

70p

Win a Comx 35 computer

YOUR

COMPUTER

Denmark	DKr	26.00
Germany	Dm	6.50
Greece	Dra	150.00
Holland	DFL	6.50
Italy	L	2900
New Zealand	NZ\$	2.60
Singapore	M\$	4.30
Switzerland	SFr	5.40

AUGUST 1983

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

Vol. 3 No. 8

Run silent, run deep with Spectrum War beneath the Waves

Reviews:
£120 Comx 35 micro
BBC software

C.V. KRIMPEN

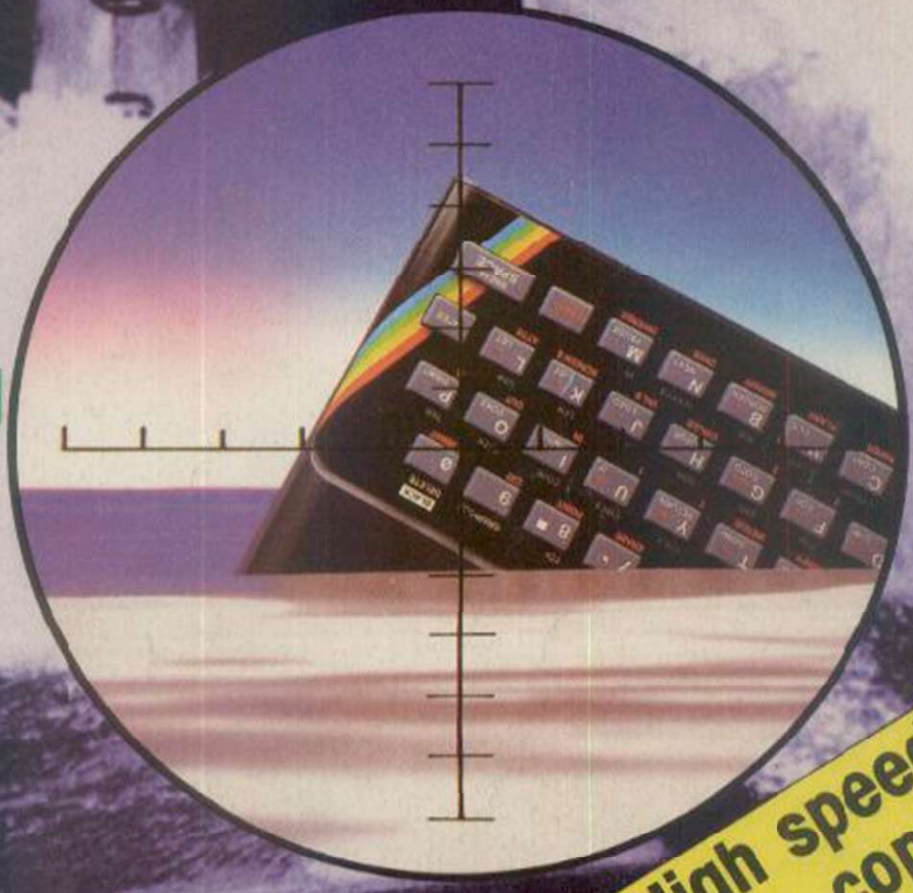
Vic-20 Flying Saucer Attack

Spectrum Tortoise graphics

ZX-81 Death Duel

Dragon Gnasher and Store and Search

Compacting BBC Basic



High speed ZX-81 compiler

SPECTRUM GAMES

An amazing
collection of
exciting
games for
VIC 20 and
ZX Spectrum

Featuring—

- Hi-Resolution Graphics
- Solid Machine Code Thrills
- Authentic Arcade Action
- Sensational Sound Effects

Titles for Oric,
Dragon and
Commodore 64
Ring for details:

061-832 9143

(24 HOURS)

Dealer enquiries invited

**FREEPOST
MANCHESTER
M3 8BB.**

**KONG/MANIC/MISSILE ATTACK/
STRIKE FORCE/ROAD FROG/
MONSTER MANCHER/ROCKET COMMAND/
FRENZ/COSMIC INTRUDERS**

Available from all good
software dealers and major
department stores

remember to ask for

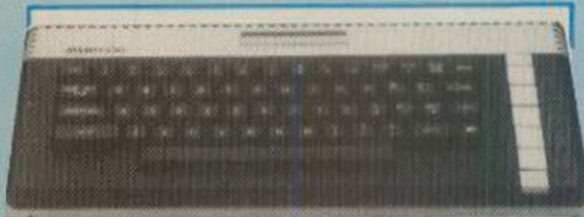
**spectrum
games**

by name

YOUR COMPUTER

Contents

AUGUST 1983



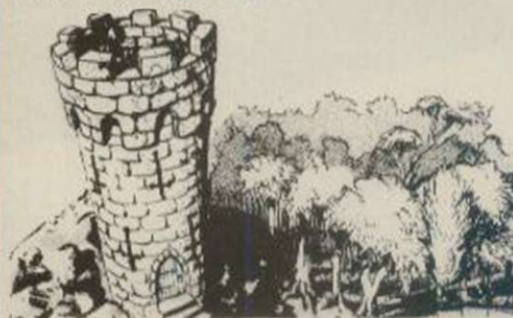
Latest Ataris. News: page 42.



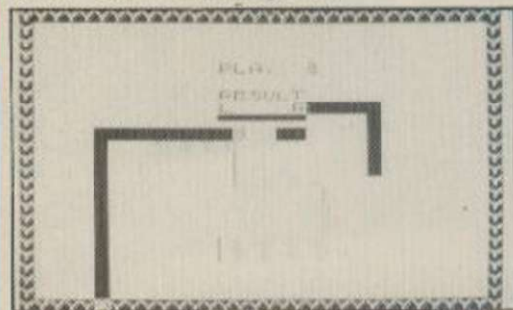
Star games Shortlist: page 51.



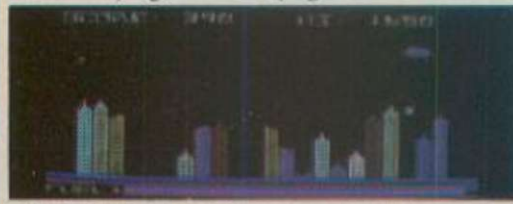
Above BBC software: page 52. Below Timeswitch: page 64.



ZX-81 Death Duel: page 68.



Vic-20 Flying Saucers: page 94.



Cover photograph by Stephen Oliver.

- 40 EDITORIAL AND YOUR LETTERS:** Atari bugs; exorbitant prices and even quicker loading. Are minor faults spoiling computers?
- 42 NEWS:** Home micro nearly causes Third World War — but it's only a film; two new Ataris; cloning computers and more price cuts.
- 46 FIRST BYTES:** Your introduction to computing this month explains RAM and ROM and how data is stored.
- 49 COMPUTER CLUB:** Bionic Simon Beesley armwrestles with an Armdroid at Nottingham Computer Club.
- 51 SOFTWARE SHORTLIST:** A new monthly round up of the latest software. **SHORTLIST**
- 52 BBC SOFTWARE SURVEY:** Sun-crazed Peter Connor takes to the great outdoors with soccer and horse-racing in his own living room.
- 56 COMX35:** The latest Hong Kong import — a colour micro with 35K for £120 and a built in joystick — reviewed by Kathleen Peel.
- 64 SPECTRUM TIMESLIDER:** You are stranded 1,000 years from home and your only hope of return is to find your Time Machine before the Adventure ends.
- 68 ZX-81 DEATH DUEL:** A fast Tron-style game for two players perfected by Tavcar Igor in Yugoslavia.
- 71 DRAGON GNASHER MAZE:** A different maze every game and choice of ghosts which can float through walls, presented by John Nash.
- 77 ZX-81 COMPILER:** David Threlfall is back in the fast lane with practical examples showing how to compile particular functions.
- 85 VIC-20 MONITOR:** Sometimes running a machine-code program can be as complicated as running a power station. Alan Westwood's monitor puts the facts at your finger tips.
- 90 BBC SCRAMBLER:** All the excitement of arcade-style Scramble with minimalist teletext graphics for the real purists.
- 94 VIC-20 FLYING SAUCER ATTACK:** Livelier than any commercial version of Blitz, this game is fast, colourful and noisy.
- 100 ORIC CENTEPODS:** David Whitehead leads you up the garden path with the loudest game we have ever published.
- 105 ZX-81 CASSETTE FILES:** Kevin Hill's program will allow you to store the whole Encyclopaedia Britannica on ZX-81 cassettes — if you have a lifetime to spare.
- 108 SPECTRUM SUBMARINE MISSION:** Another realistic Rod Hopkins simulation puts you in control of a British submarine hunting U-boats.
- 120 TORTOISE ON SPECTRUM:** With Turtles an endangered species Chris Davison has turned to the Tortoise for Spectrum graphics.
- 123 BBC COMPACTOR:** Line crunching, space munching, bit smacking Fintan Culwin shows you how to get the most into your BBC Micro.
- 133 DRAGON STORE AND SEARCH:** John Nash turns the Dragon 32 into a useful library tool which could guide you to references.
- 140 GAMES WRITING:** John Dawson calls for more invention.
- 143 6502 MACHINE CODE:** Our series on 6502 code.
- 151 RESPONSE FRAME:** Tim Hartnell answers queries on VDU commands for the BBC and computing for the disabled.
- 157 SOFTWARE FILE:** 10 program-packed pages full of games, tips and serious applications for the ZX-81, BBC, Vic-20, Dragon, Spectrum, Lynx and TI-99/4A.
- WIN A COMX:** See card at page 38
- 177 COMPETITION CORNER:** New teaser, Microline printer winner.



**JUST A FEW OF THE THINGS YOU'LL FIND AT
YOUR **COMPUTERS FOR ALL** DEALER**



Your local **COMPUTERS FOR ALL** dealer offers you an incredible choice of personal computing hardware, software, peripherals and printers of all shapes sizes and prices!

But a **COMPUTERS FOR ALL** dealer will also give you much, much more than most computer shops.

For instance: you'll get good, sound advice and professional service. You'll also be able to talk to someone that knows a lot about computing. Quite frankly, a **COMPUTERS FOR ALL** dealer is dedicated to computers. He won't try to sell you things like cameras or cosmetics,

stationery or sealing wax... as others do!

He's there to look after your interests whether you're buying or just browsing. So why not call today at your local dealer? He can help you find your way through the computer jungle.

STOP PRESS PRICES

COMX 35 COMPUTER	£119.95
LASER 200 COMPUTER	£69.95
ORIC I 48K	£139.95
New Low Price	
ATARI 800	£299.99
DRAGON 32	£175.00
ATARI 400	£149.99 inc. Programming Pack!
VIC 20	£139.95 inc. Tape Recorder, BASIC + 4 cassette games!
COMMODORE 64	£343.85
ZX SPECTRUM	16K £99.95; 48K £129.95
BBC MICRO	(A) £299.00 (B) £399.00
SEIKOSHA GP 100A PRINTER	£247.25
EPSON FX80 PRINTER	£460.00
EPSON RX80 PRINTER	£343.85

PLUS DISC DRIVES, JOYSTICKS, CASSETTE RECORDERS, SOFTWARE ALL AT LOWEST PRICES!

The shops where people matter:

AVON
JADE COMPUTERS
COOMBEND RADSTOCK BATH
0761 35270

MERCATOR COMPUTER SYSTEMS
3 WHITELADIES ROAD
CLIFTON, BRISTOL 0272 731079
MOBILE MICROS
2 CASTLE STREET THORNBURY
BRISTOL 0454 418383

BERKS.
KENNETH WARD
COMPUTERS
VERVE HOUSE LONDON ROAD
SUNNINGDALE 0990 25025

CAMBRIDGE
CAMBRIDGE
MICROCOMPUTER CENTRE
153-154 EAST ROAD 0223 355404

CHESHIRE
DELTA MICROS
68 CHESTERGATE MACCLESFIELD
0625 618827

CORNWALL
FAL SOFT
8 ST GEORGES ARCADE
FALMOUTH 0326 314663
COMPUTAVISION
4 MARKET STREET
SAINT AUSTELL PL25 5HW
0726 5297

CHANNEL ISLANDS
MEGA
7 ANLEY STREET ST HELIER
JERSEY 0534 72263

DEVON
COMPUTER SYSTEMS
TORBAY PUMP STREET
BRIDHAM 08045 6565
A & D COMPUTERS
6 CITY ARCADE FORD STREET
EXETER 0392 77117

BITS AND BYTES
44 FORD STREET ILFRACOMBE
EX34 9JD 0271 62801

SYNTAX LTD
76 CORNWALL STREET
PLYMOUTH PL1 1NS 0752 28705

CRYSTAL COMPUTERS
209 JUNIC STREET TORQUAY
0803 22699

DORSET
DENSHAM COMPUTERS
329 ASHLEY ROAD PARKSTONE
POOLE 0202 737493

ESSEX
AKHTER INSTRUMENTS
UNIT 19 ARLINGHYDE ESTATE
SOUTH ROAD HARLOW
0279 412639

CHANNEL ONE
174 HIGH STREET HORNCHURCH
84 75613
COMPUTERS FOR ALL
72 NORTH STREET ROMFORD
RM1 0708 752862

S. WALES
DAN EVANS
81 OLTON ROAD BARRY
0445 734242

STEVE'S COMPUTER COMPANY
CASTLE ARCADE CARDIFF
WALES 0222 41905
AUTOMATION SERVICES
31 WERMEYS ROAD
PEN Y SFAI BRIDGEND
0656 720959

MORRISTON COMPUTER CENTRE
37 CLASE ROAD MORRISTON
SWANSEA SA6 8DS 0792 797572

HAMPSHIRE
MICRO VIDEO STUDIOS
17 TURKS STREET ALTON
0420 82055

HERTFORDSHIRE
COMBINED TRADING
COMPANY
10 AND 11 SALSBUARY SQUARE
OLD HATFIELD 0707 265551

VIDEO CITY COMPUTERS
45-47 FISHERS GREEN ROAD
STEVENAGE SG1 2PL
0439 53808

KENT
MICRO MAGIC
128 ERITH ROAD BEXLEYHEATH
KENT 0322 523525

THE DATA STORE
6 CHATTERTON ROAD
BROMLEY 01-460 8991

MEDWAY COMPUTERS
141 NEW ROAD CHATHAM
0634 826080
APHROS SOFTWARE
47 HAWLEY SQUARE MARGATE
0843 294699

THE MICRO SHOP
11 THE PANTILES
TUNBRIDGE WELLS 0892 27691

LANCS
P.C.S.
39 RAILWAY ROAD DARWEN
0254 778677
4MAT COMPUTING
67 FRIARGATE PRESTON
PR1 2AT 0772 561952

LEICS
DIMENSION
27-29 HIGH STREET LEICESTER
LE1 5EU 0533 57479

LONDON E17
EROL COMPUTING
125 HIGH STREET
WALTHAMSTOW 01-520 7763

LONDON SE9
KAYDE HOME COMPUTERS
1 STATION APPROACH
NEW ELTHAM 01-859 7505

LONDON SE26
KELLY'S COMPUTERMARKET
227 DARTMOUTH ROAD
SYDENHAM 01-699 6202

MIDDX
SCREENS
MICROCOMPUTERS
6 MAIN AVENUE MOOR PARK
NORTHWOOD HA6 2HJ
09274 20664

TWILLSTAR COMPUTERS
17 REGINA ROAD SOUTHALL
01-574 5271

NORFOLK
KAYDE HOME COMPUTERS
THE CONGE GREAT YARMOUTH
NR30 1JP 0493 57867

NORTHAMPTON
LEISURE TIME
13 THE FRIARY
GROSVENOR CENTRE
0604 35726

RICHARD REEVES
174 KETTERING ROAD 0604 33578

N. IRELAND
D. V. MARTIN
13 BRIDGE STREET BELFAST
BT1 1LT 0232 228434

MCLAUGHLIN ELECTRONICS
44 CARLISLE ROAD
LONDONDERRY
0665 54022

OXFORD
SCIENCE STUDIO
7 LITTLE CLARENDON OX1 2HP
0865 54022

SHETLAND
TOMORROW'S WORLD
ESPLANADE LERWICK ZE1 0LL
0595 2145

SUFFOLK
BECCLES COMPUTERS
5 THE RIDINGS WORLINGHAM
BECCLES 0502 715061

SURREY
ANIROG
8 HIGH STREET HORLEY
02934 6083

COMPUTASOLVE
8 CENTRAL PARADE
ST MARKS HILL SURBITON
01-390 5135

SUSSEX
THE COMPUTER CENTRE
37a & 37b ROBERTSON STREET
HASTINGS 0424 439190

TYNE & WEAR
THE COMPUSHOP
10 NEWGATE CENTRE
NEWCASTLE UPON TYNE
NE1 5RE 0632 618673

W. MIDLANDS
CALISTO COMPUTERS
119 JOHN BRIGHT STREET
BIRMINGHAM B1 1BE
021 632 6458

J.B.C.
200 EARLESDON AVE NORTH
EARSDON COVENTRY 0203 73813

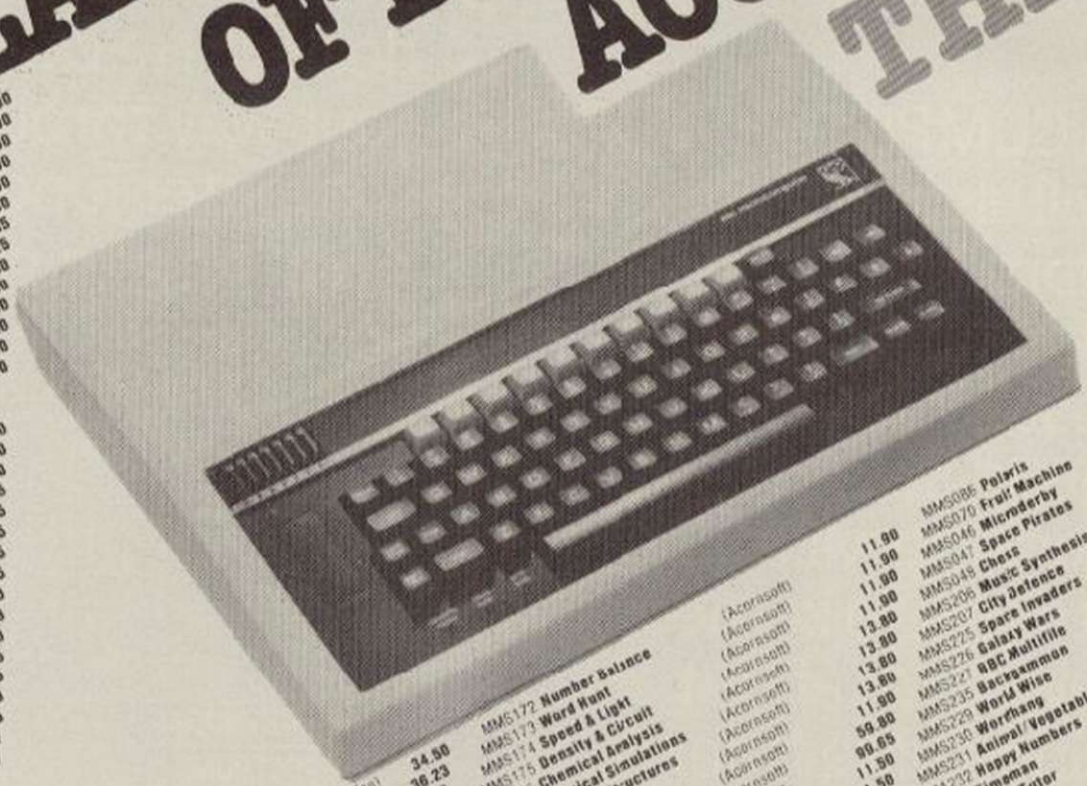
WARKS
IMPULSE MICRO SYSTEMS
6 CENTRAL CHAMBERS
COOKS ALLEY, WOOD STREET
STRATFORD UPON AVON
0789 295819

WORCESTER
EVESHAM COMPUTER
CENTRE
CROWN COURTYARD
BRIDGE STREET EVESHAM
0386 48635

S. YORKSHIRE
COM-TEC
6 EASTGATE BARNSELY
0226 46972



MICROS ACCESSORIES THE WORLD'S LARGEST LIST OF BBC MICROS ACCESSORIES THE WORLD'S LARGEST LIST



HARDWARE

- MMB001 BBC Model B 390.00
- MMB002 BBC Model B-Econ/Disk B 446.00
- MMB003 BBC Model B-Econ/Disk Int 516.00
- MMB004 BBC Model A-Econ/Disk Int 400.00
- MMB005 BBC Model A-Econ/Disk Int 205.00
- MMB006 BBC Disk Drive 100K 803.85
- MMB007 BBC Disk Drive 100K 109.25
- MMB008 BBC Disk Interface 310.50
- MMB009 BBC 6502 2nd Processor 295.00
- MMB010 BBC 6502 2nd Processor 225.00
- MMB011 Teletext Receiver 103.50
- MMB012 Teletext Receiver 13.00
- MMB013 Prestel Receiver (Acorn)
- MMB014 Joysticks (pair) (Acorn)
- MMB015 1.2 Operating System (Acorn)

PRINTERS

- MMB037 Seikosha EP100 215.00
- MMB035 Seikosha 6P250 276.00
- MMB036 NEC PC 8023 Printer (D/M) 368.00
- MMB038 Epson MX100 488.75
- MMB039 Epson FX-80 Printer 339.25
- MMB040 Epson FX-80 Printer 150cps 454.25
- MMB041 Epson Jet Printer 419.75
- MMB042 Spark Corona D/Wheat 511.75
- MMB043 Smith Corona D/Wheat 1285.00
- MMB044 Tec Starwriter 7.40
- MMB045 Tec Starwriter Ribbon 38.80
- MMB046 Epson FX Tractor Feed 44.95
- MMB047 Epson RS232 Int 1/F 2K 69.00
- MMB048 Epson RS232 Int 1/F 2K 69.00
- MMB049 Seikosha RS232 1/F Option 155.25
- MMB050 Tec Starwriter 1/Feed 12.07
- MMB051 Epson MX 100 Ribbon (Epson)
- MMB052 Epson FX 80 Ribbon (Epson)

DISK DRIVES

- MMB054 Disk Drive 100K Single 201.25
- MMB055 Disk Drive 200K Single 304.75
- MMB056 Disk Drive 400K Single 398.75
- MMB057 1 Drive Cable for above 711.85
- MMB058 2 Drive Cable for above 12.65
- MMB059 280 Disk Pack (Teach) 17.25
- MMB060 280 Disk Pack (Teach) 897.00

MONITORS

- MMB015 RGB Colour Monitor Std/Ras 287.50
- MMB016 RGB Colour Monitor H/Ras 632.00
- MMB017 RGB Cable 9.95
- MMB018 12" Amber Monitor 8.74
- MMB019 12" Amber Monitor 8.74
- MMB020 12" Green Monitor 11.79
- MMB021 12" Green Monitor 6.84

UPGRADE KITS

- MMB022 A to B Upgrade (Fit/Disk) 15.00
- MMB023 Memory Upgrade (Kit) 2.30
- MMB024 Printer I/O (Kit) 2.98
- MMB025 Analogue (Kit) 0.00
- MMB026 Serial I/O & RGB (Kit) 0.00
- MMB027 Expansion Box (Kit) 4.03

PLUGS AND CABLES

- MMB028 Parallel Cable Assembled 22.43
- MMB029 User Port Connector/Cable 28.75
- MMB030 Analogue Plug & Cable 1.00
- MMB031 5 Pin DIN 5.74
- MMB032 6 Pin DIN 5.74
- MMB033 7 Pin DIN (Micro Man)
- MMB034 Bus Connector (Micro Man)

STORAGE

- MMB041 5 1/4" Disks (10) S/Side S/Dens Soft/Sec 20.00
- MMB042 5 1/4" Disks (10) D/Side D/Dens Soft/Sec 4.82
- MMB043 Computer Cassette Tapes 2.87
- MMB044 Computer Cassette Tapes 2.87
- MMB045 Cassette Recorder 14.85
- MMB046 Flochart Stencil 18.40
- MMB047 Disk Library Case (Micro Man)
- MMB048 Paper Listing Binder 138.00
- MMB049 Paper 9 1/2" x 11" (2000) (Micro Man)
- MMB050 Paper 15 1/2" x 11" (2000) (Micro Man)
- MMB051 Computer Work Station (Micro Man)

PERIPHERALS

- MMB050 Graphics Tablet (Disk) 88.25
- MMB051 Graphics Tablet (Disk) 143.75

BOOKS

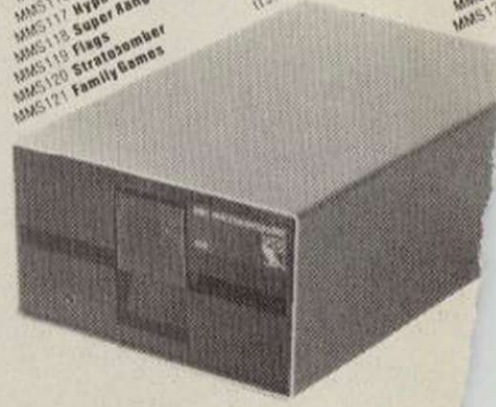
- MMB060 AIP For BBC Computers 201.25
- MMB061 30 Programs for BBC 304.75
- MMB062 Programming the BBC 398.75
- MMB063 6502 Applications 711.85
- MMB064 BBC Micro Revealed 12.65
- MMB065 30 Hour Basic 17.25
- MMB066 Let Your BBC Teach You 897.00
- MMB067 Speaker De-buzzer Voltmeter & D (Torch) 287.50
- MMB068 Light Pen (Micro Man)
- MMB069 A/D Converter (Micro Man)
- MMB070 Cooling Fan (Micro Man)
- MMB071 Speaker De-buzzer (Micro Man)
- MMB072 Voltmeter & D (Micro Man)

SOFTWARE

- MMB073 The Computer Book 15.00
- MMB074 Easy Prag for BBC 2.30
- MMB075 Games BBC Comps Play 2.98
- MMB076 Basic Programming for BBC 0.00
- MMB077 Forth Programming 0.00
- MMS053 Arcadians (Acornsoft) 9.95
- MMS054 Snapper (Acornsoft) 9.95
- MMS055 Motors (Acornsoft) 9.95
- MMS056 Creative Graphics (Acornsoft) 9.95
- MMS057 Tree of Knowledge (Acornsoft) 9.95
- MMS058 Business Games (Acornsoft) 9.95
- MMS059 Peek-a-Computer (Acornsoft) 9.95
- MMS060 Algebraic Manipulation (Acornsoft) 9.95
- MMS061 Monsters (Acornsoft) 9.95
- MMS062 Planetoid (Acornsoft) 9.95
- MMS063 Arcade Action (Acornsoft) 9.95
- MMS064 Desk Diary (Acornsoft) 9.95
- MMS065 Philosophers Quest (Acornsoft) 9.95
- MMS066 Lisp (Acornsoft) 9.95
- MMS067 Graphs and Charts (Acornsoft) 9.95
- MMS068 Cube Master (Acornsoft) 9.95
- MMS069 Castle of Riddles (Acornsoft) 9.95
- MMS070 Forth (Acornsoft) 9.95
- MMS071 Rocket Race (Acornsoft) 9.95
- MMS072 Sphinx Adventure (Acornsoft) 9.95
- MMS073 Sliding Block Puzzles (Acornsoft) 9.95
- MMS074 Chess (Acornsoft) 9.95
- MMS075 Super Invaders (Acornsoft) 9.95
- MMS076 Missile Base (Acornsoft) 9.95
- MMS077 Snooker (Acornsoft) 9.95
- MMS078 Starship Command (Acornsoft) 9.95
- MMS079 Countdown to Boom (Acornsoft) 9.95
- MMS080 Sentence Sequencing (Acornsoft) 9.95
- MMS081 Word Sequencing (Acornsoft) 9.95
- MMS082 Missing Signs (Acornsoft) 9.95

- MMS172 Number Balance (Acornsoft) 34.50
- MMS173 Word Hunt (Acornsoft) 36.23
- MMS174 Speed & Circuit (Acornsoft) 343.85
- MMS175 Chemical Analysis (Acornsoft) 38.24
- MMS176 Density & Light (Acornsoft) 3.45
- MMS177 Chemical Simulations (Acornsoft) 28.75
- MMS178 Chemical Structures (Acornsoft)
- MMS179 Jars (Acornsoft)
- MMS180 Microtext (Acornsoft)
- MMS181 View ROM (Inc Manuals) (Acornsoft)
- MMS182 BCPL (ROM, Disk-Manuals) (Acornsoft)
- MMS183 Arcadians (Acornsoft)
- MMS184 Super Invaders (Acornsoft)
- MMS185 Starship Command (Acornsoft)
- MMS186 Sphinx Adventure (Acornsoft)
- MMS187 Philosophers Quest (Acornsoft)
- MMS188 Number Balance (Acornsoft)
- MMS189 Word Hunt (Acornsoft)
- MMS190 Speed & Circuit (Acornsoft)
- MMS191 Density & Light (Acornsoft)
- MMS192 Chemical Analysis (Acornsoft)
- MMS193 Chemical Simulations (Acornsoft)
- MMS194 Chemical Structures (Acornsoft)
- MMS195 Jars (Acornsoft)
- MMS196 Lisp (Acornsoft)
- MMS197 Forth (Acornsoft)
- MMS198 Microtext (Acornsoft)
- MMS199 Word Sequencing (Acornsoft)
- MMS200 Missing Signs (Acornsoft)
- MMS201 Sentence Sequencing (Acornsoft)
- MMS202 Rocket Raid (Acornsoft)
- MMS203 Monsters (Acornsoft)
- MMS204 Snapper (Acornsoft)
- MMS205 Meteo (Acornsoft)
- MMS206 Planetoid (Acornsoft)
- MMS207 Creative Graphics (Book) (Acornsoft)
- MMS208 Graphs & Charts (Book) (Acornsoft)
- MMS209 Lisp (Book) (Acornsoft)
- MMS210 Forth (Book) (Acornsoft)
- MMS211 View Guide (Book) (Acornsoft)
- MMS212 Into View (Book) (Acornsoft)
- MMS213 BCPL Manual (Book) (Acornsoft)
- MMS214 Early Warning (Acornsoft)
- MMS215 Roadrunner (Acornsoft)
- MMS216 Planes (Acornsoft)
- MMS217 Pharaohs Tomb (Acornsoft)
- MMS218 Frogger (Acornsoft)
- MMS219 Lunar Lander (Acornsoft)
- MMS220 Tower of Altos (Acornsoft)
- MMS221 Painter (Acornsoft)
- MMS222 Options Timetable (C) (BBC)
- MMS223 Record Changer (BBC)
- MMS224 Word Processor (BBC)
- MMS225 Home Finance (BBC)
- MMS226 Early Learning (BBC)
- MMS227 The Computer Program Vol.1 (BBC)
- MMS228 The Computer Program Vol.2 (BBC)
- MMS229 Music (BBC)
- MMS230 Painting (BBC)
- MMS231 Drawing (BBC)
- MMS232 Games of Strategy (Bug-Byte)
- MMS233 Fun Games (Bug-Byte)
- MMS234 The Computer Book (Bug-Byte)
- MMS235 Golf (Bug-Byte)
- MMS236 Dragon Quest (Bug-Byte)
- MMS237 AirHit (Bug-Byte)

- MMS238 Fruit Machine (Bug-Byte) 5.50
- MMS239 Space Pirates (Bug-Byte) 5.50
- MMS240 Music Synthesis (Bug-Byte) 5.50
- MMS241 City Defence (Bug-Byte) 8.00
- MMS242 Spare Invaders (Bug-Byte) 10.02
- MMS243 Galaxy Wars (Bug-Byte) 7.50
- MMS244 BBC Multitile (Bug-Byte) 7.50
- MMS245 Backaxxon (Bug-Byte) 15.00
- MMS246 World Wise (Bug-Byte) 9.00
- MMS247 Worthang (Bug-Byte) 6.97
- MMS248 Animal Numbers (Bug-Byte) 6.97
- MMS249 Happy Numbers (Bug-Byte) 6.97
- MMS250 Timemen (Bug-Byte) 6.97
- MMS251 Pascal (Bug-Byte) 6.97
- MMS252 Angle (Bug-Byte) 6.97
- MMS253 Invisi Man (Bug-Byte) 6.97
- MMS254 Letters (Bug-Byte) 6.97
- MMS255 Metrics (Bug-Byte) 6.97
- MMS256 Sequences (Bug-Byte) 6.97
- MMS257 30+ prog for the BBC (Bug-Byte) 6.97
- MMS258 144 Letters (Bug-Byte) 6.97
- MMS259 Spacehikes (Bug-Byte) 6.97
- MMS260 Chess (Bug-Byte) 6.97
- MMS261 Wordwise (Bug-Byte) 6.97
- MMS262 Snake (Bug-Byte) 6.97
- MMS263 Beeshape (Bug-Byte) 6.97
- MMS264 Starblast (Bug-Byte) 6.97
- MMS265 Tablestar (Bug-Byte) 6.97
- MMS266 War & Peace Numbers (Bug-Byte) 6.97
- MMS267 War & Peace Tables (Bug-Byte) 6.97
- MMS268 Anglerup (Bug-Byte) 6.97
- MMS269 Take Hit (Bug-Byte) 6.97
- MMS270 Monte Carlo (Bug-Byte) 6.97
- MMS271 Graph Capers (Bug-Byte) 6.97
- MMS272 Educational-1 (Bug-Byte) 6.97
- MMS273 Educational-2 (Bug-Byte) 6.97
- MMS274 Superlito (Bug-Byte) 6.97
- MMS275 Katakamba (Bug-Byte) 6.97
- MMS276 Ulysses (Bug-Byte) 6.97
- MMS277 Early On (Bug-Byte) 6.97
- MMS278 Early Two (Bug-Byte) 6.97
- MMS279 Early Three (Bug-Byte) 6.97
- MMS280 Billiards (Bug-Byte) 6.97
- MMS281 Tess (Bug-Byte) 6.97
- MMS282 Alphabeta (Bug-Byte) 6.97
- MMS283 Signals & Magic (Bug-Byte) 6.97
- MMS284 Shape & Race (Bug-Byte) 6.97
- MMS285 Invaders (Bug-Byte) 6.97
- MMS286 Mutant Breakout (Bug-Byte) 6.97
- MMS287 3-D Maze (Bug-Byte) 6.97
- MMS288 Beeb Peep (Bug-Byte) 6.97
- MMS289 Hyperdrive (Bug-Byte) 6.97
- MMS290 Super Angman (Bug-Byte) 6.97
- MMS291 Family Games (Bug-Byte) 6.97



BEST LIST OF BBC TV

ORIC • COMMODORE • APPLE

- (J.K.) 7.50
- (J.K.) 6.50
- (J.K.) 10.50
- (J.K.) 17.25
- (Level 9) 11.38
- (Level 9) 11.38
- (Level 9) 15.00
- (Level 9) 57.44
- (Level 9) 57.44
- (Level 9) 22.94
- (Micro Man) 11.44
- (Micro Man) 5.59
- (Micro Man) 7.99
- (Program Power) 6.84
- (Program Power) 4.54
- (Program Power) 6.84
- (Program Power) 6.84
- (Program Power) 1.99
- (Program Power) 7.99
- (Program Power) 6.84
- (Program Power) 7.99
- (Program Power) 5.59
- (Program Power) 5.99
- (Program Power) 7.99
- (Program Power) 6.84
- (Program Power) 6.84
- (Program Power) 7.99
- (Program Power) 7.99
- (Program Power) 6.84
- (Program Power) 6.84
- (Program Power) 7.99
- (Program Power) 6.84
- (Program Power) 6.84
- (Program Power) 7.99
- (Program Power) 6.84
- (Program Power) 10.29
- (Program Power) 6.84
- (Program Power) 7.99
- (Program Power) 7.99
- (Program Power) 7.99
- (Program Power) 7.99
- (Program Power) 7.99
- (Program Power) 5.99
- (Program Power) 7.99
- (Program Power) 6.84
- (Program Power) 6.84
- (Program Power) 5.99
- (Program Power) 5.99
- (Program Power) 5.99
- (Program Power) 5.99
- (Program Power) 6.84
- (Program Power) 6.84
- (Program Power) 10.29
- (Program Power) 6.84
- (Program Power) 34.50
- (J. Rushon) 5.95
- (Simon W. Hessel) 5.95
- (Simon W. Hessel) 5.95
- (Simon W. Hessel) 7.19
- (Simon W. Hessel) 1.45
- (Softlex) 9.95
- (Software for all) 9.95
- (Software for all) 9.95
- (Software for all) 1.95
- (Software for all) 6.95
- (Software for all) 6.95
- (Software for all) 7.45
- (Software for all) 1.94
- (Software for all) 8.54
- (Software for all) 7.95
- (Software for all) 6.95
- (Software for all) 6.95



APPLE IIe

BDL2E001	64K Starter System	1057.45
BDL2E002	64K Executive System	1453.04
BDL2E003	128K Starter System	1139.45
BDL2E004	128K Executive System	1538.04

APPLE III

BDL30001	Big Business System	4950.00
BDL30003	256K System	2395.00
BDL30004	Profile Solution	495.00
BDL30005	Professional Solution	295.00
BDL30006	Business System	2995.00
BDL30007	Profile System	3495.00

FULL RANGE IN STOCK!

COMMODORE

MM001	Commodore 64	345.00
MM002	Tape Recorder	43.95

DOZENS OF OTHER PRODUCTS AVAILABLE!

ORIC HARDWARE

MM0001	Oric-1 40K	(Oric)	189.95
MM0002	Oric-1 10K	(Oric)	99.95


ORIC SOFTWARE

MOS001	Oric Flight	(Oric)	7.95
MOS002	Oric Multigames-1	(Oric)	7.95
MOS003	Chess	(Oric)	9.95
MOS004	Oric-Bass	(Oric)	9.95
MOS005	Zodiac	(Oric)	9.95
MOS006	Timebomb	(Oricsoft)	7.99
MOS007	Superstug	(Oricsoft)	5.99
MOS008	Rainbow Warrior	(Oricsoft)	5.99
MOS009	Oricmunch	(Oricsoft)	7.99
MOS010	Castle	(Bug-Byte)	8.00
MOS011	Death Satellite	(A & F)	6.90
MOS012	Zodiac	(A & F)	6.90
MOS013	Painter	(A & F)	6.90
MOS014	Oric Forth	(Oric)	16.35

PLUS 50 MORE ORIC PRODUCTS COMING SOON!



NEW!
Robustly designed
computer
work station
£138.00

Mail or telephone order: 
Barclaycard or Access Credit Card
accepted.



Only defective or faulty goods may be
returned.

Post and Packing
only £1 per item software
£2 per item hardware

MICRO MANAGEMENT ORDER FORM

CODE	ITEM	QTY	AT		COST	
			£	p	£	p
CREDIT CARD No.			SUB TOTAL			
NAME			BARCLAY/ACCESS		P & P	
ADDRESS			TOTAL			

**ECONET?
ASK US**

MICRO MANAGEMENT

32 Princes Street, Ipswich, Suffolk. Phone: (0473) 59181



PROGRAMS WANTED

**SPECTRUM DRAGON
BBC ZX81**

WORK FORCE

**THE BIGGEST
LITTLE SOFTWARE
HOUSE AROUND**



**THE
WINGED
AVENGER**

DO NOT PASS GO
Now the SPECTRUM VERSION IS READY. D.N.P.G. is a complete simulation of THAT BOARD GAME you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the work. Acts as DICE THROWER, BOARD, RENT COLLECTOR, UMPIRE, BANK, RULE BOOK, ACCOUNTANT, ESTATE AGENT and ASSET RECORDER. SUPERB GRAPHICS by GARRY KENNEDY (thanks mate). GAME SAVE with winner so far report. Complete with full instructions. The ULTIMATE in FAMILY GAMES. DON'T MONOPOLISE YOUR MICRO. AMAZE your friends and family. (Can you imagine your GRANNY on a MICRO?). A 16k ZX81 version also available. 48k SPECTRUM or 16k ZX81 versions **ONLY £6.95.**



**Base
Invaders** £4.50



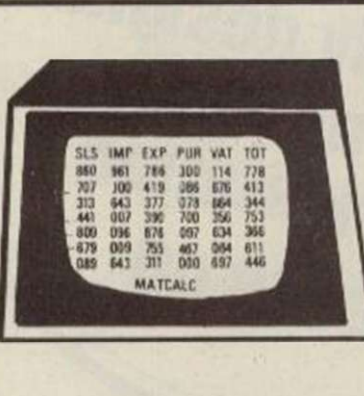
HIGH NOON
1 OR 2 PLAYERS
16 OR 48K SPECTRUM
£4.50

THE WINGED AVENGER
Fast and furious. Two versions of the same game on the SPECTRUM tape., the original and the NEW VERSION. SOUND, GRAPHICS SEVEN SKILL LEVELS. Full ARCADE ACTION including THREE WAVES OF ALIENS, HIGH SCORE, REFUELLING, RAPID REPEAT FIRING, SMART BOMBS and LASER SHIELD. P.C.W. "ONE OF THE BEST SINCLAIR GAMES YET". HOME COMP WEEKLY "FOUR STAR WINNER". 16k ZX81 VERSION "PROBABLY THE FASTEST ZX81 GAME". NOTED as EXCELLENT by the INTERNATIONAL BUREAU OF SOFTWARE TEST. 16k ZX81 & 16+48k SPECTRUM VERSIONS AVAILABLE. **NOW £5.00.**



BASE INVADERS
S.USER "DIFFICULT TO BEAT... ONE OF THE MOST ADDICTIVE". 16 & 48k SPECTRUM. CURRENTLY THE FASTEST VERSION FOR THE SPECTRUM. SHIELD AVAILABLE if you can't HANDLE THE ACTION.
YAHTZI
48k SPECTRUM. All ELECTRIC VERSION of the classic dice game of STRATEGY. More CHUNKY graphics from GARRY KENNEDY. No extras required up to SIX PLAYERS can compete, or practise if you wish. SPECTRUM acts as UMPIRE, SCORE SHEET and DICE THROWER. Update your games cupboard for just **£5.50**, 48k only.
SCRAMBLE
Spectrum SCRAMBLE (Condition Red) EIGHT DIRECTIONAL KEYS. All MACHINE CODE. LASERS, BOMBS, ROCKETS, INSTANT RESPONSE, CONTINUOUS SCORING, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. BEWARE. CONDITION RED you must REFUEL. "THE REVIEWERS DIDN'T GET TO THE FINAL STAGE". 16 & 48k SPECTRUM. **JUST £4.95.**

PROGRAMMERS DREAM
16k or 48k SPECTRUM.
An advanced SPECTRUM TOOLKIT. Comprised of just 1450 BYTES of POSITION INDEPENDENT MACHINE CODE. RENUMBER lines or blocks. Allows START, FINISH, INCREMENT and new START to be defined. BLOCK or line MOVE including RENUMBER to fit available GAP. RENUMBER will renumber ALL GOTO, GOSUB, LIST etc without further action. CHANGE strings (NAMES or CONTENTS). DUMP VARIABLE NAMES and CONTENTS to DISPLAY PROGRAM SIZE with or without VARIABLE SIZE. This package is FAST, CLEAN, PRODUCES ERROR MESSAGES and is WELL DOCUMENTED. S.USER "WORKS LIKE A DREAM". SPECTRUM ONLY **£6.95.**



MATCALC
16 & 48k SPECTRUM
This is our SPREADSHEET PROGRAM with a difference. This ONE has the option of the standard display or a 64 CHARACTER per LINE display or printout. Ideal for WHAT IF, CASH FLOW PROJECTIONS, and analysing related figures. FORMULA may be MATHEMATICAL or LOGICAL. MENU DRIVEN. SAVE and LOAD to TAPE. FULL instructions and TWO matrices on TAPE with a full explanation of their formation. P.C.W. "MORE FLEXIBLE overall than...". Both the 16k & 48k versions on ONE TAPE. SIMPLY HUNDREDS OF USES. **JUST £7.00.**

"SHIFTY" 48k SPECTRUM
A WORD PROCESSOR FOR THE SPECTRUM. "SHIFTY" was designed to overcome the limitations of the standard SINCLAIR HARDWARE, specifically the PRINTER. Using the STANDARD PRINTER all output over 32 CHARACTERS PER LINE is PRINTED SIDEWAYS allowing pages to be formatted from the printer paper. Any width from 20 to 80 characters per line may be specified. Text can be viewed prior to printing and can be JUSTIFIED to the RIGHT MARGIN. SHIFTY will WORD SEARCH, MOVE PARAGRAPHS, SPLIT PARAGRAPHS, APPEND PARAS. SAVE and LOAD from TAPE. INDENT PARAS and allow standard PHRASES to be STORED and accessed from DATA STATEMENTS using DEFINED KEYS. EDITING is ON SCREEN using 4 way CURSOR MOVE. SHIFTY comes complete with a sample letter and full instructions. Requires ZX printer. **ONLY £7.50.**



YAHTZI 48k
UP TO 6 PLAYERS **£5.50**

**NEW RELEASE
"JAWS REVENGE"
48k SPECTRUM**
Disappointed with his box office returns JAWS brings his GORY EATING HABITS to the SPECTRUM in his very own ARCADE GAME. JAWS eats his way through a mixed diet of DIVERS, BOATMAN, JELLYFISH SWIMMERS and FISH. You control JAWS in this FAST MOVING trail of carnage. Avoid DEPTH CHARGES, EXPLODING JELLYFISH, HARPOONS, ARMED SCUBA DIVERS and EAT everything you can. 5 LIVES, SCRAMBLE type SEA BED, current and HIGH SCORE. ALL MACHINE CODE and FAST, DEMO SCREEN, BONUS LIVES, FASTEST GAME FOR 10,000 POINTS. WREAK HAVOC ON THE HUMAN RACE. "THE BEST GAME YET" ANIMAL RIGHTS MOVEMENT". 16 & 48k SPECTRUM **£5.00.**

DISPLAY
How would you like 273 different USER DEFINED GRAPHICS on a 16k SPECTRUM or a FULL 336 on a 48k. All can be displayed on screen at the SAME TIME. U.D.G.'s are stored as PAGES and any two pages may be EXCHANGED in MEMORY. FILES may be SAVED or LOADED from TAPE at a USER specified location. TURN a UDG one quarter or half turn. FLIP a UDG over. REVERSE a UDG, EXPAND a quarter UDG into a FULL CHARACTER. MOVE a UDG one PIXEL at a TIME, UP, DOWN, LEFT or RIGHT. FIVE complete TAPE FILES are INCLUDED on tape ONE CONTAINING a 64 CHARACTER DISPLAY, DESIGN GRID for constructing CHARACTERS and SHAPES. FULL INSTRUCTIONS and ANIMATED DEMO SCREEN. **£7.00**, 16 & 48k SPECTRUM.

CLONE
"CLONE" is probably the BEST BACK UP TAPE around. We are confident it will make BACK UP COPIES of your current SOFTWARE. CLONE will COPY both HEADERLESS and STANDARD TAPES. CLONE will PROTECT your SOFTWARE INVESTMENT by ensuring you have BACK UP. All PROTECTION routines are COPIED and a description of FILE TYPES is GIVEN. If you want a COPY TAPE then BUY the BEST. CLONE is AVAILABLE on the STRICT UNDERSTANDING THAT IT WILL NOT BE USED TO INFRINGE COPYRIGHT. TAPES up to 38k can be copied, COPIES are made of each program as it appears on tape. UNLIKE SOME COPY TAPES "CLONE" DOES NOT NEED TO BE RELOADED AFTER EACH SAVE. CLONE copies TAPES that can't be BROKEN INTO. USE our knowhow for just **£5.00**. ALL SPECTRUM. P.S. CLONE WILL COPY MOST COPY TAPES SHOULD YOU WISH.

THE PROGRAMS ON THIS PAGE ARE ONLY AVAILABLE FOR SINCLAIR COMPUTERS 16K ZX81
CONDITION RED **£3.95**
TOOLKIT **£5.00**
ADVENTURE IN TIME... Nearly 60k of ADVENTURE in parts for the 16k ZX81 **£7.00.**
WINGED AVENGER **£4.50**
DO NOT PASS GO **£6.95**
Most programs available from BUFFER, MICROWARE, SOFTWARE SUPERMARKET, GREENWELDS, HEFFERS, JOHN MENZIES and selected SPECTRUM COMPUTER FRANCHISES. DEALER ENQUIRIES WELCOME.

WORK FORCE
140, WILSDEN AVENUE
LUTON BEDS.
Post Included

Assembler/Disassembler ORIC-1

The assembler follows standard 6502 conventions and has proved very reliable while in continual use by Durell Software. Features include the following:

Generally	List File	Pseudo-Operations
Auto line numbering	LIST	EQUATE
Six character labels	DELETE	BYTE
Updatable list-file	LLIST	DBYTE
Maths on operands	ALTER	WORD
Syntax checking	INSERT	TEXT
Output to printer	END/STOP	BLOCK

The disassembler also allows output to either screen or line-printer. The tape comes complete with comprehensive instructions. £8.95

Harrier Attack ORIC-1

Pure machine-code, super-fast, action-packed, highly addictive arcade-style game requiring great skill. The harrier takes-off from an aircraft-carrier and flies over seaborne defences to attack enemy installations on a nearby island. The harrier may fly faster, slower, higher or lower, and has bombs and rocket fire with which to protect itself and make its own attack. If it flies too high it is detected by enemy jet-fighters (which it may counter-attack) – so it needs to hug the mountainous terrain which also varies with every new game. But the island is heavily defended by anti-aircraft rockets and tanks, which again the harrier may counter-attack or try to fly through. A tally is kept of fuel, bombs and rockets, plus player score and high score. Finally the harrier must make its bomb-run over the enemy base before returning to its own carrier. £6.95

Starfighter ORIC-1

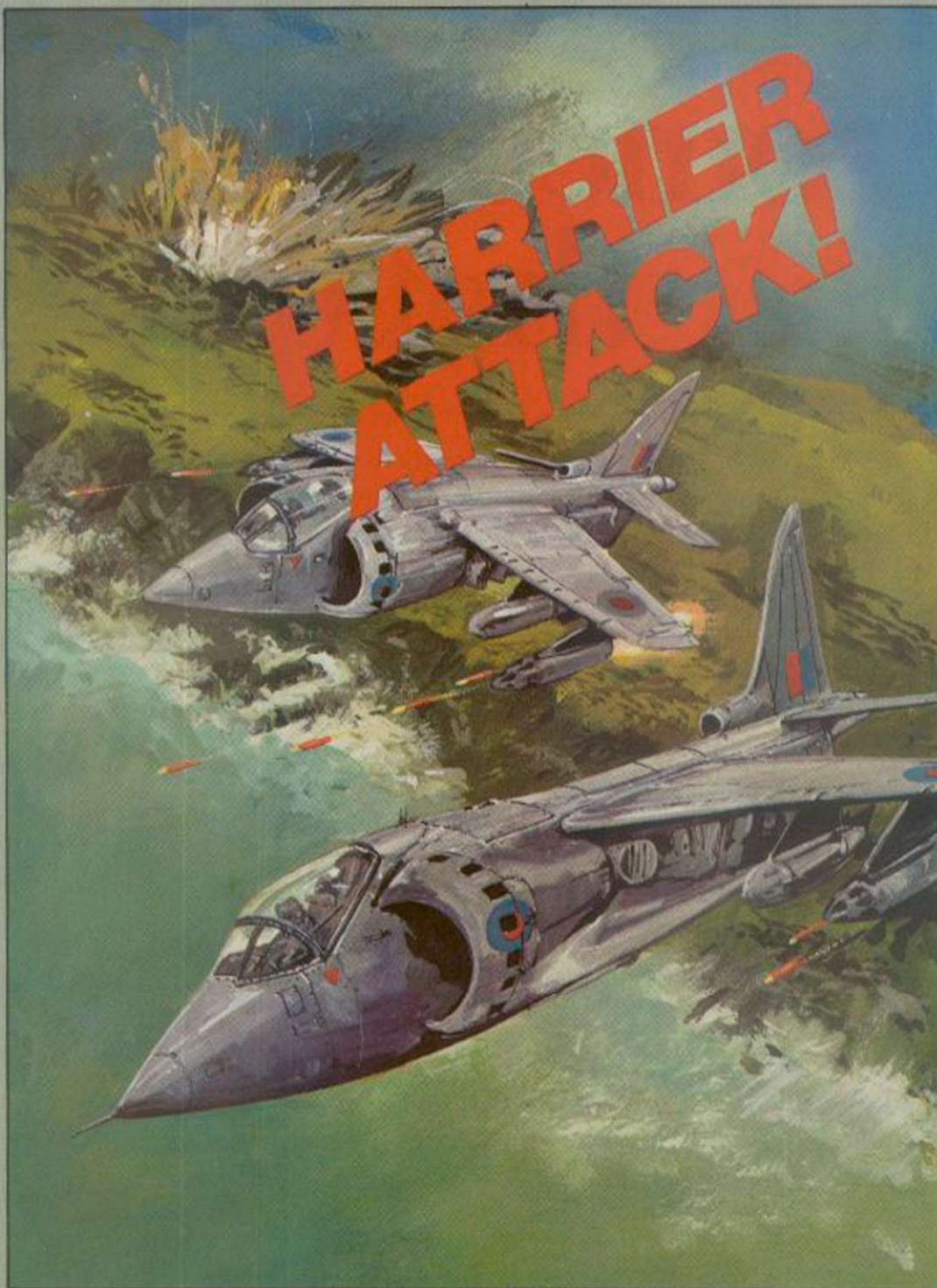
Pure machine-code real-time graphics. The player is in command of a galactic defence vessel. His mission is to attack and destroy intruding alien vessels. At long range this can be carried-out via the ship's computer and space-scanner: the ship may be manoeuvred to a position from which a photon torpedo may be launched. However beware! If your reactions are slow you may crash into enemy space-mines. At short range the action is hair-raisingly fast as the alien ship is pursued through space under manual control. See the star-scape spin relative to your ship's manoeuvres, but watch out for alien mines whizzing past. Blast your phasor at the alien – but be careful! You must preserve your limited energy and weapon resources. Weapons, shield and energy status are all monitored throughout the game – which may itself be set for variable levels of skill. £6.95

Lunar Lander/Asteroids ORIC-1

Aimed at the newcomer to BASIC and/or the Oric-1, these exciting and enjoyable games illustrate the fundamental techniques of interactive real-time games programming with computer graphics. The games are relatively short and simple, but with a clear structure; and each is followed-up by a second version where every line of the BASIC is preceded by at least one line of english explaining how it works. Apart from its value as a general learning aid, these games also provide an illustrative guide to the Oric's screen attributes. £5.95

Durell Software

Durell Software
Castle Lodge · Castle Green
Taunton · TA4 1AB
ENGLAND



Dambuster LYNX

Aimed at the newcomer to BASIC and/or the Lynx, this novel and demanding game of skill illustrates the fundamental techniques of interactive real-time games programming with computer graphics. Similar in concept to the Lunar Lander/Asteroids tape inasmuch as it is followed-up by subsequent versions where every line of the BASIC is preceded by at least one line of english explaining how it works. However this game is in itself a very substantial product, being about 11K, with the following features:

- Introductory instructions backed by dambusters' theme tune
 - Three planes and three dams
 - Bomber flies higher, lower, faster or slower
 - Random anti-aircraft fire
 - Bomb bounces relative to height and speed of drop
 - Player score plus high score
- £6.95

Jungle Troubles SPECTRUM

Pure machine code. This original and witty game is set in the depths of the African jungle. First you must direct your cartoon fugitive away from a pile of axes to cross a nearby river via stepping stones that protect him from a lurking crocodile. Then he must climb a ladder to the next level, where he has to fell a number of trees in his path. As he does this a marauding ape appears from the left of the screen and steals his axe! So back to the start for another axe and more problems with the crocodile! And the ape! Having hacked a path through the forest he may climb another ladder to level three where he has to leap a chasm by grabbing a swinging rope. Will he ever escape back to the city? A highly amusing game with delightful graphics suited to all members of the family – but very frustrating and addictive. £6.95

Why the BBC Micro? It might be fairer to let someone else answer that question.

"The BBC Microcomputers are the limousines of home computers. The graphics are probably the best of any machine in this class. You are paying for a smart machine which would not disgrace the home of a professional." *Video World, Feb. '83.*

"Its design has given the BBC Micro an unrivalled potential for business, educational and serious home applications. It has been equipped to function as the heart of a system which can be expanded to suit its owner's need." *Which Micro & Software Review, Feb. '83.*

"The most attractive and exciting feature of the BBC Microcomputer is its enormous potential for expansion which will allow a highly expansive system to be built-up." *Deborah Carruthers, Which Micro, June '82.*

"They (the graphics) are tremendously exciting, and they are one of the features that make this machine stand out head and shoulders above everything else that is available in the market place at this time." *Dave Futcher, Educational Computing, May '82.*

"It is expandable and has a powerful BASIC. It has superb sound and graphics, the software is readily available and the price is right." *Mr. A. D. Alles, a BBC Micro owner from Hampshire.*

"The basics are easy to follow. My wife has developed a program for teaching our daughter French vocabulary. Our daughter uses it mainly for games and simple programming." *Dr. A. Yarwood, a BBC Micro owner from Co. Durham.*

"It is a very powerful computer. My husband has written his own data base. I have been writing programs and programming games. Even the children have written small programs." *Mrs. A. M. Thomas, a BBC Micro owner from Devon.*

"No other computer can offer such ease of use when dealing with complex sound effects."

Which Micro, June '82.

"It isn't often a journalist can sit down to write about a computer with the certain knowledge that he has never seen a nicer machine."

Guy Keowney, Personal Computer World, Dec. '82.

"It has got huge potential. Besides playing the games, the whole family are learning basic programming."

Mr. P. S. Green, a BBC Micro owner from Staffordshire.

"Everything possible seems to have been done to ensure that this is not a 'dead end' machine..."

Paul Beverley, Personal Computer World, July '82.





Perhaps we could just add that the BBC Micro is the machine which was chosen to be at the heart of the BBC's massive Computer Literacy Project.

It is also the machine which, having won the Department of Industry's blessing, will account for over 80% of the computers bought by British schools this year.

And now for some facts about the machine itself.

The BBC Micro is light, compact and, with a conventional electric typewriter keyboard, easy to get the feel of.



It can be loaded from virtually any cassette recorder. And there is a wealth of ready-made programs available covering games, education and business subjects.

The BBC Micro uses BBC BASIC, a sophisticated version of the most popular computer language.

However, as your confidence and fluency grow, it can be adapted to switch to other languages.

It can also become a word processor, with the facility to link with a second processor for high-powered business use.

A disc drive unit can also be added. And with an adaptor, the BBC Micro is the first micro to be able to pick up programs from the Miconet-Prestel system. Another adaptor converts your TV into a Teletext receiver, with further ability to download programs.

All this for only £399.

The most sophisticated version of the BBC Micro, the Model B, is only £399. The basic Model A is £299. (Both come with a "Welcome cassette" and comprehensive introductory manual.)


They are both available from John Lewis, selected branches of Boots or local stockists.

Alternatively, if you would like to order a BBC Micro B with your credit card, or if you want the address of your nearest stockist, just phone 01-200 0200.

Or, you can buy a Model B by sending off the order form below to: BBC Microcomputers, c/o Vector Marketing, Denington Estate, Wellingborough, Northants.

Your order will be despatched by fully insured courier.

Finally, you can also use the coupon simply to get full reprints of the articles from which the press cuttings featured have been taken.

 01-200 0200 credit card holders.

To BBC Microcomputers, c/o Vector Marketing,
Denington Estate, Wellingborough, Northants NN8 2RL.

Please send me more information on the BBC Micro.

Please send me _____ BBC Model B Microcomputers
at £399 each, inc. VAT and delivery.

I enclose PO/cheque payable to Acorn Computers
Limited Readers A/C or charge my credit card.

Card Number _____

Amex/Diners/Visa/Access (Delete)

Name _____

Address _____

Postcode _____

Signature _____

YCB

Registered No. 140 3810 VAT No. 215 400220

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

See the BBC Microcomputer System at The Acorn User Exhibition at The Cunard Hotel, London, W6. August 25-28.

IMPACT SOFTWARE

DESTROYERS

New and original arcade game in real time high speed machine code, hi-res graphics, full colour and sound effects. 16 or 48K Spectrum £6.50

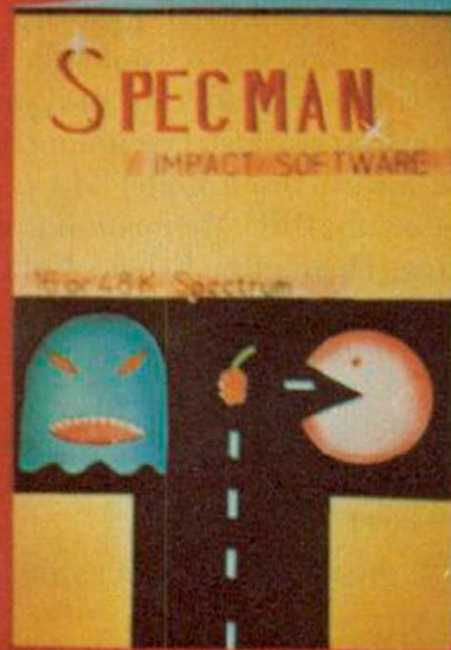


GAMES PACK

Blitzkrieg
Alien Rain
Fruit Machine
Lazer Blast
3 - D Maze
All in hi-res graphics.
16 or 48K Spectrum £6.50

Specman

First class example of the popular arcade game in high speed machine code and hi-res graphics, full colour and sound effects. 16 or 48K Spectrum £5.75



ZX Trek

Startrek game in real time hi-res graphics full colour and sound effects, constant on screen display, long and short range scan plus status report. 48K Spectrum £6.50

THE QUEST

48K Spectrum Dragon 32
Exciting adventure, fight your way through up to 1500 locations as you search for the Holy Grail. £5.00

ORB

48K Spectrum Dragon 32 Vic 20 16K
Search through the underground labyrinth and destroy the dreaded Orb. Encounter monsters and discover treasure. £5.00

STARTREK

16K Spectrum Dragon 32 Vic 20 8 or 16K
Save the galaxy from the Klingons using your phasers & torpedoes. Long and short range scan, galaxy map & star bases. £5.00

GAMES PACK

Vic 20 UN EXP
Alien. Road Race.
The Island. Pontoon.
£5.00

NEW FOR VIC 20 UN EXP

TERMINATOR

New and original machine code space battle with hi-res graphics & full colour. 16 types of alien plus the deadly Zagers. Expanded screen keyboard or joystick. £6.50

CITY BOMBER + SNAKE CHARMER

Both with hi-res graphics + full colour
The two on one cassette. £6.50

FOR THE VIC 20

GALAXY ATTACK

4 types of attackers accompanied by fireballs and meteors in high speed machine code. Hi-res graphics and full colour.
Keyboard or joystick £6.80

COSMIC KNOCKOUT

Combination of breakout and space battle. Keep the satellite from crashing to the bottom of the screen. High speed machine code.
Keyboard or joystick £6.80

ATTRACTIVE DEALER DISCOUNTS

PLEASE STATE

1 Cassettes Required

2 Machine Type

3 Memory

IMPACT SOFTWARE

70 REDFORD AVENUE

EDINBURGH. EH13 0BW

TEL 031 441 4257

PROGRAMERS 25% ROYALTIES

BBC MICRO INSTANT MACHINE CODE!

Yes, it's true. Instant machine code from a good subset of BBC BASIC. Type your BASIC program into your model B BBC Micro, trigger the compiler, and your program is changed almost instantaneously into superfast machine code.

For £34.95 you get: Cassette version of the complete compiler (along with a version of the compiler for use with discs, ready for when you upgrade, the disc version being dubbed on the cassette after the cassette version); complete compiler listing; extensive documentation and instructions. The compiler was written by Jeremy Ruston.

THE BBC MICRO REVEALED

By Jeremy Ruston

'... destined to become the bible of all BBC microcomputer users. . . ' (Personal Computing Today). If you've mastered the manual, then this book is for you. Just £7.95

LET YOUR BBC MICRO TEACH YOU TO PROGRAM

By Tim Hartnell

'... takes you further into the cloudy areas of the BBC machine than anything else I've yet seen. . . ' (Computer and Video Games). If you're just starting out in the world of programming, then this book is the one for you. Forty complete programs, including Othello/Reversi, Piano and a host of dramatic graphic demos. Just £6.45

Interface, Dept. YC3,

44-46 Earls Court Road, London W8 6EJ

Please send me:

- () INSTANT BBC MACHINE CODE—tape and book—£34.95
- () THE BBC MICRO REVEALED—Ruston—£7.95
- () LET YOUR BBC MICRO TEACH YOU TO PROGRAM—Hartnell—£6.45

I enclose £

Name

Address

YCB

micro business

... is the only trade magazine uniquely poised to link manufacturers and distributors with retailers.

micro business

... is produced from the same stable as Practical Computing, Computer Weekly, Systems International, Electrical and Electronic Trader, Electrical and Radio Trading and Your Computer.

Thus the Micro Business controlled circulation reader list has been culled from the widest of sources to include potential as well as existing retailers. It is a readership which is absolutely vital to micro manufacturers who need to reach retailers and dealers effectively without wastage.

Take full advantage of this growing market by promoting your products in

micro business

Telephone Kenneth Walford on
01-661-3139
for immediate action.

ZX MICROFAIR

Where else can you see so much
for Sinclair Computers?



ONCE AGAIN AT ALLY PALLY THE BIGGEST SHOW OF ITS KIND ANYWHERE IN THE GALAXY!

What Computer Exhibition gives you the opportunity of finding everything (and we mean *everything*) for ZX Computers?

Where can you find more than 150 exhibitors dedicated to Sinclair enthusiasts?

Where on Earth can you discover new and original products — hardware, software, books peripherals, programs, add-ons — many additions launched at the show?

Where can you find plenty of space to move, eat, drink, relax and, of course, buy?

Where will you discover that special 'show offer' on the equipment you have been promising yourself?

Where will you find an exhibition hall with so much parking space — and in parkland too?

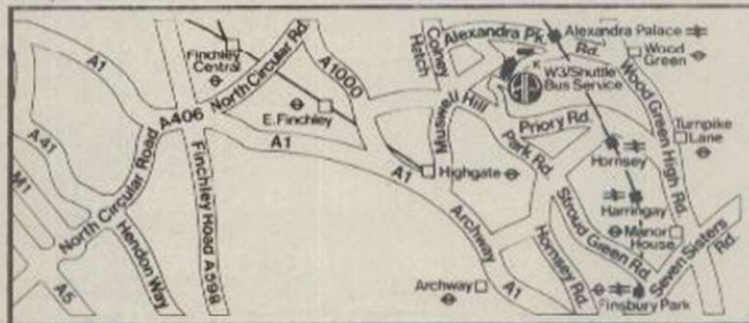
And what other exhibition offers you all this for only £1 entrance fee (50p for kids under 14)?

There's only one answer:
**THE 8th ZX MICROFAIR AT
ALEXANDRA PAVILION
SATURDAY 20th AUGUST 1983.**
Make a note of it now. . . and come along for a good day out!

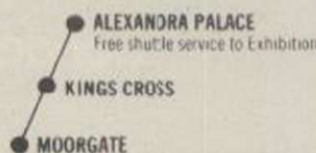
The big show for a quid (or less)!

CUT OUT AND KEEP

By Road
Follow signs from the A1 (Link with M1 and North Circular). Plenty of parking space available!
Variety of routes from Central London



By British Rail
From London (Kings Cross or Moorgate) — about every 10 minutes to Alexandra Palace station — free shuttle bus or short walk from there!
From any part of the U.K. enquire from Kings Cross Travel Centre, London N1 9AP (phone 01-278 2477) about special day trips to the ZX MICROFAIR!



By London Transport
Underground: Victoria Line from Victoria (also Oxford Circus, Kings Cross/St Pancras) to Highbury and Islington — change (cross platform) to BR Suburban Service to Alexandra Palace — free shuttle bus or 5 minute walk from there!



Alternative: Piccadilly Line (from Heathrow etc) to Finsbury Park or Wood Green — Link with W3 bus service to the fair

HEATHROW ← Piccadilly Line

8th 
ZX MICROFAIR
ALEXANDRA PALACE,
SATURDAY 20th AUGUST 1983

SATURDAY 20th AUGUST 1983 AT ALEXANDRA PAVILION, ALEXANDRA PALACE, WOOD GREEN, LONDON N22. FROM 10am TO 6pm. Advance tickets available from: Mike Johnston, (YC) 71 Park Lane, Tottenham, London N17 0HG. Adults £1.00. Kids (under 14) 50p. Parties of 10 or more at 20% discount!
Please make cheques/P.O.s payable to ZX MICROFAIR and enclose S.A.E.

EXHIBITORS! Call Mike Johnston now on 01-801 9172 for details of space at this and future shows!

ARE YOU OUT OF THIS WORLD?

SOFTWARE PROGRAM WRITERS

SILVERSOFT want to hear from you...

We are looking for out of this world, original, creative arcade action games utilising cosmic graphics written for any of the popular range of home computers.

If you think the games you have invented would challenge other space travellers contact:

Dougie Bern at SILVERSOFT LIMITED, now,
London House 271/273 King Street London W6
Telephone: 01.748 4125.

SILVERSOFT



100 FREE PROGRAMS

FROM SILICA SHOP — WITH EVERY PURCHASE OF AN

ATARI 400

800




REDUCED PRICES!

We at Silica Shop are pleased to announce some fantastic reductions in the prices of the Atari 400/800 personal computers. We believe that the Atari at its new price will become the U.K.'s most popular personal computer and have therefore set up the Silica Atari Users Club. This club already has a library of over 500 programs and with your purchase of a 400 or 800 computer we will give you the first 100 free of charge. There are also over 350 professionally written games and utility programs, some are listed below. Complete the reply coupon and we'll send you full details. Alternatively give us a ring on 01-301 1111 or 01-309 1111.

ATARI 400 with 16K	£149
ATARI 400 with 48K	£198
ATARI 800 with 48K	£299

400/800 SOFTWARE & PERIPHERALS

Don't buy a T.V. game! Buy an Atari 400 personal computer and a game cartridge and that's all you'll need. Later on you can buy the Basic Programming cartridge (£35) and try your hand at programming using the easy to learn BASIC language. Or if you are interested in business applications, you can buy the Atari 800 + Disk Drive + Printer together with a selection of business packages.

Silica Shop have put together a full catalogue and price list giving details of all the peripherals as well as the extensive range of software that is now available for the Atari 400/800. The Atari is now one of the best supported personal computers. Send NOW for Silica Shop's catalogue and price list as well as details on our users club.

THE FOLLOWING IS JUST A SMALL SELECTION FROM THE RANGE OF ITEMS AVAILABLE:

ACCESSORIES Cables Cassettes Diskettes Joysticks Le Stick - Joystick Misc Supplies Paddles	Mountain Shoot Rearguard Star Flite Sunday Golf	BUSINESS Calculator Database Manager Decision Maker Graph-It Invoicing Librarian Mort & Loan Anal Nominal Ledger Payroll Personal Finl Mgmt Purchase Ledger Sales Ledger Statistics 1 Stock Control Telelink 1 Visicalc Weekly Planner Word Processor	DYNACOMP Alpha Fighter Chompelo Crytals Forest Fire Intruder Alert Monarch Moonprobe Moving Maze Nominos Jigsaw Rings of The Emp Space Tilt Space Trap Stud Poker Triple Blockade	Maths-Tac-Toe Metric & Prob Solvg Mugwump Music Terms/Notatn Musical Computer My First Alphabet Number Blast Polycalc Presidents Of U.S. Quiz Master Starware Stereo 3D Graphics Three R Math Sys Video Math Flash Wordmaker	Scream States & Capitals Touch Typing	EMI SOFTWARE British Heritage Cribbage/Dominos Darts European Scene Jig Hickory Dickory Humpty Dumpty Jumbo Jet Lander Snooker & Billiards Submarine Commdr Super Cubes & Tilt Tournament Pool	Castle Centurion Checker King Chirese Puzzle Codecracker Corredy Diskette Dice Poker Dog Daze Domination Downhill Eastern Front Galahad & Holy Gri Graphics/Sound Jax-O Jukebox Loockhead Memory Match Midus Touch Ministaur Outlaw/Howlitzer Preschool Games Pro Bowling Pushover Rabbitz Reversi II Salmon Run 747 Landing Simul Seven Card Stud	Sleazy Adventure Solitaire Space Chase Space Trek Sultans Palace Tact Trek Terry Wizards Gold Wizards Revenge	Jawbreaker Mission Asteroid Mouskattack Threshold Ulysses/Golden FI Wizard & Princess	PERIPHERALS Centronics Printers Disk Drive Epson Printers Program Recorder RS232 Interface Thermal Printer 16K Memory RAM 32K Memory RAM	PROGRAMMING AIDS from Atari Assembler Editor Assembler (APX) Microsoft Basic Pascal (APX) Pilot (Consumer) Pilot (Educator) Programming Kit
ADVENTURE INT Scott Adams Adv No 1 Adventureland No 2 Pirate Adv No 3 Mission Imp No 4 Voodoo Cast No 5 The Count No 6 Strange Ody No 7 Mystery Fun No 8 Pyramid of D No 9 Ghost Town No 10 Sav Island 1 No 11 Sav Island 2 No 12 Golden Voy Angle Worms Deflections Galactic Empire Galactic Trader Lunar Lander	AUTOMATED SIMULATIONS Crush Crumble Cmp Datestones of Ryn Dragons Eye Invasion Orion Rescur at Rigel Ricochet Star Warrior Temple of Apshe Upper Reaches Aps	BOOKS Basic Ref Manual Compute Atari DOS Compute Bk Atari Compute Magazine De Re Atari DOS Utilities List DOS2 Manual Misc Atari Books Op System Listing Wiley Manual	EDUCATION from APX Algalcalc Atlas of Canada Cubbyholes Elementary Biology Frogmaster Hickory Dickory Inst Comptg Dem Lemonade Letterman Mapware	EDUCATION from ATARI Conv French Conv German Conv Italian Conv Spanish Energy Czar European C & Caps Hangman Invit To Prog 1/2/3 Kingdom Music Composer	ENTERTAINMENT from APX Alien Egg Anthill Atrank Avalanche Babel Blackjack Casino Block Buster Block 'Em Bumper Pool	ENTERTAINMENT from ATARI Asteroids Basketball Blackjack Centipede Chess Entertainment Kit Missile Command Pac Man Space Invaders Star Raiders Super Breakout Video Easel	ENTERTAINMENT from APX Adventure Asteroids Basketball Blackjack Centipede Chess Entertainment Kit Missile Command Pac Man Space Invaders Star Raiders Super Breakout Video Easel	PERSONAL INT from APX Adv Music System Banner Generator Blackjack Tutor Going To The Dogs Keyboard Organ Morse Code Tutor Personal Fitness Prg Player Piano Sketchpad	SANTA CRUZ Basics of Animation Bobs Business Display Lists Graphics Machine Kids 1 & 2 Horizontal Scrolling Master Memory Map Mini Word Processor Page Flipping Player Missile Gr Player Piano Sounds Vertical Scrolling	SILICA CLUB Over 500 programs write for details	

FOR FREE BROCHURES - TEL: 01-301 1111

For free brochures and reviews on our range of electronic products, please telephone 01-301 1111. To order by telephone, just quote your name, address, credit card number, and order requirements and leave the rest to us. Post and packing a FREE OF CHARGE in the UK. Express 24 hour delivery available at an additional charge.

- **SHOP DEMONSTRATIONS** - we provide full facilities at our shop in Sidcup, Monday to Saturday 9am to 5.30pm (closing Thursday 1pm, Friday 8pm).
- **MAIL ORDER** - we are a specialist mail order company and are able to supply goods direct to your door.
- **MONEY BACK UNDERTAKING** - if you are totally unsatisfied with your purchase you may return it to us within 15 days. On receipt of the goods in satisfactory condition we will give you a full refund.
- **PART EXCHANGE SECOND HAND MACHINES** - we offer a part exchange scheme to trade in many makes of T.V. game for personal computers.
- **COMPETITIVE PRICES** - our prices, offers and service are very competitive. We are never knowingly undersold and will normally match any lower price quoted by our competitors.
- **HELPFUL ADVICE** - available on the suitability of various computers.
- **AFTER SALES SERVICE** - available on all computers out of guarantee.
- **VAT** - all prices quoted above include VAT at 15%.
- **CREDIT FACILITIES** - we offer credit over 12, 24 or 36 months, please ask for details.

SILICA SHOP LIMITED
Dept. YC0883, 1-4 The Mews, Hatherley Road, Sidcup,
Kent DA14 4DX. Telephone: 01-301 1111 or 01-309 1111.

SILICA SHOP

FREE LITERATURE

I am interested in purchasing an Atari 400/800 computer and would like to receive copies of your brochures and test reports as well as your price list covering all of the available Hardware and Software:

Name

Address

.....

Postcode

YC0883 - Your Computer - AUGUST 1983

THE Northern Computer Fair

Personal computers
Home computing
Small business systems

Sponsored by:

Practical
Computing

and

YOUR
COMPUTER

The right place The right time

Following the overwhelming success of the 1982 Northern Computer Fair, the sponsors announce that an even bigger and better show will be held again this year at Belle Vue, Manchester, from November 24th-26th.

This is the North's premier exhibition for the rapidly expanding home and small business computer market, mounted at a time now recognised as a peak buying period for this type of equipment. It is now one of a nationwide series of exhibitions designed to attract the broadest possible cross-section of both home computer enthusiasts and the rapidly increasing body of personal computer users found throughout business and the professions.

Make a date for Belle Vue, Manchester, November 24-26, 1983, and post the coupon below for more details.

Belle Vue, Manchester. November 24-26, 1983.

THE Northern Computer Fair
Personal computers
Home computing
Small business systems

I am interested in exhibiting.

Name _____

Position _____

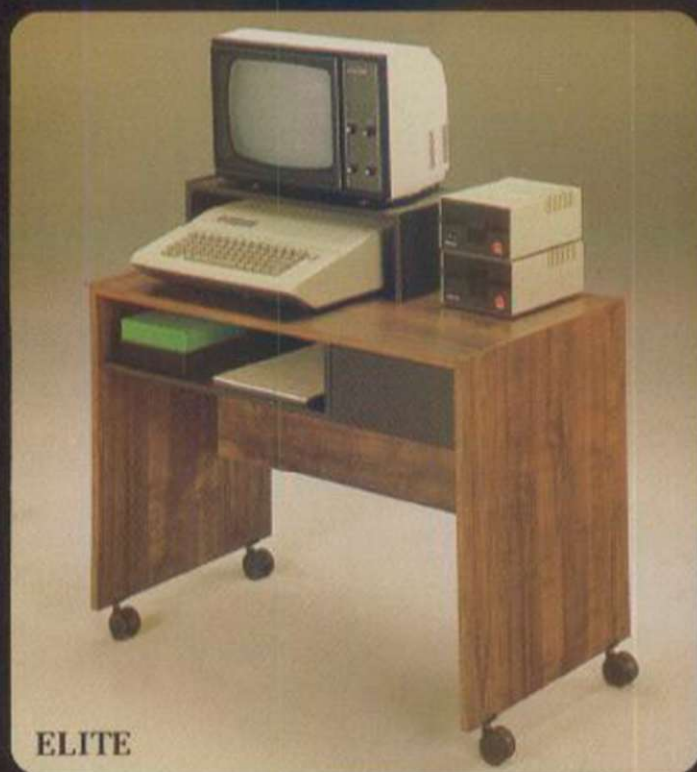
Company _____

Address _____

Telephone _____

The Exhibition Manager, Northern Computer Fair, IPC Exhibitions Limited, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ

GIVE YOUR COMPUTER A FIRST CLASS HOME

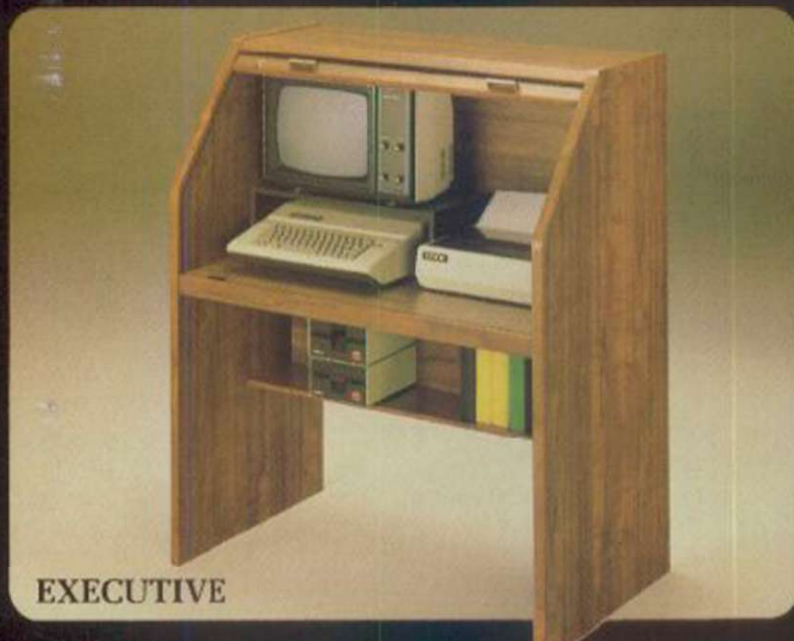


ELITE

Colvin are pleased to introduce this new range of Computer Furniture.

Each unit is designed and constructed to accommodate computer equipment and provide stability and durability, preventing sway and shake.

Give your computer a truly professional base.



EXECUTIVE

ELITE

Featuring a spacious drawer and large storage area for accessories, the Elite comes complete with sturdy black, dual-wheel castors which make for easy moving.

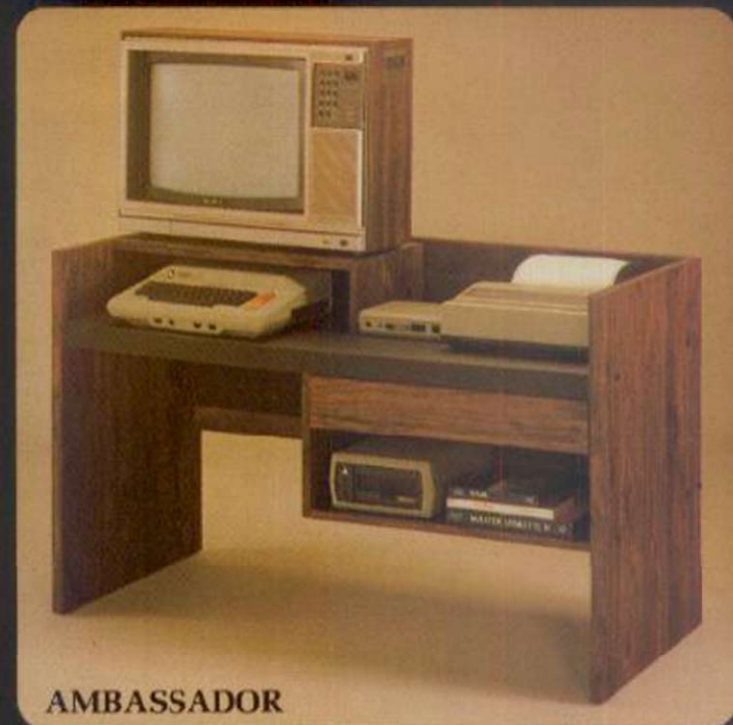
SPECIFICATIONS: Overall: 25 3/4" H, 19 3/4" D, 32 3/4" W
Platform: 6 3/8" H, 9 3/4" D, 19 3/4" W

EXECUTIVE

With sturdy roll top, brass finished handles and key lock assembly, the Executive would not look out of place in any study.

SPECIFICATIONS: Overall: 46 3/4" H, 23 1/2" D, 37 1/2" W
Platform: 6 3/8" H, 9 3/4" D, 19 3/4" W

All items delivered flat-packed, easy to assemble with full instructions provided.



AMBASSADOR

AMBASSADOR

Plenty of work area combined with ample storage space are features of the Ambassador computer work centre.

SPECIFICATIONS: Overall: 32 3/4" H, 23 1/2" D, 51 3/4" W
Platform: 6" H, 13" D, 24" W

Colvin Computer Centres Ltd.,

Interface House, 70-72 Croydon Road, Caterham, Surrey, CR3 6QD. Tel: 0883 40511

A member of the Standard Group of Companies.



ALL MAIL ORDERS

To: Colvin Computer Centres Ltd.,

Interface House, 70-72 Croydon Road, Caterham, Surrey, CR3 6QD.

BLOCK CAPS PLEASE

*Delete as applicable

QTY.	ITEM	ITEM PRICE	TOTAL
	Elite	87.50 inc. VAT	
	Ambassador	109.00 inc. VAT	
	Executive	159.00 inc. VAT	

U.K. Mainland: Add £10 per item to cover Delivery, Packing and Insurance

Allow 28 Days for your order to be processed. TOTAL:



OR ORDER BY TELEPHONE WITH YOUR CREDIT CARD ON 0883 40511

Reg. No: 1281096. Reg. Office: 240 London Road, Mitcham, Surrey, CR4 3TY.

*I enclose a Cheque/Postal Order payable to Colvin Computer Centres Ltd. for £ _____

*Please charge my Access/Barclaycard account

No: | | | | | | | | | | | | | | | | | | | | | |

Signature: _____

Name: _____

Address: _____

Designed to



The All-Purpose Computer

The MTX500

The MTX500 is a new departure in micro-computer technology. Whether your needs as a user are for personal programming, games playing, scientific or process control, educational or business use the MTX500 is already capable or very easily adaptable to almost every application. Glance through the standard features below – you'll see what we mean.

Software

The MTX500's 16k ROM contains several languages and routines which enable the novice or the experienced programmer to make full use of the machine. Standard languages are MTX BASIC, LOGO and NODDY. ROM routines include an ASSEMBLER/DISASSEMBLER with screen display of the Z80 CPU registers, memory and program which can be manipulated from the keyboard. Machine code programs can be stepped through one instruction at a time, and easily called from within BASIC

programs. A further feature is the Virtual Screen facility which enables the programmer to define sections of the screen to work independently whilst maintaining all full screen facilities. Pascal is available as an add-on ROM pack.

Hardware

As standard – 32k of user RAM expandable to 512k plus 16k of dedicated video RAM. Sixteen colours, 40 column text, 256 × 192 high resolution graphics with all sixteen colours available and easily moveable user defined graphics (Sprites) combine to make effective screen displays quick and simple to achieve. Standard outputs are centronics printer

Perform



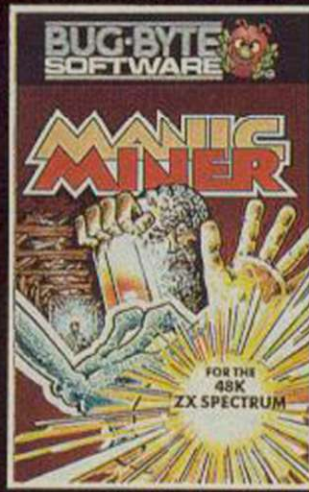
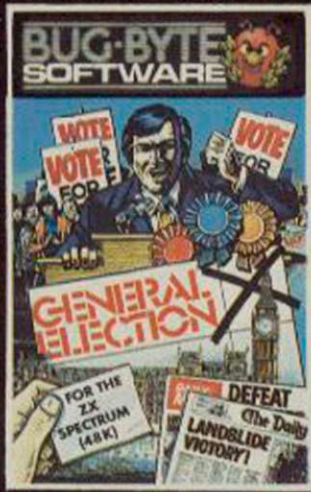
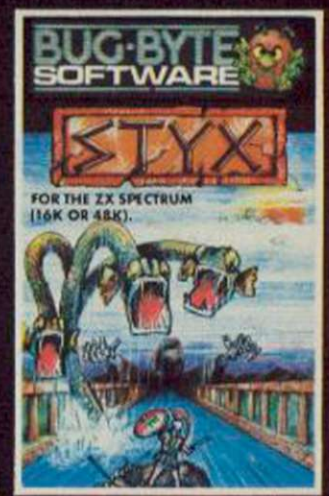
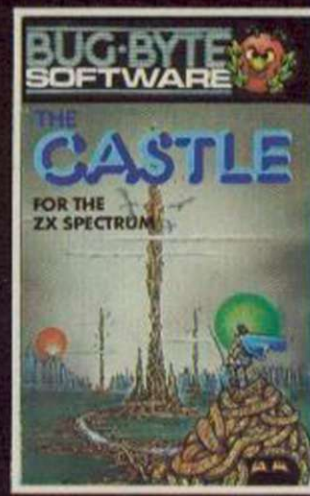
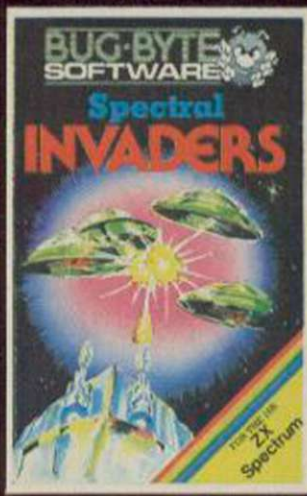
port, two joystick ports, an uncommitted I/O port, 2400 Baud Cassette port, separate TV and Video Monitor ports, 3 voice sound with hifi output plus a dedicated games cartridge port. Other standard features include the Z80A processor running at 4MHz, real time clock, full moving key keyboard with 79 keys including eight function keys and separate numeric pad. Optional expansions include 80 column colour

video board, twin RS232 interfaces, 5¼ and 8 inch floppy disc interfaces to run CP/M, Node interface to enable ring system, plus an A/D and D/A convertors.

MEMOTECH

MTX500

For further information, please write to:
Sales Dept. Memotech Limited, Station Lane Industrial Estate,
Witney, Oxon. OX8 6BX. Telephone Witney (0993) 2977.



CLOUD NINE

**BUG-BYTE
SOFTWARE**



Mulberry House, Canning Place, Liverpool L1 8JB

Selected titles available from larger branches of Boots and W H Smith, Spectrum, Lasky's, Currys Micro-C and all good Computer Shops

sinclair special

1



**Inside...
Latest prices round-up...
Latest software...
Order form...**

Introduction

One thing's certain about the Sinclair world – there's never a dull moment.

Every month sees new software and new hardware, produced by Sinclair enthusiasts, or produced by Sinclair itself.

The magazines do a fantastic job of keeping you up to date with the input of enthusiasts. We want to keep you in touch with Sinclair's own developments.

Every month, there'll be a Sinclair Special in this magazine.

Sometimes, inevitably, there won't be anything new to say – we want to break away from the breathless announcements of hardware and software you just can't buy.

But when something new *is* available, we want you to have accurate information – fast. You'll find it here.

This month, we're giving you the latest information on the recommended retail prices of Sinclair equipment. They're *our* prices, and you may well find things cheaper (or dearer) in the shops. If they're cheaper – terrific! Snap them up. Note, however, that from us the ZX81 is down to £39.95.

We're also announcing six superb new Sinclair cassettes for the Spectrum, and three more which make full use of the ZX81. There's an order form at the back of this Special.

Next month... but there, next month is another story! Watch (as they say) this space.

Nigel Searle

Nigel Searle,
Managing Director,
Sinclair Research Ltd.



Spectrum – latest recommended retail prices.

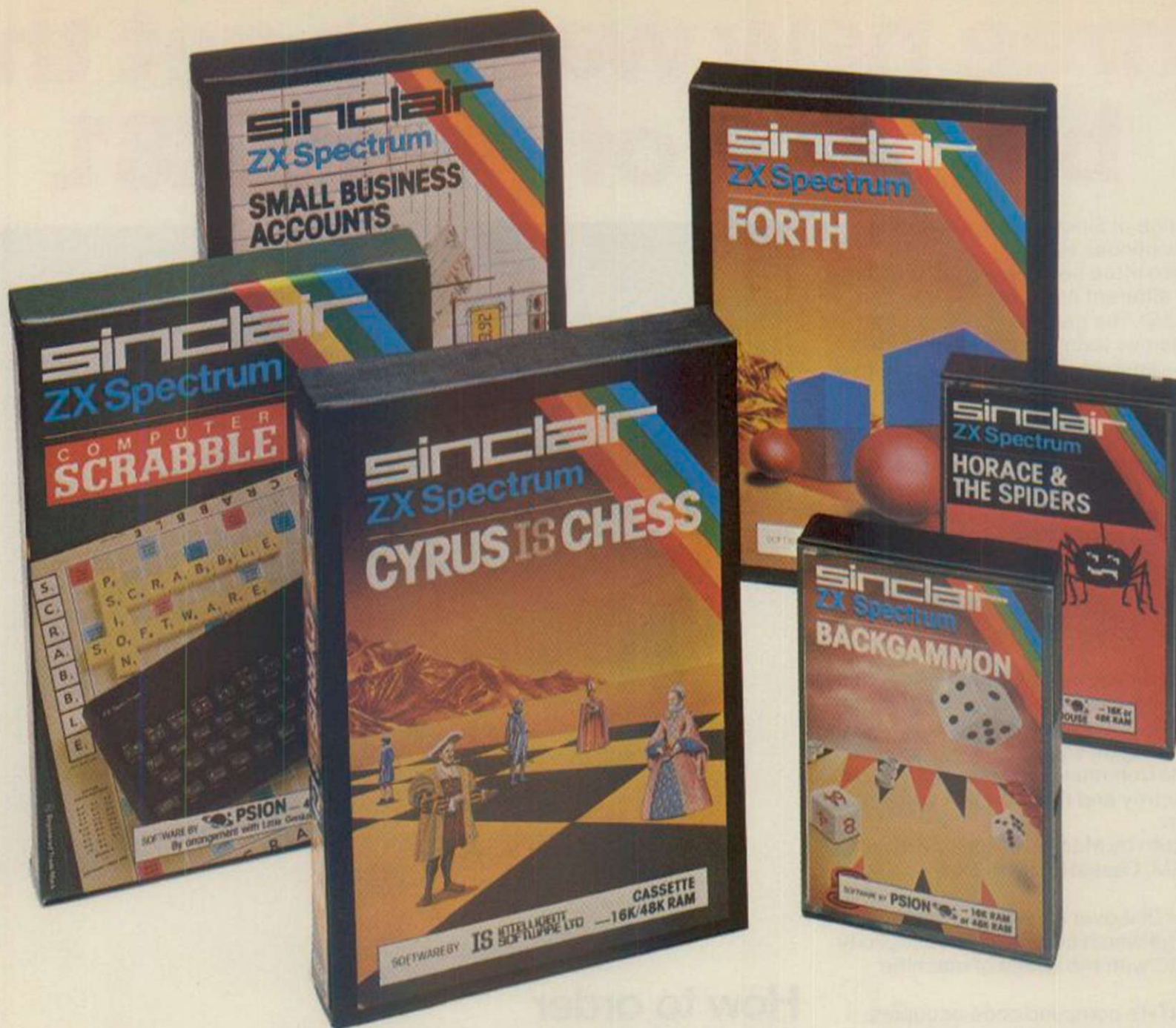


16K was £125.00
16K now £99.95

48K was £175.00
48K now £129.95

ZX Printer was £59.95
ZX81 was £49.95

ZX Printer now £39.95
ZX81 now £39.95



Six new ways to make more of your Spectrum.

Take a look at these brand-new titles. Each is an outstanding new program using the full potential of the Spectrum, for games with stunningly animated graphics, for strategies of fiendish cunning, for masterly applications of computing capability...

Cyrus-IS-Chess Based on the Cyrus Program, which won the 2nd European Microcomputer Chess Championship and trounced the previously unbeaten Cray Blitz machine. With 8 playing levels, cursor piece-movement, replay and 'take-back' facilities, plus two-player option. The 48K version has many additional features including an extensive library of chess openings. For 16K or 48K RAM Spectrum.

Horace and the Spiders Make your way with Horace to the House of Spiders, armed only with a limited supply of anti-spider-bite serum. In the house, destroy the webs before the spiders can repair them. Then destroy the spiders, before they destroy Horace! Undoubtedly the creepiest Horace program ever produced! For 16K or 48K RAM Spectrum.

Computer Scrabble The famous board game, on-screen - with the whole board on view! A huge vocabulary of over 11,000 words. Full-size letter tiles, four skill levels - the highest of which is virtually unbeatable. For 1 to 4 players. For 48K RAM Spectrum.

(SCRABBLE trademark and copyright licensed by Scrabble Schutzrechte und Handels GmbH - a J.W. Spear and Sons PLC subsidiary.)

Backgammon A fast, exciting program, with traditional board display, rolling dice and doubling cube. Four skill levels. For experts - or beginners. (Rules are included - it's the quickest way to learn the game.) For 16K or 48K RAM Spectrum.

FORTH Learn a new programming language, as simple as BASIC, but with the speed of machine code. Complete with Editor and User manual. For 48K RAM Spectrum.

Small Business Accounts Speeds and simplifies accounting work, produces Balance Sheets, Profit and Loss information and VAT returns. Complete with User manual. For 48K RAM Spectrum.

Overleaf - your Sinclair order form.

Three new ways to get the best out of your ZX81.

The range of Sinclair software for the ZX81 continues to grow.

These three new cassettes offer two totally different challenges to you and your ZX81. The games – like so many ZX81 games today – really do use the ZX81's capability. The FORTH program is a fascinating extension of your own computer understanding.

Sabotage Defender or attacker? The choice is yours in this exciting game.

Be the Guard and defend the randomly placed boxes of ammunition inside the compound – or be the Saboteur and attack the ammunition!

Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

City Patrol You are the Commander of a laser-firing ship. Your task is to intercept and destroy alien suicide ships descending on your city. Judge your rating as Commander by how many aliens you destroy and how much of your city survives.

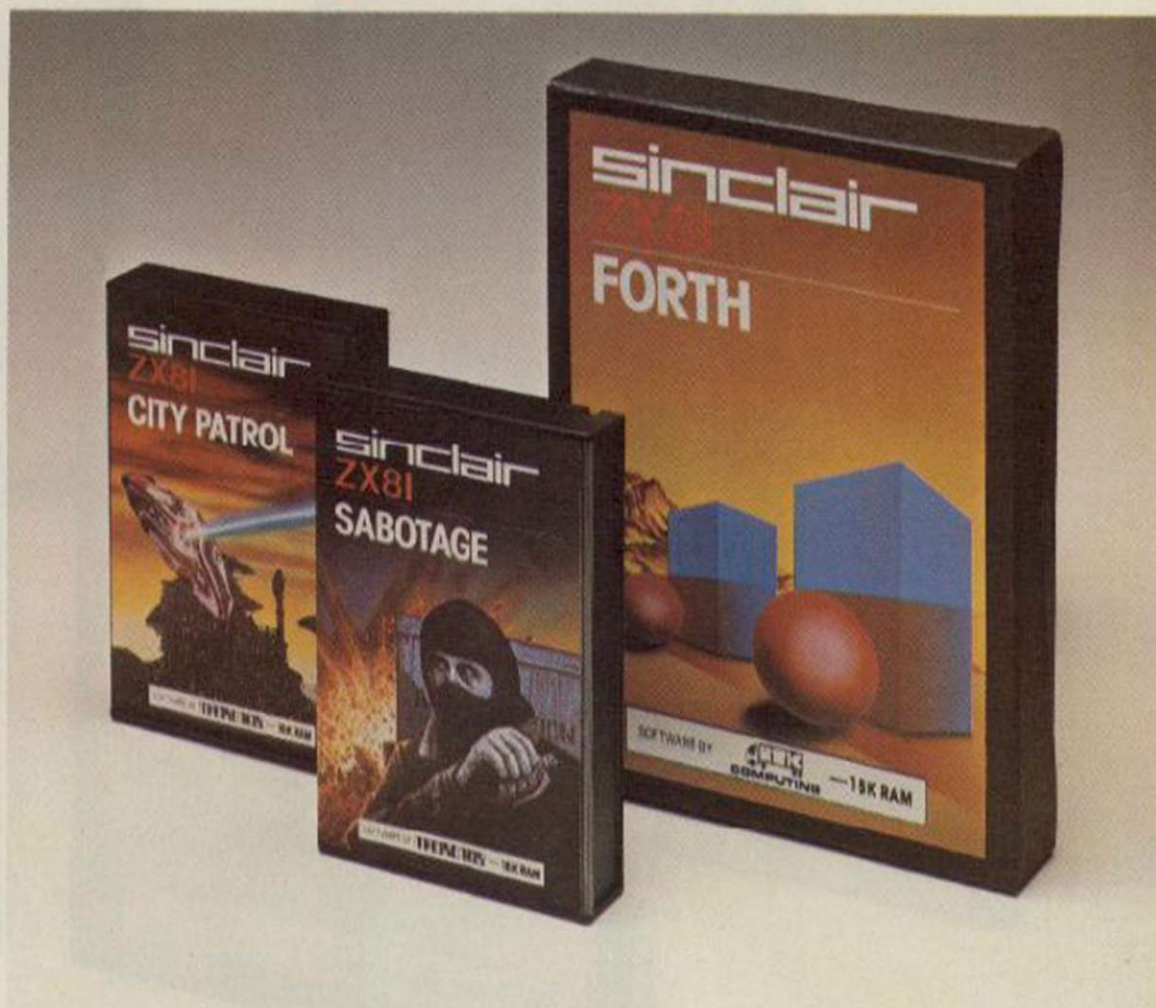
Written by Macronics for a ZX81 with 16K RAM. Cassette price: £4.95.

FORTH Discover a new programming language which combines the simplicity of BASIC with the speed of machine code.

FORTH's compiled code occupies less than a quarter of the equivalent BASIC program and runs ten times as fast. It is fully extendable by the addition of user-defined commands.

Free User-Manual and Editor Manual with each cassette.

Written by Artic for a ZX81 with 16K RAM. Cassette price: £14.95.



How to order

Simply fill in the relevant section(s) on the order form below. Note that there is no postage or packing payable on Section B. Please allow 28 days for delivery. Orders may be sent FREEPOST (no stamp required). Credit-card holders may order by phone, calling 01-200 0200 24 hours a day. 14-day money-back option.

sinclair

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

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

ORDER FORM

Section A: hardware purchase

Qty	Item	Code	Item Price £	Total £
	ZX Spectrum – 48K	3000	129.95	
	ZX Spectrum – 16K	3002	99.95	
	ZX 81 (including 1.2A Mains Adaptor)	1003	39.95	
	16K RAM pack for ZX81	1010	29.95	
	ZX Printer	1014	39.95	
	1.2A Mains Adaptor, for use with ZX81 computer/ZX Printer combination (only required if you have an early ZX81 with 0.7A Adaptor)	1002	7.95	
	Printer paper (pack of 5 rolls)	1008	11.95	
	Postage and packing: orders under £90	0028	2.95	
	orders over £90	0029	4.95	
			TOTAL £	

Section B: software purchase

Qty	Cassette	Code	Item Price £	Total £
FOR SPECTRUM				
	G22/S: Backgammon	4021	5.95	
	G23/S: Cyrus-IS-Chess	4023	9.95	
	G24/S: Horace & the Spiders	4022	5.95	
	G25/S: Scrabble	4024	15.95	
	L1 /S: FORTH	4400	14.95	
	B6 /S: Small Business Accounts	4605	12.95	
FOR ZX81				
	G25: Sabotage	2124	4.94	
	G24: City Patrol	2123	4.95	
	L1: FORTH	2400	14.95	
			TOTAL £	

*I enclose a cheque/postal order made payable to Sinclair Research Ltd for £

*Please charge to my Access/Barclaycard/Trustcard account no:

*Delete/complete as applicable.

(Please print)

Signature

Mr/Mrs/Miss

Address

SPECTRUM

NEWS

from SPECTRUM

IKON

HOBBIT FLOPPY TAPE DRIVE for the BBC Micro

Because there is a shortage of BBC Disk Drive up-grade kits, we have been able to secure a supply of IKON FLOPPY TAPE DRIVES for the BBC micro, which is an ideal alternative - see our ad for details.

ZX SPECTRUM

We have a large range of add-on goodies for the ZX SPECTRUM - see our ad you'll be amazed!

SOFTWARE

See our super range of SOFTWARE from top American & British companies

NEW SPECTRUM MEMBERS

Check our address page! - there are many new SPECTRUM dealers throughout the UK so there's a good chance there'll be a SPECTRUM centre near you.

PRESTEL

See PRESTEL Page 600181 for up to date information from SPECTRUM

AFTER SALES CARE

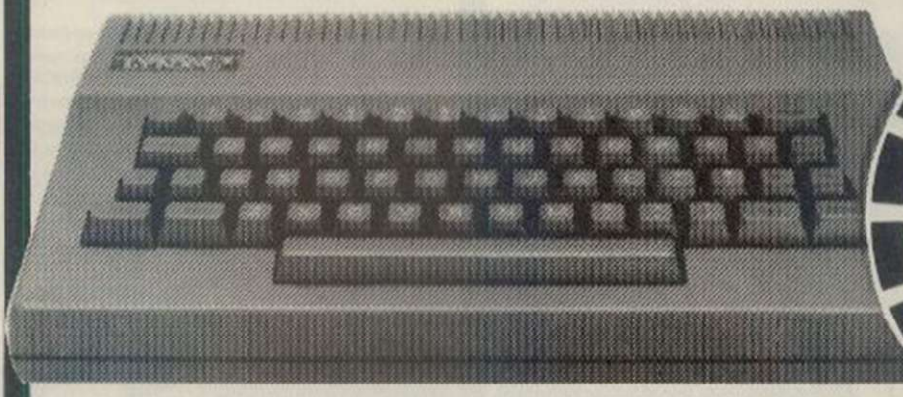
SPECTRUM service centres will ensure that should your machine 'go down' we will get it running again as quickly as possible. We also offer extended warranties at reasonable prices too! - ask your SPECTRUM HOME COMPUTER CENTRE for full details.

COMPUTER DEALERS

The SPECTRUM dealer list is virtually closed. If your area is free and you'd like to join the waiting list, please write to MIKE STERN, Spectrum (U.K.) Ltd, Burrowfields, Welwyn Garden City, Herts.

Just arriving - the new

LYNX 96K



More power!
More features!

Now from SPECTRUM - the new LYNX 96K offering more workspace for ambitious programs. The most important feature of the 96K machine is its additional memory. In full high resolution colour, it provides 37.5K of RAM directly accessible in Basic - with up to 24K more available to programs using machine code. The extra memory of the 96K machine helps you make the most of the outstanding features it shares with the 48K Lynx: remarkably high resolution graphics and the highly praised Lynx Basic with its built-in machine-code monitor. Additional ROM features on the LYNX 96K include drivers for both parallel and serial printers, and a range of preformatted sound effects. Ask to see the super new LYNX 96K at SPECTRUM - NOW!

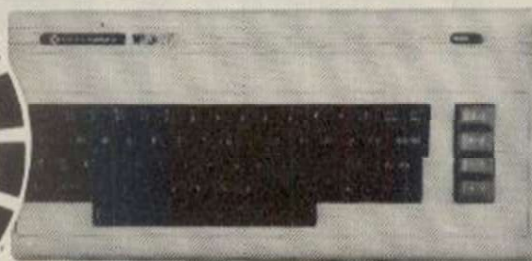
SPECTRUM PRICE

£299.00

LYNX 48K Model -SPECTRUM PRICE £225

For the 48K Lynx owners who're ready to take the next step, the 48K machine can be upgraded to full 96K specification for just £89.95

Commodore VIC-20 Package Deal

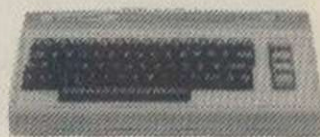


Sensational Value ONLY

£139.99

A complete Home Computer system including the VIC-20 Computer, a Cassette Unit, Introduction to BASIC part 1 - a simple explanation of computer programming. A tape of four computer programs - Blitz, Type-A-Tune, Race & Hopbit. A fantastic deal!! and great value-for-money check it out at your local SPECTRUM dealer NOW! But HURRY! this is a limited offer only while stocks last.

COMMODORE 64



Powerful 64K RAM 40-colour displays to monitor TV. High resolution graphics and 3-dimensional effect capability, music synthesiser. Z80 additional processor option.

Spectrum Price

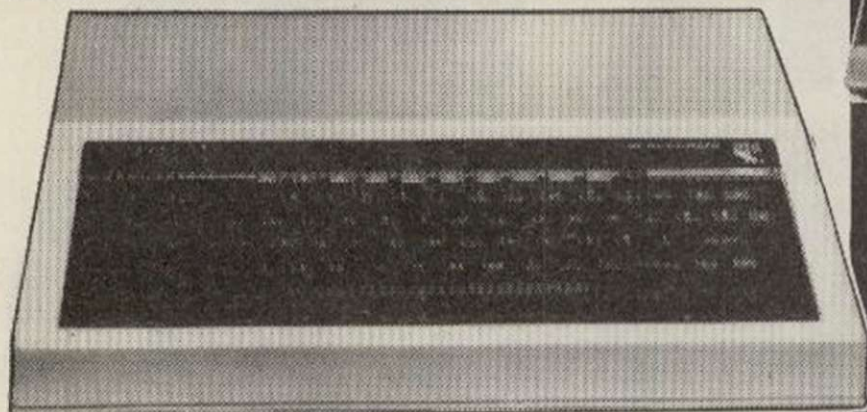
£345.00

Package Deal offer does not apply to Commodore 64 Model

TURN THE PAGE FOR MORE SUPER OFFERS FROM SPECTRUM

SPECTRUM

BBC Model 'B' MICRO



Yes, this top selling Micro system is now available from your local SPECTRUM dealer - the BBC Model 'B' offering 32K RAM plus a full back-up of peripherals & software too! It's an infinitely expandable machine, ideal for the home or business and is already widely used for educational purposes in schools - so the chances are your children may already be well familiar with its operation, which must make it the ideal choice for the home too!

Now available
IKON FLOPPY TAPE DRIVE
for the BBC The ideal alternative!
Spectrum Price **£155.25**

QUICK SHOT JOYSTICK
Especially for the BBC
Spectrum Price £19.95

SPECTRUM PRICE

£399.00 INC. VAT

- BBC Single Disk Drive 100K £265.00
- BBC Dual Disk Drive 800K £803.85
- BBC Tape Recorder £29.90
- Acorn Software Cassette based from £9.95
- Acorn Disk based software £11.50
- BBC cassette based software from £9.95

Please note! We regret that there is a shortage on all BBC equipment - please phone you nearest store before making a journey to check stock position.

SHARP MZ-80A

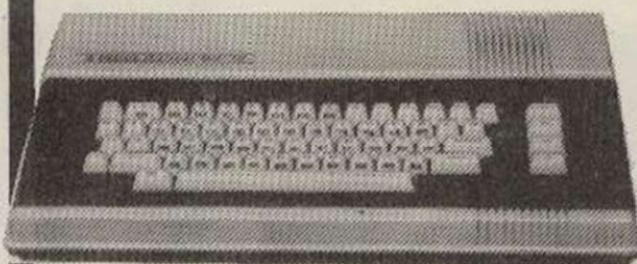


FREE!
£75 WORTH
of software
with every MZ80A purchased

£546.25

Desk top genius! the all-in-one SHARP MZ-80A. Ready to run the moment you get it home. Built-in keyboard. CRT 9" display and cassette data storage with 48K RAM. The BASIC with extra useful additions, offers quite a powerful micro for the home or business ■ 4K Byte ROM 48K Byte RAM - 2K Byte Video RAM ■ ASC11 profiled keyboard - numeric pad ■ 2 Page Video RAM allows screen to be scrolled up or down. ■ CP/M available.

- Floppy Disks and Accessories for MZ-80A
- Twin Floppy Disk Unit (inc. 1/0 Card, Disk Cable)..... £856.75
 - Twin Disk Unit (only)..... £878.50
 - Single Floppy Disk Unit..... £460.00
 - Cable for F/D Drive..... £29.79
- Printers and Accessories for MZ-80A, MZ-80B & MZ-80K
- 80 Col Tractor Feed Printer nc. Cable, 1/0 Card & Rom..... £477.25



The Super COLOUR GENIE

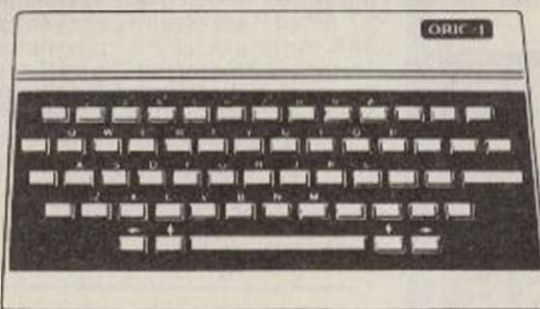
A truly reliable micro and highly recommended by SPECTRUM featuring powerful and sophisticated COLOUR GRAPHICS, allowing you to create full 8-colour Games, Diagrams and charts quickly and simply. Powerful 16K RAM memory (expandable internally to 32K) for FULL COLOUR video games and POWERFUL COMPUTING with a full range of inexpensive accessories: 16K RAM pack, Joysticks for TV games, Light Pen, Disk Drive and a Printer. The superb Colour Genie is at SPECTRUM now - check it out and see the Genius at work!

SPECTRUM PRICE

£194.00

- COLOUR GENIE ACCESSORIES
- Joysticks £49.49
 - 16K RAM £38.50
 - Printer Interface £39.95
 - VISCOUNT Teach yourself Colour Genie Basic £6.95

ORIC-1



Special OFFER! FREE!

4 programs with every ORIC-1 48K purchased.

- Multigames
- ORIC Flight
- Chess
- Zodiac

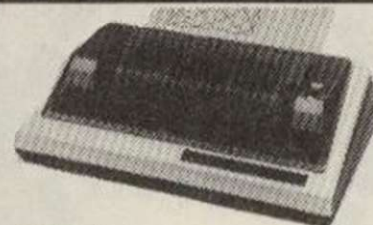
Spectrum Price ONLY

£169.95

- SPECTRUM FACTS
- Maximum user RAM 47,870 Bytes
 - Text Screen 28x40
 - High Resolution 240x200
 - Cassette Lead Included

Now available: P.A.S.E. joystick interface for ORIC-1 £14.95

PRINTERS



- EPSON**
- Model FX-80..... £503.70
 - Model RX-80 £332.35
- SEIKOSHA**
- GP-100A..... £229.94
 - GP-100VC..... £247.25
- SMITH CORONA**
- Model TP-1A..... £431.25
- OKI MICROLINE**
- Model 80..... £259.90
 - Model 82A..... £455.40
 - Model 92P..... £585.35
- All prices include VAT

MONITORS



- SANYO CDD 3125NB**
Colour Monitor
£286.35
 - SANYO 12"**
Green Monitor
£113.85
- All prices inc. VAT

THE PLUG

Ever had your micro crash on you when you were in the middle of a complex program because some other electrical appliance was switched on and caused a power fluctuation? THE PLUG is designed especially to overcome this problem.

only **£14.95**

ALL PRICES INCLUDE VAT

Not all stores carry every advertised item, please phone before making a journey - Prices correct at time of going to press E. & O.E.

SOFTWARE

THE TOP SELLERS from

SOFTISAL®

American games for the U.K. market from leading American software houses

ATARI	
Donkey Kong Atari (Cart)	£41.70
Dig Dug Atari (Cart)	£30.00
AVALON HILL	
Computer Stocks & Bonds Com 64 (Cass)	£16.56
Midway Campaign Com 64 (Cass)	£16.56
Bank Street Writer Atari (Disk)	£23.18
BRÖDERBUND	
Choplifter Atari (Disk)	£28.93
Apple Panic Atari (Disk)	£24.79
AE Atari (Disk)	£28.93
Seafox Atari (Disk)	£24.79
Bank Street Writer Atari (Disk)	£56.31
BIG FIVE SOFTWARE	
Miner 2049er Atari (Cart)	£41.70
DATASOFT	
Zaxxon Atari (Disk)	£33.07
EDUCATIONAL SOFTWARE	
Tricky Tutorials 1 to 6 Atari (Disk)	£98.97 (For the 6)
EPYX/AUTOMATED SIMULATIONS	
Jump Man Com 64 (Disk)	£33.07
Temple of Aposhi Atari/Vic 20 (Disk)	£33.07
HEYDEN	
Sargon 2 Atari (Disk)	£28.93
Cass	£24.79
HUMAN ENGINEERED SOFTWARE	
Turtle Graphics Com 64 (Cart)	£49.15
Vic 20 (Cart)	£32.75
Heswriter Com 64 (Cart)	£38.85
Vic 20 (Cart)	£32.75
Predator Vic 20 (Cart)	£33.35
CoCo II Com 64 (Disk)	£33.07
Vic 20 (Disk)	£33.07
Simon Vic 20 (Cass)	£13.20
Torg Vic 20 (Cass)	£14.85
6502 Professional Development System Com 64 (Cass)	£24.11
Vic 20 (Cass)	£24.11

INFOCOM	
Zork 1, 2 & 3 Atari (Disk)	£33.07
Com 64 (Disk)	£33.07 (each game)
Deadline Atari (Disk)	£41.35
Suspended Com 64 (Disk)	£41.35
THE MUSE SOFTWARE	
Castle Wolfenstein Atari (Disk)	£22.97
LIGHTNING SOFTWARE	
Master Type Atari (Disk)	£32.16
MIS	
Vic Vango Vic 20 (Cass)	£10.71
Fruit Fly Vic 20 (Cass)	£10.71
PROGRAM DESIGN	
Pre-school IQ Builder Atari (Disk)	£19.28
Cass	£13.77
ROCKLAN	
Wizard of War Atari (Disk)	£33.07
Cart	£37.52
SIERRA ON-LINE	
Frogger Atari (Disk)	£27.27
Com 64 (Disk)	£26.93
Ultima II Atari (Disk)	£49.83
Crossfire Vic 20 (Cass)	£24.79
SIRIUS SOFTWARE	
Repton Atari (Disk)	£30.64
Com 64 (Disk)	£33.07
Fast Eddy Com 64 (Disk)	£28.93
Vic 20 (Cart)	£33.35
Squishem Com 64 (Disk)	£28.93
Type Attack Vic 20 (Cart)	£33.35
Turmoil Vic 20 (Cart)	£33.35
SPINNAKER	
Story Machine Atari (Disk)	£28.14
Rhymes & Riddles Atari (Disk)	£24.11
Snooper Troops Atari (Disk)	£36.19
Hey Diddle Diddle Atari (Disk)	£24.11
In search of the Most Amazing Thing Atari (Disk)	£32.16



Plus!
THE BEST SELLERS from these top British Software houses



Cruising (Dragon 32)	£8.95
Cruising (ZX Spectrum)	£4.95
Blind Alley (ZX Spectrum)	£4.95
Androids (ZX Spectrum)	£5.95
Galaxy Attack (ZX Spectrum 48K)	£5.95
Sword Fight (ZX Spectrum)	£8.95

RABBIT

Cyclons - Commodore 64	£5.99	Pakacuda - Vic 20	£5.99
Escape MCP - Commodore 64	£5.99	Race Fun - Vic 20	£5.99
Pakacuda - Commodore 64	£5.99	Anti-Matter Splatter - Vic 20	£5.99
Paratrooper - Vic 20	£5.99	Cyclons - Vic 20	£5.99
Annihilator - Commodore 64	£5.99	The Catch - Vic 20	£5.99

TITAN

TITAN	
Alien Swarm Spectrum 16/48K	£5.95
Galactic Raiders Spectrum 16/48K	£4.95
Ground Force Zero Spectrum 16/48K	£4.95
Missile Panic Vic-20 3.5K	£5.95
Roadrunner Vic-20 3.5K	£4.95
Android Attack Vic-20 3.5K	£4.95
Space Hopper Vic-20 3.5K	£4.95
Mission 99 T199/4A STD M/C	£4.95

COMPUTER RENTALS

High Resolution (ZX-81)	£5.95	Testmatch	£5.95
Galactic Patrol (Spectrum 16K)	£5.95	Handicap Golf	£5.95
For Spectrum 48K:		Alien Maze	£5.95
Derby Day	£5.95	3D Desert Patrol	£4.95
Rescue	£5.95	St. George & the Dragon	£5.95
Jackpot	£4.95	(Dragon 32)	£8.95

MICRODEAL

DRAGON		Alcatraz	£8.90
The King	£8.00	Katerpillar Attack	£8.00
Space War	£8.00	Space Monopoly	£8.00
Defence	£8.00	Mansion Adventure	£8.00

MIKROGEN

Mikrogen		Masterchess (Spectrum)	£6.95
Bomber (ZX81)	£3.95	Scramble (Spectrum)	£5.95
Scramble (ZX81)	£3.95	Space Zombies (Spectrum)	£5.95
Space Invaders (ZX81)	£3.95	Panic (Spectrum)	£5.95
Frogs (ZX81)	£3.95	Mad Martha (Spectrum)	£8.95
ZX Chess (ZX81)	£8.50		

BOOKS

GRANADA PERSONAL COMPUTING TITLES		The Working Commodore 64	£5.95
The ZX Spectrum and how to get the most from it	£5.95	Commodore 64 Machine Code Master	£8.95
The Spectrum Programmer	£5.95	The Working Dragon	£5.95
The Spectrum Book of Games	£5.95	The Working Spectrum	£5.95
Dragon 32 Games Master	£5.95	The Working CBM 64	£5.95
Introducing Spectrum Machine Code	£7.95	Dragon 32 Games Master	£5.95
The Apple II Programmer's Handbook	£10.95	Functional Forth for the BBC	£5.95
Programming with Graphics	£5.95	Androids for the 16K Spectrum	£5.95
The Dragon & how to make the most of it	£5.95	Sword Fight for 16K Spectrum	£5.95
Computing for the Hobbyist & small Business	£8.95	Galaxy Attack for 48K Spectrum	£5.95
Simple Interfacing Projects	£8.95	Blind Alley for 16K Spectrum	£5.95
The BBC Micro: An expert guide	£8.95	Cruising for 16K Spectrum	£5.95
Commodore 64 Computing	£5.95	PRENTICE HALL	
The Oric-1 and how to get the most from it	£5.95	The Apple Personal Computer for Beginners	£6.95
The Dragon 32 book of games	£5.95	Atari Games and Recreation	£12.70
Computer Languages and their uses	£5.95	BASIC Programming on the BBC Microcomputer	£5.95
Lynx Computing	£8.95	The ZX Spectrum - Your Personal Computer	£5.95
21 Games for the BBC Micro	£5.95	Commodore 64 Programmer's Reference Guide	£14.95
Choosing a Microcomputer	£4.95	The PET Personal Computer for Beginners	£5.95
Databases for fun & profit	£5.95	VIC 20 Programmer's Reference Guide	£9.95
Introducing the BBC Micro	£5.95	Osborne User's Guide	£12.70
SUNSHINE		The C Programming Language	£16.95
The Working Spectrum	£5.95	Starting FORTH	£15.25
Functional Forth for the BBC	£5.95		
The Working Dragon 32	£5.95		
Dragon 32 Games Master	£5.95		

ACCESSORIES

C12 DATA CASSETTES	£0.50
C15 DATA CASSETTES	£0.50
VISCONT SINGLE SIDED DOUBLE DENSITY (10) (FOR APPLE COMMODORE, ATARI, TANDY)	£21.25
VISCONT SINGLE SIDED SINGLE DENSITY (10)	£21.25
VISCONT DOUBLE SIDED DOUBLE DENSITY (10) (FOR SHARP SUPERBRAIN, ETC.)	£33.81
VISCONT SINGLE SIDED DOUBLE DENSITY 96 TRACK (10) (FOR NASCOM, COMMODORE 8050, ETC.)	£51.30
EMPTY DISK CASES (FOR 5¼" DISKETTES)	£1.95
DISK HEAD CLEANER KIT	£16.10
TELEVISIONS	
12" T80 B&W PORTABLE	£59.95
CTP131 14" COLOUR PORTABLE	£229.95

Teach yourself BASIC cassette available for most popular micros - all £6.95

The TOP 50 from MICRO DEALER UK

NEW RELEASES FROM QUICKSILVA



ZX81

NEW RELEASES FROM QUICKSILVA



SPECTRUM

The best of British software from leading British software houses

SOFTWARE HOUSE	TITLE		SOFTWARE HOUSE	TITLE	
(A) ZX SPECTRUM			IMAGINE	"ARCADIA"	£5.50
MELBOURNE HOUSE	"TERROR-DAKTIL"	£8.95	POSTERN	"SHADOWFAX"	£7.95
MELBOURNE HOUSE	"PENETRATOR"	£8.95	RABBIT	"SCRAMBLE"	£9.99
MELBOURNE HOUSE	"THE HOBBIT"	£14.95	INTERCEPTOR MICROS	"CRAZY KONG"	£6.00
QUICKSILVA	"ASTRO BLASTER"	£4.95	(D) COMMODORE 64		
QUICKSILVA	"TIMEGATE"	£6.95	LLAMASOFT	"MATRIX"	£8.50
QUICKSILVA	"MINED OUT"	£4.95	LLAMASOFT	"GRIDRUNNER 64"	£8.50
QUICKSILVA	"TRADER TRILOGY"	£9.95	LLAMASOFT	"ATTACK OF THE MUTANT CAMELS"	£8.50
ARTIC COMPUTING	"3-D COMBAT ZONE"	£4.95	INTERCEPTOR MICROS	"PANIC 64"	£6.95
ARTIC COMPUTING	"COSMIC DEBRIS"	£4.95	(E) ORIC-1		
ARTIC COMPUTING	"QUADRACUBE"	£4.95	I.J.K. SOFTWARE	"XENON-1"	£8.50
IMAGINE	"ARCADIA"	£8.50	I.J.K. SOFTWARE	"3-D MAZE"	£1.50
NEW GENERATION	"KNOT IN 3-D"	£5.95	SALAMANDER	"ORIC-TREK"	£9.95
NEW GENERATION	"3-D TUNNEL"	£5.95	(F) DRAGON-32		
HEWSON	"HEATHROW A.T.C."	£7.95	QUICKSILVA	"MINED OUT"	£5.95
P.S.S.	"MAZE DEATH RACE"	£4.95	P.S.S.	"DRAGBUG"	£12.95
SOFTK	"THE SOFTK COMPILER"	£9.95	C.R.L.	"ST. GEORGE & THE DRAGON"	£8.95
RICHARD SHEPHERD	"TRANSYLVANIAN TOWER"	£8.50	C.R.L.	"HANDICAP GOLF"	£8.95
MICROGAME SIMULATION	"BATTLE OF BRITAIN"	£5.95	SALAMANDER	"DRAGON TREK"	£9.95
CP SOFTWARE	"SUPERCHESS II"	£7.95	(G) B.B.C. (A&B)		
ABBEX	"ETX"	£5.95	I.J.K. SOFTWARE	"STRATOBOMBER"	£7.50
C.R.L.	"TEST MATCH"	£5.95	I.J.K. SOFTWARE	"ATLANTIS"	£7.50
(B) ZX-81			QUICKSILVA	"PROTECTOR"	£7.95
QUICKSILVA	"COSMIC GUERRILLA"	£3.95	QUICKSILVA	"WIZARD"	£6.95
QUICKSILVA	"3-D BLACK STAR"	£4.95	QUICKSILVA	"MUSIC PROCESSOR"	£14.95
C.R.L.	"HI-RES GRAPHICS TOOLKIT"	£5.95	DIGITAL FANTASIA	"ESCAPE FROM PULSAR 7"	£8.95
MARTECH GAMES	"CONFLICT" (Specialist War Game)	£11.95 (ZX-81 or ZX-SPECTRUM)	DIGITAL FANTASIA	"FEASIBILITY EXPERIMENT"	£8.95
(C) COMMODORE VIC-20					
LLAMASOFT	"MATRIX"	£6.00			
LLAMASOFT	"GRIDRUNNER"	£8.00			
LLAMASOFT	"ANDES ATTACK"	£8.00			
QUICKSILVA	"TORNADO"	£5.95			

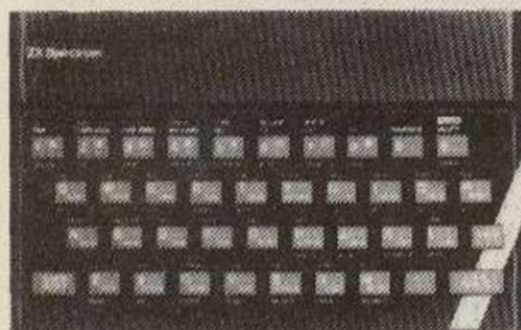
Compiled by Micro Dealer U.K. Distributors of fast-selling Micro Computer Software

TURN THE PAGE FOR MORE SUPER OFFERS FROM SPECTRUM

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

SPECTRUM

SINCLAIR ZX SPECTRUM



This top selling micro is now available from Spectrum in both 16K and 48K RAM.

**SINCLAIR
ZX SPECTRUM
16K
£99.95**

**SINCLAIR
ZX SPECTRUM
48K
£129.95**

Spectrum Computer Centres have no connection whatsoever with the ZX-Spectrum Computer manufactured by Sinclair Research Ltd.

Just look at this fantastic range of add-on goodies for the ZX Spectrum!

VISCOUNT 32K RAM PACK £39.95
SPECTRUM/TV SOUND UNIT
Control sound of your ZX-Spectrum
through volume control on T.V. only **£9.95**

Fuller
MASTER UNIT
Combines all the features
of both ORATOR and the
FULLER BOX at the amaz-
ingly low price of
ONLY £54.95

**ORATOR VOICE
SYNTHESIS
FOR
ZX SPECTRUM
ONLY £39.95**

Fuller
**16K RAM
ONLY
£24.95**

**THE AMAZING
FULLER BOX**
Features: Programmable
Sound, Joystick Con-
troller, Cassette Interface,
Beep Amplifier, Thru Buss,
Volume Control
ONLY £29.95

Fuller
**FD 42 KEY-
BOARD FOR
ZX81
SPECTRUM
ONLY £29.95**

Fuller
**SPECTRUM
SOUND
AMPLIFIER
ONLY £6.95**

**DIGITAL
TRACER**
from RD
Labs



SPECTRUM PRICE £55.50

ZX-81 ACCESSORIES

**64K RAM Pack.... £54.95
16K RAM Pack.... £24.95
ZX Printer £39.95**

ATARI 800



Now this proven and tested machine has been upgraded to a massive 48K RAM and its still at the amazing LOW price of £299.95 from SPECTRUM. It's an ideal Home Micro for graphics, educational and personal finance etc. use it and it will take you from learning up to a small business use. You can add printers, program recorders, disk drives and more, to expand your micro as and when you want, to suit your needs. So if you're looking for a top of the line micro you must see the ATARI 800 with 48K at SPECTRUM - NOW!

**NOW
ONLY £299.95**

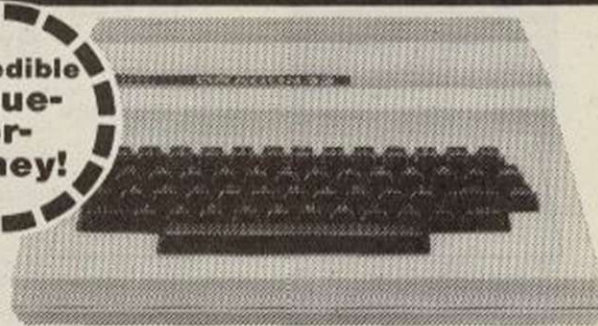
**ATARI 400
16K RAM
NOW ONLY
£149.95**



**Including FREE
Programming Kit**

Plus a wide range of other peripherals & software for ATARI from your local SPECTRUM dealer - See our SOFTWARE page!

DRAGON



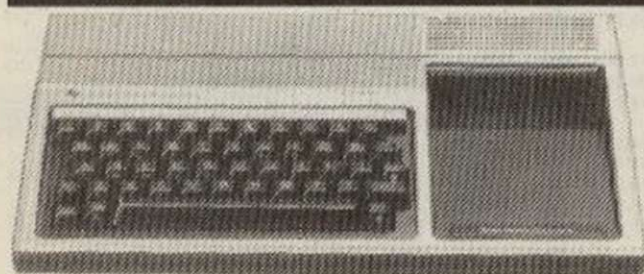
Extensive facilities include highly advanced colour graphics. Powerful standard 32K RAM (expandable to 64K Bytes). ● 9 Colour 5 resolution Display ● Extended Microsoft colour BASIC (as standard) ● Advanced sound with octaves -255 tones.

SPECTRUM FACTS
Maximum user RAM 29,679 Bytes
Text Screen 16 x 32
High resolution.... 256 x 192
Cassette Lead Included
VISCOUNT Teach yourself
Dragon Basic..... £6.95

**SPECTRUM
PRICE
ONLY £175.00**

Plus a wide range of other peripherals & software for DRAGON from your local SPECTRUM dealer - See our SOFTWARE page!

TEXAS TI-99/4A



Yes, now from SPECTRUM the fabulous TEXAS TI-99/4A Home Micro for only **£149.95** plus! a super FREE! offer too! Worth **£50.85** (which means you're effectively only paying **£99.10** for your TEXAS TI-99/4A micro.) Hurry! this is a limited offer only

Including FREE!
■ Pair of Joyicks ■ Begin-
ners BASIC Tutor program
■ Connect Four program
worth **£50.85**

£149.95
**HURRY!
Limited
Offer
only -
Ask for
details**

**PLUS
FREE!**

■ SPEECH SYNTHESISER or a
■ TI CASSETTE RECORDER
each worth **£49.95**

When you buy any 6 Texas Software modules.
Please ask for details. Subject to availability

There's a Spectrum Centre near you ...

