POPULAR Computing WEEKLY

35p 30 June-6 July 1983 Vol 2 No 26

This Week

Dragon disc drive
Keith and Steven Brain take a close look at the *Kelta* Disc drive for the Dragon 32. See page 14.

Inside Pimania
David Kelly gets to grips with *Pimania* purveyors Automata and is told of their latest project *Groucho* on page 13.

Spectrum check
Ian Logan continues with part two of his five part series on the Spectrum and this week looks at syntax checking. See page 20.

New releases
Coverage of the new games from Virgin including *Yomp* and news of a *Forth* package for the Oric. See page 45.

★STAR
Space Docking on Spectrum. See page 10.
GAME★

News Desk

Wind-down for the Model A

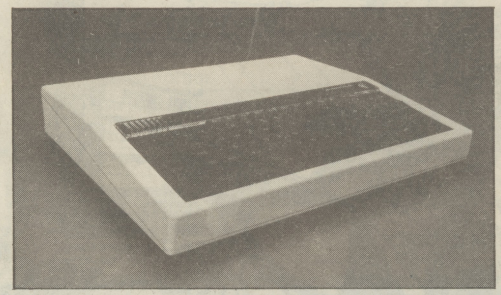
ACORN computers has decided to discontinue the BBC Model A machine.

Production is currently being wound down and a spokesman commented: "The reason is that nearly all of the orders now are for the BBC Model B and those who do buy As are tending to upgrade to Bs very quickly."

Acorn denies that the decision has been taken because the now-imminent Electron machine will supersede the Model A. "Although it looks like that, it is purely coincidental," he said. "It happens that people who buy the BBC seem to want the greater power of the B. If demand had been the other way around it would be the Model B that we would be stopping instead.

"The Electron, on the other hand, will tend to be attractive to people still on Sinclair-type machines," he added.

The price of the Electron has now been fixed at £199. The BBC Model B remains at £399.



Electric car project rolls on

IT now seems likely that the electric car being developed by Sir Clive Sinclair will be a three-wheeler, powered by a new electric motor using a conventional lead-acid battery design.

The Sinclair Vehicle Project, as it is called, has been active for over ten years and the electric car is now planned for sale in 1985. Although research on the project began in 1973, the major development work began in 1981 following the formation of Sinclair Research. Early this year a share placement for Sinclair Research raised £12.9m. for the work and the vehicle project was split off as a separate venture, owned by Sir Clive.

The SVP group is now based in Exeter under the guidance of Barrie Wills.

The group is also exploring the potential of an electrically assisted bicycle. Forthcoming government legislation may allow such a bike to be ridden by 14-year olds.

Classified

Computer Swap 01-930 3266

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

JUPITER ACE and ZX81 software. For the Jupiter Ace: JA1 Three 3K games, £3; JA2 19K graphic adventure, £6; JA3 19K text adventure, £7. For the 16K ZX81: Z11 A graphic adventure, £5; Z12 Hangman, £4. Richard Roberts, 52 Whalesmead Road, Bishopstoke, Eastleigh, Hants SO5 6HL.

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

FIVE MACHINE CODE ARCADE GAMES, all on one cassette: Missile Commander, Space Escape, Astro Scramble, Descender and Centipede; for only £4.95. Versions of above available for Spectrum, BBC, Vic and Dragon Computers (state which). Send cheques/POs to: R. Bhattacharya, 3 Wensley Close, Harpenden, Herts, AL5 1RZ.

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

SPECTRUM/VIC20 software 10% off! Games by Imagine, New Generation and others. For full list SAE Jawasoft, 46 Springwood Road, Sheffield S8 9TW.

DRAGON 32/TANDY COLOR
Now 4 – yes 4 – fabulous magazines just for you! ! !
"RAINBOW"
"COLOR COMPUTER NEWS"
"COLOR COMPUTER MAGAZINE"
"HOT CO-CO"
all plus EXCLUSIVE UK/European Supplement and Free advisory service. Send **£2.25** (+57p SAE) for sample copy to **ELKAN ELECTRONICS** (Dept. POP), **FREEPOST**, 11 Bury New Road, Prestwich, Manchester M25 6LZ. Tel. 061-798 7613.

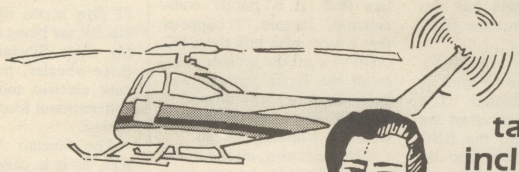
VIC20 + 8K/16K CRICKET, with graphics and sound, only £2.95. Unexpanded Vic20 cassettes, over 25, at only 99p each. Send £1 for game and list. D. A. Spencer, 230 Lowgrange Avenue, Billingham, Cleveland.

Continued on page 40

NOW AVAILABLE FROM W.H. SMITH

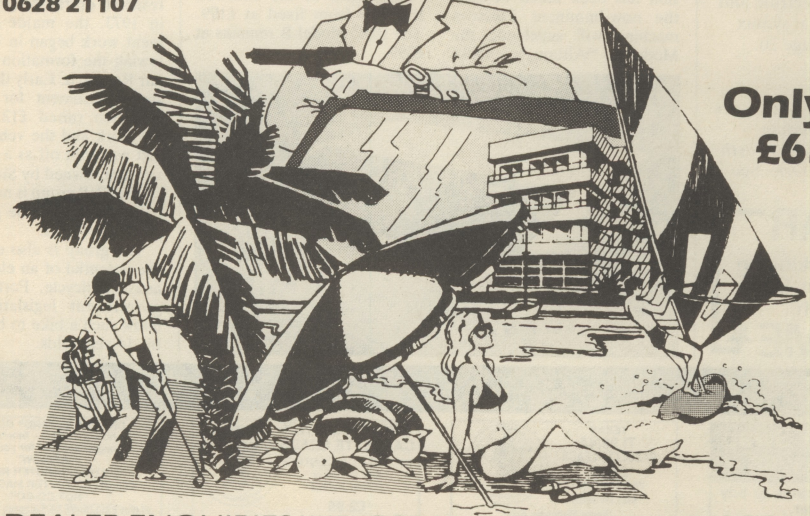
SUPER SPY 48K Spectrum

Locate the secret island hideaway of the mysterious meglomaniac Dr. Death. Follow his trail across continents, through complex puzzles, coded messages and 3-D mazes. Discover the entrance to his underground lair — but beware — even with your death-defying gadgets his evil henchmen may still win the day!



Saving the world may take some time—so we've included a 'save' routine for part-time secret agents!

Credit Card Hotline
0628 21107



Only £6.50

DEALER ENQUIRIES WELCOME — GENEROUS DISCOUNTS

Adventurous Programs always wanted. Please send sample — generous cash payments!

RICHARD SHEPHERD SOFTWARE
FREEPOST, MAIDENHEAD, BERKS SL6 5BY.

POPULAR Computing WEEKLY

30 June-6 July 1983 Vol 2 No 26

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
Trouble for Spectrum

Letters 7
Logo and turtle graphics

Star Game 10
Satellite docking on 16K Spectrum

Street Life 13
David Kelly talks to the Pi-men



Reviews 14
Delta disc drive for Dragon

Programming 17
'O' level studies

Spectrum 20
Syntax checking by Ian Logan

Dragon 22
Barchart by Ian Robertson

BBC in education 25
Assembly language powers

Open Forum 27
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

The electric car has long been dreamed of by motor companies and environmentalists alike. Such a car would be non-polluting, economic and, above all, cheap.

Companies such as Ford, General Motors and the Japanese conglomerates have commissioned design studies, built prototypes and tested a dozen different models. However, none of them have produced a vehicle that is commercially viable.

Now, Sinclair, with his acquisition of an option to purchase the defunct De Lorean car plant, has publicly thrown his hat into the ring. This is not, however, a sudden move on Sinclair's part. He has been working on the project since at least 1973 and had probably been formulating ideas long before that.

An electric car would certainly be a considerable coup for Sinclair, since he would be succeeding where many have already failed. But, there are a number of technical problems still to be overcome before the Sinclairmobile takes to the road.

Most conventional lead/acid or nickel/cadmium batteries are too heavy in relation to their output to make a suitable power source. They also need to be recharged frequently.

If Sinclair has come up with a new type of battery, or a method of making existing batteries more efficient, the world's first mass-produced electric car may yet have a ZX logo.

Next Thursday

Next week's Star Game is Mini Pacman by Richard Walton — it's for the super expanded Vic20 but can be easily adjusted for the unexpanded Vic.

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 .....

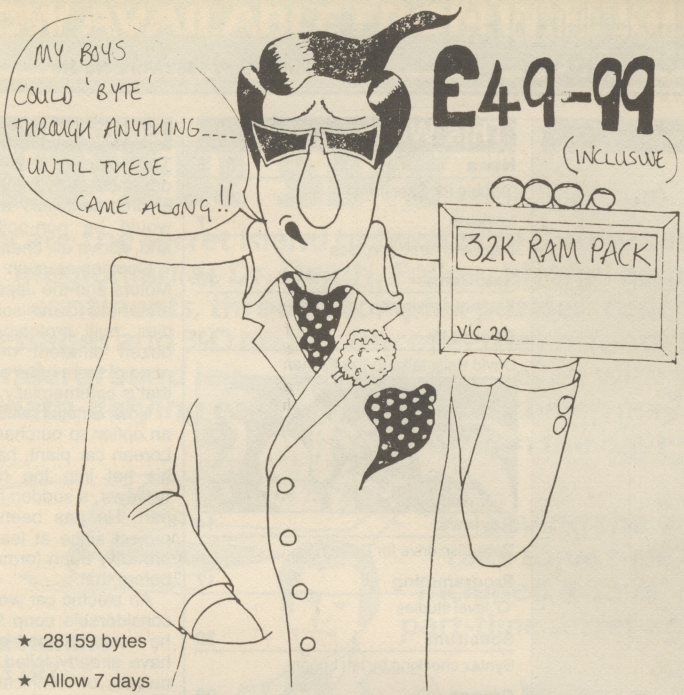
Name .....

Address .....

.....

.....

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



★ 28159 bytes

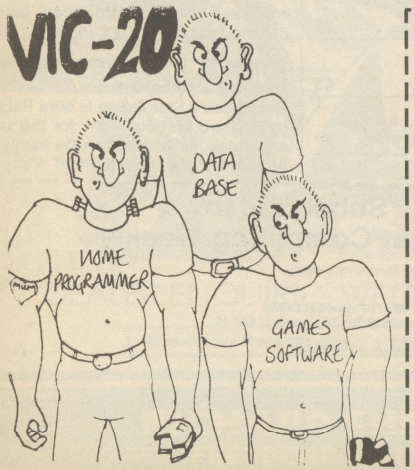
★ Allow 7 days

'GEMINI' SOFTWARE

1. DATA BASE
2. STOCK CONTROL
3. MAILING LIST
4. INVOICE/STATEMENT
5. HOME ACCOUNTS
6. COMMERCIAL ACCOUNTS

£19.95 (incl)

BUY SOFTWARE AND RAM PACK TOGETHER FOR **£59.99 (incl)**



Name.....

Address .....

.....

Please send me ☐ 32K Ram pack/s @ £49.99

Software number ☐ 32K Ram pack @ £59.99.

I enclose cheque/PO for £.....

SEND TO: **PLUS 80 LTD**
(No stamp needed) **FREEPOST**
HARROW
MIDDLESEX HA2 0BR
Tel: 01-423 6393

Double trouble for Spectrum games

SPECTRUM Games has been forced to withdraw its *Penetrator* program for the Vic20.

The decision follows discussions with Melbourne House who market a program with the same title for the ZX Spectrum.

Melbourne House threatened legal proceedings against Spectrum Games if the Vic20 program continued to be sold. Melbourne's Christine Laugharne said: "There is a law about passing-off. If they don't stop selling the game we will bring an injunction to stop them."




Managing director, David Ward

Commenting on the decision to withdraw the Vic-20 *Penetrator* program, Spectrum Games' managing director David Ward said: "We decided that it was better to do so to avoid any confusion between the two games."

Manchester-based Spectrum Games has produced a range of arcade titles for the Spectrum and Vic machines.

Texas second victim of vicious US war

TEXAS Instruments has followed Atari to become the second victim of the vicious US price-cutting war.

Following the forecast of a $100m loss for the second quarter of this year — leaked to the *Dallas Financial Times* on Friday June 10 — TI's share price plunged 51 points in two days. This wiped out nearly $1bn in equity and was one of the sharpest market declines in recent American history.

Texas' loss comes mainly from the home computer division, where the April price drop of the TI99/4A by $50 to only $100 spectacularly failed to produce an upturn in sales.

The company showed only one 'new' product at the recent Chicago trade show — a re-vamped 99/4A in a different case, designed to reduce losses on the product.

Of the big three US manufacturers only Commodore remains comparatively unaffected — following Atari's dismal recent financial results. Commodore's share price suffered following Texas' bombshell, but the company has just announced results for the quarter ending March 31 up to 124 percent to $25m.

Commodore is now selling the 64 machine for only $199 in the US and offering a staggering further $100 rebate off the price in exchange for a used Vic20.

Commodore International's chief, Jack Tramiel, in town for the Earls Court show, denied that the price war in the US had now gone too far: "Not at all. It is all to do with the learning curve — as we improve our yield and manufacturing efficiency, we can reduce prices. We do not wait until we are forced to cut prices — we do it when we can."

● THE price of the Commodore 64 machine will fall to £229 from August 1.

But, retailers are expected to discount this price still further to bring it down under the £200 barrier.

Lynx shares offer

IF you ever hankered after becoming a high-technology investor, now is your chance.

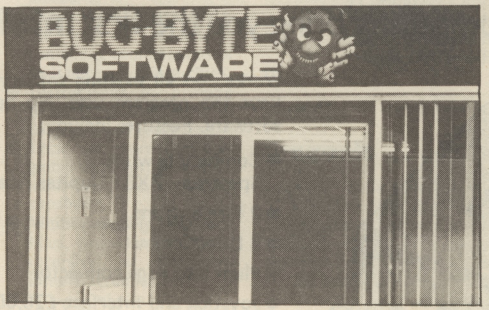
A new company, Camputers Holdings plc has been set up by Camputers, manufacturers of the Lynx Microcomputer. Some 25 per cent of the company's share capital is being offered for sale.

Up to 6,400,000 ordinary 10p shares are available at 17p a share and the sale will raise about £900,000 to fund further expansion and development work necessary in the coming year. The shares offer is open to any individual. Although Camputers is keen to encourage small investors, a minimum purchase of 3,000 shares (£510) is suggested.

For those who wish to know about such things, stockbrokers Statham Duff Stoop are handling the share placement. The directors of Camputers forecast a profit before tax of around £750,000 for the year ending March 31, 1983, and the shares have a prospective fully-taxed profit/earning value of 12.0. In due course, Camputers Holding plc will seek a full stock market quotation. Until then shares will change hands through the brokers on a matched-market basis.

Statham Duff Stoop are on 01-628 5070.

Bug-Byte on the move!



LIVERPOOL-based software house Bug-Byte has moved to new offices in the city.

The 6,000 sq ft office complex at Mulberry House, Canning Place, cost £50,000 to fit out to Bug-Byte's specifications. Work was completed in early June.

This move concentrates Bug-Byte's activities under one roof. Spool Ltd, which is half owned by Bug-Byte, is a new tape duplicating company that is also located in Mulberry House.

Using a Gauss half-inch loop-bin system, Spool duplicates tapes at 16 times normal speed. Director Roy Varley plans to build up capacity to 25,000 tapes a week by the beginning of August.

Bug-Byte, which was founded in the spring of 1980 by Tony Baden and Tony Milner, is also planning an export drive. Sales Manager John Phillips is hoping to establish new markets in the US, Europe, Australia and New Zealand.

Spriteful system for the Dragon

PREMIER Micro Systems has developed a graphics system for the Dragon computer.

The hardware/software combinations takes the form of a cartridge which plugs into the Rom port on the Dragon. Using a combination of the TI99/26 video chip and 16K additional video Ram, the graphics card gives the Dragon a high-resolution 192 x 256 display in 16 colours and a 32 sprite (movable graphics shapes) capability.

Sprites up to 36 x 36 pixels (4 x 4 characters) in size can be defined using Basic commands which take the form of an extension to the existing Microsoft Basic.

Premier also plan a motherboard card rack and six-voice sound card for the machine.

The graphics system should be available in September for under £100. Details from Premier Micro Systems, 208 Croydon Road, Anerley, London.



WARLORD

Our fantastic adventure War Game set in Medieval Japan is now available for the 48K Spectrum and features full supporting graphics. A sell-out at the June ZX Micro Fair. Also available for the Dragon 32, Tandy Color 32K and ZX81 16K (no graphics). Coming soon for Atari, 48K and Oric 1 48K.

LOTHLORIEN

WARMASTERS

ANNOUNCE 4 GREAT NEW TITLES

JOHNNY REB

This full-graphics wargame, for 1 or 2 players, is set during the American Civil War and is played entirely on a graphics battlefield which is generated slightly differently each game. Each side selects its force of infantry, cavalry and artillery with which it must capture the enemy's flag. You have full keyboard command of all movement and fire controls. A "Save Game" facility allows a partly-played game to be reloaded to test different tactics!
PLAY THE COMPUTER OR CHALLENGE A FRIEND. A SELL-OUT AT THE ZX MICRO FAIR.
AVAILABLE FOR 48K SPECTRUM £5.50.

REDWEED

Can you save London from the MARTIANS? Three powerful Martian war machines are advancing on London whilst semi-sentient REDWEED threatens to immobilise all your fighting units as it grows across the map. The game is played on a graphics battlefield on which you have full cursor control to move your tanks, flamethrowers, etc. 15 levels of play will test your tactical abilities.
AVAILABLE FOR 48K SPECTRUM £5.50.

PARAS

You have command of a small parachute force (hand-picked by yourself) which has been dropped behind enemy lines to capture an important river crossing. Keyboard command allows you to manoeuvre and fight on the modified hex-grid battlefield. You can play either a standard or a shortened version of the game with several levels of play.
AVAILABLE FOR BBC MODEL B £6.95.

BATTLEZONE 2000

A futuristic wargame also played on a modified hex-grid battlefield with full keyboard control. Your force comprises a selection of tanks, infantry, missile launchers, etc, with which you have to destroy an all-powerful computer-controlled battle machine. Will you achieve your mission before it escapes to threaten the whole world?
AVAILABLE FOR BBC MODEL B £6.95.

OTHER TITLES

TYRANT OF ATHENS available for DRAGON; SPECTRUM 16K; ZX81 16K; TANDY 32K COLOR.
ROMAN EMPIRE available for DRAGON; SPECTRUM 16K; ZX81 16K; TANDY 32K COLOR; ATARI 400 & 800 48K; AND NOW BBC MODEL B.
SAMURAI WARRIOR available for DRAGON; SPECTRUM 16K; ZX81 16K.
PRIVATEER available for a back-to-back cassette for both ZX81 16K and 48K SPECTRUM for only £4.50.
PELOPONNESIAN WAR available for ZX81 16K only.

