95
Braxx Bluff	Micromega	Spectrum	£6.95
Zaxxon	Synsoft/US Gold	CBM 64	£9.95
Boulder Dash	State Soft	CBM 64	£8.95
D-Day	Games Workshop	Spectrum	£7.95
Avalon	Hewson	Spectrum	£7.95
Tower of Despair	Games Workshop	Spectrum	£7.95
Battlecars	Games Workshop	Spectrum	£7.95
Kosmic Kanga	Micromania	CBM 64	£6.95
Manic Miner	Software Projects	Amstrad	£8.95
Xavior	PSS	Spectrum	£7.95
Beachead	Access/US Gold	Spectrum	£7.95
Beam Rider	Activision	Spectrum	£7.99
Dues ex Machina	Automata	Spectrum	£15.00
Manic Miner	Software Projects	BBC	£7.95
3D Grand Prix	Software Invasion	BBC	£9.95
Kentilla	Micromega	Spectrum	£6.95
Dark Star	Design Design	Spectrum	£7.50
Summer Games	Quicksilva	CBM 64	£14.95

Omega Compucorder

- Battery/Mains Operation
- Built-in condensor microphone
- Automatic level control
- 3-digit Tape Counter
- DIN Socket

GREAT VALUE AT ONLY £24.95

BBC Emulator

This superb unit enables you to process your BBC projects on your Commodore 64 at home. All you do is type programs in BBC BASIC and the Emulator allows your Commodore 64 to 'imitate' the BBC.

Spectrum Price £13.95

Quickshot II Joystick

Helicopter-style grip with the Fire button on top. Features suction feet for stability and Auto Fire mode. Compatible with most micros.

£11.95

Super Value Shado Add-Ons

Shado BBC Compatible Data Recorder

Also suitable for other micros

This neat, stylish data cassette recorder is a terrific value-for-money way to save your program and data from your BBC Acorn or Electron micro. The Shado connects easily, offers reliable and consistent performance and features a Tape Position indicator for easier data access.

Spectrum Price £32.50

Commodore 64 Compatable Data Recorder

Directly compatible with the Commodore 64 and VIC-20 micros, this excellent data recorder eliminates the problems of using ordinary cassette recorders - at a top value price too!

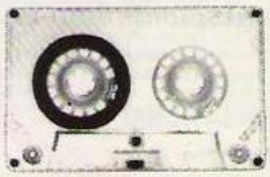
Spectrum Price £34.97

Shado Joysticks for the BBC

Designed as direct replacements for the Acorn originals, these superfast joysticks (connected to the Analogue port) feature much improved hand action with sprung response. left & right are identified by the colour of the fire buttons.

Spectrum Price Per Pair £16.95 per pair

Blank Data Cassettes



C12 Standard Data Cassette..... 50p
C15 Standard Data Cassette..... 58p
C12 Reel to Reel.... 75p

Not all stores carry every advertised item, please phone before making a journey - prices correct at time of going to press E&OE

spectrum CHARGE CARD

Up to £1000 Instant Credit

• There's up to £1,000 worth of Instant Credit available on a Spectrum Chargecard. See your local SPECTRUM dealer for written details (UK mainland only) Typical APR -29.8%

Latest News

for up to date news, information & offers from SPECTRUM - see PRESTEL page 600181 for details

There's a Spectrum near you...

AVON

BATH Software Plus, 12 York St Tel: (0225) 61676
WESTON-S-MARE K & K Computers, 32 Alfred St Tel: (0934)419324

BEDFORDSHIRE

DUNSTABLE Dormans 7-11 Broad Walk Tel: (0582) 65515
LEIGHTON BUZZARD The Computer Ctr at Milton Keynes Music, 17 Bridge St. Tel: (0525)376622
LUTON Terry-More, 49 George St. Tel: (0582) 23391/2

BERKSHIRE

BRACKNELL Computer Centre, 44 The Broadway. Tel: (0344) 427317
NEW! WINDSOR Gadgets 30 Peascod Str., Tel: (07535) 67211
SLOUGH MU Games and Computers 245 High St. Tel: (0753) 21594

BUCKINGHAMSHIRE

BLETCHLEY Rams Computer Centre, 117 Queensway. Tel: (0908) 647744
CHESHAM Reed Photography & Computers, 113 High St. Tel: (0494) 783373

CAMBRIDGESHIRE

CAMBRIDGE K P Computers Ltd. 19/20 Market St. Tel: (0223) 312240 (Open 6 Days)
HUNTINGDON T.S.C. Electronics, 3 All Saints Passage, High St. Tel: (0480) 411579
PETERBOROUGH Logic Sales, 6 Midgate Tel: (0733) 49696
PETERBOROUGH Ptrbrgh Communications, 91 Midland Rd. Tel: (0733) 41007

CHANNEL ISLANDS

GUERNSEY Gruts, 3-5 The Pollett, St Peter Port. Tel: (0481) 24682
JERSEY Audio & Computer Centre, 7 Peter St, St Helier. Tel: (0534) 74000

CHESHIRE

ALTRINCHAM Mr Micro 28 High St. Tel: (061) 941 6213
NEW! CHESTER Computer Link 21 St Werburgh St Tel: (0244) 316516
CREWE Microman Unit 2, 128 Nantwich Rd. Tel: (0270) 216014
ELLESMERE PORT RFR Computers, 1 Pooltown Rd. Whitby. Tel: 051 356 4150
STOCKPORT Wilding Ltd. 1 Little Underbank Tel: (061) 480 3435
WARRINGTON Wildings, 111 Bridge St. Tel: (0925) 38290
WIDNES Computer City, 78 Victoria Road. Tel: (051) 420 3333
WILMSLOW Swift of Wilmslow, 4-6 St. Annes Parade. Tel: (0625) 526213

CLEVELAND

MIDDLESBOROUGH McKenna & Brown, 206 Linthorpe Rd. Tel: (0642) 222368

CORNWALL

ST AUSTELL A B & C Computers, Duchy House, 6 Lower Aylmer Sq. Tel: (0726) 67337
TRURO Truro Micro Ltd. Unit 1, Bridge Ho., New Bridge St. Tel: (0872) 40043

CUMBRIA

BARROW-IN-FURNESS Barrow Computer Centre, 2/4 The Mall. Tel: (0229) 38353
CARLISLE The Computer Shop, 56-58 Lowther St. Tel: (0228) 27710
PENRITH Penrith Communications, 14 Castlegate. Tel: (0768) 67146 Open Mon-Fri till 8pm
WHITEHAVEN P D Hendren 15 King St. Tel: (0946) 2063

DERBYSHIRE

ALFRETON Gordon Harwood 69-71 High St. Tel: (0773) 832078
CHESTERFIELD The Computer Centre, 14 Stephenson Place Tel: (0246) 208802
NEW! NEW MILLS New Mills Micro Centre 388 Market Street, Tel: (0663) 47332

DEVON

EXETER Seven Counties (Computers) Ltd., 7 Paris Street. Tel: (0392) 211211
EXMOUTH Open Channel, 30 The Strand. Tel: (0395) 264408
PLYMOUTH Syntax Ltd., 76 Cornwall St. Tel: (0752) 28705
TIVERTON Actron Micro Computers, 37 Bampton St. Tel: (0884) 252854

DORSET

BOURNEMOUTH Lansdowne Computer Ctr 1 Lansdowne Crescent. Tel: (0202) 20165
NEW! DORCHESTER Seven Counties Cptrs. 20 High Street East Tel: (0305) 66022
NEW! POOLE Lansdowne Cptr Centre 14 Arndale Centre Tel: (0202) 670901

DURHAM

DARLINGTON McKenna & Brown, 102 Bondgate. Tel: (0325) 459744

ESSEX

BASILDON Godfrey's 28-32 East Walk. Tel: (0268) 289379
BASILDON Godfrey's Computer Centre, 5 Laindon Main Centre Laindon. Tel: (0268) 416747
NEW! CANVEY ISLAND Tower Radio Ltd. 43 High Str., Tel: (0268) 682211
NEW! CHELMSFORD Way-In Cptrs. 7 Village Square Chelmer Village Tel: (0245) 467858
CHELMSFORD Maxton Hayman Ltd., 5 Broomfield Rd. Tel: (0245) 354595
COLCHESTER Brainwave 51 Head St. Tel: (0206) 561513
GRAYS H Reynolds, 79 Orsett Rd. Tel: (0375) 5948
ILFORD Woolfmans, 76 Ilford Lane. Tel: (01) 478 1307
NEW! ROMFORD 92 Market Place Tel: (0708) 41719
SOUTHEND Computer Centre 332 London Rd. Tel: (0702) 337161

HAMPSHIRE

BASINGSTOKE Fisher's, 2-3 Market Place. Tel: (0256) 22079
PORTSMOUTH (Waterlooville) G B Microland, London Rd., (Opp. Co-op) Tel: (0705) 259911
SOUTHAMPTON L.T.C. Ltd., 112 East St., Tel: (0703) 333958/24703
WINCHESTER Winchester Camera & Computer Centre, 75 Parchment St. Tel: (0962) 53982

HEREFORD

HEREFORD Melgray Hi-Tech Ltd., 53/54 Commercial Str. Tel: (0432) 275737

HERTFORDSHIRE

HITCHIN GK Photographic & Computers, 68A Hermitage Rd., Tel: (0462) 59285
POTTERS BAR The Computer Shop, 197 High St. Tel: (0707) 44417
ST ALBANS (Herts) Clarks Computer Centre 14-16 Hollywell Hill. Tel: (0727) 52991
STEVENAGE D J Computers, 11 Town Square. Tel: (0438) 65501
WATFORD SRS Microsystems Ltd., 94 The Parade, High St. Tel: (0923) 26602
WELWYN GARDEN CITY D J Computers, 40 Fretherne Rd., Tel (07073) 28435/28444

HUMBERSIDE

BEVERLEY Computing World, 10 Swaby's Yard Dyer Lane. Tel: (0482 881831
GRIMSBY RC Johnson Ltd., 22 Friargate, Riverhead Centre. Tel: (0472) 42031
HULL The Computer Centre, 26 Anlaby Rd. Tel: (0482) 26297

ISLE OF MAN

DOUGLAS T H Colebourn Ltd., 57-61 Victoria St. Tel: (0624) 3482

ISLE OF WIGHT

COWES Beken & Son. 15 Bath Rd. Tel: (0983) 297181

KENT

BECKENHAM Supa Computers Ltd., 425 Croydon Rd., Tel: (01) 650 3569
BROADSTAIRS Video Vision 19/20 Willow Court, St. Peters Park Road Tel: (0843) 63284 (No Early Closing Day)
BROMLEY Computers Today 31 Market Square Tel: (01) 290 5652
CANTERBURY Ctbury Computer Centre 56/57 Palace St. Tel: (0227) 62101
DOVER Kent Photos & Computers, 4 King St. Tel: (0304) 202020
GRAVESEND Marshalls Computers & Cameras, 3 Windmill St. Tel: (0474) 65930
RAINHAM Microway Computers Ltd., 39 High St. Medway Towns Tel: (0634) 376702
SEVENOAKS Ernest Fielder Computers, Dorset St. Tel: (0732) 456800
SITTINGBOURNE Computers Plus, 65 High St. Tel: (0795) 25677
NEW! TUNBRIDGE WELLS Modata Computers Ltd. 28-30 St Johns Rd. Tel: (0892) 41555

LANCASHIRE

ACCRINGTON PV Computers, 104 Abbey St. Tel: (0254) 36521/32611
PRESTON Wilding's, 49 Fishergate. Tel: (0772) 556250

LEICESTERSHIRE

MARKET HARBOROUGH Harborough Home Computers, 7 Church St. Tel: (0858) 63056

LONDON

E8 Percivals, 85 High St. North, East Ham. Tel: (01) 472 8941
E17 Erol Computers Ltd., 125 High Street Walthamstow Tel: (01) 520 7763
EC2 Devron Computer Centre, 155 Moorgate Tel: (01) 638 3339/1830
N14 Logic Sales, 19 Broadway, The Bourne, Southgate. Tel: (01) 882 4942
N20 Castlehurst Ltd. 1291 High Rd. Tel: (01) 446 2280
NW4 Da Vinci Computer Store, 112 Brent St., Hendon Tel: (01) 202 2272
NW11 Computers Inc., 86 Golders Green Rd. Tel: (01) 209 0401/0279
SE1 Vic Odden's 6 London Bridge Walk. Tel: (01) 403 1988
SE9 Square-Deal, 373-375 Footscray Rd., New Eltham. Tel: (01) 859 1516
SE15 Castlehurst Ltd., 152 Rye Lane, Peckham. Tel: (01) 639 2205
W1 Computers of Wigmore St., 104 Wigmore St. Tel: (01) 935 2452
W1 Sonic Foto & Micro Centre, 256 Tottenham Court Rd. Tel: (01) 580 5826
NEW! W1 Ramsons 4 Edgware Rd., Tel: (01) 724 2373

GREATER MANCHESTER

BOLTON Wilding Ltd., 23 Deansgate. Tel: (0204) 33512
MANCHESTER Lomax Ltd., 11 St Mary's Gate Tel: (061) 832 6167
OLDHAM Home & Business Computers Ltd., 54 Yorkshire St. Tel: (061) 6331608
ROCHDALE Home & Business Computers, 75 Yorkshire St. Tel: (0706) 344654
SWINTON Mr Micro Ltd., 69 Partington Lane. Tel: (061) 728 2282 Late Night Friday
WIGAN Wilding Ltd., 11 Mesnes St. Tel: (0942) 44382

MERSEYSIDE

BIRKENHEAD Fairs Cameras & Hi-Fi, Dacre Hill, Rock Ferry. Tel: (051) 645 5000
HESWALL Thornguard Computer Systems, 46 Pensby Rd. Tel: (051) 342 7516
HUYTON Ian Houghton 5 Huyton Hey Rd. Tel: (051) 489 5785
NEW! LIVERPOOL Home & Business Cptrs 31 Bold St. Tel: (051) 708 0428
LIVERPOOL Beaver Radio, 20-22 Whitechapel. Tel: (051) 709 9898
LIVERPOOL (Aintree) Hargreaves, 31-37 Warbreck Moor. Tel: (051) 525 1782

MIDDLESEX

HARROW Camera Arts, (Micro Computer Division) 42 St Ann's Rd. Tel: (01) 427 5469
TEDDINGTON Andrews, Broad St. Tel: (01) 977 4716
NEW! PINNER P&H Micro & Photo Ltd 91 Field End Rd., Eastcote Tel: (01) 868 6830/6860
UXBRIDGE J K L Computers, 7 Windsor St. Tel: (0895) 51815

NORFOLK

FAKENHAM Fastview, 12 Norwich Rd. Tel: (0328) 51319
KING'S LYNN Computer Plus, 40 Conduit St. Tel: (0553) 4550
NORWICH Norwich Camera Centre 20 White Lion Str. Tel: (0603) 612537
NEW! NORWICH Brainwave 11A Castle Meadow Tel: (0603) 663796
THETFORD C B & Micros, 21 Guildhall St. Tel: (0842) 61645

NORTHAMPTONSHIRE

NORTHAMPTON Dormans, 22 Princes Walk Grosvenor Centre. Tel: (0604) 37031

NOTTINGHAMSHIRE

NOTTINGHAM Jacobs Cptrs, 13 Middlegate Newark. Tel: (0636) 72594
NEW! NOTTINGHAM Amplitone Ltd., 3 Mansfield Road. Tel: (0602) 418191
WORKSOP Computagrafix, 132 Bridge St. Tel: (0909) 472248

NORTHERN IRELAND

BELFAST Arthur Hobson Ltd., 37 Great Victoria St. Tel: (0232) 246336
PORTSDOWN Pedlows, 16 Market St., Craigavon Co. Armagh. Tel: (0762) 332265
LONDONDERRY Foyle Computer Systems, 3 Bishop St. Tel: (0504) 268337
NEWRY Newry Computer Centre. 34 Monaghan St. Tel: (0693) 66545

NORTHUMBERLAND

MORPETH Telerents 31 Newgate St. Tel (0565) 513 537

OXFORDSHIRE

ABINGDON Ivor Fields Computers, 21 Stert St. Tel: (0235) 21207
BANBURY Computer Plus, 2 Church Lane. Tel: (0295) 55890
OXFORD Ivor Fields, 7 St Ebbes St. Tel: (0865) 247082

SCOTLAND

NEW! ABERDEEN Doo Micro 278 George Street Tel: (0224) 644350
ABERDEEN North East Computers, 1-3 Ellis St., Peterhead. Tel: (0779) 79900
AYR Vennals, 6A New Bridge St. Tel: (0292) 264124
DUMFRIES Vennals, 71 English St. Tel: (0387) 54547
NEW! DUNDEE Micromania 60 Gray St., Boughty Ferry Tel: (0382) 77130
EDINBURGH The Silicon Centre, 6-7 Antigua St. Tel: (031) 557 4546
HAMILTON Tom Dickson Computers, 8-12 Cadzow St. Tel: (0698) 283193

SHROPSHIRE

NEW! Services Ltd., Smithfield Ctr Whitburn St. Tel: (07462) 61458
SHREWSBURY Computerama, 13 Castlegate. Tel: (0743) 60528
TELFORD Cptr Village, 4 Hazeldine House Telford Town Centre. Tel: (0952) 506771

SOMERSET

TAUNTON Grays, 1 St James St. Tel: (0823) 72986

STAFFORDSHIRE

STAFFORD Computerama, 59 Fergate St. Tel: (0785) 41899
STOKE-ON-TRENT Computerama, 11 Mkt Square Arcade Hanley. (0782) 268620
STOKE-ON-TRENT The Microchip, 37 Station Rd. Biddulph Tel: (0782) 511559

SUFFOLK

BURY ST EDMUNDS Guildhall Cptr Ctr, 11 Guildhall St. Tel: (0284) 705772
IPSWICH Brainwave, 24 Crown St. Tel: (0473) 50965
LOWESTOFT John Wells, 44 London Rd North Tel: (0502 3742

SURREY

CAMBERLEY Camera Arts (Micro Computer Division), 36 High St. Tel: (0276) 65848
NEW! CATERHAM Telecare, 35-37 Croydon Rd, Tel: (0883) 46209
EPSOM The Micro Workshop, 12 Station Approach Tel: (03727) 21533
HASLEMERE Haslemere Computers, 17 Lower Str. Tel: (0428) 54428
RICHMOND Crest Computer Services, 8 Hill St. Tel: (01) 940 8635
WALLINGTON Surrey Micro Systems Ltd., 53 Woodcote Rd. Tel: (01) 647 5636
WOKING Harpers, 71-73 Commercial Way Tel: (04862) 25657

SUSSEX

BEXHILL-ON-SEA Computerware, 22 St Leonards Rd. Tel: (0424) 223340
NEW! BOGNOR REGIS Bits & Bytes High Str., Tel: (0243) 867143
NEW! BRIGHTON Gamer 71 East St. Tel: (0273) 728681
NEW! BURGESS HILL Weald Cptrs, 247-249 London Rd, Tel: (04446) 41381
CRAWLEY Gatwick Computer Services, 62 Boulevard. Tel: (0293) 37842
LITTLEHAMPTON Alan Chase Ltd., 39 High St. Tel (09064) 5674
NEW! UCKFIELD Aries Cptrs 166 High St. Tel: (0825) 3326

WALES

ABERYSTWYTH AberData at Galloways, 23 Pier St. Tel: (0970) 615522
CARDIFF Randall Cox, 18-22 High St Arcade. Tel: (0222) 31960
LLANDUDNO (Gwynedd) Cptr Plus Discount, 15 Clonmel St. Tel: (0492) 79943
NEWPORT (Gwent) Randall Cox, 118 Commercial St. Tel: (0633) 67378
PEMBROKE Randall Cox, 19 Main St. Tel: (064) 682876
WREXHAM T E Roberts, 33 King St. Tel: (0978) 3644u4/364527