AVON

BATH Software Plus, 12 York St. TEL: (0225) 61676
BRISTOL Brensall Computers Ltd., 24 Park Row. TEL: (0272) 294188
WESTON-SUPER-MARE K. & K. Computers, 32 Alfred St. TEL: TBA

BEDFORDSHIRE

BEDFORD Stanad Ltd., 115 Midland Rd. TEL: (0234) 49341
DUNSTABLE Dormans, 7-11 Broad Walk. TEL: (0582) 65515
LUTON Terry-More, 49 George St. TEL: (0582) 23391/2

BERKSHIRE

READING David Saunders Computer Centre, 8 Yield Hall Place. TEL: (0734) 580719

BUCKINGHAMSHIRE

CHESHAM Reed Photography & Computers, 113 High St. TEL: (0494) 783373
LEIGHTON BUZZARD The Computer Centre at Milton Keynes Music, 17 Bridge St. TEL: (0525) 382504, 376622
WINDSOR Wycombe Video, 44 King Edward Court. TEL: (07535) 67441

CAMBRIDGESHIRE

CAMBRIDGE K. P. Ltd., 12a Kings Parade. TEL: (0223) 68087
PETERBOROUGH Peterborough Communications, 91 Midland Rd. TEL: (0733) 41007

CHANNEL ISLANDS

GUERNSEY Gull's, 3-5 The Poller, 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: TBA (Phone (061) 728 2282 for Int.)
CREWE Microman, Unit 2, 128 Nantwich Rd. TEL: (0270) 216014
CHESTER Oakleaf Computers Ltd., 100 Boughton. TEL: (0244) 310099
MACCLESFIELD Camera & Computer Centre, 118 Mill St. TEL: (0625) 27468
NORTHWICH Camera & Computer Centre, 3 Town Sq. TEL: (0606) 45629
STOCKPORT Wilding Ltd., 1 Little Underbank. TEL: (061) 480 3435
WARRINGTON Wildings, 111 Bridge St. TEL: (0925) 38290
WILMSLOW Swift of Wilmslow, 4-E St. Annes Parade. TEL: (0625) 526213

CLEVELAND

MIDDLESBROUGH McKenna & Brown, 190 Linthorpe Rd. TEL: (0642) 248345

CORNWALL

ST. AUSTELL A B & C Computers, Bucky House, 6 Lower Aylmer Sq. TEL: (0726) 84463

CUMBRIA

BARROW-IN-FURNESS Barrow Computer Centre, 96 Church St. TEL: (0229) 38353
CARLISLE The Computer Centre, 56-58 Lowther St. TEL: (0228) 27710
WHITEHAVEN P. D. Hendren, 15 King St. TEL: (0946) 2063

DERBYSHIRE

ALFRETON Gordon Harwood, 69/71 High St. TEL: (0773) 832078
DERBY C T Electronics, at Camera Thorpe, The Spot. TEL: (0332) 360456

DEVON

EXMOUTH Open Channel, 30 The Strand. TEL: (03952) 4408

PAIGNTON Devon Computers, 81 Upper Manor Rd. TEL: (0803) 526303

DURHAM

DARLINGTON McKenna & Brown, 102 Bondgate. TEL: (0325) 59744

ESSEX

BASILDON Godfrey's 28-32 East Walk, Town Centre. TEL: (0268) 289379
CHELMSFORD Maxton Hayman Ltd., 5 Broomfield Rd. TEL: (0245) 354595
ILFORD Prot Enterprises, 1 Centreway, High Rd. (next to Salesburys) TEL: (01) 553 0144
LOUGHTON Micro & Movie Channel, 309 High Rd. TEL: (01) 508 1216
RAINFHAM Microway Computers, 39 High St. TEL: (0634) 376702

GLOUCESTERSHIRE

GLOUCESTER The Model Shop, 79-81 Northgate St. TEL: (0452) 410693

HAMPSHIRE

ALDERSHOT David Saunders Computer Centre, 51 Station Rd. TEL: (0252) 20130
BASINGSTOKE Fisher's, 2-3 Market Place. TEL: (0256) 22079
PORTSMOUTH Computer Corner, 261 Commercial Rd. TEL: (0705) 633938
PORTSMOUTH Waterlooville G B Microland, 7 Queens Prde. TEL: (07014) 58911
SOUTHAMPTON R. J. Parker & Son Ltd, 11 Portsmouth Rd., Woolston. TEL: (0703) 434137/8
WINCHESTER Winchester Camera & Computer Centre, 75 Parchment St. TEL: (0962) 63982 (Just Opening)

HEREFORD

HEREFORD Melgray Hi-Tech Ltd., 49 Broad St. TEL: (0432) 275737

HERTFORDSHIRE

HATFIELD Microworld, 2 Crawford Rd. TEL: (07072) 64137
HEMEL HEMSTEAD Faxminster Ltd., Computer & Electrical Discount Centre, 25 Market Sq. TEL: (0442) 55044
HITCHIN Camera Arts (Micro Computer Division), 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 Holywell Hill. TEL: (0727) 52991
STEVENAGE D. J. Computers, 11 Town Sq. TEL: (0438) 65501
WATFORD SRS Microsystems Ltd., 94 The Parade, High St. TEL: (0923) 28602

HUMBERSIDE

GRIMSBY R. C. Johnson Ltd., 22 Friargate, Riverhead Centre. TEL: (0472) 42031

ISLE OF MAN

DOUGLAS T. H. Calabour Ltd., 57-61 Victoria St. TEL: (0624) 3482 (Just Opening)

KENT

CANTERBURY Kent Micro Systems, Conquest House, 17 Palace St. TEL: (0227) 50200
SEVENOAKS Ernest Fielder Computers, Dorset St. TEL: (0732) 456800

LANCASHIRE

ACCINGTON PV Computers, 38A Water St. TEL: (0254) 36521/32611
BURNLEY IMD Computer Centre, 39-43 Standish St., BB11 1AP. TEL: (0282) 54299
BURY (Lancs.) Micro-North, 7 Broad St. TEL: (061) 797 5764
OLDHAM Home & Business Computers Ltd., 54 Yorkshire St. TEL: (061) 633 1608
PRESTON Wilding's 49 Fishergate. TEL: (0772) 556250
ROCHDALE Home & Business Computers, 75 Yorkshire St. TEL: TBA

LEICESTERSHIRE

LEICESTER Youngs, 40/42 Belvoir St. TEL: (0533) 544774
MARKET HARBOROUGH Harbrough Home Computers, 7 Church St. TEL: (0858) 63056

LINCOLNSHIRE

GRANTHAM Oakleaf Computers Ltd., 121 Dudley Rd. TEL: (0476) 78994/70281
LINCOLN MKD Computers, 24 Newlands. TEL: (0522) 25907

LONDON

E6 Percivals, 85 High St. North, East Ham. TEL: (01) 472 8941
E8 McGowans, 244 Graham Rd., Hackney. TEL: (01) 533 0935
EC2 Devron Computer Centre, 355 Moorgate. TEL: (01) 638 3339/1830
N14 Youngs Electronic L/a Fieldmaster, 19 The Broadway, The Bourne, Southgate. TEL: (01) 882 5579
N20 Castlehurst Ltd., 1291 High Rd. TEL: (01) 446 2280
NW4 DA Vinci Computer Store, 112 Brent St., Hendon. TEL: (01) 202 2272/3/4 (Just Opening)
NW9 Moviescape, 459 Kingsbury Rd. TEL: (01) 204 6352
SE1 Vic Odden's, 6 London Bdg Walk. TEL: (01) 403 1988
SE9 Square-Deal, 375 Footscray Rd., New Eltham. TEL: (01) 859 1516
SE15 Castlehurst Ltd., 152 Rye Lane, Peckham. TEL: (01) 639 2205
SW6 Chelsea Micros Ltd., 14 Jerden Place. TEL: (01) 385 8494
W1 Devron 4 Edgware Rd. TEL: (01) 724 2373
W1 Computers of Wigmore Street, 87 Wigmore St. TEL: (01) 486 0373
W1 Sonic Foto & Micro Center, 256 Tottenham Court Rd. TEL: (01) 580 5826
W3 Colomatic Computers, 44 High St., Acton. TEL: (01) 992 7611
W11 Electroislaire, 120 Notting Hill Gate. TEL: (01) 221 7029

MANCHESTER GREATER

MANCHESTER Lomax Ltd., 8 Exchange St., St. Ann's Sq. TEL: (061) 832 6167
SWINTON Mr. Micro Ltd., 69 Partington Lane. TEL: (061) 7282282 (Open Friday until 8 p.m.)
HYDE Pase, 213-215 Market St. TEL: (061) 366 5935
BOLTON Wilding Ltd., 23 Deansgate. TEL: (0204) 33512
ECCLES Home & Business Computers, 4 Northway, Eccles Precinct. TEL: (061) 707 2004
WIGAN Wilding Ltd., 11 Mesnes St. TEL: (0942) 44382

MERSEYSIDE

HESWALL Thornguard Computer Systems, 46 Pensby Rd. TEL: (051) 342 7516
LIVERPOOL Beaver Radio, 20-22 Whitechapple. TEL: (051) 709 9898
LIVERPOOL (Aintree) Hargreaves, 31/37 Warbeck Moor. TEL: (051) 525 1782
SOUTHPORT Central Computers, 575 Lord St. TEL: (0704) 31881
WIDNES Computer City, 78 Victoria Rd. TEL: (051) 420 3333

MIDDLESEX

EDGWARE Breaker 1-4, 130 High St. TEL: (01) 952 7488/8860
HARROW Camera Arts (Micro Computer Division), 24 St. Ann's Rd. TEL: (01) 427 5469
HAYES Chipstop, 1000 Uxbridge Rd. TEL: (01) 573 2511 (Just Opening)
TEDDINGTON Taddington Camera Centre, Broad St. TEL: (01) 977 4716

NORFOLK

NORWICH Sound Marketing, 52 St. Benedicts St. TEL: (0603) 667725

QT. YARMOUTH Tony Hood Electronic, 26a Market Gate Shopping Centre. TEL: (0493) 3143

THETFORD Thetford C B & Micros, 21 Guildhall St. TEL: (0842) 61645

NORTHANTS

NORTHAMPTON Basic Computers & Systems Ltd., 72 Kingsthorpe Hollow. TEL: (0604) 710740

NOTTINGHAMSHIRE

NOTTINGHAM Cameo Computers, 8/9/10 Trinity Walk. TEL: (0602) 42912
NOTTINGHAM Basic, 39-41 Trent Boulevard, West Bridgeford. TEL: (0602) 819713

NORTHERN IRELAND

BELFAST Arthur Hobson Ltd., 37 Gt. Victoria St. TEL: (0232) 246336
LONDONDERRY Foyle Computer Systems, 3 Bishop St. TEL: (0504) 68337

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: (0235) 21207

SCOTLAND

DUMFRIES Vennals, 71 English St. TEL: (0387) 4547
EDINBURGH The Silicon Centre, 6-7 Antigua St. TEL: (031) 557 4546
GLASGOW Victor Morris Ltd., 340 Argyle St. TEL: (041) 221 8958
HAMILTON Tom Dickson Computers, 8-12 Cadzow St. TEL: (0698) 283193
KILMARNOCK Vennals, 49 Foregate. TEL: (0563) 32175
KIRKCALDY Kirkcaldy Photographic Services, 254E High St., Fife. TEL: (0592) 204734
PETERHEAD North East Computers, 1-3 Ellis St. TEL: (0779) 79900
STIRLING R. Kilpatrick, 58 Port St. TEL: (0786) 5532

SHROPSHIRE

SHREWSBURY Computaram, 13 Castlegate. TEL: TBA

SOMERSET

TAUNTON Grays, 1 St. James St. TEL: (0823) 72986

STAFFORDSHIRE

STAFFORD, Computaram, 59 Fergate St. TEL: (0785) 41899
STOKE-ON-TRENT Computaram, 11 Market Sq., Arcade, Hanley. TEL: (0782) 268620

SUFFOLK

BURY ST. EDMUNDS Bury Computer Centre, 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) 65948
CHERTSEY Chertsey Computer Centre, 1 Windsor St. TEL: (09328) 64663
CROYDON Cadcom Ltd., 96 Whitgift Centre (Next door to MacDonald's) TEL: (01) 686 8393
GUILDFORD The Model Shop, 23 Swan Lans. TEL: (00772) 0483 39115
HASLEMERE Haslemere Computers, 25 Junction Place, adj. Rex Cinema. TEL: (0428) 54428
NEW MALDEN Surrey Micro Systems, 31 High St. TEL: (01) 942 0478
WALLINGTON Surrey Micro Systems Ltd., 53 Woodcote Rd. TEL: (01) 647 5636
WOKING Harpers, 71/73 Commercial Way. TEL: (04862) 61061

SUSSEX

BRIGHTON Capricorn, 1 Queens Rd. TEL: (0273) 29634
LITTLEHAMPTON Alan Chase Ltd., 39 High St. TEL: (09064) 5674/4545

TYNE & WEAR

NEWCASTLE-ON-TYNE Newcastle Camera & Computer Mart, 16 Northumberland Ct. TEL: (0632) 327461

WALES

ABERYSTWYTH AberData at Galloways, 23 Pier St. TEL: (0970) 615522
CARDIFF Randall Cox, 18/22 High St. Arcade. TEL: (0222) 31960
NEWPORT (Gwent) Randall Cox, 118 Commercial St. TEL: (0633) 67378
PEMBROKE Randall Cox, 19 Main St. TEL: (064) 668 2876
PORT TALBOT Micro Gen, 6 Royal Buildings, Talbot Rd. TEL: (0639) 887730
WREXHAM T E Roberts, 26 King St. TEL: (0978) 364404/364527

WARWICKSHIRE

LEAMINGTON SPA IC Computers, 43 Russell St. TEL: (0925) 36244 (Opening Soon)
RUGBY The Rugby Micro Centre, 9-11 Regent St. TEL: (0788) 70622

WEST MIDLANDS

BIRMINGHAM Sherwoods, Gt. Western Arcade. TEL: (021) 236 7211
COVENTRY Coventry Micro Centre, 33 Far Gosford St. TEL: (0203) 58942
UDLEY Central Computer Services, 35 Churchhill Precinct. TEL: TBA
WEST BROMWICH Bell & Jones, 39 Queens Sq. TEL: (021) 553 0820

WORCESTER

WORCESTER David Waring Ltd., 1 Marmion House, High St. TEL: (0905) 27551

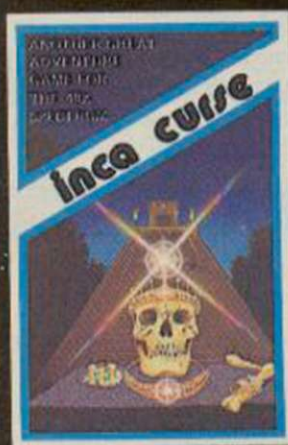
YORKSHIRE

BRADFORD Erricks Foto-Sonic House, Rawson Sq. TEL: (0274) 309266
HULL The Computer Centre (Humberside) Ltd., 26 Asaby Rd. TEL: (0482) 26297
LEEDS Gaze & Bligh, 4 Lower Briggate. TEL: (0532) 454451
SHEFFIELD Superior Systems Ltd., 178 West St. TEL: (0742) 755005
SKIPTON Look & See, 45 Belmont Bridge. TEL: 0756 60078
YORK York Computer Centre, 7 Stonegate Arcade. TEL: (0904) 641862

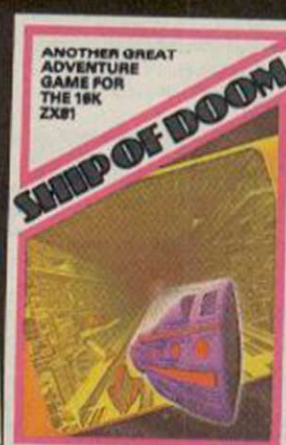
NEW SPECTRUM MEMBERS

Check your area there are many new SPECTRUM dealers throughout the U.K. So there's a good chance there'll be a SPECTRUM centre near you!

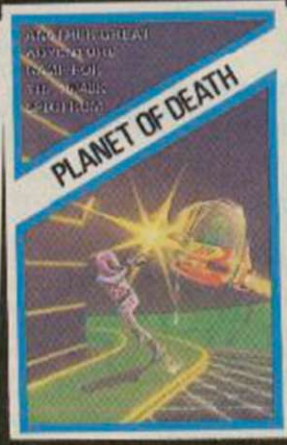
Meet the



1



2



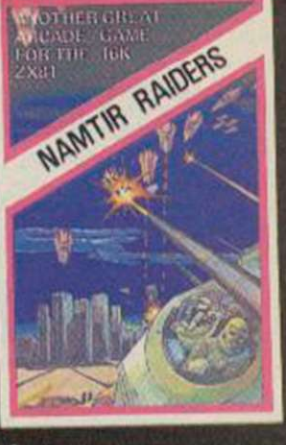
3



4



5



6



13



14



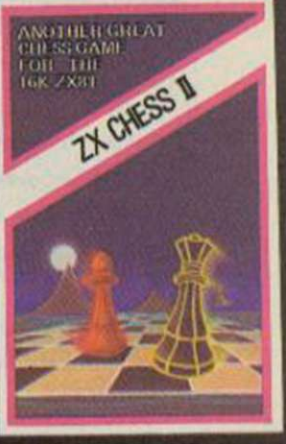
15



16



17



18

with Artic Software

1. INCA CURSE

(Adventure B)
In a jungle clearing you come across an ancient Inca temple. Your mission to enter, collect the treasure and escape alive! But beware!
£5.95 for 16K ZX81 and £6.95 for 48K Spec.

2. SHIP OF DOOM

(Adventure C)
You are unavoidably drawn to an alien cruiser. Can you reach the control room and free yourself? Or will they get you first?
Cassette £5.95 for 16K ZX81 and £6.95 for 48K Spec.

3. PLANET OF DEATH

(Adventure A)
You find yourself stranded on an inhabited alien planet. Can you reach your ship and escape?
£5.95 for 16K ZX81 and £6.95 for 16K/48K Spec.

4. ESPIONAGE ISLAND

(Adventure D)
While on a reconnaissance mission your plane loses control and you are forced to land. Can you survive and escape with the island's hidden secret?
£5.95 for 16K ZX81 and £6.95 for 48K Spec.

5. INVASION FORCE

A popular arcade game for the 16K/48K Spectrum.
Fires through the force field to destroy the menacing alien ship. Sounds easy? Two levels of play normal or suicidal. Full colour. Sound and hi-res graphics.
£4.95 for 16K/48K Spec.
£3.95 for 16K ZX81.

6. NAMTIR RAIDERS

High speed, quick action invaders-type game with four separate groups of attackers.
£3.95 for 16K ZX81.

7. INVADERS

Planet earth is once more being invaded. You must fight to the death to protect your planet. Thirty-six levels of play.
£4.95 for 16K/48K Spec.

8. GALAXIANS

Swooping attackers, explosions, excellent graphics and personalised scoring.
£3.95 for 16K ZX81 and £4.95 for 16K/48K Spec.

9. COSMIC DEBRIS

You find yourself in an alien asteroid belt. To survive you must blast the asteroids to powder... before they get you!
£4.95 for 48K Spec.

10. ZOMBIES/ SWORD OF PEACE

Prove you are worthy of becoming the Monarch of Oz, by finding four objects of state

against tremendous odds. As the only survivor on a desert island you have to escape from man-eating Zombies.
£5.95 16K ZX81.

11. GOBBLE MAN

Escape from munching ghosts to eat power dots and then gobble up the ghosts. High speed classic game with hi-res graphics and sound.
£4.95 for 16K/48K Spec. and £3.95 for 16K ZX81.

12. GALAXY WARRIOR/ STAR TREK

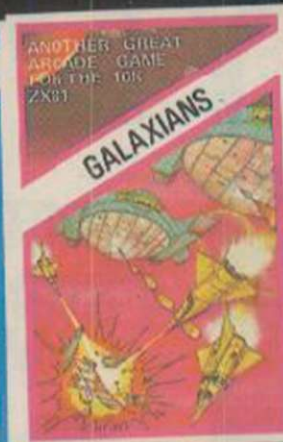
Galaxy Warrior - Destroy all the Klingons in the Galaxy and exit through a black hole into a new Galaxy. Star Trek - You have 15 star-dates and your mission is to destroy 7 Klingons.
£5.95 16K ZX81.

Artic for all your Sinclair ZX81

challenge



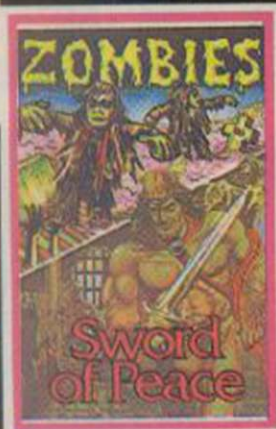
7



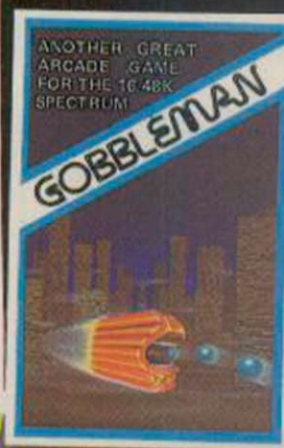
8



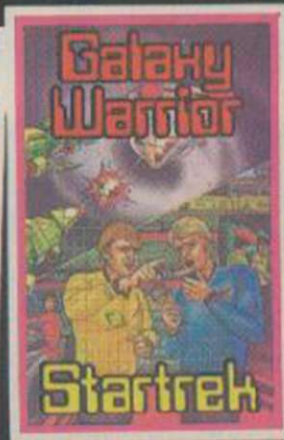
9



10



11



12

PUSH YOUR SINCLAIR TO THE LIMIT

Artic supply the best selection of adventure, arcade and educational games available for the Sinclair home computers.

Artic also offer a wide range of utilities that will enable you to utilize your ZX81/Spectrum to its full potential.

These include:

16K ZX81 Assembler	£9.95
48K Spectrum Assembler	£9.95
Toolkit	£5.95
Spec Bug	£6.95
ZX Bug	£6.95
SYS 64	£6.95



13. 3D COMBAT ZONE

Drive your tank through a 3D landscape destroying enemy super tanks, flying saucers and avoiding the pyramids. £5.95 for 48K Spec.

14. 1K GAMES PACK

A superb selection of 11 games to stimulate your mind for the 1K ZX81. Only £4.95.

15. 3D-QUADRACUBE

Can you outwit the computer with this original version of 3D noughts and crosses? £4.95 16K/48K Spec.

16. 1K ZX CHESS

An incredible 1K chess game ideal for someone who wants a quick game without waiting for loading. Only £2.95 for ZX81.

17. SPECTRUM MICRO CHESS

The first chess program for 16K/48K Spec. Allows all legal moves, castling, en-passant and pawn promotion. Full colour and graphics display. £6.95.

18. ZX CHESS II

A great game of chess for your 16K ZX81 or 48K Spec. Seven levels of play, analysis and recommended move options. £9.95 for 16K ZX81. £8.45 48K Spec. Voice Chess 48K Spec. £8.95.

ARTIC COMPUTING LIMITED



396 James Reckitt Avenue, Hull, North Humberside

Cheques and P.O. made payable to Artic Computing Ltd. Dealer Enquiries Welcome. Please state whether your order is for ZX81 or Spec. Send S.A.E. (9" x 6") for Catalogue. (Access, Barclaycard welcome.)



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

Please supply _____

* Cheque for total amount enclosed. _____

* Access/Barclaycard No. _____

Name _____

Address _____

* Please delete or complete as applicable.

/ Spectrum software needs...

NO MORE LUCKY DIP!

STRETCH YOUR MIND & MICRO WITH MR. MICRO GAMES & ACCESSORIES

Mysterious Island Vic 20 16 K £9.90

Your graphic adventure begins after escaping from prison in a hot air balloon—try to land it on Mysterious Island, then the fun really begins. • Booby Trapped Fields • Killer Bees • Hostile Natives • Hidden Clues • Force Fields • Capture the Nautilus • Full Graphic Display • Several Games lead to Exciting Climax • Separate Practice Program • Includes Blank Data Tape to store the game to play later.

This game requires a high level of skill and lightning reflexes. All successful adventures can claim a unique personalised award by sending Mr. Micro their final position at the end of the game—(For use with Commodore Vic 20, 16k expansion, by joystick or keyboard).

Ramdram Vic 20 £13.90

This accessory enables programs which would normally only work with 3k expansion to work with 8k or 16k expansion. RAMDAM saves having to buy a 3k pack if you already own an 8k or 16k. With RAMDAM and a Commodore 16k expansion all known tape games will run on your Vic 20. • Includes Memory Test Program • Free 6.5k game - MICROVADERS for use with Joysticks.

Hunchy Spectrum 48k £6.90

Guide Quassimodo over the ramparts to rescue Esmeralda. Leap flames, dodge arrows and ring the bells. • Amazingly good graphics • Fast Arcade Action • You'll be surprised at what your micro is capable of • Very demanding.

Dragon Tamer Dragon 32 £9.90

Allows Atari type and other digital joysticks to be used with the Dragon—giving better response and more control. For the first time your Dragon will be able to reflect your true skills. • Achieve higher games scores • Less Frustration.

Plus To ensure maximum value, Dragon Tamer includes two original games for use with digital joysticks:

Goldrush Vic 20 3.5k £6.90

This graphic adventure program was the first in the world to offer real gold for the successful adventurer. An idea which has been much copied but never equalled. • Fun • Educational • Challenging • Clues • Puzzles • Searches • Fast Reaction Game.

Should you experience any difficulty in obtaining Mr. Micro products from your local dealer, they are available post free direct from Mr. Micro.

Send your remittance to: Mr. Micro Ltd, 69 Partington Lane, Swinton, Manchester M27 3AL.

Cheques should be made payable to Mr. Micro Ltd. Please allow 28 days for delivery.

Note to dealers

You should benefit greatly by stocking the Mr. Micro range of software and accessories. For further details telephone Jim Gregory at Mr. Micro without delay.

TRADE DISTRIBUTION BY:

P.C.S.

Unit 6, Scotshaw Brook Ind. Est.,
Branch Road, Lower Darwen, Lancs, BB3 0PR.
Tel: 0254 691211



Have you ever eagerly loaded a new program only to discover that you've wasted your hard earned cash? We know how you feel—we've suffered too.

Our company, Mr. Micro Ltd, has grown out of a passion for home computing, an obsession that went far beyond a hobby.

We are determined to ensure that all programs and accessories which bear the Mr. Micro name are proven, tried, tested and debugged and represent excellent value for money. After all we were in from the beginning and we have built ourselves a hard earned reputation in the world of home computing.

Our packaging has undergone a complete re-design so that before you buy anything you know exactly what the package contains, how it works and what the screen display will look like.

No lucky dip—we've got nothing to hide. All our programs are well written, exciting and exhilarating, designed to stretch your capabilities to the full and extract every ounce of performance from your micro.

Mr. MICRO



69 Partington Lane, Swinton, Manchester M27 3AL,
England. Telephone: 061-728 2282

Centr
58. Bul
rnchu
omme
50 899
e SK1
ion, La
nchest
2, 0926
40. Micr
ward Co
375 For
Thame

If you're not in the Educational establishment, please call and ask for our general prices either end user and trade.

DISKING

EDUCATIONAL SALES DEPARTMENT

Liphook, hants, GU30 7EJ, U.K.

TEL (0428) 722563 TELEX 849131 G

AMAZING
EDUCATIONAL
DISCOUNTS ON

MEMOREX

FLOPPY DISKETTES

Memory Excellence

Without doubt the PRICE/PERFORMANCE winners with their new Japanese media. Such high quality, is currently yielding zero reject rates and certification levels easily surpassed in actual performance. Protected by a special anti-static lubricant, head performance and media life are also extended.

5 1/4" DISKETTES

Certified for single OR Double density, and with hub ring reinforcement.

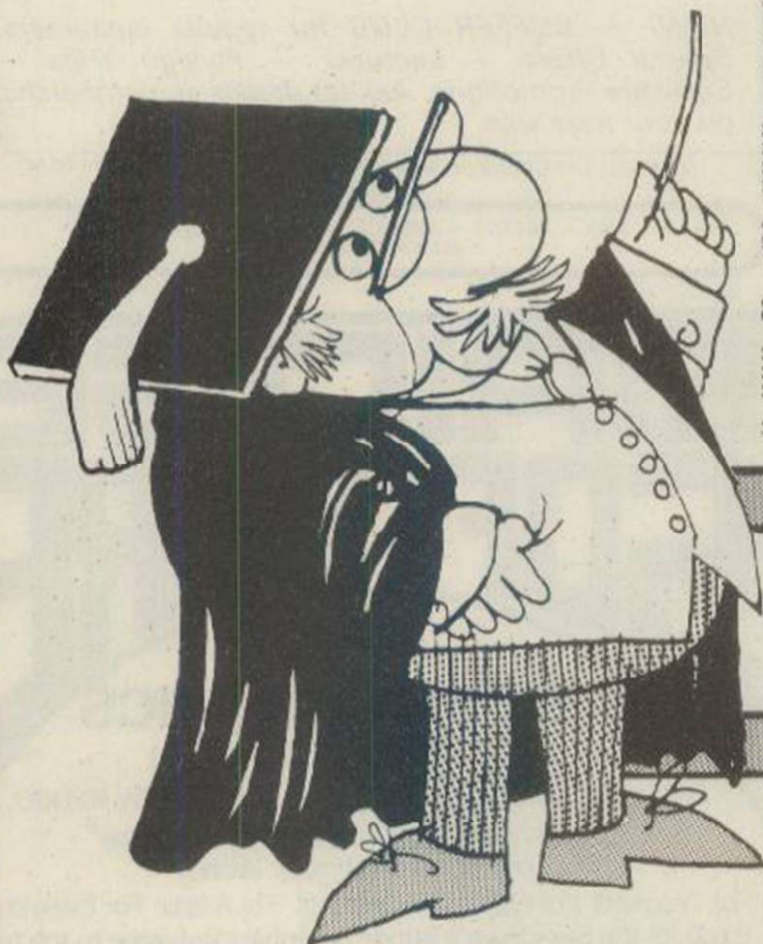
	EXC VAT
3481 S/Sided 48 tpi	£18.90
3491 D/Sided 48 tpi	£24.90
3504 S/Sided 96 tpi	£25.90
3501 D/Sided 96 tpi	£32.90

48 tpi suitable for 35 or 40 track operation
96 tpi suitable for 77 or 80 track operation
10 & 16 Hard Sector available at same prices

8" DISKETTES

	EXC VAT
3060 S/Sided S/Density	£21.90
3090 S/Sided D/Density	£24.90
3102 D/Sided D/Density	£30.90

32 hard sector available at same prices



LIBRARY BOXES

LB5 for minidisks	£2.20
LB8 for 8" disks	£2.30
Prices EXC VAT	

CLEANING KITS

Prevent head crashes and ensure efficient error-free operation. Enough for 26 bi-monthly cleans & a lot cheaper than a service call!
CK5 for 5.25" disk drives £14.90
CK8 for 8" disk drives £14.90
Prices EXC VAT

PLEASE TEAR ME OUT - YOU'RE SURE TO NEED ME LATER

ALL ORDERS FOR DISKING EDUCATIONAL SALES DEPARTMENT

PLEASE CLEARLY MARK YOUR ORDERS FOR THE ATTENTION OF DISKING EDUCATIONAL SALES DEPARTMENT.

These special low prices, apply to Educational Establishments. We will despatch goods on receipt of an official order, for order values over £30.00 inc. VAT. We do this on the UNDERSTANDING THAT INVOICES WILL BE SETTLED WITHIN THIRTY DAYS or

preferably less please.

Alternately, you may send your remittance with your order if you so wish. Also bear in mind, that you do have to pay VAT, which will be added to these prices.

If you are in any doubt, please see the coupon on this ad., to help with your calculations, or telephone us for assistance.

NO FREE GIFTS are included, at these prices.

U.K. P&P RATES INC INS. EXC. VAT

Minidisks 1-2 PACKS each pack @ 95p
Minidisks 3-5 PACKS each pack @ 75p
Minidisks 6-9 PACKS each pack @ 60p
Minidisks 10+ PACKS * POST FREE *
8" disks 1-2 PACKS each pack @ £1.60
8" disks 3-5 PACKS each pack @ £1.20
8" disks 6-9 PACKS each pack @ 90p
8" disks 10+ PACKS * POST FREE *
LB5 5.25" Library box 1-4 off @ 40p
LB5 5.25" Library box 5-9 off @ 30p

LB5 5.25" Library box 10+ @ 20p
LB8 8" Library box 1-4 off @ 60p
LB8 8" Library box 5-9 off @ 45p
LB8 8" Library box 10+ off @ 30p
For CK5 5.25" Cleaning kit read Minidisk postal rates 10+ POST FREE
For CK8 8" Cleaning kit read 8" disk postal rates 10+ POST FREE
For SDL or SDLX (5.25" version only) read Minidisk postal rates.

To:

DISKING EDUCATIONAL SALES DEPARTMENT
Liphook, Hants, GU30 7EJ, U.K.
TEL (0428) 722563 TELEX 849131 Telbar G

QTY	DESCRIPTION	PRICE EXC VAT
		£
		£
		£
	TOTAL GOODS VALUE EXC. VAT	£
	TOTAL DELIVERY AND INSURANCE	£
	SUB TOTAL EXC. VAT	£
	VAT	£
	TOTAL VALUE OF ORDER	£

Name:

Address:

Tel No:

Or please charge my credit card No:

ACCESS VISA & DINERS CARD WELCOME

SPECTRUM 48K : ZX81 16K SIX PART ADVENTURE



BLACK CRYSTAL THE QUEST IS ABOUT TO BEGIN

The ultimate role-playing adventure for the SPECTRUM/ZX81. You can become a warrior, elf or wizard on a quest to find and use the rings of creation: to destroy the Black Crystal and defeat the Lords of Chaos. Held within six programs lies a land of fabulous treasures and mythical monsters. Journey through the land of Beroth, explore the castle of shadows, descend into the Shaggoths lair, search for diamonds in the sea of sand but beware of sand sharks! Confront the fire demon in his temple, battle against the Lords of Chaos and win your way to the Black Crystal.

By splitting Black Crystal into six programs we can provide more variety and detail than any other adventure for the Sinclair computers.

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

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



Carnell Software Ltd. Northweylands Industrial Estate,
Molesey Road, Hergham, Surrey KT12 3PL.

Please send me: Black Crystal for my:

- Spectrum 48K..... £7.50
 ZX81 16K..... £7.50

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

NAME.....

ADDRESS.....

TRADE ENQUIRIES WELCOME

BUFFER MICRO SHOP

310 STREATHAM HIGH ROAD, LONDON SW16 6HG
Tel: 01-769 2887

Open Tues.-Sat. 10.30 am to 5.0 pm (Closed Mondays)

SOFTWARE FROM ALL THE BEST SUPPLIERS
— OVER THE COUNTER —
PLUS GROWING RANGE OF PERIPHERALS
SEE IT 'N TRY IT BEFORE YOU BUY IT
SAE appreciated for catalogue — but please specify
for which computer.

DRAGON ZX81 ZX SPECTRUM

THE WORLD'S GREATEST RANGE OF
SINCLAIR SOFTWARE
PIONEERS IN 1981 — WAY AHEAD TODAY

BBC-ACORN KEYBOARDS CASSETTES
ADD-ONS BOOKS VIC-20

NEW! — *BUFFER CLUB* for regular customers.
*Special Offers — Lectures — Foreign Trips —
Software Promotions. Ask for details of membership
on your next visit.*

MEMBER OF THE COMPUTER TRADE ASSOCIATION — YOUR FAIR DEAL
GUARANTEE

VISA — ACCESS — AMERICAN EXPRESS — DINERS CLUB
ALL CARDS WELCOME

BRIDGE SOFTWARE

SPECTROGRAPHICS

(for Sinclair Spectrum 48k)

"A complete graphics toolkit...very easy to use...
documentation clear and concise"
(*Personal Computer World*)

For Teachers For Games Enthusiasts For Artists For Everyone!
Exploits the Spectrum's superb graphics potential to the full:

- 11 graphics procedures
- Hi- and lo-res sketch pads
- 8 sizes of text
- a mini-text editor
- colour WASH and PAINT
- create your own UDG characters
- SAVE displays on tape or PRINT on ZX Printer
- RELOAD displays into your own programs

send £6.90 for cassette and manual
graphics software for ZX81 also available

send s.a.e. for our full list of games, statistics, graphics and scientific software!
Full money-back guarantee: Trade enquiries welcome



Dept , 36 Fernwood, Marple Bridge,
Stockport, Cheshire, SK6 5BE, England.

MUSHROOM MANIA

For the 16K or 48K
ORIC-1

So fast, it'll
take your
breath away!

only **£5.50**

FEATURES

- Written entirely in MACHINE CODE
- Over 50 skill levels
- Random scoring spiders
- One or Two Player Option
- Hall of Fame ● Full colour and sound
- Bonus lives every 12000 points ● Deadly PACPERSON attacks



Blast the fast moving centipede, as it snakes down towards you, in the depths of the green forest. Score points by shooting-up mushrooms and the deadly spiders. But beware of the hungry PACPERSON, which will gobble anything in its path. The higher your score rises, the faster the action becomes, until it is only a screaming blur of colour and sound.

Send cheque or P.O. for £5.50 (postage paid), stating computer type and memory size to:-

ARCADIA SOFTWARE

FREEPOST, SWANSEA, SA3 4ZZ

The Opportunity You Have
Been Waiting For To
Turn YOUR Ideas Into Money!

READ THIS!

If you, either by yourself or with a team of colleagues, have written an original game for any of the following home microcomputers

SINCLAIR SPECTRUM COMMODORE 20 or 64
BBC MODEL B TEXAS INSTRUMENTS 99-4A
DRAGON APPLE II
ORIC-1 ATARI

— then look no further.

Whether it be the best shoot em up arcade action yet devised, a fiendishly cunning adventure a challenging strategy game for two (or more) players, or just a bit of fun for the very young, we have the resources, expertise, and contacts to professionally package and market your game **WORLDWIDE**.

If we like it, we will arrange a meeting with you to offer you our very attractive terms

Send a cassette or disc copy (keep one for yourself, by registered mail for your own protection to:

MN
Megabyte Marketing

Dept 1 79 BRCDRICK RD
EASTBOURNE SUSSEX

REMEMBER time is all important—so!

CYBERGRAM GRAPHIC VIC-20 AIDS PACK

ALL YOU NEED TO DESIGN SCREEN GRAPHICS

The CYBERGRAM GRAPHIC AIDS PACK contains an assortment of fifty A4 sheets on Bond and Tracing paper, overprinted with grids carefully proportioned to the VIC screen. Designs can be accurately translated from paper to video without any of the distortion implicit when using ordinary graph paper.

VIC-20 SCREEN PLANNER* Identify all PRINT, PEEK and POKE positions on an accurate and correctly proportioned grid.

VIC-20 SCREEN MEMORY ADDRESS MAPS instantly locate all PEEK/POKE values on the screen Planner with these tracing overlays on both Standard and Expanded VICs.

VIC-20 HIGH RESOLUTION PLOTTER* each pixel individually mapped and 'CHAR' positions identified to get the best out of the Super Expander capability.

VIC-20 CHARACTER DESIGNER* invent your own graphic characters and calculate their data values rapidly with these detailed sheets.

At last you can organise your VIC-20 graphics capability with a professionally designed computer aids pack, and keep a detailed working record of the development of your program sequences.

Mail Order ONLY

GRAPHIC AIDS STANDARD PACK **£4.50** inclusive

*economical CONTINUATION PACKS (100 sheets) also available

Please make Cheques payable to CYBERGRAM DESIGNS

10 Grove House Court North Lane Leeds LS8 2NQ

Allow 28 days for delivery

UPGRADE YOUR SPECTRUM to 48k

with an EASY TO FIT DELTA-RAM KIT

SPECTRUM

1 **£33**

SPECTRUM

2 **£26**

Each kit contains step by step instructions for easy, trouble-free installation within your Spectrum case. Prices include p. & p. and V.A.T.

FREE with every order the UNIQUE DELTA CHIPCHEK Memory Diagnostic Cassette worth £3.50

All you need to do is cut out this coupon, tick the appropriate box, enclose your cheque or Access No. and we'll do the rest.

Name
Address

Postcode

Access Number

Make cheques payable to Servodata Ltd.



DELTA RESEARCH LIMITED
15 Church Street, Basingstoke, Hants RG21 1QG
Tel: 0635 45373



Eltec HOME & BUSINESS TECHNOLOGY

computers

BBC MICROCOMPUTERS Model B £399
1.2 operating system NEW BASIC

PROTECTIVE COVERS AND CARRYING CASES

Polyester Cotton Cover	£3.97
Soft PVC Cover	£4.45
Hard Carrying Case for Computer, Cables, Cass/Disc Drive	£55.20
Soft Carrying Case for Computer, Cables, Cass/Disc Drive	£23.00

JOYSTICKS AND SOFTWARE

BBC Joysticks — pair	£13.00
BEEBSTICK — Fully proportional for Computer Aided Design	£29.95
JOYSTICKS GRAPHICS — Draw and Save your own Line Diagrams	£5.75

HARDWARE

Sound Pick-Off Module (Simple to fit)	£6.95
Loudspeaker in cabinet plus cable for above pick-off	£27.95
Loudspeaker plus Amplifier for above pick-off (Blaster)	£37.50

NOW IN STOCK R.H. ELECTRONICS light pen includes software £45.94

ATPL EPROM Programmer	£138.00
ATPL EPROM UV Eraser	£55.20
MICREX X-Y Digitiser No drift, precise + software	£86.25

BOOKS

NEC 30Hr BASIC	£5.95
BASIC PROGRAMMING ON THE BBC MICRO-CRYER	£6.95

PRACTICAL PROGRAMS FOR THE BBC COMPUTER & ATOM

LET YOUR BBC COMPUTER TEACH YOU TO PROGRAM — HARTNELL	£6.45
THE BBC MICRO REVEALED — RUSHTON	£7.95
CREATIVE GRAPHICS ON THE BBC COMPUTER — ACORNSOFT	£7.50
GRAPHS AND CHARTS ON THE BBC COMPUTER — ACORNSOFT	£7.50
LISP ON THE BBC COMPUTER — ACORNSOFT	£7.50
ASSEMBLY LANGUAGE FOR THE BBC MICRO — BIRNBAUN	£8.95
30 PROGRAMS FOR THE BBC COMPUTER — EVANS	£4.95
GAMES BBC COMPUTERS PLAY — HARTNELL, GEE, JAMES	£6.95
EASY PROGRAMMING FOR YOUR BBC — DEESON	£5.95
PROGRAMMING THE BBC MICRO — THE BOOK OF LISTINGS — HARTNELL, RUSHTON	£3.75
BBC COMPUTER — USER MANUAL	£10.00

SOFTWARE FOR THE BBC COMPUTER

PROGRAM POWER KILLER GORILLA	£7.99
------------------------------	-------

NEW ACORNSOFT GAMES

COUNTDOWN TO DOOM	£9.95
STARSHIP COMMAND	£9.95
IJK SPACE INVADERS MODEL B	£7.50
IJK ATLANTIS	£7.50
IJK HYPERDRIVE	£6.50
IJK STRATOBOMER	£7.50

CLARE SOFTWARE

CLARES THE KEY	£12.95
CLARES GRAFDISK	£12.95
CLARES REPLICA	£12.95
IJK LEAP FROG	£7.50
SUPERIOR SOFTWARE GALAXIANS	£7.50
SUPERIOR SOFTWARE INVADERS	£7.50
SUPERIOR SOFTWARE SPACE FIGHTER	£7.50
SUPERIOR SOFTWARE CENTIPEDE	£7.50
SUPERIOR SOFTWARE ALIEN DROPOUT	£7.50
SUPERIOR SOFTWARE FRUIT MACHINE	£7.50
SUPERIOR SOFTWARE ROAD RUNNER	£7.50
SUPERIOR SOFTWARE FROGGER	£7.50

The above prices are VAT inclusive. Add £1.00 p&p for orders below £100.00 and £10.00 (Securicor delivery) for orders above £100.00.

Access and Barclaycard accepted on all items.



This price list supercedes all other price lists and may be amended without notice. INSURANCE & EXTENDED WARRANTY — Write for details

ELTEC COMPUTERS 217 Manningham Lane, BRADFORD BD8 7HH
Tel: (0274) 722512



HISOFT PASCAL DEV PAC



Quality ZX SPECTRUM* Software

Hisoft Pascal 4T and Hisoft DEV PAC turn the SPECTRUM into a powerful machine — ideal for those who wish to produce quality software, be it business, educational or games software. Hisoft Pascal is also available on other machines — see below.

Hisoft Pascal produces programs that run up to 100, and in some cases 1000!, times faster than the equivalent programs written in ZX BASIC. This Pascal compiler is a virtually complete implementation of Standard Pascal (Jensen/Wirth), comes complete with a 60-page manual and represents tremendous value for money.

Hisoft DEV PAC comprises a powerful assembler and a disassembler/debugger which open up the secrets of fast machine code programming on the SPECTRUM. DEV PAC contains a unique blend of advanced features that you will not find together in any other product. These include conditional assembly, front panel display of registers, single step of programs and much, much more. 'DEV PAC is most highly recommended' — Your Computer, May 1983.

PRICES: **SPECTRUM: PASCAL 4T — £25 inclusive, DEV PAC — £14 inclusive,**
PASCAL 4T for the SHARP MZ80A/K/B, NASCOM, NEWBRAIN — £35 plus VAT.



HISOFT
60 Hallam Moor
Liden Swindon
Wilts. SN3 6LS
Tel. (0793) 26616



*and others

KEYSOFT Present



THE KEY

For any ZX Spectrum

THE ULTIMATE SPECTRUM BACK-UP COPIER!

ALSO INCLUDES HEADERLESS COPIER

The Key is a 100% machine code utility which allows you to back-up your valuable software investment. Simple to use.



KEYSOFT, Dept. YC2
6 Bruce Grove
London N17 6RA

N.B. KEYSOFT advise users not to infringe the Copyright Acts.

DEALER ENQUIRIES WELCOME

Please send me "KEY"(s) @ £5.95. Total £

Name

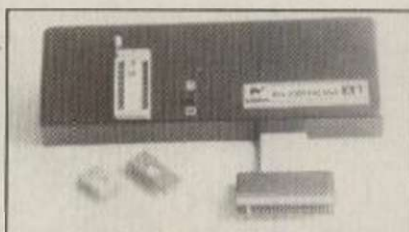
Address

YC2 Post Code

CAMEL PRODUCTS

PROMER-81

BLOPROM-81



```

STATUS | NO. SYSTEM - HEX
        | EPROM TYPE - 27128
        | RAM START ADDR - 0000
        | EPROM ST. ADDR - 0000
        | JOB LENGTH - 0000
        | TABS - CHECK
    
```

WHICH TASK DO YOU WISH TO DO

M) CHECK THAT EPROM IS ELEGN

X) READ THE CONTENTS OF EPROM INTO RAM

V) BLCK AN EPROM WITH DATA FROM RAM

Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM

R TO QUIT.....R TO RESTART

FAST CODES AVAILABLE:

D H FOR KXVZ

A uniquely sophisticated EPROM PROGRAMMER as used by various labs. incl. Sinclair Research.

BLOPROM-81

Eprom programmer for the 2516, 27XX single supply families. Yes, even the 27128 from Intel. check, Read, Program + 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-81. No Personality Cards or other additions, just a ZX81. Several inbuilt: safety features. On-board Vpp generation. 28 pin ZIF socket. Cabled connector and extender plug. ABS case.

Note: Can provide up to 36 inputs or 40 outputs as an I/O **£79.95**

★ **MEMIC-81.2** Faster than a Floppy. Easier than an EPROM.

A 4K CMOS memory and Lithium battery unit. Saves programmes upto 10 years without external power. Plug it into the ZX81 and flick a switch and your program is ready for retrieval. A simple PRINT USR . . . entry loads your program into RAM. Resides in 8-12K but can be moved to 12-16K. Comprehensive notes + example **£29.95**



★ **CRAMIC 81** Banish the Whir, Click and Try again of ZX81 Systems.

16K CMOS RAM and Lithium battery in cabled ABS case, with expansion adaptor. Powers off the ZX81 when running. Resides in 13-32K. Can be used like an ordinary 16K but can also retain program upto 10 years. Ingenious hardware/software allows swapping of RAMs from program **£79.95**

★ **PIO-SP** An 8 + 8 line parallel Input/Output card which lets the Spectrum communicate with external systems. Connections on 15 pin sockets. Mating plugs supplied **£18.50**

★ **PIO-81** As PIO-SP but for the ZX81 **£13.00**

★ **DREAM-81** Full 64K Rampack with link options to disable 0-8-16K. Plus a 28 pin EPROM socket for 2716/2732/2764 and even the latest 27128 from Intel. Fast/slow Eprom option. Professionally built and tested. In an ABS case with an LED indicator **£69.95**

★ **PROMER-81** At last! A low cost reliable programmer for 2516/32, 2716/32 EPROMS. This is the solution to using EPROMs instead of tape. Requires 4xPP3 batteries for a regulated 25 volts. Remarkably prices at **£19.95**

★ **ROM-81** Provides two 24 pin sockets for up to 8K of EPROM memory in the 8-16K area. Eproms are permanent memory which require programmers (see below) to write to them. Can use 2516/32 or 2716/32 **£14.95**

PRINTER/MONITOR ACCESSORIES



MSB Monitor Stand for BBC micro. Sits over the Beeb 17" x 12" x 3.75" P+P **£3.50** **£19.95**

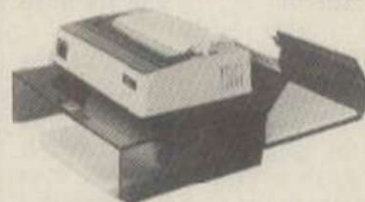
PSS Standard printer stands for OKI, Epson etc. 15" x 12" x 4.5" P+P **£3.50** **£16.95**

PSL Large model 17" x 14.5" x 3.75" P+P **£3.50** **£19.95**

PSC-2 for Epson MX-100 etc. 21" x 14" x 3.75 P+P **£3.50** **£22.95**

Custom Printer Stands for larger printers **P.O.A**

POT Printer Output Tray for 11" fanfold paper P+P **£3.50** **£16.95**



PRINTER STANDS



UK, VAT extra. No VAT on exports P+PUK, Free Europe + 5% — Overseas + 10%. UK & Worldwide dealerships available.

Cambridge Microelectronics Ltd, One Milton Rd, Cambridge CB4 1UY Tel (0223) 314 814

PARFIT GENTIL KNIGHT

Here is my reaction to your May editorial: Sir Clive won't be starving this Christmas.

I am sure I speak for many home computer users when I say how outraged I am when I hear the money difference between the cost of the machine and the actual shop price.

I lately heard that the Spectrum cost £15.00 to make. Please tell Sir Clive that if £15.00 is subtracted from £99.95 you do not get zero.

We hear excuses that the market can only take so much, but surely it is in the consumers' and, as is so painfully obvious, makers' interest to have their products as low-priced as possible. Surely it makes sense — the lower the price, the more you sell. If Sinclair was really trying to bring home computing to everyone's fingertips, then he would bring down the price. I end with a call to Mr Millionaire Sinclair — cut Spectrum prices now!

John M Thorne, Slough, Buckinghamshire.



SNAKE LETTER

The June issue of *Your Computer* contained my article on Snakes and Ladders. The program was written for a BBC with a 0.1 OS. Parts of it will not work properly if you have a 1.2 OS. Some modifications need to be made.

Scan through the program putting VDU4 and VDU5 either side of any Printtab statements. Put VDU4 just before Printtab and VDU5 after the first colon after the Printtab statement. For example, on line 1000, put

```

:VDU4
after      PROCL(29)
and
          VDU5:
before    PROCANS
    
```

Also change line 190 so the last character on the line becomes a 0 rather than a 7. Do the same to line 880.

Peter Donn,
Upminster,
Essex.

USER FRIENDLY

Congratulations to Mr Taylor for his most useful and effective ZX-81 quick-load program in June *Your Computer*. Loading programs in this way is unfortunately none too user-friendly, what with swapping tapes and using machine-code calls, especially if the programs are to be used by other people.

This can be overcome in the following manner. When the program to be saved is in the computer and the quick-load code entered at line 0, then Save and Verify it as described in the article. Remove this tape and mark it — or confusion will ensue — and replace it with a taped version of the quick-load machine code. Load this into the computer and add the lines:

```
1 Save "name"
```

2 RAND USR 16607

Find a clean tape onto which the final recording is to be made, start recording and Run the program. Watch the screen and immediately the diagonal "searching for program" line appears turn off the recorder and then press Break. Remove and mark this tape: do not rewind or forward it. Put the tape containing the main program back in, rewind and load at high speed using

RAND USR 16607

Now go back to the other tape and save this program at high speed by typing

RAND USR 16514

without

NEWLINE

start recording and immediately Newline. This should be done from within the program if Autorun is required.

Thereafter when you want to load the program, rewind and Load "name". Note that this effectively restores the ability to Load by name. The quick-load program then loads at slow speed and autoruns, loading at high speed the most program on the tape, that is, the main program.

Using Verify requires a little more effort as the start of the main program must be found first, either using the tape counter: or using

LOAD "X"

where X is not the program name and then watching for the end of the quick-load program on the screen.

This method of saving does sound rather contorted, but in fact is very quick and easy to do and saves a lot of trouble when loading programs at a later date.

It is not true, as it is stated in the article, that machine code in Rems cannot be accepted by quick load. It will, however, be necessary to change a Rem at line 1 to line 2 using Edit before adding the quick-load Rem statement, and calls to machine code must be addressed 262 bytes further on, for example, a call

to a line 1 Rem will now be Rand USR 16776.

Line 30 in listing 4 should read "20 POKE 32512+A,PEEK (16514+A).

W Sturges,
Lancaster.

CHARACTER SET

I feel I should point out an error in Tim Langdell's article in the June issue of *Your Computer*, about the Oric and Spectrum Graphics.

Mr Langdell is perfectly correct when he says that the Oric has two completely re-definable character sets, but the actual number of characters is only 176, not 512, about one third of the number which he suggests. This is mainly because the character sets are only 128 characters long, the most significant list of the code on the screen being used as an indication of whether the character should be displayed in normal or inverted colours, so that the code left for determining the character is only seven bits long.

Using the eighth bit to invert the colour in which the character is displayed means that up to four colours may be displayed at one time

using only one foreground and one background colour-defining attribute.

These colour-defining attributes and the other codes which flash text, etc, also reduce the number of characters in the character sets as they have to have codes too, in fact, they use the first 32 codes in both character sets.

There is yet a further complication; as this would mean that each character set should contain 96 characters, that is 32-127, but the second only contains 80. The second or alternate character set, which contains a lep-sided version of teletext graphics, overlaps the screen memory by 128 bytes — 16 characters — and although the mechanism exists to display these characters they only appear as random sets of dots because the machine defines them with the same bit of RAM which it uses for the first five and an eighth lines of the screen — in both Text and hi-res modes.

Thus, in practice, there are only 176 character definitions held in RAM: codes 32-127 in the first set and 32-111 in the second.

A J Edgington,
Norwich,
Norfolk.

BUGBLATTER FOR THE ATARI

Perhaps David Andrew — Letters, June *Your Computer* — has found bugs in assembler routines, but there are very few bugs in Atari Basic. Most are in the operating system. Here are all the ones I have found or read about.

The printer and cassette use the same buffer IOCB# 7 — see page 23 of the manual. If this is not clear it sometimes spoils a Csave, so you can not Cload your program. The solution is to do an LPrint before each Csave. If you do not have a printer, this just produces a harmless error message, but it does clear the buffer.

Basic sometimes hangs during program editing. I do not know why, and I do not know of a cure. You just have to Save things often. It has only happened to me a couple of times in nearly two years. This bug has apparently been fixed in the Revision B operating system now used in the U.S.A., but all U.K. machines use Revision A, and will never be supplied with Revision B. According to Compute!'s book *Mapping the Atari*, Peek (58383) is supposed to give 56 for A and 0 for B. I do not get either number.

Using Input without an argument causes my 800 to lock up. Just type Input in direct mode and see.

Trying to enter lines longer than three screen lines causes problems as the screen editor gives the overflow to Basic as the next line.

The unary minus of zero, that is Print -0, prints garbage. If you want to print an X that is likely to be -0 then use Print 0-X. Print 0-0 works just fine.

You can use reserved words as variable names. The catch is, you cannot do it with words that start with Not. Using Note as a musical variable with Chord can turn out as Not E.

Another cassette file problem: you cannot write a file smaller than 128 bytes to cassette then turn off the cassette motor without producing garbage. Then if you read back more than 128 bytes, the Atari uses the bottom part of Page 6 to RAM. It was apparently designed that way. Solution: output a dummy file of 128 bytes of blanks before your data, then throw it away on Input. Solution to Page 6 problem: do not use 0600 to 067F for machine language routines.

Also, you can Dimension arrays to be larger than memory without getting an error message. I am not sure if this is a bug or a feature. Any other offers?

Jack Schofield, London W3.

ROTATOR

Although the 16K version of the Spectrum 3D rotator in the July issue is error-free, the 48K version needs a few corrections. In the conversion table for the hex dump 7B should be changed to F& and not 7C as given. In the Basic program 31721 and 63729 in lines 2060 and 4020 should read 63465 and 63279 respectively.

It is not necessary to use the hex loader provided — any loader will do — but you must run lines 100-150 to create the Sine table. Remember also to set the variable Addr using the Pokes on page 82.

L. Schendler,
Bayswater,
London.

ORIC PICTURES

With reference to the article on Oric graphics in the June 1983 issue of *Your Computer*, the illustrated programs and the paragraph headed "Speed and smoothness" may be giving some less experienced users some confusion. First of all line 200 in the program Oric 2 is strange. I presume that the line should read

```
200 INK 1
```

which would turn on red characters. The program for the Spectrum with which this is compared omits this step.

It is entirely feasible to get high-resolution movement on the Oric using the Char command. I think this is what the writer was after. The following is a short program that gives smooth horizontal movement:

```
10 HIRES
20 FOR N = 1 to 230
30 CURSET N, 100, 0
40 CHAR 62, 0, 1
50 CURMOV -1, 0, 0
60 CHAR 62, 0, 0
70 NEXT
```

A similar technique will give vertical movement. The movement is quite slow — but steady — at this resolution. The screen is crossed in about 12 seconds. Using a Step in Line 20 and a few other alterations the movement can be made more coarse and faster.

David Simfield,
Heacham,
Norfolk.

HOTH STUFF

Unfortunately, I left out the vital key instructions in the Star Wars Battle on Hoth game published in the July issue of *Your Computer*. They are as follows:

```
I to Q — fire
Q to P — increase rate of climb
A to Enter — decrease rate of climb
Shift to Space — turn around
Shift to V — turn left
B to space — turn right
```

Also, you should insert Poke A,B, after Print A,B in the machine code and character set loaders.

Duncan Kinnaird,
Ginton,
Peterborough.

TENSE, NERVOUS, IRRITABLE every time you use your micro? You could be suffering from bad computer design. It is a malaise that is on the increase as more and more computers are rushed on to the market with apparently less and less time spent on details.

Fortunately it is never fatal and rarely worse than the infamous ZX-81 RAMPack wobble — the nastiest outbreak of recent years which left emotional scars on a whole generation of computer enthusiasts.

Poor design takes two forms: badly-conceived ideas, and well-conceived ideas badly executed. The plug on the new Comx 35 is a badly-conceived idea. You have to take your pick between not running your micro because you have not plugged it in and not running it because you have. The generously-wide Comx plug ensures that the on switch at the wall socket is always off.

The Oric's reset button is a well-conceived idea badly executed — or rather badly located. To reset, the energetic Oric owner has to flip the machine over and drive something long and thin such as a pencil into a small hole. In practice it is much easier to turn the micro off and then on again at the wall — an option not open to the Comx user.

Sometimes it is a little difficult to decide into which of the two categories a particular short-coming falls. But there is always a difference between bad design and a manufacturer building down to a price.

At the moment you cannot expect a micro which costs less than £100 to have a proper keyboard. In most cases it is a feature that the machine's maker had to choose to keep the price as low as possible. It

could only be counted as bad design if, say, the keys were to stick down in use.

Poor keyboard design initially attracts more criticism than anything else. As the user's interface with the computer a keyboard's failings are more conspicuous and invariably the first to be discovered — even though they may be minor compared with any sins the designer may have committed in the privacy of the micro's inner workings.

The Spectrum's lack of full-sized space-bar, reset button and uncomfortable angle preoccupy its critics. Some even object to what they see as its excessive use of keywords which are supposed to make typing commands simpler. The high degree of coordination needed to type Ink on the Spectrum involves four key-strokes as opposed to three on the more conventional Oric.

No keyboard feedback is also cited as a problem. Even if the Oric's beep is ear-piercing at least you know you have made contact with a key. But real keyboards do not escape scot-free. Those new to the Dragon may find that a carefully entered program can be made to dematerialise at the touch of the clear button position next to Return.

A good deal of what is seen as bad design may be the result of major manufacturing decisions — unusual choice of CPU, or deciding that interfaces would push the price too high. But so much could be corrected very easily: lack of scrolling on the Lynx, the ZX-81 overheating, the Spectrum's short video leads.

A few pennies or a few more hours of careful thought spent at the design stage could stop millions of us being driven mad by trivial faults.

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.

Wanted: We want program checkers to assess readers' programs. If you can help us please write to Simon Beesley, *Your Computer*, stating which machine you have expertise on.

Editor

TOBY WOLPE

Assistant Editor

MEIRION JONES

Staff Writer

SIMON BEESLEY

Sub-editor

PAUL BOND

Editorial Secretary

LYNN COWLING

Editorial: 01-661 3144

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

Subscriptions: U.K. £9 for 12 issues.

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 EIPRESG. ISSN 0263-0885. Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Instep Ltd, London EC1.

ABC

Advertisement Manager

PHILIP KIRBY 01-661 3127

Assistant Advertisement Manager

PETER RICE 01-661 8441

Advertisement Executives

BILL ARDLEY 01-661 8484

NIGEL BORRELL 01-661 3127

Midlands Office

VIC SHERET 021-356 4838

Northern Office

RON SOUTHALL 061-872 8861

Advertisement Secretary

JEANETTE MACKRELL

Classified

CLAIRE NOTLEY 01-661 3036

Publishing Director

CHRIS HIPWELL

© Business Press International Ltd 1983



Pete Shelley

From punk to programming

FIRST the software industry started to behave like the music business, fancy packaging, star programmers and the like. Then the record companies, like Virgin, K-tel and EMI started to sell programs.

Now with a wave of pop stars who think they are programmers, and vice versa the borderline between the two industries has broken down.

Seventies pop star Steve Hillage now writes musical effects for Virgin's games for the Spectrum. Meanwhile new wave hero and former Buzzcocks lead singer Pete Shelley whose first single *Spiral Scratch* spent a million punks pogoing into the streets in 1977 is now a Spectrum enthusiast.

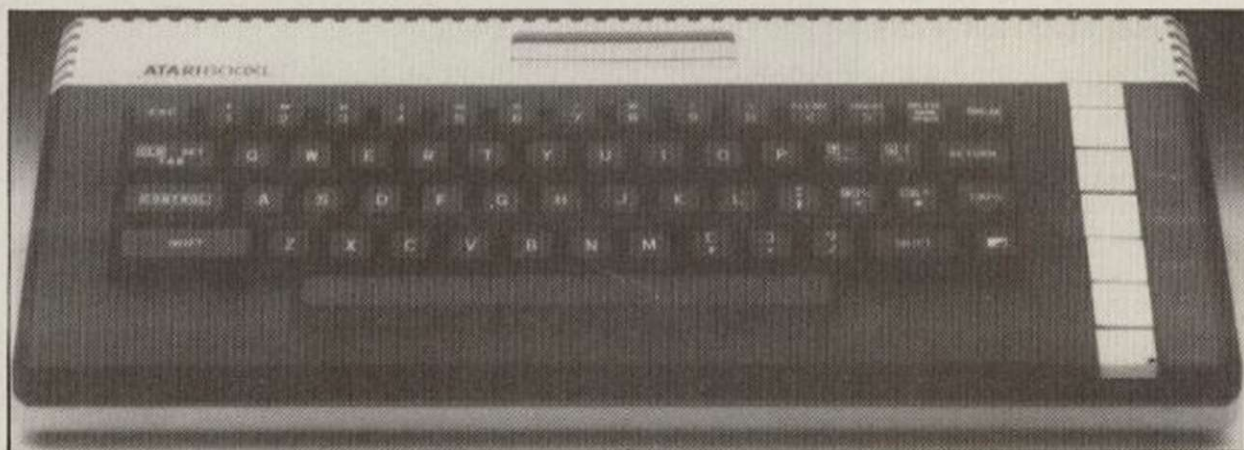
His current top-30 album *XL-1* includes a track for the 48K Spectrum which allows you to display the lyrics for the songs on screen. A trap prevents you playing the track by accident at full blast over a hi-fi system.

You have to specifically lift the arm onto the Spectrum track which you then transfer to tape before loading the machine code with *Load""Code*. This technique was pioneered by *Your Computer* in June 1982 with a give-away flexidisc featuring an *Othello* game for the ZX-81. We repeated the idea in December 1982 with games for the ZX-81, Spectrum and Vic-20, all on a flexidisc.

Then in May of this year EMI released a single by Chris Sievey called *Camouflage* which was available on record or cassette and which had a track for the ZX-81 which displayed lyrics and simple graphics as well as a game.

Pete Shelley's album was released in June after he and a programmer called Joey had spent five months experimenting with ideas for using a Spectrum display to match his music.

Atari unleashes 600 XL, 800XL, and video game upgrade kit



DESPITE MASSIVE advertising and great games cartridges Atari has never sold many micros in Britain. The brash American styling of the home computer range, the tacky keyboard of the 400 and general overpricing have all helped to dissuade British buyers.

Now Atari is launching a massive Autumn offensive on two fronts in Britain. The number of new machines is staggering — two home computers, a computer upgrade for the games machine, three printers and a host of peripherals. At the same time Atari is converting its software to run on rival machines, the Spectrum, Vic-20 and Commodore 64 amongst others.

The two new computers, 600XL and 800XL, both have typewriter-quality keyboards, are 6502-based

and will run all the old Atari computer software. They both use a 24K ROM including Atari Basic which has particularly good graphics and sound commands. Sound allows you to control four voices through a 3½ octave range. The 62 keys include 29 graphics keys, four function keys, and a Help! key in case you panic. The 600XL and

Above: Atari's new 600 XL.

Below: the Graduate which turns a game machine into a computer.



800XL are essentially up-dates of the 400 and 800 in smart new cases. The 600XL has 16K RAM and the 800XL has 64K. Both should go on sale in September.

The Graduate is Atari's catchy name for the video games machine upgrade which will turn the VCS 1200 into a computer. The new printers range from a cheap four colour printer, the 1020 on the lines of the Sharp design which has been adopted by Tandy and Oric amongst others, to the better quality 1020 printer.

On the software side Atari is making *Pac-Man*, *Centipede* and *Defender* available on the Texas TI-99/4, Vic-20, and Commodore 64. More titles will soon follow and will also be converted for the Spectrum.

Microsoft sets standard for clone computers to run same games

IF MICROSOFT has its way you will soon be able to run the same software on a range of different new machines.

The American company has proposed that manufacturers adopt its MSX standard for 8-bit machines in the games-orientated market. MSX prescribes that all machines should include the same essential set of hardware and software features —

a Z-80 processor, a TI9918 video display processor, input/output ports, joystick, ROM cartridge and cassette interfaces, and Microsoft's own 32K extended Basic interpreter.

So far the MSX standard has been endorsed by 14 Japanese computer firms including NEC and Sony, and one American company Spectravideo. Microsoft is now trying to interest British companies.

Obviously widespread acceptance of the standard would create an enormous mass market for games producers but Microsoft's proposals might be too late for the home market. For instance Nigel Searle Sinclair's managing director believes that standardisation may have to wait for the next generation of home computers perhaps based on 16-bit or even 32-bit processors.

Arcade robots and software

ANOTHER LEADING arcade game manufacturer, Atlas Coin, is planning to move into the home computer market with a talking robot and a range of games for the most popular micros. Atlasoft will concentrate on retailing cassettes in record and video stores while a sophisticated micro robot is scheduled for release in November. It will be equipped with a speech synthesiser and will respond to spoken commands.

Microtech will sell MSX backers Spectravideo's £300 80-K SV-328 and £200 32K SV-318 in Britain soon.



Warning — home micros could cause Third World War to erupt

WARGAMES is a new movie featuring a young computer-nerd who accidentally links his home micro into the United States Defense Department's wargames computer — JOSHUA — causing the world to teeter on the brink of nuclear holocaust.

Improbable? Maybe. But when you consider that teenagers at one Manhattan high school reportedly succeeded in writing a program that allowed them to dial a Canadian computer network and take virtual control of a well-known soft drinks manufacturer's computer no great suspension of disbelief is required to make *Wargames* one of the most spectacular — but credible — films of 1983.

The central character — David Lightman, played by Mathew Broderick — is just an average American high-school kid in Seattle, Washington, except that he has developed the art of networking — not always legally — to a remarkable level of refinement.

Like a radio ham, he can talk to other people like himself through vast computer communications networks. But there is a more interactive angle to his probing. He hi-jacks the software for new video games before they appear on the market, purely for his own amusement, of course. And by tapping into the high-school network he can boost his own grades.

He is hitch-hiking across the networks one day when he encounters an unidentified computer system. Under the impression that he is playing a harmless game he unwittingly challenges the government machine to a game of nuclear war — for real.

When the nickel finally drops, David cannot do anything about it. Both the USSR and the USA believe that an attempt to launch a pre-emptive nuclear strike is in progress



A schoolkid with a homecomputer nearly causes World War III in *Wargames*. Here he is altering a friend's school grades by computer.

against them. David is the only one who can stop the war, with a little help from disillusioned computer genius Professor Stephen Falken, played by John Wood.

Wargames is about getting in over one's head and Walter Parkes, who wrote the screenplay with Lawrence Lasker, is well aware of the danger

of this. "Particularly in this area, where kids understand computers a lot better than their parents. There is a whole subculture of kids who like to break in to discover what the world is like — from their homes."

So be careful with that modem unless you want an SS-20 missile landing in the back yard.

Chess champion ready to take on any rival Spectrum masters.

INTELLIGENT SOFTWARE is confident that its *Cyrus Chess* program is the strongest Spectrum chess program around — so confident, in fact, that it has issued a £5,000 challenge to other commercially-available chess

programs for the Spectrum. The terms of the challenge are that the program should play six games with *Cyrus* under tournament conditions, for a £5,000 stake.

So far the offer has found no takers. One leading software company showed interest but withdrew when it discovered it would have to commit £5,000 of its own.

The challenge only holds for a month or two and only to programs which are presently available. As Intelligent Software's David Levy, himself a chess master, points out it would not be difficult to analyse *Cyrus's* game and design a program specifically to beat it.

Cyrus Chess is a past winner of the European Microcomputer Chess Championship. The chess-playing code takes up just 8K while the rest of the program is used to provide user-friendly features such as a demonstration option.

Oric printer special offer

HOW MUCH would you pay for a 48K computer, a four-colour printer, and all the leads you might need to connect them? Oric now offers the cheapest deal around — less than £270, following price cuts and a voucher offer. The 48K Oric has had £30 knocked off the price to bring it to £139.95. A free voucher with the Oric entitles you to a £40 discount on Oric's £159 Sharp style printer. After attempts to sell the 16K Oric for £125 failed the price is returning to £99.95. Two further peripherals for the Oric, a disc drive and a modem, are due to arrive in September.

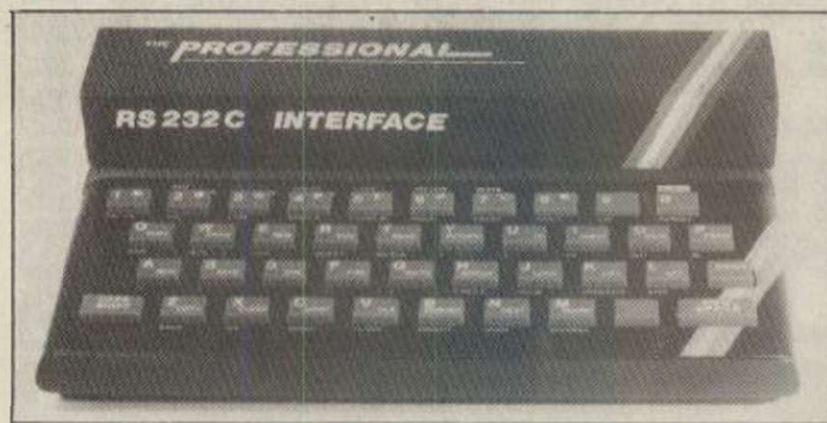
Commodore 64 price cut

COMMODORE has substantially reduced the price of the CBM-64. Previously sold for £345 its new recommended retail price is £243 with some dealers preparing to sell it for around £200. Price reductions are expected to follow for the Commodore disc drive and printer making it possible to buy a complete system for around £600.

The company claims to have already sold 450,000 units in the USA where it can be picked up for as little as \$199.

It may look like an intelligent vacuum cleaner but the Edinburgh Turtle has ready proved itself as a way of teaching young children the ideas of programming. Up till now there was only one thing wrong with it — the price. Now it has been cut from £400 to £190 with a special offer of £175 during the Summer holidays.

An Israeli company has developed an RS-232 interface for the Spectrum which will shortly be available in this country for around £50. The operational software is supplied on cassette and allows the user to select baud rates up to 19,200 baud. Details from CT Comtrade, Tel-Aviv, Israel.



GREAT NEW DEALS FROM MICRO POWER

- *SPACIOUS SHOWROOM OPEN MON. to SAT.
- *FRIENDLY AND HELPFUL STAFF
- *EXPERT ASSISTANCE ALWAYS ON HAND
- *GOOD RANGE OF COMPUTER BOOKS
- *AFTER SALES TECHNICAL BACK-UP and SUPPORT

BBC MICRO

Model	£325.00
Model A (32K)	£349.00
Model B	£399.00
Memory Upgrade	£25.00
Full Upgrade	£75.00
Joysticks (pair)	£13.00
Single Disk Drive	£265.00
Disk Interface (fitted)	£119.00
14 inch Colour Monitor	£309.00
20 inch Colour Monitor	£343.85

ACORN SOFTWARE PROGRAMS (phone for availability)

ACORN ATOM

MICRO POWER COLOUR BOARD	£31.60
Single Disk Drive (incl. FREE buffer kit)	£343.85
ATOMCALC ROM	£39.10
WORK PROCESSOR ROM	£29.90
FLOATING POINT ROM	£23.00
ROM Selector Board	£22.40
Additional BASIC ROM	£16.60
Programmer's TOOLBOX	£20.10
SUPER TOOLBOX	£16.60
M/C CODE MONITOR/DISASSEMBLER	£16.60

PRINTERS

EPSON FX-80	£459.00
EPSON RX-80	£342.00
SEIKOSHA GP 100A	£239.00
Printer Leads (BBC/ATOM/DRAGON)	£15.50

BOOKS

Assembly Language Programming for the BBC Micro	£8.95
BBC Micro - Instant Machine Code	£7.95
BBC Micro Revealed	£7.95
Basic Programming on the BBC Micro	£5.95
Let Your BBC Micro Teach You to Program	£6.45
NEC '30 Hour BASIC'	£5.95
Practical Programs for the BBC Micro and Acorn Atom	£5.95
Getting Acquainted with your Acorn Atom	£6.45
39 Tested Programs for the Acorn Atom	£6.45
Atom Magic Book	£5.50

The Colourful **DRAGON 32**

THE FAMILY COMPUTER TO FIRE YOUR IMAGINATION

KEY FEATURES

- **32K RAM as Standard, Expandable to 64K
- **Display:
 - 9 colours available.
 - 5 different resolutions from 16 x 32 to 256 x 192.
- **Extended MICROSOFT Colour Basic as Standard.
 - Advanced graphics commands.
 - Advanced Sound
 - Full Editing—insert, delete, amend.
- **Professional Typewriter Keyboard
- **FREE 160 page 'BASIC' training manual.
- **Connections for Joysticks, Printer, Cartridges and Cassette.

NOW ONLY £199.50 inc. V.A.T.

MICRO POWER LTD.
Dept. CT 7
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE
Tel: (0532) 683186
or 696343

Carriage FREE on cash/cheque orders over £100. All prices inclusive of V.A.T.

CARTRIDGES

Chess
Ghost Attack

~~£24.95~~
£15.95

Berserk
Astroblast
Meteoroids
Starship Chameleon
Cave Hunter

~~£19.95~~
£12.95

CASSETTES

Dragon Selection 1
Dragon Selection 2
Quest
Graphic Animator
Computavoice
Calixto Island
Black Sancturp
Dragon Mountain

~~£7.95~~
£4.95

DRAGON SOFTWARE PRICES SLASHED!



YOUR COMPUTER TOP 20

Game	Company	Machine
<input type="checkbox"/> Arcadia	Imagine	Vic-20
<input type="checkbox"/> Black Crystal	Carnell Software	ZX-81
<input type="checkbox"/> Centipede	Superior Software	BBC
<input type="checkbox"/> Donkey King	Microdeal	Dragon
<input type="checkbox"/> Flight Simulation	Psion	ZX-81
<input type="checkbox"/> Flight Simulation	Psion	Spectrum
<input type="checkbox"/> Jet-Pac	Ultimate	Spectrum
<input type="checkbox"/> Matrix	Llamasoft	Vic-20
<input type="checkbox"/> 3D Monster Maze	J K Greye	ZX-81
<input type="checkbox"/> Necro- mancer	Synapse	Atari
<input type="checkbox"/> Penetrator	Melbourne House	Spectrum
<input type="checkbox"/> Pimania	Autota	Spectrum
<input type="checkbox"/> Q S Scramble	Quicksilva	ZX-81
<input type="checkbox"/> Rocket Raid	Acomsoft	BBC
<input type="checkbox"/> Snapper	Acomsoft	BBC
<input type="checkbox"/> Space Raiders	Psion	ZX-81
<input type="checkbox"/> Telewriter	Microdeal	Dragon
<input type="checkbox"/> The King	Microdeal	Dragon
<input type="checkbox"/> Transyl- vanian Tower	Richard Shepperd	Spectrum
<input type="checkbox"/> Zaxxon	Datasoft	Atari

Zoom is certainly the best arcade game Imagine has produced and is perhaps the most convincing shoot-em-up program yet written for the Spectrum. You have to shoot down waves of attacking planes as they bank and dive towards you. If you can clear four complete waves then you have to take on tanks and finally you have to fly over the ocean to face further hazards. Zoom has a very different appeal from Molar Maul which was Zoom author John Gibson's first program for Imagine but it should be even more successful.

Smile please for the Microdrive — watch for the ZX-83 out West.



SINCLAIR is getting his skates on — already the letters are in the post to the first 1,000 people who bought Spectrums asking them if they want

Plenty to smile about, now that the Microdrive is working. Sinclair researchers discuss plans for a new technology center.

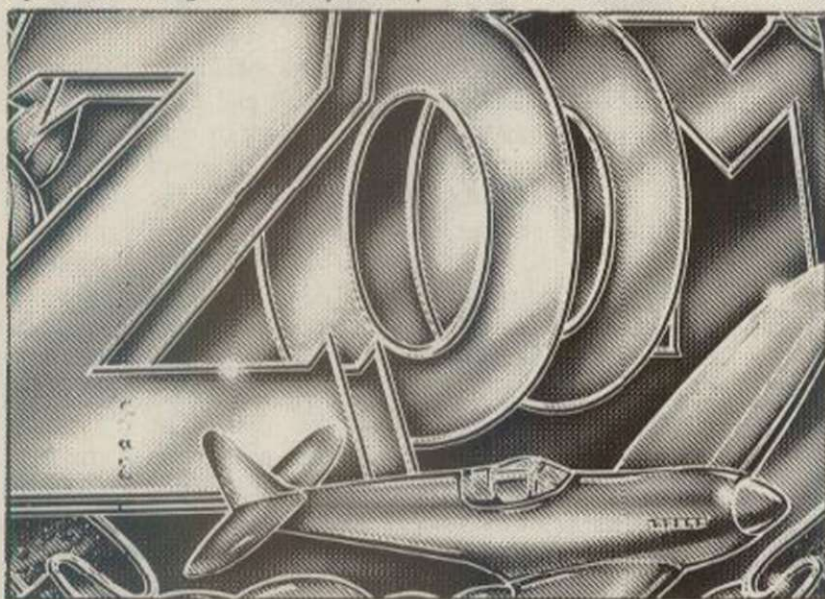
to buy the fabled Microdrive just 15 months after Clive announced it was

"coming soon". Now with the launch of the Timex Sinclair 2000 in America this month ZX-83 fever is mounting — and the latest Timex Sinclair 2000 specification for the American market shows some interesting deviations from standard Spectrum design.

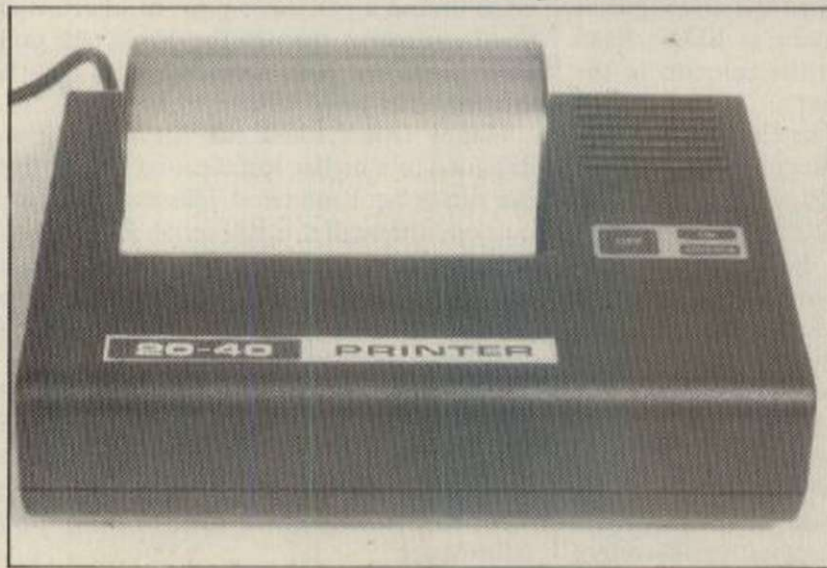
The much-vaunted stringy-floppy, otherwise known as the Microdrive made what would appear to have been a somewhat premature entrance into the spotlight at the Spectrum launch in April 1982, since then it has been waiting breathlessly in the wings for production problems to be resolved.

Each drive costs £40 for up to 100K memory storage; it will be unusable without the £30 ZX expansion module which contains a Microdrive controller, an RS-232 interface and provides facilities for local area networking. Meanwhile in the U.S.A. the Timex TS-2000 has several features which are expected to appear on the ZX-83. The keyboard is much better than the Spectrum — with a full size space bar. Sound too is much improved. The machine has a built-in loudspeaker with a range of 10 octaves and 130 semi-tones plus two industry-standard joy-stick ports.

The TS-2000 takes a leaf out of the books of other leading U.S. manufacturers like Texas and Commodore by including a mini-cartridge facility. Sinclair has already admitted that he is producing a cartridge adaptor for the Spectrum and his next machine will have a built-in cartridge socket.



The improved thermal printer which is used with the Timex versions of the ZX-81 and Spectrum in America will now be sold here as the Alphacom 32. It offers the same facilities as the Sinclair printer COPY, LLIST, LPRINT but prints on 4.5in. wide paper and at a rate of two lines per second. Its print quality is claimed to be superior to the ZX printer's while replacement rolls are cheaper at £1 each. The printer which plugs directly into the ZX-81 and Spectrum £99.95 inclusive of VAT, postage and packing. It is available in the shops or by mail order from Dean Electronics, Glendale Park, Fernbank Road, Asoct, Berkshire.



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.

QUESTIONS How do you save space?

"How can one devise ways of making the most economical use of memory"

MOST VERSIONS of Basic store keywords such as If or Goto in the same way — as one-byte codes, usually known as tokens. But the way in which variables, line numbers and floating point numbers are stored varies from machine to machine. If you understand how your Basic stores its program lines and variables you can often find more economical ways of doing things.

Sinclair Basic, in particular, uses a rather complicated method for storing floating point numbers and considerable space savings can sometimes be made by using character strings instead. For example, on the ZX-81, the line

```
10 LET X=4
```

consumes 15 bytes while the alternative

```
10 LET X=VAL "4"
```

only takes up 12 bytes.

Similarly, on the Spectrum, numeric variables consume less memory than numeric literals. If you are short of space it is a good idea to assign 0 and 1 to single letter variables at the beginning of the program and substitute these variables for the numbers 0 and 1 wherever they occur alone in the program. In a long program this technique can save several hundred bytes, at least. For example:

```
FOR n=L to L+L
```

where L=1 saves 7 bytes over

```
FOR n=1 to 2
```

These techniques are specific to Sinclair Basic but it is easy enough to discover how to exploit the quirks of other Basic interpreters. You can investigate how much memory a line consumes by using the memory-free function — FRE (0) on the Vic and Oric, MEM on the Dragon.

Dragon and Vic owners, for example, will discover that renumbering a program in steps of one reduces space substantially — low line numbers obviously consume less memory than high ones. But on the BBC line numbers both at the beginning of a line and after Gotos or Gosubs take up the same amount of memory whether they are large or small.

Yet another saving is to remove spaces between keywords. The Sinclair Basic interpreter does not register spaces although it inserts them in the screen listing. Other Basics, however, will allow almost all the text on a program line to be packed together.

Finally, you may find that you are not short of memory after all. Try running this two line program:

```
10 GOSUB 20
```

```
20 GOSUB 10
```

You should get an Out of memory message. The problem here is that when the interpreter performs a Gosub or a Proc instruction it stores the address it must return to on the Basic stack — in RAM. When the program returns from a subroutine the address is removed from the stack. If your program contains an endless loop of subroutine calls without returning you will find the stack gobbles up RAM very rapidly.



STORAGE

ALL COMPUTER SYSTEMS must use some form of storage device to hold programs and data. This storage may be internal memory or may be an external cassette deck or disc. The size of the memory is described by quoting the number of memory locations — bytes — present in K such as 16K, 32K or 64K. Random Access Memory, RAM, is always present and the most important point about this is that its contents can be easily changed.

It is therefore most useful for temporary storage of information by the user. The disadvantage of RAM is that it will only retain the information as long as the power is turned on. One solution to this problem is to use CMOS RAM chips which have only a low power requirement and can therefore be kept running with batteries when the mains power is off. At the other extreme is ROM, Read Only Memory, in which the contents of the memory locations are fixed.

These contents cannot be changed but they are not lost when the system is turned off, so that this type of storage is useful for containing operating systems and languages. In most computers the Basic interpreter is stored in ROM. In a position between RAM and ROM lies the EPROM, Erasable Programmable Read Only Memory, which will retain information on power down, but can be wiped clean by exposure to strong UV light and then the locations refilled. EPROMs are particularly useful for development work, as, if bugs are found they can be removed. The early versions of new computers therefore

often use EPROMs instead of ROM.

They are also used when only small numbers of fixed memory chips are needed, such as for an add-on facility, as it is cheaper to program a few EPROMs than to make a small number of special ROM chips. The most common method of long-term storage in the home computer field is the cassette tape. The computer converts the contents of the memory locations to an audio tone which can be recorded on a domestic tape recorder.

There are two problems with this system, the first being that transfer of data must be relatively slow if the information is not to be corrupted. The rate of transfer is described by the baud rate, the higher the number the faster the transfer. The second problem is that if you want to find a particular piece of information you must search through the whole tape until you find it, as the information can only be searched in a serial fashion.

Floppy tape systems still use tape but are designed to a higher specification so that they can run at fast baud rates. This makes transfer quicker, although it is still serial. Floppy discs are more expensive but information is stored and retrieved very quickly, and access to the disc can be random, so that you can jump straight to the information you need.

On the simplest disc system there are 40 tracks on each disc, single density, but it is possible to double this with appropriate hardware and software to give double-density 80-track discs which can hold twice as much information.

STRUCTURE

A PROGRAM THAT is structured is easy to follow and logical. That is not strictly true as the flow has to be logical but there is no real reason why it should be easy to follow.

If you are intending to drive into the quagmire of structured programming try to use a structured programming language. Pascal and Algol are structured but now with the better versions of Basic you can have any language structured if you want it.

The feature that links these programming languages together is that they all allow the vigilant programmer to wage war on the Goto concept. Now, this may seem unfair to you, but look closely at how much damage the inoffensive Goto idea has done, and you should see what I mean. It is so tempting, and seems so powerful.

How does it all work though? Well, the key is that all structured programming languages tend to lend themselves to block structuring. Block structuring allows you to layout your program in the way you would if you were ever to write the structure down on paper. For

example take the common problem of asking a question to which you expect the answer Y or N. Now you or I would just ask the question and take Y as a yes and anything else as an N, but imagine that we have been set the task of making the program foolproof. One way of tackling the problem is to have

```
100 INPUT "Are you happy (Y/N)?"; A$
110 IF A$ = "Y" THEN 150
120 IF A$ = "N" THEN 200
130 PRINT "Try 'Y' or 'N'!"
140 GOTO 100
150 REM CODE FOR HAPPY
190 GOTO 300
200 REM CODE FOR SAD
290 REM END OF SAD
300 ...
```

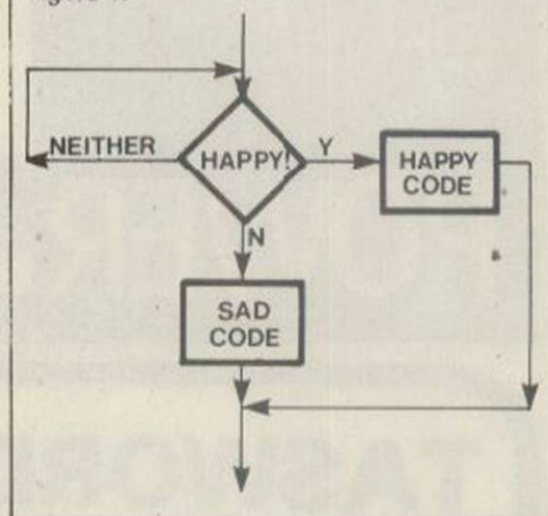
This may be simple enough, but when you look at the original problem, which was something like the flowchart shown in figure 1, the solution seems rather silly, especially when you look at the code given in structured Basic:

```
100 INPUT "ARE YOU HAPPY (Y/N)?" ; A$
110 IF A$ = "Y" THEN PROC H
```

```
ELSE IF A$ = "N" THEN PROC S
ELSE PRINT "FOOLISH ANSWER, TRY (Y/N)"; GOTO 100
120 CONTINUE PROGRAM
```

ProcH is the happy code, ProcS the sad code, and in either case we end up at line 120 quite simply. I know what you are thinking "What's that Goto doing there?". Tricky. It is there because Basic relies on line numbers, and they eventually, are what you have to Goto.

Figure 1.



Now, if you had Pascal, you could try this method:

```
REPEAT
Write ("ARE YOU HAPPY (Y/N)");
INPUT A
UNTIL A = "Y" or A = "N";
IF A = "Y" THEN HAPPY ELSE SAD;
```

Here the most useful sort of interactive loop is shown — the repeat or While loop; they are exactly the same except that the test is at the bottom on one, and at the top on the other. All structured programming languages have one or both of these statements available. This example also shows Pascal's wonderful possibilities for procedure names, and being able to call them by name only.

Another statement that occurs in the more important structured programming languages in the case statement. This enables you to select one of a series of choices by saying for instance:

```
CASE FEELING OF
Begin H: Happy;
S: Sad
A: Angry;
M: Mad
END;
```

or print Case month of ("JAN", "FEB", "MAR", "DEC"); The implications of this are enormous, and can be extremely useful in the use of conversion routines, hashing tables and so on.

Piers Letcher

I could do that...

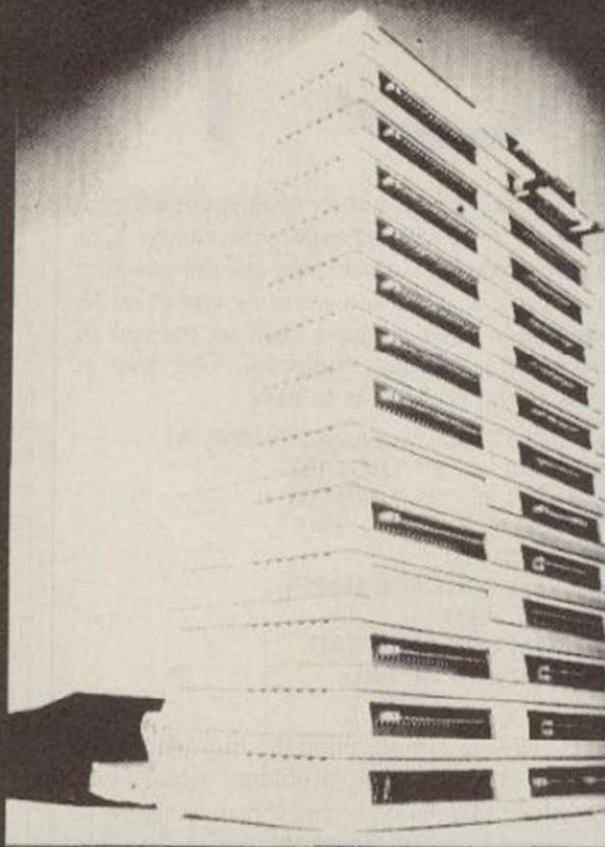
As you may know, all numbers are stored in computers as a string of zeroes and ones. 0001 is 1, 0010 is 2, 0011 is 3, and so on. Each digit from the right, represents steadily increasing powers of two, just as in ordinary numbers each digit represents a number of powers of ten: every time you give your computer an ordinary decimal number it first has to convert the number into binary, then store it ready for you to do what you will with it. Have you ever stopped to consider what the computer must have to do when you ask it to add two numbers? Let us assume that the two numbers are already held in binary, in two arrays, 16 binary digits long — use ordinary arrays, but do not input any digits other than 0s and 1s. Can you write a program in Basic that will add two binary arrays together? Remember to detect overflow and to handle carries correctly.

The £15 prize for June's anagram problem goes to S. Wood, 12 Old Park Road, Palmers Green, London N13, who submitted the following program to run on a ZX Spectrum:

```
10 INPUT A$
20 FOR P=1 TO 6
30 FOR Q=1 TO 6
40 FOR R=1 TO 6
50 FOR S=1 TO 6
60 IF P=Q OR P=R OR
P=S OR Q=R
OR R=S THEN GOTO 140
70 B$=A$(P)+A$(Q)+A$(
R)+A$(S)
80 B=0
90 FOR N=1 TO 4
100 IF B$(N)="A" OR
B$(N)="E" OR B$(N)="I"
OR B$(N)="O" OR B$(N)=
"U" THEN LET B=B+1
110 NEXT N
120 IF B<1 OR B>3 THEN
GOTO 140
130 PRINT B$,
140 NEXT S
150 NEXT R
160 NEXT Q
170 NEXT P
```

PERSONA ZX

YOUR KEY
TO THE
TOWER
OF
POWER



You simply choose the following modules you want and plug them into the PERSONA and turn your ZX81 or ZX SPECTRUM into a total computing package ... into an ORGANIC MICRO.

PERSONA ZX81	£30.35
PERSONA ZX SPECTRUM	£45.00
RAM 08 (2K)	£24.50
RAM 16	£26.75
RAM 64	£76.25
MINIMAP	£35.95
DROM (2K)	£39.50
TOOLKIT	£22.20
PERICON a	£27.90
PERICON b	£33.75
PERICON c	£41.75
SONUS	£30.15

Options: USERFRONT	£8.00
Additional 2K for RAM 08	£6.50
Additional 2K for DROM	£7.50

Prices include VAT, Postage and Packing for U.K. deliveries. Overseas Orders: please add 15% to price for surface mail.

Post to: BASICARE MICROSYSTEM LTD.
12 Rickett Street, London SW6 1RU.
Tel: 01 - 385 2135



TASWORD TWO THE WORD PROCESSOR

64 CHARACTERS PER LINE ON THE SCREEN AND TO PRINTERS!

48K
SPECTRUM

TASWORD TWO The Word Processor

Your Spectrum becomes a professional word processor with TASWORD TWO. TASWORD TWO gives you an amazing **64 characters per line** on your screen. This is ideal for standard A4 paper and TASWORD TWO prints your text just as it appears on your screen.

Tasword Two drives the following interfaces:

- Cobra RS232 I/O Port
- Euroelectronics Interface (ZX Lprint)
- Hilderbay Interface
- Kempston Interface
- Morex Interface

The same program drives these interfaces. A short easy to follow set of instructions takes you through setting up your Tasword Two to drive the interface you have or choose to buy. Tasword Two does drive the ZX printer.

£13.90 fully inclusive mail order price.

TASWORD TWO £2 Demonstration Cassette

See for yourself the powerful features of TASWORD TWO. Send just £2 for the Tasword Two demonstration cassette. A voucher is included which gives you £1 off the price of TASWORD TWO.

TASMAN SOFTWARE

Dept YC

17 HARTLEY CRESCENT LEEDS LS6 2LL

TASWORD The Word Processor

"This package is definitely value for money."

Educational Computing, April 1983

The first real word processor for the Spectrum and still great value for money. Thirty two characters per line make it ideal for use with the ZX printer.

£7.95 fully inclusive mail order price.

TASWORD £1 Demonstration Cassette

Send just £1 for the demonstration cassette and a voucher giving you 50p off the price of TASWORD.

ZX81 TASWORD

"Very good value and great fun to use."

"Unreservedly recommended." Popular Computing Weekly 19/8/82

No demonstration cassette available but send 50p (refundable against your subsequent purchase of ZX81 TASWORD) for a copy of the manual.

£6.50 fully inclusive mail order price.

TASWORD TUTOR

"an eloquent demonstration of Tasword's uses"

Every TASWORD program comes complete with a manual and a cassette. The cassette contains your TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD. Whether you have serious applications or simply want to learn about word processing TASWORD and TASWORD TUTOR make it easy and enjoyable.

Computer Club is here to encourage you to start your own local computer club or, if one already exists, to join it and become involved. We would like to hear of anything which has made your club a success, or of any projects or programs you are developing.

NOTTINGHAM ROBOT

Whilst visiting the merry men of Nottingham computer club, Simon Beesley shakes hands with the future in the form of an Armdroid.

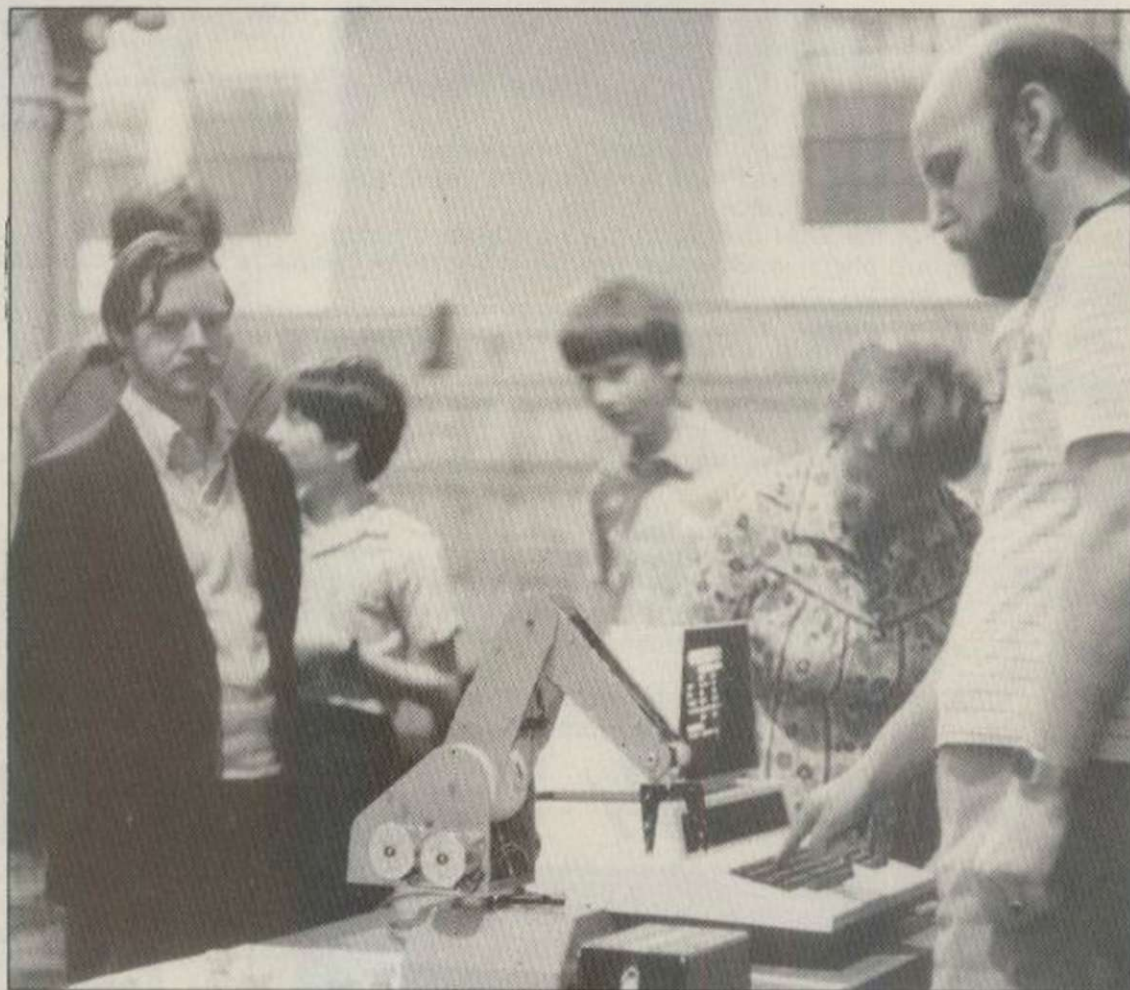
TALK TO THE members of any micro club and you begin to appreciate the enormous depth of computing expertise provided by the nation's computerniks. Britain, after all, has more home computer owners per capita than any other country in the world.

Nottingham Computer Club is a good example. Members' applications include writing educational software, games, programs for mining engineers, and robots. As clubs go it is quite venerable having been formed as long ago as 1979; but in the last two years membership has soared and now numbers 120.

One of its members, Chris Stevenson, built a robot arm, an Armdroid, from a kit and on the evening *Your Computer* visited the club he gave a talk on robotic software. Computer club speakers do not always succeed in conveying the interest of their subject.

Chris Stevenson, however, did so in vivid fashion — at one point graphically representing the workings of a stepper motor with a series of sideways jumps.

Initially Chris Stevenson had been bitten by the bug of wanting to control something. But in the process of developing the software to control the arm he had discovered Forth. Basic had been too slow, while assembly language was too cumbersome: Forth proved to be just right.



Chris Stevenson of Nottingham Computer Club demonstrates the Armdroid

The Armdroid, which had cost £250 and had taken him 30 hours to build, was linked up to a Pet. He started the talk by putting it through its paces. Robots are always popular and when the Armdroid managed to pick up a knob it received a round of applause. Enthusiasts pointed out that it takes a baby three months to learn this feat. Later as its

party piece the robot played a game of noughts and crosses.

Only four out of the 40 present had written programs in Forth so he proceeded to give an excellent introduction to the language, which he described as quite the most interesting language around.

The principle difference between Forth and other languages, he explained, was the way it handles data. This and other Forth mysteries such as the stack, the dictionary, the use of reverse polish, were made clear with the aid of some simple program examples.

Talks like this, along with demonstrations, are a regular monthly feature at the Nottingham Club. On a previous occasion a musical micro contest had been held between six different computers. The winner was a BBC Micro which played a Bach suite accompanied by fancy graphics.

Other weeks of the month are given over to user groups. Sinclair, Commodore, Atari, BBC and Dragon owners are all catered for.

One unusual facility the club offers is the chance to rent a computer. For £1.50 a week members can hire a ZX-81, while anyone enthused by the evening's talk could hire a Jupiter Ace for £2.50.

The Nottingham club meets on Mondays at the Congregational Centre on Castle Gate. For more details contact Geoffrey Jago on 0602-621453.

Local society news

Lancaster anniversary

LANCASTER AND MORECAMBE Computer Club is celebrating its first anniversary with an Open Day in October at the Town Hall, Lancaster. Normally the club meets every fortnight on Tuesdays at the Greaves Hotel, Lancaster. Meetings alternate between discussions and displays, and programmers' workshop evenings. The club also runs courses in Basic and machine code. For details contact David Smith on Lancaster 33279.

Members for Bloxwich

BLOXWICH COMPUTER Club has just formed and needs more owners in the area to join it. Meetings are every Wednesday evening at the Frank F Harrison Comprehensive School in Leamore Lane, Bloxwich.

Wrexham computing

MEETING OF the Wrexham and District Computer Club are attended by over a 150 people and cover talks on the latest hardware, machine comparisons, demonstrations and beginners courses. It meets on most Thursday evenings at Wrexham Memorial Hall.

Sutton sessions

SUTTON LIBRARY Computer Club, in Surrey, is open to anyone whether experienced or starting out. No machine is necessary and 25 percent of the membership do not own one. There are Acorn and Sinclair user groups and sessions for Dragon and Oric owners are planned. Meetings take place on the first Friday and third Tuesday of every month. More from Paul Sedgwick on 01-661 5667.

NEW: Speech & Music for ZX81 & Spectrum!

ZXM SOUND BOX

ZXS SPEECH SYNTHESISER

£29.95



£32.50

- 3 channel sound chip gives a huge range of possible sound effects. Programmable pitch, level, envelope and noise source.
- For the ZX81 or Spectrum - no adaptor needed.
- Just plug it in. Other peripherals or Ram Pack can be plugged into the ZXM.
- Built in amplifier and loudspeaker.
- Audio in/out socket, can be used to amplify the Spectrum 'beep'.
- 9-pin I/O socket can be used with cheap Atari/Commodore type joysticks.
- Comprehensive manual includes many example routines.
- For the ZX81 or Spectrum - no adaptor needed.
- Let your computer talk back!
- 'Allophone' synthesis gives an unlimited vocabulary.
- Active filtering for improved speech quality.
- Other peripherals or RAM Pack can be plugged into the ZXS.
- Output to normal audio amplifier or to our ZXM Sound Box.
- Manual gives full details on how to use the ZXS, with many examples.

And Don't Forget Our Books;

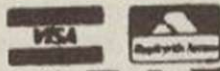
EXPLORING SPECTRUM BASIC: £4.95 The book of answers. Explains Spectrum BASIC programming techniques in more depth than was possible in the Sinclair manual, illustrated by over 50 full programs. 192 pages.

THE EXPLORERS GUIDE TO THE ZX81: £4.95 The book for the ZX81 enthusiast. Games, application and utility programs plus much useful information on machine code and hardware. "Immediate and lasting value" (PCW).

All prices include U.K. carriage and VAT where applicable. Overseas customers add £1.50 per item for surface mail.

TIMEDATA Ltd. 16 Hemmells, Laindon, Basildon, Essex. SS15 6ED Tel.: (0268) 418121

TIMEDATA



**campbell
systems**

THE VERY BEST IN MACHINE CODE FOR THE ZX SPECTRUM & ZX81

All programs supplied double recorded, and mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

for 48K Spectrum **MASTERFILE** business/domestic filing and reporting system. So flexible that it is equally usable for your mailing lists, catalogues, stock control, text extracts applications are endless. Fully user defined data and report display formats, dynamic variable length file, records and data items. Fully menu driven with powerful search facilities, sorting, total/average, update, multiple independent files, printing. Yes, we aim to support microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 22 page manual. £15.00

NEW Masterfile-16 for 16K Spectrum owners.

We have produced a subset version of MASTERFILE called MASTERFILE-16. It has most of the features of big MASTERFILE, with 7 pre-defined report formats and 6 pre-defined fields e.g. name, address, etc., and we have found a useful 4500 bytes of file space. MASTERFILE and MASTERFILE-16 are fully 'file-compatible' and will happily process each other's files, so that 16K owners who upgrade to 48K can use their old files immediately. Complete with 12 page manual, priced at £12.00.

PLEASE REMEMBER TO STATE CLEARLY WHICH VERSION OF MASTERFILE YOU REQUIRE.

for 16K Spectrum **GULPMAN**

game of the '..... man' variety with 15 mazes, 4 chasers, laser defence, 9 grades, 9 speeds, demo mode, choice of joystick control. "An extraordinarily good program" raves Boris Allan for Popular Computing Weekly. We think you will agree. £5.95

for 16K ZX81 **GULP 2** almost identical spec to GULPMAN £4.75

for 16 64K ZX81 **THE FAST ONE** is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

Campbell Systems, Dept.(YC),
15, Rous Road, Buckhurst Hill,
Essex, IG9 6BL, England.
Telephone: 01-504-0589



FREE OFFERS

FREE catalogue containing something for most micro users - if you send us a stamped addressed envelope: Software, hardware, dust covers, books (POST FREE), T-shirts, cassette leads, LOADING aids, test cassettes & head de-magnetisers etc.

FREE 4 page leaflet that explains tape head azimuth alignment . . . if you order any of our products (tape head misalignment can cause LOADING problems).

Ace dust covers £1.99; Atom dust covers £2.95; Atari book £5.95 dust covers £2.95; BBC Forth £15.00; EDG graphics package £24.95 dust covers £3.95 cassette leads £3.20; Commodore 64 Adventure Quest £9.90 dust covers £2.95 book £5.95; Dragon Gridrunner £7.95 Everest £7.95 dust covers £2.95; Genie Book £5.95 dust covers £3.95; Lynx Space Trek £4.75 Colossal Adventure £9.90 dust covers £2.95 parallel connector + reset push-button £4.95; Nascom Dungeon Adventure £9.90; NewBrain dust cover £1.95; Oric cassette leads £3.20 dust cover £2.95 book £5.95; Sharp book £5.95 dust cover £4.95; Spectrum dust cover £1.95 Colossal Adventure £9.90 book £5.95; Texas dust cover £3.95 cassette leads £7.20; VIC book £6.95 dust cover £2.95; ZX81 16K RAM packs only £17.95 loading aid £18.70; professional head alignment test cassettes £4.90; tape head de-magnetiser £4.95; hand airbrushed T-shirts "I'm a micro addict" or "Microcomputers take you into another world" 24"-44" £4.50 THIS IS JUST A SAMPLE - SEND S.A.E. FOR DETAILED CATALOGUE

mail order with cheque/PO to:

FULCRUM PRODUCTS Dept YC3
14 STEEP LANE, FINDON
WEST SUSSEX, BN14 0UF
Tel: Findon (090 671) 2750

SEND FOR
FREE
CATALOGUE

Star chart

Catcha Snatcha

Vic-20: Novelty: £5.50:
Imagine.

★ ★ ★

Cast in the role of a store detective, your task is to patrol the premises contending with shoplifters and lost property. An amusing and original game.

Monopole

CBM 64: Board-game: £5.99:
Rabbit.

★ ★

Uses the CBM's predefined graphics to display the Monopoly board and keeps track of properties held and transactions made. Sadly no computer-versus-player option.

Cyrus IS Chess

16/48K Spectrum: Board-game: £9.95: Sinclair.

★ ★ ★ ★ ★

Adapted from a competition-winning program by Intelligent Software, Cyrus plays an exceptionally fast and strong game. Fits into 16K with eight levels of play and full board display.

Magic Mountain

48K Spectrum: Adventure: £4.95: Phipps Associates.

★ ★ ★ ★

Graphic adventure game along the lines of Hobbit. Familiar landscape of mountains, caves, tunnels, dungeons, rivers peopled with dwarves, lizards and spiders. Not as good as Hobbit but engrossing enough.

Gridrunner

Dragon: Shoot-'em-up: £7.95:
Salamander.

★ ★ ★

Joystick-only game in which you must roam the Grid destroying Droids and Pods while avoiding X/Y Zappers. Quite enjoyable for a Dragon game but not a patch on Jeff Minter's brilliant Vic-20 original.

Xenon

Oric: Shoot-'em-up: £8.50:
IJK.

★ ★ ★ ★

Colourful Galaxians variation with five phases of play.

SOFTWARE

Shortlist

Pssst

- 16/48K Spectrum
- £5
- Ultimate Play The Game

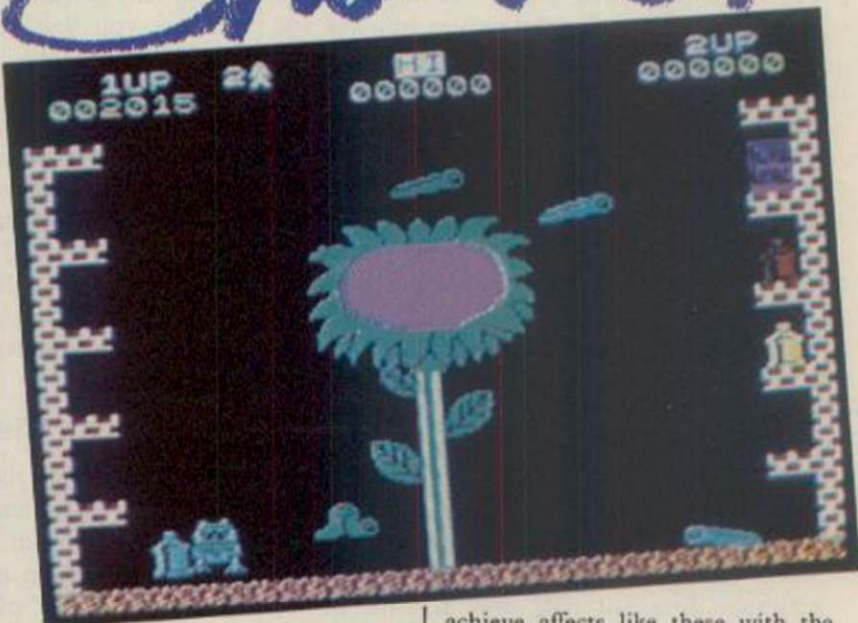
★ ★ ★ ★

A WORKING knowledge of insecticides will help you more than green fingers in Pssst's pest-infected garden. You control Robbie, a robot gardener, whose job is to protect his plant, a Chrisanthodil, from the attentions of slugs, leeches and midges.

Three spray cans aid you in this task, but only one delivers a lethal dose — the others merely stun. If you succeed in destroying enough insects your plant grows, sprouts leaves, and eventually rewards you with a flower. Play then proceeds to the next screen where the action is, of course, faster and more crowded.

At this stage the game takes on a pleasingly frantic quality. If the garden is not to turn into a horticulturist's nightmare, you need to scurry about madly picking up and putting down sprays, Grow-bags, and watering cans.

Although Pssst has some elements



in common with Ultimate Play The Game's other game, Jet-Pac, it is otherwise refreshingly novel. But what marks it out as exceptional is the quality of its graphics.

If Ultimate Play The Game can

achieve affects like these with the Spectrum's relatively modest screen and colour resolution one wonders what it could produce for the BBC or the CBM 64.

Jumpin' Jack

- 16/48K Spectrum
- £5.50
- Imagine

★ ★ ★ ★

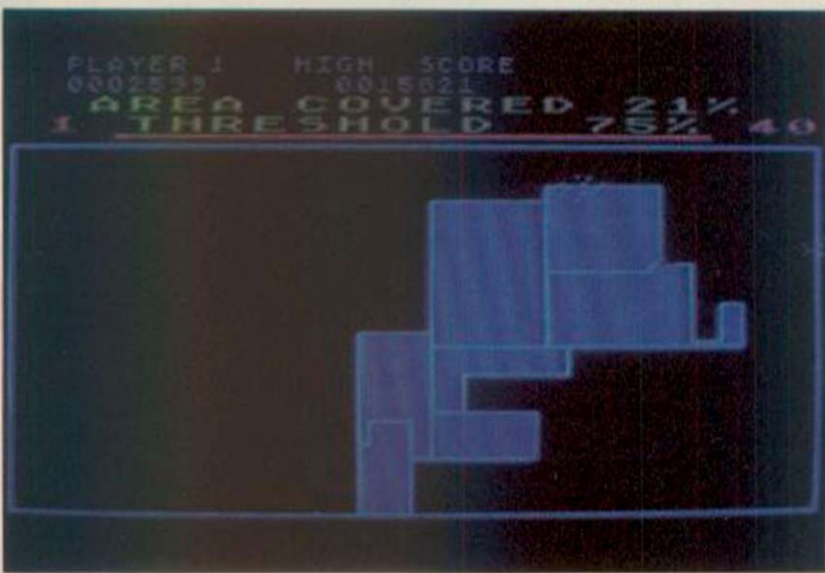
"JUMPIN' JACK is quick and bold with skill his story will unfold." This is the first rhyme you encounter in Imagine's Jumpin' Jack, a quirky and clever game which is much better than the poetry which punctuates the player's progress.

The object of this addictive game is to move your man, the Jack of its title, to the top of a series of screens consisting of horizontal lines. To move up you must jump through the holes which appear; to avoid dropping through them you can run right or left.

Jack himself is an ingenious piece of graphic design, all pumping legs and flailing elbows. When you mistime your jump, poor Jack is electrocuted on the lines and writhes in truly gruesome convulsions.

At the beginning of the game there are no obstacles to progress, except your own ineptitude. However, when you have conquered screen 1 not only do you see the next line in the limerick you complete by finishing the game, but you also come up against the first hazards. These are either a pretty little steam-train, a manically chopping axe or a lunatic with a shotgun.

Jumpin' Jack has the charm of a nursery rhyme and the cruel twists of fortune of snakes and ladders — or even life, if you like to see deep meaning in the hours spent with your micro.



Qix

- Atari 400/800
- £29.95 cartridge
- Atari

★ ★ ★

QIX FROM ATARI is a refreshingly abstract and almost non-violent game, but no less gripping for that. The Qix of the title is a whirling collection of lines which you must box in by filling at least 75 percent of the screen with blocks of colour.

To do this you draw lines — called Stix, says the blurb — with your marker controlled by the joystick. The interest of the game lies in the different strategies possible and the unpredictable properties of the Qix and your other opponents.

Some players like to build bizarre patterns of boxes in an attempt to imprison the Qix in a tiny area, since

any percentage over 75 is rewarded with a bonus multiplied by 1,000. Bluff, no-nonsense players, prefer however, to get it over with quickly by blocking off large areas immediately.

This strategy, though, can be dangerous — the Qix is a capricious creature. If you have not completed a line and the Qix touches it the game is up.

You must also watch out for the Sparx twinkling along the lines and multiplying the longer you play. If you are slow completing a box, or try to cross one of your own lines, then the fuse will ignite and come fizzling after you.

The game starts with only one Qix to capture, but if you are skilful, you soon move on. That is when Qix becomes really difficult and really compelling.

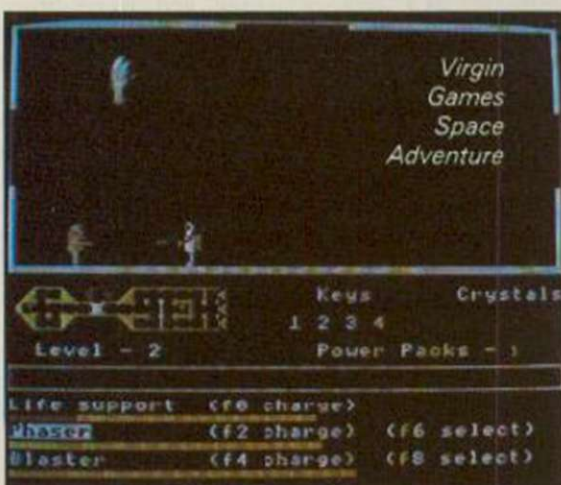
From submarines to soccer, from snooker to starships, Pete Connor takes a hard look at BBC software.

"SPORT FOR ALL" is the theme of this month's survey, as your reviewer laces up his football boots, casts a shrewd eye over the racecard and chalks his cue in preparation to break the pack of new BBC Micro programs.

First under the starter's orders is Professor Frank George's H5 Horse Racing Forecast Program, which takes the punter into the age of the microchip. No longer does he have to ponder the evidence entirely on his own, or resort to using the pin; now he just has to key in the relevant data and let the Prof's program do the work. This it seems to do pretty well; of the four races I used, the program strongly recommended the winner in three. Unfortunately, it also recommended one or two others equally strongly, so the gambler still has some decisions to make on his own.

Before all BBC owners write off for the H5, they should pause and reflect on the amount of work involved in using it. For each runner there are at least 10 separate items to be keyed in. For races with large fields you will need the patience of Job and the leisure of Andy Capp. Even so, there are still many factors the program does not take into account before giving its verdict of Eliminate, Possible Bet, Very Good Bet, or Excellent Bet; the state of the going, jockeyship, illness. These have to be considered, the H5 booklet says, after the program has done its work. Professor George's program, then, is one for the dedicated micro-owning follower of the turf rather than the dilettante. With regular use it might well repay the outlay of time and money involved.

From the sport of kings we move to the sport of misspent youth — snooker. Acornsoft's Snooker is the first such game to be produced for the BBC, and it is very effective. The coloured balls stand out well



against bright green baize. You direct them using four keys to position the cue.

You can choose strength of shot, backspin and topspin, and so on. The program automatically registers foul shots and adjusts the score. Snooker is not quite as satisfying — or frustrating — as the real thing, but it is certainly a lot less trouble than queuing at the local hall.

Two other new games from Acornsoft are Missile Command and Starship Adventure, neither of which will hold any terrors for anyone familiar with an arcade. The first is a very good version of Missile Base, where you have to move a target finder to lay down a

protective blanket of exploding bombs. There is a good variety of screen colours and the graphics are very clear; the sound, though, is a bit feeble. A daunting prospect in this game is the "intelligent missile". I was too incompetent to encounter them. You should enjoy this game if you have a joystick; if you do not you will find yourself trying to use eight keys at once.

Starship Command is an interesting hybrid of Asteroids and the Star Trek genre; on the left is a screen where you rotate your ship to fire at the enemy, on the right a display showing position and fuel-supplies. You can put up shields and launch an escape capsule when things look dire. You might get another mission; it all depends on the Admirals back at starbase — a hard bunch to please in my experience.

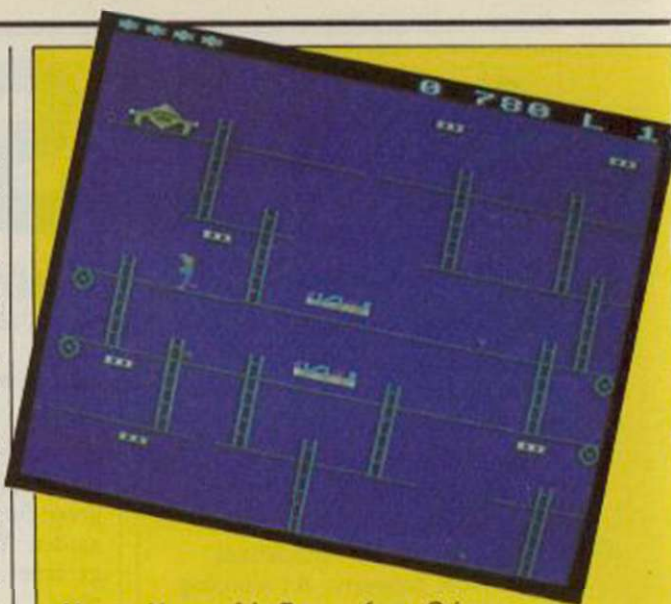
Match of the day

For something more vigorous and down-to-earth there is Five-a-side Socca (sic), a two player game from IJK. This is an exciting computer version of table football, in which you move your players around, tackle and shoot.

In the style of English football, there is no great individualism on display. Your players move in strict formation, each man playing for the team rather than himself. They give 100 per cent effort and cover every blade of grass on a pitch so luxuriant it puts Wembley to shame. And it is magic when you shoot and the ball hits the back of the net. I was over the moon with this one, Brian. IJK also produce Leap Frog, their version of Frogger. It is the usual thing with the usual graphics and sound, but the road has lane markings. Is this a major new development in Frogger technology?

Atlantis, from the same company is altogether more alluring. It starts with a rousing blast of classical music and then goes on to mention Plato — of all people — in the introductory blurb. By this time the disoriented games player may be wild-eyed with astonishment. But persevere! For what you get is, in fact, no less than an aquatic version of Scramble — a brave attempt to do something new with this game.

Instead of spaceships you have five Nautilus submarines armed with torpedoes and bombs. The rugged terrain with which we are all so familiar is still there, but it is all underwater now. The graphics are good and even at the



Above: Hopesoft's *Escape from Orion*.
Below: IJK's *Star Soccer*.



BBC SOFTWARE

lowest level it is a difficult game to master. One minor drawback is that the torpedoes make a noise like squealing piglets.

While we are on the subject, there is Moonraider from Program Power. No nonsense about philosophers and myths here — this is a straightforward Scramble game. It is very similar to Acornsoft's Rocket Raid in terms of graphics and sound, although you can choose the additional hazard of ack-ack fire. That, plus the whizzers, is a pretty daunting prospect.

The major, and controversial, development in this game is the "skip" facility. Families will split on the issue of whether this should

SURVEY

very good new games. *Swarm* is a distant relative of *Galaxians* in which birds swoop down making convincingly unpleasant avian squawks. There is the added danger that they lay very large and very evasive eggs which turn into eagles if not destroyed. If you have seen Hitchcock's film *The Birds* you may have an idea of the unpleasant thrill to be derived from this game.

Android is one of the best games to appear recently. A boy runs round a maze trying to eat the energy pills before being caught by the pursuing androids, elasticated creatures which expand and contract in a menacing fashion.

To destroy these the boy either turns and shoots them with his pistol or lays bombs which can later be detonated. Then he has to face the disagreeable pink monsters — a pink monster is always very nasty — and, last, a creature which knows no barriers, floating over the screen and through the walls. The graphics and colour in *Android* are excellent, and the game has an appeal which is unique.

Which brings us to *Bug-Bomb*, one of the first games to be released by the new Virgin software house. All the Virgin games come with a heavy load of packaging, including photographs of the writers.

Some of these are not a pretty sight, and should be kept away from sensitive adolescents. *Bug-Bomb* has similarities to *Android*; you run around a grid, avoiding the bugs and trying to destroy them by releasing a cleaning agent. The game starts very fast and furious and is an effective development of a simple idea. Even though it lacks *Android's* graphics originality, it will please many people.

Lost in space

Virgin's *Landfall* is a sophisticated flight simulator with just a hint of *Star Trek* games in there somewhere. You must land your rocket using the map and the plethora of information on the control panel. If you like this sort of game, then you will probably find *Landfall* an absorbing program.

Most entertaining of the Virgin programs is *Space Adventure*, a graphic adventure with action. Here you are a spaceman in a three-level space-ship, infested with androids protecting the power capsules you seek.

A plan of the craft is shown, and each individual room is represented by a rectangle in which you and your android opponents bounce around in zero gravity and shoot it out with phasers and blasters. To stay alive you have to find new power packs. *Space Adventure* is a pleasing mixture of violence and logic.

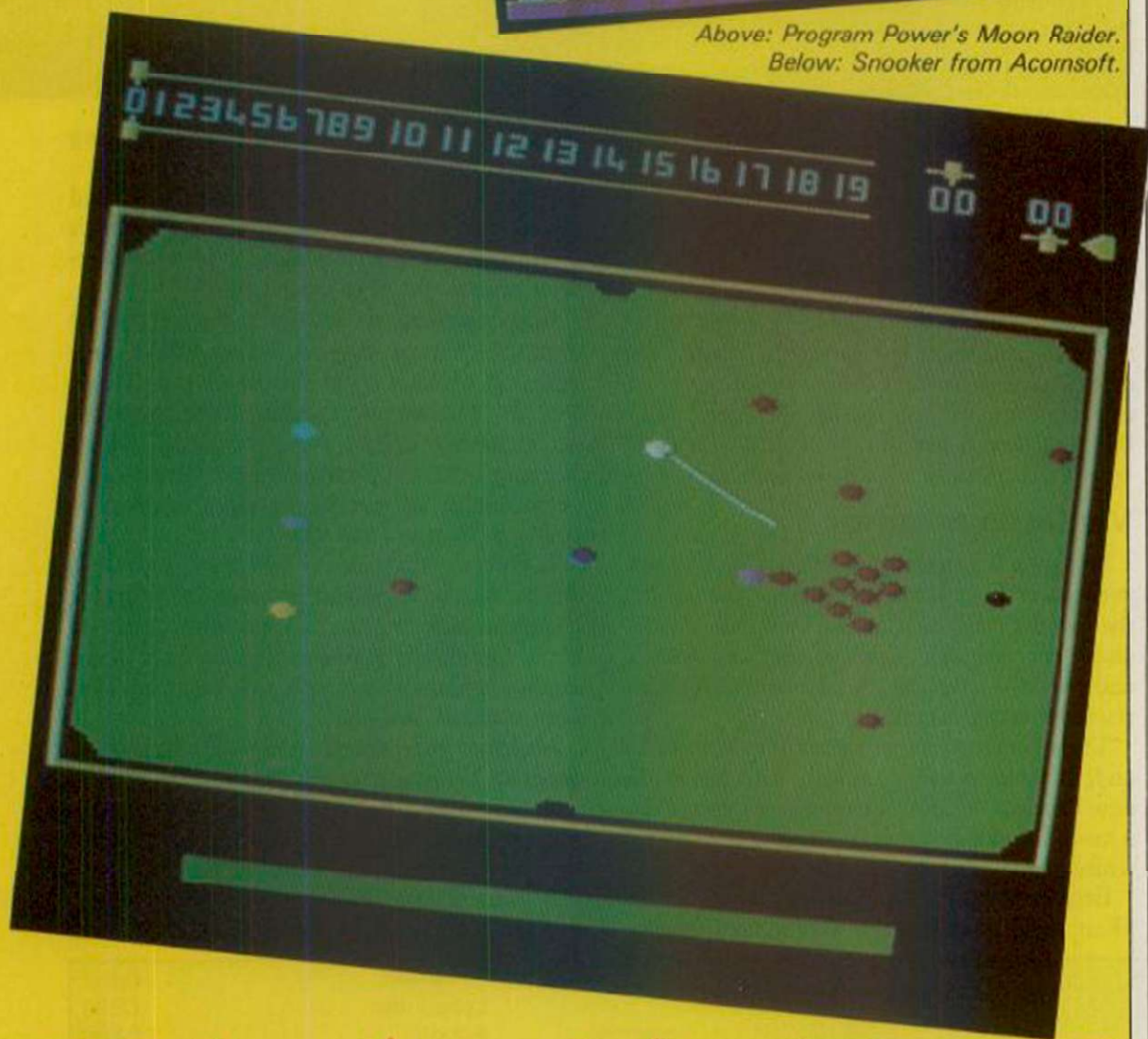
Kansas City has a reasonable version of *Frogger* on the market, with all the usual obstacles. The joke here is that the introductory tune is the *Marseillaise*. Geddit!!!

Superior Software's *Frogger* is similar, although it is slightly more demanding in that you must move sideways as well as ahead. The graphics are good and the crocs really do look both vicious and voracious.

(continued on page 54)



Above: Program Power's *Moon Raider*.
Below: *Snooker* from Acornsoft.



TWARE

ever have been invented, let alone used. I take no side in this dispute, but wonder if Baron Von Richthofen would have got where he did if the Kaiser had let him skip to combat before he had learned to fly.

Heiress on a high-rise

Program Power's *Croaker* is a standard issue *Frogger* game, but their *Killer Gorilla* is much more fun. In this *Donkey Kong* variant the hero has to rescue the captured heiress from a gorilla at the top of a skyscraper.

The boy does not really seem old enough to be going around rescuing heiresses, even ones who look like Goldilocks. But let that pass.

This is a very amusing and compelling game. As you progress through the pages the obstacles and aids become more inventive; you go up and down in lifts, grasp umbrellas and dodge falling girders.

Another entertaining variation on the same theme is *Escape From Orion* by Hopesoft, which claims to "take *Donkey Kong* into the 21st Century." Again, there are different obstacles and aids as the pages turn over; ladders, lifts, conveyor belts with explosive devices, electrified doors. It is an entertaining game with inventive graphics, but does not quite have the charm of "*Killer Gorilla*".

Computer Concepts has produced two

(continued from page 53)

Road Runner, also from Superior Software, is an intriguing game in which you guide a car around a maze-like racetrack. You score points by passing the flags. However, you are pushed by hostile cars which you can throw off the trail by laying a smoke-screen. Additional problems are caused by rocks in the road. If you drive in London you should be at home in this fast moving game.

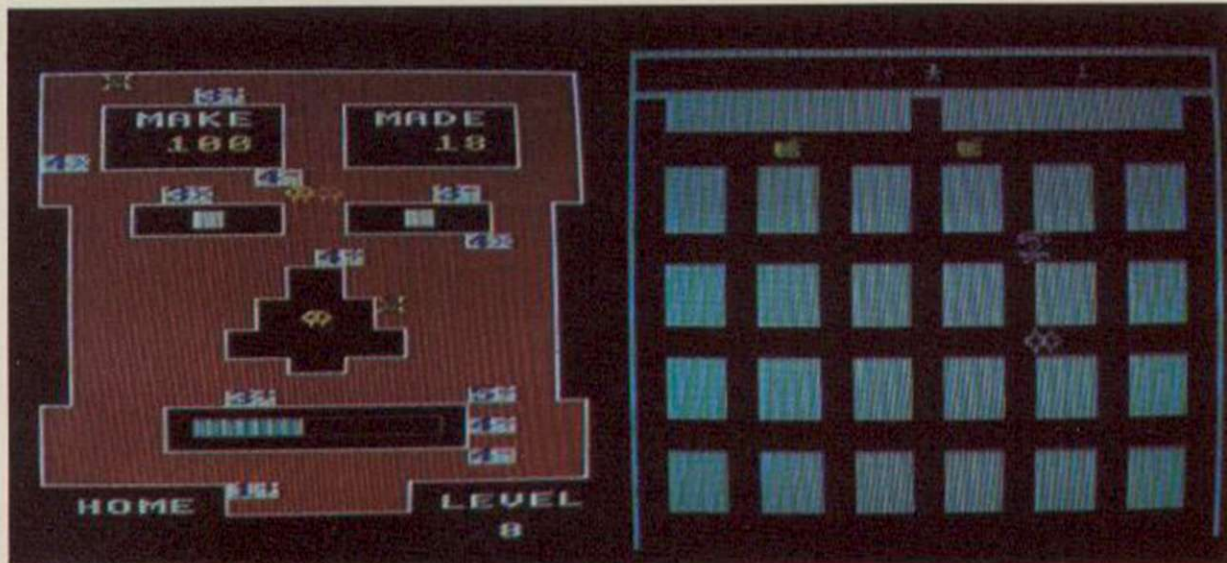
Painter, from A&F, is a rather less frantic game. The screen is filled with rectangular blocks around which you move. Once you have gone around all the sides, the block is filled in and you score points. Chasing you are whirling opponents who multiply as the game proceeds. It is a simple idea, but no less effective for that.

As welcome relief from all these frogs crossing roads ASK now have several new educational programs available. All of these programs use colour and graphics to take the sting out of learning. Number Gulper, for instance, uses the format of an arcade-style game to help children improve number skills. The player selects a number to make and a different number appears in one of the eyes which are part of the robotic face constituting the screen.

The player's Number Gulper then has to be guided around the screen, multiplying, subtracting or adding the numbers scattered around. Time is limited and, at the higher of the 19 levels, there are scramblers which can really mess your number up. The game can become very fast and exciting and is undoubtedly one that children — and adults — will find enjoyable and educational.

Let's Count is designed to help younger children learn simple counting and the numbers up to 9. There are four different games each with colourful graphics and jolly time. If the child repeatedly fails to find the answer, the program will help.

Number Puzzler is another program



Above left: ASK's Number Gulper, and, right, A&F's Painter.

designed to enhance mental arithmetic skills, this time by means of a numerical noughts and crosses. Other options are mental arithmetic contests with friends, or against the computer. Hide and Seek aims to improve short-term memory using games similar to the ones where you put objects on a tray, look for thirty seconds and then try to name them. The colourful graphics and different options mean that children will not easily get bored using this program. A useful new program for those with a practical interest in computing.

Versatile monitor

Beebug's Exmon is an exceptionally comprehensive machine code monitor. As well as the usual spread of monitor facilities — a disassembler, register display, memory search, and so on — it provides two useful extras: a relocater and a simulator.

The relocater moves a program in memory and, as far as possible, adjusts it to run at the new location. The simulator allows you to test a machine code program a single step at a time while displaying the contents of the registers.

Exmon would be hard to improve upon. In 5K it manages to provide all the facilities you

are likely to need in developing and testing machine code.

Those interested in the BBC's sound facilities would do well to look at Quicksilva's Muproc or Bug-Byte's BBC Music Synthesiser and Auto-Composer.

Both programs are similar in that they allow you to compose tunes on the BBC's four channels using a wide variety of pre-defined sounds. You can also combine these sounds to get some you might not have heard before. Although there is little to choose between the performance of these programs, Muproc is perhaps the more fun to use.