WARGAMES for:—	SPECTRUM	DRAGON	TANDY 32K COLOR	BBC MODEL B	ATARI 400/800 48K	ZX81 16K	ORIC1 48K
	£5.50	£6.95	£7.95	£6.95	£12.50	£4.50	COMING SOON

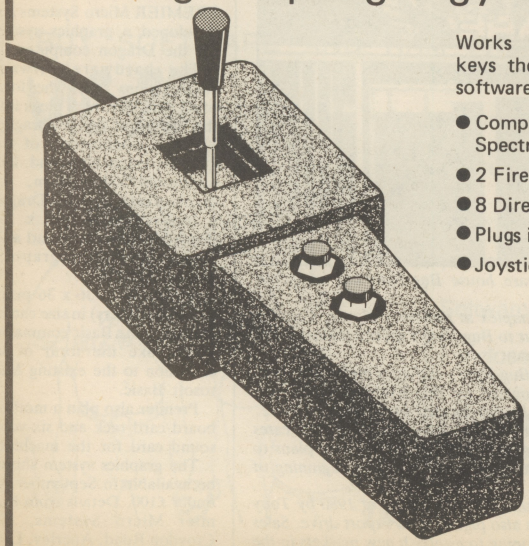
AVAILABLE FROM BETTER SOFTWARE SHOPS OR DIRECT BY MAIL ORDER
ACCESS NUMBER, CHEQUES OR POSTAL ORDERS PLEASE, PAYABLE TO:

M. C. LOTHLORIEN
DEPT PC26, 4 GRANBY ROAD, CHEADLE HULME, CHESHIRE SK8 6LS

Access

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 Fire buttons
- 8 Directions
- Plugs into edge connector
- Joystick and Interface £26.00

Name .....

Address .....

.....

Please send me.....joysticks @ £26.00 for the Spectrum ☐ ZX81 ☐ Jupiter Ace ☐

Cheques and P.O.s made payable to:
Cambridge Computing,
1 Benson Street, Cambridge CB4 3QJ.

Dealer enquiries welcome please ring C P Lloyd on Cambridge (0223) 522905

Invidia dragonis . . . 1

My thanks to James Thomas for his exaggerated but amusing diagnosis (2-8 June).

For the record, I am not envious of the Dragon's switches and keyboard. The Spectrum's rubber keys may be 'squidgy' but, because of the computer's one-word entry system and comprehensive syntax checking, it is far easier to type and run a program on the Spectrum than it is on the Dragon with its almost illegible black on green screen.

Neither am I jealous of the other six items in Mr (or should I say Dr?) Thomas's list including the Dragon's superfluous sockets and modes — the highest resolution is no higher than that of the Spectrum. As for expansion capabilities, you may have noticed that the Spectrum, but not the Dragon, has pages on Prestel's Micronet database.

A friend of mine had a Dragon but sold it to buy an Oric which proves that, often in the world of micros, paying less buys you more.

Anyway, most Spectrum owners are content in the knowledge that their micros have lower-case letters, user defined graphics, the ability to mix hi-res graphics with text and to change the colour of text. All these facilities are non-existent on the Dragon. The Spectrum also has the added bonus of the best range of software for any colour micro in the UK. It is not a huge surprise that Uncle Clive has become Sir Sinclair.

Andrew Wiseman
68 Mayfield Road
Hartford, Huntingdon
Cambridgeshire PE18 7NJ

Not a minor matter

I refer to the article *Turning Turtle* in your issue for 9-15 June which includes the statement "It is not difficult to use these routines for a Logo-type emulator". The routines turn out to be for screen formatting, plus an ability to move a turtle forward and to turn it through an angle. Your readers without knowledge of Logo and Turtle Graphics must be left in mystification. Is that it?! Is that what the Massachusetts Institute of Technology spent their time on?!

Accepting that the article aims at technical detail rather than rationale, it is unfortunately only one example of "popular writings" on the subject over the last year which give a corrupted and trivialised view of Logo to the uninformed reader. The capability outlined in the article is no nearer to serious Turtle Graphics than a firework rocket is to landing men on the moon.

Logo is a language designed to encourage and facilitate learning in the context of a particular educational philosophy. Turtle Graphics is a successful and widely used, but only a specialised and partial, realisation of the language. Whilst true Turtle Graphics implementations can fit into microcomputers, they are significant software packages, and I would warn readers to be cautious about regarding any magazine listings for such programs as other than toys. As a minimum the following language constructs are required:

- Instructions to move, turn, position and reset the turtle in absolute and incremental modes.
- Instructions to name, define and call procedures containing combinations of such moves, in hierarchies.
- Instructions to provide nestable repeat loops in programs and procedures.
- Local (to procedure) and global variables, with arithmetic and variable display capability.
- Whilst providing these facilities, procedures must be recursive and allow conditional termination.
- A range of plotting, colour and administrative instructions are needed.

To make such a language usable, any real implementation must include a significant operating system, with an editor, syntax checking, error messages, listing capability and the rest.

My regrets to this particular author that his offering has provoked this 'last straw' response. Editors equally should ensure that articles clearly state their context and scope. Gross misrepresentation of a promisingly fruitful approach to human development is not a minor matter.

M Davies
Lymington Bottom
Four Marks
Alton
Hants GU34 5AH

Boris Allan writes: Readers of Ziggurat will know the difference between Logo and Turtle Graphics — my TG routines follow those of UCSD Pascal.

I imagined that a Logo-type emulator might be a Logo interpreter written in BBC Basic — I am not silly enough to claim that the routines are like Logo.

If Mr Davies looks through his list of requirements, he will see that they are all satisfied by BBC Basic. The examples given in my second article (*Popular Computing Weekly*, June 16-22) include all Mr Davies' requirements, even down to recursion.

Over-heated sword!

Sir Clive Sinclair? I trust he will have to wait over 16 weeks before being dubbed and then have the sword overheat.

Richard Carsons
3 Cornflower Close
Simons Park
Wokingham
Berks RG11 2UF

Invidia dragonis . . . 2

As a colleague of Mr Andrew Wiseman I wish to explain his computer-induced neurosis. The allegation that he envies the Dragon 32 computer is entirely true. Mr Wiseman can be described as a "Sinclair freak" as he takes everything Uncle Clive makes and hails it as the best in the world.

With the arrival of the ZX Spectrum he happily sold his ZX81 and sent off his Spectrum order form. When it finally arrived he was extremely happy, until I decided to purchase a Dragon.

With the obvious better features of the Dragon he grew envious and started to find any way possible to criticise the Dragon.

I hope that this letter will end this argument once and for all. Mr Wiseman should be satisfied with his inferior machine, although it is evident to anyone but a fool that the Dragon is a better computer.

I would like to add that I have recently purchased an Oric-1 micro, so any letters from Mr Wiseman slagging off that computer should be ignored as he is just getting neurotic yet again.

Michael Smith
57 Pettis Road
St Ives
Huntingdon
Cambs

Legal copying

As a supplier of a tape copier for the Spectrum (plus a ZX81 system), I would like to answer the comment on the legality of such programs (*PCW* 16-22 June).

Copying of tapes always has been *legal*. Indeed, the suppliers of all the various games cassettes advertised have their cassettes made by large companies specialising in the copying of cassettes. Obviously, a legal process, as is the making of 'back-up' copies of your own cassette for your own use only.

It is totally illegal to copy tapes, either by copier programs or by tape-to-tape method, if the copy is for 'giving away' and not for your own use. Suggesting the banning of such copier programs has the same validity as suggesting that all photo-copier machines should be made illegal.

Further to the above, I am appalled at some of the so-called copies available. (I have studied the 'opposition'). The majority will copy *all* programs, including Datafile (headerless type), but some use as much as 750 bytes of your program area. In a 16K Spectrum this is about 10 per cent of your usable area.

It is unnecessary for a copier to use any of your memory area. (Mine uses none, yet still allows the user to simply press a button to make a copy.)

G A Bobker
29 Chadderton Drive
Unsworth
Lancs



THE WIZARD'S WARRIORS: A fast moving game that matches developments in your skill as a player by becoming increasingly more devious. By offering to you the full range of options you can choose how to control your warrior through the maze. A full implementation of this program enables such features as a continuous series of sound effects, arcade quality graphics, double-point scoring, and--for the very artful --bonus lives.

Spectrum £4.95

FORTH: A full implementation. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available.

Spectrum 14.95

ADVENTURE ONE: Features a save game routine as the game can take months to complete.
'a remarkably good version....well worth the money.'
...*Sinclair User*...

ZX81 £5.95

MAZEMAN: A fast action m/c game that reproduces the spirit of the original.
'..is very accurate and fast.' ...*Which Micro?*...

Spectrum £4.95
ZX81 £4.45

CHESS 1.4: Ten levels of play with this m/c program. Good graphic screen display.
'In a class of it's own.' ...*Your Computer*...

ZX81 £5.95

INVADERS: Very fast m/c action. Includes mystery ship and increasingly difficult screens.

ZX81 £4.45

7 MAES AFALLEN, BOW ST., DYFED, SY24 5BA

24hr Ansaphone 0970 828851

Access

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

COMPUSENSE
Software for Dragon 32

BARCLAYCARD VISA

PO Box 169, Palmers Green
London N13 5XA

Access

Telephone: 01-882 0681 (24 Hr) and 01-882 6936
Offices at 286D Green Lanes (9.45-6.00 Mon-Fri)

SOFTWARE ON PLUG-IN CARTRIDGE FOR THE DRAGON 32 AND 64

HI-RES **£25.30**

Our popular 51 × 24 BIG SCREEN upgrade with redefinable character sets (FRENCH, GERMAN, SPANISH, SWEDISH, DANISH, ITALIAN). BASIC works as normal with extensions for PRINT and CLS and SPRITE GRAPHICS. A better keyboard routine gives AUTO-REPEAT and TOUCH-TYPING.

EDIT+ **£34.50**

Full screen editor with lots of facilities. Includes HI-RES. Available end July 1983.

DASM **£18.95**

Machine code assembler. Easy to use and excellent value for money. Just read the reviews and you'll be convinced. With manual and reference card.

DEMON **£18.95**

Our powerful monitor. Now with DUMP to PRINTER. An essential tool for the serious programmer.

DASM/DEMON **£30.45**

The ideal combination for developing machine code on the DRAGON.

PLEASE ADD 50p for postage and packing

DISKS — PREMIER DELTA SYSTEM NOW IN STOCK

DELTA CONTROLLER **£99.95** DELTA 1 **£299.95**
DELTA 2 **£345.95**

add £4.50 for postage

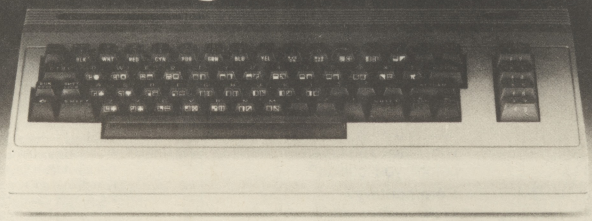
PRINTERS — with free cable and screen dump program listings

EPSON RX-80 **£342.70** EPSON FX-80 **£503.70**

add £12.50 for carriage

DEMONSTRATIONS BY APPOINTMENT — PLEASE PHONE.
ALL PRICES INCLUDE VAT. SEND LARGE SAE FOR CATALOGUE.

"It's about time you started work my lad!"



"All the money I've spent on you, young Vic. And all you do is sit around all day playing games."

"Well it's about time you started earning your keep like a big computer."

"With the help of PractiCalc you could give me a hand with the household budgets, business accounts, and even the work I bring home from the office."

"You could also help me work out cash-flow problems, choose the best life assurance policy, and decide whether it's best to pay for my double-glazing now with a loan, or to wait for a few more months."

"In fact PractiCalc would allow you to do in seconds, the kind of repetitive calculations that would take hours with a pencil and paper or pocket calculator."

"And do it for just £24.95."

"It really is about time you took your computing seriously."

PRACTICALC. THE SPREADSHEET FOR 16K VIC 20.

Also available for Commodore 64. (And soon from all good software dealers.)

"JUST YOU FILL THIS IN AND SEND IT OFF RIGHT NOW!"

OR SEND FOR FULL PROGRAM DETAILS
From MMS, Goddard Road, Whitehouse Industrial Estate, Ipswich, Suffolk, IP1 5NP.
Tel. No. 0473 462721. Co. Reg. No. 1694320.

Send this coupon to: Marketing Micro Software Ltd., FREEPOST, Ipswich IP1 5BR.

QTY	PROGRAM	PRICE (UK)	TOTAL
	PractiCalc for 16K Vic 20 Cassette	£24.95	
	PractiCalc for 16K Vic 20 Disc	£29.95	
	TOTAL (Please add 50p P&P)		

FREEPOST – No stamp needed in UK.
I enclose a cheque/postal order payable to: Marketing Micro Software Ltd.
£

OR Please charge to my Access, Visa, Diners, or American Express card:

Signature
PLEASE USE BLOCK CAPITALS
Name
Address

PCW 30/6

Space Docking

A new game for 16K Spectrum by Colin Jones

Your on-board computer has locked on to a satellite that, after 10 years in parked orbit around the Earth, is to be retrieved for routine servicing.

You are aware of a knot of tension in the pit of your stomach as you take the controls of the huge space shuttle, preparatory to making the fine synchronisation adjustments necessary for successful docking. The grim concentration on your face is a cold blue, lit by the flickering light emitted by your data screen. The screen shows an image constantly changing as the satellite moves through space.

The gleaming shuttle ponderously rotates towards the tiny fragile satellite as you use the side thrusters to match the spin. As the screen indicates that you have achieved synchronisation, you nudge your shuttle forward.

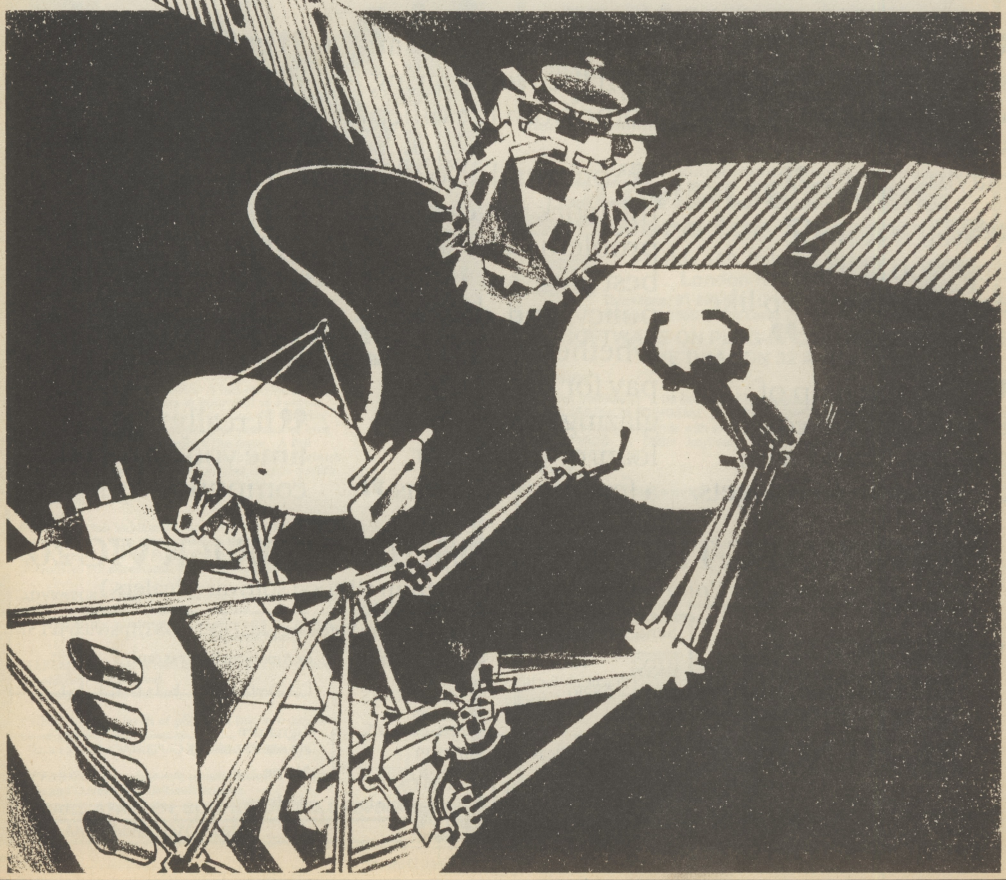
A huge image now fills the screen to indicate your proximity to the satellite. You are within seconds of final dock. Panic tries to seize you! You see that the satellite has suddenly started to drift away from you! Have you time to match the new spin before you collide?

Commentary

35-60 Set variables
70-90 Screen display
100-160 Read keyboard
170-260 Display indicators (distance/spin sync./time left)
270-290 Display new satellite image
300-340 Set spin factors
350-450 Remove old satellite image/calculate new image
370 NOTE — To test 'docking complete' sequence
460-490 Calculate new spin/approach factors
500-530 Docking completed
540-600 Score/new satellite?
610 Ran out of time
620 Crash

Variables

L — cumulative score
J — time remaining
P — horizontal line of sat. image
I — input from keyboard
K — spin display position
RA — rate incr/decr. distance from sat.
R — size of sat. image
RT — rate spin incr/decr. ■



```
  10 REM SPACE DOCKING
  20 REM BY CS JONES
  30 REM ********************
  35 LET L=0
  40 LET K=0: LET J=20: LET RA=1
: LET P=0: LET R=5.5: LET I=1
  50 LET RT=INT (10*RND)/10: LET
S=INT (100*RND)
  60 IF S<50 THEN LET RT=-RT
  65 PAPER 1: INK 7: BORDER 1: C
LS
  70 CIRCLE 127,87,86: CIRCLE 12
7,87,84: CIRCLE 127,87,43
  80 PRINT AT 0,15;"VV";AT 10,0;
"=";AT 11,0;"="
  90 GO TO 400
 100 IF INKEY$="" THEN GO TO 330
 110 LET I$=INKEY$: LET I=CODE I
$-48
 120 IF I=5 THEN GO TO 320
 130 IF I=6 THEN GO TO 470
 140 IF I=7 THEN GO TO 460
 150 IF I=8 THEN GO TO 300
 160 GO TO 100
 170 INK 4: PRINT AT 1,0;"▒";AT
20,0;"▒";AT 1+R/10,0;"▒";AT 20-R
/10,0;"▒": INK 7
 180 IF R>=88 AND C>=124 AND C<=
132 AND D>150 THEN GO TO 500
 190 IF R>=88 THEN GO TO 620
 200 INK 2: PRINT AT J,31; INVER
SE 1;"▒": LET J=J-.15: INVERSE 0
: INK 7
 210 IF J<=1 THEN GO TO 610
 220 PLOT INVERSE 1;10,K: DRAW I
NVERSE 1;10,0
 230 LET K=87+100*RT
 240 IF K>=170 THEN LET K=165
 250 IF K<=5 THEN LET K=10
 260 PLOT OVER 1;10,K: DRAW OVER
1;10,0
 270 PLOT OVER 1;X,Y: DRAW OVER
1;-A,-B
 280 PLOT OVER 1;C,D: DRAW OVER
1;B*.5,-A*.5
 290 GO TO 100
 300 LET RT=RT+.02
 310 GO TO 330
 320 LET RT=RT-.02
 330 LET H=INT (RND*100): IF H<=
40 THEN GO TO 480
 340 IF H>60 THEN GO TO 490
 350 LET P=P+RT
 360 LET R=R*RA
 370 REM **TO TEST LET P=0 HERE*
 380 PLOT OVER 1;X,Y: DRAW OVER
1;-A,-B
 390 PLOT OVER 1;C,D: DRAW OVER
1;B*.5,-A*.5
 400 LET X=127+R*(COS (P+2*PI)):
 LET Y=87+R*(SIN (P+2*PI))
 410 LET C=127+R*(COS (P+1.55+2*
PI)): LET D=87+R*(SIN (P+1.55+2*
PI))
 420 LET A=2*(X-127): LET B=2*(Y
-87)
 430 IF A<5 AND A>-5 THEN LET A=
0
 440 IF B<5 AND B>-5 THEN LET B=
0
 450 GO TO 170
 460 LET RA=RA+.01: GO TO 330
 470 LET RA=RA-.01: GO TO 330
 480 LET RT=RT+.01: GO TO 350
 490 LET RT=RT-.01: GO TO 350
 500 PLOT OVER 1;0,0: DRAW OVER
1;254,174: PLOT OVER 1;0,174: DR
AW OVER 1;254,-173
 510 FLASH 1: PRINT AT 10,12;"DO
CKING": PRINT AT 11,11;"COMPLETE
D": FLASH 0
 520 FOR A=1 TO 15: BEEP .2,15:
BEEP .2,20: NEXT A
 530 CLS
 540 LET J=INT J
 550 LET L=L+J
 560 PRINT
 570 PRINT "YOUR SCORE WAS ";J;"
 PARSECS"
 580 PRINT : INVERSE 1: PRINT "Y
OUR CUMULATIVE SCORE IS ";L: PRI
NT : PRINT "ANOTHER SATELLITE ?"
: INPUT A$: INVERSE 0
 590 IF A$="Y" THEN GO TO 40
 600 STOP
 610 CLS : BEEP 2,5: INVERSE 1:
PRINT "YOU RAN OUT OF TIME": GO
TO 540
 620 CLS : BEEP 2,5: INVERSE 1:
PRINT "YOU CRASHED INTO THE SATE
LLITE": LET J=0: GO TO 540
```

AVAILABLE NOW

DRAGON 32 OWNERS

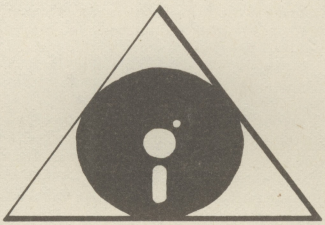
AVAILABLE NOW

Now you can buy a professional disk system to turn your Dragon into a real computer!