WARWICKSHIRE

NUNEATON Micro City 1A Queens Road Tel: (0203) 382049
RUGBY The Rugby Micro Centre, 9-11 Regent St. Tel: (0788) 70522

WEST MIDLANDS

NEW! BIRMINGHAM Software World 12 Ethel Street Tel: (021) 643 7559
COVENTRY Greens, 22 Market Way. Tel: (0203) 28342
DUDLEY Central Computers, 35 Church Hill Precinct. Tel: (0384) 238169
WALSALL New Horizon Computer Centres, 1 Goodall St. Tel: (0922) 24821
WEST BROMWICH Bell & Jones, 39 Queens Square. Tel: (021) 553 0820
NEW WOLVERHAMPTON Wolverhampton Computer Centre 17/19 Lichfield Street Tel: (0902) 29907

WORCESTER

KIDDERMINSTER Central Computers, 20-21 Blackwell St. Tel: (0562) 746941
WORCESTER Davd Waring Ltd., 1 Marmion House High St. Tel: (0905) 27551

YORKSHIRE

BRADFORD Erricks, Fotosonic House Rawson Square. Tel: (0274) 309266
DEWSBURY Home & Business Computers, 59 Daisy Hill. Tel: (0924) 455300
DONCASTER The Soft Centre 8 Queensgate Waterdale Centre Tel: (0302) 20088
HUDDERSFIELD Richards (Formerly Lauries) 12 Queen St. Tel: (0484) 25334
HULL Computer Centre 26 Anlaby Rd. Tel: (0482) 26297
LEEDS Bass & Bligh, 4 Lower Briggate. Tel: (0532) 454451
NEW! ROTHERHAM GT Leisureworld, Cascade Centre, Tel: (0709) 67391
NEW! SKIPTON Skipton Cptr Systems Victoria House, Belmont Bridge Tel: (0156) 68192
NEW! SHEFFIELD HVL Computers 812 Ecclesall Rd., Tel: (0742) 661328
YORK York Computer Centre 7 Stonegate Arcade. Tel: (0904) 641862

LOOK WHAT YOU MISSED IN BEEBUG VOLUME TWO

BBC MICRO
– USER SUPPORT –

● 10 ISSUES OF BEEBUG MAGAZINE MAILED FREE TO MEMBERS ● 30 EXCITING GAMES AND VISUAL PROGRAMS ● 43 SOFTWARE REVIEWS ● 33 HARDWARE REVIEWS ● 16 BOOK REVIEWS ● 150 HINTS AND TIPS ● 25 APPLICATION PROGRAMS ● SERIES OF ARTICLES FOR BEGINNERS ● MANY ADVANCED TECHNICAL ARTICLES ● NEWS AND PRODUCT INFORMATION ● PLUS SPECIAL OFFERS ● BIG DISCOUNTS ON A WIDE RANGE OF PRODUCTS ● EVENTS ● BRAIN TEASERS ● LOCAL CLUBS ● FULL MAGAZINE INDEX

A YEARS SUBSCRIPTION WOULD HAVE BOUGHT YOU ALL THIS

Figures based on the 10 issues of BEEBUG Volume 2.

BUT IT'S NOT TOO LATE TO JOIN FOR VOLUME THREE

BEEBUG PUBLICATIONS LTD. PO BOX 109, HIGH WYCOMBE, BUCKS

PLEASE ENROL ME FOR VOLUME 3 of BEEBUG AT £11.90 (10 ISSUES)

NAME .....

ADDRESS .....

..... AMOUNT ENCLOSED .....

BEEBUG HAS BEEN ESTABLISHED FOR TWO YEARS AND NOW HAS OVER 25,000 MEMBERS. IT OFFERS TOTAL USER SUPPORT TO ALL BBC MICRO USERS.

PLEASE MAKE CHEQUES MADE PAYABLE TO BEEBUG PUBLICATIONS LTD.
AND SEND TO:- DEPT 4 PO BOX 109, HIGH WYCOMBE, BUCKS.
(DISTRIBUTION AGENTS FOR BEEBUG)

THE BEST HOME COMPUTER SUPPORT IN LEICESTERSHIRE

MICROWARE Leicester "THE FRIENDLY TOUSER STORE"

SINCLAIR ● COMMODORE
BBC ● SOFTWARE
HARDWARE ● REPAIRS

The Best Products at the Best Prices
And Service to Match

SUPER SOFTWARE CLUB

Join our FREE software club and receive very real savings on all new software purchases,

EXAMPLES: R.R.P. £6.95; only £5.95 (save £1.00)
R.R.P. £9.95; only £8.50 (save £1.45)
R.R.P. £14.95; only £12.75 (save £2.20) etc.

FREE membership, no joining fee!

MICROWARE

5, St Peters Lane, Leicester.
Telephone 29023

7, Leicester Road, Loughborough, Leics.

Member of The Computer Trades Association

POOLSWINNER

THE ULTIMATE POOLS PREDICTION PROGRAM

Boxed, with detailed instruction booklet

- **MASSIVE DATABASE** Poolswinner is a sophisticated Pools prediction aid. It comes complete with the largest database available – 22000 matches over 10 years. The database updates automatically as results come in.
- **PREDICTS** Not just SCOREDRAWS, but AWAYS, HOMES and NO SCORES.
- **SUCCESSFUL** SELEC guarantee that Poolswinner performs significantly better than chance.
- **ADAPTABLE** Probabilities are given on every fixture – choose as many selections as you need for your bet. The precise prediction formula can be set by the user – you can develop and test your own unique method.
- **SIMPLE DATA ENTRY** All English and Scottish team names are in the program. Simply type in the reference numbers from the screen. Or use FIXGEN to produce fixture list automatically (see below).
- **DISC/MICRODRIVE COMPATIBLE** All versions (except Apple and IBM) are supplied on tape, with simple instructions for conversion to disc/microdrive operation.

(This seasons results are supplied with the package so that predictions can start immediately.)

AVAILABLE FOR Spectrum (48K), Commodore 64, VIC 20 (+16K), AMSTRAD CPC 464, BBC B, Atari (48K), ZX81 (16K), Dragon, Apple II, IBM pc

PRICE £15.00 (all inclusive)

NEW

FIXGEN 84/5 AT LAST: No more struggling for hours to get the fixture list into the computer. FIXGEN has been programmed with all English and Scottish fixtures for 1984/5. Simply type in the date, and the full fixture list is generated in seconds. Fully compatible with Poolswinner.

POOLSWINNER with FIXGEN £16.50 (all inclusive)
Fixgen alone £5.50

COURSEWINNER V3
THE PUNTERS COMPUTER PROGRAM

Coursewinner is designed to allow you to develop and test your own unique winning system. Using information from daily newspapers or 'Sporting Life', the most important factors can be input and analysed. The program is supplied with a database detailing best trainers and jockeys, and effect of the draw for all British courses. (Flat & National Hunt.)

AVAILABLE FOR Spectrum (48K), Commodore 64, BBC (B), Dragon, Atari (48K), Apple II

PRICE £12.50 (all inclusive)

AVAILABLE (RETURN OF POST) FROM . . .

VISA phone 24 hrs

selec SOFTWARE

Access phone 24 hrs

37 COUNCILLOR LANE, CHEADLE, CHESHIRE. ☎ 061-428 7425

Join the winners!

CONGRATULATIONS TO LAST MONTHS WINNERS

SIMON JONES Leeds	MICHAEL McEWAN Glasgow	JONATHAN PARKES London	PETER WILSON Aberdeen	BRIAN HASTINGS Norwich
PAUL FOSTER Ealing	PHILIP ANDREWS Manchester	DAVID WILLIAMS Cardiff	DAVID HOPKINS Liverpool	JOHN HOLDEN Sheffield

TIRED OF YOUR OLD TAPES?
NEW GAMES TOO EXPENSIVE?
JOIN THE FASTEST GROWING SWOP CLUB
AND YOU COULD WIN ONE OF FORTY GREAT PRIZES!
IN OUR FABULOUS £5,000 COMPETITION

10 Portable Colour T.V.s
10 Disc Drive Units
10 Printers
10 BMX Bikes

Or cash equivalent if you prefer! Just send 3 × 17p stamps and completed coupon for intro pack and competition entry form.

FULL NAME .....

ADDRESS .....

.....

..... POST CODE .....

COMPUTER MAKE ..... MODEL ..... MEMORY .....

YC 3

Swoppatape

PO BOX 18 · HESWALL · WIRRAL · MERSEYSIDE · L60 1YN

Ask an expert why the Electron's the best micro in its class.

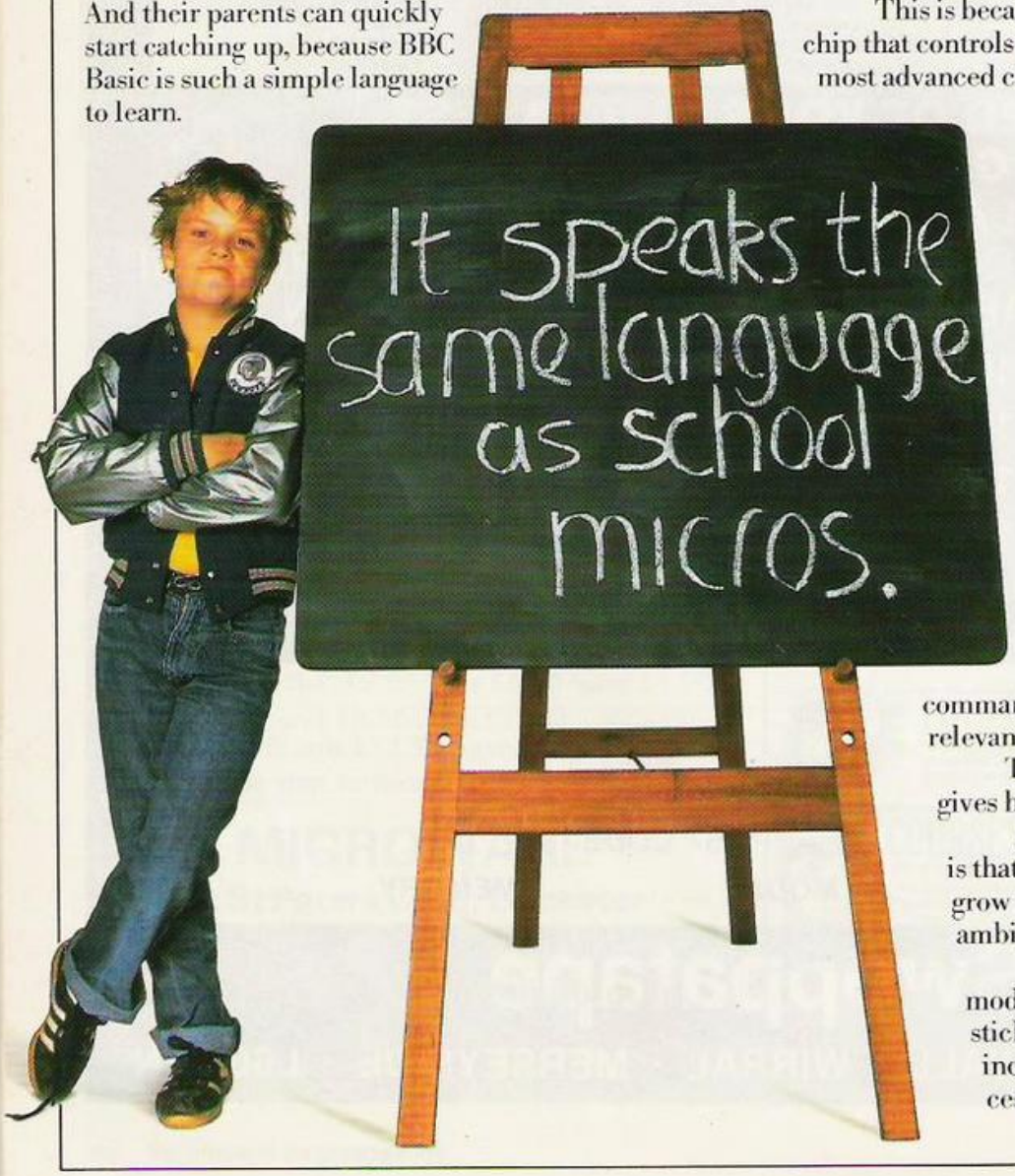
Most schoolchildren will tell you that one computer prevails in British classrooms today. Acorn's BBC Micro.

With a hint of pride, they'll also tell you that they're fluent in the computer language which Acorn developed for the BBC Micro. It's called BBC Basic.

And if you ask their advice on choosing a home computer for around £200, they're likely to tell you that there's really only one sensible choice.

The £199 Acorn Electron.

Like its £399 stablemate, but unlike any other micro, the Electron speaks BBC Basic. Which means that children can easily carry on with their computer studies at home. And their parents can quickly start catching up, because BBC Basic is such a simple language to learn.



However, language isn't the only thing which makes the Electron outstanding among every other micro in its price range.

A powerful choice.

The Electron is a 64K microcomputer which has 32K of RAM, combined with another 32K ROM.

This simply means that it has more power than most people ever need from a home computer.

Nevertheless, it has been designed to help you make the fullest use of its power.

For example, its graphics have the highest resolution of any home computer bar none.

This is because Acorn specially designed the chip that controls the graphics. And it's among the most advanced chips of its kind.

Indeed, it delivers twice as many characters across the screen as the Electron's nearest rival.

It expands into a system.

With the Electron, even total newcomers have been surprised at how quickly they can find their way into the complex world of computing.

Where many computers have keyboards which are confusing and clumsy to operate, it has a keyboard just like an ordinary electric typewriter's.

And for issuing main commands, there are single entry keys. Instead of literally spelling out the command, letter by letter, you just push the relevant key and it's issued.

There's also a built-in loudspeaker which gives high quality sound.

And what is perhaps most exciting is that the Electron has the capacity to grow with your knowledge and ambition.

With Acorn's Plus 1 expansion module, it can link up with a printer, joy sticks and fast-load cartridge software including View and Viewsheet word processing and spread sheet programs.

With the Plus 3 module, which will soon be available, you'll have a disc drive system and will be able to enjoy all the speed and convenience of 3.5 inch discs.

But let's not get carried away too quickly. You can start using and enjoying your Electron as soon as you get it home.

All you need is your television set and a cassette recorder.

The speed of a business micro.

Some home computers respond pretty slowly to your commands. After you've pressed the keys, they leave you twiddling your thumbs for more than a mere few seconds.

The plodders, however, are a very long way behind the Electron.

In fact, on processing speed, a recent bench test survey ranked the Electron up with such high fliers as the IBM PC and the Apple III. Both are machines which cost well over £1,000.

It's an astonishing accolade when the Electron makes no greater claim than to be a micro which is designed to become part of the family.

Your starter for free.

With your Electron, you'll receive a free introductory cassette.

It will give you a taste of the exceptional colour graphics. It will show you how the Electron can play and notate music.

And when it's given you some new ideas about home accounting, it will challenge you to a few games and even spend a few seconds doing your whole family's biorhythms for you.

But remember, although it holds 15 programs, the cassette will only give you a glimpse of the Electron's full potential.

Because the potential is as infinite as your own imagination.

No shortage of software.

Although the Electron is still a relative newcomer to the market, the range of software available for it is considerable.

Besides plenty of games, there are many educational programs for children of all ages, from playschool to A Level.

There's a great deal to keep adults occupied, too. From money management to helpful domestic programs, even a range of foreign language programs, teaching the basics of French, German, Italian and Spanish.

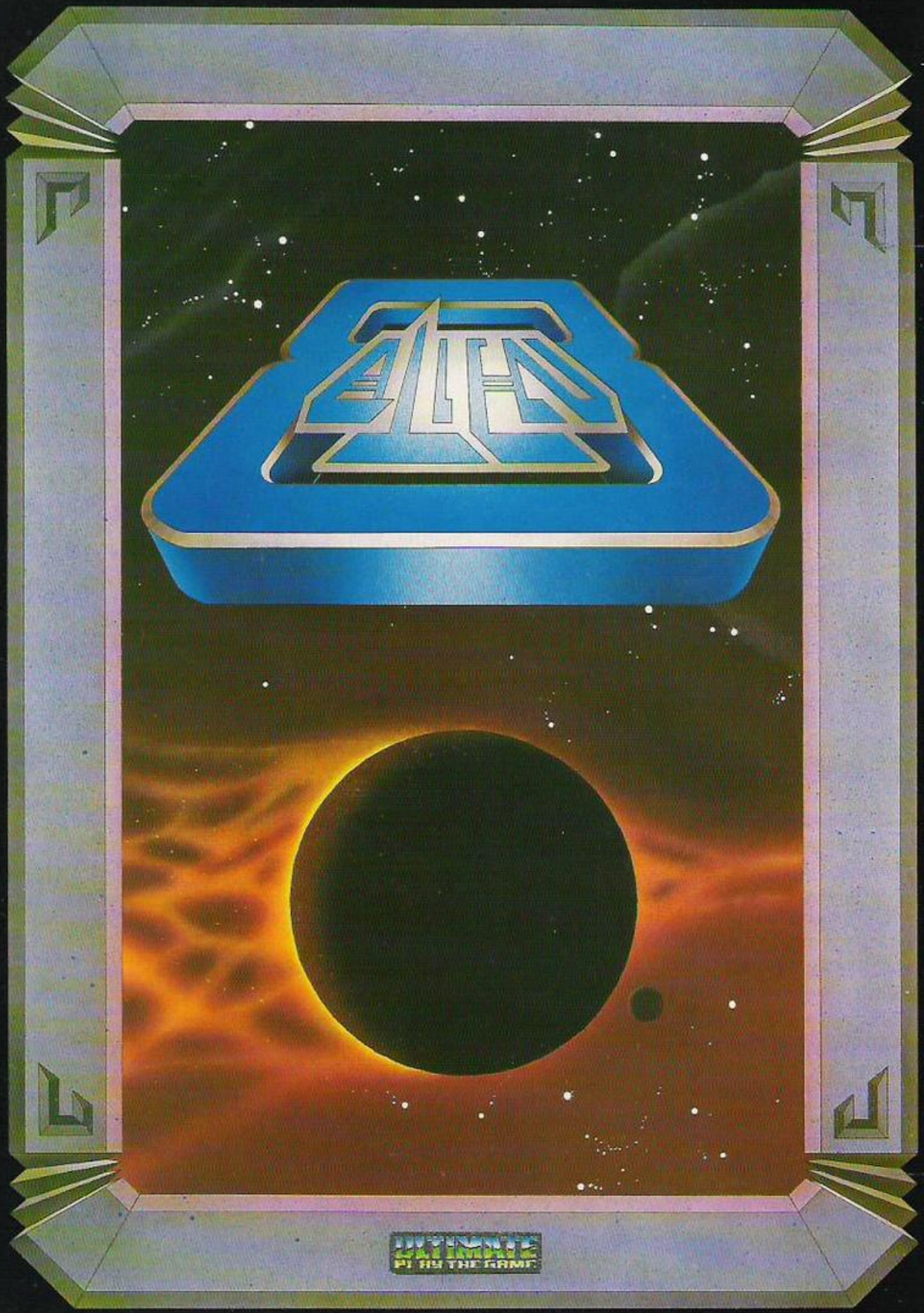
And of course, with its simplicity and flexibility, the Electron could soon be processing programs created and written by none other than yourself.

You can find the Acorn Electron with its full complement of accessories and software at local Acorn dealers and major high street stores.

For the address of your nearest supplier, ring 0933 79300.

The Acorn Electron.