It cleverly simulates a four-track recording studio, displaying sound levels on the different channels, allowing you to have fast forward or back, lay down a funky rhythm here some mellow strings there; you can really indulge your musical fantasies.

Muproc also scores over the Bug Byte program because it is less cumbersome to use, with a clear screen display and lucid explanatory booklet which avoids the appalling spelling errors to be found in the Bug-Byte program. There is certainly room on the market for an educational spelling game. ■

Company	Program	Price	Company	Program	Price
A&F Software, 830 Hyde Road, Manchester, M18 7JD.	Painter	£8	IJK Software 9 King Street, Blackpool Lancashire.	Leap Frog	£7.50
Acornsoft, c/o Vector Marketing Denington Estate, Wellingborough, Northamptonshire, NN8 2RL	Snooker	£9.95	Program Power	Atlantis	£7.50
ASK London House, 68 Upper Richmond Road, London SW15.	Starship Adventure	£9.95	Micropower	Five-a-side soccer	£7.50
Beebug, PO Box 109, Baker Street, High Wycombe, Buckinghamshire.	Countdown to Doom	£9.95	Dept AU3, 8/8a Regent Street Chapel Allerton, Leeds LS7 4PE.	Killer Gorilla	£6.95
Bug-Byte Mulberry House, Canning Place, Liverpool L1 8JB.	Missile Command	£9.95	Quicksilva, Palmerston Park House, 14 Palmerston Road, Southampton S01 1LL.	Croaker	£6.95
CC Software, 16 Wayside, Chipperfield, Hertfordshire WD4 9JJ.	Number Gulper	£9.95	Superior Software 69 Leeds Road, Bramhope, Leeds.	Moon Raider	£6.95
Hopesoft, Hope Cottage, Winterbourne, Newbury, Berkshire.	Lets Count	£9.95	Virgin Games, 61/63 Portobello Road, London W11 BDD	Muproc	£14.95
	Number Puzzler	£9.95	Sporting Forecasts Bureau of Information Science, Commerce House, High Street, Chalfont St Giles, Buckinghamshire.	Road Runner	£7.95
	Hide & Seek	£9.95		Bug-Bomb	£7.95
	Exmon	£7.90		Landfall	£7.95
	Music Synthesiser	£9.50		Space Adventure	£7.95
	Android Attack	£8.95		Horse Racing forecast	£19.95
	Swarm	£8.95			
	Escape from Orion	£6.75			

NEW!

PROGRAM DIRECT DRAGON 32 SOFTWARE



Submarine Command.

Take a modern Nuclear Submarine on anti-shiping patrol. Stalk the enemy's convoys and sink his ship — but beware — enemy warships will be hunting you!

Great new game specially written for Dragon with full colour graphics in Machine Code. **£7.95** (inc.)

FEATURES INCLUDE

Two undersea games in one

- South Atlantic Crisis
- Baltic Battle

With animated maps and sonar screen
Conventional and homing torpedoes
View the enemy through the periscope
Full easy to understand instruction sheet

Great New Games for your DRAGON 32 computer



£5.95
(INC.)

LUNAR LANDER • BOMBER •
BREAKOUT — all in one cassette.

Dragon Games Pack

*Exciting
and
Addictive*



£6.95
(INC.)

POKER/PONTOON

Sophisticated implementations of two of the most popular card games — POKER and PONTOON.

Each program uses high resolution colour graphics. Bluff or be bluffed.

Master Cards Player

Our Guarantee

If our product ever fails to load, simply return it within 14 days and we will immediately replace it with refund for the postage.

All prices include VAT, Postage & Packing.

Send Cheques/P.O. made payable to:

PROGRAM DIRECT LIMITED
37B NEW CAVENDISH STREET
LONDON W1M 8JR

Please send me the following software immediately

- Submarine Command **£7.95 inc.**
- Master Cards Player **£6.95 inc.**
- Dragon Games Pack **£5.95 inc.**

I enclose a Cheque/P.O. for £ _____

NAME _____

ADDRESS _____

Postcode _____

**DEALERS
ENQUIRIES
WELCOME**

Kathleen Peel takes the wraps off the COMX 35. With a built-in joystick and 35k memory the new arrival is full of Eastern promise.

THE COMX 35 is well made and nicely packaged, supplied complete with cassette leads, a cable to connect to your domestic TV, a power supply with integral three pin plug and a Basic Manual.

The keyboard houses plastic keys with a calculator-type feel but without any loud speaker feedback. Because of its size it is unsuitable for touch typing. The joystick is centre-biased and produces non-printing codes when activated; its use is mainly for self-written and commercial games.

The cassette interface at 600 baud seems relatively trouble free and actually requires that both earphone and microphone leads are left connected. This allows a spoken header for each tape track which is heard through the computer loudspeaker on playback. Both program and data files may be saved.

Expansion is through a double sided 44-way socket, at present no information exists as to the connections of the socket.

There are plans for an RS-232 — Centronics interface to take a suitably badge-engineered version of the extremely popular Sharp four-colour printer plotter. Floppy disc drive, speech synthesiser and memory expansion to 67K are all as they say "to be available shortly".

The machine is one of the coolest running micros I have seen, it barely heats up which is a good indicator as to the reliability of the electronics.

The Computer is based on the RCA 1802 microprocessor — an 8 bit register-orientated central processing unit, CPU. Its main features are low power consumption, a register array, R0-RF, consisting of sixteen 16-bit scratchpad registers and 91 easy-to-use instructions. A summary of the registers is given in table 4.

Switching on repeats a display routine waiting for any key other than space to be pressed. It then prints on the screen

```
COMX Basic V1.00
READY.
```

As you enter data it is printed in white with the computer response which can be selected, in cyan and the cursor in pink, an interesting use of colours for data presentation.

Program errors are denoted by error codes which although easily referenced in the manual, will be of little use to the inexperienced beginner without further explanation. For instance "unacceptable character in number fold" is the explanation for error code 45.

Editing a line is simple. The line is called into the editor and displayed at the bottom of the screen, the cursor is spaced along underneath the line to the desired position and either I,C or D is typed — Insert, Change, Delete — and the amendment made on the cursor line. Typing Control S puts the correction into the edit line and allows further changes. A second Control S puts the corrected line back into the

program. The maximum line length is 95 characters and the cursor line commences below the end of the line to be edited, so it may be displaced by up to three lines which is a bit confusing. Not the best editor I have seen, but by no means the worst.

A novel command, Control R, recalls the text prior to the last press of the return key with any data typed after the return superimposed at the beginning of the line. Very useful for changing line numbers and minor changes at the end of often repeated commands.

At switch on there are 30934 Bytes available to the user according to Print Mem. It prints 256 less than actually available to allow for stack growth. The Basic implementation on this micro has one major drawback — it is incredibly slow, taking approximately four times as long to complete the timing tests used for the Spectrum — Oric evaluation presented in the March 1983 issue of *Your Computer*.

The usual selection of Basic commands are available, but disturbingly the manual has no references to any printer command.

This indicates the level of standardisation of COMX Basic. Table 1A lists commands which just vary in the keyword and Table 1B lists commands that are either not defined in the dictionary or have a non-standard meaning.

Redefinable character set

There are no simple structures such as If — Then — Else and On — Gosub but their relevance is debatable. The Basic interpreter inserts and deletes spaces as it merrily tidies up your data entry. As you may type PR — a shortened form of PRINT, there is a slight problem with lines such as PR INT (A /256) which the interpreter resolves as PRINT (A /256).

The whole of the character set is redefinable by using the Shape command, each character being formed within a 8 × 9 character cell. The two most significant bits are used to define the colours and the remaining six the pixel content of the relevant row of the character. This theoretically is capable of giving high resolution and the program below does that. As you can see, not all the character codes are usable within the display and the user is left with about 112 definable characters. The characters are duplicated in the top and bottom half of the character set, each half able to use a set of four colours — Black, Blue, Green and Cyan or Red, Magenta, Yellow and White.

Unfortunately, there is a slight problem, whenever the shape command is used, the screen nearly always blinks — it seems to be a timing problem. If the programmer does not redefine characters whilst a program is running then this will not be a problem.

There are no Draw, Plot and Circle commands which is not surprising as the display does not appear to be memory mapped. This is the hi-res program:

```
1 B=0:CPOS (0,0):CLS
2 FOR A=32 TO 127:GOSUB 7:NEXT
3 FOR A=144 TO 255:GOSUB 7:NEXT
4 GOTO 2
7 PRINT CHR$(A);:B=B+1:IF B>958
EXIT 10
8 RETURN
```

REVIEW

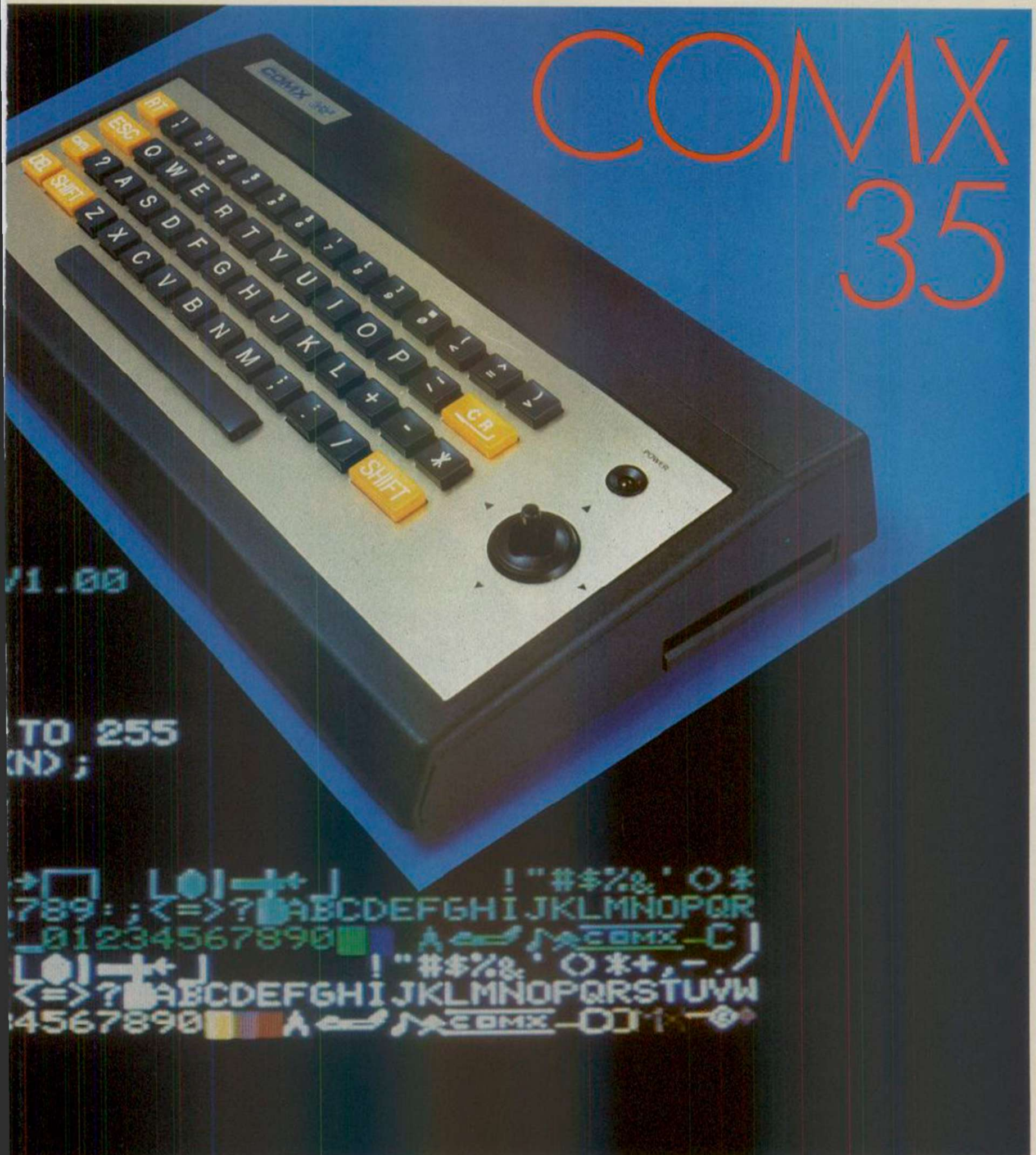
COMX BASIC

```
READY
:10 FOR N=1
:20 PR CHR$
:30 NEXT
:RUN
TE [ ] L
+,-./012345
STUVWXYZ[\]
| ↓ → □
0123456789:
XYZ[\]↑_012
READY
```

```
10 Z$="0123456789ABCDEF":FOR A=144
TO 255:GOSUB 50:NEXT A
12 WAIT (500):GOTO 12
50 A$="":FOR B=0 TO B1:C$=MID$(Z$, 1+INT(RND(15)),1):A$=A$+C$:
NEXT B:SHAPE (A,A$):RETURN
```

I mentioned earlier that data entry from the keyboard is white and the computer response cyan, which can be changed to a number of other permutations. Unfortunately there is a

COMX 35



side effect, coloured graphics entered via the keyboard in a program change colour when printed by the computer.

Larger picture

The machine has the usual six colours plus black and white. The paper colour does cover the whole screen for all colours and does not leave a border like on the Oric or Spectrum. The display which is 24x40 characters covers

virtually the whole of the TV screen and gives a picture almost 20 percent larger than the Spectrum with the same character definition. Spectrum definition is 24x32. Colours are good, stable with very little noticeable dot crawl. The colour commands are in table 3.

The sound commands in table 2 are also good and capable of giving a wide range of realistic noises from lasers to explosions, and could even provide a fair imitation of speech

which would give an extra dimension to games. Although the machine does not suffer from the dreaded Sinclair power supply hum, there is a hum coming from the loudspeaker which is annoying.

The joystick is effectively four additional keys which are activated by pushing the joystick in an appropriate direction. These keys produce non-display character codes

(continued on page 59)

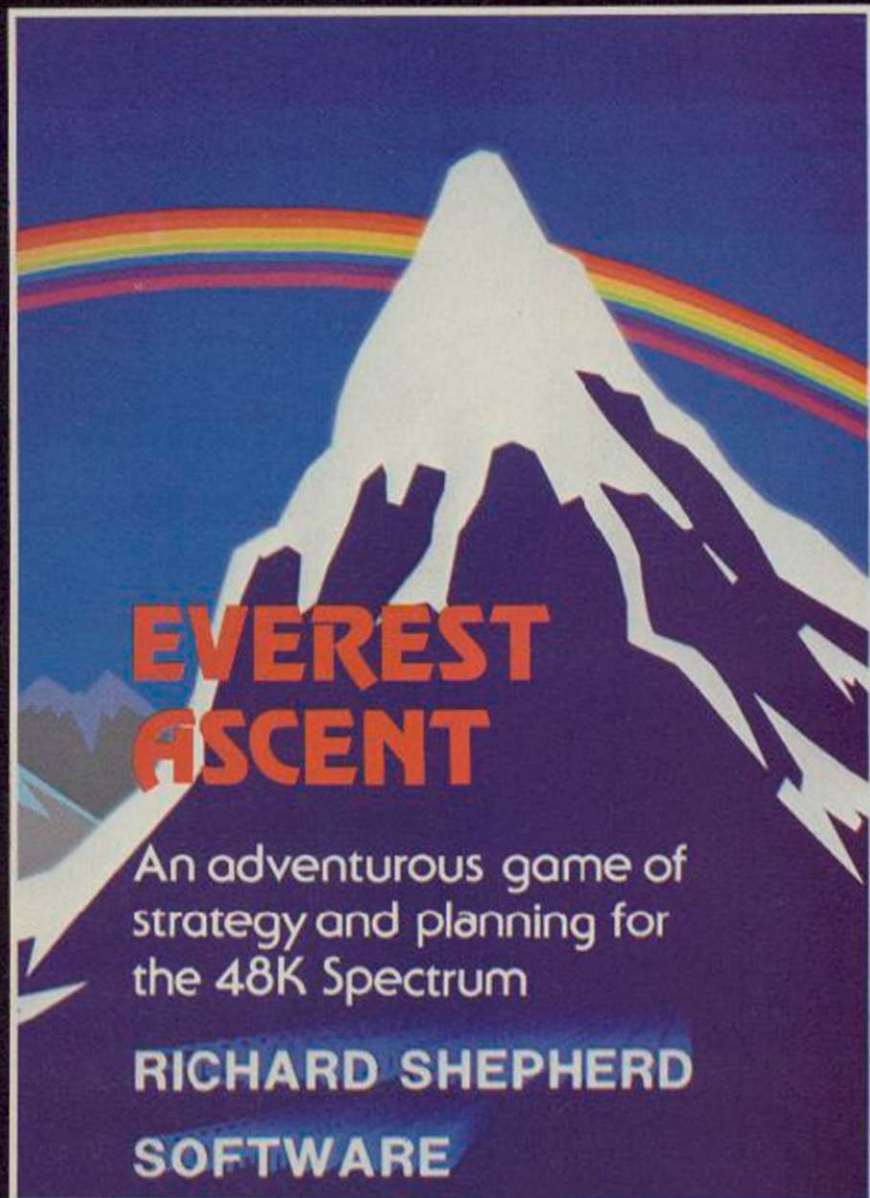
**NOW AVAILABLE FROM W. H. SMITH & SON,
JOHN MENZIES AND BOOTS**



TRANSYLVANIAN TOWER

A spectacular 3-D maze adventure for the 48K Spectrum

RICHARD SHEPHERD SOFTWARE



EVEREST ASCENT

An adventurous game of strategy and planning for the 48K Spectrum

RICHARD SHEPHERD SOFTWARE

TRANSYLVANIAN TOWER

A spine chilling adventure ... enter via the dungeons ... navigate your way through 500 3-D rooms ... survive the swooping vampire bats ... reach the terrifying top ... and rid the world of the evil Count Kreepie!

Can you survive the top of The Tower?

Full save routine for use during the hours of darkness!

48K Spectrum. £6.50.

Also available by mail order

SHIP OF THE LINE

Command a sailing ship ... juggle your supplies, crew and firepower ... fearlessly battle your way up the admiralty ladder, bribe Sea Lords as necessary ... until you make First Sea Lord! Full save routine. 48K Spectrum. £6.50.



EVEREST ASCENT

Conquer the world's highest peak in defiance of all the obstacles, men and nature can throw at you ... survive avalanches ... cross bottomless crevasses ... cope with wayward Sherpas — but don't run out of supplies!

Full save routine. 48K Spectrum. £6.50.

Also available by mail order

SUPER SPY

A global spy chase through complex puzzles, coded messages and 3-D mazes. Follow Dr. Death's trail ... locate his secret island ... discover the entrance to his lair ... but it doesn't end there! A different solution every game. Full save routine. 48K Spectrum. £6.50.

RICHARD SHEPHERD SOFTWARE

Dealers: Generous discounts available

Credit Card Hotline 0628 21107

All programs are sold subject to the condition that they may not, by way of trade or otherwise, be lent, hired out, resold or otherwise circulated without the written permission of Richard Shepherd

DISCOUNT:	BUY TWO GET £1 OFF BUY THREE GET £2 OFF BUY FOUR GET £3 OFF	ALL PRICES INCLUDE VAT & FIRST CLASS UK POSTAGE OVERSEAS ORDERS ADD £1.50 FOR AIR MAIL
48K EVEREST ASCENT	at £6.50	£
48K TRANSYLVANIAN TOWER	at £6.50	£
48K SUPER SPY	at £6.50	£
48K SHIP OF THE LINE	at £6.50	£
DEALER PACK	—	—
	DISCOUNT	—
	TOTAL	£

a) I enclose cash/cheque/P.O. payable to Richard Shepherd Software
b) Debit my ACCESS/VISA Card No.

with the sum of £ Signature

NAME ADDRESS

SEND IMMEDIATELY TO: RICHARD SHEPHERD SOFTWARE
FREEPOST (no stamp needed), MAIDENHEAD, BERKS, SL6 5BY

(continued from page 57)

which auto-repeat and can be read by the key function. This returns the ASCII code of the current key being depressed. So If Key = 136 Then. . . Because of the nature of the keyboard scanning routine, the use of the key facility in a program such as figure 2 creates problems and does not smoothly move the character around the screen. It is necessary to make the variable the value of the last key pressed and integrate the variable as in figure 2. This point is omitted from the manual.

The content of the manual for the beginner is good and quite clear but spoilt by rather too many silly errors. There is virtually no technical information in the manual. It really should include 1802 assembler instructions, memory maps, system variables and I/O socket connections. They may not be required initially, but you will not get very far without them.

Glancing through the ROM reveals three commands not in the manual. Dos Pout and Tout. Dos and Pout give error code 62, "ROM or ROM card not present" and Tout reruns Ready. There appear to be ROM routines for double and quadruple-size printing available which should be very useful.

CONCLUSIONS

- The Comx 35 cannot be recommended for business use as it lacks speed and a suitable keyboard.
- If an adequate library of high-quality machine-code arcade games can be assembled then the Comx 35 could be treated as a games machine with computing capabilities, where the integration of a joystick with the keyboard will make for a more realistic arcade-style presentation than a normal keyboard. The demonstration tape contains some good machine-code arcade-type games.
- For a 1983 computer it has an extremely slow version of Basic and it uses an outmoded CPU which is unknown in today's popular micros.
- It has an incomplete version of Basic and some commands have non-standard meanings.
- Error codes need to be more explicit about the nature of the error and could be greatly enhanced by the use of examples in the manual.
- It has a non-standard size keyboard.

Table 1A.

FVAL = VAL KEY = INKEY

Figure 3.

Program	Comx 35	Spectrum
1 B=0	RUN	RUN +
10 FOR A=1 TO 10,000		
15 GOTO 20		1 LET B=0
20 B=B+1	400 secs.	20 LET B=B+1
25 LET K=KEY		
30 NEXT A		50 STOP
40 PRINT A, B		
50 END		100 secs.
80 GOTO 25		

Program to print out character set and pause while space key depressed.

```
1 FOR A=1 TO 255
2 IF KEY=32 THEN GOTO 3
5 PRINT A, CHR$(A);
8 NEXT A
10 END
```

This modification is required to enable the above program to work.

```
3 IF KEY=32 THEN WAIT (20) : GOTO
```

Table 1. Comx 35 standard Basic commands.

ABS ASC ATN CHR COS DATA DEFINT DEG END EXP FOR-NEXT GOSUB GOTO IF-THEN INPUT INT LEN LET LIST LOG MEM MID MOD NEW PEEK POKE PI PRINT RAD READ REM RENUMBER RESTORE RETURN RND SGN SIN SQR TAB WAIT

Table 2. Sound commands.

MUSIC Note, octave, amplitude.
NOISE Frequency, amplitude.
TONE Frequency, octave, amplitude.
VOLUME Level.

Table 1b. Non-standard Basic commands.

CALL (NN, a, b)	Transfer execution to machine code routine at address NN passing data a and b into R8 and RA.
CLD	Clear all strings and arrays.
CLS	Clear screen from current cursor position.
CPOS (Y, X)	Place the cursor at position Y,X.
DEFUS NN	Creates a space between variables and the start of the program (NN) to be used for machine language routines. A maximum of 26 arrays limited to 255 in any dimension, also 26 strings maximum. Destroyed by Run, New, CLD and perhaps Editing.
DIM	
DLOAD	Load data stored by a previous DSave.
DSAVE	Save data for subsequent retrieval by DLoad.
EOD	Prints hex address of end of data.
EOP	Prints hex address of end of program.
EXIT N	Unconditional branch to line N. If used as an escape from a For/Next loop it should jump to the next level down of nesting if applicable.
FIXED N	Formats the printing of all numbers. N is number of digits to the right of the decimal point.
FNUM (exp)	Round to nearest whole and convert to floating point.
FFORMAT N	Specifies field size N for printed numeric data until turned off.
INUM (exp)	Round to nearest whole number and convert to integers.
PLOAD	Load program stored by a previous PSave
PSAVE	Save program for subsequent retrieval by PLoad.
RND (N)	Returns a random floating point number from 0 to less than N. A = RND (15) will not work. A = INT (RND (15)) is acceptable.
RUN N	Runs program from line N but does not clear the data space.
RUN +	The computer replaces all interpretive branches such as Goto 150 with absolute addresses and then Runs the program.
SHAPE (A, "18 HEX numbers")	Redefines character code A — see text.
TIME (T)	Time to elapse before jumping to subroutine
TIMEOUT (N)	Address N — 50 units per second for T.
TRACE (A)	A30 Trace off A ≠ 0 Trace on.
USR (NN, a, b)	As call but used as part of an expression returning a 32-bit binary integer number constructed from R8 (low) and RA (high).

Figure 2. Operating joystick.

```
10 CPOS (0, 0) : CLS
20 A = 12 : B = 20
30 IF K = 136 THEN A = A-1           Up
40 IF K = 139 THEN B = B-1           Left
50 IF K = 138 THEN A = A+1           Down
60 IF K = 137 THEN B = B+1           Right
70 CPOS (A, B) : PR """"
80 GOTO 30
```

Table 3. Colour commands.

COLOUR (N) Where N = 1 to 12 and represents the colour combination used for keyboard input and computer response — initially set at 12.
SCREEN (N) where N = 1 to 8 and represents the background colour — default set to 1, black.
CTONE (N) N ≠ 0: computer response a shade brighter than the screen colour. N = 0: effect turned off.
Colour and screen are global and affect the whole of the display.

Table 4. 1802 Register summary.

D	8 Bits	Data Register (Accumulator)	N	4 Bits	Holds low-order Instruction digit.
DF	1 Bit	Data Flag (ALU Carry)	I	4 Bits	Holds high-order Instruction digit.
R	16 Bits	1 to 16 scratchpad Registers	T	8 Bits	Holds Old X, P after Interrupt.
P	4 Bits	Designates which register is program counter.	IE	1 Bit	Interrupt Enable.
X	4 Bits	Designates which register is data pointer.	Q	1 Bit	Output Flip-Flop.



HARDWARE

Atari 400 with 16K RAM (AF36P) £199.95
 Atari 400 with 48K RAM (AF37S) £299.00 ★
 Atari 800 with 48K RAM (AF02C) £399.00 ★
 All above with BASIC and handbooks
 Atari Cassette Recorder (AF28F) £50.00
 Atari Disk Drive (AF06G) £299.95
 48K RAM for Atari 400 (AF44X) £99.95
 48K Upgrade for 400 (AF45Y) £99.95
 Commodore 64 (AF56L) £339.00 ★
 VIC20 (AF47B) £129.95
 16K RAM for VIC20 (AF53H) £59.95
 Commodore Cassette (AF48C) £44.95
 Commodore Disk Drive (AF50E) £299.99
 Dragon 32 (AF57M) £199.50
 Dragon Joystick (BC30H) £19.95
 Cassette Cable for Dragon (BC31J) £2.95
 Epson Printer MX80F/T (AF40T) £447.35
 MENTA (XG28F) £115.00
 Floppy Disk (YX87U) £2.50
 5 C12 Data Cassettes (AF61R) £1.99
 Joystick Controller (AC53H) £7.50
 Joysticks (Pair) (AC37S) £13.95
 Le Stick (AC45Y) £24.95
 Full details all above in MAPLIN catalogue.
 ★ Delivery next day by Datapost

SELECTED SOFTWARE

ATARI

Attack At Ep-Cyg-4 -1E-16K-KF54J £34.95
 *Eaja Buggies -1C-16K-KB74R £22.95
 Candy Factory -1D-32K-KF53H £21.95
 Claim Jumper -1E-116K-KB67X £34.95
 Defender -1E-16K-KF10L £29.95
 Forth -1D-24K-YL29G £62.95
 *Frogger -1C-16K-KB68Y £22.95
 Galaxian -1E-16K-KF11M £29.95
 Gorf -1E-16K-KB44X £34.95
 *Hellfire Warrior -1C-32K-KF02C £27.45
 K-razy Shootout -1E-8K-KB63T £34.95
 *Moon Shuttle -1C-16K-KF22Y £27.50
 Pac-Man -1E-8K-BQ71N £29.95
 Paint -1D-48K-KB22Y £29.95
 Picnic Paranoia -1E-16K-KF13P £34.95
 *Preppie -1C-16K-KB07H £21.95
 Qix -1E-16K-KF16S £29.95
 SAM Speech Synth -1D-32K-KB15R £47.19
 *Shamus -1E-16K-KB90X £34.95
 Softporn Adventure -1D-40K-BQ93B £20.64
 Starcross -1D-32K-KB37S £29.95
 Synassembler -1D-48K-KB83E £38.95
 *Zaxxon -1C-16K-KF20W £31.50
 Zork I -1D-32K-BQ94C £29.95
 Zork II -1D-32K-BQ95D £29.95
 Zork III -1D-32K-KB31J £29.95
 *3D-Supergraphics -1C-40K-BQ29G £31.95

Plus over 280 other titles for Atari.

COMMODORE 64

Temple Of Apsal (Part 1) -1D-BC57M £27.45
 Upper Reaches (Part 2) -1D-BC58N £13.80
 Curse Of Ra (Part 3) -1D-BC59P £13.80
 Sword Of Fargoal -1D-BC60Q £20.75
 Crush, Crumble & Chomp -1D-BC61R £20.75
 Jump Man -1D-BC62S £27.45

DRAGON

Berserk -1E-BC32K £19.95
 Black Sanctum -1C-BC78K £7.95
 Dragon Trek -1C-BC82D £9.95
 Galax Attax -1E-BC79L £19.95
 Quest -1C-BC41U £7.95
 Wizard War -1C-BC83E £7.95

Plus 30 other titles for Dragon

SPECTRUM

The Hobbit (48K) -1C-BC88V £14.95
 Timegate (48K) -1C-BC89W £6.95
 Space Intruders (16K) -1C-BC90X £4.95
 Meteor Storm (16K) -1C-BC91Y £4.95
 Chess Player (48K) -1C-BC92A £6.95
 Speakeasy (48K) -1C-BC93B £4.95

VIC20

Crush, Crumble & Chomp (+16K) 1C-KK10L £20.75
 Datestones Of Ryn (+16K) -1C-KK13P £13.80
 Invasion Orion (+16K) -1C-KK12N £17.25
 Monster Maze -1E-KK11M £27.45
 Plattermania -1E-KK14Q £27.45
 Princess & Frog -1E-KK16S £29.95
 Rescue At Rigel (+16K) -1C-KK08J £20.75
 Ricochet (+8K) -1C-KK15R £13.80
 Sword Of Fargoal (+16K) -1C-KK09K £20.75
 Tank Arcade -1C-KH18U £11.95

Plus 80 other titles for VIC20

*Disk versions also available though price and memory size may be different.

Send sae now for our new software leaflet with details of all programs added since Maplin catalogue.
 Order As XH52G Issue 4.

MICROWRITER

The new hand-held word processor that eliminates the need for a typist. You can learn the Microwriting technique in less than an hour and produce perfectly typed text the same day.

Microwriter (AF62S) £485 + £72.75 VAT ★
 Complete Word Processor Package (Microwriter, printer and lead) (AF63T) £1,455 + £218.25 VAT ★
 Available ONLY by mail order or from WESTCLIFF shop.

★ Delivery next day by Datapost

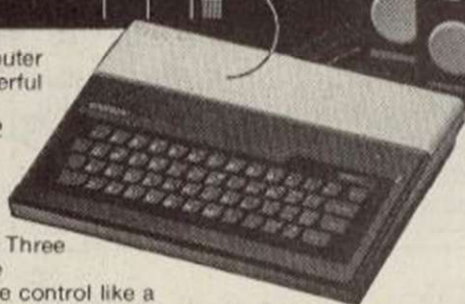


AUTHORISED ATARI SERVICE CENTRE

The brilliant new colour computer

SORD M5

A superb new home computer with one of the most powerful colour video processors available. An incredible 32 sprites simultaneously and 16K of RAM dedicated to graphics alone. Powerful Z80A (3.5MHz) main processor. Three tone generators and noise generator all with envelope control like a mini-synthesiser. Complete with BASIC and superb handbooks for beginners. All this for just £189.95 (AF64U)



INTEREST
 FREE
 CREDIT
 NOW!

If your order contains over £120 worth of computer hardware apply now for interest free credit by telephoning: Mail-order: (0702) 552911. London Shop: 01-248 0926. Birmingham Shop: 021-356 7292. Southend shop: 0702 554000 or write to P.O. Box 3, Rayleigh, Essex SS6 8LR. You pay 10% down, then 10% per month for a further nine months (to nearest penny).

Credit quotations on request. This offer subject to approval which can take up to 48 hours (APR = 0%).

Mapsoft full colour catalogue. Price £1 incl. post. Maplin catalogue contains full details of all hardware and lots of software. On sale now in all branches of W. H. Smith price £1.25 or £1.50 incl. post from PO Box 3, Rayleigh, Essex.



Maplin Electronic Supplies Ltd., Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel. Southend (0702) 552911 (Sales). Demonstrations at our shops NOW.

159-161 King St., Hammersmith, W6. Tel. 01-748 0926. 284, London Road, Westcliff-on-Sea, Essex. Tel. (0702) 554000. Lynton Square, Perry Barr, Birmingham. Tel. (021) 356 7292.

All goods delivered in UK mainland carriage paid, but add 50p if total order less than £5 except catalogues. Orders including items marked ★, delivery next day by Datapost. Subject to availability. All prices include VAT unless shown. Prices correct at time of going to press.

**YOUR
TOP
100
PROGRAMS**

Please add 15% VAT to all prices.

SIRIUS 1

- FORTH £185.00**
Full FIG Forth
- CHEDIT £24.50**
Character set editor
- ISLES OF ARTUAN £19.50**
Extensive Adventure game
- OTHELLO £19.50**
With fine graphics
- MAZE RUNNER £14.50**
Thinking Man's Maze Game
- RX £80.00**
File Transfer Program

NewBrain

- TINY WORD £24.50**
Comprehensive Word Processor
- EDITOR/ASSEMBLER £29.50**
The first Z80 Ed/Ass for the NewBrain
- DISASM £14.50**
Disassembler
- MCMON £14.50**
Machine Code Monitor
- ACCOUNTS £22.57**
Computerised cash/bank book
- DATABASE £22.57**
Information storage
- CARD INDEX £30.43**
Multipurpose data management program
- FILE MANAGER £20.00**
Creates and maintains records
- HOME BUDGET £8.65**
Keep track of your home finances
- GOBBLER £8.00**
Negotiate a maze filled with hazards
- STAR TREK £8.00**
Save the galaxy from the Klingons!
- COMMODITY TRADER £8.65**
Gamble on the Commodity Market
- MASTERMIND £8.65**
Guessing Game
- BLOCK HIM IN £8.65**
Obstacle Course Game
- FRENCH VERB £8.65**
2 programme Database
- FRENCH CONJUGATE £8.65**
French verb conjugation
- FRENCH VOCAB £8.65**
2 part Database
- FOOTBALL FORECAST £25.00**
Sophisticated Pools Forecasting
- HORSE RACE FORECASTING £24.50**
The Serious Punter's Aid
- TYCOON/PELMANISM £8.65**
Two programmes in one

TERMS: Please add £1.00 post and packing to orders under £10.00 carriage free on all cash, cheque or credit card orders over £10.00 in the U.K. Telephoned credit card orders accepted on our 24 hour ansaphone service.

SHARP MZ 80A

- WDPRO (Disc) £79.95**
Professional Word Processor
- MAILPRO (Disc) £69.95**
Mail List for WDPRO
- DATABASE (Disc) £59.50**
Information Storage. Solid State Recommended
- EASIVAT (Disc) £89.50**
Compact VAT accounting system
- FORTH (Disc) £49.50**
Delivery t.b.a.
- ZEN Editor/Assembler £37.50**
Editor Assembler C.P.M.
- HISOFT PASCAL 4 (Disc) £40.00**
Compiling Pascal C.P.M.
- WDPRO (Cassette) £39.50**
Professional Wordprocessor
- DATABASE V3.3 £29.50**
Solid State. Information storage
- EASIVAT (Cassette) £39.50**
Solid State. VAT accounting system
- CALC 3.1 (Cassette) £34.50**
Spreadsheet Calculator
- FIG-FORTH (Cassette) £34.95**
Fully structured self-extending language
- FORTH TOOLKIT £14.50**
Forth word definitions
- HISOFT PASCAL (Cassette) £35.00**
Compiling Pascal
- BASMOD £17.50**
Modifies Sharp Basic SA-5510
- ZEN £19.50**
Z80 Editor/Assembler
- DISASSEMBLER £10.50**
Zen compatible Disassembler
- DYBUG £17.50**
Machine Code Program debugger
- MICROTYPE £39.50**
Touch Typing tutorial
- HOME BUDGET MKIII £14.50**
Home accounting system
- CURSED CHAMBERS £10.50**
Adventure game
- QUEST £5.50**
Adventure game
- PAK MAN £8.00**
A great alternative to Space Invaders
- PARAGON £5.50**
Adventure game
- CASTLE QUEST £8.50**
The latest new Adventure Game
- ELECTRON 22622 £8.00**
Space game — very fast
- FLY ONE £10.50**
Flight Simulator
- ASTEROIDS £8.00**
Can you survive the Asteroids belt

» KUMA « COMPUTERS



11 York Road, Maidenhead, Berks SL6 15Q
Tel: (0628) 71778/9 Telex: 849462 TELFAC.KUM

THE SOFTWARE LIST

- FROGGER £8.00**
Guide the frogs safely home
- FENDER £5.50**
Fly a high speed space cruiser
- MILLIPEDE £8.00**
Fight or evade a giant Millipede
- 4D £14.50**
Time warping strategy game
- TOMBS KARNAK £8.65**
50 level adventure game
- CAVE DIVER £8.00**
Beat the trolls and find the hidden chalice
- LABYRINTH £8.65**
Escape from a 3D maze
- PRUNES OF PENGE £8.00**
First political arcade game
- CAMPAIGN 14 £8.00**
Defend the Universe against alien attack
- PELMANISM £8.00**
Memory Test Game
- MIDAS £8.65**
Pursue a fast, tricky opponent
- GLOBAL WAR III £10.50**
Can you win WW III
- SCOOP £10.50**
Edit, print and distribute a newspaper
- THE TOMB £10.50**
Explore an Egyptian tomb
- COSMIC SCRAMBLE £10.50**
Attack the alien stronghold (Hiscor 21070)
- ENCOUNTER £8.65**
Rescue a kidnapped girl from thugs
- GOLF £8.00**
A round of Golf with your Sharp
- TREASURE ADVENTURE £10.50**
Adventure Game
- MAP OF THE U.K. £10.50**
Educational U.K. Geography
- KINGS & QUEENS £10.50**
English Monarchs since 1066 — Educational
- SEND FOR NEW MAY CATALOGUE**
- FORTH (Disc) £49.95**
Fully structured self extending language
- HISOFT PASCAL (Disc) £40.00**
Fast Pascal Compiler C.P.M.
- WDPRO (Cassette) £39.50**
Professional Word Processor
- FORTH (Cassette) £34.95**
Fully Structured Self extending language
- HISOFT PASCAL (Cassette) £35.00**
Fast Pascal Compiler

commodore

- DATABASE £21.30**
255 pages of 10 items
- NON-VAT ACCOUNTS £21.30**
Up to 80 entries/month

sinclair

- MAP OF THE UK £10.40**
Educational J.K. Geography

ATARI

- ADVENTURE PARAGON £8.65**
New Adventure game

EPSON HX-20

- DESK MASTER 1 £29.50**
Office Aid Calculator program
- DESK MASTER 2 £29.50**
Word Processor
- DESK MASTER 3 £29.50**
Spread Sheet Calculator
- DESK MASTER 4 £29.50**
The Friendly Terminal
- DESK MASTER 6 £19.50**
Decision Maker
- DESK MASTER 7 £19.50**
Editor/Assembler
- HOME BUDGET £17.35**
Home Accounting System
- HORSE RACE FORECAST £24.50**
Win or place — it's a winner!
- COMPUTAX £49.50**
Personal Income Tax Planning
- DATABASE £29.50**
Plus lots more ...

OSBORNE 1

- FORTH £85.00**
Full FIG Forth
- TX £80.00**
CP/M File Transfer Program

Please tick box for information required, and send coupon to:
Kuma Computers, Ltd. 11 York Road, Maidenhead, Berks SL6 15Q

- | | | | |
|--------------------------------------|--------------------------|------------------------------------|--------------------------|
| <input type="checkbox"/> SIRIUS-1 | <input type="checkbox"/> | <input type="checkbox"/> NEWBRAIN | <input type="checkbox"/> |
| <input type="checkbox"/> SHARP A+B | <input type="checkbox"/> | <input type="checkbox"/> COMMODORE | <input type="checkbox"/> |
| <input type="checkbox"/> OSBORNE-1 | <input type="checkbox"/> | <input type="checkbox"/> SINCLAIR | <input type="checkbox"/> |
| <input type="checkbox"/> EPSON HX-20 | <input type="checkbox"/> | <input type="checkbox"/> ATARI | <input type="checkbox"/> |

NAME

ADDRESS

POST CODE



DO YOU WANT A WORD PROCESSOR FOR YOUR BBC OR A WORD PROCESSOR FOR YOUR BBC ?

Yes there is a difference between word processors and we can offer the best because it's the FIRST PROFESSIONAL DISC BASED WORD PROCESSOR FOR THE BBC COMPUTER.

The MERLIN SCRIBE uses the disc on your computer the same way that professional systems costing many hundreds of pounds do.

Until now any document you wished to create has been limited to the few pages which could be squeezed into your computer memory. This means the computer is really using the disc as if it were a cassette!

The SCRIBE can create documents far greater in size than the computer memory, and really uses the disc as it was intended to be used. SCRIBE automatically loads and offloads pages between disc and memory without you even knowing it's happening!

Amongst the many super features available are:

- * Optional 40 & 80 column screen format selection.
- * On screen formatting - you see it as it's printed INCLUDING UNDERLINING.
- * Right justify, word wrap, insert, delete, move copy & centre.
- * Document merge (will merge two documents into one from disc).
- * Addresses all four drive units allowed by your BBC disc system.

Plus many more professional features.

SCRIBE comes in ROM with five minute fitting instructions, printer utilities on disc and a comprehensive manual.

PRICE £59.95

Also MERLIN SCRIBE in ROM for cassette machines £29.95, and on tape £19.95. All prices include VAT. Post and Packaging 60p.



MERLIN COMPUTER PRODUCTS (BUCON LIMITED)
18 MANSEL STREET, SWANSEA, SA1 5SG. TEL (0792) 467980



GREAT VALUE FOR MONEY WITH OUR SPECTRUM

SOFTWARE

GAMES FOR THE 16K OR 48K SPECTRUM

MONGOOSE (M/C) & BEAR ISLAND	£4.95
Fast and furious arcade action with these colourful high speed games.	
REVERSI (M/C) & POKER DICE	£4.95
Classic strategy and addictive gambling games.	
TIME-LINE (M/C) & TASKS	£4.95
A superb 16K text adventure and a collection of mind stimulating puzzles.	
MAGIC CASTLE (M/C 48K only)	£4.95
A gripping text adventure. Rescue the princess but beware of booby traps.	
3D MAZE OF GOLD (M/C)	£5.95
Amazing full colour, high resolution views as you walk around a large labyrinth.	

EXTEND SPECTRUM BASIC (16K OR 48K) WITH

WHITE NOISE AND GRAPHICS (M/C)	£5.95
Adds many useful commands to BASIC including a WINDOW system and true EXPLOSION type sound effects. Extensive manual supplied.	

EDUCATIONAL PROGRAMS

CESIL	£5.95
A widely used 'O' level teaching language available for 16K or 48K Spectrum, DRAGON 32 and 16K ZX81. Supplied with a comprehensive manual.	
HAL	£5.95
Another popular 'O' level teaching language for a 16K or 48K Spectrum.	
VISUAL PROCESSOR	£5.95
Provides an on screen display of a simple micro-processor illustrating its internal operation as it runs your programs. With comprehensive manual. For the 16K or 48K Spectrum.	

OUR SOFTWARE IS NOW AVAILABLE FROM MANY COMPUTER SHOPS NATIONWIDE, OR DIRECT FROM US BY POST OR PHONE. S.A.E. FOR DETAILS. DEALER ENQUIRIES WELCOME.

GILSOFT

30 Hawthorn Road, Barry
South Glamorgan, CF6 8LE
Tel: 0446 736369

TELEPHONE YOUR ORDER WITH:



Are your finances driving you mad?

Do you find that working out your finances makes your head buzz?

Do you see red?

Don't worry, now you can have Hilton's **Personal Banking System** on your side, giving you a clear head start and (hopefully) putting you back into the black!

Maintain permanent records and fully detailed statements of your finances including:

★ All cheque book transactions and bank receipts

★ All standing order payments **Automatically Processed**

(monthly, quarterly, six-monthly or annually and for set number of payments)

In addition the ability to search, locate, delete or correct previous entries. List by category facility is included.

Additional **Bank Reconciliation** module available to automatically match your Bank Statement to your **Personal Banking System** account.

Full instructions included and **guaranteed** after sales maintenance provided.

★ **PBS ZX81 £8.95 (16K)**

★ **ZX SPECTRUM £9.95 (48K)**

★ **DRAGON £9.95 (32K)**

Bank reconciliation (for use with above) £5.

Ask for the PBS at your local computerstore, ORDER by POST (specifying machine) OR at the POST OFFICE using TRANSCASH ACCOUNT 302 9557



Hilton Computer Services Ltd
(Dept VC) 14 Avalon Road,
Orpington, Kent BR6 9AX

★ YOUR PBS IS NEVER OUT OF DATE ★

THE FLEXIBLE COMPUTER SYSTEM FOR THE FUTURE

ORIC-1



16k Oric £129.00 inc.
48k Oric £169.95 inc.
Now with FREE Software

ENHANCED

NOW AVAILABLE

ORIC SOFTWARE

(available on cassette only. Prices include VAT and post and packing)

ORIC FORTH language. Requires 48k machine.
Price £15.90

ORIC BASE for the maintenance of personal and small business information. Requires 48k machine.
Price £15.40

ZODIAC adventure game. Requires 48k machine.
Price £10.39

ORIC CHESS Requires 48k machine.
Price £10.39

NEW ORICMON A complete machine code monitor. Either 16k or 48k machines.
Price £15.90

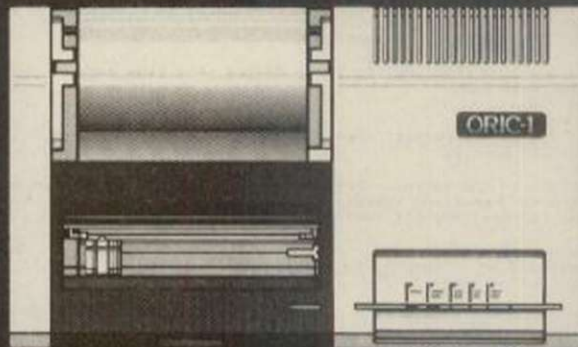
NEW HOUSE OF DEATH game. Requires 48k machine.
Price £10.39

NEW MULTI GAMES PACK 2 Requires 48k machine.
Price £7.30

NEW ORIC MUNCH game. Requires 48k machine.
Price £8.35

ORIC PRINTER

£169.95 inc.



Oric Products are pleased to announce the release of the four-colour printer.

The Printer uses standard 4½ inch paper and is switchable between 40 and 80 characters per line.

The writing mechanism is a clever arrangement of four miniature ball-point pens (red, green, blue and black inks.)

There are 15 programmable character sizes and four different drawing angles.

The pen plotting facility allows the drawing of complex diagrams and pictures.

The price includes an integral power supply and printer lead.

You may place your order by phoning our telesales number on ELY (0353) 2271/2/3/4 or by completing the postal form below:

Payment may be made by cheque, postal order, Barclaycard Visa or Access.
All cheques and postal orders should be made payable to Tansoft Ltd.
For credit card payment please quote Access, Barclaycard Visa No.

Name _____

Address _____

All orders should be sent to Tansoft Ltd,
3 Club Mews, Ely, Cambs CB7 4NW

Full colour brochure and software catalogue
is available on request.

Description	Qty	Price
TOTAL		

Trade enquiries welcome. All prices are inclusive of VAT

Table 1. Variables used.

o\$	array of object descriptions
l	array of object locations
i	number of objects being carried
set	pointer to subroutine that deals with the current location
up, do, we, no, so, ea	pointers to surrounding locations
l\$	current location description
i\$, a\$, b\$	input string, command and parameter respectively
init	pointer to initialisation routine
n	For-Next control variable
fed, found, sp, und, unc	} various flags

TIME

```

10 LET a$="": LET fed=0: LET l=0: LET set=1000: LET init=5000
12 POKE 23609,10: BORDER 0: PAPER 0: INK 7: GO SUB 8000
15 GO SUB init
20 LET no=0: LET we=no: LET ea=no: LET so=no: LET up=no: LET do=no
30 LET l$="": GO SUB set
40 CLS: PRINT l$
60 LET found=0: FOR n=1 TO 11+(set<>1180): IF l(n)<>set THEN NEXT n: GO TO 90
63 IF NOT found THEN PRINT "I can see...": LET found=1
65 PRINT "a "l$(n)
70 NEXT n
80 GO TO 100
90 IF a$="look" AND NOT found THEN PRINT "I can't see anything special"
100 BEEP .01,10: INPUT "What shall I do?": LINE l$: IF l$="" THEN GO TO 100
102 FOR n=1 TO LEN l$: IF l$(n)="A" AND l$(n)<"2" THEN LET l$(n)=CHR$(CODE$(n)+32)
103 NEXT n
105 IF set=1240 AND RND>.95 THEN PRINT "The dog awoke and killed you!": GO TO 9000
107 GO SUB 500: PRINT INK 6:j$a$:"j$b$
110 IF a$="n" AND no THEN LET set=no: GO TO 20
120 IF a$="s" AND so THEN LET set=so: GO TO 20
130 IF a$="w" AND we THEN LET set=we: GO TO 20
140 IF a$="e" AND ea THEN LET set=ea: GO TO 20
150 IF a$="d" AND do THEN LET set=do: GO TO 20
155 IF a$="u" THEN GO TO 6100
160 IF a$="r" THEN GO TO 40
170 IF a$="help" THEN PRINT "No Chance!": GO TO 100
180 IF a$="take" OR a$="get" THEN GO TO 2000
190 IF a$="put" OR a$="drop" THEN GO TO 4500
200 IF a$="open" THEN GO TO 2500
205 IF a$="feed" THEN GO TO 3500
210 IF a$="look" THEN GO TO 60
215 IF a$="swim" THEN GO TO 4000
220 IF a$="break" OR a$="smash" THEN GO TO 6000
225 IF a$="light" THEN GO TO 7500
230 IF a$="read" THEN GO TO 6500
240 IF a$="unlock" THEN GO TO 3000
250 IF a$="i" THEN GO SUB 5500: GO TO 100
260 IF a$="insert" THEN GO TO 7000
275 IF a$="quit" THEN GO TO 9000
280 IF a$="save" THEN SAVE "TimeSwitch" LINE 20: PRINT "Verify": VERIFY "": GO TO 100
490 IF LEN a$=1 THEN PRINT "I can't ": GO TO 100
499 PRINT "I can't "j$a$:"j$b$": GO TO 100
500 IF l$(1)="" AND LEN l$=1 THEN LET l$=l$(2) TO 1: GO TO 500
502 LET sp=0: LET a$="": LET b$="": FOR n=1 TO LEN l$
505 IF l$(n)="" AND NOT sp THEN LET sp=1: GO TO 520
510 IF NOT sp THEN LET a$=a$+l$(n)
515 IF sp THEN LET b$=b$+l$(n)
520 NEXT n
530 RETURN
1000 LET l$="You are in a forest. There are paths leading north and south."
1010 LET no=1390: LET so=1030
1020 RETURN
1030 LET l$="You are in a forest, with paths leading north and east and a clearing to the west."
1040 LET no=1000: LET ea=1090: LET we=1060
1050 RETURN
1060 LET l$="You are in a clearing. In the centre is a time machine, which lacks a power source. Exit east."
1070 LET ea=1030
1080 RETURN
1090 LET l$="You are in the forest. There is a path running east-west."
1100 LET we=1030: LET ea=1120
1110 RETURN
1120 LET l$="You are in the forest. Through a gap to the north you can see a lake. The path runs east-west and there is a cave to the south."
1130 LET ea=1300: LET we=1090: LET so=1150
1140 RETURN
1150 LET l$="You are in a small cave. Daylight is to the north. There is a door to the west and an opening to the south."
1160 LET so=1180: LET no=1120
1170 RETURN
1180 LET l$="You are in a large cavern. There is a chest lying in one corner, and a skeleton in another. The only exit is to the north."
1190 LET no=1150
1200 RETURN
1210 LET l$="I can't see a thing!"
1220 LET up=1150
1230 RETURN
1240 LET l$="You are in a long passage. You can hear the sound of dripping water. To the north is a stair with a large dog sleeping on the bottom step."
1250 LET so=1210
1260 RETURN
1270 LET l$="You are on an island in the centre of the lake. There is a hole in the ground with a stair in it."
1280 LET do=1240
1290 RETURN
1300 LET l$="You are beside a lake. There is an island in the middle of the lake. To the west is the forest and to the north is a rocky."
1310 LET no=1330: LET we=1120
1320 RETURN
1330 LET l$="You are in a rocky. The lake is to the west, and there are some reeds to the north. Exits are south and north."
1340 LET no=1360: LET so=1300
1350 RETURN
1360 CLS: PRINT "I have just fallen into a swamp. Blug. Blug.. Blug.....": GO TO 9000
1390 LET l$="You are in a shrubbery. The lake is to the east. The forest is to the south, and meadow is to the north."
1400 LET no=1420: LET so=1000
1410 RETURN
1420 LET l$="You are in a meadow. The lake is to the south-east. To the south is the shrubbery and to the east is a tower."
1430 LET ea=1450: LET so=1390
1440 RETURN
1450 LET l$="You are at the foot of a tower. There is no door to be seen. To the west is the meadow and to the east are some reeds."
1460 LET we=1420: LET ea=1360: LET up=1480

```



```

1470 RETURN
1480 LET l$="You are at the top of the tower. To the south you can see the lake with the island in the centre and the forest beyond. In the centre of the platform is a glass case with a golden key inside."
1490 LET do=1450
1500 RETURN
2000 IF i>5 THEN PRINT "I can't carry any more!": GO TO 100
2002 IF b$="" THEN PRINT a$:" what?": GO TO 100
2005 LET found=0: FOR n=1 TO 12: IF o$(n)=(b$+" ") THEN LET found=1: GO TO 11: AND l(n)=sp
AND i<5 THEN PRINT "OK..": LET found=1: LET l(n)=0: LET i=i+1
2010 NEXT n
2020 IF NOT found THEN GO TO 499
2030 GO TO 100
2500 IF b$="" THEN INPUT "Open what?": LINE b$: GO TO 2500
2505 IF b$="door" AND set<>1150 THEN PRINT "What door?": GO TO 100
2507 IF b$="door" AND NOT und THEN PRINT "It's locked dumb!": GO TO 100
2510 IF b$="door" THEN PRINT "There is a stair going down.": LET do=1210: GO TO 100
2515 IF b$="chest" AND set<>1180 THEN PRINT "I see no chest!": GO TO 100
2517 IF b$="chest" AND NOT unc THEN PRINT "It's locked!": GO TO 100
2520 IF b$="chest" THEN PRINT "OK!": LET l(11)=set: GO TO 100
2530 GO TO 499
3000 IF b$="" THEN INPUT "Unlock what?": LINE b$: GO TO 3000
3005 IF b$="door" AND set<>1150 THEN PRINT "What door?": GO TO 100
3007 IF l(7) THEN GO TO 499
3010 IF b$="door" THEN LET und=1: PRINT "Click!": GO TO 100
3015 IF b$="chest" AND set<>1180 THEN PRINT "What chest?": GO TO 100
3020 IF b$="chest" THEN LET unc=1: PRINT "Clunk!": GO TO 100
3030 GO TO 499
3500 IF b$="" THEN INPUT "Feed what?": LINE b$: GO TO 3500
3510 IF b$="dog" THEN PRINT "Don't be silly!": GO TO 499
3520 IF set<>1240 THEN PRINT "There's no dog here!": GO TO 100

```

SLIDER

Colin Carruthers illustrates the dangers of spatio-temporal vortices to Spectrum Time Lords.

YOUR CLOSE encounter with a spatio-temporal anomaly has left you stranded in an alien land, thousands of years out of sync with your own time segment. Not only that, but you have forgotten where you parked your time machine. The object of the game is to find your way back to your own time.

When writing the game the first problem encountered was how to represent the various locations used in the program. Each location requires a description, a list of objects to be found at that location and a list of the surrounding locations and their directions.

The solution was to give each location a subroutine, where the description of the surroundings and pointers to the neighbouring locations are set. We decided that the objects would best be represented by two arrays, the first string array holding the description of each object and the second numeric array holding a pointer to the location of each object. A pointer value of zero indicates that that particular object is being carried.

The command decoder converts the input string into lower case, and splits the string into command and parameter. This allows input to both upper and lower case.

The game is played by typing in direct commands with verbs followed by nouns, for example:

GET ROPE

Some of the other commands recognised are n for north, s for south, e for east, w for west, u for up and d for down. In addition, there are a number of special commands. These include:

Save, which saves the current game; I, which is short for inventory, gives a list of all objects being carried; and R which is short for recap, clears the screen and repeats the description of the surroundings. Quit exits from the current game and asks if you want another try.

Once you have typed the program in, Save it by typing

GO TO 9990

This will automatically verify the recording. Anyone who is completely stuck may send for a special map to ease their frustration. These are available from Colin Carruthers at 22 Drylaw House Gardens, Edinburgh EH4 2UE. Please enclose a stamped addressed envelope and a cheque/postal order for 50p.

Table 2. Program breakdown

10-15	Initial set-up sequence
20-499	Main loop
500-530	Command decoder
1000-1500	Location Subroutines
2000-2030	Get/Take Subroutine
2500-2530	Open Subroutine
3000-3030	Unlock Subroutine
3500-3550	Feed Subroutine
4000-4010	Swim Subroutine
4500-4530	Drop Subroutine
5000-5080	Initialisation
5500-5550	Inventory Subroutine
6000-6030	Smash Subroutine
6100-6220	Up Subroutine
6500-6540	Read Subroutine
7000-7010	Game Over
7500-7530	Light Subroutine
8000-8500	Titles
9000-9020	Another Game?
9990	Save/Verify



```

3530 IF I(12) THEN PRINT "I have no dog food !": GO TO 100
3540 LET I=I-1: LET fed=1: LET up=1270: PRINT "Munch, munch !": LET I(12)=1180:
GO TO 100
3550 GO TO 499
4000 IF set=1120 OR set=1270 OR set=1300 OR set=1330 OR set=1390 OR set=1420 THE
N PRINT "Brr. The water is too cold !": GO TO 100
4010 PRINT "There is no water here !": GO TO 100
4500 LET found=0: FOR n=1 TO 12: IF a(n)=(b$) THEN PRINT "I found a "a(n)":
THEN PRINT "OK.": LET found=1: LET I(n)=set: LET I=I-1
4502 IF b$="" THEN PRINT a(n) " what ?": GO TO 100
4510 NEXT n
4520 IF NOT found THEN PRINT "I don't have "b$": !":
4530 GO TO 100
5000 LET und=0: LET unc=0
5010 DIM o$(12,1): DIM l(12)
5020 RESTORE 5030
5030 DATA "rope",1330,"rock",1330,"ladder",1300,"gold ring",1090,"gun",1390,"13
amp plug",1420
5035 DATA "golden key",1,"torch",1150,"battery",1270,"log",1270,"manuscript",1,
bone",1180
5040 FOR n=1 TO 12: READ o$(n),l(n): NEXT n
5080 RETURN
5500 LET found=0: FOR n=1 TO 12: IF l(n)<>0 THEN NEXT n: GO TO 3540
5510 IF NOT found THEN PRINT "I have the following...": LET found=1
5520 PRINT "a "a(n)
5530 NEXT n
5540 IF NOT found THEN PRINT "I don't have anything !":
5550 RETURN
6000 IF b$="" THEN INPUT (a$) " what ?": LINE b$: GO TO 6000
6010 IF b$="glass" OR set=1480 THEN GO TO 499
6020 IF I(2) THEN PRINT "Nothing to "a$": it with !": GO TO 100
6030 PRINT "Snash ! Tinkle !": LET I=I-1: LET I(7)=set: LET I(2)=set: GO TO 100

```

```

6100 IF set=1240 THEN GO TO 6200
6105 IF set=1450 AND up THEN LET set=up: GO TO 20
6110 IF I(3) THEN PRINT "There's no way up !": GO TO 100
6120 IF up THEN LET set=up: GO TO 20
6130 PRINT "I can't go up !": GO TO 100
6200 IF NOT fed THEN PRINT "There's a dog in the way !": GO TO 100
6210 LET set=1270: GO TO 20
6220 GO TO 499
6500 IF b$="" THEN INPUT "Read what ?": LINE b$: GO TO 6500
6510 IF b$="manuscript" THEN GO TO 499
6520 IF I(11) THEN PRINT "I do not have "b$": GO TO 100
6530 PRINT "It say's: PPS-TH Island ?": GO TO 100
6540 GO TO 499
7000 IF I(9) OR set=1060 THEN GO TO 499
7010 PRINT "You have successfully completed the adventure.": GO TO 9000
7500 IF b$="" THEN INPUT "Light what ?": LINE b$: GO TO 7500
7510 IF I(8) THEN GO TO 499
7520 IF set=1210 THEN LET no=1240: LET I$="You are in a small room. There is a
staircase to the east and a damp passage to the north.": GO TO 40
7530 PRINT "That didn't do much good.": GO TO 100
8000 CLS: PRINT "=====
T I M E S W I T C H
=====
8010 PRINT "You are stranded in the dia and distant past. You must find
your way back to your own time."
8020 PRINT "Press any key to start.": PAUSE 0
8030 FOR n=0 TO -10 STEP -1: BEEP .05,n: NEXT n
8050 RETURN
9000 INPUT "Do you want to try again ?": LINE a$
9010 IF a$="y" THEN RUN
9020 STOP
9990 CLEAR: SAVE "TimeSwitch" LINE 10: PRINT "Verify.": VERIFY: PRINT "OK":
STOP

```

wildings

COMPUTER CENTRE

A Member of the SPECTRUM Group.

WIGAN 11 Mesnes Street, Wigan, Lancashire L3 1QP.
Tel: Wigan (0942) 44382. Closed Wed.

BOLTON 23 Deansgate, Bolton, Gtr. Manchester BL1 1HH.
Tel: (0204) 33512. Closed all day Wed.

PRESTON 49 Fishergate, Preston, Lancashire PR1 8BH.
Tel: Preston (0772) 556250. Closed Thursday.

STOCKPORT 1 Little Underbank, Stockport, Cheshire, SK1 1LA.
Tel: Stockport 061-480 3435. Closed Thurs.

WARRINGTON 111 Bridge Street, Warrington, Cheshire, WA1 2AR.
Tel: Warr (0925) 38290. Closed Thurs.

All mail order enquiries to Wigan.

HARDWARE

BBC		ATARI		LYNX		SHARP	
	INC. VAT		INC. VAT		INC. VAT		INC. VAT
MODEL 'B' 32K	£399.00	ATARI 400 INC. BASIC	£147.95	LYNX 48K	£214.95	SHARP MZ80A	
MODEL 'B' 32K INC. DOS	£470.50	ATARI 400 + BASIC + CASSETTE UNIT	£185.95	TEXAS		INC. £75.00 OF SOFTWARE	£499.95
MODEL 'B' 32K INC. ECONET INT.	£447.50	ATARI 400 48K INC. BASIC	£214.95	T199/4A + SOFTWARE AND		SHARP PC1251	£ 79.95
MODEL 'B' 32K INC. DOS & ECONET INT.	£517.50	ATARI 400 48K + BASIC + CASS. UNIT	£264.95	JOYSTICKS	£149.95	SHARP CE 125 PRINTER AND	
'A' TO 'B' UPGRADE (INC. FITTING)	£135.00	ATARI 800 48K INC. BASIC	£294.95	DISK DRIVE	£169.95	CASSETTE FOR PC1251	£ 99.95
RAM UPGRADE (INC. FITTING)	£ 32.00	ATARI 800 48K + BASIC + CASS. UNIT	£329.95	PERIPHERAL EXP. SYSTEM	£149.95	MONITORS	
CANON 1 x 100K (100K)	£209.95	ATARI 410 RECORDER	£ 46.95	DISK CONTROLLER CARD	£169.95	MICROVITEC 14" COLOUR	£287.50
ACORN 1 x 100K (100K)	£264.95	48K RAM FOR 400	£ 94.95	RAM CARD (EXP. TO 48K)	£399.95	SANYO 14" COLOUR	£284.95
CANON 1 x 200K (200K)	£269.95	KEYBOARD FOR 400	£ 59.95	JOYSTICKS	£129.95	PRINCE 12" GREEN	£ 94.95
CANON 1 x 400K (400K)	£389.95	ATARI JOYSTICKS (PAIR)	£ 13.95	CASSETTE LEAD	£ 5.95	PRINTERS	
CANON 2 x 100K (200K)	£384.95	ATARI 850 INTERFACE	£134.95	DRAGON		EPSON RX80	£ T.B.A.
ACORN 2 x 100K (200K)	£389.95	I/O CABLE	£ 12.99	DRAGON 32 INC. JOYSTICKS	£174.95	EPSON FX80	£469.95
CANON 2 x 200K (400K)	£514.95	PRINTER CABLE	£ 28.50	JOYSTICKS	£ 19.95	EPSON MX100	£529.95
CANON 2 x 400K (800K)	£699.95	RS 232C CABLE	£ 25.00	LIGHT PEN	£ 12.95	SEIKOSHA GP 100A	£229.95
ACORN 2 x 400K (800K)	£799.95	MONITOR CABLE	£ 25.00	JUPITER		SEIKOSHA GP 250X	£264.95
PRINCE 12" MONO MONITOR	£ 94.95	DERE ATARI (BOOK)	£ 19.95	JUPITER ACE	£ 79.95	SHINWA CP80 FRICTION/TRACTOR	£279.95
MICROVITEC 14" COLOUR MONITOR	£287.50	QUICKSHOT JOYSTICK	£ 9.95	COLOUR GENIE		COMMODORE	
SANYO 14" COLOUR MONITOR	£284.95	ORIC		COLOUR GENIE 16K	£189.95	VIC 20 + CASSETTE UNIT + SOFTWARE	£134.95
BBC CASSETTE LEAD	£ 3.95	ORIC 1 16K	Not Available	16K RAM CARD	£ 36.95	COMMODORE 64	£299.95
BBC DOS KIT	£109.00	ORIC 1 48K INC. £40 SOFTWARE	£159.95	JOYSTICKS AND KEYBOARD	£ 49.95	C2N CASSETTE	£ 39.00
BBC PADDLES	£ 14.95	SINCLAIR		LIGHT PEN	£ 16.95	VIC 1515 PRINTER	£209.95
BBC PRINTER CABLE (PARALLEL)	£ 18.50	ZX81 1K	£ 49.95			VIC 1540 SINGLE FLOPPY DISK DRIVE	£299.95
P.L. DIGITISER	£144.95	ZX81 16K RAM PACK	£ 29.95			VIC 1515 PRINTER	£209.95
		ZX SPECTRUM 16K	£ 99.95			VIC 1540 SINGLE FLOPPY DISK DRIVE	£299.95
		ZX SPECTRUM 48K	£129.95			VIC JOYSTICK	£ 7.50
		ZX PRINTER	£ 39.95				

SOFTWARE

BBC		SPECTRUM		VIC 20		LLAMASOFT	
	INC. VAT		INC. VAT		INC. VAT		INC. VAT
ACORN/ST		BUG BYTE		SUMLOCK		ATTACK OF THE MUTANT CAMELS	£ 8.50
*CASTLE OF RIDDLES	£ 9.95	SPECTRES	£ 8.00	SKRAMBLE	£ 7.95	GRID RUNNER	£ 8.50
*MONSTERS	£ 9.95	SPECTRAL INVADERS	£ 5.00	JUMPIN' JACK	£ 7.95	ROX	£ 4.95
*SNAPPER	£ 9.95	IMAGINE		TRIAD	£ 7.95	ENGLISH SOFT	
*ARCADE ACTION	£11.95	ARCADIA	£ 5.50	ASTRO FIGHTERS	£ 6.95	SUPERFONT - CHAR. GENERATOR	£ 6.95
*METEORS	£ 9.95	SCHIZOIDS	£ 5.50	CHOPPER	£ 6.95	SPRITE MAKER	£ 6.95
*ARCADIANS	£ 9.95	AH DIDDUMS	£ 5.50	GRID TRAP	£ 7.95	BOOKS	
BUG BYTE		DK-TRONICS		SPACE RESCUE	£ 6.95	KNOW YOUR VIC 20	£ 5.95
*GALAXY WARS	£ 7.50	3D TANX	£ 4.95	PUZZLE PACK	£ 6.95	VIC 20 PROG. REF. GUIDE	£14.95
*CITY DEFENCE	£ 7.50	CENTPEDE	£ 4.95	SCORPION	£ 7.95	DRAGON COMPANION	£ 4.95
*MUSIC SYNTHESISER	£ 9.50	METEORIDS	£ 4.95	STARSHIP ESCAPE (16K)	£ 9.95	THE WORKING DRAGON	£ 5.95
*SPACE INVADERS	£ 7.50	DICTATOR (48K ONLY)	£ 4.95	IMAGINE		DRAGON BOOK OF GAMES	£ 5.95
A & F		3D SPAWN OF EVIL	£ 4.95	ARCADIA	£ 5.50	POWER OF THE DRAGON	£ 4.95
*FROGGER	£ 8.00	ULTIMATE		WACKY WAITERS	£ 5.50	KNOW YOUR DRAGON	£ 5.95
D.A.C.C.		JET PAK	£ 5.50	CATCHA SNATCHA	£ 5.50	DRAGON EXTRAVAGANZA	£ 4.95
*747 FLIGHT	£ 9.95	PSSST	£ 5.50	RABBIT		VIC REVEALED	£ 9.95
MICRO POWER		QUICKSILVA		SPACE PHREAKS	£ 4.95	VIC GRAPHICS	£ 6.95
*KILLER GORILLA	£ 6.95	MINED OUT	£ 7.95	ANNIHILATOR	£ 4.95	THE WORKING 64	£ 5.95
*CROAKER	£ 6.95	TIMEGATE	£ 8.95	KRELL	£ 4.95	64 COMPUTING	£ 5.95
*CHESS	£ 6.95	METEOR STORM	£ 7.95	SPACE STORM	£ 4.95	ATARI SOUND & GRAPHICS	£ 6.75
*LASER COMMAND	£ 6.95	ASTRO BLASTER	£ 7.95	SKRAMBLE	£ 4.95	ATARI PROGRAMMING	£11.75
		HEWSON		QUACKERS	£ 4.95	MAKING THE MOST OF ATARI	£ 8.95
		HEATHROW A.T.C.	£ 7.95	GALACTIC CROSSFIRE	£ 4.95	30 HOUR BASIC (BBC)	£ 5.95
				ORBIS	£ 4.95	BBC MICRO REVEALED	£ 7.95
ATARI				ALIEN SOCCER	£ 4.95	30 PROGRAMS FOR THE BBC	£ 5.95
MINER 2049ER (ROM)	£29.95	DRAGON 32		HOPPER	£ 4.95	THE BBC MICRO	£ 6.95
PREPPIE	£21.95	COMSIC ZAP	£ 7.95	MIKRO-GEN		21 GAMES FOR THE BBC	£ 5.95
PREPPIE II	£24.95	CUTHBERT GOES WALKABOUT	£ 7.95	PUCKMAN	£ 6.00	LYNX COMPUTING	£ 6.95
CHOPPLIFTER (ROM)	£29.95	DEFENSE	£ 7.95	COMMODORE 64		THE ORIC I	£ 5.95
ZAXXON	£27.95	DRAGON INVADERS	£ 7.95	RABBIT		OVER THE SPECTRUM	£ 6.95
BAJA BUGGIES	£21.95	FROGGER	£ 7.95	ESCAPE MCP	£ 9.95	SPECTRUM GRAPHICS	£ 6.95
AIRSTRIKE	£14.95	GALACTIC AMBUSH	£ 7.95	GRAVE ROBBERS	£ 9.95	THE SPECTRUM HANDBOOK	£ 5.95
CLAIM JUMPER	£24.95	GOLF	£ 7.95	CYCLONS	£ 9.95	THE ZX SPECTRUM	£ 5.95
AZTEC CHALLENGE	£12.95	KATERPILLAR ATTACK	£ 7.95	CENTROPODS	£ 9.95	SPECTRUM BOOK OF GAMES	£ 5.95
THE E FACTOR	£11.95	MOROCCO GRAND PRX	£ 7.95	PAKACUDA	£ 9.95	PROGRAMMING THE Z80	£11.75
SPIDER INVASION	£11.95	PHANTOM SLAYER	£ 7.95	INTERCEPTOR		PROGRAMMING THE 6502	£12.50
MELTDOWN	£11.95	SCARFMAN	£ 7.95	CRAZY KONG	£ 7.00	PROGRAMMING THE 6809	£11.35
UP UP AND AWAY	£14.95	SHUTTLE	£ 7.95	FROGGER	£ 7.00	BASIC COMPUTER GAMES	£ 7.50
NECROMANCER (32K)	£24.95	THE KING	£ 7.95	PANIC 64	£ 7.00	CASSETTES	
ALL ATARI PROGRAMS ARE ON 16K CASSETTE		TALKING ANDROID ATTACK	£ 7.95	TERMINAL		C12's 50p or 10 for	£ 4.00
UNLESS STATED OTHERWISE		TELE WRITER	£ 49.95	SUPER SKRAMBLE	£ 9.95		
MANY AVAILABLE ON DISK - PLEASE RING FOR PRICES		ESCAPE	£ 7.95				
		RACER BALL	£ 7.95				
		747 FLIGHT	£ 9.95				

COMPREHENSIVE SOFTWARE LISTS AVAILABLE. SEND LARGE S.A.E.

POSTAL CHARGES

COMPUTERS/PRINTERS ETC
POSTAGE CHARGED AT 1% OF
ORDER VALUE. MIN. £2.00

SOFTWARE

1 PROGRAM 50p, 2 PROGRAMS 75p,
3 OR MORE, NO POSTAGE

SEND YOUR PROGRAMS FOR EVALUATION -
GOOD ROYALTIES PAID

IMPORTANT NOTICE

We are not a 'Cash and Carry' operation. We demonstrate equipment and give first class service. We offer instant credit facilities to callers who have a current cheque or credit card and we take Visa, Access, Creditcharge and Spectrum cards without surcharge. All mail order to Wigan please, credit card holders simply phone your card number for prompt despatch.

Prices correct at time of going to press but subject to change without notice. E & O E

All mail order enquiries to Wigan



Shards

SOFTWARE

FOR ALL THE FAMILY

Shards

SOFTWARE

DRAGON 32

FAMILY PROGRAMS: 8 games/education/utility programs. Suitable for all the family £6.95.

FUN AND GAMES: 10 games for children of all ages £6.95.

LIVE AND LEARN: 6 educational programs. Suitable for the older child and adult £6.95.

CITY DEFENCE: Exciting missile command game for one player with joystick £5.75.

QUIZ PACK: 500 word vocabulary. Word quiz and crossword puzzle generator £3.95.

INFANT PACK: Pre-school education. Learn the alphabet and simple counting. 100% high res graphics £3.95.

JUNIOR PACK: Learn maths tables and word recognition the fun way! £3.95.

EMPIRE: Defeat the evil Dragon empire before it destroys the world. With 7 world maps and 8 difficulty levels. Strategy game in high res graphics, for all ages £6.95.

PUZZLER: Jigsaw puzzles were never like this! 4 puzzles, 2 levels and 4 degrees of difficulty. Suitable for older child and adult £6.95.

BBC B

FUN TO LEARN: Recommended education cassette for 6-12 years olds. 5 programs linked by menu, includes Space Hangman, Counting, Word Mixer, Calculator, and Codebreaker. Used in schools £6.95

LYNX 48K

GRID ATTACK: Can you survive the grid! Fast action with machine code. £4.95

ORIC 16/48K

GAMES PACK: Lunar Lander, Breakout and Nim. Superb value at only £4.95

SPECTRUM 48K

STREETFIGHTER: Cross the city, but avoid the deadly street fighter. Machine code action with 8 difficulty levels for only £3.95

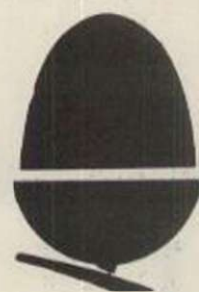
GENEROUS DEALER DISCOUNTS – Send now for details

Available at Boots and all good software outlets, or by mail order (send cheque/PO) to:

Shards

SOFTWARE

189 ETON ROAD
ILFORD, ESSEX
IG1 2UQ

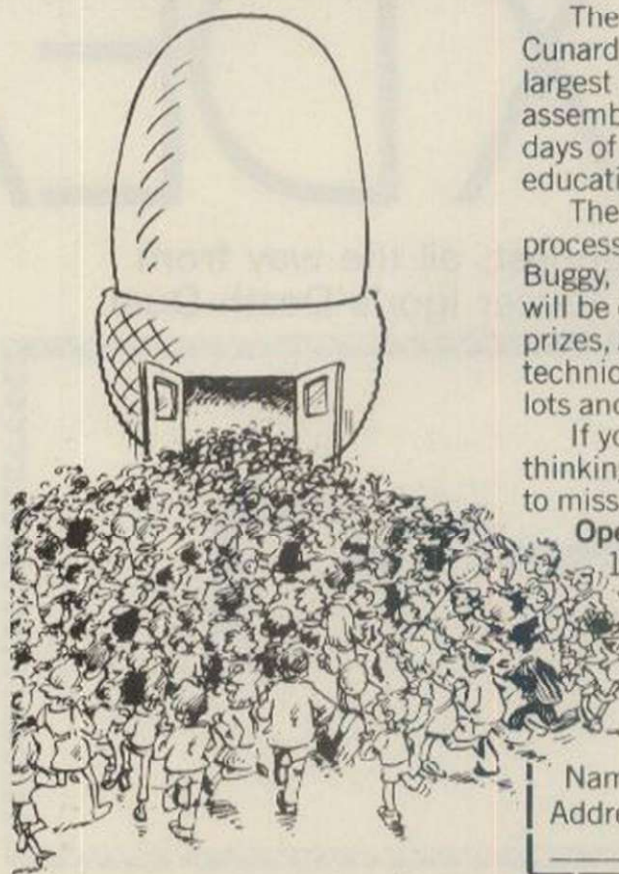


Everything for the Acorn and BBC microcomputer user.

ACORN USER EXHIBITION

Cunard International Hotel

Hammersmith,
25-28 August 1983



The Acorn User Exhibition at the Cunard, Hammersmith will house the largest display of Acorn products ever assembled under one roof. It will be four days of non-stop entertainment and education for parents and children alike.

The new Electron, the second processors for the BBC micro, the BBC Buggy, all the new software and hardware will be on show. There'll be competitions, prizes, Acorn experts to answer your technical questions, demonstrations and lots and lots of bargains.

If you are an Acorn owner, or just thinking about being one, you can't afford to miss it.

Opening hours: August 25th-27th, 10am-7pm; August 28th, 10am-4pm.

Admission charges: Adults £2 per ticket, Children £1 per ticket.

We have arranged for nearly every exhibitor to redeem the cost of your ticket when you buy something from their stand.

Group rates: 10% discount for parties of 10 or more.

Buses: Frequent services from central London.

Tubes: Hammersmith Broadway – Metropolitan, District and Piccadilly lines.

Car Parking: Several car parks in the immediate area.

For details of exhibition stands and advance ticket sales contact Computer Marketplace Ltd, 20 Orange Street, London WC2H 7ED. Tel: 01-930 1612.

ADVANCE BOOKING COUPON Miss the queue – buy your tickets in advance.
Computer Marketplace Ltd, 20 Orange Street, London WC2H 7ED.

Please send _____ Adult tickets at £2 _____ Childrens tickets at £1
enclose a cheque/postal order value £ _____ payable to Computer Marketplace Ltd.

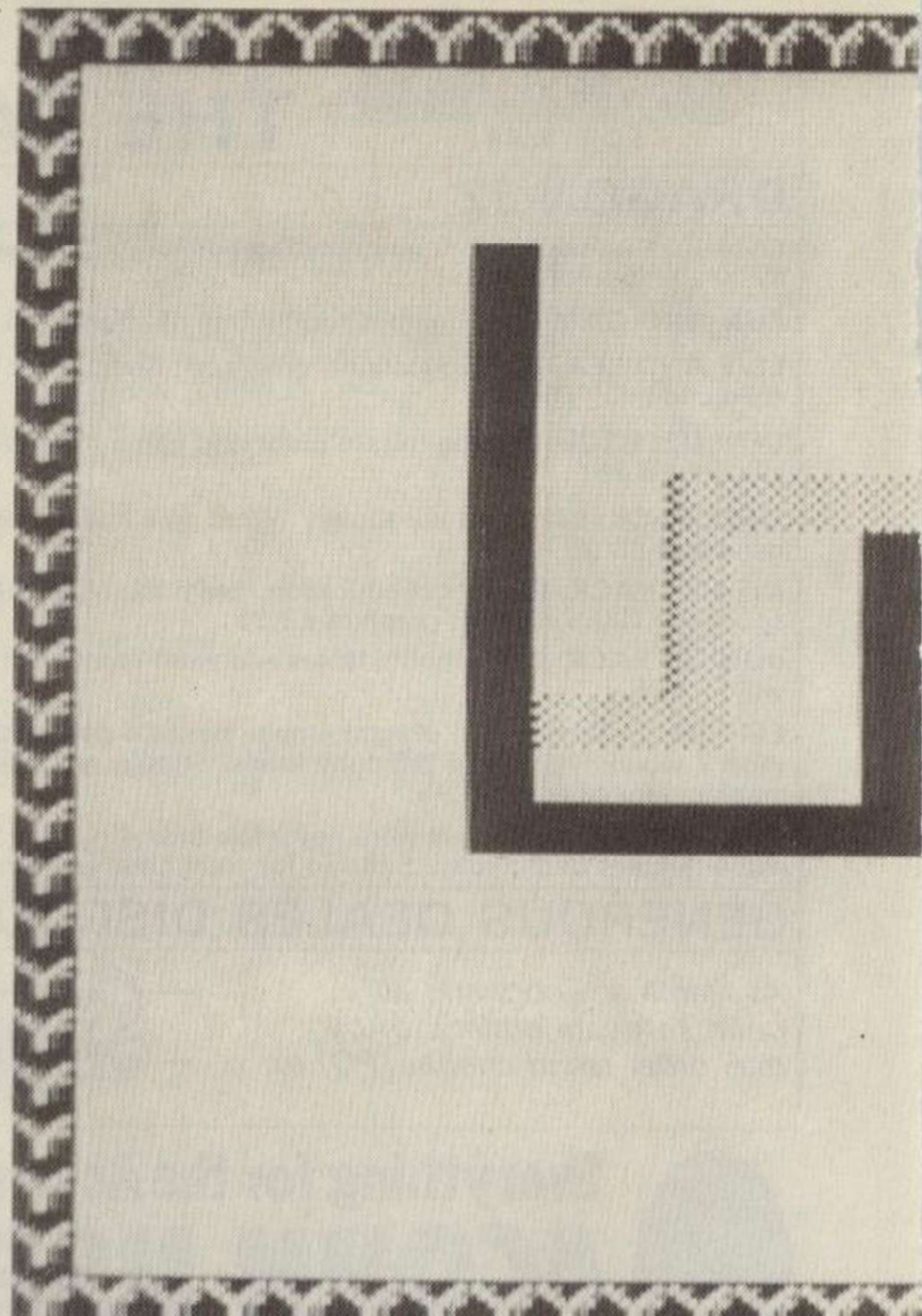
Name _____
Address _____

Figure 1. Decimal Loader.

```
10 REM AT LEAST 506
CHARS
20 FOR N=16514 TO 17110
30 INPUT B
40 SCROLL
50 PRINT N,B
60 POKE N,B
70 NEXT N
```

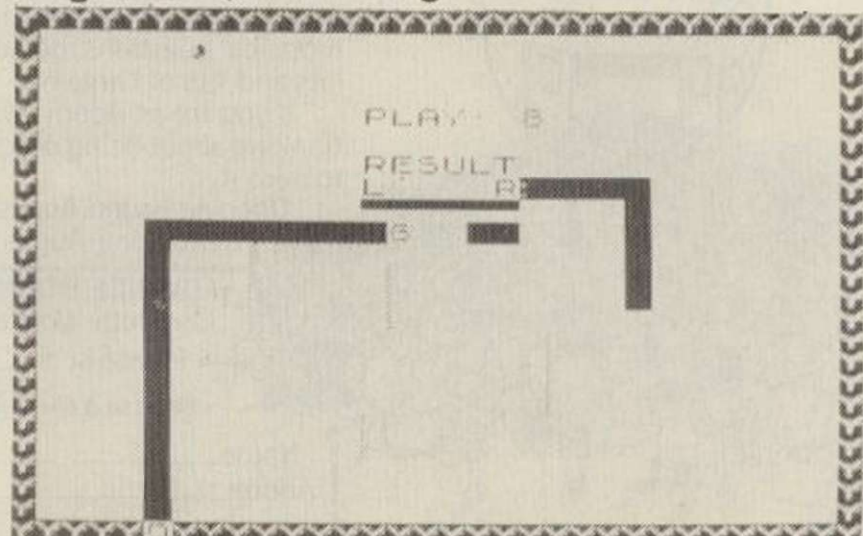
Figure 3. Main listing.

```
10 LET L=0
30 CLS
40 PRINT AT 0,0;"DEPTA"
50 GOSUB 500
70 IF INKEY$="Y" THEN GOTO 250
80 IF INKEY$<>"N" THEN GOTO 70
90 RAND USA 16514
100 LET L=L+1
110 POKE 16418,0
120 PRINT AT 4,13;"PLAY: ";L;AT
6,13;"RESULT";AT 7,13;"L R";
AT 8,13;" ";AT 9,13;" ";USR
17015;" ";USR 17024;" ";AT 10,
13;" ";AT 17,4;"SHALL I CON
TINUE ? (Y/N)"
130 IF USR 17015=10 OR USR 1702
4=10 THEN GOTO 190
140 IF INKEY$="Y" THEN GOTO 170
150 IF INKEY$="N" THEN GOTO 190
160 GOTO 140
170 RAND USA 16530
180 GOTO 100
190 PRINT AT 23,7;" ANOTHER GO
? (Y/N)"
200 FOR F=1 TO 40
210 NEXT F
220 IF INKEY$="Y" THEN GOTO 10
230 IF INKEY$="N" THEN STOP
240 GOTO 220
250 PRINT AT 0,0;" PUT IN 1,2,3
OR 4 FOR POSITION. "
260 POKE 16418,2
270 DIM A(3)
280 LET A(1)=17096
290 LET A(2)=16652
300 LET A(3)=17098
310 FOR F=1 TO 40
315 NEXT F
320 IF INKEY$="" THEN GOTO 320
330 IF INKEY$="N" THEN GOTO 90
335 PRINT AT 13,0;" "
337 PRINT AT 20,0;"POSITION ?(1
2,3 OR 4)"
340 INPUT I
350 IF I>4 THEN GOTO 340
360 IF I<0 THEN GOTO 420
370 PRINT AT 20,0;"PUT IN A CHA
RACTER OF PAPER."
380 INPUT A$
390 IF CODE A$>=64 AND (CODE A$
<128 OR CODE A$>191) THEN GOTO 3
80
400 POKE 17100,CODE A$
410 GOTO 460
420 PRINT AT 20,0;"CHANG ?(FROM
0 TO 255)"
430 INPUT II
440 IF II>255 THEN GOTO 430
450 POKE A(I),256-II-256*(II=0)
460 GOSUB 500
470 FOR F=1 TO 40
480 NEXT F
490 GOTO 250
500 PRINT AT 3,0;"(1) INITIAL S
PEED= ";256-PEEK 17096-256*(PEEK
17096=0);";AT 5,0;"(2) FIN
AL SPEED= ";256-PEEK 16652-256*(
PEEK 16652=0);";AT 7,0;"(3)
ACCELERATION= ";256-PEEK 17098-2
56*(PEEK 17098=0);";AT 9,0;"(
4) PAPER= """;CHR$ PEEK
17100;" """"
505 PRINT AT 13,0;"SHALL I CHA
NGE ANYTHING ? (Y/N)"
""N"" FOR PLAY."
507 PRINT AT 20,0;" "
510 RETURN
520 SAVE "TIS DUE"
530 RUN
```



ZXDEA

By special request, all the way from Yugoslavia, Tavcar Igor's Death Duel.



ZX-81

ATH DUEL

DEATH DUEL is a version for the 16K ZX-81 of the highly successful Spectrum game published last April. Written in machine code it improves on the Spectrum game by giving a choice of speed and acceleration.

Two people play at the same time. The players race around the screen leaving a trail behind them. Your object is to drive your opponent to crash either into your trail or his own. Steer clear of the border — that's fatal.

Before battle commences you can change the speed and acceleration and set the background character for the playing area. During play press T to freeze the action and B to return to Basic. Pressing Y will turn the acceleration on; N will turn it off. The border character shows which option has been chosen.

To enter the program create a Rem statement in line 1 with at least 596 characters. If you are typing it from the keyboard — rather than

using a program to create it — use Fast mode and remember that the first line contains 26 and each full line 32 characters thereafter.

Now type in the decimal loader in figure 1 as lines 20 to 70, after the Rem statement. Run the program to enter the decimal code in figure 2. Press Newline after you have entered each number.

Once all the code has been Poked into the Rem statement enter Stop to stop the loader, delete the lines 20 to 70 and type in the program in figure 3, again leaving the Rem statement in place. The program is now ready to run but should be saved first.

Use the following keys to steer:

Left Player	Right Player
1 — Up	0 — Up
Q — Down	P — Down
D — Right	N/L — Right
A — Left	K — Left

Figure 2. Decimal code.

```

15314-00 2200 1000 0000 1000
15319-00 0303 1000 0000 0000
15324-00 0303 1000 0000 0000
15329-00 0303 1000 0000 0000
15334-00 0303 1000 0000 0000
15339-00 0303 1000 0000 0000
15344-00 0303 1000 0000 0000
15349-00 0303 1000 0000 0000
15354-00 0303 1000 0000 0000
15359-00 0303 1000 0000 0000
15364-10 0303 1000 0000 0000
15369-10 0303 1000 0000 0000
15374-04 1000 0000 0000 0000
15379-04 1000 0000 0000 0000
15384-04 1000 0000 0000 0000
15389-04 1000 0000 0000 0000
15394-10 0303 1000 0000 0000
15399-00 0303 1000 0000 0000
15404-00 0303 1000 0000 0000
15409-00 0303 1000 0000 0000
15414-00 0303 1000 0000 0000
15419-00 0303 1000 0000 0000
15424-00 0303 1000 0000 0000
15429-00 0303 1000 0000 0000
15434-00 0303 1000 0000 0000
15439-00 0303 1000 0000 0000
15444-00 0303 1000 0000 0000
15449-00 0303 1000 0000 0000
15454-00 0303 1000 0000 0000
15459-00 0303 1000 0000 0000
15464-00 0303 1000 0000 0000
15469-00 0303 1000 0000 0000
15474-00 0303 1000 0000 0000
15479-00 0303 1000 0000 0000
15484-00 0303 1000 0000 0000
15489-00 0303 1000 0000 0000
15494-00 0303 1000 0000 0000
15499-00 0303 1000 0000 0000
15504-00 0303 1000 0000 0000
15509-00 0303 1000 0000 0000
15514-00 0303 1000 0000 0000
15519-00 0303 1000 0000 0000
15524-00 0303 1000 0000 0000
15529-00 0303 1000 0000 0000
15534-00 0303 1000 0000 0000
15539-00 0303 1000 0000 0000
15544-00 0303 1000 0000 0000
15549-00 0303 1000 0000 0000
15554-00 0303 1000 0000 0000
15559-00 0303 1000 0000 0000
15564-00 0303 1000 0000 0000
15569-00 0303 1000 0000 0000
15574-00 0303 1000 0000 0000
15579-00 0303 1000 0000 0000
15584-00 0303 1000 0000 0000
15589-00 0303 1000 0000 0000
15594-00 0303 1000 0000 0000
15599-00 0303 1000 0000 0000
15604-00 0303 1000 0000 0000
15609-00 0303 1000 0000 0000
15614-00 0303 1000 0000 0000
15619-00 0303 1000 0000 0000
15624-00 0303 1000 0000 0000
15629-00 0303 1000 0000 0000
15634-00 0303 1000 0000 0000
15639-00 0303 1000 0000 0000
15644-00 0303 1000 0000 0000
15649-00 0303 1000 0000 0000
15654-00 0303 1000 0000 0000
15659-00 0303 1000 0000 0000
15664-00 0303 1000 0000 0000
15669-00 0303 1000 0000 0000
15674-00 0303 1000 0000 0000
15679-00 0303 1000 0000 0000
15684-00 0303 1000 0000 0000
15689-00 0303 1000 0000 0000
15694-00 0303 1000 0000 0000
15699-00 0303 1000 0000 0000
15704-00 0303 1000 0000 0000
15709-00 0303 1000 0000 0000
15714-00 0303 1000 0000 0000
15719-00 0303 1000 0000 0000
15724-00 0303 1000 0000 0000
15729-00 0303 1000 0000 0000
15734-00 0303 1000 0000 0000
15739-00 0303 1000 0000 0000
15744-00 0303 1000 0000 0000
15749-00 0303 1000 0000 0000
15754-00 0303 1000 0000 0000
15759-00 0303 1000 0000 0000
15764-00 0303 1000 0000 0000
15769-00 0303 1000 0000 0000
15774-00 0303 1000 0000 0000
15779-00 0303 1000 0000 0000
15784-00 0303 1000 0000 0000
15789-00 0303 1000 0000 0000
15794-00 0303 1000 0000 0000
15799-00 0303 1000 0000 0000
15804-00 0303 1000 0000 0000
15809-00 0303 1000 0000 0000
15814-00 0303 1000 0000 0000
15819-00 0303 1000 0000 0000
15824-00 0303 1000 0000 0000
15829-00 0303 1000 0000 0000
15834-00 0303 1000 0000 0000
15839-00 0303 1000 0000 0000
15844-00 0303 1000 0000 0000
15849-00 0303 1000 0000 0000
15854-00 0303 1000 0000 0000
15859-00 0303 1000 0000 0000
15864-00 0303 1000 0000 0000
15869-00 0303 1000 0000 0000
15874-00 0303 1000 0000 0000
15879-00 0303 1000 0000 0000
15884-00 0303 1000 0000 0000
15889-00 0303 1000 0000 0000
15894-00 0303 1000 0000 0000
15899-00 0303 1000 0000 0000
15904-00 0303 1000 0000 0000
15909-00 0303 1000 0000 0000
15914-00 0303 1000 0000 0000
15919-00 0303 1000 0000 0000
15924-00 0303 1000 0000 0000
15929-00 0303 1000 0000 0000
15934-00 0303 1000 0000 0000
15939-00 0303 1000 0000 0000
15944-00 0303 1000 0000 0000
15949-00 0303 1000 0000 0000
15954-00 0303 1000 0000 0000
15959-00 0303 1000 0000 0000
15964-00 0303 1000 0000 0000
15969-00 0303 1000 0000 0000
15974-00 0303 1000 0000 0000
15979-00 0303 1000 0000 0000
15984-00 0303 1000 0000 0000
15989-00 0303 1000 0000 0000
15994-00 0303 1000 0000 0000
15999-00 0303 1000 0000 0000
17004-10 246 123 254 1
17009-40 90 33 195 66
17014-02 20 37 75 195 66
17019-20 1 33 197 66 52
17024-20 7 75 197 66 201
17029-33 34 64 54 0
17034-42 12 64 54 0
17039-35 55 188 66 119
17044-16 249 6 23 14
17049-33 13 35 32 252
17054-58 188 66 119 16
17059-244 66 31 43 158 16
17064-188 66 31 119 16 249
17069-6 22 14 33 13
17074-40 32 252 58 188
17079-66 119 16 244 201
17084-108 131 75 134 75
17089-2 2 1 8 2
17094-0 46 56 6 8
17099-1 0 6 0 14
17104-0 13 32 253 16
17109-249 201

```

EXCITING ADDITIONS FOR YOUR HOME COMPUTER

THE MAPLIN TALK-BACK for ZX81 and VIC20

Now your computer can talk

- ★ Allophone (extended phoneme) system gives unlimited vocabulary.
- ★ Can be used with unexpanded VIC20 or ZX81 — does not require large areas of memory.
- ★ In VIC20 version, speech output is direct to TV speaker with no additional amplification needed.
- ★ Allows speech to be easily included in programs.

Complete kits. Order As:
LK00A (VIC20 Talk-Back). Price £24.95.
LK01B (ZX81 Talk-Back). Price £19.95.
Full construction details in Maplin Projects Book 6. Price 70p. Order As XA06G.

SOUNDS GENERATOR FOR ZX81

3-Programmable tone generators with programmable attenuators turns your ZX81 into a mini-synthesiser. Noise generator with 3 pitch levels enables the creation of most special effect sounds. Single address access via BASIC with PEEK and POKE. Connects directly to expansion port socket or motherboard. Complete kit. Order As LW96E. Price £10.95. Full construction details in Maplin Projects Book 5. Order As XA05F. Price 70p.

ZX81 INPUT/OUTPUT PORT

Two bi-directional ports for a total of 16 input or 16 output lines. Includes one buffered output which can interface directly to CMOS. On board address selection allows for expansion to 6 ports with two boards. Complete kit. Order As LW76H. Price £9.25. Full construction details in Maplin Projects Book 4. Order As XA04E. Price 70p.

MODEM

A CCITT standard modem that connects directly to your telephone line via a B.T. approved transformer. Transmits and receives simultaneously on European standard frequencies at 300 baud. May be used to talk to any other 300 baud European standard modem including the Maplin Computer Shopping modem on 0702 552941 and any British Telecom Datel 200/300 Service modem. The modem's computer interface is RS232 compatible. A complete kit excluding case is available. Order As LW99H. Price £39.95. Full construction details in Maplin Projects Book 5. Order As XA05F. Price 70p.

KEYBOARD with ELECTRONICS for ZX81

- ★ Full size, full travel keyboard that's simple to add to your ZX81 (no soldering in ZX81).
 - ★ Complete with electronics to make "Shift Lock", "Function" and "Graphics 2" single key selections.
 - ★ Powered (with adaptor supplied) from ZX81's own standard power supply.
- Full details in Project Book 3 (XA03D). Price 70p.
Complete kit (excl. case) £21.90.
Order As LW72P.
Case £4.95. Order As XG17T.
Ready built-in case £29.95.
Order As XG22Y.

ZX81 TV SOUND

ZX81 sound on your TV set. Video reversing switch for normal or inverse video display. Can be used with the Talk-Back or Sounds Generator kits. Complete kit. Order As LK02C. Price £19.95. Full construction details in Maplin Projects Book 6. Order As XA06G. Price 70p.

ZX81 EXTENSION BOARD

Our ZX81 Extendiboard plugs directly into the ZX81 expansion port and will accept a 16K RAM pack and three other plug-in modules simultaneously. Parts are sold separately as follows:
PCB Order As GB08J. Price £2.32.
Edge Connectors (4 needed) Order As RK35Q. Price £2.39 each.
Track pins (1 pack needed). Order As FL82D. Price 85p per pack of 50.

INTERFACES for MODEM

Interfaces for most popular home computers which do not have RS232 ports will be available shortly. Interfaces for the ZX81 and VIC20 that include a complete Machine Code Communications Program are available. Order AS LK08J (ZX81 Modem Interface Kit). Price £24.95. Order As LK11M (VIC20 Modem Interface Kit). Price £9.45. Full construction details in Maplin Projects Book 7. Order As XA07H. Price 70p.

MAPLIN

Maplin Electronic Supplies Ltd., Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR.
Tel. Southend (0702) 552911 (Sales).

159-161 King St., Hammersmith, W6. Tel. 01-748 0926. 284, London Road, Westcliff-on-Sea, Essex.
Tel. (0702) 554000. Lynton Square, Perry Barr, Birmingham. Tel. (021) 356 7292.
All prices include VAT & carriage. Please add a 50p handling charge to orders under £5 total value.

Main listing.

For £ read hash character.

```
4 CLEAR500,32250
5 HS=0
6 DIMG(4,2)
10 CLS
15 PRINT" USE THE RED BUTTON FOR RANDOM", " JUMPS- UP
TO 3 PER GAME":PRINT
20 INPUT "DO YOU WANT GHOSTS TO GO THROUGH WALLS? (Y,N
OR S)";Q$
30 'PRINT MAZE
40 SCREEN0,1:CLS0
50 SC=0
60 L=3
70 PRINT@0,SC
80 FORA=6 TO510
90 IFRND(10)<4THENPRINT@A,CHR$(128); ELSEPRINT@A,"£";
100 NEXTA
110 PRINT@29,"L";L;
112 RC=3:PRINT@480,"R";RC;
115 EXEC 322B3: REM STORE WALLS
120 'POWER PILLS PLACING
130 FORP=1TO10
140 PR=RND(510)
150 PY=INT(PR/32):PX=PR-(PY*32)
160 IFPOINT(PX*2,PY*2)<>-1 OR PR<6 OR (PR>28 AND PR<32
) OR PR>479THEN140 ELSE 170
170 PRINT@PR,CHR$(239);
180 NEXTP
190 'GHOST PLACING
210 FORGH=1TO4:
220 GR=RND(510)
240 GY=INT(GR/32):GX=GR-(GY*32):IF GX>30 OR GX<1 THEN
220
250 IF GY<1 OR GY>14 THEN 220
280 G(GH,1)=GX:G(GH,2)=GY
290 IF POINT(GX*2,GY*2)=-1 THEN 300 ELSE 220
300 PRINT@GR,CHR$(255);
310 NEXTGH
320 PRINT@510,CHR$(175);
330 MX=30:MY=15
340 'MOVE YOUR MAN
```

DRAGON



MAZE

```
345 LC=LC+1
350 OX=MX:OY=MY
360 PRINT@MY*32+MX,CHR$(143);
370 IH=JOYSTK(0):IV=JOYSTK(1)
375 MY=MY+(IV<27 AND MY>0)
380 MY=MY-(IV>37 AND MY<15)
390 MX=MX+(IH<27 AND MX>0)
400 MX=MX-(IH>37 AND MX<31)
401 PE=PEEK(65280):IF PE = 126 OR PE=254 THEN GOSUB150
0
```

(listing continued on page 73)

A DIFFERENT, random maze every game; three random jumps per game, to get you out of tight corners; facility to choose at the start of the game whether the ghosts can pass through the walls. What more could you want?

This maze makes extensive use of colour and should really be played on a colour TV for maximum enjoyment. The game is written for a joystick connected to the right-hand port, and the button gives the random jump. The

(continued on page 73)

Software for
the BBC Micro



Android Attack

32k

A brilliant new game. The quality of the graphics and the smooth animation make this game unsurpassed. You are in the middle of a maze being chased by various androids, your only weapons are your hand laser and a quantity of land mines. These can be dropped at any point in the maze and later detonated under remote control. Beware of the "Smiley" master android and watch your oxygen levels — the lower the level the slower you move. Many different skill levels and a high score table. This is how "SNAPPER" should have been.

£8.95 incl.

Swarm

32k

Another new addition to our range. A formation of attacking birds control the sky. Your aim is simply to destroy them. Birds, bombs, eggs that hatch into diving eagles. This action packed game features exceptionally smooth graphics and novel sound effects. Joystick or keyboard operation.

£8.95 incl.



2 NEW EXCITING
GAMES!



COMPUTER
CONCEPTS

Dept. YC5
16 Wayside, Chipperfield, Hertfordshire WD4 9JJ
Telephone: Kings Langley (09277) 69727

DODG'EM

ARCADE ACTION — BBC MODELS A+ & B

Features: Two Driving Speeds, 15 Difficulty Levels, up to 3 Computer Controlled 'Jam' Cars, Hall of Fame, Sound, and Colour.

Available by Mail Order from Microgame Simulations or from larger branches of W.H. Smiths.

£5.95



73 The Broadway, Grantchester, Cambridge CB3 9NQ

THE PROFESSIONAL APPROACH TO SPECTRUM SOFTWARE

We are a well established software company expanding into the field of Personal Computing.

ENHANCE YOUR BASIC

Now available BASIC toolkit includes:

- Add logical arithmetic functions (AND, NOT, OR, XOR)
- List all BASIC variables and arrays
- Speed up your games with our fast screen output.
- Renumber your program (including GOTO and GOSUB)
- All routines in machine code
- Easily called from BASIC
- Fully documented
- Runs on 16K and 48K SPECTRUM

£6.95 inc VAT (+ 50p Postage & Packaging)

To order or to obtain details of our other products contact:

Malva Ltd.

REAL TIME SOFTWARE SPECIALISTS

70 ASHCURCH DR.
WOLLATON
BOTTINGHAM
B86 2RA

DECIMAL LISTING FOR MACHINE CODE

```

32256 142 6 0 16 142 4 0 166
32264 128 140 7 255 39 12 129 128
32272 39 4 230 160 32 241 167 160
32280 32 237 57 142 4 0 16 142
32288 6 0 166 128 167 160 140 5
32296 255 39 2 32 245 57 142 4
32304 0 198 99 166 128 140 5 255
32312 39 12 166 132 129 255 38 2
32320 231 132 166 128 32 239 57 0

```

MODIFICATIONS TO GNASH MAZE FOR KEYBOARD OPERATION

```

370 I$=INKEY$
375 IF I$="↑" AND MY>0 THEN MY=MY-1
380 IF I$=CHR$(10) AND MY<15 THEN MY=MY+1
390 IF I$=CHR$(8) AND MX>0 THEN MX=MX-1
400 IF I$=CHR$(9) AND MX<31 THEN MX=MX+1
401 IF I$="R" THEN GOSUB 1500
402 I$=""
510 IF LC<TI THEN 640
10 FOR N=32256 TO 32328
20 READ A:POKE N,A
30 NEXT
40 DATA 142,6,0,16,ETC
50 DATA 128,140,7,ETC
60 ENTER REST OF MACHINE CODE AS ABOVE

```

DRAGON

(continued from page 71)

score is at top left, and the number of lives, initially three, at top right. You start at lower right, and return there for a new life if the ghosts get you. When you eat a purple pill, the ghosts freeze for a random time of less than five seconds and you can get them, for 500 points. Purple pills count 100, and flowers 10 points.

A version for keyboard is also included, in which case R gives the random jump. The arrow keys move your man. You can also remove the delay in line 510, without which the joystick is almost impossible to use.

The program uses some small machine-code routines, mainly to clean up ghost damage to the maze, and these should be loaded to addresses 32256 onwards, using a data statement to Poke the codes to the addresses shown.

CLEAR200,32256

before doing this. Then save this machine code to tape, and clear your Basic loader from memory. Load the Basic program for the game and also save this to tape. On subsequent occasions type

CLEAR200,32256

then CloadM, then Cload and finally Run. Good hunting! For a faster game, type

POKE&HFFD7,0

(listing continued from page 71)

```

405 IF POINT(MX*2,MY*2)=0 OR POINT(MX*2,OY*2)=0 OR POINT(OX*2,MY*2)=0 THEN MX=OX:MY=OY:PRINT@MY*32+MX,CHR$(175);:GOTO340
410 IFPOINT(MX*2,MY*2)=-1 AND (MY*32+MX)>6 AND POINT(MX*2,OY*2)<>0 AND POINT(OX*2,MY*2)<>0 THEN SC=SC+10
420 IFPOINT(MX*2,MY*2)=7 AND POINT(MX*2,OY*2)<>0 AND POINT(OX*2,MY*2)<>0 THEN SC=SC+100:GOSUB650
430 IFPOINT(MX*2,MY*2)=8 ANDPOINT(MX*2,OY*2)<>0 AND POINT(OX*2,MY*2)<>0 THEN GOSUB700
440 IFPOINT(MX*2,MY*2)=2 AND POINT(MX*2,OY*2)<>0 AND POINT(OX*2,MY*2)<>0 THEN SC=SC+500
460 IF LC>TI THEN GOSUB 750
470 PRINT@MY*32+MX,CHR$(175);
490 PRINT@0,SC;
500 'MOVE GHOSTS
510 IF LC<TI THEN FOR D=1 TO 110:NEXTD:GOTO 640
520 FORGH=1TO4
530 'STORES OLD GHOST POSNS
540 HY=G(GH,2):HX=G(GH,1)
550 R=INT(RND(0)+.5)
560 GX=G(GH,1):GY=G(GH,2)
570 IF GY<14 THEN GY=GY-R*(GY<MY)
580 IF GY>1 THEN GY=GY+R*(GY>MY)
585 PO=POINT(GX*2,GY*2)
590 ON PO+2 GOSUB 970,890,970,800,820,800,800,800,800,800
597 R=INT(RND(0)+.5)
598 HY=GY
599 IF GX<30 THEN GX=GX-R*(GX<MX)
600 IF GX>1 THEN GX=GX+R*(GX>MX)
610 PO=POINT(GX*2,GY*2)
620 ON PO+2 GOSUB 970,890,970,800,820,800,800,800,800,800
621 HX=GX
625 NEXT GH
630 EXEC 32302
631 FORGH=1 TO 4:PRINT@G(GH,1)+32*G(GH,2),CHR$(255);:NEXT GH
635 EXEC 32256:REM REPRINT WALLS
640 GOTO340
650 LC=0:REM LOOP CTR
652 TI=RND(25)+25
655 FL=0:REM GHOST REPLOTT FLAG
660 FORGH=1TO4:GX=G(GH,1):GY=G(GH,2)
670 PRINT@GY*32+GX,CHR$(159);
680 NEXTGH
690 RETURN
700 L=L-1:MX=30:MY=15:PRINT@30,L;
710 IFL=0THENGOTO2000
720 FORN=25 TO 10 STEP-1:SOUNDN,1:NEXTN
730 RETURN
740 RETURN
750 'RESET GHOSTS
755 IF FL=1 THEN RETURN
760 FORGH=1 TO 4:GX=G(GH,1):GY=G(GH,2)
770 PRINT@GY*32+GX,CHR$(255);
780 NEXTGH
785 FL=1:REM SET REPLOTT FLAG
790 RETURN
800 GX=HX:GY=HY
805 G(GH,2)=GY:G(GH,1)=GX
810 RETURN
820 'GHOSTS GET THEIR MAN
830 FOR N=1 TO 10:SOUNDN,1:NEXTN
840 L=L-1:PRINT@29,"L";L;
850 IFL=0THENGOTO2000
860 PRINT@MY*32+MX,CHR$(143);
865 G(GH,1)=MX:G(GH,2)=MY
870 MX=30:MY=15
880 RETURN
890 IF Q$="S" AND RND(0)<.5 THENGX=HX:GY=HY:G(GH,1)=GX:G(GH,2)=GY:RETURN
900 IFQ$="N" THEN BX=HX:BY=HY:G(GH,1)=GX:G(GH,2)=GY:RETURN
910 G(GH,1)=GX:G(GH,2)=GY
920 IFPOINT(HX*2,HY*2)=0 THEN PRINT@HY*32+HX,CHR$(128); ELSE PRINT@HY*32+HX,CHR$(35);
930 RETURN
960 IF Q$="N" THEN RETURN
970 PRINT@HY*32+HX,CHR$(35);
980 G(GH,1)=GX:G(GH,2)=GY
990 RETURN
1500 RC=RC-1:PRINT@480,"R";(RC AND RC>-1);:IFRC<0 THEN RETURN
1510 R=RND(510)
1520 EY=INT(R/32):EX=R-(EY*32)
1530 IFPOINT(EX*2,EY*2)<>-1 THEN 1510
1540 MY=EY:MX=EX:PRINT@MY*32+MX,CHR$(175);:OX=MX:OY=MY
1550 RETURN
2000 IF HS<SC THEN HS=SC
2010 CLS3:PRINT"GAME OVER":PRINT:PRINT"SCORE ";SC:PRINT:PRINT"(RECORD ";HS;")";
2020 INPUT"ANOTHER GAME (Y OR N)";Q$
2030 IF Q$="Y" THEN 10 ELSE END
2100 REM CHANGE 587 TO AN ACTIVE LINE TO ALTER RATIO OF X:Y GHOST MOVEMENTS. PROGRAM WILL BE A LITTLE SLOWER

```

New from ...

MIKRO-GEN

SPECTRUM Software

COSMIC RAIDERS (16K) £5,95

You — the only remaining pilot of the "Earth Defence Fleet" — have the daunting task of defending the Earth from attack by alien beings that have already set up a base of their own on earth.

- * Radar Scanner display in hi-res *
- * Full colour and sound effects *
- * From the author of Spectrum 'Scramble' *
- * 100% machine code *



SPACE ZOMBIES (16K) £5,95

Shooting through space you are ambushed by a fleet of Space Zombies flying at you in formation, swooping and diving at you. Destroy them, if you can! But in destroying them, you attract more to the area, and the game gets progressively harder.

- * Full screen hi-res graphics *
- * 1 or 2 players * Joystick option *
- * Full sound and colour *
- * Three playing speeds *

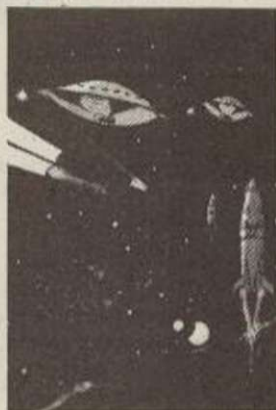


MINES OF SATURN and RETURN TO EARTH £5,95

Mines of Saturn While piloting a routine orbit of Saturn, you are caught up in a radiation storm which forces you into the giant planet's rings. Your energy drained, you make a forced landing on the planet's surface. Luckily you crashed near an abandoned mining base and you set off in search of some di-lithium crystals to refuel your stranded space ship. Can you do it?

Return to Earth Having escaped from your previous dilemmas, you reach Earth Station 1, but fail to make radio contact. You effect a safe if harrowing manual docking. On entry you find it deserted, and the control room destroyed. You must explore the station and find some way to alert Earth of your predicament, but beware, many of the rooms are identical, there is extensive damage, and signs of alien intruders.

(16K) Text Adventure



Graphic Adventure (48K) MAD MARTHA £6,95

Poor little Henry is the hen-pecked hero of this domestic tale. One night he can take no more. He steals his wages from his wife's purse, sneaks out of the house being careful not to wake the baby or trip over the cat, and heads for the bright lights to have some fun. Trouble is he runs out of money. His only way to raise some cash is to gamble his few remaining pounds on the spinning wheel of the roulette table. Just as Henry is getting into his evening his wife — Mad Martha — has noticed his absence. Realising Henry has absconded with the housekeeping she sets out after him with an axe. Guess what part you play in this happy tale? That's right, you're Henry. Watch out for that axe!



Access or Visa Card holders

please telephone (0344) 27317 (9am-6pm)



Please add 40p per order for post & packing

Name _____ Address _____

Cosmic Raiders Space Zombies
 Mines of Saturn/Return to Earth Mad Martha

MIKROGEN, Dept SP, 24 Agar Crescent, Bracknell, Berkshire, RG12 2BK

HARDWARE ZX81,

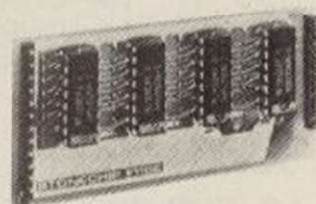


PANDA

The famous Panda Expandable Ram Pack, massive 16K add-on memory which can easily be expanded to 32K with an optional plug-in module. Supplied in no-wobble design, rugged, injection moulded case, contoured to fit the ZX81 snugly. Comparable with other add-ons (printer etc). LED on/off indicator. No additional power needed just plug in and go. British designed and made from top quality components throughout, guaranteed 12 months **ONLY £19.95**

EXPANSION MODULE

The 16K 'Panda' is easily expanded from 16K to 32K by adding this expansion module as and when you need it. **£14.50**



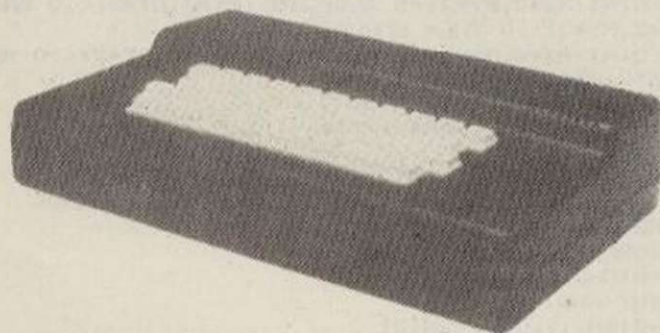
NEW NO FRILLS ZX81 — 16K RAM

Fully boxed tested
Guaranteed
£18.50 Inclusive

64K version £48.00

Made in Britain
Amazing Value — All in Price

PROFESSIONAL CASED KEYBOARD TYPE FD42



MODELS FOR ZX81 OR SPECTRUM

(Please state which)

The Fuller FD42 has long been our most popular seller, its sturdy, attractive injection moulded ABS case is rigid and rugged enough to withstand many years of use and converts your computer into a professional unit with a full typewriter size keyboard having 42 full travel, long-life keys etched with either ZX81 or Spectrum graphics.

Installation is simplicity itself requiring neither soldering, special skills or knowledge. The computer P.C.B. fits inside the case giving access to the user ports as before for the addition of accessories i.e. RAM expansion pack, printer etc.

A RAM adaptor board is available to enable RAM packs to be fitted inside the keyboard case and the Power Supply Unit can also be fitted if desired. **ONLY £29.95**

TYPE FDS FOR ZX81 OR SPECTRUM

Our new advanced keyboard has the same, fine specifications as the FD42 system, but with a new re-designed case, space bar and double-sized shift and enter keys. A must for the discerning ZX81 or Spectrum user. **ONLY £39.95**

Ram Adaptor Boards for the ZX81

Allows you to fit your Ram Pack inside the FD42 system. Leaving free access to user port **Price £9.75**

SPECTRUM, VIC-20 AND JUPITER ACE

AVAILABLE NOW
ZX SPECTRUM
32K RAMPACK

Simply plugs into user Port at rear of computer and increases your 16K Computer instantly to 48K **ALL MODELS!!**
£39.95

- Fully Compatible with all accessories.
- No need to open computer and invalidate guarantee.
- Why send your computer away and wait weeks for upgrade.
- Fully cased, tested and guaranteed.

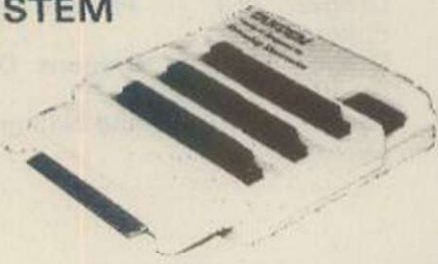
STOP PRESS Issue 2 only
 16K Spectrum owners — upgrade to 48K with a Spectrum Upgrade Pack complete with full instructions. No Soldering
ONLY £25.00

New, the Vixen RAM Cartridge for the VIC-20. Switchable between 16K or 8K + 3K gives you the option of full 16K RAM or 8K and 3K RAM in one pack. Simply plugs into rear expansion port. No re-addressing of existing basic programs needed.
ONLY £39.95 inc P&P



THE EXPANDABLE EXPANSION SYSTEM

Gives 4 expansion slots for VIC-20 cartridges. Custom-designed case. Plugs directly into computer. Fitted with ROM socket for expansion. No extra power supply needed.
£29.95



MORE MEMORY FOR YOUR JUPITER ACE

PACER 16K EXPANDABLE RAM
 The uniquely expandable 16K RaW Pack, similar in concept to the "ZX Panada" but for the incredible Jupiter Ace. Complete in attractive, solidly built, injection moulded case. For more power to faster FORTH . . . you need a Pacer for **ONLY £25.00**
16K EXPANSION MODULE
 Increase your Pacer potential to 32K with the plug-in 16K Expansion Module for **ONLY £16.00**



THE SOUND EXPANDER

A superb economical addition to your ZX Spectrum. Clear, dynamic sound effects will really enhance your enjoyment of the new exciting programs available for the Spectrum. Our new sound amplifier comes complete with lead, volume adjuster, built-in loudspeaker. Simply plug into the mic input, it sits neatly behind the Spectrum.
ONLY £7.50

ZX KLIK-KEYBOARD



If, like many ZX81 users, you are fed up with the dead feel of the touch sensitive keypad then consider the well tried 'Klik-Keyboard'. This is a simply fitted genuine push button keyboard which has been designed as an existing keypad. *Fits on to the ZX81. *Full 40 keys plus one spare for any purpose. *No

soldering — just plug in. *No trailing wires. *clear permanent two colour legends. *Positive feel and sound as data is entered. *Speeds up programming enormously and reduces errors. *fitting service offered £2.00 extra. (remember to send your ZX81) **ONLY £24.50**

The FD Printerinterface



The amazing FULLER PRINTERINTERFACE is designed to operate with any serial printer or teletype. For graphic displays the SEIKOSHA 250 is recommended, as all the software is held in ROM to carry out the graphic routines. The PRINTERINTERFACE can also be made to print out graphics on the Tandy DMP 100.

Simple commands to print are used, to either print at Sinclair printer size displays or normal 80 column. Spectrum only. Full details supplied with each unit.
PRICE £39.95
RS 232C £34.95
Dual (Selectable) Version £49.95

All prices include VAT and post and packaging. All items include a full year guarantee. Cheques/Postal Orders etc. should be made payable to:
AFDEC Electronics Ltd.

PRODUCTS ARE STOCKED AND USUALLY DESPATCHED WITHIN 10 DAYS

I WISH TO ORDER THE FOLLOWING:

QUANTITY	ITEM	AMOUNT

CREDIT CARD SALES LINE 0256-52208 (24 hours)
 Please debit my Access/Barclaycard Visa/Diners Club

Card Number

SIGNED _____

CHEQUE/P.O./CASH ENCLOSED: £ _____

NAME _____

ADDRESS _____

Overseas customers add £4 post and packing.

YCB

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

Q. E. D. Systems

experts in business systems now bringing professionalism into the home market for the **SPECTRUM, ORIC, DRAGON** and **APPLE II** micro-computers.

UTILITIES

THE DRAGON 6809 ASSEMBLER/EDITOR

With this powerful software realise the full potential of this splendid micro by writing your own machine code programs and routines. Full operating instructions are included. £6.95

THE ORIC 6502 ASSEMBLER/EDITOR

Probably the best ORIC program on the market. With this powerful software the full potential of the ORIC can be realised by writing your own machine code programs and routines. Full operating instructions are included £6.95

SPECTRUM MACHINE CODE UTILITIES

Five specially written machine code programs to help you develop your software. Included are memory management and RENUMBER (including GOTO's GOSUB's etc.). Full operating instructions are included £4.95

HOME MANAGEMENT

HOME ACCOUNTS MANAGEMENT

Plan all your financial affairs with this Q.E.D. quality system.

Features include budget creation, maintenance and balance of all accounts (including credit cards). Full monitoring of expenses against budget and complete expense reporting. This system is supplied with full documentation and operating instructions.

Spectrum, ORIC, Dragon £9.95
Apple II (disc) £12.95

GAMES

THE VARIETY PACK 25 specially selected programs to realise the potential of your new micro. The best value around today!

Spectrum, ORIC, Dragon, Apple II £4.95
(LESS THAN 20p per program!)

THE VIDEO CHALLENGE SUITE

These are not just any games but Q.E.D. quality action packed programs. Award yourself the VCI

Spectrum VCI — Photon, Apes & Ladders, Microthello and Phantoms. £5.95

Spectrum VCII — Towers of Logic, Bugblaster, Link-four and Awari £5.95

ORIC VCI — Photon, Link-four, Microthello and Phantoms £5.95

Dragon VCI — Photon, Link-four, Microthello and Phantoms £5.95

Dragon VCII — Dragons Domain, Cards, Draxit and Awari £5.95

Apple II VCI — Grand National, Star Trek, Link-four and Microthello (cassette) £5.95
. (disc) £7.95

DESIGNERS

Calling all designers! Q.E.D. Systems pay generous royalties for high quality programs and routines. All enquiries are treated in the strictest confidence.

Why not send your programs today (full details are available on request, please include s.a.e.)

(All programs are supplied on quality cassettes, unless otherwise stated.)

Please send me on cassette/disc

for my MICRO with memory.

I enclose my cheque/postal order for £ (payable to Q.E.D. Systems).

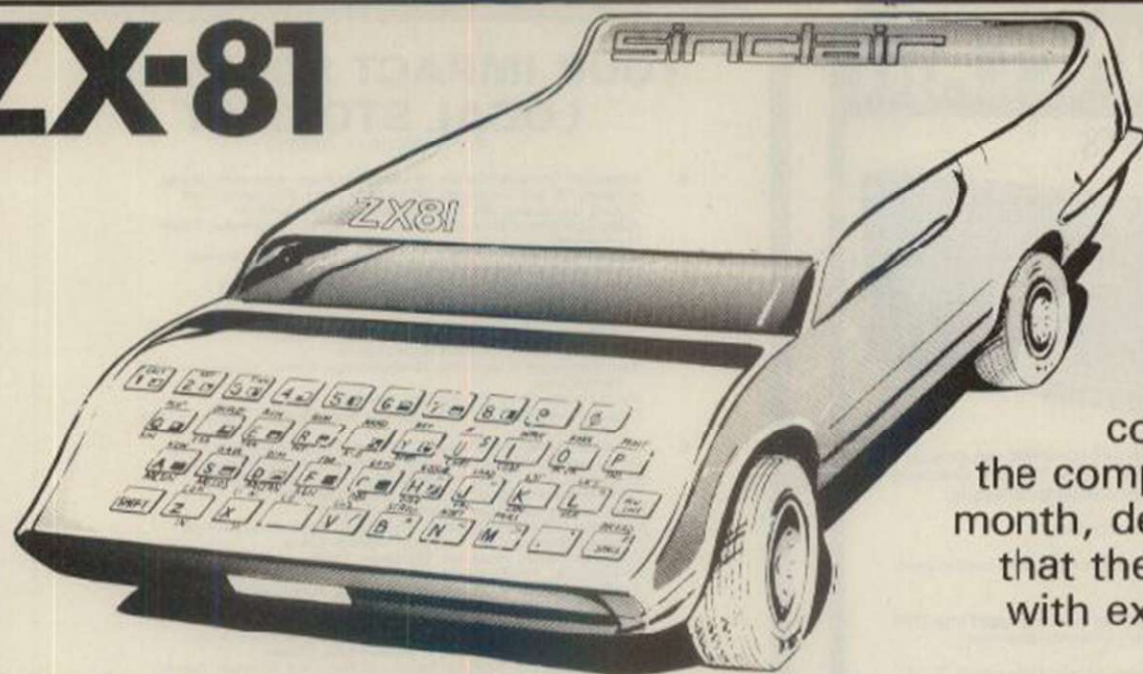
Name Telephone No.

Address

Q.E.D. SYSTEMS, 2 SEFTON GARDENS, AUGHTON GREEN, ORMSKIRK, LANCS., L39 6RZ.

OFFER!
buy 2 get £1 off
buy 3 get £2 off
buy 4 get £3 off

ZX-81



David Threlfall continues his short series with the complete machine code for ZXGT, a true compiler for the ZX-81. ZXGT is only just over 2.3K bytes. The fast code is the result of limiting the compiler to integer Basic. This month, details are given of the way that the compiler translates Basic with examples from the standard Basic repertoire.

GT COMPILER

LAST MONTH we considered the philosophy behind ZXGT, my ZX-81 Basic compiler. This month we move on to the intricacies of integer arithmetic evaluation and see how some statements compile.

For those uninitiated to Z-80 machine code here are a few preliminaries. ZXGT uses the Z-80 registers A,B,C,D,E,H and L. A is the eight-bit accumulator. H and L may be considered as a single 16-bit accumulator. All

the registers may be used for eight-bit storage but the pairs BC and DE may also be used in 16-bit manipulations. Putting a register pair or 16-bit number in brackets means that the value in brackets should be taken to point to the location required. For example:

LD HL,n load HL with the value n
but
LD A,(HL) means load register A with the data in the location pointed to by

the value in the HL register pair.

Here are a few simple examples to start the description of the compiler.

CLS

This results in a call to Sinclair's ROM at hexadecimal address 0A2A.

RETURN

This one is very easy, requiring the Z-80 instruction Ret — return.

PEEK n

This causes HL — the double-precision accumulator — to be loaded with the contents of location n, thus:

LD HL,n load HL with n
LD A,(HL) load the accumulator with the contents of location HL

LD L,A move A into L
LD H,0 zero H
HL now contains the contents of location n.

The next example is:

ABS X

Load HL with X and test the top bit of H — the sign bit. Call a negate routine if this bit is set, that is, if the number is negative. Negating a number entails taking the 2's complement but there is no Z-80 instruction for this. Instead we must take the 1's complement of H and L independently and then increment HL.

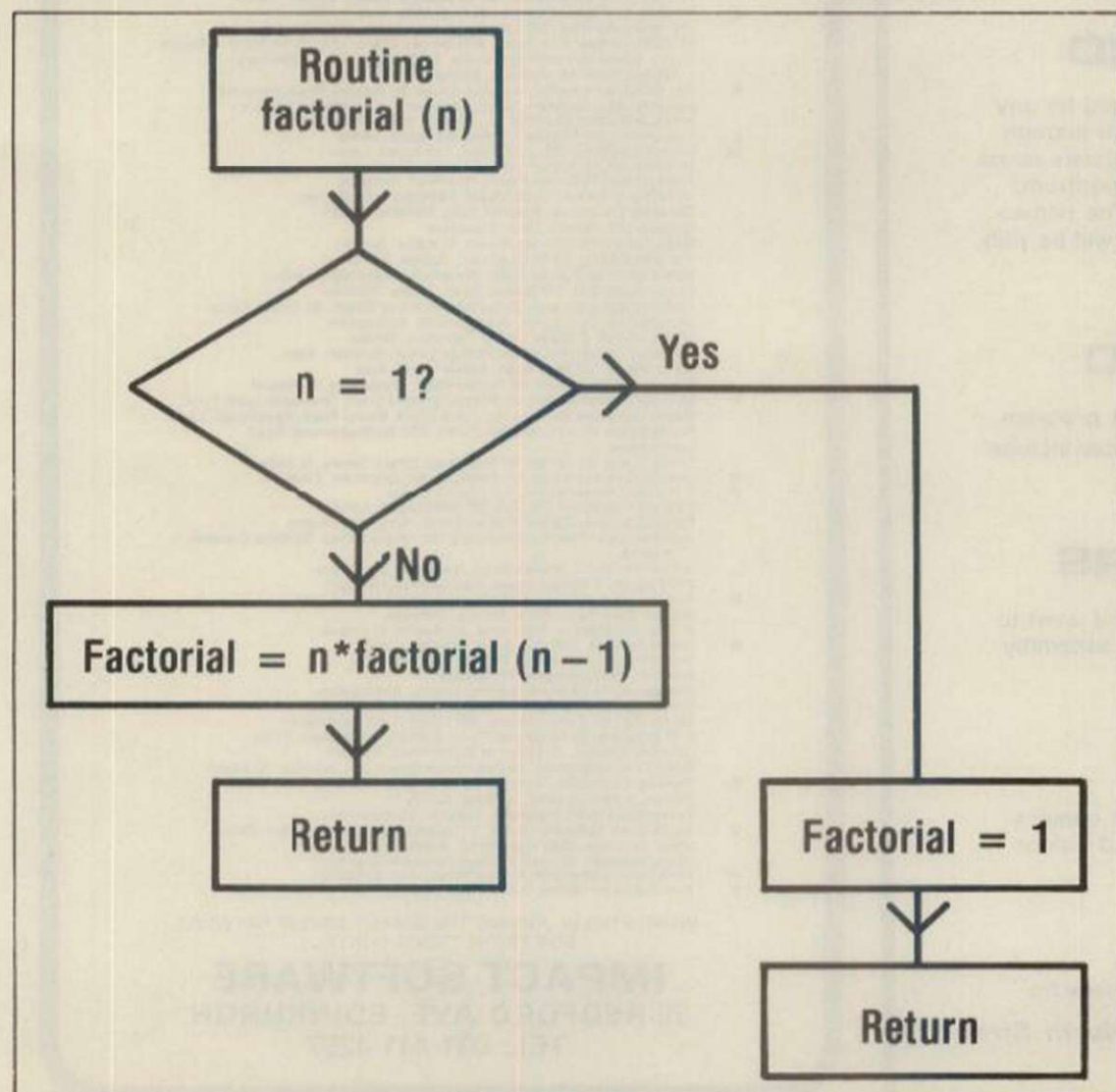
POKE x,y

This means put the lower byte of y in location x. As we need x and y simultaneously they cannot both be in the HL register pair. Therefore we get x in HL and y in DE then do LD (HL),E as required remembering that Poke acts on only one byte.

GOTO n

This will be translated as a Jump — JP — instruction; n must be a number and not a variable. The compiler has two passes. On the first, it generates a table of line numbers and their addresses in the machine code. On the second pass, the correct addresses will be available for both forward and backward Gotos.

(continued on page 79)



SOUND with SINCLAIR

MAKE AMAZING SOUND EFFECTS
WITH YOUR ZX 81,
TIMEX Sinclair 1000
or SPECTRUM



THE ZON X

£25.95

incl p&p & VAT.

★ The ZON X SOUND UNIT is completely self-contained and especially designed for use with the ZX 81, TIMEX Sinclair 1000 and Spectrum Computers. It just plugs in — no dismantling or soldering.

★ No power packs, batteries, leads or other extras.*

★ Manual Volume Control on panel — ample volume from built-in loud-speaker.

★ Standard Sinclair — 16K Rampack or printer can be plugged into ZON X Sound Unit without affecting normal computer operation.

★ Huge range of possible sounds for Games, Music, Helicopters, Sci-Fi, Space Invaders, Explosions, Gun-shots, Drums, Planes, Lasers, Organs, Bells, Tunes, Chords, etc., or whatever you devise!

★ 8 full octaves. Uses 3-Channel sound chip giving programme control of pitch, volume of tones and noises, all with envelope control.

★ Easily added to existing games or programmes using a few simple "BASIC" lines or machine code.

★ No memory addresses used — I.O. mapped.

FULL instructions with many examples of how to obtain effects and the programmes, supplied, fully guaranteed. British Made.

*Except with Spectrum, you need the Spectrum Extension Board Order No. SE1 — Price £6.80 incl. V.A.T.

Payment may be made by Cheque, P.O. Giro No. 388 7006, Postal Order or Credit Card.

Export orders: — Bank Cheque, International Money Order, U.S. \$ or £ Sterling.

BI-PAK

Dept YC8 PO Box 6
63A High Street
Ware, Herts



Access & VISA accepted
Ring 0920 3182 for
immediate despatch

£500 REWARD

Five hundred pounds reward will be paid for any completed programs which are of a high enough standard to be included in the Oasis Software range.

