40 Rock (C)

POPULAR Computing WEEKLY

35p 4-10 August 1983 Vol 2 No 31

This Week

Microdrive
Exclusive photographs of both inside and outside of the ZX Microdrive and interface 1. See page 13.

Printer interfaces
Stephen Adams reviews a range of printer interfaces for both the ZX81 and Spectrum on page 14.

Commodore 64
David Lawrence and Mark England explain how to master machine code on the Commodore 64 in the first of a new series. See page 29.

New releases
All the latest software games including Warrior from ISCA Software and Cosmic Fire Birds from Solar Software. See page 45.

★STAR
Marshy Maze on Dragon. See page 10.
GAME★

News Desk

Spectrum tops ½ million mark

SINCLAIR has announced that sales of the ZX Spectrum in the UK and Europe have now exceeded 500,000.

This is an average of more than 6,500 a week. Of the two models available, the larger memory version has dominated — with the 48K outselling the 16K by about two to one.

On breaking the half-million barrier, Sinclair's managing director Nigel Searle said: "Of course, we are delighted. And we hope that peripherals like the ZX Microdrive, announced last week, and the Rom cartridge software we aim to publish in the autumn, will keep that user group challenged by their Spectrums."

The Spectrum has, in fact, been more successful than the ZX81 comparing corresponding 16 month periods from launch. The ZX81 sold just over 400,000 units for the period to July 1982.

Home turn-on for Aquarius

A UNIQUE computer add-on has been announced by Mattel for the Aquarius home computer, which will enable the machine to control household electrical appliances.

Called the Home Control System it allows lights, central heating, or any other mains-operated device, to be operated remotely at predetermined times, without any additional wiring having to be installed.

It works by using a special control unit which plugs into any mains socket which then communicates with appliances, each connected using special plugs, by sending high-frequency coded signals through the existing mains wiring.

To set up the system to switch on or off a particular appliance at a particular time the Home Control Unit has to be programmed — using an Aquarius microcomputer.

The unit — a small device about the size of a thick paperback book — plugs into the

Continued on page 5

Classified Classified Classified Classified

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

ZX PACMAN, close version of the arcade favourite with pills, dots, ghosts, exits, etc, £2.50. Lander, guide the module to a safe landing. Tell the on-board computer how much thrust, but mind your fuel, £2.25. All 3 cassettes only £5.95. Send cheques/PO to Donald Grose, 8 Manton Avenue, Hanwell, London W7 2DZ.

TEXAS
TI 99/4A
CASSETTE LEADS
£4.95
INCLUDING POST AND PACKING
Single Recorder only
Orders to: (Dept. PCW)
Clares, 222 Townfields Road, Winsford, Cheshire CW7 4AX
Tel: Winsford 51374

SPECTRUM, two new super games from Wizard — Gone Fishin' + Pigeon Shoot, only £1.50 for both. Send cheques/POs to: Wizard, 6 Crown Close, Sherwood Park, Rainworth, Notts.

BBC, ORIC, LYNX' CASSETTE LEADS
WITH MOTOR CONTROL
DIN to DIN or
DIN to JACKS
£2.95
Orders to: (Dept. PCW)
Clares, 222 Townfields Road, Winsford, Cheshire CW7 4AX
Tel: Winsford 51374

SWAP BBC GAMES for others, have Killer Gorilla, Croaker, 3D Advent, Galaxy Wars + others. Send me a list. A. P. Saggar, 88 High Street, Southall, Middlesex UB1 3DB.

ELKAN SUMMER SALE!
Back copies of American magazines for Dragon 32/Tandy color users
Rainbow/CoCo News/CoCo Mag/ Hot Co-Co
Only £1.50 each (+ 57p SAE)
(normally £2.25 each)
Bumper bundle!
Six different for **only £9.95** (post free)
(whilst stocks last)
ELKAN ELECTRONICS, FREEPOST,
11 Bury New Road, Prestwich, Manchester M25 6LZ or
061-798 7613

VIC20. Rat Race, Jelly Monsters for sale, £10 each. Also got games to swap. Tel: Stevenage 0438 58288.

Continued on page 40

★ ★ WIN A LYNX — SEE PAGE 37 ★ ★

NEW FROM

MICRODEAL

SIX GREAT NEW PROGRAMS FOR THE DRAGON 32

The Official FROGGER™

SAFELY MANOEUVRE THE FROG TO ITS HOME WITHIN THE TIME GIVEN. CROSS THE HIGHWAY WITHOUT GETTING RUN OVER, AND CROSS THE RIVER WITHOUT FALLING IN. AVOID TRAFFIC, SNAKES, CROCODILES AND DIVING TURTLES.

IN MACHINE LANGUAGE FOR 1 TO 2 PLAYERS. JOYSTICKS OPTIONAL

£8.00

SPACE SHUTTLE

CAN YOU FLY THE WORLD'S MOST SOPHISTICATED VEHICLE. LIKE MOST WORTHWHILE THINGS IT'S NOT EASY – AND THERE'S A LOT TO LEARN!

FOR 1 PLAYER. 1JOYSTICK REQUIRED

£8.00

Cuthbert Goes Walkabout

CUTHBERT IS ON THE LUNAR LANDING PAD, WAITING FOR THE FEDERAL CHIEF'S STATE VISIT. HE MUST TURN THE LIGHTS ON BY WALKING ACROSS THE SWITCHES, LOCATED AT THE CORNERS OF THE SQUARES, BEFORE THE INVADING MORONIANS GET HIM. WATCH HIM DO HIS VICTORY DANCE BEFORE HE TACKLES THE NEXT "PAD" AND ANOTHER, LARGER, SET OF MORONIAN INVADERS. CAN YOU GET YOUR NAME IN THE HALL OF FAME? SUPERB FULL COLOUR GRAPHICS WITH ACCOMPANYING MUSIC.

FOR 1 PLAYER. JOYSTICKS OPTIONAL IN MACHINE LANGUAGE

£8.00

Morocco Grand Prix

100 MILES OF TYRE SCREECHIN', CLUTCH BURNIN', WHEEL SPINNIN', GAS GUZZLIN' TRACK LIES AHEAD, AS YOU BATTLE YOUR WITS AGAINST THE REST OF THE FIELD IN THE MOROCCO GRAND PRIX. **FOR 1 PLAYER. JOYSTICK REQUIRED IN MACHINE LANGUAGE**

£8.00

GOLF

IF YOU LIKE GOLF, THIS'LL BE JUST YOUR CUP OF 'TEE'. WITH A CHOICE OF CLUBS, WEIGHTS AND DIRECTIONS, SAND TRAPS AND DUCK PONDS "PLUS" A BUILT IN 12% SLICE FACTOR; IT'S ALMOST AS GOOD AS THE REAL THING. "GOLF" HAS THREE LEVELS OF DIFFICULTY + HIGH RES GRAPHICS. "GO ON", TAKE ON THE WORLD'S VERY BEST: IN YOUR LIVING ROOM!! **FOR UP TO 4 PLAYERS. JOYSTICKS NOT REQUIRED**

£8.00

The Composer

THE COMPOSER IS A 4 VOICE MUSIC COMPILER WHICH EASILY ALLOWS ONE TO DEVELOP HIGH QUALITY MUSIC. EACH VOICE IS PROGRAMMED SEPARATELY. IN ADDITION EACH VOICE USES ITS OWN WAVE SHAPE TABLE WHICH MEANS A UNIQUE SOUND FOR EACH OF THE 4 VOICES. THE COMPOSER FEATURES 7 OCTAVE RANGE AND SUPPORTS DOTTED AND DOUBLE DOTTED NOTES AS WELL AS EIGHTH, QUARTER AND STANDARD TRIPLET NOTES. THE COMPOSER ALLOWS MUSIC TO BE PLAYED IN ANY TEMPO OR KEY.

£15.00

Selected **Microdeal Games** are available from **Boots** and **John Menzies Stores** with Computer Centres and Dragon 32 Dealers Nationwide or order direct from:

DEPT (WE)

MICRODEAL

41 TRURO ROAD, ST. AUSTELL
CORNWALL PL25 5JE.
TEL: 0726 3456

Access

POPULAR Computing WEEKLY

4-10 August 1983 Vol 2 No 31

SUNSHINE

The Team

Editor
Brendon Gore

News Editor
David Kelly [01-930 3271]

Software Editor
Graham Taylor [01-839 2504]

Production Editor
Lynne Constable

Editorial Secretary
Caroline Owen

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3260]

Classified Executive
Diane Davis [01-839 2476]

Administration
Theresa Lacy [01-930 3266]

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2 7HF
Telephone: **01-839 6835**
Published by Sunshine Publications Ltd.
Typesetting, origination and printing by
Chesham Press, Chesham, Bucks
Distributed by S M Distribution
London SW9. 01-274 8611. Telex: 261643
© Sunshine Publications Ltd 1983

Subscriptions
You can have *Popular Computing Weekly* sent to your home:
UK Addresses
26 issues £9.98
52 issues £19.95
Overseas Addresses
26 issues £18.70
52 issues £37.40

How to submit articles
Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

News 5
Wargames

Letters 7
Cost of software

Star Game 10
Marshy Maze for Dragon 32

Microdrive 13
Exclusive photographs of the Microdrive

Reviews 14
Stephen Adams looks at ZX printer interfaces

Spectrum 18
Solar System Trek by Maurice Gavin

Programming 21
Binary chop search

BBC in education 23
More assembly language

Commodore 64 29
Machine code master

Open Forum 30
Six pages of your programs

Adventure 37
Tony Bridge's corner

Peek & poke 39
Your questions answered

New releases 45
Latest software programs

Competitions 47
Puzzle, Top 10, Ziggurat

Editorial

What makes a good computer game? There is no simple answer, since people's tastes differ, but there are a number of qualities that seem to be present in most successful games.

One of the most important elements in computer games is their addictiveness. The desire to play a game again and again is a hallmark of its quality. Any game which elicits the response "Just one more go and I'll get on to the next level . . . set a new hign score . . ." is likely to be successful.

As a corollary to the quality of addictiveness, good computer games tend to be progressive, ie, they get harder as they go along. A game which only has one level of play tends to become boring as soon as you have mastered it.

Another important element in judging the quality of a computer game is its simplicity. This is not to say that sophisticated games are bad, just that they should be easily comprehensible.

Funnily enough, all of these qualities depend on the design of the game, rather than the programming skill which goes into it. Even the most amazing use of graphics and sound will find it hard to rescue a poorly designed game.

Perhaps the key to designing a good computer game is the recognition that it requires both programming knowledge and an understanding of the mechanics of game construction.

Next Thursday

Manoeuvre the green blocks around the screen and try and get the sun down to the bottom. But don't let the clouds fall through the gaps. Sunfall for the 16K or 48K Spectrum by Jonathan Medhurst.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*.
Please start my subscription from the ..... issue.

UK Addresses: ☐ 26 issues at **£9.98** ☐ 52 issues at **£19.95**
Overseas Addresses: ☐ 26 issues at **£18.70** ☐ 52 issues at **£37.40**
Please tick relevant box
I enclose my cheque to *Popular Computing Weekly* for .....

Name .....

Address .....

.....

.....

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

WINDOW ON ANOTHER WORLD

NEW RELEASES FOR DRAGON 32

FRANKLIN'S TOMB £9.95

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.

EVEREST £7.95

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.

GRIDRUNNER £7.95

By the year 2190 the Earth is a barren and desolate wasteland. With all natural resources used up, the human race's last 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 manoeuverable ship, the Gridrunner, was developed. Your mission: stop the droids and save the Earth!
Gridrunner is an arcade game requiring one joystick.

DRAGON 32 and TANDY 32K (please specify):
Dragon Trek £9.95. Wizard War £7.95. Golf £7.95. Grand Prix £7.95. Vulcan Noughts & Crosses £7.95. Games Comp D1 £7.95. Salamander Graphics System £9.95. Super Skill Hangman £7.95. Star Jammer £7.95. Nightflight £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 Comp 01 £7.95.

NOW AVAILABLE AT MAJOR BRANCHES OF:

Boots AND spectrum

Mail Order (add 50p p&p) and Catalogues (send SAE) from:
Dept C, SALAMANDER SOFTWARE, 27 Ditchling Rise, Brighton,
East Sussex BN1 4QL. Tel: 0273 771942

Salamander Software

Bundles of ZX81 starter packs

SINCLAIR is now doing to the ZX81 what Commodore has done to the Vic20.

As of August 1, the machine will be available as part of a special package deal. This Sinclair Starter Pack, as it is called, will include a ZX81, a 16K Ram pack and one software cassette — all for £45.

This price is a £30 saving on the cost of buying the three components separately. To begin with, the software cassette on offer will be Psion's *Backgammon* title. But other titles will be available as well, with shops receiving a random selection.

The reason for the deal is that the price drop of the ZX81 earlier in the year to £39.95 has failed to revive flagging sales of the machine.

Initially, the offer will run for two months and the Starter Packs will be available from most usual stockists, including Boots and John Menzies.

In another offer, running concurrently with the Starter Pack scheme, Sinclair is offering a free pack of five rolls of printer paper with every ZX Printer sold between now and the end of September.

Just a war game

WARGAMES, which opens in London this week is the latest film to be inspired by the micro.

Its teenage hero, David Lightman, has one interest in life — the world he can access over the telephone lines with his home computer. But, along the way he accesses the American defence system — and the game he has found that seems like *Space Invaders* is in fact a whole lot more!

Frightening, but not impossible. Last year, three New York school children used their computer to crack the code used by Pepsi Cola to control its Canadian freight movement. In a few days they had placed huge orders from fictitious companies and delivered empty bottles to subsidiaries all over Canada.

The 'joke' cost Pepsi a fortune and, when the culprits were eventually tracked down by the Californian police and the FBI, the three — being minors — escaped prosecution.

For a more weighty discussion of such real-life incidents see *Computer Insecurity* by Adrian Norman, published by Chapman and Hall.

Aquarius

Continued from page 1

mains and also connects to the cassette port on the computer. A Rom cartridge provides the programming software, to set up the codes of each appliance to be controlled, and to set on and off times. For lights there is also a dimmer facility. Having programmed the unit, the Aquarius is no longer needed and can be disconnected.

Up to 256 appliances can be controlled from the system, each being programmed with up to 32 on/off events over a seven-day cycle.

The Home Control system has been developed by BSR/Pifco in Scotland in conjunction with Mattel. It is expected to go on sale in early 1983 and prices will be around £100 for the controller and software, and around £10 for each of the special plugs needed for each appliance.

Memory expansion

QA Data Systems has announced a mother-board and memory expansion module for the TI 99/4A machines.

The unit, which plugs into the data bus at the side of the machine, has 32K, four expansion sockets and its own power supply. The module will be available in August at a price of around £200. This compares with an equivalent package from Texas Instruments costing £159.95 for a 6-slot motherboard and power supply plus a further £159.95 for a 32K Ram expansion.

QA Data Systems can be contacted at 9 St Georges Street, Chorley, Lancs.

Dragon and Oric dumps

PROGRAMS to allow users to make high-resolution screen dumps to a printer are now available for both the Dragon and Oric.

The Dragon program is from Caveman Computers, costs £7.95 and works with the Seikosha GP100A and Tandy DMP100 printers, with an Epson version to follow.

The Oric package is from Peach computers and comes in two forms — producing either a 40 or 80 character per line high-resolution dump of the Oric's 240 × 200 screen. Both versions cost £5 and should work with most Centronic interface type printers, including the Epson range.

Contact details: Caveman Computers, 55 Iona Road, Windy Nook, Gateshead, Tyne and Wear, and Peach Computer, 192 Greenock Road, Largs, Ayrshire.

Cards on the table

U-COMPUTERS – better known for its plug-in cards for the Apple – has now turned its hand to the Spectrum.

To begin with the company has produced a 3-slot buffered expansion board (£35.65) and a 4-slot extension board – allowing a maximum of seven additional boards to be connected.

Among the expansion cards being offered is a dual RS232 board (£34.50) and a general-purpose parallel port board (£29.90).

A further five cards are still at the design stage.

Details from U-Computers, Winstanley Industrial Estate, Long Lane, Warrington, Cheshire.

Two more CBS deals

CBS Records has announced two more distribution deals in addition to its Quicksilva deal announced last week (see *Popular Computing Weekly*, July 28).

CBS has now agreed to distribute software produced by Virgin Games and Rabbit Software.

Court moves for Commodore

COMMODORE is considering taking legal action against the General Hardware Company which is selling a device to allow Rom cartridge software for the Vic20 to be broken into and copied (see *Popular Computing Weekly*, July 14).

A spokesman said: "We are very concerned and the matter has now been referred to our solicitors who are considering the next move."

Possible court action has been made considerably easier by a legal precedent set earlier this year in the business sector. Dataview successfully challenged FAW Electronics which was manufacturing a switch — *Masterkey* — which could be encoded to disable Dataview's dongle software protection code. The breakthrough came after Dataview claimed that the dongle-breaker had only one use: "to induce a breach of contract between supplier and customer."

YEP FOLKS — IT'S HERE

AVAILABLE NOW
Spectrum 48K
Dragon
Com. 64

CALIFORNIA

GOLD RUSH

HOWDE DO PARDNERS
This here's Prospector Jake, I sure am havin' one helluva time tryin' to peg ma claim with those damned Injuns a hootin' an a hollerin' all over this territory. Ma job gets harder as I move from one Gold Field to another. I know, that is me an' ma stubborn hornery ol' Mule here know of 24 rich an' I mean rich seams of pure Gold. All it needs to make this here ol' critter happy is that you help me peg every doggone last one of them claims.

Can YOU help Jake become rich, help him peg his claim, dodge the arrows, avoid the tomahawks, and plant the Dynamite in just the right place? . . . YOU CAN!!!

YIPPEE . . . Git yer Picks an' Shovels and join the CALIFORNIA GOLD RUSH . . . NOW

Amazing Arcade Action . . . Stunning Sound and Graphics
Available NOW for Commodore 64, Spectrum 48, and Dragon

£7.95 including P&P

SPECIAL OFFER ***SPECIAL OFFER*** ***SPECIAL OFFER***

Order CALIFORNIA GOLD RUSH before August 14 and get a 10-game Cassette of terrific games . . . **FREE**

COMING SOON

LEAPIN' LANCELOT: Medieval Machine Magic to enthral you
GALACTIC SURVIVAL PAK: Every Astro-Traveller *must* have this!

ANIK

We always need Dynamic Dealers and Imaginative Writers

Please rush me CGR for (m/c)

TOTAL SUM INCLUDED £
Please make cheques and POs payable to ANIK MICROSYSTEMS
30 KINGSCROFT COURT
BELLINGE, NORTHAMPTON

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

LETTERS

A fifth level

Did all you 48K Spectrum owners know that the game *Penetrator* has a fifth level? It seems when in the training mode the computer asks "level (1 to 4)". I entered 5 and found a new sheet.

At one point in this sheet there is an impassable mountain which always destroys your ships, but there is also a way of getting 1000 extra points. Maybe this sheet was written and, because of a bug, discarded. I'll keep you guessing about the 1000 points.

Steven Wilson
64 Sudbury Court Drive
Harrow
Middx HA1 3TD

Paying the price

May I take the opportunity to reply to Ziggurat in *PCW* 14 July, Vol 2 No 28 issue?

Mr Allan went to great lengths to complain about the cost of software in relation to the cost of blank cassettes. As a producer and seller of software, we can appreciate his point of view, given the price of software and blanks available over the counter. To the end user, the £5 or so must seem a bit of a rip-off. In fact, this same attitude was the catalyst in the formation of our own company, and many like us.

Now let us examine the facts as they exist and not just the end prices. Tape duplication — this is the first point at which the software house incurs expenses. Most duplicators will charge for tape mastering. This can cost anything from £15 to £40 or even more. For this, the duplicators make a copy, by various means, of the tape you supply to them. Most of the 'reputable' duplicators also have minimum run requirements, which on a new title becomes a possible liability to the software house — this will become clearer later on.

OK, so now we've got the mastering charge, and, surprise, surprise, carriage charges for delivery of the duplicates. Next on the shopping list are labels. Unfortunately, the end user is solely to blame for this aspect, as they are unwilling to buy software which is packaged as cheaply as possible. We have experience of this, and have had to introduce full colour, double flap, cassette inlays.

Here is where the cost hits RAMtop — 'readily available money'. To produce the inlays which the customer expects, commercial artists are set the task of producing artwork, after which printing plates must be made. These plates, one for each of the four colours used, are made of metal and produced by a photographic etching process, very specialised and very expensive.

Next comes the actual printing. It is true that the cost of a label is small, but this is only for the printing. The average cost for actually taking the plates from a drawer and fixing them into a printing press is about £300.

OK, now we have inlays and duplicated cassettes. Next, we need labels on the cassettes themselves, these being printed with title of program, company logo, machine type, etc. There will be a cost for producing the artwork and minimum runs.

If your bank balance is still alive, you now have a finished and saleable article — not so fast! Who in their right mind is going to buy your software, when they can open any magazine and see nice full colour, full page advertisements for the ultimate playable software of the "universe" available from the large chain stores — it must be good!

So it's obvious that advertising will play an important role in the success of your software.

Advertising is not free — the average cost of a quarter page advertisement in black/white is £130-£160 per insertion (week, month). Colour advertising is astronomical.

So now we are advertising, but users still cannot buy it over the counter. So, you must rely on retailers seeing the advertisement, mail order, and your trusty GPO telephone to muster sales. To get known by the retailers and wholesalers, you must now give away your software as samples — some return eh!

You can disregard the retailers to some extent, as they prefer to buy from wholesalers. So, let's concentrate on the wholesalers. They will require something like 50-60 percent discount, so after all this the £5 cassette is only worth £2.50 to you, less all the other expenses and less all the freebees you've given away, postage of samples and review copies, which are never reviewed, etc.

I have not yet mentioned travelling the country attending computer fairs and exhibitions, where stands can cost anything up to £500 (plus VAT).

And, if you don't get your software into the big chain stores, then your overpriced software, which only represents the cost of a blank, will never get into the 'Top Ten', and must therefore be below the standards set by the cheque books of the 'big boys'.

If the buyer would purchase plain, wrapped, unadvertised software by mail order for £2, then it would become available. But they won't, so they must pay the price for being wooed by exciting inlays, colourful advertising and over the counter availability.

D Wieckowski
Elephant Software
41 Haymill Road
Burnham
Berkshire SL1 6NE

Cured eye strain!

I would like to thank Brian Cadge for his Dragon screen invert program (*PCW*, July 14) — eye strain cured at last!

I now load this program, on start-up, as a matter of course. Such constant use has revealed a minor problem: any attempt to execute a *Get* command, with the code in memory, results in a *Syntax Error;* at least, this happens on my Dragon.

The following changes will give a green on black screen on Running: change *'D'* in line 30 to *'5'*, and change checksum in line 60 to '17097'.

I've also found the following additions of benefit:

```
80 PRINT "INVERTER-COURTESY
   OF BR IAN CADGE"
85 PRINT@32, STRING$ (8,188)
90 PRINT:PRINT "ORANGE TEXT
   IS AL SO AVAILABLE"
95 PRINT "DO YOU REQUIRE
   THIS? (Y/N)"
100 X$ = INKEY$:IF X$ = ""THEN
   100
110 IF X$ = "Y" THEN POKE
   32644,13
115 PRINT:PRINT "THE BASIC
   PROGRAM WHICH LOADED
   INVERTER IS NO LONGER
   NEEDED. 187 BYTES ARE RE-
   SERVED AT RAMTOP"
120 PRINT:PRINT "MAY I DELETE
   PROGRAM? (Y/N)"
130 Z$ = INKEY$:IF Z$ = "" THEN
   130
140 IF Z$ = "Y" THEN CLS:NEW
150 PRINT:PRINT "AWAITING IN-
   STRUCTION"
160 END
```

Dave Vaughan
105 Tollohill Drive
Kincorth
Aberdeen

300,000 in seconds

I am writing to tell you of a bug I have discovered in Microdeal's *Donkey King* program for the Dragon 32 — you can get 300,000 points in a matter of seconds.

All you have to do is, when your first man appears, have your button already pressed and your joystick pointing right. Jump until you are just before the second ladder and then climb it. Take one further jump to grab the hammer and fall off the end. When your next man appears you will have exactly 300,000. This only works with player 1's first man.

Also, I would like to ask about the rates paid out by software companies as I am now just finishing my own game loosely based on *Galaxians* called *Datacc*. It is in machine code with full sound, saveable hall of fame and nine colour graphics in Alpha-semigraphics mode 24.

Stephen Quail
158 Parkhills Road
Bury
Lancs

Typically, you can expect to receive either a flat-rate cash fee, or a royalty payment. The royalty may vary according to sales, but should be in the region of 7-12½ percent of the retail price. If you are offered a massively larger royalty, it will be at the expense of a proper marketing and promotional campaign.

NB: When you submit your game, I would include a clause in the letter stating that you reserve the right to offer the game elsewhere if you do not receive a reply within three weeks.

Richard Shepherd Software

Rid the world of the Transylvanian Terror before he introduces you to the dark world of the living dead in...

Transylvanian Tower

A spectacular 3-D maze adventure for the 48K Spectrum only £6.50

"Enthralling and addictive"... Popular Computing Weekly

"Addictive"... Sinclair user

Available from W. H. Smith & Son* Boots and John Menzies

Phone 0628 21107 for instant credit card orders

Richard Shepherd Software, Freepost, Maidenhead, Berks SL6 5BY.

Dealer enquiries welcome * Selected computer branches only

Mr Chip
SOFTWARE

VIC20 GAMES AND UTILITIES

BUGSY (Joystick Only)
This is a Minefield with a difference as you step on the stones while collecting purple boxes which give you both time and points, they disappear from beneath your feet. DO NOT DESPAIR! "Bugsy" will randomly replace the stones but avoid bumping into him or it's sudden death! An original compulsive and challenging game **£5.50**

JACKPOT
This is it, the ultimate Fruit Machine Program, for the VIC. You will be truly amazed by the graphics, colours and nine different tunes and sound effects of this remarkable program. With nudge, hold and respin, can you win the JACKPOT? 100% Machine Code **£5.50**

"Makes Commodore's Fruit Machine Cartridge look unbelievably cheap and nasty" (HCW)

MINI-ROULETTE — PONTOON — HI-LOW
Three great games of chance for the VIC, try to beat the computer, hours of fun, full colour, sound effects and tunes **£5.50**

DATABASE — Create your own files and records on tape **£7.50**

BANK MANAGER — Computerise your bank account **£5.00**

SUPER BANK MANAGER — A full feature version any memory size, but needs 3K expansion **£7.50**

M/C SOFT — Machine code Monitor and Disassembler, any memory size **£7.50**

COMMODORE 64 GAMES AND UTILITIES

LUNAR RESCUE — Our own version of that popular arcade game **£7.50**

PONTOON — ROULETTE — ACES HIGH
More powerful versions, that make three great games of chance for the 64 ..... **£7.50**

M/C SOFT 64 — Assembler and Disassembler, with decimal to hex converter, everything our program for the VIC will do and more **£7.50**

BANK MANAGER 64 — As our Super Bank Manager, but for the 64 .... **£7.50**
NOW AVAILABLE ON DISK WITH EXTRA FACILITIES **£10.00**

Full documentation with all utility programs.

Other software available for the VIC and Commodore 64, send for free brochure, including **RABBIT SOFTWARE** for the VIC, at our Special Offer of **£7.50** each or buy two or more at **£7.00.**

Send Cheques/POs to: **MR. CHIP SOFTWARE**

Dept PCW, 1 NEVILLE PLACE, LLANDUDNO GWYNEDD, LL30 3BL. Tel: 0492 49747

WANTED: HOT SHOT SOFTWARE WRITERS, PHONE AND ASK US ABOUT OUR FAIR DEAL POLICY AND TOP ROYALTIES.

★ ALL PROGRAMS AVAILABLE ON DISK.

DEALER ENQUIRIES WELCOME

Attention all Dragon owners

WE PAY

25%

ROYALTIES FOR GOOD DRAGON PROGRAMS

WRITE OR PHONE

0632 382059

NAME.....
(Block Capitals)
ADDRESS.....

.....

.....

CAVEMAN COMPUTERS

CAVEMAN COMPUTERS
55 IONA ROAD,
WINDY NOOK, GATESHEAD,
TYNE & WEAR.

Marshy Maze

A new game for Dragon 32 by Kevin Whitley

Marshy Maze for the Dragon 32 is an exciting maze-type game. The objective is to guide your man along paths in the maze, with the help of a joystick, to enable you to reach home. But, if you stray from the path and enter the marsh you will be eaten by crocodiles and lose a life.

You have a total of 12 lives with which to complete four different mazes. Each maze is more difficult than the preceding one.

Just to make things more difficult, you only have a limited amount of time in which to complete each maze. Again, if you fail to complete a maze inside your allotted time, you lose a life.

NB. Lower case letters in the listing denote inverse characters.

Lines

1-7	Goto instructions
8-20	Set up variables
50-240	Set up first maze
500-670	Set up second maze
1000-1210	Set up third maze
1500-1710	Set up fourth maze
2000-2050	Goto movement
2052-2055	Check if you made it
2060-2080	Check timer
2090-	Returns to Movement
2500-2840	Movement
4000-4030	Prints you have fallen into the marsh
4200-4250	Prints men left
4300-4330	Prints ran out of time
4500-4550	Prints you succeeded on this maze
4700-	Returns to print maze
4800-4870	Prints no men left
5000-5060	Prints you succeeded all the mazes
8000-8010	Checks timer for screen four
9000-9010	Checks timer for screens one, two and three
9500-9710	Prints instructions

Variables

S = Scores
M = No of lives
X = Maze No
S1,S2,S3,S4 = Current scores
O$,W$ = Maze blocks
A = Position of player ■

```
1 REM ##MARSHY MAZE##
2 REM ##COPYRIGHT OF##
3 REM ##KEVIN WHITLEY##
4 REM ##18-3-83##
5 REM ##AGED 9 YEARS##
6 REM  ## INSTRUCTIONS  ##
7 GOSUB 9500
8 S=0
10 A=12
20 D#=CHR$(255):W#=CHR$(207)
50 CLS5
55 X=1
60 PRINT@0,CHR$(175);
70 PRINT@9,W#;W#;W#;W#;W#;W#;
80 PRINT@32,D#;W#;:PRINT@40,W#;D#;D#;D
```

MOREX PERIPHERALS LTD

ZX SPECTRUM

WORD PROCESSING PACKAGE

★ MOREX PERIPHERALS Interface + Manual
★ Printer cable (Parallel or Serial)
★ TASWORD 2 Word Processor + Manual
★ Interface Driver Software cassette
★ Modified Print Driver for TASWORD 2

FULLY INCLUSIVE PRICE: £68

★ **THE INTERFACE:** Its features speak for themselves! A parallel (Centronics type) and a serial (RS-232) interface in the same neat box. Driver software supplied on cassette enables LPRINT and LLIST keywords to be used as well as a high-resolution screen copy (Single or Double size) on most popular printers (EPSON MX-70, MX-80 FTIII, RX-80, FX-80, MX-100, SEIKOSHA GP-100, GP-250, NEC 8023, etc).

In addition, an RS-232 input is provided which opens the way to a full Communications System with applications too numerous to list fully. Many interfaces are now in use with VDUs, electronic typewriters, plotters, development systems and main-frame computers or simply exchanging information with other SPECTRUMs. Other applications include sharing a parallel printer between several SPECTRUMs using the serial link to transmit the data.