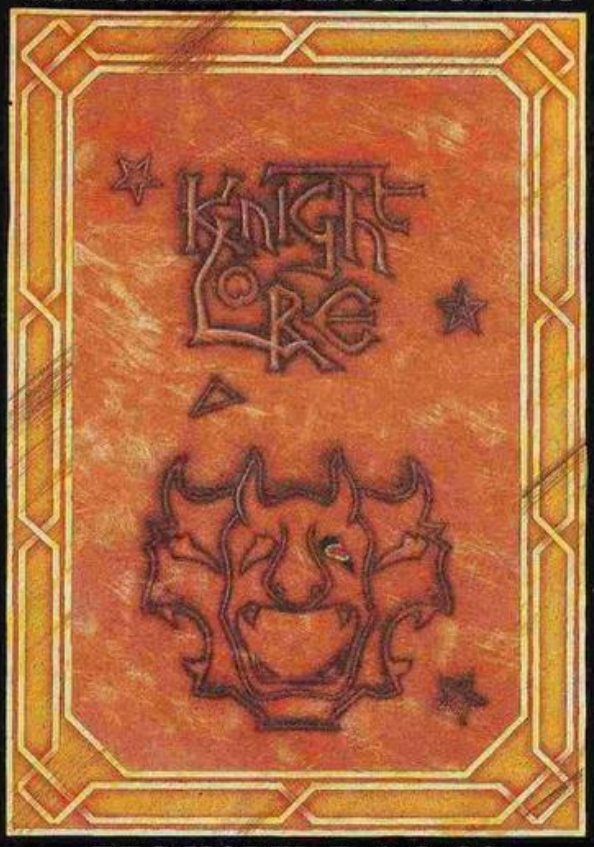
48K SINCLAIR ZX SPECTRUM



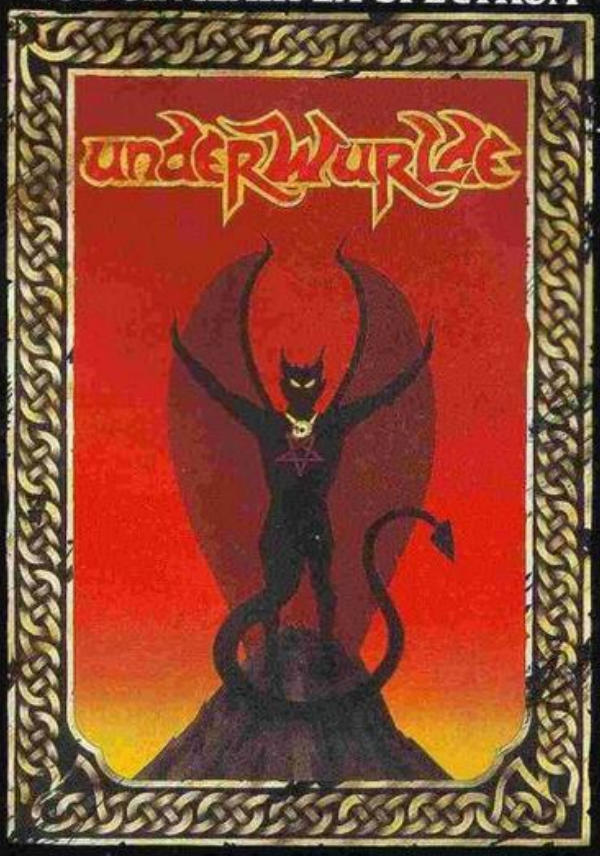
"ALIEN 8" recommended retail price £9.95 inc VAT
Available from W.H.SMITHS, BOOTS, J.MENZIES, WOOLWORTHS
and all good software retail outlets. Also available from
ULTIMATE PLAY THE GAME, The Green, Ashby-de-la-Zouch, Leicestershire LE6 5JU
(P&P included) Tel: 0530 411485

ULTIMATE
PLAY THE GAME

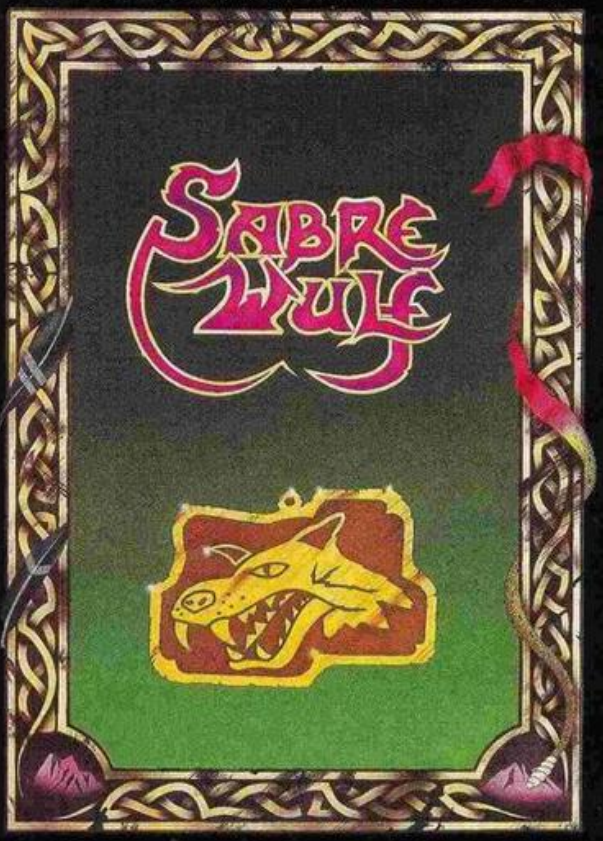
48K SINCLAIR ZX SPECTRUM



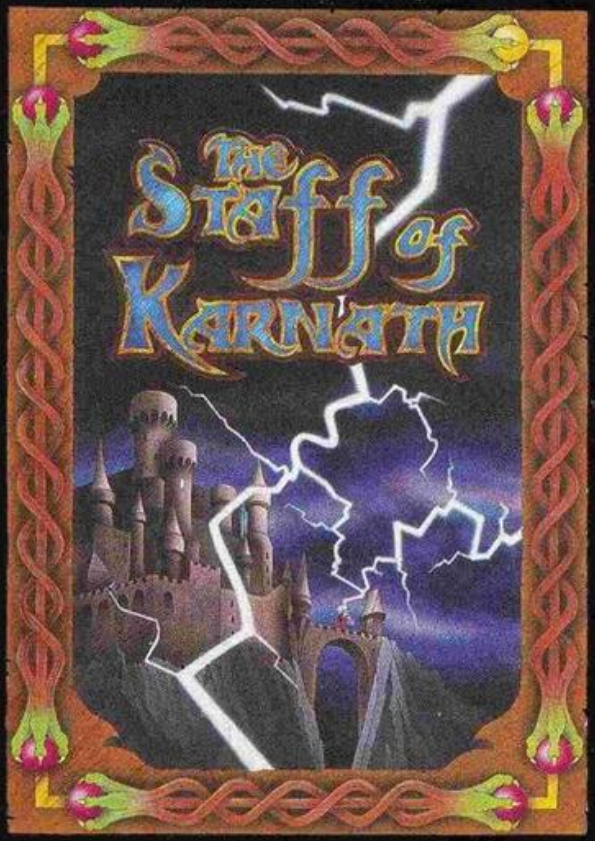
48K SINCLAIR ZX SPECTRUM



BBC MODEL B 1·2 OS
48K SINCLAIR ZX SPECTRUM



COMMODORE 64



"KNIGHTLORE", "UNDERWURLDE", "SABRE WULF", and "STAFF OF KARNATH" recommended retail price £9.95 inc VAT. Available from W.H.SMITH, BOOTS, J.MENZIES, WOOLWORTHS and all good software retail outlets. Also available from ULTIMATE PLAY THE GAME, The Green, Ashby-de-la-Zouch, Leicestershire LE6 5JU (P&P are included) Tel: 0530 411485

HAVE AN ADVENTURE THIS CHRISTMAS WITH LEVEL 9

"The appearance of a new program from Level 9 is a flag-day for all aspiring adventures and, in my household, a signal for the cat to hide under the bed for the duration against the inevitable moment when I go rampaging through the flat, a wild look in my eyes muttering ferociously about bricklaying birds nudist beaches and the like. Since *Return to Eden*, the sequel to *Snowball* is out, the cat may be in hiding until Christmas.

You don't need to have played *Snowball* to get into the sequel as ever, there is ample documentation with the tape which in my Commodore 64 version (it is also on the Spectrum, Amstrad and BBC), is turbo-loaded. It starts with you, agent Kim Kimberly, having been framed for sabotaging the colonyship Snowball, in a crashed stratoglider on the planet Eden. For the moment your mission is to survive the misplaced retribution by your own people, but life gets very much more complicated than that. Solving these puzzles has nothing to do with luck; you either figure your way out of trouble on Eden or die there.

One major difference between this and former Level 9 efforts is that the Spectrum and C64 versions have graphics of a very high quality and can be switched off if required. The scope of the vocabulary appears unscathed by this addition.

Even experienced adventurers will probably get fried a few times by the avenging engines of the Snowball, before discovering how to take shelter. But, once that hurdle is passed, the real adventure begins, and it's a lulu.

From the radioactive desert caused by the engine blast, you progress through a variety of hazards through some highly unlikely locations.

I haven't got to that point yet, and so far superhuman willpower has stopped me using the clue sheet provided, but I can't hold out very much longer since I am having what could be lethal communication problems with some robots. Terrific fun, but should carry a mental health warning." *Popular Computing Weekly 7 Nov 84*

MERRY CHRISTMAS

DISTRIBUTORS

If your local dealer doesn't stock Level 9 adventures yet, use the coupon to buy them from us, or ask him to contact: Centresoft, Microdealer UK, Lightning, R&R, Leisuresoft, PCS(SW), MCD, TBD etc.

	Cassette £9.95	Disk £11.95 BBC or CBM64
COLOSSAL ADVENTURE: The classic mainframe game, with 70 - bonus rooms.	☐	☐
ADVENTURE QUEST: An epic puzzle journey through Middle Earth.	☐	☐
DUNGEON ADVENTURE: 40 treasures to find and 100 - puzzles to solve.	☐	☐
SNOWBALL: Immense Science Fiction game with over 7000 locations.	☐	☐
RETURN TO EDEN: Vegetarian adventure. (Amstrad, CBM 64 and Spectrum versions have 240 pictures)	☐	☐
LORDS OF TIME: Imaginative romp through World History.	☐	☐
ERIK THE VIKING: Family game for BBC, CBM 64 and Spectrum only. All with 180 - pictures.	☐	

I ENCLOSE A CHEQUE/PO FOR £9.95 PER CASSETTE OR £11.95 PER DISK

My name: _____

My address: _____

_____

_____

_____

My micro is _____

(one of those listed below with at least 32K). Send coupon to:

LEVEL 9 COMPUTING
Dept Y, 229 Hughenden Road
High Wycombe, Bucks. HP13 5PG

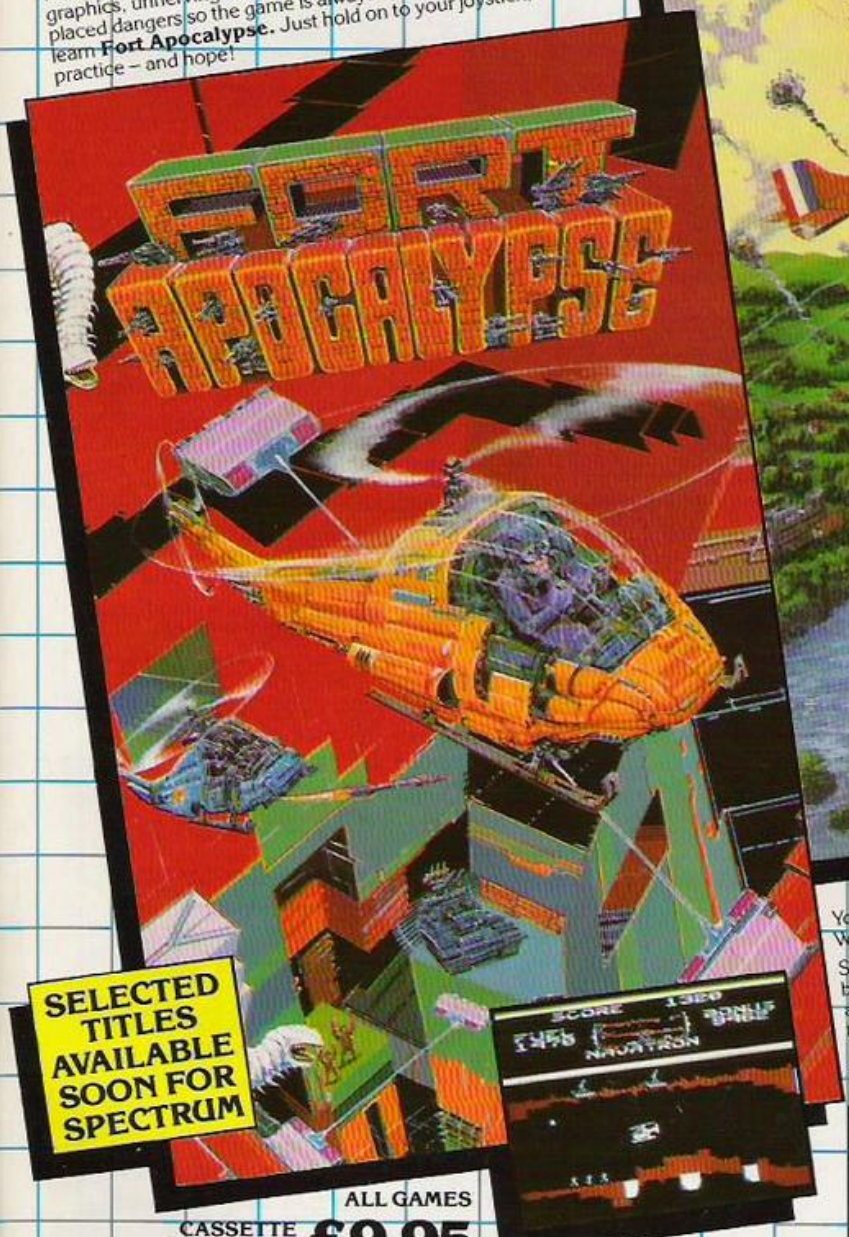
AMSTRAD BBC CBM64 SPECTRUM MEMOTECH NASCOM ATARI

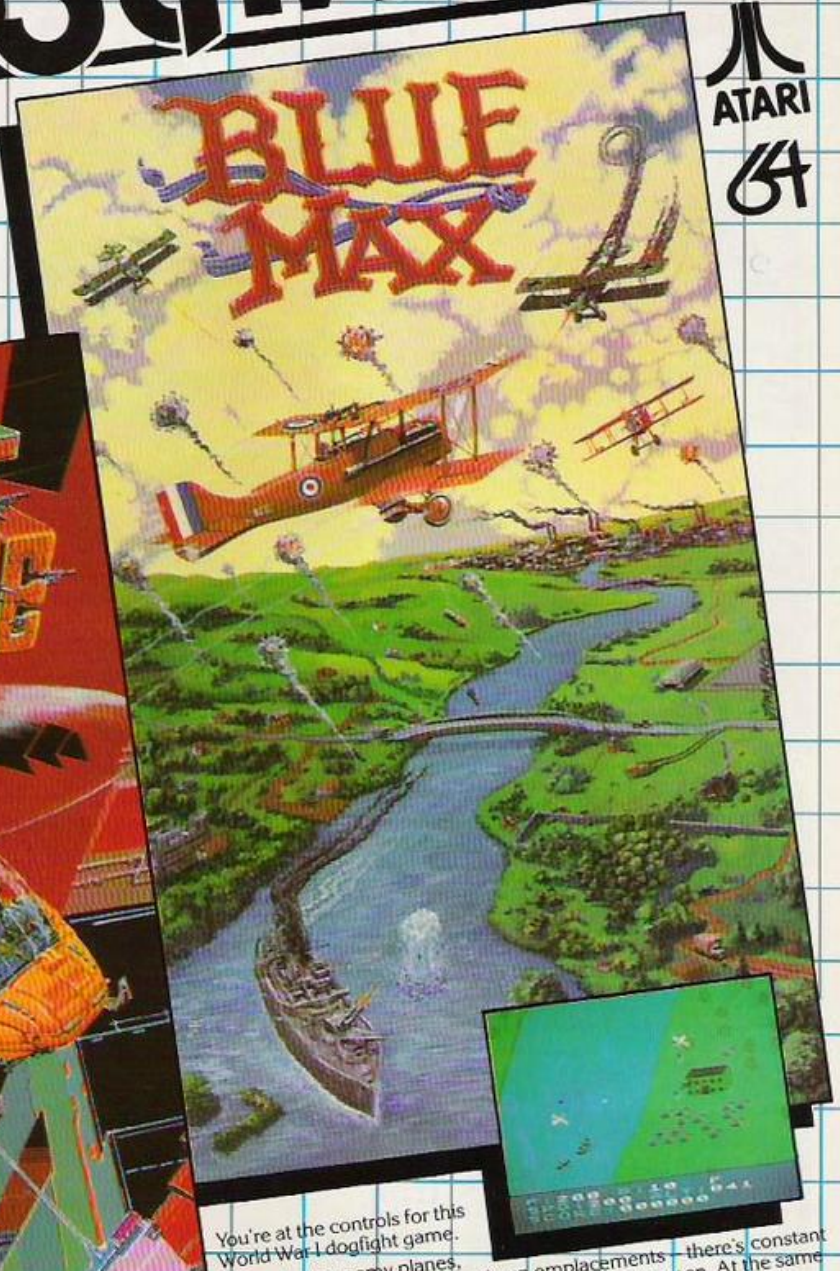
Aerial arcade action from Synsoft

BOMBS AWAY!

ATARI 64

Play this multi-level extravaganza three different ways. You and your chopper must bomb and fire on vile enemies, navigate hazards like deadly laser rooms and hyper-energy chambers, rescue 18 trapped friends – and make your way through the most demanding, maddening set of caves ever devised. Super graphics, unnerving sounds, constant scrolling, plus randomly placed dangers so the game is always new. You can't really learn **Fort Apocalypse.** Just hold on to your joystick, practice – and hope!





You're at the controls for this World War I dogfight game.

Shoot down enemy planes, bomb targets, strafe tanks and gun emplacements – there's constant action on the incredible 3-D diagonally scrolling screen. At the same time, you have to keep track of altitude, speed, fuel and damage. Medals don't come easy. You must master a series of flying skills and perform them with pinpoint accuracy. One slip and you've lost it all – even your life. Happy landings, ace!

SELECTED TITLES AVAILABLE SOON FOR SPECTRUM

ALL GAMES

CASSETTE £9.95

DISK £14.95

U.S. Gold Ltd., Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Tel: 021-359 3020.

U.S. GOLD All American Software

synsoft

A lively, imaginative alternative to rockets and bombs. Your Drelb builds squares, his enemies knock them down. Quick reflexes, intelligence and strategy are a must.

Commodore 64 & Atari.

One of the most challenging arcade games available! Incredible 3-D graphics, diagonally scrolling screen, super sound – all in great detail.

Commodore 64.

Exciting 3-D action! The most realistic point-of-view game you've ever played. Navigate through asteroid belts, destroy enemy ships, and more!

Commodore 64.

REAL ARCADE ACTION! FROM JETSOFT

FAST LOAD 2 minutes

FAST LOAD 1½minutes

All 3 games for Commodore 64

Cavelon II Can you destroy the wicked wizard of castle Cavelon? Only after negotiating the six levels in his castle. Collect all the door pieces before you can attain the next level. Help is at hand in this all thrills, all action, real arcade game, when excalibur appears, achieve indestructability.

Quari 27 levels of increasingly difficult real arcade action. Based on the game Bongo, you must avoid the chasing dinosaur, pterodactyls, falling rocks, native spears and bouncing Bongos. Negotiate rope bridges and erupting volcanoes, picking up the treasures of a lost civilisation as you go – and finally cage the dinosaur – if you can!

FAST LOAD 1½minutes

BMX STUNTS BMX STUNTS Based on the original arcade game this action packed game challenges your skill over six tests, straight race, wheelie, ramp jump, slalom, bunny hops and the ultimate test over a V.W. beetle in the Beetle ride.