Products should be for the Dragon, Spectrum, ZX81, B.B.C. and Oric microcomputers. The names of the three most outstanding authors will be published in future advertising.

£50 REWARD

Even if you don't own a micro or can't program, we'll pay £50 for original ideas that we can include in our product range.

PROGRAMMERS

If you own one of the above micros and want to put it to good use send details of your assembly language experience.

ARTISTS

Oasis Software will pay up to £50 for camera-ready artworks for cassette inserts and colour advertisements.

If any of the above interests you then send to:-

"REWARD" Oasis Software, Lower North Street, Cheddar, Somerset.

YOUR IMPACT SOFTWARE LOCAL STOCKIST

(ALPHABETICAL ORDER)

- A** Amersham Computer Centre, 18 Woodside Road, Amersham, Bucks
Arwaves CB and Computers, 50 Barracks Road, Newcastle, Staff
Applied Computing, 35a Stricklandgate, Kendal, Cumbria
Ashby Computer Centre, 298 Ashby High Street, Scinthorpe, South
Humberstone
- B** Arcade Computers, 37/38 Second Floor, Silver Arcade, Leicester.
Bass & Bligh, 4 Briggate, Leeds
Blackpool Computer Store, Church Street, Blackpool, Lancs
Bennetts, 24 Norwich Street, Dereham, Norfolk
Botanic Computer Centre, 5 Botanic Ave., Belfast, N. Ireland
BBB Computers, 124 Newport Street, Bolton, Lancs
B D B, New Street, Cockensie, East Lothian
Basic Computers & Systems, 72 Kingsthorpe Hollow, Kingsthorpe Road,
Northampton
Bits & Pieces, 60/62 The Balcony, Merion, Leeds
Burslem Computer Centre, 74 Waterloo Road, Burslem, Stoke-on-Trent,
Staffs
- C** Computer Games Retail Division, 11 Nuttall Road, Southport, Lancs
Computers of Wigmore Street, 87 Wigmore Street, London
Computer Corner, 261 Commercial Road, Portsmouth, Hants
Castle Records & Tapes, 30 Castle Street, Clitheroe
Computecat, 224 Chapel Street, Leigh, Lancs
Computer & Business Systems, Manchester Road, Nelson, Lancs
Channel 8 Software, 51 Fishergate, Preston, Lancs
Computer Corner, Pinewood, Blackburn, Lancs
Comprite Ltd, Thorpe House, Laisterdyke, Bradford, Yorks
The Computer Shop, Bondgate, Darlington, Tyne & West
Camers & Computer Centre, 118 Mill Street, Macclesfield, Cheshire
The Cursor Key, 40 High Street, Bexley, Kent
Computer Corner, 7 Orchard Place, Weston-Super-Mare, Avon
Crestar Software Centre, 49/51 Brook Street, Chester
Computasolve Ltd, 8 Central Parade, 51 Marks Hill, Surbiton, Surrey
Chelsea Micros, 14 Jordan Place, Fulham
Computer Shop, Handyside Arcade, Ferry Street, Newcastle
Computerland, 9A Crown Rd, Alnagar, Nr. Stoke-on-Trent, Staffs
Darlington Computer Shop, 75 Bondgate, Darlington, Co Durham
Darwen Video, Duckworth Street, Darwen, Lancs
Digital Fantasy, Norbeck Road, Blackpool, Lancs
Data Aids Systems Ltd, 70 Westgate, Burnley, Lancs
Discount Store, 29/31 Blackburn Road, Great Harwood, Lancs
Dinham Computers Ltd, 329 Ashley Road, Parkstone, Poole, Dorset
Dimension, 27-29 High Street, Leicester, Leics
- E** Electronics Services, 176 Victoria Road, Clevellys, Lancs
Eclipse Computers, 28 Bury New Road, Prestwich, Manchester
Esfield Communications, 135 High Street, Ponders End, Middlesex
Ester Software Supplies, 2 Guildford Close, Exeter, Devon
Ebor Computer Services, 5 Regent Buildings, Acomb, York
EY Computing Ltd, 700 Burnage Lane, Burnage, Manchester
Estuary Software, 261 Victoria Avenue, Southend-on-Sea, Essex
Evesham Micro Centre, Crown Courtyard, Bridge St., Evesham, Worcs.
Fingwick Ltd, Standish Street, Burnley, Lancs
Fissoft, 8 St Georges Arcade, Falmouth, Cornwall
- G** J Gough & Sons, East Smyth Street, South Shields, Tyne & Wear
Gairns Electronics, Newton Buildings, 50 Newton Street, Manchester
Garth Dawson, Accrington, Lancs
Gies, Alvecot Road, Carterton, Oxfordshire
General & Northern Micro Computers, Unit 8, South West Ind Est, Whitworth
Road, Peterlee, Co Durham
- H** Godfreys Computers, 28/32 East Walk, Basildon, Essex
Haven Hardware, 4 Ashby Road, Asby, Worthington, Cumbria
Tony Hood Electronics, 26a Market Gate Shopping Centre, Gt Yarmouth,
Norfolk
H A Humberstone Computers, Manchester Road, Nelson, Lancs
Home & Business Computers, 54 Yorkshire Street, Oldham, Lancs
HCCS Associates, 533 Durham Road, Low Fell, Gateshead, Tyne & Wear
Hunslett Computers, 36 Widemarsh Street, Hereford
W Heffer & Sons Ltd, 20 Trinity Street, Cambridge
Holytree Wines, 4 Pine Wood, Blackburn
Home Computers, Church Street, Blackpool
Halifax Computer Centre, 2 Dunkirk Lane, West End, Halifax
- I** IMO Business Systems Ltd, 39/43 Standish Street, Burnley, Lancs
- J** T Jobs, 56 Rudyerd Street, North Shields, Tyne & Wear
JRC Micro Services, 200 Earlsdon Avenue North, Earlsdon, Coventry
M Jubb, Juniper Computing, 8 Pembroke Green, Lea, Malmesbury, Wiltshire
D W Jowett, Windmill Electronics, 15 Bapham Village Chambers,
335 Red Bank Rd, Bispham, Blackpool
- K** Key Computer Services, Osborne House, 28 Osborne Road, Newcastle
Kayde Home Computers, Station Approach, New Eltham, London
K&K Computers, 37 Alfred St., Weston-Super-Mare, Avon
- L** Leisureonics, 64 Abingdon Street, Blackpool, Lancs
- M** Micro Chip Shop, 190 Lord Street, Fleetwood, Lancs
M Micro, 89 Partington Lane, Swinton, Manchester
Micro Shack, 16 Crown Street, Aberdeen, Scotland
McKenna & Brown, 11 Bondgate, Darlington, Co Durham
Mansfield Computers, Ratcliffe Gate, Mansfield, Notts
Mlequip Ltd, 7a Hare Lane, Gloucester
Misa Computers, 7 Anley Street, St Helier, Jersey
The Model Shop, 10-16 Queen St., Belfast, N. Ireland
Miles Barn, 35 Burnley Road, Waterfoot, Rossendale, Lancs
Miron Audio Ltd, 172 Baslow Road, Totley, Sheffield
Modern Electronics and Computing, 40 Wood Street, St Annes, Lancs
Microplus, 38 Don Street, Grangemouth, Stirlingshire
Mobile Micros, 2 Castle Street, Thornbury, Bristol
Microway Computer Centre, 29 High Street, Rainham, Kent
Micro Magic, 128 Erith Road, Bexley Heath, Kent
M:Laughlin Electronics, 44 Carlisle Road, Londonderry, N. Ireland
- N** Newcastle Camera Mart, 16 Northumberland Court, Newcastle upon Tyne
Nelson Computer Services, St Johns Court, Bacup Road, Rawtenstall, Lancs
Northampton Home Computer Centre, 58a Wellingborough Road,
Northampton
Newry Computer Centre, 34 Monaghan Street, Newry, N. Ireland
- O** Oakleaf Computers Ltd, 121 Dudley Road, Grantham, Lincs
- P** P V Tubes, Water Street, Accrington, Lancs
Personal Computers Ltd, 220-226 Bishopsgate, London
Penine Computer Centre, Willow Street, Accrington, Lancs
Alan Pearman, Personal Computers Ltd, Maple House, Mortlake Crescent,
Cheshire
J T Parrish (PLC), Shields Road, Newcastle upon Tyne
The Playpen, 6 Market Street, Hay on Wye, Hereford
- R** Richards (D A G Starrier) 12 Marygate, Wakefield, W Yorks
Ricom, Third Floor, Silver Arcade, Leicester
R M S, 108 Millfield, Ballymena, Co Antrim, N. Ireland
- S** Sound Services, Standish Street, Burnley, Lancs
Singleton Ltd, 45 Belmont Bridge, Skipton, Yorks
Sumlock, 196 Deansgate, Manchester
Stenwoods, 11-13 Great Western Arcade, Birmingham
Silcon Centre, 7 Antigua Street, Edinburgh, Scotland
Slytronics Ltd, Computerama, 357 Derby Road, Nottingham
S W Software, 23 Niddersdale Place, Bramley, Rotherham, Yorks
Sumlock Bondain, 32 Prince of Wales Road, Norwich
Spiral Communications, 26 Park House Street, Ayr, Ayrshire, Scotland
- T** Thinking Computers, Water Street, Abergele, N Wales
Trumps, 6 Rectory Lane, Ashtad, Surrey
Tomorrows World, Esplanade, Lerwick, Shetland Isles
Vx 20 Users Software Library, 11 Newark Road, Broadal East, Derby
- V** Vision On Video, 255a High Street, Erdington, Birmingham
Viking Software, Brownston, Great Yarmouth, Norfolk
- W** West Coast Computers, 47 Kyle Street, Ayr, Scotland
York Computer Centre, 7 Stonegate Arcade, York

INTERESTED IN JOINING THE IMPACT DEALER NETWORK
FOR TRADE TERMS CONTACT

IMPACT SOFTWARE
70 REDFORD AVE. EDINBURGH
TEL: 031-441 4257

(continued from page 77)

Note in particular that, in the compiled code, the nearness of *r* to the start of the program does not affect the time taken to execute the Goto.

GOSUB *n*

This works just like a Goto except that it results in a Call instead of a JP.

USR *x*

This results in the machine code at location *x* being executed. It looks as if it should result in just a Call to location *x*. However, there is no machine code statement for "call to the address given by a register pair" that is,

CALL (HL)

so subterfuge is necessary. Consider the following code:

```
LD BC,BACK    load BC with the address of
               label BACK.
PUSH BC       keep BC on the stack
LD HL,x       get x into HL
PUSH HL       and push HL on to the stack
```

BACK: continue code

The first four lines get the address of Back and the address to which we wish to go on to the stack. The Ret instruction makes the machine "return" to the address at the top of the stack which is *x*, just as we wanted. At the end of the routine starting at *x*, a Return causes a jump to the next address on the stack which is Back and there we are.

FOR-NEXT

The For-Next pair is compiled into directly executable code — not calls to other routines — and so a For-Next loop is extremely fast. The For statement has the form:

FOR *K* = *M* TO *N*

where *M* and *N* may be parenthesised expressions. *M* is moved into variable *K* and (*N*+1) is stored in the next word/two-byte location. During compilation the address of the next location after For — let us call it *zzzz* — is also stored. The next *K* statement is compiled thus:

```
LD HL,(nnnn)  where nnnn is the location
               where variable K is stored.
INC HL        make K one bigger
LD (nnnn),HL  store this value
LD DE,(nnnn+2) get value of end of loop
AND A         clear carry flag
SBC HL,DE     subtract DE from HL
JP M,zzzz     if HL-DE is negative jump to
               the next address after FOR.
               Otherwise execute the next
               instruction.
```

This arrangement results in extremely fast execution of the final code — about 170 times faster than Basic. Machine-code enthusiasts might care to consider what limitations the test places on the values of *M* and *N*.

Now for some arithmetic. Wherever a variable may be used in Basic an expression may be substituted, so some means has to be found to evaluate that expression. The method which has been chosen for ZXGT uses an often-mentioned but rarely-used mathematical function called recursion.

For those who have not come across recursion before, consider evaluation of *n!*, that is, *n* factorial; *n!* is defined as:

$$n! = n \times (n-1) \times (n-2) \dots \times 1$$

and we may rewrite this as:

$$n! = n \times (n-1)!$$

$$= n \times (n-1) \times (n-2)!$$

etc.

To calculate *n!* it is necessary to multiply *n* by (*n*-1)!. To calculate (*n*-1)! we multiply (*n*-1) by (*n*-2)!. This process is continued until we arrive at 1! which is 1. Figure 1 shows a flow diagram for this process. The routine Factorial calls itself repeatedly.

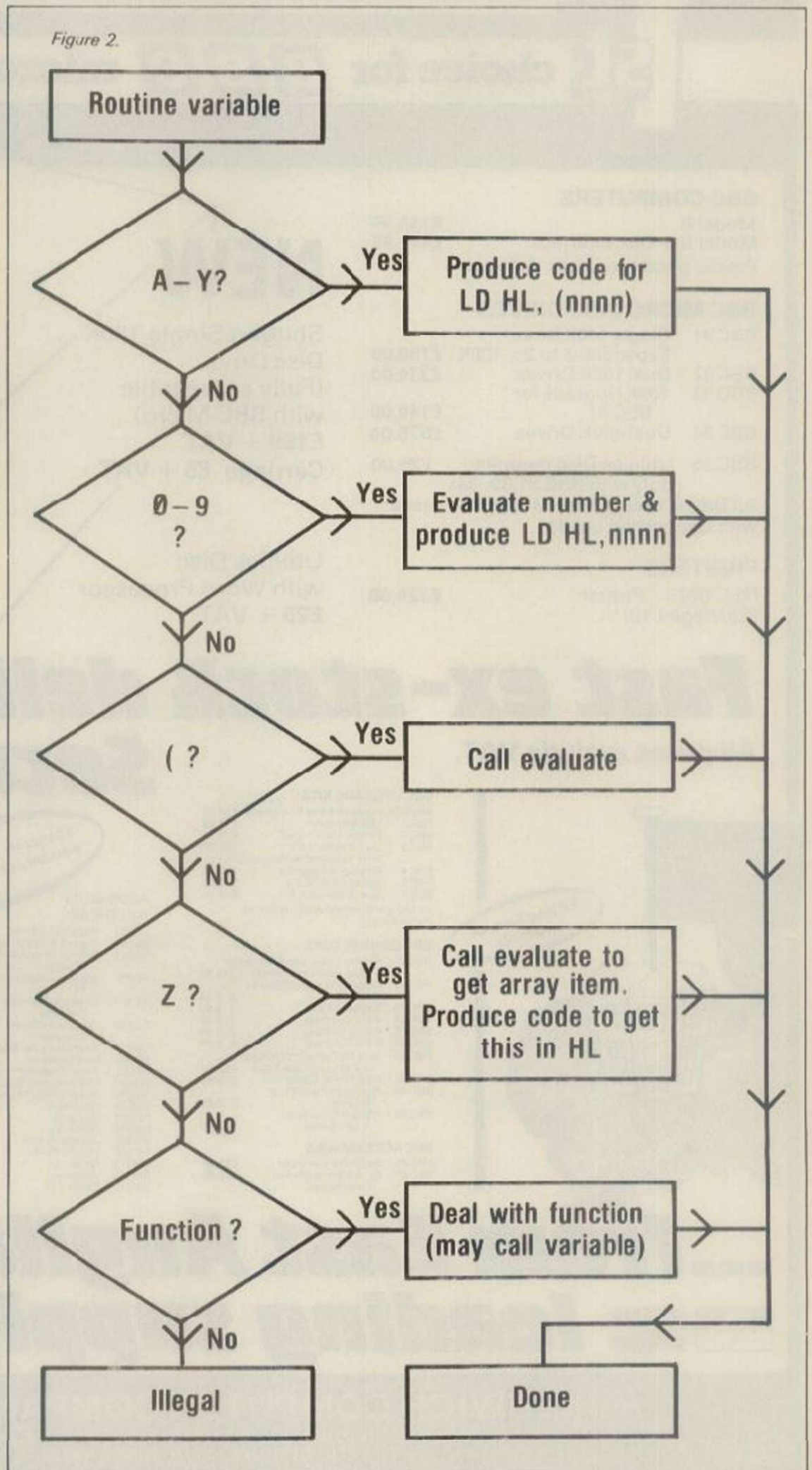
The process of evaluating an expression uses a similar technique which is shown in figures 2 and 3. We see that Variable calls Evaluate

and Evaluate calls Variable, but the way out may not be clear. Each time we enter Evaluate, a marker — 0 — is pushed on to the compiler stack and when we reach the end of the line or a right parenthesis, the stack is popped back to see what "pending operations" are left.

Operations are performed until an "operator" 0 is encountered. We placed this

(continued on page 81)

Figure 2.



Midwich

COMPUTER COMPANY LIMITED

1st choice for **BBC** microcomputers

BBC COMPUTERS

Model B	£346.95
Model B + Disc Interface	£441.95

Please phone to check delivery

BBC MICRO DISC DRIVES

BBC 31	Single 100K Drive Expandable to 2 x 100K	£199.00
BBC 32	Dual 100K Drives	£330.00
BBC 33	100K Upgrade for BBC 31	£140.00
BBC 34	Dual 400K Drives	£575.00
BBC 35	Utilities Disc (supplied only with BBC 31,32, 34)	£25.00

All Drives except BBC 33 supplied cased with Connecting Leads.

PRINTERS

NEC 8023 Printer (Carriage £10)	£320.00
------------------------------------	---------

NEW

Shugart Single 100K
Disc Drive
(Fully compatible
with BBC Micro)
£199 + VAT
Carriage **£5 + VAT**

Utilities Disc
with Word Processor
£25 + VAT

Supplied complete
with all Connecting
Cables

Expansion slot
for second Drive
£140 + VAT

Fast ex-stock delivery by Securicor...

All prices exclude VAT.

BBC UPGRADE KITS

BBCA2B	Complete A to B Upgrade	£44.75
BBC 1	16K Memory	£18.00
BBC 2	Printer User 1:0 Kit	£ 7.50
BBC 3	Disc Interface Kit only supplied with Disc Drives	£95.00
BBC 4	Analogue Input Kit	£ 6.70
BBC 5	Serial 1:0 RGB Kit	£ 7.30
BBC 6	Bus. Expansion Kit	£ 6.45

All kits are supplied with full fitting instructions.

BBC CONNECTORS

BBC 21	Printer Cable and Amphenol Plug (not assembled) User Port Connector and Cable 36"	£13.00
BBC 22	Cassette Lead	£ 2.46
BBC 23	7 Pin Din Plug	£ 3.50
BBC 24	6 Pin Din Plug	£ 0.60
BBC 25	5 Pin Din Plug	£ 0.60
BBC 26	2 x 34 way Card Edge Disc 1:0 Cable 34W IDC to & Lever	£12.00
BBC 36	Disc Power Cable	£ 6.00
BBC 44	Analogue Input Plug & Lever	£ 2.25
BBC 66	1 M Bus Connector + 36" Cable	£ 3.50

BBC ACCESSORIES

BBC 45	Joysticks (per pair)	£11.30
BBC 67	Eprom Programmer (assembled)	£57.95

ACORN SOFTWARE FOR THE BBC

SBE03	Business Games	£ 8.65
SBE04	Tree of Knowledge	£ 8.65
SBE02	Peeko Computer Inc Manual	£ 8.65
SBE01	Algebraic Manipulation PK	£ 8.65
SBX01	Creative Graphics Cassette	£ 8.65
SBX02	Graphs & Charts Cassette	£ 8.65
SBB01	Desk Diary Inc Manual	£ 8.65
SBL02	Lisp Cassette	£14.65
SBL01	Forth Cassette	£14.65
SBG01	Philosophers Quest	£ 8.65
SBG07	Sphinx Adventure	£ 8.65
SBG03	Monsters	£ 8.65
SBG04	Snappers	£ 8.65
SBG15	Planetoid	£ 8.65
SBG06	Arcade Action	£10.35
SBG05	Rocket Raid	£ 8.65
SBG13	Meteors	£ 8.65
SBG14	Arcadians	£ 8.65
SBG10	Chess	£ 8.65

ACORN SOFTWARE BOOKS FOR THE BBC MICRO

SBD01	Creative Graphics	£ 7.50
SBD02	Graphs - Charts	£ 7.50
SBD04	Lisp	£ 7.50
SBD03	Forth	£ 7.50

* Please ring for current delivery on Acornsoft products before ordering.

BBC MICRO COMPONENTS

4516	100NS	£ 2.25
6522		£ 3.19
74LS244		£ 0.59
74LS245		£ 0.69
74LS163		£ 0.34
DS3691N		£ 4.50
DSBLS120N		£ 4.50
UPD7002		£ 4.50
8271		£36.00
20 Way Header		£ 1.46
26 Way Header		£ 1.76
34 Way Header		£ 2.06
40 Way Header		£ 2.32
15 Way D Sk:		£ 2.15
6 Way Din Stt		£ 0.90
5 Way Din Stt		£ 0.90

BBC SOFTWARE IN ROM.

Wordprocessor "View"	£52.00
1.2 MOS	£10.00

12 month "no quibble"
warranty on all products

Fitting Service
available



**...from East Anglias
leading supplier**

Delivery charges
Computers/Disc Drives £7.50
Components/Software £0.50
Books/Joysticks £1.00

MIDWICH COMPUTER COMPANY LIMITED

RICKINGHALL HOUSE, RICKINGHALL, SUFFOLK IP22 1HH
TELEPHONE (0379) DISS 898751

(continued from page 79)

there to mark the end of the expression when we entered the routine. The exit is taken with the result in HL.

Two other points should be noted. Firstly, the right and left parentheses will match

exactly, because of Sinclair's syntax checking. Secondly, we are using two different stacks. The operands of the expression are pushed on to the stack of the compiled program by code generated in the compiler. The operators are kept on the compiler stack and are used by the compiler to cause the correct code to be generated for combinations of operand in HL and DE.

In effect, infix notation is changed into postfix or reverse Polish.

The Let statement calls Evaluate directly. Many other Basic statements are supported such as: Fast-Slow, Input, Pause Rand/Rnd to seed and use the random number generator, Print, Scroll, Stop Unplot/Plot.

The ZX-81 does not have the ability to store on tape anything except Basic statements so where can the machine code generated by the compiler be put so that it may be recalled from tape for later use?

The general answer to this is "in a Rem statement" and that is the solution adopted by the compiler. The one twist is that the compiler generates its own Rem statement into which it puts the code. To accomplish this the code is first compiled over the ROM — and so not stored — and the resulting length of code is used in forming the Rem. It does not delete any old compiled code.

One of the best features of ZXGT is that the

Basic may be run and tested under the interpreter before the compiler is invoked. One writes a program bearing in mind that eventually it will be compiled. When you are satisfied with your code a single Usr command runs the compiler and puts your code into the Rem statement. This is clearly a very powerful feature and one which should eventually become standard on all small machines.

Some people may not be aware of the way to make the large Rem required for ZXGT. A possible procedure is as follows: first, type a line 1:

```
1 REM ABCDEFGHIJKLMNOPQRSTUVWXYZ
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  ABCDEFGHIJKLMNOPQRS
```

This makes the total length of the line including the terminator — 118 — exactly 100 bytes. Check that

```
PEEK 16511
```

is 96. Second, edit line 1 changing the line number to 2. Third, edit line 2 to make it line 3. Repeat up to line 23. Fourth, edit line 1 adding 1234567 immediately after Rem. We now have the correct number of characters. Fifth, check that

```
PEEK 18815
```

is 118. Steps 6 to 10 of the procedure are:

```
POKE 16512,8
POKE 16511,255
```

(continued on page 83)

Figure 3.

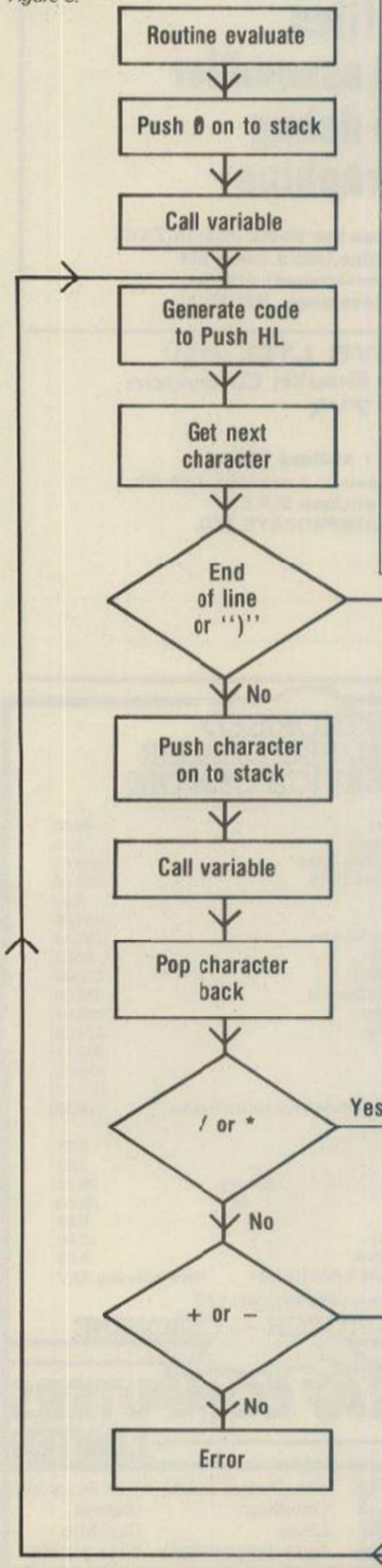
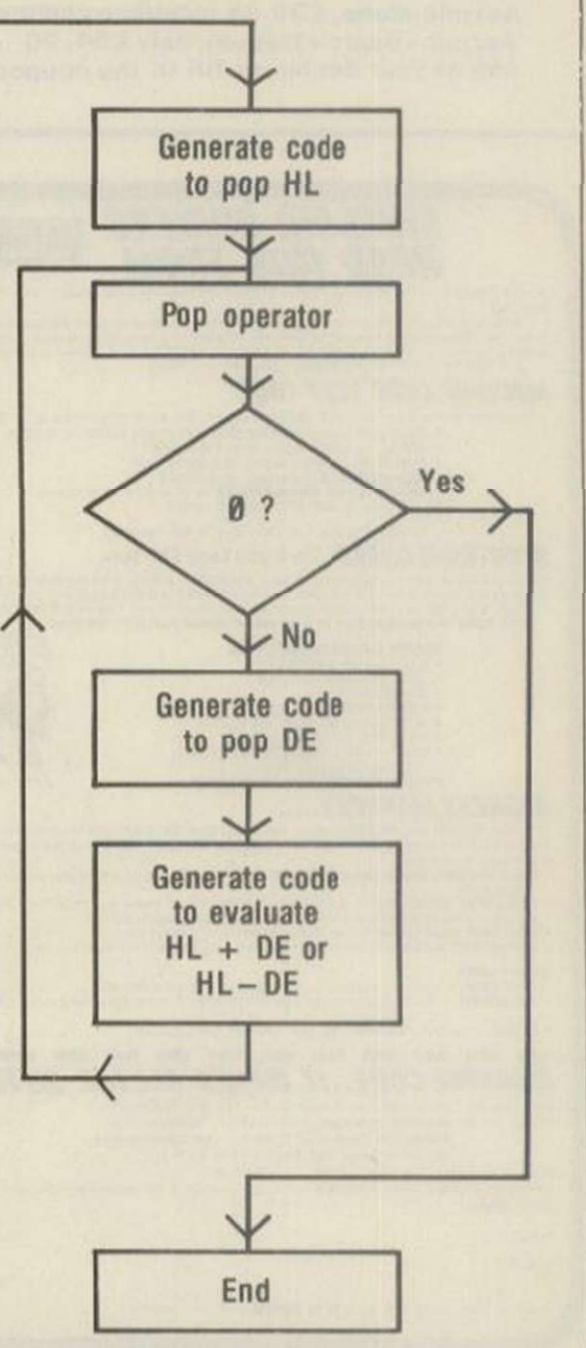


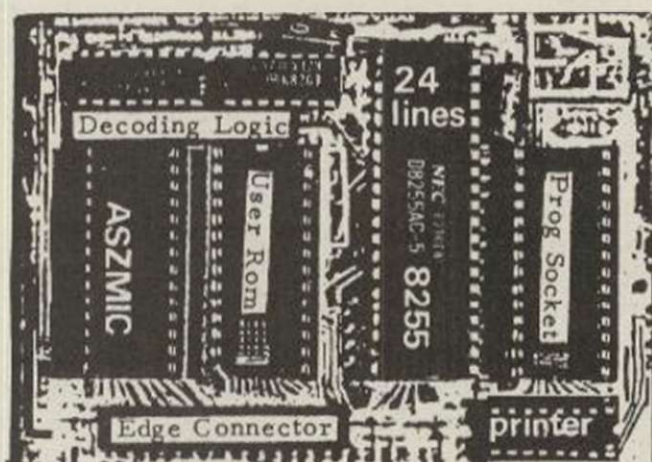
Figure 4. The hex loader.

```
5 FOR L=16514 TO 18814 STEP 1
@
10 LET T=0
15 SCROLL
20 PRINT L: ""
25 INPUT A$: ""
30 PRINT A$: "="
35 INPUT TOT
40 PRINT TOT
45 IF L=18814 THEN LET L0=5
50 IF L(>18814) THEN LET L0=21
55 IF LEN A$(>L0) THEN GOTO 95
60 IF INT (L/10)-INT (L/100)*1
@ CODE A$(1)-28 THEN GOTO 95
65 FOR K=2 TO LEN A$ STEP 2
70 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
75 POKE L-1+INT (K/2),C
80 LET T=T+C
85 NEXT K
90 IF TOT=T THEN GOTO 110
95 SCROLL
100 PRINT "ERROR - PLEASE INPUT
AGAIN"
105 GOTO 10
110 NEXT L
```



ZX81 MACHINE CODE?

ZX.ASZMIC ROM gives:



NEW! ASZMIC PLUG-IN EXTERNAL BOARD

accepts the Aszmic Rom to combine the best of machine code and basic. 24 I/O lines, Eprom programmer, 8k user socket.

Aszmic alone, £39.95 including comprehensive manual.
Aszmic+Board+Manual, only £54.90
Ask at your dealer, or fill in the coupon now!

- o full screen editor
- o multiple files
- o powerful assembler
- o complete debug
- o hi-res graphics

ZX.Aszmic Rom replaces the Basic Rom in ZX81 to transform the machine into a complete Assembly Language Development station. Fast. Powerful. Professional. Reliable.

COMPROCSYS LTD., (YC1)
P.O. Box 149, South Croydon,
Surrey, CR2 7YX

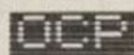
Please rush me:

- Aszmic+manual. I enclose £39.95
 Board+Aszmic+manual. I enclose £54.90
 Further details. I enclose S.A.E.
 Cheques payable to COMPROCSYS LTD.

Name _____

Address _____

SINCLAIR OWNERS READ THIS FROM



You've probably heard about MACHINE CODED PROGRAMS and thought "so what? How can they help me?"

Well, now you can find out and taste the very real difference by purchasing our latest MACHINE CODED programs. These emulate features of the most modern professional computers (12 years' writing machine coded programs for IBM, ICL, UNIVAC and Sinclair means we know what we're talking about) just read the specification and you'll see what we mean.

MACHINE CODE TEST TOOL

The ultimate professional tutor and debug program, we wrote this to help us write our own programs.

- 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
- HEXIDECIMAL conversion as standard
- CHARACTER GENERATOR — of unbelievable quality

Supplied free with the Spectrum version

Available for the 16K ZX81 and 16/48K Spectrum

SPECTRUM CHESS Dare you face The Turk

The original Turk was an eighteenth century automaton, a life-size mechanical figure resident in Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.

OCP now offer you the twentieth century equivalent of that Turk — a chess-playing computer program. The Turk challenges you to a game of chess (Spectrum 48K only)

MANY OPTIONS INCLUDE:

- 6 LEVELS OF DIFFICULTY
- DEMONSTRATION MODE
- BOARD EDITOR
- GAMES PRINTOUT FACILITY
- BUTZ CHESS AGAINST THE CLOCK
- TWO PLAYER MODE
- UNFINISHED GAMES CAN BE STORED
- RECOMMENDED MOVE

FULL INSTRUCTIONS PROVIDED



ADDRESS MANAGER.....

Works on the 16K and 48K Spectrum, in 48K it will store, file, select and retrieve over 400 full addresses (over 1500 individual names). Dynamic Memory Management and compression techniques makes all this possible and there's a lot more.

- FULL SCREEN INPUT and EDITING — see it as a page as it happens with insert, delete and TAB Commands
- MULTIPLE INDEXING — 3 way user-defined index enables you to define, catalogue, select and print entries as needed, (essential for the more sophisticated applications)
- INSTANT RESPONSE — yes, this program is very very fast.
- SUPER FRIENDLY — crash-proof, extremely easy to use and efficient in a way that BASIC can never be.

MANY USES

- AT HOME — (storing addresses, printing out Xmas Card lists etc.)
- AT WORK — for mail-order work, internal telephone directory, sorting customers into types, areas, size you choose.
- CLUBS — print-out members list, sort different categories etc.

MACHINE CODE.. IT MAKES ALL THE DIFFERENCE.....

Post order to Oxford Computer Publishing Ltd., P.O. Box 99, Oxford.

Please rush me: Address Manager at £8.95 each — Spectrum only

Chess The Turk at £8.95 each — 48K Spectrum only

Machine Code Test Tool at £9.95 each

Tick box for edition required: ZX81 Spectrum

Send cheque, postal order or ACCESS No. to above address. Or telephone order with ACCESS No. to 07531 888866.

NAME _____

ADDRESS _____

POSTCODE _____

Available from most branches of W H SMITH and other retailers



AUTHORISED ACORN/BBC DEALER AND SERVICE CENTRE

	£
* BBC Model B Computer	99.00
BBC Computer Dust Cover	3.99
* BBC/LVL Single 100K Disk Drive	265.00
* BBC/LVL Twin 100K Disk Drive	389.00
Disk Drive Covers	3.99
* Torch 280 Disk Pack	897.00
* 14" Microvitech Colour Monitor	287.90
* 12" Sanyo Green Screen	90.85
* 14" Sanyo Colour Monitor	276.00
* Grundig 14" Colour TV/Monitor	275.00
* Seikosha GP100A Printer	229.94
* Seikosha GP250Z Printer	274.85
* Epsom FX80 Printer	503.70
* Epsom EX80 Printer	332.35
* Epsom MX100 Printer	539.35
* Silver Reed EX44 inc. Interface Typewriter/Printer	516.35
Tape Recorder Leads	
Din to Din + Jack	3.95
Din to 3 Jacks	3.95
Wordwise	39.95
View	59.80
Acorn Soft from..	9.95
BBC Software (all titles)	10.00
Educational Software from..	5.69
Books - hundreds of titles S.A.E. for list	Price including VAT

* Carriage £8.00 including VAT.

VICTOR — TORCH — OSBOURNE

OAKLEAF COMPUTERS LIMITED



ACORN SPECIALISTS



121, Dudley Road,
Grantham,
Lincs.
0476 76994/70281

100, Boughton,
Chester,
Cheshire.
0244 310099

(continued from page 81)

POKE 16514,118
POKE 16515,118
POKE 16510,0

You now have a Rem called line zero of length 2,303 bytes as required. Note that there are minor differences between the assembler code and the version of ZXGT in the hex dump.

Figure 4 shows the hex loader that will enable you to enter ZXGT. Note that the Rem to contain the code must be exactly 2,303 bytes in length, that is the total line length as defined by Sinclair. The loader will prompt

with the address to be loaded and you should refer to figure 5 to see the hex string that should be entered.

You should input the 21 characters up to, but not including, the equals sign followed by Newline. You will then be prompted for the check number by an equals sign. If the hex and decimal agree you will be prompted for the next line of input. If they disagree you will be asked to re-enter the data. The last hex string only contains five characters.

The entry point to the complete compiler is 17389 - use Rand Usr 17389 or Let L=Usr 17389 - for the code to be put in a Rem at

line 2 or 17381 if you wish it to ask where the code is to be put.

The entry to the code generated by ZXGT is at 18823. Use

Let L=USR 18823

Do not use

RAND USR 18823

In future issues, we shall give the remaining third of the ZXGT assembler code and discuss how to avoid some of the restrictions mentioned in part 1. If you find the listing too daunting to type in the compiler is available on cassette for £8.95 from Personal Software Services, 452 Stoney Stanton Road, Coventry.

Figure 5. Hex dump of ZXGT compiler.

```

16514 1BFBDACB97676C3B440C3=1607
16524 22341C35741C34F41C385=1114
16534 341C39741C39B41C32142=1201
16544 4C39C42C3DE42C33943C3=1414
16554 57A43C35743C3B843C38C=1331
16564 6E3D5AFC0D2142CB7C2808=1296
16574 73E16CD2142CD1B411110=718
16584 827CD0741301A11E803CD=847
16594 907413015116400CD0741=535
16604 030131E0ACD07413012C3=645
16614 1FC40CD0D4111E803CD0D=1069
16624 241116400CD0D411E0ACD=710
16634 30D411E01CD0D41AFD1E1=1001
16644 4C32142E5A7ED52E1C93E=1497
16654 51CA7ED5238033C18F919=931
16664 6C321427C2F677D2F6F23=886
16674 7C92A0C40112100E50100=599
16684 8000923E519EB21D602ED=1019
16694 942E3C1EBEDB0E1018602=1544
16704 009220E403E213239403E=449
16714 103323A40C9CDBB027CFE=1148
16724 2FE200ECD8B022420FACD=1217
16734 38B027DFE0FF28F8017FFD=1492
16744 4AFE5ED42E1CAB24001EF=1616
16754 5FC4FE5ED42E128DD4424=1549
16764 6C84DCDB077E7E00C9CB=1462
16774 7FC2234402A34407CE67F=1041
16784 8B5C8CD4F4128F306104A=1109
16794 97BEB210000CB391F3001=731
16804 019EB29EB10F5C93E2B90=1247
16814 1DADC42473E01CB283002=931
16824 23E84CB293002CB07F5CD=1020
16834 3EB417EC807FE1103007CB=1164
16844 40F3002EE8F47119E0C3A=752
16854 5304093FAE141F12FA018=1271
16864 602F1B0FE083002EE8F18=1144
16874 7363E17900ADC4279E61F=1169
16884 84FC5C5AFCB10CB10CB=1486
16894 91068672929C1484709C1=843
16904 04709ED4B0C400923220E=560
16914 140C13E1890323A403E21=754
16924 291323940C9D5E5C5F53A=1459
16934 33A40FE0223AF1FE7628=1129
16944 42A7FE4038722A0E407723=796
16954 5220E403A9403D323940=523
16964 67E7FE76204A3A403D32=895
16974 73A4023220E403E213239=471
16984 84018382A0E407EFE7628=802
16994 9E62318F82A0C4001F802=906
17004 009368FCDF4F128FBFE28=1140
17014 12815FE3F281BFE292008=780
17024 22110272B7DB420FBDC23=959
17034 3411803CD2A0AF1189AC1=961
17044 4E1D1C9CD690818D37881=1485
17054 5C81ACD2142130B18F5FE=1083
17064 6433809FEC0CB7DA3542=1301
17074 7E53F2111014704FE2130=754
17084 804AFC0D2142CB7E2328FB=1138
17094 910F97ECB7F2006CD2142=1063
17104 02318F5E63FCD2142AFC3=1271
17114 12D42CF8A7BB228FACD29=1293
17124 243C57CB20738F1484211=1020
17134 30000D5EB2329EB297995=1070
17144 4789CEB30F6EBEBAF7C1F=1605
17154 5677D1F6FB42818EBAFCB=1227
17164 61CCB1D7995789CF8FE42=1376
17174 779954F789C47E319E318=1199
17184 80DE1C1CB78C21B41C944=1517

17194 97C17DC1B41EB7C8047CB=1260
17204 07CC21B41C9ED5B324063=1152
17214 12EFD78B70600ED5298ED=1310
17224 252985F50ED5230012322=846
17234 33240CBBCC90303030303=915
17244 4030303210849CD30923=655
17254 53E767123350223C17123=760

17264 6702336EA2377237723C9=979
17274 7210000E5E5CD5741FE16=1124
17284 82009E1D1F5E5CD214218=1277
17294 90FE76E1201F29E52929=1260
17304 0D1194FCD214279D61C38=1036
17314 1084F060009FE0A38D3F1=874
17324 23EE6CD214218C7F1CC18=1291
17334 341C9C5E5A7B40F577E5=1514
17344 423227B40CD4F41FE2920=932
17354 5123E76CD2142E1CDB440=1176
17364 6F126006FCDB4401802E1=1090
17374 7F1E1C1AFC9C9C93E0FD7=1729
17384 8CD7549181221000CD12=693
17394 944CDF74803CD7849E5CD=1427
17404 00649E1CD1244CD5949CD=1167
17414 12044CD0D44CF7F3EC9C3=1178
17424 27B49227040ED5B1C4013=845
17434 3217240CD09452A704036=766
17444 418233668232279401168=592
17454 50019227B40217D40CD04=885
17464 6442323E523221640CD44=795
17474 745FEF20CCB44FEF9CC96=1897
17484 848FEFACCC848FEDE28EA=1802
17494 9FEE9CC1049FECC02B45=1599
17504 0FEEDCC4045FECC0C747=1791
17514 1FEF30CF447FEE4CC0049=1755
17524 2FEF40CB647FEE50CF148=1955
17534 3FEECC5D48FEF6CC6C48=1745
17544 4FEFCC9248FEF1CC0346=1700
17554 5FEFBC0947FEF3CA9647=1843
17564 6FEF5CC55FEFA2815FE=1660
17574 7E7CCA447FEFEC0D44FE=1717
17584 800200EC04445FE762007=799
17594 9E1CD0E49C236443EB8CD=1284
17604 06849CD5949CF9BCD4047=1259
17614 1215F49C3A947E556235E=1080
17624 2D5EBE5222340220A40CD=1123
17634 3EC45CD5349E1CD13451B=1211
17644 41EBE01CD0945FEA85B740=1269
17654 5CD0945E5ED5B7240A7ED=1422
17664 652E13803227240E1C973=1119
17674 72372230E5235623C9E5=1065
17684 8C12A1C4023CD0E45E8A7=1052
17694 9ED42D02A7240ED52D8EB=1501
17704 02318ED3EC3F5CD4445CD=1345
17714 12A48CD1345EBCD0E45EB=1165
17724 2F1C3AB473ECD18E9E5E7=1662
17734 3FE762809FE7E2805F5CD=1296
17744 46849F1E1C9CD4445FE76=1558
17754 52877FE082813FCF1284C=1046
17764 6FED62874CD5047215349=1169
17774 7CDA947104F9E10C07849=1035
17784 82A7840E5CD7B4901FFFF=1370
17794 92A164023037EF5CD6849=919
17804 0F1FE082805CD7B4918EF=1215
17814 1221640E1C571233E11CD=974
17824 2AB473E01E1CDAB472168=1117
17834 349CDA9471812CD3747CD=1096
17844 4C14721434CDCAE4721F5=1169
17854 508CDA947CD4445FE1A28=1115
17864 68CFE19288821EC45CDA9=1307

17874 7472A16402B221640AFC9=738
17884 8CD40473E7DCD7B492168=1078
17894 949CDA94718D63E76C368=1235
17904 049FE402C14406261717=1160
17914 1ED4B794026006F09C9CD=1061
17924 24445CDF145FE64200ACD=1253
17934 32A493EE5CD7B4926FE5=1329
17944 4CD4445FE14C2C144CD3D=1337
17954 546CDD345E17CFE9F200C=1457
17964 621D1EBCDCAE47210945C3=1233
17974 7A9473E22C3847AFF5CD=1398
17984 84D473EE5CD7B49CD4445=1182
17994 9FE112850FE76284CF5CD=1329
18004 04D47F1FE152804FE1620=1016
18014 123C16778FE002004F5E5=1215
18024 218D8E521444DCDAE47CD=1302
18034 37E463EE5216960CDAB47=1168

18044 418C4F5C5181CFE182810=1048
18054 5FE17C2C144CDCE462162=1336
18064 649CDA94718ACDC64621=1220
18074 76E4918F33EE1CD7B49F1=1379
18084 8FE00C8FE152311CDC646=1259
18094 921A7EBDCDAE4721ED52CD=1442
18104 0AE4718E7CDC5463E19CD=1265
18114 17B4918DD3ED1C37B49FE=1357
18124 2D3200FCD4D47217E6FCD=1086
18134 3AE47212600C3AE47FED4=1222
18144 42012CD4D4721EB46C3A9=1105
18154 54701F146C5E5C96069C9=1412
18164 6FEC4C20F47CD4445FE41=1391
18174 7C2C144217A47C38A47FE=1160
18184 82621006FC38A47FE40C2=1131
18194 91A47217249C3A947FED2=1216
18204 02011CD4D4721CB7CCDAE=1141
18214 1473EC4217A47C38A47FE=1246
18224 2CFC2C144C34D47CD4D47=1358
18234 3CD4445F53EE5CD7B49CD=1484
18244 44D473ED1CD7B49F1C9CD=1467
18254 54445FE16F5CD4445FE10=1269
18264 62816FE40300DFE26D482=1075
18274 747DC8F47F1CC7547C9CD=1544
18284 8CB4618F6CD3D4618F121=1177
18294 97A47182F767D2F6F821=821
18304 023C9CDF145FE64C3F49=1443
18314 13E2AC3AB47CD2A483E21=955
18324 21815CD0044E1ED467B40=1055
18334 3C9212A0A180521564918=531
18344 4003ECD07B497CDB47FE=1194
18354 57CC37B49CD3747CDD147=1315
18364 621EB7318EDFE1AC2C144=1379
18374 7C9CD4445CDF145E5E5CD=1721
18384 84445CD37473CD7B49F966=966
18394 921ED53CD8A47E1CD8A47=1478
18404 03E222323CDA947E1ED5B=1166
18414 17B40CD0945C9CD4445CD=1218
18424 2F145E5E53E2A0CB47FE=1352
18434 32322CDAE47E1CD8A4723=1229
18444 4233EEDCD7B493E5BCDAE=1264
18454 5473EA721ED52CD8A473E=1161
18464 6FAE1CD0E45E3E0CB47C9=1646
18474 7210000180FCD4445FE7E=794
18484 8281AF5110A00CDE249F1=955
18494 9FE26D2C144FE1CDAC144=1524
18504 0D61C06004F0918DFE52A=854
18514 1164011050019221640E1=478
18524 2C9217549CDA947CD4445=1211
18534 3CDF145C338453E9BF5CD=1503
18544 43747CD147214B45CDAE=1151

18554 5473E3ED7B49F1CD7B49=1238
18564 63E32213040CDAE472165=838
18574 749C3A9473EA018083E2A=1074
18584 8213440CDAE473E222132=775
18594 940C3AA47FED02812FE14=1307
18604 028141F3001EB17A7ED52=884
18614 137F817D01808ED5237C0=1132
18624 21804ED5237C93FC9CD37=1126
18634 347672E3ECDCAE4721A648=1003
18644 4CDA9472A0A4023CD1345=889
18654 5EBCD0E45EB3ED2CDAE47=1477
18664 6CD4445FEDECC2C144C921=1507
18674 7F748C3A947CDE7022138=1284
18684 840CB86C9210649C3A947=1197
18694 9213B40CBF6C307024E23=922
18704 04609233A0C409DC03A0D=668
18714 1409CC9CD4445FE3FC2C1=1467
18724 244CD4047AFC9CD4D4721=1183
18734 3ED4BCDAE4721C40CD8A=1266
18744 447212909C3AE47CD2A49=914
18754 53ED5CD7B49210E45CDAE=1166
18764 64721EBD1C3AE47C38840=1363
18774 7C38B40C38E40C39140C3=1398
18784 89440C39740C39A40C39D=1387
18794 940C3A040EBC3A40C3A6=1501
18804 040C3A940C3AC40C3A40=1357
18814 1AF40=239

```

NEW PROGRAMMING BOOKS FOR ALL MICROS

From Newnes Technical Books



Q & A on BASIC Programming

Peter Lafferty

This book describes, in easy-to-follow 'Questions and Answers' format, how to program a computer using the most popular and widely used language, BASIC. A simple version of BASIC is described

which should be applicable to all commonly available microcomputers. Many educational and game program examples are given.

Softcover 112 pages 0 408 01300 1 £2.50 June 1983

Introducing Z-80 Assembly Language Programming

Ian R Sinclair

If you've mastered BASIC, then progress on to assembly language programming with this ideal introduction. Practical methods of designing and entering code are emphasised and the interaction between machine code and hardware stressed. Great value for money for all users of Z-80 based micros, including the ZX81, ZX Spectrum, TRS80, Video Genie etc.

Softcover 152 pages 0 408 01338 9 £5.95 approx August 1983

Newnes Programming Books

A series of books specially written for micro users

FORTH for Micros

Steve Oakey

FORTH is a relatively new language which is rapidly catching on with micro users. Its easy to use and faster than BASIC. This book explains how to program in FORTH and demonstrates how extensible it is as a language. Gaining in popularity, FORTH is available for a range of micros, including ZX81, ZX Spectrum, BBC, Acorn, Atom, Dragon 32, Oric 1, TRS80, Apple, Pet, Jupiter Ace etc.

Softcover 160 pages 0 408 01366 4 £5.95 approx September 1983

FORTRAN for Micros

Garry Marshall

FORTRAN was one of the first high-level languages and a great deal of software has been produced for it over the years. Now FORTRAN is available for micros, much of this software can be used. Assuming only some working knowledge of BASIC programming, this book will appeal to all potential users of FORTRAN and will encourage them to start writing programs in FORTRAN as quickly as possible.

Softcover 96 pages 0 408 01336 2 £5.50 approx September 1983

Programming Languages for Micros

Garry Marshall

Covers all the common languages, BASIC, Pascal, Lisp, COBOL, FORTH, Comal, FORTRAN, Pilot, C, etc and gives sample programs. Explains what each language is intended for, how to use it and its main areas of application.

Softcover 136 pages
0 408 01185 8 £5.95
January 1983

Programming Languages for Micros



COBOL for Micros

N Stang

A book on COBOL devoted to its use with micros which emphasises its business advantages – particularly in areas such as screen handling, file handling and comprehension. Contains examples of COBOL programs with explanations of the language elements in terms of why, how and where they are used.

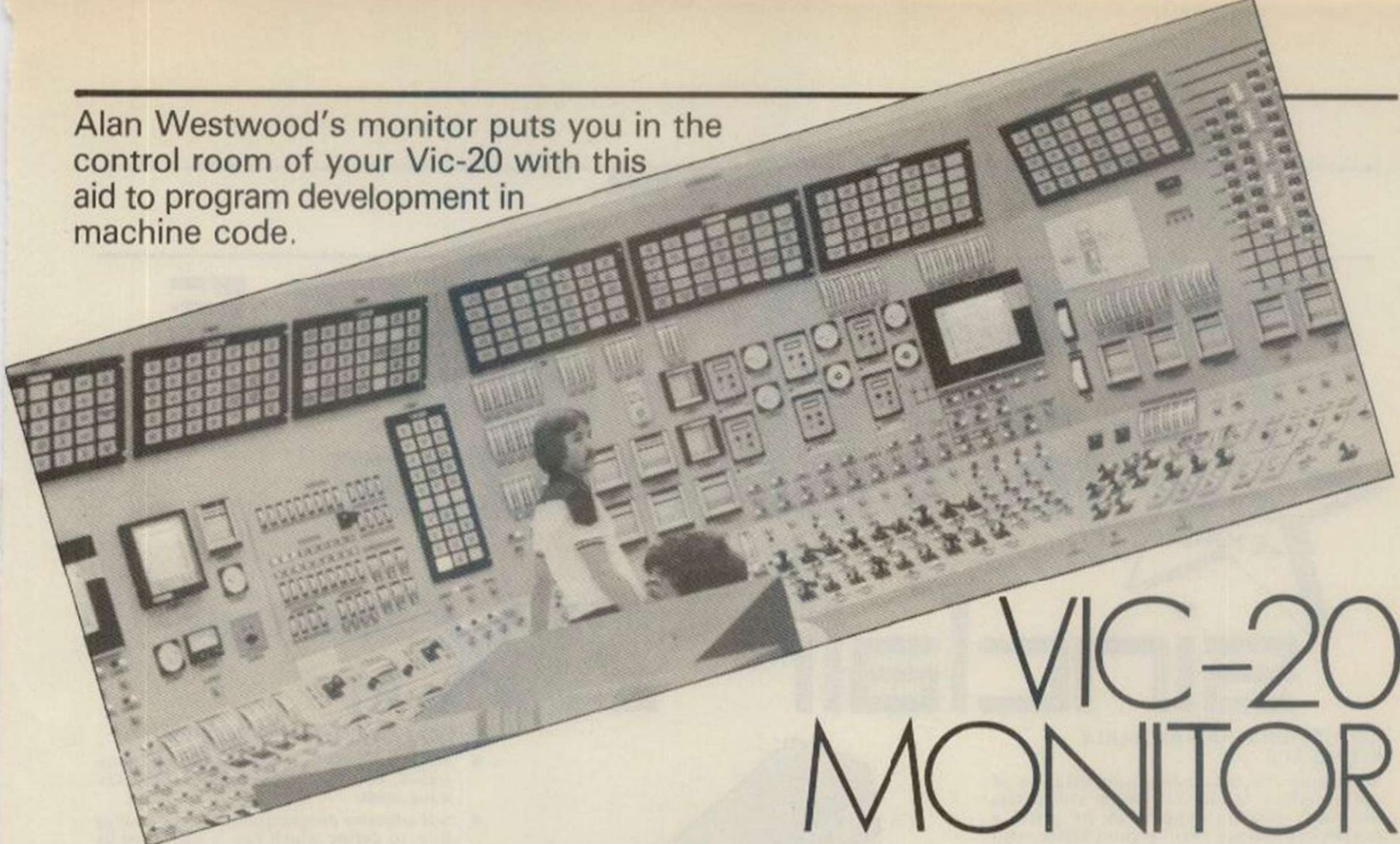
Softcover 224 pages 0 408 01342 7 £7.95 approx September 1983

Also available **BASIC for Micros** – Maynard £5.95 **Pascal for Micros** – James £5.95

Order now from your local bookseller

Newnes Technical Books
FREEPOST,
Borough Green, Sevenoaks, Kent TN15 8BR

Alan Westwood's monitor puts you in the control room of your Vic-20 with this aid to program development in machine code.



VIC-20 MONITOR

THIS MONITOR will run on any Vic and is designed to aid the development of machine-code programs. Listing 1 shows a loading program which Pokes the monitor into memory. Unfortunately, it will not run on an unexpanded machine — though the monitor will — and so those of you with only the basic machine will have to use listing 2.

When run, the monitor reassembles itself above RAMtop, taking up about 980 bytes. The monitor is therefore transparent to Basic and will happily sit above RAMtop while

leaving space for running other programs.

If you have an expanded machine, simply enter listing 1 then Save and Verify before running. This is your back-up copy. When you run the loader any errors will be detected by the checksum — it checks for zeros too — and the Data line number in which the error was found will be printed. Once all is correct, Run the loader and then Poke the addresses indicated with the values printed at the end of the program.

Then save the monitor — whatever you, do

not List. If you have an unexpanded machine do the following:

POKE 45,3: POKE 47,3: POKE 49,3: POKE 46,21:
POKE 48,21: POKE 50,21: POKE 43,1:
POKE 44,21: POKE 5376,0

then enter listing 2. Run the program and enter the code as in listing 1, starting at Data line number 210. The first data string on each line is the code, the second is the checksum. If you enter it incorrectly the program will print

C/SUM ERROR

and will ask for the data again. When you have finished enter an asterisk and the program will stop. Now do the following:

POKE 45,244: POKE 47,244: POKE 49,244:
POKE 46,20: POKE 48,20: POKE 50,20:
POKE 43,1: POKE 44,16

then Save and Verify as a normal program — do not list.

One you have a copy or two on tape, switch the machine off then on to clear the memory, reload, and, before running, Clear screen. You should now be in the monitor proper.

The first function the monitor performs is to set the breakpoint vector to point at the start of the monitor. What this means is that, when testing machine-code routines, breakpoints can be set by simply inserting BRK instructions 00 in appropriate places.

When this instruction is met, the program will automatically return control back to the monitor with the register values. The second function the monitor performs is to save the register values in the following addresses:

PC>=00 PC<=01 SR=02 AR=03 XR=04
YR=05 SP=06

The program then sets up the display and hands command to the user.

Now for a description of the commands; see figure 1 for a summary. There is full syntax checking so commas and so on must be entered where indicated, addresses should be in hex and of the length shown. All the

(continued on page 87)

Listing 1.

```
5 REM VICMON A.WESTWOOD C.1983
10 PRINT "[ ]":AD=PEEK(56)+A1=AD-6+POKE56:A1+POKE52:A1
20 A2=A1*256+PEEK(55)+A3=A2
30 CT=0:AF=0
40 IFA#="" THEN READCS:IFCS(<>)CTHENPRINT"[C]/SUM ERROR LINE"PEEK(64)*256+PEEK(63)
45 IFA#="" ANDCS(<>)CTHENPOKE56,AD+POKE52,AD+POKE51,PEEK(55)+STOP
50 IFA#="" THENCT=0:READA#:PRINTA#:IFA#=""*THEN80
60 H#=(LEFT$(A#,2)+GOSUB1000:CT+D+1+POKEA2:D
70 A#=(MID$(A#,3)+A2=A2+1:GOTO40
80 POKE52,AD+POKE56,AD+POKE54,AD+POKE53,PEEK(55)+POKE51,PEEK(55)
90 PRINT"POKE44:"INT(A3/256)
100 PRINT"POKE43:"A3-(INT(A3/256)*256)+1
110 PRINT"POKE45,47&49:"A2-(INT(A2/256)*256)
120 PRINT"POKE46,48&50:"INT(A2/256)
130 PRINT"THEN SAVE 'VICMON':"END
200 DATA
210 DATA002B040A006F22141414141414141414931E5649434D4F4E0D119E412E574553,1870
220 DATA54574F4F44203139383300460414009E28C228343329AA323536ACC228343429,2222
230 DATAAA30373125000000A52D8522A52E8523A5378524A5388525A0000A522D002C623,2733
240 DATAC622B122D03CA522D002C623C622B122F0218526A522D002C623C622B1221865,3482
250 DATA24AAA526652548A537D002C638C6376891378A48A537D002C638C63768913718,3367
260 DATA90B6C9BFD0EDA5378533A53885346C37000000BF78ADF00AEFFF000D1603,4011
270 DATA8E1703A9002090FF58000068950568850468850368850268850168850000BA86,2773
280 DATA0638A501E9028501A50000E900008500002079E5ADA3FF00ACH4FF00201ECB20,3021
290 DATAADF00AD0C7FF00ACC8FF00201ECB20F3FD0020A0FC0020B3FC0020CFFFC920F0,4387
300 DATAF9A209DDE0FF000012851C8A00AA0DEAFF0005C1BDEBFF0085C26CC10000CA10,4386
310 DATAE6A93F20D2FF4C68FC00209FFF20E4FFC90000FF6F662081E5A20000200DEA9,4295
320 DATA0D20D2FF4C81E5C93A08290F289002690060A90000852A20CFFFC920F0F920E1,3511
330 DATAFC00901720CFFFC930901820C3FC00062A062A062A062A052A0852A306020CFFF,2893
340 DATAC92CD00C20CEFC009007AA20CEFC009001606684CA0FC0020CFFFC90DF0F46020,4056
350 DATAF6FC0005C386C4A905851E200EFD00C92CD0E320CEFC00900DEA2000081C3C1C3,4234
360 DATAD0F1E6C3D002E6C4C61ED0E220F3FD0020A0FC00C949F0034C68FC004820B3FC,4668
370 DATA006820D2FFA92C20D2FFA5C3A6C420EAFD004C10FD0020F6FC00085C186C220F6,4404
380 DATAFC0005C386C420F6FC0005418642C5C18A5C2900AA5C3C541A5C4E542B09DA5,4751
390 DATAC3C3C1A5C+E5C29014A20000A1C10141E6C1D002E6C2E641D002E642D0E220F3,4842
400 DATAFD004C7AF0018A00000A20120FOFFADACFF00ACHDF00201ECBA501A6000020,3438
410 DATAEAFD00A9000085C2690285C14C32FE001869F690026900693A4CD2FF484A4AA,3458
420 DATA4A20D0F0008290F4CD0FD00489A20CDF00684C0CDF00A541A64285C186C2A2,3942
430 DAT00418861EA0000020FFA9DD20D2FFA5C1A6C220EAFD002032FE00A5C1186905,3863
440 DATA85C19006A5C269000085C2E61E18A61EA000020FOFFEB17D0D460A00000A9DD,3779
450 DATA20D2FFB1C120DCFD00C8C005D0F1A9DD4CD2FF20F6FC000541864220F3FD004C,4713
460 DATA7AFC00A54118695A854190F1A54269000018A90E7A54138E95A8541B0E0A542,3781
470 DATAE90001890ED20CEFC0085C186C220F6FC0085C386C4A2000020CFFFC92CF006,4189
480 DATAC90DF00CD03D20CEFC009563E8E00300E9861EA61EA00000B1C1D9630000F017,3874
```

(listing continued on page 87)

AGF

PROGRAMMABLE JOYSTICK INTERFACE



for

sinclair ZX Spectrum 81

ABOUT OUR PROGRAMMABLE INTERFACE

Surpassing the outstanding specification of our Interface Module II which still offers the best software support at its price, a Joystick Interface that is compatible with ALL SOFTWARE through its unique hardware programmable design.

The Interface plugs on to the rear connector of your ZX81 or ZX Spectrum.

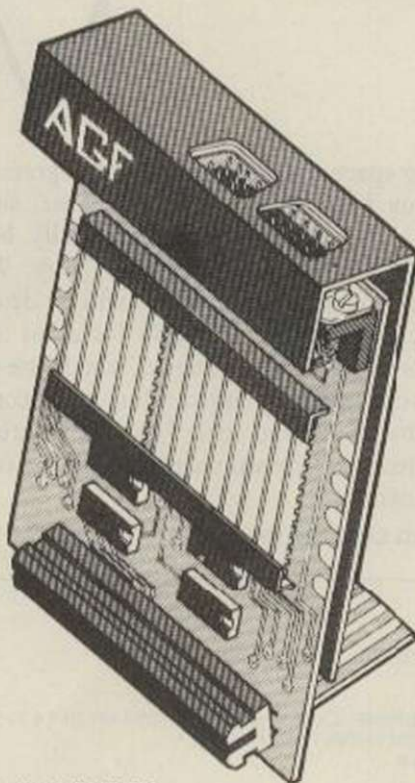
Quick clip-on connections, which are configured from a reference card supplied, allow you to define which of the forty keys are simulated by which action of the Joystick. A pack of ten Quick Reference Programming Cards makes setting for your favourite games even easier. These can be filled in to show at a glance the configuration required and stored in the cassette case of the particular game. When you change to a game using different keys the module is re-programmed in a few seconds.

As with our Interface Module II the Programmable Interface accepts all standard switch Joysticks that are Atari-compatible. Two sockets are available which are connected together for two player games which use the same keys for both players.

The Interface resides in the keyboard address space and does not affect its operation or interfere with any other add-ons. A rear extension edge connector will accommodate expansion of your system.

The unique AGF key simulation principle makes it extremely easy to incorporate Joystick action in your own programs. All eight directions and fire are read by simple BASIC.

With every order comes a free demonstration program called 'Video Graffiti' plus a full set of instructions.



KEY FEATURES

- * Programmable design gives TOTAL software support.
- * Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- * Rear extension connector for all other add-ons.
- * Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
- 12 months guarantee and full written instructions.

JOYSTICKS ATARI CONTROLLERS

FOR USE WITH OUR INTERFACE Module or VIC 20, Commodore 64, Atari VCS, Atari 400, Atari 800

If you require extra Joysticks for our original interface module mark order 'OLD' Joysticks

ONLY £7.54 inc VAT + P&P

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT. YCR

FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	33.95	
	JOYSTICK(S)	7.54	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ONE	VIDEO GRAFFITI	FREE	
ZX81 <input type="checkbox"/> ZX SPECTRUM <input type="checkbox"/>		FINAL TOTAL	
DEALER ENQUIRIES WELCOME		EXPORT PRICES ON APPLICATION	

(continued from page 85)

commands are entered in the top line of the screen. Here they are:

V,aaaa

This displays a screen page of memory from address aaaa by entering carriage-return on its own. The next screen page of memory is displayed, and, for continuity, the last line of the previous page becomes the first line of the next page. Entering P will display the previous page and the first line becomes last.

I,aaaa,11,22,33,44,55

This inputs up to five bytes of memory starting at address aaaa. If five bytes are entered, the monitor will wait for an input. If you now press I the next address for input will be displayed on the command line. This has been included for fast entry code.

H,aaaa,bbbb,11,22,33

Hunts between addresses aaaa and bbbb for a sequence of one, two or three bytes.

M,aaaa,bbbb,cccc

Moves a block of memory between addresses aaaa and bbbb to a block starting at address cccc. If you try to move the block upwards through memory into its own space then the monitor will reject it, thus preventing corruption of the block.

It will, however, accept movement down through memory as this will not corrupt the block, that is, it will accept

M,1000,2000,0fff

but will reject

M,1000,2000,1001

You can move memory freely in either direction, if you are moving the block outside its own space. Note the monitor is not

Listing 1 continued from page 85.

```

490 DATAE6C1D002E6C2A5C3C5C1A5C4E5C2901320E1FFD0E0F00CC8C8A00E45C18541A5.5535
500 DATA285424C68FC004C0AFC0020CFFFC90DF00720F9FC0055018600002079E5A606.3655
510 DATA9AA5000046A50146A50248A503A604A4054070A6069A6C002079E54C68FC00.3033
520 DATA2079E54C68FC00A00184B084390884B784908493A90205BCA940858B20CFFFC0.4444
530 DATA20F0F9C90DF01AC922D0D620CFFFC922F025C90DF00B91BBE6B7C0C010F0C2D0.4956
540 DATAEAA51CC94CDBE22079E5A9000020D5FFA59029100F0F0A420CFFFC90DF0E3C9.4815
550 DATA2C00F120CEFC00290FF0D4C933F0FA05BA20F6FC0005C186C220F6FC0005A0E6.4691
560 DATAHF20CFFFC920F0F9C90DD008451CC953D0F8A90D20D2FFA90185892079E52082.4705
570 DATAHF64CFEFE0000FF00425245414B0E0000HEFF001280C00043C0E23332B24152B2.3603
580 DATA5652B25952B25350A0DD000009FF0000A0BC0C0C00BC0C00BC0C00BC0C00B.4736
590 DATA0C00BC0C00B3000051474D484956534C500DF7FE00D3FE0063FD0076FE0016FD.3875
600 DATA0048FE0000FF0000FF00066FE0055FE0034FC00.1880
610 DATA#
1000 D=0:IFH#>""THENFORI=1TOLEN(H#):H=ASC(MID#(H#,I))-48:D=D*16+A+(A>9)*7:NEXTI
RETURN

```

protected from this function, so you must be careful when using this it.

G,aaaa

Goto code starting at address aaaa. If G is input on its own then control will be handed

Listing 2.

```

10 AD=4096:PRINT"DJ"
20 AF=""
30 INPUT"CODE#":IFAF#""*THENEND
35 INPUT"C/SUM":CS:CT=0
40 FORJ=1TOLEN(AF)-1STEP2
50 H=MID#(AF,J,2):GOSUB1000:CT=CT+1
60 NEXTJ
70 IFCS<>CTTHENPRINT"C/SUM ERROR":GOTO20
80 IFAF#""THENCS0
90 H=LEFT$(AF,2):GOSUB1000:POKEAD,H
100 AF=MID$(AF,3)+AD=AD+11GOTO80
1000 D=0:IFH#>""THENFORI=1TOLEN(H#):H=ASC(MID$(H#,I))-48:D=D*16+A+(A>9)*7:NEXTI
RETURN

```

Figure 1.

U,aaaa	view page
Carriage return	next page
P	previous page
G or G,aaaa	goto
H,aaaa,bbbb,11,22,33	hunt
I,aaaa,11,22,33,44,55	input
M,aaaa,bbbb,cccc	move
Q	quit
L or L"prog name"	load
S"prog name",01,aaaa,bbbb	save

over to code starting at the address in the PC register. The registers can be changed before going to a routine by inputting the values into the register storage addresses, which are 0000-0006.

Q

Quit to Basic. Basic programs can be entered and run as normal provided they do not write over the monitor. To return to the monitor SYS60151.

L or L"prog name"

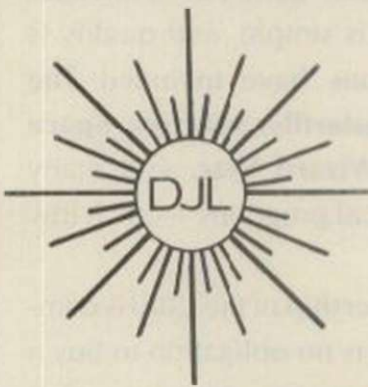
Loads memory into the address from which it was saved.

S"prog name",01,aaaa,bbbb

Saves memory between addresses aaaa and bbbb to cassette.

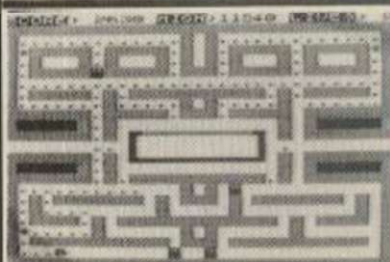
One last thing, if you exceed the command line and corrupt the display simply clear the screen and enter C, and this will return the display to normal.

If anybody would like a copy of this program on tape then they should send a cheque or postal order for £3 to this address Monitor, 97 Trentham Street, London, SW18 5DH. I will also include a copy of my disassembler on the tape.



DJL SOFTWARE

DEPT YC, 9 TWEED CLOSE, SWINDON, WILTS
SN2 3PU Tel: (0793) 724317 Trade enquiries welcome
 Export Orders: Please add £1.00 per tape airmail



ZUCKMAN ZX81 (16K)

- * ALL MACHINE CODE (10K)
- * FOUR INDEPENDENT GHOSTS
- * HIGH-SCORE 'HALL OF FAME'
- * AUTHENTIC ARCADE ACTION
- * TITLE/DISPLAY MODE
- ONLY £5.95 INC. P&P**



FROGGY ZX81 (16K)

- * MOVING CARS, LOGS, TURTLES
- * ALLIGATORS, DIVING TURTLES
- * FOUR 'SCREENS' OF ACTION
- * ALL ARCADE FEATURES
- * ENTIRELY MACHINE CODE
- ONLY £5.95 INC. P&P**

★ ZX Spectrum ★

New FROGGY 16K or 48K

SPECTRUM VERSION OF ARCADE GAME WITH FULL ARCADE FEATURES:--

- * Fabulous Hi-Res Colour Graphics
- * Authentic Sound Effects + 3 Tunes
- * 3-D Logs, Swimming & Diving Turtles
- * 3 Lanes of Multi-coloured vehicles
- * On-screen Score, Hi-Score, Time-bar
- * Snake, Alligators and Baby Frog
- * 'Top 5' High-Score initials table
- * Demonstration Game routine

Your home-sick frog must leap across a busy main road, then onto logs and turtles in the river to reach safety of the river-bank frog-homes.

THIS MACHINE-CODE GAME MUST BE SEEN TO BE BELIEVED!!

ONLY £5.95 INC. P&P



SOFTWARES

SOFTWARES has a readership of more than 35,000 to home micro owners each month, yet you will not find **SOFTWARES** in any newsagents.

SOFTWARES is filled with in-depth reviews of the latest and the best programs from the many hundreds of software publishers, yet **SOFTWARES** is not for sale.

SOFTWARES offers its readers substantial savings on the prices of the programs it recommends, yet **SOFTWARES** is free of charge.

SOFTWARES will soon be including hardware reviews and offers, program listings, and hints and tips, yet it will remain free of charge.

IS A STRANGE MAGAZINE

SOFTWARES is the magazine of the **Microcomputer Software Club**. It is available, free of charge, to members only. Why don't you become a member?

THE MicroComputer SOFTWARE CLUB

The Microcomputer Software Club exists to provide its members with quality software at low prices. Its 35,000 members have all realised that membership of the Club takes the gamble out of buying software. Fancy packaging and glossy advertising do not impress us — a program has to be good to be recommended to members in **SOFTWARES**. We test for loading, unique features, value for money, use of the computer's capabilities, reliability, speed and playability, or in the case of non-games programs, their suitability for the job they are to undertake. All kinds of program are included: arcade; adventure; strategy; utilities; educational; practical/business applications.

All of the programs recommended in **SOFTWARES** are available direct from the Club at low prices — minimally 10% cheaper than normal and, for the program

we feel is the best available each month, 20% cheaper than usual prices. Ordering is simple, and quality is guaranteed. Recent selections have included **The Hobbit, Wacky Waiters, Masterfile, Spectres, Space Phreeks, Chess: The Turk, Wizard War**, and many other educational and practical programs — all at low membership prices.

Surprisingly, perhaps, membership of the Club is completely free of charge. There is no obligation to buy a certain number of programs — members buy what they want when they want. Receipt of **SOFTWARES** is automatic and free and postage and packing is free as well. Sounds too good to be true? Try it and find out. If you own or regularly use a ZX81(16K), Spectrum, BBC, Dragon, VIC-20, Commodore 64 or Oric, join the Club.

Free membership application

Please accept my application and enrol me as a member of The Microcomputer Software Club. I understand that membership is free of charge.

As a member I will receive the Club Newsletter free of charge and will be entitled to benefit from any savings offered to members on selected programs for micro-computers. I may cancel my membership at any time.

THE MICROCOMPUTER SOFTWARE CLUB
P.O.Box 166, Oxford, OX2 9BJ, England.

NAME _____

ADDRESS _____

CITY _____

POSTCODE _____ AGE _____

COMPUTER MODEL _____ COMPUTER RAM _____

FOX SPECTRUM UPGRADE KIT £20.99

LOWEST
PRICE
EVER

NEW
LOW
PRICE

INCLUSIVE (Issue 2 machines only)

A high quality kit at a new low, low price which simply plugs into existing sockets within your Spectrum, no soldering is required and step by step instructions are supplied.

**PROBABLY THE BEST KIT AVAILABLE AT DEFINITELY THE
LOWEST PRICE**

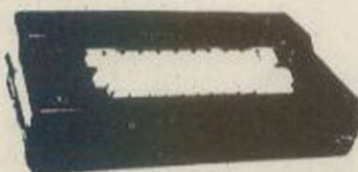
Should you require any more information on the kit or any other items, please phone or write to us at the address below.

ALSO AVAILABLE FOR THE VIC-20, SPECTRUM ZX81

FULLER FD42 KEYBOARD

FOR THE SPECTRUM OR
ZXZ-81. A42 KEY FULL
TRAVEL, CASED
KEYBOARD WHICH
YOUR MACHINE SITS
INSIDE, PLUGS IN
(NO SOLDERING REQ).

£29.05
INCL



SPECTRUM JOYSTICK

A Deluxe Joystick Controller. Complete with Interface with

- CONTOURED GRIP
- 2 FIRE BUTTONS
- 4 FEET OF CORD
- 4 SUCTION CAP GRIPS FOR ATTACHING TO ANY SURFACE

£19.50

INCL.

ZX-81

THE BEST AVAILABLE EXPANDABLE RAM
PACK AT THESE NEW LOW PRICES!!

16K
£19.50
+45p p&p

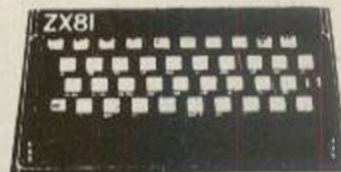


32K
£34.00
+45p p&p

The ZX-Panda a specially contoured unit designed to eliminate wobble and memory loss, housed in a very attractive case with red LED on/off indication.

A replacement keyboard — this one with a calculator-type feel. Peel off backing and press to fit. Incredibly low price of £10.00 p&p included.

ZX81
ZX81
ZX81
ZX81



Give your VIC-20 a new DIMENSION

Vixen RAM Cartridge £34.95
Switchable between 16K or 8K + 3K

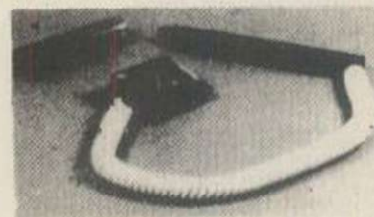
Gives you the option of full 16K or 8K and 3K RAM in one package. When added to a standard VIC-20 gives 16384 bytes of extra memory in memory blocks 1 and 2 or 3092 bytes of extra memory into the 3K memory block and 8192 bytes of extra memory switchable between memory blocks 1 and 3

- Fully compatible with available motherboards modules.
- Simply plugs into the rear expansion port of computer.
- No re-addressing of existing BASIC programs needed.



VIC-20

VIC LIGHT PEN
A high quality light pen which plugs straight into your Vic with no special interface needed.



£20.00 inc. of software.

DEALERS WELCOME

Many other

Products

AVAILABLE EX-STOCK
Send S.A.E. for details

SEND NOW TO:

FOX ELECTRONICS CALLERS WELCOME
BY APPOINTMENT

141 Abbey Road, Basingstoke, Hants. Tel: 0256 20671



SEND NOW TO FOX ELECTRONICS

Please send me:

- | | | | |
|------------------------|--------------------------|------------------------|--------------------------|
| Spectrum Upgrade | <input type="checkbox"/> | ZX81 Press On Keyboard | <input type="checkbox"/> |
| Spectrum Keyboard FD42 | <input type="checkbox"/> | VIC-20 Light Pen | <input type="checkbox"/> |
| ZX81 Keyboard FD42 | <input type="checkbox"/> | Name | |
| ZX-Panda 16K/32K | <input type="checkbox"/> | Address | |
| Vixen RAM Cartridge | <input type="checkbox"/> | | |
| Spectrum Joystick | <input type="checkbox"/> | | |

Listing 1. The initialising program.

```

5 REM FOR E READ HASH CHARACTER
10 REM ... SCRAMBLER ...
30 REM Copyright (c) D.Griffin 1983
70 MODE 7
80 VDU 23,1,0,0,0,0
90 PROCTitle
100 PROC machine_code
110 CHAIN ""
120 END
130 DEFPROCtitle
140 FOR I=0 TO 5:VDU 31,0,1,132,157,150,31,39,1,156:NE
XT
150 PRINT TAB(3,0):" _ppp0 _ppp0 pppp _ppp"
160 PRINT TAB(3,1):" h1,l1,v5,c,l1,151,145:kh1,jh'h,14"
170 PRINT TAB(3,2):" ju'h,j755/xj_0554455:kj1j;DHR#255
,"jh"j#eS "
180 PRINT TAB(3,3):" j7-jjt#551;ju55555up"j#ojp#jh45
"
190 PRINT TAB(3,4):" */ / , - / x , - X , - X , - X
"
200 PRINT TAB(4,7):"Copyright (c) David Griffin 1983"
210 FOR I=0 TO 23
220 VDU 31,0,1,145
230 NEXT
240 A$="lahagahegahelejekelakelenanananalaakajaiaha
gafafeagahelehalahagafafege"
250 FOR I=1 TO 76 STEP 2
260 Y=ASC(MID$(A$,I,1))-97
270 C=ASC(MID$(A$,I+1,1))-97
280 FOR X=18 TO 23-Y STEP -1
290 VDU 31,1/2+1,X,255
300 NEXT
310 VDU 31,1/2+1,23-Y,C+116
320 NEXT
330 FOR I=19 TO 23
340 VDU 31,1,1,157,131,31,39,1,156
350 NEXT
360 VDU 31,8,21:PRINT "Easy or Hard Game ?"
370 REPEAT A$=GET$
380 UNTIL A$="Y" OR A$="N"
390 PRINT TAB(6,21):"Please wait approx. 1 minute"
400 IF A$="E" PROC terrain(1) ELSE PROC terrain(0)
410 PRINT TAB(6,21):SPC(30)
420 VDU 20,8,22,35,19
430 ENDPROC
440
450
460 DEFPROC machine_code
470 FOR PASS=0 TO 2 STEP 2
480 P%:=E4B00
490 OPT PASS
500 .SCRLL
510 LDY E2
520 .NN
530 LDA &7C78,Y:STA &7C77,Y
540 LDA &7C60,Y:STA &7C6F,Y
550 LDA &7C50,Y:STA &7C67,Y
560 LDA &7C60,Y:STA &7C6F,Y
570 LDA &7D10,Y:STA &7D17,Y
580 LDA &7D40,Y:STA &7D3F,Y
590 LDA &7D60,Y:STA &7D67,Y
600 LDA &7D90,Y:STA &7D8F,Y
610 LDA &7DB0,Y:STA &7D87,Y
620 LDA &7DE0,Y:STA &7D0F,Y
630 LDA &7E00,Y:STA &7E07,Y
640 LDA &7E30,Y:STA &7E2F,Y
650 LDA &7E50,Y:STA &7E57,Y
660 LDA &7E80,Y:STA &7E7F,Y
670 LDA &7EA0,Y:STA &7EA7,Y
680 LDA &7ED0,Y:STA &7EDF,Y
690 LDA &7FB0,Y:STA &7FB7,Y
700 LDA &7F20,Y:STA &7F1F,Y
710 LDA &7F40,Y:STA &7F47,Y
720 LDA &7F70,Y:STA &7F6F,Y:VLD &7F90,Y:STA &7F97,Y
730 INY:CPY &40:BEQ NN:JMP NN
740 .MM LDY E0:LDX E20:LDA &5F:STA &70:LDA &57:STA &
71
750 .NNI LDA E32:STA (&70),Y
760 CLC:LDA &70:ADC &40:STA &70:LDA E0:ADC &71:STA &71
770 DEX:BPL NN1
780 RTS
790 .PRI
800 LDY E0:LDX &80
810 LDA E8F:STA &70:LDA E87:STA &71
820 .NRB OPT E0:BEQ NN0:LDA E255:STA (&70),Y
830 CLC:LDA &70:ADC E39:STA &70:LDA &71:ADC E0:STA &71
840 DEX:JMP NN2
850 .NRB LDA &79:STA (&70),Y
860 LDY E0:LDX &82
870 LDA E8F:STA &70:LDA E87:STA &71
880 .NRB CPY E0:BEQ NN0:LDA E255:STA (&70),Y
890 CLC:LDA &70:ADC E40:STA &70:LDA &71:ADC E0:STA &71
900 DEX:JMP NN3
910 .NRB LDA &7A:STA (&70),Y
920 RTS
930 .RUB
940 LDY E0
950 LDA E32:STA (&50),Y
960 INY:STA (&50),Y
970 INY:STA (&50),Y
980 INY:STA (&50),Y
990 LDY E40:STA (&50),Y
1000 INY:STA (&50),Y:INY:STA (&50),Y:INY:STA (&50),Y:IN
Y:STA (&50),Y
1010 LDY E80:STA (&50),Y
1020 INY:STA (&50),Y:INY:STA (&50),Y:INY:STA (&50),Y
1030 RTS
1040 .NRB
1050 LDY E0
1060 LDA E83:STA (&50),Y
1070 INY:LDA E80:STA (&50),Y
1080 INY:LDA E82:STA (&50),Y
1090 INY:LDA E83:STA (&50),Y
1100 LDY E40
1110 LDA E87:STA (&50),Y
1120 INY:LDA E8F:STA (&50),Y
1130 INY:STA (&50),Y
1140 INY:STA (&50),Y
1150 INY:LDA E84:STA (&50),Y
1160 LDY E80
1170 LDA E82:STA (&50),Y
1180 INY:LDA E82:STA (&50),Y
1190 INY:LDA E82:STA (&50),Y
1200 INY:LDA E82:STA (&50),Y
1210 RTS
1220 .CHECK
1230 LDY E0
1240 LDA (&50),Y:CHP E32:BNB HITT
1250 INY:LDA (&50),Y:CHP E32:BNB HITT
1260 INY:LDA (&50),Y:CHP E32:BNB HITT
1270 INY:LDA (&50),Y:CHP E32:BNB HITT
1280 LDY E40
1290 LDA (&50),Y:CHP E32:BNB HITT
1300 INY:LDA (&50),Y:CHP E32:BNB HITT
1310 INY:LDA (&50),Y:CHP E32:BNB HITT
1320 INY:LDA (&50),Y:CHP E32:BNB HITT
1330 INY:LDA (&50),Y:CHP E32:BNB HITT
1340 LDY E80
1350 LDA (&50),Y:CHP E32:BNB HITT
1360 INY:LDA (&50),Y:CHP E32:BNB HITT
1370 INY:LDA (&50),Y:CHP E32:BNB HITT
1380 INY:LDA (&50),Y:CHP E32:BNB HITT
1390 RTS
1400 .HITT LDA E1:STA &75:RTS
1410 .FIRE
1420 LDY E0
1430 LDA (&72),Y:CHP E32:BNB FIREND

```

```

1440 INY:LDA (&72),Y:CHP E32:BNB FIREND
1450 INY:LDA (&72),Y:CHP E32:BNB FIREND
1460 LDA E44:STA (&72),Y
1470 CLC:LDA &72:ADC E2:STA &72:LDA E0:ADC &73:STA &73
1480 RTS
1490 .FIREND STA &54:LDA E0:STA &74:RTS
1500 .BOMB
1510 LDY E0
1520 CLC:LDA &76:ADC E41:STA &76:LDA E0:ADC &77:STA &77
1530 LDA (&76),Y:CHP E32:BNB BOMBEND
1540 LDA E43:STA (&76),Y:RTS
1550 .BOMBEND
1560 LDA E0:STA &78:RTS
1570 .ROCKET
1580 LDY E0
1590 LDA E96:STA (&55),Y
1600 INY:LDA E117:STA (&55),Y
1610 INY:LDA E32:STA (&55),Y
1620 LDY E40:LDA E106:STA (&55),Y
1630 INY:LDA E122:STA (&55),Y
1640 INY:LDA E32:STA (&55),Y
1650 LDY E80:LDA E104:STA (&55),Y
1660 INY:LDA E109:STA (&55),Y
1670 INY:LDA E32:STA (&55),Y
1680 RTS
1690 .RUBOUT
1700 CLC
1710 LDY E0:LDX &57
1720 .RUB1
1730 LDA E32
1740 STA (&58),Y
1750 INY:STA (&58),Y
1760 INY:STA (&58),Y
1770 TY:ADC E30:TAY
1780 DEX:BPL RUB1
1790 .RTS
1800 .ROCKETS
1810 LDY E0:LDX E0
1820 .ROCKET1 LDA E90,X:CHP E0:BEQ NR0C
1830 CLC:LDA E92,X:SHC E0:STA &92,X
1840 LDA &93,X:SHC E0:STA &93,X
1850 LDY E0:LDA (&92,X),Y:CHP E32:BNB ROCKET2
1860 LDA E0:STA &90,X:JMP NR0C
1870 .ROCKET2
1880 LDA &91,X:CHP E0:BEQ ROCKET3
1890 DEC &91,X:JMP NR0C
1900 .ROCKET3 LDA E2:STA &57:LDA &92,X:STA &58:LDA &93,
X:STA &59:STX &5A:JSR RUBOUT:LDX &5A
1910 CLC:LDA &92,X:SHC E39:STA &92,X:LDA &93,X:SHC E0:ST
A &93,X
1920 LDY E0:LDA (&92,X),Y:CHP E32:BNB ROCKET4:LDA E0:ST
A &90,X:JMP NR0C
1930 .ROCKET4 LDY E255:LDA (&92,X),Y:CHP E32:BNB ROCKET
5:LDA E0:STA &90,X:JMP NR0C
1940 .ROCKETS LDA &92,X:STA &55:LDA &93,X:STA &56:STX &
5A:JSR ROCKET:LDX &5A
1950 .NR0C INX:INX:INX:INX:CPX E27:BPL ROCKET6:JMP ROCK
ET1
1960 .ROCKET4 RTS
1970 .BOUNDR
1980 LDY E0
1990 LDA E104:STA (&5B),Y
2000 INY:LDA E111:STA (&5B),Y
2010 INY:LDA E109:STA (&5B),Y
2020 LDY E40:LDA E54:STA (&5B),Y
2030 INY:LDA E47:STA (&5B),Y
2040 INY:LDA E39:STA (&5B),Y
2050 RTS
2060 .HOUNDR
2070 LDY E0:LDX E0
2080 .NRB LDA &84,X:CHP E0:BNB B00:JMP B0N
2090 .B00 CLC:LDA &83,X:SHC E0:STA &83,X:LDA &84,X:SHC
E0:STA &84,X
2100 LDA (&83,X),Y:CHP E32:BNB B01
2110 LDA E0:STA &84,X:JMP B0N
2120 .B01 LDA &83,X:STA &58:LDA &84,X:STA &59:LDA E1:ST
A &57:STX &5A:JSR RUBOUT:LDX &5A:LDY E0
2130 CLC:LDA &83,X:SHC E0:STA &5D:LDA &84,X:SHC E0:STA
&5E
2140 LDA (&5D),Y:CHP E128:RRT B02:CHP E255:BEQ B02:LDA
E0:STA &84,X:JMP B0N
2150 .B02 LDA &85,X:CHP E1:BNB B03:CLC:LDA &83,X:SHC E3
9:STA &83,X:LDA &84,X:SHC E0:STA &84,X:JMP B04
2160 .B03 CLC:LDA &83,X:ADC E40:STA &83,X:LDA &84,X:ADC
E0:STA &84,X
2170 .B04 CLC:LDA &83,X:SHC E78:STA &5D:LDA &84,X:SHC E
0:STA &5E:LDA (&5D),Y:CHP E32:BNB B05:CLC:LDA &83,X:ADC
E121:STA &5D:LDA &84,X:ADC E0:STA &5E:LDA (&5D),Y:CHP E3
2:BEQ B05
2180 .B05 LDA &85,X:CHP E1:BEQ B0T:LDA E1:STA &85,X:JMP
B06
2190 .B0T LDA E0:STA &85,X
2200 .B06 LDA &83,X:STA &5B:LDA &84,X:STA &5C:JSR BOUNDR
ER
2210 .B0N INX:INX:INX:CPX E9:BPL BEND:JMP NN6
2220 .BEND RTS
2230 RTS
2240 .JNEXT
2250 ENDPROC
2260
2270
2280 DEFPROC terrain(1)
2290 VIX=0:VIX2=0:AXX=0
2300 FOR X=85000 TO 85010 STEP 3
2310 VIX=VIX+(VIX+1)=0:VIX2=0
2320 VIX=VIX+1
2330 NEXT
2340 FOR X=85021 TO 855DF STEP 3
2350 AXX=AXX+1
2360 VIX=VIX+(VIX+1)=0:VIX2=0
2370 NN6=NRND(3)-2
2380 VIX=VIX+NN6
2390 IF VIX<2 OR VIX>12 VIX=VIX-NN6:GOTO 2370
2400 IF AXX<3 OR VIX<7(X-3) OR VIX>7(X-6) GOTO 2440
2410 IF NRND(7+85X+7)=1:VIX2=5:AXX=0:GOTO 2440
2420 IF NRND(4-85X+2) > 1 GOTO 2440
2430 VIX2=NRND(3):AXX=0
2440 NEXT
2450 FOR X=855E2 TO 855FD STEP 3
2460 VIX=VIX-1:IF VIX<0 VIX=0
2470 VIX=VIX+(VIX+1)=0:VIX2=0
2480 NEXT
2490 AXX=0
2500 VIX=0:VIX2=0
2510 FOR X=85600 TO 856EB STEP 3
2520 AXX=AXX+1
2530 VIX=VIX+(VIX+1)=0:VIX2=0
2540 VIX=VIX+NRND(3)-2:VIX2=VIX+NRND(3)-2
2550 IF VIX<1 VIX=1
2560 IF VIX<0 VIX=0
2570 IF VIX+VIX<9 GOTO 2600
2580 IF VIX<0 VIX=VIX-1
2590 IF VIX<0 VIX2=VIX-1
2600 IF AXX<12 AND NRND(7+85X+7)=1:VIX2=4:AXX=0
2610 NEXT
2620 FOR X=856B0 TO 856FD STEP 3
2630 VIX=VIX-1:VIX2=VIX-1
2640 IF VIX<0 VIX=0
2650 IF VIX<0 VIX2=0
2660 VIX=VIX+(VIX+1)=0:VIX2=0:VIX2=0
2670 NEXT
2680 AXX=0
2690 FOR X=85C00 TO 861FD STEP 3
2700 AXX=AXX+1
2710 VIX=VIX+(VIX+1)=0:VIX2=0
2720 IF VIX<5 VIX=VIX-1:GOTO 2760
2730 NN6=NRND(3)-2
2740 VIX=VIX+NN6
2750 IF VIX<1 OR VIX>5 VIX=VIX-NN6:GOTO 2730
2760 IF AXX<3 OR VIX<7(X-3) OR VIX>7(X-6) GOTO 2790
2770 IF NRND(3+85X+2)=1 AND AXX<4:VIX2=NRND(12+3):AX

```



A MOUNTAINOUS wasteland in magenta: the surface is littered with mystery bases, fuel dumps, loaded and unloaded missiles. As you race under the radar, your ship must destroy targets to gain points. Keep a watchful eye on your fuel: bombing or shooting fuel dumps will increase your fuel supply. You have to make sure your fuel tank is full before attempting the next sector.

This is the scenario that greets you in the first screen of Scrambler. The screen changes colour from magenta to red, as you enter the cave. The path of your attacking ship is blocked by bouncing fizzers. These evil creatures just bounce up and down whilst emitting a curious sound to help send you insane. Either try to shoot them down, or try to avoid them with some nifty finger work. A full tank of fuel is almost used up in this phase.

After vast fuel consumption in the cave you will be anxious to replenish your supply in this green-coloured rocky terrain. Fuel dumps and mystery bases occupy the ground, whilst fireball comets occupy the air space. The comets are indestructible, so the only way to survive is to dodge them.

The screen turns blue as the deserted city approaches. This sector has all the hazards of the first one, with the enemy missiles in deep silos. The silhouette of the city at nightfall provides the background for all the action, the missiles coming fast and furious.

The fifth screen consists of large caverns joined by narrow passages being blocked by fuel dumps. Clever use of the boosters and retro rockets is the only way to survive this terrain.

A final colour change from yellow to cyan signals the start of the final sector, the Base. Flying over the futuristic skyline will bring you to the nerve centre of the enemy planet. A

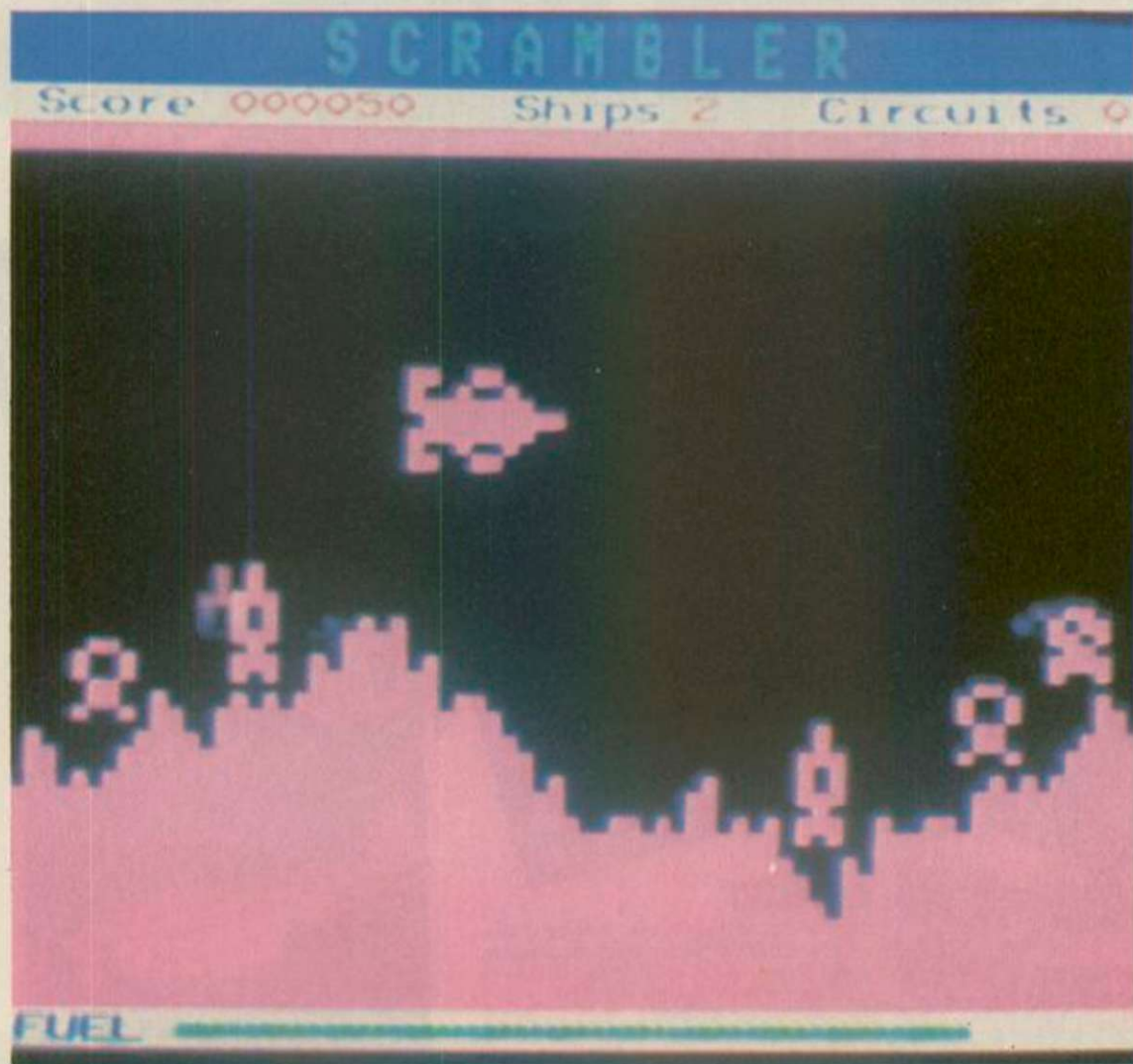
```

3=0:GOTO 2790
2780 IF NRND(3)=1:VIX2=1+NRND(2):AXX=0
2790 NEXT
2800 VIX=10:VIX2=1:AXX=0
2810 FOR X=86200 TO 86790 STEP 3
2820 VIX=VIX+1:AXX=AXX+1
2830 VIX=VIX+(VIX+1)=0:VIX2=0
2840 IF NRND(7)=1 AND VIX>3:VIX=NRND(10)+4:VIX2=0
2850 IF NRND(7)=1 AND VIX>3:GOTO 2890
2860 IF NRND(7)=1:VIX2=NRND(2)+1:AXX=0:VIX2=2:GOTO 2890
2870 IF VIX<5 GOTO 2890
2880 IF NRND(4+85X+5)=1:VIX2=VIX-4:VIX=6:VIX2=VIX-3:VIX
X:VIX2=VIX+(VIX+1)=0:VIX2=1:AXX=0
2890 NEXT
2900 AXX=0
2910 FOR X=86740 TO 867FD STEP 3
2920 AXX=AXX+1
2930 VIX=3+(VIX+1)=0:VIX2=0
2940 IF AXX<4:VIX2=5:AXX=0
2950 NEXT
2960 VIX=15:VIX2=1:VIX=0:AXX=0
2970 FOR X=86800 TO 868FD STEP 3
2980 VIX=VIX+1:AXX=AXX+1
2990 VIX=VIX+(VIX+1)=0:VIX2=0
3000 IF (VIX<40 OR (VIX<2 AND NRND(15)=1)) AND VIX+VIX2=16
VIX=0:VIX2=0:VIX=0:AXX=0
3010 IF VIX<10 OR (VIX<20 AND NRND(5)=1 AND VIX+VIX2=16) VIX=
NRND(2)-1+14+NRND(3)-1:VIX2=16-VIX:VIX=0:AXX=0
3020 IF AXX<2 AND NRND(3)=1 AND VIX+VIX2=16 AND X<86890
VIX2=2:AXX=0
3030 NEXT
3040 X=86E00
3050 TT="a44tluqpkaf44f4qdpqobnbkbbhfbdbccdbhd
bccdbbfbhbbbnccodpqqpcobnbkbbhfbdbccdbpabccdbdbf
jbpqobnbhfbdbccfb"
3060 FOR J=1 TO LEN(TT):STEP 2
3070 NRX=ASC(MID$(TT,J,1))-97
3080 VIX=ASC(MID$(TT,J,1))-97
3090 IF NRX<99 END
3100 FOR I=1 TO NRX
3110 VIX=VIX+(VIX+1)=0:VIX2=0
3120 X=X+3
3130 NEXT
3140 ENDPROC

```

SCRAMBLER

David Griffin's teletext Scrambler has the speed of machine code but is as easy to enter as Basic.



well-timed bomb on this headquarters will alter the military situation in favour of the human race.

When the sixth screen has been completed a bonus of 2,000 will be added to your score,

and you are returned to the start for an even faster game.

I have written this game in mode 7 — teletext — for several reasons, firstly it is easier to write routines for right to left

scrolling in this mode, there is more memory to work with than when using a high-resolution display and accessing the screen in machine code can be achieved with more speed and less difficulty than is the case with other modes.

The game is written using only one colour for each screen. To change the colour in teletext mode a control character is necessary. This would involve an extra gap before and after each part of the display requiring a different shade. This would mean added bulk to the already chunky display.

To get Scrambler into your machine you must do the following: type in listing 1, Save this using

SAVE "SCRAMBLER"

Type in listing 2, Save using
SAVE "SCRAMB"

To play the game Chain in the first program, and allow this one to Load and start the game itself.

Listing 1 is the initialising program. It contains all the necessary assembler, and it creates the data for the reproduction of the terrain. I have stored the information to draw the ground of the planet out of the way in memory so that the game can use the same planet each time the game is played. This also speeds up the game because the routines to print the relief do not have to mess around with random numbers and complex checking routines.

Listing 2 is the game and is loaded by the header program described above.

The listings are long and will take plenty of time and energy to type in. If you feel you do not have either the stamina or patience for such an epic, I will supply the game on cassette. Send £3 to David Griffin, 31 Apsley Road, Oldbury, Warley, West Midlands B68 0QY.

Listing 2. The game.

```

10 REM ... SCRAMB ...
20
30 REM Copyright (c) D.Griffin 1983
40
50
60 MODE 7
70 VDU 23,1,0,0,0,0,0
80 PROCINIT
90 ON ERROR GOTO 100
100 PROCINSTR
110 PROCGAME
120 PROCTABLE
130 GOTO 110
140 END
150
160
170 DEFPROCINIT
180 DIM HX(8),HX(8)
190 FOR I=1 TO 8
200 HX(I)=(9-I)*2000+RND(190)*10
210 READ H(I)
220 NEXT
230 DATA --- the KING ---,KILROY,RACH loves DAVE,JEDI-
KNIGHT,see !!,david griffin,Bruce 4 Sheila,Auntie BEEB
240 SCROLL=6400
250 ROCKET=64A1C
260 PRI=64B4V
270 RUB=64BFC
280 RUBOUT=64A4D
290 BCRB=649FD
300 NIN=6492V
310 BBOUNCE=64B0F
320 BOUNCER=64AEE
330 CHECK=6496A
340 PROCKETB=64A64
350 FIRE=649CE
360 ENVELOPE 1,1,130,95,50,126,126,126,126,0,0,-1,126,
100
370 ENVELOPE 2,1,0,0,0,0,0,126,-1,-1,-1,100,60
380 ENVELOPE 3,4,-4,-4,-4,126,126,126,126,-1,-2,-5,126,
100
390 ENVELOPE 4,2,-1,-1,1,15,15,30,126,0,0,0,80,60
400 ENBPROC
410
420 DEFPROCGAME
430 CIRCUITS=0
440 LIVESX=3
450 SECTORS=1
460 SCOREX=0
470 XTREX=1
480 CLS
490 PROCSCREEN
500 STX=-1
510 REPEAT
520 PROCSECTOR(SECTORX)
530 IF %75=0 SECTORX=SECTORX+1:STX=0:ELSE PROCHEAD:ST
X=-1
540 IF SECTORX=7 PROCDOE
550 UNTIL LIVESX=0
560 PROCDOE
570 ENBPROC
580
590 DEFPROCSECTOR(SX)
600 IF SX=1 PROCPHASE1
610 IF SX=2 PROCPHASE2
620 IF SX=3 PROCPHASE3
630 IF SX=4 PROCPHASE4
640 IF SX=5 PROCPHASE5
650 IF SX=6 PROCPHASE6
660 ENBPROC
670
680 DEFPROCPHASE1
690 PROCOLOR(149)
700 IF STX PROCTB(47,116)
710 %7A=47
720 NNX=65000
730 REPEAT
740 %79=(RND(12)-1)*4+116
750 PROCDO(NNX)
760 NEX=7(NNX+2)
770 IF NEX=1 OR NEX=5 PROCROCKET(1,7,45-7(NNX+4))
780 IF NEX=2 PROCFUELDUP(7(NNX))
790 IF NEX=3 PROCHYSTERY(7(NNX))
800 IF NEX=4 PROCRACKET
810 NNX=NX+3
820 UNTIL NNX>655FD OR %75=1
830 ENBPROC
840
850 DEFPROCPHASE2
860 RND 1,4,150,1
870 PROCCOLOR(145)
880 IF STX PROCTB(139,116)
890 NNX=65600
900 REPEAT
910 %79=(RND(12)-1)*4+116
920 %7A=(RND(2)-1)*4+39
930 PROCDO(NNX)
940 IF 7(NNX+2)=4 PROCBOUNCER
950 NNX=NX+3
960 UNTIL NNX>655FD OR %75=1
970 SOUND 1,0,1,1
980 ENBPROC
990
1000 DEFPROCPHASE3
1010 PROCCOLOR(146)
1020 IF STX PROCTB(47,116)
1030 %7A=47
1040 NNX=65000
1050 REPEAT
1060 %79=(RND(2)-1)*4+116
1070 PROCDO(NNX)
1080 NEX=7(NNX+2)
1090 IF NEX=2 PROCFUELDUP(7(NNX))
1100 IF NEX=3 PROCHYSTERY(7(NNX))
1110 IF NEX=4 PROCRACKET(NEX)
1120 NNX=NX+3
1130 UNTIL NNX>651FD OR %75=1
1140 ENBPROC
1150
1160 DEFPROCPHASE4
1170 PROCCOLOR(148)
1180 IF STX PROCTB(47,124)
1190 %79=124
1200 %7A=47
1210 NNX=66200
1220 REPEAT
1230 PROCDO(NNX)
1240 NEX=7(NNX+2)

```

(continued on page 93)



HEWSON CONSULTANTS

Items from this advertisement are available through W.H. Smiths, larger branches of Boots and all leading micro computer retailers.



SPECVADERS

16K Spectrum.
Defeat each squadron of Bleep Zaps and another appears only closer. Cyria mother-ship with ejecting Zeete Baps. 5 levels of play from Oriors snail's pace to close your eyes and hope. Real time scoring. 3 lives. Pan galactic gargle blaster for highest score. Descending asteroids.

£4.95

HEATHROW

AIR TRAFFIC CONTROL
For the 16K Spectrum.
YOUR TASK: to direct incoming aircraft from holding stacks to runway - smoothly, safely and expeditiously.
YOUR INSTRUMENTS: Radar screen showing aircraft call signs, blips and trails. Four stack displays giving altitude, heading, speed and size.
SEVEN levels of play including a demonstration mode.
FEATURES: mixed aircraft, restricted airspace, minimum separation, outbound traffic, emergencies, unknown aircraft, radio failure, loss of a runway, instrument failure

£7.95

NIGHTFLITE

16K Spectrum, NOW WORKS WITH THE KEMPSTON JOYSTICK.
NIGHTFLITE puts you at the controls of a light aircraft flying at night. You can: climb, descend, take off, land, bank left or right, navigate between beacons, raise/lower the flaps, raise/lower the undercarriage, adjust engine rpm, raise/lower the nose

£5.95

BACKGAMMON

For the 16K Spectrum.
8 levels of play from novice to expert. Full colour display of tables and dice. Gamble on a single game or a series, double or quits. All the features of the ancient game.

£5.95

40 BEST MACHINE CODE ROUTINES FOR THE ZX SPECTRUM

by Andrew Hewson and John Hardman
How to load and save machine code. How to use the system variables. How program lines are stored. How to use the stack, the display, the attribute files.
ROUTINES: Scroll - up, down, side to side by pixel or by character. Rectate character, invert character - horizontally and vertically. Line renumber - including GCSUBS, GOTOs, RUN etc., and many more.

£5.95 EACH

20 BEST PROGRAMS FOR THE ZX SPECTRUM

by Andrew Hewson
Program titles include: Machine Code Editor Index File - filing system for the ZX Spectrum. Duckshoot. Graphix - construct up to 210 graphics. Plus football, digitiser, diary and many more.

QUEST

Explore the dense forest, gloomy castle, maze and mountains, confront the dwarves, elves, dragon and centaur. Your QUEST is to locate the ancient scroll. An enthralling adventure for the 48K Spectrum.

£5.95

MAZE CHASE

For the 16 and 48K Spectrum. 4 or 12 mazes, highest score to date, 4 independent guardians, 3 lives, full colour, fast machine code action, magic strawberries, eat lemons to score more, real time scoring.

£4.95

COUNTRIES OF THE WORLD

16 and 48K on one cassette.
Countries of the World is an educational package designed to give an appreciation of the location of all the main countries. 16K version shows the position of each country and names its capital. 48K version: all the above plus prints the population, size, currency, and main languages of each country, and statistics on largest and smallest countries etc.

£5.95

DRAGONFLY

FLIGHT SIMULATOR
For the Dragon 32



DRAGONFLY

Real time flight simulator for the DRAGON 32. Two runways, take off, land, bank, adjust trim, full instrument display.

£6.95

SPECTRALPANIC

For the 16K ZX Spectrum. Climb the ladders, dig holes, bury monsters, eat the power pill, move fast to avoid being eaten. On screen scoring, 3 lives.

£5.95

Trade inquiries welcome



Name _____ Product _____
(Block Capitals Please)

Address _____

Signed _____

My Access/Barclaycard No. is _____

Post to: HEWSON CONSULTANTS, 60A St. Mary's Street, Wellingford, Oxon OX10 0EL. Tel (0491) 36307.

Make cheques/PO's payable to Hewson Consultants

YC8

Program 2.

```

10 PRINT "VIC-20 ATTACK" : POKE55,0 : POKE56,28 : CLR
100 FORZ=7168TO7679 : READX : POKEZ,X : NEXT : FORZ=673TO751 : READX : POKEZ,X : NEXT
200 DATA 254,254,146,146,146,146,254,254,146,254,146,254,146,254,146,254,254,254,254,254
210 DATA 254,68,254,254,254,170,170,170,170,170,170,254,16,16,56,56,124,254,2,16,56
220 DATA 56,254,170,254,170,254,16,16,16,56,56,254,130,254,16,16,16,56,124,124,54,254
240 DATA 108,108,108,108,254,254,254,36,60,24,36,60,24,
250 DATA 255,255,136,85,34,255,255,2,142,238,254,18,86,246
260 DATA 8,10,94,126,254,2,130,138,218,222,254
270 DATA 128,146,214,246,128,192,200,202,238
280 DATA 219,146,210,82,219,179,170,179,170,171,87,82,114,82,87,
290 DATA 117,69,87,85,117,
300 DATA 124,254,198,186,254,214,214,124,124,186,198,254,214,214,254,124
320 DATA 233,137,137,233,137,137,134,116,68,68,116,68,68,119
340 DATA 15,60,127,201,127,63,8,128,224,120,252,38,252,248,32
360 DATA 8,36,129,40,5,80,129,40,64,26,64,40
380 DATA 34,136,6,32,10,18,64,32,132,32,138,32,
400 DATA
420 DATA 153,153,126,24,60,36,66,195,24,24,126,153,60,36,36,102
440 DATA 3,2,34,2,2,2,34,3
450 DATA 255,255,255,255,255,255,254,254,254,254,255
460 DATA 255,252,252,252,252,255,255,248,248,248,248,255
470 DATA 255,240,240,240,240,255,255,224,224,224,224,255
480 DATA 192,192,192,192,255,255,128,128,128,128,255
510 DATA 255,255,154,146,154,146,217,
550 DATA 180,164,180,164,54,255,141,185,141,189,189,189,255
570 DATA 56,108,198,198,198,108,56,24,120,24,24,24,126,
580 DATA 124,198,6,12,56,96,254,124,198,6,28,6,198,124,
590 DATA 60,116,230,254,12,12,254,192,252,6,6,198,124,
600 DATA 96,192,252,198,198,124,254,198,12,24,48,96,96,
610 DATA 124,198,198,124,198,198,124,124,198,198,126,6,12,120,32,32,
620 DATA 136,186,138,232,235,139,255,255,140,171,171,139,171,172,255
640 DATA 199,95,199,223,95,199,255
660 DATA 239,223,129,223,239,255,255,192,160,160,192,14,21,21,21
1010 DATA 120,169,174,141,20,3,169,2,141,21,3,88,96,230,254,165,254,41,16,74,170,160,8,189
1020 DATA 168,28,153,247,28,232,136,208,246,165,197,201,8,208,37,160,140,14,144,32,159,255
1030 DATA 165,197,201,8,240,247,32,159,255,165,197,201,8,208,247,32,159,255,165,197,201,8
1040 DATA 240,247,160,15,140,14,144,76,77,1
2000 FORZ=319TO414 : READX : POKEZ,X : NEXT : FORZ=0TO73 : READX : Y : POKE37888+Z,X : POKE38144+Z,Y : NEXT
2010 DATA 162,169,32,157,52,30,157,186,30,202,208,247,96
2020 DATA 165,1,240,3,206,12,144
2030 DATA 165,240,57,198,249,208,53,173,10,144,201,127,240,12,230,249
2035 DATA 169,127,141,10,144,141,11,144
2040 DATA 208,34,166,250,230,250,169,15,61,148,10,10,10,133,248
2045 DATA 169,15,61,149
2050 DATA 101,248,240,13,141,11,144,141,10,144,169,7,133,249,76,194,234,169,13,249
2060 DATA 169,133,250,76,194,234
3010 DATA 12,3,12,3,12,12,14,13,7,13,7,12,12,12,14,12,3,12,3,12,12,14,13,7,13,7
3015 DATA 12,15,13,7,13,1
3020 DATA 13,1,13,8,13,11,14,1,14,1,13,8,13,11,13,1,13,1,13,8,13,9,14,1,14,1,13,9,14,1
3030 DATA 13,7,13,7,13,13,13,15,14,4,14,4,13,15,13,7,13,1,13,1,13,8,13,10,14,1,14,1,13,10
3040 DATA 13,1,12,3,12,3,12,12,14,13,7,13,7,12,11,12,13,13,7,13,7,13,1,13,1,12,15,12
3050 DATA 15,12,9,12,9,11,7,11,7,10,15,10,15,10,3,10,3,9,15,9,15,
3060 POKE198,7 : POKE631,76 : POKE632,207 : POKE633,13 : POKE634,82 : POKE635,213 : POKE636,13

```

Program 3. The game.

```

5 POKE37150,2
10 PRINTCHR$(8) : CLR : B=1000 : GOT010000
20 POKE36879,8 : PRINT"J"CHR$(8) : CLR : B=5000 : GOT010000
50 IF$=1000ANDC1=0THENC1=1 : L=L+1 : POKE38889+L,5 : POKE8169+L,31
60 PRINT"TAB(9-LEN(STR$(S)))RIGHT$(STR$(S),LEN(STR$(S))-1) : RETURN
100 IFM>8095THENRETURN
103 IFPEEK(K)=JANDC=0THENGOSUB20000 : RETURN
105 IFPEEK(8151)=44THEND1=1 : POKEE,0 : GOSUB20000 : RETURN
110 IF0=0THENPOKEV-E,240 : 0=E : N=M+E : POKEV-2,235 : POKEE,E : POKEV-E,0 : GOSUB1500 : IFA5=ETHENRETURN
120 N=N+D : IFPEEK(N)<>I THENPOKEE,0 : POKEV-2,0 : GOT0160
130 IFPEEK(N-D)<>DANDPEEK(N-D)<>25THENPOKEN-D,I
140 POKEN+C,P : POKEN,Q : RETURN
150 POKEN-D,I : POKEN+C,P : POKEN,Q : RETURN
160 IFN+D<0122THENPOKEN+D,RND(E)*6+11
170 IFPEEK(N)<>A2THENPOKEN,I : S=S+2+W
180 IFPEEK(N-D)<>DANDPEEK(N-D)<>25THENPOKEN-D,I
190 POKEV-E,130
200 GOSUB50 : 0=0 : POKEV-E,0 : N=A3 : RETURN
1000 POKEM,I : M=M+E : IFM=8107THENA6=E
1010 POKEC+M,F : POKEH+M,F : POKEM,D-E : POKEV-E,0 : IFPEEK(M+2)=I THENRETURN
1020 B1=1 : RETURN
1500 IFPEEK(8151)=44THENA7=1 : RETURN
1510 IFA8=1 THEN1530
1520 A5=A5+1 : IFA5>2THENA5=0 : RETURN
1530 POKER4,PEEK(R4)+1 : IFPEEK(R4)=44THENA4=A4-1
1540 RETURN
2000 POKEV-2,0
2005 POKEN,I : POKEV-E,138 : POKE0,0 : POKEV-3,0 : POKEM,I : POKEM+E,I : M=M+E : FORT=252TO12
8STEP-4
2010 POKEV-E,T : POKEV-T,4 : R=RND(1)*15+E : POKEM+C,R : POKEM+H,R : POKEM,27 : R=RND(1)*15+E
2020 B1=0 : POKEM+E,28 : POKEM+C,R : POKEM+H,R : POKEM,29 : POKEM+E,30 : NEXT : POKEM,I : POKEM+E,I
2025 IFD1<>I THENPOKEM+27,RND(1)*6+11
2030 POKEV-E,8 : FORT=15TO0STEP-.1 : POKEV,T : NEXT : L=L-1 : POKES170+L,I

```

(continued on page 99)

VIC-20 ATTACK

YOU ARE an alien in a crippled flying saucer and as you gradually descend you must destroy the buildings blocking your approach by dropping your limited supply of energy pods.

Flying Saucer Attack packs an amazing amount of game into the 3.5K of the unexpanded Vic-20 by using a hybrid mixture of Basic and machine code. Features of the game include nine levels of play, high score, fuel bonus, animated faces and 64 user-defined characters. The program also plays three different tunes.

To achieve all this in 3.5K means having three programs. The first program is simply a title screen and may be omitted. By far the biggest program in terms of complexity is program 2. This contains the 64 hi-res characters, the data for two of the tunes and the five machine-code routines, most of which are primarily concerned with sound. This program just fits into 3.5K and must be typed in exactly as shown. The large number of commas together represent zeros and must be included.

This program must be saved and carefully verified as the tiniest mistake could lead to a crash or out of memory error. Take care keying in this program. Some of the lines are over 88 characters long, so use the abbreviated form of Data, that is, D shift A.

Doomsday boogie

The Data for the tune is stored in a novel fashion. It is held in unused colour memory. As can be seen from program 2, the Data is Poked into some strange locations, notably the stack and the free locations 673 to 767. By utilising these free locations the program has managed to do in 3.5K what would usually take 4.5K of user memory.

Again program 3, the game itself, must be typed in with extreme caution. Over 40 variables are used and yet again some lines may be over 88 characters. The screen is a rectangular 26x19 as dictated by line 10000. The scores are print-formatted as well, to give a professional result.

We must stress that this program must not be run until it is checked and saved. Line 5 disables the Run Stop key and Restore. This may be omitted if you plan to modify the program as described later.

If you have saved all three programs and thoroughly tested them you may now run the three of them together. Each program automatically loads the next on Running.

At the start of the game, instructions are

The Legend continues

Since before the mists of time, legends have been born out of conflict; not least the conflict of the mind over seemingly overwhelming odds.

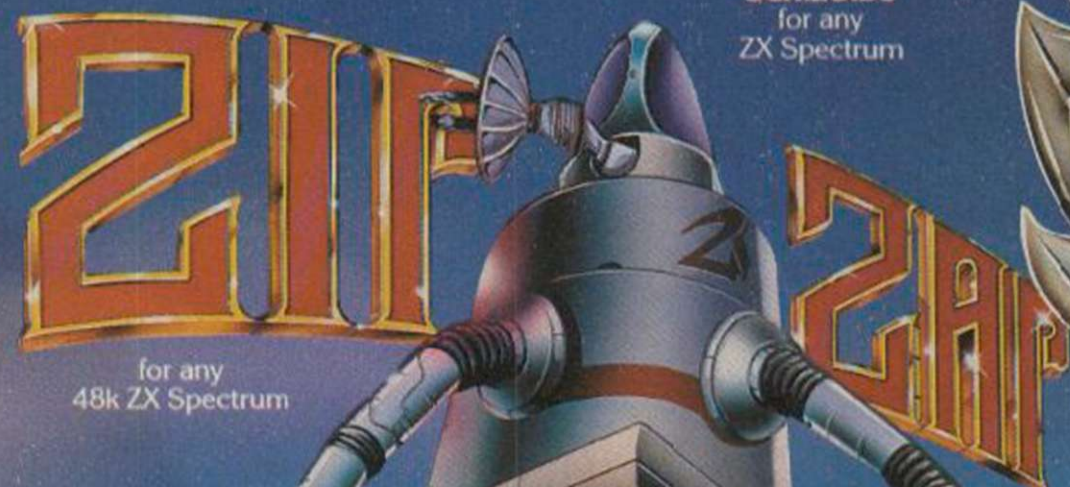
Now the Imagine legend continues, with a new generation of games. Do you possess the determination to pit your mind against, and eventually conquer this new breed?

Through your epic battles will you too become a legend?

... Imagine have cast down the gauntlet.



SCHIZOIDS
for any
ZX Spectrum



for any
48k ZX Spectrum



**CATCHA
SNATCHA**
for any Commodore
Vic-20



**..the name
of the game**

Imagine games available from

**W.H. SMITH
Boots
John Menzies
Dixons
Laskys
Photomarkets U.K.**
and all other good
Software Outlets.

Zoom—As you climb into your gleaming Grox Skimmer and slide behind the highly sophisticated Flight computer, the feeling of excitement turns to dread. Another mission is about to begin. Conc on checking your high recoil machine guns and air, air-to-sea missiles you're going to need their defend yourself against the endless variety of weapons the enemy will unleash on you including terrifying Exetron missile. Zoom has an ever changing scenario presenting even the most hardened player with the ultimate challenge. It incorporates now famous Imagine style hi-res graphics in a innovative way to create the most realistic 3D vi seen in a computer arcade game. 100% machine Zoom requires a 48k Sinclair Spectrum.

Imagine Software, Masons I

tinues...

for any 48k ZX Spectrum

for any Commodore Vic-20

FRANTIC



ARCADIA
now available
for the
Commodore 64.
Commodore Vic-20
and ZX Spectrum

Jumping Jack

for any
16 or 48k ZX Spectrum

AH
DIDDUMS
for any
ZX Spectrum

WACKY
WAITERS
for any
Commodore
Vic-20

MOLAR MAUL

for any
ZX Spectrum

Zip-Zap - You're the only droid left, your circuits are damaged, you can't switch off your motors, you must survive to warn the colonists, your energy is running low, you must get more fuel cells and stock up power by travelling in the teleportal. You'll encounter more aliens than you've ever seen before in this desperate attempt to survive, as you progress your droid through the various domains of ever increasingly intelligent and vicious attackers. Heart stopping tension and supersmooth animation and sound, 100% matching code. Zip-Zap requires a 48k Sinclair Spectrum.

Jumping Jack - poor old Jack has to jump up through eight moving layers to reach the top before he can recite the first two lines of his secret rhyme. On his way up sudden hazzards plague our hero, a snake, a dinosaur, a spider, a ghost and many many more. Its up to you to guide Jack up to reveal the rest of his secret rhyme. Jumping Jack is an experience that will have you laughing with delight and crying with frustration, and with supersmooth hi-res graphics and sound effects adding to the fun it has to be the most addictive game since Arcadia. 100% machine code. For use on any Sinclair Spectrum.

Any of these games for just
£5.50 EACH

including first class post, packaging, VAT and an UNCONDITIONAL LIFETIME GUARANTEE. If you have any difficulty in obtaining any Imagine Games ring Imagine Direct on 051-236 6849 to place your order.

Dealership Enquiries contact: Colin Stokes: 051-236 0646
Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.

Join the jet set.

The Acorn Spark-Jet printer employs the very latest dry-ink printing technology, resulting in fast, clean and virtually noiseless printing.

This is all due to its advanced serial matrix printhead. Electronic impulses fire minute particles of the carbon rod at high speed through a 7 x 7 dot matrix, producing extremely high-quality lettering and graphics time after time.

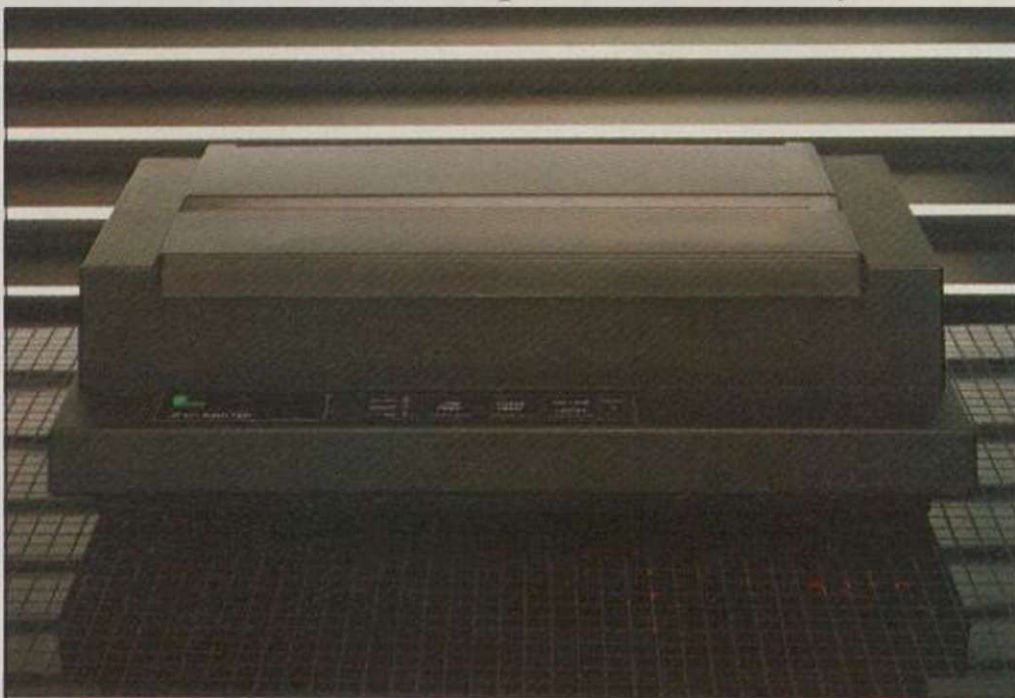
And, as there are no moving parts within the head itself, the action is as quiet as a whisper.

In addition, the Acorn Spark-Jet printer is also capable of handling high resolution graphics and plotting.

It works with any 8 bit micro-computer, via the centronics parallel interface, and is specially recommended for use with the BBC Micro (also designed and built by Acorn Computers Ltd.) to form a thoroughly professional word, copy and graphics processing system.

All printing is logic-seeing and bi-directional and can be executed in normal, double height, double width and underlined characters.

And yet, with all these advanced features, the Spark-Jet costs only £365.



THE ACORN SPARK-JET PRINTER

Not only that, but you also receive a free program on cassette that enables you to 'dump' graphics from either monitor or TV.

If you're interested in joining the jet set, simply call in at one of the dealers listed below. He'll tell you everything you need to know.



MICRO MANAGEMENT
32 Princes Street, Ipswich, Suffolk IP1 1QG.
0473 59181.
MICROSTYLE
47 Cheap Street, Newbury, Berkshire. 0635 41929.
COMPUTERS FOR ALL
72 North Street, Romford, Essex. 0708 60725.
JESSOP MICROELECTRONICS LIMITED
Unit 5, 7 Long Street, London E2 8HN.
01-739 3232/7291851.
WELBECK VIDEO
26 Tottenham Court Road, London W1. 01-5801328.

TWILLSTAR COMPUTERS LIMITED
17 Regina Road, Southall, Middlesex UB2 5PL.
01-574 5271.
GROUP 70
208 Maybank Road, South Woodford, London E18.
01-505 7724.
LEASALINK VIEWDATA LIMITED
Scientific House, Bridge Street, Sandiacre,
Nottingham NG10 5BA. 0602 399484/396976.
CARDIFF MICROCOMPUTERS
46 Charles Street, Cardiff, Glamorgan.
0222 373072.

LEAMINGTON HOBBY CENTRE
121 Regent Street, Leamington Spa, Warwickshire.
0926 29211.
RDS ELECTRICAL
157/161 Kingston Road, Portsmouth, Hampshire.
0705 812478.
TWICKENHAM COMPUTER CENTRE
72 Heath Road, Twickenham, Middlesex.
01-891 1612.
KELLY'S COMPUTER MARKET
227 Dartmouth Road, Sydenham, London SE26 4QY.
01-699 6202/4399.