DELTA DISC SYSTEM

THE DELTA DISK SYSTEM gives you ....

* An affordable disk system
* Powerful DELTA disk commands - see right
* Random, Sequential and Indexed file-handling
* Simple plug-in to DRAGON - unlike other systems there are NO HARDWARE MODS needed to run DELTA!
* Easily expandable 100K to 1.6 megabyte storage
* Full range of business, utility and games software close to release
* The price you see is the price you pay - NO HIDDEN RAM upgrade costs
* Uses under 2K of user-RAM as DELTA is held in EPROM



DELTA contains the following powerful new words, all accessible directly from BASIC:-

SAVE"	SAVEM"	LOAD"
LOADM"	RUN"	RUNM"
CHAIN"	APPEND"	DIR
INIT	CONFIG	KILL
ASSIGN	VERIFY	SELECT
COPY	BACKUP	CREATE
FLUSH	OPEN	CLOSE
FILES	END#	RESTORE#
DIM#	BOOT	INPUT
PRINT	FIND	BUILD
DO		IF EOF(x) THEN

DELTA CARTRIDGE - contains DELTA Disk Operating System, User Manual, demonstration diskette.	£99.95
DELTA 1 - DELTA Cartridge, User Manual, a single-sided 40 track (100K) drive plus free cable	£299.95
DELTA 2 - as DELTA 1, but with a double-sided (200K) drive	£345.95
Disk Interface cable (supplied free with DELTA 1 or 2)	£9.95
ENCODER 09 assembler/disassembler/editor - integral with DELTA	£34.95
INFORM - Data Base Management System commissioned especially for DELTA systems	£39.95

SCRIBE - true lower case on DRAGON!

Below is a live 'screen dump', generated by our HIPRINT program. It clearly shows the features and display potential of SCRIBE!

SCRIBE for the DRAGON 32

* FULL UPPER and lower case direct from the keyboard
* An enlarged 42 x 24 screen display which gives a superb READABLE text
* Full text display on hi-res screen
* Automatic underline & reverse image
* Up to 255 user-defined graphics
* Precision character position command giving super/subscripts
* Black on white text display option
* A new PRINT@ command extending to 1008 thus almost doubling screen area

Cassette £13.95 DELTA disk £14.95

ENCODER 09 - is a full symbolic assembler using standard mnemonics and pseudo op-codes. Source code can be incorporated into BASIC programs. The monitor section contains commands to allow memory display, modification and execution. Memory block move, breakpoint handling, full disassembly and a full editor are only a few of its many features. The most powerful assembler/disassembler/editor available for the DRAGON 32. Available as either an integral DELTA fitment or on cassette.

Tape £29.95.Disk - see above

HIPRINT - screen dumper

- will dump the entire contents of your DRAGON 32 high-res screen to a high resolution printer. Can be used for design, display etc (see left). Available at present for EPSON printers only. Other modules to follow shortly.

Tape £13.95 DELTA disk £14.95

POSTAGE and PACKING
Software 95p. DELTA systems £4.50.
ALL PRICES INCLUDE VAT.
Send SAE for full catalogue.

PREMIER MICROSYSTEMS

208 Croydon Road, Anerley, London SE20 7YX.

Access

TELEPHONE 01-659-7131 or 778-1706

Dealer and Overseas orders welcomed

BARCLAYCARD VISA

Waiting for Groucho

***David Kelly** lets Automata put some life in Street Life*

"If there is such a thing as an alien, it doesn't want to come down to earth and get killed," observes Mel Croucher.

"I have yet to find an arcade game where there is a full trial at the start," rejoins Christian Penfold.

Automata could become one of the world's great double acts. Then again, they may not. But, they have — in their own words — found a niche for themselves in the games software business, somewhere between *Monty Python* and *Not the 9 O'clock News*.

For openers, there was *Can of Worms*, more recently *Pimania*, starring the infamous *Pi-man* himself, and soon there will be *Groucho*.

"Nobody else is in there doing the same kind of things as us — they are all still zapping aliens," says Mel.

"That's pathetic — and not at all what we are concerned with. Maybe it sounds trite, but we want to bring back something of the parlour game atmosphere and involve the whole family."

This is by no means the first venture for either Automata or its two founders. Mel has been an architect, bass-player in a rock band, and a cartographer. Christian has sold everything from motor cars to magazine space in his time. They have done, and still do, a lot of work for local radio stations — for a while they ran a company making audio promotions of foreign hotels for travel companies.

"That was one of our less successful ventures," says Mel. Christian shrugs: "We did one on the States just before Laker crashed, and we followed that up with one on Spain just before the pound plummeted!"

Automata started two years ago on a cross-Channel ferry back from just one such tourist guide venture.

"The entire world was throwing-up," recalls Mel with relish, "including Christian. I told him about the ZX81 I'd just bought to play with and he wasn't interested!"

Back on dry land, however, Christian was hooked — programming the Sinclair machine for 10 hours a day, seven days a week.

Christian is keen to point out that he has no responsibility for any of the ideas. He just keeps his head down, doing the coding: "I used to write poetry and my programming is just the same — unstructured," he points out helpfully.

Nevertheless, it is Christian who is the business brains. Says Mel: "My input is the idea and Christian makes it work. We are very interdependent on each other. We *are* the company. If we had 50 programmers they would all have to be clones of us — otherwise it wouldn't work.

"We are quite different," says Mel, indicating Christian: "He's somewhere to the right of Enoch Powell and I'm to the left of Tony Benn. "That's why it works — otherwise we'd come in the morning and agree!"

Each of the Automata programs starts life as an elaborate story-board produced by Mel. First there was a tape called *Can of Worms* for the ZX81 which developed from a 20-page story-board and was condensed down to 1K by Christian.

In April last year the Spectrum was launched and it caught a great many software houses on the hop. "It certainly caused us to stop and think," says Mel. "And when we had thunk we brought out *Pimania*."

To Automata the program concept is more important and takes up much more time than the actual coding. "All the elements have come together with the computer," explains Mel. "I don't have to go and raise £¼m to do a short film — we can do it here. Okay, so the animation is not up to Disney standard, but it is coming. I reckon we are up to the standard of the *Flintstones* cartoons now — static backgrounds with moving characters."

The idea behind *Pimania* was a treasure hunt — for a real prize, The Golden Sundial of Pi — worth £6,000. It can be won by solving the clues to be found inside the *Pimania* computer game. "The idea was like *Masquerade*," says Christian, "just less successful — we haven't sold 10 million copies!

"People are obviously worried that it hasn't been won yet — but the prize definitely exists! It hasn't been won because it is rather more than six or seven sentences. It's bloody hard to solve the puzzle — and for £6,000 it ought to be!"

And, on top of that, the *Pi-man* has become something of a cult figure. Says Christian: "He is an escape — an extension of our own personalities — all the nice and nasty bits rolled into one. But now he no longer just exists in our minds. He is real. He has his own character."

Automata is now working on the next project — *Groucho*. "Why Groucho? Because," says Mel, "Groucho Marx was a very funny man and he is a kind of salute to the world of entertainment."

In *Groucho* you have to travel the length and breadth of the USA — in the program of course — trying to discover where Groucho is playing each night. It is a world where the currency is cigars and life is a succession of pools, pool-halls, bars and casinos.

Hidden somewhere in the game is the identity of a famous Hollywood personality. Find the name and you win yourself a trip on Concorde to New York, £500 spending money, a chance to meet the famous star in Hollywood and a return trip on the *QE2*.

"*Groucho* has been aborted — maybe I should say reconceived — twice now. We planned to launch it in March but we threw it away. We shall only launch it when it is just right — it still hasn't quite got that 'Ting'!

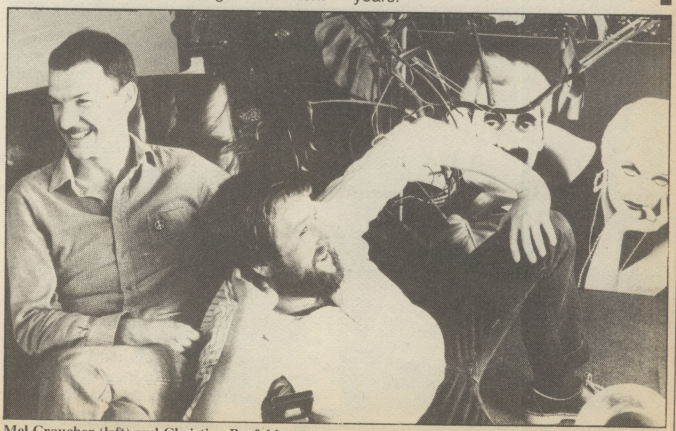
"It is not a typical adventure. We could have done the *Return of the Pi-man* — in fact he does get a guest appearance for all his expectant fans — but we wanted to do something different."

More than that neither Mel nor Christian will say. All will be revealed in the fullness of time.

"Earlier this year we hit a crisis when *Pimania* took off. In about February we had to put on the brakes and say 'No'!" Mel holds up his hand. "Automata is just the two of us. If we expand too far we will lose everything — we will lose the driving wheel. You probably think we are just two boring old hippys — but we're not as daft as we look."

"Speak for yourself," interjects Christian, but Mel continues unabated: "I'm on my fourth time around and Christian is on his second. *Pimania* has been going eight months now. We *think* we know what we are doing and we are not going to blow it by get-rich-quick — like the one-hit wonders of the record industry.

"We have a drawer full of ideas — some good, some bad. Enough to last us for years." ■



Mel Croucher (left) and Christian Penfold

The mouth of the canon

***Keith and Steven** Brain delve into the Delta disc drive for the Dragon 32 from Premier Microsystems*

For some considerable time the computer press has been full of rumours of the 'imminent' launch of a disc system from Dragon Data Ltd. But we are still waiting for the Dragon's creators to give him new fire, though a prototype was on display at the recent Earls Court computer fair (see opposite page).

In the meantime, independent entrepreneurs have not been idle and a number of alternative disc systems for the Dragon have also been promised. Whilst some of these systems are still only pipe-dreams, or prototypes, Premier Microsystems has actually reached the market with its *Delta* disc system, which is becoming widely available, particularly through the Computers for All dealer group.

The heart of the system is a plug-in cartridge, containing the disc controller circuit, and the 8K Rom containing the *Delta* operating system. This external Rom approach means that very little of the standard 32K Dragon memory is reserved for system use, and thus unavailable to the user (1.8K).

The operating system is totally integrated with Dragon Basic, so that all normal commands function as usual. However, over 30 new or extended Basic commands are also added. These new facilities are as easy to use as the original Basic — 26 different clear and comprehensive disc error messages are generated when things start to go astray with your programs.

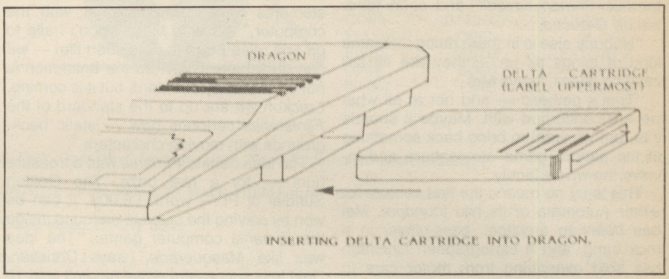
Although Premier supplies complete systems using the two-thirds height, 40-track Canon disc drives, the software can be configured to support virtually any available disc drives by the *Config* command, which needs six parameters (drive letter, no of tracks, sectors/track, no of sides, step rate, data rate). The *Delta* controller cartridge is available alone at £99.95 for those with alternative preferences of disc, or perhaps source of supply. So, if you fancy some 3in MCD-1 miniature versions, or can lay your hands on some redundant 8in drives, then setting up is still simple.

Up to four drives can be supported and each of these can be configured separately, so you can even copy from one size to another. Both single and double density and single and double sided are supported.

At present, Premier is supplying *Delta 1* (single 40-track, single sided) at £299.95 and *Delta 2* (single 40-track, double sided) at £345.95, both using the single density Canon drives, but the literature specifies systems up to *Delta 8* with two double-sided, double-density (80-track) drives for £679.95.

Delta 1 provides 100K of storage. This is doubled in *Delta 2*, to 200K, and if you really need the space two *Delta 8s* (or is that a 16?) will provide 1.6 megabytes! If even that won't satisfy you, then a change to 8in discs will send you up to 2.5 megabytes, though why you are using a Dragon in such an application we can't really imagine.

Connection of the Premier system is very straightforward, as the controller simply plugs into the cartridge port (power off!!), the disc drive cable is connected, the Dragon is powered up, the *Delta* message appears in place of the usual Dragon Data line, and when any key is pressed it boots up. *Dir* will now list the first 14 items on the disc, giving filename, file type, and length in domains (1 domain = 256 bytes). To continue the directory listing, just press any key. Output can be redirected to the printer by means of a simple *Poke*. A mother board, which will allow multiple connections to the cartridge port, is promised and *Delta* can also be specified containing the Premier *'Encoder 09'* two-pass assembler internally.



INSERTING DELTA CARTRIDGE INTO DRAGON.

A 75 page A4 looseleaf manual is provided and, as adequate documentation can make or break a product, we are very pleased to be able to report that this is absolutely first-class. An errata sheet contained only eight corrections, and we did not find any other errors. The manual starts with an introduction to the *Delta* system and disc operations in general, which is obviously aimed at the novice. We particularly liked the line in bold type:

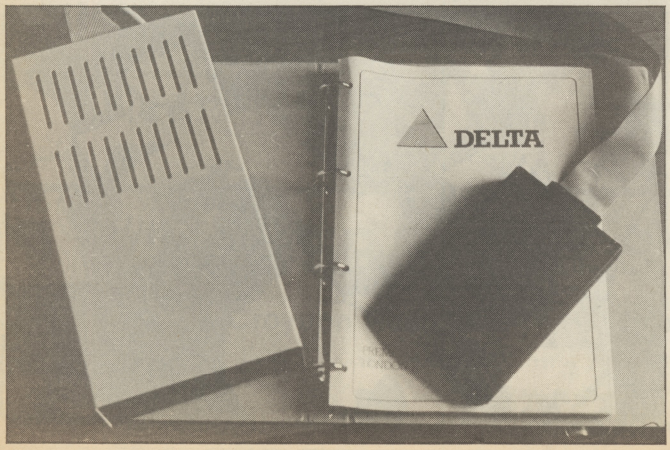
"REMEMBER >>> IF ALL ELSE FAILS, READ THE MANUAL!! <<<".

Each *Keyword* is then explained in detail in a standard format:

Function
Syntax
Examples
Comments
Associated keywords

Init is the formatting command and, as a precaution, it requires user confirmation before wiping used discs. In addition to being able to handle program files with *Save*, *Savem*, *Load* and *Loadm*, you can *Run* and *Runm* which will load and auto-execute your programs. A quick comparison indicates that programs load about 10 times faster than from cassette.

Chain allows you to load a new program, but carry over variables from the old program. *Append* merges the program in the workspace with one on disc, although use of *Renumber* may be necessary as, if



line-numbers are identical, the disc line will overwrite the line in memory.

Assign has two functions. It allows you to rename files and it can also protect and unprotect files. Protected files cannot be erased with *Kill*, which otherwise deletes named files. A *Verify* operation is normally included as the default, but this can be disabled to speed up access where speed is the most important consideration.

Copy copies a named file from one disc to another, whilst *Back-up* copies the entire disc. These facilities are straightforward and user-friendly, even for the single-drive system we tested, although all the disc-swapping required to *Back-up* an entire disc on a single drive tends to make your arms ache! At this point you need to consider how valuable your time is and whether, if your particular applications require routine *Back-up* of data, the extra £145 required to provide 200K as two 40-track single-sided drives, rather than one 40-track double-sided drive, is a sound investment.

Use of *Boot* allows a disc to automatically carry out an instruction as soon as the disc is selected. It can be used to provide further software facilities, for example we used it to automatically provide an on-screen machine-code clock based on Ian Nicholson's program in the June 1983 edition of *Dragon User*. It is also a particularly useful feature for applications software to be used by untrained operators, as it can automatically set a process in motion when the disc is inserted. It can only contain one command, but this is not a problem as it can *Do* an executive file.

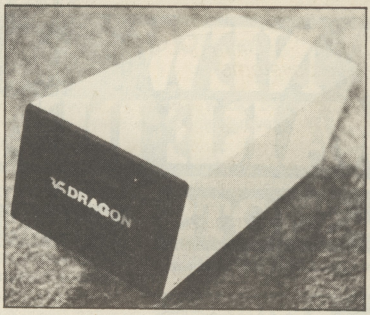
Build creates an executive file of up to 255 characters which can contain a series of commands. This saves itself to disc, when you press *Break*, with your chosen filename and the suffix *Bld*. *Do*" " activates the file created with *Build*, and can thus set in motion a complex series of events.

Specified areas of memory can be stored as machine code files, so that machine code programs and graphics screens can be saved and reloaded. Extensions of this are *Runm* and *Exec* which allows you to execute from any address. The greater access speed of disc means that graphics screens can be loaded in seconds, an obvious asset in the educational and perhaps adventure game fields.

There is an extensive detailed section in the manual on data files, with a series of clear worked examples. Both serial and random files are supported. *Create* prepares the file and sets aside the specified disc space, while *Flush* clears a data file for re-use under the same name.

Files are *Opened* and *Closed* as in Microsoft Basic, but up to eight files may be *Open* at the same time. When more than one file is to be open simultaneously, *Files* is used to set aside buffer space in memory for each channel. *Print#* puts data into a file and *Input#* reads it back. *End#* moves the read/write pointer to the end of the serial file or random access

Dragon Data previewed its own disc system for the first time at the Earl's Court Computer Fair.



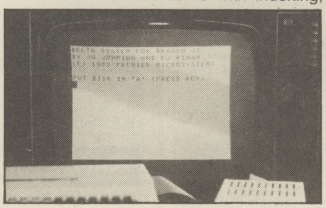
The half-height drive uses 5¼ inch mini-diskettes, with a formatted memory capacity of 184.32K. The Discs are single-sided, double-density, with 40 tracks, 18 sectors per track and 256 bytes per sector.

The drive unit, with either single or double disc drives has a steel case and requires an external power supply. The single disc drive unit weighs 4.4kg.

The drives should be available in the summer. A single disc drive unit will cost £225 with a further £50 for the disc controller. Adding an extra disc to the single unit will be undertaken by Dragon dealers and cost £200.

Restore# resets the pointer to the start of the serial file, or random access record, and *If Eof(N) Then* has the normal error-trapping function.

Dim# is an extension of the normal Basic command which allows you to set the length of a random access record. The default is the industry standard of 128 bytes, but it can set to any value from 1 to 255 as required. This is very important for optimal use of memory and simple programming. The main difficulty with random access files is remembering on which record a particular item of data was stored, but this can be overcome with indexing,



where a small serial file provides an index for a large random access file.