★ **THE WORD PROCESSOR:** TASWORD TWO, the incredible piece of software that gives an amazing 64 characters per line on your screen. This is ideal for standard A4 paper and prints your text as it appears on the screen.

Text justification, programmable left and right margins, global search and replace, Block move and Block copy, programmable printer control codes etc are only some of the features of this — true value for money — program.

PRICE LIST

1.	SPECTRUM Word Processing Package	**£68**
2.	SPECTRUM Interface + cable + software + manual	**£49**
3.	Extra cables (parallel or serial)	**£12.65**
4.	Additional software (EPSON/NEC/SEIKOSHA)	**£4**
5.	Tasword Two word processor	**£13.90**
6.	Modified Driver for Tasword Two	**£5.50**

For items 3-6 please enclose £0.80 for postage and packing if not ordered with an interface.
Prices include VAT and p&p unless otherwise specified.

Please specify:
*Parallel or serial cable.
EPSON/NEC/SEIKOSHA/other software driver.

ACCESS and BARCLAYCARD welcome

Orders to:

MOREX PERIPHERALS LTD
Dept W8, 172B KING'S ROAD
READING, BERKS
Tel: (0734) 478854
TELEX: 849911 MOREX G

Dragon Dungeon

BEST SELLING DRAGONWARE

THE FROGGER (Microdeal). Straight into No. 1 spot! The original official version. **£8.00**

SHUTTLE (Microdeal). Tom Mix's ultimate flight simulation, complete with satellite captures sequence in orbit. **£8.00**

GRIDRUNNER (Salamander). Jeff Minter's chart-topping machine-code hit is now available for the Dragon. **£7.95**

NINJA WARRIOR (Programmers' Guild). Best selling arcade game prior to the arrival of "GRIDRUNNER". Can you achieve black belt status in the Martial Arts? **£8.95**

CUTHBERT GOES WALKABOUT (Microdeal). Great graphics, great sound, great arcade game! **£8.00**

OTHER TOP SELLERS:

THE KING (Microdeal) **£8.00; CRUISING** (Sunshine) **£6.95** and (as always) **RING OF DARKNESS** and **PIMANIA £10.00**

P.O. Box 4, Ashbourne, Derbyshire,
DE6 1AQ. Tel: (0335) 44626

AVAILABLE NOW

ANiK

for ZX81 16K
Spectrum 48K
Dragon
Commodore 64

PURCHASE LEDGER . . . handles up to 100 accounts, invoices, payments, VAT handling and analysis. Selectable print options.

SALES LEDGER . . . spec. as Purchase Ledger.

COMBINED DATABASE . . . fully definable, vast spreadsheet storage, rapid calculations. Terrific value.

MICROLYMPICS 1 . . . each containing 10 action
MICROLYMPICS 2 . . . games. Selection of standards (Pac-Man, etc.), plus new amazing games.

ALL TAPES COME WITH FREE BACK-UP TAPE IN PRESENTATION BOX

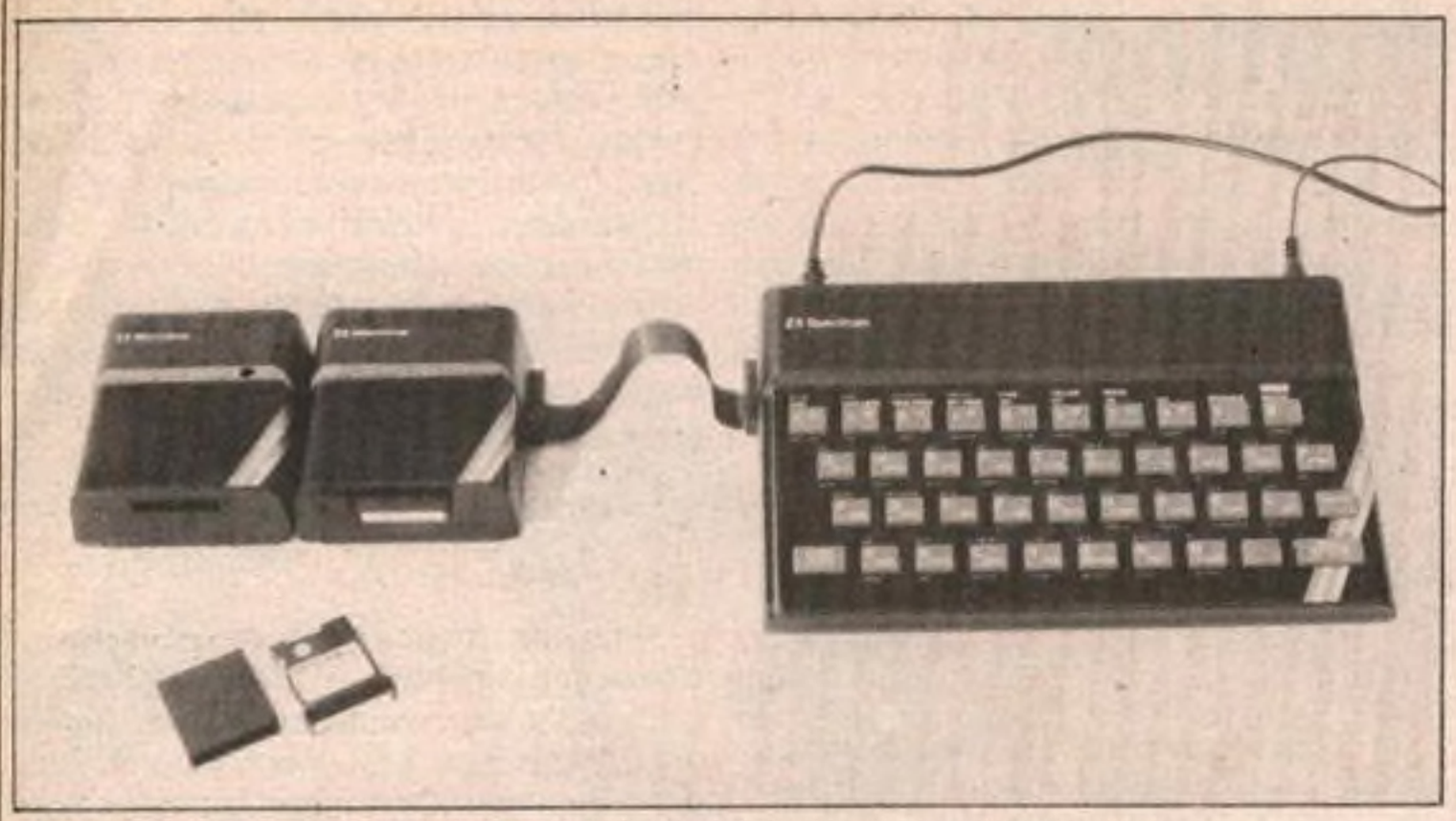
SINCLAIR ZX81, 16K	SPECTRUM 48K	COM. 64	DRAGON
£9.95		£12.95	

Please rush me .....

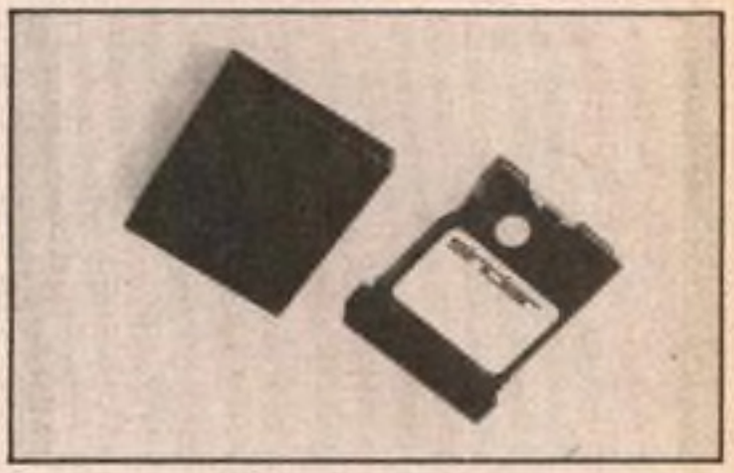
TOTAL SUM INCLUDED: £
Please make cheques and PO payable to
ANIK MICROSYSTEMS,
30 KINGSCROFT COURT
BELLINGE, NORTHAMPTON

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

PICTURE SPECIAL



Up to eight Microdrives may be connected to a single Spectrum, complete with ZX Interface 1, for a total capacity of 680K bytes.



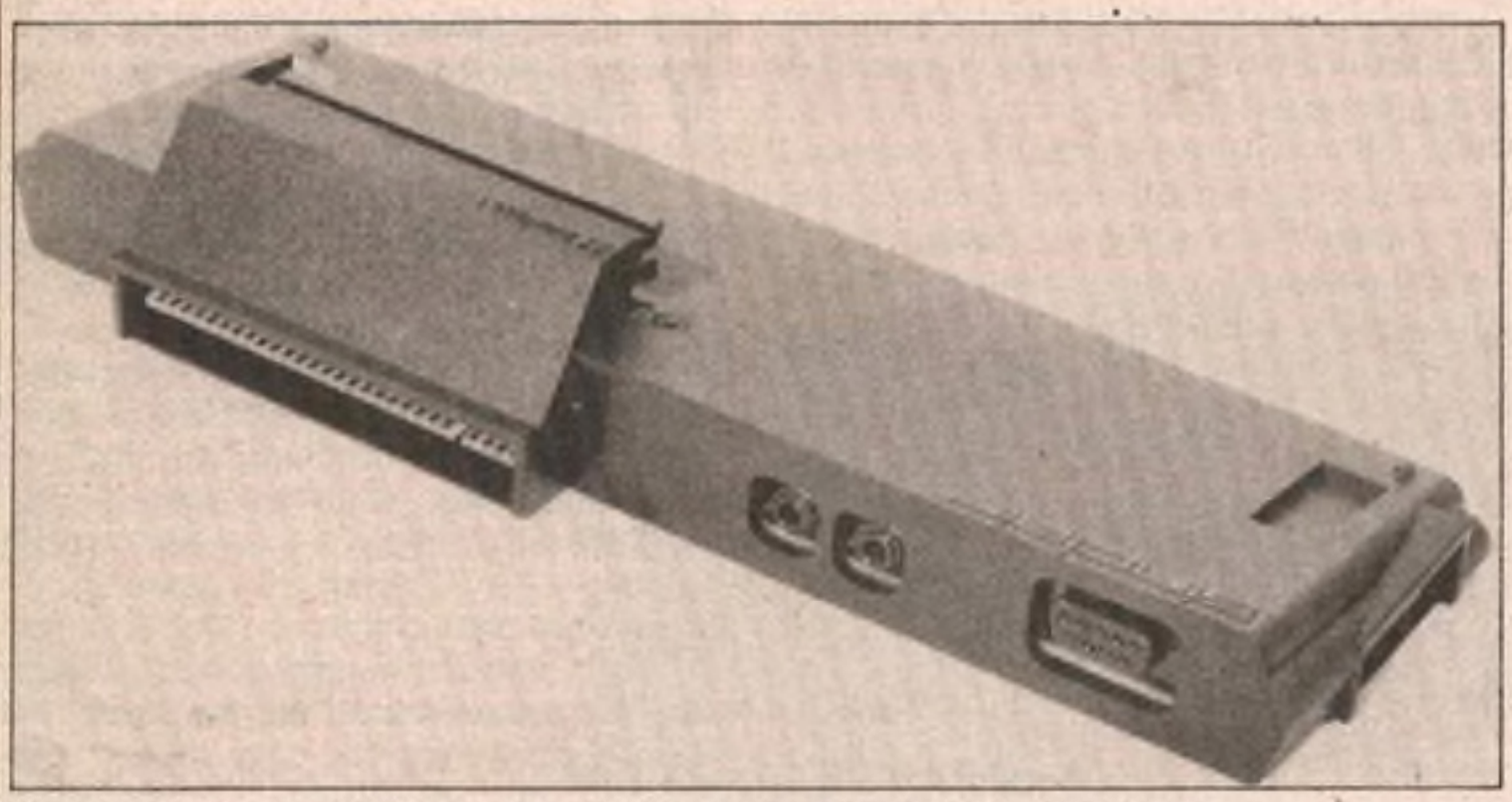
Each Microdrive cartridge (shown here with case) can store up to 50 files — with an access time of 3.5 seconds.

The Microdrive was officially launched in London last Thursday, but it will not be available in the shops for some months yet.

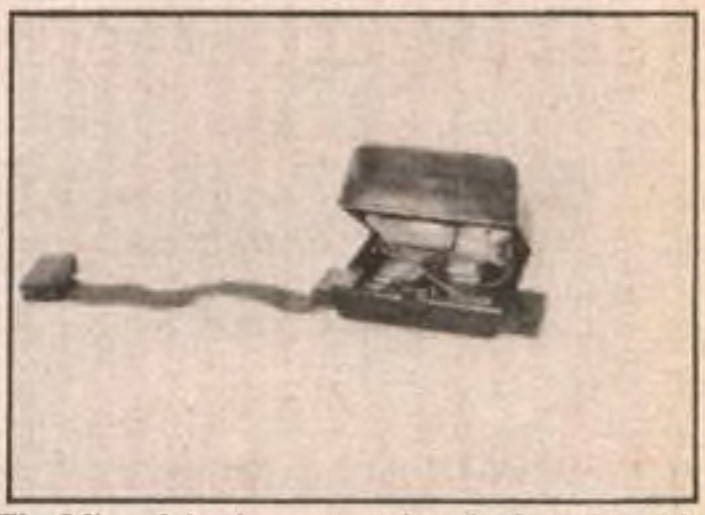
Mail-order Spectrum customers have already been sent letters about the Microdrive — the earliest customers have even been sent order forms.

Manufactured by Thorn EMI Datatech, the Microdrive costs £49.95 and includes a free demonstration cartridge. The ZX Interface 1 costs £29.95, if purchased with a Microdrive — £49.95 if bought on its own. Blank cartridges, at £4.95 each, are rather more expensive than originally suggested.

The Microdrive/Interface 1 manual is available now and can be bought separately for £5, including VAT and post and packing. ■

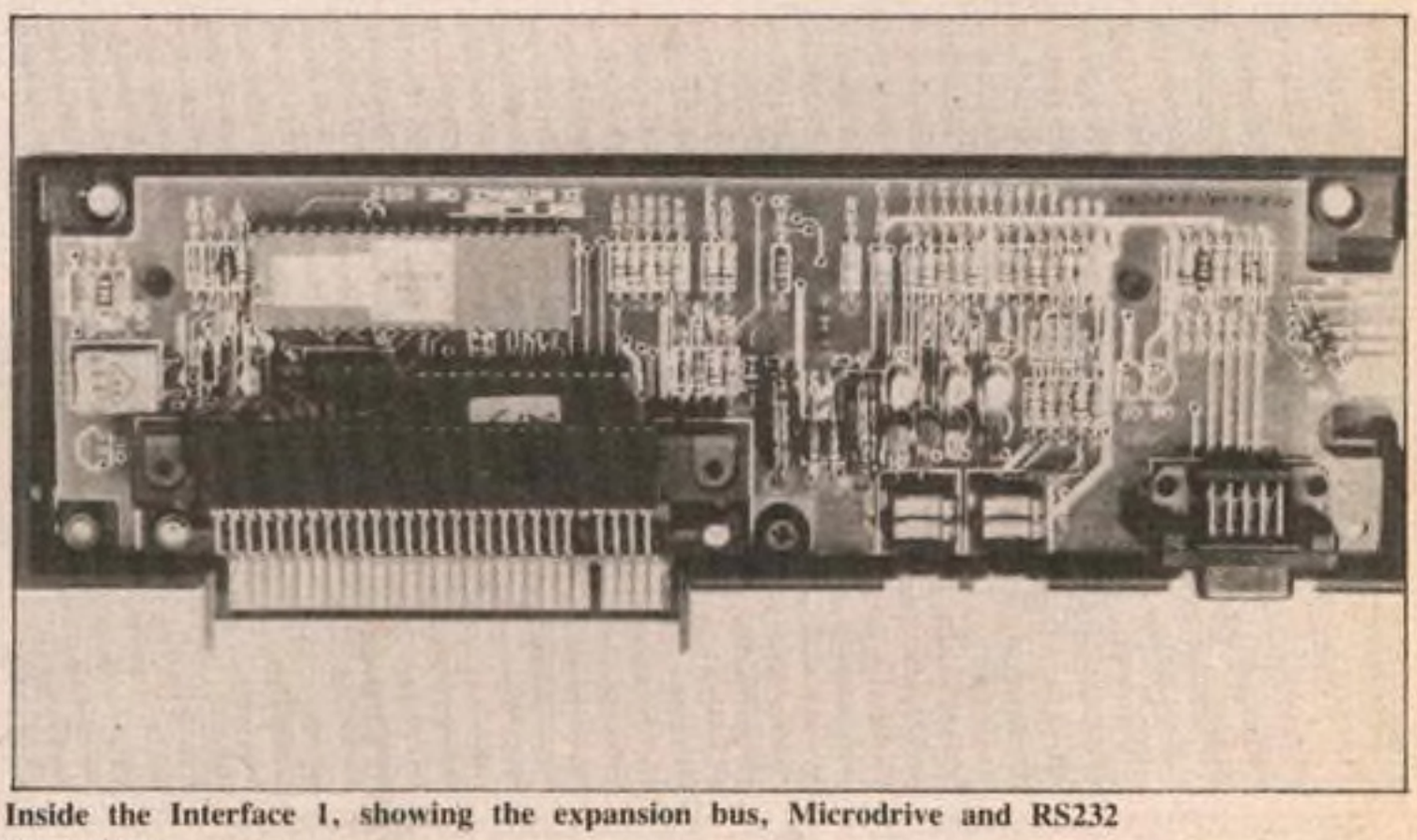


The ZX Interface 1, which fits underneath the Spectrum, operates at all standard baud rates up to 19,200 with speed software selectable.



The Microdrive is connected to the Interface 1 by a Microdrive lead. Powered by the Spectrum's power supply, a red indicator light shows when the Microdrive is running.

Mircodrive designers: (clockwise from bottom right) David Southward, Martin Brennan, John Williams and Ben Cheeze.



Inside the Interface 1, showing the expansion bus, Microdrive and RS232 connectors.

Printed information

***Stephen Adams** looks at a range of printer interfaces for both ZX81 and Spectrum*

All the interfaces reviewed here are based on a standard set for centronics printers. This is a method of connecting up a parallel port and a printer to send eight bits of information at a time.

The interface to the printer has a common plug (a 36-way Amphenol type plug) which carries eight data lines, Strobe, 0 volts, various protection earths and control signals. The other end of the ribbon cable, which connects the two, may be completely different depending on how many of the extra lines are used or checked by the interface. This means that any centronics standard printer may be plugged into the interface, but that some of the extra features of the printer may be unobtainable, eg, Paper empty, Initialise, Error detection, etc.

The connections to the printer include a Strobe line which is used to indicate to the printer when data is ready for collection (see Figure 1). Every time this line goes to 0 volts, there is a new set of data bits on the data lines for the printer. Two further connections are used by the printer to signal to the computer that it cannot accept any more data.

The printer is a very slow device compared to the speed of the computer — it is necessary to check that the transfer of data continues at the speed which the printer can accept. This method of telling the printer when data is ready (via the Strobe line) and the printer telling the computer when it can or cannot accept any more data (via the Busy or Ack lines) is called handshaking.

The Busy line goes to +5 volts immediately on receiving the first Strobe pulse and only returns to its normal state (0 volts) when all the printing operations have finished. If the computer contains a Ram chip as a buffer, to store incoming data before printing, the Busy line will revert to its normal state quicker as the data is printed later.

The Acknowledge line goes low for a short time at the end of the printing period. Therefore, the computer has to constantly monitor this signal, as it will only be there for a short period of time and does not change immediately data is sent. This is one of the reasons that the Busy line is often the only line checked by the interface software. See Figure 2 for details.

All of the printers that use the centronics standard also have another common feature — the Ascii character set. This defines the letters, numbers and symbols used inside the printer from 0 to 127. Codes 128 to 255 are ignored by the standard, but many of the printer manufacturers have used the codes from 128 to 255 (the maximum number on an eight bit byte) to implement graphics and other features.

The character codes from 0 to 31 also have special significance, as they are used to control the printer mechanism itself and are called control codes. These do things like double height or width characters, underlines, high-resolution graphics and a host of other tricks. Again, these are not exactly standard and must be put out by the software controlling the interface.

The same character codes may be completely different inside the computer, so the printer software often has to make restrictions on the sort of code it can handle. The ZX81 printer interfaces also have to convert the ZX81 character set to Ascii. The software is often stored on tape, which means that it must be run in before the programming session starts. But, once there (assuming no crashes occur requiring the user to reset the machine), it will not need to be *Loaded* with every program.

The software is usually stored above Ramtop at the top of memory — you must ensure that this does not clash with your own programs. No problem should be experienced with the Memotech (ZX81) or Euroelectronics interfaces, as both are Rom based in an area unused by the basic system.

Three commands are built into Basic for use with the printer — *Lprint* which prints out characters contained within the inverted commas, *Llist* which automatically goes through the program listing the lines on to the printer and *Copy* which makes a complete dot by dot copy of the image of the screen on to the printer.

Any formatting of the printed page must be done through the *Lprint* command (new line, double width, etc).

The Memotech interface comes in the same package as their Ram packs, with a socket at the back to take a 34-way IDC (insulation displacement connector) plug. Pin one is identified by a coloured stripe on the wire. The ribbon cable has to go under any of the other Ram packs etc to the printer. The only other signal beside Busy and Ack is the Error signal. The interface is based on the Seikosha GP100 printer.

The software is placed in a 2K Rom starting at 10K, so the 64K Ram pack is limited to 48K with this device. This interface can only handle text (letters and numbers) and not graphics, as anything outside this range must be prefixed by a chr$(155) which is an inverse dot.

An alternative to prefixing everything with chr$(155) is to put control characters into a Rem statement at the beginning of the program and calling the interface direct by using *Lprint* chr$(6). No characters outside the range 0-127 may be sent to the printer.

The instruction booklet that comes with the interface is very good, but not infallible. The user will have to write a lot of control characters in his program to get it to be anywhere near as useful as the Sinclair printer. But, this printer does have two advantages — one, that no software needs to be *Loaded* before using it, and two, that all the commands use the same Basic commands as Sinclair.

To use the Pericon c module, you must first have bought the Persona and a Ram pack (at least 16K) from Basicare, as it is not compatible with any other part of the system except the computer. The module comes with a tape which allows you to

Figure 1

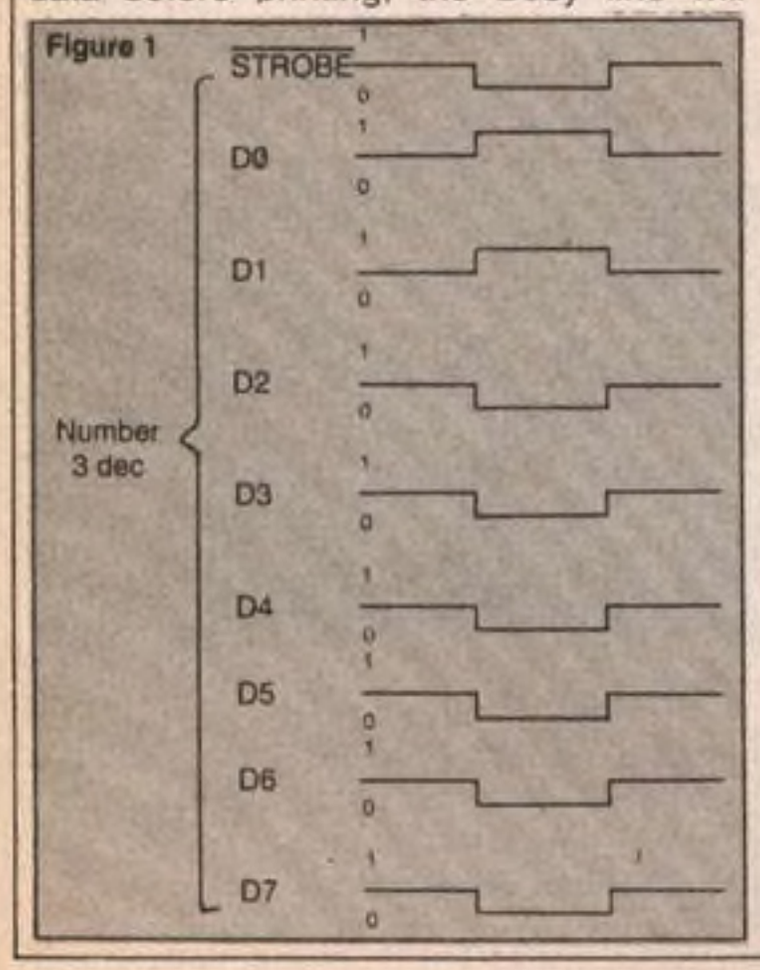
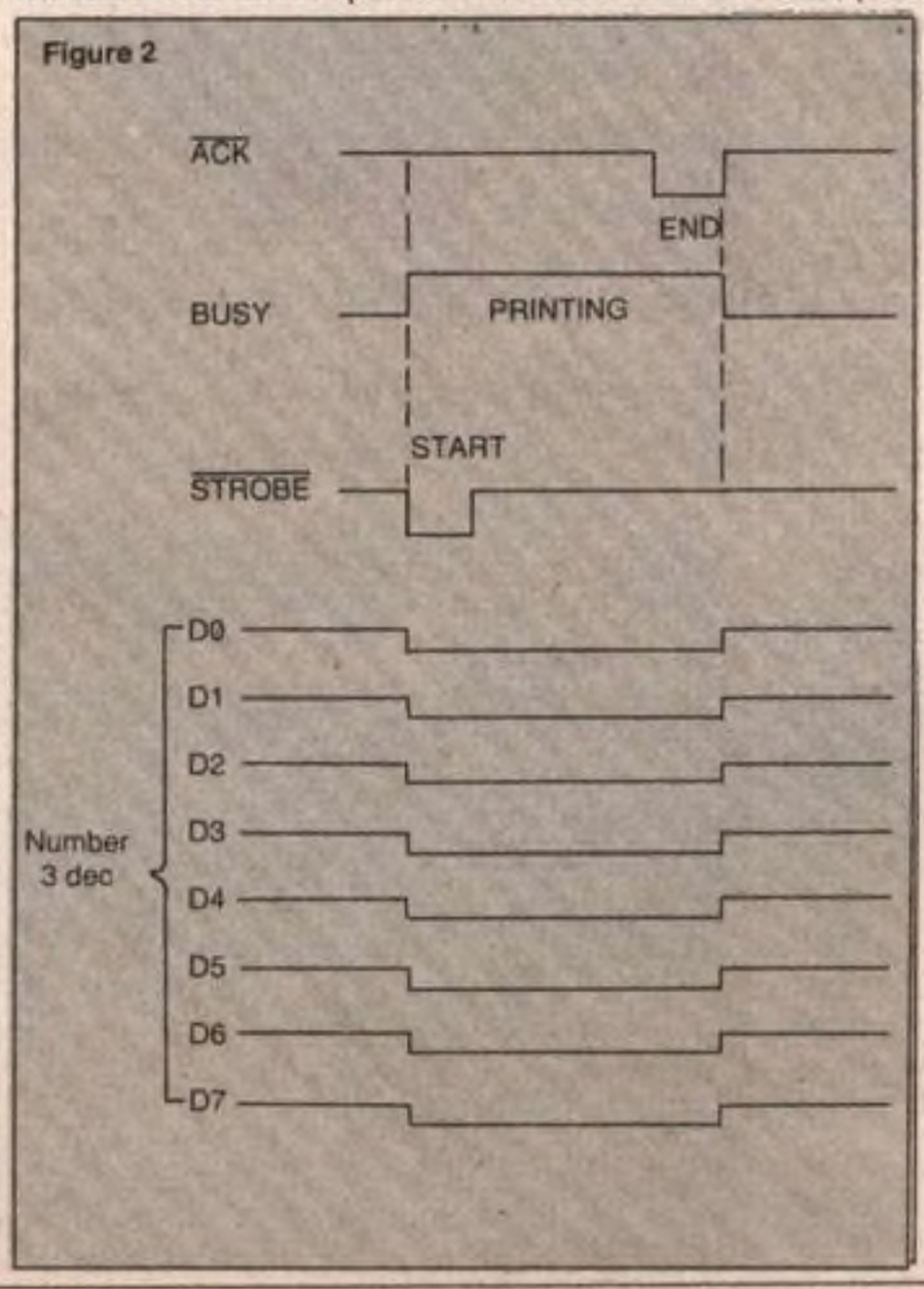
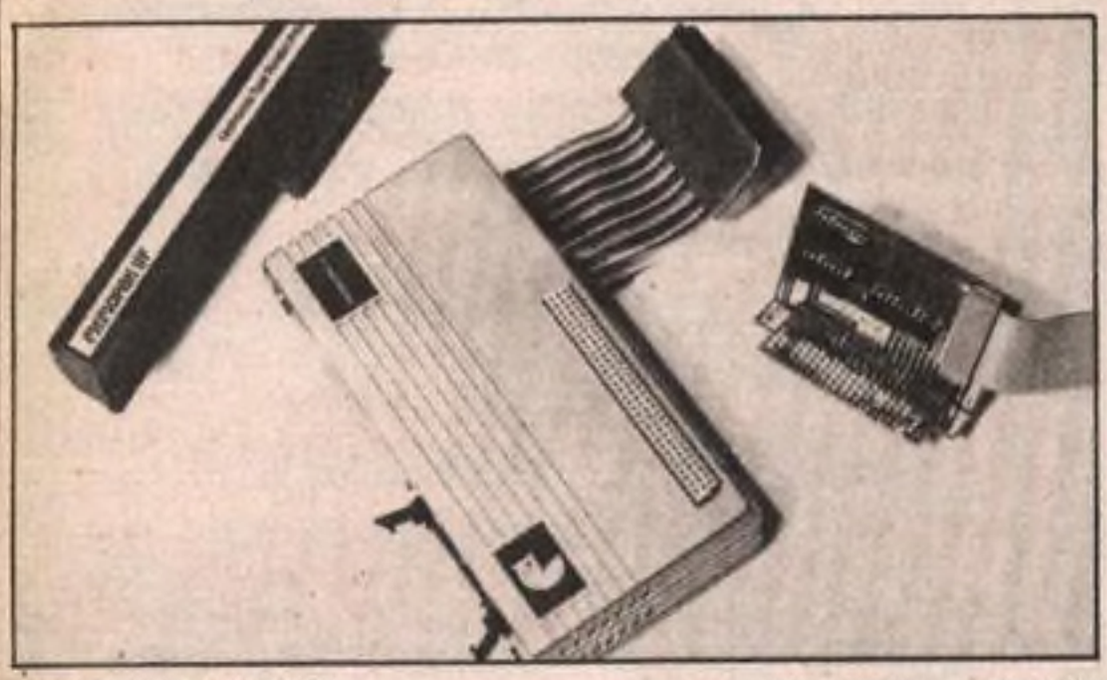


Figure 2



change the type of printer from Seikosha to an Epson for the graphics print-out. All of the printer commands are via *Usr* (address) calls to the machine code above Ramtop. Instead of using machine code, you can *Poke* the number of the character you want into the port at address 48129 and check the signals from the printer (Busy $\overline{\text{Ack}}$, Paper empty and $\overline{\text{Select}}$) on



port address 48130.

The *Lprint* is implemented by filling up string B$ with your message, which is then converted to Ascii (inverse characters for lower letters again) and sent to the printer. The machine code uses up about 1K of your 16K Ram and is run in from tape which auto-runs. The printer interface is via a 26-way IDC connector on the back.