SCORE: 700 HI: 1650

SAUCER ATTACK



(continued from page 94)

```

2040 O=0:POKE1,0:POKEY-E,0:IFL=0THEN3500
2050 FORT=8151T08167:POKET,36:NEXT:POKET,37:A4=8168:FORT=0T0999:NEXT:B1=0:GOT07
000
2090 FORT=8151T08167:POKET,36:NEXT:POKET,37:FORT=0T02000:NEXT:GOT08000
3000 IFS>=BTHENB=S
3010 PRINT" "TAB(26-LEN(STR$(B)))>RIGHT$(STR$(B),LEN(STR$(B))-1):RETURN
3500 FORT=0T0999:NEXT:PRINT" "TAB(136)" "TAB(162)" |? GAME 0
VER ?
3510 PRINT" "TAB(188)" "":POKEY,15:POKEY-3,0:POKEY-4,0:RESTORE:F0
RT=0T07
3520 READC,D:POKEY-2,C:FORU=0T050*D:NEXT:POKEY-2,0:NEXT:GOT09000
3530 DATA225,4,215,2,215,2,219,4,215,8,223,4,225,4,0,50
5000 PRINT" "TAB(163)" CITY CRUSHED!":POKEM+30723,3:POKE0,0:POKE36874,0:POKE36
875,0
5010 A8=E:FORT=0T09:POKEM+3,33:FORU=0T099:NEXT:POKEM+3,34:FORU=0T099:NEXT:NEXT:
A7=0
5020 POKE36876,240:GOSUB1500:GOSUB50:POKE36876,0:S=S+2:IFA7=0THEN5020
5030 A6=0:A8=0:FORT=0T0999:NEXT:GOT02090
7000 D1=0:M=7732:POKEY,15:POKE0,1:POKE250,0:POKEX,6
7010 GOSUB1000:GOSUB100:GOSUB100:FORT=0T030:NEXT:IFA6=1THEN5000
7020 IFB1=1ORD1=1THEN2000
7030 GOT07010
8000 A4=8168:POKE0,0:W=W+1:SYS319:POKEY,0:POKEY,65:POKEZ,65:IFW>5THENW=5
8010 FORT=ATOA+21:IFRND(1)<.4-(G/30)-W/100THENNEXT:GOT07000
8020 R1=RND(1)*7+1:R2=RND(1)*6+1+(G/2)+(W/3):R3=RND(1)*4:R4=RND(1)*5+4
8030 FORU=TTOT-D*R2STEP-D:POKEC+U,R1:POKEU,R3:NEXT:POKEC+U,R1:POKEU,R4:NEXT:GOT
07000
9000 PRINT"J":POKE38414,3:POKE7694,48+G:PRINT"R:000000 |-. |I |ST:000000
";
9010 FORT=0T025:PRINT" | ";:NEXT:GOSUB3000:FORT=0T017:PRINT:NEXT:PRINT" | ";:FO
RT=0T025
9020 PRINT" | ";:NEXT:PRINT" | ##### % | ";
9030 PRINT" "TAB(85)" CITY CRUSHER"TAB(71)" "TAB(57)" | | = |
TART"
9040 PRINTTAB(45)"<= | LEVEL SELECT"TAB(81)"> | PAUSE"
9050 V=36878:Y=374:Z=385:X=398:D=26:A=8098:C=30720:POKE650,1:E=1:F=4:H=C+1:I=32
9060 K=203:J=64:P=3:Q=9:A2=10:A3=9000:S=0:C1=0
9100 POKE249,1:POKE250,0:POKE0,1:POKE1,0:POKEY,15:POKEY,0:POKEZ,0:POKEX,7:SYS67
3
9110 IFPEEK(K)=JTHENPOKE7694,G+48:GOT09110
9120 IFPEEK(K)=39THENL=3:GOT08000
9130 IFPEEK(K)=I THENG=G+E:IFG=10THENG=E
9140 FORT=0T099:NEXT:POKE7694,G+48:GOT09110
10000 G=1:POKE36866,154:POKE36864,9:POKE36867,38:POKE36869,255:POKE36879,8:GOT0
9000
20000 FORT=0T013:RETURN

```

```

0 GOSUB 5000
1 CLS:          GOSUB 6000
2 FORX=1TO18:READ N,W
3 MUSIC1,3,N,15
4 WAIT W*20:NEXT X
5 DATA3,2,6,3,8,2,10,3,11,1,10,2,8,4
,5,2,1,3,3,1,5,2
6 DATA 6,4,3,2,3,3,2,1,3,2,5,4,2,2
7 PRINTCHR$(6):PRINTCHR$(17):EXPLODE
8 GOSUB 6000
9 INK 7:PAPER 0
10 K$=KEY$
11 PLOT 1,1,"Once in every lifetime
....."
17 SC$=STR$(SC)
18 PLOT 2,0,SC$
19 PLOT 1,11,T$
20 IF K$=L$ THEN X=X-1
30 IF K$=R$ THEN X=X+1
32 IFX>32THEN X=32
34 IF X<7 THEN X=7
40 IF K$=F$ THEN GOSUB 1000' FIRING R
OUTINE
50 IF K$=L$ THEN PLOT X+1,25," "
60 IF K$=R$ THEN PLOT X-1,25," "
70 PLOT X,25,"@"
75 IF SCRN(X,24)<>32 THEN GOTO 40000
77 GOSUB 10000
78 PLOT 1,26,"
"
80 GOTO 10
1000 FOR D=24 TO 13STEP-1
1001 MUSIC 1,5,1,0:PLAY7,0,1,50
1003 PLOT X,D,"!"
1006 IFSCRN(X,D-1)=125THENSQ=0
1008 IFSCRN(X,D-1)=125THENSC=SC+700
1009 IFSCRN(X,D-1)=94THENSC=SC-1000
1010 IF SCRN(X,D-1)=35THENSC=SC+50
1020 IF SCRN(X,D-1)=37THENSC=SC+100
1025 IFSCRN(X,D-1)=38THENSC=SC+25
1030 IFSCRN(X,D-1)=91THENSC=SC+300
1040 IFSCRN(X,D-1)=93THENSC=SC+1500
1050 IFSCRN(X,D-1)=123THENSC=SC+1000
1055 IF SCRN(X,D-1)<>32 THENPLOTX,D-
1,"!"
1060 IFSCRN(X,D-1)<>32THEN1080
1070 PLOTX,D," "
1074 PLOT2,0,SC$
1077 NEXT D
1080 FORT=24TOD-1 STEP-1
1085 IF SCRN(X,T-1)=37THENPLOTX,T-1,
"@"
1087 IFSCRN(X,T )=37THENRETURN
1090 PLOTX,T," "
1100 NEXTT
1105 SHOOT
1107 WAIT 10
1110 RETURN
6000 PAPER0:INK 7
6002 FORSW=1TO12:PLOT4,SW,17:NEXT SW
6010 FORSH=13TO26:PLOT4,SH,20:NEXT S
H
6020 PLOT3,25,0
6025 FORRT=1TO24
6028 GJ=INT(RND(1)*7)
6030 IF GJ=1THEN GJ=0
6032 IF GJ=4THEN GJ=7
6034 IF GJ=5THEN GJ=2
6037 PLOT3,RT,GJ
6038 NEXT RT
6050 RETURN
10000 K$=KEY$
10005 PLOT 1,1,"Once in every lifeti
me....."
10010 PLOT 1,26,"
"
10020 IF K$=L$ THEN X=X-1
10030 IF K$=R$ THEN X=X+1
10040 IF K$=F$ THEN GOSUB 1000
10042 IF X<7 THEN X=7
10043 IF X>32 THEN X=32
10050 IF K$=L$ THEN PLOT X+1,25," "
10060 IF K$=R$ THEN PLOT X-1,25," "
10070 PLOT X,25,"@"
10075 MUSIC 1,6,12,1
10080 IF SCRN(X,24)<>32 THEN 40000
10090 B=INT(RND(1)*30)+7
10092 C=INT(RND(1)*23)+1
10100 IF B=15 THEN GOSUB 30000
10105 IF B=17 THEN GOSUB 35000
10106 U=INT(RND(1)*27)+5
10107 IF B=18 THEN GOSUB 25000
10108 IFB=20THEN GOSUB 15000
10110 PLOT B,C
,"!"
10120 PLOT B,C-1,"Z"
10125 PLOT X,25,"@"
10127 K=INT(RND(1)*20)+7
10130 RETURN
15000 FORQ=0 TO 26 STEP INT(RND(1)*5
)+1
15002 MUSIC1,0,1,0:MUSIC2,1,1,0:MUSI
C3,2,1,0:PLAY7,0,5,100
15005 PLOT 1,1,"Once in every lifeti
me....."
15010 K$=KEY$
15015 SE=INT(RND(1)*100):IF SE<10 AN
D SE>5THENRETURN
15020 IFK$=L$THENX=X-1
15030 IFK$=R$THENX=X+1
15032 IFX<7THENX=7
15034 IFX>32THENX=32
15040 IFK$=L$THENPLOTX+1,25," "
15050 IFK$=R$THENPLOTX-1,25," "
15060 PLOTX,0,""
15070 IFK$=F$THENGOSUB1000
15080 IFSCRN(X,24)<>32THEN40000
15090 PLOTX,0,""
15092 PLOTX,25,"@"
15093 PLOT 2,0,SC$
15095 NEXT 0
15097 PLOT 2,0,SC$
15100 RETURN
24050 U=INT(RND(1)*27)+5
25000 FOR D=4 TO 26 STEPINT(RND(1)*2
)+1
25003 MUSIC1,5,(D/2)-1,0:MUSIC2,6,(D
/2)-1,0:MUSIC3,7,(D/2)-1,0:PLAY
7,2,3,100
25005 K$=KEY$
25007 PLOT 1,1,"Once in every lifeti
me....."
25010 IF K$=L$ THEN X=X-1
25020 IF K$=R$ THEN X=X+1
25030 IF X<7 THEN X=7
25040 IF X>32 THEN X=32
25050 IF K$=L$ THEN PLOT X+1,25," "
25060 IF K$=R$ THEN PLOT X-1,25," "
25076 PLOT 2,0,SC$
25080 PLOTU ,D,"("
25085 IF SCRN(X,24)<>32 THEN 40000
25087 IF K$=F$ THEN GOSUB 1000
25090 PLOTU ,D , " "
25110 PLOT X,25,"@"
25200 NEXT D
25205 PLOT 1,26,"
"
25206 FORUI=0TO26:PLOTU,UI," ":NEXT
UI
25210 RETURN
30000 FOR 0=2 TO 23 STEP 2
30001 MJ=INT(RND(1)*27)+9:PLOTNJ,G-2
,"*":PLOTNJ+3,G+2,"*":PLOTNJ-3,
G+2,"*"
30002 PLOT INT(RND(1)*30)+7,INT(RND(
1)*25)+1,"Z"
30005 FOR H=10TO 31
30005 PLOT INT(RND(1)*30)+7,INT(RND(
1)*24)+1,"E"
30007 K$=KEY$
30008 SC$=STR$(SC)
30009 PLOT 2,0,SC$
30010 IF K$=L$ THEN X=X-1
30020 IF K$=R$ THEN X=X+1
30030 IF K$=F$ THEN GOSUB 1000
30040 IF X<7 THEN X=7
30050 IF X>32 THEN X=32
30060 IF SCRN(X,24)<>32 THEN 40000
30070 IF K$=L$ THEN PLOT X+1,25," "
30075 IF K$=R$ THEN PLOT X-1,25," "
30076 MUSIC 1,1,G/2,0:MUSIC 2,3,G/2,
0:PLAY 7,0,1,400
30079 PLOT 1,1,"Once in every lifeti
me....."
30085 PLOT X,25,"@"
30090 PLOT H,G,"J"
30100 PLOT H-1,G,"["
30105 PLOT H-1,G-2," "
30107 PLOT H+1,G-2," "
30108 U=INT(RND(1)*20)+7:IFU=15THEN
GOSUB 24050
30109 IFU=16THENGOSUB15000
30110 NEXT H
30120 NEXT G
30125 PLOT 5,22,"
"
30130 RETURN
35000 PLOT 28,0,"Flea storm!"
35001 MUSIC1,7,3,0:PLAY7,0,1,2000
35002 FOR V=1 TO 26
35005 K=INT(RND(1)*20)+7
35010 K$=KEY$
35015 PLOT 1,1,"Once in every lifeti
me....."
35020 IF K$=L$ THEN X=X-1
35030 IF K$=R$ THEN X=X+1
35040 IF K$=F$ THEN GOSUB 1000
35050 IF X<7 THEN X=7
35060 IF X>32 THEN X=32
35070 IF K$=R$ THEN PLOT X-1,25," "
35080 IF K$=L$ THEN PLOT X+1,25," "
35090 PLOT X,25,"@"
35100 PLOT K,V,"&"
35105 PLOT K,V-1," "
35110 SC$=STR$(SC)
35120 PLOT 2,0,SC$
35125 NEXT V

```

Defend yourself against all the horrors of an English country garden in David Whitehead's game.

THIS ARCADE-STYLE action game takes noisy advantage of the Oric's sound and graphics. It is slightly like the game Centipede as you are in the garden being attacked by all manner of creepy-crawlies.

You are armed with only a weedy weed gun against the terrors of fleas, mushrooms, homing missiles, stampers, centepods and rocks.

After the opening serenade of *Greensleeves* the screen is set up. Your firing range is extended to the limit of the red half of the background. Your score is on the top line to the left of that classic line from *The Young Ones*. When the program is run you are asked which keys you would like to use to play the game with. The easiest configurations of keys are the cursor keys and Z, C and M. The hazards themselves all have to be dealt with in different ways.

The listing should be entered exactly as shown, except that where a £ sign appears a # should be typed. The program is structured as follows:

2-9	Play tune
10-80	Movement routine
1000-1110	Firing routine
6000-6050	Set up borders
10000-10130	Mushrooms routine
15000-15100	Homing missiles routine
24050-25210	Stampers routine
30000-30130	Centepods routine
35000-35130	Fleas routine
40000-40480	Dead
50000-50060	Which keys to use
60000-60520	User-defined graphics

The centepod will not come all the way down to crush you and so it is harmless. If you hit the head of the centepod you score 1,000 points, if you hit the body you score 500 points.

Mushrooms appear at random, sometimes whole and sometimes in half. If you shoot a whole mushroom the top half of it will be transformed into a rock which can be very dangerous, as you will find out later. For the bottom of a mushroom you score 50 points, and for the top you score 100.

Homing missiles will follow you wherever you go. They move at variable speed, and although the slow ones seem to be easy points you will be lucky to evade the fast missiles for long. If you shoot a homing missile then it will return to the top of the screen and keep on

```

35127 PLOT 27,0,"
"
35130 RETURN
40000 PLOT X,25,"!"
40030 EXPLODE:PLAY 7,7,1,65000
40040 WAIT 700
40050 CLS:INK0:PAPER7
40060 PRINT:PRINT"Your score was "SC
$"
40080 PRINT:PRINT:PRINT"Would you li
ke to play again"
40085 GET C$
40090 GET B$
40095 PRINTCHR$(6):PRINTCHR$(17)
40100 IF B$="Y" THEN RUN
40110 END
40480 RETURN
50000 CLS
50005 PING
50008 PRINT:PRINT"Which key would yo
u like to use"

```



coming until it runs out of fuel. Homing missiles are worth 1,000 points each time you shoot them.

Stampers cannot be stopped but they can harvest a lot of points. They come down very

fast and make a terrible racket. They are worth 1,000 points every time you hit them.

Fleas occur in storms and they are the worst pests of the garden. They are worth only 25 points and they come down in tens. Rocks, as

previously mentioned, appear when you shoot a full mushroom. They do nothing but if you shoot a rock then you lose 1,000 points.

My own high-score is 65,000, which I am sure most of you will beat. Happy shooting.

```
50010 PRINT:PRINT"a.To move left ?":
GET L$
50020 PRINT"b.To move right ?":GETR$
50030 PRINT"c.To fire ?":GET F$
50040 PRINT:PRINT "Thank you"
50050 WAIT 200
50060 RETURN
60000 FOR Y1=46376 TO 46383
60010 READ Y2:POKE Y1,Y2
60020 DATA 0,30,53,45,53,53,43,33
60030 NEXT Y1
60040 FOR Y3=46360 TO 46367
60050 READ Y4:POKE Y3,Y4
60060 DATA 51,18,22,18,22,26,18,33
60070 NEXT Y3
60080 FOR Y5=46592 TO 46599
60090 READ Y6:POKE Y5,Y6
60100 DATA 12,12,30,63,63,63,30,30
60110 NEXT Y5
60120 FOR Y6=46808 TO 46815
```

```
60130 READ Y7:POKE Y6,Y7
60140 DATA 30,63,63,63,63,63,63,30
60150 NEXT Y6
60170 FOR Y8=46824 TO 46831
60180 READ Y9:POKE Y8,Y9
60190 DATA 1,61,54,60,54,61,1,0
60200 NEXT Y8
60210 FOR Z1=46832 TO 46839
60220 READ Z2
60230 POKE Z1,Z2
60240 DATA 4,30,63,62,62,62,24,8
60250 NEXT Z1
60260 FOR Z3=46416 TO 46423
60270 READ Z4
60280 POKE Z3,Z4
60290 DATA 33,51,12,12,30,45,33,0
60300 NEXT Z3
60310 FOR Z5=46384 TO 46391
60320 READ Z6:POKE Z5,Z6
```

```
60330 DATA 8,42,62,62,62,62,42,0
60340 NEXT Z5
60360 FOR Z7=47064 TO 47071
60370 READ Z8:POKE Z7,Z8
60380 DATA 18,33,33,18,12,63,45,63
60390 NEXT Z7
60400 FOR Z9=47080 TO 47087
60410 READ A1:POKE Z9,A1
60420 DATA 0,12,30,63,63,30,12
60430 NEXT Z9
60440 FOR B6=47072 TO 47079
60450 READ B7:POKE B6,B7
60460 DATA 12,30,63,12,12,12,30,12
60470 NEXT B6
60480 FOR B8=46344 TO 46351
60490 READ B9:POKE B8,B9
60500 DATA 33,18,12,29,46,12,18,33
60510 NEXT B8
60520 RETURN
```

Let battle

BUT BEWARE-ATTACK



Want a *real* fight on your hands?

Then go for CDS, the games packed with excitement, challenge and the thrill of the unexpected.

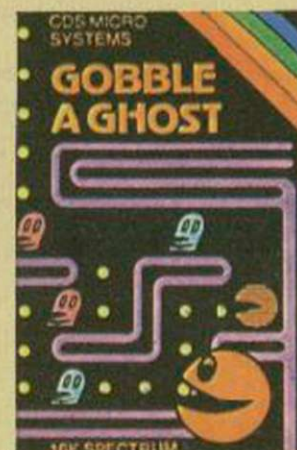
Fight your way across a five lane highway with the frantic frog... eat a path through the fiercesome fighting ghosts... face the huge ferocious caterpillar in the mushroom field... protect the panicky painter as he flees from danger... outwit and confuse your opponent with a counter attack on the board.

Yes, with CDS games you get it all.
And they only cost £5.95 each. Go get 'em boy, go get 'em!



C.D.S. computer games are available from W.H. Smith, Boots, and other leading computer stores, and are produced by

CDS Micro Systems
Will you survive the challenge?

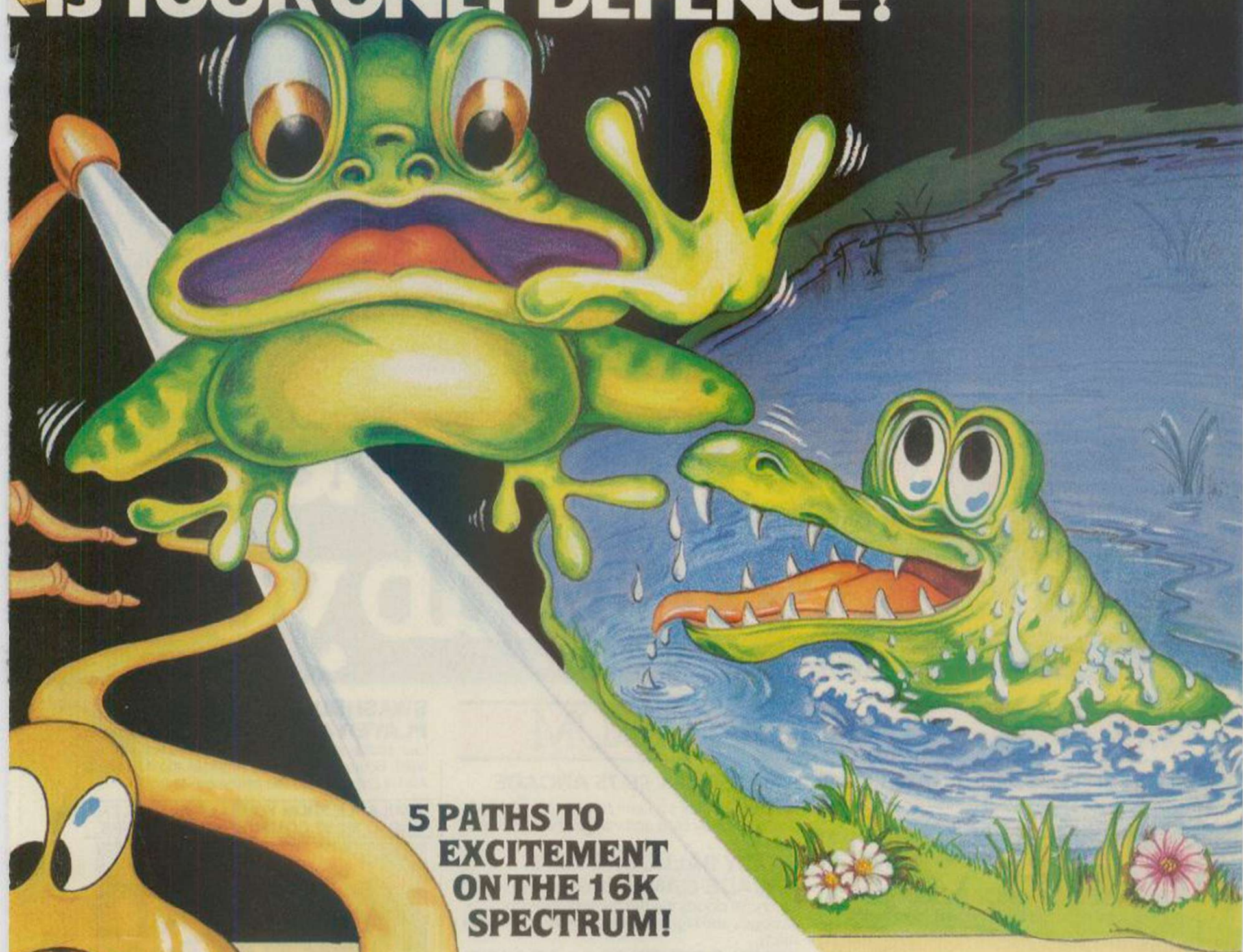


GOBBLE A GHOST

Moving around and gobbling up dots sounds easy. But not when 4 ghosts are constantly trying to destroy you. Kill or be killed - the 4 power pills are your answer. It's all a question of who gets who first...

Commence

IS YOUR ONLY DEFENCE!



5 PATHS TO
EXCITEMENT
ON THE 16K
SPECTRUM!



CATERPILLAR

The giant caterpillar is coming to get you, helped by a horde of weird creatures. Destroy it segment by segment, blast a way through the mushrooms, kill off the ugly creatures. But don't relax... there's danger *everywhere!*



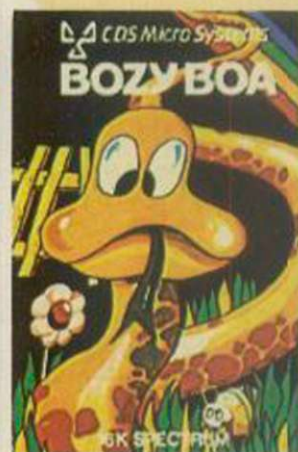
LEAPFROG

A frog meets many dangers on his way home. Like 4 lanes of fast moving traffic, a swirling lcg-filled river, plus diving turtles, frog-eating snakes and nasty alligators. Do you have the skills to see him home safely?



PAINTER

The bonus score is ticking away as you help the panicky painter paint the 3-D maze. Can you finish before it hits zero? Will the computer outwit you? And look out — the game goes faster as you get better!



BOZY BOA

It's a hectic life being a boa in an English country garden. There are juicy beetles if you can find them, and snails too if you are lucky. First left, then right and inbetween the flowers — you've got to be quick! After a couple of games you'll be as boss-eyed as me!



and
we'll
keep on
coming
to
get you!

NEW!



Action games that will grab you.

BBC 32K

- PAINTER £8 ARCADE GAME ***
One of the best. Paint your grids and score before the fizzers get you.
- PLANES £8 ARCADE GAME ***
Fast or slow, skill and speed are needed to beat the enemy aircraft attack.
- FROGGER £8 ARCADE GAME**
It's tough going to get FROG across road and river. Snakes and crocodiles too, but there's a lady FROG!
- PHARAOHS TOMB £8 ADVENTURE GAME**
Pick up the gold but don't be scared penniless by the mummy. Be quick, it's in real time, so work out those magic words.
- SHRINKING PROFESSOR £8 ADVENTURE GAME**
You're only an inch high how are you going to survive in the garden with all those monstrous spiders, ants and other giant horrors. The crystals do it.
- HORROR CASTLE £8 ADVENTURE GAME**
A beautiful princess waits for you to save her. But how can you get into the castle? The clues lead you to the hidden guarded prison.
- HOWSZAT £6.90 1-2 PLAYER CRICKET**
Be a cricket star and enjoy all the hazards of cricket to beat your equally keen opponent.
- BOUNCER £8 ARCADE GAME**
Thank your lucky stars for the anti matter scoop to catch the BEEBOIDS before they drain the universe into oblivion.

SPECTRUM

- PAINTER 48K £5.75 ARCADE GAME**
Patrick's a keen painter but old rollers don't like spray cans and vengefully set out to crush him.
- CRAZY BALLOONS £5.75 ARCADE GAME**
It's a great balloon but ice crystal clouds are the menace. Narrow passages and high winds too before home base safety.
- JUNGLE FEVER £6.90 ARCADE GAME**
It's got everything, with an exotic horror array of nasty natives, man-eating spiders and crocodiles too.

ORIC

- ZODIAC £6.90 ARCADE GAME**
An intricate game with pit falls to surprise, frustrate and kill you before you find your successful way. But you can be resurrected.
- DEATH SATELLITE £6.90 ARCADE GAME**
You've run out of fuel on an orbiting satellite near a forbidding robotic planet with mutant monsters guarding your vital fuel supply. Can your wits help you to survive?

DRAGON 32K

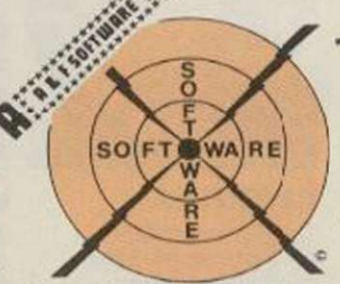
- DEADWOOD £6.90 1-4 PLAYER ADVENTURE GAME**
An ideal family game for everyone who can decide where to invest their bank roll in the long slog to millions.

SWASHBUCKLERS £6.90 1-4 PLAYER ADVENTURE GAME Up to four pirate ships laden with treasure that you want. Scurvy knaves and smallpox too don't help. And is Leper Island the best place to go?

AVAILABLE FROM YOUR LOCAL DEALER AND AT MOST COMPUTER BOOK SHOPS.



Also at:
JOHN MENZIES
*W. H. Smiths
(starred items only)



Out
out of this
world

**830 HYDE ROAD
MANCHESTER M18 7JD**
Direct from mail order dept. Tel. 061 223 6206

CASSETTE FILES

FED UP with writing machine code because of the complexity of saving and loading it? Or do you write programs needing various data to be stored on tape? This program can save any block of the computer's memory onto tape, verify it, distinguish it from a normal Basic program and load it back into the same, or a different, part of the memory.

The first thing to do in order to type it in is to lower RAMtop to some value lower than 31681. The easiest way to do this is as follows:

```
POKE 16388, 193
POKE 16389, 123
NEW
```

Now type in the loading program in figure 4. This is a modified menu-driven version of the standard hexadecimal code loader, designed so that the machine code does not all need to be typed in at one go. If the first character of a byte is not a hexadecimal character, you will be returned to the menu where the options are self-explanatory.

There are five anomalies in the hex listing of the program which now need correcting. These concern the error-code messages. Error codes greater than 127 do not actually stop a program when it is running.

At last the ZX-81 has agreed to handle cassette data files, persuaded by Kevin Hill's program.

ZX-81

Address	Old value	Corrected value
32076	9D	1D
32144	9B	1B
32184	8B	15
32246	96	16
32293	8C	11

Once you have a copy or two of the program on tape, you can resave the machine code using the program in figure 5 as this will load in quicker. Simply lower RAMtop as before, load in the machine code and loader program from tape, allow the machine code to be Poked in and stop the program. New it, type in the program in figure 5 and then Run it.

Having typed in all the machine code and checked that it is correct, how do you use the program?

The program is called by Rand USR 32067 whether you are Saving, Verifying or Loading. A Basic variable — U\$ — is used to tell the program what to do; its syntax is shown in figure 1 along with some examples. Do not insert any spaces before the command as this

will cause an error. The only character that can precede the command is an asterisk which prevents any messages being printed on the screen. For this reason, the asterisk should not be used with Verify.

Only the first letter of the command is considered, to Save, S and Sausages all mean the same thing. The three commands that can be used begin with S, L or V for Save, Load and Verify respectively. A pair of brackets must follow the command and contains the name of the data file.

All the characters between the brackets including spaces are used for the name. If there are no characters between the brackets, this is the same as the Basic Load quote quote; that is, the next program on the tape regardless of name will be loaded or verified depending on the command.

Two parameters follow the name and I have called these Start and Length for simplicity.

(continued on next page)

Hex dump of the data-file program.

```
31681: CD C6 7B 18 FB 0E 01 06
31689: 00 3E 7F DB FE D3 FF 17
31697: 38 05 CD 28 0F CF 0C 17
31705: 17 38 07 10 EC F1 CD 06
31713: 7B C9 D5 1E 94 06 1A 1D
31721: DB FE 17 CB 7B 7B 38 75
31729: 10 F5 D1 20 04 FE 06 06
31737: 0E 3F CB 11 30 F9 09 78
31745: FE 00 20 02 37 C9 1D 00
31753: 3F 7D CD 00 7C D8 FE 1D
31761: 20 F8 0E 00 CD 00 7C 00
31769: 0C D6 1C 38 00 FE 0D 00
31777: 04 F5 0C 18 00 FE 03 00
31785: 7F 78 32 FE 7F 79 FE 00
31793: 20 02 37 C9 11 01 00 21
31801: 00 00 F1 FE 00 28 04 47
31809: 19 10 FD E5 21 00 00 06
31817: 0A 19 10 FD E5 E1 0D 00
31825: E9 3A FE 7F 47 ED 5B 7C
31833: 7F A7 C9 3A 39 40 FE 20
```

```
32076: ED 01 10 27 33 7F 0F 07
32084: 00 42 30 00 00 01 00 00
32092: 00 00 00 00 00 00 00 00
32100: 00 00 00 00 00 00 00 00
32108: 00 00 00 00 00 00 00 00
32116: 00 00 00 00 00 00 00 00
32124: 00 00 00 00 00 00 00 00
32132: 00 00 00 00 00 00 00 00
32140: 00 00 00 00 00 00 00 00
32148: 00 00 00 00 00 00 00 00
32156: 00 00 00 00 00 00 00 00
```

```
31841: 20 7F 00 00 00 00 00 00
31849: 7F 7F 00 00 00 00 00 00
31857: 7F 7F 00 00 00 00 00 00
31865: 7F 7F 00 00 00 00 00 00
31873: 7F 7F 00 00 00 00 00 00
31881: 7F 7F 00 00 00 00 00 00
31889: 7F 7F 00 00 00 00 00 00
31897: 7F 7F 00 00 00 00 00 00
31905: 7F 7F 00 00 00 00 00 00
31913: 7F 7F 00 00 00 00 00 00
31921: 7F 7F 00 00 00 00 00 00
31929: 7F 7F 00 00 00 00 00 00
31937: 7F 7F 00 00 00 00 00 00
31945: 7F 7F 00 00 00 00 00 00
31953: 7F 7F 00 00 00 00 00 00
31961: 7F 7F 00 00 00 00 00 00
31969: 7F 7F 00 00 00 00 00 00
31977: 7F 7F 00 00 00 00 00 00
31985: 7F 7F 00 00 00 00 00 00
31993: 7F 7F 00 00 00 00 00 00
```

```
32161: 13 F3 FF 38 20 04 CB DE
32169: 13 F3 FF 38 20 04 CB DE
32177: 13 F3 FF 38 20 04 CB DE
32185: 13 F3 FF 38 20 04 CB DE
32193: 13 F3 FF 38 20 04 CB DE
32201: 13 F3 FF 38 20 04 CB DE
32209: 13 F3 FF 38 20 04 CB DE
32217: 13 F3 FF 38 20 04 CB DE
32225: 13 F3 FF 38 20 04 CB DE
32233: 13 F3 FF 38 20 04 CB DE
32241: 13 F3 FF 38 20 04 CB DE
32249: 13 F3 FF 38 20 04 CB DE
32257: 13 F3 FF 38 20 04 CB DE
32265: 13 F3 FF 38 20 04 CB DE
32273: 13 F3 FF 38 20 04 CB DE
32281: 13 F3 FF 38 20 04 CB DE
32289: 13 F3 FF 38 20 04 CB DE
32297: 13 F3 FF 38 20 04 CB DE
32305: 13 F3 FF 38 20 04 CB DE
32313: 13 F3 FF 38 20 04 CB DE
```

(listing continued on next page)

The best accessory for your micro



ONLY
£34.49
 (P+P £2.50)

The Rotronics Portable Case

Here is the ideal portable work station for home, school or work. Specially made for most home microcomputers, it contains your ZX81, Spectrum, Oric or VIC 20 within a smart executive style case with removable lid for convenience in use.

The individually tailored foam insert securely protects your

micro, printer, cassette recorder, tapes and manuals during transit. A scalpel is provided to modify the insert for expansion units and an alternative insert can be supplied if you change your hardware in the future.

All components remain fully operational within the case via interconnections routed between the

double layers of foam, so there are no unsightly leads.

This is the first case designed for easy use with each component positioned for convenient operation. The overall dimensions are 138mm x 657mm x 363mm.

Exceptional Value

ZX Panda

- 16K Expandable RAM Pack £18.50 (p + p 50p)
- 16K Plug-in Module for above £13.95 (p + p 50p)
- 32K Giant Panda including Module £31.45 (p + p 75p)



Vixen Ram Cartridge

Offers standard 16K expansion plus three other switchable memory configurations
 £34.45 (p+p 50p)



Order Form

Trade Enquiries Welcome

Please send me (tick appropriate box)

- Rotronics Portable Case at £36.99 (inc. £2.50 p + p) for ZX81/Spectrum/Oric/Vic 20*
- ZX Panda 16K RAM Pack at £19.00 (inc. 50p p + p)
- ZX Panda 16K Plug-in Module at £14.45 (inc. 50p p + p)
- ZX 32K Giant Panda including Module at £32.20 (inc. 75p p + p)
- Vixen RAM Cartridge at £34.95 (inc. 50p p + p)

All prices inclusive of VAT

I enclose a cheque/PO for £ _____ made payable to SMT.

*Please delete as necessary.

Name _____

Address _____

SMT

Please allow 14 days for delivery. Send to (no stamp required)
FREEPOST Greens Norton Towcester Northants NN12 8BR

TWO SUBMARINES seek each other's destruction in this tough and tense World War Two scenario. I certainly do not find it easy to make a kill, with all the advantage of inside information.

A Second World War S-type submarine was a fairly small craft which could manage about 16 knots on the surface and about nine knots submerged. Radar might well have been on board, certainly Asdic and echo sounder. Optimum periscope depth was about 34 feet. Surfacing and submerging was managed with the two pairs of hydroplanes and a number of ballast tanks. Hydroplanes were simply balanced horizontal rudders which used engine power to deflect the course of the submarine upwards or downwards.

There are three major displays: first, the control room; to the left of the display is the main ballast tank indicator, filled or vented to alter buoyancy. Below is a representation of the forward starboard hydroplane. Common sense will tell you which inclination will help the boat to rise. Next to the hydroplane tell-tale is a digital depth indicator. The large wheel to its left is one of the type which used to be needed to adjust the hydroplanes.

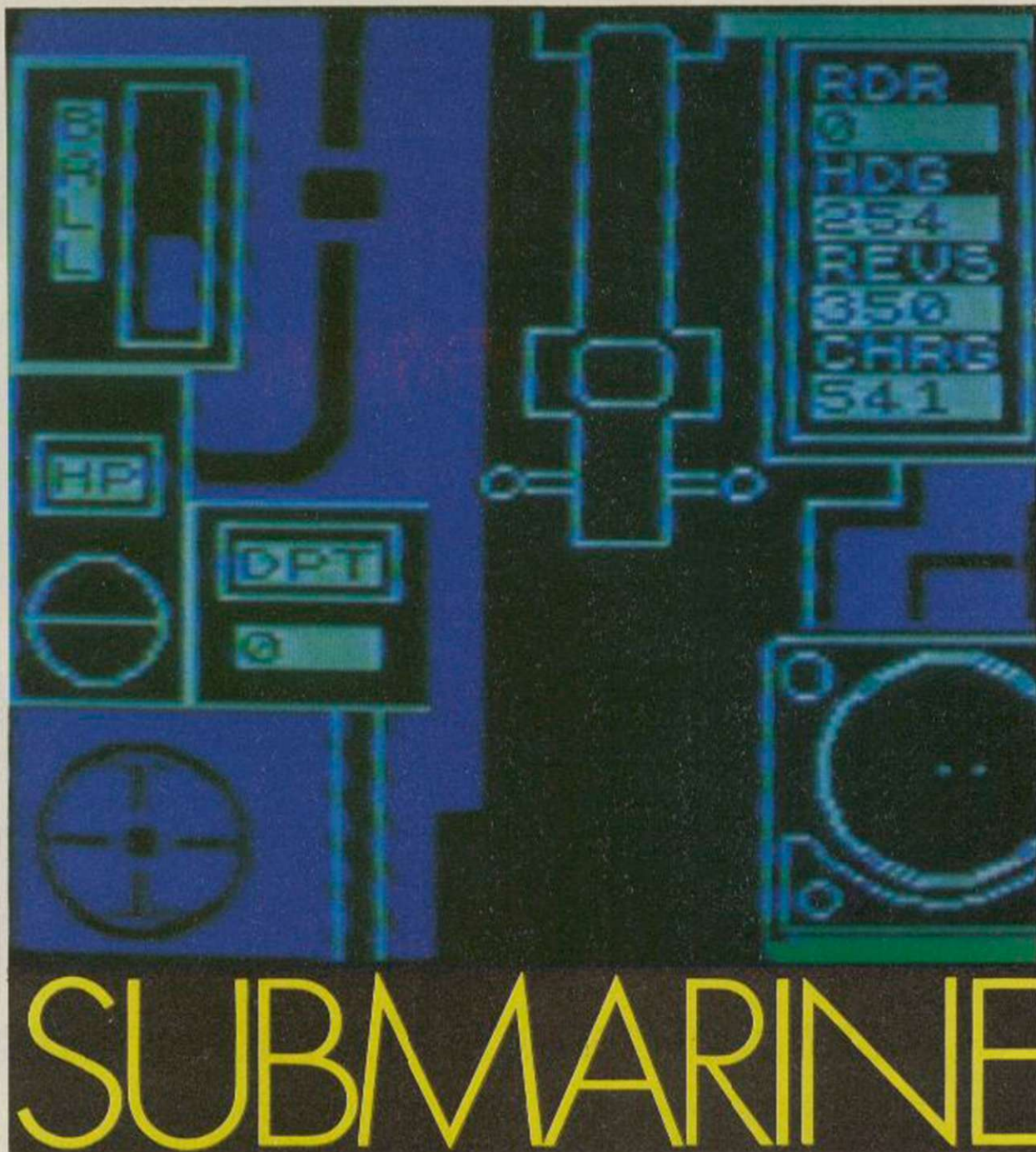
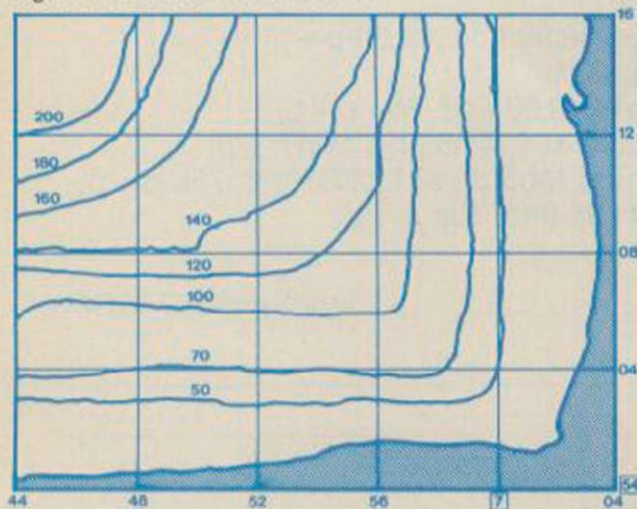
Raise periscope

In the centre, the periscope can be raised and lowered. For our purposes, it must be up in order to look through it. A panel of digital readouts displays rudder angle, heading, engine revs and battery charge in that order. The battery is automatically charged on the surface, incidentally. Care should be taken when submerged, that sufficient charge always remains to resurface.

Beside the panel, another instrument shows whether diesel or electric motors are in use, and flashes a warning if the boat begins to go under with the diesels running. The torpedo count, top right, is self-explanatory. Our Asdic set displays a North-up true bearing for targets within a four-mile range. It comes on automatically at depths greater than 10 feet. On the surface, the radar set is switched on instead. It has a greater range — 22 miles — and again is a north-up, PPI display, on which each sweep of the antennae is seen. Finally, the echo-sounder indicates the depth of water below the keel. Thus, if the boat is rising, the trace falls, as it does when the submarine remains level while the sea-bottom shelves off. It reads from 200 feet up to zero.

The second display shows the chart room: this is really part of the control room; when

Figure 1. Seabed contour chart.



accessed. The control room proper slides across, making room for the chart display as it goes; this simulates the skipper walking across to the chart table. Sounder and Asdic sets both remain in view, now on the left, and both continue to work. On the chart itself, apart from local coastline, there is a large compass rose, the boundaries of a continuous coastal minefield — m — and a longitude — latitude grid calibrated at bottom and right. Inverse figures give degrees, the others, minutes.

For simplicity's sake, a minute is taken to be a nautical mile on both axes. At the top left of the chart, a short line radiating from a small circle points in the direction of the tidestream. Your own position is pointed to by a miniature submarine — at the left-hand end. Below the chart can be found tide strength, speed through the water, and the enemy's reported position at the start of the game. The enemy is always surfaced for the solo game, and always starts off from some point on the eastern side of the chart, steaming a course with a lot of west in it, at a random speed up to about four knots. Your own position is not updated while the chartroom is accessed.

The third display shows the periscope view: this shows as a framework, the brass flange surrounding the periscope

viewing window. Below, a panel gives updated readings of periscope angle, heading, enemy distance and torpedo count.

Taking these in order: the periscope may be rotated full circle, and the angle indicated relates to the keel, reading 0 when the periscope is looking along the bows. Heading is simply the direction in which the vessel is pointing, and not necessarily the direction in which it is actually moving. Enemy distance is read from the radar; life would be quite difficult without it. Torpedo count keeps track of torpedoes running, since salvos may be fired. Salvos must be fired in line, spread in time, not angle. Torpedoes run at 45 knots, and have a range of three miles, being fired only through bow tubes. If the periscope angle is other than zero on firing, it will automatically swing to, and lock on zero.

Torpedoes running

The rest of the display also locks until a torpedo strikes home, or until all have run themselves out. If a miss has clearly been made, the salvo may be aborted. A bubble track gives some indication of the progress of torpedoes, though not giving any actual position for the torpedo, of course. Torpedoes cannot be fired unless the rudder is straight and the boat is maintaining a steady depth less than or equal to maximum periscope depth.



MISSION

You are on the bridge of your submarine when radar picks up an enemy U-boat recharging on the surface. Destroy it before it destroys you in Rod Hopkins' fight to the finish.

the latter ranges from zero to about 37 feet, the horizon rising up the window as the submarine sinks.

From such a low vantage point as another submarine, and in potentially hostile waters, all you can hope to spot is the conning tower of an enemy U-boat. This conning tower varies in size with distance, and moves in high resolution, flicker-free increments along the horizon according to the relative motions of the two subs. Range of vision is affected by the depth of the viewer.

A fourth display is the boot-up screen. This stems from an early idea, since abandoned, to allow the skipper to carry out a simulated sextant reading to establish his own position.

And now to business, Commander. Screen constructions: figure 3 gives three listings required to build up the major displays. The recommended procedure is as follows: in turn, type in and run each listing, saving the result as a screen\$ on tape, along with the construction program itself. The latter is not needed directly, but is worthwhile saving in case of problems, or to satisfy a later craving for customising. Consult figure 2 to discover the final destination of each display. When the time comes to load them into their proper places, a command of this type:

LOAD ""CODE ADDRESS

will load any of the screen\$ into the address

specified, rather than into the screen RAM.

Note that, in the case of both the control room and the chartroom, the machine-code paint routine must be present in line 1 of the construction program; it could be entered separately and merged with each listing in turn. The routine is worth keeping as a utility in its own right, anyway. Referring now to the

Table 1. Keyboard controls.

Key	Function
5	rudder left
6	hydroplane down
7	hydroplane up
8	rudder right
A	abort salvo
B	blow ballast
C	goto Chartroom
E	electric motors on/off
F	fire second and subsequent torpedoes
I	decrease periscope angle by six degrees
J	decrease revs
K	increase revs
N	flood tanks (negative buoyancy)
O	increase periscope angle 36 degrees
P	periscope up/down
T	prime torpedo tubes and fire first torpedo
V	view through periscope
X	exit from chartroom

periscope print routine in the control room listing, the strings of letters A-N are all of graphic-shifted characters, of course.

Machine code and tables: see figure 5. Clear 60415 before entering anything, and then use the loader routine of figure 4 to enter each block in turn. Save intermediate stages on tape and reload before starting again:

SAVE "FILENAME" 60416,5120

When this little task has been accomplished and the results saved, then, with the machine code resident in RAM, type:

CLEAR 32767

and load each of the three screen displays into their allotted spaces using the procedure outlined earlier. Save the total as:

SAVE "Uboat CODE" CODE 32768,32768

There is a 6K+ gap; it is more convenient to load the 32K block in toto. The gap is used as a dynamic store for the control room display.

Basic: figure 6 gives the main Basic program which should be saved on tape immediately following the 32K of code. Do not forget to verify at any stage at which a significant amount of labour would be wasted in the event of a saving problem. Make the Basic autorun by typing:

SAVE "UBOAT HUNT" LINE 1

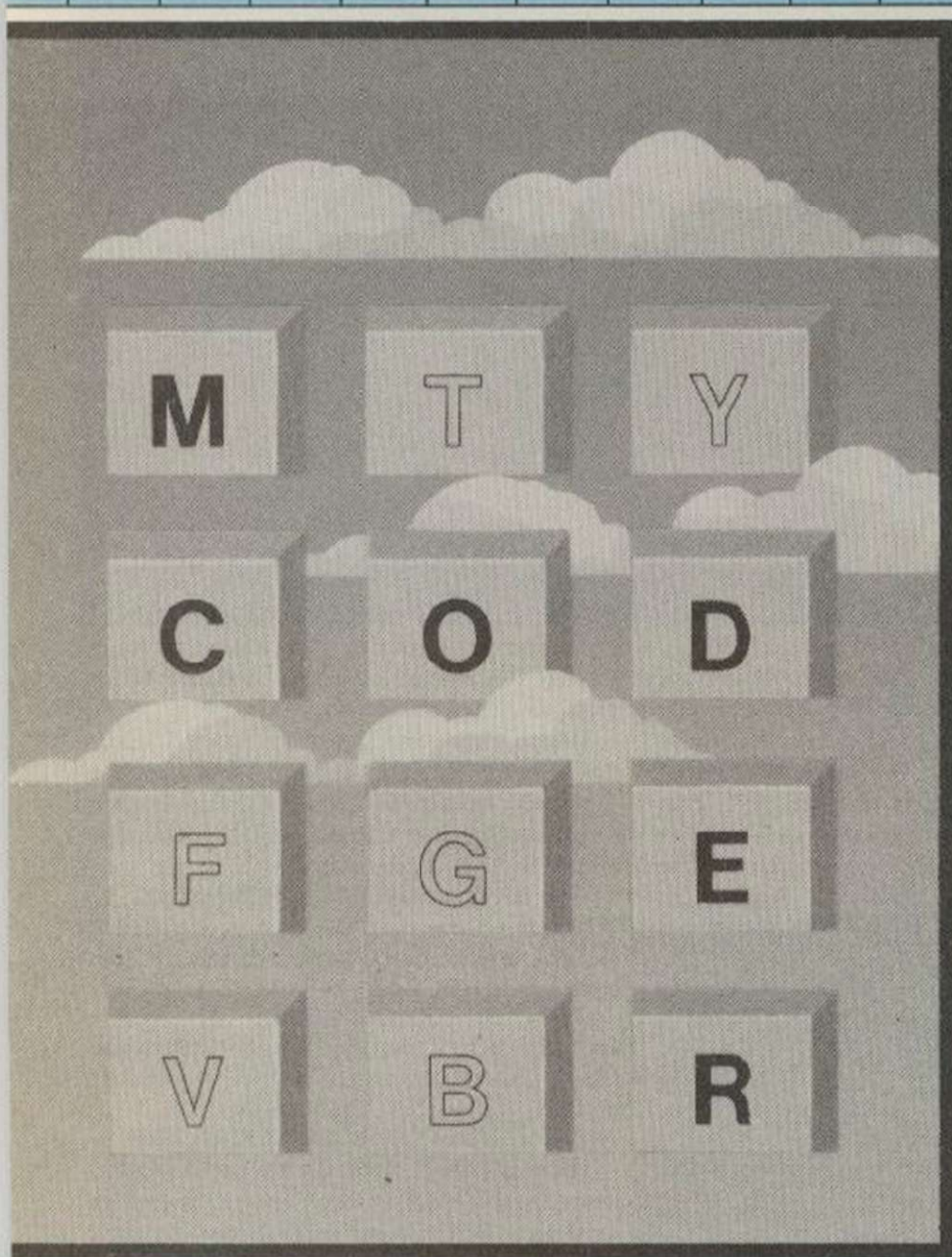
Finally, concoct a short header-cum-loader program displaying your family crest or

(continued on page 111)

PSS...THE FUTURE MAKERS INTRODUCE

M CODER II

**The ultimate integer basic compiler for
the 48k Spectrum and 16k ZX81
Instantly turns your basic into machine
code at the touch
of a key!**



PSS
PSS

Personal Software Services

After the huge success of M Coder (THE original compiler for the ZX81 and Spectrum) we have gone one stage further and improved it to make programming even easier!!

M CODER II now handles STRINGS (NOT string arrays) as well as 95% of all integer basic, and we have made it even easier to use.

The list of commands are too long to print here — but we are so sure that you won't be disappointed, we are prepared to offer a NO-QUIBBLE GUARANTEE.

If you are not completely satisfied, return M CODER II within 7 days from date of purchase and your money will be refunded in full — without question.

SEND PSS A CHEQUE OR P.O. TO THE VALUE OF £9.95 FOR THE SPECTRUM VERSION OR £8.95 FOR THE ZX81 16K VERSION AND WE WILL SEND THIS REMARKABLE NEW PRODUCT TO YOU BY RETURN POST.

NEW!! SPECTRUM BRIDGE PLAYER

At last you can play Bridge against your Spectrum! Uses the Acol bidding system with Stayman and Blackwood conventions. With scoring and inquest/replay facilities. The ideal complement to our Bridge Tutor programs.
48K Spectrum - £8.95

SPECTRUM BRIDGE TUTOR

Improve your Bridge with Spectrum Bridge Tutor. Uses the Acol bidding system including Blackwood and Stayman conventions. Each of the 40 hands illustrates a particular aspect(s) of the bidding and play. Following the card play is an explanation of those aspects highlighted in the hand. The correct bid and play must be made in order to progress but a help feature is included.

For 16k and 48k Spectrum -

Beginners (40 hands) £5.95
Advanced (40 hands) £5.95

FLOATING POINT FORTH

Supports all Forth structures, the ZX printer and access to I/O ports. Has all the Spectrum hi-res, colour graphics, plot and draw and beeper facilities. Allows direct entry of machine code. Comprehensive user guide.
48K Spectrum - £10.95

ORIGINAL SPECTRUM FORTH

Similar facilities to the floating point version but has only integer arithmetic.
16K and 48K Spectrum - £7.95

COLOSSAL CAVES (Adventure 1 by Abersoft)

Enter the Colossal Cave, discover the treasure left by the wizard. On your travels you will meet dragons, snakes, trolls and other denizens of the underworld. Be warned, this adventure can be addictive. Includes a save facility so that the adventure can be continued from the point reached when saved.

48K Spectrum £6.95

SUPERCODE

The ultimate Machine Code Tool Kit for the Spectrum with 60 plus routines. Both 16K and 48K versions on each cassette.
16K and 48K Spectrum - £6.95

SUPERCHESS II For Sinclair 48K SPECTRUM THE BEST AT £7.95

● 7 levels of play ● Plays a variety of openings e.g. French Defense, Sicilian Defense, Ruy Lopez, Queen's Gambit etc. ● Self play mode ● Analyse mode ● Enhanced end-game play ● Recommended move option.

ORIGINAL SUPERCHESS

10 levels of play, plus many features
16k ZX81 £4.95 48k Spectrum £4.95

16K SUPERCHESS £6.95

The best 16k Spectrum Chess program. 3 levels of play with playing strength similar to the 48k version's first three levels. Analyse mode, plays several openings e.g. Queens Gambit, Ruy Lopez, plus more features. Runs on 16k and 48k Spectrum.

BACKGAMMON Very popular 48k Spectrum £5.95

SNAIL LOGO

An advanced implementation to the Logo turtle type graphics. Uses the original style Logo instructions to control the movements of a graphical Snail around the screen instead of a mechanical turtle. Includes the following features: ● Full operating system and Editor ● Comprehensive user guide with sample programs ● Multi-level Hierarchic Procedures ● Procedures with Parameters ● Recursive Procedures ● Nestable repeat loops ● Variables ● Colour and wall bouncing controls ● 25 Language Instructions, over 20 warning and error messages ● Commands to control the optional ZEAKEr turtle.
48K Spectrum £9.95

ZEAKEr TURTLE with Pen and obstruction sensors. Can be used with our Spectrum Snail Logo. The ZEAKEr can be used with both the Spectrum and ZX81 or other micros with suitable parts.

ZEAKEr in Kit Form - £52
ZEAKEr Ready Assembled - £69.50
ZX81 Interface £13
Spectrum Interface if required £18.50
add £3 for P&P and 15% VAT

Speech from the Spectrum

48k

SOFTALK I 'Multiwords' 70 plus words
£5.95

SOFTALK II 'Spacegames' 80 plus words
£5.95

BEEPER AMPLIFIER

Plugs directly to the Spectrum's EAR or MIC socket. Battery powered (no: supplied)
£5.95
or SAVE £1 when ordered with any program
Please add 35p for p&p.

UK Prices include post & packing. Despatch within 48 hours (For orders outside UK add 80p for postage).

Send cheque or postal order to:

Send SAE for catalogue

Also available from Boots and W. H. Smith

CP SOFTWARE, Dept. YC6, 17 Orchard Lane, Prestwood, Bucks. HP16 0NN

TOP RATES PAID FOR HIGH QUALITY PROGRAMS -
SEND YOUR MATERIAL FOR EVALUATION AND PROMPT REPLY.

BRIDGING THE GAP WITH GUARANTEED SOFTWARE FOR YOUR ORIC-1 & SPECTRUM



JOGGER

Super arcade action—Help your jogger cross the motorway & the river.

- Road, cars, lorries, river, crocs, & more.
- Increasing skill levels
- Fast M/C.
- Smooth full colour graphics.
- Sound effects.
- Hall of fame.

Perspire your way up the screen.

Oric-1 version

Author — Adrian Sheppard.



MORIA

A challenging adventure set in the Mines of Moria.

Can you survive encounters with the monsters of Middle-Earth? Will the Wizard help you? Are you fated to die beside the sealed doors or have you the power to open them?

Unless you find Durins Ring you will never leave the mines alive.

A game to test your character.



GRAIL

An exciting role-playing adventure. Where in the Castle Perilous is the Holy Grail?

Gather armour & weapons to fight monsters.

Sell treasure to a trader in exchange for strength potions and wound ointment.

Where will the Warp take you to? This is a test of skill, luck, logic & intelligence.



QUINCY

Superb graphic 5-dice game for 2 to 6 players.

- You can win by skilful playing.
- Easy to learn but totally absorbing.
- Full colour graphic game displays.
- Rolling dice.
- Dice control.
- Individual screen score cards.

Make the most of your micro.

Author — Tony Churcher.

FOR
THE
ORIC-1

NEW
DINKY KONG

DINKY KONG

Super M/C arcade game.

- Skill levels, full colour, Platforms, Ladders, Fireballs, Barrels, Umbrellas, Hearts, Hall of Fame, Sound effects.

You won't see a better game for the ORIC
Author — Adrian Sheppard.

NEW
ORICADE

ORICADE

Assembler/Disassembler Editor.

- Handles full 6502 mnemonics.
 - Features Save & Reload M/C.
 - Assembles & Disassembles at any address.
- You can't program seriously without ORICADE.
Author — Adrian Sheppard.

Sold at all good software shops. ORIC-1 titles recommended by ORIC PRODUCTS INT. LTD & available at branches of LASKYS. Trade/Dealer enquiries welcome — excellent terms.

PLEASE SEND ME (Tick box)

For ORIC 48K

JOGGER
at £6.95

MORIA
at £6.95

DINKY KONG
at £6.95

ORICADE
at £8.50

GRAIL
at £6.95

For ZX SPECTRUM

JOGGER
at £4.95
for 16/48K

MORIA
at £4.95
for 16/48K

GRAIL
at £4.95
for 16/48K

ORICADE
at £4.95
for 48K only.

NAME.....

ADDRESS.....

..... Post code.....

I enclose cheque/P.O. for £.....

**SEVERN SOFTWARE
5 SCHOOL CRESCENT,
LYDNEY, GLOS GL15 5TA**

A MUST FOR ANYONE INTERESTED IN ZX MACHINE CODE!

The finest range of utility programs for ZX Computers. Used by professionals. Very useful for beginners



ZX SPECTRUM MACHINE CODE SYSTEM (The key to machine code success)

SPECTRUM EDITOR/ASSEMBLER A powerful and essential machine code programming aid. 16K and 48K on same cassette + full documentation. Major features: EDITOR with Aut line number and renumber, 40 column screen display, tabulated into fields for easy reading; 5 character label names, easy line editing and cursor control; SAVE/LOAD/VERIFY routines; output to ZX PRINTER TWO PASS ASSEMBLER accepts all Z80 mnemonics; decimal or hex numbers; simple arithmetic on operands; Assembler Directives — ORG, END, DEFB, DEFW, DEFL, EQU, DEFM. **ONLY £8.50**

SPECTRUM MONITOR Machine Code Debug/Disassembler Enter, Run, Debug M/C programs. Compatible with BASIC. Breakpoints and Registers Display. Disassembler to screen or ZX PRINTER. 16K and 48K on one cassette + 30 page manual. **ONLY £7.50**

ZX81 UTILITIES (For everyone... beginner to professional)

ZX81 REMLOAD Machine Code Debug/Monitor Explore and master machine code. Compatible with BASIC. CREATE A REM line — any length. BREAKPOINTS & REGISTERS DISPLAY. Fully documented 30 page manual and cassette. **ONLY £6.95**

ZX81 ZX-MC Machine Code Debug/Monitor The professional one! ENTER/RUN/DEBUG M/C programs. SAVE/LOAD/VERIFY at double speed. BREAKPOINTS & REGISTERS DISPLAY. Self-contained machine code — cannot be used with BASIC. 36 page manual and cassette. **ONLY £7.50** 4K to 64K

ZX81 SCREEN KIT 1 More screen power in your BASIC programs! BORDERS — any size anywhere on screen. SCROLL in 4 directions. CLEAR and REVERSE part of the screen. FLASHING CURSOR anywhere on screen — simulates INPUT. DATA FILES SAVE/LOAD BASIC variables — Double speed. 880 bytes machine code for instant response. Becomes part of your BASIC program. **ONLY £5.70** 4K to 64K

SEND CHEQUE/P.O. FOR FAST MAIL ORDER!
S.A.E. for full details.
6 Corkscrew Hill, West Wickham, Kent BR4 9BB
*All prices include VAT & P&P.



Spectrum Software available from: Buffer Micro Steatham, Microware Leicester, Educational supplies, Griffin & George

NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER 3D

by Addictive Games

for SPECTRUM 48K AND ZX81 16K

ACTION FROM THE SPECTRUM VERSION

➔ This superb game is now available from branches of **W.H. SMITH * and BOOTS.**

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:
★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★
★ TRANSFER MARKET ★ TEAM SELECTION ★
★ SAVE GAME FACILITY ★★ AND MUCH MORE! ★★

WHAT THE PRESS SAY ABOUT IT—

➔ *IF YOU have always wanted to manage a football team, FOOTBALL MANAGER, from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.*
SINCLAIR USER FEBRUARY 1983

➔ *Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!*
* SPECTRUM VERSION ONLY. ZX COMPUTING FEB/MARCH 1983

ALSO AVAILABLE FROM THE FOLLOWING SHOPS
BUFFER MICRO SHOP (London)
MICROWARE (Leicester)
ANPROG COMPUTERS (Horley, Surrey)
SUCCESS SERVICES (Walsall)
THE COMPUTER SHOP (Newcastle)
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES:
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque/P.O. payable to
ADDICTIVE GAMES, Dept. P.O. Box 275
Cannibarrow, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

SINCLAIR AND ORIC COMPUTERS

Oric 1 48K computer £147 (£158). Oric 1 16K n/a (n/a). Sinclair Spectrum 48K £113 (£13). Spectrum 16K £86.91 (£107). 32K memory upgrade kit for 16K Spectrum (Issue 2 only) £26.09 (£28). Fuller master unit for the Spectrum including speech synthesizer, sound synthesizer, amplifier and joystick ports £47.78 (£56). ZX microdrive n/a (n/a). ZX rs232 n/a (n/a). Keyboards with space bars for the ZX81 and the Spectrum £36 (£41). ZX printer £34.74 (£50). 5 printer rolls £10.43 (£16). ZX81 £43.43 (£52). ZX81 16K ram packs £26.04 (£28). New luxury spectrum computers 48K with full sized typewriter keyboards complete with normal space bar enclosed in a larger plastic case which also houses the power supply and the computer pcb £138.20 (£147).

PRINTERS

New Epson RX80 £279 (£339). The Epson MX80FT/3 has been replaced by the almost identical CT1 CP80 £251 (£271) and the very similar Star DP510 £251 (£271). Epson FX80 £378 (£408). Epson MX100/3 £425 (£465). New Star DP515 15" carriage printer £346 (£386). Seikoshia GP100A £199 (£219). Oki Microline 80 £207 (£227). Oki Microline 82A £360 (£400). Oki Microline 84 £730. Oki Microline 92 £470. The Silver Reed, the latest miracle, a combined daisy wheel printer and electric typewriter for only £385 (£425). Juki 6100 proportional daisy wheel printer £364 (£404). MCP40 colour printer £139 (£159). Star STX 80 thermal printer £139 (£159). We can supply interfaces to run all the above from Sharp Computers.

COMMODORE COMPUTERS

Commodore 64 £299 (£09). Special offer package: Vic 20 + cassette recorder + basic course + 4 games £121 (£149). Converter to allow the use of most ordinary mono cassette recorders with the Vic 20 and the Commodore 64 built £8 (£9), kit £6 (£7). Commodore cassette recorder £36.50 (£44). We stock most accessories.

OTHER COMPUTERS

Colour Genie £168 (£178). BBC Model B £424 (£440). Texas T199/4A £139 (£169). Atari 800 £347 (£380). Atari 400 16K with basic £173 (£215).

SWANLEY ELECTRONICS

Dept YC, 32 Goldsel Rd., Swanley, Kent BR8 8EZ.
Tel Swanley (0322) 64851

UK prices are shown first. UK customers must add postage (£1 on Sinclair products, £3.50 on other computers and disc drives and £4.50 on other printers) and the 15% VAT. The bracketed prices are European export prices and include insured airmail postage to all the countries of Europe including Norway, Sweden, Finland, Denmark, Spain and Italy. No VAT should be added to export prices. We are the leading computer export specialist. Official UK credit orders welcome from government laboratories and educational establishments.

HIRE ZX81/SPECTRUM PROGRAM TAPES

Make the most of your computer by hiring from the original and still the only software library offering all these features:

- Over 900 tapes stocked, offering more than 120 different programs from 39 suppliers (all with their permission)—many of the best currently advertised, plus some specially commissioned—and the range increases each week!
- Arcade, adventure and simulation games, many business and home utilities, graphics, education...and so much more besides
- Descriptive catalogue helps you make your choice
- Free quarterly, illustrated magazine includes tips from a professional programmer, DIY plans, reviews, letters, discount offers—and our Top 40 Tapes chart averaged from thousands of members' scores
- Full-time staff offer you a friendly, efficient welcome & service
- A fortnight's hire for just £1 +40p p/p—hire what/when you like
- All tapes guaranteed loadable
- Help given with loading problems (azimuth test tape available) and with marketing members' programs
- You may switch from ZX81 to Spectrum at any time
- Send SAE for details—or join on money-back no-risk approval today

The SINCLAIR OWNERS' SOFTWARE LIBRARY
Warren Road, Liss, Hants GU33 7DD

Please send me on money-back approval my magazine, descriptive library catalogue and order form, on the understanding that if I'm not delighted with your service within 28 days you will refund my money in full.

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

Please enclose cheque/P.O. for £8.50 (year's ZX81 membership)/£9.50 (Spectrum). Overseas £2 extra in each case.

YC

(continued from page 115)

```

5=5IN TD,15=COS TD: INK H
5000 LET Y=STR$ T$: PRINT AT 10
,15,Y$: LET Y=STR$ KN: PRINT AT
20,15,Y$
5020 RANDOMIZE USR 50700: IF K T
HEN GO SUB K: POKE 23550,A: IF N
OT CHR THEN GO TO VAL "1E3"
5025 GO SUB 100: IF NOT DPT THEN
GO TO 5027
5026 IF UD<E THEN OVER B: LET S$
(8)=STR$ (TBR*DEG): PLOT X2,Y2:
LET X2=64+C*UD*SIN TBR: LET Y2=1
34+C*UD*COS TBR: PLOT X2,Y2: OVE
R A: LET ASB=TBR: PRINT AT 13,5:
INVERSE 1;S$(8): GO TO 5040
5027 RANDOMIZE USR 51120
5040 PLOT 71,PL: IF SU AND UD<E
THEN BEEP .02,44
6100 IF PU THEN GO TO 4000
6200 GO TO 5005
7000 IF CHR THEN RANDOMIZE USR 5
1935: LET X2=X2+176: LET CHR=A:
POKE 50741,0: LET SF=VAL "2050":
POKE 50710,62
7005 RETURN
7050 REM XXXXXXXXXXXX
7055 IF NOT YC THEN RETURN
7060 LET SF=VAL "2300": LET T$="
DDDDDDDDDDDDDD": LET TC=0: PRINT
AT 20,27,"": RETURN
7999 REM XXXXXXXXXXXX
8000 IF NOT PU THEN RETURN
8001 IF ABS RD<1 THEN LET RD=0
8002 IF ABS HP<1 THEN LET HP=0
8005 IF DPT>37 OR RD OR BY OR HP
THEN RETURN
8010 LET SF=VAL "1500": LET PA=A
: LET TC=A: GO SUB 5500: LET YT=
((12-HZ)*6-40)/95/(UD/2)
8020 FOR Q=41 TO 167-HZ*8 STEP Y
T
8025 IF PU THEN GO TO 4000
8030 PLOT INK 3,123,0: IF INKEY$
="F" THEN GO SUB 8499
8035 IF INKEY$="A" THEN GO SUB 7
950
8100 GO SUB 100: FOR N=1 TO 14:
IF T$(N)="L" THEN GO SUB 8600
8120 NEXT N
8140 FOR N=1 TO 14: IF T$(N)="L"
THEN GO TO 8200
8150 NEXT N
8160 LET SF=VAL "2050": RETURN
8200 NEXT Q: IF N<15 THEN GO TO
8020
8499 IF NOT TC THEN RETURN
8500 IF NOT TP THEN RETURN
8510 LET SF=SF*200: LET TP=TP-B:
LET T(14-TP,B)=S: LET T(14-TP,C
)=U: LET T$(14-TP)="L": LET TC=T
C+B
8530 PRINT AT 20,27, INVERSE B;T
C: RETURN
8580 LET T(N,B)=T(N,B)+(50*COS H
D+T5*COS TD)/SF
8610 LET T(N,C)=T(N,C)+(50/SIN H
D+T5*SIN TD)/SF
8620 LET T(N,D)=T(N,D)+50/SF
8630 IF T(N,D)>D THEN LET T$(N)=
"D": LET TC=TC-B: PRINT AT 20,27
: INVERSE B;TC: LET SF=SF+200: R

```

```

TURN
8540 IF ABS (T(N,B)-U5)>.02 THEN
RETURN
8550 IF ABS (T(N,C)-UW)>.02 THEN
RETURN
8560 GO TO 2300
8599 REM XXXXXXXXXXXX
8700 IF PU OR CHR THEN RETURN
8701 LET EM=ABS (EM-B): POKE VAL
"22743+EM*64",VAL "56": POKE VA
"22744+EM*64",VAL "55": POKE U
"22807-EM*64",H: POKE VAL "22
EM*64",H: RETURN
8705
8805 IF PU OR CHR THEN RETURN
8810 LET BY=BY+B*(BY<C): PRINT A
T E+BY,D:"": RETURN
8850 IF PU OR BY<-C THEN RETURN
8855 PRINT AT E+BY,3: PAPER 1:"
": LET BY=BY-B: RETURN
8905 LET RD=RD-HPI*(RD<-H*HPI):
RETURN
8975 LET RD=RD+HPI*(RD<H*HPI): R
TURN
8985 LET RU=RU+50*(RU<500): RETU
RN
8995 LET RU=RU-50*(RU>A): RETURN
9300 IF PU OR CHR THEN RETURN
9201 IF USR 61432 THEN LET HP=HP
-HPI
9202 RETURN
9203 IF PU OR CHR THEN RETURN
9204 IF USR 61485 THEN LET HP=HP
+HPI
9205 RETURN
9250 LET PA=PA+36*RD: IF PA>CR
THEN LET PA=PA-CR
9255 RETURN
9270 LET PA=PA-B*RD: IF PA<0 TH
EN LET PA=PA+CR
9275 RETURN
9701 IF PU OR CHR THEN RETURN
9702 LET PR=ABS (PR-B): IF PR=A
THEN GO TO 9705
9703 RANDOMIZE USR 65323: RETURN
9705 RANDOMIZE USR 65291: RETURN
9800 IF PR OR CHR THEN RETURN
9810 LET PU=ABS (PU-B): RANDOMIZ
E USR 60684: RANDOMIZE USR 61997
9812 IF NOT PU THEN LET HZ=A: RE
TURN
9814 LET PU=B: RANDOMIZE USR 619
92: GO TO 100
9899 REM XXXXXXXXXXXX
9900 LET Z$="
DIM U$(27): POKE 50710,62: LET
B$=CHR$ 17+CHR$ 1+
9901 LET A=0: LET BY=A: LET DI=A
: LET PP=A: LET PO=A: LET CHR=A:
LET BO=A: LET FU=A: LET K=A: LE
T TC=A: LET Z=A: LET DU=A: LET E
3=A: LET PU=A: LET PU=A: LET P
JC=A: LET PUD=A: LET UI=A: LET R
J=A: LET HZA=A: LET DH=A: LET KN
=A: LET SU=A: LET K=A: LET TBR=A
: LET TSS=A: LET TSC=A: LET TD=A
: LET S1=A: LET U1=A: LET UD=A
9903 LET B=VAL "1": LET C=B+B: L

```



```

ET D=C+B: LET E=D+B: LET F=E+B:
LET G=F+B: LET H=G+B: LET TN=F+F
: PAPER A: BORDER A: INK H: CLS
9903 LET PL=D+D: LET GN=VAL "180
": LET EXN=A: LET EX=A: FOR Q=
A TO B: NEXT Q: LET RU=A: LET HZ
=A: LET P1=PI: LET P2=PI/2
9904 DIM Q$(5): LET SY=21: LET S
X=A: LET PA=A
9905 POKE VAL "23550",H+B: LET P
R=B: LET HP=A: LET RAD=PI/VAL "1
30": LET DEG=B/RAD: LET CR=C*PI:
LET HPI=RAD*TN
9914 RANDOMIZE : LET CO=B: LET P
U=A: LET SM=A: LET TD=RND*CR: LE
T T3=RND*F: LET CH=VAL "500":RND
*VAL "200": LET TP=H+H: LET HD=R
ND*CR: LET RD=A: LET ASB=A
9915 POKE VAL "50741",A: POKE VA
"50671",A: RANDOMIZE : LET S=S
+RND*F: RANDOMIZE : LET U=11*RND
+B
9920 LET DPT=A: LET BY=A: DIM T(
14,3): LET T$="DDDDDDDDDDDDDD"
9934 LET SF=VAL "2050": LET RA=U
AL "221": LET RB=VAL "323": LET
PA=PI/E: LET X=A: LET Y=22
9943 LET X2=VAL "240": LET Y2=VA
L "104": LET X1=VAL "155": LET Y
1=VAL "37": POKE VAL "51300",H:
LET RU=50*INT (RND*TN)
9955 GO SUB VAL "9970"
9956 GO SUB VAL "3000": RANDOMIZ
E USR VAL "50672"
9957 LET EM=DPT<TN: GO SUB VAL "
5700"
9958 PRINT AT A,A:
9959 RETURN
9970 RANDOMIZE : LET US=S+RND*4:
LET UW=12+RND*4: LET UH=255+RND
*30: LET US="54 "+STR$ INT US+"
46 "+STR$ INT (UL+44)+"E": LET
JH=UH*RD: LET UK=RND*4: LET USU
=A: RETURN
NOTE: Z$ COMPRISES A RANDOM MIX
OF UDC CHARS 'O' & 'P', FOR WHICH
THE DATA IS PART OF THE FINAL
MACHINE CODE BLOCK

```

DOWNSWAY

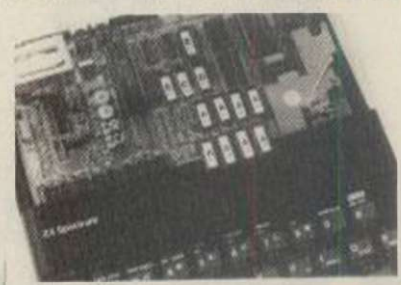
NEW ADD-ON MEMORIES FROM DOWNSWAY

All in smartly styled injection-moulded ABS plastic cases for extra rigidity, finished to match the computers, and built to the highest standards for guaranteed performance and reliability.

64K MEMORY for ZX81 — Switchable Redesigned ultra-slim memory measuring only 82X58X22 mm, with tight fitting gold-plated edge connector. Needs no extra power supply — 8-16K portion of memory map can be switched out to permit use of other accessories. **Only £59.95.**



16K RAM Pack — same size and finish as 64K — **Just £24.95** including free NODROG maze adventure game

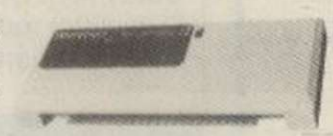


NEW 48K MEMORY for Jupiter Ace Gives a full 51K of RAM — light, snug-fitting unit with all the outstanding features of other Downsway memories — finished to match the new Jupiter case. **Only £59.95**



16K Model — identical finish and quality — **£26.50** with special introductory offer of free GALACTIC INVASION cassette!

16K RAM CARTRIDGE for VIC 20 Switchable for 3, 8 or 16K operation, giving up to 20K of RAM. Plugs directly into the rear expansion port, fully compatible with appropriate accessories. **Only £37.50**




32K RAM FOR SPECTRUM

A full 48K of memory for the 16K Spectrum — simply D.I.Y. installation by just undoing 5 screws and plugging in!
For Issue One machines (with light grey keys) — a RAM board of advanced design, using "state-of-the-art" technology — **only £42.50.**
For Issue Two machines (with dark grey keys) — a simple plug-in kit of I.C.s which fit straight-in to the sockets already provided — **only £32.50.**
Both come with fully detailed, illustrated instructions.

TO: DOWNSWAY ELECTRONICS (UK) LTD.
DEPT. M, DEPOT ROAD, EPSOM, SURREY KT17 4RJ

Please send me

All prices include VAT, p & p. 

My Cheque/P.O./M.O. is enclosed

Please debit my Barclaycard No.

Name:

Address:

.....

Please allow up to 28 days for delivery.

Naturally Downsway add-on memories are fully tested and guaranteed but should you be dissatisfied for any reason, just return the memory within 14 days for a full refund.

INSTANT IMAGE TRANSFER TO ZX SPECTRUM RD DIGITAL TRACER £55.50



Please send meRD DIGITAL TRACERS at £55.50 each (including P&P and VAT). I enclose cheque for £ payable to RD Laboratories Ltd.

Name

Address

Send to: Dept. YCB, RD Laboratories Ltd., 20 Court Road Estate, Cwmbran, Gwent NP44 3AS

RD Laboratories also supply the RD 8100 SYSTEM for economic automatic measurement, test and control. The modular-based RD 8100 SYSTEM is already used widely in many applications - from scientific experimentation to small-scale energy management systems. Please send stamp and address for brochure.

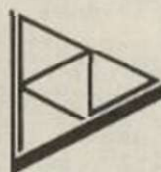
The high resolution colour graphics of the ZX Spectrum permit accurate presentation of complex or irregular images - maps, technical drawings, even personalities. But entering individual co-ordinates for unusual shapes can be tedious and time-consuming.

The RD DIGITAL TRACER cuts out tedious plotting. It provides instant transfer from original to display file - for screen display, ZX printer printout, or retention on cassette.

The RD DIGITAL TRACER is supplied with tracing sheet, software cassette and full instructions on use. Latest software includes fast colour fill, audible keystroke acknowledgement, fast PAPER colour change and fast LOAD from saved display file.

This is an invaluable tool for engineers, architects and other technicians, and for educational use in the presentation of lectures, and in computer training and application. Designed for the ZX Spectrum, the RD DIGITAL TRACER as supplied is compatible with ZX 81, although high resolution colour graphics are not available on this machine.

The RD DIGITAL TRACER is available from computer shops or direct from RD Laboratories. The direct, UK only, price of £55.50 includes VAT (Postage and Packing free). Send a cheque (payable to RD Laboratories Ltd.) with order for delivery within 28 days, or ask your local dealer for details.

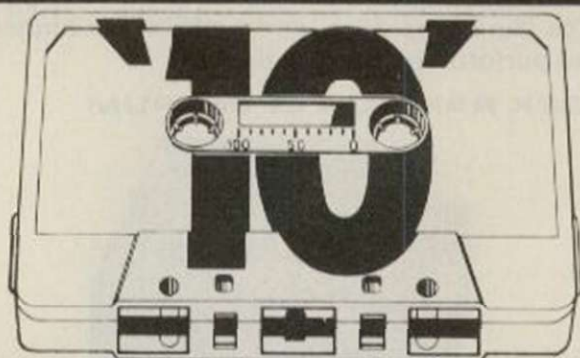


R D Laboratories Ltd

20 Court Road Estate Cwmbran Gwent NP44 3AS
(05333) 74333

STARTTECH

Absolutely the lowest prices!



BLANK DATA CASSETTES

£5.95

Inc VAT
Postage and Packing 45p

Computer Grade Data Cassettes suitable for use in all of today's home computers. Each comes with its own case.

Tick for further information
 VIC 20 PRODUCTS
 COMMODORE 64
 All prices subject to availability or change without notice.

PLEASE SEND ME
 Pack of 10 Data Cassettes

Name
 Address

I enclose Cheque, P/O for
 CREDIT CARD ACCESS BARCLAY CARD 24hr. ANSWERPHONE SERVICE

Qty Price TOTAL
 £6.40 inc. VAT

STARTTECH 208 Aigburth Rd, Aigburth, Liverpool L17 0SL 727-7267

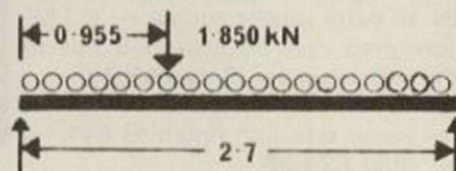
TECTONIC SOFTWARE



Spectrum
48k

Computer Aided Design

for real applications and uses



SteelCalc - steel beams to BS449; all design criteria and data output; prompts for loadings, span, etc.; single and "twin" beams; accepts UDL, point and combination loading. Suggests suitable section. Output satisfies usual L.A. requirements. Data page. Calculator mode. Graphics include beam section, with a loading schematic and UDG's. £19.95 inc. p&p, VAT and manual.

TimberCalc - joists and beams to CP112; outputs all design criteria and data; prompts for loadings, span, etc.; accepts UDL, point and combination loadings. Suggests suitable section. Accepts modifications and re-calculates. Data page. Output satisfies usual L.A. requirements. Calculator mode. Graphics include beam/joist section, loading schematic and UDG's. £19.95 inc. p&p, VAT and manual.

TECTONIC SOFTWARE,
P.O. Box 100, Poole, Dorset BH17 9BH

LLAMASOFT!!

MORE THAN JUST A PRETTY PACKET!

LLAMASOFT!!
PRESENTS
MATRIX
(GRIDRUNNER 2)
FOR VIC-20 (8K) and Commodore 64



Jeff Minter has taken Gridrunner — the game that topped bestseller charts in USA and UK — and created an awesome sequel —

Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking, count-down/panic phase and much, much more. . .

Packed into 20 mind-zapping zones and accompanied by incredible sonics.

N.B. MATRIX REQUIRES A JOYSTICK
FOR VIC-20: £8.00 FOR C64: £7.90

MATRIX ENTER THE ZONE OF EXCELLENCE

LLAMASOFT SOFTWARE
49 MOUNT PLEASANT,
TADLEY, HANTS,
RG26 6BN

J = JOYSTICK CONTROL

LLAMASOFT!!
YES
YES, HE'S DONE IT AGAIN

JEFF MINTER's done it again, not only is Laserzone the best VIC-20 game in existence, now this action packed, mind-zapping game is soon to be released for the COMMODORE 64. Graphically superb!



ONLY £7.50 ONLY £7.50

Experience Laserzone in your own home. It's the only one. TOTALLY ORIGINAL. MASTER PRICE of Video Game Design.

LLAMASOFT

FEEL THE EXHILARATION as you zap your way through 20 zones. You'll never see the same game again. NOT JUST A PRETTY PACKET!

VIC 20

LASERZONE (8K +)

Destroy the oncoming ALIENS with your TWO independently controlled laser bases! Lunge for the ELECTRO button and blast your enemies into expanding clouds of SPACE JUNK! An exhilarating and totally original game with a unique system of control from a standard joystick. A mere £6.00 + 50p P & P.

ABDUCTOR

A classic new space game! ZAP the swirling alien hordes before they ram you — and abduct your humanoids! Survive the assault for long enough and you'll get an extra stage on your spaceship with double firepower! Awesome unexpanded Vic Action. £5.00 + 50p P & P.

GRIDRUNNER

Finally, true arcade quality on the unexpanded VIC! Shoot down the segmented DROIDS invading the grid. Beware of the pods and zappers! The awesome speed, sound and graphics gives you the best blast available for unexpanded Vic. £5.00 + 50p P & P.

ANDES ATTACK (8K)

Your spacecraft must attack the descending aliens and frustrate their evil intent. Fly your Ramjet fighter over the Andes mountain range and protect your llamas from kidnap by hostile UFOS. Features 5 kinds of UFO, controls include up, down, reverse, fire, thrust and smart bomb. Entirely in machine code. Requires 8K expansion and joystick. £5.00 + 50p P & P.

TRAXX M/C (8K + EXPANSION)

This is VIC 20 cross breed between the now famed 'Pacman' and the game 'Quix'. All in machine code, fast and fun with joystick controls, uses Hi-Res colour graphics. 8K or larger expansion needed. Only £6.00 + 50p P & P complete with instructions.

COMMODORE 64

ATTACK OF THE MUTANT CAMELS

Planet Earth needs you! Hostile aliens have used genetic engineering to mutate camels from normally harmless beasts into 90 foot high, neutronium shielded, laser-spitting death camels!! Can you fly your tiny, manoeuvrable fighter over the mountainous landscape to weaken and destroy the camels before they invade the human stronghold. You must withstand withering laser fire and alien UFOS. Game action stretches over 10 screen lengths and features superb scrolling, scanner, 1/2 player actions and unbelievable animation! Play this game and you'll never be able to visit a zoo again without getting an itchy trigger finger! Awesome m/c action! £7.50 + 50p P & P.

ROX-64

Rox is a challenging game involving the defence of your lunar base from a deadly meteor shower. Rox-64 includes amazing sprite graphics displays and spacy sound effects, and an awesome 'mothership' display if you win the game. Top 10 scores are tabled along with their names. This program shows just what can be achieved using only Commodore-64 basic. Study the listing and learn how to use sprites and sound on this outstanding machine. £3.00 + 50p P & P.

GRIDRUNNER 64

The No 1 best game for the Vic has been improved for your COMMODORE 64! Gridrunner is a smash hit in the USA. Now experience the lightning-fast challenge of the grid on the 64. Features 31 skill levels and excellent sound and graphics. Sore trigger finger free with every game! £5.00 + 50p P & P.

SPECTRUM

GRAPHICS CREATOR (16K)

Not just another character editor! Allows you to define not only the 21 user definable characters. Also allows you to change the entire 95 character ASCII set. Creates BYTES files ready for you to load into your own programs. Includes advanced Reflect. Invert. Field commands etc. Complete with full documentation. Bin the BIN statement and use Graphics Creator with its easy on-screen cursor editing. £2.50 + 50p P & P.

BOMBER (16K)

Yes, a full feature version of the popular game 'Blitz', supplied for the 16K or 48K Spectrum. For only £2.50 + 50p P & P.

HEADBANGER (48K)

Colourful new game starring Chico the headbanger who you must guide to riches through an increasing shower of heavy metal. Gain bonuses for headbanging but be sure to take an aspirin when the pain gets too much! Basic + m/c to speed up action. Great graphics, nice animation. Will even drive William Stuart system's voice synthesiser to produce speech output. Can you attain the grade of 'Rocker Class One' or will you be 'Barry Manilow Class 5'? Start headbanging today and find out. £4.00 NEW.

SUPERDEFLEX (48K)

Bounce 'Sid', the space invader, around the screen into the power pods keeping away of course from the devil who chases you around the screen. Steer with your Deflex shields, but beware the mines or you may be burned alive! Superb graphics and fantastic sound on the 48K Spectrum only. Only £2.50 on cassette + 50p P & P.

ATARI 400-800

GRIDRUNNER

Now play the best selling VIC/C64 game on your ATARI 400/800. Any memory size (16-48K). Basic cartridge *not* required — 100% machine code autoboot tape. Play this awesomely fast and addictive game on your Atari. For only £7.50.

TURBOFLEX

Superb ultra-fast and totally new ball game. Uses ATARI's unique features to the full. Incorporates superb colour/sound effects and uses Player/Missile graphics. Tables top 10 scores along with Scorer's name. £4.00 + 50p P & P.

ZX81

CENTIPEDE (16K)

The ORIGINAL game from the ORIGINAL author. This is the identical program to that being sold by other companies for three times our price. The game has received ecstatic reviews in the computing press. Program has 30 speed levels and ever increasing Centipede hordes. Tables top 10 scores and names. Why wait to pay more? Only £1.95 + 50p P & P.



LLAMASOFT GAMES now available in BOOTS and many other retail outlets

PLEASE ADD 50p TO ALL ORDERS

LLAMASOFT SOFTWARE

Dept YC8, 49 Mount Pleasant, Tadley, Basingstoke, Hants. RG26 6BN



Tadley 07356 4478

TRADE ENQUIRIES WELCOME

Chris Davison coaxes the Spectrum's graphics out of their shells with an ingenious Basic-Logo mix.

ONE OF the most outstanding features of the ZX Spectrum is its graphics capability. Unfortunately Basic was never designed to handle graphics and, as a result of this, it is not easy to produce complex graphic displays.

Logo, on the other hand, was designed to handle graphics, and does so very well, but it is little more than a graphics language. So imagine the graphics capability of Logo combined with the mathematical and control capabilities of Basic, combine them into one language and you have Tortoise.

The idea behind turtle graphics is simple: basically, as readers of the BBC-orientated articles in *Your Computer* January 1983 will know, you are in control of a turtle.

You can instruct the turtle's movements along some surface — for example, the screen, and hence create shapes. For example, telling the turtle to:

```
Move forward one unit
Turn 90° to the left
Move forward one unit
Turn 90° to the left
Move forward one unit
Turn 90° to the left
Move forward one unit
```

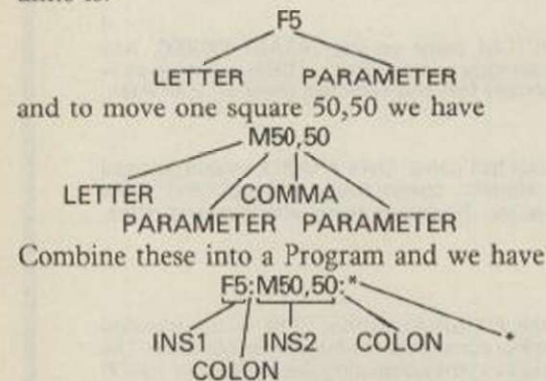
would draw a square. The actual commands of the language are given later on. Obviously here we can say

```
Move forward one unit
Rotate 90° to the left
FOR count=1 TO 4
  (Forward one unit
  turn 90° to the left)
NEXT count
```

Having looked at turtle graphics, let us now look at Tortoise itself.

The format which Tortoise commands take is as follows. An instruction is made up of a letter followed by some parameters separated by commas. A program is made up by a number of instructions followed by an * and all separated by colons.

So the instruction to move forward five units is:



A parameter may be any of the following: a constant, a variable, an expression. Now that you know a little about the language, let us look at the program itself.

The routine at 200-330 is designed to let you play turtle before you combine Tortoise with Basic. You are limited to just one loop, yet you can produce some very exciting results. After the prompt

INSTRUCTION>"

type in your program, for example, try:
fa:90:*

followed by Enter. The code is then displayed at the top of the screen and the prompt
Loop a start>

is given. This asks you at what value you would like the loop a to start from.

try 2

Then you are asked where you wish the count to finish,

try 50

Finally you are asked in what steps you wish the count to be incremented:

try 1

The screen clears and your program is executed. If you tried the example given, then you should see a square spiral being drawn.

When it finishes, the prompt
INSTRUCTION>
appears again and you can try something else. Note that this time your drawing will start from the last point plotted, that is, at the end of the spiral, so you may wish to move back to the centre. To do this you can use the Move command:

M128,77:*

This time type in 1 for all three loop questions; you will then be ready for your next program. The whole emphasis of this type of program is on experimentation, so do not be

frightened to have a bash at something new.

Once you have used the package a few times you may wish to progress. If you delete 200-330, or type

180 GOTO 400

and start your program at 400, you can now type in your own program. Your computer will only accept Basic, so we must fool it into thinking that Tortoise is Basic. This is done by placing your Tortoise code into the string s\$ and then

GOSUB tort

to access the main program. So your spiral program now looks like this:

```
400 LET s$="fa:90:*"
410 FOR a=2 TO 50 STEP 1
420 GOSUB tort
430 NEXT a
440 STOP
```

Do not forget to start your program with
GOSUB 9200

This sets up all the variables used.

When writing your Basic program, be careful not to use the variables used by the package — see variable list. You may use them if you wish but remember the package has its own use for them, so exercise extreme caution.

Try this program:

```
LET s$=M0,0:Ba,20,B:***
FOR a=0 to 2*PI STEP 0.1
LET b=COS(a)*80+80
GOSUB tort
```

TORTOISE

```

1 REM  Tortoise II
3 REM A mini turtle graphics
4 REM interpreter for the
5 REM ZX Spectrum.
6
7 REM  By Chris Davison
10 REM Normally you will put
20 REM your own BASIC program
30 REM here that includes the
40 REM Tortoise II instruction
50 REM
60 REM The routine here at the
70 REM moment allows you to
80 REM use the package
90 REM interactively.
100
150 GO SUB 9200: REM Initialise
199
200 REM ***Interaction***
201
205 PRINT AT 0,10;"Code:"
210 INPUT "Instruction>";s$
215 PRINT TAB (10);s$(1);
220 FOR i=2 TO 50
230 IF s$(i)="" THEN PRINT : P
PRINT TAB (10);: GO TO 260
240 PRINT s$(i);
250 IF s$(i)="" AND s$(i-1)=""
THEN LET i=50
260 NEXT i
270 INPUT "Loop a start>";x1
280 INPUT "      end>";x2
290 INPUT "      step>";x3
294 CLS
295 POKE 23677,128: POKE 23678,
88
300 FOR a=x1 TO x2 STEP x3
310 GO SUB tort
320 NEXT a
330 GO TO 200
5998 STOP
5999
6000 REM **Decode Section**
6001
6010 LET v(1)=0: LET vi=2
6020 LET i=0
6030 LET i=i+1
6040 LET l$=s$(pt+i)
6050 IF (l$<>"," ) AND (l$<>":")
THEN GO TO 6030
6060 LET v(vi)=VAL s$(pt TO pt+i
-1)
6070 LET v(1)=v(1)+1
6080 LET pt=pt+i+1
6090 LET vi=vi+1
7000 IF l$<>":" THEN GO TO 6020
7009
7010 RETURN
7011
7500 REM ***Box***
7501
7510 LET v(2)=v(2)-x: LET v(3)=v
(3)-y
7520 DRAW v(2),0: DRAW 0,v(3)
7530 DRAW -v(2),0: DRAW 0,-v(3)
7531
7540 RETURN
7541
7600 REM ***Edge***
7601
7610 BORDER v(2)
7611
7620 RETURN
7621
7700 REM ***Circle***
7701
7710 CIRCLE x,y,v(2)
7720 PLOT x,y
  
```

NEXT a
STOP

The designs are only limited by your imagination.

Now for descriptions of each routine. First the B for box routine. For example:

B3,5

This draws a box between the last plotted point and your two parameters, 3 and 5 in the above example. The C for circle:

C7

This draws a circle, whose radius is given as the parameter and whose centre is the last plotted point.

The E for edge routine, for example:

E6

This changes the colour of the border to that given by the parameter, that is E6 changes it to yellow. The F for forward routine, for example:

F7

This moves the turtle forward a distance given by the parameter, so here the turtle would move seven spaces forward.

The I for ink routine, for example:

I4

This changes the colour of the trail left by the turtle, that is, I4 changes it to green. All colours are as normal on the Spectrum. The M for move routine, for example:

M0,0

This moves the last plotted position to the specified co-ordinate, in this example, the bottom left-hand corner.

The P for polygon routine, for example:

P5,40,10

This draws a polygon, whose number of sides is given by the first parameter. The first side of that polygon is a line between the last plotted position and the last two parameters. In this example the polygon is a pentagon.

The R for rotate routine, for example:

R90

This changes the direction in which the turtle is heading. Note that the parameter specifies degrees, so here the turtle turns at a right angle to its old direction.

The S for screen routine, for example:

S6,0

This changes both the ink and the paper

Table 1. Name	Letter	Parameter 1	Parameter 2	Parameter 3
Box	B	X co-ord	Y co-ord	
Circle	C	Radius		
Edge	E	Colour		
Forward	F	Distance		
Ink	I	Colour		
Move	M	X co-ord	Y co-ord	
Polygon	P	No. of sides	X co-ord	Y co-ord
Rotate	R	Degrees		
Screen	S	Ink	Paper	

```

7721
7730 RETURN
7731
7900 REM ***Forward***
7901
7910 DRAW xi*v(2),yi*v(2)
7920 LET x=x+xi*v(2)
7930 LET y=y+yi*v(2)
7931
7940 RETURN
7941
8000 REM ***Ink***
8001
8010 INK v(2)
8021
8030 RETURN
8031
8100 REM ***Move***
8101
8110 POKE 23677,v(2)
8115 POKE 23678,v(3)
8120 LET x=v(2): LET y=v(3)
8121
8130 RETURN
8131
E200 REM ***Polygon***
E201
E210 LET oldrad=rad
E220 LET oldxi=xi
E230 LET oldyi=yi
E235 IF x=v(3) THEN LET rad=-PI/
2-PI: GO TO E245
E240 LET rad=ATN ((y-v(4))/(x-v(
3)))
E245 LET xi=COS rad: LET yi=SIN
rad
E250 LET length=SQR ((x-v(3))*(x
-v(3))+ (y-v(4))*(y-v(4)))
E255 LET angle=2*PI/v(2)
E260 FOR i=1 TO v(2)
E265 LET v(2)=length
E270 GO SUB 7910
E275 LET rad=rad+angle
E280 GO SUB 8320
E285 NEXT i
E287 LET rad=oldrad
E288 LET xi=oldxi
E289 LET yi=oldyi
E290
E295 RETURN
E296

8300 REM ***Rotate***
8301
8310 LET rad=rad+(v(2)/180)*PI
8320 LET xi=COS rad
8330 LET yi=SIN rad
8331
8340 RETURN
8341
8400 REM ***Screen***
8401
8410 FOR i=0 TO 21
8420 PRINT AT i,0: INK v(2): PAP
ER v(3): OVER 1;"
8430 NEXT i
8431
8440 RETURN
8441
9000 REM ***TORTOISE***
9001
9010 LET pt=1
9020 LET c$=s$(pt)
9030 IF c$="*" THEN RETURN
9040 LET pt=pt+1
9050 GO SUB 6010
9060 IF c$="b" THEN GO SUB 7510
9070 IF c$="e" THEN GO SUB 7610
9080 IF c$="c" THEN GO SUB 7710
9100 IF c$="f" THEN GO SUB 7910
9110 IF c$="i" THEN GO SUB 8010
9120 IF c$="m" THEN GO SUB 8110
9130 IF c$="p" THEN GO SUB 8210
9140 IF c$="r" THEN GO SUB 8310
9150 IF c$="s" THEN GO SUB 8410
9180 GO TO 9020
9181
9190 REM ***End***
9191
9200 REM ***Initialisation***
9201
9205 LET tort=9000
9210 DIM v(4): DIM s$(50)
9230 LET x=128: LET y=88
9240 LET xi=1: LET yi=0
9250 LET rad=0
9260 LET oldrad=0
9270 LET oldxi=0
9280 LET oldyi=0
9290 LET length=0
9300 LET angle=0
9301
9999 RETURN

```

colours, but leaves the actual picture untouched. The first parameter is ink, and the second one paper. So in this example we have yellow ink on black paper.

All that information may be summarised into table 1.

All X,Y co-ordinates are absolute, also colours are as normal on a Spectrum, for example: 0 is black, 7 is white and so on. Now you have seen how to use the program, let us look at the program itself.

Here is a list of the routines used:

200 Interaction. This allows the user to use turtle graphics without using Basic.
6000 Decode. This takes each instruction from s\$ and breaks it down into separate parameters. These are then stored in v(),v(1) holds the number of parameters the first parameter being held in v(2).
7500 Box 7900 Forward 8200 Polygon
7600 Edge 8000 Ink 8300 Rotate
7700 Circle 8100 Move 8400 Screen

9000 Tortoise. This breaks the program into instructions, and then uses Decode to obtain parameters. It then calls the relevant routine.

9200 Initialisation. This sets up all the variables to their starting values.

Here is a list of all the variables used:

v() Holds all the parameters of current instruction
s\$ Holds the Tortoise program
tort Address of Tortoise routine (9000)
x,y Last plotted position

xi,yi x and y increment, altered by Rotate

oldxi,oldyi Direction in radians
rad,oldrad Length of side of polygon
length Angle between sides of polygon
angle Loop counts
i,a From, to, step in For-Next loop
x1,x2,x3 Pointer for s\$
pt Index for v()
vi Segment of s\$
ls Command letter

Here are some programs to be run in the interaction routine. The three numbers above each line represent the start, end and step for each loop.

- (1) 1,72,1
"m128,88:f72:r-5:"
- (2) 1,109,1
"m200-a:f55:r-5:"
- (3) 1,43,1
"fa*2:r90:ca:"
- (4) 3,100,1
"fa:r70:"
- (5) 3,76,1
"fa*2:r123:"
- (6) 1,201,1
"fa:r177:"
- (7) 3,11,1
"m100,0:pa,150,0:"
- (8) 1,112,1
"fa:c4:r80:"

Note that you will have to re-centre the last plotted position each time you run one of the above.

WINDOW ON ANOTHER WORLD



NEW RELEASES FOR DRAGON 32

FRANKLIN'S TOMB

Franklin's Tomb is an adventure for one player. Can you, as Dan Diamond, solve the riddle of the crypt, or will you fall prey to its mystery as so many others before you. Franklin's Tomb comes complete with a 20 page fully illustrated case file.

£9.95

EVEREST

Nestled on the border between Tibet and Nepal, the highest mountain in the world, Everest, Goddess Mother of the world, towers five and a half miles above sea level. In 1953, Sir Edmund Hilary and Sherpa Tenzing Norgay were the first men to conquer the unconquerable. Now you have the chance to scale the summit of Everest, Lhotse or Nuptse. Will your attempt end in tragedy, or will your name live forever in the annals of mountaineering history.

£7.95

GRIDRUNNER

By the year 2190 the Earth is a barren and desolate wasteland. With all natural resources used up, the human race's hopes rest with a huge orbiting solar power station known as GRID. Now the GRID has been invaded by a race of evil droids from Frogfax V, intent on the total subjugation of Earth. To combat these droids, an incredibly powerful and manoeuvrable ship, the Gridrunner, was developed. Your mission: stop the droids and save the Earth! Gridrunner is an arcade game requiring 1 joystick.

£7.95

DRAGON 32 and TANDY 32K (please specify): Dragon Trek £9.95. Salamander Graphics System £9.95. Wizard War £7.95. Golf £7.97. Grand Prix £7.95. Vulcan Noughts & Crosses £7.95. Games Comp D1 £7.95. Super Skill Hangman £7.95. Nightflight £7.95. Star Jammer £7.95. Franklin's Tomb £9.95. Everest £7.95. Gridrunner £7.95.

BBC MODEL B:

Dragon Rider £7.95. Tanks! £7.95. Games Comp B1 £6.95. Games Comp B3 £6.95. EDG Graphics (tape) £24.95. EDG Graphics (disc) £29.95.

ORIC 1:

Oric Trek £9.95. Games Group 01 £7.95.

NOW AVAILABLE AT MAJOR BRANCHES OF:



and



Mail Order (add 50p p&p) and Catalogues (send SAE) from:
Dept B, SALAMANDER SOFTWARE, 27 Ditchling Rise,
Brighton, East Sussex BN1 4QL. Tel: 0273 771942.

Salamander Software

BBC SQUEEZE

Rem statements, variable names, spaces and lines waste space in your programs. Fintan Culwin piles on the pressure.

THE PROGRAM presented in this article contains four methods of saving space. First, it removes Rem statements; second, it renames all variables and reduces function names to optimised two-character codes — this procedure is known as re-variable — third, it removes all spaces and fourth, it backs up lines.

As it is similar to using a compiler I will borrow the terminology for the rest of this article. The programs that do the compacting I will call the compactor. The program to be compacted will be called the source program and the compacted program produced will be called the object code. Where a variable name is discussed it also means string, floating and integer names and arrays. Where a procedure name is referred to it applies to procedures and functions equally.

The main program is given in listing 1; it requires the machine-code routine produced by listing 2 to be loaded into the machine before the line-pack section is called. There are various places in memory that the code can be loaded into. The most useful place is below Himem for mode 7. But it can be relocated by changing the value of P% in listing 2; this is catered for in the main program's initialisation section.

The most suitable source files for the compactor will be those with large amounts of screen memory. The compactor program itself occupies about 11K in source form and around 6K after it itself has been compacted.

It should, in its compacted form, run easily in 16K.

The procedure is first to load the source program. Then reset Page above it by typing
PAGE=PAGE+256

then Load and Run the compactor program. The compactor asks if the machine-code routine needs to be loaded and, if so, asks where it is to be loaded and then * Loads it. If the source file does not extend beyond &4000 there should be enough space for the compactor program to run. If there is not enough space, then there are two possibilities.

Firstly, the source program can be loaded from a lower address. Page can be reset downward before loading the source program. It is important to remember that 0D00 is not used; 0C00 is the user-defined graphics; 0B00 is the user key definitions and 0900 is the 242 buffer.

To accommodate this the compactor program prompts for the start address of the Basic program to be input. If this is still not enough for your source program, the compactor itself can be split up. Each of the major sections is complete in itself and draws on some of the utility functions included in the utilities section. This is made clear in the program listing.

After the compactor program has been run, it is wise to renumber the file before saving it as a normal Basic program. The object file is virtually unreadable and definitely uneditable so a copy of the source file should be retained

for any future development or maintenance.

In order for a program file to be successfully compacted it has to be prepared with the compactor in mind. The rules are:

1. No computed Gosubs or Gotos.
2. No variable names of two characters — three characters within the assembler — not including the terminal % or \$.
3. No two-character variable or procedure names.
4. No use of variable names that are identical with assembler mnemonics, LDA, STA and EOR.
5. A space in the assembler after every mnemonic including those that do not require an argument; NOP, ASL, CLC and so on.
6. Variables cannot be used in any * commands if the assembler is not being used then point 4 can be safely ignored.

It is necessary to explain how the Basic interpreter stores the program and organises its variables. Although the program is typed in and displayed as a sequence of ASCII characters, it is stored within the machine in a shorter form.

To achieve this, each Basic keyword is replaced by one or two tokens. These tokens have values greater than 123 (&7B) in order not to be confused with the other alphanumeric parts of the file. Each line of the Basic program is prefaced by four bytes.

The first of these is an end-of-line delineator (&0D). The following two bytes are the line number organised as two parts, high part and low part to the base 255. That is, the line number in decimal is 255 times the high part plus the low part. The last of the four characters is the line length in bytes, including the four-byte overhead, and has a maximum value of &EF (239).

There are a few other points worth noting. The way in which line numbers are referenced is not at all obvious. Referenced line numbers are the line numbers used in Goto and Gosub commands. These numbers are stored as a sequence of four bytes.

The first of these bytes is a token marker having the value

884 (132)

The following three bytes are the line number
(continued on page 125)

Listing 1. Main program.

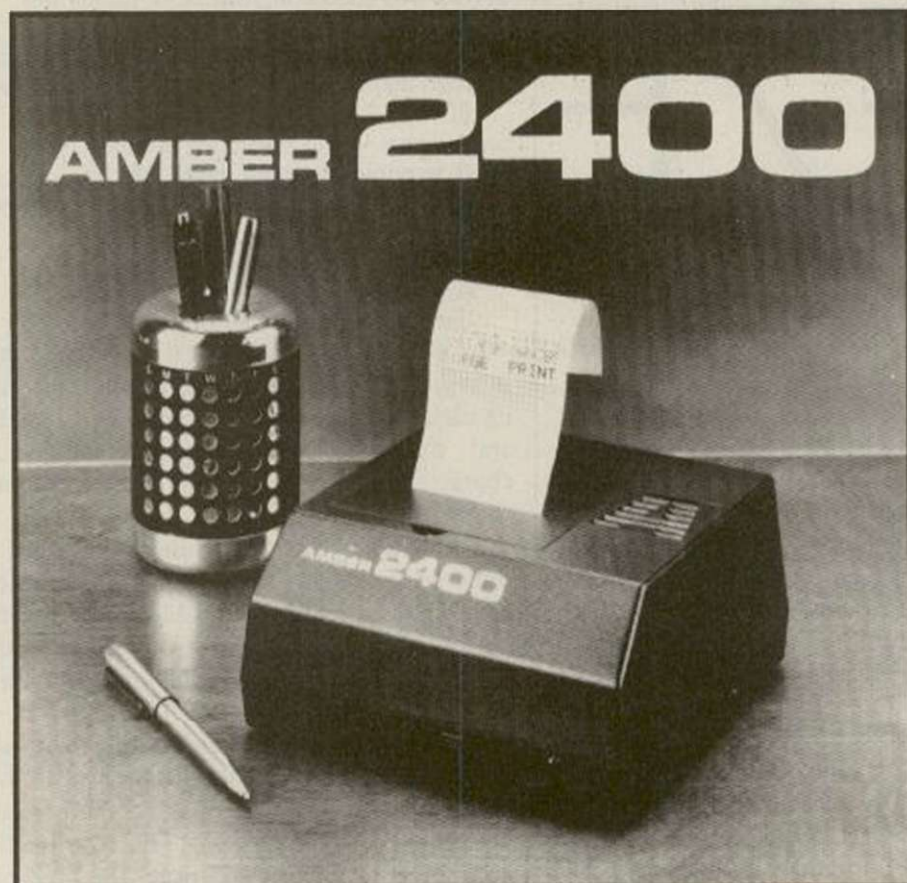
```

LIST
232 MODE 7
1010 PROC_INITIALISE
1020 PROC_CONTROL
1030 STOP
2000 DEF PROC_CONTROL
2010 PRINT " COMPLETE OPTION Y/N";RESPONSEX=FN_YES_NO
2020 IF RESPONSEX THEN PROC_MAX;ENDPROC
2030 PROC_DELAY(5);CLS
2040 PRINT "DEBUG ONLY Y/N";RESPONSEX=FN_YES_NO
2050 IF RESPONSEX THEN PROC_LITTLE_WINDOW;PROC_DE_REM(DE_BUGX);PROC_DOWN_COPY(
one_SPACE);PROC_BIG_WINDOW
2060 PROC_DELAY(5);CLS
2062 PRINT "DEREH ONLY Y/N";RESPONSEX=FN_YES_NO
2064 IF RESPONSEX THEN PROC_LITTLE_WINDOW;PROC_DE_REM(DE_REMX);PROC_DOWN_COPY(
one_SPACE);PROC_BIG_WINDOW
2066 PROC_DELAY(5);CLS
2070 PRINT "RE VARIABLE Y/N";RESPONSEX=FN_YES_NO
2080 IF RESPONSEX THEN PROC_LITTLE_WINDOW;PROC_RE_VARIABLE;PROC_DOWN_COPY(ALL_0
UTX);PROC_BIG_WINDOW
2090 PROC_DELAY(5);CLS
2100 PRINT "LINE PACK Y/N";RESPONSEX=FN_YES_NO
2110 IF RESPONSEX THEN PROC_LITTLE_WINDOW;PROC_LINE_PACK;PROC_DOWN_COPY(ALL_0
UTX);PROC_BIG_WINDOW
2120 PROC_DOWN_COPY(FINISHX)
2130 ENDPROC
3000 DEF PROC_INITIALISE
3010 FOR NX=0 TO 1:PRINTTAB(10,NX):CHR$(141)+"COMPACTOR";PRINTTAB(10,NX+2):CHR$
(141)+"EEEEEEEEE";NEXT
3020 PROC_BIG_WINDOW
3030 PRINT "LOAD MACHINE CODE SECTION Y/N "
3040 RESPONSEX=FN_YES_NO;IF RESPONSEX THEN PROC_CODE_LOAD
3050 PROC_DELAY(5);CLS
3060 INPUT "ENTER START ADDRESS OF " "THE SOURCE FILE &ADDRESS#
3070 ADDRESS#="&"+ADDRESS#;START_ADDRESS# = EVAL(ADDRESS#)
3080 PROC_DELAY(5);CLS
3100 REM
3110 REM SPECIAL VALUED SECTION
3111 VDU 7
3120 DIM STRING_ARRAY$(2)
3130 FOR COUNT#0 TO 2:STRING_ARRAY$(COUNT)=55;NEXT
3140 DE_BUGX=2
3150 VDU7
3160 DE_REMX=0
3170 ALL_OUTX=0
3180 FINISHX=1
3190 one_SPACE#2
3200 PROCX=0
3210 FUNCX=1
3220 FLOATINGX=2
3230 INTEGERX=3
3240 STRINGX=4
3250 DEBUG#="DEBUG"
3260 VARIABLE_LENGTHX=3
3270 ENDPROC
4000 DEF PROC_BIG_WINDOW:VDU 28,0,25,39,5: ENDPROC
4010 DEF PROC_LITTLE_WINDOW:VDU 28,0,20,39,18: ENDPROC
4020 DEF PROC_DELAY(FACTORX);ENDPROC:FOR NX=1 TO 2:(PRINTTAB(15):CHR$(141)+CHR$(
136)+"PLEASE WAIT";NEXT
4030 TIME#0:REPEAT:UNTIL TIME>100*FACTORX:ENDPROC
4040 DEF FN_YES_NO
4050 LOCAL RESPONSEX:REPEAT:RESPONSEX=BET OR 820:UNTIL RESPONSEX=121:DN:RES
PONSEX=110
4060 IF RESPONSEX=121 THEN =TRUE ELSE =FALSE
4070 DEF PROC_CODE_LOAD
4080 PRINT "LOAD BELOW HIMEM Y/N";RESPONSEX=FN_YES_NO
4090 IF RESPONSEX THEN HIMEM#HIMEM-150;HZ#HIMEM;GOTO 4110
4100 INPUT "ENTER LOAD/EXECUTION ADDRESS &ADDRESS#;ADDRESS#="&"+ADDRESS#;HZ#E
VAL(ADDRESS#)
4110 PRINT CHR$(136)+"MAKE SURE YOU LOAD CORRECT TAPE "
4120 *OPT 1,2
4130 PROC_LITTLE_WINDOW
4140 *LO.
4160 PROC_BIG_WINDOW;CLS
4170 ENDPROC
4500 DEF PROC_MA
4510 PROC_LITTLE_WINDOW
4520 PROC_DE_REM_DE_REMX
4530 PROC_DE_REM_DE_BUGX
4540 PROC_RE_VARIABLE
4550 PROC_DOWN_COPY(ALL_OUTX)
4560 PROC_LINE_PACK
4570 PROC_DOWN_COPY(FINISHX)
4575 PROC_BIG_WINDOW
4580 ENDPROC

```

(listing continued on page 125)

PRINT OUT



AMBER 2400 MATRIX PRINTER

LOW RUNNING COST USING
PLAIN PAPER
USED WITH MANY COMPUTERS
INCLUDING BBC, UK101, ATOM,
DRAGON, NEWBRAIN, ATARI,

£ 78

+VAT & £2.95 P&P
Or for details send a
large SAE to:

LETHABY NUMBERING SYSTEMS LTD.

Central Way
Walworth Industrial Estate
Andover
Hampshire SP10 5AL

hi-tech

presents

LOCK NESS MONSTER

FOR THE 48K SPECTRUM £5.50 EACH.

For years now the legend of the Loch Ness Monster has existed, but until now no-one has been able to prove whether the Loch Ness Monster exists or not. We have changed all that.

In the deepest, darkest, dirtiest, smelliest piece of the Loch we have unearthed not one but a whole clan of monsters.

They are not shy and recusive as the legend tells us but hungry. Your job is to go in and clear the loch of these monsters but beware their favourite food is little boats with brave explorers in.

100% Machine code, full colour graphics, full on screen instructions, with musical sound. A exciting and challenging game for all the family.

DRAGON and ORIC owners do not despair a version for your machine is coming soon!!! (Please phone for details)

Our range of programs for the Jupiter Ace are still available S.A.E. for details.

SOFTWARE AUTHORS is your worm getting world wide distribution? If not send your latest masterpiece to us on cassette + S.A.E. for a quick evaluation.

Trade/Export enquiries welcome: phone "ANGIE" on 0304-821495 for details of our amazing dealer discounts

Please send me:

- Details of your range of programs for the Jupiter Ace (Please enclose S.A.E.)
 Loch Ness Monster. (I enclose a cheque/PO for £6.00 inc 50p post and packing)

NAME _____

ADDRESS _____

Postcode _____

hi-tech
microsoft

FREEPOST, WHITFIELD, DOVER KENT
TEL: 0304 821495

Cheques/PO payable to: Hitech Microsoft

NEW LOW PRICES FROM EconoTech!

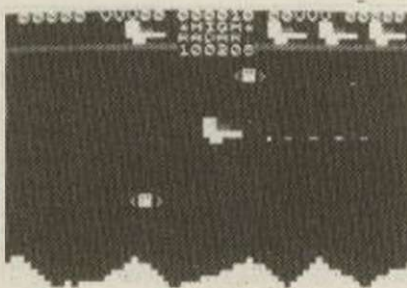
16K RAM Pack for ZX81

— fully assembled, tested and guaranteed — extra snug fit to eliminate wobble! Thousands in use world-wide!

Only £17.50



PLUS!



STAR DEFENCE (16K) with unique "Fast Loading" feature — loads in under a minute! Fast moving arcade game — use laser and smart bombs to destroy waves of attacking aliens! Only £4.95

Buy both for just £21.45 — unbeatable value!

All prices include VAT and p & p.

Send for details of other software available.

To: EconoTech, 30 Brockenhurst Way, London SW16 4UD

Please send me

Cheque/PO/MO enclosed for £

Name

Address

(continued from page 123)

itself coded from two into three bytes. Acorn gives two reasons for this. Firstly, the coding avoids any confusion between line codes and tokens. Secondly, the coding allows for a rapid renumbering algorithm to be used. The decoding algorithm is:

Assembler	Basic
LDA BYTE1	TEMP% = ?BYTE1%
ASL A	TEMP% = TEMP% * 4
ASL A	FACTOR% = TEMP% AND α10
STA TEMP	LOW% = FACTOR% EOR?BYTE2%
AWD #&C0	TEMP% = TEMP% * 4
EOR BYTE2	
STA LOW	HIGH% = TEMP% EOR ?BYTE3%
LDA TEMP	LINE NUMBER = 255*HIGH% + LOW%
ASL A	
ASL A	
EOR BYTE3	
STA HIGH	

where bytes 1, 2 and 3 are the three locations following the &84 token. The method by which the variables are stored is a consideration to minimise the execution time of a Basic program.

The resident integer variables are always stored in locations &0400 (@%) to &047C (Z%). Other variables are identified by using their initial character as a pointer to an entry address lying in the range &0480 to &04F5. Each of these entry points indicates the location of the value of the first variable — the text of the variable name — having that initial letter.

It also contains a pointer to the next value and a further value. To look up the value of a variable, the interpreter uses the initial character to find the first name, attempts to match the names and carries on down the list until the variable is matched, or the end of the list is encountered.

The program commences its run by asking if the machine-code routine is installed and, if

not, where to load it. If the source file does not occupy space below &E00, then it is probably wisest to load the Page &0D00 where it is safe against an accidental mode change or hard reset. If this is not possible, then it can be loaded below Himen for mode 7, but it will be lost if a change of mode or a hard reset is made. The program then asks if you wish to use all the options. If you do not, then all the sections are presented separately.

The first of these is the de-Rem option which merely removes Rem statements where they occur. But if the first word after the Rem is "debug" it will remove the whole line. This is followed by a down-copy option which leaves one space only between statements. This option is useful for the development of programs where some sections or lines are left in for de-bug purposes only.

The re-variable option, which renames all variables and procedures which are above the minimal length, follows. The down-packing

(continued on page 127)

Listing 1 continued from page 123.

```
5000DEFPROC DE_REM(OPTION%)
5010 LOCAL SYMBOL%,FLAG%,ADDRESS%,ASSEMBLER%
5015 PRINT "DE REMMING option _;: IF OPTION%<DE_DEBUG THEN PRINT " DE debugging"
ELSE PRINT "DE reming"
5020FLAG%<FALSE
5030 ASSEMBLER%<FALSE
5040ADDRESS%<START_ADDRESS%
5050REPEAT
5060ADDRESS%<ADDRESS%+4
5070 REPEAT
5080 SYMBOL%<?ADDRESS%
5090 IF SYMBOL%<8D THEN ADDRESS%<ADDRESS%+3
5100 IF SYMBOL%<34 THEN ADDRESS%<FN_ENDQUOTES(ADDRESS%,FALSE)
5110 IF SYMBOL%<F4 THEN ADDRESS%<FN_CRUNCH(OPTION%,ADDRESS%)
5120 IF SYMBOL%<93 OR SYMBOL%<91 THEN ASSEMBLER%<NOT ASSEMBLER%
5130 IF SYMBOL%<92 AND ASSEMBLER% THEN ADDRESS%<FN_CRUNCH(OPTION%,ADDRESS%)

5140 ADDRESS%<ADDRESS%+1
5150 UNTIL ?(ADDRESS%)<8D
5160 UNTIL ?(ADDRESS%+1)<8FF
5170 ENDPROC
5280 = NOT THIS LINE%
5300 DEFFN REM_CRUNCH(OPTION%,ADDRESS%)
5310 IF DEBUG%<FN_GET_STRING(ADDRESS%) THEN option%<TRUE ELSE option%<FALSE
5320 IF option% AND OPTION%<DE_DEBUG THEN ADDRESS%<FN_START_LINE(ADDRESS%);ADRES
5330 FN_END_LINE(ADDRESS%);GOTO 5340
5340 =ADDRESS%
5400 DEFFN END_LINE(ADDRESS%)
5410 LOCAL SYMBOL%
5420 REPEAT
5430 SYMBOL%<?ADDRESS%
5440 ?ADDRESS%<32
5450 ADDRESS%<ADDRESS%+1
5460 UNTIL ?ADDRESS%<80E
5470 =ADDRESS%-1
5500 DEFFN START_LINE(ADDRESS%)
5510 REPEAT
5520 ADDRESS%<ADDRESS%-1
5530 UNTIL ?ADDRESS%<80D
5540 =ADDRESS%
5600 DEFFN NOT_SPACE(ADDRESS%)
5610 REPEAT
5620 ADDRESS%<ADDRESS%+1
5630 UNTIL ?ADDRESS%<32
5640 =ADDRESS%
10000 DEF PROC RE_VARIABLE
10010 LOCAL ASSEMBLER%;ASSEMBLER%<FALSE
10020 ADDRESS%<START_ADDRESS%
10030 REPEAT
10040 ADDRESS%<ADDRESS%+4
10050 REPEAT
10060 ADDRESS%<FN_Q_STAR(ADDRESS%)
10070 IF ?ADDRESS%<7B AND FN_START_CHR(?ADDRESS%) THEN ADDRESS%<FN_ONE_VAR(ADDR
ESS%)
10080 IF ?ADDRESS%<34 OR ?ADDRESS%<F4 THEN ADDRESS%<FN_ENDQUOTES(ADDRESS%,ASSEM
BLER%)
10090 IF ?ADDRESS%<92 AND VARIABLE_LENGTH%<4 THEN ADDRESS%<FN_ENDQUOTES(ADDRESS%
)
10100 IF ?ADDRESS%<8D THEN ADDRESS%<ADDRESS%+3
10110 IF ?ADDRESS%<3B THEN ADDRESS%<FN_HEX(ADDRESS%)
10120 IF ?ADDRESS%<91 THEN VARIABLE_LENGTH%<4
10130 IF ?ADDRESS%<93 THEN VARIABLE_LENGTH%<3
10140 IF ?ADDRESS%<91 OR ?ADDRESS%<93 THEN ASSEMBLER%<NOT ASSEMBLER%
10150 ADDRESS%<ADDRESS%+1
10160 UNTIL ?ADDRESS%<80E
10170 UNTIL ?(ADDRESS%+1)<8FF
10180 ENDPROC
10200 DEF FN_ONE_VAR(ADDRESS%)
10210 LOCAL TEST%,SYMBOL%,count%
10220 TEST%<CHR(?ADDRESS%)
10230 TYPE%<FN_LOOK_BACK(ADDRESS%)
10240 count%<1
10250 REPEAT
10260 SYMBOL%<?(ADDRESS%+count%)
10270 IF FN_VAL_CHR(SYMBOL%) THEN TEST%<TEST%+CHR(SYMBOL%)
10280 count%<count%+1
10290 UNTIL NOT FN_VAL_CHR(SYMBOL%)
10300 length%<LEN(TEST%)
10310 IF TYPE%<5 THEN TYPE%<FN_TYPE_VAR(TEST%)
10320 IF TYPE%<FLOATING% THEN length%<length%-1
10330 IF VARIABLE_LENGTH%<4 AND length%<3 THEN ?(ADDRESS%+3)<0
10340 IF length%< VARIABLE_LENGTH% THEN 10380
10350 REPLACE%<FN_MAKE_STRING(TYPE%)
10360 PRINT "REPLACING " ;TEST% ; " WITH " ;REPLACE%
10365 IF TYPE%<PROK% THEN PRINT "PROC " ELSE IF TYPE%<FNK% THEN PRINT " FUNCTIO
N " ELSE IF TYPE%<FLOATING% THEN PRINT " FLOATING " ELSE IF TYPE%<integer% THE
N PRINT " INTEGER " ELSE PRINT " STRING "
10370 PROC_REPLACE(TEST%,REPLACE%,ADDRESS%)
10380 =ADDRESS%+count%-1
10400DEFPROC_REPLACE(oid#,new#,ADDRESS%)
10410 LOCAL MARK%,ASSEMBLER%
10420 MARK%<FALSE
10430 IF VARIABLE_LENGTH%<3 THEN ASSEMBLER%<FALSE ELSE ASSEMBLER%<TRUE
10440 IF TYPE%<FLOATING% THEN REPEAT ADDRESS%<ADDRESS%-1 UNTIL ?ADDRESS%<8A4 OR
?ADDRESS%<8F2
10450REPEAT
10460 SYMBOL%<?ADDRESS%
10470 IF SYMBOL%<91 OR SYMBOL%<93 THEN ASSEMBLER%<NOT ASSEMBLER%
10480IF FN_START_CHR(SYMBOL%) AND TYPE%<FNK% THEN ADDRESS%<FN_TEST_STRING(ADDRESS%
)
10490 IF SYMBOL%<8A4 AND TYPE%<FNK% THENADDRESS%<FN_TEST_STRING(ADDRESS%+1)
10500 IF SYMBOL%<8F2 AND TYPE%<PROK% THENADDRESS%<FN_TEST_STRING(ADDRESS%+1)
10510IF SYMBOL%<34 OR SYMBOL%<F4 THEN ADDRESS%<FN_ENDQUOTES(ADDRESS%,ASSEMBLER%
)
10520 IF SYMBOL%<92 AND ASSEMBLER% THEN ADDRESS%<FN_ENDQUOTES(ADDRESS%,ASSEMBLER%
)
10530IF SYMBOL%<8D THEN ADDRESS%<ADDRESS%+3
10540 IF SYMBOL%<3B THEN ADDRESS%<FN_HEX(ADDRESS%)
10550 ADDRESS%<ADDRESS%+1
10560 IF SYMBOL%<8D THEN IF ?ADDRESS%<8FF MARK%<TRUE
10570 IF SYMBOL%<8D THEN ADDRESS%<ADDRESS%+3 ;ADDRESS%<FN_Q_STAR(ADDRESS%)
10580UNTIL MARK%
10590 ENDPROC
10700DEF PROC REP(ADDRESS%,oid#,new%)
10710 IF ASSEMBLER% THEN new%<new%+CHR(0)
10720 #ADDRESS%<new%
10730 FOR NX%<1 TO LEN(oid#)-LEN(new%)
10740 ?(ADDRESS%+LEN(new%)+(NX%-1))<32
10750NEXT
10760 ENDPROC
10900 DEF FN_MAKE_STRING(IND%)
10910 LOCAL IND%;TEST%
10920 IF IND%<integer% THEN IND%<" "; ELSE IF IND%<STRING% THEN IND%<" " ELSE IN
D%<" "
10930 IF IND%<= FLOATING% THEN IND%<FLOATING%
10940 number%<STRING_ARRAY%(IND%)
10950 STRING_ARRAY%(IND%)<STRING_ARRAY%(IND%)+1 ; IF STRING_ARRAY%(IND%) MOD
54 = 0 THEN 10955
10960 FIRST_CHR%<number% MOD 54
10970 SECOND_CHR%<number% DIV 54
10980 FIRST_CHR%<FN_MAKE_CHR(FIRST_CHR%)
10990 SECOND_CHR%<FN_MAKE_CHR(SECOND_CHR%)
11000 TEST%<FIRST_CHR%+SECOND_CHR%
11010 IF INSTR("NIFLNONORPITO",TEST%)<1 THEN TEST%<FN_MAKE_STRING(FLOATING%)
11020 =TEST%+IND%
11100 DEF FN_MAKE_CHR(number%)
11110 IF number%<27 THEN= CHR%(64+number%)
11120 =CHR%(94+(number%-26))
11200 DEFFN TEST_STRING(ADDRESS%)
11210 LOCAL TEST%: TEST%<FN_GET_STRING(ADDRESS%-1)
11220 IF TEST%<oid# THEN PROC_REPLACE(ADDRESS%,oid#,new%)
11230 = ADDRESS%+LEN(TEST%)-1
11240
11250 DEF FN_HEX(ADDRESS%)
11260 REPEAT
11270 ADDRESS%<ADDRESS%+1
11280 UNTIL NOT =N_VAL_CHR(?ADDRESS%)
11290 =ADDRESS%-1
11300 DEF FN_LOOK_BACK(ADDRESS%)
11310 REPEAT
11320 ADDRESS%<ADDRESS%-1
11330 UNTIL ?(ADDRESS%)<32
11340 IF ?ADDRESS%<8A4 THEN = FNK% ELSE IF ?ADDRESS%<= 8F2 THEN = PROK% ELSE = 5
11350 DEF FN_TYPE_VAR(TEST%)
11360 LOCAL right%: right%<RIGHT%(TEST%,1)
11370 IF right%<" " THEN = integer%
11380 IF right%<" " THEN = STRING%
11390 = FLOATING%
15000DEFPROC LINE_PACK
15010LOCAL ADDRESS%,O_K%,CHR_COUNT%,CHR_COUNT_LOC%,LAST_LINE%,THIS_LENGTH%
15020 CHR_COUNT%<FN_Q_STAR(START_ADDRESS%); IF CHR_COUNT%<START_ADDRESS% THEN LAS
T_LINE%<FALSE ELSE THEN LAST_LINE%<TRUE
15030ADDRESS%<FN_NEXT_LINE(START_ADDRESS%)
15040CHR_COUNT%<?(START_ADDRESS%+3); CHR_COUNT_LOC%<START_ADDRESS%+3; THIS_LENGTH%
<?(ADDRESS%+3)
15050REPEAT
15060O_K%<FN_OK_LINE(ADDRESS%)
15061 IF NOT O_K% THEN PRINT "BREAKING "
15070IF O_K% THEN CHR_COUNT%<CHR_COUNT%+THIS_LENGTH%-3 ;(ADDRESS%<820202020;
?(ADDRESS%+3)<82); ?ADDRESS%<8B
15080 IF NOT O_K% THEN ?CHR_COUNT_LOC%<CHR_COUNT%; CHR_COUNT%<?(ADDRESS%+3); CHR_C
OUNT_LOC%<ADDRESS%+3
15090 ADDRESS%<ADDRESS%+THIS_LENGTH%; THIS_LENGTH%<?(ADDRESS%+3)
15095 PRINT "LINE NUMBER " ;255*?(ADDRESS%+1)+?(ADDRESS%+2)
15100 UNTIL ?(ADDRESS%+1)<8FF
15105 ?CHR_COUNT_LOC%<CHR_COUNT%
15110 ENDPROC
15200DEF FN_OK_LINE(ADDRESS%)
15210LOCAL TEST%,THIS_LINE%
15220 THIS_LINE%<FALSE
15225 IF LAST_LINE% THEN THIS_LINE%<TRUE; LAST_LINE%<FALSE
15230IF ?(ADDRESS%+4)<42 THEN THIS_LINE%<TRUE;LAST_LINE%<TRUE
15235 IF ?(ADDRESS%+4)<8D THEN THIS_LINE%<TRUE
15240IF NOT THIS_LINE% AND (CHR_COUNT%<?(ADDRESS%+3)>230) THEN THIS_LINE%<TRUE
15250 TEST%<FN_LOOK_IF(ADDRESS%)
15255 IF TEST% THEN LAST_LINE%<TRUE
15270 IF NOT THIS_LINE% THEN THIS_LINE%<FN_LINE_REF(ADDRESS%)
15280 = NOT THIS_LINE%
15300 DEF FN_LOOK_IF(ADDRESS%)
15310 LOCAL FOUND%,count%

```

(listing continued on page 127)

KRAZY KONG

An E-XPANDED screen, large graphics, rolling barrels, hammer fireballs, lifts, handbags and umbrellas as you try to rescue the damsel Kong has abducted. Spectacular collapse of Kong's lair in the fourth screen. Uses all 21K of your expanded Vic for this 100% M/C thriller. Complete with high score table.

KB/JS VIC 20 16K £7.90

MINI-KONG

For UNEXP from the writer of Krazy Kong comes the equally brilliant Mini-Kong. You will wonder how he managed to cram so much in the unexpanded VIC. Brilliant multi-colour graphics, expanded screen, lift, rolling barrels, ladders, running score/Hi-score and not to forget the hand bag bonus in this all M/C presentation.

K.B./J.S. VIC 20 UNEXP £5.95

XENO II

An E-XPANDED-D screen presentation with superb action packed space thriller, written entirely in machine code with four action packed stages. To destroy the power source of Xeno II, you have to fight off waves of robot attack, plasma bombing by the legions of the outer sanctum and finally attack the power source protected by a force field, continuous bombardment by guardians and blocking by wild whirling suicidal space ships. Truly a game for all arcadians.

JS VIC 20 16K £7.90

3D TIME TREK

At last a 3D game for the VIC! Although badly wounded, you are determined to seek and destroy the marauding space pirates who have now dispersed around the galaxy in search of fresh prey. A brilliant Startrek game with a difference — spectacular 3D graphics and real arcade actions.

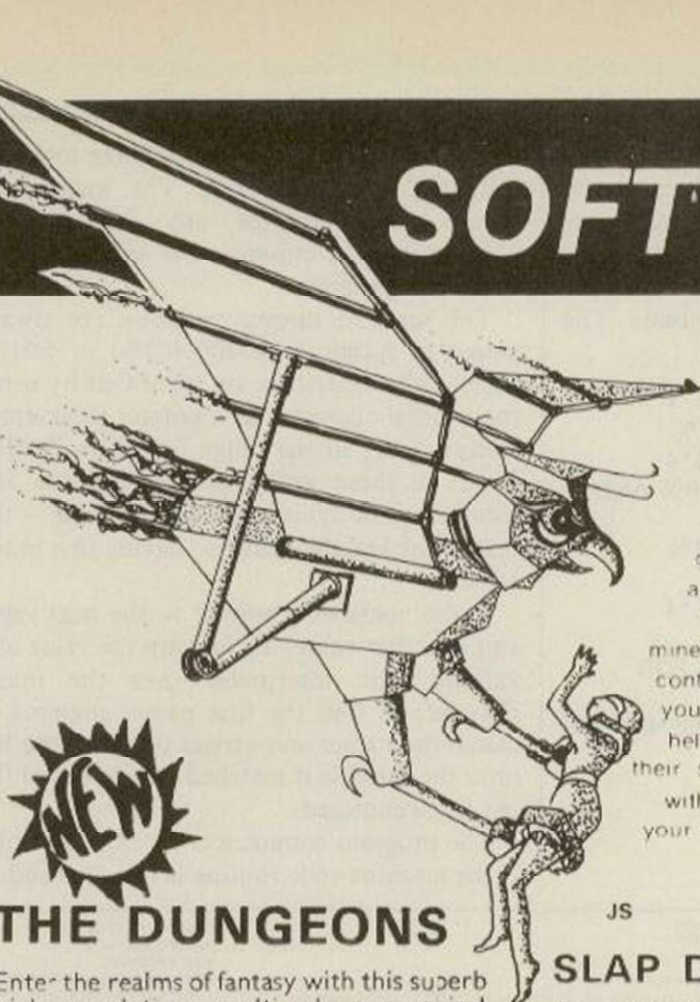
JS VIC 20 16K £5.95

JS COMMODORE 64 £5.95

ZOK'S KINGDOM

Your starcruiser badly damaged in a meteor storm is forced to crash land on the planet ruled by ZOK, a time-space generated image of Dracula. You are challenged to a battle of wits and endurance as the battle for survival starts in earnest in this big multi-screen graphical adventure in hi-res graphics and M/C movements.

KB/JS VIC 20 16K £5.95



THE DUNGEONS

Enter the realms of fantasy with this superb high resolution, multi-colour graphical text adventure. Choose your role as a fighter with armour or a magician with spells to do battle with the fearfull fire breathing RED DRAGON and many other horrific monsters in THE DUNGEONS with 100 rooms, many with ingenious traps. First of the text adventures that will keep you enthralled and frustrated for a very long time if you use the fast save facility or give up and have a new adventure.

K.B. VIC 20 16K £5.95

FROGRUN

Popular arcade game. All machine code with brilliant colour graphics and sound effect. Features include snakes, crocodiles, ladyfrogs, turtles, cars, lorries and logs.

KB/JS VIC 20 Unexp. £5.95

KB/JS SPECTRUM 16K/48K £4.95

KB/JS COMMODORE 64 £5.95

DOTMAN

Ghosts chase you as you try to eat the dots and collect points. You can turn the tables on them by eating the pills. Don't forget the ghosts have been given intelligence and will try to corner you. This feature makes Dotman exciting and challenging. All M/C game complete with running and highest scores and tunnels.

JS/KB VIC 20 Unexp. £5.95

CAVERN FIGHTER

All M/C version of SCRAMBLE

KB/JS VIC 20 Unexp. £5.95

GALACTIC ABDUCTORS

A stunning action packed game which uses all of your TV screen for the superb large animated graphics. Giant Space Hawks whirl and weave in intricate patterns as they drop their deadly homing mines which will destroy your base on contact. While you are busy defending yourself, the Hawks will feed on your helpless population, returning only their skulls. All M/C game complete with high score table that will blow your mind with its graphics and sound effects.

JS VIC 20 16K £7.90

SLAP DAB

An exciting game based on the arcade game PAINTER which combines fast action with strategy. Giant insects hiding under the old paint surface are released by your paint brush. You require fast action and quick thinking to outwit them and finish the panel. The game is 100 percent machine code and HI-RES, graphics also includes HI-score and running score with brilliant sound effects.

KB/JS VIC 20 UNEXP £5.95

KB/JS SPECTRUM 16K/48K £7.95

TINY TOT'S SEVEN

Super games pack for younger children with bright colour graphics and sound effects. Everybody's favourite Simon plus Super Snap, O's and X's, Word Jumble, Bomber, Duck Shoot and Mad Drivers.

KB SPECTRUM 16K/48K £4.95

KB VIC 20 Unexp. £5.95

PHARAOH'S TOMB

Once you enter, the only way out is with the aid of a key which unlocks the mystery of the Pharaoh's tomb. Beware of the mantraps the ancient Egyptians so painstakingly built. One false move and you will meet the same fate as befell other tomb robbers over thousands of years. A multi-screen big graphical adventure with M/C movements.

KB VIC 20 16K £5.95

CRAWLER

All M/C version of Centipede.

JS VIC 20 Unexp. £5.95

Also available now

computers

COMMODORE - BBC - SPECTRUM - DRAGON 32
ORIC - Disc Drives - Printers Memory Add ons
and the best selection of software and books
8 HIGH STREET, HORLEY, SURREY.
29 WEST HILL, DARTFORD, KENT.

TRADE ENQUIRIES WELCOME, GENEROUS DISCOUNT

24 HR. CREDIT CARD SALES HORLEY (02934) 6083
PAYMENT BY CHEQUE, P.O., ACCESS/VISA
ANIROG SOFTWARE
8 HIGH STREET
HORLEY, SURREY

Overseas 50p post & packaging

(continued from page 125)

option following does not allow any spaces to be left in the program. If the line-packing option is not chosen following this, then

PROC-DOWN-COPY (FINISH%)

should be entered from the keyboard after the program has finished. If the assembler is involved in the source program. The final option presented is to pack lines together. If this option is chosen then the machine-code routine must be installed in the computer.

The first of the working sections is de-Rem - Option%. The option is either to debug or de-Rem as already explained. The section proceeds by initialising a local variable address% to the Start address and then stepping through the whole of the source file in two repeat-until loops. The inner loop steps through each line and terminates when the end of file marker - &00 followed by &FF - is found.