A particularly useful and flexible command is *Find*, which will perform rapid comprehensive searches for a specified string. In a serial file, *Find* followed by *Input#* will input the target string from its start — and in a random access record will input the *Record* containing the string. As the search starts from the current file pointer position, this must be *Restored* for a complete search.

Random access searches start from a specified record number. Wild characters are allowed and are indicated with "*", so that partial matches can be easily searched for. For example, consider what *P*** **** *C******** *W***** might turn up.

At around £300 the simplest disc system will set you back getting on for twice the new low price for the Dragon, so do you really need one and can it be worth the expense? Well, as always, that depends on what you want to do with your computer. If you are simply an arcade-games freak then just forget it, unless you have more money than sense, as the only potential advantage is the ability to load up your favourite program faster. And even that is rather a vain hope, as most new machine-code software is heavily protected against copying.

The most obvious candidate for a Dragon disc system is the small business, where cassette files for data and/or text are not really a very practical proposition. When a customer is on the line asking if an item is in stock, he does not really want to know about the vagaries of your cassette loading, or wait for the record at the end of the tape to be reached — the rapid access to large databases available with disc is invaluable.

In addition to the business sector, increasing numbers of 'serious' hobbyists are beginning to consider that disc systems are not beyond their pockets. We are waiting impatiently for a disc-based word-processing system for the Dragon.

The question of how *Delta* will stand up against the competition must be very much to the fore, but in the continued absence of visible alternatives it must be getting a clear head start. Peter Rihan of Premier indicated that 60 percent of their sales so far have been complete systems, and claimed current sales/orders of 2000 units.

The *Delta* disc system is a very professional product and it looks as if Premier are going to support it properly. A nice touch, especially in view of the potentially large number of new disc users, is the Customer Service Session from 7 to 9 pm on Monday evenings when you can phone in with your problems. We tried this out, whilst seeking more information on the system and got a very helpful response.

In our opinion, *Delta* deserves to be a success, but that will also depend on how quickly commercial software becomes available for it. We understand that a number of software houses have taken an interest in the Premier system and that in particular MSD Consultants have some business programs ready. The longer other systems are delayed, the more likely it is that other programmers will write for *Delta* and that it's early beachhead will develop into a successful campaign. ■

GREAT NEW SOFTWARE DEAL

BUY 'N' TRY

HOT-SHOTS

The latest list of best selling titles drawn from our database covering national trends.

ATARI

Zaxxon	£31.40
Choplifter	£29.95
Shamus	£29.95
Miner 20'49er	£29.95
Preppie	£21.99

B.B.C.

Planetoid	£9.95
Killer Gorilla	£7.99
Moon Raider	£7.99
Rocket Raid	£9.95
Music Processor	£14.95

COMMODORE 64

Gridrunner	£8.50
Attack of Mutant Camels	£8.50
Pakacuda	£5.99
Matrix	£8.50
Centropods	£5.99

SPECTRUM

3D Tanx	£4.95
Timegate	£6.95
Arcadia	£5.50
Krazy Kong	£5.50
3D Combat zone	£4.95

VIC 20

Tornado	£5.95
Trader	£14.95
Boss	£14.95
Choplifter	£29.95
Arcadia	£5.50

ZX81

Trader	£9.95
Flight Simulations	£5.95
QS Scramble	£3.95
Mazogs	£10.00
Inca Curse	£5.95

PREDICTION

Call us for details of best sellers for the Dragon, Oric and Lynx

Fastest moving **new** products through Software Centre: Two remarkable programs for home and business use, created for the VIC 20 (+16K), Oric 1, Sinclair Spectrum, Sinclair ZX81 (+16K), Dragon and Commodore 64. You too can Buy 'n Try them by completing the order form on the coupon.

CentreSpread SC at £19.95

A fast and flexible spread sheet program providing 'what if' formula variations on columns and lines.

DataBase SC at £19.95

Powerful database management program covering 12 fields and giving an extensive electronic filing system capacity with around 250 records per field, calculation within and between records, and within ranges.

SOFTWARE CENTRE .... THE BETTER WAY TO BUY SOFTWARE

128 Wigmore St	30 New Walk	426 Cranbook Rd	112 East St
London W1	Leicester	Ilford, Essex	Southampton
Tel 01-487-5974	0533-532704	01-554-6574	0703-24703

Please add my name to your Buy 'n Try list to keep me right up to date with the latest software, news and views through Software Centre's FREE up-dates. ☐

Please send me the following programs:

..... at £ .....

..... at £ .....

TOTAL £ _____

Cheque ☐ Postal Order ☐ enclosed.

Please debit my Access ☐ Barclaycard ☐ in the sum of £ .....

Account No. ..... Signed .....

My computer is (make) ..... (Model) .....

Memory ..... Peripherals .....

Name .....

Address .....

Telephone No. ..... Please allow 21 days for delivery.

SEND TO:- SOFTWARE CENTRE, 128 WIGMORE STREET, LONDON W1. TEL. 01-487-5974, or your nearest branch.

OVER 1000 TITLES ALWAYS IN STOCK

Choose Software Centre for the widest choice of quality programs. And never forget we ensure your satisfaction with our remarkable Buy 'n Try buy-back option.

THE BUY-BACK OPTION

If, within one month of purchase, the program you bought fails to live up to your expectations, then provided it's in perfect working order, we'll buy it back for 80% of the price you paid against the purchase of another software item of equal of greater catalogue value. Send for our list .... you know it makes sense.

NEW RELEASES

Software Centre keeps you right up to date with the important new releases .... including an exciting selection of exclusive programs.

LATEST HIT TITLES

Software Centre keeps you in the picture with regular reports on the best selling titles, so you always know the 'hot shot' programs.

SPECIAL OFFERS

Software Centre will be making special promotional offers of programs, hardware and peripherals. Just post us the coupon to make sure you are kept informed.

SHOPS AND MAIL ORDER

Software Centre is growing fast. We have shops in Southampton, London, Ilford and Leicester. More are planned. If you can't call in person, we'll gladly handle your telephone or mail orders through any branch.

IN YOUR INTEREST

Buy 'n Try makes sure you get what you want, because we know that our reputation relies on your satisfaction. We are not a library, and we discourage copying .... so all programs are sold subject to an undertaking that they will not be copied.

THE ORIGINAL AND THE BEST

Software Centre invented Buy 'n Try. We have the experience, the stock, a fast growing Dealer network, specially commissioned software authors and thousands of satisfied customers. It's a successful formula that should be serving you.

ACTION PLAN

To receive our regular catalogue, details of Software Centre branches, special offers, league table of hit software and list of latest releases ... just complete the coupon, and post it back to us as soon as possible. Or 'phone your nearest branch.

Close to critical

***Andrew Thompson** presents five programs to help 'O' level pupils with their studies*

With computers now an everyday part of our lives, they are being used in many different areas. One of these fields is education and, while the teacher will never be replaced, the computer serves as a useful tool.

Here are five, short, concise programs concerned with topics covered in schools at 'O' level. They are all scientific programs, demonstrating theories such as radioactive decay and refraction of light. In this sort of program, a common difficulty is the equation with many factors:

A=1/(B*C-D)

Any value can be found if all the others are known, the problem arises when the unknown value has not been isolated (ie, *B,C,D*). The following programs get round this by holding all possible combinations of the equations. A student would be expected to isolate any particular value if required.

Refraction: This program demonstrates the connection between ingoing and outgoing rays of light when they pass through glass or plastic. It explains why things become distorted and water looks shallower than it actually is. The angle of incidence (*I*) and the angle of refraction (*R*) are linked by the equation:

N=SIN(I)/SIN(R) — SNELL'S LAW.

Where *N* = the refractive index, a constant for a particular material; eg, glass = 1.5.

Program notes

70	If no null input then re-enter values
65 & 67	Convert degrees to radians
80-100	Compute unknown value
115-117	Convert radians to degrees

Critical angle: Another program concerning light, it explains why light is reflected at a glass-air boundary if the angle of incidence is too great. This also relates to the refractive index. When a ray of light passing from a dense medium to a less dense medium exceeds the critical angle, the boundary ceases to be transparent and acts like an everyday mirror.

C=ARC SIN(1/N)

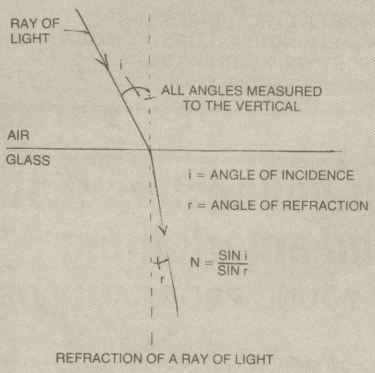
Program notes

90	Convert degrees to radians
100	Re-enter if no null input
110-120	Computer unknown value
130	Convert radians to degrees

Radioactive decay: When elements emit radiation, they decay at a constant rate with respect to their mass. The half-life of an element is the time taken for that element to decay to half its former mass.

This can be demonstrated in class by

Continued on page 19



REFRACTION OF A RAY OF LIGHT

```
R E F R A C T I O N

10 REM REFRACTION
20 PRINT"REFRACTION OF LIGHT IS GOVERNED"
30 PRINT"BY:"
40 PRINT"N=SIN(I)/SIN(R) - SNELL'S LAW"
50 PRINT"ENTER N,I,R,0=UNKNOWN VALUE"
60 INPUTN
62 INPUTI
64 INPUTR
65 LET I=3.1415*I/180
67 LET R=3.1415*R/180
70 IF (N*R*I)<>0 THEN GOTO 50
80 IF N=0 THEN LET N=SIN(I)/SIN(R)
90 IF I=0 THEN LET I=ASN(N*SIN(R))
100 IF R=0 THEN LET R=ASN(SIN(I)/N)
115 LET I=180*I/3.1415
117 LET R=180*R/3.1415
120 PRINT"N=",N
130 PRINT"I=",I
140 PRINT"R=",R
150 D=ABS(I-R)
160 PRINT"PATH DIFFERENCE",D
```

```
C R I T I C A L   A N G L E

10 REM CRITICAL ANGLE.
20 PRINT"TOTAL INTERNAL REFLECTION OCCURS"
30 PRINT"WHEN LIGHT PASSES FROM A DENSE"
40 PRINT"MEDIUM INTO A LESS DENSE MEDIUM"
50 PRINT"AT AN ANGLE GREATER THAN THE"
60 PRINT"CRITICAL ANGLE. THIS EQUALS:-"
70 PRINT"N=1/SIN(C)  C=CRITICAL ANGLE"
75 PRINT"ENTER N,C  0=UNKNOWN VALUE"
80 INPUT N
85 INPUT C
90 C=3.1415*C/180
100 IF (N*C)<>0 THEN GOTO 75
110 IF N=0 THEN N=1/SIN(C)
120 IF C=0 THEN C=ASN(1/C)
130 C=180*C/3.1415
140 PRINT"N=",N
150 PRINT"C=",C
READY.
```

SPECIAL OFFER
Deduct £1 per cassette when ordering 2 or more

TOP QUALITY PROGRAMS

DRAGON DATA LTD APPROVED

AND BECAUSE . . . (NEW RELEASE) £6.95
We proudly present our latest release. A totally original game with an amazing nine screens. Loosely based on a television advertisement the idea is to get the chocy's to your beloved's home before she arrives. You must risk life and limb by driving, running, horse riding, motor-cycle riding and jumping, hang-gliding, ski-ing, dangling from a ski-lift and parachuting to the scene. With superb graphics/sound effects and a high-score chart, the game culminates with an excellent finishing display for those that make it. But will you?
"A great idea" . . . *Cadburys*

DRAGOPOLY (NEW RELEASE) £6.95
The first full-feature version of the extremely popular board game available for the Dragon. A complete simulation including buying, selling, mortgaging, etc, etc. The program makes full use of the Dragon's colour facilities and incorporates some inspired graphics and sound effects. With options for 2-6 players, continually available instructions and the Dragon as banker, the game is terrific for all the family and there will be no missing £500s!

★ SUBMARINE COMMANDER £6.95
Navigate the seas to find the enemy with this high-resolution colour simulation. Engage enemy aircraft and ships who will try to torpedo and ram you. Depth charges and under-sea mines add to your problems. You are assisted by torpedoes, periscope view, radar/compass, fuel and depth gauges with on-screen displays of ammunition and score. Realistic explosions and sound effects alongside identification sheet, home-coming display, hall of fame and graphic reward for beating the high-score makes this program a masterpiece. TRY IT!

★ LUNAR LANDER AND RESCUE £6.95
A brilliant two-part game. Part one is an arcade standard lander which trains you for part two. Here you must rescue lunar engineers in a tortuous cavern. Fuel dump landings and falling stalactites add to the perils of your heroic mission in one of the best Dragon programs available.
"The best version we've seen for the Dragon 32" . . . *Dragon Dungeon*
"A challenging and well-written game" . . . *Dragon User*
"Very good" . . . *Dragon Data*

ALSO AVAILABLE

★ A WEEK AT THE RACES	£6.95	GEOGRAPHY OF UK	£6.95
★ JACKPOT	£5.95	★BLACKJACK	£5.95
★ GRAPHIC TOOLKIT	£6.95		

TOP THREE DEALERS
No. 1 — THE COMPUTER CENTRE, Hull, E. Yorkshire
No. 2 — DRAGON DUNGEON, Ashbourne, Derbyshire
No. 3 — STATACOM, Sutton, Surrey
TOP THREE DEALERS

B & H SOFTWARE
208 KING STREET
COTTINGHAM, HULL
Telephone 0482 446753

PLEASE NOTE
(1) All prices are fully inclusive
(2) Dealers always welcome
(3) Excellent display on b/w television
(4) We pay 25 per cent royalties for high-quality programs

PINNACLE ELECTRONICS

MICRO COMPUTER SOFTWARE

BUYER/ STOCK CONTROLLER

JOB SPECIFICATION

1 Appraise and select lines for distribution.

2. Negotiate with potential suppliers.

3. Liaise with Marketing Dept/Sales Force.

4. Monitor stock levels/reorder accordingly.

Pinnacle is a leading National Distributor of Audio/ Video accessories and equipment, with a Sales Force of 30 Representatives serving over 6,000 Retail Outlets. Our products already include a comprehensive range of computer and printer leads, covers and some software. We need an aggressive, enthusiastic and knowledgeable person to expand our current activities.
Salary negotiable — excellent opportunities for advancement in a rapidly growing company.

PINNACLE ELECTRONICS LIMITED
PINNACLE HOUSE, 1 OASTHOUSE WAY
ORPINGTON, KENT BR5 3QJ
TELEPHONE (0689) 27000

At last! A BASIC book for youngsters that is both educational *and* entertaining

ZX81/TS1000 PROGRAMMING FOR YOUNG PROGRAMMERS

by Linda Hurley

The ZX81 computer is becoming ever more popular both in schools and homes, but in order to teach youngsters the techniques required to become proficient in programming the ZX81, they need instruction that will hold their interest *and* provide entertainment and enjoyment. This book, to be published in July, teaches young programmers from nine years upwards the fundamentals of BASIC programming in a way that they'll find both educational and exciting.

A software cassette to accompany the book will also be available. This contains listings in the book, plus ideas for routines that will help the adventurous programmer design and write their own simple games programs. Also included are three games not contained in the book.

Order Form

To order your book/cassette, just tick the appropriate box(es) below and send this advertisement (or a copy of it), with your cheque or postal order to:

Marketing Services Department, McGraw-Hill Book Co (UK) Ltd

FREEPOST, Maidenhead, Berkshire, SL6 2BU

Please send me _____ copies of '**ZX81/TS1000 Programming for Young Programmers**'
(book) 07 084595 6 at £4.95 each ☐
(cassette)07 084700 2 at £5.95 each ☐

giving each pupil a number of dice. Then, the dice are thrown and all sixes are removed. This continues until all the dice are removed.

Program notes

80-90	Ensure valid input
130-150	Toss the dice
160-175	Report on population

Prime number: A number is said to be prime if it has no divisors other than itself and unity (1). The apparently random distribution of primes in the number system still frustrates mathematicians. Checking for primes becomes tedious as numbers increase. This program divides a number by every number under its square root.

Program notes

65	Ensure valid input
70	Scan all numbers under the square root
100	Address for line 80

Equation of a line: A recurrent 'O' level maths topic is the establishment of the equation of a line on a graph. Many questions take the form of several points on a graph where you have to work out another point.

In fact, only two points on a straight line are required to deduce the equation of the line. The program requests these two and computes the equation of the line joining the points. Try writing down two points, working out the equation and then checking with the computer.

Program notes

130	Calculate gradient
140	Calculate data zero

All the programs are written in standard Basic and are designed to run on most micros. ■

RADIOACTIVE DECAY

```
 10 REM RADIOACTIVE DECAY
 20 PRINT"THE RADIOACTIVE DECAY OF AN
    ELEMENT"
 30 PRINT"CAN BE SIIMULATED BY THROWING
    DICE AND"
 40 PRINT"PROGRESSIVELY REMOVING ALL
    SIXES"
 50 PRINT"THROWN."
 60 PRINT"HOW MANY DIE TO BEGIN WITH"
 70 INPUT D
 80 LET D=ABS(INT(D))
 85 LET R=0
 90 IF D=0 THEN GOTO 60
 120 R=R+1
 130 FOR A=1 TO D
 140 IF INT(6*RND(1)+1)=6 THEN LET D=D-1
 150 NEXT A
 160 PRINT"ROUND",R
 165 REM SCROLL IF ZX-81
 170 PRINT"SIZE",D
 175 REM SCROLL IF ZX-81
 180 GOTO 90
READY.
```

PRIME NUMBER

```
 10 REM PRIME TEST
 20 PRINT"A NUMBER IS SAID TO BE
    PRIME"
 30 PRINT"IF IT HAS NO DIVISORS
    OTHER"
 40 PRINT"THEN ITSELF AND UNITY
    (1)"
 50 PRINT"ENTER A NUMBER TO BE
    TESTED"
 60 INPUT N
 65 IF N<3 OR N<>INT(N) THEN GOTO
    60
 70 FOR A=2 TO SQR(N)
 80 IF N/A<>INT(N/A) THEN NEXT:
    PRINT"PRIME!":GOTO100
 90 PRINT"NOT PRIME.":A=SQR(N):
    NEXT A
 100 END
READY.
```

EQUATION OF A LINE

```
 10 REM EQUATION OF A LINE
 20 PRINT"A STRAIGHT ON A GRAPH"
 30 PRINT"CAN BE EXPRESSED BY THE EQUATION"
 40 PRINT"Y=M*X+C"
 50 PRINT"IF TWO POINTS ON A LINE ARE KNOWN"
 60 PRINT"THE EQUATION CAN BE CALCULATED."
 70 PRINT"ENTER TWO POINTS (X,Y)"
 80 PRINT"POINT 1"
 90 INPUT X1
 95 INPUT Y1
 100 PRINT"POINT 2"
 110 INPUT X2
 115 INPUT Y2
 130 M=(Y1-Y2)/(X1-X2)
 140 C=Y1-M*X1
 150 PRINT"Y="M"*X+"C
READY.
```

Input error — nonsense in Basic

***Ian Logan** looks at syntax checking in the second of a five-part series*

The three Sinclair machines — the ZX80, ZX81 and Spectrum — have proved to be very popular machines, and this success is partly due to the inclusion of 'syntax checking'.

To the user, the syntax checker appears to be that part of the operating system that stops faulty Basic lines being copied from the editing area at the bottom of the TV screen to the program area at the top of the screen. Indeed, when the syntax checker finds a mistake, a flashing question mark appears in the edit-line at a point where the syntax has failed. The user can then amend the Basic line and try to have it accepted a further time. Note that direct Basic lines are also checked for correct syntax before being executed.

The syntax checker is therefore concerned with the identification of 'syntax errors' in the edit-line and is called on every occasion the user leaves the editor by pressing the *Enter* key. In fact, the syntax checker is also called to check the syntax of the 'input-line' when the user is responding to an *Input* prompt.