Amber has produced a very small 2½-inch-wide plain paper printer. Since it does not use a standard centronics interface (a 25-way 'D' socket is used), Amber has produced its own interface. The board comes with a plug on it for the printer, cable and pcb interface to plug into the ZX81's expansion port. No program is provided on tape, though one is *Listed* in the instructions to convert ZX81 codes into Ascii (in Basic). The output to the printer is via a 16-byte machine code placed above Ramtop. You will have to write your own *Llist*, *Lprint* and *Copy* routines as the programs given only allow you to output single bytes. Ascii codes 0-127 are used — eight-bit codes are only used after a control character to produce graphic dots on a line and there are only 24 characters per line.

The Euroelectronics *Lprint* interface consists of a low, flat, black, plastic box, which plugs into the expansion port at the back of the Spectrum. It has no extension pcb, so all other devices must be placed between it and the computer.

The box contains a Rom for all the routines (it sits in a spare Rom space), except *Copy* which is available on tape as an optional extra. *Lprint* will ignore graphics, both user definable and Sinclair, as well as underline. *Lprinting* chr$(5) before any set of characters allows any code to be sent to the printer direct and many to be turned off with chr$(4).

On *Llist* it does not recognise a 32-column format, but goes on to print out until a new line is reached either on the printer or on the Listed line. This tends to make a mess of listings.

The "lazy man's" printer interface, it has the advantage of being there when you switch on (no tape to *Load*), but it is inflexible about graphics, CR, etc, so the user will have to write routines in Basic or machine code to get round this. It is also expensive.

The Kempston interface was one of the first to arrive on the scene for the Spectrum and provides all the facilities of *Lprint* and *Llist* via a short machine code routine. This routine can be "customised" by a Basic program supplied to suit any type of printer. All the output codes can be changed and, as graphics are not printed, you can redefine them to print as spaces (for filling in later on by hand).

The machine code is located above Ramtop and is *Loaded* in by using *Code* after modifying it with the Basic program. This saves memory, as only the machine code needs to be *Loaded*. Both 16K and 48K versions are provided on the one tape. *Tasword* is one word-processing program which uses this interface to print out on a full-sized printer.

A very useful interface, very flexible and simple to use. Most non machine code programs will run without any alterations using a full-sized printer.

The Morex interface has both centronics and RS232 interfaces which drive printers and other equipment. The centronics side works very well and includes a *Copy* command called by *Rand Usr*. Software is fully explained and again run in from tape above Ramtop. You can set the CR/LF option via a *Poke*, but not line length. Graphics, etc, are printed as "?".

Much of the explanation in the instructions refers to the RS232 input and output port, which I could not get going with a printer. It is supposed to allow you to transmit and receive between 4800 and 50 baud, giving you a wide range of speeds.

This would be well worth buying if you were thinking of using a printer and modems or other devices using the RS232, as you get two devices in one.

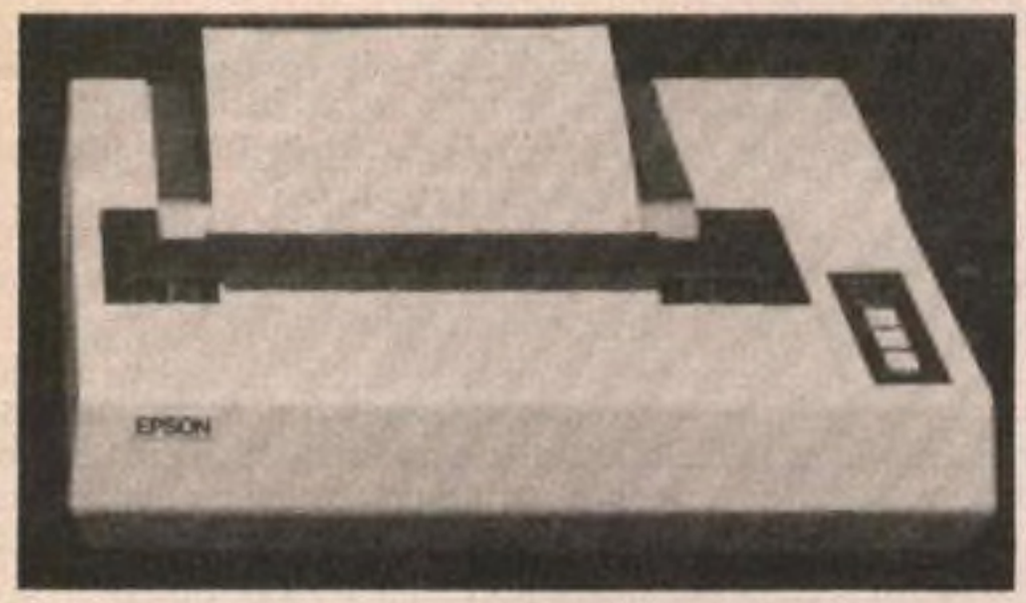
Hilderbay wrote the software for Kempston's printer and has decided to bring out its own version of the interface with some more software. In a different box to Kempston's, but with the same "customising" software, plus a free word processing tape, Hilderbay's interface is just as useful as Kempston's.

A good product backed-up with good software and service. It is flexible enough to be incorporated into most programs. ■

Firm	Micro	Price
Amber Central Way Walworth Industrial Estate Andover Hampshire	ZX81/Spectrum	£24.80
Basicare 12 Rickett Street London SW6	ZX81	£41.75
Euroelectronics Ziln House Oakfield Street Cheltenham Glos GL50 2UJ	Spectrum	£53.48
Hilderbay 8-10 Parkway London NW1	Spectrum	£45
Kempston 180a Bedford Road Kempston Bedford MK42 8BL	Spectrum	£45
Memotech 3 Collins Street Oxford OX4 1XL	ZX81	£41.90
Morex Peripherals 2 Balliol Road Caversham Heights Reading Berks	Spectrum	£35.95

*All prices include VAT and cable to printer

The Choice is Yours!



But do you really know which printer is best for your application?

As with the Computer market it's a difficult job these days knowing which printer is most suitable for your particular needs. Whichever manufacturer you turn to they tell you their's is ideal for the job.

Well, we at Hilderbay have been in computing for over 20 years. 20 years in which time we've gained an awful lot of experience. Experience we are happy to share with you – we are willing to evaluate your circumstances and advise on the best printer for the job at keen prices. We will make sure the printer you buy will be the best for your needs. So at the end of the day you won't be wasting money on facilities you won't use, nor will you have a printer which, though cheap, won't do what you need it to.

We also have a range of software for the Apple – i.e. Payroll £60, Bookkeeper £49, SSP £70 etc + VAT.

Another First from Hilderbay . . .
Word Processor Systems for ZX Spectrum

At last – sensible, functional systems that give your Spectrum a word processor facility.

System 1 A package that utilizes the Spectrum and an Olivetti daisywheel typewriter to give you a stand-alone word processor. The typewriter doubles as printer and keyboard but can be used as a typewriter while still connected to the Spectrum – expected availability Mid-July.

System 2 A package that can be 'tailor made' to suit your needs, comprises a parallel interface, customised Tasword Two software and printer (from our wide range). This system can be supplied for any computer however, we do recommend a typewriter style keyboard for fast professional use with Spectrum.

Spectrum Software: Payroll, Stock Control, SSP etc. Price on application.

JUST ARRIVED

Ideal for our System 2 package – a fast daisywheel printer that gives 20 CPS, 10, 12, 15 CPI and proportional spacing! Including a 1 year guarantee for only £399. VAT & delivery extra.

ALSO AVAILABLE

For Spectrum – Centronics type parallel interface including cable and connectors. Recognises LLIST and LPRINT. Does screen copy. Complete with driving software. Only £39.13 + VAT – please contact us about availability. Simple word processor for Spectrum free on request with printer or interface orders!

PLEASE CONTACT US FOR FURTHER INFORMATION

Hilderbay

Professional Software

Hilderbay Ltd Dept. 8-10 Parkway
Regents Park London NW1 7AA
Telephone: 01-485 1059 Telex: 22870

NEW!

FOR ZX81 16K and SPECTRUM 48K

The Oracle

The unique new program that answers your important questions by using your hidden mind power.

An entertaining and uncanny diversion for all the family.
Light-hearted fun or genuine E. S. P. development - no one can resist it!

Send £5.50 to:
Peacock Software
32 Redfern Avenue,
Kenilworth,
Warwickshire.

Tel. enquiries (0926) 512153

MAIL ORDER ENQUIRIES

Mega Computers

ANLEY STREET, ST HELIER, JERSEY, CI

THE BEST PRICES FOR HOME COMPUTERS AND SOFTWARE IN THE UK

ZX81 — £43.45, 48K Spectrum — £113, 48K Oric — £121.95, Dragon 32 — £152, Commodore 64 — £199, BBC B — £346.75.

SOFTWARE

All the top titles from the top Software Houses in stock

MELBOURNE/SALAMANDER/ACORN
IMAGINE/ULTIMATE/QUICKSILVA
ARTIC/MICRODEAL/AND OTHERS

INTERESTED? THEN GIVE US A CALL ON 0534 72263

If you're coming to Jersey on holiday or here already call in and see us.

(GOODS DISPATCHED WITHIN 24HRS)

BARCLAYCARD OR ACCESS ACCEPTED.

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES

£9.95

YES, 50 GAMES! on cassette for all the following:

FOR YOUR MICRO

GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
INVASIVE 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
CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES
NP54PA

sinclair SPECTRUM
ZX81 LYNX
DRAGON
ATARI VIC-20
apple (ON DISC & CASSETTE)
ACORN ATOM
BBC A/B
SHARP
ORIC-1
NEW BRAIN

SUPPLY CASSETTE 50 FOR _____ COMPUTER
I enclose cheque/P.O.

Name _____ PCWK2

Address _____

_____

Mail order only.

ORDER NOW!

TO MAKE A SUPER GAME INTO A FANTASTIC GAME YOU NEED SOFTLINK 1.
This will allow you to use a Kempston type joystick with all the following Spectrum games:
Arcadia, Penetrator, Horace Goes Skiing, Spectres, Flight Simulation and Space Zombies.

ONLY £4.95

SPECIAL OFFER

Spectres plus Softlink 1 ..... **£11.00**
Arcadia plus Softlink 1 ..... **£9.00**

SUPER SOFTWARE FOR YOUR CBM 64

Cyclons, Pakacuda, Escape MCP, Centropods, Anhilator, at only **£5.65 each**

FOR YOUR UNEXPANDED VIC

Escape MCP, Pakacuda, English Invaders, The Catch, Paratroopers, Antimatter Splatter, at only **£5.65 each.**
Crazy Kong only **£6.50.**

FOR ANY VIC

Catcha snatcha, Wacky Waiters, Arcadia only **£5.25 each.**

FOR YOUR VIC PLUS AT LEAST 8K

Critters, Cyclons, only **£5.65 each.**

New for your 64
Star Trek, Panic 64, Frogger 64
Cheques and postal orders to

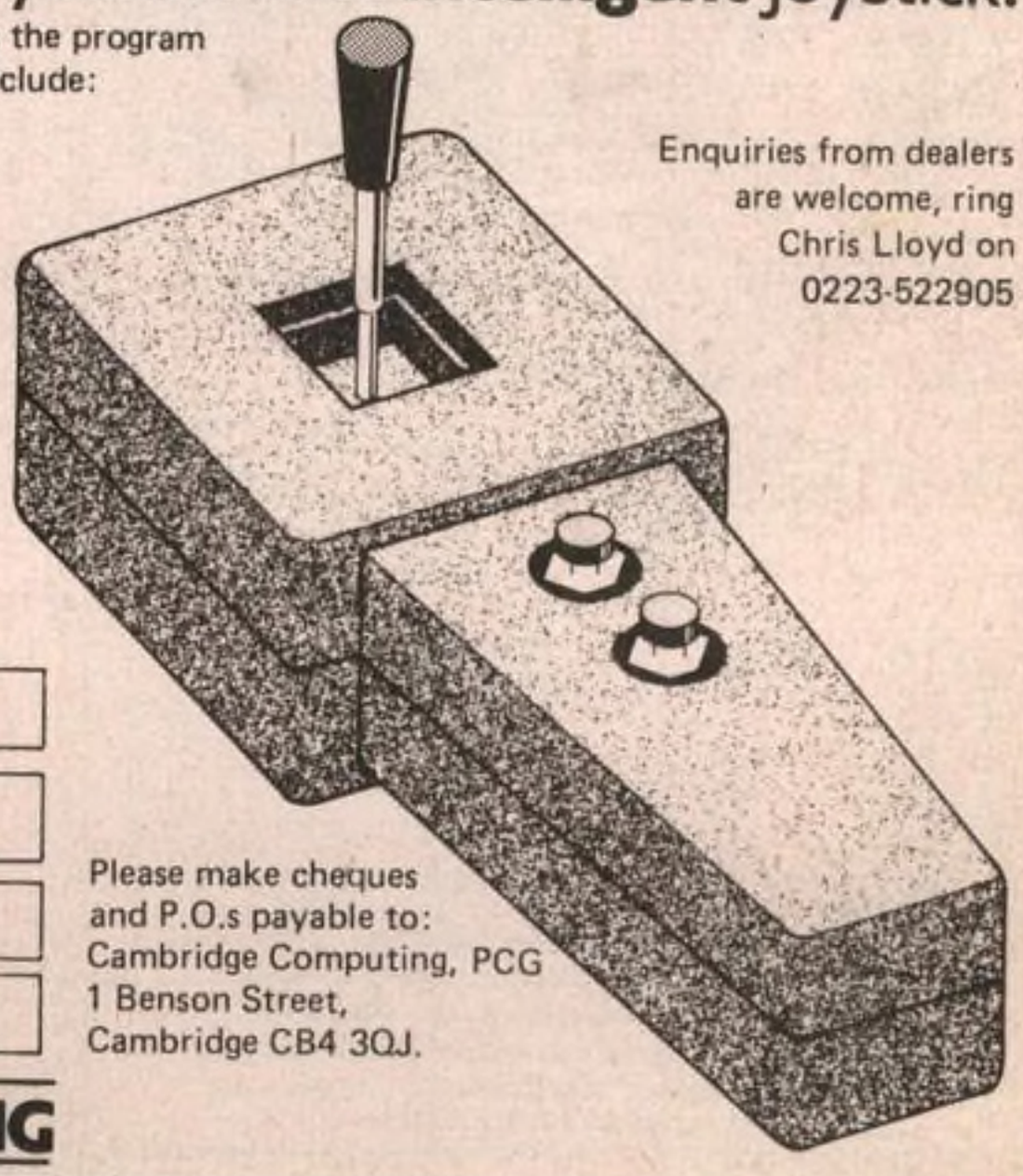
BYTEWELL
203 COURT ROAD, BARRY
SOUTH GLAMORGAN CF6 7EN
Tel: (0446) 742491

At last! A joystick that works!

Cambridge Computing bring you the first **intelligent** joystick.

Works on all existing software - regardless of which keys the program uses. No need for specially written software. Features include:

- Compatible with Spectrum, ZX81, Jupiter Ace
- 2 Independent Fire Buttons
- 8 Directional Microswitched action
- Plugs into edge connector
- Interface complete with edge connector
- Atari joystick compatible
- Joystick with Interface £29.90



Enquiries from dealers are welcome, ring Chris Lloyd on 0223-522905

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

Please send me:
.....joystick, interface, and tape @ £29.90.... £ [ ]
Spectrum☐ ZX81☐ Jupiter Ace☐
.....interface and tape @ £24.00..... £ [ ]
Spectrum☐ ZX81☐ Jupiter Ace☐
.....joysticks @ £7.00..... £ [ ]
Spectrum☐ ZX81☐ Jupiter Ace☐
Total including VAT..... £ [ ]

Please make cheques and P.O.s payable to:
Cambridge Computing, PCG
1 Benson Street,
Cambridge CB4 3QJ.

CAMBRIDGE COMPUTING

Space explorer

***Maurice Gavin** explores the Solar System with the aid of his 16K Spectrum*

Fancy a trip to real worlds, via your computer, without the empty fantasy of yet more space games? Now you can with this astronomy program for the 16K Spectrum. It enables you to "view" the Solar System as seen from the "skies" of any planet, including Earth, and for any date. You can even defy the mythical Icarus by "viewing" the planets from the surface of the Sun or perhaps from Jupiter during a space-craft's fly-by.

The program contains all the necessary data to compute the various planetary positions (ecliptic longitude), the constellation in which each planet appears and the angular separation from the Sun (solar elongation). This is displayed in both table and graphic form — the latter as a 360° panoramic strip of sky centred on the Sun. The computation and display take but a few seconds and are deliberately slowed down to make the information easier to assimilate. Good use is made of the Spectrum's colour and graphics and an option to *Copy* the screen via the ZX printer is included.

The initial display lists the planets and *Draws* the orbits to two scales — one for the Earth-like "rock planets" Mercury to Mars, and one for the remote and "giant gas planets" Jupiter to Neptune. Despite the program's simplicity, it is sufficiently accurate for you to identify the planets as seen from your back garden. This naturally assumes you choose Earth as your viewpoint and *Input* a current date with a clear evening. A star-atlas like Norton's will be useful in finding the constellations.

The exceptions to this are the remote planets Uranus, Neptune and Pluto which are all too faint to be seen without a telescope and even then are indiscernible from the stars. Pluto is excluded from the program, because its orbit is highly elliptical and inclined 17° to the general plane of the planets called the ecliptic. Circular orbits of zero inclination are therefore assumed — Mercury and Mars prove the least accurate but only so over long periods of time.

The results of a program of this type are called 'ephemerides' and it may be of interest to discuss the principles behind them.

A plan of the Solar System could be likened to a giant clock with eight hands of varying length — the outer tip of each hand representing a major planet. Each hand will sweep-out the same area (shown shaded in Fig 1 and 2) in the same time interval. Thus planets progressively further from the Sun move more slowly and take longer to complete an orbit.

Knowing the position of the planets on an epoch, or reference date, it is only necessary to wind the hands backwards or forwards to locate the planets on any other date — past, present or future. If your viewpoint is the Sun, each planet will appear projected onto the background constellations; ie, Signs of the Zodiac equal to the planet's heliographic (Suncentred) longitude. If your viewpoint is a planet, then the computer performs the necessary triangulation to deduce the revised positions.

The Rem statements show the general structure of the program with the *Data* held from Line 1000. This program was originally designed for my ZX81 and I still have a liking for slicing string arrays for data! Be sure to double check these arrays are correctly entered — the smallest error will produce wrong results. Use the sample screen display to check your results.

In the graphic displays, a "*" symbolises the Sun and "*h*" for Hermes (the alternative classical Greek name for Mercury to avoid confusion with "*m*" for Mars). The 'ecliptic longitude' (ecl. long) gives the planet's angular distance from the First Point of Aries ie 0° measured eastwards from 0° to 360°, and the 'solar elongation' (elong) the angular distance from the Sun ie 0° — a minus (—) figure indicates the planet is to the right of the Sun.

Lines 420 and 440 separate the planets into two groups — those nearer to the Sun (inner planets) and those further from the Sun (outer planets) from the chosen viewpoint and computes their positions accordingly. Under test it will be noted that, as seen from Earth, the 'inner planets' Mercury and Venus never stray far from the Sun, whilst all the remaining and therefore 'outer planets' can be found anywhere along the ecliptic. Conversely, from Neptune all the planets become 'inner planets' with Mercury to Mars sometimes never more than a fraction of a degree from the Sun — virtually undetectable to a Neptunian! ■

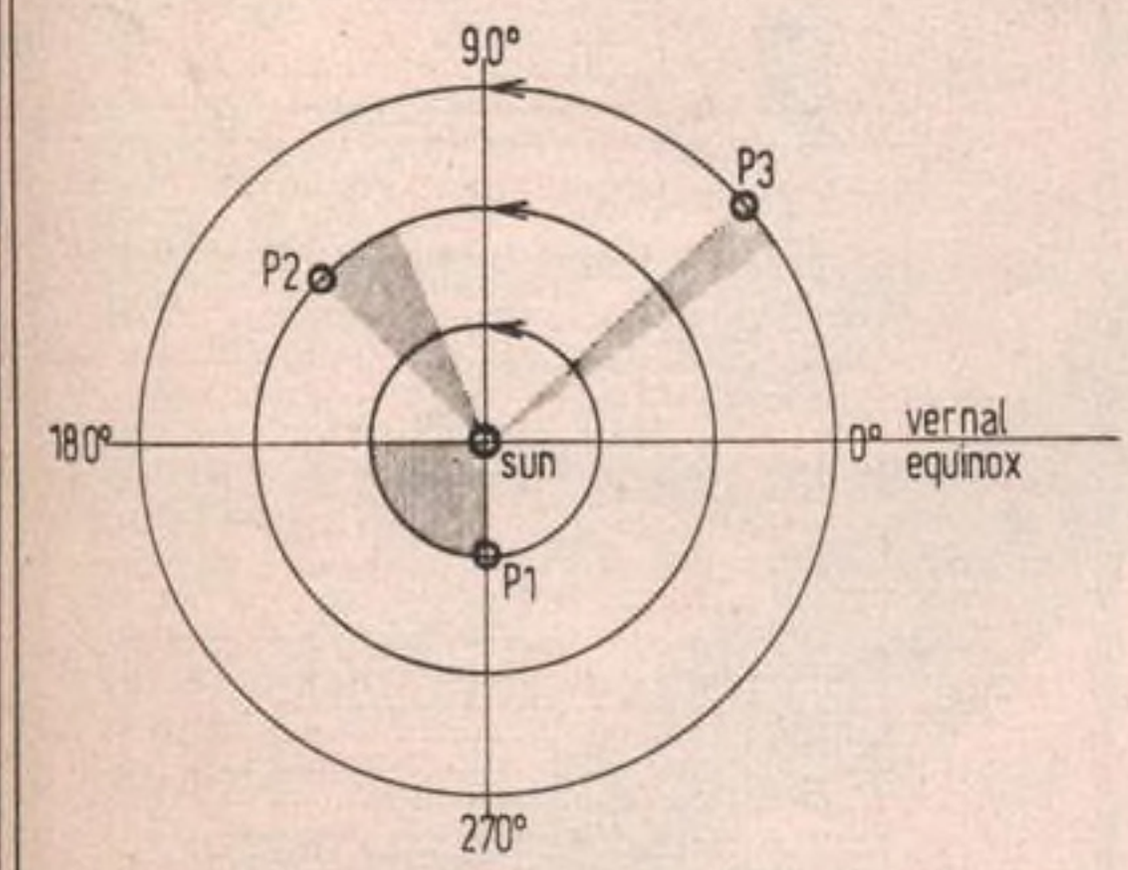


Figure 1
Kepler's 2nd Law of Planetary Motion — where each planet sweeps out an equal area in an equal time interval. In this simplified solar system with the planet's orbits equally spaced, P1 covers a complete quadrant whilst P2 covers ¼ quadrant ($1/2^2$) and P3 covers 1/9 quadrant ($1/3^2$).

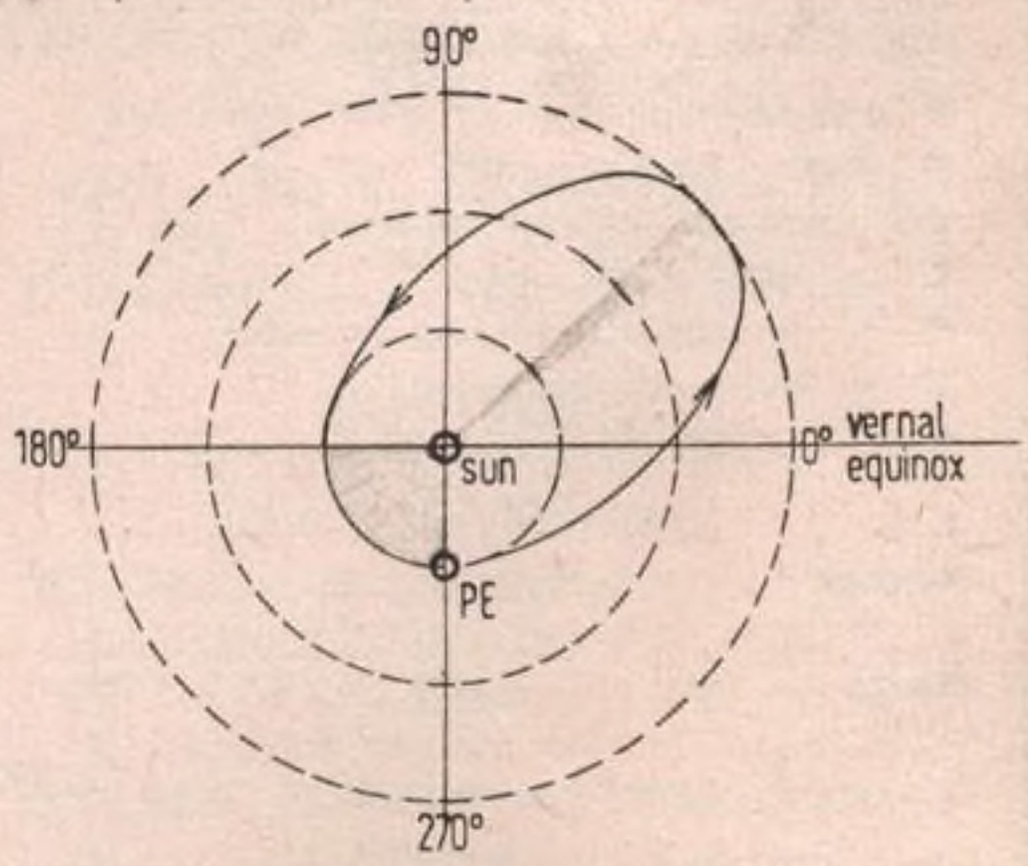


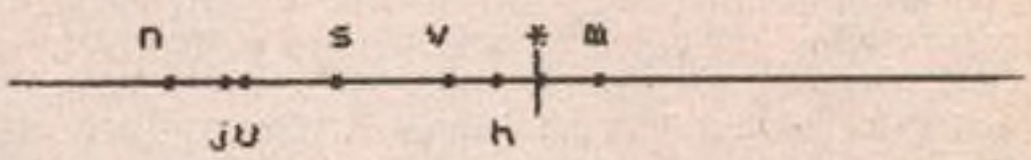
Figure 2
A planet PE in a highly elliptical orbit still follows the same "law", its velocity constantly changing according to its current distance from the Sun.

```
Solar System Trek ©
1-Sun *
2-Mercury
3-Venus
4-Earth
5-Mars
6-Jupiter
7-Saturn
8-Uranus
9-Neptune
```

Planet	ecl.long	const	elong
1-Sun *	129.3	Cnc	0
2-Mercury	145.1	Cnc	15.8
3-Venus	152.5	Leo	33.1
4-Earth	<Viewpoint>1983	Aug	1
5-Mars	105.7	Gem	-23.7
6-Jupiter	247.3	Sco	117.9
7-Saturn	204.5	Vir	75.2
8-Uranus	240.5	Sco	110.9
9-Neptune	267.5	Sco	138.2

zodiac constellations

CpSa ScLi Vr Le CnGe TaAr PiAq C

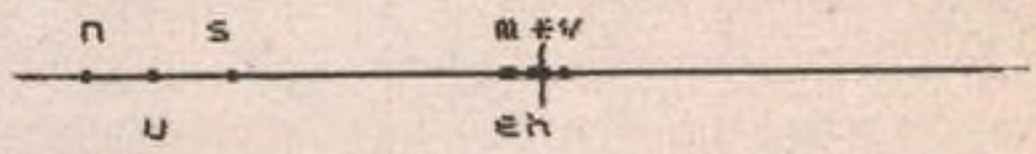


CpSa ScLi Vr Le CnGe TaAr PiAq C

Planet	ecl.long	const	elong
1-Sun *	97.5	Gem	0
2-Mercury	101.9	Gem	4.3
3-Venus	89.7	Tau	-8
4-Earth	108.5	Gem	10.9
5-Mars	112.6	Gem	15
6-Jupiter	<Viewpoint>1984	Apr	21
7-Saturn	213.4	Lib	115.8
8-Uranus	244.1	Sco	146.5
9-Neptune	270	Sgr	172.4

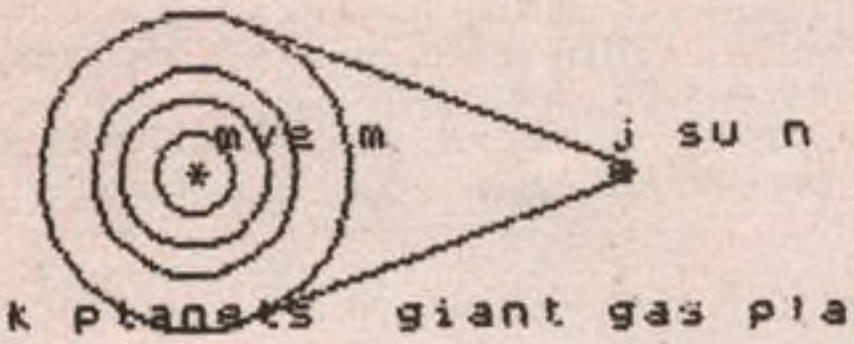
zodiac constellations

a ScLi Vr Le CnGe TaAr PiAq CpSa



a ScLi Vr Le CnGe TaAr PiAq CpSa

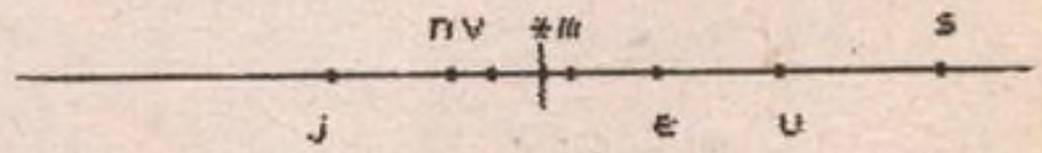
```
Solar System Trek ©
1-Sun *
2-Mercury
3-Venus
4-Earth
5-Mars
```



Planet	ecl.long	const	elong
1-Sun *	127.1	Cnc	0
2-Mercury	<Viewpoint>1934	Oct	8
3-Venus	146.1	Cnc	19
4-Earth	83.1	Tau	-44
5-Mars	116.3	Gem	-10.9
6-Jupiter	205.7	Vir	78.6
7-Saturn	335.2	Aqr	-151.9
8-Uranus	35.7	Ari	-91.4
9-Neptune	161.1	Leo	34

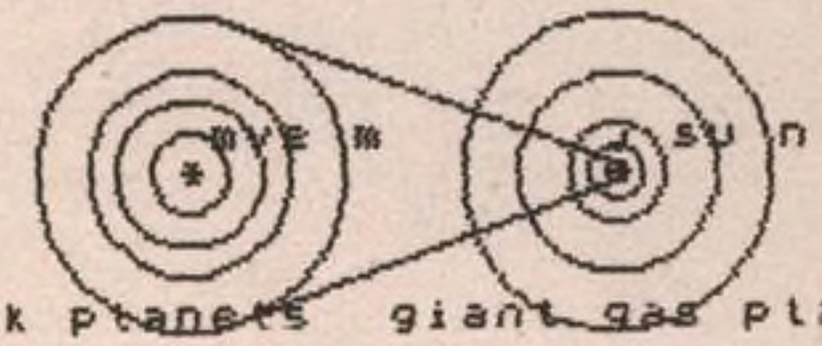
zodiac constellations

CpSa ScLi Vr Le CnGe TaAr PiAq C



CpSa ScLi Vr Le CnGe TaAr PiAq C

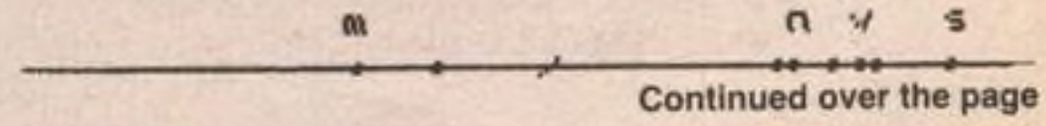
```
Solar System Trek ©
1-Sun *
2-Mercury
3-Venus
4-Earth
5-Mars
6-Jupiter
7-Saturn
8-Uranus
```