Within each line the address is incremented,

skipping three positions if a reference line number token (&84) is found; and to the end of quotes, if a quote symbol (&22) ASCII 34 is found. If the line detects the Rem token (&F4) then, depending on the option, either the rest of the line is replaced with spaces, or the whole line is replaced with spaces. This is done by

FN-REM-CRUNCH

which uses FN-Get-String to examine the first
(continued on page 129)

Listing 1 continued from page 125.

```

15320 ADDRESS% = ADDRESS% + 3; count% = 3
15330 REPEAT
15340 IF ?ADDRESS% = &E7 OR ?ADDRESS% = &F4 THEN FOUND% = TRUE
15370 IF ?ADDRESS% = &BD THEN ADDRESS% = ADDRESS% + 3
15380 ADDRESS% = ADDRESS% + 1; count% = count% + 1
15390 UNTIL count% = THIS_LINE%
15410 = FOUND%
15500 DEF FN_LINE_REF (ADDRESS%)
15510 LOCAL Line_NUM%
15520 Line_NUM% = 255 * ?(ADDRESS% + 1) + ?(ADDRESS% + 2)
15540 CALL FN_START_ADDRESS%, Line_NUM%
15550 IF ?&70 = &FF THEN = TRUE ELSE = FALSE
15600 DEF FN_NEXT_LINE (ADDRESS%)
15610 ADDRESS% = ADDRESS% + 4
15620 REPEAT
15630 IF ?ADDRESS% = &BD THEN ADDRESS% = ADDRESS% + 3
15640 ADDRESS% = ADDRESS% + 1
15650 UNTIL ?ADDRESS% = &00
15660 = ADDRESS%
20000 DEF PROC_DOWN_COPY (OPTION%)
20010 PRINT "STARTING DOWN COPY "
20020 IF OPTION% = ALL_OUT% THEN PRINT "ALL SPACES OUT " ELSE IF OPTION% = one_SPACE% THEN PRINT "ONE SPACE LEFT " ELSE PRINT "FINISHING "
20030 LOCAL ASSEMBLER%
20040 ASSEMBLER% = FALSE
20050 ADDRESS% = START_ADDRESS%
20060 FRONT_ADDRESS% = ADDRESS%
20070 REPEAT
20080 START_LINE% = ADDRESS%
20090 CHR_COUNT% = 0
20100 START_LINE% = FRONT_ADDRESS%
20110 FRONT_ADDRESS% = FRONT_ADDRESS% + 4
20120 ADDRESS% = ADDRESS% + 4
20130 REPEAT
20140 IF ?FRONT_ADDRESS% >= 32 THEN ?ADDRESS% = ?FRONT_ADDRESS% + ADDRESS% - ADDRESS% + 1; CHR_COUNT% = CHR_Count% + 1
20150 IF !(?ADDRESS% - 1) = &90 AND ?(ADDRESS% - 2) = &58 THEN ADDRESS% = ADDRESS% - 1; CHR_Count% = CHR_Count% - 1
20160 IF OPTION% = one_SPACE% AND ?FRONT_ADDRESS% = 32 AND NOT (? (ADDRESS% - 1) = 32) THEN ?ADDRESS% = ?FRONT_ADDRESS% + ADDRESS% - ADDRESS% + 1; CHR_Count% = CHR_Count% + 1
20170 IF ?FRONT_ADDRESS% = 91 OR ?FRONT_ADDRESS% = 93 THEN ASSEMBLER% = NOT ASSEMBLER%
20180 IF OPTION% = FINISH% AND ?(ADDRESS% - 1) = 0 THEN ?(ADDRESS% - 1) = 32
20190 IF ?FRONT_ADDRESS% = 34 OR ?FRONT_ADDRESS% = &F4 THEN PROC_STRING_COPY
20200 IF ?FRONT_ADDRESS% = 92 AND ASSEMBLER% THEN PROC_STRING_COPY
20210 FRONT_ADDRESS% = FRONT_ADDRESS% + 1
20220 UNTIL ?FRONT_ADDRESS% = &00

```

```

20230 ?(START_LINE% + 3) = CHR_Count% + 4
20240 IF CHR_Count% = 1 AND ?(ADDRESS% - 1) = &98 THEN ADDRESS% = START_LINE%
20250 IF CHR_Count% = 0 THEN ADDRESS% = START_LINE%
20260 UNTIL ?(FRONT_ADDRESS% + 1) = &FF
20270 ?ADDRESS% = &00; ?(ADDRESS% + 1) = &FF
20280 ENDPROC
20290
20300 DEF PROC_STRING_COPY
20310 LOCAL SYMBOL%
20320 FRONT_ADDRESS% = FRONT_ADDRESS% + 1
20330 REPEAT
20340 SYMBOL% = ?FRONT_ADDRESS%
20350 ?ADDRESS% = SYMBOL%
20360 FRONT_ADDRESS% = FRONT_ADDRESS% + 1
20370 ADDRESS% = ADDRESS% + 1
20380 CHR_Count% = CHR_Count% + 1
20390 UNTIL SYMBOL% = 34 OR SYMBOL% = &00
20400 FRONT_ADDRESS% = FRONT_ADDRESS% + 1
20410 IF SYMBOL% = &00 THEN FRONT_ADDRESS% = FRONT_ADDRESS% - 1; ADDRESS% = ADDRESS% - 1; CHR_Count% = CHR_Count% - 1
20420 ENDPROC
25000 DEF FN_ENDQUOTES (ADDRESS%, ASSEMBLER%)
25010 REPEAT
25020 ADDRESS% = ADDRESS% + 1
25030 UNTIL ?ADDRESS% = 34 OR ?ADDRESS% = &00 OR (ASSEMBLER% AND ?ADDRESS% = &58)
25040 = ADDRESS%
25100 DEF FN_START_CHR (SYMBOL%)
25110 IF (SYMBOL% >= 64 AND SYMBOL% <= 91) OR (SYMBOL% >= 94 AND SYMBOL% <= 123) THEN = TRUE ELSE = FALSE
25119 DEF FN_GET_STRING (ADDRESS%); ADDRESS% = ADDRESS% + 1
25120 LOCAL SYMBOL%, TEST% ; TEST% = ""
25130 IF ?ADDRESS% = 32 THEN ADDRESS% = FN_NOT_SPACE (ADDRESS%)
25140 REPEAT
25150 SYMBOL% = ?ADDRESS%
25160 TEST% = TEST% + CHR (SYMBOL%)
25170 ADDRESS% = ADDRESS% + 1
25180 UNTIL NOT FN_VAL_CHR (?ADDRESS%)
25190 = TEST%
25200 DEF FN_VAL_CHR (SYMBOL%)
25210 IF (FN_START_CHR (SYMBOL%) OR !SYMBOL% = 47 AND SYMBOL% = 58) OR SYMBOL% = 34 OR SYMBOL% = 37 THEN = TRUE ELSE = FALSE
25200 DEF FN_0_STAR (ADDRESS%)
25210 LOCAL O_ADDRESS% ; O_ADDRESS% = ADDRESS%
25220 IF ?ADDRESS% = 32 THEN ADDRESS% = FN_NOT_SPACE (ADDRESS%)
25230 IF ?ADDRESS% >= 42 THEN = O_ADDRESS%
25240 ADDRESS% = FN_ENDQUOTES (ADDRESS%, 1)
25250 = ADDRESS% + 4

```

ATTENTION All Games Programmers

If you can feed our
DRAGON we can make
Your Fortune

We urgently require top quality original games programmes, arcade or otherwise, for the

DRAGON 32

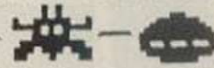
Whether you are young or old, experienced or new to the business, yours may be just the game we are looking for . . . and we will reward you by paying the highest royalties and featuring your work in our national advertising campaign and our latest games catalogue. Send your cassettes with full details and instructions for immediate appraisal to:-



7 WOODFALL, ASTLEY PARK
CHORLEY, LANCS, PR7 1XD.



TOP QUALITY
MACHINE-CODE
PROGRAMS



FOR THE
BBC
MICRO

FROGGER (32K)

Not just another version of Frogger . . . this is the proper high-quality version that you've been waiting for. Graphically brilliant, with gaping-mouthed crocodiles, diving turtles, and frogs that flex their legs as they jump along. Increasing difficulty, hi-score, responsive controls, sound effects, flies and bonus frogs.

£7.95 Cassette/£11.95 Disc

ROAD RUNNER (32K)

The only full feature machine-code version of the arcade game available for the B.B.C. micro. Features include: scrolling screen, radar display, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty and sound effects.

£7.95 Cassette/£11.95 Disc

GALAXIANS (32K)

Fast action version of the popular arcade game. 4 types of Galaxian (in 3 initial screen formations) swoop down individually or in groups of two or three. 6 skill levels, hi-score, rankings, bonus laser bases, increasing difficulty, superb graphics and sound.

£7.95 Cassette/£11.95 Disc

CENTIPEDE (32K)

Incredible arcade type game featuring mushrooms, flies, snails, spiders, and the centipedes of course. Excellent graphics and sound, 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more active and the mushrooms increase.

£7.95 Cassette/£11.95 Disc

FRUIT MACHINE (32K)

Probably the best fruit machine implementation on the markets. This program has it all . . . HOLD, NUDGE, GAMBLE, moving reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

£7.95 Cassette/£11.95 Disc

ALIEN DROPOUT (32K)

Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. Suitable for use with keyboard or joystick.

£7.95 Cassette/£11.95 Disc

INVADERS (32K)

Superior version of the old classic arcade game including a few extras. 48 marching invaders drop bombs that erode your defences, and 2 types of spaceship fly over releasing large bombs that penetrate through your defences. Hi-score, increasing difficulty, superb sound effects and graphics.

£7.95 Cassette/£11.95 Disc

SPACE FIGHTER (32K)

Arcade-style game based upon features from DEFENDER and SCRAMBLE. 5 types of menacing alien fire at you and may attempt to ram you. Separate attack phases, fuel dumps, asteroids, repeating laser cannon, smart bombs, hi-score, rankings, 6 skill levels, bonuses.

£7.95 Cassette/£11.95 Disc

★ WE PAY 25% ROYALTIES FOR HIGH QUALITY PROGRAMS ★

★★ Dealer enquiries welcome ★★



SUPERIOR SOFTWARE
Dept. YC10
69 Leeds Road,
Bramhope, Leeds.
Tel: 0532 842714

DISC SOFTWARE
AVAILABLE NOW!



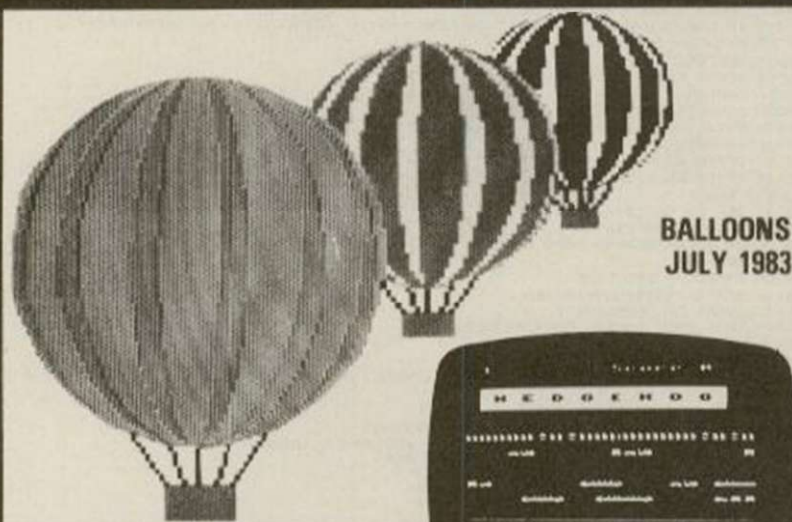
BEEBUG FOR THE BBC MICRO

DEVOTED EXCLUSIVELY TO THE BBC MICRO

MEMBERSHIP NOW EXCEEDS 18,000 BRITAIN'S LARGEST COMPUTER USER GROUP

18,000 members can't be wrong—BEEBUG provides the best support for the BBC Micro. BEEBUG Magazine—NOW 64 PAGES devoted exclusively to the BBC Micro.

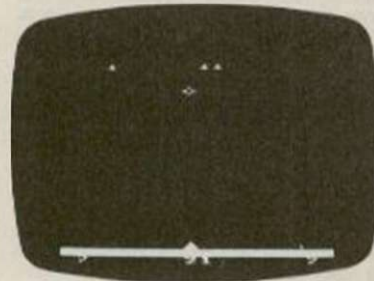
Programs—Hints & Tips—Major Articles—News—Reviews—Commentary.
PLUS members discount scheme with National Retailers. PLUS members Software Library.
10 Magazines a year. First issue April 1982. Reprints of all issues available to members.



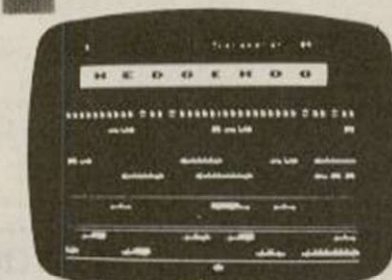
BALLOONS
JULY 1983



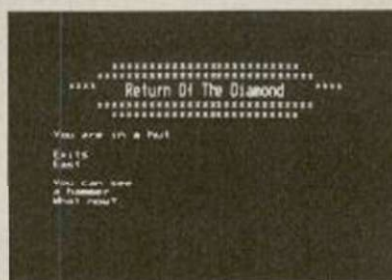
ELLIPTO JUNE 1983



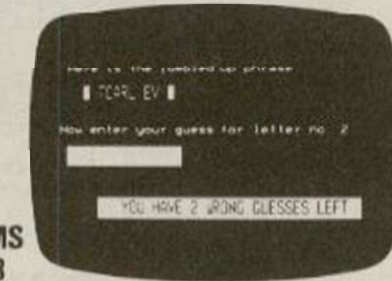
INVASION APRIL/MAY 1983



HEDGEHOG JUNE 1983



RETURN OF THE DIAMOND
JUNE/JULY 1983



ANAGRAMS
JULY 1983

Magazine programs now available on cassette to members at £3.50 inc: VAT & p&p—see April/May issue for details.

February Issue: Program Features: BEEBMAZE—Find your way through the random maze, guided by 3D views from inside the maze—an excellent game. FIVE-DICE—A Beeb implementation of YAHTZEE (R), a novel dice game. Also a listing of WINDY FIELD—a creation from Acornsoft, SPIROLOT screen doodler, and a complete memory display program in a user key. Plus Machine Code Screen Dumps for the Epson and Seikosha Printers; articles on USING FILES, IDEAS ON ANIMATION (Including a Rotating Cube program), an Introduction to the Use of Procedures, a Survey of Books on the BBC Micro, and a Roundup of Disc System Hints. PLUS a variety of HINTS, TIPS AND INFO, including a single VDU command to perform a SIDEWAYS SCROLL.

March Issue: Program Features: Life (32K), Artillery Duel (16K/32K), Square Dance, 3D Rotation (will rotate any object). Printers for the BBC micro—Review of Epson, Seikosha, Tandy and Olivetti. What to do with the new Operating System, Disc Formatter Program, and full Disc instruction set. Newcomers article on Text and Graphics Windows. PLUS How to get a new Operating System ROM and a special deal on Wordwise (members only).

April/May Issue Special Anniversary Issue—Contains index to the whole of BEEBUG Volume 1. Music Composer—create complex 3 part harmonies with this synthesiser Program. Colour bar chart generator program. Beeb implementation of the Connect-Four Game. Invasion—a 16k. Plus Review of Tape Recorders for the Beeb; a Basic Program Editor, which lists variables and procedures, and executes Find and Replace in a Basic Program; Reviews of Acornsoft Games and the Torch Z80 Disc Pack. Disc Menu Program. Newcomers introduction to Mode 7. How to save the unsavable; and a routine to print Double Height Characters in all modes.

June Issue: Program Features: 'Return of the Diamond' A 16k adventure game, 'hedgehog' a well implemented 'frogger' type game, and Ellipto. Create your own off the shelf sound effects with Sound Wizard. Plus articles on Using Files, Rotating and Expanding Characters, Using Printers, and How to multi-program the User Keys. Reviews of The Hobbit Floppy Tape System, Adventure Games, and a Comparative Review of Wordwise and View. Plus FX Call Update, Disc Program Auto-relocator, Wordwise Update, and more BBC Book Reviews.

July Issue: Games: Robot Attack (32K) and Anagrams, a 16K word game. Watching the Beeb at work—a simple program to show your micro at work. An introduction to discs—what are they and are they worth getting. Balloons—a coloured animation. Make your micro speak like Kenneth Kendal. Bad Program Lister—lists programs even when the computer pronounces them 'bad'. Reviews of Epson and Seikosha's new printers. Five books of programs reviewed, plus more software reviews. Using Files part 4. A full disc sector editor program—to read and retrieve lost disc files. And how to modify Acornsoft's Planetoid. Plus hosts of useful hints.

BEEBUGSOFT: BEEBUG SOFTWARE LIBRARY offers members a growing range of software from £3.50 per cassette.

BEEBUG NEW OPERATING SYSTEM OFFER

BEEBUG members can now obtain the new 1-2 OPERATING SYSTEM ROM at around HALF PRICE. See BEEBUG Magazine February, March or April for details. As a result of BEEBUG negotiations with Acorn the ROM now may also be offered by other user groups to their members.

1. Starfire (32K). 2. Moonlander (16K). 3D Noughts and Crosses (32K). 3. Shape Match (16K). Mindbender (16K). 4. Magic Ee (32K). 5. Cylon Attack (32K). 6. Astro-Tracker (32K).

Utilities: 1. Disassembler (16K). Redefine (16K). Mini Text Ed (32K). Applications: 1. Superplot (32K). 2. Masterfile (32K).

13% DISCOUNT TO MEMBERS ON THE EXCELLENT WORDWISE WORD PROCESSING PACKAGE—THIS REPRESENTS A SAVING OF OVER £5.00.

Send £1.00 & SAE for Sample

Membership: UK £5.40 for six months, £9.90 for one year.

Overseas one year only: Europe £16.00, Middle East £19.00, Americas & Africa £21.00, Other countries £23.00
Make cheque to BEEBUG and send to BEEBUG Dept 4a, PO Box 109, Baker Street, High Wycombe, Bucks HP11 2TD.
Send editorial material to: The Editor, BEEBUG, PO BOX 50, St. Albans, Herts AL1 2AR

(continued from page 127)

word of the Rem statement. Its debug option is chosen and if the first word is Debug then FN-Start-Line is followed by FN-End-Line; or else FN-End Line is called directly.

The routine also contains a switch called Assembler% which is turned on or off by the occurrence of the assembler markers. If the switch is on, then the assembler comment delineator is acted on in the same way; but the blanking-out of lines can finish when a multi-line delineator is found.

This section is followed by the re-variable section which renames all variables. Its stepping routine is largely identical to that of de-Rem, the major differences are that lines beginning with A* are left intact.

Hex numbers are skipped over as the system cannot decide between variable ABCD and number ABCA. The assembler delineators are also used to change the value of the variable string-length; which is used to decide if an encountered variable is long enough to be replaced. The main action routine

FN-ONE-VAR

is called when a valid start character is encountered. One-Var firstly attempts to identify the type of variable/name by looking backwards for the FN or Proc token (&A4 and &F2). If these are found, then the Type% attribute can be set. After the string has been extracted, then the new string is produced by

FN-MAKE-STRING

The string is produced by a number from the array string-array%(2). 0 is for function; 1 for procedures and 2 for variables.

```

10 CLS
20 PRINTTAB(6,3)"LINE CRUNCHER"
30 PRINTTAB(2)"ASSEMBLER ROUTINE TO "
40 PRINTTAB(2)"SEARCH FOR GIVEN LINE NUMBER"
50 PRINTTAB(2)"STARTING FROM GIVEN ADDRESS."
60PRINTTAB(2)"LOADS INTO MEMORY BELOW MODE 7"
70 PRINTTAB(2)"HIMEM. ON ENTRY FIRST INTEGER"
80 PRINTTAB(2)"PARAMETER IS START ADDRESS"
90 PRINTTAB(2)"OF FILE; SECOND IS LINE NUMBER."
100 PRINTTAB(2)"ON EXIT LOCATION &70 SET TO $FF"
110 PRINTTAB(2)"FOR SUCCESS AND 500 FOR FAILURE."
120 PRINTTAB(2)"USED ABSOLUTE ADDRESSING METHODS;"
130 PRINTTAB(2)"AND IS NON RELOCATABLE"
140 PRINTTAB(2,23)"PRESS THE SPACE BAR TO START"
150 REPEAT:RESPONSEX=GET:UNTIL RESPONSEX=32
160 MODE 7
170 HIMEM=HIMEM-155
180 DIM FX155
190 BASEX=&600
200 ADDX=&74
210 INDICX=&70
220 FOR PDTX=0 TO 3 STEP 3
230 FX=HIMEM
240OPT PDTX
250 STARTX
260LDA BASEX+1
270STA &70
280LDA BASEX+2
290STA &71
300LDA BASEX+4
310STA &72
320LDA BASEX+5
330STA &73
340LDY &0
350LDA (&70),Y
360STA &74
370LDA (&72),Y
380STA &76
390INY
400LDA (&70),Y
410STA &75
420LDA (&72),Y
430STA &77
440LDA &0F
450STA INDICX
460.nextone
470JSR INCADD
480LDY &0
490LDA (ADDX),Y
500CHP &0D
510BNE JUMPOVER
520JSR FINISH
530 JUMPOVER
540CHP &0D
550BNE JUMPOVER2
560JSR TEST
570.JUMPOVER2
580LDA &70
590CHP &0FF
600BEO FINISHED
610CHP &0
620BEO FINISHED
630JMP nextone
640.FINISHED
650RTS
660.FINISH
670PHA
680JSR INCADD
690LDY &0
700LDA (ADDX),Y
710CHP &0FF
720BNE JUMPOVER4
730LDA &0
740STA INDICX
750.JUMPOVER4
760PLA
770RTS
780.INCADD
790CLC
800LDA &74
810ADC &1
820STA &74
830LDA &75
840ADC &0
850STA &75
860RTS
870.TEST
880LDY &1
890LDA (&74),Y
900ASL A
910ASL A
920STA &71
930AND &0C0
940INY
950ORR (&74),Y
960STA &72
970LDA &71
980ASL A
990ASL A
1000INY
1010BDR (&74),Y
1020STA &73
1030CHP &77
1040BEO PERHALPS
1050RTS
1060.PERHALPS
1070LDA &72
1080CHP &76
1090BEO CERTAIN
1100RTS
1110.CERTAIN
1120LDA &0FF
1130STA &70
1140RTS
1150)
1160 NEXT
1170 RESPONSEX=GET
1180 CLS :PRINTTAB(6,3)"CODE ASSEMBLED"
1190 PRINTTAB(2)"PRESS S TO MAKE A COPY"
1200 PRINTTAB(2)"OF THE OBJECT CODE."
1210 REPEAT
1220 RESPONSEX=GET
1230 RESPONSEX=RESPONSEX OR &20
1240 UNTIL RESPONSEX=&73
1250 *OPT 1,2
1260 *SAVE "LINECRUNCH" 7856 7C01
1270 *OPT 1,1

```

Listing 2. Line cruncher.

Within the assembler two other considerations apply. Firstly, the interpreter stores op-codes as three ASCII characters, not as a token. To avoid these being re-variabled then the minimum length of variables which will trigger Proc-Replace is increased from three to four. Any three-character variables outside the assembler will cause the op-codes to be re-variabled with disastrous consequences. Accordingly variables such as LDA, ASC, etc, should not be used if the assembler is being used. Secondly, a space must separate the code from the address in assembler, to avoid the compactor recognising it as a variable. To prevent this space from being removed by the line-pack routine it is replaced by

CHR\$0

in re-variable and changed back in down copy: Finish%.

The system does not discriminate between codes which require an address and those which do not — so a space must follow all codes. The line-packing routine works by replacing the four-byte line delineator with a colon and three spaces. Lines which start with an asterisk have to be left alone in their entirety. Lines which include an If or Rem statement have to be the last old line packed on to the end of the new line. Any line which starts with a Def statement or which is referenced by a Gosub or Goto has to be put at the start of a new line.

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES £9.95!

CASSETTE 50 FOR YOUR MICRO



GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
OXO
BOGGLES
PONTOON
SKI JUMP
HANGMAN
OLD BONES
THIN ICE

MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SITTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS

SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE



CASCADE SOFTWARE

NOW AVAILABLE FOR

SINCLAIR
SPECTRUM
ZX81
LYNX
DRAGON
ATARI

VIC-20
ACORN
ATOM
ORIC-1
SHARP
NEW BRAIN
BBC A/B



DIRECT MAIL ORDER FORM

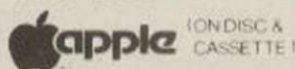
CASCADE SOFTWARE

CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES NP54PA

SUPPLY CASSETTE 50 FOR
enclose cheque/P.O.

Name
Address

COMPUTER






MINIMUM SIZE COMPUTER REQUIRED ONLY

LOTHLORIEN

WARMASTERS

BATTLE YOUR WAY THROUGH
TIME WITH WARGAMES FROM
ANCIENT GREECE TO THE 21st CENTURY

470	TYRANT OF ATHENS adventure wargame ZX81 16K : Spectrum 16K Dragon 32 : Tandy Color 32K	
431	PELOPONNESIAN WAR diplomacy and strategic wargame ZX 81 16K	
B C 30 A D	ROMAN EMPIRE strategic wargame with 3 levels of play. ZX81 16K : Spectrum 16K Dragon 32 : Tandy Color 32K Atari 400/800 48K BBC Model B	
1150	SAMURAI WARRIOR adventure game in medieval Japan. ZX81 16K : Spectrum 16K Dragon 32	
1201	WARLORD adventure wargame set in medieval Japan. 3 levels of play. ZX81 16K : Spectrum 48K Dragon 32 : Tandy Color 32K (coming soon for Atari and ORIC 1-48K)	
1800	PRIVATEER real time graphics games to sink French warships. Combined cassette contains both ZX81 16K AND Spectrum 48K for only £4.50	
1861	JOHNNY REB all graphics wargame for 1 or 2 players, manoeuvring troops on a battlefield. Spectrum 48K	
1944	PARAS all graphics wargame to destroy enemy bridge. 2 battlefields, 10 levels of play. BBC Model B	
1996	REDWEED all graphics wargame in which you must prevent the Martians and Redweed reach London. Spectrum 48K	
2000	BATTLEZONE 2000 all graphics tactical wargame to destroy the supertank before it escapes from the map. 10 levels of play. BBC Model B	

PROGRAMMERS — help fill the gaps with your wargames.
Machine code programmers wanted.

PRICES			
ZX81 16K	£4.50	BBC-B	£6.95
Spectrum	£5.50	Dragons	£6.95
Atari	£12.50	Tandy	£7.95

Available from better software shops or direct by mail order. Access Number, Cheques or Postal Orders. Please payable to:

M.C. LOTHLORIEN 
Dept YC8, 4 Granby Road, Cheadle Hulme, Cheshire SK8 6LS

LYNDENHURST LTD

Any Spectrum

MAGIC WORM

£4.95

Accept the challenge of guiding Magic Worm on his journey to the secret cavern. Use your skill and nerve to overcome the many obstacles you will meet along the way. Complete the dangerous journey into the cavern and overcome the final challenge of the bottomless pit and the game is yours!

Please send cheques/P.O.'s/cash to

LYNDENHURST LIMITED,
38 ASHLEY ROAD, LONDON N19 3AF

Overseas orders £5.95 per cassette.



*CURRENTLY ON
PRESTEL VIA
MICRONET 800

BBC 32K 747 FLIGHT SIMULATOR & BRIEFING SYSTEMS

A full blown, pilot written simulation (writer of the famous Atom 747) real time instrument and visual display. 3D runway view (Hesthrow or Gatwick), large dials, moving pointers plus digital readout. Demonstration approach and landing. Full, separate briefing program. Area chart, notes and flight plan. Fantastic!

A new concept, a new classic . . .

Wolfpack III

BBC 32K, all operating systems

Combat briefing and program

"Sometimes your first warning is a lancing disruptor beam striking from beyond—sometimes they materialise close at hand. You are either quick or dead!" "A think, zap and think again game!"

True in-space cumulative motion, amazing full colour Starfield graphics & sound. Multiple ship control, each ship has its own mission and destiny, 4 types of enemy, meteor strikes. Good strategy rewarded by energy & promotion. Poor combat rewarded by death! (but rescue/refuel possible). Rotating base station, intergalactic warp.

KREMLIN: multi level maze escape with Gremlins/bomb/3D graphics and sound/map/compass/quiet explore option!

HARMONY: infinite, saveable, 3D patterns of colour and sound, menu driven

WORD PERFECT: friendly and versatile, full facility 40/80 column word processor (add £4 for disc version)

DEALERS ONLY PLEASE PHONE (0903) 206076 ROYALTIES DOC PAYS THE BEST FOR THE BEST

Orders to: Doctor Soft, 258 Coneygree Rd., Peterborough PE2 8LR
NO extras all prices fully inclusive

• Special offer £1 off for 2 items, £2 off for 3 items, etc

..... copies of	747 @ £7.95	Name.....
..... copies of	Wolfpack £7.95	Address.....
..... copies of	Kremlin £6.95
..... copies of	Harmony £6.95
..... copies of	Word Perfect £9.95
TOTAL £	

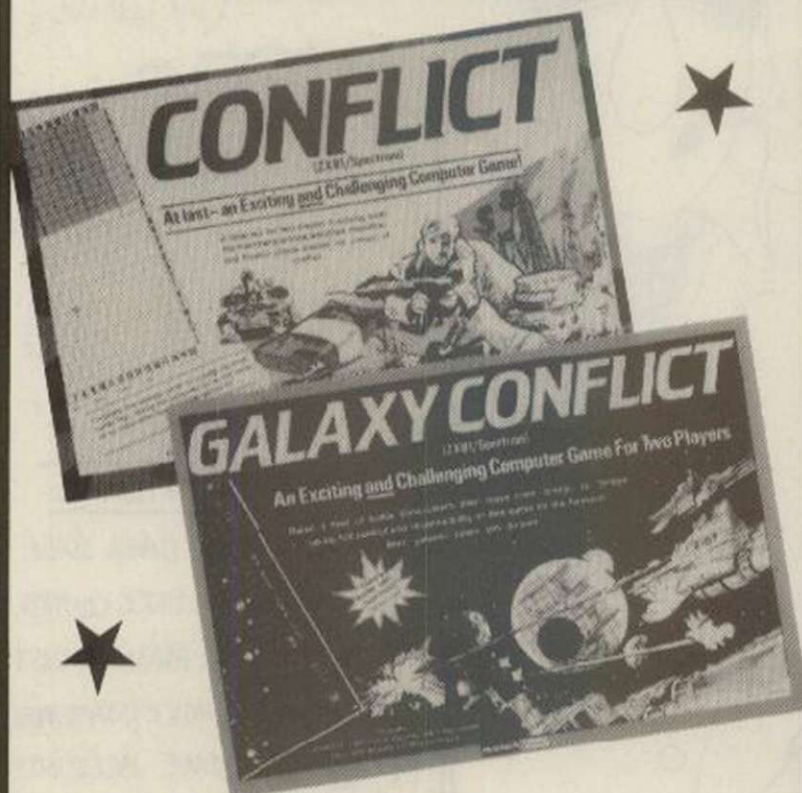


DOCTOR SOFT
ADVANCED SOFTWARE

Martech Durell

... a spectacular range of software

COMPUTER MODERATED BOARD GAMES



The original and completely unique two player games of cunning and strategy. For the more demanding games enthusiasts amongst us.

Both games available on ZX81 (16K), Spectrum (48K), BBC 'B', Dragon 32, Commodore 64, Atari 800
Each Game £14.75

OTHER GAMES



JUNGLE TROUBLE! (Spectrum 16K/48K)

A highly addictive and very funny pure machine code game set in the depths of the African jungle. Lurking crocodiles, marauding apes, the pit of fire... Come back Tarzan... All is forgiven!!

£6.95



BLASTERMIND (Spectrum 48K only)

We have yet to find a more infuriating and downright rude version of a well known game. You too can have insults heaped upon you, as you struggle to beat a very sarcastic opponent. Even cheating won't work. Very addictive — until you throw the computer into the T.V. screen.

£6.95



THE QUEST OF MERRAVID (Vic-20 (16K))

A very challenging adventure. Will accept and act up to nine word sentences. Can you even find the magical firestone of the Dwarves, let alone wrest it from the Dragon of Thargon!

£7.95



HARRIER ATTACK (Any ORIC-1)

Pure machine code, superfast, action packed, highly addictive arcade style game requiring great skill. This game is everything an arcade fanatic could ever hope for!

£6.95

All Mail Orders (inc. p. & p.) to:

martech games

9 Dillingburgh Rd., Eastbourne, E. Sussex BN20 8LY

ADD ON MEMORY for your SINCLAIR SPECTRUM

Issue 2 with dark grey keys

16K Bytes to 48K Bytes Upgrade

Kit comprises 8 chips which simply push into sockets & come complete with full instructions

£29-50 inc P&P & VAT

OR

ATARI 800

16K Bytes Memory Board

Kit comprises printed circuit board which simply plugs in & comes complete with full instructions

£39-50
inc P&P & VAT

Or buy 2
for only

£69-50
inc P&P & VAT

PLUS

Superb programmers Flight System Game for Apple II DOS 3-3

- Total IFR & VFR system inc 20 - programmes for learners & professional pilots of real aeroplanes.
- Real time full colour picture graphics like your TV picture, NOT old fashioned flickering vector lines.
- All navigation instruments necessary for flying Real aircraft, in Real airspace in the Real world.
- Approaches/scenery for any world airport may be keyed in using SEED & PIX programmes in this incredible package.
- A flight path X-Y plot — Naturally!
- Cassette or Floppy Disk

£34-50

inc P&P & VAT

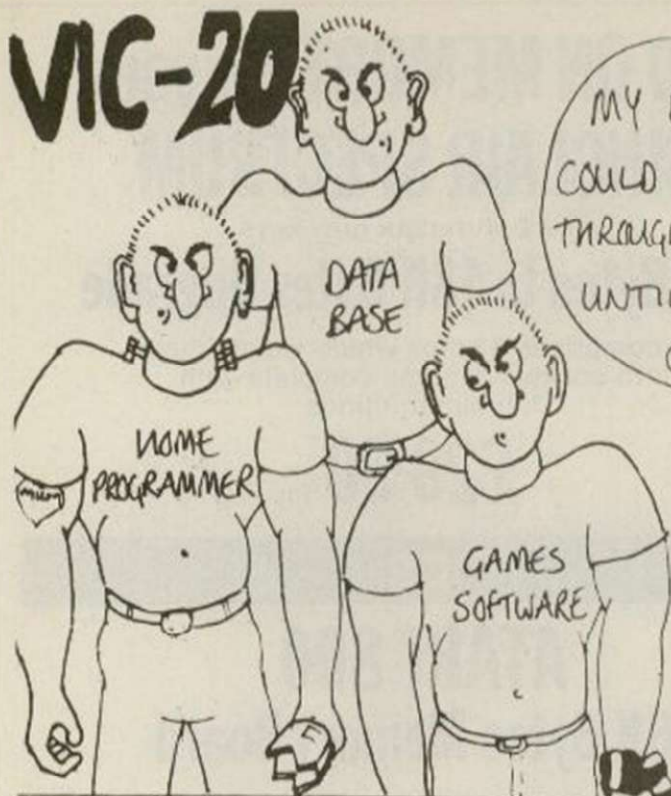
Trade Enquiries Welcome

PLEASE SUPPLY

Add on Memory for Sinclair Spectrum	Qty _____	£ _____
Add On Memory for Atari 800	Qty _____	£ _____
Apple II Flight System Game tape — or Floppy —	Qty _____	£ _____
Value of cheque enclosed payable to Sun Computing		£ _____
Or		
Please charge my Access or VISA card No: _____		
Official Government and Local Council orders welcomed		
Name: _____		
Address: _____		
Tel No: _____		

Sun Computing Services Limited
Concorde House, St. Anthony's Way, Feltham, Middlesex, TW14 0NH
Telephone 01-890 1440 Telex 8954428 SUNCOM G

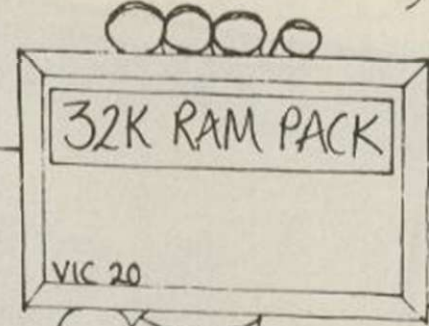
VIC-20



MY BOYS
COULD 'BYTE'
THROUGH ANYTHING...
UNTIL THESE
CAME ALONG!!

£49-99

(INCLUDES)



- 'GEMINI'
SOFTWARE
- 1- DATA BASE
 - 2- STOCK CONTROL
 - 3- MAILING LIST
 - 4- INVOICE/STATEMENT
 - 5- HOME ACCOUNTS
 - 6- COMMERCIAL A/C

Name _____
Address _____

Please send me 32K RAM PACKS @ £49.99
 Software Number 32K RAM PACK @ £59.99
 I enclose cheque / PO for £ _____
 SEND TO: PLUS 80 LTD
 (No stamp needed) FREEPOST
 NARROW
 MIDDLESEX WA2 0BR

*2859 bytes
*Allow 7 days

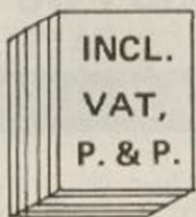
£19.95
BUY SOFTWARE AND RAM PACK
TOGETHER FOR £59.99
(incl.)

SPECTRUM RAM UPGRADE 16K→48K

A GREAT
NEW DEAL!



EASY TO FIT.
CHIPS JUST
PLUG IN.
NO SOLDERING.
SENT WITHIN 10
DAYS



INCL.
VAT,
P. & P.

ISSUE TWO
MACHINES ONLY
(BLUE KEYS)
S.A.E. for details,
please.

DISPLAY INSTRUCTION SHEET

Get the best possible results from your Spectrum.
Deals with yellowish white, wobbling colours etc.
Send £1 plus Stamped Addressed Envelope

MAIL ORDERS ONLY. Cheques/P.O.s to:
FOUNTAIN COMPUTERS LIMITED
Bishops Court,
Bishopstoke,
EASTLEIGH
Hants, SO5 6PE
(0703) 616505

SORRY, NO OVERSEAS
ORDERS ACCEPTED
(including BFPO, Channel
Islands and Eire).

SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

SPECTRUM FAMILY LEARNING SERIES

Use our Computer Assisted Learning PACKs to help your children with their school work. The programs in the series use moving colour graphics and sound to make learning more enjoyable. Each pack contains four programs and is suitable for use with the 16K or 48K Spectrum. Program notes are supplied.

- CALPAC FL1 (5 to 8 years) £7.50**
Tens and units addition and subtraction with detailed help facilities; powerful, easy to use drawing program; English comprehension applied to American Indians.
- CALPAC FL2 (7 to 10 years) £7.50**
Roman history; spelling tester with easy entry of your own lists; flexible table-tester; homophones.
- CALPAC FL3 (9 to 12 years) £7.50**
Nouns, verbs, adjectives and adverbs; tenses of verbs; biology of the flower; long division tutor.

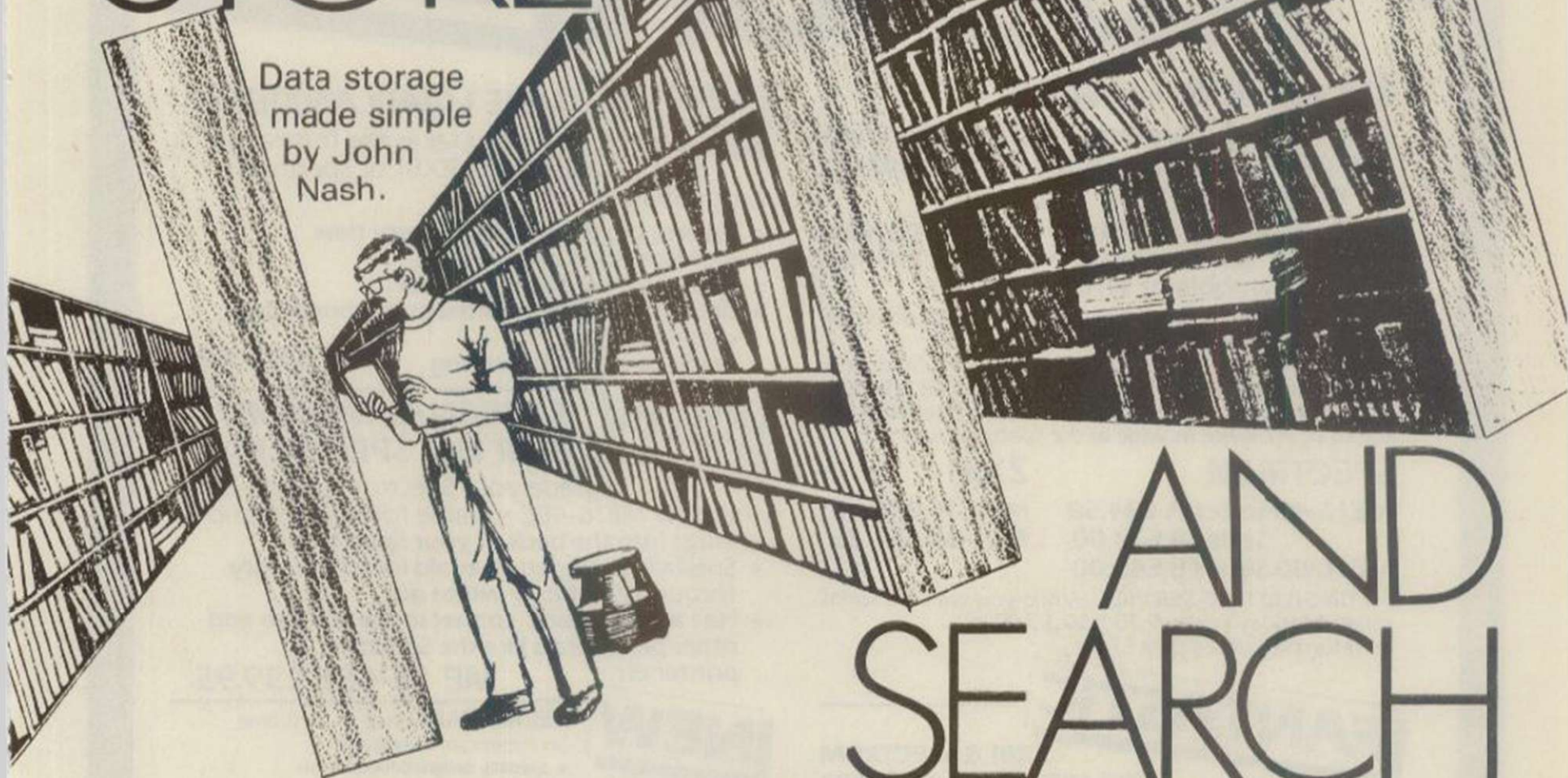
The programs are ideal for the ages stated, but could be used by anyone requiring revision of these areas of study at any age.

- CALPAC C1 O-LEVEL CHEMISTRY £7.50**
Four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:
- * Elements, compounds and mixtures.
 - * Structure, bonding and properties.
 - * Redox, electrolysis and the activity series.
 - * Acids, bases and salts.
- 48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:
CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns,
Woking, Surrey GU21 1UF.

DRAGON STORE

Data storage
made simple
by John
Nash.



AND SEARCH

HOW DO YOU store and retrieve text data, for example, journal references on the Dragon? Well, you could use the string arrays in Basic, but these use five extra bytes of memory per string. Storing on tape and searching are also rather slow. Why not put the data straight into memory, merely delimiting the strings with a suitable terminator?

This program uses machine-code routines under Basic control, to do just that. It then allows you to search for a key word, or combination of characters and spaces, and will display the whole of the entry containing the key "word".

For first-time loading, switch the machine off, then on, and load the decimal machine codes using the program supplied. Note that the code must be loaded from Address 2943 — decimal. There are 150 bytes to load. Before doing anything else, save this to tape as a machine code file

```
CSAVEM"MC",2943,3093,150
```

Now turn the machine off, then on, type
POKE25,6

enter New, enter and load the Basic program as listed. Do not add any spaces as memory is tight. Finally, Save the Basic file in the usual way.

For subsequent loading and running, type
POKE25,6

enter New, enter and Cload the Basic from tape. Now type

```
CLEAR512,2943
```

and CLoadM the machine code from tape. Type Run enter and the machine will prompt you with "Start at address?"(decimal) which must be 3134 or above. Addresses 3134 to 32767 are now free for storage. You will now see a "S,L or C?" prompt, that is, search, load or clear. It is best to clear the memory before creating a new file, so respond "C" — this is error-trapped to avoid disasters. The program will stop, so rerun it and put the starting address in again. You can now put in text up to 255 characters using any character except asterisk and hash, which are reserved for program use. Each time you press Return, your entry is stored, and your position in memory is displayed. Press Break to leave this routine.

To search, rerun and answer 3134 to the address prompt, and S to the "S,L,C" prompt. You will now be asked for a string, maximum length 32 characters, and excluding asterisk or hash as before. The program will find the first entry, display all of it, not just the search word, and then ask "Cont?". Type Y to go on. You will see "Finished" when all the strings have been found.

(continued on page 135)

Program for loading decimal machine codes.

```
1 REM MACHINE CODE DECIMAL/HEX. LOADER
2 REM PUT CODES (DEC. OR HEX.) INTO DATA STATEMENTS.
3 REM AS MANY AS YOU NEED, BETWEEN LINES 10 - 49.
4 REM SET THE PARTITION, E.G. CLEAR1000,32250 THEN RUN THIS PROGRAM
  AND ANSWER THE PROMPTS.
5 REM EXAMPLE: FOR THE FIRST BLOCK OF MACHINE CODE FOR THE
6 REM FLIGHT SIMULATOR, S IS 32256, AND N IS 182.
7 REM
8 REM
9 DATA201,0,0,253,127,etc., or HEX. CODES.
10 DATA etc.
50 INPUT"STARTING ADDRESS DEC.":S:S=S-1
60 INPUT"NUMBER OF CODES, DEC.":N
70 FOR X=1 TO N:READ A:POKE(S+X),A:NEXT X
71 REM
72 REM FOR HEX., LINE 70 SHOULD BE: (REMOVE REM.)
73 REM FOR X=1 TO N:READ A#:POKE(S+X),VAL("&H"+A#):NEXT X
80 CLS:PRINT"CODES LOADED. NOW SAVE IT AS A","MACHINE CODE FILE
  AND THEN","PRESS
E THIS BASIC PROGRAM."
```

FABULOUS!

SINCLAIR ADD-ON OFFER

from 16k – 48k

With our ME48 memory expansion add-ons your ZX Spectrum can increase its capacity by up to three times.

- ★ No soldering ★ easy to fit ★ simply plug in ★ fully guaranteed ★ no loss of memory through wobble or white out.

NB. Before ordering your Spectrum add-on please check which Spectrum you have in your possession. At the back of the ZX Spectrum the metallic contact strips can be clearly viewed. In the series A the space separating the strips is the same width as the strips. In the series B the strips are twice as wide as the space between.

SPECTRUM	ZX81
ME16-48 Series A £34.50	ME1-16 £19.25
Series B £23.00	ME1-64 £44.25
ME16-80 Series B £46.00	

FITTING/TESTING SERVICE. While-you-wait, personal callers Monday-Friday 9.30-5.00, £3.00. By return registered post £7.00.

FANTASTIC

**ZX81 & SPECTRUM
SS1 SPEECH SYNTHESISER**

SIZE 3 1/2" x 5 3/4" x 1"

- ★ Make amazing speech effects with your ZX Spectrum.
- ★ Specially designed for use with your Spectrum. Just plugs in, no dismantling or soldering.
- ★ No power pack, leads, batteries or other extras.
- ★ Ample volume for built in loudspeaker, Manual Volume Control on panel. Can be plugged in to Existing hi-fi system.
- ★ Uses no memory addresses.
- ★ Free Dictionary of Sounds.

SS1 SPEECH SYNTHESISER £39.00

NEW LEVEL-VU PRISM

Allows you to see your tape counter without moving from your seat!

- ★ attaches easily to recorder body or lid
 - ★ fits most recorders including Radio Shack, Vic-20, Atari
 - ★ greatly magnifies counter numerals
- LVP £3.99**
- ★ All items are normally despatched within 24 hours

NEW TAPE LOAD ANXIETY?

Vu-Load takes the frustration out of loading your ZX81 or Spectrum programmes.

- ★ insures programme load every time
 - ★ monitors tape output level
 - ★ gives positive save indication
 - ★ detects blank tape without disconnecting cassette wires
 - ★ ready to use – no wiring
- TL £19.99**

NEW EXTERNAL MEMORY FOR THE SPECTRUM!

Upgrade your Spectrum to 48K with the new ME16-48E suitable for series A and B

- ★ Plugs into the back of your Spectrum
 - ★ Specially designed to avoid loss of memory through wobble or white out
 - ★ Has a 'piggy back' connector so you can add other peripherals like the Spectrum printer etc.
- ME 16-48E £39.95**

NEW MICRO TAPE save it – first time on American microtape

- ★ specially designed for use with micro computers
 - ★ Low drop out occurrence ★ uniform coating
 - ★ High saturation level ★ So good, we can guarantee them for 12 months
- AUDIO DIGITAL AD.C12 – 55p AD.C20 – 65p**



- ★ Free 23 line memory test programme with every add-on.

Post and packing still only 40p per item.

Please tick the appropriate box to order your Computer Add-on:

Memory Expansion Spectrum ME48 Series A Series B
 ZX81 ME16 ME64 Speech Synthesiser SS1 Spectrum
 ZX81 Tape Load TL Level VU LVP ME16-48E
 Audio Digital AD.C12 AD.C20

*NB. Add 40p Post & Packaging to the price of all items.

I enclose a cheque or postal order for _____ made payable/crossed to Computer Add-ons, or I would like to pay by Access  or Barclay Card  and I enter my number and signature accordingly *Allow 28 days for delivery.

Signature _____

Date _____

Name _____

Address _____

Occupation _____

COMPUTER ADD-ONS 7-9 Thane Works, Thane Villas London N7

COMPUTER ADD-ONS

7-9 Thane Works, Thane Villas, London N7 Tel: 01-609 7919



(continued from page 133)

The file can be saved on tape, together with the machine-code program, by a CSaveM command. Your current position is contained in addresses 3092 and 3093, and can be found by typing:

PRINTPEEK(3092)*256+PEEK(3093)

If the answer was 8000, you would then type:

CSAVEM"FILE",2943,8000,5058

for example. On reloading, the same Peek will tell you where to continue adding data to your file, that is, it will give you your starting address.

ASSEMBLER LISTING FOR STORE AND SEARCH

```

00050          ORG      2943
00051 TEMP4    EQU     3092
00052 TEMP2    EQU     3090
00053 ENDP     EQU     $7FFF
00054 TEMP     EQU     3088
00055 TABLE   EQU     3094
00060 CSTART   LD      LD  TEMP4
00070          LDA     #0
00080 CLEAR    STA     ,X+
00090          CMPX   #ENDP
00100          BNE    CLEAR
00110          RTS
00130 START   LD      #065
00131          LDB   #00
00132          TFR   B,DP
00133          LDY   #TABLE
00140          LDB   ,Y+
00145          STB   TEMP
00150          LD   TEMP4
00160 LOOP    LDA     ,X+
00170          CMPA  TEMP
00180          BEQ   SAME
00190          CMPX  #ENDP
00200          BEQ   DONEIT
00210          BRA  LOOP
00220 SAME    PSHU   Y,X
00230 CONT   LDA     ,Y+
00240          STA  TEMP2
00250          CMPA  #023
00260          BEQ   OUT
00270          LDA  ,X+
00280          CMPA  TEMP2
00290          BEQ   CONT

```

(listing continued on page 137)

DECIMAL LISTING OF MACHINE CODE

```

2943 190 12 20 134 0 167 128 140 127 255
2953 38 249 57 206 0 101 198 0 31 155
2963 16 142 12 22 230 160 247 12 16 190
2973 12 20 166 128 177 12 16 39 7 140
2983 127 255 39 59 32 242 54 48 166 160
2993 183 12 18 129 35 39 13 166 128 177
3003 12 18 39 240 32 0 55 48 32 218
3013 55 48 191 12 20 166 130 16 142 4
3023 96 166 130 129 42 38 250 166 128 166
3033 128 129 42 39 8 129 32 39 8 167
3043 160 32 242 191 12 20 57 134 143 32
3053 244 16 190 12 14 190 12 20 198 0
3063 31 155 166 160 129 35 39 9 167 128
3073 140 127 255 39 2 32 241 191 12 20
3083 57 191 191 64 0 0 0 0 0 0

```

Dragon & Dungeon



NUMBER ONE FOR THE DRAGON

LATEST DRAGONWARE

ARCADE GAMES: 'Mined Out' (Quicksilver) £5.95, 'Dragonhawk' (Pentagon) £6.95, 'Vultures' (Dragon Galaxians, Morrison) £5.95, 'Droids' (great new action game, Morrison) £6.95, 'Drone' (Tron-type game, Cable Software) £8.75, 'Spider' (Premier) £4.95, Area Radar Controller £7.95, Frogger £8.00.

The best arcade game yet - Programmers' Guild's fantastic 'Ninja Warrior' (17 screens!), £8.95.

Adventures: 'Alien Odyssey' (the first two parts of a giant 80K-plus saga) £9.95, 'Into the Labyrinth' £7.95, 'Danger Island' £6.95, 'Chateau' £7.95, 'Jungle Search' £6.95, 'Volcanic Dungeon' £5.00.

Best-seller still Wintsoft's mammoth 'Ring of Darkness' £10.00.

JUNIOR PROGRAMS: 'Baby Dragon' (Teddy Bears' Picnic and Koko the Clown) £5.95, 'St. George and the Dragon' £6.95, 'Pirate' £8.50, Infant Pack (pre-school letters and numbers) £3.95, Action Pack (mazes and simple arcade) £3.95.

UTILITIES: Editor/Assembler/Monitor cartridges and manuals Compuserve £30.45, Mace £29.95, RS232 Interface Unit £49.50, Monitor Sound Unit £37.50, Salamander Graphics System £9.95.

BOOKS: 'Dragon Extravaganza' £4.95, 'Making the Most of your Dragon' (highly recommended) £5.95, plus 50p postage; 'Learning to use the Dragon 32' £4.95; 'Dynamic Games for the Dragon 32' £4.95; 'Know your Dragon' (a friendly introduction to a friendly computer) £5.95.

DRAGON OWNERS CLUB

The Dungeon is also the home of the largest Dragon Owners Club in the UK (or, since members are scattered through Europe to Africa and the Middle East, should we say "the world"!).

The club magazine, *Dragon's Teeth*, is published monthly and includes news, reviews, advice and information exchange for dedicated Dragon-bashers. Free members' adverts, monthly offers (some members have already saved the cost of their subscription), competitions and, for extrovert Dragonards, badges and bomber jackets.

Annual Membership: £6.00 (£8.00 overseas),
Six-month Trial Sub £3.25 (£4.25 overseas).

P.O. Box 4, Ashbourne, Derbyshire, DE6 1AQ. Tel: (0335) 44626

Arcade Action For The ZX Spectrum



If you want Arcade quality control for your Sinclair ZX Spectrum, you'll find the Protek combination hard to beat. The Interface is compatible with some of the best Arcade games from top software publishers including:

Flight Simulation by Psion
Slippery Sid by Silversoft
Spectrapede by Protek

Plus many more.

The Protek Joystick Interface is simple to use. It just plugs in at the back of your Spectrum and is compatible with any "Atari type" Joystick Connector. We recommend the Spectravision Joystick at only £9.95 for a Pistol Grip Joystick with a top and base fire button plus specially contoured shape and rubber suction cup footing for single hand operation.

Both units are available separately from

TRADE
ENQUIRIES
WELCOME

Subject to availability. Prices correct
at time of going to press.

=Protek=

COMPUTING LTD.

Reg. Trade Mark

Clydesdale Bank Building
High Street, South Queensferry
Edinburgh EH30 9HW
Tel. 031-331 4400

Available at larger branches of
John Menzies
and all good computer stores

(listing continued from page 135)

```

00300 BRA BACK
00310 BACK PULU X,Y
00320 BRA LOOP
00330 OUT PULU X,Y
00340 STX TEMP4
00350 LDA , -X
00355 LDY #5460
00356 SCHECK LDA , -X
00357 CMPA #52A
00358 BNE SCHECK
00359 LDA , X+
00360 PRINT LDA , X+
00380 CMPA #52A
00390 BEQ DONEIT
00391 CMPA #520
00392 BEQ ADJUST
00400 RETADJ STA , Y+
00410 BRA PRINT
00420 DONEIT STX TEMP4
00430 DONE RTS
00431 ADJUST LDA #58F
00432 BRA RETADJ
00441 VAR EQU 3086
00443 MEMEND EQU $7FFF
00450 INST LDY VAR
00460 LDX TEMP4
00465 LDB #50
00466 TFR B, DP
00480 SLOOP LDA , Y+
00490 CMPA #523
00500 BEQ STDONE
00510 STA , X+
00520 CMPX #MEMEND
00530 BEQ STDONE
00540 BRA SLOOP
00550 STDONE STX TEMP4
00560 STOPLO RTS
00570 END
    
```


NB: You will probably have to assemble this Program to a higher address, eg. ORG 6943 in line 50, and then move it down to start at 2943 before storing it on tape. This is because the Assembler may use the lower memory in the course of assembly.

Dragon Store and Search program.

```

20 INPUT "START AT ADDRESS";S:IFS<3134THEN20
25 POKE(3092),INT(S/256):POKE(3093),(S-(PEEK(3092)*256))
30 INPUT "S,L OR C";B#
40 IFB#="S" THEN 1000
45 IFB#="C" THEN 2000
90 POKE(S-1),42
95 CLS
100 LINE INPUT "TEXT:";A#
110 A#="A#+"*#"
120 A=VARPTR(A#)+2:B=VARPTR(A#)+3
130 POKE(3086),PEEK(A):POKE(3087),PEEK(B)
140 EXEC3054
150 P=PEEK(3092)*256+PEEK(3093)
155 CLS:PRINTP:IFP >=32766 THEN PRINT"FULL":POKE32767,42:END
156 GOTO100
1000 INPUT "SEARCH#";A#
1010 A#="A#+"*#":IFLEN(A#)>33THENPRINT"TOO LONG":GOTO1000
1011 FORN=1 TO LEN(A#)
1012 C=ASC(MID$(A#,N))
1013 POKE(3093+N),C
1014 NEXTN
1015 CLS
1020 EXEC2956
1030 IF PEEK(3092)*256+PEEK(3093)=32753 THEN PRINT @ 500,"FINI-
SHED":END
1040 INPUT "CONT?";B#
1050 IF B#="Y" THEN 1015
1100 STOP
2000 INPUT"CERTAIN (Y)";B#
2010 IFB#="Y" THEN EXEC2943
2020 STOP
    
```

J. K. GREYE ENTERPRISES LTD



THE ARCADIAN
16/48K SPECTRUM
Includes games to suit all ages, from 5 to 105.
INVASION Our version of the Classic Arcade Game...
KAMIKAZE If you like Solitaire, you'll love this...
MINEFIELD A totally new game...
UFO Dodge the Asteroids...
All of these for only **£4.95**



10 GAMES
KINGDOMS CRASH-LANDING SIMON ARTIST UFO
CODE ASTEROIDS BOMBER KALEIDOSCOPE GUILLOTINE
GAMESTAPE 1
1K ZX81
Probably the BEST VALUE 1K TAPE AVAILABLE
only **£3.95**



STARFIGHTER PYRAMID ARTIST
GAMESTAPE 2
16K ZX81
"STARFIGHTER Superb machine code Space Battle...
PYRAMID Can you move the Pyramid? Make a mistake and it will collapse!
ARTIST The ultimate Graphic Designer's 400 Questions, 10 Memories, SAVE, COPY, RUBOUT, CLS, etc.
only **£3.95**



CATCOMBS
A MULTI-LEVEL GRAPHICS ADVENTURE
GAMESTAPE 3
16K ZX81
"CATCOMBS A Multi-Level Graphics Adventure...
NOTE: This is NOT one of the necessarily limited 16K Adventures...
"An excellent addictive game which will keep you hooked for hours"...
only **£4.95**



3D VORTEX
16/48K SPECTRUM
After a successful war transfer, you drop your craft...
Are you capable of 'beat all the pants' thing...
Full Sound Effects, High Speed Machine Code Animation, Full Instructions...
only **£5.95**

SOFTWARE SUCH AS DREAMS ARE MADE OF

Please tick boxes of required tapes:

3D VORTEX at £5.95

THE ARCADIAN at £4.95

GAMESTAPE 1 at £3.95

GAMESTAPE 2 at £3.95

GAMESTAPE 3 at £4.95

All software sold subject to the condition that Hiring, Lending, Unauthorised copying or Resale is Strictly Prohibited.

Send your order to:
J.K. GREYE ENTERPRISES LTD.
16 Park St. Bath BA1 2TE

Name

Address

Postcode

I enclose a cheque/p.o. for £.....
made payable to J.K. GREYE ENTERPRISES LTD.

TRADE & EXPORT ENQUIRIES WELCOME

If you prefer to see before buying, our range of Gamestapes are stocked by W.H. Smith, John Menzies and good computer stores Nationwide.

dk'tronics

ZX KEYBOARD FOR USE WITH 81 SPECTRUM

Our new cased keyboard has 52 keys, 12 of which are used for the numeric pad. The numeric pad offers useful features, you can cursor with one hand and it will be a boon for anyone who enters a lot of numeric data. The pad is a repeat of the 1 - 9 keys, it also has a full stop and a shift key. The numeric pad keys are red in colour, the normal keyboard keys are grey, with the case being black, which results in making the keyboard very attractive. The keyboard case dimensions are: 15" x 9" x 2½". The computer (either 80/81 or Spectrum), fits compactly inside.

You will have to remove the computer from its original case, it is then screwed to the base of the case. The case has all the bosses already fitted and the screw holes are marked. Also fitted inside the case is a mother board (81 model only) which allows 16K, 32K and 64K to be fitted in the case. All connectors are at the rear of the case i.e. Power, Mic, Ear, T.V. and the expansion part. The case is large enough for other add-ons also to be fitted inside. One of these could be the power supply then you could very quickly fit a mains switch or a switch on the 9V line. This means you have a very smart contained unit. This case does not stop you from using any other add-ons that you may have eg Printer etc. We are convinced that this is the best keyboard available at present. It offers more keys and features than any other keyboard in its price range.

NOTE...

The case can be purchased separately with the keyboard aperture uncut, therefore if you possess one of our early uncased keyboards, or in fact, any other suppliers' keyboards these could be fitted. The keyboard is connected to your computer by a ribbon cable and this has connectors fitted which simply push into the Sinclair connectors. It is a simple two minute task and requires no electronic skills. This keyboard does not need any soldering. Please specify on order whether you require the ZX81 or Spectrum case.

SPECTRUM MODEL

This is supplied with Spectrum legends, and a slightly different base for fitting the Spectrum inside, again, all the connectors are at the rear of the case and there is plenty of room for the power supply (and other add-ons). Should you wish to change, we can supply both the Spectrum legends and details of updating your case which will enable modification from the ZX81 to Spectrum. PLEASE specify on your order whether you require the ZX81 or Spectrum inside.

£45



MEMORY FOR ZX 81

16K Memory £22.95
64K Memory £52.95
16K (Uncased) £19.95
64K (Uncased) £49.95

SPECTRUM MEMORY

MKI £30
MKII £30



FLEXIBLE RIBBON CONNECTOR

If you have ever had white outs or system crashes this could be the answer. It stops the movement between the computer and the RAM expansion, it is supplied with a ribbon 6 inches long, with a male connector at one end and a female at the other.



ONLY £10



dk'tronics

DK Tronics, Unit 2, Shire Hill Ind Est, Saffron Walden
Essex CB11 3AQ. Tel: (0799) 26350 (24 hrs) 5 lines.

ZX 80/81 SPECTRUM HARDWARE

SPECTRUM/81 TOOLKIT BOTH AT ONLY £6.95

This is the toolkit which won acclaim in the feature in the August 1982 issue of Sinclair User. "It is the most impressive program, fast in execution with clear and full instructions . . . it stands out from the rest of the field". The ZXED is a powerful editor for use on the expanded ZX81. It is intended for use by the serious BASIC programmer and offers several useful and time saving features most helpful during all stages of program development. The facilities provided are as follows: ALTER, BYTES, COPY, DELETE, FIND, HELP, INSERT, KEEP, MOVE, RENUMBER, AND VERIFY.

The Spectrum Toolkit contains most of the features above plus autoline numberer and append, and will run in the 16K and 48K Spectrum.

4K GRAPHICS ROM £24.95

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

SPECTRA-SOUND

The so called speaker in your Spectrum is really only a 'buzzer'. With the DK Tronics "SPECTRA SOUND" you can generate fully amplified sound through the speaker on your T.V. set. SPECTRA-SOUND is a very simple but highly effective add-on. This means that you no longer have a faint beep but a highly amplified sound, which can be adjusted with the TV volume control.

The SPECTRA SOUND fits compactly and neatly inside the Spectrum case and is connected by three small crocodile clips.

NEW AT ONLY £9.95

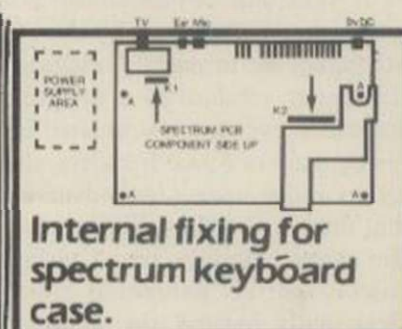
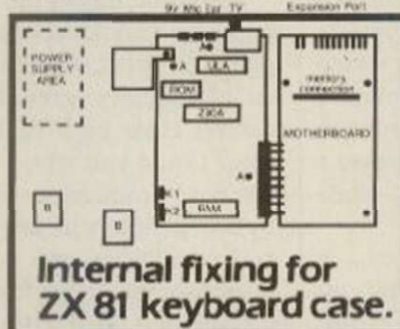
£19.95 Light Pen

LIGHT PEN
The pen enables you to produce high resolution drawings on your own T.V. screen. The controlling software supplied with the light pen has 16 pre-defined instructions. These are chosen from a menu positioned



at the bottom of the screen next to the pen. You can utilise the menu for changing colour (Border, Paper, Ink). Drawing circles, arcs, boxes, lines. You are also able to fill any object with any colour, and insert text onto the screen at any chosen place. Of course you can also draw freehand. There is a feature to retain the screens and animate. On the 48K Spectrum you can retain 5 screens. You can also use the machine code on it's own in your own programs, for selecting out of a menu etc. The software provided will return with the X,Y, cords for it's position on the screen.

The light pen is supplied with a control interface in order to adjust the sensitivity/pen alignment. This simply plugs into the ear socket on your spectrum. Should you require further details please send a S.A.E.



Please state type of machine, which ROM memory size, quantity, and place when ordering.

Please send me @ £

Please send me @ £

Please send me @ £

Please add on £1.25 for p/p

I enclose cheque/P.O. payable to DK Tronics tota £.

or debit by Access/Barclaycard No.

Signature

Name

Address

Send to DK Tronics, Unit 2, Shire Hill Ind Est, Saffron Walden, Essex CB11 3AQ. Tel: (0799) 26350 (24 hrs) 5 lines.

Bagged a few aliens recently? Proud of it? Maybe games should encourage more thought. John Dawson lays down the sword and picks up the ploughshare.

I ONCE WROTE, a game for a programmable calculator called After your Lunar Module has Crashed.

The object of the game was to trek across the lunar surface in a solar-powered moon buggy, attempting to reach the safety of a home dome before the oxygen supply on the buggy ran out. The available oxygen was consumed at a constant rate throughout the journey but the initial battery charge for the buggy's motors was insufficient for the whole journey and, consequently, it was necessary to stop for a period to recharge the batteries from the buggy's solar cells.

Like the sand in one of Earth's deserts, the surface of the moon required little energy to travel at low speeds but a disproportionately large amount of energy if you attempted to push up the speed of the buggy in a mad dash for the home dome. The display on the calculator was limited in the first version to one line of figures and in a second to a single line of alpha-numeric characters. The game had to be played with the aid of graph paper on which was drawn a map of the area. The results from the calculator were plotted as compass bearings and co-ordinates for the buggy's position at the end of each stage of the journey.

That game was utterly different from Space Invaders or the other games of wholesale annihilation and destruction available for every home computer in town. The alien-preventing-burning-babies-from-being-munched-by-a-gorilla-with-a-large-hammer variety of games all depend upon fast graphics displays written in machine code against which the player has to exercise his or her physical skill and co-ordination in order to overcome the challenge set by the computer.

Both games are forms of modelling in which the computer establishes a limited universe within which events are simulated in order to test, in the case of Space Invaders, the player's ability to judge speeds and distances, while making the correct physical response.

After your Module has Crashed was a different kind of simulation involving no physical skills beyond the ability to input information to a calculator keyboard, but requiring the player to exercise judgement about a course of action that will lead to a desired goal.

An end to hostility

A third use of a computer in games playing is to limit the role of the machine to that of a referee, checking that moves made by two human opponents are legitimate and carrying out housekeeping functions such as the accumulation of scores and penalty points and the application of time limits to certain phases of the game.

There is quite a difference between playing a game and creating or developing your own program. As usual, the process begins with an idea. The idea may be to do with, literally, any activity or situation into which you can inject some human input. The preoccupation with

violence and destruction evident in a very high proportion of computer games reflects only the poor, narrow minds of the people who wrote the original programs. Games are certainly competitive but it is possible to write an absorbing and challenging game that has peaceful, constructive aims.

Advice, for example, is a board game written by a doctor which models human social interactions. The game is for two players and each has a citizen, the most important of the persons represented on the board. The citizen is advised and protected, by a lawyer, a priest and a psychiatrist. The pieces are moved across the board with the aim of establishing the citizen in the home square of the opposing player. The lawyer can override the opposing psychiatrist but is subordinate to the spiritual force of the priest. The priest, in turn, may be overridden by the powerful medicine of the psychiatrist. The game is deceptively simple and complex strategies can be developed.

Constructive objectives

You could write a computer game about a mountain rescue team trying to evacuate a party of climbers in bad weather conditions; many of the current crop of small computers can draw excellent colour maps. If you want to inject a real-time graphics sequence into the game, why not model the difficult process of lowering a casualty down a cliff face in a stretcher using two ropes to stabilise the stretcher and a third climber to pick the best route. Only if you were successful in doing that would you be able to continue, making decisions about how to cross the swollen river in the valley floor.

You could model the progress, against fierce opposition by local commercial interests, of a planning application for the redevelopment of an old factory site into a new community centre. How high is unemployment in your area? Could you set up a new business making fast food products, or high technology devices to help people who are disabled, or handmade craft souvenirs to sell at British holiday resorts, or writing software to run an irrigation scheme in a third world country?

Where would you site the business in a fictional town? How much money would you allow the players to start their business and what costs would accumulate before profits started to come into the business, what transport is available to bring workers to the place of work, or could they work at home and, if so, what management problems could you build into the game such as quality control and poor timekeeping?

The possibilities are endless. If you can find an activity that you can describe logically or using mathematical equations, then you have the basis for a computer model of the process and, hence, a game. One of the better games available for the Apple II and other computers is the simulation of the control cabin on a 747 Jumbo. One version is dreadfully slow but others are quite fascinating and do allow you to make mistakes and then recover before the

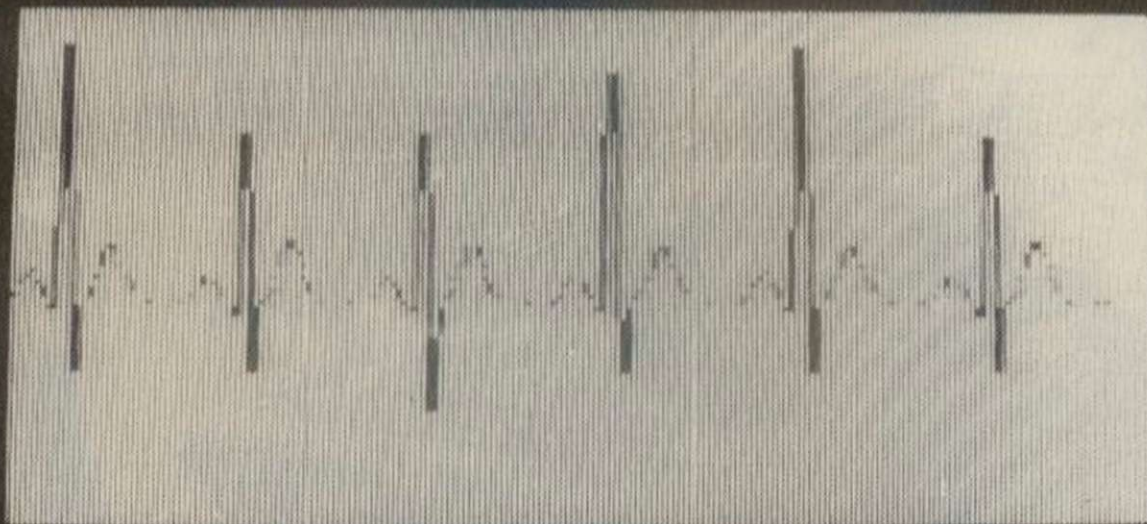
BEATING INVADERS ON A GAME

```
*LIST
10
20 REM "HEARTSTOP"
30 REM Started 12 June 1983
40 REM A game by John Dawson
50
60 PROCinit
70 MODE 4
80 REM MAIN COMMAND LOOP
90 REPEAT
100 comm = INKEY(10)
110 IF comm = -1 THEN
    PROChousekeeper
120 comm$ = CHR$(comm)
130 IF comm$ = "E" THEN PROCecg
140 UNTIL comm$ = "Q"
150 MODE 7
160 END
170
180 DEF PROChousekeeper
190 ENDPROC
200
```

aircraft crashes. Although you will probably use Basic if you decide to develop your own game, other languages may be more suitable for the particular type of game that you wish to create.

Forth is a typical example of a high-level language which can, nevertheless, be used to produce very fast machine-code graphics routines. Lisp is a functional list-processing language which can be well suited to games involving "artificial intelligence" or games in which the performance of the machine is modified by the results that it achieves as each round is played. In other words, it is easier to write a program in Lisp that will allow the machine to learn from its mistakes and

ING SPACE ERS AT THEIR



ECG shows normal rhythm

```

210 DEF PROCecg
220 VDU 5
230 VDU 19,0,0,0,0,0
240 VDU 19,1,2,0,0,0
250 MOVE 500,1000 : MOVE
    1250,1000
260 PLOT 85,500,660
270 PLDT 85,1250,660
280 MOVE 500,800
290
300 PROCecgplot
310 MOVE 500,600
320 PRINT "ECG shows ";res#
330 ENDPROC
340
350 DEF PROCinit
360 DIM Y(30)
370 ON ERROR GOTO 570
380 ENDPROC
390
400 DEF PROCecgplot
410 res# = "normal rhythm"
420 size = 15
430 LOCAL X,Y,xpos,ybaseline
440 xpcs = 500
450 ybaseline = 800
460 REPEAT
470   FOR X = 1 TO 120 STEP 5
480     READ Y
490     PLOT 6,(xpos+X),(ybase
        line + (size * (Y)))
500     NEXT X
510     xpos = xpos+X
520     RESTORE
530   UNTIL xpos > 1150
540 DATA 0,0.7,1.4,1.1,0,0,-1,
        16,-6,0,0,1,1.5,3,2,1.5,
        0.5,0,0,0,0,0,0,0,0,0
550 ENDPROC
560
570 MODE 7
580 REPORT
590 PRINT ERL
600 END
    
```

successes than it is to do the same job in Basic.

Several articles have been published about the use of Prolog — programming with logic — for the development of games to teach history.

Dialectical history

The programmer who designed the games developed a structured collection of information which can be interrogated in particular ways to give information, for example, about the progress of the Russian revolution; allowing the players to develop different policy options

I am becoming something of a fanatic about the BBC Micro computer. The Basic

interpreter supplied with the machine is extremely fast and the provision of procedures and the Repeat . . . Until structure makes programs easy to develop and understand. The Basic is so fast that for many purposes it is unnecessary to use the built-in assembler.

Listing 1 shows the first few lines of a game that I have started to write called Heartstop. The player is put in the role of a junior hospital doctor and the purpose of the game is to treat a patient in a hospital Intensive Care Unit while coping with a lot of distracting pressures. I wrote this part of the program first because I wanted to see if I could display an ECG recording in the course of the game. An ECG is an Electro-cardiograph, which

IDEAS

means that it shows the electrical activity of the heart muscle. Different patterns of activity can be isolated in abnormal conditions affecting a person's heart and interpretation of both simple and complex ECGs can play a major part in treating heart attacks.

After the first introductory lines the program calls a procedure — 60 Procinit. Procedures are defined parts of a program — program modules — that carry out a particular function. You should be able to write a number of procedures that operate independently of each other by using local variables. Results from the procedure can be transmitted by global variables for use by the rest of the program. This method of constructing a program makes it easy to read and understand and even makes it possible for more than one person to work on the program with some hope that the various bits will match up at the end without producing endless bugs.

Starting to write

Lines 350 to 380 are the present definition of Procinit. As I find further things that need to be set to particular values I shall simply add instructions to that section. I could have used a straightforward GOSUB instruction at line 60 but procedures are faster and allow you to isolate variables from the main program in a way that you cannot achieve with a subroutine. Prohousekeeper is empty at present but will contain the part of the program that checks the time variable to see if the player is keeping up with the decisions that have to be made.

It will also introduce complication into the game by bleeping the doctor — you the player — with messages from the Casualty department, the Unit administrator, your bank manager and the Pharmacy and Pathology departments. Ignoring the messages will increase the risk of disaster overtaking the patient in the Intensive Care Unit, answering the message will take up valuable time — just like real life.

Procinit sets up a green rectangle in the top right corner of the BBC display and Procinitplot draws a normal ECG trace in the rectangle. The amplitude of the trace is controlled by the variable 'size' and I expect that I shall move it out of the procedure into another part of the program where the general condition of the patient is simulated and controlled on the basis of the doctor's responses.

The data statements display a normal ECG and more will be needed to display abnormal ECG traces. Comparing the values in the data statement in line 540 with the normal ECG in the picture you should be able to turn the other traces into numbers in data statements and alter the main procedures Procinit and Procinitplot to show irregular heart activity. BBC Basic allows you to Restore the pointer that is used to read a data statement to a particular line number and that may be the easiest way to choose ECG displays. ■

DRAGON 32

THE RING OF DARKNESS

The game created to be the most complete, enthralling, addictive and detailed adventure ever written for the Dragon 32. A whole graphic world (of nearly 3000 travel days) with kings, princesses, mad jesters and dangerous quests will unfold before you. Across ocean, river, mountain and forest you travel to trade in many towns and dare the depths of vast dungeons (more than 9 levels deep with over 20 different creatures in hi-res 3-D graphics), in search of fortune and the hidden curse of the Dark Ring. Many hours of mystery, suspense and raw excitement await you.

"The most impressive adventure tested . . . soon displaced breakfast TV in our house." *Your Computer* (April)

DRAGON TREK

Your starship has just entered quadrant 6-8. You are surrounded by 8 battle cruisers and the Klingon Empire. Do you fight or run? They launch a salvo of photon torpedoes. Your HIT! Get a damage report. Its OK, the shields are holding, the next move is up to you, but be quick or they will attack again. Hi-res graphics, onboard computer and lag time interaction will have you zapping Klingons till the stardate 2477.

"Excellent value for money." *Your Computer*

PEPPER'S GAME PACK

Huge blue mushrooms, mad wizards, bouncing bricks, chessboard strategy, doomed space shuttles and mind teasing codes. They're all to be found on this great compendium of six games (Mushroom Muncher, Nad the Necromancer, Pepper's Breakout, Chessboard Tracker, Chameleon Run and MasterBrain.)

ARTIST'S DESIGNER

Produce intricate designs in hi-res graphics and save them on cassette. Full list of features include text merging, joystick or keyboard control, circles, paint and shape replication. Ideal for home video captions, education, charts and diagrams.

All prices include p&p, VAT and the WINTERSOFT guarantee of quality and reliability.

WINTERSOFT
SOFTWARE

Dealer enquiries welcome
Tel: 01-367 5720

Available from  and good software outlets.

Post coupon now to:

WINTERSOFT

Dept. Y, 30 Uplands Park Road, Enfield, Middx. EN2 7PT. Please rush me copies of (tick box)

- The Ring of Darkness.....£10.00
- Dragon Trek.....£6.99
- Pepper's Game Pack.....£7.95
- Artist's Designer.....£6.99

I enclose cheque/P.O. for £

Name

Address

INTERPRETATION

AS SHAKESPEARE might have said if he were around today, "All the world's an interpreter, and the people in it just Basic sub-routines". When Basic comes across a command such as Print, or Input, these keywords set off a veritable flood of machine code sub-routines which are contained in the Basic Rom.

A small section of the whole interpreter is shown in figure 1, but hopefully you can see the manner in which Basic works — get an instruction, decode it, execute the appropriate subroutines, get the next instruction. The process is essentially the same in any high level interpreter such as Forth, Pascal, Fortran, Cobol and so on.

Command combinations

When the interpreter comes across a command such as

```
'PRINT A'
```

it might say . . .
 Is it a 'PRINT' command?
 Is it a 'PRINT' . . . command?
 Is it a 'PRINT;' command?
 IS it a 'PRINT value' command?
 Look up the value in the variable list
 Convert it into a printable form
 Print out the characters from the current cursor location
 Has a scroll or new line been incurred?
 Is the command followed by a semi-colon?

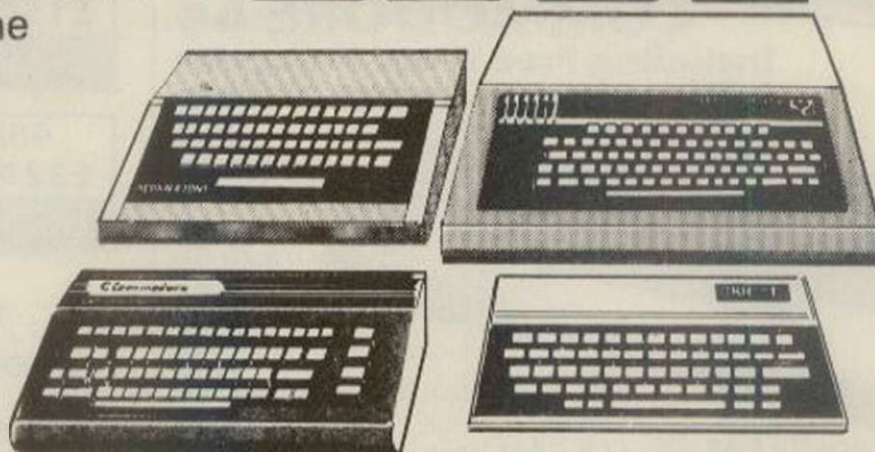
There are a large number of possible combinations for the Print command on its own, and the number of comparisons made by the processor in deciding what type of print command it has is enormous.

Why not scrap all of the decoding, and call the various subroutines as and when they are needed? A program which does this is called a compiler.

The internal workings of a compiler are quite complex, but using one is simplicity

Darryl Mattocks continues his guide to 6502 machine code.

6502



MACHINE CODE

itself. Assume that you have written a completely bug-free Basic program, you can then run a compiler which will take all of your Basic program and convert it into the same program, but in machine code.

Sounds too good to be true? It is. Unfortunately, the machine code it generates is very inefficient. The compiler has cut out most of the irrelevances, but not all. Although the program is in machine code, it is only up to 40 times faster than Basic. That is the sort

of thing you might read in adverts, a more realistic figure is that of an increase to about 15 times the speed of Basic.

Compilers are certainly worth looking at for the home user, but being only 15 times faster, they are still not up to the speeds of pure machine code.

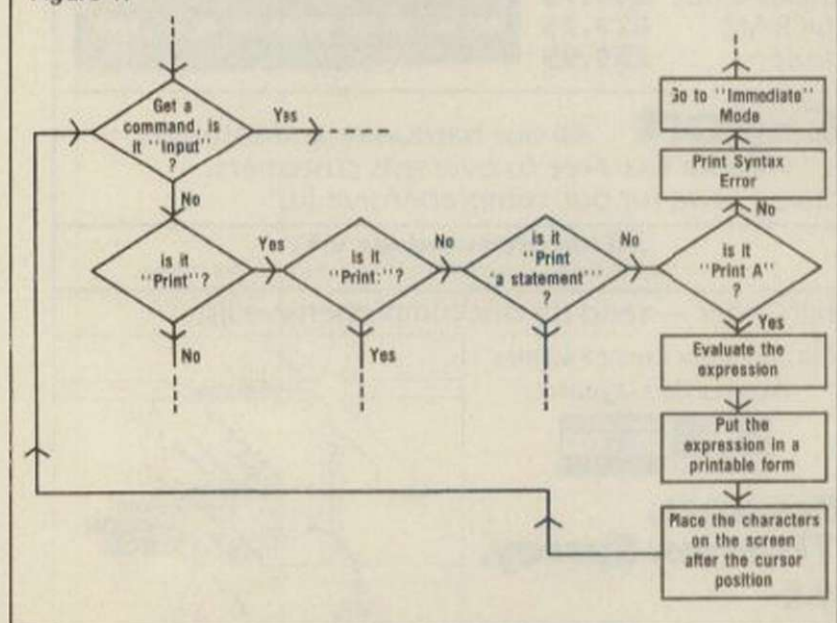
There are seven flags in the status register and one of them is the decimal flag. Unlike others such as carry, it does not form the

(continued on page 145)

```

10 REM ***COUNTING PROGRAM FOR THE CBM 64
20 READD$: IFD$="" THEN60
30 D1$=LEFT$(D$,1): D2$=RIGHT$(D$,1)
40 V=(ASC(D1$)-48+((ASC(D1$)>64)*7))*16
45 V=V+(ASC(D2$)-48+((ASC(D2$)>64)*7))
50 POKE2#4096+C,V:C=C+1:GOTO20
60 SYS8197:END
100 DATA 00,00,00,00,00,20,14,20,20,28,20
105 DATA 20,3B,20,20,67,20,4C,0B,20
110 DATA A2,00,A9,20,9D,00,04,9D,00,05,9D
115 DATA 00,06,9D,E7,06,CA,D0,F1,60
120 DATA A2,00,8D,20,D0,8D,21,D0,A9,01,A2
125 DATA 0A,9D,D9,04,CA,D0,FA,60
130 DATA F8,18,AD,00,20,69,01,8D,00,20,AD
135 DATA 01,20,69,00,8D,01,20,AD,02,20
140 DATA 69,00,8D,02,20,AD,03,20,69,00,8D
145 DATA 03,30,AD,04,20,69,00,8D,04,20
150 DATA D8,60,18
160 DATA AD,00,20,29,0F,69,30,8D,E3,04,AD
165 DATA 00,20,4A,4A,4A,4A,69,30,8D,E2,04
170 DATA AD,01,20,29,0F,69,30,8D,E1,04,AD
175 DATA 01,20,4A,4A,4A,4A,69,30,8D,E0,04
180 DATA AD,02,20,29,0F,69,30,8D,DF,04,AD
185 DATA 02,20,4A,4A,4A,4A,69,30,8D,DE,04
190 DATA AD,03,20,29,0F,69,30,8D,DD,04,AD
195 DATA 03,20,4A,4A,4A,4A,69,30,8D,DC,04
200 DATA AD,04,20,29,0F,69,30,8D,DB,04,AD
205 DATA 04,20,4A,4A,4A,4A,69,30,8D,DA,04,60,*
    
```

Figure 1.



South London's Largest
Micro Computer
Centre

VISION STORE

In Stock Now

COMMODORE 64
Including Free Word Processor
Program on Cassette or Disk.



64K
£345.00

Vic20 5k
£129.95

21k £169.95

includes 5 Free programmes.

VIC 1541 Disk Drive £299.95

16K RAM Pack £39.95

16K RAM Pack

(Expandable To 24K) £49.95

VIC Cassette £44.95

VIC Printer £229.00

Ideal for Commodore computers

NEW Seikosha GP100 VC Printer £249.95

Commodore 64 Software Now in Stock

Main Commodore Dealer for

New 500 series, New 700 series Business Computers.

ATARI 400



16K
£159.95

Less Basic

48K
£229.95

Less Basic

Programmer Kit £39.90

48k Up Grade for Atari 400 £73.50

Atari 800 48K inc

basic £469.95

Atari 410 Cassette £49.00

Atari 810 Disk

Drive £299.00

Atari 822 Printer £199.95

Plus Daisy Wheel and Dot Matrix printers
for the Atari range From £99.95

NEW

Atari 400 Typewriter keyboard. Direct easy
replacement for standard keyboard £59.95

Just Arrived...

BBC Model B £399.95

Plus Disk Drives, Printers and Software.

Texas TI99A £159.95

Plus Disk Drives, Voice Synthesizer and Software.

Epson HX-20 Portable

Plus probably the largest range of Epson software
and accessories

Epson QX-10 Business Computer

Very latest — just in.

Largest Stocks of Software in South London.
Available on Cassette, Disk or Cartridge. Massive
ranges for:
Atari, Spectrum, ZX81, BBC and Dragon.

Printers

We carry a wide range of printers including:

Amber Dot Matrix £89.95

Seikosha GP100A £229.95

Epson FX80 New 160cps £449.95

Smith-Corona Daisy Wheel £549.95

**Cables and interfaces for most home
micro's in stock.**

THE AMAZING ORIC - 1

Colour Computer

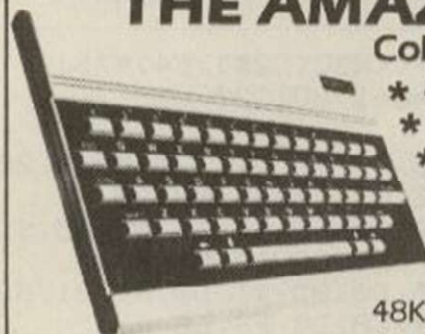
* 40 Columns x 28 rows.

* Microsoft Basic

* 8 Colours.

* Built-in Sound
Synthesiser.

* High Res Graphics.



48K Microsoft Basic £169.95

16K Microsoft Basic **Phonel**

Come in for a Demonstration.

DRAGON 32 £198.95

64K Upgrade/
Disc Drive place
your order now

Limited stocks available. New software coming in
all the time. Come in for a demo or send for our list.

Over 900 software programmes always in stock.
We carry probably the widest range with
continuous demonstrations.

We offer excellent part exchange deals or cash
for your old machine.

**3 Eden Walk Precinct,
Kingston-on-Thames, Surrey.**
Tel: 01-546 8974

Sinclair Spectrum Colour Computer

16K £124.95

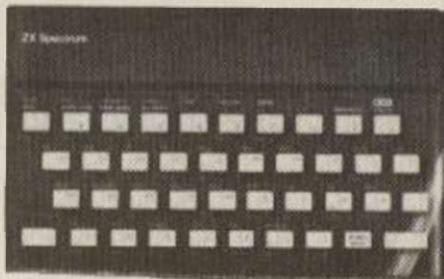
48K £174.95

We carry massive
stocks of Software
for the Spectrum.

Sinclair ZX81 £49.95

16K RAM £27.95

Printer £59.95



Export All our hardware and software
is available Tax-Free to overseas customers,
please send for our comprehensive list.

All our prices include VAT

Prices correct at time of going to press but subject to change without notice.

Mail Order — send for our comprehensive list.

Ask about our Credit Facilities
Access/Barclaycard



continued from page 143)

basis of many branches or jumps, but changes the whole operation of the 6502 processor.

Normally, we think of the computer as a binary system, with all numbers and other references appearing as multiples of two. Not when the decimal flag is set.

The same binary system operates but now instead of binary representation, a system known as Binary Coded Decimal — BCD — is used.

BCD has two features which distinguish it from the normal binary code. The first is that a byte ceases to be considered as one whole byte — eight bits — but is now just a useful way of manoeuvring two nibbles — four bits.

The second feature is that numbers are now represented literally, for example:

0100 decimal = 0000 0001 0000 0000 BCD
 0527 decimal = 0000 0101 0010 0111 BCD
 9479 decimal = 1001 0100 0111 1001 BCD

To code something into BCD all we have to do is to give each of the digits in the decimal number their corresponding binary code and string all of these four-bit codes together.

BCD representation

Adding up in BCD is somewhat easier to master. As the maximum value of any nibble is ten, the maximum value of any byte is 99 and any addition which results in a number larger than 99 sets the carry flag. All of this makes working with BCD representation much the same as ordinary addition.

Before we have a look at BCD in operation, there is one disadvantage. Any code which

uses the carry flag as a counter for anything in binary will not work at all well when the decimal flag is set. To overcome this minor setback, only set the decimal flag when the actual addition or subtraction is taking place, turn it off immediately afterwards.

Program 1 illustrates adding up in the decimal mode. Try to put the great decimal mode into action with a counting program. The program will clear the screen, colour it black and then start counting from one to one million million. Playing around, I calculated that the machine-code program takes approx seven hours to count up to 1,000,000,000,000 whereas the basic equivalent takes about two weeks. The Basic program to enter the machine code is given after the assembler listing.

COMMODORE 64

LINE#	LOC	CODE	LINE															
00001	0000					00078	2068	AD 00 20		LDA VAL1		UNIT						
00002	0000					00079	2069	29 0F		AND #X00001111		NIBBLE						
00003	0000					00080	206D	69 30		ADC #48								
00004	0000					00081	206F	0D E3 04		STA 1024+227								
00005	0000					00082	2072	AD 00 20		LDA VAL1		TENS						
00006	0000					00083	2075	4A		LSR A		NIBBLE						
00007	0000					00084	2076	4A		LSR A								
00008	0000					00085	2077	4A		LSR A								
00009	2000					00086	2078	4A		LSR A								
00010	2000					00087	2079	69 30		ADC #48								
00011	2000	00	VAL1	.BYT 0	UNITS+TEN	00088	207B	0D E2 04		STA 1024+226								
00012	2001	00	VAL2	.BYT 0	HUNDREDS+THOUSANDS	00089	207E			LDA VAL2		HUNDREDS						
00013	2002	00	VAL3	.BYT 0	ETC	00090	207E	AD 01 20		AND #X00001111		NIBBLE						
00014	2003	00	VAL4	.BYT 0		00091	2081	29 0F		ADC #48								
00015	2004	00	VAL5	.BYT 0		00092	2083	69 30		STA 1024+225								
00016	2005					00093	2085	0D E1 04		LDA VAL2		ETC						
00017	2005					00094	2088	AD 01 20		LSR A								
00018	2005					00095	208B	4A		LSR A								
00019	2005	20 14 20	START	JSR CLEAR	CLEAR SCREEN	00096	208C	4A		LSR A								
00020	2008	20 28 20		JSR COLOUR	COLOUR BYTES	00097	208D	4A		LSR A								
00021	200B					00098	209E	4A		LSR A								
00022	200B	20 3B 20	MAIN	JSR PLUS1	ADD ONE	00099	209F	69 30		ADC #48								
00023	200E	20 67 20		JSR DISP	DISPLAY	00100	2091	0D E0 04		STA 1024+224								
00024	2011	4C 0B 20		JMP MAIN	DO IT AGAIN	00101	2094			LDA VAL3								
00025	2014					00102	2094	AD 02 20		AND #X00001111								
00026	2014	A2 FF	CLEAR	LDX #255	STORE SPACES	00103	2097	29 0F		ADC #48								
00027	2016	A9 20		LDA #32	OVER SCREEN	00104	2099	69 30		STA 1024+223								
00028	2018	9D 00 04	CLR1	STA #0400,X		00105	209B	0D DF 04		LDA VAL3								
00029	2018	9D 00 05		STA #0500,X		00106	209E	AD 02 20		LSR A								
00030	201E	9D 00 06		STA #0600,X		00107	20A1	4A		LSR A								
00031	2021	9D E7 06		STA #06E7,X		00108	20A2	4A		LSR A								
00032	2024	CA		DEX		00109	20A3	4A		LSR A								
00033	2025	D0 F1		BNE CLR1		00110	20A4	4A		LSR A								
00034	2027	60		RTS		00111	20A5	69 30		ADC #48								
00035	2028					00112	20A7	6D DE 04		STA 1024+222								
00036	2028					00113	20A8			LDA VAL4								
00037	2028	A2 00	COLOUR	LDX #0	COLOUR IS BLACK	00114	20AA	AD 03 20		AND #X00001111								
00038	202A	8D 00 D0		STA 53280	BORDER COLOUR	00115	20AD	29 0F		ADC #48								
00039	202D	8D 21 D0		STA 53281	SCREEN COLOUR	00116	20AF	69 30		STA 1024+221								
00040	2030	A9 01		LDA #1		00117	20B1	0D DD 04		LDA VAL4								
00041	2032	A2 0C		LDX #12	NUMBERS WHITE	00118	20B4	AD 03 20		LSR A								
00042	2034	9D D9 04	COL1	STA 1024+217,X		00119	20B7	4A		LSR A								
00043	2037	CA		DEX		00120	20B8	4A		LSR A								
00044	2038	D0 FA		BNE COL1		00121	20B9	4A		LSR A								
00045	203A	60		RTS		00122	20BA	4A		LSR A								
00046	203B					00123	20BB	69 30		ADC #48								
00047	203B					00124	20BD	0D DC 04		STA 1024+220								
00048	203B	F8	PLUS1	SED	DECIMAL ON	00125	20C0			LDA VAL5								
00049	203C	18		CLC		00126	20C0	FD 04 20		AND #X00001111								
00050	203D					00127	20C3	29 0F		ADC #48								
00051	203D	AD 00 20		LDA VAL1	ADD 1 TO UNITS	00128	20C5	69 30		STA 1024+219								
00052	2040	69 01		ADC #1		00129	20C7	0D DB 04		LDA VAL5								
00053	2042	8D 00 20		STA VAL1		00130	20CA	FD 04 20		LSR A								
00054	2045					00131	20CD	4A		LSR A								
00055	2045	AD 01 20		LDA VAL2	CARRY FROM THE	00132	20CE	4A		LSR A								
00056	2048	69 00		ADC #0	TENS NIBBLE ?	00133	20CF	4A		LSR A								
00057	204A	8D 01 20		STA VAL2		00134	20D0	4A		LSR A								
00058	204D					00135	20D1	69 30		ADC #48								
00059	204D	AD 02 20		LDA VAL3	CARRY FROM THE	00136	20D3	0D DA 04		STA 1024+218								
00060	2050	69 00		ADC #0	THOUSANDS	00137	20D6			RTS								
00061	2052	8D 02 20		STA VAL3	NIBBLE	00138	20D6	60										
00062	2055					00139	20D7											
00063	2055	AD 03 20		LDA VAL4	HUNDRED	00140	20D7											
00064	2058	69 00		ADC #0	THOUSANDS ?	00141	20D7											
00065	205A	8D 03 20		STA VAL4		00142	20D7			.END								
00066	205D																	
00067	205D	AD 04 20		LDA VAL5	ETC													
00068	2060	69 00		ADC #0														
00069	2062	8D 04 20		STA VAL5														
00070	2065																	
00071	2065	D8		CLD														
00072	2066	60		RTS														
00073	2067																	
00074	2067																	
00075	2067																	
00076	2067	18	DISP	CLC														
00077	2068																	

(continued on page 147)

If you can buy it cheaper we'll refund the difference.*

This month's offer is another winner — a consignment of 14" R.G.B. colour monitors manufactured by J.V.C. — at prices never seen before in the U.K. Suitable for use with BBC Micro,

Lynx, Oric, Apple II, Apple III and IBM etc. It's safe to put a cheque in the post today. Because, if you find someone who's cheaper, we'll refund the difference.

RGB MEDIUM RES £199.00

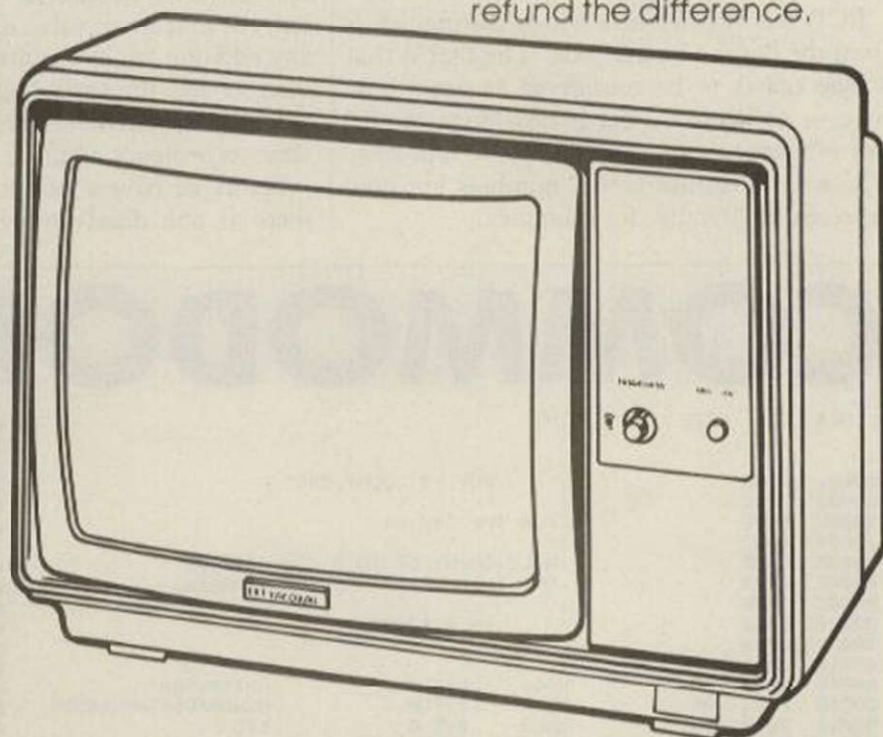
Resolution, 370 x 235. Pixels.
Display, 80 characters x 25 lines. Slot Pitch 63mm.
Input, Video — RGB Analogue with TTL input.
SYNC — Separate SYNC on RGB. Features, On/Off switch with pilot light. Brightness control.
Power 220/240V 50/60HZ.

RGB HIGH RES £299.00

Resolution, 580 x 235 Pixels.
Display, 80 characters x 25 lines. Slot pitch 41mm.
Input, Video — RGB Analogue with TTL input
SYNC — Separate SYNC ON RGB.
Features, On/Off switch with pilot light.
Brightness control. Power, 220/240V 50/60HZ

IBM COMPATIBLE £349.00

Spec as above with IBM Interface.



TEAC DISC DRIVES

TEAC 55F — 5 1/4" D/S 80 track. Formatted single density 400K Double density 800K. **only £229.00**

Case to hold two drives with power supply and blanking plate. **only £39.95**

Ribbon lead to connect one drive to BBC. **£12.00**

Dual Ribbon lead **£15.00**

Power lead to connect one drive to BBC. **£5.00**

Ideal for use with BBC Micro. Full warranty. Low power consumption. Slimline latest technology. Switchable 40/80 track.

CANON DISC DRIVES

MDD 6106 5 1/4" S/S 40 track. Formatted single density 100K. Double density 200K. **£129.95**

Case to hold single drive. **£9.95**

Leads as with TEAC DRIVES

THE ORGANIZER DESK

At last a desk designed for the personal user. Full size desk. Suitable for all leading micros. On castors. Teak finish. DEALER ENQUIRIES INVITED. **only £49.50**

DOGFIGHT

If you have a BBC 32K with any O.S. become a flying ace with our wonderful new game Dogfight. An exciting 2 player game with 8 levels of difficulty. **only £8.65**

12" GREEN SCREEN MONITOR

One year warranty, ex stock delivery, 18 MHZ, Phono connector. Limited quantity. **only £69.95**

Lead to connect to BBC **£5.95**

NASHUA FLOPPY DISCS

Minis		8" Discs	
S/S S/D	£16.95 for 10	S/S S/D	£17.95 for 10
S/S D/D	£19.95 for 10	S/S D/D	£23.95 for 10
D/S D/D	£22.95 for 10	D/S D/D	£24.95 for 10
S/S 80 Track	£24.95 for 10		
D/S 80 Track	£26.95 for 10		

With full 5 year warranty. All mini discs have hub rings and a FREE plastic library case.

8" DISC DRIVES SHUGART COMPATIBLE

FD514 S/S Dual density. Formatted 600K Byte **only £149.00**

FD650 D/S Dual density. Formatted 1.2M Byte **only £199.50**

Pertec 90 day warranty.

Case to hold 2 drives — complete with power supply and fan. **only £99.95**

VIEW DATA TERMINALS

Prestel, Built in modem. G.P.O. approved, slimline design. **only £199.00**

*Our price pledge only applies to the JVC monitor

To order: Add carriage at the following rates:—
Discs 85p. Other goods £7.00. Add VAT at 15% to total and send your order to:

OPUS SUPPLIES

158, Camberwell Road, London SE5 0EE
Tel: 01-701-8668 (3 lines) 01-703-6155/6/7



Government and educational orders welcome.



(continued from page 145)

```

LINE# LOC  CODE      LINE
00001 0000          ; PUT "BCD ADD.SRC"
00002 0000          ;
00003 0000          ; THIS PROGRAM RUNS ON A CBM 64.
00004 0000          ;
00005 0000          ; THE ACTUAL ADDING UP IS MUCH THE
00006 0000          ; SAME AS IN THE NORMAL, BINARY, MODE
00007 0000          ; THE MAIN DIFFERENCE IS THAT NOW
00008 0000          ; THE VALUE IN THE HI-BYTES
00009 0000          ; REPRESENT MULTIPLES OF 100 OF THE
00010 0000          ; LO-BYTES INSTEAD OF 256 TIMES.
00011 0000          ;
00012 0000          ;
00013 0000          ; TO ADD THE NUMBER STORED IN NUMLO
00014 0000          ; AND NUMHI TO THE NUMBER CONTAINED
00015 0000          ; IN THE ANSLO AND ANSHI PAIR.
00016 0000          ;
00017 0000          ;
00018 0000          ;
00019 0000          ;
00020 2000          * = $2000
00021 2000 34      NUMLO .BYT #34
00022 2001 87      NUMHI .BYT #87          ; = 8734 DECIMAL
00023 2002          ;
00024 2002 28      ANSLO .BYT #28
00025 2003 89      ANSHI .BYT #89          ; = 8928 DECIMAL
00026 2004          ;
00027 2004          ;
00028 2004 F8      START SED          ; DECIMAL MODE ON
00029 2005 18      CLC
00030 2006 AD 02 20 LDA ANSLO          ; ADD THE
00031 2009 6D 00 20 ADC NUMLO          ; LO-BYTES
00032 200C 8D 02 20 STA ANSLO
00033 200F          ;
00034 200F AD 03 20 LDA ANSHI          ; AND THE
00035 2012 6D 01 20 ADC NUMHI          ; HI-BYTES
00036 2015 8D 03 20 STA ANSHI
00037 2018          ;
00038 2018          ; ANSWER IS IN ANSLO AND ANSHI
00039 2018          ;
00040 2018 D8      CLD          ; DECIMAL MODE OFF
00041 2019 60      RTS          ; RETURN TO BASIC
00042 201A          ;
00043 201A          .END

```

ERRORS = 00000

SYMBOL TABLE

```

SYMBOL VALUE
ANSHI 2003 ANSLO 2002 NUMHI 2001 NUMLO 2000
START 2004

END OF ASSEMBLY

2 REM FOR THE CBM 64
3 REM ***GET SCREEN COLOURS
5 POKE53280,0:POKE53281,0:PRINT"END"
10 REM ***POKE IN MACHINE CODE
20 READD$:IFD$=""THEN200
30 D1$=LEFT$(D$,1):D2$=RIGHT$(D$,1)
40 V=(ASC(D1$)-48+((ASC(D1$)>64)*7))*16+(ASC(D2$)-48+((ASC(D2$)>64)*7))
50 POKE2#4096+C,V:C=C+1:GOTO20
60 REM ***MACHINE CODE DATA
100 DATA 34,87,28,09,F8,18,AD,02,20,6D,00,20,8D,02,20
110 DATA AD,03,20,6D,01,20,8D,03,20,D8,60,*
120 REM ***CONVERTS INPUTED DATA TO BCD
130 REM ***FIRST NUMBER TO BE ADDED
200 PRINT"FIRST NUMBER"
201 PRINT" UNITS":GOSUB400:POKE2#4096,R
210 PRINT" TENS":GOSUB400:POKE2#4096,PEEK(2#4096)+R#16
220 PRINT" HUNDREDS":GOSUB400:POKE2#4096+1,R
230 PRINT" THALSANDS":GOSUB400:POKE2#4096+1,PEEK(2#4096+1)+R#16
235 PRINT
236 REM ***SECOND NUMBER
240 PRINT"SECOND NUMBER"
241 PRINT" UNITS":GOSUB400:POKE2#4096+2,R
250 PRINT" TENS":GOSUB400:POKE2#4096+2,PEEK(2#4096+2)+R#16
260 PRINT" HUNDREDS":GOSUB400:POKE2#4096+3,R
270 PRINT" THALSANDS":GOSUB400:POKE2#4096+3,PEEK(2#4096+3)+R#16
280 SYS 2#4096+4
290 PRINT
295 REM ***ANSWER IN BCD TO DECIMAL
300 PRINT"ANSWER IS"
301 PRINT" UNITS":PEEK(2#4096+2) AND 15
310 PRINT" TENS":(PEEK(2#4096+2)/16) AND 15
320 PRINT" HUNDREDS":PEEK(2#4096+3) AND 15
330 PRINT" THALSANDS":(PEEK(2#4096+3)/16) AND 15
340 PRINT"XXXXXXXXX AGAIN ,1 FOR YES, 9 FOR NO":GOSUB400:IFC<>9THENRUN200
350 END
399 REM ***SELECTIVE INPUT ROUTINE
400 GETA$:IFAS$=""THEN400
410 IFASC(A$)<48 OR ASC(A$)>57THEN400
420 A$=VAL(A$):PRINTA$:RETURN

```

READY.

STOP

USING SCRAPS OF PAPER

STOP

LOSING PROGRAMS

PROGRAMMERS AIDS

BASIC CODING PAD (75)

MACHINE CODE PAD (75)

SCREEN LAYOUT PAD (50)

PLUS FREE COLOURED PENS

£7.50

Use Professionally Designed Universal Computer Stationery Pads

BOTH PACKS FOR £13.95

LIBRARY CATALOGUE SYSTEM

INDEX FORMS (10)

CASSETTE REGISTERS (50)

FILE DETAILS (100)

£7.50

PLUS FREE DELUXE BINDER

START

IMPROVING YOUR PROGRAM

START

SECURING YOUR LIBRARY

Qty	Price	Total
Programmers Aids	£7.50	
Catalogue System	£7.50	
Both Packs	£13.95	
Plus Post & Parking		1.00
		£

Name: _____

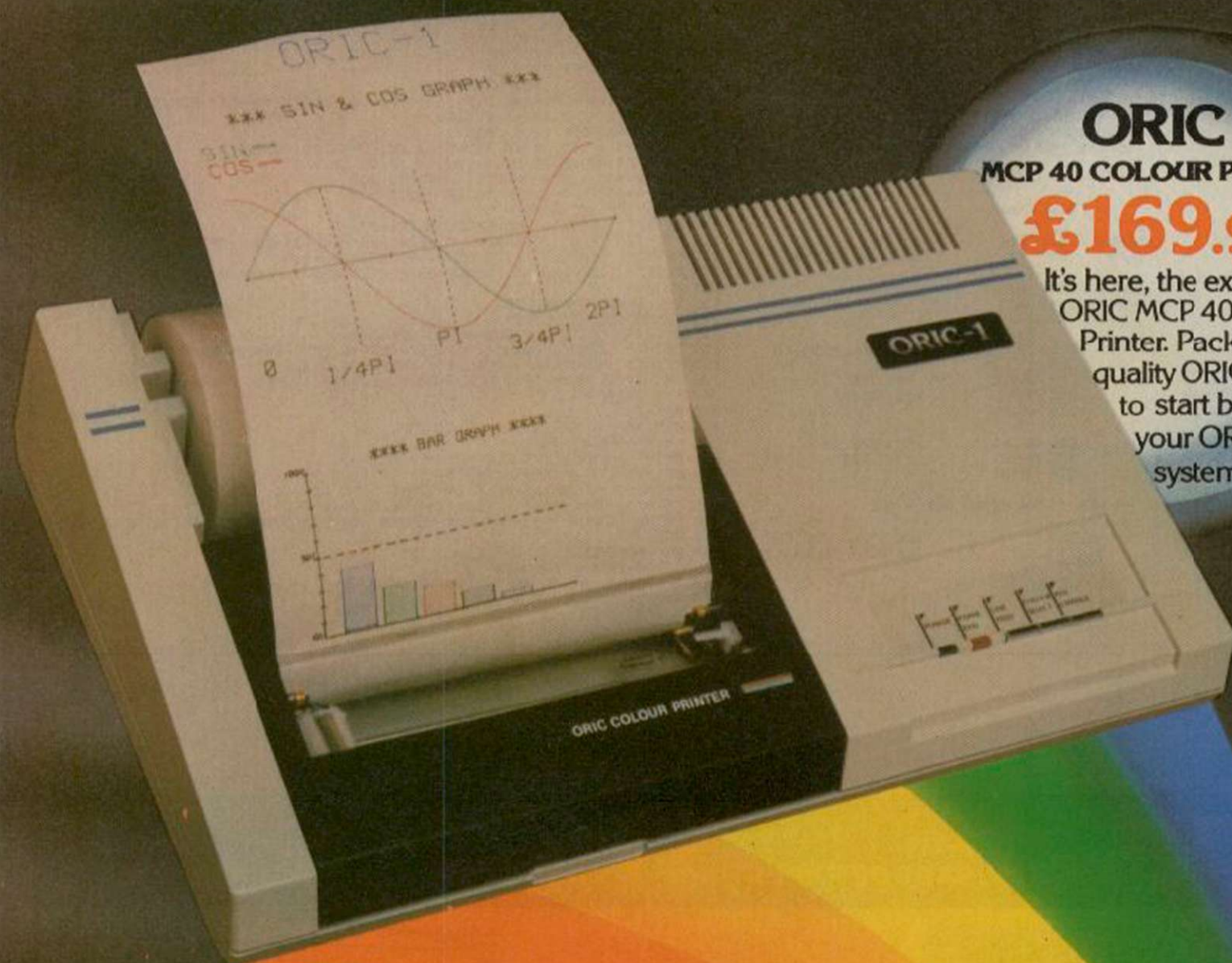
Address: _____

Post Code: _____

Send to: Diamondsoft Limited,
FREEPOST, Cheadle Hulme,
Cheadle, Cheshire SK8 5YB.
Tel: 061-485 8705 (24 hrs.)

diamondsoft
A better way of computing

ORIC MCP 40 COLOUR PRINTER



ORIC
MCP 40 COLOUR PRINTER

£169.95 incl.VAT.

It's here, the exciting new ORIC MCP 40, Colour-Printer. Packed with quality ORIC features to start building your ORIC system.

Superbly styled and quality engineered to provide 4 colour hard copy, for home and business use.

Just look at these leading features:

- **Quality hard copy on plain paper**
- **Superb graphics and text capability**
- **Prints 4 colours – Red, Green, Blue and Black**
- **Designed to match the futuristic style of ORIC 1**
- **Plugs straight into your ORIC – printer lead supplied**

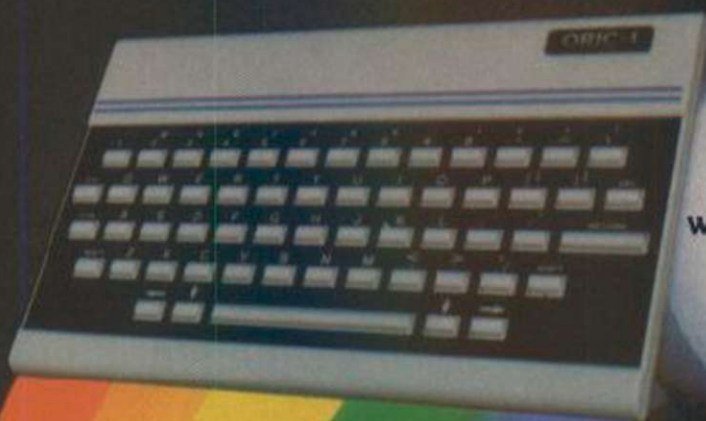
ORIC

The ORIC MCP 40 – Setting new standards in Micro Computer Printers. ORIC The Real Computer System

ORIC PRODUCTS INTERNATIONAL LTD Coworth Park Mansion, Coworth Park, London Road, Sunninghill, Ascot, Berks. SL5 7SE

ORIC products available from:-
WH SMITH · DIXONS · GREENS · LASKYS · MICRO'C'
· MICRO PERIPHERALS · SPECTRUM · COMPUTERS FOR ALL
and hundreds of independent dealers.

ORIC-1 16K & 48K



**ORIC-1 16K
VALUE PACK**
ORIC 16K plus £30*
worth of ORIC Software
for ONLY
£129.95 incl.VAT.

*TEACH YOURSELF BASIC
HOME FINANCE ORIC FLIGHT
MULTI-GAMES



**ORIC-1 48K
VALUE PACK**
ORIC 48K plus £40*
worth of ORIC Software
for ONLY
£169.95 incl.VAT.

*TEACH YOURSELF BASIC
HOME FINANCE ORIC FLIGHT
MULTI-GAMES

ORIC 1 16K & 48K Micros

- **Superb Styling**
- **Ergonomic keyboard with 57 moving keys**
- **28 rows x 40 characters high resolution**
- **Teletext/Viewdata compatible graphics**
- **6 Octaves of real sound plus HI*FI output**
- **Centronics printer interface and cassette port**
- **Free user manual, cassette recorder lead and Driver game included.**

ORIC 1 Today's best value in real computer systems.

To be launched within the next few weeks - the revolutionary ORIC 3" MICRO FLOPPY DISK DRIVES, with incredible access time and data storage capacity.

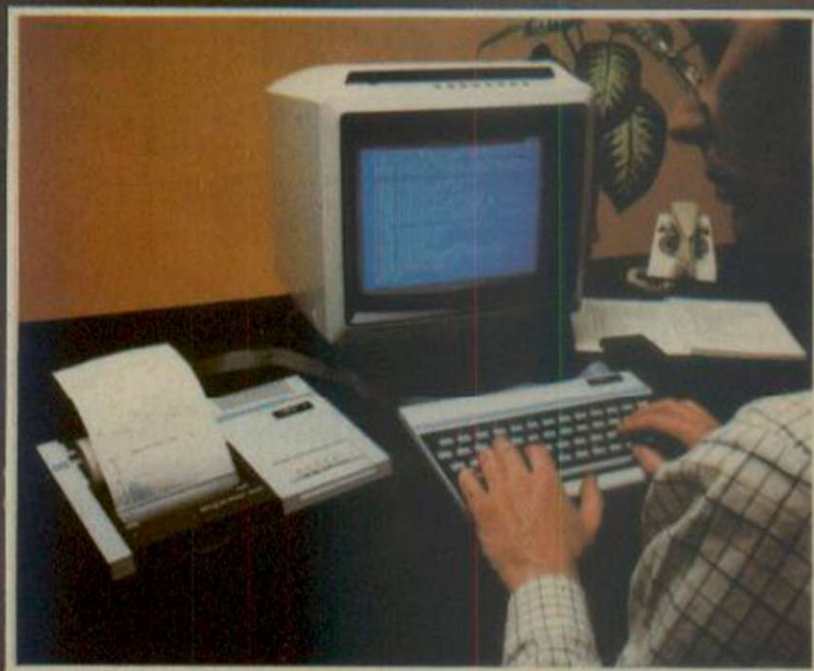
Other peripherals to be launched this year...

It is Oric's policy to continue to expand our product range, in order to offer our customers a comprehensive, professional, Micro Computer system, at a realistic price.

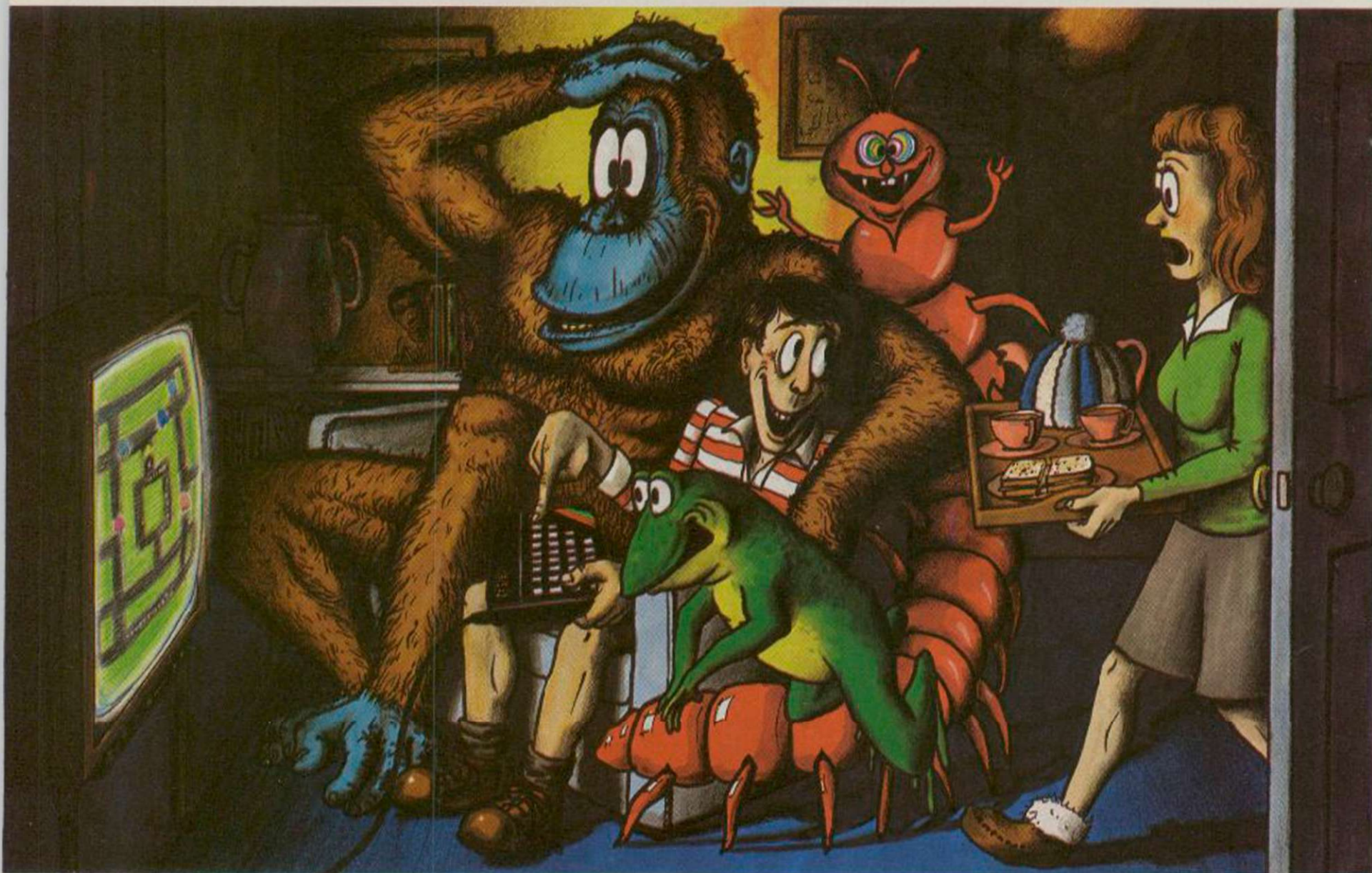
We believe that with the launch of our MCP 40 colour printer, and our combined computer/software value packs, we will continue to lead the small micro market in both quality and value.

*Titles may vary subject to availability but the approximate value will not.

© Copyright ORIC PRODUCTS INTERNATIONAL 1983



INVITE SOME NEW FRIENDS ROUND TONIGHT



FROM C-TECH SOFTWARE

SELECTED LINES AVAILABLE AT JOHN MENZIES • W.H. SMITHS AND ALL GOOD COMPUTER SHOPS



SUPER CENTIPEDE and PAINTER

Super Centipede is a full colour machine code arcade game where the object is to defend yourself with your laser against a fast moving centipede which weaves in and out of the mushroom patch. Beware of the man eating spider!

Painter-You must diffuse the time bombs in numerical order whilst leaving a trail but you must not cross your path.

For 16K/48K Spectrum £5.50



FROGGER and SPECMAN

Specman has great machine code graphics with 3 to 5 ghosts, power pills and a real munchie man who munches in all directions.

Frogger-2 screen superb representation with full colour Hi-Res Frogs, Cars, Roads, Logs, Turtles and riverbank with super sound effects.

For 16K/48K Spectrum £5.50

FIGHTER PILOT & CITY BOMBER

This is an ingenious program for the Dragon 32. It begins with a briefing session giving details of the several attack waves and shows you pictures of the aircraft including Messerschmidt and Junkers. You have to get the aeroplanes within your sights and shoot them down. There is a parachuting sequence. It makes full use of Hi-Res graphics, colour and sound. All this for £5.50

KRAZY KONG

100% machine code program featuring 3 screens of Hi-Res Gorilla, Barrels, Fireballs, Conveyor Belts and a running and jumping man who must rescue his girlfriend from the enraged Kong.

For the 48K Spectrum £5.50

RING OUR TELESales NOW

061-366 8223



PLEASE SEND ME THE FOLLOWING

NAME ADDRESS

I enclose cheque/PO payable to C-TECH SOFTWARE

TOTAL £

• 184 MARKET ST • HYDE • CHESHIRE • SK14 1EX

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".

SUMMER CAMP

■ I have read in American computing magazines about summer camps which concentrate on computer use. Is there anything like that in the U.K.?

Malcolm Parks,
Amersham.

CAMP BEAUMONT runs camps in London, East Sussex, Devon and the Lake District for four to fifteen-year-olds. As well as the normal sporting and recreational activities, each camp features a computer centre where half of each day is spent working on a computer for each person. The computer activities, as well as instruction in Basic programming, include films and lectures. For the more advanced computer users there are one, two and three week projects on robotics and artificial intelligence, including the use of machine code. Both residential and non-residential camps are available. You can get more information from Beaumont Summer Camps, 73 Upper Richmond Road, London, SW15 2SZ. Telephone 01-870 9866.

ANAGRAM

■ I am the owner of a 48K Spectrum and have been trying unsuccessfully to write a program for working out anagrams, that is to print out a seven-letter word and every combination of the seven letters on the screen. I would be most grateful if you could help.

G Smith,
Tyne and Wear.

ONE WAY to tackle this would be to use the Sinclair's string-slicing facilities to break the word down into seven separate characters, and take the code of each and place these in elements of an array. Then you could use the random number generator to randomly mix the elements of the array, finally printing out the word using CHR\$. You will need two loops, one inside the other, to ensure that each element of the array is only used once in each anagram.

ORIC QUERY

■ I have owned a ZX-81 for about a year now and recently decided to buy an Oric 1. On going to shops such as Dixons and WH Smith to buy directly rather than by mail order, I was told that the stores only stocked the 48K model. Wanting a 16K

rather than a 48K version I was rather disappointed. On further enquiry at one shop I was told if I ordered a 16K version by mail I would be sent a 48K machine and asked to pay the difference. Is this true? Do I have to buy a 48K machine?

T Zahoui,
Shoreham.

ORIC'S PR company, in rather guarded replies to my queries, said "most of the 16K production has gone to Europe but Tangerine is selling a few by mail order". At present, if you order a 16K by mail order, you may be sent a 48K Oric "on loan", with the idea that when the 16K becomes available you will be given the option of swapping your 48K for the 16K, or of paying the difference. When I bought an Oric by phone when they were first advertised last October, I ordered the 16K, but received a 48K, my credit card was debited for a 48K machine, and no "downgrade option" was offered. Oric assure me this was a mistake. Ian Osborn of Norfolk wrote to ask if it was possible to buy a 16K model now, with the idea of buying an upgrade kit to make his Oric 48K in due course. Oric's PR company says that "no expansion is possible for the Oric".

DISABLED HELP

■ My 14-year-old son is disabled, but wants very much to be able to use a computer. Our local computer shop has been most sympathetic and has tried to help, but have been unable to make any specific suggestions on how we can equip a microcomputer so that my son can use it. Is there a resource centre we can turn to?

Mrs K Jones,
Edinburgh.

UNFORTUNATELY, you do not mention the nature of your son's disability, which limits somewhat the advice I can give. I have heard from a number of people over the past two years with disabilities — generally involving limited movement and control skills — who have managed to find satisfactory ways of operating their computers. Electriad, New Street, Aylesbury (0296) 87309 should be able to assist you, particularly in respect of use of Commodore computers such as the Vic-20.

You may also like to contact the Disabled Advice Service, Atheldene Community Centre, Garratt Lane, London, SW18, 01-870 7437, and the Disabled Living Foundation, 346 Kensington High Street,

London W14, 01-602 2491. Contact a Family is a organisation which links up parents throughout the U.K. who have a handicapped child living with them at home. One of the fathers associated with the organisation is a computer buff who has set up a scheme called CAFCAL — Contact a Family Computer Assisted Learning. The scheme is based around the Vic-20 and is building up a library of suitable programs. You can contact the group at 16 Strutton Ground, Victoria, London, SW1 P2HP 01-222 2695. CAFCAL welcomes suitable educational programs from any Vic-20 users.

TEXAS PRINTER

■ I have recently bought a Texas Instruments TI-99/4A computer and I want to connect a printer to it. I have been told by one shop that although there is a Texas printer, it is not yet available in the U.K. Is this true, and if so, what printer can I buy which is suitable for my computer?

Scott Shaw,
Hounslow.

CONNECTING a printer to the TI-99/4A is a rather involved and expensive process. The official TI printer retails for £481 but is not currently available in the U.K. Before you can connect any printer, including the Texas one, to the computer you need to buy a peripheral expansion box for £159 and the TI RS-232 interface which costs £117. Once you have these, any printer which connects with an RS-232 interface will work, such as the dot matrix printers made by Epson — these start around £400. Texas peripherals are available by mail from Landau Electronics, Lion House, 227 Tottenham Court Road, London, WC2. You can check on availability by phoning them on 01-580 7383, extension 28. Texas tells me that a range of cheaper peripherals will be available "real soon". These are designed for the TI pocket computer, the CC-40. An adaptor will be available to connect these to the TI-99/4A.

FAST DEFENDER

■ I have written a simple Defender program on my ZX-81. However, it runs too slowly to be much of a game. How can I speed it up?

Andrew Marsden,
London W4.

THE SHORTEST, and best answer, would be to learn machine code, and then rewrite the program in machine code, rather than Basic. However, this is not an easy task although it is a skill you should seriously consider acquiring. The way in which your Basic program is written; that is, the order of the lines, and the things you get your computer to do, such as raising numbers to a power, or

making decisions all have an effect on the running speed of the program. Try to write it so you make as few decisions as possible. Generate as few random numbers as possible — you may be able to generate just one random number each time the program cycles, and use this in different places. Try to make the program run in a clear loop, with a single Goto at the end of the major loop. An alternative to a Goto is a vast For-Next loop which contains a much higher number than you are likely to need — such as For A = 1 to 100,000. Finally, make the first line of your program Poke 16389,75 to slightly speed the computer up.

NEED TO KNOW

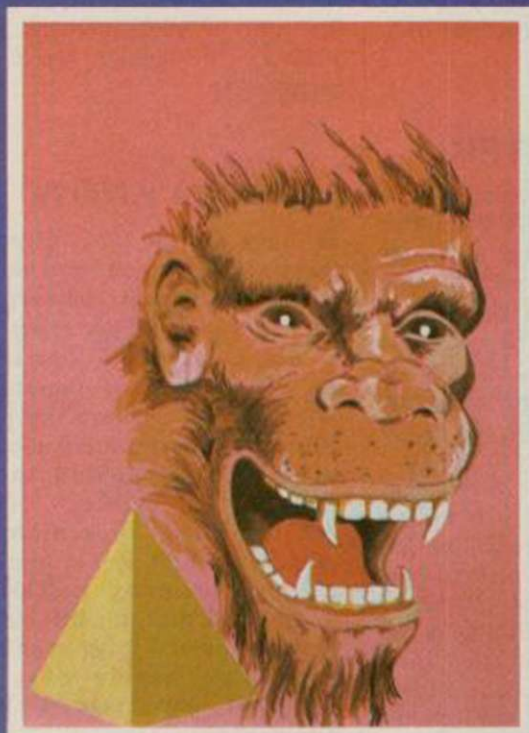
■ I have had my BBC Micro for five weeks now, and have bought some commercial software for it. The quality of the tapes I've bought is very high, but I find the programs most depressing. Why? simply because my puny efforts at programming seem so weak when compared to the effects possible from accomplished programmers. What is the best way to improve my programming quickly? I should add that the BBC is the first computer I have ever had, and I am barely past the For-Next loop stage of Basic programming.

Colin Chelton,
Southampton.

THE OLD ADAGE about learning to walk before you try to run holds true for programming. The learning curve for Basic is fairly steep at the beginning, but soon evens out to a very gradual rise. You sound as if you are past the worst already. The three best ways to improve your programming are to get in touch with a local users' group, join one of the national user clubs, and read some books on the subject. An advertisement in your local newspaper, or a notice in a computer shop — such as your nearest BBC Micro dealers — should uncover other users in your area. The two national clubs are Laserbug, 10 Dawley Ride; Colnebrook, Slough, Berkshire, SL3 0QH, Beebug, 374 Wandsworth Road, London SW8 4TE. There are many, many books for the BBC Micro. One of the latest is *The BBC Micro Book — Basic, Sound and Graphics* by McGregor and Watt, published by Addison-Wesley. Others include *APL for the BBC Micro*, *The BBC Micro, An Expert Guide*, *Instant BBC Micro Machine Code*, *The BBC Micro Revealed*, *Easy Programming for your BBC Micro*, *The BBC Micro Compendium*, *Games BBC Computers Play*, *The Book of Listings*, *Let your BBC Micro Teach You to Program*, *Practical Programs for the BBC Computer and Acorn Atom*, *30+ Programs for the BBC Micro*, and *30 Hour Basic*. ■

P.S.S. THE FUTURE

CREATING FANTASIES FOR DRAGON AND NOW



KRAZY KONG

All machine code version of the popular arcade game. This program has all the features of the original and is every bit as fast. 3 different screens make it difficult to beat.

ZX81 16K

3.95



HOPPER

Can you help Fergy and his friends get across the 4 lane highway and back to the lilly pond? Includes Crocodiles, Logs, varying traffic speed etc.