So, what is the syntax checker actually doing? Well, this is a simple question, but the answer may appear far from simple unless the reader understands the difference between syntax errors and run-time errors.

A syntax error occurs when the computer finds that the user has entered a line that in some manner has failed to make sense. A run-time error occurs, however, when the computer finds that it cannot manage the task set by the user, not because the sense of the statement is not correct, but because the operating system just does not allow it. As a first example consider the statement: `10 LET = B`
that can be entered, using the editor, into the edit-line. But, when the *Enter* key is pressed, a syntax error is signalled. The mistake is one of 'syntax fails' because the user has not placed a variable between the '*Let*' and the '='. The syntax checker 'insists' that in a *Let* statement the command word is followed by:

- characters that form a valid variable name, the character '='.
- characters that form an expression — numeric or string to match the type of variable used.
- either a 'carriage return' — end of the Basic line, or a ':' — end of the Basic statement.

and it is the checking for these four items that constitutes the task of the syntax checker when examining a *Let* statement.

If the user were now to change the statement to read: `10 LET A = B`
then the syntax of the *Let* statement would be satisfied. But, if the user executes this one line program by entering *Run* and *Enter* the operating system will give a run-time error because it cannot find a suitable value for *B*. The system has been asked to do something that is just not allowed. It is of interest that, in some other microcomputers, such a statement does not give a run-time error, as the manufacturers have asked the system programmer to give 'undeclared' variables the value zero (for example).

In the Spectrum system, there are 50 different Basic commands, *Let*, *Run*, *Cls* . . . and in the parameter table at *6778 (1A7Ah)* to *6934 (1B16h)* is to be found a corresponding set of parameter items for each of the commands.

In the case of the *Let* command, the entries are:

address dec	(hex)	entry dec	(hex)
6778	(1A7A)	1	(01)
6779	(1A7B)	61	(3D)
6780	(1A7C)	2	(02)

and from these entries the operating system understands that the syntax for a *Let* command has to have the four 'conditions', as outlined earlier. This is performed in the following manner: the first entry — *01* — is collected once the operating system has determined that it is dealing with a *Let* command. This value signifies that the *Let* is to be followed by a variable, as this is the condition given in the *Class-01* subroutine at *7199 (1C1Fh* —called *Tem1* by Sinclair).

The scanning of the characters in the *Let* statement, that form the variable name, shows very nicely just what points are checked by the syntax checker and what is left alone. The first action of the *Class-01* subroutine is to call the *Look-Vars* subroutine — *10418 (28B2h* and called *Find_n* by Sinclair). This subroutine checks to see if the variable has the correct form.

The system variable *Ch_add* is used as a pointer to each of the characters in the *Let* statement, as they are required. Bit 6 of the system variable *Flags* is set if the variable is of the numeric type and reset if string. The carry flag is always returned reset as syntax is being checked. If there should have been an error — such as the user submitting the line:

`10 LET AB$ = ""` (where there are two letters before the $)

```
Address              Name          Action

24    (0018h)    GET-CHAR      ;The byte addressed by CH_ADD
                               ;goes into the A register.
                               ;Spaces and control codes are
                               ;ignored.

32    (0020h)    NEXT-CHAR     ;CH_ADD is advanced before
                               ;GET-CHAR is called.

7298  (1C82h)    EXPT-1NUM     ;The next number goes onto the
                               ;calculator stack.

7308  (1C8Ch)    EXPT-EXP      ;The next string expression
                               ;goes onto the calculator stack.

7828  (1E94h)    FIND-INT1     ;The number on the top of the
                               ;calculator stack goes into the
                               ;A register.

7833  (1E99h)    FIND-INT2     ;Number to BC register pair.

9467  (24FBh)    SCANNING      ;The next expression is
                               ;evaluated - the result goes on
                               ;the calculator stack.

11249 (2BF1h)    STK-FETCH     ;A set of string parameters is
                               ;taken off the calculator stack.
                               ;BC = length, DE = base address.
```

then syntax will have failed at this stage. When this occurs, the user is 'returned' to the editor and the edit-line is printed with a flashing question mark at the point that *Ch_add* had reached when the error was identified.

The second entry — *3D* — is now considered. This code is the Ascii representation of the '=' character and is the 'separator' required at this stage. The code addressed by the system pointer *Ch_add* is compared to the '=' code. If they match, then the syntax condition is satisfied and *Ch_add* is advanced before proceeding to the next stage. However, if the codes do not match, then the user is returned to the editor.

The third and final entry — *02* — can now be used. This code indicates that the subroutine *Class-02 — 7246* (*1C4Eh* and *Tem2*) is to be called. This subroutine is a little complicated, but essentially there are two tasks to be performed:

- Scan the 'next expression' by calling SCANNING — 9467 (24FBh and EXPRN) to ensure that the characters form a meaningful expression.
- Match the 'type' of the variable to that of the expression, giving a syntax error if they are not both numeric or both string.

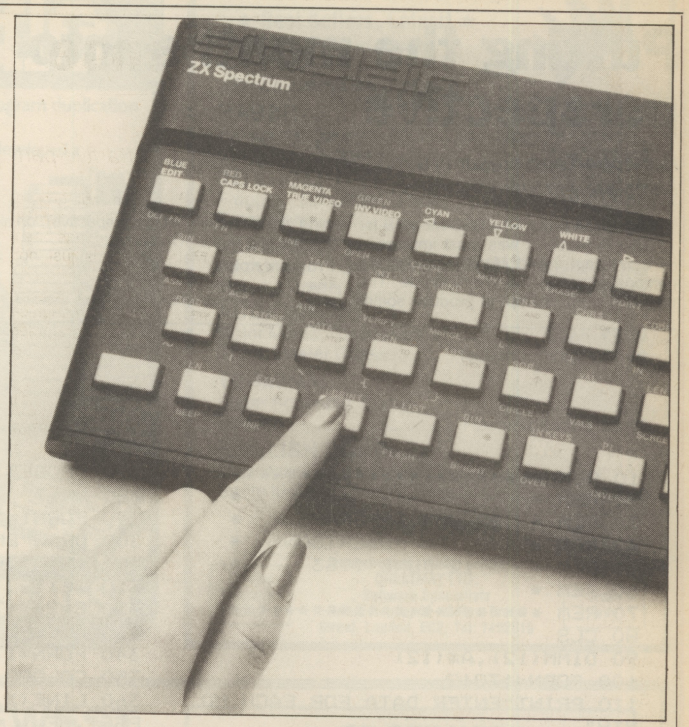
The only condition that remains to be handled is the requirement that the statement must now be at its end. This is done at the end of every statement — the subroutine *Check-end — 7150* (*1BEEh* and *End?*) does no more than compare the character addressed by *Ch_add* against the characters 'carriage return' and ':'. If there is an error, the user is returned to the editor as usual. Otherwise, the syntax of the whole statement has been accepted and the operating system is ready to consider the 'next' statement. If there are no further statements, then the operating system allows the line to be accepted and used accordingly.

This discussion of the syntax checking procedure for a *Let* command shows that the syntax checker is only concerned with 'sense'. At no stage are variables created, values assigned, expressions evaluated or run-time errors considered.

There is, however, in the Spectrum system, a very special action undertaken by the syntax checker and that is the 'insertion of hidden floating-point forms' after numeric values as they occur in expressions. This operation is performed by the *Scanning* subroutine and makes the evaluation of expressions faster in run-time. It is interesting to note that if 'syntax fails' further along a line, then the floating-point forms have to be removed from the whole line before a 'return' is made to the editor.

The *Let* command uses two of the command class routines that are found in the Spectrum's operating system. Details of all the command classes are to be found in table 1.

The parameter table contains entries for all the Basic commands and, as a further example, the steps involved in handling a *Run* statement will now be outlined. The entries for *Run* are:



address dec	(hex)	entry dec	(hex)
6827	(1AAB)	3	(03)
6828	(1AAC)	161	(A1)
6829	(1AAD)	30	(1E)

In this case, the first entry shows that 'a numeric expression may follow — zero to be used in case of default'. The second and third entries form the address of the 'run-time command routine' and are not used in syntax time. The *Class-03 — 7181* (*1C0DH* and *Tem3*) contains the two steps:

- Call FETCH-NUM — 7390 (1CDEh and OPTNO) which in syntax time confirms that any characters that are present in the statement do indeed form a numeric expression.
- Check that the end of the statement has been reached.

These examples show how syntax is managed in the 'old' Spectrum Rom, but the mechanisms involved form an integral part of the operating system and it is difficult to use them in one's own programs. However, the 'shadow' Rom, of the microdrive/network/RS232 interface, includes a provision for extending the Basic interpreter, should the user so wish.

The 'shadow' system variable *Vector — 23735* (*5CB7h*) — contains the vectored address to the end of the command-search in the 'shadow' Rom. This address may be changed by the user and further tests conducted before returning. Should one of the new tests indicate a certain condition, then this can be acted upon and, in effect, a new Basic command added to the existing set.

As an example, let me show how the new command — *Cls#* — has been added to the existing set of Basic. This new command allows the user to 'clear the screen and revert to the original colours', ie white paper, black ink, etc.

In the command-search a test is made for the command *Cls*, realising that at this point the 'old' Rom would have handled this command word if it had been followed by a 'carriage return' or ':' character. Once found, the syntax time routine for *Cls* is entered. Here *Ch_add* is advanced and the 'present' character compared to the 'hash' code, ie *35* (*23h*). If the codes do not match, then there has been an error, otherwise the code is accepted and *Ch_add* advanced once again.

Now a check is made to ensure that the end of the statement has been reached — again an error if not. This stage now marks the end of the syntax checking and a 'return' is made, carefully, to the appropriate place in the 'old' Rom, so that the next statement can be considered.

It is envisaged that the 'adding' of new commands to the Spectrum's Basic, whilst perhaps never being particularly useful, will be taken up by many hobbyists as they vie to make toolkits, new languages and many other interesting programs.

In the next article, 'run-time' will be considered. ■

Putting the months into perspective

***Ian Robertson** presents a monthly barchart program complete with demonstration routine*

Having just acquired a BBC Model B for use in school, I was most impressed by a program called *Monthly* among the demonstrations in the Users Guide. The following is an attempt to produce something similar (albeit not in perspective), on my true and trusted Dragon.

Program notes

Line	
90	Dimension arrays to hold graph data and strings to print the months on the hi-res screen.
100-180	Loop to input the data. For demonstration purposes this READ's the data rather then INPUT's it. The increment of M(N) in line 140 is to allow room for the months at the bottom of the hi-res screen. Line 160 prevents the DRAW instructions going out of range.
190-210	Loop to read data for month DRAW strings.
220-260	Stop and start instructions.
270-410	Calculate and draw the 'bars' in alternating colours. Lines 370-380 draw a box in the background colour in the same position as the filled boxes in order to separate the 'bars'.
420-470	Data for demonstration and month DRAW strings. ■

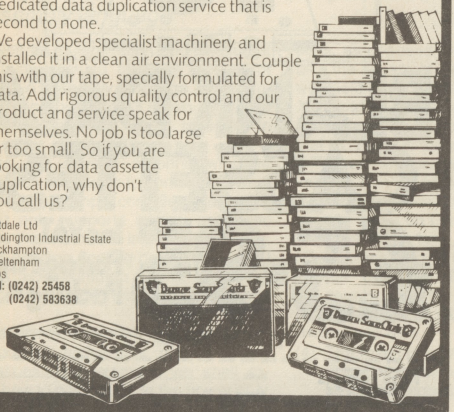
```
10 REM ************************
20 REM *                      *
30 REM *  DRAGON BARGRAPH.    *
40 REM *  (C)IAN ROBERTSON    *
50 REM *    12 JUNE 1983      *
60 REM *                      *
70 REM ************************
80 CLS
90 DIMM(12),A$(12)
100 FORN=1TO12
110 PRINT"ENTER DATA FOR EACH MO
NTH"
120 PRINT @64,"MONTH";N
130 REM**************************
      TEMPORARY READ STATEMENT
      FOR DEMONSTRATION.
      REPLACE WITH 'INPUT'.
      AND DELETE DEMO DATA,
      (LINE430).
140 READM(N):M(N)=M(N)+10
150 REM**************************
160 IFM(N)>191THENM(N)=191
170 CLS
180 NEXT
190 FORN=1TO12
200 READA$(N)
210 NEXT
220 PRINT@98,"TO SEE GRAPH PRESS
 spacebar"
230 PRINT@224,STRING$(32,"£")
240 PRINT@290,"spacebar AGAIN FO
R NEW GRAPH"
250 SCREENO,1
260 IFINKEY$=""THEN260ELSE270
270 PMODE3,1:PCLS:SCREEN1,1
280 N=17
290 FORN1=1TO12
300 DRAW"BM"+STR$(N)+",191C7"+A$
(N1):N=N+20
310 NEXT
320 C=2:X=7
330 COLORC
340 FORN=1TO12
350 COLORC
360 LINE(X,182)-(X+20,191-M(N)),
PSET,BF
370 COLOR5
380 LINE(X,182)-(X+20,191-M(N)),
PSET,B
390 X=X+20:C=C+1
400 IFC>4THENC=2
410 NEXT
420 REM**************************
      DEMONSTRATION DATA
430 DATA 123,3,73,187,69,100,57,
65,87,32,145,150
440 REM**************************
      DATA FOR MONTH LETTERS
450 DATA BL4R3U8L2R4,U4NR1U4NR4,
BL4U8F4E4D8,BL4U4NR6U4R6D8,BL4U8
F4E4D8,BL4R3U8L2R4,BL4R3U8L2R4,B
L4U4NR6U4R6D8
460 DATA BL4R6U4L6U4R6,BL4R6U8L6
D8,BL4U8BD1F6BD1U8,BL4U8R4F2D5G2
L4
470 REM**************************
480 IFINKEY$<>CHR$(32)THEN480ELS
ERUN
```

Kiltdale

At Kiltdale we don't treat computer program duplication as a side line. We are the specialists.

Since we started three years ago, we have developed a dedicated data duplication service that is second to none.
We developed specialist machinery and installed it in a clean air environment. Couple this with our tape, specially formulated for data. Add rigorous quality control and our product and service speak for themselves. No job is too large or too small. So if you are looking for data cassette duplication, why don't you call us?

Kiltdale Ltd
Liddington Industrial Estate
Leckhampton
Cheltenham
Glos
Tel: (0242) 25458
(0242) 583638



QUITE SIMPLY THE BEST

COMMODORE 64

★ Best Sellers, Latest! ★

I challenge you to find a better deal!
(Prices include VAT, p&p)

RABBIT
Pakacuda, Escape, MCP, Centropods, Annihilator, Monopole, Cyclons ..... Each **£5.45**

INTERCEPTOR
Frogger, Scramble, Panic, Spriteman (PacMan), Crazy Kong ..... Each **£6.45**

LLAMASOFT
Gridrunner 1, Gridrunner 2 (Matrix), Attack of the Mutant Camels ..... Each **£7.45**

AUDIOGENIC
Motor Mania, Renaissance ..... Each **£8.49**
Grand Master Chess ..... Recommended **£17.49**

TERMINAL
Super Scramble, Super Gridder ..... Recommended **£9.89**

ENGLISH SOFT
Superfont
Sprite Maker **£6.45**

Beat That!

Dealer Enquiries Welcome

Send cheques, postal orders to:
CRESTMAT LTD.
Software Specialists
Orient House, 42-45 New Broad Street, London, EC2. Tel: 7492510

Mail order only

THE VERY NEWEST
VIC20 GAME
NEUTRON ZAPPER

★ £3 OFF WITH THIS VOUCHER TILL JULY 31st

You are the pilot of the fastest starship in the galaxy FREEDOM FIGHTER. It has dual anti-gravity thrusters and a laser cannon that will ZAP any of the enemy craft this side of BETELGEUSE. You have been chosen to fight for the rebel forces against the enemy. Your life expectancy is only a few minutes — first you have to manoeuvre through a radio-active asteroid belt avoiding the exploding fragments. Because of the high radio-activity in this area your forward thrusters have run out of control and so the ship is constantly accelerating until you finish the phase. Once you are near the enemy's base planet you have to ZAP the Imperial Star Destroyers. If you can survive them, then you are confronted with the most terrifying of all, the menacing Maniac Mutants from the high gravity planet of DARG II. They swarm around like slugs but zillions of times faster.

The game includes:
- ★ 100% Machine code for incredibly fast arcade action
- ★ High Resolution multi-colour graphics — realistic movement!
- ★ On-screen score and high score
- ★ Ultra Froody sound will blow your mind
- ★ Hypnotically moving aliens threaten your deteriorating sanity
- ★ Increasing difficulty for continuous challenge
- ★ Keyboard or Joystick control
- ★ Colours that range from infra dead to ultra violent
- ★ If you, a mere mortal, can take on the challenge of NEUTRON ZAPPER then you know the terms . . .

The best game ever developed for the VIC20 including full money-back guarantee, mind eroding fun and super-fast delivery.

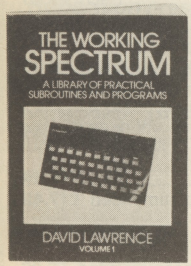
Limit of one voucher per order

Send Cheque, PO or Access number to:

GALACTIC SOFTWARE

Lambrook Road, Shepton Beauchamp, Somerset TA19 0LZ. Tel: 0460 40744

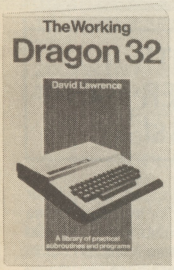
Better books from Sunshine



A collection of sophisticated Basic programs and subroutines including Unifile, Renumber (handles Gotos and Gosubs) education, accounts, games and scores of essential routines. Put your Spectrum to work with what must be the most comprehensive Spectrum book. 248pp **£5.95***

Some of the more advanced programs in this collection include a word processor and text editor, a music and sound synthesiser, a sprite editor and a program which allows you to enter high resolution graphics mode. This is not available in the standard Basic. 160pp **£5.95***





This computer has capabilities far beyond most other computers in this price bracket. With this collection of Basic programs and routines David Lawrence introduces word processing, music and shows you how to mix text and high resolution graphics. As with the other books in this series, each program is built up out of re-useable subroutines. 160pp **£5.95***

*Available through W H Smith's and computer dealers.

Trade/dealer enquiries welcome.

SUNSHINE

Please send me

☐ **The Working Spectrum** at £5.95 each

☐ **The Working Commodore 64** at £5.95 each

☐ **The Working Dragon 32** at £5.95 each

I enclose a cheque/ postal order for £_____
payable to **Sunshine Books** 19 Whitcomb Street, London WC2 7HF.

Name _____

Address _____

_____

Signed _____

We can normally deliver in four to five days.

STARTECH

Absolutely the lowest prices!



'10' BLANK DATA CASSETTES

£5-95 Inc VAT Postage and Packing 45p

Computer Grade Data Cassettes suitable for use in all of todays home computers. Each comes with its own case.

Tick for further information
☐ VIC 20 PRODUCTS
☐ COMMODORE 64

All prices subject to availability or change without notice.

PLEASE SEND ME
Pack of 10 Data Cassettes

Qty	Price	inc. p&p	TOTAL
	£6.40		

Name _____

Address _____

I enclose Cheque, P/O for _____

CREDIT CARD ☐ ACCESS ☐ BARCLAY CARD ☐ (24hr. ANSAPHONE SERVICE)

Post C.W.S.

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

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

Squaring the powers of the assembly

***Jeremy Ruston** explains how to compute powers of numbers in assembly language*

As well as multiplication and division, it is fairly easy to take the powers of numbers in assembly language (for example, 2 'to the power of' 3 is two multiplied by itself three times which is eight. In Basic, this is '*Print 2^3*').

There are several reasons why we should wish to be able to compute powers of numbers. A simple compiler or interpreter that only supports integer arithmetic can use this method to implement powers, without needing floating point arithmetic. I find the most common use of the power operator is to help in extracting bits from a byte.