Planet	ecl.long	const	elong
1-Sun *	<Viewpoint>1983	Jun	26
2-Mercury	42.1	Ari	42.1
3-Venus	235.7	Lib	-124.3
4-Earth	275.9	Sgr	-56.1
5-Mars	73.5	Tau	73.5
6-Jupiter	252.7	Sco	-107.3
7-Saturn	207.9	Vir	-152.1
8-Uranus	242.1	Sco	-117.9
9-Neptune	268.4	Sco	-91.6

zodiac constellations

r Le CnGe TaAr PiAq CpSa ScLi Vr



Continued over the page

```
 10 REM ┌──────────────────────┐
        │ Solar System Trek © │
        │ Maurice Gavin, FRAS │
        └──────────────────────┘
 20 BRIGHT 1: GO SUB 1000
 30 REM ■initial screen display
 40 LET L=1: CLS : BORDER RND*8
 50 PRINT PAPER 5;"Solar System
 Trek ©                "
 60 PRINT AT 14,10;"mve m
j su n";AT 15,9;"*";AT 15,21;"*"
 70 PRINT AT 19,0; PAPER 4;" ro
ck planets "; PAPER 5;" giant ga
s planets"
 80 LET a=0: LET ax=23
 90 FOR n=1 TO 9: IF n=6 THEN P
AUSE 50: GO SUB 800: PAUSE 50: L
ET a=96: LET ax=20/17
 100 CIRCLE 75+a,51,a(n)*ax
 110 PRINT AT n,0; PAPER 6-(2 AN
D n>1)+(1 AND n>5);y$(n): NEXT n
 120 GO SUB 790
 130 REM ■ select viewpoint
 140 INPUT "Enter planet no",k:
IF k<1 OR k>9 THEN GO TO 140
 150 BORDER k/2: LET j=k
 160 PRINT PAPER 1;AT 10,0;b$
 170 PRINT AT 11,0; PAPER 0; INK
 7;"       zodiac constellations
 "
 180 PLOT 0,40: DRAW INK 4;255,0
 190 REM ■ enter date
 200 INPUT "Date (yyyy,mm,dd)";T
AB 6;y;TAB 11;m;TAB 14;d: IF y<1
00 THEN LET y=y+1900: IF m>12 OR
 d>31 THEN GO TO 200
 210 LET k$=o$(m*3-2 TO m*3)
 220 PRINT AT k,9; FLASH 1;"<Vie
wpoint>"; FLASH 0; PAPER 6-(2 AN
D k>1)+(1 AND k>5); INK 9;y;" "+
k$+" ";d;" "+(" " AND d<10)
 230 PRINT PAPER 5;AT 0,0;" Plan
et    ecl.long const  elong "
 240 REM ■ leap years/epoch days
 250 LET y4=y/4
 260 IF y4=INT y4 THEN LET L=0
 270 IF m>2 THEN GO TO 300
 280 LET b=(m-1)*(63-L)/2
 290 GO TO 310
 300 LET b=(m+1)*30.6-62-L
 310 LET dy=INT (b+d)
 320 LET ed=INT ((y-ep)*U+dy+.5)
 330 REM ■ mainloop
 340 FOR n=1 TO 9: IF n=9 AND n=
j THEN GO TO 710
 350 IF n=j THEN NEXT n
 360 LET pp=c*(ed/t(j))+l(j)
 370 LET qe=(pp/e-INT (pp/e))*e
 380 LET p=c*(ed/t(n))+l(n)
 390 LET q=(p/e-INT (p/e))*e
 400 IF j=1 THEN GO TO 460
 410 REM ■ calc inner planets
 420 IF a(n)<a(j) THEN LET el=18
0+qe+r*ATN ((a(n)*SIN ((qe-q)/r)
)/(a(j)-a(n)*COS ((qe-q)/r)))
 430 REM ■ calc outer planets
 440 IF a(n)>a(j) THEN LET el=q+
r*ATN (SIN ((q-qe)/r))/(a(n)-COS
 ((q-qe)/r))
 450 GO TO 470
 460 LET el=q
 470 IF el<=0 THEN LET el=el+e
 480 IF el >e THEN LET el=el-e
 490 IF el>e OR el<=0  THEN GO T
O 470
 500 LET el=INT (.5+el*10)/10
 510 REM ■ solar elongation
 520 IF n=1 THEN LET sun=el
 530 IF j=1 THEN LET sun=0
 540 LET b=INT ((el-sun)*10)/10
 550 IF b >180 THEN LET b=b-e
 560 IF b<-180 THEN LET b=b+e
 570 IF el>=e THEN LET el=el-e
 580 LET v=1+INT (el/30)
 590 PRINT AT n,0;y$(n);
 600 PRINT TAB 10;(" " AND el<9)
;(" " AND el<99);el;TAB 19;c$(v*
4-3 TO v*4);
 610 PRINT TAB 24;(" " AND b>-10
0);(" " AND b>=0 AND b<10);(" "
AND b>=10 AND b<100);b
 620 REM ■ print zodiac/planets
 630 LET w=30-sun/12: IF w>=0 TH
EN LET w=w+1
 640 LET r$=m$(w TO )+m$( TO w)
 650 PRINT INK 7; PAPER 2;AT 13,
0;r$;AT 20,0;r$
 660 LET z=0: LET nn=n/2
 670 IF nn=INT nn THEN LET z=3
 680 PRINT INK 7; PAPER 1;AT 15+
z,b/12-16;z$(n)
 690 REM ■ plot planets position
 700 CIRCLE INK 7; INT (132-b/1.
5),40,1: BEEP .1,n*3: NEXT n
 710 REM ■ end of mainloop
 720 IF j=1 THEN PLOT 130,38: DR
AW INK 6;4,4: GO TO 740
 730 PLOT 132,32: DRAW INK 6;0,1
5
 740 GO SUB 790
 750 PRINT #0;"Press z to copy,
c to continue": PAUSE 0
 760 IF INKEY$="z" THEN COPY
 770 GO TO 40: REM ■ reRUN
 780 REM ■ gosub "lines"
 790 FOR n=175 TO 90 STEP -8: PL
OT 0,n: DRAW 255,0: NEXT n: RETU
RN
 800 CIRCLE 171,51,2: PLOT 171,5
3: DRAW -90,33: PLOT 171,49: DRA
W -90,-33: RETURN
1000 REM ■ data & variables
1010 DIM a(9): DIM l(9): DIM t(9
): DIM y$(9,9): DIM b$(32*10)
1020 LET U=365.2654
1030 LET ep=1975: LET e=360
1040 LET r=180/PI: LET rr=e/PI
1050 LET c=e/U
1060 LET F=1e3: LET G=1e4
1070 LET o$="JanFebMarAprMayJunJ
ulAugSepOctNovDec"
1080 LET z$="*hvemjsun ■planets"
1090 LET m$=" Le CnGe TaAr PiAq
CpSa ScLi Vr": REM ■zodiac signs
1100 LET l$="0000003206633109750
995342496293552141041732057832499
15": REM ■Long at epoch(1975.0)
1110 LET t$=".00001.24085.615211
.00001.880911.86229.45884.012164
.79": REM ■period in years■
1120 LET a$="0000010038710072350
1000001523705202609538819181830 0
579": REM ■orbit radii in AU■
1130 LET p$="1-Sun *  2-Mercury3
-Venus  4-Earth  5-Mars  6-Jupi
ter7-Saturn 8-Uranus 9-Neptune"
1140 LET c$="Psc Ari Tau Gem Cnc
 Leo Vir Lib Sco Sgr Cap Aqr "
1150 FOR n=1 TO 9: LET x=n*6
1160 LET a(n)=VAL a$(x-5 TO x)/G
1170 LET l(n)=VAL l$(x-5 TO x)/F
1180 LET t(n)=VAL t$(x-5 TO x)
1190 LET y$(n)=p$(n*9-8 TO n*9)
1200 NEXT n: RETURN
1210 REM ■ data subroutine ends
9990 SAVE "SStrek" LINE 1
```

Listed searching

***Bryan Skinner** looks at some of the advantages of the binary chop search routine*

In a previous article (*PCW* 23-29 June), I described how a string array could be searched for the occurrence of a user defined sub-string. The search routine described was sequential.

Each specified field or column of each row was tested in turn; ie, the array was searched row by row. If there are a large number of rows this can turn out to be a very slow procedure, particularly if you are searching a random-access file on disc (which can be thought of as a large array).

There is, of course, a more efficient and therefore faster search algorithm that can be used. The method is known by various names, my favourite being the "binary chop". The method is without doubt the fastest way of searching a list, but it does have a number of prerequisites which can be limiting:

(a) The list must be in order; either alphabetical, numeric or ASCII (depending on the comparison made).
(b) There must be no blank entries, ie, the list must be "dense".
(c) The size of the list must be known.
(d) Each entry must be unique, as the search will only find one item.
(e) Only direct matching is allowed, you cannot use INSTR.

The algorithm is so efficient that doubling the length of the list only adds a few extra comparisons to its operation.

The procedure employed is similar to that used by human beings searching for a word in a dictionary. If you were looking for the word *Search*, you might open the book at its mid-point and see the word *Middle*. *Search* comes after this in alphabetical order, so you can ignore the first half of the dictionary.

Next, you would halve the remaining pages, ie, open the book mid-way between the mid-point and the end. You might alight upon the word *Test*, which is alphabetically greater than the target word *Search*, so you would halve the distance between *Middle* and *Test*, perhaps finding *Perch*. As this word is too "low" in alphabetical order, you would halve the difference between it and the previous word *Test*, and so on.

The basic operations then are:

(a) Setting two points
(b) Finding the mid-point between them
(c) Testing the item at the mid-point.
(d) Deciding the direction in which to proceed (if a match is not found)

Figure 1 shows the search routine in diagramatic form, where we are looking for the letter *F* in the letters *A-T*.

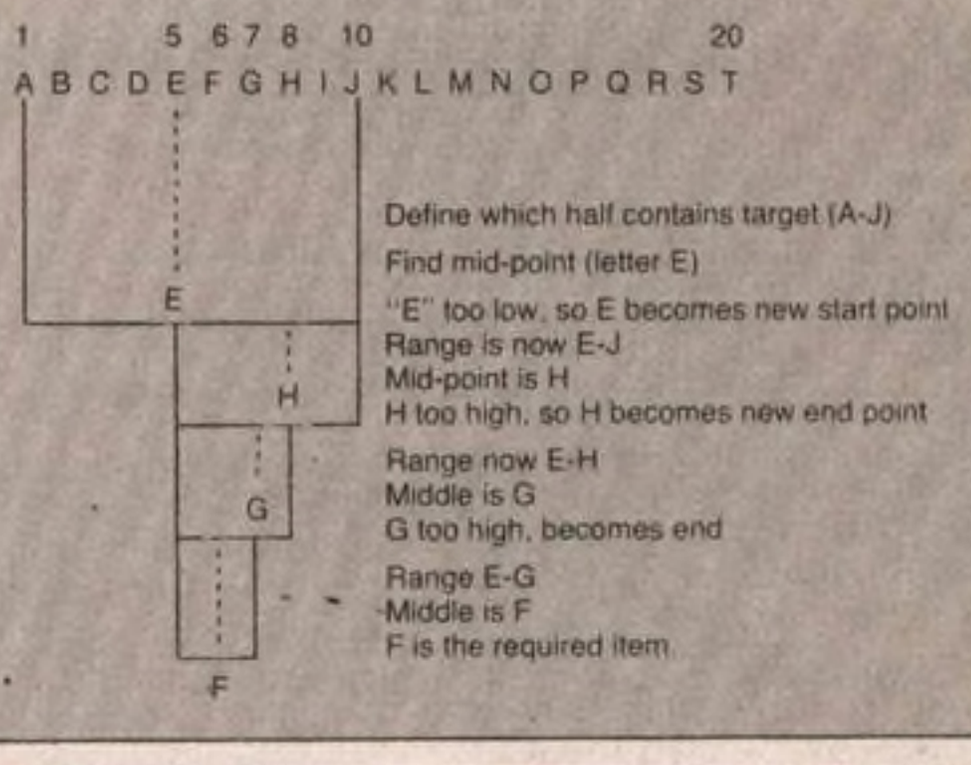
Obviously, we must also add checks to ensure that we do not "run off" either end of the list and to allow us to exit from the routine if the word is not found.

The coding is relatively simple; the example given sets up a list of names in a string array and allows you to search for a name. You should be able to modify the actual search routine to your own needs for multi-dimensional arrays of characters or numbers, but do not forget to alter the relevant variables!

Cr and *Pr* are the list pointers to the Current and Previous Records. I is the mid-point between *Pr* and *Cr*. Line 1090 decides the direction to search in, according to a comparison between the item being searched for and the current item being tested.

Ef is used as an Error Flag to prevent oscillations between adjacent entries. *Ef* is incremented each time the difference between the Current item and the Previous item equals 1 (line 1040). Line 1030 tests for running off the ends of the list. ■

Fig 1




```
10 REM SET UP ARRAY
20 NR = 10
30 DIM AR$(NR)
40 FOR I = 1 TO NR
50 READ AR$(I)
60 NEXT
70 DATA BILL,CHARLES,ETHEL,FREDA,GERTRUDE
80 DATA HILARY,JOHN,KEVIN,LIONEL,MARY
90 CLS:REM %%%%%%%%%% ENTRY POINT FOR SEARCHES
100 PRINT "ENTER NAME TO FIND ";
110 INPUT A$
120 IF A$ = "ZZZ" THEN END
130 GOSUB 1000
140 GOTO 90
150 REM %%%%%%%%% END OF "MAIN PROGRAM"

1000 REM SEARCH - BINARY CHOP
1010 CR = INT((NR/2)+.5)
1020 PR = 1 : EF= 0
1030 IF CR < 0 OR CR > NR THEN GOTO 2010
1040 IF ABS (PR-CR) = 1 THEN EF= EF+1:PR=PR-1
1050 IF EF > 2 THEN GOTO 2010
1060 IF A$ = AR$(CR) THEN PRINT "FOUND" :RETURN
1070 I = ABS(PR-CR)
1080 I = INT((I/2)+.5)
1090 IF A$ > AR$(CR) THEN CR = CR+I ELSE CR = CR-I
2000 GOTO 1030
2010 PRINT "NOT FOUND"
2020 RETURN
```

GEM SOFTWARE

for LYNX, DRAGON, SPECTRUM and ZX81 Software

SULTAN'S MAZE by Christopher Hunt. Enter the 3D Maze in search of the Sultan's jewels, but beware, your strength may run out, or, you may come face to face with the Mad Guardian. A multi-difficulty game with fantastic graphics and sound. Price (LYNX & DRAGON) **£7.95**

MONSTER MINE by W. E. MacGowan. Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. Price (LYNX & DRAGON) **£7.95.** Price (SPECTRUM & ZX81) **£4.95.**

GOLF by Pete Allen. An excellent Basic program, giving you an 18-hole course, with handicaps and choice of clubs. A golfing weakness must be specified. Amazing graphics and sound!! Price (LYNX & DRAGON) **£7.95.**

CHATEAU by Pete Allen. A new type adventure, in which you must wander the Count's old mansion in search of treasure! Of course, when the Count hid his treasure, then died, he left lots of unpleasant surprises for those brave enough to try and seek out his riches!! Come face to face with Ghouls and Ghosts, Vampires and Trolls; do you run or fight? Will the mysterious Travel Agent suddenly appear and whisk you away to far off places? Where can you find the key or the lamp? Is the clock booby-trapped? Will you die a cold and lonely death, or will you win through to claim the fantastic treasures of The Chateau? Price (DRAGON) **£7.95.**

GAMES PACK III by Christopher Hunt.

REVERSI. Pit your wits against the Lynx with this easy to learn, yet extremely demanding board game. Five skill levels, from novice to grand master.

SNAKE. Guide the snake to the food, but watch out, he will grow and must not eat the wall or himself.

PONTOON. An excellent implementation of a favourite card game in full colour with sound. Lynx is a mean Banker. Price (LYNX) **£7.95.**

GEMPACK IV by W. E. MacGowan. Two great machine code games, with full colour graphics. In **Sea Harrier** you must land your plane on the aircraft carrier, after dispersing the clouds with chemical bombs, but don't hit the ship! In **Sub Chase** you must depth charge the wolf pack without being sunk. Both with four levels of play from easy to kamikaze! Price (LYNX & DRAGON) **£7.95.**

GEM SOFTWARE
UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS
Telephone: (0279) 723567
TRADE ENQUIRIES WELCOME – PLEASE RING FOR DEALER PACK

GREAT VALUE FOR MONEY WITH OUR

SPECTRUM

SOFTWARE
GAMES FOR THE 16K or 48K SPECTRUM

MONGOOSE (m/c) and BEAR ISLAND **£4.95**
Fast and furious arcade action with these colourful high speed games.

REVERSI (m/c) and POKER DICE **£495**
Classic strategy and addictive gambling games.

TIME-LINE (m/c) and 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 adventure. Rescue the princess, but beware of booby traps and vampires.

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 the 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 nation-wide, or direct from us by post or phone. SAE for details. Dealer enquiries welcome.

GILSOFT

30 Hawthorn Road, Barry
South Glam CF6 8LE
Tel: (0446) 736369

TELEPHONE YOUR ORDER WITH

BARCLAYCARD VISA

Access

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

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.

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, (PCW) 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!

Assembled—part three

***Jeremy Ruston** continues his introduction to assembly language programming*

The *And* instruction logically *Ands* the contents of a memory location with the contents of the accumulator. The *And* operation is identical to the *And* operation carried out by the Basic keyword *And*. However, the assembly language version of *And* only acts on eight bits at a time.

It can easily be extended to act upon data of arbitrary length, by simply using more than one *And* instruction, each acting upon a different pair of bytes. The addressing modes allowed with the *And* instruction are the same as those used with the *Adc* instruction. The *And* instruction sets the flags as follows:

Zero flag — set if the result of the calculation was zero
Sign flag — set if the result was negative (it reflects the status of bit 7 of the result)

The *Asl* instruction works with rather fewer addressing modes than the *Adc* and *And* instructions. The addressing modes allowed are:

Accumulator, eg. ASL A
Zero page direct, eg. ASL &20
Absolute direct, eg. ASL &3000
Zero paged indexed with X, eg. ASL &20,X
Absolute indexed with X, eg. ASL &3000,X

You'll notice that besides the accumulator mode, these modes can be reduced to two distinct modes — indexed with *X* and absolute — since the assembler automatically works out whether zero page should be used or not.

The *Asl* instruction mnemonic stands for 'arithmetic shift left', which means that the instruction moves all the bits in the number one position to the left. This moves the contents of bit 0 to bit 1, bit 1 to 2 and so on. But, there are some slight problems. Bit zero is going to be undefined and bit 7 has nowhere to go, because bit 8 doesn't exist. In fact, bit zero is always left unset, and the contents of bit 7 are copied into the carry flag, in the same way as the carry flag acts as bit 8 in the *Adc* instruction.

The other status bits affected are:

Zero flag — set if the result was zero
Sign flag — set if the sign of the result was negative

The *Bcc* instruction is called a conditional jump instruction or, sometimes, a conditional branch instruction. It acts somewhat like the '*If* <condition> *Then Goto* <line *v* number>' statement of Basic. The *Bcc* instruction will only carry out the *Goto* to a new address if the carry flag is clear.

The way it carries out the branch is not totally expected. Rather than loading the program counter with a new value, it adds a displacement to the present value of the program counter.

There are two problems with this approach. The program counter is set to the address after the *Bcc* instruction, before the displacement is added to it, and the displacement can only be an eight bit number. This means that the range of the branch is only within +/− 125 bytes of the *Bcc* instruction. Luckily, you don't have to explicitly work out whether a branch instruction such as *Bcc* will reach a specific address, since it will not assembly an instruction which branches out of range.

To use the *Bcc* instruction in your programs, you must follow it with a label. This sample program explains what a label does:

```
.START
LDA &80
CMP &81
BCC START
RTS
```

A label is like a place marker in the program. It is created by writing the name of the label preceded by a full stop (a label can be followed by other instructions without using a colon to start a new statement). When a label is processed by the assembler, it assigns the address of the instruction that follows the label to the variable name given as the label. Thus, labels must adhere to the normal BBC Basic rules for naming variables and the label becomes a mnemonic for the address it is placed at.

When a branch or jump instruction is written, the label following the instruction is taken as the destination for the jump. It may not seem very useful to be able to execute a jump if the carry flag is set, but it allows us to do several vital things, like see which of two numbers is the larger. After we have looked at all the instructions, you will find a table of how and why each of the branch instructions should be used.

The *Bcs* and *Beq* instructions do more or less the same thing as the *Bcc* instruction, except that different conditions spark off the jump. The *Bcs* will only branch if the carry flag is set, whilst the *Beq* instruction will only jump if the zero flag is set — in other words, if the last result was zero.

The *Bit* instruction logically *Ands* the contents of the accumulator with the contents of a selected memory location and then sets the condition flags accordingly. Weirdly, it doesn't alter the contents of the accumulator or the contents of the memory byte. Thus, the only effect this instruction has is on the condition flags. The only addressing modes allowed are:

Absolute, eg. BIT &1234
Zero page, eg. BIT &23

In other words, you can only carry out the *Bit* in struction on the contents of a memory location the address of which is known at the time you write the program.

The point of this instruction is to allow you to see if a certain bit (or bits) of a memory location are set (or unset), without upsetting the contents of the location, and ignoring any untested bits. This is a useful operation since it allows you to set up, in effect, your own flags register in memory.

To use the instruction, first select the bits you wish to test of the location. For example, if you wished to see how bit 4 of location *&234* was set, the bit in question would be bit 4. Then, turn the 'value' of the bit into a number. The value of bit 4 is 2^4, or 16. You can then write instructions to load this number into the accumulator, and do a *Bit* instruction with reference to location *&234*. If the selected bit was zero, the zero flag will be set, otherwise it will be unset. The code needed in this example would be:

```
LDA £16
BIT &234
```

The other use of this instruction is to inspect the contents of bits 6 and 7 of a memory location, without disturbing the accumulator. For example, after this instruction, the sign and overflow flags are set to the state of bits 7 and 6 respectively of location *&234*. Once these bits have been moved into the flags, you can use them in calculations. The other result is that they allow you to use the top two bits of any location as flags, and then test them, without having them do anything to the accumulator — without even having to load a 'mask', as we did above.

To sum up the action of the flags:

Zero flag — set if the result of the AND operation was zero
Sign flag — set to the status of bit 7 of the memory byte selected
Overflow flag — set to the status of bit 6 of the memory byte selected

The *Bmi*, *Bpl* and *Bne* branch instructions all act like the *Bcc* instruction, except they branch under different conditions. The *Bmi* instruction (Branch if MInus) will only branch if the sign bit is set; the *Bpl* instruction (Branch if PLus) will only branch if the sign bit is unset, and the *Bne* instruction will only branch if the zero flag is not set.

The *Brk* instruction is described in the User Guide in its capacity for trapping errors in programs, such as the 'No such line' message in Basic. The internal action of the *Brk* instruction is to set the break flag, push the program counter and status register on to the stack and finally to jump to the routine whose address is contained in locations *&FFFE* (*lsb*) and *&FFFF* (*msb*).

It is worth pointing out that interrupts also jump to the same address. The only way the operating system can see which type of interrupt (*Brk* or external) caused the jump to the routine is to look at the contents of the flag register. Finally, the action of jumping to the routine automatically disables interrupts. ■

To be continued next week

This is an extract from *The BBC Micro Compendium*, available from 1 August, from Interface Publications, 44-46 Earls Court Road, London W8 6EJ.

Martech Durell

ORIC-1 SOFTWARE

HARRIER ATTACK!

At last a pure machine code, super-fast, action-packed, highly addictive arcade-style game requiring great skill. The harrier takes-off from an aircraft-carrier and flys over seaborne defenses to attack enemy installations on a nearby island. The harrier has bombs and cannon 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, speed, altitude, ammunition, plus player score and high score. Finally the harrier must make its bomb-run over the enemy base before returning past more hostile shipping to its own carrier. This game is everything an arcade fanatic could ever hope for — with full colour graphics and explosive sound!

£6.95

LUNAR LANDER/ASTEROIDS

Learn how to create your own arcade games. With this tape you can play two exciting games, then list on the screen full instructions explaining how they work. A must for all owners of an ORIC-1.

£6.95

ASSEMBLER/DISASSEMBLER

With A4 note pad and full instructions.

£8.95

☆ *All prices include p. & p.*

Send cheque or P.O. to: DEPT (PCWK)

martech games

9 Dillingburgh Rd., Eastbourne, E. Sussex BN20 8LY

TOWN NATHAN

Dragon Byte

Home Computers Software and Games

51a Queen Street
Morley
Leeds
Tel: 0532 522690

ZX SPECTRUM now under £100

Ring for more information

Last Chance

10 Ash Road
Headingley
Leeds 6
Tel: 744235

Home computers, software board games, role-playing games and books

At Last's place we make you offers you can't refuse . . .

We're worth a visit because:

- ★ We've probably the best range of software in the North — and we're improving all the time.
- ★ We've a growing range of computers, peripherals, upgrades and books.
- ★ We've the biggest range of Citadel figures for leagues around.
- ★ We've board and adventure games for all ages from TSR, Games Workshop, Avalon Hill, Victory Games, GDW, Yaquinto, etc, etc.

PROGRAMMERS — Assassin Software needs your marketable programs. Give us a call

ASTROLOGY

truly AVAILABLE AT YOUR FINGERTIPS

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemera, etc.

THE SIDEREAL TIME OF BIRTH.
THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes and Seconds for EQUAL HOUSE SYSTEM.
THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.
THE SUN AND MOON POSITIONS in Sign, Degrees, Minutes and Seconds.
ALL THE PLANETS' POSITIONS in Sign, Degrees and Minutes.
THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

ZX81 16K

ZODIAC I — ONLY **£10.00**
ZODIAC II — ONLY **£8.00**

GIVES YOU THE ASPECTS AND MIDPOINTS

FOR 48K SPECTRUM AND DRAGON 32

ZODIAC F
Full combined program on one cassette

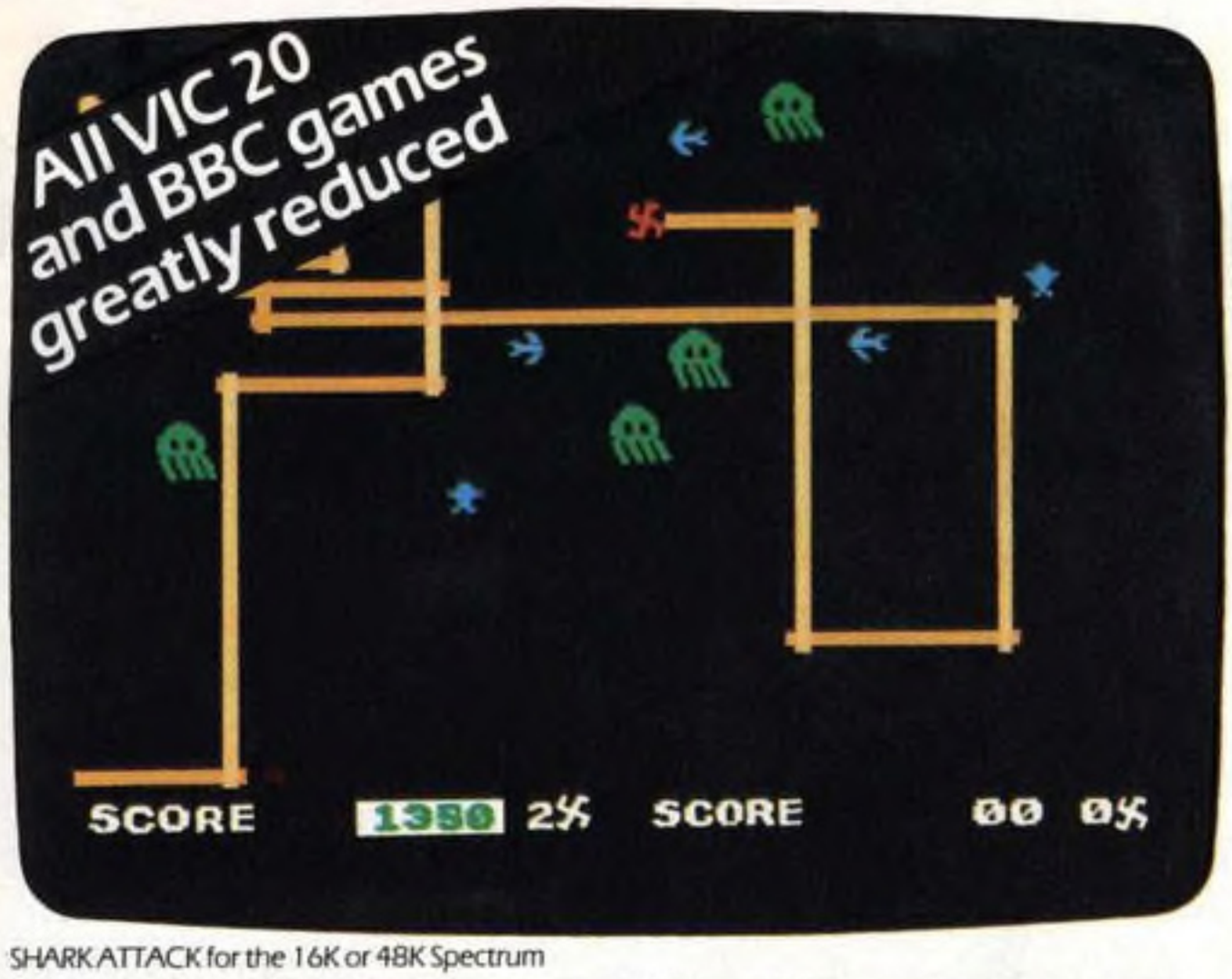
FOR ONLY **£15.00**

Other programs in course of preparation include: PROGRESSING THE HOROSCOPE; RECTIFICATION OF THE BIRTH TIME, etc.

Send orders with cheque payable to:

STELLAR SERVICES

8 FIR TREE VALE, LEEDS LS17 7EY
Tel: (0532) 692770



SHARK ATTACK for the 16K or 48K Spectrum

GAMES THAT ARE HARD TO BEAT

Why? Because every single Romik action game is professionally written in machine code to give you all the thrills and action of a fast-moving arcade game. Every one recorded on top quality tape, most of them playable either from the keyboard or with joysticks.

A lot of thought and development goes into every game – and we guarantee no bugs to drive you mad, no infuriating gaps to interrupt your fun.

Whether pitted against invaders from alien worlds, tracking hungry sharks or frantically stalling the melt-down of a nuclear reactor you can be sure that if it's a Romik game you'll have a battle on your hands. The kind of battle that leaves no room for mistakes or hesitation.