JetSoft the arcade people

061 775 0333

***Commodore-64**
***Dragon 32S/64**
***Atari 400/600/800 (48K)**
***Acorn Electron**
***BBC Model/B**
***Tandy c/c (32K)**

NOW ON ZX SPECTRUM 48K

747 Flight Simulator

from DACC — The Simulation specialists

©Actual screen photograph (BBC version)

Unrivalled and unbeatable for accuracy and realism — the DACC 747 Flight Simulator is the most successful of its kind on home computers. The only simulator which shows all the essential flight and engine instrumentation of the Jumbo Jet, as they really are — real dials — and with a precise 3D view of the runway. The control and response of the 747 are faithfully reproduced using genuine aero-dynamics formulae. Start options include take-off, random landing approach, passenger and fuel load selection, etc. You control the throttles, elevators, ailerons, flaps, spoilers, landing gear, brakes, reverse thrust, etc. Joysticks are optional on all but Dragon and Tandy versions.

Cassette £9.95 (inc. VAT and P&P)

Spectrum version £7.95 (inc. VAT and P&P)
CBM 64 Diskette version £11.95 (inc. VAT and P&P)
WE DESPATCH WITHIN 48 HOURS

Order direct from:

DACC Ltd. (Dept YC3)
23 Waverley Road, Hindley, Nr. Wigan, Lancs. WN2 3BN.

MAIL ORDER PROTECTION SCHEME

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, *Your Computer* will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided that:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of of *Your Computer* summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claims and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent.

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements. Classified advertisements are excluded.

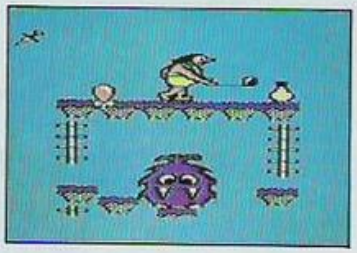
Commodore 64, available Now

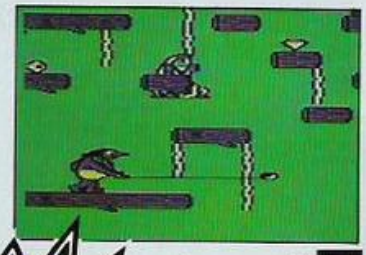
POSITIVELY PRIME EVIL...

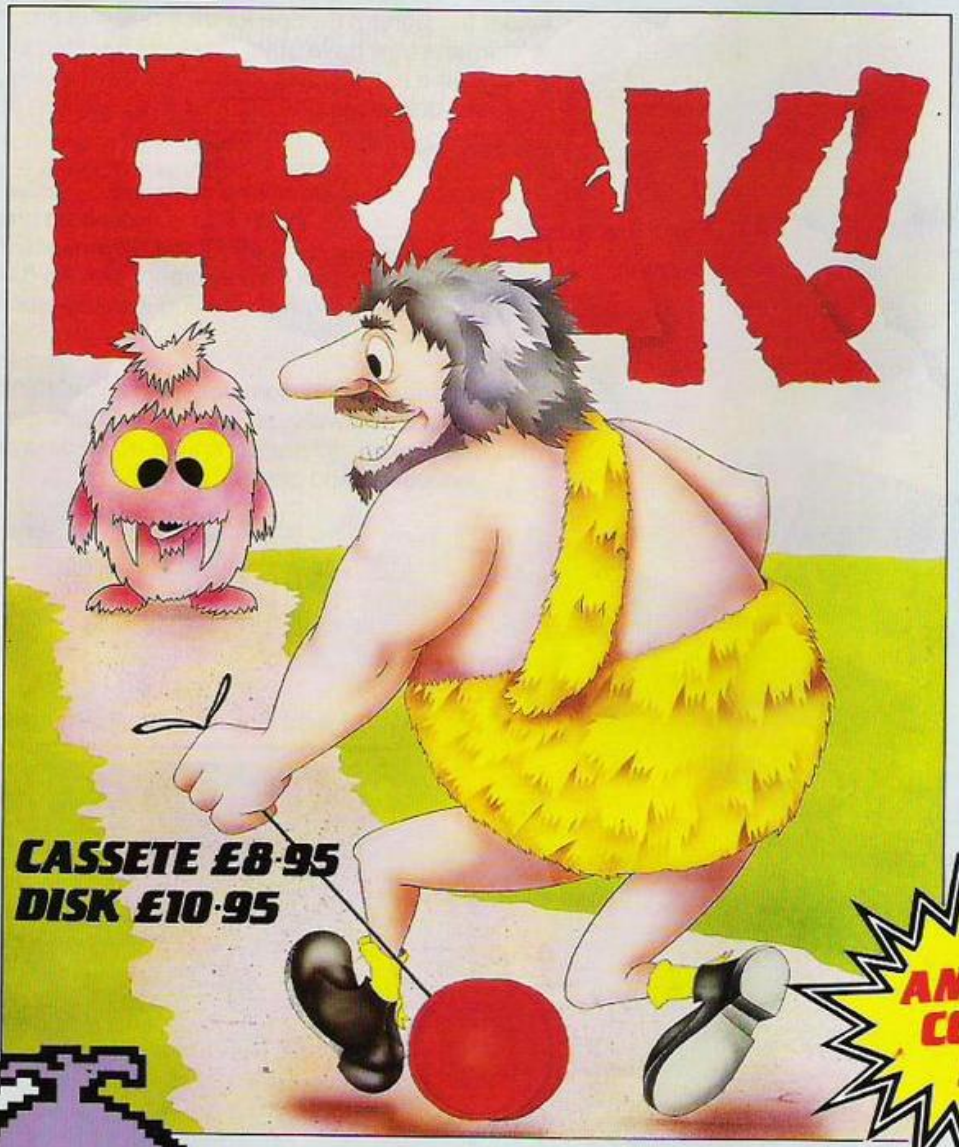
Steer our hero **TROGG** the cuddly caveman, through 96 *reversible* levels of dangers — Occasional hails of descending daggers, heat-seeking balloons and the evil **BUNYIP** will cause you deathly problems; But don't worry — your trusty yo-yo and *off-screen action*(!) will win you points and keep you going.

SCRUBBLY guardians, **HOOTER** **POGLET** and others will give you a hard time, and the better you are, the nastier and more unexpected the surprises in store.

96 LEVELS







CASSETE £8·95
DISK £10·95

AMSTRAD COMING SOON

FRAK 64! Grand Master Challenge:

Send us your name, address, hi-score and code, and we will enter you in our prize draw for the top score in '84 - details on request

Mail Order or Dealer Enquiries....

State Soft Limited

Statesoft

Business & Technology Centre Bessemer Drive STEVENAGE Hertfordshire SG1 2DX Tel: (0438) 317583

TAKE A TEST FROM THE RANGE

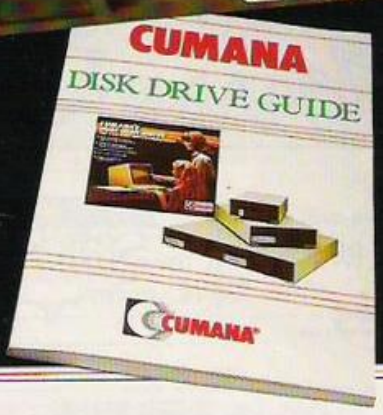
So now you have got your home computer, you're ready to talk to Cumana – the best name in memory. Already a market leader throughout Europe for their range of disc drives Cumana now have other products on offer, all to the same exacting standards that have made their disc drives the number one choice in the home and in education.

The Touch Pad

The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

The product comes complete with an instruction booklet, basic software, stylus and connecting cable. Its uses are in graphics, computer aided design, education and games.

£69.95
including VAT.



Disc Drives

Cumana have spent years on research, development and marketing a range of drives second to none. Their drives are compatible with BBC, Spectrum, Dragon, Oric, Tandy Models I,II, III and 4 and Video Genie. They are fully guaranteed for 12 months and approved for electrical safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disc drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you in the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.

DRIVE
CUMANA

The Acorn Electron Computer
A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

Cumana price
£199.00

Disk interface now available for the Acorn Electron, details from Cumana.

Cumana BBC Microcomputer compatible disk drives: retail price list.

Cumana disk drives supplied with formatting diskette, drive connecting cable and comprehensive user manual. Independent power supply, mains lead and moulded plug included.

CS100 40 Track single sided (100K)	£159.95
CS200D 40 Track double sided (200K)	£203.95
CS200 80 Track single sided (200K)	£192.95
CS400 80 Track double sided (400K)	£219.95
CD200 2 x 40 Track single sided (200K)	£284.95
CD400/S 2 x 80 Track single sided (400K)	£359.95
CD800/S 2 x 80 Track double sided (800K)	£414.95

Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

CS100E 40 Track single sided (100K)	£149.95
CS200ED 40 Track double sided (200K)	£192.95
CS200E 80 Track single sided (200K)	£180.95
CS400E 80 Track double sided (400K)	£208.95

Cumana disk drives supplied with formatting diskette and comprehensive user manual. Power supply taken from BBC Microcomputer, with lead supplied.

CSX100D 40 Track single sided (100K)	£119.95
CSX200D 40 Track double sided (200K)	£165.95
CSX200 80 Track single sided (200K)	£159.95
CSX400 80 Track Double sided (400K)	£189.95
3½ INCH DRIVES	
CSX351 40 Track single sided (100K)	£139.95
CSX354 80 Track double sided (400K)	£199.95
CDX352 2 x 40 Track single sided (200K)	£256.95
CDX358 2 x 80 Double sided (800K)	£383.95

All Prices Inclusive of VAT.
All 80 Track 5¼" Drives are Switchable to 40 Track Mode

DISTRIBUTORS/RETAIL

Available from the following retail outlets: W.H.Smith, John Lewis Partnership, Greens Leisure, Laskys, Spectrum UK.

Area distributors:
Addons Ltd. (Southampton) 0703 34775/6, Audio & Computer Centre (Jersey) 0534-74000, Eltec (Bradford) 0274-722512, South Wales Peripherals 0633-841760, HCCS Associates (Gateshead) 0632-821924, Hugh Symons (Bournemouth) 0202-26535, J. S. Simnett Computers (South London) 01-541 1495, Kingdom Design (Belfast) 0232-643720, Lightning (Harrow) 01-969 5255, Microage Distribution (North London) 01-205 7688, Microworld (Edinburgh) 031-228 1111, National Micro Centre (Stockport) 061-429 8080, Silicone Express (Leicestershire) 0533 374917, Thompson Cook (Birmingham) 021-328 3895,
+ National Dealer Network.

Diskettes
Only when Cumana found a double density diskette up to their stringent quality control requirements, and at a price that made sense to the end user, were Cumana ready to put their name to it.

The result was a top quality diskette, complete with a plastic protective case for the ten-pack (they are also sold in two-packs!) together with index stickers.

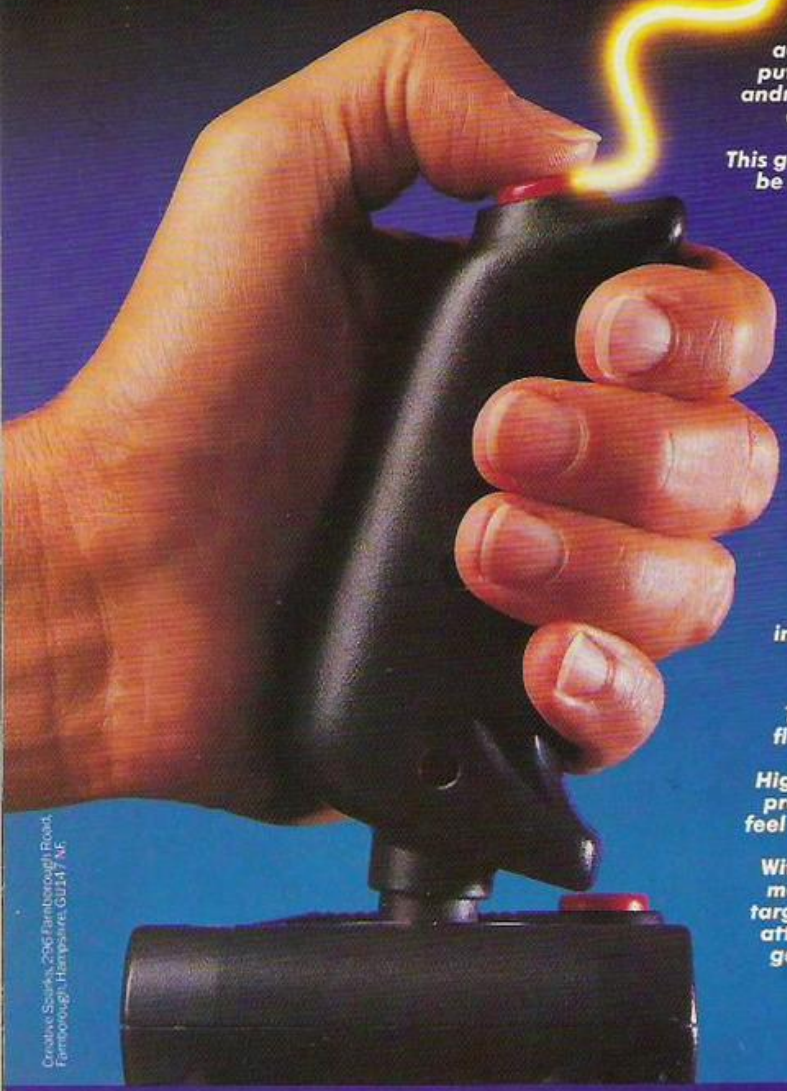
Cumana diskettes are available now in both 5¼ inch and 3½ inch as single or double-sided, 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name on record.

CUMANA®

Cumana Limited, Pines Trading Estate, Broad Street, Guildford, Surrey. GU3 3BH
Telephone: 0483 503121

QUALITY CONTROL FROM CREATIVE SPARKS ON C64

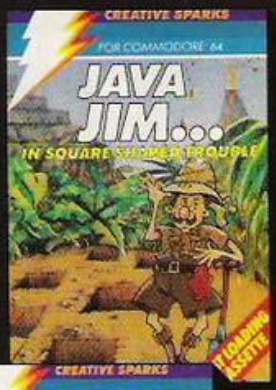
For those who demand excellence



JAVA JIM

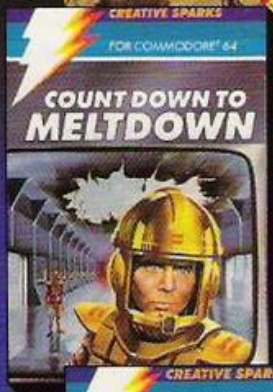
Guide Java Jim around the screen digging near square holes as he searches for ancient relics. You will have to avoid the lumps of sizzling lava being continually showered down on Jim from the still active volcano in this highly original fun game.

4 full graphic all action screens.
20 levels of play.
High score feature.
Fast loading cassette.



COUNTDOWN TO MELTDOWN

An amazing graphic action adventure game which puts you in charge of a team of androids trying to reach the core of a nuclear reactor before it explodes.
This game has over 2000 rooms to be negotiated and every single one of them is in 3D!!
Probably the most exciting game yet developed for the C-64.
Fast loading cassette.

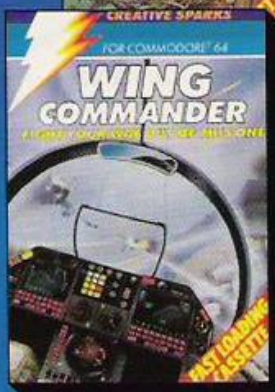


BIRD MOTHER

This is a delightfully original game which uses nature as the setting for a highly compelling and challenging game. Guide the Bird Mother as she builds her nest and raises her young, finally protecting them from a predator hawk.
Fast loading cassette.
The stunning graphics and music in Bird Mother are not to be missed.

WING COMMANDER

This is a highly sophisticated flight combat simulator which puts you in the pilots seat. Highly advanced machine code programming has ensured you feel every stomach lurching dive and roll.
With 17 separate controls to be monitored and several ground targets to be defended from the attacking enemy bombers. This game will stretch your skills to their limits.
Fast loading cassette.



Creative Sparks, 296 Farnborough Road, Farnborough, Hampshire, GU14 7NF.

CREATIVE SPARKS

Available from All good computer software stockists.

Send me (tick as required)

- ☐ **JAVA JIM** TNCE163 (C64) **£7.95**
- ☐ **COUNTDOWN TO MELTDOWN** TNCE273 (C64) **£7.95**
- ☐ **BIRD MOTHER** TNCE263 (C64) **£7.95**
- ☐ **WING COMMANDER** TNCE203 (C64) **£7.95**
- ☐ My local stockist's address
- ☐ Your full list of games

Game/s at £7.95 each £ : p
+ single P&P sum : 30p
Total to send £ : p

Method of payment
By cheque or PO (no cash) made payable to **TECS**

☐ By Access
or
Enter card no. ☐ Barclaycard

Sign below:

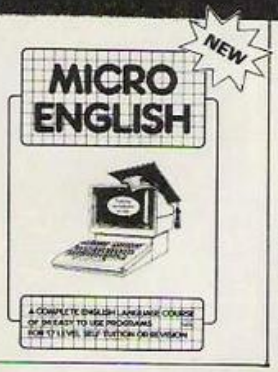
Credit card sales: UK buyers only.
Response within 21 days.

Creative Sparks,
Department MO,
296 Farnborough Road,
Farnborough, Hampshire, GU14 7NF.
Telephone: (0252) 518364.

Name
Address

YC 185

Educational Software LCL



BBC Micro
ZX Spectrum
Commodore 64
Electron
unexpanded Vic
ZX81
Apple
PET
Dragon (book only)
All software for the above computers.

MICRO ENGLISH (BBC, Electron). Complete English Language self-tuition and revision course, to O-Level, of 24 programs. Includes "speak-and-spell" (no extras). £24.50.
MICRO MATHS 24 program revision or self-tuition course to O-Level. £24.50 (except ZX81 £12.00).
BRAINTEASERS (BBC, Electron, CBM 64, Spectrum, Dragon, Vic) Book of IQ tests & puzzle programs. £3.95.
ANIMATED ARITHMETIC Teaches using moving colour pictures (not words) Ages 3-8. £6.50 (disc £7.50).
MASTER MATHS (Apple, Pet and CBM 64 only). 50 program O-Level course or teacher's aid, amazing graphics. £90.
"... the programming standard is high". TIMES EDUCATIONAL SUPPLEMENT

Immediate dispatch Micro Maths, Micro English and Master Maths. Phone or send orders or requests for free catalogue (200 programs) to:
World leaders in educational software (distributors in 24 countries.)

LCL
26 Avondale Ave.
Staines, Middx.
Tel: 0784 58771
24 hrs. Orders

Access
VISA
GENEROUS TRADE DISCOUNTS
AS SEEN ON TV

THE MICRO WORKSHOP

MICRO COMPUTER SPECIALISTS

(Spectrum Group Member)

Software and hardware over the counter for Sinclair Spectrum, ZX-81, BBC,. Vic-20, CBM-64, Memotech, Amstrad, etc.

* COMPUTERS
* JOYSTICKS
* KEYBOARDS
* TAPES
* RAMPACKS
* BOOKS
* DISCS
* LIGHT PENS

* COMPONENTS *

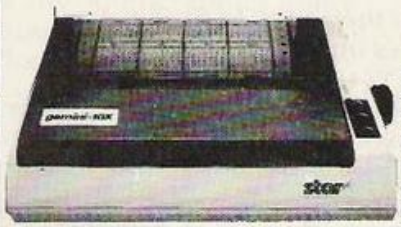
Business/Serious Programs available

Located directly opposite Epsom Main Line Station. Visit us or ring for friendly service. See and try before you buy.