In addition, many arithmetic and numerical analysis techniques require power calculations. For example, we shall examine how to compute *X* to the power of *N*, given *X* and *N*, and assuming *N* is a positive integer.

Let us assume we want to find *X* to the power of 16. We could start with *X* and multiply it by *X* 15 times. This is the obvious way to do it, but it is needlessly complex and slow. It is possible to obtain the same answer with only four multiplications, as opposed to 15, if we repeatedly take the square of each partial result. This will yield the partial answers *X^2*, *X^4*, *X^8* and *X^16*. This result is extracted from the basic laws of indices, which state that (*X^N*) ^*M* is the same as *X^(N * M)*.

The same idea can be applied to any value of *N* in the following way:

(1) Write the number *N* in binary, but omit any zeros on the left; ie, the first digit must be a 1.
(2) Replace each 1 in the number by the pair of letters *SX* and replace each zero by the letter *S*.
(3) Cross off any *SX* pairs that appear on the left.
(4) The result is a sequence of the letters *S* and *X*. Oddly enough, this result can be used for computing *X* to the power of *N*.
(5) *S* is interpreted as the operation of squaring and *X* is interpreted as the operation of multiplying by *X*.

For example, I shall work through the above method if *N* is equal to 23. The binary representation of 23 in 10111. This gives a letter sequence of *SX S SX SX SX*. We can remove the leading *SX* to gain the answer *S SX SX SX*.

This rule states that we should square the number twice, then multiply by *X*, square it again, multiply by *X*, square it and then multiply by *X*. We would be successively computing *X^2*, *X^4*, *X^5*, *X^10*, *X^11*, *X^22* and *X^23*. This binary method is pretty easy to translate into assembly language as long as you have a suitable multiplication routine, like those we have discussed previously.

A computer program to do all this often bears very little resemblance to the above algorithm. The method used to find *X^N* is as follows:

(1) Set *Y* to 1 and *Z* to *X*.
(2) Shift *N* right. If the bit that fell off was zero, go on to step 5.
(3) Set *Y = Z * Y*.
(4) If *N= 0*, the program has finished; the answer is *Y*.
(5) Set *Z = Z * Z*.
(6) Go back to step 2.

This can be encoded in a simple Basic program (see below).

You can trace through this program by hand to see exactly how the algorithm works. You may also like to encode the program into assembly language. If you decide to do so, I would recommend you stick a limit of one byte on the lengths of all the variables used. ■

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

```
 10 REM POWER
 20
 30 REM Binary method for exponentiation
 40
 50 REM (c) 1983 Jeremy Ruston
 60
 70 INPUT "What do you want to the power of what:"Z,N
 80
 90 REM Step 1:
100 Y=1
110
120 REM Step 2:
130 N=N/2
140 IF N=INT(N) THEN GOTO 230
150 N=INT(N)
160
170 REM Step 3:
180 Y=Z*Y
190
200 REM Step 4:
210 IF N=0 THEN PRINT "Answer:"Y:END
220
230 REM Step 5:
240 Z=Z*Z
250
260 REM Step 6:
270 GOTO 120
```

KEYSOFT *Present*



THE KEY

For any ZX Spectrum

THE ULTIMATE SPECTRUM BACK-UP COPIER!

ALSO INCLUDES HEADERLESS COPIER

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

KEYSOFT, Dept. PCK1
6 Bruce Grove
London N17 6RA

N.B. 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

Please send me ..... "KEY"(s) @ £5-95. Total £ .....

Name .....

Address .....

.....

PCK1 .....Post Code .....

FIFTY ARCADE GAMES FOR YOUR MICRO

For a limited period we are offering 50 first-class games at a special introductory price. To be sure of your copy order now.

Spectrum 16K or 48K	£8.99
Dragon 32.....	£8.99
Oric 1	£8.99
Sinclair ZX81 1K	£4.99
ZX81 16K	£5.99

All tapes post free. Mail order only.
Cheques/POs payable to
Anco Software, 25 Corsewall Street
Coatbridge ML5 1PX

HORNET

SOFTWARE LTD

FOR THE

DRAGON 32 & TSR80 CO-CO

A BRAND NEW MACHINE CODE GAME IN THE UK

WORMTUBE

FROM ZETA

1 to 4 players — 9 speed/skill levels — Joystick Control — Pause Control — Arcade style action and sound — Wormtube has Rainbow certification seal and was reviewed in March 83 *Rainbow* as a well-conceived game with great graphics and strong sound effects

MISSION-EMPIRE

A STRATEGIC SPACE WAR GAME

Requires not only 32K of Computer Power but XXXXK of Brain Power to conquer your corner of the Galaxy. Each game takes two to five hours and is different each time.

ACCESS **£8 each** (inc VAT) BARCLAY

ALL ORDERS DISPATCHED 1ST CLASS WITHIN 24 HOURS
TRADE ENQUIRIES WELCOME

HORNET SOFTWARE LTD
10 BUCKINGHAM'S WAY, SHARNFORD
LEICS, LE10 3PX. TEL: 0455 272037

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.

Dragman

on Dragon

This game resembles Pacman. The program uses the two different speed modes in the processor (do not use fast unless you are sure your Dragon can handle it). The game consists of three Ghosts, three Dragmen and four Power pills.

The game will become progressively harder. Many Dragon owners have been wondering how to achieve continuous movement by using _Inkey$_. I have managed this by introducing another variable.

Program notes

10-60	Rem lines
70	Game type and instruction
80-120	Variables
130-310	Set up screen
320-530	Movement
540-710	Ghosts movement
720-800	Screen Data
810-850	Routine for dead Dragman
860-1130	Chase
1140-1250	End
1260-1520	Increase speed and instructions
1530-1580	Game Type

Variables

NS= Sheet number
DL= Dragmen left
SC= Score
HI= High
HI$= Highest scorer
G1,2,3= Three ghosts position
X= Position of Dragmen
XG= Game type

```
10 REM ******************
20 REM ***  DRAGMAN BY ***
30 REM *** SIMON GREEN ***
40 REM *** (C) 12/2/83 ***
50 REM ***  8K PROGRAM ***
60 REM ******************
70 GOSUB 1530:GOSUB 1320
80 REM *** VARIABLES ***
90 TG$="G":NS=1:HS$="DRAGON"
100 DIM BS(463):PL=3:HI=5000
110 BS(100)=3:BS(122)=3:BS(356)=3:BS(378)=3:BS(335)=4:
    BS(238)=5:BS(239)=5:BS(240)=5
120 G(1)=238:G(2)=239:G(3)=240:X=335
130 REM *** SET UP GAME ***
140 FOR F=63 TO 415 STEP 32:BS(F)=1:NEXT F:CLS
150 FOR SD=1 TO 184:READ SN:BS(SN)=1:PRINT @SN,CHR$
    (175);:NEXT SD
160 PRINT @G(1),"G";:PRINT @G(2),"G";:PRINT @G(3),"G";
    :PRINT @X,"C";
170 IF BS(100)=3 THEN PRINT @100,"O";
180 IF BS(122)=3 THEN PRINT @122,"O";
190 IF BS(356)=3 THEN PRINT @356,"O";
200 IF BS(378)=3 THEN PRINT @378,"O";
210 FOR SD=64 TO 414
220 IF AA=1 THEN IF BS(SD)=0 OR BS(SD)=1 OR BS(SD)=3 OR
    BS(SD)=4 OR BS(SD)=5 THEN 250
230 IF BS(SD)=1 OR BS(SD)=3 OR BS(SD)=4 OR BS(SD)=5
    THEN 250
240 BS(SD)=2:PRINT @SD,"*";
250 NEXT SD
260 PRINT @0,"score=";SC;:PRINT @13,"hi=";HI;:PRINT @23,
    "lives=";PL;
270 PRINT @453,"dragman by simon green";
280 PRINT @482,"sheet=";NS;
290 PRINT @63,"h";:PRINT @95,"i";:PRINT @159,"x";
300 FOR F=1 TO LEN(HS$):PRINT @F+32+159,MID$(HS$,F,1);
    :NEXT F
310 PRINT @F+32+159,"x";
320 REM *** MOVE DRAGMAN ***
330 ZZ$=INKEY$
340 IF ZZ$="" THEN ZZ$=O$
350 IF ZZ$=CHR$(9) THEN X1=1
360 IF ZZ$=CHR$(8) THEN X1=-1
370 IF ZZ$=CHR$(94) THEN X1=-32
380 IF ZZ$=CHR$(10) THEN X1=32
390 X=X+X1
400 IF X=463 THEN PRINT @431," ";:X=47:GOTO 440
410 IF X=15 THEN PRINT @47," ";:X=431
420 IF BS(X)=1 THEN X=X-X1:GOTO 530
430 PRINT @X-X1," ";
440 PRINT @X,"C";
450 O$=ZZ$
460 IF BS(X)=2 THEN SC=SC+10:PRINT @6,SC;:BS(X-X1)=0:
    SOUND 220/TG,1:ND=ND+1:IF ND=213 THEN 1260
470 IF SC)=8000 AND KK=0 THEN PL=PL+1:PRINT @29,PL;
    :GOTO 490
480 GOTO 500
490 FOR F=1 TO 5:PRINT @492,"extra dragman";:FOR F1=1
    TO 200:NEXT F1:PRINT @492,"";:FOR F1=1 TO 200:NEXT
    F1,F:KK=1
500 IF BS(X)=2 THEN SC=SC+40:PRINT @6,SC;:BS(X-X1)=0:
    BS(X)=0:PLAY"O3T30CDEFGFEDCDEFG":ND=ND+1:IF ND=213
    THEN 1260 ELSE 860
510 IF G(1)=X OR G(2)=X OR G(3)=X THEN 810
520 BS(X)=0
530 FOR U=1 TO NS:GOSUB 540:NEXT U:GOTO 330
540 REM *** MOVE GHOSTS ***
550 FOR J=1 TO 3
560 RM=RND(4)
570 IF RM=1 THEN MG=-32
580 IF RM=2 THEN MG=1
590 IF RM=3 THEN MG=32
600 IF RM=4 THEN MG=-1
610 G(J)=G(J)+MG
620 IF G(J)=15 THEN PRINT @47," ";:G(J)=431
630 IF G(J)=463 THEN PRINT @431," ";:G(J)=47:PRINT @G(J),
    TG$;
640 IF BS(G(J))=1 THEN G(J)=G(J)-MG:GOTO 710
650 PRINT @G(J),TG$;
660 IF BS(G(J)-MG)=2 THEN PRINT @G(J)-MG,"*";:GOTO 690
670 IF BS(G(J)-MG)=3 THEN PRINT @G(J)-MG,"O";:GOTO 690
680 BS(G(J)-MG)=0:PRINT @G(J)-MG," ";
690 IF G(J)=X AND OO=0 THEN 810
700 IF G(J)=X THEN SC=SC+(100*NS):PRINT @6,SC;:PRINT
    @G(J)," ";:G(J)=237+J:PLAY"O3T30CDCDC":X=335:O$=""
710 NEXT J:RETURN
720 REM *** SCREEN DATA ***
730 DATA 32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,48,
    49,50,51,52,53,54,55,56,57,58,59,60,61,62,64,68,69,
    73,78,80,85,89,90,94
740 DATA 96,98,103,107,108,110,112,114,115,119,124,126,
```

PROGRAM OF THE WEEK

Continued over the page

BRIDGE SOFTWARE

LYNCHMOB

(for Sinclair Spectrum 16k/ZX81 16k)

"Undoubtedly the best version of Hangman... we cannot recommend this program too highly"

(SOFTWORDS, Journal of the Micro Software Club)

Fed up with arcade games for loners?
Play the fun game that's all the rage at parties!

- "Fine graphics" *(Popular Computing Weekly)*
- "Sound and hi-res colour in Spectrum version"
- "A good game for adult parties" *(SOFTWORDS)*
- Educational for the children"

send £6.50(SPECTRUM)

or £4.95 (ZX81) for quality cassette.

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

BRIDGE SOFTWARE

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

Dragon Dungeon

FIRST WITH THE LATEST!

Latest Dragon games into stock:

NINJA WARRIOR — The ultimate arcade game with superior graphics, m/c speed and 16 screens to go at! Try your hand in combat as you progress in the martial arts up to Black Belt. **£8.95**

PACK-DROIDS — Add to all that best in Packman and Defender, with multiple mazes, laser cannons and smart bombs and you begin to get an inkling of this super-fast arcade game! **£8.95**

'ALIEN ODYSSEY' — Parts 1 and 2 of a massive 60K-plus adventure, set on an alien world. Battle your way through the warren of streets of the capital to the Grand Harbour where the mighty Land-Ships set out across the Great Grass Plain. SF readers of 'Green Oddessy' may find the concept familiar. **£9.95**

'DROIDS' — Morrison's best m/c arcade game yet. Get the Invader Lordes before they pull out the lead shields under the Neutron Bombs, which will vaporise you! **£6.95**



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

TASWORD TWO THE WORD PROCESSOR

48K SPECTRUM

64 CHARACTERS PER LINE ON THE SCREEN AND TO PRINTERS!

TASWORD TWO The Word Processor

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

Tasword Two drives the following interfaces:

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

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

£13·90 fully inclusive mail order price.

TASWORD TWO £2 Demonstration Cassette

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

TASMAN SOFTWARE

Dept PCWK

17 HARTLEY CRESCENT LEEDS LS6 2LL

TASWORD The Word Processor

"This package is definitely value for money."

Educational Computing, April 1983

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

£7·95 fully inclusive mail order price.

TASWORD £1 Demonstration Cassette

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

ZX81 TASWORD

"Very good value and great fun to use."
"Unreservedly recommended." Popular Computing Weekly 19 8 82

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

£6·50 fully inclusive mail order price.

TASWORD TUTOR

"an eloquent demonstration of Tasword's uses"

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

```
128,132,133,135,137,140,146,149,151,153,154,158
750 DATA 160,162,170,174,175,176,180,188,190,192,196,
    197,199,200,204,210,214,215,217,218,222
760 DATA 224,226,231,232,234,235,236,242,243,244,245,247,
    252,254
770 DATA 256,260,261,263,264,268,274,278,279,281,282,
    286,288,290,298,302,303,304,308,316,318
780 DATA 320,324,325,327,329,332,338,341,343,345,346,350,
    352,354,359,363,364,366,368,370,371,375,380,382,384,
    388,389
790 DATA 393,398,400,405,409,410,414,416,417,418,419,420,
    421,422,423,424,425,426,427,428,429
800 DATA 430,432,433,434,435,436,437,438,439,440,441,442,
    443,444,445,446
810 REM *** DRAGMAN CAUGHT ***
820 PL=PL-1:OO=0
830 RESTORE:PRINT @X,"c";:AA=1
840 PLAY"O3T3GFEDC"
850 IF PL=0 THEN PRINT @29,PL;:GOTO 1140 ELSE Q$="":
    GOTO 120
860 REM *** CHASE GHOSTS ***
870 OO=1:TG$="g"
880 FOR U=1 TO 160/NS/2:FOR F=1 TO NS:GOSUB 540:NEXT F
890 ZZ$=INKEY$
900 IF ZZ$="" THEN ZZ$=Q$
910 IF ZZ$=CHR$(9) THEN X1=1
920 IF ZZ$=CHR$(8) THEN X1=-1
930 IF ZZ$=CHR$(94) THEN X1=-32
940 IF ZZ$=CHR$(10) THEN X1=32
950 X=X+X1
960 IF X=463 THEN PRINT @431," ";:X=47:GOTO 1000
970 IF X=15 THEN PRINT @47," ";:X=431
980 IF BS(X)=1 THEN X=X-X1:GOTO 1120
990 PRINT @X-X1," ";
1000 PRINT @X,"C";
1010 Q$=ZZ$
1020 IF BS(X)=2 THEN SC=SC+10:PRINT @6,SC;:BS(X-X1)=0:
    SOUND 220/TG,1:ND=ND+1:IF ND=213 THEN 1260
1030 IF SC)=8000 AND KK=0 THEN PL=PL+1:PRINT @29,PL;:
GOTO 1050
1040 GOTO 1060
1050 FOR F=1 TO 5:PRINT @492,"extra dragman";:FOR F1=1
    TO 200:NEXT F1:PRINT @492,"";:FOR F1=1 TO 200:
    NEXT F1,F:KK=1
1060 IF BS(X)=3 THEN SC=SC+40:PRINT @6,SC;:BS(X-X1)=0:
    PLAY"O3T30CDCDC":ND=ND+1:IF ND=213 THEN 1260
1070 IF G(1)=X THEN SC=SC+(100*NS):PRINT @6,SC;:PRINT
    @G(1)," ";:PLAY"O3T30CDCDC":G(1)=239:BS(X)=0:
    X=335:Q$=""
1080 IF G(2)=X THEN SC=SC+(100*NS):PRINT @6,SC;:PRINT
    @G(2)," ";:PLAY"O3T30CDCDC":G(2)=239:BS(X)=0:
    X=335:Q$=""
1090 IF G(3)=X THEN SC=SC+(100*NS):PRINT @6,SC;:PRINT
    @G(3)," ";:PLAY"O3T30CDCDC":G(3)=240:BS(X)=0:
    X=335:Q$=""
1100 PRINT @X,"C";
1110 BS(X)=0
1120 NEXT U
1130 OO=0:TG$="G":Q$="":GOTO 320
1140 REM *** GAME ENDS ***
1150 FOR F=1 TO 1000:NEXT F
1160 IF SC)HI THEN HI=SC:JJ=1
1170 CLS:PRINT"YOUR SCORE=";SC
1180 PRINT:PRINT"HIGHEST SCORE SO FAR=";HI
1190 IF JJ=1 THEN PRINT:INPUT"ENTER YOUR NAME";
    HS$:ELSE 1210
1200 IF LEN(HS$))8 THEN PRINT:PRINT"NAME TOO LONG":
    PRINT"MAX LENGTH=8 LETTERS":GOTO 1190
1210 PRINT:PRINT"ANOTHER GAME (Y/N)"
1220 AG$=INKEY$:IF AG$="" THEN 1220
1230 IF AG$="Y" THEN RESTORE:SC=0:KK=0:AA=0:NS=1:ND=0:
    PL=3:JJ=0:Q$="":GOSUB 1530:GOTO 110
1240 IF AG$()"N" THEN 1220
1250 END
1260 REM *** NEW SHEET ***
1270 CLS:PRINT @140,"WELL DONE";PRINT @200,"SHEET"
    ;NS;"COMPLETED"
1280 NS=NS+1:PRINT @262,"GET READY FOR SHEET";NS
1290 FOR F=1 TO 4000:NEXT F
1300 RESTORE:AA=0:ND=0:TG$="G"
1310 OO=0:GOTO 110
1320 REM *** INSTRUCTIONS ***
1330 CLS:PRINT
1340 PRINT TAB(12);"dragman":PRINT:PRINT"  YOU 'O'
    TRAVEL INSIDE A MAZE  TRYING TO GOBBLE UP AS MANY
    DOTSAS YOU CAN."
1350 PRINT"  WHILST DOING THIS 3 GHOSTS   WANDER AROUND
    HOPING TO CATCH   YOU."
1360 PRINT"  IF ONE OF THEM CATCHES UP WITHYOU, YOU LOSE
    A LIFE.";
1370 PRINT"BUT IF YOU EAT A POWER PILL 'O' THEN FOR A
    LIMITED TIME YOU CAN CHASE THEM."
1380 PRINT:PRINT"     PRESS 'Z' TO CONTINUE.";
1390 ZC$=INKEY$:IF ZC$()"Z" THEN 1390
1400 CLS:PRINT:PRINT"  WHEN YOU EAT A POWER PILL THE
    GHOSTS WILL CHANGE FROM A 'G' TO A 's'."
1410 PRINT"  IF YOU ENTER THE TUNNEL YOU   WILL APPEAR ON
    THE OPPOSITE    SIDE."
1420 PRINT"  THERE IS AN UNLIMITED NUMBER  OF SHEETS BUT
    EACH ONE IS HARDERTHAN THE PREVIOUS."
1430 PRINT"  IF YOU EXCEED 8000 POINTS YOU THEN RECEIVE
    AN EXTRA DRAGMAN."
1440 PRINT"  YOU USE THE CURSOR KEYS TO    MOVE THEN
    DRAGMAN."
1450 PRINT:PRINT"  PRESS 'Z' FOR SCORING TABLE";
1460 ZC$=INKEY$:IF ZC$()"Z" THEN 1460
1470 CLS:PRINT:PRINT TAB(9);"scoring table":PRINT:PRINT
    TAB(9);"* =  10 POINTS":PRINT
1480 PRINT TAB(9);"O =  40 POINTS":PRINT
1490 PRINT"   s = 100 POINTS X SHEET NO."
1500 PRINT:PRINT:PRINT"  PRESS 'Z' TO START GAME.....";
1510 ZC$=INKEY$:IF ZC$()"Z" THEN 1510
1520 RETURN
1530 REM *** TYPE OF GAME ***
1540 CLS:PRINT:PRINT"1. ORDINARY":PRINT"2. FAST"
1550 PRINT:INPUT"ENTER TYPE OF GAME (1 OR 2)";TG
1560 IF TG()1 AND TG()2 THEN 1550
1570 IF TG=1 THEN POKE 65494,0 ELSE POKE 65495,0
1580 RETURN
```

Dragman
by Simon Green

GEM SOFTWARE

for LYNX, DRAGON, SPECTRUM and ZX81 Software

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 and DRAGON) **£7.95.** Price (SPECTRUM and ZX81) **£4.95.**

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. Prince (LYNX and DRAGON) **£7.95.**

CHARACTER GENERATOR by John Line. A program for the programmer, allowing creation and saving of character sets/shape tables and subsequent inclusion into users basic program. Demonstration program and full ASCII character set included. Price (DRAGON) **£9.95.**

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 and 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 died and hid his treasure, he also 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.**

LYNX COMPUTING BOOK by Ian Sinclair. Excellent book, which the beginner will find an invaluable aid, in helping to unravel the LYNX'S many varied features! Price **£6.95.**

All titles available mail order or Access
All cassettes despatched by return of post

GEM SOFTWARE
UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS
Telephone: (0279) 723567

TRADE ENQUIRIES WELCOME – PLEASE RING FOR DEALER PACK

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
IVASIVE ACTION
OXO
BOGGLES
PONTOON
SKI JUMP
HANGMAN
OLD BONES
THIN ICE
MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SITTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS
SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE

50 games on cassette only £9.95 inc vat & pp

CASCADE SOFTWARE
CASCADES HOUSE
BARGAIN'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!