UNEXPANDED VIC 20

Martian Raider	£6.99
Sea Invasion	£4.99
Power Blaster	£5.99
Space Fortress	£5.99
Shark Attack	£5.99
Atom Smasher	£6.99
Space Attack	£5.99
Mind Twisters	£4.99
Multisound Synthesiser	£6.99
Pedes and Mutants	£6.99

EXPANDED VIC 20 (3K, 8K or 16K)

Time Destroyers	£6.99
Moons of Jupiter	£7.99

NEW! ADVENTURES FOR THE VIC 20

Zorgon's Kingdom (8K or 16K) (real time graphic adventure)	£6.99
Sword of Hrakel (3K, 8K or 16K) (classic adventure)	£5.99
The Golden Apple of Zeus (8K or 16K)	£4.99

COMMODORE 64

Multisound Synthesiser	£14.99

BBC (Model A or B)

Birds of Prey	£6.99
Atom Smasher	£6.99

DRAGON

Strategic Command	£9.99
Convoy Attack	£9.99
Cyclops	£9.99
Romik Cube	£9.99
White Crystal (graphic adventure)	£9.99

ATARI 400 OR 800

See-Saw Scramble	£9.99

LYNX

Power Blaster	£9.99

16K or 48K SPECTRUM

Colour Clash	£7.99
Galactic Trooper	£5.99
3D Monster Chase	£6.99
Spectra Smash (plus Breakout)	£6.99
Shark Attack	£5.99

ZX 81

Super Nine – 9 1K games	£4.99
Galactic Trooper (16K)	£4.99

FREE COMPETITIONS

Every action game purchased brings a free entry into the national competition to find the Supreme Champion, and free entry into the annual Romik Grand Master competition with its fantastic prizes.

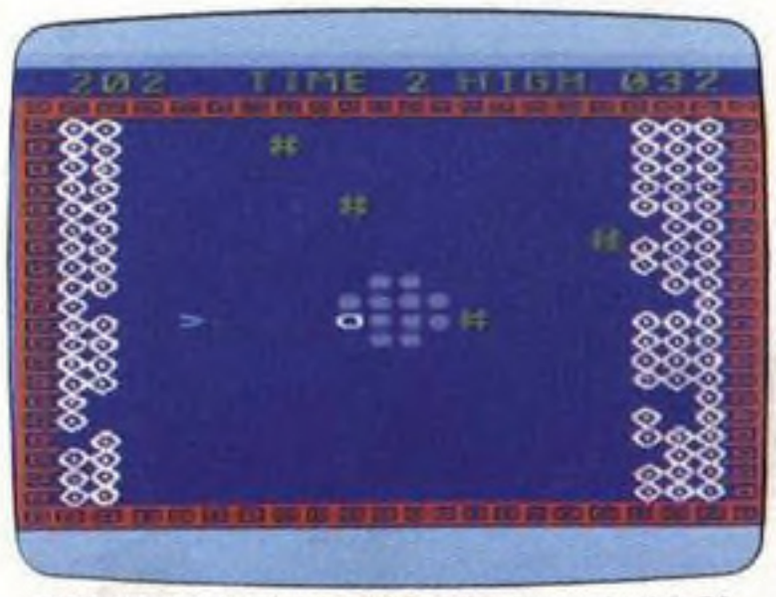
TOP PRICES PAID!

We're always on the lookout for new, top quality machine code arcade games for any machine. If you have what you consider a marketable game, let us know. Nobody pays higher royalties than we do.

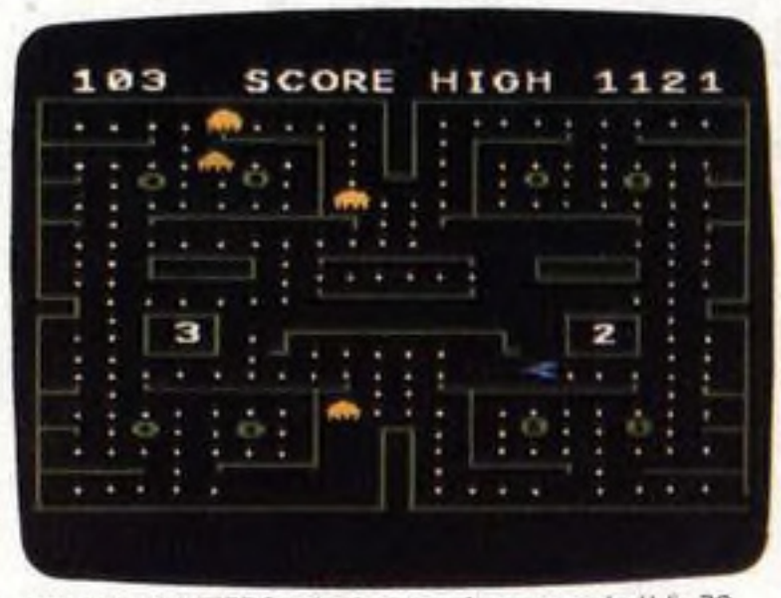
ROMIK SOFTWARE

For further details of all our games and a list of stockists complete the coupon and send it to:
Romik Software, 272 Argyll Avenue, Slough SL1 4HE

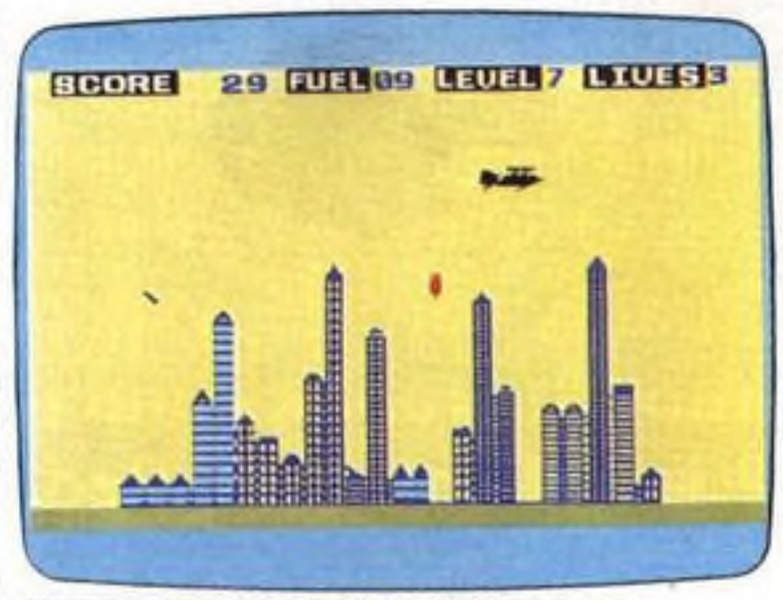
TIME DESTROYERS for the expanded Vic 20 (3K+)



ATOM SMASHER for the BBC and unexpanded Vic 20



POWER BLASTER for the Lynx and unexpanded Vic 20



SPECTRA SMASH for the 16K or 48K Spectrum

Please send me further details of your games and a list of stockists.

Name_____

Address_____

_____

_____ Age (If under 21)_____

I own a_____ computer

ORIC MCP 40 COLOUR PRINTER

ORIC
MCP 40 COLOUR PRINTER
£169.95 incl.V.A.T.

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.V.A.T.
*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.V.A.T.
*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 Todays 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

SATISFY YOUR SYSTEM

WHICHEVER YOUR SYSTEM WE HAVE THE RANGE OF BOOKS & TAPES TO MEET YOUR REQUIREMENTS

Distributed through bookshops, Computer shops and selected chain and multiple stores

DISTRIBUTORS TO THE TRADE, SOLE U.K. DISTRIBUTOR OF SYBEX BOOKS, TRADE ENQUIRIES WELCOME

The Computer Bookshop

30 Lincoln Road, Olton, Birmingham B27 6PA Tel: 021-707 7544

A built-in program

Every computer program, regardless of the language in which it is written, begins its life as a series of instructions stored in a coded form within the computer's memory. In the case of most languages, the instructions which make up the program are quite meaningless to the central processing unit or CPU, the computer-within-a-computer which will eventually be called on to execute the tasks dictated by the program. To overcome this problem, standing in between the program entered by the user and the CPU will be yet another program, most often built into the machine at the time of its manufacture, which takes the user's program and translates it into a form which the CPU is able to understand.

The permanent, "built-in" program, however, performs another function, for without its help it would be impossible for the user to enter instructions in the first place. From the moment the computer is switched on, the built-in program begins its task of scanning the keyboard to detect an input from the outside world. It then takes those inputs and stores them in the memory in such a way that they can later be interpreted for the CPU.

The user who writes programs in Basic will seldom be aware of this process. Program lines will be entered, the return key pressed and the line will become part of the program — provided that the correct grammar of Basic has been observed. No real effort or thought is required to insert a new instruction into the program, for the computer's memory is automatically rearranged to make space for the new input.

When we turn to programming in machine code, the situation is not quite as simple. There are no facilities built into the computer to allow a new instruction to be simply entered from the keyboard in the confidence that it will automatically be entered into the computer's memory and the present contents rearranged to make room for it. The first task of a machine code programmer is, therefore, to devise a method of entering instructions, examining memory and rearranging it to suit the developing needs of the program that is being entered. This is true whether the machine code instructions are being entered directly in the form of numbers (which is the eventual form in which they must be presented to the CPU), or by means of a special language called assembly language, which makes machine code programs easier to enter and understand.

The simplest tool which allows the necessary management of the memory to take place is called a monitor. In this series we shall build up a flexible monitor program which will allow you to examine individual bytes of memory or chunks and to modify their contents at will. ■

This is an extract from *Commodore 64 Machine Code Master* by David Lawrence and Mark England, published by Sunshine Books

MASTERCODE: TABLE OF VARIABLES

AD	Current address in memory
AM	(Assemble to memory) flag used in assembler
BASE	Current number base for conversions
CO	COntinue in monitor/COmmand in file editor
DEV	Indicates device for load/save
E$	Used in file editor to record empty lines*
EA	(End Address) used in monitor
EC	(Error Count) during assembly
EN	(Error Number) used to indicate type of error during assembly
EO	(Error Only listing) flag used in assembler
ERR	Used to flag error conditions
ERR$	Error messages for assembler
EXIT	Set if END directive encountered by assembler
FALSE	Logical value (=0)
FI$	Main file array in file editor
FL	Line to finish list or delete in file editor
FM	Number of lines in FI$
FNDEC	Converts decimal digit to hex ASCII
FNHEX	Converts hex digit to decimal
FP	(Finish Pointer) used by list and delete in file editor
H	Used in conversion routines - H$ converted to decimal
H$	General string for input and output of hex numbers
IN$	General variable used for input
LN	(Line Number) used in file editor
PTR	Pointer used in scanning assembly language instruction
PTR$	Holds order of items in FI$
OP	Operand type: assembler and disassembler
O$	General output string
O1$	Output string used in dump of memory contents to screen
O2$	Output string used in dump of memory contents to screen and disassembler
O3$	Output string used in dump of memory contents to screen
PASS	Current pass of two pass assembler
PO	Pointer to mnemonic type
Q	Loop variable used in assembler
Q1	Start address of line being assembled
Q3	Loop variable used in assembler
Q1$	Temporary variable used in formatting assembler output
RESULT	Output of expression evaluator
SA	(Start Address) used by severalroutines
SE	Current number of symbols during assembly
SL	(Start Line) used in list and delete in file editor
SM	Maximum number of symbols in the symbol table
SP	Start pointer for list and delete in file editor
ST	System variable in Basic
ST$	(Symbol Table) used in assembler
SY	Used to indicate dump of symboltable in assembler
T,TA,TB,T0,T1,T2 etc	Temporary variable used in several modules
T$	Temporary variable used in several modules
TA$	Decoder tables for assembler/disassembler
T1$	Temporary variable used in several modules
TERM	Temporary result in expression evaluator
TRUE	Logical value (=-1)
X1	Loop variable used in Hex Loader
XY	Loop variable used in file editor
XZ	Loop variable used in file editor

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published.

Bounce

on Spectrum

The object of this program is to bounce the babies that fall from the building across the screen, and to also catch the parachutists who fall from the helicopter. You get 50 points for bouncing a baby, 100 points if you bounce it off the screen, and 100 points for catching a parachutist. Difficulty 'j' alters the babies x coordinate as it falls back to earth for the second or third time.

Lines 2 to 160 set up the user defined graphics and lines 9000 to 9080 set up the variables. The reason I used *Print at* in lines 6000 to 6009 was because I found that a *For next* loop produced a flickery effect and it also slowed the game down considerably.

```
      WELCOME TO BOUNCE

      © 1983 S.McIntosh

   1 GO SUB 9000
   2 DATA BIN 11111110,BIN 00100
000,BIN 11111000,BIN 11100100,BI
N 11100010,BIN 11111100,BIN 1111
1000,BIN 11100000
   3 FOR t=0 TO 7: READ x
   4 POKE USR "a"+t,x
   5 NEXT t
  10 DATA BIN 00111000,BIN 10010
010,BIN 01111100,BIN 00010000,BI
N 00111000,BIN 01101100,BIN 0100
0100,BIN 01000100
  15 FOR t=0 TO 7
  20 READ x
  30 POKE USR "p"+t,x
  40 NEXT t
  41 DATA BIN 11111111,BIN 11111
111,BIN 0,BIN 0,BIN 0,BIN 0,BIN
0,BIN 0
  42 FOR t=0 TO 7
  43 READ x
  44 POKE USR "e"+t,x
  45 NEXT t
  46 DATA BIN 00000011,BIN 0,BIN
 11000000,BIN 11111111,BIN 00011
111,BIN 00000111,BIN 00000001,BI
N 0
  47 FOR t=0 TO 7
  48 READ x
  49 POKE USR "b"+t,x
  50 NEXT t
  54 DATA BIN 01110000,BIN 01110
001,BIN 00100110,BIN 00111000,BI
N 00100000,BIN 01010000,BIN 1101
1000,BIN 10001000
  65 FOR t=0 TO 7
  80 READ x
  85 POKE USR "d"+t,x
  90 NEXT t
 100 DATA BIN 00111100,BIN 01111
110,BIN 11111111,BIN 11100111,BI
N 10000001,BIN 10000001,BIN 0100
0010,BIN 01000010
 105 FOR t=0 TO 7
 107 READ x
 110 POKE USR "g"+t,x
 115 NEXT t
 130 DATA BIN 00001110,BIN 10001
110,BIN 01100100,BIN 00011100,BI
N 00000100,BIN 00001010,BIN 0001
1011,BIN 00010001
 135 FOR t=0 TO 7
 140 READ x
 150 POKE USR "f"+t,x
 160 NEXT t
 164 PRINT AT 4,0;"       WELCOME
 TO BOUNCE                "
 165 PRINT AT 6,0;"       © 1983
S.McIntosh                "
 166 INPUT "ENTER DIFFICULTY 'j'
 (1 OR 0)..";j
 167 CLS
 169 FOR t=6 TO 19
 170 PRINT AT t,27;"▀▀▀ "
 180 NEXT t
 190 PRINT AT 19,27;"▀▀▀▀ "
 195 PRINT AT 5,27;"▗"
 200 PRINT AT 19,0;"▀▀▀▀
```

Decimal Hex

on ZX81

This program converts decimal codes to Hex and vice-versa. Although there are much simpler ways of achieving this I have deliberately made it very user friendly so that it is clear how it all works.

Parts of this program can be isolated and used separately as toolkit routines.

Program notes

Lines	
240 360	These lines check if N/L has accidentally been pressed (the commonest error when entering machine code)
560	Set the limits of Q and Z and Dim D to the maximum no of entries you wish to make at the same time
530 620 1200 1210 2120 2140 2610	These lines peek to see if the screen is about to overflow. A simple check which avoids the need to use *Cont* when the screen fills up.

I have used *Run* in several places to restart the program — this is because the variables need to be reset before running.

```
   1 REM  DONALD MACLEOD, MAR/83
   5 FAST
  10 CLS
  20 PRINT TAB 4;"DEC TO HEX AND
 VICE VERSA"
  30 PRINT ,,,,TAB 5;"**SELECT Y
OUR CHOICE**"
  40 PRINT ,,TAB 5;"**BY PRESSIN
G A  KEY**"
  50 PRINT ,,TAB 5;"**IN THE RAN
GE 1 - 4**"
  60 PRINT ,,"1 ... HEX TO DEC
, ONE 1 BYTE"
  70 PRINT TAB 8;"ENTRY PER RUN"
  80 PRINT ,,"2 ... AS OPTION
1 BUT WITH"
  90 PRINT TAB 8;"SEVERAL ENTRIE
S PER RUN "
 100 PRINT ,,"3 ... DEC TO HEX
, ONE 1 BYTE"
 110 PRINT TAB 8;"ENTRY PER RUN"
 120 PRINT ,,"4 ... AS OPTION
THREE BUT WITH"
 130 PRINT TAB 8;"SEVERAL ENTRIE
S PER RUN"
 140 PRINT AT 21,4;"PLEASE ENTER
 CHOICE NOW"
 150 SLOW
 160 IF INKEY$="" THEN GOTO 140
 170 LET I=VAL INKEY$
 180 GOTO 100+I*100
 200 CLS
 210 PRINT "OPTION ONE"
 220 PRINT AT 18,6;"ENTER 1 BYTE
 HEX NOW"
 230 INPUT A$
 240 IF CODE A$=0 THEN GOTO 230
 250 FAST
 260 CLS
 270 LET H=16*CODE (A$)+CODE (A$
(2))-476
 280 GOTO 2000
 300 CLS
 310 DIM D$(8,2)
 320 PRINT "OPTION TWO"
 330 FOR Q=1 TO 8
 340 PRINT AT 18,6;"ENTER 1 BYTE
 HEX NOW"
 350 INPUT D$(Q)
 360 IF CODE D$(Q)=0 THEN GOTO 3
50
 365 PRINT AT 18,6;"------------
--------"
 370 NEXT Q
 375 FAST
 380 GOSUB 1200
 390 GOTO 2100
 400 CLS
 410 PRINT "OPTION THREE"
 420 PRINT AT 18,6;"ENTER 1 BYTE
 DEC NOW"
 430 INPUT X
 440 FAST
 450 CLS
 460 GOSUB 1000
 470 GOTO 2200
 500 CLS
 510 PRINT "OPTION FOUR"
 520 DIM D$(8,4)
 530 FOR Q=1 TO 8
 540 PRINT AT 18,6;"ENTER 1 BYTE
 DEC NOW"
 550 INPUT D$(Q)
 560 IF CODE D$(Q)=0 THEN GOTO 5
50
 570 PRINT AT 18,6;"------------
--------"
 580 NEXT Q
 590 FAST
 600 CLS
 610 PRINT TAB 6;"DEC";TAB 13;"H
EX"
 620 FOR Z=1 TO 8
 630 LET F=0
 640 FOR K=1 TO 4
 650 IF F=1 THEN GOTO 700
 660 IF D$(Z,K)=" " THEN LET X=V
AL D$(Z, TO K-1)
 670 IF D$(Z,K)=" " THEN GOSUB 1
000
 680 IF F=1 THEN GOSUB 2600
 690 NEXT K
 700 NEXT Z
 710 GOSUB 2500
 720 RUN
1000 LET Y=X/16
1010 LET X1=INT Y
1020 LET X2=Y-INT Y
1030 LET P1=X1
1040 LET P2=X2*16
1050 LET N=26
1060 LET T=0
1070 LET R$=CHR$ (N+T) AND P2=T
1080 IF P2=T THEN GOTO 1110
1090 LET T=T+1
1100 GOTO 1070
1110 LET N=26
1120 LET T=0
1130 LET P$=CHR$ (N+T) AND P1=T
1140 IF P1=T THEN GOTO 1170
1150 LET T=T+1
1160 GOTO 1130
1170 LET H$=P$+R$
1180 LET F=1
1190 RETURN
1200 DIM H$(8,3)
1210 FOR Q=1 TO 8
1220 LET H$(Q)=STR$ (16*CODE (D$
(Q))+CODE (D$(Q,2))-476)
1230 NEXT Q
1240 RETURN
2000 PRINT TAB 6;"DEC";TAB 13;"H
EX",,TAB 6;H;TAB 13;A$
2010 GOSUB 2500
2020 RUN
2100 CLS
2110 PRINT TAB 6;"DEC";TAB 13;"H
EX"
2120 FOR Q=1 TO 8
2130 PRINT ,,TAB 6;H$(Q);TAB 13;
D$(Q)
2140 IF PEEK 16442=3 THEN GOSUB
2700
2150 NEXT Q
2160 GOSUB 2500
2170 RUN
2200 PRINT TAB 6;"DEC";TAB 13;"H
EX",,TAB 6;X;TAB 13;H$
2210 GOSUB 2500
2220 RUN
2500 PRINT AT 21,4;"ANOTHER Y/N
"
2510 SLOW
2520 IF INKEY$="" THEN GOTO 2500
2530 IF INKEY$="N" THEN STOP
2540 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GOTO 2500
2550 FAST
2560 RETURN
2600 PRINT ,,TAB 6;X;TAB 13;H$
2610 IF PEEK 16442=3 THEN GOSUB
2700
2620 RETURN
2700 PRINT AT 21,4;"N/L TO CONT I
NPUT"
2710 SLOW
2720 IF INKEY$="" THEN GOTO 2700
2730 FAST
2740 CLS
2750 PRINT TAB 6;"DEC";TAB 13;"H
EX",
2760 RETURN
```

Decimal Hex
by Donald Macleod

Letter Head

on Dragon 32

This simple program will print either letter headings or envelopes. Lower case letters are obtained using Shift/0.

Although written for a Microline 80 the program can be adapted for most other printers.

```
10 'DRAGON PRINT
20 ' Copyright S.J.Halstead.1983
30 PRINT@0,"******** ADDRESS PRINTER ********"
40 INPUT"INPUT NAME";F$
50 INPUT"INPUT 1ST LINE OF ADDRESS      ";A1$
60 INPUT"INPUT 2ND LINE OF ADDRESS      ";A2$
70 INPUT"INPUT 3RD LINE OF ADDRESS      ";A3$
80 INPUT"INPUT 4TH LINE OF ADDRESS      ";A4$
90 INPUT"INPUT TELEPHONE NUMBER         ";T$
100 INPUT"INPUT DATE";D$
110 Z$=" "
120 PRINT@480,"INPUT LETTER OR ENVOLOPE (E/L).
130 J$=INKEY$:IF J$="" THEN 130
140 IF J$="L" THEN 160
150 IF J$="E" THEN GOSUB 260
160 PRINT#-2,TAB(52),F$
170 PRINT#-2,TAB(52),A1$
180 PRINT#-2,TAB(52),A2$
190 PRINT#-2,TAB(52),A3$
200 PRINT#-2,TAB(52),A4$
210 PRINT#-2,TAB(52),T$
220 PRINT#-2,TAB(52),Z$
230 PRINT#-2,TAB(52),D$
240 GOTO 120
250 REM ENVOLOPE SUB ROUTINE.
260 PRINT#-2,TAB(18),F$
270 PRINT#-2,TAB(18),A1$
280 PRINT#-2,TAB(18),A2$
290 PRINT#-2,TAB(18),A3$
300 PRINT#-2,TAB(18),A4$
310 GOTO120
```

Letter Head
By S Halstead

Designer

on Oric

This program was written on a 48K Oric-1, but should work without modification on the 16K model. It is a useful aid to designing your own characters. Normal character generators will not work on the Oric, due to the unusual size of the characters. The display has a horizontal resolution of only 240 pixels (dots), but has a character width of 40 columns. The price for these extra characters per line is a character of only six pixels wide, instead of the usual eight.

When the Oric is switched on, or the reset button is pressed, the character set is copied into *Ram*. Thus virtually any character can be redefined in the following way:

1. FOR A = 0 TO 7
2. READ D
3. POKE 46080 + A + (8 × n), D
4. NEXT A
5. DATA 1st row, 2nd row . . . 8th row

Where n is the ASCII code of the character. The *Data* statement contains eight numbers, each the decimal equivalent of a row of the new character. These numbers normally have to be worked out using graph paper, and a knowledge of binary.

When the program is run, you will be asked to enter the character to be changed. It can either be entered as the symbol or the code. Codes 160-255 are free, and can be redefined at will. But if you wish to be able to print the character at will, then a character from the keyboard should be used, as in the program. After the screen has cleared, a grid is printed, containing a flashing cursor. This can be moved at will using the arrow keys.

To fill a square, press the space bar. *'Del'* will empty it. If you make a complete mess of your character, or change your mind, 'C' will clear it. When you are satisfied with your design, press *'Return'* to store it in memory. If the 'R' key is pressed, the decimal number for each row will be displayed (this data is for the character stored in memory, and will not change until the new character is stored).

You can leave the program at any time by pressing 'E'. Pressing 'N' will cause the program to clear the screen and ask for the next character to be changed. These commands are summarised below the grid for convenience.

The program does not allow you to save the character set, as it is cleared as soon as Reset is pressed. The numbers should be copied down after pressing 'R'.

```
 1 FOR A=0 TO 7
 2 READ D:POKE 46080+(8*ASC("[")+A),D
 3 NEXT A
 4 DATA 63,33,33,33,33,33,33,63
 5 FOR A=0 TO 7
 6 POKE 46080+(8*ASC("\")+A),255
 7 NEXT A
 8 DIM CH(6,8):DIM TCH(8)
 9 X=1:TX=1:Y=1:TY=1
10 PAPER 0:INK 6:PRINT CHR$(20)CHR$(17)
15 CLS
20 PRINT"Character (symbol or code) ";:INPUT C$
21 IF VAL(C$)>0 AND VAL(C$)<32 THEN GOTO 20
22 IF VAL(C$)=0 THEN CHR=ASC(C$)
23 IF VAL(C$)<>0 THEN CHR=VAL(C$)
24 FOR A=1 TO 6:FOR B=1 TO 8
26 CH(A,B)=0
28 NEXT B:NEXT A
30 CLS
35 PLOT 10,0,"Character:":PLOT 20,0,2:PLOT 21,0,CHR$(CHR):PLOT 25,0,6
```

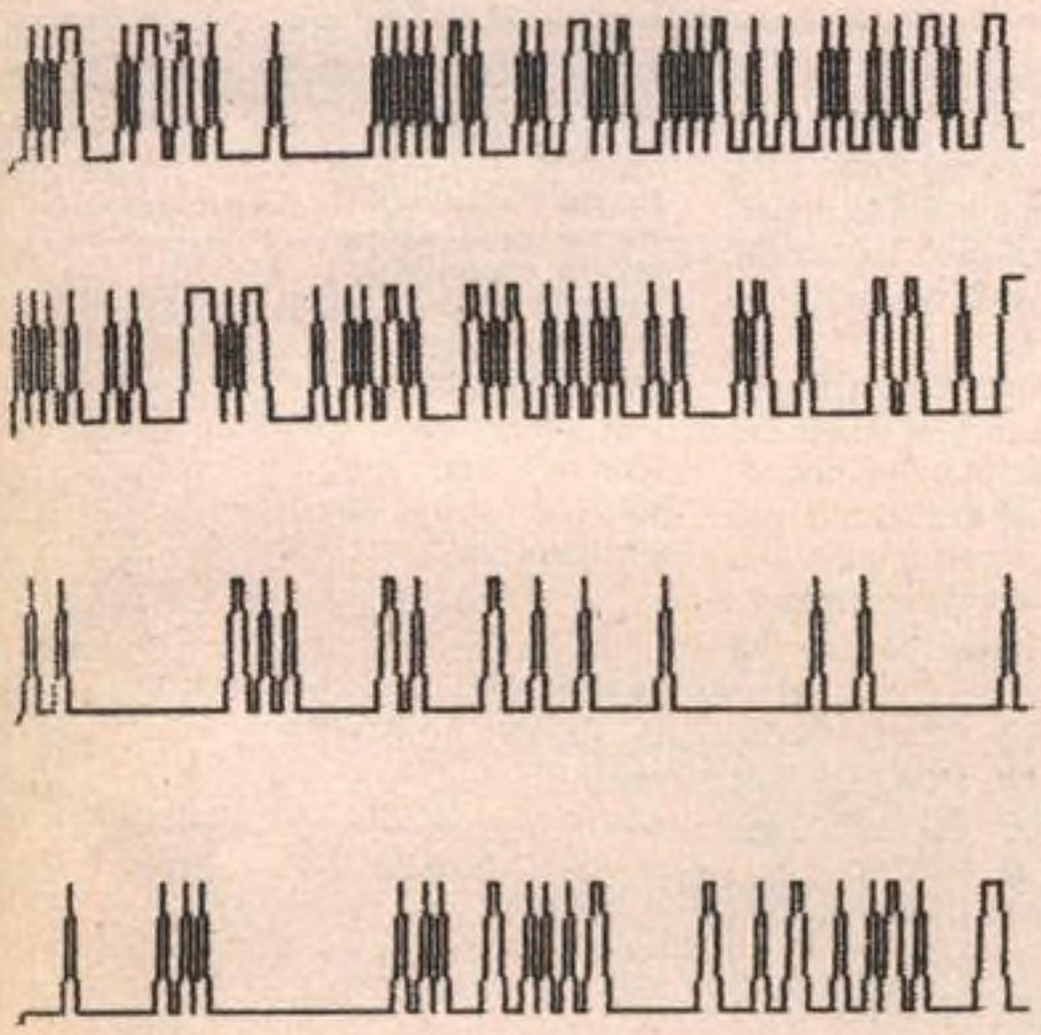
```
 37 PLOT 26,0,"Code:":PLOT 31,0,STR$(CHR):PRINT
 40 FOR A=1 TO 8:PRINT"CCCCCC":NEXT A:PRINT:PRINT
 45 PRINTCHR$(130);"RETURN";CHR$(134);" to store character"
 46 PRINTCHR$(130);"DEL";CHR$(134);" to empty square"
 47 PRINTCHR$(130);"SPACE BAR";CHR$(134);" to fill square"
 48 PRINTCHR$(130);"R";CHR$(134);" to review character data"
 49 PRINTCHR$(130);"E";CHR$(134);" to stop Program"
 50 PRINTCHR$(130);"N";CHR$(134);" for next character"
 51 PRINTCHR$(130);"C";CHR$(134);" to clear grid"
 52 PRINTCHR$(130);"ARROW KEYS";CHR$(134);" to move flashing cursor"
 55 FL=1-FL:PLOT TX,TY,CH(TX,TY)+91:TX=X:TY=Y
 60 PLOT X,Y,91+FL
 70 K$=KEY$
 80 IF K$=CHR$(9) AND X<6 THEN X=X+1
 90 IF K$=CHR$(8) AND X>1 THEN X=X-1
100 IF K$=CHR$(11) AND Y>1 THEN Y=Y-1
110 IF K$=CHR$(10) AND Y<8 THEN Y=Y+1
120 IF K$=CHR$(13) THEN PLOT TX,TY,(CH(TX,TY)+91):GOTO 200
130 IF K$=CHR$(127) THEN CH(TX,TY)=0
140 IF K$=CHR$(32) THEN CH(TX,TY)=1
150 IF K$=CHR$(101) THEN PRINT CHR$(20)CHR$(17):END
160 IF K$=CHR$(114) THEN GOSUB 2000
170 IF K$=CHR$(110) THEN CLS:GOTO 20
180 IF K$=CHR$(99) THEN GOTO 24
190 GOTO 55
200 FOR A=1 TO 8:TCH(A)=0:NEXT A
205 FOR A=1 TO 8
210 FOR B=1 TO 6
220 IF CH(B,A)=1 THEN TCH(A)=TCH(A)*(2^(6-B))
230 NEXT B
240 NEXT A
250 FOR A=0 TO 7
260 POKE 46080+(8*CHR)+A,TCH(A+1)
270 NEXT A
280 GOTO 55
2000 FOR A=0 TO 7
2010 PLOT 10,A+1,"    "
2020 P=PEEK(46080+(8*CHR)+A)
2030 PLOT 10,A+1,STR$(P)
2040 NEXT A
2050 RETURN
```

Designer
by Andrew Roberts

Sound Waves

on Spectrum

This program demonstrates a simple practical use for your Spectrum. Using an *In* instruction the computer will display a waveform of the sound it finds there.



```
  The above are sample print
outs from my sound wave program.
   Music etc. should be fed in
through either the ear or mic
sockets at the rear of your
spectrum and the program run.
It will produce a waveform like
one of the above ( taken from
'DARE' by the Human League.

   Copies of a wave can be made
using 'COPY' on a ZX-printer
```

```
 10 REM SOUND WAVES
 20 REM © S.Lathrope
 30 REM 10:4:82
 40 REM
 50 LET z=130: PLOT 0,z
 60 FOR n=0 TO 252 STEP 2
 70 LET y=(IN 65022)/2
 80 DRAW 2 ,z-y
 90 LET z=y
100 NEXT n
110 CLS : GO TO 50
```

Sound waves
by Steve Lathrope

Monte Carlo

on BBC

This program is like the arcade game Turbo. You have to dodge the oncoming cars while travelling towards a city. At the end your score and the hi-score is shown.