ZX81 16K

3.95

ORIC 48K

6.95



CENTIPEDE

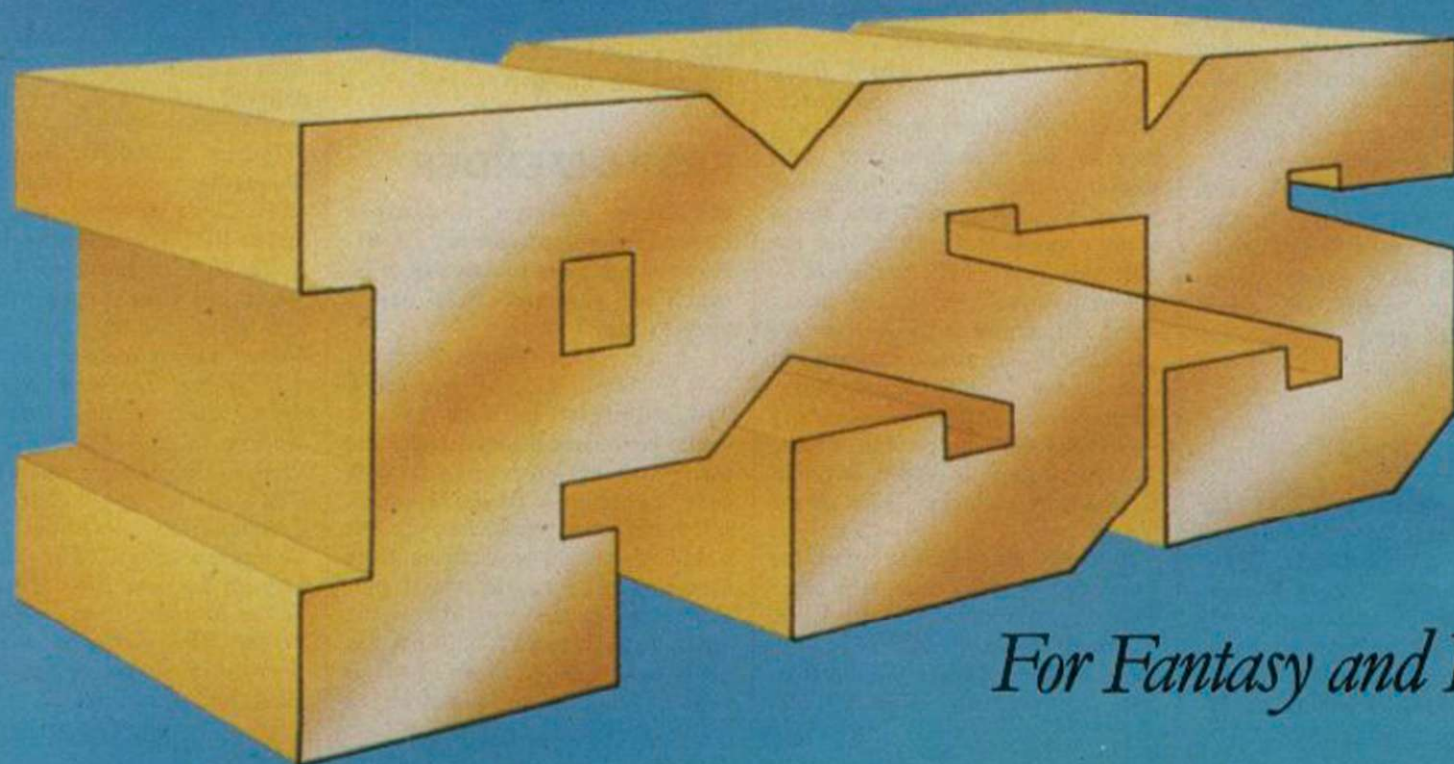
All machine code - very fast - Superb graphics "Better than the original."

ORIC 48K

6.95

BBC A OR B

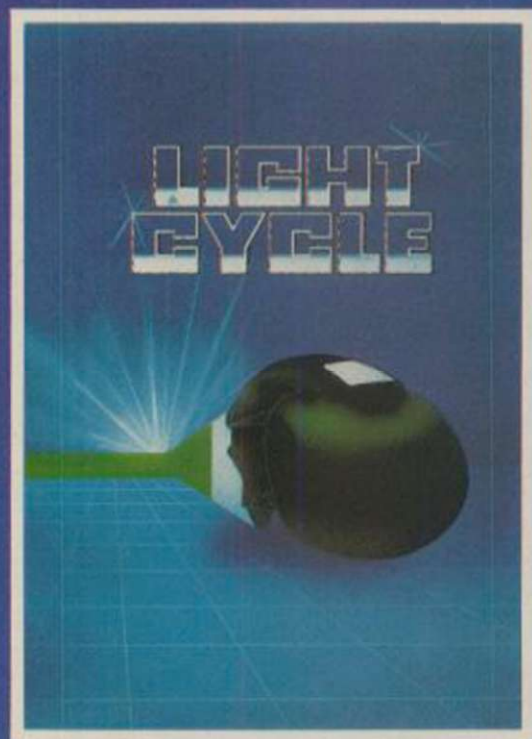
6.95



For Fantasy and Reality

MAKERS

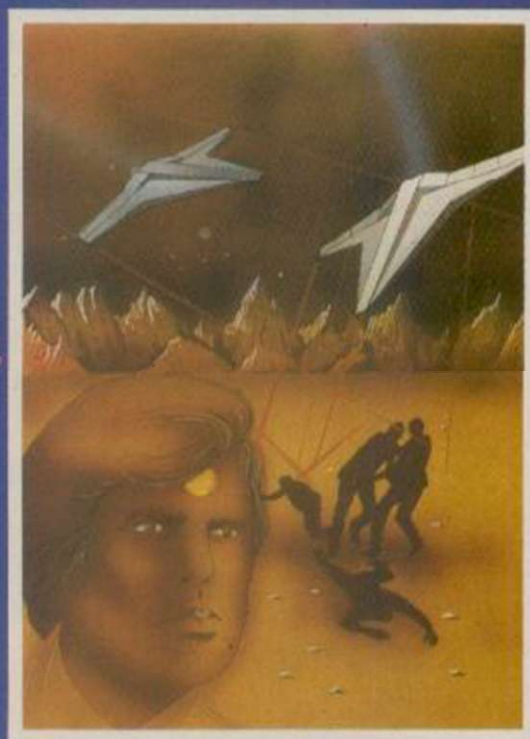
ZX81, SPECTRUM, ORIC AND BBC



LIGHT CYCLE

All the speed and excitement you could want, very addictive. Race and block the computer or another player.

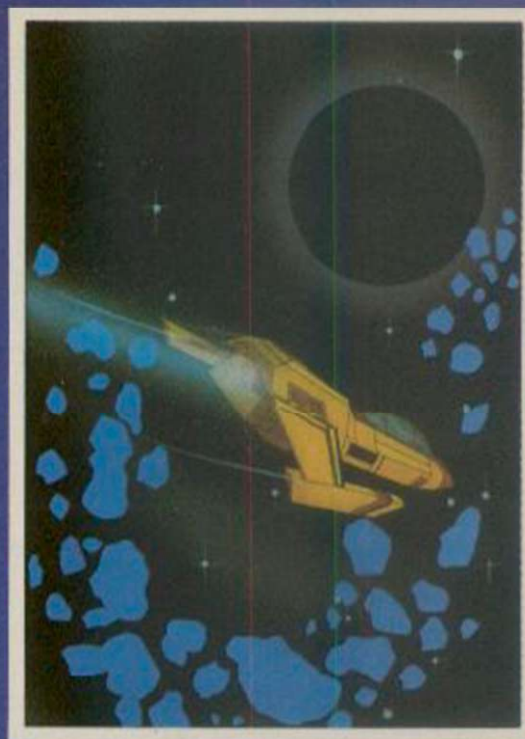
SPECTRUM 16K 48K 5.95



ATTACK

Attack is a super fast, all machine code arcade style game. You are the Chief Security Officer on the prison planet 'KOVENTRI' where all the captured space invaders are kept until a humane way of dealing with them can be found. There has been a major breakout and it is a race against time to stun the invaders and return them to the compound. After being in the open too long they mutate and become much fiercer. See how long you can keep them all locked up.

DRAGON 7.95



DEEP SPACE

Alarms begin humming loudly as warning lights flash at you from the computer control console of your ASTRO-CRUISER.

Within seconds a huge ball of destruction explodes outside your observation port, battering the ship violently.

A quick check of your tracking screen shows you to be entering one of the worst space storms ever recorded in that quadrant.

Your only defence is your skill with the laser cannon.

We DARE you to take control and fight your way to safety.

Unless you can blast a way through your ship will be crushed.

SPECTRUM 48K 5.95



INVADERS

At last the version you have been looking for. Quite simply unbeatable.

ORIC 48K 6.95

BBC A OR B 6.95

SEND CHEQUE OR P.O.
TO P.S.S. 452 STONEY STANTON RD. COVENTRY CV6 5DG.
FOR INSTANT CREDIT CARD SALES TEL (0203)667556

TRADE ENQUIRIES CONTACT JOHN FLETCHER, COVENTRY (0203) 667556

Although the NewBrain is conceived as a total system, the unexpanded Processor itself has a great deal to offer. It is available in two forms: Model AD, shown below, with a built-in line display; and Model A, without the line display. Both models can operate with a monitor or a television set.

MEMORY

- 24K bytes of ROM;
- 32 bytes of RAM, at least 28K of which is available to the user.

THE SCREEN DISPLAY

- 40 or 80 characters to the line – without affecting the 28K bytes of RAM at your disposal;
- 24 or 30 lines to the screen;
- well-formed characters, with true descenders;
- a full European character set;
- normal or reverse video, high resolution graphics on screen of controllable size, 256, 320, 512 or 640 horizontal resolution by 250 vertical lines;
- a facility to set up a "page" of up to 255 lines, with the screen acting as a "window" to display it;
- ability to maintain several such pages simultaneously, and to switch rapidly between them;
- text may be used on graphics screen as well as on parts of the video screen not used by graphics.

CHARACTER SET

- 512 characters, including the full ASCII set, all European accented characters, Greek and graphics symbols.

GRAPHICS

- 20 powerful graphics commands;
- all text characters usable on the graphics screen;
- variable-sized graphics screen, with the rest of the screen available for text – for versatility and to save memory.

SOFTWARE

Enhanced ANSI BASIC; screen editor (32 commands); mathematics package (10 significant figures); graphics commands.

- a very friendly screen editor – a delight to use and readily adapted to text processing;
- arithmetic to 10 significant figures;
- very controllable output formatting of numbers – invaluable for accounting, statistics, and scientific applications;
- a powerful, much enhanced BASIC;
- a very flexible operating system, which allows any data stream to be opened to any device.

INTERFACES

- two tape cassette ports built into the processor unit;
- a built-in printer interface;
- a built-in communications interface (V24/RS232);
- a video monitor interface;
- a TV interface;
- an expansion interface for NewBrain system expansion modules.

KEYBOARD

- standard typewriter pitch, action, layout and size, with editing control and graphics keys.



CP/M IS A REGISTERED TRADE MARK OF DIGITAL RESEARCH INC.

You can get everything in the box on the

If you understand the facts and figures on the left you'll soon realise that NewBrain has to be one of the most powerful micros around.

However, if you find the box on the left a little hard to follow, don't worry.

We've got over 120 dealers nationwide who've got all the answers at their fingertips.

Either way you'll discover that NewBrain is the kind of micro that will stop the competition getting a look in.

At £269 it starts off with twice as much memory as most of its competitors and can expand to over thirty times that amount. So there's no chance of being left behind in the micro race.

It comes with a very powerful language (enhanced ANSI BASIC) and it'll take CP/M, so it'll work on the same system as similar big business micros, giving you the capacity to use an almost limitless variety of tried and tested software.

But most of all NewBrain is a machine that can expand.

It's designed to take disks, printers and memory expansion modules (up to 2M bytes) plus anything else you'd expect a professional business micro to handle.

So, whether you understand the box on the left or not, pay a visit to someone in the know on the right.

They'll answer all your questions and give you a full demonstration.

NewBrain

Grundy Business Systems Ltd., Grundy House, Somerset Road, Teddington.

DEALER NETWORK

ALTRINCHAM
PHARMACY COMPUTER SYSTEMS
(061-828 0087)

ANDOVER
TABS (0264 58933)

BARNLEY
RIVONK OFFICE SUPPLIES LTD
(0225 88916)

BARNSTAPLE
LANDKEY-NEWLAND (0271 77883)
J & A CAMERAS (0271 79037)

BEDFORD
MICROPOWER BUSINESS APPLIES
(0234 218571)

BIRMINGHAM
CALISTO COMPUTERS LTD
(021-632 6458)

LASKYS (BIRMINGHAM) (021-632 6303)
MICRO-C (BIRMINGHAM)
(021-233 1105)

TYPEWRITER CENTRES (021-622 5385)

BRADFORD
NORTHWAY COMPUTER SERVICES
(0274 588236)

BRIGHTON
LASKYS (BRIGHTON) (0273 725625)

BRISTOL
ELECTROPRINT COMPUTERS
(0272 292375)

LASKYS (BRISTOL) (0272 20421)
MICRO-C (BRISTOL) (0272 650501)

COLSTON COMPUTER CENTRE LTD
(0272 226619)

BROMLEY
LASKYS (BROMLEY) (01-464 7829)

BUCKNELL
BORDER COMPUTING &
PROGRAMMING (05474 358)

CAMBERLEY
ASYST SYSTEMS CONSULTANTS LTD
(0275 28397)

CAMBRIDGE
G C C (CAMBRIDGE) LTD (0223 835330)
CAMBRIDGE COMPUTER STORE (0223 65334)

CANTERBURY
M D WRIGHT DATA SERVICES LTD
(0227 69090)

CANVEY ISLAND
MERCURY MICROSYSTEMS LTD
(0268 696263)

CARDIFF
LASKYS (CARDIFF) (0222 374893)

CHALFONT ST GILES
PRINITY LTD (02407 4906)

CHATHAM
MEDWAY COMPUTERS (0634 826080)

CHELTEMHAM
COMPUTER SHACK LTD (0242 364343)

CHESTER
BELLARD ELECTRONICS LTD
(0244 380123)

LASKYS (CHESTER) (0244 317667)

COLCHESTER
CAPRICORN COMPUTER CENTRE
(0206 68471)

CORK
C D S COMPUTING LTD (0902 23922)

CORRINGHAM
C & L COMPUTERS LTD (0375 57 5655)

COVENTRY
COVENTRY MICROCENTRE
(0203 58942)

CROYDON
LASKYS (CROYDON) (01-681 3027)

DARLINGTON
DARLINGTON COMPUTER SHOP
(0325 487478)

DERBY
FIRST BYTE COMPUTERS
(0332 49672)

DUBLIN 4
THE E.C.L. GROUP OF COS.
(000) 603497

DUNFERMLINE
ANDREW THOMSON (0383 724541)

DURHAM
MAGNUM COMPUTERS (0385 733480)

EALING
TEMPLE PHARMACY COMPUTERS (01-991 2 99)

EDGWARE
CITADEL PRODUCTS LTD (01-951 1848)

EDINBURGH
LASKYS (EDINBURGH) (031-556 2914)
JOHN MENZIES PLC (EDINBURGH)
(031-225 8595)

ELSTREE
ELSTREE COMPUTER CENTRE
(01-953 6921)

EPPING
ORRIDGE COMPUTER SYSTEMS (0378 76148)

GILLINGHAM
MEDWAY MICRO COMPUTERS LTD
(0634 576764)

GLASGOW
VICTOR MORRIS (AUDIO VISUAL)
(041-221 8058)

LASKYS (GLASGOW) (041-226 3747)
AMERICAN COMPUTERS & ENGINEERS
(041-248 2427)

GLOUCESTER
MILQUIP COMPUTERS (0452 411010)
THE MODEL SHOP (0452 410693)

GREAT YARMOUTH
KAYE ELECTRONICS LIMITED
(0493 57867)

GUILDFORD
M C D LTD (0483 574659)

HAMILTON
STRATHCLYDE MICRO CENTRE
(03552 22517)

HARPENDEN
CONSULTANTS IN OFFICE POWER
(05827 66931)

HASTINGS
THE COMPUTER CENTRE (BMS) LTD
(0424 439190)

HAYWOODS HEATH
APPLIED PROGRAMMING LIMITED
(0444 450054)

HEREFORD
HONEYSETT COMPUTERS LTD
(0432 279404)

HERTFORD
RMR COMPUTER SERVICES
(0992 56160)

HIGH WYCOMBE
SUM-IT COMPUTER SYSTEMS LTD
(0494-827 238)

HULL
TOMORROW'S WORLD (0482 24887)

HUNTLY
J C E (ELECTRONICS) (0466-88 337)

ISLE OF WIGHT
VECTIS COMPUTER SERVICES
(0983 528345)

KIDDERMINSTER
MICRO-MART (0562 74212)

KINGSTON
LASKYS (KINGSTON) (01-546 1271)
VISION STORES LIMITED (01-549 4900)

LEAMINGTON SPA
WARWICKSHIRE COMPUTER CENTRE
(0925 311873)

LEEDS
MICRO-C (LEEDS) (0532 446601)
MICROCELL COMPUTER SYSTEMS
(0532 681366)

ALLAN M PLENER LTD (0532 688397)

LEICESTER
TILEY COMPUTER SYSTEMS
(0533 553984)

MICRO-C (LEICESTER) (0533 546224)

M & R COMPUTER SUPPORT SERVICE
(0533 757779)

LINGFIELD
SNOBEECH MICRO CENTRE
(0342 832476)

LIVERPOOL
LASKYS (LIVERPOOL) (061-236 2828)

LONDON
DIXONS PHOTOGRAPHIC (UK) LTD
(01-491 7376)

LION MICRO COMPUTERS
(01-580 7383)

MICRO-C (LONDON NW1) (01-387 9275)

TRANSAM MICROSYSTEMS LTD
(01-405 5240)

LASKYS (QUEENSWAY) (01-229 6425)

LASKYS (TOTTENHAM COURT ROAD)
(01-636 0845)

LASKYS (OXFORD STREET)
(01-493 4623)

OFFICE INSTALLATIONS LTD
(01-579 6771)

TREND VIDEO & HI-FI LTD
(01-521 6146)

M R DEAN & SONS LTD (01-723 4630)

WELBECK VIDEO (01-488 3783)

RICHBY COMPUTER SERVICES (W2)
(01-723 1382)

AUDIO MARKETING (UK) LTD
(01-580 2554)

SNAPT COMPUTERS LTD (01-894 1443)

LOUGHBOROUGH
DATA ONE SYSTEMS LTD (0509 37281)

MICRO-C (LOUGHBOROUGH)
(0509 37367)

LUTON
LASKYS (LUTON) (0582 38302)

MICRO-C (LUTON) (0582 425079)

MAIDENHEAD
KUMA COMPUTERS LTD
(0528 71778/9)

MAIDSTONE
LASKYS (MAIDSTONE) (0622 678165)

MANCHESTER
N S C COMPUTER SHOPS LTD
(061-852 2269)

MICRO-C (MANCHESTER)
(061-834 0144)

LASKYS (MANCHESTER)
(061-832 6067)

LOMAX LTD (061-832 6167)

MARYPORT
MARYPORT HOME COMPUTERS (0900 81521)

MIDDLESBROUGH
MICRO-TECHNIC COMPUTER SYSTEMS
(0642 221501/2)

MILTON KEYNES
MILTON KEYNES COMPUTER CENTRE
(0908 668811)

NEW MILTON
SNIPET COMPUTERS LIMITED
(0421 617477)

NEWCASTLE-UPON-TYNE
MICROCORE COMPUTERS
(0652 617077)

OFFICE INTERNATIONAL (0632 610265)

NEWARK
DATABASE (0638 667311)

NOTTINGHAM
MICRO-C (NOTTINGHAM)
(0602 412455)

LASKYS (NOTTINGHAM)
(0602 415150)

ADTEL (NOTTINGHAM) LTD (0602 705366)

ORMSKIRK
MALHOUSE COMPUTERS LTD
(0692-78 901)

PETERBOROUGH
LASKYS (PETERBOROUGH)
(0731 313513)

HARIS-DN COMPUTERS
(0731 312418)

PLYMOUTH
DISKWISE LTD (0752 267000)

POTTERS BAR
POTTERS BAR COMPUTERS
(0703 44417)

PRESOT
MICROSYS LTD (051-426 7271)

PRESTON
LASKYS (PRESTON) (0772 56264)

READING
LASKYS (READING) (0734 595459)

RICHMOND
TANTUS MICROSYSTEMS LTD
(01-940 7299)

RUGBY
CEM COMPUTER SYSTEMS
(0782 70522-4)

SANDESTEAD
J R INSTRUMENTS (01-657 7646)

SARISBURY GREEN
WENMORE MANAGEMENT SERV LTD
(0485 6318-9/0)

SHEFFIELD
T A EDUCATION LTD (0742 618539)

LASKYS (SHEFFIELD) (0742 750971)

SOUTHAMPTON
MICRO-C (SOUTHAMPTON)
(0703 29675)

GOOWIN ELECTRICAL LTD
(0703 783322)

ST HILIER
THE PROCESSOR CENTRE (JERSEY)
(0534 77070)

DATASTREAM (JERSEY) LTD
(0534 7219)

STOCKPORT
DISKWISE COMPUTER CENTRES LTD
(061-477 5931)

ALPHA BUSINESS COMPUTERS LTD
(061-477 7799)

STROUD
THE MODEL SHOP (045-36 5920)

SURBITON
COMPUTASOLVE (01-890 5135)

SWANLEY
PETER RALPH (82 62230)

TEDEINGTON
AM PROGRAMMERS LTD (01-943 2266)

STACTERMINAL LTD (01-943 0777)

TEWKESBURY
QUESTEL COMPUTERS (062 672258)

THIRSK
AMPLAN MANAGEMENT SYSTEMS
(0451 597330)

THORNTON HEATH
CRONON COMPUTER CENTRE
(01-619 1280)

TUNBRIDGE WELLS
RICHBY COMPUTER SERVICES (KENT)
(089286 2060)

THE MICRO SHOP (0892 27691)

UXBRIDGE
J B MICRO (0895 57908)

WALTON ON THAMES
PMFS (98 22855)

KEY COMPUTER CENTRES LTD
(98 42777/8)

WAREHAM
GAMES & COMPUTERS (09295 51383)

WARRINGTON
NORTHERN COMPUTERS LTD
(0928 35110)

WATFORD
LASKYS (WATFORD) (0923 47488)

WELWYN
ANGELA ENTERPRISES (0438 812439)

WENDOVER
TARACE LTD (0295 623965)

WINDSOR
CASTLE COMPUTERS (95 5818)

YORK
LASKYS (YORK) (0904 641221)

MITREFINCH (0904 52995)

left from anyone in the box on the right.

NEW

Extend the sound capabilities of your Dragon

DRAGON 32

Dragon 32 Sound Extension Module

- Fully-cased module plugs into cartridge port
- Provides 3 channels of sound: 3-note chords and harmonies over 5 octaves
- Uses new BASIC command. No need to 'Peek' or 'Poke'
- Many built-in sound effects (e.g. bomb, laser)
- Music and graphics can occur together without loss of speed
- Two Input/Output ports included
- User manual provided, with examples

Cheque/P.O. to:—

J.C.B. (MICROSYSTEMS)
29 Southbourne Road
Bournemouth BH6 5AE
Tel: (0202) 423973

ONLY
£34.95
inclusive

VOICE SYNTHESIZER AVAILABLE SHORTLY
Write or phone for further details

H&H SOFTWARE

For the BBC Computer A or B

EARLY ONE

an educational game
for early readers for £6.50



... be early — get the worm not the bird

Send S.A.E. for a catalogue of our other educational games and useful programs for the BBC and Dragon Computers.

Please send orders and cheques/PO/Transcash
(No 614 131 1707) to:

H & H, Dept A, 53 Holloway, Runcorn,
Cheshire.

SIR Computers Ltd CARDIFF

Agents for Acorn, BBC and TORCH
Computers

BBC Microcomputers

Model B	£399.00
Model B with disc interface	£509.00
Single 100K disc drive	£249.00
Dual 2 x 100K disc drive	£389.00
The disc manual and utilities disc are both included.	
Upgrade of BBC Model A to B	£90.00
Please telephone for up to date information on Prestel, Teletext, speech synthesis, second processors, etc.	

TORCH Computers

Z-80 Disc Pack for the BBC Microcomputer	£897.00
--	---------

This unit connects to the BBC Micro in the same way as a normal disc drive, but as well as offering a dual 2 x 400K disc drive for use under BBC BASIC or other languages it provides the option of using the wide range of CP/M software available for business and data processing applications. The firmware supplied with the machine allows switching between BASIC and CPN, a powerful operating system developed from CP/M 2.2.

In addition to the disc pack a second processor is supplied. This is a Z-80A with its own 64K RAM card, communicating with the 6502A in the BBC computer through the 'Tube'. Typically the speed of execution of programs under the twin-processor system is increased by up to 50% compared with a conventional single-processor computer.

A third processor, the 16 bit 68000, will shortly be available.

TORCH CF240	£2,795.00
-------------------	-----------

This an extension of the BBC microcomputer/Torch disc pack system, available in a single unit. The computer contains a BBC based peripheral processor connected to the main Z-80 computer, a dual 2 x 400K disc drive as described above, a high resolution (80 character) colour monitor and a complete British Telecom approved 1200 baud modem. It is the only microcomputer which has been granted permission for direct connection to the Public Switched Telephone Network both in the U.K. and the United States.

The TORCH can communicate either directly with another TORCH or with virtually any other type of computer via Prestel. Using the Gateway facility of Prestel it is possible for the TORCH to access vast amounts of information stored by private organisations on public database systems. The Mailbox facility of Prestel also allows the use of electronic mail.

TORCH CF-240/10 As above but with a 10 MB hard disc drive.

TORCH CF-240/21 As above but with a 21 MB hard disc drive.

Peripherals

Seikosha GP100A printer	£229.00
NEC PC 8023 printer	£389.00
Epson FX 80 F/T type 3 printer	£470.00
Microvitec 14" RGB Monitor	£299.00
Kaga 12" RGB Monitor	£280.00
Sanyo 14" RGB Monitor	£260.00
High resolution 12" black/green monitor	£95.00
We have still got a few Jupiter Ace computers left in stock	£89.00

Software

We currently hold in stock programs from the following suppliers:

Acornsoft	Level 9 Software
A & F Software	Molimerx
Bug Byte	MP Software
Computer Concepts	Program Power
Digital Fantasia	Salamander Software
Golem	Software for All
IJK Software	Superior Software

Unfortunately we are unable to supply software by mail except as part of a larger order.

Delivery by Interlink of any of the above items

Unless otherwise stated all prices include VAT.

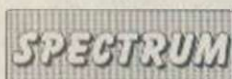
SIR Computers Ltd.
91 Whitchurch Road, Cardiff
Telephone (0222) 21341

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.

Detective

Gary Gates,
Huyton-with-Roby,
Lincolnshire.



THE PROGRAM is a problem-solving game asking the player to use his deductive powers. It begins by showing a plan of Clive's House on the screen in which a murder has taken place. It is the task of the player to deduce the room where the murder took place; the

murder weapon; the murderer's motive; who committed the murder.

Each time the game is played the computer randomly generates a different code based on the four above parameters, and it is the task of the player to find out this code.

To help solve the code, the player has control of a man, shown on the plan of Clive's House. The man is controlled by the four cursor keys and the number of movements it can make is determined by a pair of dice shown in the centre of the plan, which are controlled by the R key.

The initial task of the player is to move the man around the plan and enter one of the rooms.

On entering any room, the list of possibilities is automatically shown on the screen and the player is invited to select his choices. After inputting the choices, if they prove to be correct then a "Won" message is flashed on to the screen along with a score and a rating.

If the choices prove to be incorrect, then the list of possibilities is again flashed onto the screen but, this time, one choice which was incorrect is indicated by an inverted full stop. The player is then invited to continue the game. If the invitation is accepted, then the cycle is repeated.

However, if the player decides to quit before solving the code, then a failure notice is flashed on the screen. This program is only suitable for a 48K Spectrum.

```

5 REM +++ 48K ZX SPECTRUM +++
7 REM ++ GARY GATES 1983 ++
9 REM SET UP VARIABLES
10 CLS : PAPER 0: CLS : PAPER
0: BORDER 0: INK 7
20 LET C=0: LET XX=10: LET YY=
14: LET SA=0: DIM A$(6,11): DIM
B$(6,10): DIM C$(5,9): DIM D$(4,
8): DIM Y$(7,14)
25 LET CA=0: LET CB=0: LET CC=
0: LET CD=0: LET ZA=0: LET ZB=0:
LET ZC=0: LET ZD=0
30 DIM V(6): DIM U(6): DIM O(5
): DIM P(4)
32 REM TITLE
35 PRINT AT 0,0: INK 2:
*****GARY GATES PRESENTS***
***: INK 4:
40 PRINT AT 5,5: INK 6:
DETECTIVE
50 INK 6: FOR F=1 TO 3: CIRCLE
132,80,56-F: NEXT F
55 PLOT 25,0: DRAW 62,50: PLOT
56,0: DRAW 45,43: INK 7
60 FOR F=1 TO 3: BEEP .5,12*F:
BEEP .5,12*F: BEEP .5,5*F: BEEP
.5,6*F: BEEP 1.5,5*F: BEEP .2,1
4*F: BEEP .2,14*F: BEEP .2,16*F:
BEEP .2,20*F: NEXT F
65 PRINT AT 21,0: "PRESS ANY KE
Y TO CONTINUE": IF INKEY="" THEN
N GO TO 65
67 CLS
68 INPUT "DO YOU WISH FOR INST
RUCTIONS (Y/N) "; U$: IF U$=""
N" OR U$="N" THEN GO TO 300
70 REM INSTRUCTIONS
80 PRINT FLASH 1: "WELCOM
E TO DETECTIVE
85 PRINT "
*****
90 PRINT "CLIVE HAS BEEN MURDE
RED.": PRINT
92 PRINT "YOU HAVE TO FIND BY
THE PROCESS" OF ELIMINATION:
1. THE MURDERER" 2. THE WE
APON" 3. THE PLACE OF THE MU
RDER" 4. THE MOTIVE"
94 PRINT: PRINT "WHEN YOU ENT
ER A ROOM, YOU HAVE TO MAKE A SE
RIES OF DECISIONS. THE COMPUTE
R WILL, AFTER EACH SERIES OF D
ECISIONS, INDICATE ONE DECISIO
N WHICH IS INCORRECT. BY INVERS
ING THE FULL STOP, PRINT PRI
NT
95 FOR F=1 TO 6 STEP 2: FOR G=
1 TO 5 STEP 2: FOR H=1 TO 5 STEP
2: BEEP .6,F+G-H: BEEP .6,G+H
-F: NEXT H: NEXT G: NEXT F
96 PRINT AT 21,2: FLASH 1: "PRE
SS ANY KEY TO CONTINUE"
100 IF INKEY="" THEN GO TO 100
105 CLS: PRINT: PRINT "CON
FRONTED WITH A PLAN OF "CLIVE'
S HOUSE. A PAIR OF DICE CONTR
OLS THE "NUMBER OF MOVEMENTS OF
THE "WHILE HIS DIRECTIO
N IS "CONTROLLED BY THE FOLLOWI
NG "KEYS:": PRINT
110 PRINT " 5 - LEFT"
6 - DOWN" 7 - UP"
- RIGHT"
120 FOR F=60 TO 60 STEP 2: BEE
P .05,F: NEXT F
130 PRINT AT 21,2: FLASH 1: "PRE
SS ANY KEY TO CONTINUE"
140 IF INKEY="" THEN GO TO 140
300 CLS: PRINT AT 3,8: INK 4:
GOOD
ICK! LI
320 FOR F=1 TO 20: BORDER 4: BE
EP .05,F*2: BORDER 7: NEXT F: DO
RDER 0
330 PAUSE 15

```

```

440 REM RND STATEMENTS
450 LET A=INT (RND*6)+1
460 LET B=INT (RND*6)+1
470 LET U=INT (RND*5)+1
480 LET H=INT (RND*4)+1
490 REM SETTING UP BOARD
500 CLS: GO TO 0000
510 PRINT AT YY,XX: INK 8: "A"
520 PRINT AT 21,0: FLASH 1: "PRE
SS R TO ROLL DICE"
522 IF INKEY="R" OR INKEY="r"
THEN GO TO 524
523 GO TO 520
524 PRINT AT 21,0: INK 6:
525 PRINT AT 10,16: "BC": AT 11,1
6: "DE": AT 10,19: "BC": AT 11,19: "D
E"
527 REM ROLLING DICE
530 LET DA=INT (RND*6)+1: LET D
B=INT (RND*6)+1
535 LET A=135: LET D=60
540 FOR F=1 TO 2
550 IF F=1 THEN LET L=DA
555 IF F=2 THEN LET L=DB
560 IF L=1 THEN GO TO 4000
562 IF L=2 THEN GO TO 4010
564 IF L=3 THEN GO TO 4020
566 IF L=4 THEN GO TO 4030
568 IF L=5 THEN GO TO 4040
572 IF L=6 THEN GO TO 4050
580 LET A=A+24
585 BEEP .1,-10
590 NEXT F
600 LET SA=SA+1: LET L=DA+DB
605 REM MOVING MAN
610 FOR F=1 TO L+1
620 LET XX=XX+(INKEY="B")-(INK
EY="5")
621 LET YY=YY+(INKEY="6")-(INK
EY="7")
625 GO TO 3000
630 PRINT AT YY,XX: INK 8: "A"
635 BEEP .2,30: PAUSE 5
640 PRINT AT YY,XX: "F"
650 IF INKEY="" THEN GO TO 620
640 NEXT F
645 PRINT AT YY,XX: "A"
650 GO TO 520
690 RESTORE 9550
695 REM DETECTIVE LIST
700 FOR F=1 TO 6: READ A$(F): N
EXT F
705 FOR F=1 TO 6: READ B$(F): N
EXT F
710 FOR F=1 TO 5: READ C$(F): N
EXT F
715 FOR F=1 TO 4: READ D$(F): N
EXT F
720 CLS: PLOT 0,0: DRAW 0,175:
DRAW 255,0: DRAW 0,-175: DRAW -
255,0: PLOT 111,0: DRAW 0,175
725 FOR F=1 TO 6: PRINT AT 1+F,
1,F: "B$(F): NEXT F
730 FOR F=1 TO 5: PRINT AT 8+F,
1,F: "C$(F): NEXT F
735 FOR F=1 TO 4: PRINT AT 14+F
,1,F: "D$(F): NEXT F
739 REM INPUTTING CHOICES
740 PRINT AT 2,15: "YOU ARE IN
"AT 3,15: "THE "A$(ROOM)
745 INPUT "SUSPECT (1 TO 6) "; S
USPECT
747 IF SUSPECT<1 OR SUSPECT>6 T
HEN GO TO 745
750 PRINT AT 5,15: "SUSPECT:" AT
6,19: B$(SUSPECT)
755 INPUT "WEAPON (1 TO 5) "; WE
APON
757 IF WEAPON<0 OR WEAPON>5 THE
N GO TO 755
760 PRINT AT 8,15: "WEAPON:"; C$(
WEAPON)
765 INPUT "MOTIVE (1 TO 4) "; MO
TIVE
767 IF MOTIVE<0 OR MOTIVE>4 THE
N GO TO 765
770 PRINT AT 10,15: "MOTIVE:"; D$(
MOTIVE)
774 REM MAIN LOOP
775 LET X=0: LET CA=0: LET CB=0
: LET CC=0: LET CD=0: LET ZA=0:
LET ZB=0: LET ZC=0: LET ZD=0
780 IF A$(ROOM) <> A$(R) THEN LET
CA=1
785 IF B$(SUSPECT) <> B$(5) THEN
LET CB=100
790 IF C$(WEAPON) <> C$(U) THEN L
ET CC=7
795 IF D$(MOTIVE) <> D$(M) THEN L
ET CD=200
800 LET C=CA+CB+CC+CD
810 IF C=0 THEN GO TO 5000

```

```

820 LET H=3110
825 RESTORE 9500
830 FOR F=1 TO 15
835 BORDER 0
840 READ A
850 IF C=A THEN GO TO H
855 BORDER 6
860 LET H=H+30
870 NEXT F
872 BORDER 0
875 IF ZA=R THEN GO TO 775
878 IF ZB=S THEN GO TO 775
890 IF ZC=W THEN GO TO 775
895 IF ZD=M THEN GO TO 775
899 REM DISPLAYING RESULT
900 FOR F=1 TO 6: IF ZA=F THEN
LET U(F)=1
905 NEXT F
910 FOR F=1 TO 6: IF ZB=F THEN
LET U(F)=1
915 NEXT F
920 FOR F=1 TO 5: IF ZC=F THEN
LET O(F)=1
925 NEXT F
930 FOR F=1 TO 4: IF ZD=F THEN
LET P(F)=1
935 NEXT F
940 RESTORE 9550: CLS
950 FOR F=1 TO 6: READ A$(F): N
EXT F
955 FOR F=1 TO 6: READ B$(F): N
EXT F
960 FOR F=1 TO 5: READ C$(F): N
EXT F
965 FOR F=1 TO 4: READ D$(F): N
EXT F
970 FOR F=1 TO 6: IF U(F)=0 THE
N PRINT AT 1+F,1,F: "A$(F)
975 IF U(F)=1 THEN PRINT AT 1+F
,1,F: "B$(F)
978 NEXT F
980 FOR F=1 TO 6: IF O(F)=0 THE
N PRINT AT 8+F,1,F: "C$(F)
985 IF O(F)=1 THEN PRINT AT 8+F
,1,F: "B$(F)
990 NEXT F
990 FOR F=1 TO 5: IF P(F)=0 THE
N PRINT AT 14+F,1,F: "C$(F)
995 IF P(F)=1 THEN PRINT AT 14+F
,1,F: "D$(F)
998 NEXT F
1000 FOR F=1 TO 4: IF P(F)=0 THE
N PRINT AT 8+F,17,F: "D$(F)
1005 IF P(F)=1 THEN PRINT AT 8+F
,17,F: "D$(F)
1010 NEXT F
1012 BEEP .5,50
1015 INPUT "DO YOU WISH TO COPY
LIST (Y/N) "; H$
1020 IF H$="Y" OR H$="y" THEN CO
PY
1021 CLS: INPUT "DO YOU WISH TO
GIVE UP (Y/N) "; J$: IF J$="Y" O
R J$="y" THEN GO TO 5300
1025 REM COORDINATES FOR MAN
1030 IF ROOM=1 THEN LET YY=6: LE
T XX=13: GO TO 500
1040 IF ROOM=2 THEN LET YY=4: LE
T XX=29: GO TO 500
1050 IF ROOM=3 THEN LET YY=9: LE
T XX=6: GO TO 500
1060 IF ROOM=4 THEN LET YY=9: LE
T XX=24: GO TO 500
1070 IF ROOM=5 THEN LET YY=10: L
ET XX=3: GO TO 500
1080 IF ROOM=6 THEN LET YY=15: L
ET XX=29: GO TO 500
2000 STOP
3000 REM ATTR
3010 IF ATTR (YY,XX)=6 THEN GO T
O 3100
3015 IF ATTR (YY,XX)=7 THEN GO T
O 630
3020 IF ATTR (YY,XX)=1 THEN LET
ROOM=6
3030 IF ATTR (YY,XX)=2 THEN LET
ROOM=4
3040 IF ATTR (YY,XX)=3 THEN LET
ROOM=3
3050 IF ATTR (YY,XX)=4 THEN LET
ROOM=2
3060 IF ATTR (YY,XX)=5 THEN LET
ROOM=1
3070 IF ATTR (YY,XX)=6 THEN LET
ROOM=5
3080 GO TO 690
3100 LET YY=14: LET XX=10: BEEP
.1,-20: GO TO 630
3105 REM DECISION LOOP
3110 LET ZA=ROOM: GO TO 875
3140 LET ZB=SUSPECT: GO TO 875
3170 LET ZC=WEAPON: GO TO 875

```

(continued on next page)

SOFTWARE FILE

```

380 NEXT F
390 LET S=S+10
400 PRINT AT 0,0;"SCORE=";S;"
LIVES=";LIVE
410 LET D=(INT (AND+12))
420 IF D=1 THEN RETURN
430 IF D=5 THEN RETURN
440 IF D=11 THEN RETURN
450 GOTO 410
460 GOSUB 1200
470 FOR N=15 TO 0Z+2 STEP -2
480 PRINT AT N,P+1;"0";AT N,P+1
490 PRINT AT 15,0;A$
500 NEXT N
510 RETURN
520 IF INKEY$="0" THEN LET X=X+
1
530 IF INKEY$="A" THEN LET X=X-
1
540 IF X<1 THEN LET X=1
550 IF X>3 THEN LET X=3
560 IF X=1 THEN LET B$="
"
570 IF X=2 THEN LET B$="
"
580 IF X=3 THEN LET B$="
"
590 RETURN
600 LET C$="
"
610 LET FI=1
620 RETURN
630 LET C$="
"
640 LET FI=0
650 RETURN
660 FOR N=D+2 TO 10 STEP 2
670 PRINT AT N,P+1;"0";AT N,P+1
680 IF N=17 THEN PRINT AT AND+2
+20,P+2;"0";AT AND+2+20,P+2;"0"
690 PRINT AT 22,P+1;"0";AT 22,P;
"0"
700 NEXT N
710 LET LIVE=LIVE-1
720 PRINT AT 0,25;"LIVES=";LIVE
730 IF LIVE=0 THEN GOTO 740
740 RETURN
750 FOR N=0 TO 30
760 PRINT AT 10,10;"GAME OVER";
AT 10,10;"
"
770 NEXT N
780 POKE 16410,2
790 IF S>HS THEN GOSUB 840
800 PRINT AT 15,0;"SCORE=";S;"
HIGH=";HS;"
810 PRINT "HIT ANY KEY TO START
GAME"
820 IF INKEY$="" THEN GOTO 810
830 CLS
840 GOTO 1
850 PRINT AT 0,0;"
"
860 PRINT AT 10,10;"
"
870 LET HS=5
880 LET H$=""
890 PRINT AT 21,0;"???"
900 FOR N=1 TO 3
910 LET HSC=35
920 LET HSC=HSC+(INKEY$="7")-(I
NKEY$="6")
930 IF HSC<30 THEN LET HSC=30
940 IF HSC>63 THEN LET HSC=63
950 PRINT AT 21,N-1,CHR$ HSC
960 IF INKEY$="9" THEN GOTO 980
970 GOTO 920
980 LET H$=H$+CHR$ HSC
990 FOR M=1 TO 10
1000 NEXT M
1010 NEXT N
1020 RETURN
1030 SAVE "TANK ATTACK"
1040 LET HS=0
1050 LET H$=""
1060 PRINT AT 1,5;"
"
1070 PRINT AT 0,5;"
"
1080 PRINT AT 11,5;"
"
1090 PRINT AT 5,14;"
"
1100 PRINT AT 9,14;"
"
1110 PRINT AT 17,5;"BY R.C.COOMB
S (1983)"
1120 PRINT AT 21,0;"PRESS ANY KE
Y TO CONTINUE"
1130 IF INKEY$="" THEN GOTO 1130
1140 CLS
1150 PRINT "YOU ARE IN A TANK,YO
UR MISSION
"
1160 PRINT "IS TO DESTROY AS MAN
Y ENEMY
"
1170 PRINT "TANKS AS POSSIBLE "
1180 PRINT "
"
1190 PRINT "USE 0 TO MOVE YOUR G
UN UP AND 0 TO MOVE IT DOWN"
1200 PRINT "
"
1210 PRINT "TO FIRE PRESS 7"
1220 PRINT "USE 6 AND 8 TO MOVE
LEFT AND RIGHT "
1230 PRINT "
"
1240 PRINT "PRESS ANY KEY TO STA
RT GAME"
1250 IF INKEY$="" THEN GOTO 1250
1260 CLS
1270 GOTO 10
1280 IF X=3 THEN LET 0Z=1
1290 IF X=2 THEN LET 0Z=6
1300 IF X=1 THEN LET 0Z=11
1310 RETURN

```

Goldgrabber

Michael Taylor,
Bishop's Stortford,
Hertfordshire.

VIC-20

THIS PROGRAM just fits into an unexpanded Vic. It responds to single key-presses throughout, except during the wizard routine, which uses the Input statement. This is the

scenario: you have entered a mythical labyrinth, in your search for the gold that was left there many thousands of years ago, when the inhabitants left.

Since then, the labyrinth has been taken over by various malignant creatures, including orcs, dragons, vampires — even some of the mythical wumpuses have left their dodecahedral caves to make your task harder.

Obviously, these monsters have picked up

the gold that was lying around before they came — so you will have to kill to earn your reward. Equally obviously, stronger monsters, for instance, dragons, will have collected more gold than weaker creatures, so it is no use killing nothing but orcs.

You start with a certain number of strength units which are used up every time you move and agility units which are used when fighting — if either of these ratings reaches zero, you will die from your injuries. To see your ratings, including Spells, Gold and Overall score, simply type R.

To aid you in your exploration of the labyrinth, you are equipped with a certain number of magic spells. If used in combat, these will kill any monster with no loss of agility — but you will not get as much gold as you would in a good, honest fight. Also, beware of typing M — the command for a magic spell — if you have already used them all up.

To move North, South East or West, simply type the initial letter of the direction in which you wish to move. If you walk into a pit, you will fall a level, the lower down the labyrinth you are, the stronger the monsters are and the more gold they carry. If you walk up a staircase you will climb a level.

If you climb a staircase on level one or type Q for quit, you will leave the labyrinth: you will be given your final ratings, and the game will end. You can also leave by entering an exit.

I find this game very challenging — I still play it myself, after writing it some time ago. A good score is anything over about 30,000 and the highest score I have seen is just over 51,000. One final note — sometimes a wizard will appear, and try to sell you extra strength points in return for some of your gold. Sometimes this is a good buy, sometimes not. But the wizard is a mercenary devil, and he will charge you as much as he thinks you can afford.

```

0 GOTO100
10 POKE198,0:P=0
20 GETR$:FORI=1TOLEN(C$):IFMID$(C$,I,1)=R$THENF=I
30 NEXT I:FP=0THEN20
40 RETURN
50 U=SQR(X*X+Y*Y*Z):W=U-INT(U):RETURN
100 POKE36879,27:PRINTCHR$(8)"
"
110 PRINTTAB(5)"MAY I TAYLOR."
120 PRINT"EXPLORE THE LABYRINTH IN YOUR SEARCH FOR THE OLD - MONSTERS WILL"
130 PRINT"OBSTRUCT YOU AND YOU MUST FIGHT THEM."
135 Z=1:H=100:R=500:S=10
150 DIMM$(8):FORI=1T08:READM$(I):NEXT I:DATA320GRE,43WUMPUS,89DRAGON,51MANTICORE,
300RC
160 DATA76VAMPIRE,99HYDRA,65WRAITH
170 DIMP$(8):FORI=1T08:READP$(I):NEXT I:DATA"IN EXIT",STAIRCASE
180 DATAPIT,CHAMBER,CAVE,HALL,DOOR,WALL
190 DIMA$(12):FORI=1T012:READA$(I):NEXT I
200 DATACRYSTAL,VAULTED,WOODEN,VAST,TINY,HUGE,DAMP,DARK,LARGE,SMALL,GLOOMY,EMPT
Y
210 X=2E3:PRINT"ENTER A RANDOM SEED:"INPUTX:Y=INT(ABS(X*TAN(X))):X=INT(ABS(Y
*ATH(Y)))
400 GOSUB50:W=INT(8*W):IFW=70RW=0RW=10RW=2THENX=X+1:GOTO400
500 PRINTTAB(6)"HIT 0-9":C$="" :GOSUB10
1000 H=H-1:IFH<10RRC1THEN5000
1001 GOSUB50:W=INT(8*W):IFW<1THEN6000
1002 IFW=7THENPRINT"OUCH!":PRINT"WHAT WAS A WALL!":X=X-X1:Y=Y-Y1:H=H-4:GOTO4
00
1003 IFW=2THENPRINT"OUMP!":PRINT"DU FALL A LEVEL." :Z=Z+1:Z1=1:GOTO400
1004 IFW=1ANDZ=1THEN6000
1005 IFW=1THENPRINT"UCLIMB A LEVEL." :Z=Z-1:Z1=-1:GOTO400
1006 PRINT"YOUR CURRENT LOCATION IS A "
1007 Q=SQR(X*Y+Y*Z):Q=Q-INT(Q)
1008 PRINTA$(1+10*Q)
1009 PRINT "P$(1+W)";PRINT"LEVEL"Z"
1010 Y=Y-1:GOSUB50:Y=Y+1:PRINT"ORTH IS A "P$(1+8*W)";
1020 Y=Y+1:GOSUB50:Y=Y-1:PRINT"OUTH IS A "P$(1+8*W)";
1030 X=X+1:GOSUB50:X=X-1:PRINT"AST IS A "P$(1+8*W)";
1040 X=X-1:GOSUB50:X=X+1:PRINT"EST IS A "P$(1+8*W)";
1050 M=INT(RND(1)*45)+1:IFM>90R(N=9ANDG<1000)THEN2000
1055 IFM=9THEN7000
1060 PRINT"DU ARE CONFRONTED BY A "MID$(M$(M),3)
1065 PRINT " ? ";C$="ARM"
1070 GOSUB10:PRINTCHR$(32+ASC(R$))
1080 IFR$="R"THENX=X-X1:Y=Y-Y1:Z=Z-Z1:PRINT"HICKEN !!!":GOTO400
1090 IFR$="A"THEN1300
1100 IFS=0THENPRINT"DU HAVE ALREDY USED ALL YOUR SPELLS!HEM":PRINTMII$(M$

```

(continued on page 161)

SPECTRUM Quickshot

THE ULTIMATE JOYSTICK!

ONLY
£19.99
+ £1.50 P&P



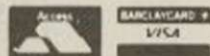
INCLUDING
INTERFACE

- Interfaced to plug straight into your Spectrum
- Full instructions
- 8-way movement
- Compatible with more software than ever!! including:

Please supply (tick items)	Amount
<input type="checkbox"/> Spectrum Joystick @ £19.99	
<input type="checkbox"/> Vic 20 Joystick @ £12.99	
<input type="checkbox"/> Atari 400/800 Joystick @ £12.99	
Software	
<input type="checkbox"/> 3D Tunnel @ £5.99	
<input type="checkbox"/> Galaxians (Artic) @ £4.99	
<input type="checkbox"/> Spookyman (Abbex) @ £4.99	
<input type="checkbox"/> Slippery Sid (Silversoft) @ £5.99	
<input type="checkbox"/> Cyber Rats (Silversoft) @ £5.99	
<input type="checkbox"/> SS Enterprise (Silversoft) @ £5.99	
<input type="checkbox"/> Nite Flite (Hewson) @ £5.99	
<input type="checkbox"/> Time Gate (Quicksilva) @ £6.99	
<input type="checkbox"/> Meteoroids (Softek) @ £4.99	
<input type="checkbox"/> Gulpman (Campbell) @ £5.99	
<input type="checkbox"/> Cosmic Guerilla (Crystal) @ 5.99	
<input type="checkbox"/> Jetpack (Ultimate) @ £5.50	
<input type="checkbox"/> PSSST (Ultimate) @ £5.50	
<input type="checkbox"/> Blind Alley (Sunshine) @ £5.99	
<input type="checkbox"/> Mazeman (Abber) @ £5.99	
<input type="checkbox"/> Cosmos (Abbex) @ £4.99	
<input type="checkbox"/> Galaxians (Abbex) @ £4.99	
<input type="checkbox"/> ETX (Abbex) @ £4.99	
<input type="checkbox"/> Frenzy (Quicksilva) @ £4.95	
<input type="checkbox"/> Astro Blaster (Quicksilva) @ £4.95	
<input type="checkbox"/> Knot in 3D (Newgen) @ £5.95	
<input type="checkbox"/> Joust (Softek) @ £5.95	
<input type="checkbox"/> Frogger (DJL) @ £5.95	
(Software Post Free) Plus Postage	£1.50

ALLOW 7 DAYS
TRADE ENQUIRIES
WELCOME
24hr CREDIT CARD LINE

TOTAL
ENCLOSED



DATTEL ELECTRONICS 27 HOPE STREET, HANLEY,
STOKE-ON-TRENT
TEL: 0782 273815

Put everything you need on the keyboard with a Custom Keypanel Kit.



Put everything you need on the keyboard with a Custom Keypanel Kit.

Precision die-cut panels fit perfectly over your keyboard and create an instant and individual reference to all your software.

Each kit comes in a clear plastic wallet and contains: 10 matt black Keypanels plus sheets containing over 140 self-adhesive command labels, pre-printed with words and symbols – arrows, left, right, FIRE!, POWER!, etc, plus a sheet of blanks for your own designs.

SPECTRUM Keypanels (96 x 224mm)
Self-adhesive label sets are printed in 'Spectrum' bright red. A must for flight simulation and all multi-key games and applications, the first add-on for your Spectrum.

ORIC Keypanels (105 x 275 mm)
Self-adhesive label sets are printed in 'ORIC' light blue. Master those CTRL and ESC key combinations and create a reference to all ORIC's keyboard functions.

NOW in super ML PLASTIC.
We despatch to you first class post by return.

Post today to **Softeach Limited**, 25 College Road, Reading, Berkshire, RG6 1QE.

Please send me:

..... Spectrum Keypanel Kits at £3.95 + 35p p&p each (overseas should add 25% for additional surface mail)

..... ORIC Keypanel Kits at £4.95 + 35p p&p each (overseas should add 25% for additional surface mail)

I enclose a total remittance of £..... cheques/postal orders payable to **Softeach Limited**.

NAME

ADDRESS

VC AUG

(continued from previous page)

```

370 F1=STRINGS(BK,153)
380 C=CHR$(191);D=CHR$(143+112)
390 'ROAD
400 CLS
410 FOR B=1 TO 416 STEP 32
420 PRINT @S,RD#;NEXTS
430 PRINT@25B,F1#;
440 'MAIN
450 A=A+(RND(3)-2)
460 PRINT @,":
470 IF A<0 THEN A=0
480 IF A>16 THEN A=16
490 PRINT TAB(A);RD#;
500 IF RND(100)>RN THEN PRINT @A+(RND(BK)), CHR$(RND(B)+16+127);
510 POKE 1219+PD,9
520 N=1219+PD
530 V=N-32
540 M=N+32
550 IF PEEK(V)<>128 AND PEEK(V)>155 THEN PLAY"D1V31T2L4G6L8B-AAGGFEG":CLS:GOTOB
40
560 IF PEEK(V)=153 THEN PLAY"02V31T5L0BAAEB03C020AGE01C03C":GOTOB00
570 PLAY"1255L255C"
580 IF B<24 THEN DL=JOYSTK(1)
590 PD=PD+(JOYSTK(0)-30)/20
600 IF DL>45 THEN B=B+1;BW=BW-3;IF B>20 THEN PRINT @509,C#;PLAY"1255L255BAG":I
F B=24 THEN PRINT@495,"BRAKE FAIL";FOR Z=1 TO 700:NEXT

```

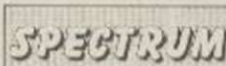
```

620 IF TIMER>=2050 THEN PRINT@480,"LAP";FOR D1=1 TO 100:NEXT;SOUND 25,1;RN-RN-
B;TIMER=0;LAP=LAP+1;IF LAP=3 THEN GOSUB780
630 FOR DE=1 TO DL*5:NEXT
640 SC=SC+1
650 POKE N,128
660 POKE M,128
670 EXEC 32734
680 GOTO 450
690 FOR A=1 TO 5
700 EXEC 32571;SCREEN 0,1;NEXT
710 PLAY"01T4V31L48BL76SL4B-AAGGFEG"
720 CLS
730 PRINT@202,"GAME OVER?";PRINT @225,"PRESS SPACEBAR FOR ANOTHER GO";SCREEN 0,
1
740 FOR A=1 TO 300
750 AS=INKEY#;IF AS="" THEN NEXT
760 IF AS=CHR$(32) THEN RUN250 ELSE IF AS="Y" THEN CLS:END
770 EXEC 32751;GOTO 740
780 PRINT@,":PRINTTAB(A+1);F1#;
790 RETURN
800 CLS
810 FOR A=36 TO 228 STEP 32
815 PRINT@A,F1#;NEXT
820 PRINT@228,"C O N G R A T U L A T I O N S !"
840 PRINT@320,"YOUR BRAKES WERE";BW;"X";PRINT" YOU SCORED ";INT(LAP+1+SC);"POIN
TG"
850 PRINT" YOU COMPLETED";LAP;IF LAP=1 THEN PRINT"LAP" ELSE PRINT"LAPS"
860 GOTO 730

```

Histograms

M Furby,
Walton on Thames,
Surrey.



ROBERT NEWMAN'S excellent machine-code animation routine in *April Your Computer* — including the amendment published in the May issue — has uses beyond purely games applications. This subroutine uses it to produce 3D block histograms like those used in *The Money Programme*, a BBC television

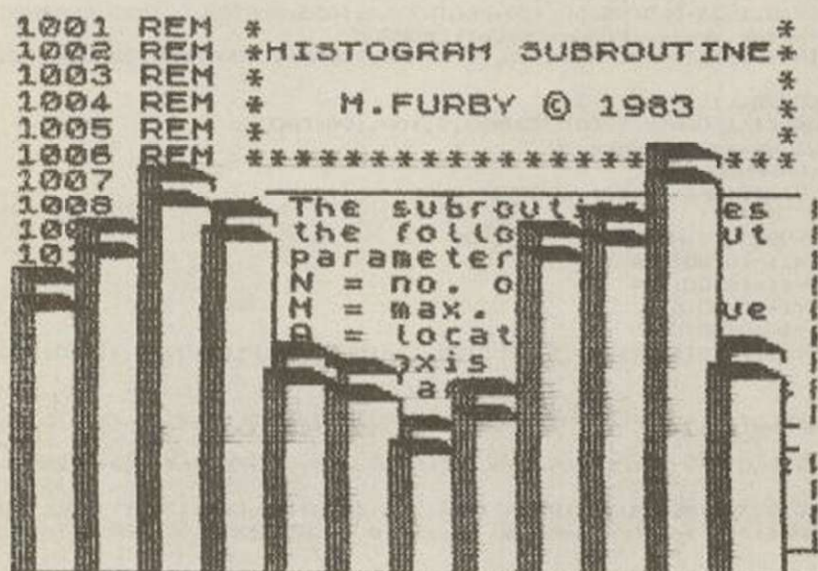
programme. It is not a complete program in itself, and requires the following parameters to be passed from your main program to run it.

- I(N)..... an array of values to be graphically depicted
- N..... the number of items in the array
- M..... the maximum value
- A..... the required location of the base line of the histogram

The Pcke and Usr addresses are for the 48K Spectrum, and you will need to change them to those in *April Your Computer* if you have a 16K machine.

The subroutine will produce a histogram of any number of values, although a practical maximum for clarity is 26. Different values of A, between 0 and 165, will place the base line in a suitable position on the screen to allow for any text you wish to include.

If you wish to show, say, values between 1 and 10, then the routine will draw the block for 10 right to the top of the screen. By giving a false value for M of 20, the blocks will be compressed to give clear space above for further text, so M can be thought of as a magnification factor.



```

1001 REM # *
1002 REM #HISTOGRAM SUBROUTINE# *
1003 REM # *
1004 REM # M.FURBY © 1983 *
1005 REM # *
1006 REM #*****# *
1007 REM # *
1008 REM #The subroutine uses *
1009 REM #the following input *
1000 REM #*****#

```

```

1010 REM | parameters: |
1011 REM | N = no. of items |
1012 REM | M = max. item value |
1013 REM | A = location of x |
1014 REM | axis (0(A-165) |
1015 REM | I(N) = array of values |
1016 REM | |
1017 REM | |
1018 REM |The following are the |
1019 REM | local variables: |
1020 REM | j = loop control |
1021 REM | d = graphics data |
1022 REM | x&y = co-ordinates of |
1023 REM | block units |
1024 REM | f = scale factor |
1025 REM | p = block position |
1026 REM | |
1030 RESTORE
1040 FOR j=USR "a" TO USR "a"+17
1050 READ d: POKE j,d
1060 NEXT j
1070 POKE 65162,24: POKE 65163,6
: POKE 65164,1: POKE 65165,1
1080 LET p=INT (250/N): LET f=M/
(175-A)
1085 PLOT 0,a: DRAW 255,0
1090 FOR x=1 TO N
1100 POKE 65160,p#x-p
1110 FOR y=6 TO I(x)/f
1120 POKE 65161,y+a: RANDOMIZE U
SR 65171
1130 NEXT y: NEXT x
1140 DATA 255,255,0,255,255,192,
191,255,240,175,255,252,171,255,
255,170,0,1

```

Limpopo

David Seymour,
East Grinstead,
Sussex.



HERE IS a program for all TI-99/4A users who enjoy music. It will run on ordinary TI Basic. There are seven different drum sounds and a variable delay feature. Here are the specifications for all the drums:
SIDE..... snare drum with proper decay
SIDES..... snare drum with sharp decay used for rolls
TOM..... tom tom with proper decay

TOMS..... tom tom with sharp decay used for rolls
BASS..... bass drum "THUD"
HAT..... a hit of the closed high hat
CYM(0).... a hit of the open high hat
CYM(1).... a hit of the open high hat followed by snare drum
CYM(2).... a hit of the open high hat followed by closing it
CYM(3).... very long cymbal
CYM(4).... only slightly shorter cymbal
CYM(5).... long cymbal
CYM(6).... quite long cymbal
CYM(8).... medium lengthened cymbal
CYM(10).... short cymbal
CYM(14).... very short cymbal used for cymbal rolls

This is how to use the delay feature. You type Del. The computer asks:
HOW LONG DELAY?
You type any number from 1 to 255. It is advisable to put a delay after every command except Side, Tom, Cym 0, 3, 4, 5 or 6 because those have longer decays to fill in for a delay. Before running the program, check that program lines 8 to 16 suit your equipment. If you use a cassette player to save the program and your drumbeat on, then leave the lines as OPEN #1:"CS1",INTERNAL,(INPUT or OUTPUT),FIXED but if you have a disc drive, then change them

(continued on page 165)

Spectrum compatible printer



- ★ Obeys standard Spectrum commands.
- ★ Printing speed 120 lines per minute maximum.
- ★ Low cost paper supply.
- ★ Price includes power supply and interfacing.

This thermal printer, now available in the U.K., is the standard printer used with the American version of the ZX81. The printer plugs direct into the Spectrum but has a through port allowing the use of additional hardware through the same connector.

The size of the printer is 7¼ x 5¼ x 3½ ins. attractively packaged in a moulded matt black plastic case.

A separate power pack is supplied in a 2½ x 3½ x 2¼ ins. case.

Two switches mounted on the printer allow for on/off switching and also access to the test mode and paper advance commands.

The printing speed in the self test mode is 120 lines per minute.

The paper rolls are 4¼ ins. wide and 25 metres in length.

£99.95 Price includes - Printer, power supply, full interfacing, one roll of paper, VAT and p&p.

DEAN ELECTRONICS LIMITED
Glendale Park Fernbank Road Ascot Berkshire England
Telephone Winkfield Row (0344) 885661 Telex 849242

DEALER ENQUIRIES INVITED.



Please send me boxes of Paper (10 rolls per box) at £12 per box (incl. VAT, p & p).
Printer(s) at £99.95 each.
Total £
Cheque/PO made payable to:
Dean Electronics Ltd.
Delivery 14 days
allow 28 days
max.

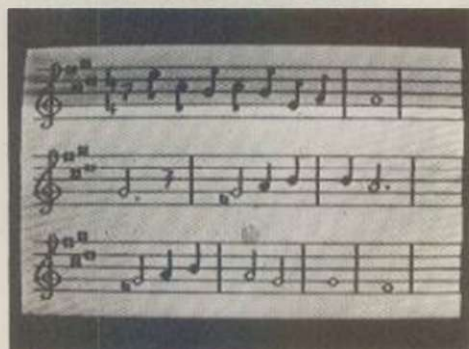
MUSIC MAKER

NEW
FOR 48K SPECTRUM

PLAY AND COMPOSE MUSIC

- ♪ Real musical notation
- ♪ Easy to use
- ♪ 11 major keys

£5.75



FOR EXPERTS AND BEGINNERS

To: Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex

Please send me Music Maker cassette(s). I enclose a cheque /postal order for £ payable to Bellflower Software.

Name

Address

Spectrum 48k

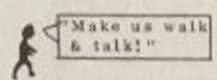
MAKE YOUR OWN TV FILMS!

WITH LIVE ANIMATION

& MUSIC

SAVE them...

& AMUSE FRIENDS AND FAMILY WHEN YOU PLAY THEM BACK!



ORDER: £7

MACRO CONSTRUCTION & ANIMATION CASSETTE MCA

- SPECIAL MACRO-PROGRAMMING TECHNIQUES ALLOW YOU TO: -
- CALL-UP ANY MEMBER OF CAST, INCLUDING UFO, HELICOPTER AND A HOST OF 'PERSONNEL' IN A CHOICE OF NEARLY 30 'CALLS! MAKE EACH ANY COLOUR - LARGE ONES CAN BE IN TWO COLOURS!
- THEY WALK, RUN, CLIMB & FLY.
- BUILD HOUSES, CHURCHES ETC. IN A FLASH - & ERASE THEM
- UP TO 15 MINS. PER 'FILM', OR MORE IF YOU'RE A GOOD DIRECTOR
- MAKE CHARACTERS 'SPEAK' USING ANNOTATIONS AS IN STRIPS.
- FULL COMPUTER-PROMPTING TO SAVE YOU MAKING ERRORS.
- INSTANT PLAYBACK, EDITING AND DELETING AS YOU GO ALONG!
- MOST COMMANDS ARE A SINGLE KEY-STROKE, WITHOUT 'ENTER'.
- COMPOSE YOUR OWN TUNES USING THE SPECIAL THREE-OCTAVE CHROMATIC MUSIC COMPOSER, WHICH ALLOWS YOU TO LISTEN, CORRECT AND EDIT AT EACH NOTE ... IF YOU NEED TO!
- STORE UP TO NINE 99-NOTE TUNES TO 'CALL-UP' AT ANY TIME IN A STORY ... COMPUTER GIVES EACH A NUMBER IN MEMORY.
- CHANGE TUNES AT ANY TIME, EVEN WHILST MAKING A 'FILM'.
- YOU CAN EVEN ADD PERSPECTIVE TO BUILDINGS, ROADS ETC.
- NO SPECIAL SKILLS OR COMPUTER KNOWLEDGE NEEDED ... JUST IMAGINATION!



pinehurst data studios

63, PINEHURST PARK, WEST MOORS, WIMBORNE, DORSET, BH22 9BP

IMPORTANT: FOR 48K SPECTRUM ONLY

"IT LOOKS NICE - BUT WHAT THE HELL CAN I DO WITH IT?"

Every ZX SPECTRUM Print'n'Plotter Jotter has 100 pages of finely printed screen grids.

50 for the high resolution screen. 50 for the normal character screen.

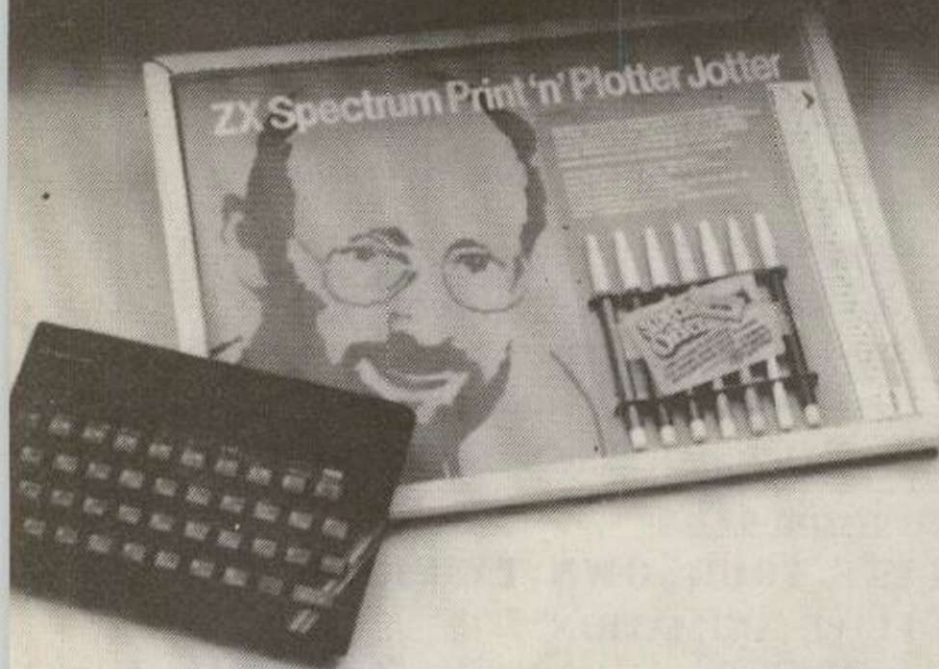
With these at your disposal you can plan practically any graphics print-out to program into your computer.

The high-resolution PLOT grid shows every one of the 45,060 pixels! Every one printed. Every one with its co-ordinate numbers. This gives you enormous graphics power to DRAW, PLOT, CIRCLE, PLOT OVER and so on in any position or screen building up graphic drawings, charts, maps... in fact anything without the complications of guesswork, Integer out of range, or wrongly positioned pixel colours which change PRINTED INK characters!

The normal character PRINT grids on the other hand will allow you to be specific about PRINT AT, TAB, PRINT OVER, SCREENS and INK / PAPER in direct co-ordination with PLOT... you see every page is printed on high quality tracing paper... ideal to overlay on to illustrations and 'copy' or co-ordinate.

And there's another bonus, because each page contains 24 User-definable grids — 2400 per pad!

With 50 pages of PLOT grids, 50 pages of PRINT grids 2400 user-definable grids, a set of colour pens, a printed PIXEL RULER and our Special Offer of demo programs, IT'S THE BEST VALUE IN ZX GRAPHICS PROGRAMMING.



"NOW WHICH KEY DO I PRESS TO SHOOT DOWN THE THING FROM MARS?"

Ever forgotten which key to press when playing a game? Do you suffer from a mind-boggling mass of programmed keys? Do you write programs that use different keys to perform various functions? If so, we have just the thing for your ZX SPECTRUM.

A pack of Print'n'Plotter Keyboard Overlays.

Just write the function or functions under each key you program and keep the overlay for the next time you play the game. Of course there's lots of more uses you will find for our OVERLAYS, user defined characters, keyboard scanners, mathematical programs, business uses — to name just a few.

There's TEN OVERLAYS to a pack — so you can program with impunity! And they fit perfectly onto your standard ZX SPECTRUM KEYBOARD. Each OVERLAY is printed with the cursor movement key directions and there's room for program name etc.



A SPECTRUM CONSOLE THAT EVERYONE CAN AFFORD!

For the cost of a 'games' cassette you can have a truly professional console for your SPECTRUM!

We've cut costs (not cut quality) by designing a self-assembly method using relatively inexpensive materials like strong corrugated board.

The result is a console that's tough, light, highly finished and capable of giving years of useful service.

Facilities include ergonomic keyboard angle, access to rear of machine, choice of P.S.U. internal or external, and alternative of Printer on-board or cassette storage area. Fully illustrated instructions are included.



"PRINTER PAPER THAT WORKS? I DON'T BELIEVE IT!"

Five rolls of our PRINTER PAPER will only cost you £12.50 including postage, packing and VAT! And you'll gain a great deal more! It prints beautifully. It's not too thick. It's not too shiny. Print is black — not grey. It actually feeds through the machine! See for yourself only £12.50 including everything. It's a bargain!



Post today to Print'n'Plotter Products, 19 Borough High Street, London SE1 9SE or phone: 01-403 6644 (General) or 660 7231 (Credit Card Sales).

Name:

Address

.....

.....

- ZX SPECTRUM JOTTER @ £9.95 each
- ZX SPECTRUM KEYBOARD OVERLAYS @ £2.95 per pack
- ZX SPECTRUM CONSOLE @ £5.25 each
- ZX PRINTER PAPER @ £12.50 per five rolls
- ZX SPECTRUM DEMO CASSETTES @ 95p each
- ZX81 JOTTER PADS @ £3.50 each
- ZX81 FILMS @ £2.25 each
- ZX81 GRAPHICS PROGRAMMING GUIDE @ £1.50 each

Remittance enclosed. Please bill my Access / Barclaycard / Visa / Mastercard No:

All prices include VAT, P&P. Overseas orders please add 25% for additional surface mail.

"WHERE CAN I GET THEM?"

You can see and buy most of our products at:

- W. H. Smith (Computer Stores)
- Boots (selected branches)
- Buffer Micro (Streatam 01-769 2887)
- Microware (Leicester 0533 29023)
- Dennys Bookshops (London EC1 01-253 5421)
- Personal Computer Services (Darwen Lancs 0254 776677)
- Telford Electronics & Computing (Chislehurst 0967 46008)
- Georges Bookshop (Wilton 0272 276602)
- Microtech Systems (Gillingham Kent 0634 571531)
- Northampton Home Computer Centre (0604 225591)
- Philip Copley Hi Fi (Ossett W. Yorks 0924 272545)
- Darlington Computer Shop (Darlington 0325 487478)
- Lancashire Micros (Morecambe Lancs 0524 411435)
- North East Computers (Peterhead 0779 799001)
- Photo-Video (Hereford 0432 267997)
- Computers For All (Rimford 0708 752862)
- March Software (Sawbridgeworth Herts 0279 724341)
- Evesham Micro Centre (Worcs 0386 48655)
- Computer City (Widnes, Cheshire 051 420 5535)
- Landau Electronics (Sutton 01-643 5494)
- D.J. Computers (Stevenage 0438 65501)
- Software Machine (London SE5 01-305 0521)
- Screen-Scene (Cheltenham 0242 28979)
- Hobbyhorse (Lincoln 0522 35227)
- Micro Home Computers (Orkney DB56 3283)

Educational Supplies through Griffin & George Ltd.
Australian agents: Centrum Systems, Tel. (Perth) 4441031.

**Print'n'Plotter
Products**

(continued from page 162)

to OPEN #1:"DSK1.ROCK"
or whatever name you will call the drumbeat when saving it. You do not need a name for the beat if you use a cassette. It is important that you change those lines before running because otherwise, when you have written the beat and then stop to change them, all the variables in which your beat is stored will be gone when you re-run the program.

When the program is run, you will first be confronted with the following menu:

- a WRITE A DRUM SEQUENCE
- b LIST THE DRUM SEQUENCE
- c PLAY THE DRUM SEQUENCE
- d MAKE ANY CORRECTIONS
- e LOAD DRUM SEQUENCE
- f SAVE DRUM SEQUENCE

Obviously if you have only just switched on, you can only do (a) or (e), and if you have not got anything on the cassette or disc, you can only do (a). For (a), here is an example of a drumbeat which you might call Rock:

Computer's questions

HOW MANY BEATS IN A BAR ?
1 ?
2 ?
HOW LONG DELAY ?
3 ?
4 ?
HOW LONG DELAY ?
5 ?
6 ?
7 ?
HOW LONG DELAY ?
ANY CORRECTIONS ?

Your reply

7
BASS
DEL
5
HAT
DEL
5
SIDE
HAT
DEL
1
"N"

Then press (c) to play the drum sequence. It will then be played again and again until you press "s" to return to the menu.

The program can be divided into two parts: Lines 1-129 which make up the "writer" program to input the drumbeat etc. and lines 130-171: the subroutines which actually play the drum sounds. Due to the limits of TI Basic, I could not write the program literally with subroutines, so where as using TI

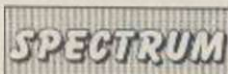
Extended Basic I could put into the program: Call Side for the snare drum routine, in this program I had to put Goto, and then the line number of the routine. Bearing that in mind, a quicker but more laborious method of using the drums would be to only type in lines 130-171, and everywhere there is a Goto 111, just type in Return. Then in the lines before 130, you could type in Gosubs for the routine you would like to be played. Here is an example:

```
5 REM "ROCK"
10 GOSUB 156 (bass)
15 D(A)=30
20 GOSUB 146 (delay for 30)
25 GOSUB 159 (hat)
30 D(A)=30
35 GOSUB 146 (delay for 30)
40 GOSUB 162 (side)
45 GOSUB 159 (hat)
50 D(A)=30
55 GOSUB 146 (delay for 30)
60 GOTO 10
130 REM CYM(0) etc
```

```
1 REM DRUMS-COPYRIGHT 1983 D.H. SEYMOUR
2 REM START
3 DIM D(100)
4 DIM S(27)
5 DIM C$(256)
6 GOTO 24
7 REM LOAD beat
8 OPEN #1:"CS1", INTERNAL, INPUT, FIXED
9 INPUT #1:B
10 FOR A=1 TO B STEP 2
11 INPUT #1:C$(A), S(A), D(A), C$(A+1), S(A+1), D(A+1)
12 NEXT A
13 CLOSE #1
14 GOTO 25
15 REM SAVE beat
16 OPEN #1:"CS1", INTERNAL, OUTPUT, FIXED
17 PRINT #1:B
18 FOR A=1 TO B STEP 2
19 PRINT #1:C$(A), S(A), D(A), C$(A+1), S(A+1), D(A+1)
20 NEXT A
21 CLOSE #1
22 GOTO 25
23 REM MENU
24 CALL CLEAR
25 PRINT "WHAT WOULD YOU LIKE TO DO?"
26 PRINT
27 PRINT "a) WRITE A DRUM SEQUENCE b) LIST
YOUR DRUM SEQUENCE c) PLAY THE DRUM SEQUENCE d) MAKE ANY CORRECTIONS"
28 PRINT "e) LOAD DRUM SEQUENCE f) SAVE DRUM SEQUENCE"
29 CALL KEY(S,Z,X)
30 IF X=0 THEN 29
31 IF Z=65 THEN 39
32 IF Z=66 THEN 83
33 IF Z=67 THEN 100
34 IF Z=68 THEN 66
35 IF Z=69 THEN 8
36 IF Z=70 THEN 16
37 GOTO 25
38 REM INPUT beat
39 CALL CLEAR
40 INPUT "HOW MANY BEATS IN A BAR ?":B
41 IF B>256 THEN 40
42 FOR A=1 TO B
43 PRINT A:
44 INPUT C$(A)
45 IF C$(A)="DEL" THEN 51
46 IF C$(A)="CYM" THEN 54
47 GOSUB 113
48 IF FLAG=1 THEN 58
49 NEXT A
50 GOTO 60
51 INPUT "HOW LONG DELAY ?":D(A)
52 IF D(A)>1024 THEN 51
53 GOTO 49
54 GOSUB 123
55 IF FLAG=1 THEN 49
56 PRINT " * NO SUCH CYMBAL"
57 GOTO 54
58 PRINT " * NO SUCH BEAT"
59 GOTO 43
60 PRINT "ANY CORRECTIONS?(Y/N)"
61 CALL KEY(S,Z,X)
62 IF X=0 THEN 61
63 IF Z=76 THEN 24
64 IF Z<>89 THEN 60
65 REM CORRECTIONS
66 PRINT "CORRECTION TO WHICH LINE ?"
67 INPUT A
68 IF A>B THEN 66
69 INPUT "NEW DRUM ?":C$(A)
70 IF C$(A)="DEL" THEN 75
71 IF C$(A)="CYM" THEN 78
72 GOSUB 113
73 IF FLAG=1 THEN 58
74 GOTO 60
75 INPUT "HOW LONG DELAY ?":D(A)
76 IF D(A)>1024 THEN 75
77 GOTO 60
78 GOSUB 123
79 IF FLAG=1 THEN 60
80 PRINT " * NO SUCH CYMBAL"
81 GOTO 78
82 REM LISTING beat
83 CALL CLEAR
84 FOR A=1 TO B
85 PRINT A:
86 IF C$(A)="DEL" THEN 95
87 IF C$(A)="CYM" THEN 97
88 PRINT C$(A)
89 NEXT A
90 PRINT " * READY *"
91 PRINT " ANY KEY TO CONTINUE"
92 CALL KEY(S,Z,X)
93 IF X=0 THEN 92
94 GOTO 25
95 PRINT "DEL "D(A)
96 GOTO 89
97 PRINT "CYM "S(A)
98 GOTO 89
99 REM PLAY beat
100 FOR A=1 TO B
101 CALL KEY(S,Y,Z)
102 IF Y=83 THEN 24
103 IF C$(A)="DEL" THEN 146
104 IF C$(A)="CYM" THEN 131
105 IF C$(A)="HAT" THEN 159
106 IF C$(A)="SIDE" THEN 162
107 IF C$(A)="SIDES" THEN 150
108 IF C$(A)="TOM" THEN 167
109 IF C$(A)="TOMS" THEN 153
110 IF C$(A)="BASS" THEN 156
111 NEXT A
112 GOTO 100
113 FLAG=1
114 IF C$(A)="TOM" THEN 121
115 IF C$(A)="TOMS" THEN 121
116 IF C$(A)="BASS" THEN 121
117 IF C$(A)="SIDE" THEN 121
118 IF C$(A)="SIDES" THEN 121
119 IF C$(A)="HAT" THEN 121
120 GOTO 122
121 FLAG=0
122 RETURN
123 INPUT "WHICH CYMBAL ?":S(A)
124 SA=S(A)
125 IF SA*(SA-1)*(SA-2)*(SA-3)*(SA-4)*(SA-5)*
(SA-6)*(SA-7)*(SA-8)*(SA-9)*(SA-10)*(SA-11)*(SA-12)*
6)=0 THEN 129
126 FLAG=0
127 GOTO 129
128 FLAG=1
129 RETURN
130 REM SOUND ROUTINES
131 REM CYM(0)
132 D=S(A)
133 FOR X=0 TO 10 STEP 2
134 IF D>3 THEN 136
135 CALL SOUND(-40,-5,X+5)
136 NEXT X
137 IF D>1 THEN 140
138 CALL SOUND(3,-6,0)
139 GOTO 111
140 IF D>2 THEN 142
141 GOTO 156
142 FOR X=0 TO 12 STEP 0-2
143 CALL SOUND(-40,-5,X)
144 NEXT X
145 GOTO 111
146 REM DEL(D)
147 FOR DEL=1 TO D(A)
148 NEXT DEL
149 GOTO 111
150 REM SIDES
151 CALL SOUND(3,-6,1)
152 GOTO 111
153 REM TOMS
154 CALL SOUND(3,140,3,-7,8)
155 GOTO 111
156 REM BASS
157 CALL SOUND(-40,-7,5,110,5)
158 GOTO 111
159 REM HAT
160 CALL SOUND(2,-5,12)
161 GOTO 111
162 REM SIDE
163 FOR X=1 TO 18 STEP 6
164 CALL SOUND(-40,-6,X)
165 NEXT X
166 GOTO 111
167 REM TOM
168 FOR X=0 TO 18 STEP 9
169 CALL SOUND(-40,140,X+2,-7,X+0.7)
170 NEXT X
171 GOTO 111
```

Wild Life

Tony Roberts,
Liverpool.



ONE OF the greatest problems I have with my Spectrum is not mentioned in any of the manuals — the insistence of my four-year old daughter that she should be the one to press the keys. Most of the games I have are simply beyond her, and, as yet, there is no software produced specifically for the pre-school child.

This program has several advantages over a bought program, in any case. It is entirely modular, and plays as many games as you wish in a random sequence: each individual game is

a short, simple affair, and it is easy to write your own to fit in with your child's wishes or with what he/she is doing in nursery. The four games in this version are just counting games — in one, 1 to 12 variously coloured butterflies flit around above a field of grass, in another worms of extraordinary lengths crawl out of the grass, the third has flowers of various sizes, and the last apples in a tree.

In each case, the child has to count the butterflies/worms/flowers/apples and press the appropriate number on the keyboard. As I wanted to use numbers up to 12, I redefined the zero key as number 10, the Enter as 11, and space as 12 — and stuck labels marked 10, 11, 12 on to the keys. Various other exciting things happen like a tune — out of the

Spectrum manual — when the answer is right, a big cross or tick on the screen as appropriate, and other odd noises at various times.

As usual, the program's organised "back-to-front" in order to speed response times. Each batch of lines 1100-1199, 1200-1299 through to 8800-8899, 8900-8999 is intended to contain a game. Here are the main variables:

Variable	Purpose
o	Set to the number of games to be randomly accessed
m(=1)	Set from the keyboard — silences most of the noisy routines
n	Random number between 1 and 12
n\$	String form of n
g	Line number of start of animation routine for each game — this is

(continued on page 167)

GIANT ADVENTURES £9.90

for
ATARI 400/800 ^{32K} **BBC** ^{32K} **CBM 64** **LYNX** ^{48K}
NASCOM ^{32K} **ORIC** ^{48K} **SPECTRUM** ^{48K} & **380Z** ^{48K}

1) **COLOSSAL ADVENTURE:** The classic mainframe game "Adventure" with all the original treasures and puzzles + 70 extra rooms.

"A minor miracle of programming" - *Popular Computing W. 12 May*

"A few days ago I received Colossal Adventure and I am writing to say that I am delighted with it. I first met Adventure on an Open University summer school and several of us regularly stayed up to 3 and 4 o'clock in the morning playing it. That was 6 years ago, and I've not been able to play it since, so I was immensely pleased to see how like the original yours is."

- *Chris Green (customer) April 83*

2) **ADVENTURE QUEST:** Through forest, desert, mountains, caves, lake, fire, moorland and swamp on an epic puzzle journey.

"This is the best adventure yet. I did the H****t in 1 day and p*****a in about 3 1/2 hours." - *S Burrows (customer) May 83*

3) **DUNGEON ADVENTURE:** "massive adventure with more than 100 puzzles to solve. Rich vein of humour throughout." - *The Micro User June 83.*

Each adventure needs 32K and costs £9.90 (inclusive). They are very much bigger than normal adventure games that you can buy.

NASCOM PROGS	Asteroids	m/c,g	£7.90
	Galaxy Invaders	m/c,g	£5.90
Extension Basic	Missile Defence	m/c,g	£7.90
Adds 30 new keywords to BASIC	Super Gulp	eb,g	£4.90
Compression Assembler 2	5-games cassette	misc	£5.90
High speed + source compression	(FULL RANGE IN NASCOM CATALOGUE)		

ALL PRICES INCLUDE P&P AND VAT. ALL programs are in stock and orders will be sent within 2 days of receipt. Please send order or SAE for catalogue, describing your micro, to:

LEVEL 9 COMPUTING

Dept Y, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG

BBC FORTH £15

"For your money you get not only a very good implementation of the popular FORTH language but also a 72 page manual ... Once you have got an idea of the fundamentals you should get better value out of this pack than virtually any other program you could buy. In fact, the only reason I can think of for not buying this cassette is that you already have a version of FORTH!" - *LASERBUG April 83*

"rqFORTH is fast and has a first-class screen editor ... Overall, a good buy" - *Computing Today July 83*

rqFORTH costs just £15 (inclusive) and runs on 16K or 32K BBC micros. It:

- * needs no added hardware and works with any MOS version;
- * works with cassette and disc;
- * is FORTH-79 STANDARD and has fig-FORTH facilities;
- * provides 260 FORTH words and is infinitely extensible;
- * allows full use of the MOS via *MOS, CALL and EMIT;
- * permits use of all graphic modes, even 0-2 (just!);
- * has an excellent full-screen editor;
- * runs faster than BBC BASIC;
- * includes a 72 page manual, a 20 page disc supplement and a summary card for quick reference;
- * is used by hundreds of people, worldwide.

BBC FORTH TOOLKIT £10

"Level 9 promise to support rqFORTH and this pack proves it. It provides the source code for all sorts of useful routines and examples of how to program in FORTH. With so much on one cassette it would be good value at twice the price." - *LASERBUG April 83*

The rqFORTH toolkit costs just £10 (inclusive) and adds the following facilities to FORTH:

- * a full assembler, providing machine-code within FORTH;
- * turtle graphics, giving you easy-to-use colour graphics;
- * decompiler routines, allowing the versatile examination of your compiled FORTH programs;
- * the full double-number set (with many extensions);
- * an example FORTH program and demonstrations of graphics;
- * other useful routines.

BUY THE **BEST** **BRITISH** **COMPUTER**

In stock
NOW!

BBC Model A £299 incl VAT
 BBC Model B £399 incl VAT

- + Wordwise Word Processor (needs 1.0 System)
- + Software - Acorn, Bugbyte, Computer Concepts (Logo 2)
- + Joysticks for the BBC + 100K Single Disk Drives
- + Torch 800K Twin Disk Drives with CPN
 (Equivalent to CPM*)

*Reg. trademark of Digital Research

SPECIAL OFFERS

Whilst stocks last!

For the BBC:
 Screen Layout Pad,
 Flow Chart Pad &
 Symbol Design Pad
 Kit with ring binder
 Rec. retail price £15.50
OUR PRICE ONLY
£12.50 incl VAT

VIC-20 Clearance:
 Arfon Expand Unit £85
VIC Games Cartridges:
 Mission Impossible £20
 Rat Race £16
 Road Race £16
 Mole Attack £16
 All prices include VAT!

PLUS computers, peripherals, printers, software, games, books and much, much more from leading makers at low prices - always available from your local stockist:

TWICKENHAM
COMPUTER CENTRE LTD

72 Heath Rd Twickenham Middx TW1 4BW (01-892 7896/01-891 1612)



Programmers Wanted

We are looking for high quality games, simulation and utility programs for ATARI, COMMODORE 64 and VIC 20, SPECTRUM, DRAGON, BBC, ORIC,

We also have contract work available for experienced machine code programmers

A combination of initial payment and royalties will be tailored to meet your requirements.

We distribute programs in this country and in the U.S.A., giving you access to an enormous market.

Phone: BASINGSTOKE (0256) 25107

Or write to: DREAM SOFTWARE, P.O. BOX 64, BASINGSTOKE, HANTS. RG21 2LB

DREAM software

SOFTWARE FILE

(continued from page 165)

Gosubbed between each scan of Inkey\$, so keep it short
 x,y Screen co-ordinates
 Each routine is accessed 1 to n times to set

up your graphics, then g is accessed once between each scan of the keyboard. Pressing m mutes the program, and n will make it noisy again. On line
 1210 the graphics characters are A,C

1212 the graphics characters are B,D
 1342 the graphics characters are I
 1355 the graphics characters are E
 1402 the graphics characters are L
 1415 the graphics characters are J

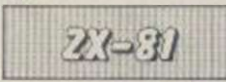
```

1 GO SUB 9500: GO TO 9000: RE
M      main loop
*****
9 RETURN : REM dummy return
200 REM      response check
*****
205 IF m=1 THEN GO TO 210
207 BEEP .005,2+(INT (RND*30))
225 LET r$=INKEY$
230 IF r$="" THEN GO SUB g: GO
TO 200
235 IF r$="m" THEN LET m=1: GO
TO 200
236 IF r$="n" THEN LET m=0: GO
TO 200
240 IF r$="0" THEN LET r$="10"
242 IF r$=CHR$(13) THEN LET r$
="11"
244 IF r$="" THEN LET r$="12"
250 IF r$(<n$ THEN INK RND*5+1:
FOR x=5 TO 15: PRINT AT x,x+15:
"█": PRINT AT x,35-x,"█": BEEP
.05,(ABS(x-10)*3): NEXT x: GO
TO 200
255 GO SUB 9050
299 RETURN
500 REM counting games loop
*****
510 LET n=INT (RND*12+1)
515 LET n$=STR$(n)
516 LET c=INT (RND*7): IF c=4 T
HEN GO TO 516
517 GO SUB 1000
518 LET rn=INT (RND*0)+1
520 FOR r=1 TO n
525 GO SUB rn*100+1000
530 NEXT r
535 LET r=1
540 GO SUB 200
549 RETURN
1000 REM draw grass
*****
1005 INK 4
1010 FOR a=1 TO 254 STEP 2
1020 PLOT a,1
1030 DRAW @,10+(RND*26)
1040 NEXT a
1099 RETURN
1100 REM draw a random flower
*****
1105 LET y=INT (RND*80)+60
1110 LET x=INT (RND*200)+27
1111 IF POINT (x,41)+POINT (x+2,
41)+POINT (x-2,41)<>0 THEN GO TO
1110
1115 INK 4
1120 PLOT x,y
1130 DRAW @,y
1140 PLOT x-1,y: DRAW @,y
1150 PLOT x+1,y: DRAW @,y
1153 LET s=INT (RND*15)+10
1155 LET i=INT (RND*3)+2
1157 INK c
1160 FOR b=1 TO s STEP i
1175 IF m=0 THEN BEEP .001,2*b+1
0
1177 CIRCLE x,y,b
1180 NEXT b
1190 LET g=9
1199 RETURN
1200 REM      butterflies
*****
1207 LET p(r,1)=INT (RND*10): LE
T p(r,2)=INT (RND*30): LET p(r,3
)=INT (RND*7)
1209 GO SUB 1210: LET g=1220: RE
TURN
1210 PRINT AT p(r,1),p(r,2): INK
p(r,3): "█"
1212 PRINT AT p(r,1)+1,p(r,2): I
NK p(r,3): "█"
1215 RETURN
1220 LET r=r+1: IF r>n THEN LET
r=1
1225 PRINT AT p(r,1),p(r,2): "█"
1227 PRINT AT p(r,1)+1,p(r,2): "█"
1233 LET p(r,1)=p(r,1)+INT (RND*
3)-1
1235 LET p(r,2)=p(r,2)+INT (RND*
3)-1
1236 IF p(r,1)<1 THEN LET p(r,1)
=1
1237 IF p(r,1)>18 THEN LET p(r,1)
=18
1238 IF p(r,2)<1 THEN LET p(r,2)
=1
1239 IF p(r,2)>30 THEN LET p(r,2)
=30
1250 GO SUB 1210
1299 RETURN
1300 REM      worms
*****
1305 LET p(r,1)=17: LET p(r,2)=I
NT ((30/n)*r-RND*(30/n)): LET p(
r,3)=INT (RND*6)
1310 LET g=1330: RETURN
1330 LET r=r+1: IF r>n THEN LET
r=1
1335 INK p(r,3)
1341 LET x1=p(r,1): LET y1=p(r,2)
1342 PRINT AT x1,y1:"█"
1343 GO TO (1344+RND*4)
1344 LET p(r,1)=p(r,1)+1: GO TO
1350
1345 LET p(r,2)=p(r,2)-1: GO TO
1350
1346 LET p(r,2)=p(r,2)+1: GO TO
1350
1347 LET p(r,1)=p(r,1)-1: GO TO
1350
1350 IF SCREEN(p(r,1),p(r,2))<
> OR p(r,1)<0 OR p(r,2)>30 OR
p(r,2)<0 THEN LET p(r,1)=x1: LE
T p(r,2)=y1
1355 PRINT AT p(r,1),p(r,2): INK
p(r,3): "█"
1399 RETURN
1400 REM      trees/apples
*****
1402 IF r=1 THEN FOR x=10 TO 20:
PRINT INK 4: PAPER 2: AT x,12:"█
█": FOR y=5+ABS(x-14) TO 18-ABS
(x-14): PRINT PAPER 4: AT x,y+
(RND*2)-1:"█": NEXT y: NEXT x
1410 LET p(r,1)=INT (RND*10+2):
LET p(r,2)=INT (RND*12+5): IF AT
TR (p(r,1),p(r,2))<>36 THEN GO T
O 1410
1415 PRINT AT p(r,1),p(r,2): INK
2: PAPER 7: FLASH 1:"█"
1420 LET g=1499
1499 RETURN
9000 REM      main loop
*****
9001 BORDER RND*7
9010 GO SUB 500: REM counting
games
9049 GO TO 9000: REM end of main
loop
9050 REM right answer!
9051 BORDER RND*7
9055 INK n/2: FOR x=9 TO 15: PRI
NT BRIGHT 1: FLASH 1: AT x,x,"█"
: NEXT x: FOR x=15 TO 4 STEP -1:
PRINT BRIGHT 1: FLASH 1: AT x,30
-x:"█": NEXT x
9057 IF m=0 THEN GO TO 9060
9058 FOR n=1 TO 200: NEXT n
9059 CLS : RETURN
9060 BEEP .25,0: BEEP .25,2: BEE
P .125,3: BEEP .125,2: BEEP .25,
0
9061 BEEP .25,0: BEEP .25,2: BEE
P .125,3: BEEP .125,2: BEEP .25,
0
9062 BEEP .25,3: BEEP .25,5: BEE
P .5,7
9063 BEEP .25,3: BEEP .25,5: BEE
P .5,7
9064 BEEP .1875,7: BEEP .0625,0:
BEEP .125,7: BEEP .125,5: BEEP
.125,3: BEEP .125,2: BEEP .25,0
9065 BEEP .1875,7: BEEP .0625,8:
BEEP .125,7: BEEP .125,5: BEEP
.125,3: BEEP .125,2: BEEP .25,0
9066 BEEP .25,0: BEEP .25,-5: BE
EP .5,0
9067 BEEP .5,0: BEEP .5,-5: BEEP
1,0
9090 CLS
9099 RETURN
9500 REM initialise
9510 LET o=4: REM options
9520 LET f=1: LET m=0: LET b=1
9530 DIM p(12,3): REM screen coo
rdinates and colour
9540 RANDOMIZE
9710 REM set up graphics
9711 POKE USR "a"+0,BIN 01100100
9712 POKE USR "a"+1,BIN 01110010
9713 POKE USR "a"+2,BIN 11111001
9714 POKE USR "a"+3,BIN 11111011
9715 POKE USR "a"+4,BIN 11111111
9716 POKE USR "a"+5,BIN 00111111
9717 POKE USR "a"+6,BIN 00011101
9718 POKE USR "a"+7,BIN 00000001
9721 POKE USR "b"+0,BIN 00000001
9722 POKE USR "b"+1,BIN 00000111
9723 POKE USR "b"+2,BIN 00011111
9724 POKE USR "b"+3,BIN 01111111
9725 POKE USR "b"+4,BIN 11111111
9726 POKE USR "b"+5,BIN 11111111
9727 POKE USR "b"+6,BIN 01111101
9728 POKE USR "b"+7,BIN 01111000
9731 POKE USR "c"+0,BIN 00100110
9732 POKE USR "c"+1,BIN 01001110
9733 POKE USR "c"+2,BIN 10011111
9734 POKE USR "c"+3,BIN 10111111
9735 POKE USR "c"+4,BIN 11111111
9736 POKE USR "c"+5,BIN 11111100
9737 POKE USR "c"+6,BIN 10111000
9738 POKE USR "c"+7,BIN 10000000
9741 POKE USR "d"+0,BIN 10000000
9742 POKE USR "d"+1,BIN 11100000
9743 POKE USR "d"+2,BIN 11111000
9744 POKE USR "d"+3,BIN 11111110
9745 POKE USR "d"+4,BIN 11111111
9746 POKE USR "d"+5,BIN 11111111
9747 POKE USR "d"+6,BIN 10111110
9748 POKE USR "d"+7,BIN 00111100
9751 POKE USR "e"+0,BIN 00111100
9752 POKE USR "e"+1,BIN 01011010
9753 POKE USR "e"+2,BIN 10011001
9754 POKE USR "e"+3,BIN 11011011
9755 POKE USR "e"+4,BIN 11111111
9756 POKE USR "e"+5,BIN 11000111
9757 POKE USR "e"+6,BIN 01100110
9758 POKE USR "e"+7,BIN 00111100
9790 POKE USR "i"+0,BIN 01010101
9791 POKE USR "i"+1,BIN 10101010
9792 POKE USR "i"+2,BIN 01010101
9793 POKE USR "i"+3,BIN 10101010
9794 POKE USR "i"+4,BIN 01010101
9795 POKE USR "i"+5,BIN 10101010
9796 POKE USR "i"+6,BIN 01010101
9797 POKE USR "i"+7,BIN 10101010
9990 POKE USR "j"+0,BIN 00010000
9991 POKE USR "j"+1,BIN 01101010
9992 POKE USR "j"+2,BIN 11111111
9993 POKE USR "j"+3,BIN 11111111
9994 POKE USR "j"+4,BIN 01111111
9995 POKE USR "j"+5,BIN 01111110
9996 POKE USR "j"+6,BIN 00111110
9997 POKE USR "j"+7,BIN 00000000
9999 RETURN

```

Four x four x four

Barrie and Mark Walmsley,
 Flackwell Heath,
 Buckinghamshire.



THE CONVENTIONAL games of Noughts and Crosses, either three-by-three or three-by-three-by-three, have a limited number of moves and can often result in draws. However, four-by-four-by-four Noughts and Crosses has many more variations and is a worthwhile game requiring skill and concentration as well as good visualisation of a three-dimensional playing area projected into two dimensions.

This program follows the normal convention of showing the playing area as four planes, drawn side by side. These planes should be visualised as lying on top of each other to form a cube — see figure 1. Winning lines can be parallel to any edge of the cube; diagonally across a plane; or diagonally across the cube such as d,d,d,d.

The method adopted by the program is to assign weights to each unoccupied square according to the contents of the lines passing through that square.

You can see that each of the 32 squares which lie on the cube diagonals lie on a total of seven different lines and the remaining squares each lie on four different lines. At the start of the game weights of 40 are assigned to the cube diagonal set and weights of 32 to the others.

Each type of line has a weight value which is assigned to the blank squares in that line. The total weight carried by any blank square is the sum of the weight values of each line which passes through that square.

After each play, by either player or computer, all weights associated with lines passing through the square which has been played into are recalculated. The computer's mode of play is first to check for winning or losing lines and then to play into the vacant square with the highest weight. In the case of equal highest weights, a partially random choice is made.

Following Run, the variables and addresses are assigned to 9500 to 9750 and the parameters pertaining to each square are set up in 9000 to 9260. The main program is entered at 18, the playing area displayed — 18 to 100 — and play starts with the computer assigned O and the player assigned X.

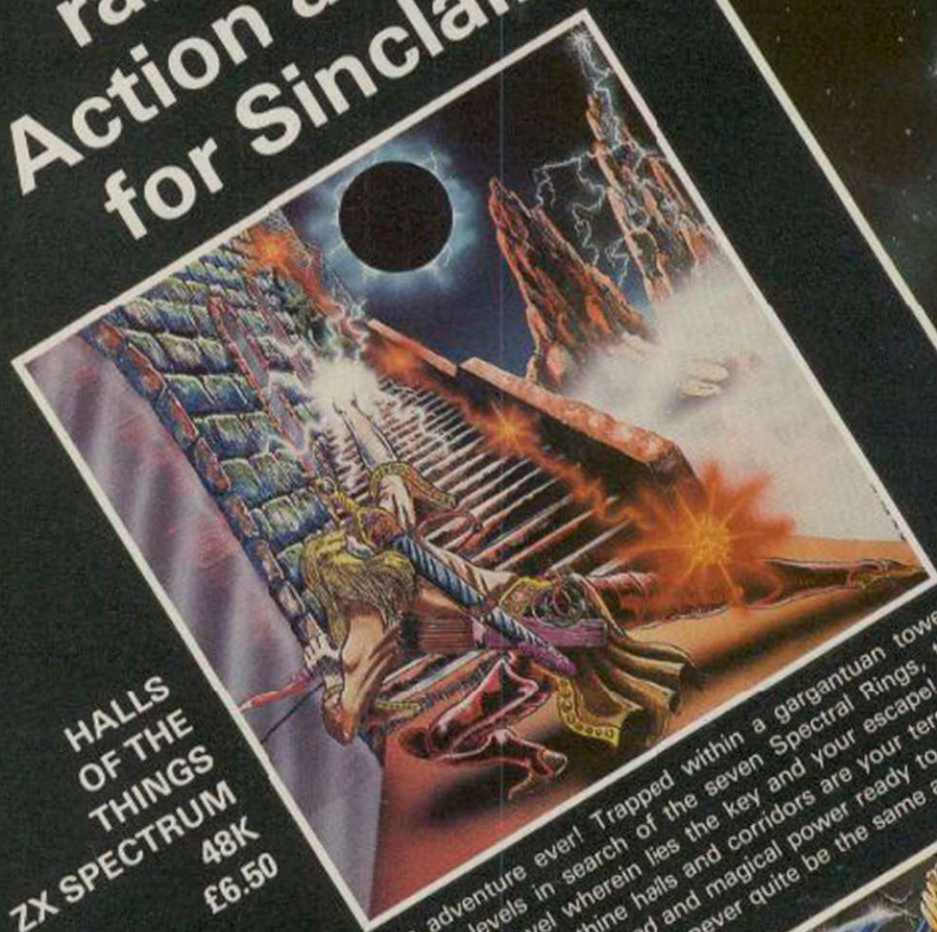
The player makes a move by entering a string of three digits, each between 1 and 4, to denote the plane, row and column on the chosen move. The computer validates the entry, shows the chosen position and asks for verification. Assuming this is given, the player's move is assigned the variables C,D,E and the main routine of the program, Set, is entered at 6000.

Set checks each line through C,D,E, counting the number of Xs and Os — Search — allocating weight adjustments — Update — and recalculating all affected weights — Weight. If three Xs are found then Flag J is set during Update and the line is tagged in parameter 6.

Following a win by either player or

(continued on page 169)

A new and exciting range of Arcade Action and Adventures for Sinclair Computers



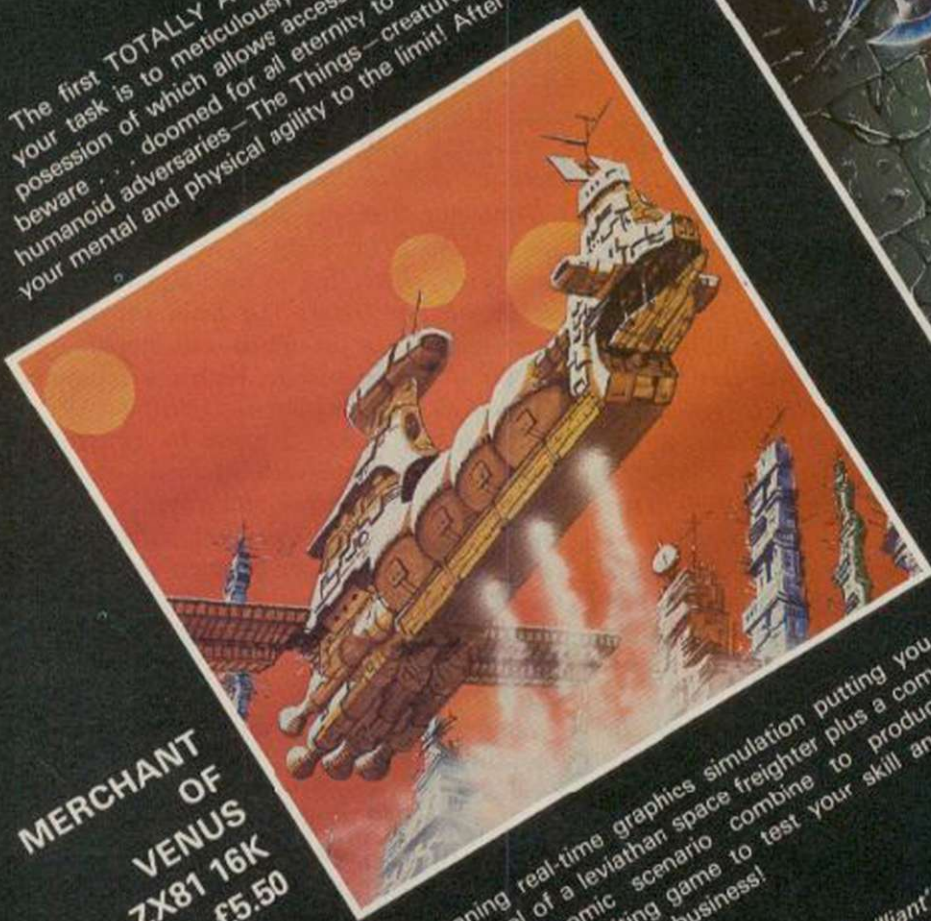
HALLS OF THE THINGS
ZX SPECTRUM 48K
£6.50

The first **TOTALLY ANIMATED** graphics adventure ever! Trapped within a gargantuan tower your task is to meticulously explore its many levels in search of the seven Spectral Rings, the possession of which allows access to the dungeon level wherein lies the key and your escape! But beware... doomed to wander the labyrinthine halls and corridors are your terrifying humanoid adversaries—The Things—creatures of incredible speed and magical power ready to stretch your mental and physical agility to the limit! After Halls, your life will never quite be the same again...



THE DUNGEON MASTER
ZX SPECTRUM 48K
£7.50

The first adventure to enter into the true spirit of traditional role-playing games.
"I have been a dungeons and dragons fan for several years... The package provides excellent entertainment for all fans of the cult and should prove a good introduction to the game".
Sinclair User



MERCHANT OF VENUS
ZX81 16K
£5.50

A stunning real-time graphics simulation putting you in control of a leviathan space freighter plus a complex economic scenario combine to produce an exciting game to test your skill and head for business!

ZX81 Games Pack. "Brilliant"... Interface. "Excellent"... Sinclair User £4.50
Four great arcade games plus a challenging adventure. All written in 100% machine code to run in 1K ZX81 Monitor and Disassembler £7.50. "Well written and useful machine code utility"... Your Computer Dealer enquiries welcome. Written any software? Send it to us for evaluation and details of our excellent royalties scheme.
P & P included. Please make cheques/PO's payable to



Crystal Computing
2 Ashton Way
East Herringston
Sunderland SR3 3RX



COSMIC GUERRILLA
ZX SPECTRUM 16K OR 48K
£5.50

Bring your Spectrum to life with the fastest, meanest and most colourful arcade action around. Your task is to zap the relentless waves of alien attackers as they obliterate the force field protecting your supply of ion laser cannons.
KEMPSTON JOYSTICK COMPATIBLE

SOFTWARE FILE

(continued from page 167)

computer, the winning line is displayed in inverse characters with an appropriate message. The Count variable allows 64 moves before declaring the game a draw.

A section of the program is written in machine code. This speeds up a simple but

time-consuming routine to determine the vacant square with the highest weight. Anyone preferring not to use a machine code can delete lines 1-8 and replace 7020-7080 with the Basic routine 7020-7220 on page 170.

The machine code will be set up each time the program is run. This is not necessary, and

after the first run lines 2-8 can be deleted, and the program saved in this form. The machine-code assumes A\$ is the first variable.

The inverse characters in the listing are:

Line 20	1,2,3,4
Lines 160, 410, 7410, 9900:	X
Lines 420, 2160, 7300:	0

```

1 REM ..... 67 CHARACTERS .....
2 FAST
3 LET X=16514
4 LET A$="00000100002A1040110
F00197EFE102018237E592B3612200CE
D583440CB432800C84528044F2202401
10A0019E5118F02A7ED52ED5B1040ED5
23E7FA4B57CE1C816C95"
5 POKE X,16:CODE A$+CODE A$(2
)-476
6 LET A$=A$(3 TO )
7 LET X=X+1
8 IF A$(">"S) THEN GOTO 5
9 CLEAR
10 FAST
15 GOTO 9500
18 FAST
19 CLS
20 PRINT "      "
30 PRINT
40 FOR N=1 TO 4
50 PRINT N:
55 IF N=4 THEN GOTO 80
60 PRINT "  +--+--+  +--+--+  +--+--+  +--+
+--+  +--+--+  +--+--+  +--+--+  +--+
70 NEXT N
80 FOR N=1 TO 4
90 PRINT " 1 2 3 4";
100 NEXT N
101 GOTO 300
103 REM **UPLAY**
106 SLOW
107 LET G$="0"
110 PRINT AT 20,0;"YOUR MOVE?"

120 INPUT B$
121 IF LEN B$<3 THEN GOTO 120
122 LET K$="0"
123 GOSUB INSERT
130 FOR N=1 TO 3
140 IF B$(N)("<"1" OR B$(N)(">"4" T
HEN GOTO 120
150 NEXT N
155 LET C=VAL B$(1)
156 LET D=VAL B$(2)
157 LET E=VAL B$(3)
159 GOTO 400
160 LET K$="0"
163 GOSUB INSERT
170 PRINT AT 20,0;"IS THIS CORR
ECT?" (Y/N)
180 IF INKEY$="" THEN GOTO 180
185 LET C$=INKEY$
190 IF C$="Y" THEN GOTO 240
200 IF C$="N" THEN GOTO 212
2010 GOTO 180
2012 LET K$=""
2015 GOSUB INSERT
2020 GOTO 350
2040 FAST
2045 LET A$(C,D,E,4)="2"
2047 LET A$(C,D,E,5)=" "
2050 LET K$="X"
2050 GOSUB INSERT
2055 PRINT AT 20,0;"
200 GOTO 500
300 PRINT AT 20,0;"DO YOU WANT
TO PLAY FIRST?" (Y/N)
305 SLOW
310 IF INKEY$="" THEN GOTO 310
315 LET C$=INKEY$
320 IF C$="Y" THEN GOTO 350
330 IF C$="N" THEN GOTO 343
340 GOTO 310
343 FAST
345 GOTO IPLAY
350 LET C=1
351 LET D=10
352 LET E=1
355 GOTO UPLAY
360 REM **INSERT**
370 PRINT AT 2+D,5+C+2+E-5;W$
380 RETURN
400 IF A$(C,D,E,4)="1" THEN GOT
O 150
410 IF A$(C,D,E,4)="2" THEN LET
K$="0"
420 IF A$(C,D,E,4)="3" THEN LET
K$="0"
430 GOSUB INSERT
435 PRINT AT 20,0;"
440 PRINT AT 15,0;"SPACE ALREAD
Y OCCUPIED"
450 PRINT AT 15,0;"PRESS ANY KE
Y TO CONTINUE"
460 IF INKEY$="" THEN GOTO 460
470 PRINT AT 15,0;"
480 IF A$(C,D,E,4)="2" THEN LET
K$="X"
490 IF A$(C,D,E,4)="3" THEN LET
K$="0"
500 GOSUB INSERT
510 GOTO UPLAY
52000 PRINT AT 15,0;"CONGRATULATI
ONS--YOU HAVE WON"
52010 PRINT AT 15,0;"DO YOU WANT
TO PLAY AGAIN?" (Y/N)
52015 SLOW
52020 IF INKEY$="" THEN GOTO 2020
52025 LET C$=INKEY$
52030 IF C$="Y" THEN RUN
52040 IF C$="N" THEN PRINT AT 15,
0;"THANKS FOR THE GAME, BYE
"
2050 GOTO 2020
2050 REM **DRAW**
2070 PRINT AT 15,0;"AN HONOURABL
E DRAW"
2080 GOTO 2010
2100 REM **FOUND30**
2110 FOR X=1 TO 4
2120 FOR Y=1 TO 4
2130 FOR Z=1 TO 4
2140 IF A$(X,Y,Z,5)("<"1" OR A$(X,
Y,Z,6)(">"7" THEN GOTO 2200
2150 IF A$(X,Y,Z,4)("<"1" THEN GO
TO 2200
2152 LET C=X
2154 LET D=Y
2156 LET E=Z
2160 LET P=VAL A$(X,Y,Z,6)*20
2160 LET K$="0"
2170 GOSUB MARKWIN
2175 GOSUB PRINTWIN
2180 PRINT AT 15,0;"MY GAME THIS
TIME"
2190 GOTO 2010
2200 NEXT Z
2210 NEXT Y
2220 NEXT X
2225 LET I=0
2240 GOTO 7015
2400 REM **FOUND3X**
2410 FOR X=1 TO 4
2420 FOR Y=1 TO 4
2430 FOR Z=1 TO 4
2440 IF A$(X,Y,Z,6)("<"8" THEN GO
TO 2500
2450 IF A$(X,Y,Z,4)("<"1" THEN GO
TO 2500
2450 LET C=X
2470 LET D=Y
2480 LET E=Z
2485 LET A$(X,Y,Z,6)="0"
2487 LET J=J-1
2490 GOTO 7270
2500 NEXT Z
2510 NEXT Y
2520 NEXT X
2530 LET J=0
2540 GOTO 7020
3000 REM **PRINTWIN**
3010 FOR C=1 TO 4
3020 FOR D=1 TO 4
3030 FOR E=1 TO 4
3040 IF A$(C,D,E,6)="9" THEN GOS
UB INSERT
3050 NEXT E
3060 NEXT D
3070 NEXT C
3080 RETURN
5000 REM **SET**
5005 LET COUNT=COUNT+2
5010 FOR P=20 TO 140 STEP 20
5020 LET L=0
5030 LET H=0
5040 FOR T=1 TO 4
5050 GOSUB (SEARCH)
5060 IF Q$(T)="2" THEN LET L=L+1
5070 IF Q$(T)="3" THEN LET H=H+1
5080 NEXT T
5090 GOSUB UPDATE
5100 FOR T=1 TO 4
5110 IF Q$(T)="1" THEN GOSUB (WE
IGHT)
5120 NEXT T
5130 NEXT P
5140 IF Q$="8" THEN GOTO IPLAY
5150 IF COUNT>63 THEN GOTO DRAW
5170 GOTO UPLAY
5200 REM **SEARCH**
5220 LET Q$(T)=A$(T,D,E,4)
5230 RETURN
5240 LET Q$(T)=A$(C,T,E,4)
5250 LET Q$(T)=A$(C,D,T,4)
5270 RETURN
5280 IF A$(C,D,E,7)="1" THEN LET
Q$(T)=A$(C,T,4)
5290 IF A$(C,D,7)="2" THEN LET
Q$(T)=A$(C,T,5-T,4)
5300 RETURN
5310 IF A$(C,D,E,8)="1" THEN LET
Q$(T)=A$(T,D,4)
5320 IF A$(C,D,E,8)="2" THEN LET
Q$(T)=A$(T,D,5-T,4)
5310 RETURN
5320 IF A$(C,D,E,9)="1" THEN LET
Q$(T)=A$(T,4)
5330 IF A$(C,D,E,9)="2" THEN LET
Q$(T)=A$(T,5-T,4)
5330 RETURN
5340 LET R=VAL A$(C,D,E,10)
5345 LET Q$(T)="1"
5345 IF R=0 THEN RETURN
5345 GOTO (SEARCH+R*10)
5350 LET Q$(T)=A$(T,T,4)
5355 RETURN
5360 LET Q$(T)=A$(T,T,5-T,4)
5365 RETURN
5370 LET Q$(T)=A$(T,5-T,T,4)
5375 RETURN
5380 LET Q$(T)=A$(T,5-T,5-T,4)
5385 RETURN
5400 REM **WEIGHT**
5420 LET A$(T,D,E,5)=CHR$(CODE
A$(T,D,E,5)+UU)
5430 RETURN
5440 LET A$(C,T,E,5)=CHR$(CODE
A$(C,T,E,5)+UU)
5450 RETURN
5450 LET A$(C,D,T,5)=CHR$(CODE
A$(C,D,T,5)+UU)
5470 RETURN
5480 IF A$(C,D,E,7)="1" THEN LET
A$(C,T,5)=CHR$(CODE A$(C,T,5
)+UU)
5495 IF Q$(T)="1" AND A$(C,D,E,7
)="2" THEN LET A$(C,T,5-T,5)=CHR
$(CODE A$(C,T,5-T,5)+UU)
5490 RETURN
5500 IF A$(C,D,E,8)="1" THEN LET
A$(T,D,5)=CHR$(CODE A$(T,D,5
)+UU)
5505 IF A$(C,D,E,8)="2" THEN LET
A$(T,D,5-T,5)=CHR$(CODE A$(T,D
5-T,5)+UU)
5510 RETURN
5520 IF A$(C,D,E,9)="1" THEN LET
A$(T,T,E,5)=CHR$(CODE A$(T,T,E
5)+UU)
5525 IF A$(C,D,E,9)="2" THEN LET
A$(T,5-T,E,5)=CHR$(CODE A$(T,5
-T,E,5)+UU)
5530 RETURN
5540 IF R("<"0 THEN GOTO (WEIGHT+P
+R*10)
5545 RETURN
5550 LET A$(T,T,5)=CHR$(CODE
A$(T,T,5)+UU)
5555 RETURN
5560 LET A$(T,T,5-T,5)=CHR$(COD
E A$(T,T,5-T,5)+UU)
5565 RETURN
5570 LET A$(T,5-T,T,5)=CHR$(COD
E A$(T,5-T,T,5)+UU)
5575 RETURN
5580 LET A$(T,5-T,5-T,5)=CHR$(C
ODE A$(T,5-T,5-T,5)+UU)
5585 RETURN
5590 REM **UPDATE**
5610 IF G$="1" THEN GOTO UPDATED
5620 REM **UPDTEX**
5625 LET UU=0
5630 IF L=4 THEN GOTO UWIN
5635 IF H("<"0 THEN GOTO 6675
5640 IF L=3 THEN LET UU=(U2-U4)
5650 IF L=3 THEN GOTO POINTX
5655 IF L=2 THEN LET UU=(U4-U7)
5660 IF L=1 THEN LET UU=(U7-U6)
5670 IF L=1 THEN RETURN
5675 IF L(">"1 THEN RETURN
5680 IF M=1 THEN LET UU=(U6-U5)
5690 IF M=2 THEN LET UU=(U8-U3)
5700 RETURN
5710 REM **UPDATEQ**
5715 LET UU=0
5720 IF M=4 THEN GOTO 2160
5725 IF L("<"0 THEN GOTO 6765
5730 IF M=3 THEN LET UU=(U1-U3)
5740 IF M=3 THEN GOTO POINTO
5750 IF M=2 THEN LET UU=(U3-U5)
5760 IF M=1 THEN LET UU=(U5-U8)
5765 IF M(">"1 THEN RETURN
5770 IF L=1 THEN LET UU=(U8-U7)
5780 IF L=2 THEN LET UU=(U8-U3)
5800 RETURN
7000 REM **IPLAY**
7010 IF I(">"0 THEN GOTO FOUND30
7015 IF J(">"0 THEN GOTO FOUND3X
7020 LET HIJ=USR 16516
7030 LET HU=PEEK 16514+256*PEEK
16515
7040 LET HU=(HU-(PEEK 16400+256*
PEEK 16401+15))/10
7050 LET C=INT (HU/16)+1
7060 LET HU=HU-(C-1)*16
7070 LET D=INT (HU/4)+1
7080 LET E=HU-(D-1)*4+1
7270 LET A$(C,D,E,4)="3"
7280 LET A$(C,D,E,5)=" "
7290 LET G$="1"
7295 IF COUNT>63 THEN GOTO DRAW
7300 LET K$=""
7310 GOSUB INSERT
7330 GOTO SET
7400 REM **UWIN**
7410 LET K$="0"
7420 GOSUB MARKWIN
7430 GOSUB PRINTWIN
7440 GOTO 2000
7450 REM **POINTX**
7500 LET H$="6"
7505 LET J=J+1
7510 GOTO MARK
7520 REM **POINTO**
7540 LET H$=STR$(P/20)
7545 LET I=1
7550 GOTO MARK
7550 REM **MARKWIN**
7555 FOR T=1 TO 4
7575 LET H$="9"
7580 GOSUB (WINLINE+P)
7590 NEXT T
7600 REM **MARK**
7610 FOR T=1 TO 4
7620 GOSUB (WINLINE+P)
7630 NEXT T
7640 RETURN
7700 REM **UWLINE**
7720 LET A$(T,D,E,6)=H$
7730 RETURN
7740 LET A$(C,T,E,6)=H$
7750 RETURN
7760 LET A$(C,D,T,6)=H$
7770 RETURN
7780 IF A$(C,D,E,7)="1" THEN LET
A$(C,T,6)=H$
7785 IF A$(C,D,E,7)="2" THEN LET
A$(C,T,5-T,6)=H$
7790 RETURN
7800 IF A$(C,D,E,8)="1" THEN LET
A$(T,D,6)=H$
7805 IF A$(C,D,E,8)="2" THEN LET
A$(T,D,5-T,6)=H$
7810 RETURN
7820 IF A$(C,D,E,9)="1" THEN LET
A$(T,T,6)=H$
7825 IF A$(C,D,E,9)="2" THEN LET
A$(T,5-T,6)=H$
7830 RETURN
7840 LET R=VAL A$(C,D,E,10)
7845 GOTO (UWLINE+R*10)
7850 LET A$(T,T,6)=H$
7855 RETURN
7860 LET A$(T,T,5-T,6)=H$
7865 RETURN
7870 LET A$(T,5-T,T,6)=H$
7875 RETURN
7880 LET A$(T,5-T,5-T,6)=H$
7885 RETURN
9000 REM **SETUP**
9010 FOR X=1 TO 4
9020 FOR Y=1 TO 4
9030 FOR Z=1 TO 4
9040 LET F$(1)=CHR$(X+20)
9050 LET F$(2)=CHR$(Y+20)
9060 LET F$(3)=CHR$(Z+20)
9070 LET F$(4 TO 10)="000000"
9080 IF Y=2 THEN LET F$(7)="1"
9090 IF Y=3 THEN LET F$(7)="2"
9100 IF X=2 THEN LET F$(8)="1"
9110 IF X=3 THEN LET F$(8)="2"
9120 IF X=Y THEN LET F$(9)="1"
9130 IF X=Y=2 THEN LET F$(9)="2"
9140 IF F$(7)="1" AND F$(8)="1"

```

(continued on next page)

SOFTWARE FILE

(continued from previous page)

```

THEN LET F8(10)="1"
9150 IF F8(9)="1" AND F8(8)="2"
THEN LET F8(10)="2"
9155 IF F8(8)="2" AND F8(7)="2"
THEN LET F8(10)="3"
9160 IF F8(8)="2" AND F8(9)="2"
THEN LET F8(10)="4"
9170 LET U=3
9180 IF F8(7)("<">"0" THEN LET U=U+
1
9190 IF F8(8)("<">"0" THEN LET U=U+
1
9200 IF F8(9)("<">"0" THEN LET U=U+
1
9210 IF F8(10)("<">"0" THEN LET U=U
+1
9215 IF U>5 THEN LET U=5
9220 LET F8(8)=CHR$(U#6)
9230 LET A$(X,Y,Z)=F8
9240 NEXT Z
9250 NEXT Y
9260 NEXT X
9270 GOTO 16
9500 DIM A$(4,4,4,10)
    
```

```

9503 LET COUNT=0
9505 LET H$="0"
9507 LET J=0
9509 LET I=0
9510 DIM F$(10)
9515 DIM O$(4)
9520 LET U1=35
9530 LET U2=35
9540 LET U3=25
9550 LET U4=30
9560 LET U5=15
9570 LET U6=0
9580 LET U7=15
9590 LET U8=2
9610 LET UPLAY=103
9615 LET INSERT=350
9616 LET DRAW=2000
9617 LET FOUND30=2100
9618 LET FOUND3X=2400
9619 LET PRINTUIN=3000
9620 LET SET=6000
9630 LET SEARCH=6200
9640 LET HEIGHT=5400
9650 LET UPDATE=6500
9660 LET UPDATEX=6620
9670 LET UPDATEY=6710
9680 LET IPLAY=7000
    
```

```

9690 LET UWIN=7400
9710 LET POINTX=7450
9720 LET POINTY=7520
9725 LET MARKUIN=7550
9730 LET MARK=7600
9740 LET UINLINE=7700
9750 LET SETUP=5000
9800 GOTO SETUP
9900 SAVE "3040"
9910 RUN
    
```

The Basic routine.

```

7020 LET HIUT=0
7030 FOR X=1 TO 4
7040 FOR Y=1 TO 4
7050 FOR Z=1 TO 4
7060 IF A$(X,Y,Z,4)("<">"1" THEN GO
TO 7200
7070 LET UT=CODE A$(X,Y,Z,5)
7080 IF UT("<HIUT THEN GOTO 7200
7090 IF UT=HIUT AND RND>.33 THEN
GOTO 7200
7100 LET HIUT=UT
7110 LET C=X
7120 LET D=Y
7130 LET E=Z
7200 NEXT Z
7210 NEXT Y
7220 NEXT X
    
```

Keyword define

J Bradshaw,
Runcorn,
Cheshire.

VIC-20

THIS PROGRAM runs on the unexpanded Vic-20 and allows you to define eight Basic keywords to the function keys. The Basic program sets up a small machine-code program — 139 bytes — at the top of memory. Therefore, you can run or type fairly long programs while this one is running. There is also an error check in line 40 which ensures

you have typed in the data correctly, thereby preventing system crashes.

Four permanent functions are defined:

- F1 = Screen colour normal
- F = Screen colour black
- F5 = Quote mode on
- F7 = Quote mode off

And, of course, by using the function keys in conjunction with the Shift and Commodore keys, eight Basic keywords can be printed at the current cursor position on the screen. You can choose any Basic keyword and assign it to its appropriate function key by altering the eight Data values on line 200 respectively.

Some values may give an output of, say, half

a keyword for example,

INT (PRINT)

yet by trial and error you should find the desired keyword. These values on line 200 merely state how far into the ROM keyboard table the Vic is to lock before printing out the characters it finds. At present, the function keys are defined as follows:

Shift F1 = PRINT	CBM F1 = FOR
Shift F3 = POKE	CBM F3 = NEXT
Shift F5 = PEEK	CBM F5 = GOTO
Shift F7 = THEN	CBM F7 = GOSUB

To disable the program press run stop and restore. To enable enter Sys 7541.

```

1 REM DEFINED FUNCTION KEYS
2 REM BY JOHN BRADSHAW"
10 POKE51,117:POKE52,29:POKE55,117:POKE56,29
20 READA:IFA=-1THENFORC=7672TO7679:READA:POKEC,A:NEXT:GOTO40
30 T=T+A:POKE7541+I,A:I=I+1:GOTO10
40 IFT("<">17900)THENPRINT"DATA WRONG":END
50 SYS7541:PRINT"FUNCTION KEYS DEFINED"
60 DATA120,169,130,141,20,3,169,29,141,21,3,88,96,165,197,197,187,240,23,133,18
7,162,1
70 DATA201,39,240,18,232,201,47,240,13,232,201,55,240,8,232,201,63,240,3,76,191
,234,173
80 DATA141,2,201,1,240,50,201,2,240,42,224,1,240,22,224,2,240,26,224,3,240,7,16
9,0,133
90 DATA12,76,191,234,169,1,133,212,76,191,234,169,27,141,15,144,76,191,234,169
,8,141
100 DATA15,144,76,191,234,232,232,232,232,189,247,29,133,188,164,188,185,161,1
92,48,8
110 DATA32,210,255,230,188,76,224,29,56,233,128,32,210,255,76,191,234,-1
200 DATA99,89,214,148,0,3,32,48
    
```

Proc point

John Chalmers,
Godstone,
Surrey.

LYNX

LYNX BASIC provides no instructions for examining the display, and Peeking it is not possible because of the way it is organised. The routine given in the listing provides the Basic programmer with a method of examining any point on the display. It works by calling a ROM routine which looks at the display RAM. The routine is written as a procedure, so to use it you simply type:

PROC POINT(X,Y)

where X and Y are the co-ordinates of the point you wish to examine. The result will be contained in the variable z on exit from the routine and will be the colour value of the point X,Y. Note how small letter variables are

used within the procedure. This would seem like good practice whenever using procedures as extra "commands" — the small letter names are reserved solely for such routines and thus do not corrupt the capital letter names of the main variables. To test the procedure once you have entered it, enter the following lines

```

INK 4
DOT100,100
PROCPOINT(100,100)
?z
    
```

The z should of course be 4.

```

99990 DEFPROC POINT(x,y)
99991 LET y=((x+256*y)/8),x=INT(y),
y=2*(7-(FRAC(y)*8)),z=0
99992 CALL @0069,@8000+x
99993 IF (HL BNAND y)>0 THEN LET z=z+1
99994 CALL @0069,@C000+x
99995 IF (HL BNAND y)>0 THEN LET z=z+2
99996 CALL @0070,@C000+x
99997 IF (HL BNAND y)>0 THEN LET z=z+4
99998 ENDPROC
    
```

Key click

P A Street,
Biggleswade,
Bedfordshire.

DRAGON

THIS KEYBOARD click routine for the Dragon 32 will emit a short click whenever a key is depressed.

The machine-code routine generates a short click, by setting up the sound generator and loading the memory location 65312 with a number, between 0 and 255.

Memory locations 363 and 364 contain the address to which the computer jumps when a key is pressed. This address is changed to the beginning of the click routine. The routine is then started by Poking location 362 with the number 126.

(continued on page 175)

£39.95

(inc. VAT)
+ 80p P&P



THE NEW for the SPECTRUM,
ZX81, LAZER 200, JUPITER ACE,
and the ORIC as illustrated

This elegant desk top system, designed for the professional user. In its slimline case, the superior keyboard contains all the graphic characters for the above computers. With the additional function keys and SPACE-BAR, speedy and accurate data entry is made simple.

The Fuller FDS is easy to install, based on the very popular FD42 system, it requires no soldering or technical knowledge.

For the user who is reluctant to install his computer circuit board inside the FDS a buffer is available (at extra cost) which simply plugs onto the expansion port and connects directly to the keyboard.

The Natural Extension.

Firmly established in the development of computer hardware, the acknowledged leaders in their field, the vast range of Fuller experience is available to you through their comprehensive selection of accessories. This ever expanding range make Fuller the natural extension for your Computer.

FULLER PRINTERFACE

Available in: RS232

This amazing RS232 Printerface is designed to operate with any special printer or teletype for graphic displays. Seiksha 250 is recommended as all the software is held in ROM, no loading of the programmes from tape is required. The printer face will allow you to make a copy of all 24 lines as the screen on your printer two sizes of copy are available; normal size users one dot on the printer to one dot on the screen or double size using four dots on the printer to one dot on the screen. Baud rate can be set at any one of 12, between 50 and 9600.

The Printerface will automatically initialize the printer to give a page width 80 characters x 66 lines, (uses 60 line for text), although any format can be set up.



£34.95

(inc. VAT)
+ 80p P&P

CENTRONICS PRINTERFACE

As above but for parallel printer with CENTRONICS input

£39.95

(inc. VAT)
+ 80p P&P

DUAL/PRINTERFACE Features both
RS 232 CENTRONICS INTERFACE

(leads can be supplied at an extra cost)

£49.95

(inc. VAT)
+ 80p P&P

Fuller MICRO SYSTEMS

FULLER MICRO SYSTEMS

The ZX Centre, Sweeting Street,
Liverpool 2. Telephone: 051-236 6109

A.F.D.E.C., 318 Kempshott Lane, Basingstoke, Hants. Arcade Computers, 37/38 Second Floor, The Silver Arcade, Leicester. 0533 532911 - Rob. Barrow Computer London N7. 01 607 2296. Beaver Radio Ltd., 20/24 Whitechapel Liverpool L3 6EH. 051 709 9898. Bressal Computers Ltd., 24 Park Row, Bristol. 0272 29411 Bury St. Edmunds, Suffolk. 1P33 1PR. Canterbury Software Centre, 9 The Friars Canterbury, Kent CT1 2AS. Channel One Computer Services, 174 High Street, H 156/158 Blackburn Road, Bolton, Lancashire. Computer Cabin, 24 The Parade, Silverdale, Newcastle Under Lyme, Staffs. 0782 636911. Computer Corner, 261 C Computersolve Ltd., 8 Central Parade, St. Marks Hill, Surbiton, Surrey KT6 4PJ. 01 390 5135 - Ross. Datastore, 6 Chatterton Road, Bromley, Kent. 01 4 Delta Micros Ltd., The Computer Centre, 68 Chestergate, Macclesfield. 0625 618827. Diskwise Computer Centres Ltd., 68/70 Lower Hillgate Stockport, Cheshire Fotosonic House, Rawson Square, Bradford BD1 3JR. 0274 309266. Fox Electronics, 141 Abbey Road, Basingstoke, Hants. Goodrights Ltd., 1 Friargate, Pres Leicester. 0858 63056. HASC, 54A Town Street, Horsforth, Leeds LS1 8AP. 0532 585357. Home & Business Computers, 54 Yorkshire Street, Oldham, Greater Mo 234 Church Street, Blackpool. ITEC, Unit 6, 13A Harbour Road, Inverness IV1 1SY. 0463 226505. JCV Hi-Fi & Video Ltd., Wharf Street, Warwick, Warwickshire Guardian Centre, Rotherham, 0709 60000. Micro Shack, 18 Chapel Street, Aberdeen, 0224 636081. Micro-Tronics, 27A Market Street, Tamworth, Staffs. 0827 5141 061 366 9935. Quids In, 38 North Street, Romford, Essex. 0708 26840. Radford Hi-Fi, 52/54 Gloucester Road, Bristol. 0272 428247. Radford Hi-Fi, 43 King Ed 144 St. Georges Road, Cheltenham, Gloucestershire. 0242 28979. SPI Soundvision, 359 Greenlanes, Palmers Green, London N13 01 882 5888. Square Deal, Swanley, Kent. Vision on Video, 255a, High Street, Erdington, Birmingham B23. 021 373 9383. Vision Store Ltd., 3 Eden Walk, Kingston Upon



£54.95

(inc. VAT)

+ 80p P&P

THE MASTER UNIT – The Ultimate Games Unit

The Master Unit provides all the requirements for the serious games enthusiast, containing not only the FULLER BOX, but also the FULLER ORATOR, all contained within the standard case.