Overseas/Export orders welcome

12 STATION APPROACH
EPSOM, SURREY.
EPSOM 21533

star ATTRACTIONS



£189.95
+VAT = £218.44

120 CPS ● BI-DIRECTIONAL LOGIC SEEKING ● FRICTION TRACTOR AND ROLL HOLDER STANDARD ● DOWNLOADABLE CHARACTERS ● ULTRA HIGH RESOLUTION ● 80 COLS ● IBM PC VERSION NOW AVAILABLE

GEMINI-10X

FIDELITY

12 MHZ VIDEO BANDWIDTH
RGB AND COMPOSITE VIDEO
MEDIUM RESOLUTION

£169.95
+VAT = £195.44

14 INCH COLOUR MONITOR
Also available in TV/Monitor version at £195.95 + VAT = £225.34

LOOK!
NEW LOWER PRICES ON EPSON, STAR & BROTHER

DAISYWHEEL PRINTERS

BROTHER HR 15	CALL FOR BEST PRICE
EPSON DX 100	£369.95 + VAT = £425.44
JUKI 6100	£325.00 + VAT = £373.75
DAISYSTEP 2000	£225.00 + VAT = £258.75

DOT MATRIX PRINTERS

COSMOS JP80	£169.00 + VAT = £194.35
EPSON RX 80	£198.95 + VAT = £228.79
EPSON RX 80 F/T	£228.95 + VAT = £263.29
EPSON RX 100	£384.95 + VAT = £442.69
EPSON FX 80	£319.95 + VAT = £367.94
EPSON FX 100	£498.95 + VAT = £573.79
STAR GEMINI-10X	£189.95 + VAT = £218.44
STAR DELTA 10	£319.95 + VAT = £367.94
STAR RADIX 10	£498.95 + VAT = £573.79

THERMAL MATRIX PRINTERS

STAR STX 80	£129.95 + VAT = £149.44
BROTHER HR 5	CALL FOR BEST PRICE
BROTHER EP 44	CALL FOR BEST PRICE

Cables – Paper – Ribbons – Sheet Feeders
Tractor Feeds – Interfaces – *Call for Best Prices*

CREDIT CARD HOT LINE
01-482 1711

Access
VISA
Please add £10+VAT for delivery
Post your cheques/P.O's to:

DATASTAR SYSTEMS UK

UNICOM HOUSE 182 ROYAL COLLEGE STREET
LONDON NW1 9NN
Telex 295931 UNICOM G
TAX-FREE EXPORT & DEALER ENQUIRIES WELCOME
MONDAY-FRIDAY 9-6 SATURDAY & SUNDAY 10-1
Personal callers welcome. We are situated by the junction of Camden Road by the railway bridge.

HERE'S SIX WAYS TO M

PAINTBOX

Superb Graphics — without expensive hardware!

PAINTBOX is a must for every owner of a 48K Spectrum.

It will give you the ability to produce stunning graphics on your micro — simply.

With PAINTBOX there's no need for expensive hardware — why pay up to £150 for hardware when you can produce incredible picture and graphics with one cassette-based software package?

If you haven't seen PAINTBOX demonstrated you're in for a pleasant surprise!

For instance, PAINTBOX will enable you to draw practically anything on your screen and save it either as SCREEN$ or as a machine code memory file to use in your BASIC or MC programs.

You wield enormous power over the graphics capability of your SPECTRUM — including the definition, storage and use of up to 84 UDG's — 4 times more than normal! A brief description of facilities are as follows:

UDG DRAWING BOARD for defining up to 4 Banks of UDG's including ROTATE, MIRROR, INVERSE etc.

UDG EDITOR for storing up to 84 UDG's for use in screen planning or in your other programs.

PRECISION PLOTTER. A high-resolution drawing board which allows you to draw anything on the screen. Facilities like CIRCLE, FILL, ARC, PLOT, DRAW, ERASE, OVER, DRAW RADIALLY, INK, BRIGHT etc are included and easy to use!

SCREEN PLANNER gives you the best of both worlds! The combined use of PRECISION PLOTTER and your Banks of UDG's for highly detailed and precise screen graphics.

The program is complete with DEMO on side two of the cassette and a 28 page instruction booklet.

PAINTBOX can be used with Joysticks and is Sinclair Microdrive compatible.

SCREEN MACHINE

Instant Machine Code for graphics and text

SCREEN MACHINE is a completely professional graphics utility to use with Paintbox (or any other graphics hardware or software).

It will allow you to manipulate your screen graphics and text in ways which will make your programs better and more memory efficient. For instance:

If you have produced a screen-full of superb graphics you can enlarge, reduce, recolour, flip screen, relocate your graphics to another part of the screen, superimpose one screen on another and perform all sorts of other wonders!

Then you can take your results and put them through a series of memory compression routines to allow you to save enormous amounts of memory. Such items like compressing with or without attributes, saving thirds of the screen and multiple combinations of both are possible.

Never has machine code storage of graphics been simpler because SCREEN MACHINE automatically creates re-callable multiple screen files with a location catalogue so that you can add them to your programs!

SCREEN MACHINE also allows the user to program UDG's or text directly into machine code, so if your programs use a lot of text instructions or menus SCREEN MACHINE is going to save fantastic amounts of memory!

SCREEN MACHINE is a major graphics toolkit for the 48K SPECTRUM. It is completely menu-driven, Sinclair Microdrive compatible, and comes with instruction book and an unbelievable DEMO on side 2 of the cassette.

ADVENTURE PLANNER

A must for the adventure game fan

If you're an Adventure Game nut, Print 'n' Plotter's new ADVENTURE PLANNER is exactly what you have been looking for!

It's a 50 page, BIG SIZE (16¾" x 11¾") pad with a complete 'mapping' system with over 150 locations on each sheet . . . created to help you solve Adventure Games.

It's the best way to beat the 'system' and is obviously for use with any make of computer.

ADVENTURE PLANNER will also assist you in planning Adventure Games for programming — a helpful pad to keep by your computer at all times.

O IMPROVE PROGRAMS.

ADVENTURE PLANNER is published with instructions for use, examples, hints and tips on how to play and win the game faster.

ADVENTURE PLANNER is a high quality pad, board-backed and fly-leaf cover . . . economically priced too!

ZX SPECTRUM JOTTER

Pre-planning your screen made easy . . . and precise!

Print 'n' Plotter JOTTERS have become a household word for the Sinclair enthusiast.

Despite various imitations our original ZX SPECTRUM JOTTER is still the one people prefer!

Of course it could be because it is professionally produced . . . the quality is superb.

And the fact that it is BIG SIZE A3 (16½" x 11¾") is a distinct advantage when working in high-resolution.

It's also 100 pages thick. 50 pages of PLOT grids showing each numbered pixel co-ordinate and 50 pages of PRINT grids showing every character and graphic character position and INPUT lines.

Each page also contains 24 UDG planning grids (2400 per pad).

Consider also the fact that it is printed on Artist's Detail paper . . . thick enough to take any writing, drawing or colouring, yet thin enough to overlay onto a drawing and trace-off.

For pre-planning graphics, text, tabulation or anything to produce 'on screen', a Print 'n' Plotter JOTTER won't be beaten.

The complete package comes with a set of coloured pens, a Pixel ruler and a handy corrugated storage tray.

If you use PAINTBOX, SCREEN MACHINE or any other graphics utility . . . you'll do things better with the ORIGINAL Print 'n' Plotter JOTTER!

KEYBOARD OVERLAYS

The simple answer to "Which key?"

Print 'n' Plotter KEYBOARD OVERLAYS for the standard ZX Spectrum keyboard are the economic answer to "Which key does what?"

If you program, or buy commercially-produced software, sooner or later you'll be faced with a mind-boggling mass of keys that perform different functions.

Let's face it, the Spectrum keyboard is complicated enough so why not take the easy way to remember . . .

. . . lay over the keyboard a Print 'n' Plotter OVERLAY and write the function underneath . . . it's child's play!

Print 'n' Plotter KEYBOARD OVERLAYS come in packs of ten. Punched to fit your Spectrum. Priced to suit your pocket!

ZX PRINTER PAPER

High quality. Cheaper Price!

Print 'n' Plotter have gained a good reputation for the most reliable and high quality PRINTER PAPER for your ZX PRINTER.

Now it's even better because we've reduced the price!

So if you want ZX PRINTER PAPER that gives good, clear print . . . and you want it a little cheaper . . . send today for quick delivery!

ORDER NOW OR ASK YOUR LOCAL COMPUTER SHOP!
CREDIT CARD
24hr ANSAPHONE ORDERS
01-660 7231

(Phone 01-403 6644 for Dealer and other enquiries)

Post to: Dept Y12 Print 'n' Plotter Products Ltd 19 Borough High Street, London SE1 9SE Please send me the following:

..... PAINTBOX SOFTWARE	@ £ 8.25
..... SCREEN MACHINE	@ £ 8.25
..... ADVENTURE PLANNER	@ £ 4.50
..... SPECTRUM JOTTER PADS	@ £ 9.00
..... KEYBOARD OVERLAYS	@ £ 2.95
..... 5 ROLLS ZX PRINTER PAPER	@ £12.00
..... 10 ROLLS ZX PRINTER PAPER	@ £23.00

☐ Please tick this box for Paintbox Microdrive instructions

All prices include VAT and U.K. postage

Overseas orders add 25% on quoted prices for additional handling

☐ I enclose remittance in full

☐ Please bill my ACCESS/BARCLAYCARD/VISA/MASTERCARD No:

Name: _____

Address: _____

_____

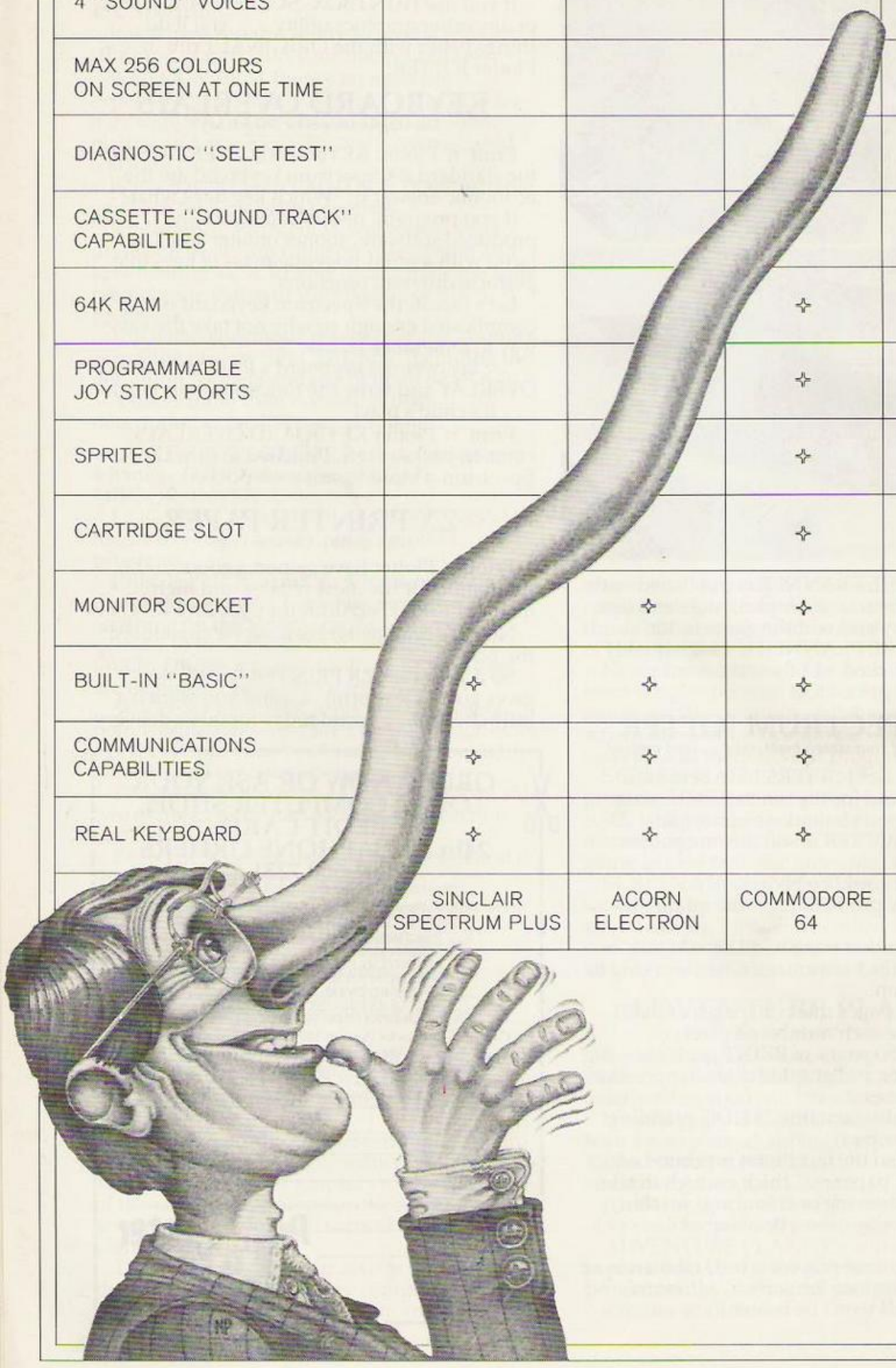
_____

_____

Print 'n' Plotter Products

YC/1/85

FEATURES				
4 "SOUND" VOICES				✧
MAX 256 COLOURS ON SCREEN AT ONE TIME				✧
DIAGNOSTIC "SELF TEST"				✧
CASSETTE "SOUND TRACK" CAPABILITIES				✧
64K RAM			✧	✧
PROGRAMMABLE JOY STICK PORTS			✧	✧
SPRITES			✧	✧
CARTRIDGE SLOT			✧	✧
MONITOR SOCKET		✧	✧	✧
BUILT-IN "BASIC"	✧	✧	✧	✧
COMMUNICATIONS CAPABILITIES	✧	✧	✧	✧
REAL KEYBOARD	✧	✧	✧	✧
	SINCLAIR SPECTRUM PLUS	ACORN ELECTRON	COMMODORE 64	ATARI 800XL



AT £129, LOOK HOW THE ATARI 800XL COCKS A SNOOK AT THE COMPETITION.

AT LAST, SERIOUS HOME COMPUTERS ARE UP AGAINST SERIOUS COMPETITION. THE ATARI 800XL OFFERS EVERYTHING COMPETITORS IN OUR PRICE RANGE OFFER. AND AS YOU CAN SEE ON THE LEFT, A GREAT DEAL MORE. PLUS SOFTWARE PRICES THAT START AT LESS THAN £10.

ATARI 800XL

FOR FURTHER DETAILS CONTACT YOUR NEAREST ATARI DEALER: BOOTS, CARREFOUR, CO-OP, CURRYS, DIXONS, GRANADA, LASKYS, LEWIS'S, LITTLEWOODS, MAKRO, RUMBELOWS, SILICA SHOP, SPECTRUM, VALLANCES, WIGFALLS, AND ALL OTHER COMPUTER SHOPS.

YOUR COMPUTER CLASSIFIED

01-661 3036

Contact: Lucy O'Sullivan

ADVERTISEMENT RATES — **Copy Date** Jan 25th

Lineage: 50p per word
(Min 20 words)
Box No: £4.00 extra
Linage advertisements are prepayable and the order form published in this section should be completed and returned with remittance. Credit Card facilities are available.

Display — rates per scc (Min. 2scc)

One insertion	:	£9.00
Three insertions	:	£8.70
Six insertions	:	£8.50
Twelve insertions	:	£8.00

Display advertisers should preferably reserve space by phone.

Closing date for Classified advertisements is the 26th Nov. for the Jan. edition.

Post to
Your Computer, Classified Department, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Britain's Biggest Selling Home Computer Magazine

MICRODRIVE TRANSFER TAPE

At last **MAJORITY** of your software can be transferred to Microdrive, even auto-start commercially made games **WILL** run as intended.

* The **NEW 007 MD** cassette enables you to transfer the Headerless programs as well.

* Includes an intelligent Header Reader which tells **YOU** if any special actions required.

* Does **NOT** require an additional Help tape.

* Semi-Automatic. Fully automatic systems have proved limited.

How it works: Copies Code to the Microdrive using its push-button copier. **YOU** make a few very easy changes to the Basic loader part. Save it to Microdrive, and magic, **INSTANT SUCCESS.**

007 MD IS JUST £5.95
(Europe + 50p Other areas + £1.50)

SPECIAL OFFER: Membership of the **MICRODRIVE EXCHANGE** Newsletter club plus 007 MD for just £10. (Or on cartridge for £15).

ZX-GUARANTEED (Dept YC)
29 Chadderton Drive, Unsworth,
Bury, Lancs. BL9 8NL
Tel: 061-766 5712

BLANK CASSETTES

Rely on the professionals for guaranteed top quality computer/audio cassettes at great value budget prices. Packed in boxes of 10, complete with labels, inlay cards and library case.

Prices include VAT, post & packing

Length	Box Price (10)	Qty.	Value
5 mins (c.5)	£4.35		
10 mins (c.10)	£4.40		
12 mins (c.12)	£4.45		
15 mins (c.15)	£4.50		
30 mins (c.30)	£4.70		
60 mins (c.60)	£5.30		
90 mins (c.90)	£7.00		
			£

Cheque Postal Order enclosed for
TRADE ENQUIRIES WELCOME. GET BEST TERMS, SERVICE & PRODUCT, BUY DIRECT FROM MANUFACTURERS OF **PROFESSIONAL** BRAND CASSETTES.

NAME .....

ADDRESS .....

.....

PROFESSIONAL MAGNETICS LTD
(Dept. CCO), Cassette House, 329 Hunslet Road, Leeds LS10 3YY
FREEPOST Tel: (0532) 706066

---

* NOW AVAILABLE FOR THE AMSTRAD CPC 464!!!

WIN THE POOLS?

SPECTADRAW 3 – THE LATEST VERSION OF THE ORIGINAL AND BEST POOLS PREDICTION PROGRAM FOR THE 48K ZX SPECTRUM!!!

AND NOW ... AMSTRA-DRAW ... THE FIRST POOLS PREDICTION PROGRAM FOR THE AMAZING NEW AMSTRAD CPC 464!!!

- Supplied with Database containing data on over 10,000 matches since 1960!
- You update the Database each week – but no tedious typing, as team and division names already in program!
- Errors easily corrected – the program even checks your entries!
- Comprehensive instruction manual and menu driven program – easy to use, even for a newcomer to computing!
- Will forecast the least likely draws for those who prefer to bet on fixed odds!
- Built in perm generator – complete your coupon direct from the screen!
- Fully microdrive compatible! (Spectadraw only)
- Compatible with Currah's Microspeech – the first pools program to read you its predictions! (Spectadraw only)

Spectadraw 3 for the 48K Spectrum ..... £9.95 inclusive
Amstra-Draw for the Amstrad CPC 464 ..... £9.95 inclusive
(Cheques/P.O.'s payable to B. S. McALLEY)

We dispatch every Monday with the database made up to include all matches up to the date of dispatch.

SPECTADRAW (Dept.COL) 1 Cowleaze, Chinnor, Oxford OX9 4TD.
(Tel: 0844 52426)

ZX81 (16K) + Gr. ROM, Cabbages and Ants adventure. "Hobbit" style split screen. Send cheque/PO's for £3.50 to: Jon Rose c/o Nyetimber, Bognor Regis, W. Sussex PO21 3JZ (48K Spectrum version coming soon! £4.95). 521

SHARP MZ700 SOFTWARE

Large selection of games, utility, educational and business. Callers welcome or send SAE (28p) for catalogue to:

Sheldon Software Centre
2065 Coventry Road,
Sheldon, Birmingham B26 3DY.
Tel. 021 742 5359

N.C.R. 9020

complete with large printer and 4 screens for sale at 30% of the purchase price. Software included. Full accounts etc.

User no longer needs such a large system.