DATABASE

BBC MICRO (32K) DRAGON 32 ORIC 1 (48K) SINCLAIR ZX81 (16K) SPECTRUM (16K/48K)

The DATABASE represents the very latest in information retrieval reporting systems. Ideal for business and especially at home, can be used for endless filing applications by beginner or expert, for hobbies or collections etc. Features include dynamic variable length data, sort, powerful search and erasure. Fully 'menu' driven and incorporates user personalisation, save/load and printer options etc. We sincerely believe this is the lowest cost, professional standard DATABASE on the market.

Exclusive unbeatable price of only £4.95 fully inclusive of manual, DATABASE software cassette and 1st class post.

Send cheque or P.O. to: DATABASE SYSTEMS, Dept W4
82 Towers Road, Poynton, Cheshire SK12 1DF.

PROGRAMMERS — 35% guaranteed royalties with optional cash advance for any good software. Send now for evaluation.

DEALERS WANTED

Alpha Chase

on Spectrum

This program is a version of the game where the object is to steer an arrow around the screen, hitting each letter of the alphabet in turn. If you run into the edge of the screen or any letter out of turn, then you lose one of three lives.

The game will run on either 16 or 48K machines. Although simple in design, after the first few levels it runs so quickly that it is, in fact, quite difficult to play.

Program notes

5	Set up the four arrows
10	Turn on caps lock; call 'print instructions'
20-30	Set up variables
40-90	Print Display
100-140	Main loop; move player etc.
200-260	Check what hit; move up a level
300-300	Lose a life; restart game
400-500	Print instructions

```
ALPHA CHASE
©  P VESSEY  1983
   5 RESTORE : FOR A=USR "A" TO
USR "D"+7: READ B: POKE A,B: NEX
T A: DATA 0,16,56,124,16,16,16,0
,0,8,12,126,12,8,0,0,0,16,16,16,
124,56,16,0,0,16,48,126,48,16,0,
0
  10 POKE 23658,8: GO SUB 400
  20 LET DIFF=0: LET LIVES=3
  30 LET CHR=65: LET A$="†"
  40 BORDER 1: POKE 23693,6: CLS

  50 FOR A=0 TO 7 STEP 2: PLOT A
,A: DRAW 255-2*A,0: DRAW 0,175-2
*A: DRAW -255+2*A,0: DRAW 0,-175
+2*A: NEXT A
  60 PRINT #1;AT 0,0; INK 6; BRI
GHT 1;"LETTERS:";AT 0,22;"LIVES:
";LIVES
  70 LET X=10: LET Y=15: LET X1=
-1: LET Y1=0
  75 DIM X(26): DIM Y(26)
  80 GO SUB 150: FOR A=1 TO 20:
BEEP .005,A: PRINT AT A,Y;" ": N
EXT A: PRINT AT X,1;"

  90 PRINT AT X,Y; INK 5;A$: PRI
NT FLASH 1; INK 7;AT X(1),Y(1);"
A": BEEP 1,40: BEEP 1,-20
 100 BEEP .01,0: PAUSE (11-DIFF)
: LET I$=INKEY$: LET X2=X: LET Y
2=Y: IF I$="5" OR I$="8" THEN LE
T Y1=(I$="8")-(I$="5"): LET X1=0
: LET A$=("†" AND I$="5")+("†" A
ND I$="8")
 110 IF I$="6" OR I$="7" THEN LE
T X1=(I$="6")-(I$="7"): LET Y1=0
: LET A$=("†" AND I$="7")+("†" A
ND I$="6")
 120 LET X=X+X1: LET Y=Y+Y1: IF
X<1 OR X>20 OR Y<1 OR Y>30 THEN
GO TO 310
 125 IF SCREEN$ (X,Y)<>" " THEN
GO SUB 200
 130 PRINT INK 5;AT X2,Y2;" ";AT
X,Y;A$
 140 GO TO 100
 150 FOR D=0 TO DIFF*5: PRINT AT
 INT (RND*18)+2,INT (RND*28)+2;"
*": NEXT D: FOR A=65 TO 90
 160 LET R1=INT (RND*18)+2: LET
R2=INT (RND*28)+2
 170 IF R1=X OR R2=Y THEN GO TO
160
 180 PRINT INK 7;AT R1,R2;CHR$ A
: BEEP .01,A/2: LET X(A-64)=R1:
LET Y(A-64)=R2
 190 NEXT A: RETURN
 200 IF SCREEN$ (X,Y)<>CHR$ CHR
THEN GO TO 300
 210 PRINT #1; INK 6; BRIGHT 1;A
T 1,0+(CHR-65);CHR$ CHR
 220 LET CHR=CHR+1: IF CHR<>91 T
HEN PRINT FLASH 1; INK 7;AT X(CH
R-64),Y(CHR-64);CHR$ CHR: RETURN
 230 PRINT INK 5;AT X2,Y2;" ";AT
 X,Y;A$: FOR A=0 TO 40: BEEP .01
,A: BEEP .01,40-A: NEXT A
 240 PRINT FLASH 1; PAPER 1;AT 9
,4;"## LEVEL ";DIFF+1;" COMPLE
TED ##"
 250 LET DIFF=DIFF+2: IF DIFF>10
 THEN LET DIFF=0
 260 FOR A=0 TO 40: BEEP .01,A:
BEEP .01,40-A: NEXT A: GO TO 30
 300 REM ## HIT ONE ##
 310 PRINT INK 5;AT X2,Y2;" "; F
APER 1; INK 6; FLASH 1;AT 9,10;"
LOSE A LIFE"
 320 FOR A=1 TO 20: PRINT INK 6;
 PAPER 2;AT X,Y;SCREEN$ (X,Y): B
EEP .02,-20: PRINT INK 2; PAPER
6;AT X,Y;SCREEN$ (X,Y): BEEP .01
,20: NEXT A
 330 LET LIVES=LIVES-1: IF LIVES
>-1 THEN GO TO 30
 340 FOR A=0 TO 40: BEEP .01,A:
BEEP .01,40-A: NEXT A
 350 PRINT FLASH 1; PAPER 1;AT 9
,6;" G A M E   O V E R "
 360 PRINT INK 7;AT 11,4;" PRESS
 ANY KEY TO PLAY "
 370 IF INKEY$<>"" THEN GO TO 38
0
 380 IF INKEY$="" THEN GO TO 380
 390 GO TO 20
 400 BORDER 0: POKE 23693,6: CLS

 410 PRINT "TAB 10;"ALPHA CHASE"
 420 PLOT 79,169: DRAW 90,0: DRA
W 0,-12: DRAW -90,0: DRAW 0,12:
PLOT 77,171: DRAW 94,0: DRAW 0,-
16: DRAW -94,0: DRAW 0,16
 430 PRINT AT 4,0;"The object of
 the game is to   collect each
letter, alphabetic-ally, by runn
ing into each in   turn."
 440 PRINT "'"If you hit the bord
er, a mine or any letter out of s
equence, thenyou will lose 1 of
3 lives. The next letter in the
sequence will flash to indicate i
ts position."
 450 PRINT "'"Controls:"
 460 PRINT "TAB 2;"5: Left","6:
Down",TAB 2;"8: Right","7: Up"
 470 PRINT " PAPER 1; INK 6; FLA
SH 1;AT 21,2;">> PRESS ANY KEY T
O PLAY <<"
 480 IF INKEY$<>"" THEN GO TO 48
0
 490 IF INKEY$="" THEN GO TO 490
 500 RETURN
GRAPHICS:
†=GRAPHIC A
*=GRAPHIC B
‡=GRAPHIC C
°=GRAPHIC D
```

Alpha Chase
by Patrick Vessey

Diamond Strikes Back

on BBC

This is another version of 'Space Invaders' which has been written for the BBC Model B. The object of the game is to shoot the diamond which drops down from the top of the screen. You man the space station at the bottom of the screen and the object is to shoot it as many times as possible in the set time (200 units). Instructions are included in the program listing.

Program notes

Lines	
10-50	The instructions
60	Set variables to 0
70-100	Define characters:
240	The diamond
241	The missile
242	The space station
243	The destroyer sign
110	Get rid of the cursor
130-220	Movement of the diamond
230-370	Space station's movement
380-460	Fire missile and check for hit
470-500	Telling you that you've hit
510-540	Giving comments and ending (or starting again)

```
10MODE7:PRINTTAB(3,6)CHR$(141)"DIAMOND
  STRIKES BACK":PRINTTAB(3,7)CHR$
  (141)"D AMOND STRIKES BACK"
20PRINT:PRINT:PRINT:PRINT
30PRINT"RIGHT":PRINT"LEFT":PRINT
 40PRINT"       Z  FIRE":PRINT
50PRINT"PRESS A KEY TO BEGIN...";:
  Z$=GET$
60MODE4:Q=0:X=0:B=0:AA=0:QQ=0:Y=0:T=0:
  SC=0
70VDU 23,240,24,36,66,129,129,66,36,24
80VDU 23,241,24,24,24,24,24,60,90,153
90VDU 23,242,24,60,90,153,255,219,165,
  255
100VDU 23,243,170,85,170,85,170,85,170,
  85
110VDU 23;8202;0;0;0;
120 VDU 19,3,6,0,0,0,19,0,7,0,0,0
130FF%=RND(4):IF FF%=0THEN 130
140IF FF%=1THEN AA=AA+1:IF FF%=2 THEN
   AA=AA-1
150IF FF%=3THEN AA=AA+2:IF FF%=4 THEN
   AA=AA-2
160PRINTTAB(AA,QQ)CHR$240:SOUND 1,20,
  -15,1
170QQ=QQ+1
180PRINTTAB(X-1,B-1)"          "
190FOR SS=1TO200:NEXTSS
200X=AA:B=QQ
210IF AA<3 OR AA>35 THEN AA=10
220IF QQ>20 THEN QQ=0:AA=RND(20)
230A$=INKEY$(10)
240IF A$="."THEN Y=Y+1:SOUND 1,-14,25,2
250IFA$=","THEN Y=Y-1:SOUND 1,-14,25,2
260IF A$="Z"THEN SOUND 0,-14,40,2:
   PROCFIRE
265 IF Y<3 OR Y>33 THEN PRINTTAB
   (Y-2,20)"":Y=10
270*FX 15,1
280 T=T+1
290 PRINTTAB(7,25)"TIME ";T
300 PRINTTAB(0,0)"
310 PRINTTAB(25,25)"SCORE ";SC
320 IF T>200 THEN GOTO510
330IF Y<2 OR Y>34 THEN Y=10
340PRINT TAB(Y,20)CHR$(242)
350PRINTTAB(Y-1,20)" "
360PRINTTAB(Y+1,20)" "
370GOTO130
380DEFPROCFIRE
390FOR F=19TO0 STEP-1
400PRINTTAB(Y,F)CHR$(241)
410PRINTTAB(Y,F+1)" "
420PRINTTAB(Y,F+2)" "
430IF Y=AA AND F=QQ THEN SC=SC+1
440IF Y=AA AND F=QQ THEN PROCHIT
450NEXT F
460ENDPROC
470DEFPROCHIT
480PRINTTAB(Y,F-1)CHR$(243):PRINTTAB
   (Y,F+1)CHR$243:PRINTTAB(Y+1,F+1)CHR
   $243:PR INTTAB(Y-1,F+1)CHR$243:PRINT
   TAB(Y-1,F)CHR$243:PRINTTAB(Y+1,F)
   CHR$243:PRINTTAB(Y-1,F-1)CHR$243:.
   PRINTTAB(Y+1,F-1)CHR$243
490FOR H=100TO150:SOUND 1,-15,H,2:SOUND
   0,-15,H-50,1:NEXTH:CLS:A$=" "
500ENDPROC
510 IF SC<15 THEN PRINT"PATHETIC !!!"
515 IF SC = 15 THEN PRINT"BORDER LINE"
520 IF SC>15 THEN PRINT" GOOD"
525 IF SC > 30 THEN PRINT"PROBABLY THE
   BEST SCORE IN THE WORLD"
530 INPUT"ANOTHER GAME ",A$
540 IF A$="Y" THEN GOTO10 ELSE CLS:END
```

Diamond Strikes Back
by H Auermuir

Piano

on Vic20

This program works just like the Vic piano program in the Vic user manual except it also draws a staff on the screen and pokes the notes on it as you play. The program is very simple to use and can be a great help for young or old students, who are taking their first steps on the musical path.

Keys 1-8 work like piano keys, but key 9 silences the *Vic* and clears the staff of notes.

You can change to another voice by altering the voice number in lines 65 and 230. Do not reassign the variable D in lines 140-210 to change octaves because the screen poke is based on this variable. For example, if you intended to convert a G to a C you would still get a G on the screen.

Program notes

Lines	
10-50	Sets up the display
60-100	Pokes notes on screen
100-310	Reads the keyboard — sound routine

```
0 REM ***************
1 REM *   (C)1982   *
3 REM *G.K.BIRGISSON*
4 REM *   ICELAND   *
5 REM ***************
6 REM
10 PRINT"J";"XXXXXX"
20 POKE36879,8
30 FORR=1TO5
40 PRINT"*                    "
50 NEXT
54 REM ***************
55 REM * DRAW NOTES *
56 REM ***************
60 IFP>21THENP=0:GOTO10
65 GETA:IFA=BTHENPOKE36876,0
66 IFA=0THEN65
70 X=7966-(A*22)+P
80 POKEX,81:POKEX+30720,7
90 IFX>7980+21THENPOKEX-22,72:POKEX-22+30720,3
100 IFX<7980+21THENPOKEX+22,71:POKEX+22+30720,3
105 REM *********
110 REM * SOUND *
120 REM *********
130 POKE36878,15
140 IFA=1THEND=135
150 IFA=2THEND=147
160 IFA=3THEND=159
170 IFA=4THEND=163
180 IFA=5THEND=175
190 IFA=6THEND=183
200 IFA=7THEND=191
210 IFA=8THEND=195
220 IFA=9THENPOKE36878,0:P=0:GOTO10
230 POKE36876,D
300 B=A:R=0:P=P+2
310 GOTO60
```

Piano
by B Bugisson

Mole Attack

on ZX81

This is a fast moving game for the 16K machine. In your garden there are 80 moles. You must rid your garden of moles, but you only get one shot at each mole. There are nine mole holes in the garden, and the moles will appear out of which ever one they want. Above each hole there is a hammer and above the hammers are the numbers 1—9.

Once a mole appears you have a couple of seconds in which to hit the button on the key pad that corresponds with the number above that hole.

Scoring

Scoring is as follows:

10 points for each one of the first 60 moles hit.

20 points for each of the final 20 moles hit.

– 5 points for each wrong key pressed on the first 60 moles.

–10 points for each wrong key pressed on the final 20 moles.

To change the speed of the game, you may change the pause in line 325.

Program notes

Line function	
20-140	Setting up variables
150-260	Setting up screen display
265-360	Main game
370-390	Checks if you have hit a mole or not
500-570	Hitting mole routine
600-620	Printing score at the end of a game
631-637	Determines whether you deserve a replay or not
640-700	"Do you wish to play again?" routine

NB. DO NOT ALTER ANY OF THE FIRST 6 LINES.

```
  1 LET H5=0
  2 POKE 16418,0
  3 PRINT AT 22,0;"                  "
"BY ATTACK"                    BY
"PENNINGTON                    "
  4 POKE 16418,2
  5 POKE 16551,0
  6 POKE 16551+66,183
 10 PRINT AT 11,15;"READY ?"
 15 LET L=RND**INT (RND*10)**RN
D+23+RND-0**RND
 17 PRINT AT 11,13;"          "
 20 LET S=0
 30 DIM A(3)
 40 LET A(1)=5
 50 LET A(2)=13
 60 LET A(3)=21
 70 DIM B(3)
 80 FOR F=1 TO 3
 90 LET B(F)=A(F)-3
100 NEXT F
110 DIM C(3)
120 LET C(1)=5
130 LET C(2)=15
140 LET C(3)=25
150 FOR F=1 TO 3
160 PRINT AT A(F),0;"
                    "
170 NEXT F
180 FOR F=1 TO 3
190 FOR N=1 TO 3
200 PRINT AT A(F),C(N);"
210 PRINT AT B(F),C(N);"
220 NEXT N
230 NEXT F
240 PRINT AT B(1)-3,0;"       1
     2
     3"
250 PRINT AT B(2)-3,0;"       4
     5
     6"
260 PRINT AT B(3)-3,0;"       7
     8
     9"
265 FOR T=1 TO 80
270 LET F=INT (RND*4)
280 LET N=INT (RND*4)
290 IF F=0 OR N=0 THEN GOTO 270
300 PRINT AT A(F)-1,C(N);"
320 PRINT AT 0,0;"YOUR SCORE ";
S;"HIGH SCORE ";H5
325 PAUSE 40
330 LET A$=INKEY$
331 IF T>60 AND A$<>"" THEN GOS
UB 370
340 IF A$<>"" THEN GOSUB 370
350 PRINT AT A(F)-1,C(N);"   "
360 NEXT T
365 GOTO 600
370 IF (A$="1" AND (F=1 AND N=1
)) OR (A$="2" AND (F=1 AND N=2)
 OR (A$="3" AND (F=1 AND N=3)) O
R (A$="4" AND (F=2 AND N=1)) THE
N GOTO 500
380 IF (A$="5" AND (F=2 AND N=2
)) OR (A$="6" AND (F=2 AND N=3)
 OR (A$="7" AND (F=3 AND N=1)) O
R (A$="8" AND (F=3 AND N=2)) OR
(A$="9" AND (F=3 AND N=3)) THEN
GOTO 500
390 IF S>0 THEN LET S=S-5
400 RETURN
500 PRINT AT B(F),C(N);"
510 PRINT AT B(F)+1,C(N);"
520 PRINT AT B(F)+2,C(N);"
530 LET L=RND**RND**RND**RND
540 PRINT AT B(F),C(N);"
550 PRINT AT B(F)+1,C(N);"
560 LET S=S+10
570 RETURN
600 FOR T=0 TO 10
610 PRINT AT 11,10;"YOU SCORED
";S;AT 12,5;(" THATS A NEW HIGH
SCORE" AND S>H5)
615 IF S>H5 THEN LET H5=S
620 NEXT T
630 CLS
631 IF S<900 THEN GOTO 640
632 FOR T=1 TO 10
633 PRINT AT 11,6;"YOU NOW HAVE
 A REPLAY"
634 PRINT AT 11,21;"REPLAY"
635 NEXT T
636 CLS
637 GOTO 265
640 PRINT AT 11,5;"ANOTHER GO ?
(Y/N)"
650 IF INKEY$="" THEN GOTO 650
660 IF INKEY$="N" THEN NEW
670 IF INKEY$="Y" THEN GOTO 690
680 GOTO 650
690 PRINT AT 11,5;"
    "
700 GOTO 3

DO NOT ALTER ANY OF THE FIRST 6
LINES
```

Mole Attack
by Ray Pennington

Screen movement

on Vic20

This is a program for the unexpanded Vic and was found by mistake. I was typing in a program and instead of typing 36879 for colour I typed 36897 and found that the screen of my Vic moved. So I poked around and wrote this program.