The Speech Unit and sound synthesiser combines to provide exciting voice and sound for your games. The other features include, Cassette interface, a variable audio output which may be connected directly to a HI-FI system. The MASTER UNIT provides endless scope in applications, and it allows access to the SPECTRUM for other peripheral, via its duplicate user port, i.e. printer interface. The MASTER UNIT is complete with full documentation and demo tapes which includes the type of speech and sound you can achieve.



£29.95

(inc. VAT)

+ 80p P&P

The Fuller Box – The Sound System for the Spectrum

The FULLER BOX added to the ZX Spectrum, improves the sound quality enormously. The built-in audio amplifier working well with all SPECTRUM programs.

The FULLER BOX allows you to program your own music, explosions, zaps, chimes, whistles and an infinite range of other sounds. Based around the popular G1-AY-3-8912 sound chip. It gives you complete control over 3 channels of tone and/or white noise, plus an overall envelope control.

Also provided with a joystick port, the unit gives instant command over all your own games programs. The port is compatible with all the commercially available joysticks eg. Atari/Commodore.

The FULLER BOX is complete with full documentation and a demo tape which includes the type of sounds you can achieve. It also allows you to program your own sounds. Fitting neatly onto the back of the SPECTRUM, the FULLER BOX still allows access for other peripherals, including the new SPECTRUM Micro Drives, via its duplicate user port.

Upgrades for the Fuller Box and Orator

The systems can be expanded to MASTER UNIT specifications including the full range of controls. The upgrades must be fitted by us, at FULLER MICRO'S.

PRICES (inc. V.A.T.) ORATOR to MASTER UNIT **£14.95** FULLER BOX to MASTER UNIT **£24.95**

The Fuller Orator – Speech for the Spectrum

A smash hit at a number of recent Micro Fairs, the FULLER ORATOR uses an allophone system. Based on the G1-SP0256 AL voice synthesiser chip. Directly accessible in BASIC, it is able to say anything you command using the keyboard or a games program. It comes in the standard case complete with its own audio amplifier, it allows access to the SPECTRUM for other peripherals via its duplicate user port. Full documentation and demo tape included.

PRICE (inc. V.A.T.) **£39.95** plus 80p p&p.

16K to 48K Memory Expansion Pack for the Spectrum

For the 16K SPECTRUM owner – upgrade your machine to 48K of RAM with the FULLER upgrade kit. Complete with full assembly instructions. (Model 2 or 3 only).

PRICE (inc. V.A.T.) **£24.95** plus 80p p&p.

Ram Adaptor Boards for the ZX81

Allows you to fit your Ram Pack inside the FD42 system. Accepts most commercial Ram Packs.

PRICE (inc. V.A.T.) **£9.35** & 80p p&p.

Fuller Quality

Fuller Micro Systems reach for the highest quality in Research and Development, to make our products the BEST.

Fuller Service

In an effort to provide the best service we have built a new MAIL ORDER dept. at 71, Dale Street, Liverpool 2. Due to come into service soon.

Fuller Guarantee

All our products carry a worldwide one year guarantee.

FULLER stock a full range of components and kits for your computer, send SAE for details.

Please supply the following items: (state items and quantity)

please send me @ £.....

please send me @ £.....

please send me @ £.....

please add £..... for p&p

I enclose a cheque/PO payable to
FULLER MICRO SYSTEMS Total £..... or debit my Access/

Barclaycard – Card No.

Signature

Name

Address



DEALERS REQUIRED FOR UK & ABROAD **051-236 6109**
ENQUIRES WELCOME **71, DALE STREET, LIVERPOOL 2**

Search Street, Barrow in Furness, 0229 38353. Bartlett's HI-FI & Video, 175/177 Holloway Road, London N16 5JL. Bury Computer Centre, 11 Guildhall Street, Bury, Lancs. 0752 34424. Clearstone HI-FI, 14 Jordan Place, Fulham, London SW14 8JL. Clearstone HI-FI, Portsmouth. Computer Shop, Unit 25, Handyside Arcade, Newcastle Upon Tyne NE1 4PZ. Computer Systems, The Computer Centre, 68 Chestergate, Macclesfield, Cheshire. 480 4422. ENL Audio Visual Ltd., 116/118 Allerton Road, Nottingham. Erricks of Bradford, 2AU. 0772 57528. Harborough Home Computers, 7 Church Street, Market Harborough, Leicestershire. Acme Hire Ltd., 40 King Street, Blackburn, Lancs. Home Computers Ltd., Metyclean Ltd., 92 Victoria Street, London SW1E 5JF. 01 828 2511. Micro Pan, Unit 12, St. Peter's Lane, Leicester. 0533 29023. PASE, 213/215 Market Street, Hyde, Cheshire SK14 1HF. Rdsar, Berks. Rush HI-FI Centre, 5/6 Cornhill, Chelmsford, Essex. 0245 57593. Screen Scene, 2nd Floor, New Elham, London SE9 2DR. 01 859 1516. Swanley Electronics, 32 Goldsloe Road, Westfarthing Computer Systems, 21 Wendron Street, Helston, Cornwall.

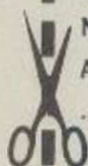
FOR FURTHER INFORMATION

SEND ENCLOSED

FOR UK SAE

ABROAD MONEY

COUPON





HI-SOFT DEV PAC

SINCLAIR ZX SPECTRUM 48K

PC Express Programmes Company presents.

Realm of the Undead by R. J. Yorke

Hounded by tarantulas, vampire bats, and zombies, you must travel through the Realm of the Undead to rescue the trapped villagers whilst collecting as much garlic as possible for your final confrontation with the Dark Lord of the Undead.

Realm of the Undead

is a hair-raising, super graphical Arcventure featuring high resolution machine code graphics, sound effects, several levels of difficulty and different layouts on each of the progressive sections of the game.

ARCVENTURE, the new concept from Express Programmes Company, combining the best features of adventure and arcade games.



Realm of the Undead for the 48K SPECTRUM

EXPRESS PROGRAMMES COMPANY presents

HISOFT DEVPAC 2: Comprising - **GENS2**, a powerful and easy to use Z80 assembler for the ZX Spectrum, roughly 7K bytes in length, an extensive professional piece of software. **MONS2**, a powerful monitor/disassembler.

INSTRUCTION MANUAL.

DEVPAC 2, in our opinion, is probably the best documented most sophisticated editor/assembler/monitor/disassembler available for the ZX Spectrum.

DEVPAC 2 has proved to be an invaluable aid to EPC in developing sophisticated Z80 machine code programmes for the ZX Spectrum.

DEVPAC 2 now available from Express Programmes Company - price £14.00.

Post coupon now to:
Express Programmes Company
Express House, City Road, Bradford, W. Yorkshire BD8 8ER

Please rush me a copy of
 Realm of the Undead for the 48K SPECTRUM £5.50
 HISOFT DEVPAC 2 £14.00

*Please debit my Barclaycard / Access
 I enclose Cheque / P.O. for
 *Delete as applicable

£

Name _____
 Address _____

VISA SUPERFAST CREDIT CARD SALES LINE
0274 668890



SOFTWARE FILE

(continued from page 170)

Enter the program very carefully. Then type Run; the program is Newed and the click routine begins to operate. Adjust the TV's volume control to obtain a preferable volume.

Mnemonics	Hexadecimal Code
LDA (65315)	B6 FF 23
ORA 8	8A 08
STA (65315)	B7 FF 23
LDA (65281)	B6 FF 01
ANDA 247	84 F7

STA (65281)	B7	FF	01
LDA (65283)	B6	FF	03
ANDA 247		84	F7
STA (65283)	B7	FF	03
LDB 0		C6	00
LDA 0		86	FF
STA (65312)	B7	FF	20
STA (65312)	B7	FF	20
LDA 0		86	00
STA (65312)	B7	FF	20
INC B			5C
BNE -16		26	F0
RTS			39

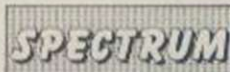
Listing 2.

```

10 CLEAR 100,32000 : X=0
20 FOR A=32000 TO 32042
30 READ D$: D = VAL("8H" + D$)
40 POKE A,D : X=X+D
50 NEXT A
60 IF X<>6165 THEN PRINT "DATA
  INCORRECT" : END
70 POKE 363,125 : POKE 364,0
80 POKE 362,126 : NEW
90 DATA B6,FF,23,8A,08,B7,FF,23,B6,FF,01,
  84,F7,B7,FF,01,B6,FF,03,84,F7,B7,FF,03,
  C6,00,86,FF,B7,FF,20,8600,B7,
  FF,20,5C,26,F0,39
    
```

Weedkiller

Peter Beech,
Kirkham,
Lancashire.



WEEDKILLER RUNS on a 16K or 48K Spectrum. Press keys 5 and 6 to move and the key 0 to drop the weedkiller. Your goal is to stop the weeds reaching the top of the wall.

WEEDKILLER (16K or 48K Spectrum)

```

0>REM * WEEDKILLER @P.Beech *
1 BORDER 1: PAPER 1: CLS : IN
K 7
10 LET hsc=0
15 GO SUB 2000: REM ##SET UP
20 LET x=0
30 LET a$=INKEY$: IF a$<>"5" A
ND a$<>"6" THEN GO TO 60
40 LET x=x+(a$="5")-(a$="6")
IF ATTR (13,x)=15 THEN LET x=x+
LET x=20
50 PRINT AT 13,x: PAPER 2: "W":
AT 13,x: PAPER 2: " ":
60 IF a$="0" THEN GO TO 140
65 REM ##MAKE WEEDS GROU
70 LET k=INT (RAND*16)+1: PRINT
AT a(k) k+7: INK 4: BRIGHT 1: CH
R$ (144+INT (RAND*5)): BEEP .02,k
+5
80 LET a(k)=a(k)-1: IF a(k)=13
THEN LET l=l-1: IF l=0 THEN PRI
NT AT 13,12: BRIGHT 1: FLASH 1: "
GAME OVER" AT 13,1: INVERSE 1: F
LASH 0: "8888" ( TO 5-LEN STR$ sc)
:sc: GO SUB 9900: LET hsc=(hsc+
c+ABS (hsc-5))/2: GO TO 15
90 IF a(1)=13 THEN GO SUB 4020
GO SUB 2047: GO TO 20
100 GO TO 20
140 PRINT AT 13,x: PAPER 2: "A":
FOR f=14 TO a(n-7) -1: PRINT AT
f,x: BRIGHT 1: " ": BEEP .02,10-f
NEXT f: FOR f=14 TO 19: BRIGH
EP .02,10-f: PRINT AT f,x: BRIGH
T 1: " ": NEXT f: FOR f=14 TO 19:
PRINT AT f,x: BRIGHT 1: " ": NEX
    
```

```

T f: LET sc=sc+(19-a(x-7))*10: P
RINT AT 13,x: PAPER 2: "W": PAPER
5: AT 15,1: "8888" ( TO 5-LEN STR$
sc):sc
150 LET a(x-7)=19: GO TO 70
2010 IF hsc=0 THEN RESTORE: FOR
f=USR "a" TO USR "h"+7: READ a:
POKE f,a: NEXT f
2020 LET sc=0: LET l=3
2030 PRINT AT 14,1: INVERSE 1: "3
CORE" AT 17,0: "HISCORE" AT 16,25
: "LIVES" AT 15,1: INVERSE 0: "000
0" ( TO 5-LEN STR$ sc):sc: AT 15,1
: "8888" ( TO 5-LEN STR$ hsc):hsc
2040 PRINT AT 1,11: INK 5: "Weedk
iller": PLOT INK 5: 89,157: DRAW
INK 5: 75,0
2041 PRINT AT 4,10: "KEYS 5 and 6
": AT 6,13: "TO MOVE": AT 8,12: "0 T
O DROP" AT 10,11: "WEEDKILLER"
2043 PLOT 73,147: DRAW 110,0: DR
AW 0,-64: DRAW -110,0: DRAW 0,64
2047 PRINT AT 17,25: "W" ( TO L-1
): " " DIM a(16): LET x=15: FO
R f=1 TO 16: LET a(f)=19: NEXT f
2050 PRINT AT 13,8: PAPER 2: "
": AT 20,8: PAPER 3:
    
```

```

8000 DATA 0,5,9,15,9,5,0
8010 LET y=6.661
8020 FOR n=-20 TO 0 STEP 6: REST
ORE 8000
8030 FOR k=1 TO 7: READ x: BEEP
.04,x+n
8040 NEXT k: NEXT n: BEEP 1,n-1
8070 FOR n=0 TO -20 STEP -3: RES
TORE 8000
8090 FOR k=1 TO 4: READ x: BEEP
.04+y,x+D
8100 NEXT k: LET y=y+.002: NEXT
n
8110 BEEP .7,n+1: BEEP .7,n: BEE
P 1.4,n+5
8120 RETURN
9000 RESTORE 9020: FOR f=1 TO 20
: READ a,b: BEEP a/3,b: NEXT f
9015 RETURN
9020 DATA 1,12,.5,12,.5,11,1,9,1
,9,.45,7,.45,9,.45,7,.45,5,.45,4
,.45,2,7,.45,4,.45,5,1,7,1,9,1,2,1
,5,1,5,4,.5,2,1,0
    
```

WEEDKILLER GRAPHICS

W=F
A=G
{}=H

MAIN LOOP

20-50 Test keys, move bucket and call fire routine if required

70-100 Makes weeds grow and tests if game is over or not

OTHER ROUTINES

140-150 Fire routine

2000-90 Initialisation

4020-9920 Various tunes

THE OBJECT OF THE GAME IS TO STOP THE WEEDS GROWING TO THE TOP. INSTRUCTIONS ARE INCLUDED IN THE PROGRAM.

Back-up

H J Thomas,
Wirral,
Merseyside.



THIS PROGRAM is intended to emulate the *Backup command of the disc filing system, but to enable the contents of a disc to be transferred to a cassette tape as a more cost-effective way of protecting a program collection. There was no need for the cassette to contain the !Boot type files, which could not be used from cassette, so only Basic programs needed to be copied.

I was thwarted at first by an apparent error in the BBC Disc Drive Manual — page 74 — which states in its section on Osword, "A=&F7 indicates that a general Read/Write operation is required". The hex should be &7F.

The program could be modified to load all programs on the disc by storing sector 01 at Page &17 and reading the length of program to *Save on to tape. This would then transfer files, machine code or Spooled material as well as Basic programs.

10REM Disc to Tape Automatic Transfer V2

20REM by H J THOMAS June 1983

30B%=&1800

40*KEYOREM!M*DISC!MPAGE=&1900!MG.130!M

50*KEY1*LOAD"X.XXXXXXX"2000!M

60*KEY2*TAPE!MPAGE=&2000!M

70*KEY3SAVE"X.XXXXXXX"!M

80A%=&7F: X%=&70: Y%&0

90?&70=0: !&71=B%: ?&75=3: ?&76=&53: !&77=&0: ?&79=&21

100PRINT "WHEN DISC & TAPE ARE READY HIT ANY KEY": A=GET

110CALL&FFF1

120IF?&7A<>0 THENPRINT "DISC FAULT": GOTO220

130B%=B%+8: IFB%??=0 THENGOTO210

140?&B32=B%??: ?&B57=B%??

150!&B34=!B%: !&B59=!B%: !&B37=B%!3: !&B5C=B%!3

160*FX13B,0,129

170*FX13B,0,130

180*FX13B,0,131

190*FX13B,0,128

200END

210PRINT "DISC TRANSFERRED"'

220PRINT "ANOTHER DISC (Y/N) ?"

230ON INSTR ("YyNn", GET#) GOTO 240,240,200,200 ELSE 230

240B%=&1800: GOTO100

IF YOU HAVE A BBC MICRO THEN YOU NEED

LASERBUG is the newsletter of the Independent National BBC Microcomputer Users Group. If you want the best source of information on the BBC Micro you can't do without **LASERBUG**. No matter what your interest - hardware, software, business, games or education then **LASERBUG** has something for you.

Also, **LASERBUG** has available many special offers including dust covers (for computer, monitor, printer, disks), cassette leads and 1.2 ROMS FOR ONLY £5.50 INCLUSIVE - THE CHEAPEST PRICE ANYWHERE! (Members Only)

LASERBUG defies description - send off for a sample copy and you'll find that it sells itself to you. See one and you'll be hooked for life!!!

- Please supply me with [] more details about **LASERBUG** and your special offers
 [] a sample copy for £1.00 and an A4 SAE (17p postage)
 [] 1 UK 12 Month Subscription for £12.00
 [] 1 UK 6 Month Subscription for £6.00
 [] 1 Overseas Surface Mail Subscription for £14.00
 (air mail rates on application)

Please send the goods to:

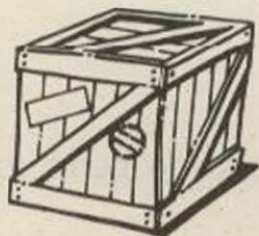
NAME ADDRESS

I enclose a cheque/PO for £ p made payable to LASERBUG. Please send the form to LASERBUG Dept. Y, 10 Dawley Ride, Colnbrook, Slough, Berks., SL3 0QH.

MICRO— — —><

your
EXPORT
specialist
for

ALL MICRO COMPUTERS - SOFTWARE &
PERIPHERALS - INCLUDING ORIC -
SINCLAIR - NEWBRAIN - LYNX
COMMODORE & MANY
MORE !!



Please Contact :
MICRO-X LIMITED
5 COVERDALE ROAD,
BRONDESBURY, LONDON NW2 4DB
TELEPHONE 01-459 1089

BBC COMPUTERS

* Official Acorn/BBC Computer dealer *

HARDWARE

BBC Model B £399
 BBC Model A with 32K/VIA £344
 BBC Model A (just a few left) £299
 TEAC Slim Profile Compatible Disc Drive—WITH CABLES £205
 Plus Monitors — Printers — Connectors etc. etc. Top quality
 authorised A/B upgrade kits £65

SOFTWARE

Monsters — Rocket Raid — Snapper — Meteors — Planetoid —
 Super Invaders — Creative Graphics and Early Learning
 All £9.95 each

Arcade Action £11.90 — Killer Gorilla £7.95

BOOKS (BBC MICRO)

Assembly Language Programming (Birnbaum) £8.95
 Games BBC Computers Play £6.95
 Creative Graphics Book £7.50
 Forth Book £7.50 (Tape £16.85 extra)

All above items in stock AT PUBLICATION DATE, are same day
 dispatch — however — due to demand for all BBC related
 products, we suggest you telephone first, and we will RESERVE
 your order.

VAT — we will have to pay it, so OUR prices INCLUDE it.
 Simply add £1 per order for postage, £9 for computer for
 Securicor delivery.

* LONG S.A.E. FOR FULL LIST/ENQUIRIES

CARDIGAN ELECTRONICS

Chancery Lane, Cardigan, Dyfed, W. Wales.
 Tel. 0239-614483

Phone from 10am to 5pm Mon-Sat
CLOSED ALL DAY WEDNESDAY

COMPETITION CORNER

A £15 book token will be awarded to the first correct solution drawn from the competition bag. All entries must be at the *Your Computer* offices by the last working day in August. The name of the winner, the solution, and a competition report will be published in the October, 1983 issue of *Your Computer*.

If you want to set a competition for Competition Corner, remember that the simplest solution should be calculable by a short program rather than by any other form of reckoning.

COMPETITION RESULTS AND WINNERS

"A MICROLINE 80 printer would make my hard copy easy . . ." was the sentence to be completed in June's crossword competition. As an opening sentence it was perhaps a trifle illogical since hard copy, of course, is not possible without a printer.

Most entries stressed the chore of listing by hand: "If you've done an LList on a Parker 45, you'll know why", said D Lockwood, while A Baker simply completed the rhyme with "because listings by hand make me feel queasy". In the Election month's only political entry A Sewell suggested, "Its Alliance with my computer would be Conservative of my Labour".

Other entries went to work on the printer manufacturer's name — Oki. "Matrix printers rule — Oki", wrote R Munday and K Butler's entry was "To read — no longer a joki but oki doki". The best in this line came from N Garrat, Brookside, Racton, Near Chichester, West Sussex, with "As all write is OK but

OKI is one better, all right" which we made the winner.

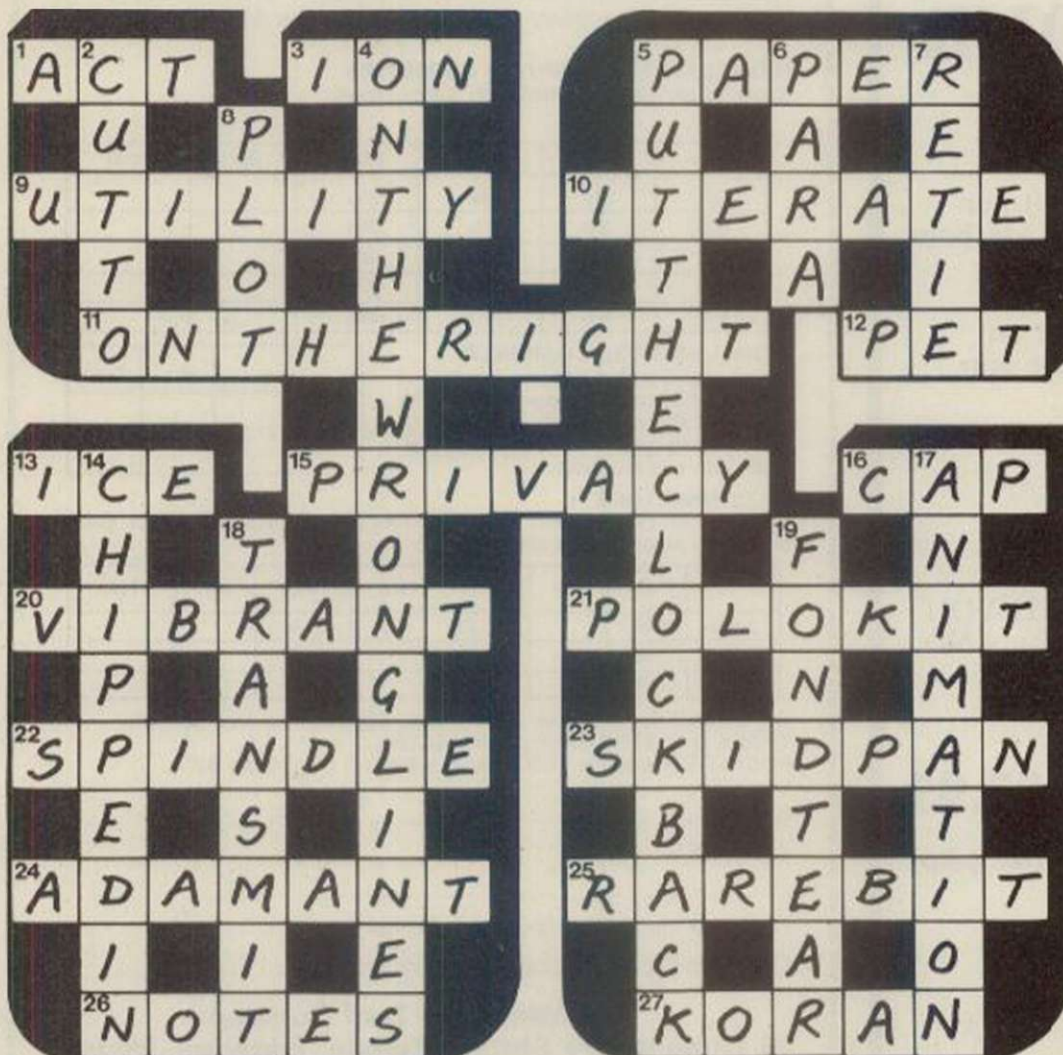
F Hindes' "ensuring that the screen show will not leave me feeling listless" was a close contender as was S Taylor's "it would dot my i's by putting dots before my eyes".

In June's android mutiny problem — in the intergalactic hive ship — running the program provided yielded the solution easily enough. When you transfer the blocks which it prints out to the honeycomb grid the number is revealed to be 3.

The program adds together all the dots surrounding each cell, then counts the number of bits set to 1 in the binary representation of that number. If the result equals two it prints a block.

The £15 book token goes to A Maude, Talley, Penglais Road, Aberystwyth, Dyfed, whose answer was the first correct solution picked from the *Your Computer* competition bag. ■

Solution to the June crossword.



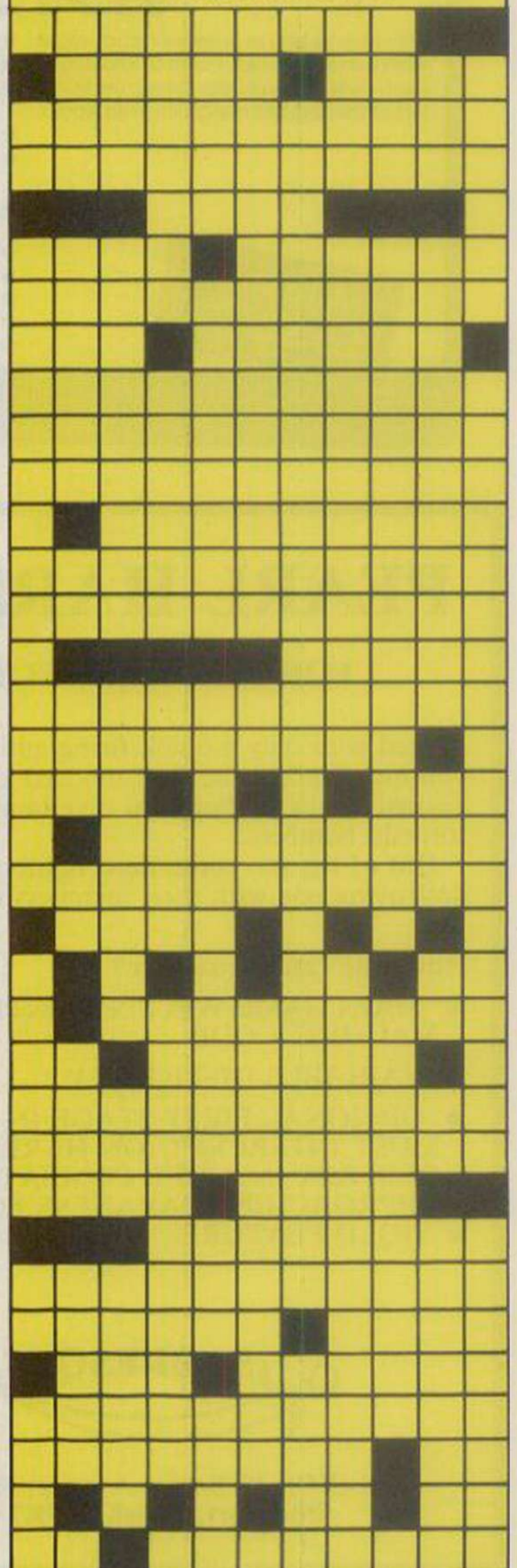
STRANGE ENCOUNTER

BY ANTHONY ROBERTS

The Earth's first intergalactic message has arrived — it is a string of 385 binary digits — shown here — and we are convinced that it contains a three-dimensional representation of the beings who sent the message.

Can you decode it and discover what they look like? How many limbs do they appear to have?

The encoded intergalactic message.





An Exciting range for 16K ZX81
from SOFTWARE FARM



SUPER SCRAMBLE

YOUR MISSION

To penetrate the witches defences, enter her cavern and destroy her wicked heart.

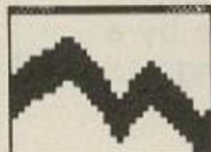
THE WITCHES DEFENCES

Stalagmites and stalactites - which grow across your path.

Volcanoes - to get past alive - if you can!

Vampire Bats - that cling to your ship and make controls sluggish

Cave-ins - should you hit the side of the cave with your Laser Cannon or Bomb, part of the roof will cave in on you



- Written entirely in machine code
- Hall of Fame
- 1 or 2 players
- Mystery score positions to bomb
- 5 skill levels

GOBBLERS Mk 2



Beat that high score!
Gobble those dots before those meanies gobble you!
Your only aids are four 'Power Pills' which make the meanies edible. But not for long!

- Machine coded for fast action
- Extra 'Gobbler' for 10,000 points
- On screen scoring
- High score with enter name facility
- Up to 4 players

Improved Mk 2
version!

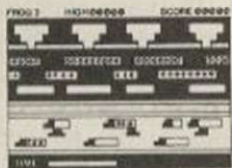
ASTEROIDS

Stay alive as long as possible in open space filled with flying rocks. Score by shooting them - which also causes them to break into lots of little bits and makes life even worse!

- Machine coded for fast action
- On screen scoring
- High score with enter name facility
- Up to 4 players
- Extra ship for 1,000 points (not as easy as it sounds!)
- Ship moves just like arcade version
- Rotate left/rotate right/thrust
- Fires in all 8 directions
- Increasing number of asteroids
- Three asteroid sizes
- alien spaceship (fires back!)

All games
£5.95 each

NEW! FROG HOPPER



Jump your frog over the lanes in the road - preferably without being turned into jam by the approaching traffic! Then cross the river by hitching a few rides on some passing logs and finally into the safety of your hole on the opposite bank. Once all 'Frog Holes' have been filled you start again with a different pattern and a bonus frog.

- 50 Skill levels!
- Played against the clock - froggie only has a short while to live!

when more than one
game purchased deduct
£1.00 from each tape!

Send your order to:

Dept B THE SOFTWARE FARM, Craigo Farm, Botany Bay, Tintern, Gwent

PEARL HARBOUR

FOR THE 48K SPECTRUM

Armed with only a quick firing anti-aircraft gun you must defend the fleet moored at Pearl Harbour against attack by fanatical dive bombers and torpedo bombers.

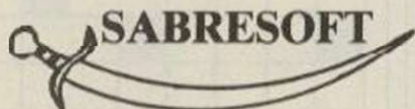
Out of the sun come Zero fighters intent on destroying you with their merciless machine gun fire.

How long can you survive?

- MAIN GAME WRITTEN ENTIRELY IN MACHINE CODE
- VARIABLE DIFFICULTY
- OPTIONAL FIRST STAGE IN WHICH YOU MUST INTERCEPT (ON HI-RES MAP), AND DESTROY IN ARIEL COMBAT THE APPROACHING JAPANESE FORCES
- HOLD FEATURE

£5.95

(inc p&p)



Dept (YC), 13 Bower Avenue, Hazel Grove,
Stockport, Cheshire SK7 6LG.

THE MINIATURE TOOL COMPANY

Leading suppliers of accessories for the MICRO user.

HIGH QUALITY COMPUTER CASSETTES

Screw assembled cassettes with library boxes

	1-9	10-99	100+	Qty	Total
C5	37p	35p	33p		
C10	39p	37p	35p		
C12	40p	38p	36p		
C15	41p	39p	37p		
C20	43p	41p	39p		

AERIAL SPLITTER/COMBINER

Simple adaptor that will combine two aerial inputs into one cable or split equally the signal of an aerial into two receivers.

£1.50

	Qty	Total
ASI	£1.50	

'D' CONNECTORS

Sub min 'D' type male & female connectors. Gold plated solder bucket terminals, plastic covers also available.

	Plug	Qty	Socket	Qty	Cover	Qty	Total
9 Way	£1.00		£1.25		£1.50		
15 Way	£1.50		£1.75		£1.75		
25 Way	£1.75		£2.25		£1.75		

Send S.A.E. for full range of products, edge connectors, leads etc.

TRADE & OVERSEAS enquiries welcome.

POSTAGE: Cassettes £1.50, Aerial splitter/D connectors 50P

NAME

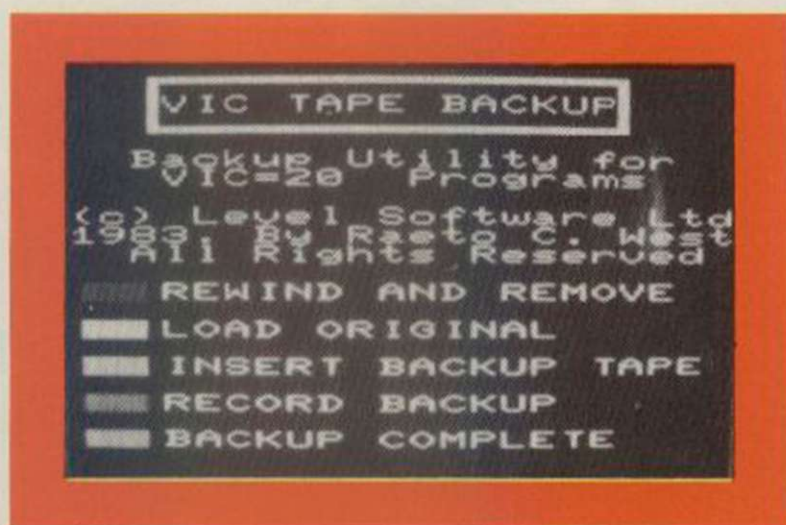
ADDRESS

I enclose my cheque/postal order for £.....

Or please debit my Access/Barclaycard No.....

The Miniature Tool Company
26 Queensbury Station Parade, Edgware, Middx.
Tel: 01-951 1183

VIC TAPE BACKUP



can provide security backup copies of most VIC-20 programs currently available on tape. It is sold strictly on condition that purchasers use it only to take backup copies of tapes which they own, for their own use.

- Complete, new, and unique machine-code program
- Provides backup for BASIC programs
- Provides backup for machine-code programs
- No extra risk to original tape
- Backups for any memory configuration (with expansion where appropriate)
- Audio-visual prompt system, using border color and sound, for ease of use
- Some allowance for load errors — copy may load and run better than the original
- Will backup programs using a range of security methods, including use of the cassette buffer, use of screen RAM, and mixed BASIC loaders with machine-code
- Supplied on boxed C30 cassette with full instructions on card inlay
- Written by Raeto West, noted exponent of PET/CBM/VIC programming

Mail order distribution address of Level Software Ltd products is:

Level Software Ltd
P.O. Box 55
Shirley
SOLIHULL
B90 4SL
Tel: 021-643 6729

Fast turnaround of orders guaranteed

Unauthorised copying of copyright material for resale hire or distribution is an offence.

This program is sold strictly on condition that purchasers use it only to take security backup copies of tapes which they own, for their own use. Dealers must undertake to the best of their ability to ensure that purchasers comply with this obligation.

All purchasers must sign the following declaration to signify that they have read and understood the conditions.

Declaration: I have read and understood the conditions and agree to abide by them.

.....Signature of purchaser or dealer
Price in UK/Euroce £7.95 each (includes VAT, postage, packing)

Name:

Address:

Enclosed is cheque/P.O. value £.....number.....payable to Level Software Ltd, crossed 'a/c payee'.



TRY FIGHTING THESE WITH YOU



OUR BARE HANDS.

Slot "Mutant Herd" into your VIC 20 computer and all of a sudden plutonium-crazed mutants will try to eat you alive.

Keep a look-out for falling boulders. They'll crush you to death at any second.

Avoid these successfully and all you have to do is save the world by destroying the heavily guarded Mutants eggs.

"Orc Attack" (on ATARI 400/800/1200) isn't exactly child's play either.

Imagine yourself standing on the battlements of a castle, defending your Kingdom against an army of ferocious Orcs.

Watch out for the hail of deadly crossbow bolts. You've only got two lives to lose.

And you've only got a few rocks, a sword and boiling oil to defend yourself.

Lose your head and you'll be decapitated.

If your hands aren't sweating after that try our other action packed titles.

There's "Fourth Encounter" (on VIC 20), an exciting new game with 3 skill levels.

The challenging "River Rescue" and "Music Composer" are also on VIC 20.

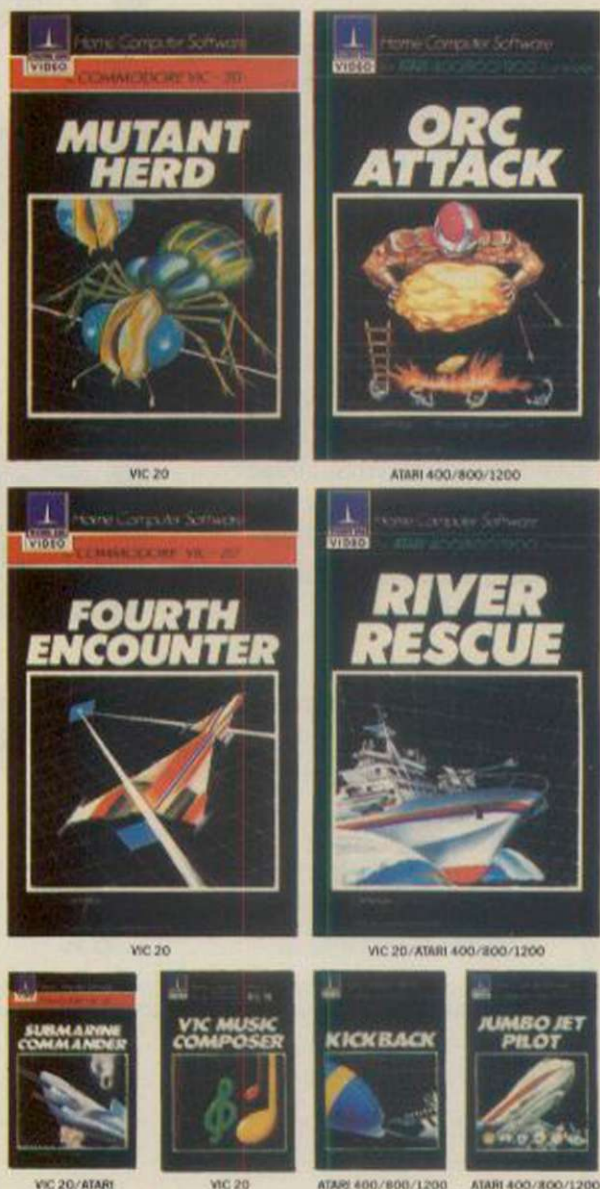
And to make the blood rush to your head the successful "Submarine Commander" is now available on VIC 20.

Or, if you've got ATARI 400/800/1200, there's the anxiety provoking "Jumbo Jet Pilot," as well as the best selling "Submarine Commander," "River Rescue" and "Kickback," all in the shops now.

Buy any one of THORN EMI Computer games and you'll have to fight off all your friends to use it.



The world's greatest computer games.



PROGRAMS FOR ATARI 400/800/1200 (Trademark of Atari Inc. except where indicated).
 *PROGRAMS FOR COMMODORE VIC 20 (Trademark of Commodore Electronics Ltd.).

WARNING

Your Oric-1 is about to become

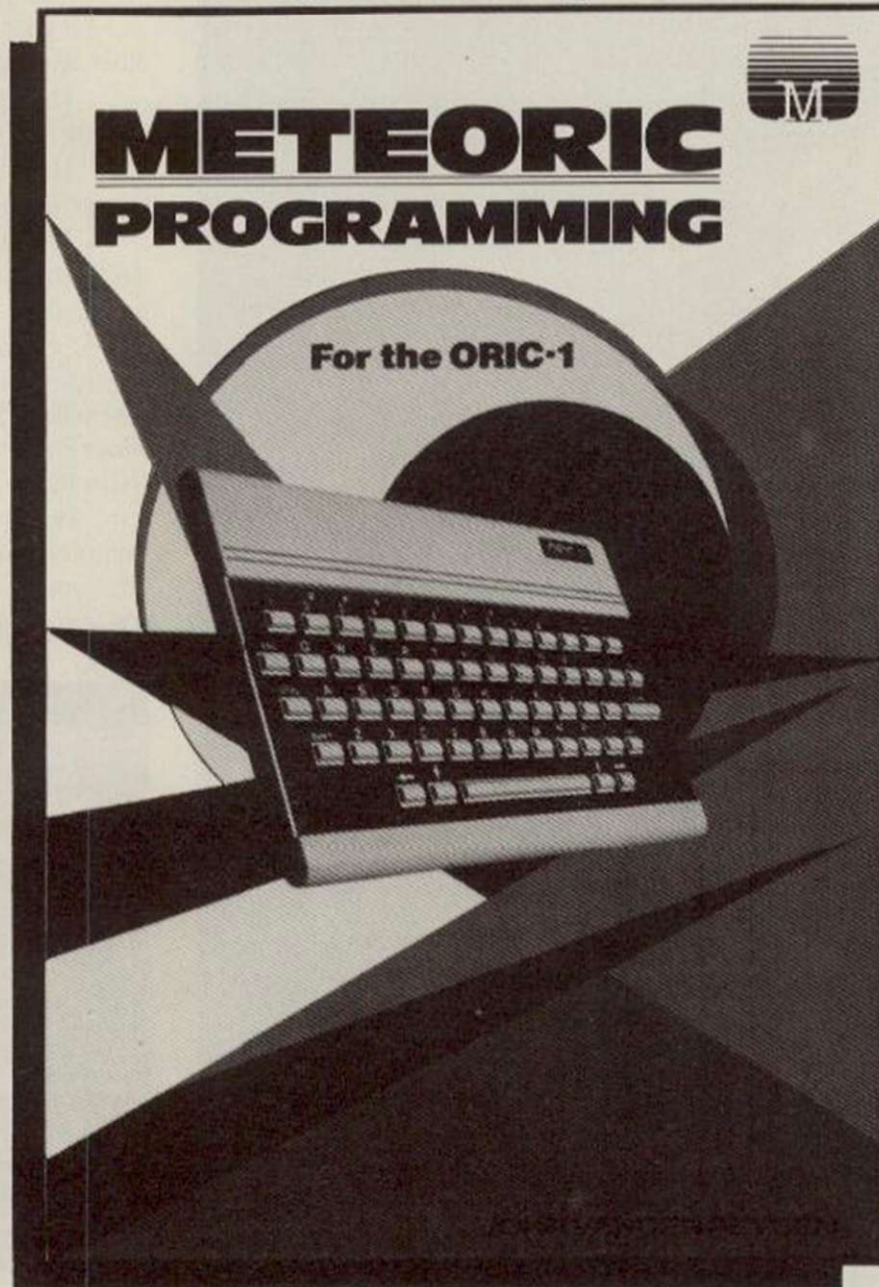
METEORIC

Now you can achieve Meteoric software performance from your micro with this collection of 30 dynamic programs, designed specifically for the Oric-1 home computer.

You can test your skill with arcade action games such as Luna Landa, Eliminator and North Sea Copter, or attempt to solve the mind stretching mathematical and educational exercises.

These programs fully extend the excellent colour resolution of the Oric-1 to its maximum!

The book includes many practical utilities that will enable you to really improve your own programs. These useful routines include Renumber, Machine Code Monitor, Block Line Deletion and Graphics Aid.



Even if you are a beginner, you can enter all the programs yourself due to Meteoric programming's easy to understand format.

Your overall knowledge of computer operation will be expanded too. Each program features an in-depth explanation of how and why it runs and illustrations of screen display back up the text to ensure you understand exactly what will be achieved.

Experienced programmers who want to develop their own Meteoric programs will really appreciate all the expert hints and tips that have been included in the book.

Whether you're a first time user or an old hand, you can't afford to miss the only book that will make your Oric-1 Meteoric.

MELBOURNE HOUSE PUBLISHERS

Please send me your free 48 page catalogue. Please send me:

SPECTRUM

- Understanding Your Spectrum £7.95
- Spectrum Machine Language for The Absolute Beginner £6.95
- Over the Spectrum £6.95
- The Complete Spectrum ROM Disassembly £9.95
- Spectrum Hardware Manual £5.95

DRAGON

- Enter the Dragon £5.95

VIC 20

- VIC Innovative Computing £6.95

COMMODORE 64

- Commodore 64 Games Book £5.95

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

ORIC 1

- Meteoric Programming £5.95

Trade enquiries welcome.

All prices include VAT where applicable

£ _____

Please add 80p for post and pack £ .80

TOTAL £ _____

All Melbourne House cassette software is unconditionally guaranteed against malfunction. Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397.



I enclose my cheque/money order for £ _____

Please debit my Access card No. _____ Expiry date _____ Signature _____

Name _____ Address _____

Postcode _____

YC8

MELBOURNE HOUSE



AS SEEN
ON T.V.!!

MICROMEGA

NEW SPECTRUM SOFTWARE RANGE ALL TITLES RUN IN BOTH 16K AND 48K MACHINES

GULPMAN
*Laser defence, fifteen mazes,
over eighty levels, superfast
machine code!!*

DOMINOES
*The all-time favourite is back,
but now your opponent is no
mere human!*

BRAINSTORM
*Two teasers to drive you
wild! Brainstorm and Puzzler
will try your mind to the
limits . . . and beyond.*

ROULETTE
*Devise the most complex
system you can, then play the
big money game!*

MONTE CARLO
*Try to beat the house at
Blackjack or lose your shirt
at the Crops table.*

MICROMEGA

Personal Computer Division
Quantec Systems & Software Ltd
230-236 Lavender Hill
LONDON SW11 1LE

AVAILABLE FROM:
JOHN MENZIES GREENCHIP
PRISM AND ALL LEADING
SOFTWARE RETAILERS



Choose from the Sunshine range of Spectrum Software

Bring some Sunshine into your life

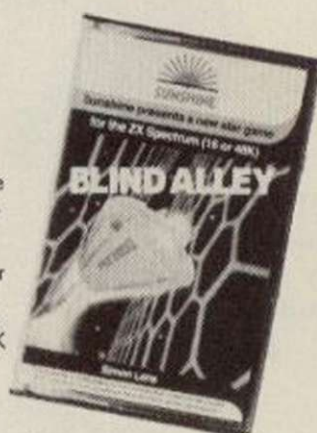


Cruising
Behind the wheel of your machine. Cruising on Broadway. You look mean. People stop to stare. Suddenly a black-and-white pulls onto the Broadway behind — its light flashing and siren wailing. The chase is on! Cruising on Broadway is a tyre-burning fast machine-code game for the 16 & 48K Spectrum. The further you can get the more difficult it becomes — cash prizes are being offered each month for the highest scores. £4.95*



Swordfight at Midnight
More like a simulation than a game, Swordfight at Midnight presents you with a duel to the death between two swordsmen — play against a friend or against the computer. Not a program whose possibilities will be exhausted in a day or even a week. What it has in common with arcade space games is a demand for quick reactions to attack but it adds to this necessary ingredient subtleties of skill and tactics that will open up endless new ways of approaching the duel. An important aid to learning these skills is a "playback" facility which enables you to watch the game that has just taken place and spot your errors. £5.95*

Blind Alley
A deadly duel, deep in space, Blind Alley is what passes for sport in the year 3017. Your craft must use strategy to out-wit and corral the opponent — in this crazy development of the pursuit games of the late 2600s. After each round in the enclosure game more players are sent against you to test your skill and agility. Blind Alley is the machine-code action of the future — now! For the 16 & 48K Spectrum. Blind Alley can be played with a Kempston Joystick. £4.95*



Androids
Trapped in an endless maze populated only by vicious androids your only objective — survival. You have a lazer of course and can withstand a few blows, but you'd better be quick on the draw, these guys are designed to kill. Maybe you can find an exit — but escape is impossible and your replenished resources won't last long. The fastest, most head-spinningly demanding game you'll ever play. £5.95



Galaxy Attack
An amazing three part hybrid of adventure and arcade action. Your task will take you through the depths of space to a crash landing on a far flung planet where you race against time to repair your crippled ship before the wakers get you. You probably won't make it but if you do the third and final part of your incredible journey will begin... the assault on the alien mothership itself. Galaxy Attack is the acid test — the ultimate game — think you're up to the challenge? Then now's the time to try... Galaxy Attack is totally machine coded and will only work on the 48K Spectrum. £5.95

SPECIALLY FOR THE DRAGON USER

Cruising
Quick thinking and dexterity are required to master this high speed chase game. Use the keyboard to travel around a maze — try to cover it all before the chaser gets you. All you have to help you is the ability to make a gap in the track which may slow your enemy up a bit but watch out — things only get tougher — the mazes get harder and more chasers appear. A high speed all machine code challenge guaranteed to raise your Adrenalin to new heights — no-one has yet mastered the highest levels. £6.95



NEW DRAGON USER

Dragon User — the new independent monthly magazine dedicated in putting the Dragon through its paces. Available through your newsagent for 60p, or take out a subscription for 12 issues for £8.

SUNSHINE

*Available through W. H. Smith's and computer dealers

Trade/dealer enquiries welcome.

Please send me

Cruising on Broadway at £4.95 each

Swordfight at Midnight at £5.95 each

Blind Alley at £4.95 each

Androids at £5.95 each

Galaxy Attack at £5.95 each

Cruising (Dragon) at £6.95 each

Dragon User Magazine at £8 for 12 issues

I enclose a cheque/ postal order for £_____ payable to Sunshine
19 Whitcomb Street, London WC2 7HF.

Name _____

Address _____

Signed _____

We can normally deliver in four to five days.

LIST . . . LOAD . . . RUN . . . OR . . . DIE . . .

VERIFY . . . ENTER . . . ATTACK . . . RESTORE . . .

INVERSE . . . THRUST . . . MOVE

GOSUB . . . BEEP . . . BREAK SPACE

TAKE UP THE CHALLENGE

SILVERSOFT

ARMAGEDDON(S)*

The cities are crumbling under the continual attack waves. As defence controller you will be obliterated with them. Unless...

MISSION IMPOSSIBLE(S)*

Space mines, force fields, meteor storms and lethal enemy ships conspire to stop you reaching the astronauts stranded below, but... you have to return them to the mother ship in one piece!

MUNCHER(S)

Maze, race and chase game. Munching gets harder as you progress. Arcade pills, random mazes, blue ghosts and smooth arcade action.

SLIPPERY SID(S)*

Take Sid on a sneaky trip, eating frogs and magic mushrooms, but watch out, if he hits the garden wall he'll be sick. Hi-scoring, 5 skill levels.

STARSHIP ENTERPRISE(S)*

Starship simulation, save the galaxy, intriguing adventure with arcade action, 3D Hyper-warp, real time Alien attacks, over 30K of machine code and BASIC (48K only).

GROUND ATTACK(S)

In the labyrinth the flesh eating aliens have been located, penetrate their defences, destroy fuel supplies and missile silos. 9 skill levels, many effects.

CYBER RATS(S)*

The meanest metallic menaces to march across the screen, moving so fast they're almost a blur. Hi-res movement, Hi-score bonus.

BRAIN DAMAGE(S)*

The master computer detects you patrolling its circuits in your proton-panzer. Defend yourself against 3 types of electron panzers or escape through the hyper gate to another circuit, 3 skill levels.

GROUND ATTACK (ZX)

Finally... a version of the Spectrum best seller for ZX81 owners, true to the original.

EXTERMINATOR(S)*

Robot intelligence has surpassed humans', using homing missiles, move and fire in eight directions, avoiding indestructible robots with homing missiles, to save the last of the human race.

ZX81

Ground Attack £3.95
Super Wumpus £3.95
Games Pack 1 £3.95
Graphic Golf £3.95

SPECTRUM

Cyber Rats £5.95

SPECTRUM

Slippery Sid £5.95
Starship Enterprise £5.95
Muncher £5.95
Ground Attack £5.95
Mission Impossible £5.95
Brain Damage £5.95
Armageddon £5.95

I enclose cheque/postal order for:

£

Name

Address

Send cheque or postal order to: SILVERSOFT LIMITED
London House 271/273 King Street, London W6
or complete your Access or Visa No.

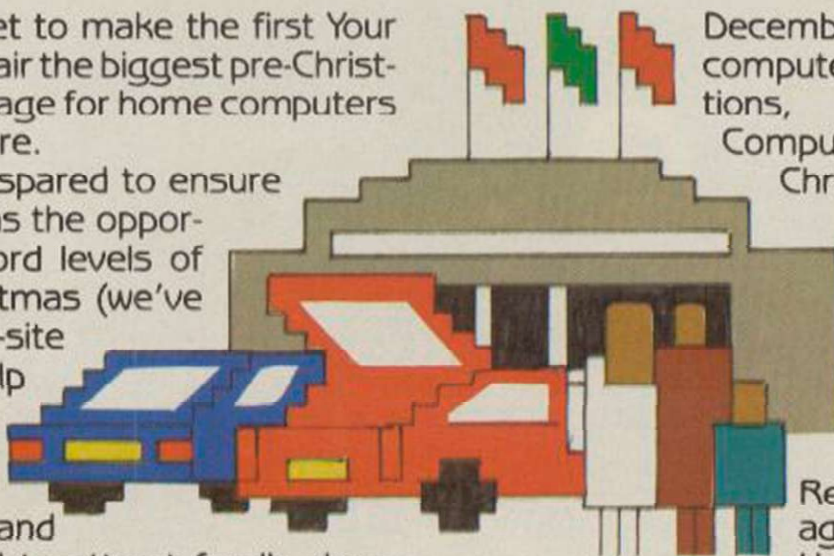
*Joystick option available.



Increase your Sales this Christmas!

The scene is now set to make the first Your Computer Christmas Fair the biggest pre-Christmas promotional package for home computers and associated software.

No effort has been spared to ensure that every exhibitor has the opportunity to achieve record levels of business before Christmas (we've even arranged on-site storage facilities to help cash and carry purchases). A £50,000 publicity campaign using TV, Press, Radio and Posters is guaranteed to attract family shoppers throughout the country from



December 15 - 18. Organised by the computer market experts, Reed Exhibitions, and sponsored by 'Your Computer' magazine, Your Computer

Christmas Fair will be the biggest and most successful showcase for home computer products ever mounted. If you haven't yet booked into this Christmas bonanza, fill in the coupon below TODAY. Only a few prime sites now remain!

Return to The Exhibitions Manager, Reed Exhibitions, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ.

**YOUR
COMPUTER**
Christmas Fair

Wembley Conference Centre
December 15-18, 1983



Please send full details and booking information for
Your Computer Christmas Fair

Name _____

Position _____

Company _____

Address _____

Telephone _____ Telex _____

MEMOTECH

The Complete Range

NEW PRICES
UP TO 37% OFF
PLUS FREE P+P!

Fifteen months ago Memotech developed the first 64K Memopak, designed to maximise the capabilities of the Sinclair ZX81. Since then, using the ZX81 as a starting point, we've gone on to produce a comprehensive range of Memopaks, adding 16K and 32K memory expansions, utilities packages comprising a Word Processor, Z80 Assembler and Spreadsheet Analysis, plus Communication Interfaces, High Resolution Graphics and a professional quality Keyboard.

To complete our range of ZX81 add-ons, we are now introducing the MEMOPAK RS232 Serial Interface.

RS232 Interface

The RS232 is an all-purpose interface which allows the ZX81 not only to output to suitable serial printers, but can link up with numerous types of peripheral or even other processors. The Interface has two main modes of operation: BASIC mode allows you to use the range of functions supplied in the RS232 EPROM within an ordinary BASIC program, and TERMINAL mode allows you to use your ZX81 as a terminal to another processor.

The EPROM functions offered permit the user to send, receive and convert bytes between ZX81 code and ASCII, as well as check the status of numerous control flags. Received or transmitted data can appear simultaneously on the screen, and received data may be printed simultaneously.

£39.95 inc. VAT

Memopak Centronics I/F

The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case. Additional facilities allow high resolution printing.

£24.95 inc. VAT

Memopak HRG

This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 x 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels.

£29.95 inc. VAT

Memocalc

The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a Memopak 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified.

£29.90 inc. VAT

Memotext

Text is first arranged in 32 character lines for the screen with comprehensive editing facilities. On output the user simply chooses the line length required for printing and the system does the rest. Used with the Memopak Centronics Interface, the Word Processor makes available printout with 80 character lines, upper and lower case and single and double size characters.

£29.90 inc. VAT

Memopak Memory Extensions

For those just setting out on the road to real computing, these packs transform the ZX81 from a toy to a powerful computer.

Data storage, extended programming and complex displays all become feasible. Further details available on request.

16K Memopak £24.95 32K Memopak £34.95
64K Memopak £49.95 Prices inclusive of VAT

MEMOPAKS ARE AVAILABLE AT MAIN BRANCHES OF WH SMITH and JOHN MENZIES

Z80 Assembler

The Assembler allows you first to code and edit a source program in the Z80 language, and then assemble it into machine code. You can now write flexible and economic programs.

The Editor mode allows you to code directly in the right format, manipulate individual lines and control the exact placing of source and machine code. Routines may be merged or listed (even to a commercial printer using our Centronics Interface). The assembler mode handles all standard Z80 mnemonics, numbers in hex or decimal, comments and user-selected labels.

£29.90 inc. VAT



Memotech Keyboard

The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for ZX81 users. The Keyboard has a light professional touch and is housed in an elegant aluminium case. The simple plug-in system means that you are not obliged to open up your ZX81, use a soldering iron or invalidate your ZX81 warranty.

Keyboard Buffer Pak

The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port of your ZX81.

£34.95 inc. VAT

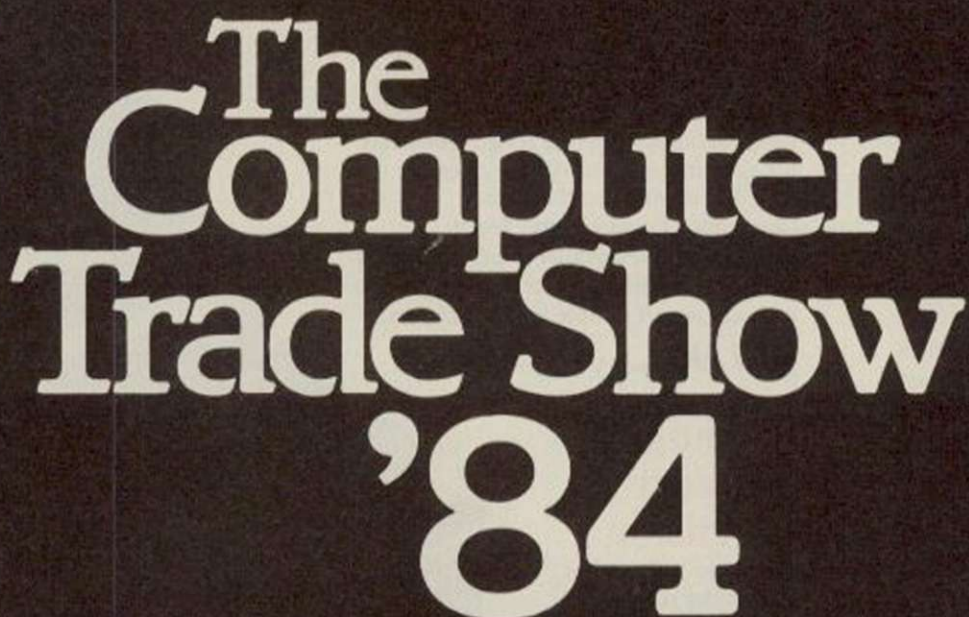


All Prices are inclusive of VAT, postage and packing.

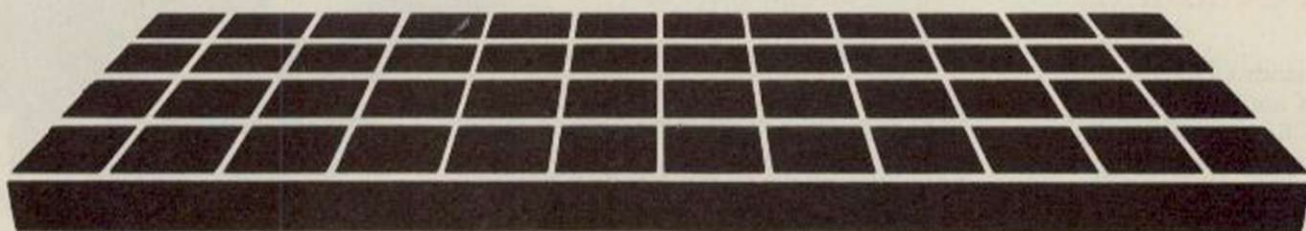
To Order: Send your Name, Address, Memopaks required, plus a Cheque/Postal Order/Access/Barclaycard number (please state which) to: Memotech Limited, Station Lane Industrial Estate, Witney, Oxon. OX8 6BX. Telephone Witney 2977

We want you to be completely satisfied with your Memopak - all our products carry a 14 day money back guarantee.

**Make a date for the UK's premier
computer trade event**



**The
Computer
Trade Show
'84**



**Wembley Conference Centre.
March 13-15, 1984.**

Sponsored by Computer Weekly, Practical Computing, Systems International, Micro Business and Software. This year's successful event has firmly established the exhibition in the computing industry's calendar of events.

For more information contact: The Exhibition Sales Manager, The Computer Trade Show, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS Telephone: 01-661 3125

The sponsors and organisers of this event are all members of Business Press International Ltd.

Make the most of your BBC SPECTRUM DRAGON ATARI VIC ZX81 ATOM

With *half a million* books sold, Tim Hartnell and Interface Publications seem to be doing something right for those who want to master their computers quickly. Tim explains: "We concentrate on books written in clear English, with a minimum of technical terms, with lots and lots of complete programs, so you can get something worthwhile running within minutes of first opening the book".

BBC

- () **INSTANT MACHINE CODE** — Jeremy Ruston, tape and book. Enter program in BASIC, trigger the compiler, and it changes automatically into superfast BBC machine code. Simple to use — £34.95.
- () **LET YOUR BBC MICRO TEACH YOU TO PROGRAM** — Tim Hartnell — £6.45.
- () **THE BBC MICRO REVEALED** — Jeremy Ruston — £7.95.

SPECTRUM and ZX81

- () **PROGRAMMING THE ZX SPECTRUM** — Tim Hartnell and Dilwyn Jones. Over 100 programs. The UK's leading book for learning to master the Spectrum — £6.95.
- () **60 GAMES AND APPLICATIONS FOR THE SPECTRUM** — David Harwood — £4.95.
- () **INSTANT SPECTRUM PROGRAMMING** — Tim Hartnell — C-60 spoken word tape with book, simple and fun to follow — £4.95.
- () **BEYOND SIMPLE BASIC — DELVING DEEPER INTO YOUR ZX SPECTRUM** — Dilwyn Jones — £7.95.
- () **CREATING ARCADE GAMES ON THE ZX SPECTRUM** — Daniel Haywood. Full instructions with 17 major programs as a bonus — £3.95.
- () **20 SIMPLE ELECTRONIC PROJECTS FOR THE SPECTRUM AND ZX81** — Stephen Adams — £6.45.
- () **GAMES ZX COMPUTERS PLAY** — edited Tim Hartnell — 15 games each for Spectrum and ZX81 — just £3.95.
- () **GETTING ACQUAINTED WITH YOUR ZX81** — Tim Hartnell — £5.95.
- () **34 AMAZING GAMES FOR THE 1K ZX81** — Alastair Gourlay — £4.95.
- () **49 EXPLOSIVE GAMES FOR THE ZX81** — Tim Hartnell — £5.95.
- () **MASTERING MACHINE CODE ON YOUR ZX81** — Toni Baker — £7.50.
- () **MACHINE INTELLIGENT PROGRAMS FOR THE 16K ZX81** — Charlton/Jones/Harrison — includes Backgammon and Eliza — £5.25.

DRAGON

- () **MAKING THE MOST OF YOUR DRAGON 32** — Clive Gifford — Over 150 programs, explores all the Dragon's resources — £5.95.
- () **DYNAMIC GAMES FOR THE DRAGON 32** — Robert Young and Tim Hartnell — Thirty great games including Asteroid, Space Search, Reversi/Othello and Cubik's Rube — £4.95.

ATARI

- () **MAKING THE MOST OF YOUR ATARI** — Paul Bunn — Master the sound and graphics and get your Atari to do just what you want it to. More than 20 major games — £8.95.

VIC

- () **GETTING ACQUAINTED WITH YOUR VIC 20** — Tim Hartnell — £6.95.
- () **ZAP! POW! BOOM! ARCADE GAMES FOR THE VIC 20** — Mark Ramshaw — £7.95.
- () **50 OUTSTANDING GAMES FOR THE VIC 20** — Symphony for a Melancholy Computer — Tim Hartnell — £6.95.

ATOM

- () **GETTING ACQUAINTED WITH YOUR ACORN ATOM** — Trevor Sharples and Tim Hartnell — £7.95.
- () **39 TESTED PROGRAMS FOR THE ACORN ATOM** — edited Tim Hartnell — £6.45.

PASCAL/BUSINESS

- () **LEARN PASCAL ON YOUR BASIC MICRO** (Pascal for Human Beings) — Jeremy Ruston. Second edition. This book comes complete with a compiler listing which allows you to run simple Pascal programs on your BASIC micro (including BBC, Spectrum, VIC, Oric, Apple, IBM PC, Dragon) — £5.95.
- () **HOW TO COMPUTERISE YOUR BUSINESS — SUCCESSFULLY** — Derrick Davey and Richard Womack, foreword Tim Hartnell — £6.95.

Interface Publications, Dept. YC7, 44-46 Earls Court Road, London, W8 6EJ.

Please send me the books indicated above. I enclose £_____.

Name _____

Address _____

*(reg. TM)

ORBIT FOR THE ACORN ELECTRON

IF YOU HAVE AN ACORN ELECTRON OR ARE THINKING OF BUYING ONE THEN YOU SHOULD JOIN THE ELECTRON USER GROUP.

Members receive 10 copies of the magazine ORBIT each year. ORBIT is devoted EXCLUSIVELY to the ELECTRON MICRO. It is packed with News, Reviews, Hints, Tips, Programming ideas, Major articles, plus Regular program features including games and useful utilities.

ORBIT, is produced by BEEBUG Publications Ltd., publishers of BEEBUG, the magazine of the National User Group for the BBC Micro. BEEBUG now has some 20,000 members, and has achieved a high reputation both in this country and abroad. Acorn and the BBC have both taken out multiple memberships, for example, and our articles are now syndicated in Australia. (For further details of BEEBUG, see separate advertisement elsewhere in this issue).

The formula which makes BEEBUG an invaluable companion for users of the BBC micro, will be applied to ORBIT.

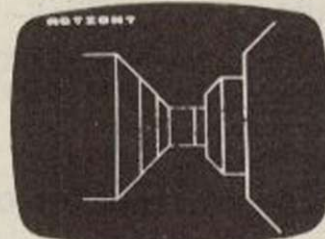
By subscribing to ORBIT you gain all the advantages of a single-micro magazine, with no space wasted on programs and articles for other computers.

Further benefits of membership: Members' discount scheme with national retailers of software, hardware and books, with savings of up to 25%; Members' software library with a growing range of titles at special prices for members.

SPECIAL OFFER

SUBSCRIBE NOW, AND GET A FREE INTRODUCTORY CASSETTE CONTAINING EIGHT TESTED PROGRAMS FOR THE ELECTRON.

1. **SPACE CITY** Defeat the invading Aliens with your laser, and save the city.
2. **3D NOUGHTS AND CROSSES** Pit your wits against the ELECTRON on a $4 \times 4 \times 4$ board.
3. **RACER** Guide your racing car to victory, avoiding other cars and obstacles on the track.
4. **3D MAZE** In this challenging game, you must escape from the maze — the screen displays a 3D view from inside the maze.
5. **PATCHWORK** A multicoloured display of continuously changing patterns.
6. **KEY SET ROUTINE** A program to set up the user function keys.
7. **MEMORY DISPLAY** An efficiently written utility to display the contents of memory (ROM and RAM).
8. **CHARACTER DEFINER** Define individual graphics characters with this useful utility for use in your own programs.



3D MAZE



RACER



SPACE CITY

HOW TO JOIN

To subscribe for one year, and get your free cassette, send £9.90 (payable to Orbit) plus a strong stamped addressed envelope (for the cassette) to:

ORBIT, PO BOX 50, ST ALBANS, HERTS.

Six month trial subscription (5 issues) UK only — Free cassette offer still stands.

Membership outside UK (one year only): Eire and Europe £16.00, Middle East £19.00, Americas and Africa £21.00, other countries £23.00.

reprints

If you are interested in a particular article/special feature or advertisement in this journal

HAVE A GOOD LOOK AT OUR REPRINT SERVICE!

We offer an excellent, reasonably priced service working to your own specifications to produce a valuable and prestigious addition to your promotional material. (Minimum order 250 copies). Telephone Michael Rogers on 01-661 3457 or complete and return the form below.

To: Michael Rogers, Your Computer, Reprint Department, Quadrant House, Sutton, Surrey SM2 5AS.

I am interested in copies of article/advert. headed featured in this journal on pages, issue dated

Please send me full details of your reprint service by return of post.

Name
 Company
 Address
 Tel No

ROSE SOFTWARE

4 NEW EDUCATIONAL CASSETTES FOR THE SPECTRUM 16K or 48K

G.C.E. "O" LEVEL FRENCH VOCAB. REVISION

The cassette contains six programs. The first three programs test vocabulary under 12 headings eg: "on holiday". The other three programs are "homework tester", "common words & phrases" and "irregular verbs". All programs offer choice of French to English or vice versa, and keying in the answer or just thinking it out.

G.C.E. "O" LEVEL MATHS REVISION EQUATIONS & INEQUALITIES

6 teach and test programs covering linear equations, simultaneous equations, quadratic equations and inequalities. Help facilitate available together with an explanation of the correct answer.

G.C.E. "O" LEVEL MATHS REVISION GEOMETRY

6 programs of multiple choice questions covering properties of parallel lines, triangles, various polygons and circles. Questions use generated numbers. Explanations are given

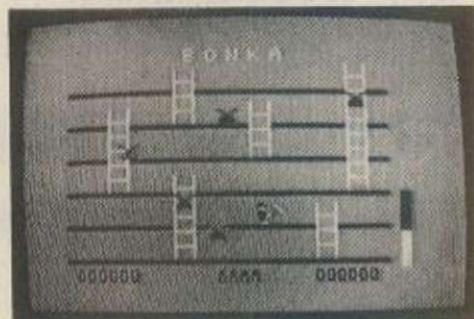
QUAZER

Test your quick thinking as well as your quick reactions with these four programs of quizzes combined with a fast action machine code maze. Select the correct answer 1, 2 or 3 and zoom your man to the answer in the maze before the archer shoots you. All questions have RND function built in.

Send sae for catalogue of all our products to:

ROSE SOFTWARE
 148 Widney Lane, Solihull,
 West Midlands B91 3LH.

J. MORRISON (MICROS) LTD NEW for the Dragon 32 - BONKA



Action-packed MACHINE CODE Arcade game using superbly animated HI-RES COLOUR GRAPHICS & SOUND. Chase up and down ladders luring homicidal meanies into holes dug with your space hammer. When you trap one, rush over and BONK him on the head. But Hurry! If you loiter he will climb out and fill in the hole. The slightest touch from him and you are electrocuted. Just to add to your problems, your oxygen is running out.

FEATURES INCLUDE:

- 4 different screen layouts.
- Score and high score counter displayed on screen.
- "Hall of Fame" high score record.
- 4 selectable speeds and choice of up to 9 meanies to start.
- More points scored for more levels "meanie" falls.
- No Joysticks Required.

SOLD ON CASSETTE £7.95

Price includes VAT, Post & Packing.

Cheques & POs payable to:

J. MORRISON (MICROS) LTD.
 2, Glensdale Street,
 Leeds LS9 9JJ, Yorkshire.
 Tel: (0532) 480987



OTHER SOFTWARE AVAILABLE FOR DRAGON 32 SEND S.A.E. FOR DETAILS

6502 PROGRAMMERS

- 10 PRINT "WANTED: Games & Educational programs"
- 20 PRINT "MACHINES: BBC, CBM 64, & ORIC"
- 30 PRINT "PAYMENT: 20% Commission on National & International Sales"
- 40 REM: The games that are currently top sellers are either unique or addictive, and usually rely heavily on Machine Code for good visual effects.

CONTACT...

nebulae software

Kilroot Park,
 Carrickfergus,
 Co. Antrim,
 BT38 7DD

BBC

ORIC

COMMODORE 64

AT THESE PRICES YOU CAN SWITCH OVER TO A PROFESSIONAL KAGA MONITOR



The Kaga range of monitors is designed specifically for use with micro-computers, offering flicker-free character and graphic displays. There is a Kaga monitor suitable for use with your system, be it an Apple, Commodore, BBC Acorn, Osborne, Tandy, NEC, Sharp or any other popular micro.

■ High-res. 12" B/W inc. Cable	£86
■ High-res. 12" Green inc. Cable	£96
■ High-res. 12" Amber inc. Cable	£112
■ 12" RGB Colour Monitor (med. res.)	£225
■ 12" RGB Colour Monitor (high res.)	£275
■ RGB Cable for IBM P/C	£8

**For
your
Apple**

Phone for our latest low prices.

AIMGRAM (09277) 68211

AIMGRAM LTD 31 Roman Gardens, Kings Langley, Herts WD4 8LG Tel: Kings Langley

HIGH SPEED MACHINE CODED GAMES FOR THE ZX SPECTRUM

We now have a selection of new and original games. Because this advert has to be written well in advance, we cannot give more details here. Why not write to us for a free sheet which will give full details of all our products.

COMPILER

We still market our highly successful compiler for the ZX Spectrum (either memory size). This will compile 99% of all Integer, non string Spectrum BASIC. It converts your slow BASIC program into a high speed version in machine code (up to several hundred times faster). No knowledge of machine code is needed. As well as handling normal basic, our compiler boasts a range of commands designed especially for writing games, these include mini Sprite graphics (hi-res plotting of characters) and an explosion noise generator. All of this for £7.99 which includes an instruction booklet and both 16K and 48K versions. A recent review in Personal Computer World stated "It would certainly be a good investment for the Spectrum owner, who wants some of the benefits of machine code without having to learn its idiosyncrasies". Part of a reply from a satisfied customer "I have just received your Spectrum Compiler and I must congratulate you, it is an excellent program".

Make P.O./Cheque payable to "Wye Valley Software, Parton House, Kinnersley, Herefordshire. Overseas orders please add £1.50.

BLOWTORCH BLASTER

This is the GAME of the AGE

You're Handsome Harry,
the Blowtorch Blaster!

Money's your life
and that's what you're after!!

You're the coolest space pilot in the Galaxy. It's easy to see why. Things just seem to fall into place. Just as you were wondering how you were going to afford the latest model from Mega-Warp Dragsters of Dagenham IV, you see an advert in the Cosmos Daily Dreamer: ICE BLASTER NEEDED FOR OUTER PLANET SPACE PORT CONSTRUCTION TEAM. You reach for your Oric-1 48K link-up and type out the message: HARRY BLOWTORCH AVAILABLE AT PIECE WORK RATE. You know you can beat them at their own game. As you mix another Harvey Warpbanger you see the message flash up: YOU START IMMEDIATELY . . .

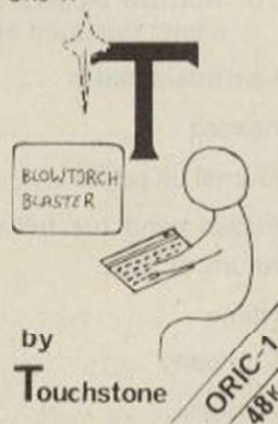
This IS the GAME of the AGE

Available now from Touchstone. Only £5.95.

Written in Basic and Machine Code. Your task is to free the planet surface of ice in at least one place, 'prove' the landing site, protect your craft from the storm, recharge your energy converter and blast back to your Mother ship . . . and on to the next planet . . . and each one is studded with gold . . .

Also available at £5 each for the 48K Oric-1.

1. THE PITS — an adventure game with graphics.
2. SAS — a multi-part action game.
3. ACTION 6 — Starshoot, Tron, Amaze, Bomber, Starchaser, Headbanger.
4. MIND 6 — Swappers, Squares, Hexpawn, 4 in a row, Bite, Slide.
5. GRAPHICS — includes character generator and 3-D program.
6. CONTRACT BRIDGE — ideal for sharpening your card sense.



**Touchstone, 61 Highfield Road,
Saxilby, Lincoln**

COMPUTER SHOWS (Northern)

are pleased to announce a

ZX COMPUTER FAIR on Sunday 28th August

at the

MERCURY HOTEL GARFORTH LEEDS

between 10.00 am and 5.00 pm

Ample free parking . . . Refreshments . . . Easy to find . . . just 4 miles from the M62 (junc 30) . . . 3 miles from the A1 (A63 and A642 junctions) . . . 7 miles East of Leeds.

AA SIGNPOSTED

Coming by train? . . . use the free shuttle service between Garforth railway station and the hotel.

Everything for the ZX user.

Get your 16K Spectrum upgraded at the Fair for only £25. Admission 75 pence for adults . . . 50 pence for kids under 14. Special £2 ticket to admit 2 adults and 2 children. For details of stand availability ring (0532) 460644.

COMMODORE 64 GAMES ARE NOW AVAILABLE ON DISKETTE FOR ONLY £2.00 EXTRA

6 NEW GAMES FOR YOUR

commodore 64

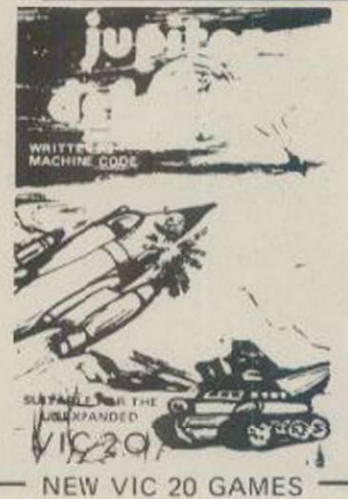
INTERCEPTOR
MICRO'S PRESENTS

SEND S.A.E.
FOR FULL LIST OF GAMES



2 NEW GAMES FOR YOUR ATARI 400/800-16K

NEW GAME FOR YOUR BBC MODEL B



NEW VIC 20 GAMES

Mr, Mrs, Miss _____					
Address _____					
Quantity	Item	Total	Item	Total	
	Scramble 64	£7.00	Galaxzions <i>VIC 20</i>	£5.00	
	Star Trek 64	£7.00	Fantazia <i>VIC 20</i>	£6.00	
	Frogger 64	£7.00	Crazy Kong <i>VIC 20</i>	£6.00	
	Panic 64	£7.00	Frog <i>VIC 20</i>	£4.00	
	Crazy Kong 64	£7.00	Alien Attack <i>VIC 20</i>	£6.00	
	Spriteman 64	£7.00	Vic Rescue <i>VIC 20</i>	£5.00	
	Fighter Pilot <i>ATARI</i>	£7.00	Penny Slot <i>VIC 20</i>	£4.50	
	Wordhanger <i>ATARI</i>	£5.00			
	Intruders <i>BBC</i>	£5.00			
	Jupiter Defender	£6.00			
			<i>P & P</i>		.50
			<i>TOTAL</i>		

Send Cheque/P.O. with Order to: Interceptor Micro's, Lindon House,
The Green, Tadley, Hants.

Postage & Packing .50p

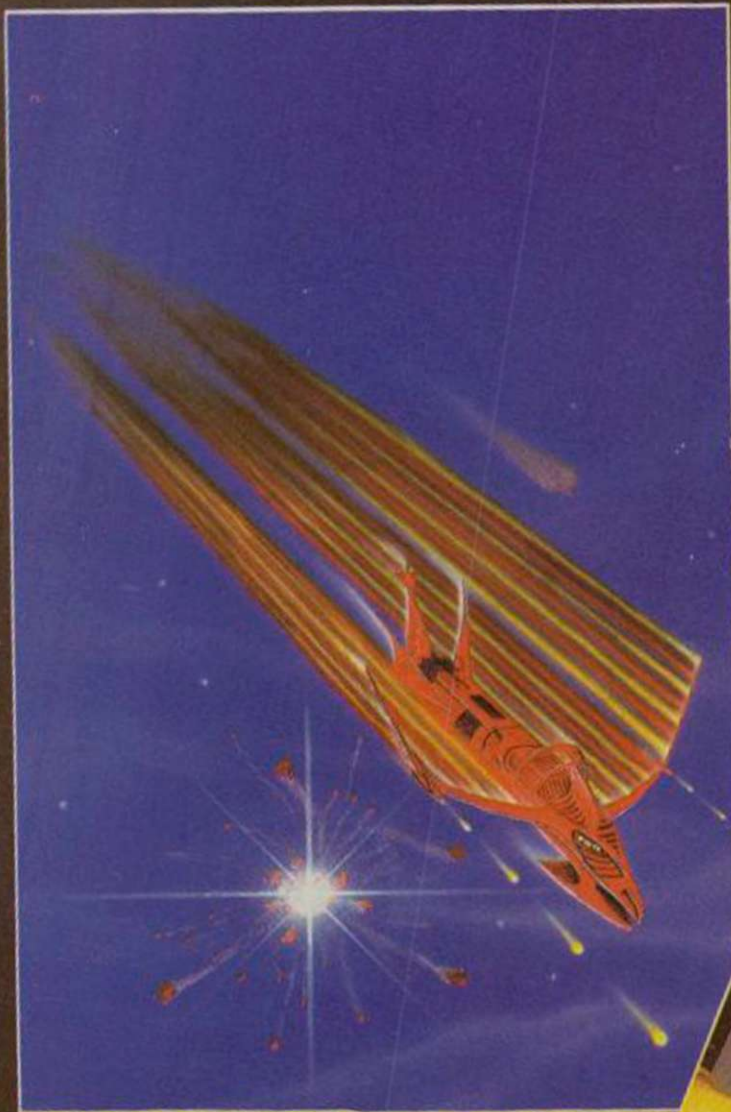
Y.C

STOP PRESS 1 NEW VIC 20 FALCON FIGHTER STOP PRESS STOP PRESS
ONLY £6.00

SOFTEK

ULTIMA RANGE

Invading your space NOW!



FIREBIRDS

In the last days of the Zolatra era the Devron ruled supreme. An evil force in a Universe almost devoid of Good, the Devron sent forth their Firebirds to destroy your last outpost of Mankind. Fiendish in their swirling attack formations, the Firebirds are joined by Blue Weavers and White Bombers to make your position seem almost hopeless. But you have your Hypergrav Drives and Blitzer Lasers and feel confident of reaching the Mothership... don't you?

A quite amazing blend of arcade game action with specially crafted super smooth movement designed to set a new standard in home arcade game action.

Realisation: Graham Devine.



JOUST!

Hidden in the folds of time's cloak lie tales of the Shadow Lords and battles with the Elders. But these are times when Myth and Reality mingle, for Lo! the Shadow Lords are come. You White Knight, are the sole remaining keeper of an Ostron and Sage of the Old Lore... You are Man's last hope!

Joust with the dark lords on their buzzards in this superb game which sets new standards of excellence for machine coded high-resolution graphics for the Spectrum. Joystick compatible and with a ten-player high-score table.

Realisation: Andrew Glaister.

Just two of Softek's amazing range of software for the ZX Spectrum.

£5.95

each including VAT and perpetual guarantee; 16K or 48K Spectrum.

SOFTEK SOFTWARE 329 CROXTED ROAD LONDON SE24

Look out for them now in W. H. Smith, and such stores as John Menzies, Boots, Currys, and other fine softsellers throughout the world.

Dealer enquiries: contact Tim Langdell



Ready to invade your space

SOFTTEK

SOFSYS



MEGAPEDE



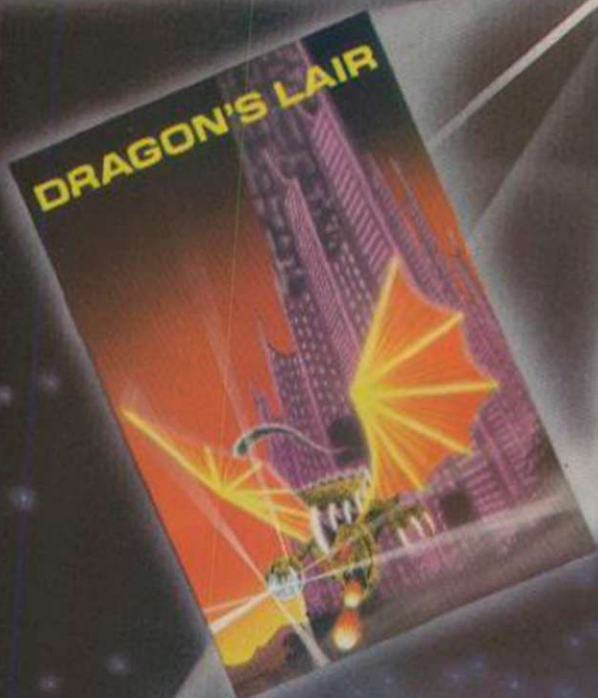
MONSTERS
IN HELL



ROBON



DRAGON'S LAIR



FIREBIRDS



and METEORIDS, and the 16K ZOLAN ADVENTURE, and REPULSAR (Missile Command), and, and, and... The Arcade Ace Series of unsurpassed arcade-type games, 3D Adventures like the Dragon's Lair, our new Ultima Range and SOFSYS (the only true system for the ZX Spectrum) all add up to the true Ultimate in Spectrum software. And Softek have MONSTERS (a version of Panic) for the Dragon 32 too (£7.99) as well as arcade action for the ORIC 1 - Galaxians (£5.95).

Send for details of SOFSYS including our bestselling Compiler and the enhanced version, SOFCOM (available soon for £24.94).

SOFTTEK SOFTWARE 329 CROXTED ROAD LONDON SE24

All Spectrum Games are
100% Machine Code and are

£5.95

including VAT and perpetual
guarantee.

Compiler available
from W.H. Smith

AMSOFT

MACHINE CODE, ASSEMBLER, AND BULK DATA HANDLING SYSTEMS FOR THE SERIOUS SINCLAIR USER

NO EXTRA HARDWARE NEEDED

AM-ZXFILE allows you to create data files of unlimited size on cassettes from your own basic programmes. You can read and write files in the same program, and use tapes just as if you had a big machine. Ideal for club records & small businesses.

ZX81 and Spectrum versions £4.00

AM-ZXSP will load a saved ZX81 basic program directly into the Spectrum, leaving it ready to run, save or edit., No more hours of retyping those old ZX81 programs. Just load ZXSP into the Spectrum, and it does the work.

Spectrum version £6.50

AM-ZXMON is a superb machine code monitor and operating system which allows you to create, edit, run, and checkpoint machine code routines, and to save them on tape. You can build libraries of your own routines on tape, and merge them into new programmes. AM-ZXMON is the operating system for the other programs below.

ZX81 version £6.00 Spectrum version £7.00

On the **ZX81** you can create assembly language source tapes and assemble them into machine code using **AM-ZXEDIT** and **AMAZON**, running under the control of AM-ZXMON. AMAZON can assemble programs of up to 6K in size at one time, and accepts user symbols, hex., decimal, and string constants, and the full Zilog mnemonics.

Combined pack, two tapes, of AM-ZXEDIT and AMAZON, for ZX81 £9.00

On the Spectrum **AM-EDIZON** is a combined editor/assembler with all the facilities you need to assemble and save machine code programs fast. It can be used to create, edit, and assemble up to 1500 lines of assembly language text at one time & produce up to 4½ K of machine code. The code and source program can be saved on tape for later use or for merging with other programs. Output tapes can be added to BASIC programs by the LOAD CODE command. Code can be assembled to run at any address, at a speed of 800 lines/minute.

Spectrum version £10.00

AM-ZXCONV will load tapes created by the ZX81 versions of AM-ZXMON or AMAZON, and load them into the Spectrum; the easy way to transfer machine code from one to the other.

Spectrum version £4.50.

All prices include VAT, post & packing. We provide a telephone advisory service from 9.00-6.00 Mon-Fri and 9.00 until 12.00 Sat.

AMERSHAM SOFTWARE LTD.

Long Roof, Hervines Rd.,
Amersham, Bucks.
(02403) 6231

micro business

... is the only trade
magazine uniquely poised
to link manufacturers and
distributors with retailers.

micro business

... is produced from the same
stable as Practical Computing, Computer
Weekly, Systems International,
Electrical and Electronic Trader,
Electrical and Radio Trading and
Your Computer.

Thus the Micro Business controlled
circulation reader list has been culled from
the widest of sources to include potential as
well as existing retailers. It is a readership
which is absolutely vital to micro
manufacturers who need to reach retailers
and dealers effectively without wastage.

Take full advantage of this growing market
by promoting your products in

micro business

Telephone Kenneth Walford on
01-661-3139
for immediate action.

YOUR COMPUTER CLASSIFIED

01- 661 3036

Contact: Claire Notley

ADVERTISEMENT RATES

Copy Date

Lineage: 40p per word
(Min. 15 words)
Box No: £4.00 extra
Lineage 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	:	£8.50
Three insertions	:	£8.20
Six insertions	:	£8.00
Twelve insertions	:	£7.50

Display advertisers should preferably reserve space by phone.

Closing date for Classified advertisements is the 10th of the month preceding publication date.

Post to
Your Computer, Classified
Department, Room H211,
Quadrant House, The Quadrant,
Sutton, Surrey SM2 5AS.

Britain's Biggest Selling Home Computer Magazine

FAWKESOFT TAPE 1

Features 4 fantastic games
16K ZX81

3 machine-code games:—

DODGE IT: Based on the arcade game of similar name, with all the exciting features of the original.

TROJAN DRAGON: Loosely based on the hand-held electronic game "Trojan Horse" but with many more features.

DEATH TRAP: Simple, but addictive. An original ZX game.

All the above 3 games are superfast machine-code.

plus

TABLES OF HIPPOCRATES: A classic adventure game.

Guaranteed difficult. If you can't solve it we will send you a free answer sheet.

All for the all-inclusive price of £4.95

Send to: **FAWKES COMPUTING**

41 Wolfridge Ride, Alveston, Thornbury
Bristol BS12 2RA. Tel: 0454 416706

No Quibble Money Back Guarantee
347/7

DRAGON 32 BBC MODEL/B TR580 C/C 32K

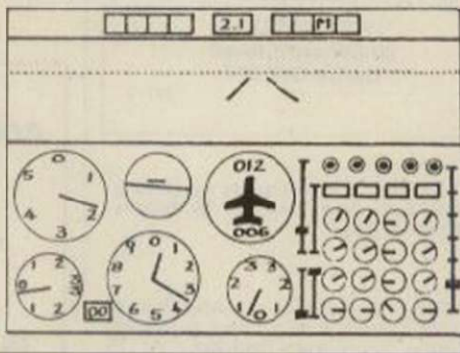
747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in life-like simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 25 other indicators (see diagram). Your controls operate throttle, airbrakes, elevators, flaps, ailerons, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joystick and includes options to start with take-off or random landing approach. "A real simulation, not just another game." (Your Computer Apr. 83).

Cassette £9.95 (P&P and VA) included!

D.A.C.C. Ltd (Dept. YCI)
23 Waverley Road, Hirstley,
Gtr. Manchester W12 3BN

154/4



APPLE II arcade type games for sale. Large selection. Reasonable price. Details K. Dru, 108 Clase Road, Morriston, Swansea SA6 8DY. 298/6

SPECTRUM — VIDEO GENIE SOFTWARE LIBRARY

25 Super programmes — machine code arcade games, simulations, competitive games, Adventures, Dungeons & Dragons, puzzles and ball games; plus a few education & business programmes. Including: Breakout, Star Wars, Amazing 3D Mazes, Gambling Machine, Corridors of Doom & Trap It. All 25 on one C48 cassette, sent by return post for only £8.50 inclusive, or send an s.a.e. for full details.

SPARTAN SOFTWARE (Dept YC)
9 Cotswold Terrace, Chipping Norton,
Oxon. Tel: 0608 3059

116/4

ZX81 16K 3-in-1 Super RENUM, EDIT, DELETE. £5.50 post free. Letts, 30 Ponton Hse., Palace Rd, LONDON SW2. 268/6

PROM SERVICES

ZX hardware specialists

micro system design and development

NEW products for ZX micros:—

3 output analogue converter, £27

8 input analogue receivers in three ranges of resolution, with or without I/O control lines, from £23.95

I/O cards — three types available 24 or 32 lines with or without LED indicators, A/D or D/A facilities, from £14.50

Still available — a range of EPROM boards and EPROM software.

NEW EPROMS now in stock — SAE for details

Motherboards, audio and graphics generators autostarts, clocks and counters, Edge cards 75p Edge connectors £2.50p Ribbon cable 75p/P&P.

EPROM SERVICES

3 Wedgewood Drive Leeds LS8 1EF

(0632) 667183

326/6

TEXAS TI 99/4A CASSETTE LEADS

£4.95

INCLUDING POST AND PACKING

Single Recorder only

Orders to:
Clares, 222 Townfields Road,
Winsford, Cheshire CW7 4AX
Tel: Winsford 51374
Dept YC

269

BBC compatible printer. Centronics, Dot matrix, 80 cps, Hi-Res graphics, Dumping. Excellent value £225 ono Canterbury 750600. 365/7

BBC, ORIC, LYNX CASSETTE LEADS

Din to Din & remote jack plug

Din to 2x3.5mm jacks

1x2.5mm for remote

PRICE ONLY £2.95

Cash with orders includes p&p

CLARES

222 Townfields Rd, Winsford, Cheshire
CW7 4AX. Tel: Winsford 51374

270/6

SOFTWARE. Games and utilities secondhand. SAE for list. Also wanted tapes for all machines. Send list for our offer by return. Dave, 72 Norwood Cres., Coldbrook, Barry, S. Glam. 315/6

JUPITER Ace add-ons, Rampacks 16K £26, 32K £36, 16-32K upgrade £14. By the time you read this, our soundboard should be available. For details of this and other products send SAE. All products cased and guaranteed. All prices inclusive. Cheques etc. to: Essex Micro Electronics, 4 Hatch Road, Brentwood, Essex. 303/6

UPGRADE YOUR 16K ZX SPECTRUM TO 48K

SIMPLY FITS INTERNALLY WITH NO SOLDERING ON SERIES 2 MODELS. UNLIKE COMPETITORS, WE USE NO REJECT COMPONENTS AND AN ADAPTOR P.C. BOARD TO ACHIEVE RESULTS. DESIGNED BY EX SINCLAIR ENGINEER. MODEL CP48 £23.95 inc. P&P (EXPORT AND UK). EX STOCK.

32K MEMORY EXTENSION ONLY £23.95

Citadel Products Ltd TEL: 01-951 1848

DEPT YC 50 HIGH STREET, EDGWARE, MIDDLESEX HA8 7EP. 159/4

DEMOSOFT

proudly present

GRAPHIC TOOLKIT

At last! All the facilities necessary to plot points, circles, etc in 8 colours with 176x160 resolution — without a cartridge!

8K + VIC only £9.50

VIC-VALLEY

The ultimate role-playing graphic adventure. 6K + VIC only £7.50

VIC-SET

Create your own characters and save them to tape. Features include Create, Reverse, Invert and Rotate. Any VIC only £3.50

ASSEMBLER

Create & Save your own machine-code programs using standard 6502 mnemonics. Decimal, Hex and Labels fully supported. Expanded VIC only £9.50.

DISASSEMBLER

Take apart your machines' ROM and see how it really works. Save £1.00 if ordered with assembler. Any VIC only £7.50

Send SAE for details of our full range. All prices include p&p and VAT.

Make cheques payable to:

DEMOSOFT

84' 86 Barton St.,

Gloucester. Tel. 27324

359/7

ARE you tired of paying £8.00 for only ONE game? Well now you can buy up to EIGHT games for only £6.45 for Dragon 32. How? Just send SAE's to Alton, 21 Crossbanks, Shipley, West Yorks and find out! 274/6

DEATH'S HEAD HOLE

You'll almost believe it's true!

It's skill, courage and your growing experience that count in this unique adventure for the Dragon 32 and BBC Model B, inspired by the real-life challenges facing a cave rescue team. Literally hours of excitement — if you measure up.

After this, any other adventure will just be a game.

Only £5.45 by return of post from

WORDS AND PICTURES
7 Hawthorn Crescent,
Burton-on-Trent

4/3

ADAM ADAPTORS eliminate expansion problems on the ZX Spectrum (16K). ADAM I allows use of 16K/64K RAM pack ADAM II allows use of 16K RAM pack PLUS memory mapped devices (disc, EPROM's etc) up to 16K. Works with Microdrive, printer etc on ALL models. Plugs in between RAM pack and Spectrum. No soldering or going inside the case. ONLY £9 inc VAT and postage. STEPHEN ADAMS, 1 LESWIN RD. LONDON N16 282/6

SPECTRUM SOFTWARE

48K

Steve Silver adventure games.
Adventure 1 £7.50
Adventure 2 £7.50
Moonlander £5.00

16K

Blitz + Code Breaker £5.00

Prices include P&P

Send Cheque/PO to:

W B Software
192 Seamer Rd, Scarborough
North Yorkshire YO12 4HG
Tel: 0723 70074

227/5

BBC (B): TRON is a new (machine code) arcade game based on the film. Supplied on cassette at £4.95. R. Bhattacharya, 3 Wensley Close, Harpenden, Herts, AL5 1RZ.

379/7

ALL Dragon software, big discounts. Media Magnetics, Freepost, West Bromwich, West Midlands B70 6BR. Free Postage.

373/7

SPECTRUM CHESS

Dare you face The Turk

The original Turk was an eighteenth century automation, a life-size mechanical figure resplendent in Turkish costume and seated behind a wooden cabinet on which a chess board and pieces were placed.

OCP now offer you the twentieth century equivalent of that Turk — a chess-playing computer program. **The Turk challenges you to a game of chess!**

MANY OPTIONS INCLUDE:

- 6 Levels of Difficulty
- Demonstration Mode
- Board Editor
- Games Printout Facility
- Blitz Chess Against the Clock
- Two Player Mode
- Unfinished Games can be Stored
- Recommended Move

FULL INSTRUCTIONS PROVIDED

CHESS THE TURK ONLY £8.95
Post order to
Oxford Computer Publishing,
P.O. Box 99, Oxford.

134/4

BROKEN JOYSTICK?

STRONGER joystick insert replacements supplied with full fitting instructions 3 YEAR GUARANTEE £2.50/Pair inc p&p SOFTWARE FOR ATARI (TM) 400/800 All cassettes under £5 send s.a.e. for lists
Computer Supplies (YC)
146 Church Road
Boston Lincs PE21 0JX



193/4

ZX81 16K software: 'Hangman' + 'Anagram' word games with large vocabs + machine code 'Fruit Machine' £4. P. Teakle, 7E Oakhanger Drive, Lawrence Weston, Bristol.

374/7

SHARP MZ-80A MZ80K Software. Business Utilities, Games. Catalogue — SAE. DCS, 3E South Parade, Bramhall, Stockport.

376/7

DRAGON 32 PROGRAMMERS

Feed The Hungry Dragon on Damsels Heros Wizards and other tasty mortals. He will reward you well. For menu details write:

COLLINSON
88 Sancroft Road
Derby DE2 7ET

247/5

ORIC software — for full details and price list send SAE to Stag Software, 10 Fairacre Maidenhead, Berks.

377/7

CITIZENS of Cartridge City rent Atari Roms at low cost. Discounts on software purchases. Emigration forms from Cartridge City, 25 Gaitside Drive, Aberdeen, AB1 7BH.

378/7

48K LYNX 48K

4 GREAT GAMES ON ONE TAPE
MASTERMIND & TOWER OF RINGS
TWO GAMES FOR THINKERS
YAHTZEE: Dice game for 1 to 5 players
BLOCKER: A very addictive, fast action, game of reactions, with high score feature.

£5 to include p&p
Willowsoft, The Willows, Eaton Bishop, Hereford.

321/6

DRAGON 32 or TANDY TRS-80 Colour

Lots of programs — lots of useful hints and information EVERY single month in "RAINBOW" an exciting new 200-page magazine from U.S.A.

Send £1.95 (plus large 56p s.a.e.) for sample issue to

ELKAN ELECTRONICS (Dept. YC),
FREEPOST, 11 Bury New Road,
Prestwich, Manchester M25 6LZ or
telephone 061-798 7613 (24 hour service).

4/2

BBC PROGRAMMERS

Realise your artistic potential with this amazing FULL COLOUR character generator! Create MOVING COLOUR GRAPHICS and screen artwork the way that the professionals do. Design aliens, lasers etc on a 16x24 pixel screen. Reduces to block of 2x3 characters. Save on tape as basic procedures to append to your own programs!

Only £6.95 from
M. Macpherson B.Sc.
20A PARK ROAD, PASLEY PA2 6JW

387/7

Chalksoft LTD

EFFEL TOWER
by
Chris Somerville



Visiting France? Learn/revise/practise your French vocabulary with this unique, animated program that builds the Eiffel T. Hundreds of words built in; 'store your own' option too. Ideal for school, business trips and holidays. Two programs for £9.25 inc. VAT.

Both (and more) available now for the BBC 'B' and Spectrum 48K. VIC 20 soon. Trade and Export enquiries welcome.

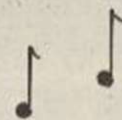
Orders/enquiries (sae) to:

CHALKSOFT LTD (Dept YC8) 37 Willowslea Rd, Northwick, Worcester.

368/7

NEW

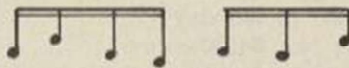
educational releases



Three superb programs for £9.25 (inc. VAT)

"Staff 1" and "Staff 2" teach notes on the bass and treble clefs. "Invaders" gives a game format opportunity to increase music-reading speed. Name the note before they destroy your base! Great fun — great graphics.

Dereck Riddell's NOTE INVADERS.



VIC-20 to Tandy color graphic printer interpage program. Also 26x32 screen editor on tape £8. SAE for information D. Riley, 97 Longley Road, Harlow, Middx.

344/7

ENFIELD COMMUNICATIONS LTD

Huge selection of software
BBC, Dragon, Spectrum
Vic 20/64, ZX81

Hardware:—

Machines, Joysticks, Interfaces
Mail order or call in

S.A.E. for lists

(State machine please)

PROGRAMMERS WANTED

135 High St., Ponders End, Enfield
Middx. EN346B
Access 01-805/7434/77 Barclaycard

392/7

SPECTRUM 16/ 48K

TAPE BREAKER

We copy any tape, does not use floppy discs not to be used to infringe copyright. Plus FREE tape leader information prog. £4.50 inc P&P.
ASSASSIN: Real time graphics plot. Could you be the next "JACKAL"? 48K £5.00
BIOHYTHMS/PYRAMIDS OF EGYPT 16/48K £4.50
CHARACTER GENERATOR: 16/48K £4.50
ENGINE DIAGNOSTIC: 48K £4.50
SPECTRASOFT A very fast m/code sort 16/48K £4.50
NIGHT RIDER 16/48K £4.50

Cheques and P/Os to
SPECTRASOFT
Capital House, Market Place, London W3

WANTED 48K ZX-Spectrum. Also wanted joystick, keyboard/other add-ons. Tel. (0222) 48489. 3434/7

CLOUD 9 SOFTWARE

CHEMISTRY EDUCATION AND GAMES for the SPECTRUM

- 1 MASTERCHEM: Based on mastermind.
- 2 ELEMENT SERPENT: Capture and digest elements with a growing snake! Fun way to learn formulae.
- Both games: 16K, Machine code, 3 levels of difficulty £4.50 each.
- 3 REVISION (16K): Electron Structure, Bonds. £4.50
- 4 pH (48K): Suite of 4 modules: Titration curves, Indicators, Colour Changes, 'A' level worksheet. £8.50

P.O./Cheques to:
Cloud 9 Software
4 Dolvin Road, Tavistock,
Devon PL19 9EA. 391/7

dotty FROM 162X81 UNIQUE

Players must test their imagination by guessing the identity of a dotty picture as quickly as they can. Pictures are chosen at random from a wide selection, and a picture plotter is supplied, so the user can change pictures at will.

Dot by Dotty, all will be revealed

State machine and send cheques/PO's for only \$3.40 to—

UNIQUE COMPUTER SERVICES

Unit 6, 19 Bilton Street
Moston Manchester M9 1WS 382/7

ACORN Atom 12K RAM FP ROM books and cassettes all as new £110 051-63 25509 388/7

THE VOICE OF THE FUTURE S & G Software

SPEECH PROGRAMMES FOR THE "SPECTRUM" WITH VOICE SYNTHESISERS. AVAILABLE NOW. KEYSPEAKER — Speaks every different key entry as you programme, including mode changes, keywords and colours. Write, run, load and save, basic or m/c code with KEYSPEAKER running.

£6.95
SPEAK & SPELL — Reads plain English from strings. Your SPECTRUM talks to you like an old friend. Add speech output to your programmes without using phonetic code. £5.95.

Available now from:
Stuart "CHATTERBOX"
Fuller "ORATER"
Add Ons "SSI"

Please state which when ordering.
S & G Software, 4 Alpha Street
Darwen, Lancs. BB3 2BX. 353/7

KEEP your Atom alive! Database and graphics ROMS, 11-way ROM boards, CMOS RAM boards, Sound board available from I.P. Johnstone, 5 Hemsley Court, Guildford, Surrey. S.A.E. for prices and availability. 393/7

To Advertise in
Your Computer
please phone
Claire Notley
on
01-661 3036

IVYSOFT . . .

is pleased to announce the opening of new premises at 36 New Street, Barbican, Plymouth to be known as "The Software Shop"

To celebrate the opening we will be offering a 10% discount on our complete range on all orders received by August 15th. Over 200 Spectrum titles in stock plus a wide range for the BBC, Dragon, Oric, Vic 20, Commodore 64 and ZX81 micros. Spectrum owners join our Software Club for £3 annual or £15 life membership (the latter including £12 of software of your choice) giving you a permanent 10% discount plus a monthly newsletter with even more savings!

Send large S.A.E. or telephone for our free price list, stating for which micro. Special Tax free rates for foreign orders



IVYSOFT, 91 CLEEVE DRIVE, IVYBRIDGE, DEVON
Tel (07554) 4088

385/7

ORIC - 1 48K. Unwanted gift, as new, £150 o.n.o. Tel: 0761-232217 (Somerset). 340/7

* LYNX MUSIC MASTER *

Now LYNX music is easy! Full two-octave stave on screen; compose, copy, replay, change tempo, etc. Cassette & full instructions £4.95.

ALBASOFT
180 Terregles Avenue,
Glasgow G41 4RR.

330/7

ATARI 400 modify your own 16K RAM board to 48K. Instructions + kit £55. Instructions only £5 refundable on kit. S. Terrell, 17 Cock Close Road, Yaxley, Peterborough, Cambs. 337/7

EDUCATIONAL PROGRAMS FOR THE BBC MICRO WORDFROG (16K)

A game to aid spelling. Words are formed by moving one part of the word across the screen past moving obstacles to join the correct second part. Words can be changed by the user. Keyboard or joysticks. £7.50 + 50p p&p.

SAE for full list of titles.
EDUCATED OWL SOFTWARE
49 Saffron Road, Tickhill,
Doncaster, S. Yorks.

341/7

AS EASY AS a b c ?

YES! Help your 3-6 year old to read and count. Big, properly designed letters and numbers in a multi-choice program. Free keyboard overlay. "CHARACTERS" for any Spectrum - £5.00.

LOWER-CASE KEYBOARD OVERLAY available separately (keywords not shown), only 50p each + 25p postage per order.

EDUCAT SOFTWARE, 83 Lynwood Avenue, Clayton-le-Moors, Accrington BB5 5RS.

SHARP MZ-80K with MZ80P3 dot printer, MZ-80FB double disc drive and MZ-801/u Interface unit. Ideal for small business or sophisticated amateur. Offers please. Phone (0948) 3425. 339/7

SPECTRUM SOFTWARE

48K

Steve Silver adventure games.

Adventure 1	£7.00
Adventure 2	£7.00
Moonlander	£5.00

16K

Blitz + Code Breaker	£4.50
----------------------	-------

Prices include P&P

Send Cheque/PO to:

WB Software
192 Seamer Rd, Scarborough
North Yorkshire YO12 4HG
Tel: 0723 70074

227/5

TEACHER'S MARKBOOK

48K Spectrum. Scrolling column display, totals, percentiles, orders of merit, mean & S.D. graphs etc. etc. A total analysis package for your full teaching load. Adaptable, friendly, menu-based. Saves hours! £5.50 with manual and demo tape. MENTOR SOFTWARE, 69 Beech Rd. Halton Lancaster 331/7

SPECTRUM Crazy Balloon 16K/48K arcade game - only £4. Quality Spectrum programs wanted - Discount Software, 25 Plymouth Road, Chelmsford, Essex CM1 5JG. 346/7

SPECIAL OFFER ZX81 KEYBOARDS

ONLY £18 inc. Full travel keys + spacebar. Smart 10 1/2" x 5 1/2" case. Simple plug-in connectors. 14-28 days delivery. Limited quantity.

Phone 0602 474973 362/7

SHARP MZ80K 48K. 3 types of Basic, Forth, Pascal, machine code, Appollo Word Processor, 100 program library. £350. Tel. 0684 297579. 335/7

LYNX 48K SOFTWARE

LABYRINTH - 3D Maze game.
OTHELLO - Our version of traditional board game in fast machine code.
CHANCELLOR - Run UK economy for 10 years.

SPACE TREK - Zap the Klingons.
£4.75 each Cheque/P.O. to:
QUAZAR COMPUTING DEPT YC,
17 Teg Close, Portslade, Sussex.
Other programs also available,
send for details. 356/7

SHARP MZ80K 48K with Basic extensions, utilities, games for sale. Boxed £300 o.n.o. 061-624 9599. 351/7

Phase 2000

COMPUTER SOFTWARE CENTRE

We sell games for the VIC-20, ZX81, SPECTRUM, BBC & DRAGON Computers.

RABBIT SOFTWARE only £6.95!

We stock games for Bug-Byte, Quicksilver . . . many more!!

Why not pay us a visit at 1482 LONDON RD, NORBURY

(next to train station).
Tel: 679 6480

348/7

ATARI 'Zaxxon' and 'Journey to the Planets' and 'Stratos' all £15 each. Phone 0254 676003. 363/7

DRAGON-32 BUSINESS SOFTWARE Mailing List £19.95, Stock File £24.95, Cash Book £24.95. Send SAE for complete list or £1.00 for our software preview cassette. Cheque/P.O. to B. Mistry, 75 St. Margaret's Road, Bradford BD7 2BY. 361/7

VIC-20 + ZX Spectrum

All the IMAGINE range of VIC-20 cassettes including ARCADIA, WHACKY WAITERS, CATCHA SNATCHA and FRANTIC ALL AT ONLY £5.50 each! INCLUSIVE OF POSTAGE & PACKING.

Send to:

RULE COMPUTERS
30 Tylers Acre Road,
Corstorphine, Edinburgh EH12 7HZ
Tel. 031 334 7261

350/7

Replicate for 48K Spectrum. The superior copying program copies any program or code up to 36K. Header listings & editing only £4.95 or s.a.e. for details to:

J. Ball
7 Moorefield Rd,
Woodbridge, Suffolk.

355/7

'SPECTRUM TAPER'. Copies virtually all programs, repeat/verifies. 2 versions OM cassette £3.50. Money back guarantee! G. Evans, 16 Stonepit Drive, Cottingham, Leics. 338/7

DRAGON, ORIC SPECTRUM PROGRAMMERS

Runesoft require high quality programs in machine code or Basic for our new Software house opening soon. Good royalties paid for accepted programs. Please send demonstration tapes to:

RUNESOFT

CHARWOOD HOUSE
67 LOWER PARLIAMENT STREET,
NOTTINGHAM NG1 3BB

380/7

NEW - joystick interface for ZX81 - do it yourself - connect this I.U.G.I H001 Atari type joystick interface to ZX81 in 5 minutes by drill and solder. Fits inside ZX81. Full instructions included. Send £6 inc. P&P to, I.U.G.I Software & Hardware. 334/7

SPECTRUM KOPYKAT £4.95

SIMPLY THE BEST. So simple to use. Any type of ZX SPECTRUM program can be backed-up onto a fresh tape, even programs that cannot be stopped can now be copied. Programs over 41.5K (8.7K for 16K machines) can be easily duplicated. 100% machine code Plus FREE Tape-header Reader program. IMMEDIATE DESPATCH Send cheque/PO to: MEDSOFT
61 Ardeen Road, Intake, Doncaster DN2 5ER
IT CAN EVEN COPY ITSELF 366/7

EDUCATIONAL programs for Spectrum. Five stimulating games on cassette for infants and juniors. Includes Gun Sums, Fun Phrases, Time Clock, Daft Draw and Super Shop. Only £4.95. Send for details or pay M.B. Software, In-Vid-Ria, Route Charles, S.P.P., Guernsey, C.I. 349/7

DUST COVERS

VIC 20/64 DRAGON 32 ATARI 800 CASS UNIT C2N, C2N1530 & ATARI in natural quality vinyl. Just send £2.95 or £3.95 to inc. cass. cover, stating computer and cassette model. (No stamp required) Cassette cover only £1.50 to:

ALLEN ENTERPRISES

FREEPOST
Luton LU2 8BR

TRADE ENQUIRES WELCOME 375/7

ORIC software library. Two weeks hire £1.00. Annual membership £5. Stamp for list. Les Wilson, Penelwick, Tintagel, Cornwall. 352/7

SOFTWARE Sharp MZ80 and Dragon Super original games and proven business packages copyrights also for sale software prepared for clients PAB software 0789 840088. 329/7

ATOM owners! Build a colour module for under £10. Full construction details including demonstration programs £3.00. Also games tape - bowling/wordsearch (12K RAM) £3.40. A Worrall, 3 Oaklands Close, Bexleyheath, Kent. DA6 7AP. 354/7

ZX81, 16K, keyboard, sound generator, motherboard, software etc. £120 o.n.o. Phone Lincoln (0522) 29523. 348/7

To Advertise in
Your Computer
please phone
Claire Notley
on
01-661 3036

ocean

URGENTLY REQUIRE GAMES PROGRAMS

Ocean Publishing Limited, publishers for a major software house, urgently require good game programs for home micro's.

ZX SPECTRUM, COMMODORE 64, ORIC, DRAGON, VIC-20 and BBC MODEL B.

Our national dealer network ensures maximum sales. Should your program be accepted we will pay top royalties or buy your copyright.

Write in confidence to the
SOFTWARE DEVELOPMENT MANAGER,
Ocean Publishing Limited,
Ralli Buildings, Stanley Street, Manchester M3 5FD.
OR TELEPHONE: 061-832 7049

381/7

WIN THE POOLS?

48K

SPECTADRAW 2

Spectadraw 2 is a Pools Prediction Program for the 48K ZX Spectrum Microcomputer.

The program looks at the recent form of the teams playing in each week's English and Scottish Football League matches and then refers to a large database to see what has happened in the past when teams with similar form met. By combining the lessons learnt from the past with the teams' current league position, the program generates a draw probability factor for each match. It can then identify the matches which are likely to yield draws and output suitable predictions. It will also output the least likely draws for the benefit of those who prefer the fixed odds lines on coupons.

The program is supplied complete with a database tape containing data on over 7500 matches and a comprehensive instruction manual.

Program, Database (both on a high quality cassette) and instruction manual £12.95 inclusive. (Cheques/POs payable to B. S. McAuley) or SAE for details.

**SPECTADRAW, 1 COWLEAZE,
CHINNOR, OXFORD, OX9 4TD.**

328/7

SPECTRUM TAPE CONTROL

Load and save fully automatically using one or two cassette recorders. Auto start/stop and lead switching under program control using simple BASIC commands. Also suitable for control of model railways etc. and several controllers can be used for multiple control. Built-in BEEP amplifier with speaker and volume control for games, alarms etc. The controller plugs into the Spectrum cassette sockets and is powered from the Spectrum supply. Supplied only as a kit complete with all parts, leads, smart black case and detailed user and construction notes. Only £23.75 plus £1 p&p.

SPECTRUM HIGH-SPEED LOADER

Load and save at double speed with our Speedyload software (48K only). Reliable and easy to use. It uses little memory and once loaded into ramtop it is almost invisible in use. Either normal or fast can be selected and only a standard cassette recorder is required. All tape commands can be used. Cassette £3.45 plus 40p p&p.

By mail order only — send S.A.E. for details

**Ness Micro Systems (YC)
100 Drakies Ave. Inverness IV2 3SD**
371/7

COMPUNTA — HORSE-RACING FORECASTER

puts your MICRO TO WORK!

- A serious, easy to use program.
- No records to keep or update.
- Contains data of leading jockeys/trainers at 34 courses.
- High success rate.

Tape version available for:—
Dragon 32, Spectrum 48K, Tandy COCO 32K, ZX81 16K,
ONLY —
£4.95 inc.
immediate delivery.

RED ROM DATA, Dept YC2, 72 Lambert Rd. Grimsby, Lincs. DN32 0NR.

372/7

LYNX

KING SOLOMON'S MINES
A randomised, role-playing adventure. No two games are the same. Side 2 has two graphics programs that show off the capabilities of the LYNX.

All for £5.95 inc. p&p
HARVEST SOFTWARE
West Winds, Tredragon Road,
Mawgan Porth, Newquay,
Cornwall TR8 4DH.

358/7

LYNX GAME, you've waited long enough, now you can have Computer Attack for your Lynx. A superb game of speed and skill for your 48K Lynx. Sound colour and gripping action on one cassette for only £5.00 cheque marked 'Imperial'.
360/7

PLAY DOMINOES on your 12K Acorn Atom. Realistic graphics. Cassette £3.95 from M. Exall, 16 Vawdrey Road, Drayton, Norwich.
364/7

LEARN your tables. 16/48 Spectrum. Two super programmes only £2.75 from: Sharma Software, 12 Barrington Court, Hutton, Brentwood, Essex CM13 1AX.
336/7

FULL assembler for 48K Spectrum — includes labels, error diagnosis, definable data tables, conversions, printouts, and more! only £5 — price includes documentation plus free disassembler — Graham Carr, Tunbeck Road, Wortwell, Norfolk.
357/7

ACORN ATOM 12K + 12K (was £300) complete package £130. Campbell after 7pm (01) 954 3875.
367/7

Please mention
Your Computer
when replying to
advertisers

SELL IT WITH YOUR COMPUTER

CLASSIFIED ORDER FORM

Classified Rates

Linage: 40p per word (Min 15 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 scr (Min 2scr)

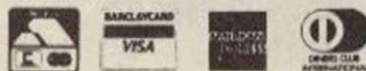
One insertion : £8.50
Three insertions : £8.20
Six insertions : £8.00
Twelve insertions : £7.50

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 Int/ as below



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

Please insert the following advertisement in Your Computer Classified Section

				LINAGE
				£6.00
				£8.00
				£10.00
				£12.00
				£14.00
				£16.00
				£18.00
				£20.00

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

THIS FORM SHOULD BE RETURNED BY AUGUST 2 FOR SEPT ISSUE PUBLICATION

Company Registered Number: 151537 (England) Registered Office: Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

MIKRO-GEN

Mikrogen is one of the longest established and most experienced companies in the home computer market.

We market to such names as W.H. Smiths, Software Masters Psion/Sinclair Timex Corp etc. We also have our own rep network covering all retail outlets.

Our reputation has been built on top quality software.

CAN YOU WRITE TOP QUALITY SOFTWARE?

To supplement our already highly successful range we are now looking for programs for all the popular home computers include games, utilities education + business software.

If you feel that your programs can meet our high standards then contact us at the address below or Telephone 0344 27317.

MIKRO-GEN, 1 DEVONSHIRE COTTAGES, LONDON RD, BRACKNELL, BERKS.

386/7

LATEST SOFTWARE!	SYSTEM-SOFT		FULLY INCLUSIVE PRICES!
	FOR THE BEST FROM THE REST		
SPECTRUM		DRAGON 32	
The Hobbit (48K)	£14.95	The King (J)	£8.00
Terror Daktil (48K)	£6.95	Talking Android Attack (J)	£8.00
Penetrator (48K)	£6.95	Cosmic Zap (J)	£8.00
The Castle	£8.00	Volcanic Dungeon	£5.00
Styx	£8.00	Chess Cartridge	£21.50
Volcanic Dungeon (48K)	£5.00	Tele-writer	£49.95
BBC MICRO		VIC 20	
Moon Raider (B)	£7.95	Wizard and Princess	£5.95
Croaker (B)	£7.95	Scramble	£7.00
Killer Gorilla (B)	£7.95	Cosmiads	£7.00
Sea Lord (B)	£7.50	Panic	£7.00
Chess (B)	£8.00	Vic Gammon (+ 3K)	£7.00
Multifile	£14.95	Vic Chess (+ 16K)	£7.00
Lots more available for most micros. Send SAE for lists			SPECIAL OFFER Deduct £1 per item when ordering two or more. 370/7
Please make cheque/PO payable to SYSTEM-SOFT			
FREEPOST, ACKWORTH, PONTEFRAC, W. YORKS. WF7 7BR.			

MISSILE. Defend your cities from the deadly onslaught. Graphics game for the BBC Microcomputer (32K) only £5.00 inc. To Paul Stevens, 11 Woodhurst Close, Cuxton, Rochester, Kent, ME2 1LU. 293/6

EDUCATIONAL programs, Spectrum 48K, junior age range. SAE for details to Computers For Education, 58 Dovecote Lane, Oldham OL4 4SW. 384/7

ELINCA
ZK
TAPELOADER

for ZX81 & SPECTRUM - trouble free loading from unspooled tapes. Switch from SAVE to LOAD without removing plugs. Passive filter on SAVE.

Send SAE for leaflet. State ZX81 or SPECTRUM.

£14.99
Inc VAT - Post FREE

ELINCA PRODUCTS LTD 90
Lyon Works, Capel Street,
Sheffield 6 (tel 0742 339774)

CAN YOU PLAY GERMAN WHIST?

Then try your hand at winning against the Spectrum with this well designed program which will stretch you to your mental limits in this fascinating game.

Cost only £5.50



Please allow 21 days for delivery

Please send me game(s) at £5.50 (inc. p&tp) each. I enclose a cheque/PO for £..... made payable to B.J. Enterprises.

NAME.....

ADDRESS.....

Orders to:

B.J. Enterprises,
Plot 669, Cranbrook Drive, Pinkneys Green,
Maidenhead, Berks.

389/7

LOOK OUT!

**COMING SOON:— ORIGINAL SOFTWARE.
NO OTHER GAMES LIKE THEM!**

"SPACE LANES" + "DOOR SLAMMER"

Cathedral
Software

from



389/7

VIC-20

HFS

MAN HUNT



FOR ANY
VIC-20

The most terrifying aliens yet seen on a Vic 20. Can you escape? or will you be another victim of their relentless pursuit?

MAN HUNT
A great game from H.F.S. only £5.95 postage free to U.K.

Order direct to
H.F.S.
35 Fenton Place,
Porthcawl,
Mid-Glamorgan,
CF36 3DW.

Dragon version of the Manhunt coming soon.

Please rush me.....cassette/s of MAN HUNT. I enclose a cheque/P.O. value £..... payable to: **H.F.S. Software, 35 Fenton Place, Porthcawl, Mid-Glamorgan, CF36 3DW.**

NAME.....

ADDRESS.....

POSTCODE.....

ORIC - I

VANQUISHER (48K)

All the excitement of the Barbary in your micro. You will be the respected Station master of Vanquisher Junction, and your judgement and problem solving ability will have to see you through.

£5.20 at good Software Stations

RINGO (16K)

You have been set the problem of the RINGS by the keeper of TIME. The meaning of LIFE, TIME, and EVERYTHING depends on you now. Do not be deterred there is a solution to the riddle of the RINGS.

£5.00 at local Software Keepers.

PARAGRAM (16K)

After you've fractured your finger on the invaders... try Paragram, and bust your brains beyond repair. Books within books of your favourite... the letters of the alphabet.

£5.50 at local Software Surgeons.

JERICO 2 (48K)

You are Joshua. In search of the lost 'H'. You have your band of followers to help you. On your quest, you have laid siege to the walled city, and you must win, but this time you don't have the Trumpet.

£5.95 at Army Surplus Software Stores.

FARMER HORACE (16K)

Horace has been jailed for TEN years you have promised him you would look after the Farm. You must make a Profit and not starve the workers, or you'll find yourself in jail for TEN years, with Horace.

FREE WITH JERICO 2

PARAGRAM (48K)
£6.00

JERICO 2 (48K)
£6.95

VANQUISHER (48K)
£6.50

RINGO (48K)
£6.50

WHOLESALE DISTRIBUTION By

P.C.S.



SPECTRUM

Elephant Software. 

41 Haymill Rd Burnham Berkshire SL1 6NE

A	AF Software	104	Delta Research	37	L	Laserbug	176	Q	QED	76
	AGF Hardware	86	Disking	35		Letherby	124			
	Acorn Computers	10, 11	DK Tronics	138, 139		Level 9 Computing	166		R	
	Acorn Peripherals	98	Doctor Soft	35		Level Software	179		RD Labs	118
	Afdec	74, 75	Downsway Electronics	48		Llamasoft	119		Richard Sheperc	58
	Aimgram	192	Dragon Dungeon	135		Lydenhurst	130			
	Amersham	196	Dream Software	166					S	
	Anirog	126							Sabre Software	178
	Arcadia Software	37	E	East London Robotics	171				SIR Computers	156
	Arrowsoft	127	Econtech	124		M	Malva	72	SrnT Rotronics	9
	Artic Computing	32, 33	Electronics Applied	156		Maplin	60		Swanley Electronics	116
	Audio Computers	Back Cover	Elephant Software	156		Maplin	190		Salamander Software	122
			Eltec Computers	38		Martech	131		Seyern Software	114
			Express Programs	174		MC Lothrien	130		Shards	191
						Megabyte	37		Silica Shop	17
B	Basicare	117				Melbourne House	182		Silversoft	185
	BeeBug	128	F	Fountain Computers	132	Memotech	20, 21		Sinclair Research	24, 25, 26
	Bellflower	163	Fox Electronics	89		Memotech	188		Siversoft	16
	BiPak	78	Fulcrum	50		Micro Games	72		Softeach	160
	Bridge Software	36	Fuller	172, 173		Micro Management	6, 7		Softex	194, 195
	Bucon Ltd	62				Micro Mega	183		Software Farm	178
	Buffer Micro	36	G	Gamer	173	Micro Power	44		Software Library	116
	Bug Byte	22	Gilsoft	62		Micro X	176		Spectrum Games	21, 28, 29, 30, 31
			Grundy Business Computers	154, 155		Microgen	74		Startech	118
C	C.Tech	150				Microware Leicester	82		Sun Computers	131
	CDS Micro Systems	102, 103	H	H/H Software	156	Midwich Computer Co	80		Sunshine Publications	184
	CP Software	113	HSF	202		Minature Tool Computers	178		Superior Software	127
	Calpac Computers	132	Hewson Consultants	92		Mr Micro	34			
	Cambridge Micro	39	Hilton Computers	62					T	
	Camel Software	36	Hitech	191		N	Newnes Technical Books	84	Tansoft	64
	Campbell	50	Hi Soft	96, 97		Newtech	188		Tasman	48
	Cardigan Software	176				North Wish	IFC		Tectronics	118
	Cascade	129	I	Imagine	96, 97				Thorn EMI	180, 181
	Centrepods	100, 101	Imagine Software			O	Oak Wish	82	Timedata	50
	Colvin Computers	19	Impact Software	12, 13		Oasis Software	191		Tomorrows World	124
	Compron Systems	192	Interceptor Micros	193		Opus Supplies	146		Twickenham	166
	Computer Addons	134	Interface	78		Oric Products	148, 149			
	Computer Concept	72	Interface	189		Oxford Computer Publishers	82		V	
	Computer Corner	177							Vision Store	144
	Computer Market	67	J	JCB	74	P	P.S.S.	152, 153	W	
	Computers For All	4, 5	J K Greye	137		PSS	110		Wildings	66
	Compro Sys	82				Picturesque Addictive Games	116		Winter Soft	142
	Correll Software	36	K	Keysoft	39	Pinehurst	163			
	Crystal Computing	168	Kuma	61		Plus 80	132		Y	
	Cybergram	37				Practical Electronics	163		Yewacre	88
D	D.J.L.	87				Print n' Plotter	164		Your Computer Christmas Fair	186
	Diamond Software	147				Program Direct	55			
	Deans Electronics	196				Protec	136		Z	
									ZX Microfair	14, 15

THE RAMPACK



MICROPERIPHERALS - MADE IN ENGLAND

£19.95

ZX81

NEED WE SAY MORE?

EXPANDABILITY:

full details with the rampack. You can choose now or later various optional extras:

- **The Keyboard Sounder:** A tone is produced every time you press a key. You can also program the Sounder byUSR 699
- **The X-ROM system:** based on the NEC 8255A chip. The system provides direct connection to an EPSON printer (or similar) and ATARI joystick. Programs EPROMS, auto-runs software and is supplied with 8k utility ROM containing 21 preprogrammed functions conveniently cased together with the Ram Pack
- Various software on ROMs

Further hardware add-ons:

- **The HARD TOP Keyboard Overlay:** 40 professional keys are positioned over the actual keyboard making typing much easier. The Hard Top overlay is finished in the same quality standard as our other products
- **The 80 Column Card:** Releases the ZX processor from picture display, therefore, the ZX runs always in fast mode. The screen will have a programmable size, up to 24 lines x 80 characters. UDG (User defined Graphic Characters) is standard

SPECIFICATIONS:

- Memory Capacity: 16k bytes
- Maximum speed: 200ns
- Use exclusively Sinclair PSU
- Absolute stability with a built-in autolocking system, incorporating special anti-wobble ridge.

THE INTEGRAL EXPANSION SYSTEM FOR ZX81
SOLIDISK TECHNOLOGY LIMITED

87 Bournemouth Park Road,
Southend-on-Sea, Essex.

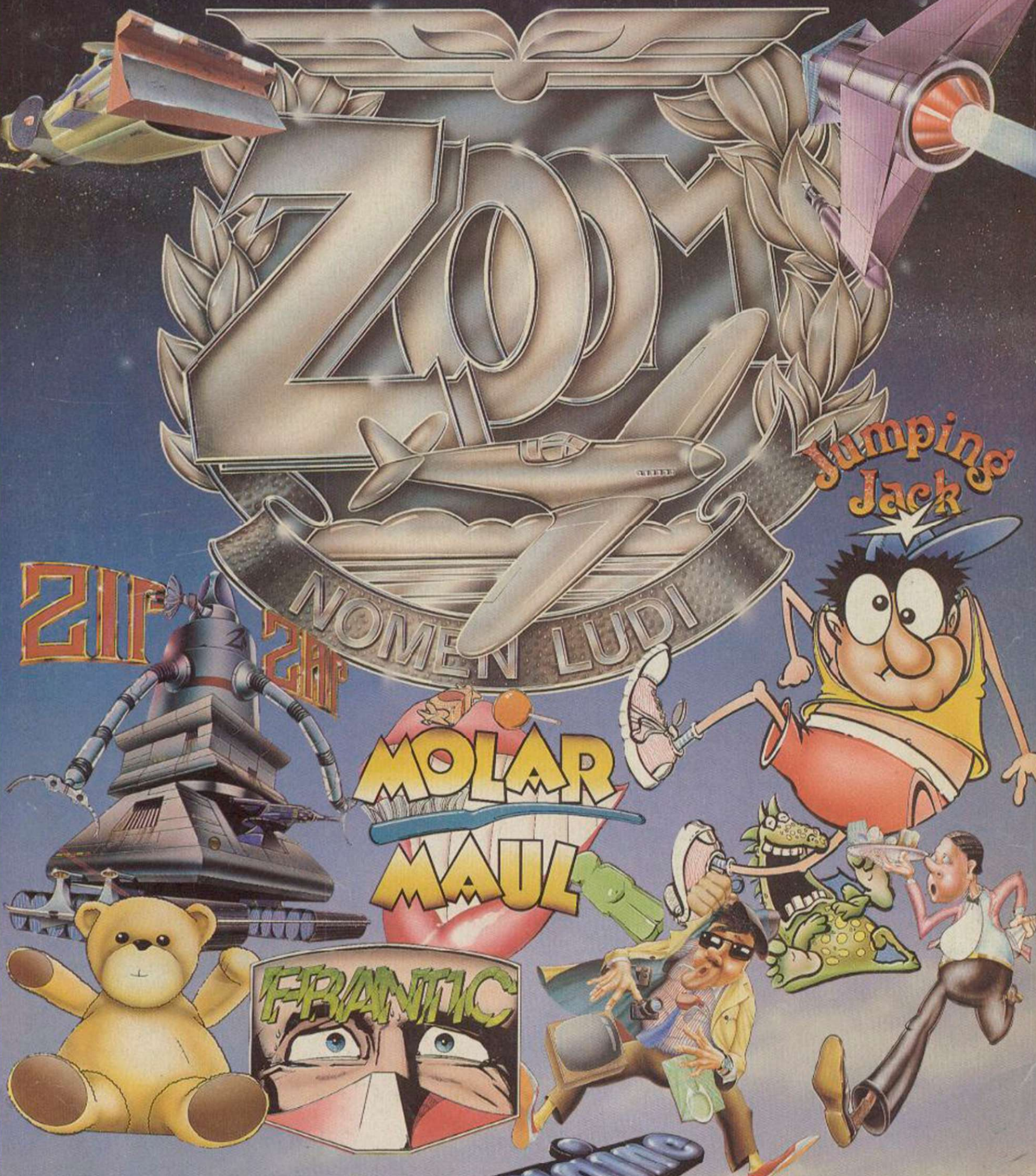
Tel: 0702 613081
Delivery: Please allow 7 days

Item	Qty	Price inc VAT	Total
The Rampack		£19.95	
The Keyboard Sounder		£2.00	
The Hard Top Keyboard Overlay		£4.95	
The X-ROM system		£15.95	
The 80 Column Card		£49.95	
Post and packing		£1.00	
Please charge my Access, Barclay account:		TOTAL £	

*Please delete/complete as applicable.
*I enclose a cheque P.O. payable to:
SOLIDISK TECHNOLOGY LTD
for: £

NAME _____
ADDRESS _____

The Legend continues...



Jumping Jack

ZIP

ZIP

MOLAR MAUL

FRANTIC

Imagine

..the name of the game

Imagine games available from
**W.H. SMITH, Boots,
John Menzies, Dixons,
Laskys, Photomarkets U.K.**
and all other good
Software Outlets.

Any of these games for just
£5.50 EACH
including first class post,
packaging, VAT and an
UNCONDITIONAL
LIFETIME
GUARANTEE.
If you have any difficulty in
obtaining any Imagine Games
ring Imagine Direct on
051-236 6849 to place
your order.

Imagine Software, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.