Tel. Mr. B. Conidis 580 2464

ATARI International Club offers you world famous cassettes for £6 maximum. Don't wait. 02265 12 93. Switzerland. 526

SPECTRUM Modem. VTX 5000, £50 incl. p&p. Julian Gregg, 63 Upway, Rayleigh, Essex SS6 8AA. 525

WANTED

TOP CLASS CBM64 SOFTWARE FOR SALE IN AMERICA

WHITE

108 Lawnswood Avenue, Shirley, Solihull B90 3QU.

POOLS PLAN checker for the 48K Spectrum. Checks Littlewoods lit-plans 50, 80, 81, 100, 82, 83, 200, 84. Send £4.99 to Cloudio Software, PO Box 1, Thurnby, Leicester. 520

I.T.T. 2020 (Apple II) 48K computer, plus language card which gives extra 16K, plus CC80 card, plus serial interface card. £450 ono. Tel. Maidstone (0622) 831294. 524

Microdrive Transfer Listings available for:- Sherlock Holmes, The Hulk, Lords of Midnight, Full Throttle, Chequered Flag, 3-D Tank Duel, Tornado Low Level and Scrabble. Listings 50p each or 8 for £3.00. Enclose s.a.e. to:
Mr Alexander, 24 White Cross Road, Hereford, HR4 0DG

COMMODORE 64 — AMSTRAD — MSX OWNERS
MIDLAND COMPUTER LIBRARY

1 All the latest titles on cassette, disc and cartridge
2 Hire your first two games absolutely free.
3 Life membership £6.00.
4 Hire charge from only £1 inc. p&p for full 7 days.
5 No limit to the amount of games you can hire.
6 All games originals with full documentation.
7 Games, Business and Educational software.
8 Return of post service guaranteed.
9 Lowest new hard and software prices in the UK.
10 Join now on money back guarantee.

Send cheque or postal order for £6 with your two selections or large SAE for further details to:

MIDLAND COMPUTER LIBRARY
The first and largest Commodore 64 library in the world
31 Evenlode Close, Lodge Park
Redditch B98 7NA
Telephone 0527 23584

LYNX 48K & 96K

Quality software for your LYNX

RALLY BRITAIN — navigation game £5.95 (inc.). COCONUTS — animated word game £4.99 (inc.). DATAL — a sophisticated data storage and retrieval program. *Easy to use, fast, flexible and very friendly.* User manual includes Address Book, and Home Accounts. *A must for all LYNX owners at £19.55 + 45p p&p.* Send cheques/PO to:

ORIGINATION
Dept Y, 2-3 Forge Row,
Nr. Soudley, Cinderford,
Glos GL14 2UF.
or please send SAE for further details.

Can you write programs?

Is your program good enough to publish? Software required for all popular home computers. Write in confidence to . . .

NOVUS SOFTWARE Ref. YC2
798 Pershore Road,
Birmingham, B29 7NG.

SPECIAL AGENT
DE-LUXE SPECTRUM COPIER

A multi-purpose yet extremely easy to use tape copier. Ideal for the experienced or absolute beginner.

****** 5 STAR RATINGS ******

1. Copies multipart programs all in one loading.
2. Copies Basic, M/Code and even the Headerless programs upto 51K.
3. Cannot be fooled by weird names or false Headers. (Other copiers would crash).
4. Can remove Autostart from Basic.
5. You can determine Pauses between sections if desired.

Once you've experienced this super DE-LUXE silk smooth copier, you'll never want to use any other.

£5.95

O/seas, Europe +50p
Others +£1.50
(Order as SPECIAL AGENT)

KERR, 24/25 High Street
King's Lynn, Norfolk, PE30 1BP

ORIGINAL programs urgently needed Oric and Commodore 64. Educational or Games. Cash payment or royalties. Professional ethics strictly adhered too. Send your program for consideration. Knight Products (UK) Ltd., 71 Colne Road, Earby, Lancashire BB8 6XL. 257

* UNLOCK YOUR AMSTRAD *
Amskey

EASY TO USE utility program. Removes protection and allows listing, studying and copying of your precious software.

YOU CHOOSE loading speed and protection of your back-up copies.

Only £6.99 incl. p&p. Overseas please add £1.00 postage.

Interlock Services Ltd.
37B New Cavendish St,
London W1M 8JR
Tel. 01-609 8301

WAFADRIVE-MICRODRIVE TRANSFER TAPES

Transfer majority of your games to a WAFADRIVE or a MICRODRIVE using the 007WD or 007MD tapes. These use the Semi-Automatic method which has been proved to be the MOST successful. Includes transferring of Headerless programs & programs in map area.
The Wafadrive 007WD includes system to greatly reduce Loading time for multipart programs.
Longer programs can be transferred to WAFADRIVE or MICRODRIVE using the technique printed in Newsletters of MICRODRIVE-EXCHANGE club . . SCRABBLE, LORDS OF MIDNIGHT being two examples.

007WD or 007MD on cassette
£5.95
On WAFA or Cartridge
£8.95
(Overseas, Europe +50p
Others +£1.50)

MICRODRIVE-EXCHANGE NEWSLETTER CLUB. Membership is just £5 for 12 monthly issues (£8 Europe, £12 elsewhere). Includes transferring VU-FILE/CALC.

ZX-GUARANTEED (YC)
29 Chadderton Drive,
Unsworth, Bury, Lancs.
BL9 8NL. Tel. 061-766 5712

AMSTRAD

ZEDIS — A comprehensive yet friendly EDITOR and DISASSEMBLER with full written instructions to disassemble ROMs. Features: —
* Full Z80 disassembly. * Continuous menu. * Memory search. * Block movement. * HEX/CHAR I/P. * Printer. * BRK Pt. insertion. * Register inspection. * 3 Windows/80 column.
ZEDIS Editor and Disassembler for the Z80. Includes full instructions for disassembling ROMs. £6.95.
SYCLONE — "Dramatically cut loading time". DUPLICATE software at up to 4 TIMES original record speed, with added facilities of removing/adding protection. Over 18 new facilities in all, including enhanced CAT and LOAD, we offered with this very useful program. LIST YOUR "WELCOME TAPE" £6.95.
Buy both and get a superb Real Time Clock programme on cassette, FREE.

PRIDE UTILITIES (YC)
7 Chalton Hts, Chalton,
Luton, Beds. LU4 9UF.

DUST COVERS quality anti-static material. Spectrum £1.50, CBM 64, 16, +4, Vic 20, BBC, DK Tronic, QL, all £2.50. Amstrad, Einstein, Mac, £5.95. Also printers etc. state make. Computacovers, 17 Lichfield St., Wolverhampton. 542

BASIC+ on microdrive

BASIC+ adds 13 extra commands to ZX BASIC for structured programming ie, Procedures, Repeat/Until loops, If . . . Then . . . Else. Also graphic commands including a fast fill and utility commands including a renumber. Commands are entered by two key presses but appear in the program spelt out in full. BASIC+ loads in less than four seconds and occupies just over 1K of RAM and so is suitable for both the 16K and 48K Spectrum.
For a copy of BASIC+ and instruction booklet either send a blank cartridge and £4.95, or £9.90 only to the address below or send a SAE for further information.

PROSIGN
Dept. E, 80 Windsor Drive,
Wigginton, York. YO3 8YE.

WDSoftware
Utilities for the QL (£10 on Microdrive)
This package offers single-key loading, running or deletion of files, multiple formatting of cartridges, and auto backup of files from one or more cartridges to another with optional over-writing of namesakes. In addition, a directory of 60+ files can be viewed without screen overflow. NB a VERIFY program is unnecessary — QDOS does this automatically. Now includes directory print-out and 'qprint' to print any or all files on a cartridge with optional dated titles. Owners of the earlier package can update by sending OUR cartridge and 25p.
Morse Tutor for QL £8.50
As for 48K Spectrum without speech
Current Spectrum Software
Tradewind (£5 Cassette)
Buy a ship, provisions and cargoes to trade between the harbours of the Coral Islands. Make a fortune if the weather and pirates let you live long enough to master seamanship and economics. A strategy/-adventure game with graphics for 48K.
Jersey Quest (£5 Cassette)
Following an accident, you are stranded in the labyrinth of time and must find your own way back to the present with the aid of persons and objects from Jersey Folklore. Meet the Black Horse of St Quen, the Dragon and Knight of La Hougue Bie, the Black Cat of Carrefour a Cendre, the Witches of Rocqueburg and many others. A text-only adventure for 48K in machine code (Quill).
Morse Tutor (£4 Cassette)
The one has it all! 4-19 words/minute, variable spacing, variable number of groups of random letters numbers or mixed, random sentences, own message, single characters (including punctuation), variable pitch, FEEDBACK via screen, printer or SPEECH (phonetic alphabet via Currah u/Speech on 48K version only), and repeat facility. Takes you to and beyond RYA and Amateur Radio receiving standards. 16K and 48K versions on one cassette. 48K only on Microdrive cartridge.
Spectrum Programs on Microdrive
All the above are available on Microdrive cartridges at a price of £4.50 for one cartridge + the price of each program as shown above. E.G., a cartridge with Tradewind and Morse Tutor would be £13.50. As a bonus, Gavin Monk's Indexed Loader is included free with each cartridge.

available from
WDSoftware,
Hilltop, St. Mary, Jersey, C.I.
Tel (0534) 81392

NEW!!

TAPE COPIER 6

Make your essential BACK-UP copies with our second generation copier package TC6. Manages virtually all programs. 48K SPECTRUM only.
* Deals with fast loaders + converts them to normal speed for drive transfer.
* LOADS in program parts CONTINUOUSLY — even when there is no sound gap, short tone leaders, false/illegal headers, etc, making the process simple and effective. User friendly.
* Copes with v. long programs (say 65000+ bytes).
* Extra features. e.g. integral header reader, pause, delete, abort, repeat copies, FULL manual.
* MINITAPE 6 (MT6 — extra program transfers Basic, Code + arrays directly to m/drive + other features.
TC6 costs £5. (£ with MT6 on same tape). MT6 £3 on separate tape. (old customers old tape + SAE but £2 reduction on above prices).

MICRO/WAFA/DISC DRIVE TRANSFER

48K Spectrum owners with Micro/Wafa/Disc drives can NOW transfer the MAJORITY of their programs (inc headerless, long programs, + those with LOW addresses — say 16384).
To transfer from tape you must convert the program, and then transfer the converted bytes. MD1 (or WD1) has 5 programs *giving you the tools* to do the modifications to get them running. MD1 also has two "CAT" housekeeping programs. MD1/WD1 has a comprehensive manual with example transfers and exercises.
This widely acclaimed program (see Your Spect. No. 9 P14) is ESSENTIAL if you are going to transfer MOST of your programs to your drive. MD1 (WD1 for disc or Wafadrive owners) costs a mere £6.50.

ALL PRODUCTS CARRY OUR MONEY BACK GUARANTEE
OVERSEAS: add £1 Europe, £2 other for each product.
SAE for enquiries.

LERM, DEPT YC, 10 BRUNSWICK GDNS, CORBY, NORTHANTS

IMPROVE YOUR PROSPECTS

with skills that employers want – learn the easy way with modern home study courses from Ideal Schools.

MODERN ELECTRONICS
Train for success in the fastest ever growing industrial sector.

COMPUTER PROGRAMMING
The demand for Programmers is increasing constantly – don't miss out!

For free booklet write today to

IDEAL
IDEAL SCHOOLS
(Ref. YC5)
60 St. Enoch Sq
Glasgow G1 UK.
Tel: 041-248 5200

HOME ACCOUNTS. Put your house in order! Probably the best home use for your computer! Comprehensive coverage of bank accounts, credit cards, HP, etc. Inbuilt accuracy check for all transactions. Project cashflow for any period ahead. Available for CBM 64 or VIC-20 £7.50 or free details from: DISCUS SOFTWARE, FREEPOST, Windmill Hill, Brixham TQ5 9BR. Tel: 08045 55532. 477

SHARP SOFTWARE

Superb new and original home, business and utility programs for the MZ-700 and MZ-711. Also local private tuition in programming from beginner to business level. For complete details (specify programs/tuition) send SAE to: Maysoft (DMB), 50 Thompson Avenue, Colchester, Essex CO3 4HW.

DUST COVERS FOR AMSTRAD CPC 464
£6.95

* Matching proofed nylon, treated with anti-static inhibitor.
* Piped in green with AMSTRAD CPC 464 hot foil printed on keyboard.
* Available as a one or two piece cover and for Colour or Mono. option. Please state which.
* 48 Hour turn-round service for Computer covers. First class postage.
* Printer Covers to match available from £3.50.
* Money back guarantee if not delighted.
(Covers available for the following Printers: Amstrad DMP-1, Canon PW 1080A, Commodore MPS 801, Epson F, X-80, RX-80, Mannesmann MT-80, Panther DX 109).

DUST COVERS FOR BBC, COMMODORE, TEXAS, DRAGON.
Available in beige, anti-static, proofed nylon piped in red or brown and with the computer name hot foil printed on the keyboard. £3.50.

DUST COVERS FOR SPECTRUM PLUS AND QL
Available in black anti-static proofed nylon with the name in gold. £2.50.

BBD COMPUTER DUST COVERS
39 Manse Avenue
Wrightington WN6 9RP

"MAKE MONEY WITH YOUR MICRO"

84 page A4 Manual.
Only £10.00 post paid.
Or SAE for details. Cheques payable to: **Regicord Ltd. Thanet Industrial Studios, Albert St., Ramsgate, Kent CT11 9HD.**

Remploy Metal Furniture — can you keep your computer on anything less?

For further information on our computer work station and display/storage module, please write to: Cass Richards, Remploy Metal Furniture, Neath Abbey Road, Neath, West Glamorgan, SA10 7BL. Telephone 0639 3812, Telex 48229.

Remploy

LOWEST PRICES IN UK?

MICROS	PRICES INC VAT
Spectrum 48K (free six pack software)	£124.95
Spectrum Plus (free six pack software)	£174.95
Commodore 64	£184.95
Commodore 64 (joysticks, cassette player and six games pack)	£245.00
Commodore 16 (free cassette player/software)	£134.95
BBC B (free cassette player/software)	£389.00
BBC B + DFS	£455.00
SINCLAIR QL	£389.00
SANYO MSX	£295
SPECTRAVIDEO MSX	£245
FOR YOUR MICROS	
ZX Microdrive	£47.95
ZX Interface 1	£47.95
ZX Microdrive/Interface 1 (4 free games)	£97.00
ZX Interface 2	£18.95
Microdrive Cartridge	£4.75
Quickshot II Joystick	£9.95
Commodore C2N Cassette Unit	£60.00
Commodore 1541 Disk Drive	£199.00
Commodore MPS801	£184.95
Alphacom 32 printer	£74.95

CASIO		CASIO KEYBOARDS	
PB700	£123.95	MT40	£79.95
FX750P	£85.95	MT68	£119.95
FX720P	£47.95	MT200	£119.95
PB410	£47.95	MT800	£224.95
PB110	£37.95		

Complete range of Casio calculators, watches and keyboards at Discount Prices.

P&P £3.00 (within UK)

Trade and export enquiries welcome

K.K. STATIONERS

187 Edgware Road, Marble Arch, W2 1ET, Tel. 01-723 1436

126 Edgware Road, Marble Arch, W2 2DZ, Tel. 01-402 4592

AMSTRAD/Oric 1/Atmos software club has a super selection of software. Send SAE for details to 26 Beechley Drive, Cardiff. 553

STOP—REVEAL

A unique cassette for the 48K Spectrum. Genuinely lets you:
1. STOP virtually all programs, BASIC, MACHINE CODE and even HEADERLESS-FILES, protected or not.
2. REVEALs the hidden Basic in Machine-Code programs. (Could be clues in adventure games).
3. LISTS actual Machine-Code on your video.

Now you can STOP, LIST, MODIFY, STUDY most Spectrum programs at your leisure. (And cassette is Microdrive compatible).

Includes a DISSASSEMBLER so can even study Sinclair ROM, etc, plus the most Advanced HEADER-READER ever written, plus pages of SECRETS OF THE TRADE explaining professional methods used to hide lines/programs, etc.

YOU CANNOT GET A MORE POWERFUL CASSETTE

(Even STOPS/REVEALS programs which are a genuine 48K long).

POST £5.95 FREE

(Europe add £1. Other areas add £2)

KERR, 1-2 HIGH STREET, KING'S LYNN, PE20 1BX.

TOP PROGRAMS TOP DISCOUNTS

AMSTRAD £4.95 Galaxia, Forest Worlds, End, Message from Andromeda.
AMSTRAD £5.95 Flight Path 737, Ghouls, House of Usher, Johnny Reb.
AMSTRAD £6.95 Blagger, Fire Ant, Gems of Stradus, Hold Fast, Steve Davis Snooker.
AMSTRAD £7.95 Amsgolf, Codename Mat, G.P. Driver, Horrer Attack, Hunchback, Manic Miner, Roland/Digging/In Caves/In Time/On Ropes/On Run, Space Hawks, Spanner Man.
AMSTRAD £8.95 American Football, Level 9 Adventures:
AMSTRAD £16.95 Tasword 464
ORIC ALL ATMOS COMPATIBLE
ORIC £4.95 Arena 3000, Skramble
ORIC £5.95 Digger, Flight 401, Harrier Attack, Mined Out, Panic, Scuba Dive, Spooky Mansion, Two Gun Turtle, Veiners Lair.
ORIC £6.50 Green Cross Toad, Ghost Gobbler, Invaders, Probe 3.
ORIC £6.95 Cat oy—Oric, Classic, Racing Defence Force, Rat Splat, Space Shuttle, Ultima Zone, Xenon 1, Zargons Revenge.
ORIC £7.50 Diabolical Tower, Fire Flash, Styx, Hare & Tortoise (3 Byts).

CHIPO's TO O. J. SOFTWARE
(sae for list, state machine)
EUROPE + 50p OTHERS +£1.00
273 MOSSY LEA RD, WRIGHTINGTON
WIGAN, LANCS WN6 9RN
TEL: (0257) 421915

PROM SERVICES

ANALOGUE CONVERTERS for ZX81 and SPECTRUMS

8 bit 8 channel input	£23.95
8 bit 3 channel output	£26.95
12 bit 8 channel input	£57.95
3 slot motherboard	£16.95

23/28 way edge cards 75p, connectors £2.50.

SAE for details of these and many other interfaces.

EPROM SERVICES
3 Wedgewood Drive, Leeds LS8 1EF.
Tel. (0532) 667183

MULTIPLY your income/profits NOW with the breakthrough ENTREPRENEUR ASSOCIATION. Discover new, lasting success. Act today! and send for full, free details: ENTREPRENEUR ASSOCIATION, Dept A4, 9 Cork Street, Mayfair, London W1. 473

SPECTRUM DATA-SAVE

If you own a 16/48K Spectrum you cannot afford to be without this program. DATA-SAVE ensures that you produce top quality BACK-UP copies of ALL types of programs and data files with ABSOLUTE SIMPLICITY. Advanced features include: Continuous Loading, Saving and Verifying of single and MULTIPART programs. MENU DRIVEN with comprehensive on-screen information. Plus FREE CHARACTER GENERATOR Programs. Send cheque/PO for £6.00 to: GREEN BANK SOFTWARE, 2A, CURZON PARK SOUTH, CHESTER, CHESHIRE CH4 8AB.

* BACK-UP-SYSTEM FOR * *CBM-64 & VIC-20 *

The BACK-UP BOARD is the latest, fastest, and most unique way to back-up your tape programs. With this board you can connect a second CBM tape deck to your computer. You can copy a program on the second deck while it loads from the first. You can back-up m/code, turbo loaders, data files etc. This system will back-up programs that your tape based copier has failed to do.

BACK-UP BOARD for CBM-64 & VIC-20
£10 inc p&p.
TRIGSOFT (Halifax)
46 Ripon Street, Parkinson Lane, Halifax, West Yorkshire HX1 3UG.

48K Spectrum Adventure!