Program notes
The scrolling is done in a text window in line 120. This means that only a section of the screen is scrolled.

Difficulty can be increased by changing the *Rnd* in line 220. Sound effects can be added. For example, line 215 can be inserted as follows:
215 *Sound* 1,0,210,1:*Sound* 0,-15,3,2
As it stands the program runs in about 2K on a BBC model B in Mode 1.

```
 10 REM*****************
 20 REM** MONTE  CARLO **
 30 REM**D.RUEGG RGE12**
 40 REM** MAY/JUNE83  **
 50 REM*****************
 60 SCORE%=0:HISCORE%=0
 70 X%=640:Y%=20:LEFT%=0:RIGHT%=0
 80 MODE7:VDU23;8202;0;0;0;:PROCINTRO
 90 MODE1:VDU23;8202;0;0;0;:SCORE%=0:*FX11,0
100 VDU23,224,255,195,195,255,255,195,195,255
    ,255,23,226,255,24,189,255,153,0,0,0,23,
    228,255,255,255,255,255 ,255,255,255
110 PROCSCREEN
120 VDU28,17,31,22,16
130 PROCLINES
140 GCOL0,2:VDU5:MOVEX%,Y%:PRINTCHR$226
150 A$=INKEY$(0)
160 IFA$="Z" AND X%>544 THEN X%=X%-32:LEFT%=1
170 IFA$="X" AND X%<704 THEN X%=X%+32:RIGHT%=1
180 IF LEFT%=1 THEN GCOL0,0:VDU5:MOVEX%+32,Y%:
    PRINTCHR$228
190 IF RIGHT%=1 THEN GCOL0,0:VDU5:MOVEX%-32,
    Y%:PRINTCHR$228
200 LEFT%=0:RIGHT%=0
210 VDU4:PRINTTAB(0,0);"";:VDU11
220 IF RND(4)=1 THEN PROCNEWCARS
230 IF POINT(X%,Y%)=3 THEN PROCCRASH:GOTO70
240 GOTO130
250 DEFPROCLINES
260 GCOL0,1:MOVE640,480:DRAW640,512
270 ENDPROC
280 DEFPROCNEWCARS
290 N=RND(6):SCORE%=SCORE%+1
300 GCOL0,3:VDU5:MOVE512+(32*N),480:PRINTCHR$
    226
310 ENDPROC
320 DEFPROCSCREEN
330 VDU19,1,6,0,0,0,19,3,5,0,0,0,19,2,2,0,0,0
340 GCOL0,1:MOVE0,544:MOVE0,1024:PLOT85,1280,
    1024:MOVE1280,544:PLOT85,0,544
350 COLOUR3
360 FORA=12TO28
370   READB
380   FORC=14TOB STEP-1
390     PRINTTAB(A,C);CHR$224
400     NEXTC
410   NEXTA
420 RESTORE
430 GCOL0,2:MOVE0,0:MOVE0,544:PLOT85,544,544
    :MOVE384,0:PLOT85,0,0:MOVE736,544:
    MOVE1280,544:PLOT85,1280,0:MOVE896,0:PLOT85,
    736,544
440 GCOL0,1:MOVE640,0:FORL=0TO512 STEP32:
    DRAW640,L:NEXT
450 ENDPROC
460 DEFPROCCRASH
470 FORD=15TO0 STEP-1:SOUND3,-D,20,5:NEXT
480 TIME=0:REPEAT UNTIL TIME=300
490 IF SCORE%>HISCORE% THEN HISCORE%=SCORE%
500 ENDPROC
510 DEFPROCINTRO
520 PRINTTAB(4,1);CHR$132;"SCORE= ";SCORE%;
    TAB(20,1);CHR$132;"HI_SCORE= ";HISCORE%
530 FORDOUBLE=4TO5:PRINTTAB(9,DOUBLE);CHR$1
    41;CHR$131;"MONTE CARLO":NEXT
540 PRINTTAB(10,7);CHR$130;"by D. Rue99"
550 PRINTTAB(4,10);CHR$129;"Dodge the
    oncoming cars to"
560 PRINTTAB(4,12);CHR$129;"score points."
570 PRINTTAB(4,15);CHR$133;"Controls-:";TAB
    (8,18);CHR$134;"Z = LEFT  X = RIGHT"
580 PRINTTAB(10,21);CHR$157;CHR$132;CHR$136
    ;"PRESS BAR   ";CHR$156
590 W$=GET$:IFW$<>" " THEN 590
600 ENDPROC
610 REM***************
620 DATA12,11,11,11,10,10,10,9,10,10,9,9,10
    ,10,11,11,10
630 REM***************
```

Monte Carlo
by David Ruegg

Bomb Disposal

on VIC20

This game requires a Vic20 with a 3K expansion fitted.

You are a bomb disposal expert and have to defuse six bombs which are located in a street. You are in your car which has a steering fault. The car circles unless a key is held down, in which case the car moves off at a tangent and resumes the clockwise circular action as soon as the key is released.

If you collide with anything other than a bomb you will lose one of your three lives the number of which are shown top right. Also if you take too long (over a minute), the bombs will explode and you will lose another life.

Before each life you have four moves in any direction to make sure that when the car starts circling it does not hit someone. Once you have defused all the bombs you receive a bonus and six more bombs and more shoppers, making the game harder.

During the game if you wish to stop the action press '←'. To restart press any key.

Program notes

7-300	Setting up variables and screen
310-380	Four moves before starting routine
382-730	Main body of the program
740-860	Instructions
900-930	Cleared sheet routine
2000-3200	Hi-res graphics and letters
5000-5090	Sound and graphics display for explosion

The screen is headed by hi-res score, time-left and lives, below which is a bordered street with people, the bombs and your car.

PROGRAM OF THE WEEK

```
 1 GOSUB740
 5 GOTO3000
 7 POKE650,255:R(1)=1:R(2)=22:R(3)=-1:
   R(4)=-22
10 POKE36879,8:C(1)=131:C(2)=132:C(3)
   =133:C(4)=130
20 PRINT"□":D(1)=-21:D(2)=23:D(3)=21:
   D(4)=-23
30 SC=0:C=30720:SK=5:S=36875:LL=3
40 POKES+3,15:W=1
50 PRINT"□■■■
```

```
110 PRINT"■──────────────────────";
111 POKE8185,75:POKE8185+C,5
120 FORN=0TO5
130 GOSUB2000
150 POKE7724+A,128
160 POKE38444+A,7
170 POKES,(A/4)+128
180 NEXTN
190 POKES,0
200 FORN=0TOSK
202 B=6
210 GOSUB2000
230 POKE7724+A,129
240 POKE38444+A,2
250 POKES+1,(A/4)+128
260 NEXT
270 POKES+1,0
280 GOSUB2000
290 TI$="000000"
300 P=A+7724:Q=1
310 FORN=1TO4
315 POKEP,130
316 POKEP+C,1
320 GETA$
325 IFA$=""THEN320
326 POKEP,32
330 IFA$="Y"THENP=P-22:A=P-7724:
    GOSUB2010
340 IFA$="B"THENP=P+22:A=P-7724:
    GOSUB2010
350 IFA$="G"THENP=P-1:A=P-7724:
    GOSUB2010
360 IFA$="H"THENP=P+1:A=P-7724:
    GOSUB2010
370 IFQ>1THENGOSUB2000:P=A+7724:Q=1
380 NEXTN
382 FORN=1TOLL:POKE7697+N,130:NEXT
385 T=60-VAL(RIGHT$(TI$,2)):IFT=2THEN
    5000
390 PRINT"■■FGH■■";SCTAB(11);"■■IJ■
    ■■■";T
400 GETA$
401 IFA$="←"THENB$=TI$:POKE198,0:WAIT
    198,1:TI$=B$:GOTO400
402 IFB=0THEN900
403 IFA$=""THENGOSUB700:GOTO400
404 IFVAL(TI$)=100THEN5000
405 POKEP,32
410 P=P+R(W)
420 IFPEEK(P)<>32THENGOSUB450
430 POKEP,C(W):POKEP+C,1
440 GOTO385
450 IFPEEK(P)=128THENSC=SC+100*SK:
    GOTO470
460 GOTO5000
470 FORN=230TO254
480 POKES+1,N
490 POKES+3,15
500 NEXT
510 B=B-1:RETURN
700 POKEP,32:W=W+1:IFW=5THENW=1
710 P=P+D(W):IFPEEK(P)<>32THENGOSUB450
720 POKEP,C(W):POKEP+C,1
721 IFTI$="000100"THENGOTO5000
722 T=60-VAL(RIGHT$(TI$,2))
723 PRINT"■■FGH■■";SCTAB(11);"■■IJ■
    ■■■";T
725 FORN=0TO100:NEXTN
730 RETURN
740 PRINT"■":POKE36879,25
742 FORN=0TO21:POKE7680+N,160:POKE
    38400+N,(NAND7):POKE8164+N,160:
    POKE38884+N,(NA
ND7):NEXT
750 PRINT"■■■■■■■■BOMB SQUAD■■■■■■■
    ■■■■■■■■■■■■■■■■■■■■■■■■■
```

PEARL HARBOUR
FOR THE 48K SPECTRUM

£5.95 (inc p&p)

Armed with only a quick-firing anti-aircraft gun you must defend the fleet moored at Pearl Harbour from attack by Japanese fighters and bombers.

Optional first stage in which you can attempt to intercept the enemy aircraft (on hi-res map) and engage them in aerial combat.

- Machine Code Action
- 4 Difficulty Levels
- Hall of Fame
- Progressive Difficulty

SABRESOFT

13 BOWER AVENUE, HAZEL GROVE, STOCKPORT, CHESHIRE

SINCLAIR OWNERS READ THIS FROM OCP

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 de-bug 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
- **HEX:DECIMAL** conversion as standard
- **CHARACTER GENERATOR** — of unbelievable quality

Supplied free with the Spectrum version

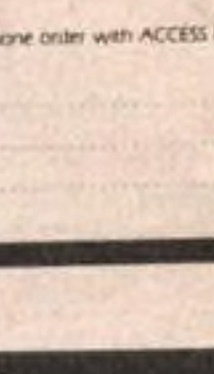
Available for the 16K ZX81 and 16/48K Spectrum

SPECTRUM CHESS Dare you face The Turk

The original Turk was an eighteenth century automaton, a life-size mechanical figure 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

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.....

Dept. PCWK 81

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. ☐ 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 (0753) 888866.

NAME .....

ADDRESS .....

POSTCODE .....

Available from most branches of **W H SMITH** and other retailers.

OCP

STARTECH

Absolutly the lowest prices!

VIC 20 16K RAM PACK

£28.95

Including VAT and Postage and Packing.

PLEASE SEND ME

VIC 20 16K RAM PACK

Qty	Price	TOTAL
☐	£28.95	

Name _____

Address _____

_____

I enclose Cheque, P/O for _____

CREDIT CARD ☐ **ACCESS** ☐ **BARCLAY CARD** ☐

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐

DEPT (PCWK)

Tick for further information

☐ **VIC 20 PRODUCTS**

☐ **COMMODORE 64**

All prices subject to availability or change without notice

STARTECH 208 Aigburth Rd, Aigburth, Liverpool L17. 051 727-7267

Zodiac adventure

This week, I want to look towards the Oric 1. As I said in my review of the machine in *PCW* 13 January, the Oric — or any new machine — will only thrive if supported by good software. And I don't mean another version of *Frogger* or *Scramble* (although a version of *Zaxxon* would be welcome!).

The Oric seems to be, gradually, attracting software houses, and Tansoft, in particular, appears to be doing rather well at the moment in supplying different programs for the new computer.

Following on from my look at the letter from Mr Fletcher, a couple of weeks ago, a few people have written to me in reply. If you follow this column, you'll remember that Mr Fletcher had done quite well in the *Zodiac Adventure*, for the Oric, having collected five Treasures and 10 signs. I thought then that it was too good to be true, and W J Bailey informs me that, indeed, there are only six signs to find. Apparently, there are several red herrings. If you should be in the middle of this adventure, you might like to know that *The Ram* and *The Scorpion* are both bogus treasures, according to Mr Bailey. However, he, like Mr Fletcher, has only found five treasures.

Roger Grimshaw also writes in regard to the Oric and, more particularly, the *Zodiac Adventure*. As far as I know, this is the only adventure for the Oric so far available, so it's not surprising that I get a lot of letters on the subject! Roger has only collected five of the treasures, but has some ideas on cracking the safe, which is where Mr Fletcher was stuck.

Jim Gibson wrote to me from Harrow, about *The Zodiac*, and told me of his wife Shelagh, who spotted the Corn from Capri — well, Jim, it doesn't mean anything to me, I hope that it means something to somebody! Jim suggests that to get to the safe you need an expert. He also says: "How about a review of Zodiac?" Yes, Jim, how about a review?

I also received a letter from G M Phillips, who actually wrote the adventure for Tansoft. He also offered advice for Mr Fletcher on cracking the safe. The consensus of opinion seemed to lean towards asking somebody else to crack the safe for you, Mr Fletcher. Isn't there a jail somewhere nearby?

Roger also has a few hints to give to people stuck in *The Zodiac* who have been thrown into jail and are being asked awkward questions. The best answers to give are:

1 any colour but blue
2 any number but nine
3 SEOUL

And finally I must add that this program is not the A+F version.

Rushing into the nearest photo booth, to change computers, I received a plea from S Lowe, asking for help in *Faust's Folly*, from Abbex. This adventure is for the 16K or 48K Spectrum. Mr Lowe would like to know how to get past the wheel at the beginning of the game. Have you tried twisting the wheel, Mr Lowe?

Faust's Folly is a text game, but supported by little one-character graphics appearing beside the description of each location. I haven't progressed very far with it, myself, and I would welcome any advice that you can offer. I hope to have a closer look at this adventure at a later date.

Pausing only to sidestep an Oric, I'll change computers again and ask my colleague Brian Cadge to look at an adventure for the Dragon — *Madness and the Minotaur*.

"This is one of Dragon Data's own offerings (although it was actually written by Spectral Associates). It is a machine code, text only, adventure. The manual supplied is fully comprehensive and describes the program as a "Classic adventure game" and such it is. The usual two word commands are given — 'Get Lamp', 'Look Bottle' etc, as well as a number of magic spells such as 'Belrog' which can be cast to perform various unexciting things like dispelling fog. Abreviations are not allowed, except for North, South, etc.

"Typing 'Help' only ever seems to provoke the reply 'Don't ask me — you got yourself into this mess' — perhaps this appeals to the American sense of humour (colour is also spelt color and centre is spelt center — couldn't they have updated this for the British market?) The object of the game is, of course, to collect all the treasures and kill the monsters. The program is in 'Real Time' — frequently, when you have half typed a command, it will interrupt to say you have been killed or are being attacked. The only use of sound is the occasional warning beep.

"Dragon Data claims the program is an adult adventure game. Playing the game, one can see why it wouldn't appeal to younger users — the lengthy descriptions and long command words are not a good feature for children. There is no facility to save the game so far completed, no graphics, very little sound and you cannot create your own custom character. All in all, I cannot enthusiastically recommend the game to anyone. *Madness and the Minotaur* is available from Dragon dealers at £7.95."

In the meantime, as R Miller, of Newark, warns me: *Never take Jabber the Hutt out to dinner (his manners are awful!).* ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

WIN A LYNX!

This competition is designed just for young people — you must be aged under 18 on September 1, 1983, in order to enter.

The competition itself is simple, just write a 1,000-word essay describing your ideal computer and the different features it should contain. For example, you may think that your ideal computer should be able to speak, or think for itself, or even move about under its own power. The essay should also explain how these additional features help you to do things which are difficult or impossible on the current range of micros.

To enter the competition, simply fill out the accompanying form and send it, together with your essay, to:

Popular Computing Weekly
Lynx Competition
Hobhouse Court
19 Whitcomb Street
London WC2.

Rules

(1) Each entry must consist of a 1,000-word essay, preferably typed double spaced on one side of the paper only, together with a completed entry form.
(2) All entrants must be aged under 18 on September 1, 1983.
(3) Closing date for competition entries is September 1, 1983.
(4) The judges' decision is final.
(5) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

LYNX COMPETITION

Name.....

Address.....

.....

.....

Age.....

Date of birth.....

Tel No.....

ANCO SOFTWARE

FIFTY PROGRAMS FOR YOUR MICRO

FOR A LIMITED PERIOD WE ARE OFFERING 50 FIRST-CLASS GAMES FOR THE FOLLOWING MICROS AT A SPECIAL PRICE

SPECTRUM	£8.99
DRAGON 32	£8.99
ORIC 1	£8.99
ZX81	£6.99

ALL TAPES POST FREE

10% REDUCTION FOR THE UNEMPLOYED
SEND YOUR UB40 OR A PHOTOCOPY, TO OBTAIN A FURTHER 10% OFF OUR LOW PRICES

SEND CHEQUES OR POs TO:

ANCO SOFTWARE
25 CORSEWALL STREET, COATBRIDGE, ML5 1PX

BOND SYSTEMS

TOUCH TYPING with a new, simple finger position system gives "peek and peck" programmers new speed and accuracy. Your computer can type up to 100 words per minute with this course! Can you? DRAGON keyboard is ideal for this course. SPECTRUM has non-standard positions for space-bar and ";", but otherwise ideal.

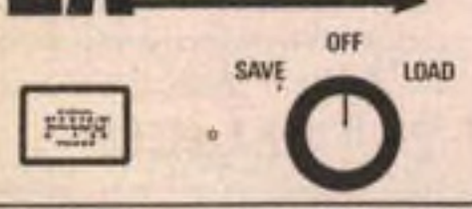
VOCAB FRENCH and **VOCAB GERMAN** present a 700 word vocabulary of your most needed words straight into your "memory".

Write to BOND SYSTEMS, stating DRAGON or SPECTRUM and PROGRAM NAME, with £5.00 for each program.

15 BELMONT ROAD, HARROGATE, NORTH YORKSHIRE, HG2 0LR

ELINCA

ZX TAPELOADER



For ZX81 & SPECTRUM
Trouble-free loading from unspoiled tapes
Switch from SAVE to LOAD without removing plugs
Passive filter on SAVE
Send SAE for leaflet
State ZX81 or SPECTRUM

ELINCA PRODUCTS LTD.(N)
Lyon Works, Capel Street,
Sheffield 6. (tel 0742 339774)

£14.99
Inc. VAT – Post FREE

Self Adhesive Cassette Labels

★ **CASSETTE LABELS ON ROLLS** - Complete with tractor feed perforations to allow them to be printed in most modern computer printers. Now you can have 'instant' labels, exactly when you need them! Minimum order 500 labels - £11
Cassette labels on sheets - 15 labels per sheet. These labels are suitable for rapid application by hand to cassettes and can easily be printed by any local instant print shop. They are also ideal for use in typewriters or word processors. Minimum order 100 labels - £3.50

★ **SMALL COMPUTER LABELS** - Many micro computer users are finding that they are able to provide a unique and profitable service to businesses in their locality. We manufacture a wide range of small computer labels at very attractive prices. They are used for so many purposes that it is difficult to list them, but price changing, tagging, coding and marking are some examples.

NEW - Sampler pack of all of our different types of label - £20.

All the above prices include VAT & carriage. Excellent quantity discounts.
PLEASE SEND 16p STAMP FOR PRICE LISTS AND SAMPLE LABELS.

Industrial Process SELF ADHESIVE LABELS Superfast

Unit A4
Smeed-Dean Centre
Eurolink Ind. Estate
Sittingbourne
Kent ME10 3RN
Sittingbourne (0795) 28425 (24 Hrs.)

VCS **ATARI** 400/800

Vic20 • PHILIPS INTELLIVISION CARTRIDGE LIBRARY

AUTHORISED DEALER

- All the latest games
- Fast reliable service
- Life membership now £10
- Descriptive catalogue
- Fortnightly or monthly hire
- p&p inc. in hire charges
- Discounts on purchases for members (hardware and software)

HIRE CHARGES: 2 WKS £3.00 — 4 WKS £5.00
JOIN NOW ON MONEY BACK APPROVAL
OR SEND SAE FOR DETAILS

To: MDM, HOME COMPUTER SERVICES, DEPT 5
20 NAPIER STREET, NELSON, LANCS BB9 0SN

ANGLIA HOME COMPUTER BARGAINS

Dragon 32	@ £167.99	Vic20 pack	@ £137.99
Spectrum 48K	@ £127.99	Osborne D/D	@ £1,375.35
Oric 48K	@ £137.99	Epson HX-20	@ £425.45
Lynx 48K	@ £218.99	Epson FX-80	@ £448.45
		Epson RX-80	@ £310.45

Price inc. VAT

Excess HP-85 stock at half price

Add £5 p&p Access and Barclaycard welcome

CALL Heather Ruffles
Anglia Home Computer Bargains
88a St Benedict's Street
Norwich. NR2 4AB

TEL (0603) 667036/7 TELEX: 975201

CUT PRICE

MAIL ORDER ONLY

DRAGON 32
BAMBAY SOFTWARE
Golden Apples, Scanner 13, Surprise
R.R.P. £6.45 Our Price £7.45
Stock Market, Interplanetary Trader
R.R.P. £5.95 Our Price £5.50
NEW from **CABLE SOFTWARE**
Drone, Dragrunner, Baccarat
R.R.P. £8.75 Our Price £8.00
PEAKSOFT
Champions, R.R.P. £6.95 Our Price £6.00
Lion Heart, Death's Headhole
R.R.P. £5.45 Our Price £5.00
GEM SOFTWARE
Monster Mine, Sultan Maze,
Chateau Space Mission, Alien Blitz, Golf
R.R.P. £7.95 Our Price £7.00

VIC20
IMAGINE
Arcadia, Catcha, Snatcha,
Frantic Wacky Waiters, Bewitched
R.R.P. £5.50 Our Price £5.00
INTERCEPTOR
Alien Attack, Crazy Kong,
Puckman Jupiter Defender, Fantazia
R.R.P. £6.00 Our Price £5.00
SPECTRUM
IMAGINE
Arcadia, AH Diddums,
Moyar Maul Jumping Jacks, ZZoom 48K,
Schizoids
R.R.P. £5.50 Our Price £5.00
GEM SOFTWARE
Monster Mine, Our Price £4.75

Send SAE state: Dragon, Spectrum, VIC, LYNX, C8M64 for list. Cheque/Postal Order made payable to:

31 Keith Park Road
UXBRIDGE
MIDDLESEX

OLTROSOFT

ASN SOFTWARE FOR COMMODORE 64 OR ATARI 400/800

COMMODORE 64

BRAIN STRAIN (C) **£5.95** incl. VAT
You have 10 attempts to break the code. Three levels of play.

NECKED (C) **£5.95** incl. VAT
Our version of Hangman in six different languages. Choose from English-English, English-French, English-German, English-Italian, English-Spanish, English-Swedish.

ATARI 400/800

SQUARE (C) **£5.95** incl. VAT (D) **£11.95** incl. VAT
A square version of Solitaire by jumping diagonally reduce 48 squares to one.

LITE BIKE (D) **£11.95** incl. VAT
Tron based game. Play the computer or another player. Hours of fun.

DEALER ENQUIRIES WELCOME

Send to:

A.S.N. COMPUTER SERVICES LTD.
DEPT. PCW, 89 STATION CRESCENT
ASHFORD, MIDDX. TW15 3HN
Tel: 07842 57599

★ Can you write good quality programmes. We pay top royalties for good software. Send for details.

ORIC CONVERSION

David Lee of Valnay Road, Tooting, London, writes:

Q A few years ago my father bought several computer and electronic magazines back from America. Apart from the fun of seeing how far computers have come in just a few years, there are some programs in them that I have tried to convert to my Oric.

Generally I have not had many problems; however, two commands which are not used a lot have me baffled. They are *Ne* and *Sleep*. Can you help?

A *Ne* is either a short version of *New* or a form of 'not equal to' which we know and use as the sign<>. You have to work out which one applies to the program from the context, although I would suggest that if it occurs within a program especially if part of a numerical statement, then it would be 'not equal to'.

Sleep is like a *Pause* statement. It simply stops the program running for a certain length of time. The length, probably tenths of a second, is defined in the number that follows the command.

COMMAND COLLISION

Siad Atihas of Edward Street, Werneth, Oldham, Lancs, writes:

Q I have recently bought a BBC computer and have learned to do many things on it. But, could you tell me how to use the *Point* command to see whether two objects have hit each other on the screen? Could you give me a small program that will show how this is done? Also, is there any other command that will do the same?

A The *Point* command returns the colour of the screen as a particular set of co-ordinates, (*x*, *y*). So, you would have to set up a pair of co-ordinates and then read them to see if they returned the same value as the item that is trying to dodge them. So, for example, if your missiles had the colour *a*, and it was in the same place as an invader, colour *b*, then you have hit the alien. A line *If Point (x, y)= b Then . . .* would take you to the 'hit' routine. A line *If Not Point (x, y) = b Then . . .* would carry on with the program.

There is an alternative, which is to use the call *Fx 135*. This is described on page 432 of the manual, along with other *Fx* calls. This returns the character at the current cursor position. By reading this, you can work out whether or not a missile and invader are trying to occupy the same location on the screen.

SPECTRUM SCRABBLE

R Walker of Church Street, Blaenau Festiniog, Gwynnedd, writes:

Q I have a 48K Spectrum and am well pleased with it. My family and I are keen *Scrabble* players, and I would like to know if there are any good *Scrabble* programs available for the 48K Spectrum. If so, how many can play, and can the computer play?

A Psion has just brought out a *Scrabble* program in conjunction with Little Genius. It is an amazing achievement, with an 11,000 word vocabulary. It plays the full *Scrabble* rules, and up to four people can play. You can use the computer to just keep score, and maintain the board, or it can act as one of the players. You should be able to find it in W H Smiths.

COMMODORE PROGRAMS

Robert Willoughby of Dunsford, nr Exeter, Devon, writes:

Q I have recently bought a Commodore 64. It is difficult to find magazines with programs for this computer in them. Please could you tell me if there are any magazines with programs for this computer, or are you going to print some in your magazine?

A The Commodore 64 has taken a few months to become established on the market. However, with its new low price I am sure that it will be a success.

We have every intention of covering it in greater depth than we have up to now (see the Commodore 64 page in this issue). Remember, we carried a review of the computer before it was released, way back at the beginning of September last year.

HISTORICAL DATES

Christopher Snow of Brook Gardens, Compton Greenfield, nr Bristol, writes:

Q Could you please tell me when the first computer was made?

A Assuming that you are going to ignore such things as the abacus, the Inca qupiu, and other adding, calculating aids, I will quote you a line from *Myth of the Micro* by Rodney Dale and Ian Williamson: 'The early years of computers and electronics are full of such contradictory claims . . .'.

What I will do is simply give you a list of important dates and achievements. 1614 — Napiers Bones — is an important date, and by the end of that century, Pascal and Leibnitz had both developed mechanical calculators. By the 1800s the slide rule as we know it, had been developed. In the 1820s Charles Babbage had started on his 'Difference Engine' which many people regard as an important precursor to the electronic computer. This was further developed into the 'Analytical Engine' with the help of Lady Lovelace.

By the early 1930s, several very powerful mechanical calculators had been developed in America. These were essentially just better versions of early adding machines made possible by better use and control of metals. In 1937 Stibitz used a series of relays and light bulbs to add two binary numbers.

The final impetus came with World War Two, and it seems that the British won, very much under the guidance of Alan Turing, who developed the concept of the Algorithm. The machine was called Colossus and the date was 1943. Until quite recently, the Americans had claimed the start with Eniac which was finished in 1946. Colossus was only revealed after the 30-year period demanded by the official secrets act expired.

BBC MANUAL

Lee Dobson of Barnard Avenue, Coal Aston, Sheffield, writes:

Q I have a BBC microcomputer, model B. I have recently upgraded the operating system from 0.1 to 1.2 Rom (though the 0.1 said Eprom on the screen). As you do not get any sort of extra manual, or leaflet with the new Rom, I am having difficulty learning some of the new commands, namely *Plot* and *Fill*. Some I have found out for myself, but could you advise me where I could get the information I want?

A The commands are in the manual and, from what you say, I can only presume that you still have the old provisional manual. All the replacement manuels should have been sent out by now, though I do not think that anyone would be too surprised if some had been 'misplaced'.

Acorn are in fact meant to be re-issuing the manual sometime, though I, for one, will believe it when I see it. Until then, I can only suggest you supplement what is in the manual by keeping an eye on the magazines, particularly those dedicated to the BBC.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

CALL *DIANE DAVIS* ON *01-839 2476* FOR SEMI-DISPLAY ADVERTISING

GAMES SOFTWARE

DRAGON USER

To make the most of your Dragon you need **Dragon User** — the independent magazine for Dragon owners. To make sure that you receive a copy of Dragon User regularly subscribe direct to us. A year's subscription costs £8 for 12 issues or subscribe for two years for £14.40 and receive a free copy of either **The Working Dragon** or **Dragon Gamesmaster** (overseas rates available on application). Send a cheque or postal order made payable to Dragon User, and accompanied by your name and address, to Dragon User, Subscriptions Department, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH.

INTELLIVISION CONSOLE, 11 cartridges (Astromash, Spacehawk, Tennis, etc). Good condition. £170 ono. Also Chess Partner game, 10 levels, £50. Tel: 223-6785 after 6 pm.

FOR THE VIC20, from Arcsoft, comes Zap-man. Hi-res graphics, colour, sound, fast machine code action, all this for unexpanded Vic for just £4 inclusive. Send cheque or postal order for fast delivery, to S. Fensome, 73 Blackfriars, Rushden, Northants NN10 9PF.

ZX SPECTRUM SOFTWARE

We are offering a 10% discount on a range of 17 cassettes if either two or more tapes are bought or a minimum order of £10 is made from us.

Tel: 031-334 7261 for details of software, or/send a SAE for listing to:

RULE COMPUTERS
30 Tylers Acre Road
Corstosphine, Edinburgh
EH12 7HZ

DRAGON 32 F10B exciting family games — Zombie Island, UFO's, Crak-it, Boat-blitz, Train. Send PO/cheque for £24.95 to: Orion Software, 268 Gladstone Road, Barry, South Glamorgan CF6 6NH.