MEGALITH MAN

You are the Megalith Man, sent out to find all of the 12 megalithic sites of the HUGE landscape. You have no idea where they are, but you can make investigations and pick up useful items along the way. BUT BEWARE! SPEC. 2,500 LOCATIONS. 13 Different types of character. 7 Different items to help you. Cassette saving routine. Simple! single key operation. **Price £5.95.** Send cheque or PO payable to: **Goltek Publications, PO Box 177, W-ton, WV11 2PE.**

New Releases

of computer software for the CBM64 BBC, Spectrum, Atari, new list every to weeks. Also software for the Ti99/4A, Dragon, Electron, Lynx, Sharp MZ700, Tandy, Vic 20, ZX81. Please state computer business and games software.

M. J. SEAWARD
St. Olafs Road, Stratton, Nr. Bude, Cornwall.

SINCLAIR SERVICE CENTRE

We have the spares for all repairs to: Spectrum: ZX-81: Printer and RAM Pack. You pay £10.00 plus parts and return postage. All units repaired to original Standard using genuine Sinclair Spares by our H.N.C. qualified staff. Also available Spectrum Memory Update 16K–48K by post £28.50 inclusive.

QUANTUM, 33 City Arcade, Coventry or Phone Coventry (0203) 24632.

TAPE COPIERS

Unique machine code programs to allow security back-up copies of the majority of protected software.

Available for:

COMMODORE 64	£5.95	ORIC 1	£5.95
VIC 20 (cartridge)	£5.95	ATARI (disk)	£5.95
SPECTRUM	£5.95	BBC (Handles Locked Files and Mixed Baud Rate)	£5.95
ELECTRON	£5.95		

ALL WITH FULL INSTRUCTIONS

HIGH SPEED BACK-UP

commodore

COMMODORE 64 owners, at last the long wait is over – FASTBACK converts your software to TURBO LOAD – creates fast loading copies of most programs (single and multi-part) that run independently of the utility. For example 'The Hobbit' loads in 150 seconds with FASTBACK.

Supplied on tape with full instructions

ONLY £9.95

AMSTRAD

SPEEDMASTER is here. Allows choice of save speed. Creates fast loading copies of all software tested.

ONLY £7.95

TAPE TO DISK TRANSFER UTILITIES

Transfer games etc. to disk. Supplied on tape with full instructions for:—

BBC	£9.95
ATARI (All models)	£9.95
COMMODORE 64 NEW IMPROVED VERSION	DISCO Still only £9.95

No user knowledge required. We guarantee this is the best available.

All prices include UK Post & Packing. Cheques, PO or Phone your Card Number to:

EVESHAM MICRO CENTRE
Bridge St, Evesham, Worcestershire
Tel: 0386 49641
NEW SHOP NOW OPEN – Micro Centre, 1756 Pershore Rd, Cotteridge, Birmingham Tel: 021-458 4564
TRADE AND OVERSEAS ORDERS WELCOME

SUPER BREAKER BACK-UP BOARD

For the **Commodore 64** and **Vic-20**. When a second CBM cassette unit is connected to the board it will make back-up copies of cassette software including turbo/fast loaders, Basic and/or machine code. Priced at £9.50 plus 50p p.p. UK (Europe add £1.00, elsewhere add £2.00). An optional **Reset Switch** can also be fitted for only £2.00 extra, inclusive or send stamp for full details to:

C. KENT, 15 Bamburg Close, Danesholme, Corby, Northants, NN18 9PA.

CBM 64

BLACK OUT AND TURTLE TRIALS

Two brand new and exciting games for the Commodore 64. Only £5.99. Send cheques and PO's to:

T. Scallon Software
82 Sorbus Close,
Salford M6 5AR.

BLANK TAPES + DISKS

10 x C15	£4.50
10 x C20	£4.80
3M error-free disks	
5¼" s.s.d.d. 40T	£14.95
5¼" d.s.d.d. 80T	£29.95

Send large SAE for full range. Cheques/PO's to

CAROUSEL TAPES
PO Box 5, Dursley, Glos. GL11 5TX.
Tel. (0453) 46893/844061

FREE Amstrad Link Club specially for the CPC464. Write for details SAE please. Mr. C. A. Bryant, 11 Havenview Rd., Seaton, Devon. 523

SPECTRUM key top labels. Long lasting legible colour characters. Very attractive for OK Tronics and similar keyboards. Only £6.95 payable to George Voyajakis, 35 Alexandra Road, Stoneygate, Leicester LE2 2BB. 550

"IMPRISONED" 48K Spectrum, fast m/code maze action, ten skill levels and great graphics! Only £2.99. Special offer! Free C15 cassette with order. P&M Designs, c/o Room H306, Quadrant House, The Quadrant, Sutton, Surrey. 546

COGITO Programs for 16K ZX81. £1.95 each. "Station Alpha: on Pluto" (Text adventure with graphics). "Birthday" (family novelty program). "Tables" (Educational/home study). E.E.T., Guilsborough, Northampton NN6 8QB. 545

QL software on microdrive: Games 1: £8.50 Chess, Mars Lander, Fruit Machine + 4 more. Games 2: £9.00 Snooker Manager, Glidepath, Bombshell, Mazeman, Intelligent Nim and Expert. £5 off if microdrive supplied. Rodent Software, 3 Brookend Drive, Henley, B95 5JA. 544

STOP computer piracy overnight. Put security on your programs. Any computer. Complete instructions send £10.00 + SAE to Nadim, 16 Arne Road, Coventry. 543

TECTEL ROBOTICS

CONTROL BOARDS FOR HOME COMPUTERS

ORIC
ORIC DUUBRY £24
1 of 16 channel controller
ORIC ADC £34
Superfast 8 channel analog — digital scanner, 8 bit resolution.
ORIC I/O port £39
16 programmable channels
ORIC PRINTER £95
26 col, matrix, graphics double sized print, ink & ribbons.

ZX81
ZX81 DUUBRY £22.50
1 of 16 channel controller
SX81 ADC £34
Superfast 8 channel analog — digital scanner, 8 bit resolution.
ZX81 I/O port £34
16 programmable channels
ZX81 HI-RESOLUTION GRAPHICS £28
stunning results.

ITEXT SOFTWARE a new range of educational programs.

TODDLERS (pre school)
LEARN your ALPHABET
LEARN to COUNT
LEARN your COLOURS
LEARN your SHAPES
ABOUT the HOUSE
ABOUT the KITCHEN
ABOUT CLOTHES
£3.95 each

MUMS & DADS
ITEXT cookbook (English)
ITEXT cookbook (Chinese)
ITEXT cookbook (Italian)
ITEXT cookbook (Indian)
ITEXT Wine & Beer Making
ITEXT Cookbook Desserts
ITEXT Cookbook Confection
£5.65 each

Send cheque or Postal Order to:

TECTEL
Telford Opportunities Centre, Halesfield 14, Telford, Shropshire.
Tel. 0952-581738

P&P £1.50 for control boards £1 for tapes

The Publishers take all reasonable care to ensure that classified advertisements are genuine, but readers must satisfy themselves that they will be obtaining what they require before entering into transactions, particularly if they involve large sums of money.

BANISH LOADing PROBLEMS

We are now the exclusive sellers of the ELINCA Tapeloader. Can only be obtained from us.

It is now available for the following computers:

Spectrum, ZX81, Oric-1, Atmos, BBC, Electron Dragon & Atom and still only **£14.99 inclusive. Post free.**

Please state Computer

We also sell the ELINCA Loudmouth. A Spectrum sound amplifier for only **£12.99 inclusive. Post free.**

CELINA Software

Business Help Series for the SPECTRUM

FILECAB The only program you will ever need for that filing job. **£15.00 incl.**

STOCK Keeps tabs on all your stock, with a running total of cash value of all stock. Add and remove stock at will. **£15.00 incl.**

PRODCOST Ever wondered how to calculate the selling price of an item, this program does just that taking into account your overheads and how much profit you want to make. **£15.00 incl.**

For details send SAE to:

Celina Ltd
Daisy Walk,
Sheffield S3 7PJ.

---

2 Artificial Intelligence programs available for the BBC Model B.

3D Noughts and Crosses and Four in a Row. Both with different levels of difficulty. Play against opponent or computer in impressive Hi-Res Graphics.

£4.95 (BBC) on tape
£6.50 (Apple) on disk

Cheque to **Data Tec, 29 Whitley Road, Thornhill, Dewsbury, W. Yorks, WF12 0LP.**

VIC-20/CBM SOFTWARE HIRE
Free membership!
Dozens of titles (e.g. 3D Time Trek, Pharoah's Tomb) from 60p per week. Send SAE for your Hirekit to:
Vic-20 Software Hire (YC)
242 Ransom Road, Mapperley, Nottingham.
State which machine please

SPECTRUM KOPYKAT

Simply the best. Copying any 16/48K Spectrum program is as easy as LOADing & SAVEing your own programs. Even unstoppable programs can now be backed-up onto a fresh tape. Only £4.95.

IT CAN EVEN COPY ITSELF

NEW

MICRODRIVE KOPYKAT

Transfer your cassette based software onto the ZX Microdrive RELOCATES programs, Stops & reveals programs ESSENTIAL for M/D transfer. Only £4.95.

Both with FREE Header Reader Despatched by Return of Post.

MEDSOFT
PO Box 84, Basingstoke, Hants

PRICE WINNERS

Epson RX80 Printer	£220
RS.232C/Current Loop interface for RX.80	£40
Commodore 64 Computer	£180
Commodore	£35

All prices inclusive of VAT p&p extra

Ring:
Lou Lynch
on CWMBRAN
(06333) 71803

MUSICAL software. Play the guitar, reading music, rhythm synthesiser. £5 each. 48K Spectrum. SAE for details. Scott Massie, No. 1, Bungalow, Firlands, Burghfield Common, Berks.

464

DISKount PRICES

5¼" SS/DD Diskettes	£1.50
3½" SS/SD Diskettes	£4.50
2000 Sheets (11"x3½") Listing Paper (11"x9")	£16.00

CASSETTES: C15 50p
C20 60p C30 70p
(Case/Labels Inclusive)

* 1 Year Guarantee
* p&p free: Delivery 7 days
* Further discounts available
* We supply schools & colleges

Cheques/P.O.'s to:
C & S Computer Services
144 Sutcliffe Avenue, Grimsby
Sth Humbs. DN33 1AP.

RETAILERS

For fast speedy distribution service contact Drake Distribution on 0752 500951/2

We can offer you:
- 24-hour delivery in UK
- The Best Discounts
- Starter packs available
- All the latest software
- Personal weekly delivery service throughout the UK
- Export enquiries welcome
- 48-Hour delivery can be arranged

As retailers ourselves we know the titles that sell — Phone or write for a price list now.

DRAKE DISTRIBUTION
Unit 45, Enterprise Plymouth,
Somerset Place, Plymouth PL3 4BB

VIC TAPE BACKUP will backup most Vic-20 programs, in BASIC, machine-code, or both. Detailed instructions are printed on the card inlay. VIC Tape Backup is easy to use, with prompting by colour and by sound — when the colours change and the tone sounds, the copier is ready! Load errors are signalled, so poor originals can be tried again. Works with all memory configurations — one machine-language program allows automatically for memory differences! Send crossed cheque/PO for £7.95 to: **Level Software Ltd, PO Box 55, Shirley, SOLIHULL B90 4SL. Tel: 021-643 6728.**

Spectrum Repairs

£16.95 inclusive of labour, parts, p&p etc. ZX81 for £11. Fast reliable service. (Av. repair 24 hrs) by qualified engineers. Send computer only to:

HS COMPUTER SERVICES
2 The Orchard, Warton, Preston, Lancs.
PR4 1BE. Tel. 0772 632686 or 634897

HEMEL COMPUTER CENTRE LTD.

For fast reliable repair service of your SPECTRUM, BBC, DRAGON, ATARI and COMMODORE computers, e.g. Send your 16/48K Spectrum to us and we will repair and return it for £20 + £1.60 p&p.

Hemel Computer Centre Ltd., (Dept. Y.C.)
52 High St., Hemel Hempstead, Herts HP1 3AF.
Tel: 0442 212436

COMMODORE 64

SOFTWARE HIRE
*** 100's Titles * Games**
***Utilities * Educational**
Life membership only £5
Cheque/RO to:
CENTRAL SOFTWARE LIBRARY
164 Moorgate, Retford, Notts. DN22

Join The Commodore 64 Cassette Library

1. All the latest cassette based Software.
2. Only one price to hire: £1.50 per cassette, inc. p&p for full 7 days.
3. No charge on Hire of first game.
4. Membership charge £6.00 only.
5. Quick postal return.

Send cheque or postal order for £6.00 membership fee, or large S.A.E. for further details to:

Commodore 64 Cassette Library
19 Darrell Way
Abingdon OX14 1HQ.
Tel. No. 0235 27769

AMSTRAD CPC464

Arnold Blackwood
Adventurer Extraordinaire
THE TRIAL OF ARNOLD BLACKWOOD
A very worthwhile addition to the Adventurers' library CPC464 USER. Oct.'84
ARNOLD GOES TO SOMEWHERE ELSE!
A healthy sense of the ridiculous *Plenty of fun* PCN Oct. '84
Each Adventure £6.50 inc.
By return post. CQ's/PO's to

NEMESIS
10 Carlow Rd, Ringstead, Kettering, Northants NN14 4DW
Tel. (0933) 623967

ATARI 400/600/800/XL

Cartridge Backup System
Backup 8/16K cartridge to tape and disc. 400/800 with 48K ram. De luxe version has gold edge blades on cartridge simulator.
Cartridge to tape & disc.....£15.00
de luxe £20.00
Spare simulator board.....£12.00
de luxe £17.00

XL Cartridge Backup
600 XL £25.00
800 XL £30.00
Specify Tape or Disk

Tape Duplicator
Duplicate almost any single or multistage tape. BASIC program, 48K ram recommended.
Tape Duplicator.....£6.00

Fast Loader
Reduce tape loading time of almost all of your single multistage tapes by up to 49%.
Fast Loader.....£6.00

600 XL Memory Upgrade
Upgrade your 16K to 64K. Complete kit with full instructions.
Memory Upgrade.....£75.00

Services
Listing and prom blowing services also available. Send for details.

Send large SAE for further details on any/all of the above and new products. All prices are inclusive of p&p. Utilities are for 400/800/XL/800XL unless otherwise specified.

S. Terrell
17 Cock Close Road, Yaxley, Peterborough PE7 3HJ

QUICKBEAM SOFTWARE

presents

DICKIE DIVER
Daring Dickie Diver, Dives Deep to the Depths of the Dark Dingy Domain of the Deadly Demons. Will our hero, Dashing Dickie, Drown, or will he Dice with Death and Dodge the Demons. Discover the Undersea World of Dickie Diver. Swim through the Massive Cavern and collect the Oysters with which you have to buy your air. But beware of the Acid Plants and the Thingumies which thrive in the Dark Dingy Domain. A pure machine code arcade game for 1/2 players. Joystick/Keyboard options (Spectrum).....**£5.95**

TERROR CASTLE
Dare you attempt this Adventure. Have you the nerve to set foot in Terror Castle. This spine chilling adventure is not for those of a nervous disposition or for people who are scared of things that go bump in the night.
Warning: Do not leave this game on grandma's chair. (Dragon 32, BBC Electron, Spectrum)
.....**£5.95**

THE SHRUNKEN SCIENTISTS'
Can you imagine being only one inch tall, mole hills are like mountains, puddles are like lakes and every insect is a monster. Due to a scientific mishap this has happened to you. Your task, to get to the antidote. But how will you do it? A tough and addictive adventure that will not be solved in a day. (Dragon 32, BBC).**£5.95**

SUPER DRAUGHTS
A version of the classic game with 10 levels, making it suitable for the beginner to the expert. (Spectrum, Commodore 64)
.....**£5.95**

TOMBSTONE AND COD CREEK
Two classic games for the whole family. Many hours of entertainment for 1 to 4 players. Excellent value. (Dragon 32) **£5.95**

DUPLICAS
The Dragon 32 cassette copier. This copier will even make backups of the latest Dongle software. "Of the numerous back-up programs I have Duplicas outperforms them all" D.M. of Warrington. (Dragon 32).....**£7.95**

Postage and packing 30p. Outside U.K. £1.00.

Make cheques/PO payable to:

QUICKBEAM SOFTWARE
67 Old Nazeing Road, Broxbourne, Herts EN10 6RN.

ADULT PARTY GAMES SPECTRUM 16/48K

STRIP POKER
Classic adult party game for 2-10 players, who may lose a lot more than their stake! Fully featured 5 Card Poker game (basic rules supplied) with that little bit extra!
£6.95 (cassette)
Fully inclusive mail order price

RISQUÉ
New on screen board game for 2-4 very, very good friends. Revealing after dinner frolics, fun, dares, risks and forfeits!
£7.95 (cassette)
Fully inclusive mail order price

Send cheque/PO/MO payable to:

PR SOFTWARE
7 Ashley Road, Poole, Dorset BH14 9BS

48K SPECTRUM ASSEMBLER & DEBUGGER

Easy to use, no new editors or monitors to learn. Menus to ASSEMBLE DIS-ASSEMBLE, TEST, SAVE, LOAD, DELETE. Microdrive and printer supported. Use assembler like BASIC. Testing — SINGLE STEP, TRACE, VIDEO GAMES TRACE, BREAKPOINT, NON-STOP CALLS, HISTORY. Dynamic displays — this and next instruction with addresses, current and last register value, stack contents, flags, selected memory bytes, all in hex and decimal. Special CONVERSATIONAL ASSEMBLY INSTRUCTION INPUT/EXECUTION with full displays, a unique testing and machine code learning aid. Cassette £9.95, Microdrive cartridge £13.95 with demonstrations.

ROYBOT Dept. YC, 45 Hullbridge Road, Rayleigh, Essex SS6 9NL. Send SAE for details.

! NEW VERSION !

TAPE TO MICRODRIVE — MICRODRIVE TO TAPE

Would you like to transfer your Spectrum programs from

① MICRODRIVE TO MICRODRIVE ③ TAPE TO TAPE
② TAPE TO MICRODRIVE ④ MICRODRIVE TO TAPE

Then do it with

TRANS-EXPRESS

TRANS-EXPRESS is the most comprehensive package of four m/c utilities for transferring Spectrum programs. They are user friendly, simple to use, reliable & very efficient.

They will enable you to transfer any kind of programs up to the full 48.0K length. TAPE TO M/DRIVE will also automatically, if necessary, modify, restructure and relocate both BASIC and M/C to run from m'drives.

You can buy any of the 4 programs for £5.50 or TAPE TO M/DRIVE AND M/DRIVE TO M/DRIVE together for £7.50, or all the 4 programs on a tape for £9.95 or on a m'drive cartridge for £14.95.

MICRODRIVE TO MICRODRIVE

NEW! . . . AMSTRAD version of **TAPE TO TAPE** at £5.95 only. **NEW!** . . . Transfers programs of any length, any speed, headerless, with unorthodox loaders, etc. Continuous **LOAD/SAFE**, repeated **SAFE**, full abort., full header, reader, unprotect, etc.

Please send me a copy of **TRANS-EXPRESS** ①②③④ (Please tick where applicable) I enclose cheque/PO for (Please add £1.00 for orders outside UK) YC

Name

Address 215

ROMANTIC ROBOT 113 Melrose Ave, London NW2

SPECTRUM adult game "forfeits" two games in one for 2, 4, 6 players. Hours of exciting fun. Send £6.50 to N. Pearn. Over 18's only Box No. 462

MEMOTECH 500/512 SOFTWARE PUC-MAN

- Joystick/Keyboard Control
- Hi-Res Sprite Graphics
- 1 or 2 Player option
- High score table

Mail Order only — Cheques, etc. payable to:— **1. Heath, Techsoft, 9 Housewood End, Hemel Hempstead, HP1 3LP. Tel. (0442) 67093. Price £6.50 per cassette (p&p FREE).**

Dealers enquiries welcome

ASTROLOGY for beginners only £11.50

A Starter Pack comprising a simple program to calculate a horoscope, an introductory booklet & 2 self-teaching programs (how to interpret the horoscope).