PRIVATE SALE. Acornsoft games, £6.50 each; Program Power Killer Gorilla, Moonraider, Croaker, Chess and others, £5.75 each; Simon-Hessel software Inheritance, Travel, G B Ltd, £5 each; + other software games. Sale due to disc upgrade. Tel: Alton 87401.

CRICKET ON 8K/16K Vic20. It's here! A hi-res graphical cricket game. Features: 2-player control, multi-move fielders, 4-speed bowling, your own team names and only £2.95. D. A. Spencer, 230 Lowgrange Avenue, Billingham, Cleveland.

TI 99/4A

A MUST FOR ALL OWNERS

MAGAZINE

PUBLISHED MONTHLY
NOW AVAILABLE ON SUBSCRIPTION
GALAXY, 60 HIGH STREET
MAIDSTONE, KENT
Tel: (0622) 679265

LYNX 48K SOFTWARE

LABYRINTH — 3D Maze Game.
OTHELLO — Our version of popular board game in fast machine code.
CHANCELLOR — Run UK Economy.
SPACE TREK — Zap the Klingons.
£4.75 each including p&p
Cheques/POs to:
QUAZAR COMPUTING DEPT, PCW,
17 Teg Close, Portslade, Sussex.
OTHER PROGRAMS AVAILABLE – SEND FOR DETAILS.

ARCADE GAMES for the 48K Spectrum: Planet Intrusion, exciting challenge, incorporating lunar lander, Kick, Tron, Pleiades and Crystal into one game, £3. Donald Grose, 8 Manton Avenue, Hanwell, London W7 2DZ. Tel: 01-567 8762.

SAGITTARIAN ★SOFTWARE★

16/48K SPECTRUM — GAMES PACK 1
FRUIT MACHINE: Fast machine code simulates a real fruit machine spin and features random HOLD & NUDGE and GAMBLE/COLLECT after win. Play from one or both ends of the reels.
PONTOON: An extremely accurate simulation of shuffling and dealing from a pack of cards gives this exciting game a very realistic feel.
PLUS: OTHELLO, MUSTYMIND, CALENDAR. Excellent value. Cheque/PO for £4.95 (inc p&p) to:
SAGITTARIAN SOFTWARE LTD,
3 Wythburn Close, Loughborough
LE11 3SZ

SPECTRUM GAMES compendium. 10 high-quality games all using hi-res graphics and sound: Pacman, Simon, Tower of Hanoi, Breakout, Blitz, etc, £3.95. R. Kirtland, 18 Thame Park Road, Thame, Oxon.

SPECTRUMERS. A new software company bring you Gopher and Character Builder on 1 EMI cassette at a sensational introductory price, only £2.50 (inc p&p). Details: SAE to Blockbyte, 213 Stainbeck Road, Leeds LS7 2LR.

SPECTRUM PROGRAMS

SPECTRUM GOLF BY R+R
16K — £3.75 INC
One or two players, nine or 18-hole course: fairway, rough green, bunkers, trees and water hazards. Each course different.

SPECTRUM MICRO CHESS BY ARTIC
16K — £5.95 INC
Accepts all legal moves en passant, castling, and promotes a pawn to queen.

MURDER ON SPEC BY MICROJUICE
16K — £5.50
Ingenuous murder game, in which you are the investigator.

Mail order only. Send cheques/POs to:
VYAJYS, H-K, 11 Margaret Avenue
St Austell, Cornwall
(or SAE for list)
Tel: St Austell 61791

ORIC • SOFT

Are you tired of 'Zapping' the Universe? Why not try a game that requires more grey matter and less nervous reaction?

Family Games
Mastermynde
Yahtzi
Code Breaker
Knight Moves
The Word

Utilities
Character/ Graphic Generator

Tapes and full instructions (inc of p&p)
£4.95 each or £11.95 for any 3
Headfield Technology, Lock Street
Savile Town, Dewsbury, W Yorks WF12 9BW

ORIC-SOFT

Are you tired of 'Zapping' the Universe. Why not try a game that requires more grey matter and less nervous reaction?

Family Games
Mastermynde
Yahtzi
Code Breaker
Knight Moves
The Word

Utilities
Character/ Graphic Generator

Tapes and full instructions (including P &P)
£4.95 each or **£11.95** for any 3
Headfield Technology, Lock Street
Savile Town, Dewsbury, West Yorkshire WF12 9BW

UTILITIES

VIC20 UNEXPANDED

The Ultimate Character Generator

100% m/c, instant key response, design on 16 × 16 grid (block of 4 UDG — **Yes 4**). All characters are displayed on screen as they are being defined. Commands include **Mirror, Upturn, Invert, Save to Tape, Display Data, Multicolour Mode** and more. Full instructions plus key overlay card. Hints and tips on use of graphics and multi-colour mode. All tapes guaranteed. **Only £4.95** inc P&P. Cheque/PO to: **SCORPION SOFTWARE,** 268 St Nicholas Drive, Grimsby, South Humberside, DN37 9RP. Tel: 0472 885705.

PET PROGRAM LISTINGS, any model, send cassette, £1.50 and SAE. Copies 75p each. K-Sap, 90 Greenbarn Way, Blackrod, Bolton BL6 5TA.

CLASSIFIED ADVERTISING RATES:

Line by line: For private individuals, 10p per word, minimum 10 words.
For companies, traders, and all commercial bodies, 20p per word, minimum 20 words.

Semi-display: £5 per single column centemetre, minimum length 2 cm. (Please supply A/W as PMT. Or supply rough setting instructions.)

Conditions: All copy for Classified section must be pre-paid. Cheques and postal orders should arrive at least two weeks before the publication date.

If you wish to discuss your ad, please ring Diane Davis 01-839 2476.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

SPECTRUM BACK-UP COPIER

includes headerless copier.

First of all you had to back-up programs by making tape-to-tape copies. Now KEYSOFT present

THE KEY

The key is 100% m-c utility which allows you to back up your valuable software investment. Simple to use.

Order THE KEY for any ZX Spectrum
Only £5.95

KEYSOFT, Dept PCk
6 Bruce Grove, London N17 6RA

The programs of this tape are sold subject to the condition that only one back-up is made of any commercial program. This back-up must be for personal use only.

Dealer Enquiries Welcome

AUTOKOPY COPIES any type of Spectrum tape (16/48K), even programs occupying full 16K or 48K memory, guaranteed, £3. B. Tidd, 160 Howlands, Welwyn Garden City, Herts.

SPECTRUM "SNIFFER", reads tapes and prints out program name, length in bytes and start address. Machine code and Basic! Also gives auto run line number, £2.50 from AWA, 50 Dundonald Road, Didsbury, Manchester.

SPECTRUM KOPYKAT £4.95

SIMPLY THE BEST. So simple to use. Any type of ZX SPECTRUM program can be backed-up on to a fresh tape, even programs that cannot be stopped can now be copied. Programs over 41.5K (6.7K for 16K machines) are easily duplicated. 100% machine code. Plus: FREE Tape-header Reader program. IMMEDIATE DESPATCH. Send cheque/PO to:

MEDSOFT
61 Ardeen Road, Doncaster DN2 5ER
IT CAN EVEN COPY ITSELF

TELETEXT ON YOUR SPECTRUM: "ZXTEXT" lets you create your own personal teletext system. Similar to Ceefax pages. Full colour, graphics, flashing, inverse video, 24-hour clock with alarm, even the engineering test pages — it's all here! Cassette, £4.95 complete with sample system, full instructions, and 12-month guarantee. Send cheque/PO (or SAE for details) to: Iain Stewart, 17 Torry Drive, Alva, Scotland FK12 5NQ.

LYNX "CODER" £7.50

Instant assembler/disassembler. Ideal for CODE lines but also works on ROM and free RAM. Over 4K of MC can be written on 48K LYNX. Features insert, delete, replace, save, test, breakpoint and more all called by single key. Relocate function, abbreviations and expression evaluation for fast, easy operation. WORKED EXAMPLE OF BANK SWITCHED BLOCK FILL — BEAT THAT SLOW LYNX SCREEN!

F. L. SOFTWARE
13 St Ronans Avenue, Southsea, Hants. PO4 0QE. Tel: (0705) 828295

TAPE COPIER for the Spectrum (16/48K). Most features + money-back guarantee. Copies ALL TYPES of programs in one go. 100% mc. Verifies/Stops/Headerless/Multiple copies etc. No program area used for maximum copying, £3.75. L. Evans, 16 Stonepit Drive, Cottingham, Mkt Harborough, Leics.

SOFTWARE

SEEN MY CAT? Post-free Spectrum software from the top writers; independent assessments, FREE offers and more in my catalogue. SOFTSPOT (P), 20 Gordon Avenue, Bognor Regis, Sussex (0243) 822561.

TWO GREAT GAMES for the BBC Microcomputer Model B. Space Zapper and Webwars on 1 cassette for £3. Send SAE, cheques or POs to: Kevin Hazeldine, 51 Southgate Avenue, Plymstock, Plymouth PL9 9LW.

5D SOFTWARE FOR ZX81

- ZX Owners — July Software list now available.
- Programmers — our Software Writer's Co-op Scheme can earn royalties up to 70%.
- Dealer enquiries welcome.

Hempland Cottage, Lopham, Diss, Norfolk. Tel: 037-988 640.

DRAGON "KOPY-KEY". Copies machine code programs, send £1 (includes return postage) to A. Ellis, 22 Turnavean Road, St Austell, Cornwall PL25 5NX.

NOLANSCO ELECTRONICS

Anirog, Llamasoft, Rabbit, Quicksilva, Avalon Games, Romik, Chalksoft, Virgin, Business, Educational and Games Software for Vic20, Commodore '64, Spectrum, Atari 400/800 and Dragon 32.

Mail Order or Phone Karen on Biggleswade (0767) 316702 (24 hrs).

SECOND-HAND SOFTWARE sale, over 300 titles with 10% off original cost. Write to: R. Bhatta Charya, 3 Wensley Close, Harpenden, Herts AL5 1RZ, for list.

VIC20 SOFTWARE (unexpanded), 5 action-packed games with defined graphics. Frogger, Jackpot, Escape, Line-up, Numbero, only £5. Write to: S. Peters, 1 Leyside, Bromham, Bedford MK43 8NF.

SHARP

Wide range of sensibly-priced programs on cassette for MZ-80A and MZ-80K Business, Games, Educational and Utility.

SAE for catalogue
D.C.S., 38 South Parade, Bramhall, Stockport

DRAGON 32 SOFTWARE for sale. One cartridge, eight tapes. Tel: Belper 4783.

New Software Release for the 16/48K Spectrum

TRY THE IMPOSSIBLE

A tantalising puzzle to challenge the most ardent enthusiast. Just connect all three services to all three houses. Simple enough! — or is it?

Hours of frustration for only **£5.45** inc p&p. Cheques/PO to:

Mutch of Farm Cottage, 28 The Street Barton Mills, Suffolk IP28 6AW

SOFTWARE FOR BBC MODEL B, including Acornsoft, A&F and BBC. Tel: 0482 849517.

EDUCATIONAL SOFTWARE

SPECTRUM, 16/48K. Tired of zapping aliens? Two difficult puzzles on a single tape will exercise your brain instead of your fingers, £4. McAllister Computing, 9 Beech Grove, New Malden, Surrey KT3 3HR.

DRAGON 32. Let Coco the Clown help your child with the "ABC". Large size lower-case letters in hi-res colour, with sound. Options include: spelling test and writing on screen. Also Dragon Maths, a fun program for all ages, with colour and sound, £5 inclusive. M. Street, 236 Chester Road North, Kidderminster, Worcs, DY10 1TE.

SPECTRUM, educational software. SAE for details, 18 Rayhall Lane, Great Barr, Birmingham.

DEALERS

SOFT MACHINE

A selection of the very best Software, Books and Accessories available for ZX81, Spectrum, BBC, Dragon, Vic20 and Commodore '64 Microcomputers.

At 3 Station Crescent Westcombe Park London SE3
Tel: 01-305 0521
or send SAE for free catalogue (state which computer)

COMMODORE 64
£264.00 (excl VAT)
64 Programmers Ref Manual **£9.00** + **£1.50 p&p**
Tel: Chris Gurney, Dave Walsh or Floyd Patterson
Tel: 01-969 4658/7527 or send SAE
Image Science Micro Computers Ltd
189 Freston Road, London W10 6TH
or cheques P/O(add 15% VAT) and £8 for p&p Securicor delivery
Prestel Frame 4820000 (a) for latest software and hardware information and prices. Full after-sales maintenance on all Commodore Equipment bought from us.

CLUBS

SOFTWARE EXCHANGE. Swap your used software via our club. Free membership. £1 per swap. Most computers. SAE for details. UKSEC, 15 Turnwell Greave, Sheffield S5 9GB.

SPECTRUM DUSTCOVERS
Only £1.75 (inc. P&P)

Smart top quality Blue 'Galaxy' PVC with silver Spectrum 'flash'. Unique design permits leads and most interfaces to remain connected.

PDQ Software, 'Parsley Rye' Hilders Lane, Edenbridge, Kent
Dealer enquiries welcome

SOFTWARE CITY SOFTWARE CLUB

Massive list of games, tapes and discount card
For Spectrum, Dragon 32, Vic20, BBC, Sharp, Apple
TRY BEFORE YOU BUY
SAE FOR LIST
Also available Apple II Peripherals
16 THEOBALD STREET BOREHAMWOOD, HERTS

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 (PCWK)
146 Church Road
Boston, Lincs PE21 0JX

TANDY CGP-115 printer and Dragon lead, £120. Telephone 0283 790454.

VIC20 OWNERS, do it yourself cassette copying, send £2 for instructions. G. Cochrane, Montana, Silksworth Lane, Sunderland SR2 1PD.

ASSEMBLER/DISSEMBLER for Oric labels, symbol table, trace facility, forward references, £6.95. Philip Rice, Department PC1, Woodroyd, Harefield Lane, Pateley, Bridge. Tel: 0423 711609.

UNBEATABLE PRICES PLUS 2 FREE OFFERS!

FREE catalogue containing lots to interest any micro user.
Just send stamped addressed envelope:
FREE 4-page leaflet that explains tape head azimuth alignment . . .
If you order any product, eg. Atari dust covers £2.50; BBC r q Forth £12.95, cassette leads £2.35; Commodore 64 Adventure Quest £8.95, dust covers; Dragon Gridrunner £6.95, Everest £6.95, dust covers £2.50; Genie Book £4.95, dust covers £3.50; Lynx Space Trek £4.50, Colossal Adventure £8.95; Oric cassette leads £2.35, dust cover £2.50, book £4.95; Spectrum dust cover £1.50, Colossal Adventure £8.95; VIC dust covers £2.50; ZX81 16K RAM packs £16.95; T-shirts "I'm a Micro Addict" or "Microcomputers take you into Another World", 24"-44" £4.40.
PRICES INCLUDE P&P (UK only)
THIS IS JUST A SAMPLE
SEND SAE FOR COMPLETE CATALOGUE
Mail Order with cheque/PO to:

FULCRUM PRODUCTS, Dept: W
14 STEEP LANE, FINDON
WEST SUSSEX BN14 0UF

ZX81 USER DEFINED GRAPHICS

Produce all the characters you will ever need with the Vector UDG Board
DRAW CIRCUIT DIAGRAMS
ENHANCE YOUR GAMES
CREATE NEW TEXT FONTS
PRODUCE MATHEMATICAL SYMBOLS
Character sets can be saved and are protected from new, allowing you to add your own graphics to commercial programs. Characters may be modified or exchanged at any time, even from within a program. The Vector UDG Board is ready built and is simply fitted to any ZX81 (1K or 16K), and has a socket for an extra Ram or Rom. A pre-programmed Eprom is available with graphics for Chess, Pac-Man, Invaders, Text, Circuits, etc.
VECTOR UDG BOARD £17.95
UDG BOARD + EPROM £19.95
Prices include VAT + P&P, send cheque or PO to:

VECTOR DESIGNS
41A WINWICK STREET
WARRINGTON, CHESHIRE WA2 7TT

RECRUITMENT

IF YOU

have written or are writing an original Machine Code Program for the VIC20 or the Spectrum

WE HAVE AN IDEA

which could make your program the best seller in Europe

INTERESTED???

Then telephone: 01-868 5332

NOW!!!

PROGRAMS AND PROGRAMMERS

Wanted for UK and USA Market. Spectrum, Vic20/64.

Send tapes to:

ENFIELD COMMUNICATIONS
135 HIGH STREET
PONDERS END, MIDDX
Tel: 01-805 7434

HARDWARE

AERIAL SPLITTER — WHAT FOR?

Why unplug your TV aerial and plug in your micro umpteen times a week? Never again with our inductive type, low loss aerial splitter. Just gently press your micro lead and the TV lead into the splitter and plug it into the TV aerial socket.

Takes 10 seconds and you never need to unplug or plug in again! Also enables you to run 2 TVs from one aerial.

ONLY £1.85 inc p&p

Also C15 Blank Computer Cassettes availale:

5 for £3.05 inc p&p
10 for £5.90 inc p&p

Cheques and POs to:

SOUND NOTIONS
17 ALBERT ROAD, LONDON N5 1TX

PRINTERS STAR DP510, £275; Shinwa CP80, £275; Epsom RX80, £280; FX80, £410, inc p&p, VAT, cable (state micro). P.I. Services, 91 Rectory Grove, Hampton TW12 1EG. Tel: 01-941 0505 (24 hours).

ATARI 400, 48K, moving keyboard, recorder, software and books, £199. Tel: Reading 345119.

PET 16K, new Roms, cassette, tool kit, joystick, sound box, manuals, 100+ programs, mint condition, £220 ono. Tel: Wallingford 39497.

VIC20 +C2N cassette, boxed + 16K + stack cartridge (hires/toolkit 13K/slot) + dust covers, software, magazines, £140. Tel: St Ives (Cambs) 0480 63985.

VIC20 computer cassette unit, joystick and other software, £140. Tel: 01-979 2294.

DRAGON 32 for sale, inc books, games, etc, £140 ono. Tel: 061-485 1550.

BBC B 5 new games: Darts, Sheep Dipping, Ghost Chase, Planet Lander, Simon, £7. Cheques/POs J. McCann, 39 Young Street, Derby DE3 6NB.

BBC B, 4 months old, very good condition, cassette, recorder, leads, cover, PCN, 1-20, 27 programs (including 11 Acornsoft), only £395. Tel: 01-460 3171.

JUPITER ACE + manual, leads, software, £70. Tel: 0254 76228.

VIC20 plus super expander, games over £30; books over £15. £130 ono. Tel: 203 0779.

SPECTRUM KEYBOARD (original). Tel: Robert on Bedford 768480 after 7 pm.

TRS-80 LEVEL 2, 16K, new green screen monitor, recorder, leads, manuals, software, dust covers, £150. Tel: 061-764 4909.

VIC20 cassette unit + £700 software, only £80. Phone Leeds 589465.

FOR HIRE

TO HIRE A COMPUTER from ZX81 upwards, ring or write to: Business and Computer Services, 292 Caledonian Road, London N1 1BA. Tel: 01-607 0157.

SERVICES

DRAGON 32K Eprom programming service. Cassette to Eprom or Eprom to Eprom. Tel: Steve Ping on (0784) 34300 Ext 208 (days), for details.

FOR SALE

TEXAS TI99/4a, 16K, includes software, cassette leads, Basic, manuals, £100. Tel: Cardiff 0222 617245.

1.2 OPERATING SYSTEM CHIP, for BBC Micro with full fitting instructions, unused, £5 inc p&p. Tel: 0443-203573.

LYNX, 48K, plus cassette recorder, still under guarantee, very good condition, £185 ono. Tel: Southampton 862577.

SEIKOSHA GP100A, graphic printer, 6 weeks old, mint condition, boxed + manuals, £170 ono. Tel: Chesterfield 36935.

LYNX, 48K, brand new, unwanted prize, instruction manual, introduction tapes + all leads, £180 ono. Tel: Nottingham 256062.

TI99 4A, 7 months old, extended Basic plus Parsec, plus Invaders cartridges, cassette cable plus joystick, £175. Tel: 0455-634074.

SWAP, 48K Lynx + 2 cassettes for Commodore 64, Dragon 32, or 48K Spectrum with printer and software or sell for £165. Tel: 0799-22207.

RADOFIN COLOUR TV GAMES with superstar chart, £25 ono. Tel: Uckfield (0825) 2514 (6 pm).

48K LYNX, 3 months old, perfect condition, all leads + books + software, University commitments cause quick sale, £145 ono. Tel: Clive, Waltham Cross 28173.

LYNX, 48K, 1 month old, excellent condition, boxed + manual + tapes, £175 ono. Tel: Swansea (0792) 891578.

CHESS COMPUTER, Chess Challenge 10 with superb carrying case, immaculate condition, only £80 ono. Tel: 01-952 4558 (evenings).

COLOUR GENIE, 16K with black and white 14-inch tv, cassette player, less than 6 months old, £190. Tel: 0793 782037.

SEIKOSHA GP-100A PRINTER, plus cable for BBC micro. As new, £115. Ian McInnes, 76 Brunswick Street, Sheffield S10 2FL.

ZX81 16K with keyboard, loads of software and magazines, under guarantee, £80. Tel: Shrewsbury 246670.

VIC20, unused, boxed, £80. Wembley 01-904 5849.

DRAGON plus Invaders, Ghost Attack cartridges, six games, tapes, books, 3 months guarantee, £170. Telephone (0606) 67191.

PET 2001-16K, large keyboard, new Rom, toolkit, cassette, £295; CBM 3022 printer, £295. Telephone 0536 712068.

DRAGON 32, as new, plus cassette, joysticks, cartridges, books, worth £300, accept £160. Telephone Hemel Hempstead 52036.

ZX81 32K, machine code book, £35 ono. Tel: 0721 21340.

SPECTRUM, 80K memory upgrade, £40 + Kempston joystick, £20.

TANDY TRS80 model 1, 16K, with manuals + £250-worth of software, £125 ono. Brighton 699921 after 6 pm.

WANTED

WANTED

Quality Games and utility programs for any Micro. All programs considered.

Instant cash plus royalties, on all programs accepted with a view to distribution in UK, USA and Europe.

Dream Software PO Box 64
Basingstoke, Hants RG21 2AB
Tel: Basingstoke (0256) 25107

WANTED, Afron expansion unit for Vic20, must be in good condition. Also memory cartridge and software. Tel: 01-574 4122.

DRAGON 32, or BBC Model B. Tel: Braintree 23756. Can collect.

WANTED, any Spectrum in West London area. Reasonable price paid. Tel: 01-561 5981.

SUNSHINE

is seeking authors for new titles to add to its highly original and successful book range.

Experienced and first time authors are invited to submit manuscripts, ideas or fields of interest.

Full details of what we can offer from **David Lawrence, Book Editor, Sunshine, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.**

Sunshine: Publishers of Popular Computing and Dragon User.

WANTED. Commodore disc reader, 8050 or 8250. Must be perfect working order. Tel: Peachman, Long Stratton (0508) 30448.

SPECTRUM SOFTWARE WANTED URGENTLY. 33% royalties for the right programs! Send tapes to: Odyssey Computing, 28 Bingham Road, Sherwood, Nottingham.

WANTED FRANTIC, Xeno II, Slap Dab, Time Trek, Galactic Abductors, new Rabbit games. Phone Leeds 589465.

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.
Ring 01-930 3266 and give us the details.

Spectrums for sale

SPECTRUM 48K, and printer and 10 rolls paper, a game and books, £120. Tel: South Benfleet 3909.

SPECTRUM 16K, brand new, 4 tapes, 2 Shera books and 5 rolls printer paper, cost £140, sell £100. Tel: 061-225027 (after 5 pm).

SPECTRUM 48K with tape controller, books, magazines and over 80 tapes worth well over £500. Total value £700, sale price £295. Tel: Harpenden 69152.

SPECTRUM 48K, other £300 software including over 40 cassettes also carrying case and books, good condition worth £474, sell £175. Tel: 01-574 4122.

SPECTRUM 16K, 4 months old, leads and manuals, £55, tapes, magazines and Dixon tape recorder, 1 year guarantee, worth £20-£120. Tel: Yately 876455.

SPECTRUM 48K, very good condition £50 software £130. Tel: 061-427 1898.

ZX SPECTRUM 48K, 7 months old, printer, printer paper, over £100 of best software, including books, cost £320, will sell for £220 or near offer. Tel: 0278-732355 after midday.

ZX81s for sale

ZX81, 16K, keyboard, sound pack, £50 of books and magazines, D. K. Tronics Graphics Rom board all leads and manuals. Fitted in consul case, and Plustion 14-inch black and white TV and aerial, all for £200. Tel: 01-998 8117, Anosh, evenings.

ZX81, 1K, excellent condition, £25. Tel: 01-552 7811.

ZX81 1K, keyboard, £60 software, £25. Tel: Erith 38073.

ZX81, 16K, with manual, books, magazines, tapes, loading tapes and software. Worth £150, bargain at £90. Tel: Flitwick 717024.

ZX81, 64K, Kempston keyboard, Q save, custom built module, manual, £130. Popular games, business software, £300 value. Bargain at £100 complete or separately, half current prices. Tel: Weymouth 74091.

ZX81, 16K, £40 software, tape recorder, all leads, and 4 months guarantee. All worth £120, sell £70. Tel: Sunderland 78215.

ZX81 16K, with a file 60 keyboard plus leads and manuals, beginners book and magazines asking for £45. P. Dobson, tel: Crawley 883922.

ZX81 1K, £30 including magazines. Tel: 01-961 2855 (between 4 and 6 pm).

ZX81, 16K, £40.

ZX81, 16K, 6 Springview, Ossett, Wakefield, W. Yorks.

ZX81, 1K, £20 of software, £40. Tel: Worcester 20668.

ZX81, 16K, full size keyboard, tapes etc for Jupiter Ace or sell for £70. Tel: Ashford (Middx) 56039.

ZX81, 16K, Kempston keyboard, Zoni sound unit Spectrum expansion board, £30 software, manual leads etc. May sell separately. Reasonable offers considered. Tel: 01-660 6007.

ZX81, 16K, and full size keyboard, tape recorder, black and white TV, £75 software will sell for £95. Tel: Warrington 63374

ZX81, 16K, leads etc £70, software, cassette holder, books and magazines. All worth £150 sell for £85 ono. Tel 01-460 6207 after 5.30 pm.

Dragons for sale

DRAGON 32, + Dragon Dungeon, joysticks + £'s worth of software, offers over £150. Tel: Melton Mowbray 68086.

DRAGON 32, + dust cover, £135. Tel: Bridgwater 56292.

DRAGON 32, + joysticks + some books + software, 5 months old, little used, £150. Tel: 01-363 9125.

DRAGON 32 plus joysticks, boxed as new, £140. Tel: 01-739 7102.

DRAGON 32, with £80 software and joystick. As new, boxed, £165 ono. Tel: 0942 712530.

Tandys for sale

TRS 80, Level 2 16K, VDU cassette, recorders, books + manuals, games + teaching tapes, £135 ono. Tel: 0865 724182, evenings only.

VIDEO GENIE EG3003 16K + sound + 18in colour tv, £100 software, £200 ono. Tel: Pete, (Scarborough) 98 62158.

TANDY TRS80 Model 3, 48K, with 2 disc drives, £750. Tel: 0786 2045, evenings.

TANDY TRS80, Model 1, Level 2, 16K + C2R 80 cassette recorder, manuals, books + some software, £140 ono. Tel: 0634 721672, evenings.

TANDY TRS 80, Model 1, level 2 complete with cassette and video display, software and manuals included £230. Tel: 01-660 1893 evenings only.

Commodores for sale

PET 2000 1, 8K integral cassette plus monitor plus sound generator, Centronics 779 printer with interface, Petsoft tapes, manuals and books, £300. Tel: 0376 70032.

VIC20 plus cassette unit and 3K Ram and super expander plus three cartridges plus joystick plus programs reference grids etc., £165 ono. Tel: 01-558 0319.

VIC20 plus cassette deck, super expander, joystick, one cartridge, tape software, £160. Tel: Weston-super-Mare 814463.

VIC20 16K STOREBOARD plus Vic kit & cassette unit, carry case, one cartridge, over £250 games, joystick, many books. Sell for around £150. Tel: South Godstone 2446.

VIC20 toolkits and utilities. Vic Kit 1, 3, 4 and 5, £15 each; Supercharger plus, includes 3K and 2 Rom sockets for Vic Kits, £25. Reasonable offers not refused. Tel: Phil, 0742 471574, after 5 pm.

COMMODORE 64 + C2N cassette + introduction to Basic, cost £405, selling, as new, £305. Tel: Warborough (Oxford) 8782.

COMMODORE Vic20, few months old, immaculate condition, bargain at £100 ono. Tel: 01-959 5267, after 6 pm.

VIC20 16+3K Ram pack, cassette unit, Adventure cartridge, dust cover, books, Vic computing magazines, fully boxed, cost £350, sell £199 + £100 software for only £50. Tel: Adson (027582) 2477, after 5 pm.

VIC20 + C2N cassette + slot microboard + 16K Ram expansion, various good-quality software, all still under guarantee, only £250 ono. Tel: 051-652 1625.

VIC20 Super expander, £20 or swap for 8K Ram pack. Tel: Edenbridge (0732) 863572.

VIC20 16K machine monitor, forth, programms aid, super expander, software, £170. Tel: 310 4031.

VIC20 cassette unit, switchable 16K, joystick, dust cover, intro-to Basic, part 1, over £1,000 software, manuals, books, fully boxed, under 1-year-old, £250 ono. Tel: 0442 58200.

COMMODORE 8K + cartridges for sale. Tel: 0442 58200.

VIC20 32K, C2N, super expander, program aid, 1 Adventure, 3 game cartridges, 8K motherboard, program res guide, light pen with lots of software, value over £600, sell for £300. Tel: T. Pu Pulu 01-440 3801.

VIC20 16K, C2N cassette deck, super expander, 4 cartridges + joystick, 3 tape games, 1 maths rev, £30 magazines, £170. Tel: 0935 823537.

SWAP VIC20, joystick, 7 games + intro to Basic, part 2, tape recorder, for Commodore 64, or sell for £160. Tel: 01-660 8136.

VIC20 + cassette recorder + 3K and 10K expansion unit + well over £1,000 software (mainly games), 2 game cartridges, joystick + magazines, all boxed, in good condition, value approximately £1,400, offers of not less than £345. Tel: Ruislip (08956) 38564.

VIC20, cassette unit + 23 programs, £140. Tel: Burgh Heath 51121.

VIC20, still under guarantee, £65; C2N, £25; 15 tapes, £25; 10 cartridges, including games + memory, £55. Tel: 01-574 4122.

VIC20 + C2N + 16K and 3K Ram packs + well over £1,000 software (mainly games), 2 games cartridges, magazines and joystick, 1 boxed and in good condition, value approximately £1,400, offers of at least £345. Tel: Ruislip (08956) 38564.

VIC20 + 16K + C2N + joystick and book + lots of cassettes and 8 cartridges, many listings, swap for Dragon 32 + hardware or Commodor 64 + hardware or BBC Model B. Tel: Braintree 23756.

VIC20 C2N cassette deck + 3 16K Ram pack, programmers aid + machine code monitor with joystick + paddle, 4 cartridges + £130 software, introductory and Basic 1 and 2 Vic revealed + programmers reference guide, all worth £665, sell for £300. Still under guarantee. Tel: 892 8768.