No previous knowledge required

48K Spectrum, BBC/Electron, 48K Oric, Dragon, Tandy Color, Tandy TRS80, Commodore 64/PET, Atari, Amstrad, Sharp MZ80A/K/700, Colour Genie, Video Genie/System 80/PMC 80

many more programs for experienced astrologers also other micros

Deze programmas zijn thans in Nederlandstalige versies verkrijgbaar voor Spectrum. Vraag Documentatie! Cash with order (add 50p outside UK) or large sae for free catalogue to:—

ASTROCALC (Dept YC)
67 Peascroft Road
Hemel Hempstead,
Herts HP3 8ER
Tel: 0442 51809

ARITHMETIC (5-15 years), for any Spectrum, £3.50, cheque/PO, G. Blake, 74 New Mill Lane, Mansfield Woodhouse, Notts. 512

SPECIAL CHRISTMAS OFFERS

All 5¼" discs are supplied in tens with a FREE plastic library case and are guaranteed for life.

VERBATIM —
Single sided/double density.....£21.95
Scotch 3M —
Single sided/double density.....£18.95
DYSAN —
Single sided/double density.....£22.95
*Bulk order discounts available
*Dealer enquiries welcome
SANTAS SUPER SAVERS —
Atari 800XL (64K computer).....£127.95
Atari 1050 (Disc drives).....£179.95
Prices include VAT. Free fast delivery
Please send Cheques/POs to:
SJB Disc Supplies (Dept. 05)
11 Oundle Drive, Nottingham NG8 1BN.
Tel (0602) 782310

MAGIC-MESSAGE

Put YOUR name in the HALL OF FAME, be the HERO of the game. Find the hidden list of words in Adventure games. All this is possible with MAGIC MESSAGE which lets you look at and change messages in machine-code games. Simple load MAGIC MESSAGE, play in main part of game and like Magic messages will appear on your video.

Post £4.95 Free

O/seas, Europe +50p Others +£1.50 (Please order as Magic M)

ZX-GUARANTEED (YC)
29 Chadderton Drive, Unsworth,
Bury, Lancs, BL9 8NL

EDUCATION

Whether it be SPECTRUM, ZX81 or BBC B, we hold in stock probably the largest range of educational software available, currently in excess of 50 DIFFERENT EDUCATIONAL CASSETTES produced by the major software houses.

SAE for catalogue and SPECIAL OFFERS. Also GAMES TAPES: 3 for price of 2.
LOCATOR, 12, Fernhall Drive, Redbridge, Essex, IG4 5BN. Tel. 01-550 5575

COMPUTER ASSISTED LEARNING

INFO-STREAM™ offers over 200 QUALITY EDUCATIONAL CASSETTES and DISKS for the Spectrum, BBC, Electron & CBM64, with SPECIAL OFFERS for the VIC-20 & ZX81.

Our new range covers VIDEO CASSETTES and BOOKS on BASIC, Assembly Language and Advanced Programming, together with introductions to Forth, Lisp, Logo & Pascal.

Send 23p SAE for FREE INFORMATION PACK to: INFO-STREAM (Dept. YC5), 36A Chase Green Avenue, Enfield, Middlesex, EN2 8EB. Export enquiries welcome.

SUPERIOR SPECTRUM TAPE COPIER

The **NEW 007 SPY** in the **ONLY** copier capable of copying even a full 48K Headerless program.

- Copies multipart programs all in one loading, automatically.
- Copies programs from 1 to 65279 bytes long. (Can yours)?
- Copies Headerless files up to a full 48K. (No other copier can).
- Copies **ALL** types, Basic, Code, Screen, Arrays, Headerless.
- Guaranteed easiest to use.

007 SPY IS JUST £3.95

(Europe + 50p Other areas +£1.50) (Please order as 007N)

ZX-GUARANTEED (Dept YC)
29 Chadderton Drive, Unsworth,
Bury, Lancs, BL9 8NL.
Tel: 061-766 5712

EXPORT YOUR PRODUCT

Major New Zealand Mail Order House requires new products to market. All types of Hardware, Programs, Utilities, Books etc. Send details and samples to:

Roda Imports PO Box 76-310
Manukau City, New Zealand

Z80 ASSEMBLER

Specially written for
AMSTRAD CPC 464
By the author of BEEBUG'S 'EXMON'

- FULL SCREEN EDITOR with block commands and string search
- DISASSEMBLER & HEX DUMP
- Allows freely mixed BASIC/Machine Code (similar to BBC BASIC)
- Professional 80 column listing with page numbering and titles
- IF/ELSE/ENDIF with nesting allowed
- Printer option
- Symbol table dump option
- Colour output
- Super fast — approx 3,000 lines/min.
- Comprehensive instruction manual

SPECIAL INTRODUCTORY OFFER
£11.60 (inc. p&p)
add £1 for overseas orders
— Trade Enquiries Welcome —

ARNOR LTD.
P.O. Box 619, London SE25 6JH.

SINCLAIR ZX Spectrum 48K plus printer, interface I, microdrive, plus various software including Tasword 2. £180. Phone Radlett 7234 518

SPECTRUM READ. Teaches children to read. £9.95. SAE for details of other Educational programs. BOURNE, 44 Haslam Crescent, Bexhill, Sussex. 532

DISCOUNT MAIL ORDER SOFTWARE

BEACH HEAD	CBM	£8.95
MONTY MOLE	CBM	£7.20
SOLO FLIGHT	CBM	£13.46
BEACH HEAD	SPEC	£7.20
LORD OF MIDNIGHT	SPEC	£8.99
MONTY MOLE	SPEC	£6.26
FRAK	BBC	£8.10
BLAGGER	BBC	£7.20

and
State title and machine SAE for lists
PO/Cheque to Dept. (YC)
65 THURLOW PARK ROAD, LONDON SE21 8JP

★★★★★★★★★★★★★★★★

U.S. GOLD

All American Software

The premier publishers of American Computer Software offer "Fantastic Opportunities" for

Assembly Language Z-80 Programmers

Translation coding from Commodore 64 to ZX Spectrum.
First class work will be highly rewarded with guaranteed payments.
Programming includes Arcade Games, Simulations Adventure, Strategy and War Games.

Write or phone now to Software Development Department, U.S.G, 6 Central Street, Manchester M2. or phone 061 832-6633

But hurry! Limited contracts left for this year.

Completed programs for Spectrum also considered.

★★★★★★★★★★★★★★★★

REPRINTS

a ready made sales aid

If you are interested in a particular article or advertisement in this publication why not take advantage of our reprint service. We offer an excellent, reasonably priced service. For further details and a quotation

Ring Michael Rogers on 01-661 3457

SELL IT WITH YOUR COMPUTER

CLASSIFIED ORDER FORM

Classified Rates

Linage: 50p per word (Min 20 words) — prepayable

Linage advertisers should complete the form provided in BLOCK CAPITALS. Phone number counts as 2 words. Name and address to be paid for if used in advertisement. Box Number if required is £4.00 extra.

Display — rates per scc (Min 2scc)

One insertion	:	£9.00
Three insertions	:	£8.70
Six insertions	:	£8.50
Twelve insertions	:	£8.00

Display advertisers should provide separate copy and preferably reserve space by phone (01-661 3036).

Method of Payment

Cheques etc, should be made payable to Business Press International Ltd, and crossed. I enclose herewith cheque/PO for

£.....

Please debit my Access/Visa Barclay Card/American Express/Diners Club Intl /as below

	LINAGE
	£10.00
	£12.50
	£15.00
	£17.50
	£20.00
	£22.50
	£25.00

Please insert the following advertisement in Your Computer Classified Section

No. of insertions required ☐ Box No. required YES/NO

NAME *(Please include initials).* .....

ADDRESS .....

.....

.....

Payment by credit card please state address card is registered

Daytime tel. no .....

SIGNATURE

Post to:
Cut out the order form and return together with your remittance to: Classified Department, Your Computer, Room H211, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. (01) 661 3036

THIS FORM SHOULD BE RETURNED BY JAN 25th FOR MARCH ISSUE PUBLICATION

Company Registered Number: 151537 (England) Registered Office: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Hot lines

Acorn Computers
Telephone: Cambridge 0223 210111

Atari
Telephone: Slough 0753 24561

Amstrad
Telephone: Brentwood 0277 228888

Commodore CBM
Telephone: Northampton 0536 205252

Enterprise
Telephone: 01-739 4282

Oric
Telephone: Cambridge 02205 5141

Sinclair
Telephone: Cambridge 0276 685311

Tandy Corporation
Telephone: Birmingham 021 5566101 ext 33

Toshiba
Telephone: Camberley 0276 62222

DATEBASE

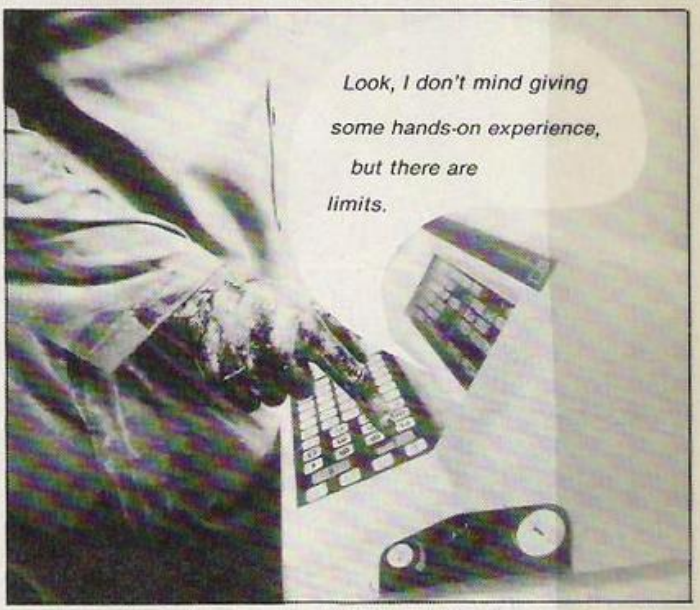
Local, national and international micro events are updated here. To publicise your event, phone Paul Bond on 01-661 3472.

International Trade Show for Home Computers and Software

Open to the public as well as trade, this exhibition deals with every aspect of home computing. Olympia, London, February 17-19. Telephone 0932 777000.

Which Computer? Show

January 15-18, NEC, Birmingham. Business computing exhibition geared to the interests of professional end users. Telephone 01-891 5051.



A rather grubby employee clocks out on an ICL 9602 Factory and Attendance terminal.

Micro Show

60 exhibitors covering both home and business computers, at the Leisure Centre, Swansea, January 17-19. Thursday trade only. Telephone 0202 30461.

INDEX OF ADVERTISERS

A
Acorn Computers 24, 25
Activision 56, 86, 188, 189
Addictive Games 20
Allcom 136
Amstrad 106, 107
Anirog 120
Anthony Ashpatel 154
Argus Press Software 29
Atari International 202, 203
Aztec 153

B
Beebug 186
Betasoft 154
Beyond Software 30
Blaby 134
British Telecom (Firefly) 16, 17
Bubble Bus 21
Buffer Micros 146
Bugbyte Software IFC, 132

C
CJE Micros 64
Cambridge Micro Electronics 154
Cobolt Systems 54
Computer Games Ltd 66
Computer Link 60
Creative Sparks 8, 74, 198
Cumana 196, 197
Currah Computers IBC

D
DACC 194
Datastar 199
Datel 140
Dennison 19, 21, 23
Disco Technology 7, 9
Doctorsoft 95

E
Electronics & Wireless World 156
Euro Electronics 150

F
First Publishing 80
Folly Micros 146
Frel Ltd 78
Frontrunner K-tel 35, 37

G
GCE Tutoring 21
Gilsoft 123

H
Hanatrex 28
Haulsterm 164
Hisoft 142

I
Independent Software 132
Innelec 6
Interface 144

J
JJ Silber (Targus) 77
Jetsoft 194

K
Kernow Software 60

L
LCL 199
Level 9 Computing 192
Level Software 12
Llamasoft 130

M
Mail Order Protection Scheme 194
Melbourne House 14, 15, 31, 96, 110, 119
Memorex UK 38, 39
Micro Fast 146
Micro-x 19
Microanswers 136
Microgold 138
Micronet 800 32, 33
Micropower 88, 127
Micropride 143
Microware 186
Mikrogen 44, 175
Miles Better Software 150
Miracle Systems 60
Mirrorsoft 105

N
National Software Library 132
National Westminster Bank 101
New Generation Software 8

O
OE Ltd 160
Oasis Software 129
Ocean Games Back Cover
Ocean Software 83
Oxford Computer Publishing 26, 27, 46

P
PAS Computers 134
PSS 11
Picturesque 19
Print n' Plotter 200, 201
Protek 72, 115, 124

Q
Quicksilva 58

R
Richard Wilcox 5
Runesoft 10

S
Saga Systems 22
Sci Soft 64
Selec Software 186
Silica Shop 13
Software Library 150
Southern Software 62
Spectrum 176, 185
Statesoft 195
Stonechip 34
Streetwise 136
Swescot 12
Swoppatape 187

T
Tasman 52
The Edge 4
The Microworkshop 199
The Royal Clifton Hotel 8
Thoughts & Crosses 171
Toshiba 85
Trionic 12

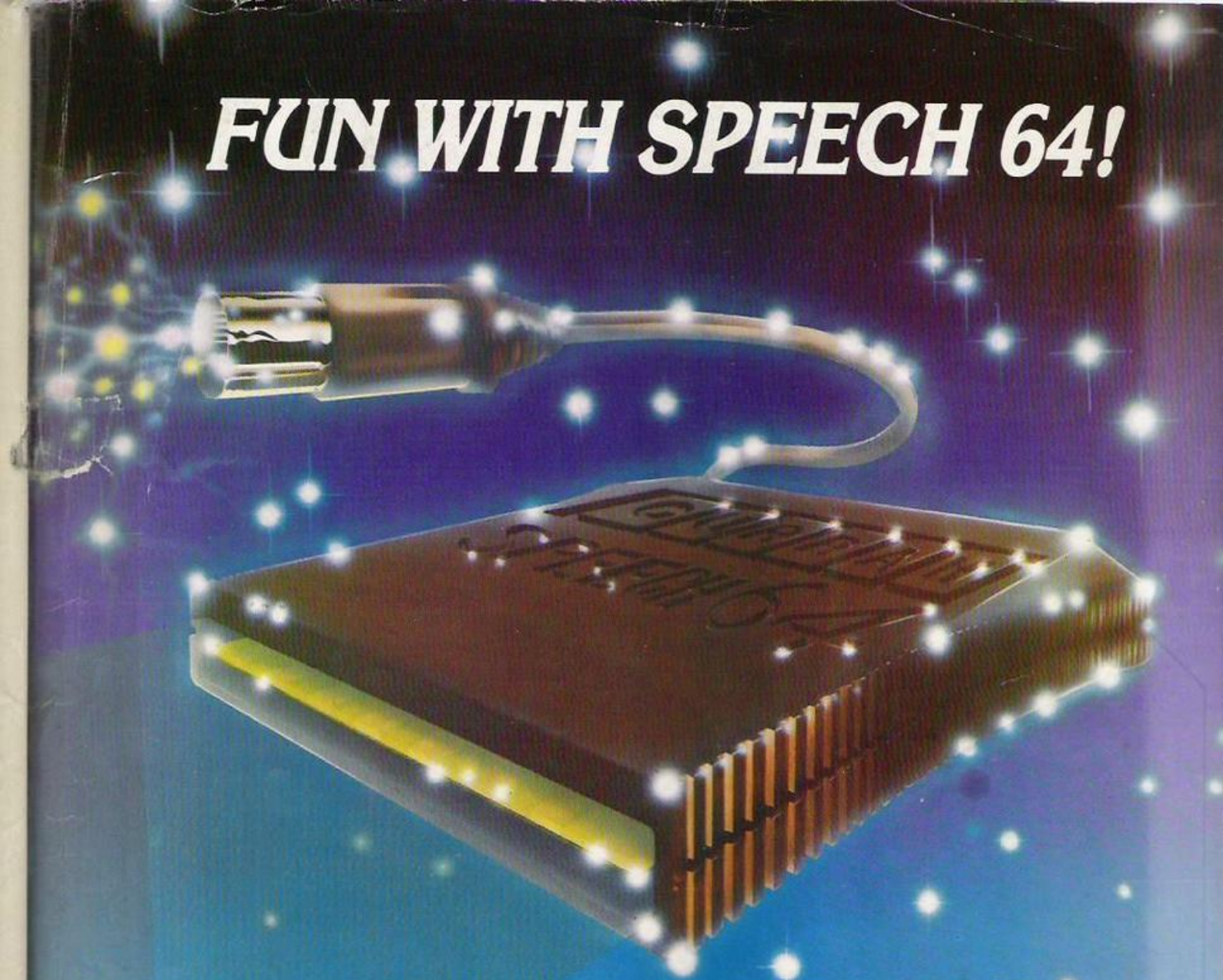
U
US Gold 18, 92, 98, 122, 139, 149, 193
Ultimate Play the Game 190, 191
Unicom 50
University Software 64

V
Visionstore 158
Vulcan Electronics 162

W
Wizard Software 164
Worldwide Computers 48

Z
ZX Microfair 36

FUN WITH SPEECH 64!



Speech Synthesiser for the Commodore 64

SPEECH 64 for the Commodore 64 is ready to talk immediately on power-up, has an infinite vocabulary and extra BASIC commands. Retailing at only **£29.95**, ***SPEECH 64***'s advanced features will give you, your family and friends lots more fun with your computer! Its sister unit μSPEECH — for the Sinclair Spectrum — is a smash hit in the UK and over 10 other countries, and has been awarded the CTA 'Product of the Year' accolade.

SPEECH 64 is easy to use! It needs no software to be loaded, it does not steal RAM from the BASIC operating system, or stop arcade style action.

With extended BASIC commands like SAY and its Text to Speech facility ***SPEECH 64*** can be programmed in plain English, just like this:

SAY "to say anything you want"

You can choose from two different voices, each with programmable intonation, and other commands control the voicing of keys as they are pressed — a useful educational aid for young children.

SPEECH 64 comes complete with full documentation and two free full colour posters. Watch out for ***SPEECH 64*** as it appears in retail outlets nationwide — or use the order form below, at no extra cost.

CURRAH

Computor Components Ltd

To: SPEECH 64 Offer, P.O. Box 1, Gateshead, Tyne & Wear, NE8 1AJ

Please Supply ..... **SPEECH 64** unit(s) at £29.95 each incl. VAT & P & P

Name (please print) ..... **YC 1/85**

Address (please print) .....

..... Postcode .....

I enclose a cheque/PO payable to 'SPEECH 64 Offer' value £ .....

or debit my Access/BarclayCard No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signed (credit card orders not accepted unless signed) .....

Credit Card Hotline 091 - 482 4683 Please allow 28 days for delivery. Offer valid UK only

MATCH DAY

Match Day is no ordinary soccer game. Blistering 3-D action, total animation and automatic camera scan are just some of the intricate techniques which make Match Day the league leader of soccer games.
Now follow the "Action":

Your striker traps the ball from a perfectly placed corner-kick, takes on the defender and dribbles neatly round him making space to

chip in a teasing cross-ball to his advancing team mate in the

six-yard box. There is no time to control the ball, your player must commit himself to a snap shot on goal...

his powerful half-volley rattles the cross-bar, the ball returns, floating menacingly above the penalty

area and your star striker seizes this half-chance

to head the ball decisively into the back of the net...

...GOAL!

Match Day is as compelling as soccer itself. You will marvel at the depth of play and ball control offered only in MATCH DAY... Shoot to win!

SPECTRUM 48k
7·95

ocean

SPECTRUM 48k
7·95

Ocean House · 6 Central Street · Manchester · M2 5NS · Telephone 061 832 6633 · Telex 669977

Ocean Software is available from selected branches of: **WOOLWORTH**, WHSMITH, Boots, John Menzies, **LASKYS**, **Rumbelows**, **COMET**,
Spectrum Shops and all good software dealers. Trade enquiries welcome.