SWAP VIC20, unexpanded, 3 weeks old, both instructions to Basic, tape recorder, 8 games (2 need 16K Ram pack) for Commodore 64 + cash if needed or sell for £160. Tel: 01-660 8136.

Acorns for sale

ACORN Atari 12K Ram 12 Rom leads, manual, power supply, recent manufacture service, complete with software, £150. Tel: Southampton 736258.

BBC MODEL B 1, 2 operating system, joysticks, masses, software, magazines, books, etc, £475 ono. Tel: 052 526527.

ACORN Atari 15K Ram, with games, including 5-volt regulated power supply for expansion plus all manuals, £75 ono. Tel: 061-790 8151, after 6 pm.

BBC MODEL B, 1.2os, Basic 2, 3 months old, £350 ono. Tel: 061-792 7431.

ACORN Atari 12K Ram/12K Rom, with power supply, manual, software, cassettes, £99. Tel: Southport 73410, after 4 pm.

Ataris for sale

ATARI VCS with 2 cartridges, £40. Tel: Canterbury 51241.

ATARI 400, Basic, recorder, joystick, assembler editor, 2 cartridge games, good condition, £170. Tel: 01-422 8174.

ATARI VCS + 11 cartridges, bargain, £100 ono. Tel: 051 531 7885.

ATARI VCS, with 9 cartridges, offers. Tel: 061-633 7988.

ATARI VCS, as new, 7 cassettes, with controllers, £120 ono. Tel: 061-653 6550, after 6 pm.

For sale

INTERFACE APPLE PCB to centronics parallel plug. £35. Tel: 0376 70032.

NATIONAL WV 5310 professional black/white monitor plus audio facilities. Very versatile, excellent condition, £60. Tel: 0376 70032.

48K LYNX. Leads, manual, cassette recorder with eight tapes. Genuine version for sale — hence bargain price, £175. Tel: 061-707 3716 after 6 pm.

SEIKOSHA GP 100 VC. adapted for Vic20 plus paper, three months old, £200. 12 Jasper Close, Danes Court, Llandass, Cardiff CF5 2RX.

Wanted

WANTED. ZX printer in exchange for full competition archery set. Tel: 0293 541988.

WANTED. ZX printer in working order, also printer paper. Tel: 574 4122.

WANTED. Atari printer and disc drive. Tel: Chris 01-858 2849.

OLD ATARI 410 TAPE RECORDER, as seen in woner's manual, exchange new 410 tape recorder. Tel: Ascot 21160.

CRUISING & BLIND ALLEY

Cruising

The winner of last month's competition with a score of 43552 was Carl Doran of Skidby Mill, North Humberside. Entries for this month's competition close on August 31.

Blind Alley

The highest score sent in so far this month is 99955 from I Wilson of Thornaby, Stockton. Entries for this month's competition close on August 31.

POPULAR Computing WEEKLY

Back Issues

Almost all the copies of **PCW** that you missed can still be bought as back issues for only 50p, including postage and packing.

An **index** of the contents of the 36 issues published in 1982 is now available from the Publishers for only £1.20. It includes full details of all the programs, routines, reviews and news that you might have missed.

Please send me the following back issues at 50p each:

Total £

Please send me a copy of the 1982 PCW Index at £1.20 ☐

I enclose a cheque postal order for £

Name

Address

Please return to Back Issues, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.

ORIC-1 MACHINE CODE

AWA Software proudly announces "ORION", a fully-integrated machine code development program for the 48K ORIC-1.

ORION, which includes a fast ASSEMBLER, a DISASSEMBLER and a single-step MONITOR, comes complete with a comprehensive 30-page manual.

The ASSEMBLER is two pass, with output to the screen on the second pass. Labels of up to six character's length are supported. Assembler directives include DFB DFW DFS DF$ ORG and END. Code can be assembled to most areas of the RAM and can be directed to run from the same or from any other address. Full error trapping is included.

Thirteen single-letter commands are available directly from the MONITOR, including Disassemble, Fill Memory, Memory Move, String Search, Hex Dump, Hex Entry and Set a Breakpoint. Setting a Breakpoint allows the user to stop his program at any point and examine the CPU registers. Program execution can then be continued one instruction at a time or allowed to run freely. Running the program in the single step mode (one instruction at a time) is an extremely powerful debugging tool which allows the user to see the exact effect of each program instruction upon the registers and upon memory.

ORION is priced at £12.95, inc p&p and is available from:

AWA SOFTWARE

50 Dundonald Road, Didsbury, Manchester M20 0RU

Dealer enquiries welcome

IVYSOFT

is pleased to announce its move to new premises at 36 New Street, Barbican, Plymouth (tel: 0752 671606) with effect from Saturday, August 6, to be known as:

THE SOFTWARE SHOP

As well as stocking over 250 titles for the Spectrum we also have wide selections of software for the Oric, BBC, Vic20, Commodore 64 and Dragon micros.

To celebrate our opening, during August we will be offering a 10 per cent discount on all software purchased and special offers on the following computers:

BBC	£389.00	Commodore 64	£219.00
Atari 400	£139.95	Dragon	£169.95
Vic 20 Starter Pack	£134.95	Oric 48K	£134.95
Spectrum 48K	£124.95	Lynx	£215.00
Vic 20 with 16K Ram			£169.95
ZX81 with 16K Rampac + games program			£45.00
Star DP510 Printer now only			£245.00 + VAT

Add £5 postage and packing on hardware

Special tax free prices for foreign orders

Listing paper from only £11 for 2,000 sheets plus £1.50 carriage. Wide selection of disks, printer ribbons, etc, at discount prices.

All mail and telephone orders should still be made to 91 Cleeve Drive, Ivybridge (tel: 07554 4088). Send large SAE for price list, stating which computer you are interested in

BARCLAYCARD VISA

SEE US AT THE 8th ZX MICROFAIR ALEXANDRA PALACE, SATURDAY AUGUST 20th

WIN THE POOLS?

48k

SPECTADRAW 2

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. It can then identify the matches which are likely to yield draws and output suitable predictions.
The program is supplied complete with database tape containing data on over 7,500 matches and a comprehensive instruction manual.

For £12.95 inclusive (cheques/POs payable to B. S. McAlley)
SPECTADRAW
1 COWLEAZE, CHINNOR
OXFORD OX9 4TD

SEE US AT THE 8th ZX MICROFAIR ALEXANDRA PALACE, SATURDAY AUGUST 20th

Dragon users...

You can now copy your high resolution graphics to your TANDY DMP100 or SEIKOSHA GP100A from any of the two colour graphics modes with our High Res Screen Dump Program.

only available from

CAVEMAN COMPUTERS

PLEASE SUPPLY..... HIGH RES SCREEN DUMP PROGRAM(S) AT £7.95 EACH

I enclose a cheque/P.O. for £..... payable to: CAVEMAN COMPUTERS

NAME.....
(Block Capitals)
ADDRESS.....

.....

.....

(Allow 28 days delivery)

CAVEMAN COMPUTERS
THE CAVE HOUSE • 55 IONA ROAD • WINDY NOOK • GATESHEAD TYNE & WEAR.

SALE **P.&R. COMPUTER SHOP** SALE

IBM GOLFBALL PRINTERS from £70 EACH + V.A.T.

INTERFACE FOR IBM GOLFBALL £40 + V.A.T.
*BRAND-NEW LA36 DEC WRITERS — SALE £200 EACH + V.A.T.
CENTRONIC 779 PRINTERS — £325 + V.A.T.
CENTRONIC 781 PRINTER — £350 + V.A.T.
POWER UNITS, 5-VOLT 6-AMP — £20 EACH
FANS, PCBs, KEYBOARDS AND LOTS MORE
8-INCH IBM FLOPPY DISC DRIVES

COME AND LOOK AROUND

SALCOTT MILL, GOLDHANGER ROAD
HEYBRIDGE, MALDON, ESSEX
PHONE MALDON (0621) 57440

ADSOFT

Something different for Spectrum owners

FOR THE KEEN SPORTSMAN WHO WOULD LIKE TO IMPROVE HIS GAME, HERE ARE THE PROGRAMS TO HELP YOU!

PLAY SNOOKER and PLAY SOCCER

FOR 16K OR 48K SPECTRUMS

INTRODUCTORY OFFER
Send this ad and pay only £14 for both programs

FEATURES:

- 6 programs on each cassette (that's over 50K of programs!)
- Over 50 'pages' of instructions, advice and diagrams using sound, colour, and hi-res graphics.
- Easy-to-follow instructions make learning enjoyable.
- Either program only **£8.50** (p&p inclusive).

Please send cheques /POs to:
ADSOFT, 36 OLD QUARRY CLOSE, RUBERY, BIRMINGHAM B45 9TU

THE ULTIMATE BYTE

LOOKING AT THE FUTURE . . . NEVER AT THE PAST

NOTICE for all Spectrum Machine-code Programmers!

WE are the newest software company looking for people who have written the games of the future **NOW!**

In return for your programs we offer:

A minimum of **40%** royalties!
HELP on improving your programs
We already have ideas for **NEW** programs
ADVERTISEMENT of your programs in the popular computing press
The chance to buy a **SHARE** in the company!

Send samples of your programs to us at the following address:

THE ULTIMATE BYTE
9 NORTH AVENUE, SOUTHALL
MIDDLESEX UB1 2RE

PS Cost of postage will be refunded

CARDS

If software houses don't release *Mastermind* or *Space Invaders* when they begin operating, then they release versions of card and other gambling games.

One such company has decided to do just that for the ZX81 — so if you fancy playing *Poker*, *Dominoes* or *Brag* you can get any two for £2.35 on one cassette.

Program *Poker/Dominoes/Brag*
Price *£2.35*
Micro *ZX81 16K*
Supplier *W Jefferson*
29 Arundel Walk
Pelton
Chester-Le-Street
Co Durham

STARRED

Things to do with your Spectrum other than kill aliens number nine: learn astrology.

Now I know there are a lot of computer buffs who are not very keen on unscientific things like astrology; they are even less keen on using computers for astrology — oh the degradation! So, I apologise in advance to anyone who may feel upset when I say that Astrocale specialises in astrology programs.

Astrocalc has a number of packages for a series of micros including Spectrum and Genie.

Astrotutor is a series of five cassettes which teach you all you need to know about planets, signs, houses, aspects, etc. and then tests you on your knowledge. The price of the individual units varies, but the complete set is available for £20.

Program *Astrotutor*
Price *£20*
Micro *Spectrum 48K*
Supplier *Terry Dwyer*
(Astrocalc)
53 Loughborough Road
Quorn
Loughborough LE12
8DU

IMPOSSIBLE

And All Because must be the first game ever to have been inspired by an advertisement.

There are nine different screens, in each of which you have to accomplish some impossible task like motorbiking down a ravine, or hang-gliding over a ledge — and all because you want to deliver some chocolates to your girlfriend.

Whether this will be as powerful a motivation towards brave deeds as saving the world from aliens remains to be seen.

Program *And All Because*
Price *£6.95*
Micro *Dragon 32*
Supplier *B&H Software*
208 King Street
Cottingham
Hull

A CLASSIC

If you have an 8K or 16K Vic then now you can play *Galaxians* on it. What do you mean, you are already?

Some people will not have a copy of the classic aracade game, where you blast away at birds which flutter around. Now, there is another version to choose from.

Cosmic Fire Birds from Solar Software has all the features, like 99 levels, demo version and bonuses and is written entirely in machine code.

Program *Cosmic Fire Birds*
Price *£9.95*
Micro *Vic20 (8/16K)*
Supplier *Solar Software*
51 Meadowcroft
Radcliffe
Manchester M26 0JP

SPECIALISED

Some of the programs I'm being sent these days for the Spectrum are pretty specialised.

Placet Software's *Aerofoil Directory* is for makers of model aircraft. It is intended to assist design by maintaining aerofoil data in an accessible form and by providing a facility for quickly calculating the dimensions of wing ribs.

OK. I'll be honest. I don't understand any of that last paragraph, I stole it from the press release. However, I'm sure all model aircraft fans will understand it.

Program *Aerofoil Directory*
Price *£4.95*
Micro *Spectrum 16/48K*
Supplier *Placet Software*
24 Marl Road
Radcliffe-on-Trent
Nottingham
NG12 2GY

IMPROVED

It may come as a shock to some people to realise that the BBC B's Basic could actually be improved — that anyway is the opinion of Vachettes Micros.

Its system, which will only work on the B with the OS1 2, includes functions like *Circle* and procedures like *Popgos*, which will delete from memory the last *Gosub* return address so that you can jump out of subroutines.

There are plans to increase the commands available on subsequent versions.

Program *BBC Extended Basic V I*
Price *£5.50*
Micro *BBC B (OS 1.2)*
Supplier *Vachettes Micros*
Marshborough
Sandwich
Kent CT13 0PG

HISTORY

The latest book from the National Computing Centre is Introducing Computers by Malcolm Peltu.

The book is intended to be a comprehensive guide to the history of computers and their development. It also includes sections on the various uses to which computers are put.

It's a mark of something or other that this book retails for £5.50 and has 326 pages with various pictures and plates, whereas most computer books cost £5.95 for not much over 100 pages.

Book *Introducing Computers*
Price *£5.50*
Micro *General*
Supplier *NCC Publications*
The National
Computing
Centre
Oxford Road
Manchester M1 7ED

PILOT

ISCA Software is a company producing games for Vic20. Its first release is *Warrior*, the scenario for which will seem strangely familiar.

You must pilot your light cycle around the screen, avoiding light trails and pylons. If you reach a purple power point you gain 100 points; if the robot warrior reaches one you lose 100 points.

The game will work either with a joystick or the keyboard.

Program *Warrior*
Price *£5*
Micro *Vic20*
Supplier *ISCA Software*
56 Whitchurch Ave
Exeter EX2 5NT

STRUCTURED

The BBC educational market seems to be getting into gear with the release of a number of professional (and expensive) products.

A company which seems to be specialising in this field is ASK Software, which has just released five educational packages for the BBC B.

The packages are adapted from programs written originally for the Vic and are mostly written in Basic.

Facemaker teaches sentence structure in the form of an Identikit picture of various mouths, noses, ears and hats, etc. Reading the name of each feature, together with an associated description, is supposed to help powers of description.

Program *Facemaker*
Price *£9.95*
Micro *BBC B*
Supplier *Applied Systems Knowledge*
London House
68 Upper
Richmond Road
London SW15 2RP

POOLED

At £200, or thereabouts, the Commodore 64 will be a very competitive machine — small wonder then that the news of the price drop has meant a significant increase in the amount of new software on offer.

Bubble Bus has a version of pool for the 64 called *Hustler* — it uses machine code and sprite graphics and offers six games for either one or two players.

This is the first of a range of software the company intends to supply for the 64.

Program *Hustler*
Price *£5.99*
Micro *Commodore 64*
Supplier *Bubble Bus*

The Computer Room
87 High Street
Tonbridge
Kent TN1 1LS

SHUTTLE

4 Mat specialises in educational software for the BBC computer.

Spacex places you in the *Golden Hind* — a space research vessel. You have jaunted off in your space shuttle to visit the Kleptoes — a semi-intelligent species who collect things and hide them.

Somehow all this has strong educational implications — the fact that they are not obvious may be a sign that it actually works.

Program *Spacex*
Price *£10*
Micro *BBC*
Supplier *4 Mat Educational Software*
Linden Lea
Rock Park
Barnstaple
Devon EX32 9AQ

LANGUAGE

CP Software is well known for its range of computer versions of classic board games.

Snail Logo is an unusual release, in that it is essentially a language — a language particularly well suited for the construction of geometric patterns hence its association with the turtle.

This is not the only version of the language available, but it is the first available for the Spectrum — it is the first moreover that actually has a displayable snail!

The price of £9.95 includes a manual which acts as a general introduction to the language.

Program *Snail Logo*
Price *£9.95*
Micro *Spectrum 48K*
Supplier *CP Software*
17 Orchard Lane
Prestwood
Great Missenden
Bucks HP16 0NN

MINIMALIST

Some new releases deserve a minimalist approach.

Gamespack. Spectrum. Cardgames. Hangman. Funfair Software.

Program *Braingames*
Price *£5.00*
Micro *Spectrum 16/48K*
Supplier *Funfair Software*
82 Lees Gardens
Maidenhead
Berkshire

PREHISTORIC

If your reputation consists of *Penetrator* and *The Hobbit* it can't be easy to decide what to do next.

Melbourne House has been strangely silent, at least on the Spectrum front, for some months now. Rumours of adventure games abound (bet you anything you like it isn't *Lord of the Rings*) but meanwhile something more tangible has emerged.

Terror Daktil 4D is an arcade style game in which, to simplify things slightly, you fire at prehistoric birds. What is unusual is the way 3D techniques are used to give you the impression the bird is rushing towards you.

Although this is not unique (see *3D Tunnel* for example) great things are claimed for the graphics.

Program *Terror Daktil 4D*
Price *£6.95*
Micro *Spectrum 48K*
Supplier *Melbourne House*
Glebe House
Station Road
Cheddington
Leighton Buzzard
Bedfordshire IU7 7NA

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 19 Whitcomb Street, London WC2 7HF.

Ziggurat

BCPL and Forth

A computer's memory is arranged in a linear sequence, one memory location followed by another in some numerical order.

BCPL and Forth are both languages which use this ordering to good effect.

BCPL, like most other programming languages, can set up an array of elements. Only one-dimensional arrays are provided, called "vectors". To make a vector of 16 elements (of name *VV*) the BCPL declaration would be:

```
LET VV = VEC 15
```

and to distinguish the (say) 7th element of *VV* we write *VV!7*. The "!" is pronounced "pling" in BCPL — as it is in BBC Basic (*User Guide*, p409).

The BBC Basic, *VV!7* is not the same as *VV(7)*: the first is the 7th element of the word vector *VV*, and the second is the 7th element of the real array *VV*. There are two different forms of declaration:

```
10 DIM 15 : REM WORD VECTOR
20 DIM VV(15) : REM REAL ARRAY ]
```

The BCPL declaration *Let VV = Vec 15* sets up a vector of 16 successive locations, and the variable *VV* is set to the address of the first location of the vector. *VV* "points" to the first element, and *VV+1* points to the second element (ie, *V+1* is the address of the second element of the vector). "*!*" is placed in front of the variable to produce the contents of the element stored at that location. That is, *!VV* refers to the value at the beginning of the vector (or *VV!0*). To refer to the second element along, we can either write the cumbersome *!(VV+1)*, or the more compact *VV!1*. The content of the second element, say, could itself be an address of a different location and, therefore, it is very easy to produce linked lists.

This system corresponds exactly to the use of memory and pointers in Forth, where there are elements in memory (called "cells" just as in BCPL) and each location can be regarded as itself being a pointer to other locations.

Systems programming languages, such as BCPL or Forth, have to provide such flexible methods of controlling memory use to be successful.

BBC Basic has three forms of indirection: *!*, *?*, and $.

The difference between the three forms of indirection in BBC Basic is what each form considers to be its own basic element. For *!* (pling) the basic element is four bytes (which exactly corresponds to an integer for the BBC). In the case of *?* (query) the basic element is one byte (*?VV* is used, *inter alia*, as the BBC version of *Peek* and *Poke*). And, finally, the $ (dollar) takes as its basic element a series of locations terminated by the value hex *0D* (and treats the locations as characters). Following the *Dim VV 15* statement above we cannot refer legitimately to *VV!7*, because the pling assumes four bytes a time: we can refer legitimately to *VV!0* (or *!VV*), *VV!1*, *VV!2*, and *VV!3* (or *?VV* to *VV?15*).

To indicate how this might be used, I will take an example from an article on graphics for the BBC computer. The authors set up a 500 element real array (for a computing technique called a "queue"). They effectively had written:

```
1000 DIM VV(500) : REM Takes up 2500 bytes
```

which in itself took up 2.5K. What numbers were they storing? They were storing co-ordinates on the high-res screen (maximum value 1279), for both *X* and *Y* — 5K in all. The number 1280 can be accommodated in two bytes (1280 = 5×256 + 0×1), and so why not define a byte vector 1000 bytes long? All it needs is:

```
1000DIM VV 999 : REM Takes up 1000 bytes
```

to save 3K overall — with an increase in speed as byte vectors are more efficient.

It is true that we would have needed to define a couple of special routines to cope with two bytes at once, but that is easy enough. Eg, to produce the number from two bytes:

```
1000 DEF FNvalue(XX,I) = 256*XX?I + XX?(I+1)
```

It seems clear that many experts (often raised via a language called Pascal) do not appreciate the power of BBC Basic, but get carried away by its more obvious advantages. ■

Boris Allan

Puzzle

Cassette prize

Puzzle No 67

Jamie needs help with a problem. He was given a set of four wooden blocks, like dice only with numbers instead of dots. His friend offered him a financial incentive to take more interest in the blocks. "Work out the sum of all the four-digit numbers possible with them and I'll give you one of my computer cassettes for every million in the total." He himself had been set the puzzle by his teacher, but preferred that Jamie was the one to put in the effort.

Can you help Jamie? No digit can be used more than once in any number — but the six may be inverted to form a 9.

Solution to Puzzle No 62

Oops! Horror of horrors, an error in the question to this puzzle!

Instead of 0 representing a zero in the seventh equation — √EEEEEEE = EEOE — O was meant to indicate an *odd* number. So, with the puzzle as was there was no possible solution to the seventh equation. The rest of the puzzle could, however, be solved using a program:

```
10 FOR N = 2 TO 8888 STEP 2
20 LET S = N * N
30 LET S$ = STRS S
40 FOR F = 1 TO LEN S$
50 IF VAL (SS(F))/2 - INT (VAL(S$(F))/2) <> 0 OR
   S$(F) = "0" THEN GOTO 80
60 NEXT F
70 PRINT "Number"; N, "Root"; S
80 NEXT N
```

This gives the answers:
√4 = 2, √64 = 8, √484 = 22, √4624 = 68, √68644 = 262, √446224 = 668 and √44462224 = 668.

Winner to Puzzle No 62

The winner is: C Hembrough, Tweed Grove, Hull, who receives £10.

Top 10

ZX81

1	(3)	QS Scramble	(Quicksilva)
2	(1)	Football manager	(Addictive Games)
3	(8)	Defender	(Quicksilva)
4	(2)	Flight Simulation	(Psion)
5	(4)	1K Chess	(Artic)†
6	(6)	1K Games	(Artic)†
7	(5)	Fantasy Games	(Psion)
8	(—)	Invaders	(Quicksilva)
9	(10)	Espionage Island	(Artic)
10	(—)	Invaders	(Bug-Byte)

*All 16K except where shown.
†Runs in 1K
(Figures compiled by Boots & Co., London)

Spectrum

1	(3)	Jet Pac	(Ultimate)
2	(4)	Flight Simulation	(Psion)*
3	(2)	Transylvanian Tower	(Richard Shepherd)*
4	(—)	Horace Goes Skiing	(Psion/Melbourne House)
5	(6)	3D Tanx	(DK Tronics)
6	(—)	Horace and the Spiders	(Psion/Melbourne House)*
7	(—)	Monsters in Hell	(Softek)
8	(5)	The Hobbit	(Melbourne House)*
9	(7)	Chess	(Psion)*
10	(1)	Penetrator	(Melbourne House)*

*Requires 48K.
(Figures compiled by WH Smith & Sons)

Atari

1	(2)	Miner 2049er	(Big Five)*
2	(—)	Triad	(Adventure International)§
3	(—)	Wayout	(Sirius)§
4	(—)	Close Assault	(Avalon Hill)§
5	(—)	Suspended	(Infocom)§
6	(3)	Zaxxon	(Datasoft)
7	(—)	Preppie 2	(Adventure International)
8	(—)	Sea Dragon	(Adventure International)
9	(7)	Hellcat Ace	(Microprose)†
10	(6)	Airstrike	(English)

*Cartridge, †32K cassette, §48K disc.
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Vic20

1	(2)	Catcha Snatcha	(Imagine)
2	(4)	Wacky Waiters	(Imagine)
3	(1)	Arcadia	(Imagine)
4	(3)	Cosmiad	(Bug-Byte)
5	(7)	Asteroids	(Bug-Byte)
6	(6)	Panic	(Bug-Byte)
7	(5)	Race	(Commodore)
8	(8)	Amok	(Audiogenic)
9	(—)	Alien Blitz	(Audiogenic)
10	(—)	Chess	(Bug-Byte)

(Figures compiled by Boots & Co., London)

BBC*

1	(1)	Snooker	(Acornsoft)
2	(2)	Starship Command	(Acornsoft)
3	(—)	Chess	(Computer Concepts)
4	(3)	Killer Gorilla	(Program Power)
5	(—)	Missile Base	(Acornsoft)
6	(—)	Bug Bomb	(Virgin Games)
7	(5)	Great Britain Limited	(Simon W Hessel)
8	(4)	Moonraider	(Program Power)
9	(—)	Forth	(Acornsoft)
10	(—)	Logo2	(Computer Concepts)

*Model B only.
Figures compiled by Poggles, Micro Management, Ipswich 0473 59181)

Books

1	(4)	Commodore 64 Programmers Reference Guide, *Commodore*	(Commodore)
2	(1)	Structured Programming with BBC Basic, *Atherton*	(Norwood)
3	(2)	Assembly Language for the BBC Micro, *Birnbaum*	(Macmillan)
4	(—)	6502 Machine-code for Beginners, *Stephenson*	(Newnes)
5	(9)	Complete Spectrum Rom Disassembly, *Logan*	(Melbourne House)
6	(—)	BBC Micro Book, Basic, Sound and Graphics, *McGregor*	(Addison-Wesley)
7	(6)	6809 Assembly Language Programming, *Leventhal*	(Osborne)
8	(10)	Forth on Your BBC Microcomputer, *de Grandise-Harrison*	(Acornsoft)
9	(7)	Vic Programmer's Reference Guide, *Commodore*	(Commodore)
10	(—)	Z80 Assembly Language Subroutines, *Leventhal*	(Osborne)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

Dragon

1	(—)	Mountain	(Dragon Data)
2	(—)	Basic Tutorial	(Ampalsoft)
3	(—)	Personal Finance	(Dragon Data)
4	(—)	Special Collection 1	(Dragon Data)
5	(1)	The King	(Microdeal)
6	(3)	Talking Android Attack	(Microdeal)
7	(4)	Planet Invasion	(Microdeal)
8	(2)	Space War	(Microdeal)
9	(5)	Night Flight	(Salamander)
10	(6)	Dragon Trek	(Wintersoft)

(Figures compiled by Boots & Co., London)

(Last week's position in brackets)

DEAR AUTOMATA, DESPITE YOUR VERY SILLY ADVERTISING, I AM ORDERING THE FOLLOWING FINE COMPUTER SOFTWARE FROM YOU!!

GO TO JAIL	(Spectrum 48K) @ £6	
PIMANIA	(Spectrum 48K) @£10	
PIMANIA	(Dragon 32) @£10	
PIMANIA	(BBC Micro 32K) @£10	
PIMANIA	(ZX81 16K) @ £5	
BEST POSSIBLE TASTE	(ZX81 1K) @ £5	
THE BIBLE	(ZX81 1K) @ £3	
CAN OF WORMS	(ZX81 1K) @ £3	
DRAGON DEMOS	(Dragon 32) @ £5	
BUNNY + E.T.A.	(Spectrum 16K) @ £5	
I enclose the right money TOTAL.....		£

or please charge my ACCESS CARD / EUROCARD / MASTER CARD

CARD NUMBER

my signature.....

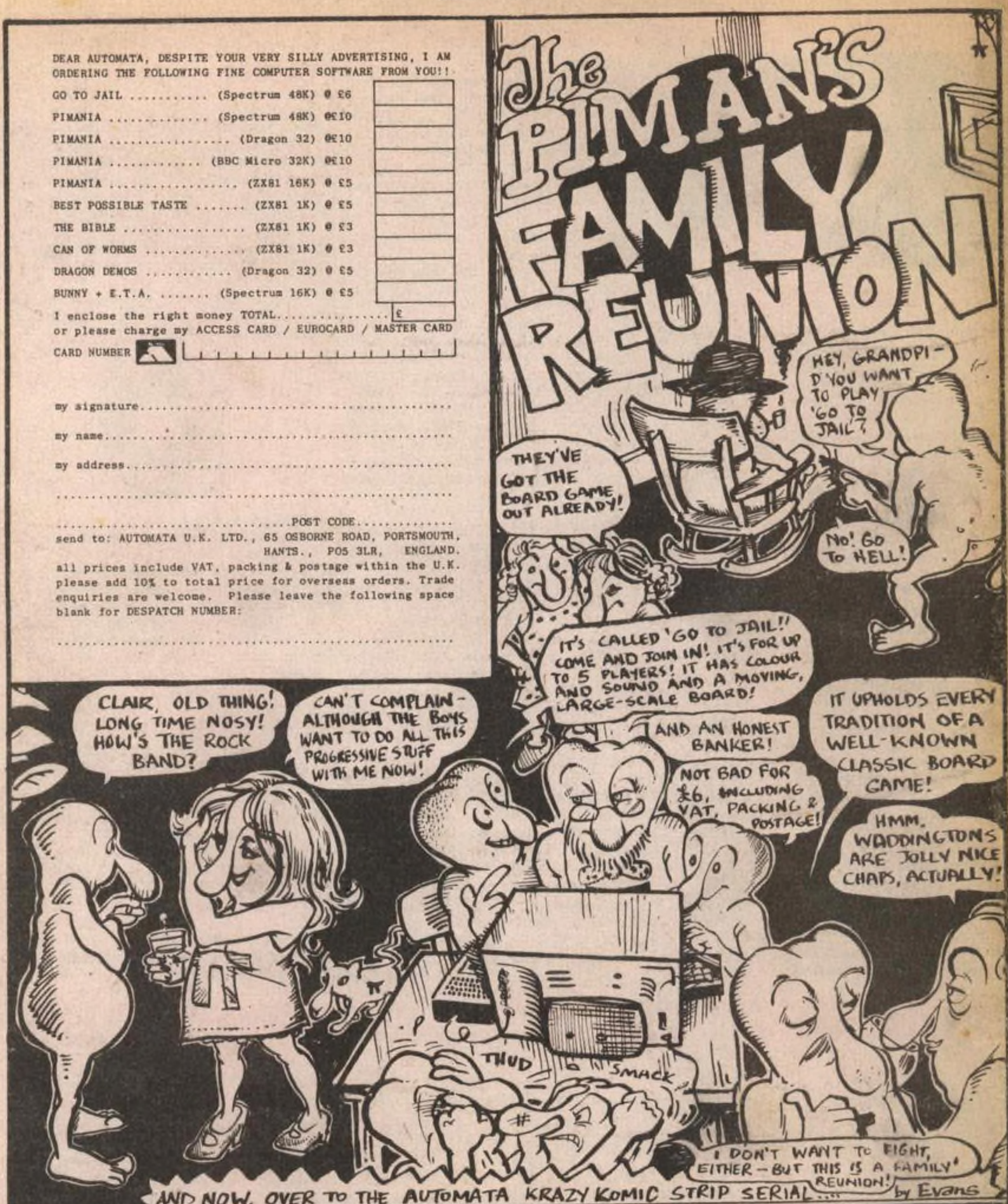
my name.....

my address.....

.....

.....POST CODE.....

send to: AUTOMATA U.K. LTD., 65 OSBORNE ROAD, PORTSMOUTH, HANTS., PO5 3LR, ENGLAND.

all prices include VAT, packing & postage within the U.K. please add 10% to total price for overseas orders. Trade enquiries are welcome. Please leave the following space blank for DESPATCH NUMBER:

.....