Program notes

10-50	Rems
60-110	Controls for the program
120	Normal co-ordinates for screen
130-170	Input and decode movements
180-190	Move screen routine
220-240	End and restore screen to normal

```
10 REM %%%%%%%%%%%%%%%%%%%%%%%%
20 REM %%% SCREEN MOVEMENT %%%
30 REM %%%       BY       %%%
40 REM %%%    SEAN MARSH    %%%
50 REM %%%%%%%%%%%%%%%%%%%%%%%%
60 PRINT "PRESS: "
70 PRINT "U=UP"
80 PRINT "D=DOWN"
90 PRINT "L=LEFT"
100 PRINT "R=RIGHT"
110 PRINT "*=STOP "
120 U%=38:L%=12
130 GET A$:IF A$="" THEN 130
140 IF A$="U" THEN U%=U%-1
150 IF A$="D" THEN U%=U%+1
160 IF A$="L" THEN L%=L%-1
170 IF A$="R" THEN L%=L%+1
180 POKE 36897,U%
190 POKE 36864,L%
200 IF A$="*" THEN 220
210 GOTO 130
220 POKE 36897,38:POKE36864,12
230 PRINT "       O.K. BYE    "
240 END
```

Screen Movement
by Sean Marsh

Mike Hampson proudly presents the ONLY

SPECTRUM FORTH

WITH FLOATING-POINT

At last! An alternative language with program power! Programmers in their thousands are turning to FORTH as the number one alternative to BASIC and MACHINE CODE because of its incredible SPEED and SIMPLICITY, and now the first ZX Spectrum FORTH with floating-point arithmetic brings a new language with SPEED and POWER to the 48K Spectrum owner.

- ★ All trig functions in radians AND degrees
- ★ Operation of ZX printer
- ★ Full floating-point arithmetic
- ★ Easily mixable integer option included
- ★ Full global control of colour, sound and high-resolution graphics
- ★ CIRCLE, DRAW, OVER etc
- ★ BEEP (like BASIC) plus BLEEP, for machine-code-style sound effects
- ★ Based on FORTH-79 (like the Jupiter Ace)
- ★ Includes all FORTH structures, and recursion
- ★ 190 predefined words
- ★ 32K available to user
- ★ Complete tutorial user manual.
- ★ £2 off if you cut out and send this advertisement

Order code FP50T..... Price £14.95

STILL AVAILABLE
The ONLY Spectrum FORTH at this UNBELIEVABLY low price. Powerful integer arithmetic, sound, graphics, colour, 256 UDGs, over 100 predefined words, 32K available to user, complete tutorial user manual.
Order code SP48T .....Price £5.95

STILL AVAILABLE
The ONLY Spectrum FORTH to run in 16K, at the same LOW, LOW price. Powerful integer arithmetic, graphics, colour, 21 UDGs, over 70 predefined words, 2K available to user, complete tutorial user manual.
Order code SP16T ..... Price £5.95

BUY NOW

WHILE SPECIAL OFFER LASTS

Cheques/POs to: Mike Hampson
7 Hereford Drive
Clitheroe
Lancs BB7 1JP

SPECTRUM SOFTWARE

BEETLEMANIA: Quick fingers and quicker thinking are needed in this original machine code maze game **£4.95**
HELLS BELLS: Go through Hell to recover the treasure but beware of Zombies, Demons and Dragons **£4.95**
REVERSI: A superb machine code implementation of the classic board game. Levels 1-8, large graphics, fast response **£4.95**
RENUMBER/DELETE: A full machine code renumber for 16/48K Spectrum. Renumbers GOTO GOSUB etc. Also block delete etc. **£3.95**

FREE C15 CASSETTE

● Don't just read about these programs, see excerpts from them on your computer screen! Send 50p DEDUCTABLE FROM FIRST ORDER for TOP QUALITY C15 tape containing complete software review (48K only) ●

FREE C15 CASSETTE

AWA Software, 50 Dundonald Road
Didsbury, Manchester M20 0RU

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.

SPECTRUM SUPER TAPES

12 SPECTACULAR AND VARIED GAMES FOR ONLY £3

Tron. Pacmen. Centipede. Pontoon. Star Tunes. Bomber. Logo. Mazeman. Kingdom Runway. Sheepdog

6 ARCADE GAMES FOR ONLY £4

Spaceman. Defender. Frogger. Blitz. Asteroids. Surprise Game

Cheques to

J. A. LOACH, 8 COTTERSFORD CLOSE
HADLEIGH, SUFFOLK

WANTED

LYNX SOFTWARE

Good quality **games,** adventures, utilities and educational. Top royalties with author's credit.

For further details ring:

BUS-TECH
on 0705 735310 during office hours
or 07014 53279 out of office hours
or send tapes to BUS-TECH
19 Landport Terrace, Portsmouth, Hants

Tape Space

on Spectrum

The function of this routine is to find the first empty space on a cassette and automatically *Save* data or an array at that point. It is intended for the Spectrum, 16K or 48K versions.

This routine is suitable for adding to any program which permits the *Saving* of data, and greatly facilitates the construction of a data tape. I have not found the alternatives, such as *Loading* the last item on the tape then using *New* prior to *Loading* the main program, or counting the items while running through the tape, very satisfactory. This routine automates the whole process.

As an example, I have made the enclosed sample routine suitable for adding to the Horizon character program which is supplied with the Spectrum. It can be added either to the original program, or to the program plus the mirror graphics routine featured in *PCW* 12-18 May. Although I have not tried it with a 16K version, I foresee no difficulty in it fitting.

Alterations to the Horizon program have been made in order to fit the addition into the space available. Lines 7065 and 7066 have been joined together, and a new 7066 added. The former line 7070 has been made 7080. 9010 has been changed so as to place the new machine code in front of the existing code. 9100 is changed so as to put *Ramtop* before the new machine code. All these changes appear on the printout.

The operation of the routine is fully explained within the program. Some points of interest follow. The user enters the file name of the last file already on the tape. The routine reads all the headers and matches them with the name which was entered. When it finds a match, it makes the value of address 23320, 100 and line 7072 causes a jump to the *Save* routine starting at 7076. The *Pause* at line 7076 causes the routine to wait until the cassette recorder has reached the end of the file.

In the absence of accurate information as to the number of bytes per second delivered by the tape, I came upon the parameter of *Pause* by trial and error. The time needed is one second for the space between the header and the program, three seconds for the leader of the program, one second or so for a suitable gap before *Saving* starts, and the actual length of the program.

Given an accurate value for the baud rate, it will be possible to compute an exact figure from the program length which is to be found at *Peek* 23307 †256*Peek* 23308.

If the routine is to be adapted for another program, instead of *Gosub* 6200 substitute *Cls*. The line numbers should, of course, be changed as required by the new program. Line 7080 must of course be adapted for the particular data or array it is wished to *Save*.

The machine code routine can be located in any suitable position, and the location chosen will, of course, dictate the values used in lines 9010 and 9100. The machine code can be entered and *Saved* as in this example, or it can be included in a *Data* statement within the main program. (This would not be suitable in the Horizon program since it already uses a *Data* statement which could cause complications.)

To enter the routine as listed, first enter as a direct command *Clear* 32221 and *Enter*, then enter the routine at section 4 of the printout, and enter the numbers in section 2. Then enter the additions and alterations as in section 1, remember to remove the loading routine from lines 10 to 45, type *Goto* 9000 and the rest is automatic.

Section 1

```
7065 GO SUB 6200: PRINT "Enter t
he file name of the code to be s
aved": INPUT LINE r$
7066 DIM l$(1,10): PRINT '"Enter
 name"'"of last file on tape."'"
(""ENTER"" if tape is blank)": I
NPUT LINE l$(1)
7067 IF l$(1,1)=" " THEN GO TO 7
080
7068 FOR f=23309 TO 23318: POKE
f,CODE l$(1,f-23308): NEXT f
7069 GO SUB 6200: PRINT "Select
 ""Playback""'"and run tape from
 start": POKE 23320,0
7070 RANDOMIZE USR 32222
7072 IF PEEK 23320<>0 THEN GO TO
 7076
7074 GO TO 7069
7076 PAUSE 250
7077 GO SUB 6200
7078 PRINT FLASH 1;"STOP TAPE" '
' FLASH 0;"SELECT ""RECORD"""
7080 SAVE r$CODE b,l
9010 SAVE " "CODE 32222,334: STO
P
9100 CLEAR 32221: LOAD ""CODE
```

Section 2

```
 55   62    0  221   33    0   91   17
 13    0  205   86    5    6   10   33
 13   91   17    1   91   26  190  192
 19   35   16  249   33   24   91   54
100  201
```

Section 3

```
7DDE 37          SCF
7DDF 3E 00       LD   A,00
7DE1 DD 21 00 5B LD   IX,5B00
7DE5 11 0D 00    LD   DE,000D
7DE8 CD 56 05    CALL 0556
7DEB 06 0A       LD   B,0A
7DED 21 0D 5B    LD   HL,5B0D
7DF0 11 01 5B    LD   DE,5B01
7DF3 1A          LD   A,(DE)
7DF4 BE          CP   (HL)
7DF5 C0          RET  NZ
7DF6 13          INC  DE
7DF7 23          INC  HL
7DF8 10 F9       DJNZ 7DF3
7DFA 21 18 5B    LD   HL,5B18
7DFD 36 64       LD   (HL),64
7DFF C9          RET
```

Section 4

```
10 FOR f=32222 TO 32255
20 INPUT i
30 POKE f,i
40 PRINT PEEK f:NEXTf

45 STOP
```

Tape Space
by Michael Kirkland

DRAGON SOFTWARE
all machine code

BONKA
ADDICTIVE Arcade style game in full colour. Climb the ladders and dig holes to trap the "Meanies" before they kill you. 4 selectable speeds and choice of 1 to 9 meanies to start. NO JOYSTICKS NEEDED.
SUPPLIED ON CASSETTE **£7.95**

DGT2
THREE Fast-moving Arcade style games in full colour, with Hi-Res graphics and sound. "Very addictive . . . any single one of these is worth a fiver, so £6.95 for all 3 is a bargain" (From *PCW* review) SNAKES, LANDER & INVADERS. (No joysticks).
3 ON ONE CASSETTE **£6.95**

EDITOR/ASSEMBLER + MONITOR
Two Pass Global type. Supports standard Motorola mnemonics and Addressing modes. Powerful Debug Monitor. Recommended for the serious user.
SUPPLIED ON CASSETTE WITH USER INFORMATION **£28.75**

DISASSEMBLER
Written in position Independent Machine Code, will run anywhere in RAM. The ideal tool to have around.
SOLD ON CASSETTE **£11.85**

SPECIAL OFFER
Buy Editor Assembler and Disassembler together and save £5.60.
Cost of both as one purchase..... £35.00

DROIDS — NEW (OPTIONAL JOYSTICK)
Stop the Droids removing lead shields to release the bombs which will destroy the world. Very fast game. Excellent Hi-Res colour graphics and sound.
SUPPLIED ON CASSETTE **£6.95**

CHESS
Hi-Res display of board and pieces. 8 selectable levels of skill. CURSOR control move selection (No numbers/letters to enter). Supports CASTLING AND EN PASSANT.
SUPPLIED ON CASSETTE **£7.95**

VULTURES — NEW (uses one joystick)
FAST MOVING GALAXIAN TYPE GAME in full colour with Hi-Res graphics and sound. A flock of vultures guard their eggs. As they swoop towards you try to kill them, but watch out. Just when you think you have killed them all, the eggs hatch!
SUPPLIED ON CASSETTE **£6.95**



Cheques/POs payable to
J. MORRISON (MICROS) LTD
(Dept *PCW*)
2 Glensdale Street, Leeds LS9 9JJ
Tel: (0532) 480987
ALL ORDERS DESPATCHED BY RETURN FIRST CLASS POST
Callers and Trade enquiries welcome

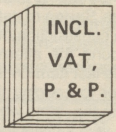
J. MORRISON (MICROS)

A GREAT NEW DEAL!

SPECTRUM RAM UPGRADE 16K→48K



EASY TO FIT. CHIPS JUST PLUG IN.
NO SOLDERING. SENT WITHIN 10 DAYS



ISSUE TWO MACHINES ONLY (BLUE KEYS)

S.A.E. for details, please.

* * * * * * * * * * * * *

DISPLAY INSTRUCTION SHEET

Get the best possible results from your Spectrum. Deals with yellowish white, wobbling colours etc. Send £1 plus Stamped Addressed Envelope

MAIL ORDERS ONLY. Cheques/P.Os to:
FOUNTAIN COMPUTERS LIMITED
Bishops Court,
Bishopstoke,
EASTLEIGH
Hants, SO5 6PE
(0703) 616505

SORRY, NO OVERSEAS ORDERS ACCEPTED (including BFPO, Channel Islands and Eire).

Q.E.D. Systems

experts in business systems now bringing professionalism into the home market for SPECTRUM, ORIC and DRAGON micro-computers.

NEW

THE VARIETY PACK

for the

less than 20p/program!

ORIC DRAGON SPECTRUM

INCREDIBLE VALUE!

25 specially selected programs to realise the potential of your new micro

THE BEST VALUE AROUND TODAY! ONLY £4.95

ALL ORDERS ARE DISPATCHED WITHIN 48 HOURS

NEW

DRAGON 6809 ASSEMBLER/EDITOR

With this powerful software realise the full potential of this splendid micro by writing your own machine code programs and routines.

FULL OPERATING INSTRUCTIONS ARE INCLUDED £6.95

NEW

DRAGON VIDEO CHALLENGE

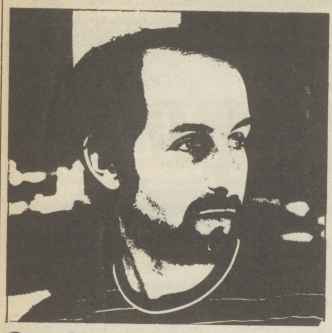
QED quality action-packed programs

PHOTON, LINK-FOUR, MICROTHELLO and PHANTOMS £5.95

Please send me on cassette .....
for my ..... micro with ..... memory
I enclose my cheque/postal order for £ .....
Name .....
Address .....

QED SYSTEMS, 2 SEFTON GARDENS, AUGHTON, Nr ORMSKIRK, LANCS L39 6RZ

Tony Bridge's Adventure Corner



Castles of . . .

Along the rain-lashed forest road comes the black coach. The four terrified horses are whipped by a black-caped coachman, and the whites of their eyes shine in the fitful moonlight.

The coach rounds a bend and, by the shocking glare of a flash of lightning the haunted hulk of a dark castle is glimpsed on a tree-shrouded hill in the distance. *(Oh get on with it, Bridge! Ed).*

Sorry about that! For some reason, we've had a lot of *"Castle of . . ."* adventures lately, so I thought we'd compare them. They're all for the Spectrum, and the first one out of the bag is: *Castle of Death* (from Electra Software, and for the expanded Spectrum). This one loads in two parts, so the screen must be watched intently. B Stangroom, the author, has written a scenario which concerns your struggle to negotiate the maze-like grounds of the eponymous edifice.

After the instructions, you are invited to *hit Enter* — but don't take this literally, you would do better to *press Enter!* The program then tells you that, unlike many other adventures, "the idear (*sic*, I'm afraid!) of this game is not to work out how to phrase your command." The commands are then listed for you, but you'd better write them down as they are not repeated.

You start on a dirty path, with exits North and West. There are no objects here, so press (or *Hit!*) N, to go North, and the computer goes to sleep until you press another key. Thus every move takes at least two key depressions.

As in most adventures, you should make a map of your wanderings — there are several objects lying around, always, it seems, in the same position. However, at any moment you may slip and smash your skull, which proves fatal. This seems purely random, which is a little unfair.

I haven't, so far, managed to get to the castle. But, though things may hot up a bit inside, I'm afraid that the mechanics of the game, along with the sheer randomness of fatal accidents did nothing to endear me to the *Castle of Death.*

Down the road a few miles we come to the *Castle of Doom.* The architects of this delightful little residence are Specsoft. The program comes on a tape with a bonus of an arcade game, *Missile Command.* The cassette box contains a blurb which prattles on about the program being "a winner in the adventure game field. Highly original and amusing." Well, Specsoft are at least one-third correct — the game is occasionally amusing.

The program is loaded in four parts, each section presenting you with a different scenario. The first stage is the countryside, with farmyard scenes playing a major part. The second stage takes you into the town, while the third part of the program takes place in the mountains.

Each scenario requires you to wander about, picking up various objects as you find them, and using them wisely in order to get past the obstacles that you meet.

The fourth part follows the same pattern, but takes place in the castle.

I found the map-making enjoyable, but ultimately the game palled — not least because there is no point to the proceedings. After many happy hours of wandering around, I was finally asked to give the correct answer to a weedy riddle. *Peeking* at the listing took care of that!

On without pause for breath to *Magic Castle,* from Gilsoft, "for any 48K Spectrum". This time it is a Princess who is imprisoned in the castle, and it's your job to rescue her. Again the instructions are all in the program, but unfortunately the only way to get back to these once you've started playing is by *Quitting.*

Like the others in this survey, *Magic Castle* is a text adventure. This follows the traditional adventure rather closely, with the obligatory maze near the start (represented by a minefield and an impenetrable forest), a torch that has to be lit, and all the other paraphernalia. I liked this one, even though the keys didn't respond very quickly to being *"Hit".*

Not much room left this week, just enough to reply to letters I've had from some of you regarding *The Valley* (you may have seen, in the past couple of weeks, the news stories about discussions between Kayde and ASP concerning this program.) Henry Budgett, of ASP, kindly let me have a copy of his *"Valley"*, and I hope to have a report on it soon.

Finally, if any of you are currently playing *The Knight's Quest,* from Phipps Associates, remember: *The microdrive is not, repeat not, the object of this Knight's quest!* ■

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.

Cruising & Blind Alley

£10 to be won

Can you beat the new high score?

Cruising

First there was *Space Invaders,* then there was *Pacman* – now there is *Cruising.* This all-action, machine code, arcade type game, will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly, or move so fast.

Achieving a high score on *Cruising* takes considerable skill, and not a little patience.

Popular Computing Weekly is offering £10 each month to the player with the highest score on *Cruising.* All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

Popular Computing Weekly
Cruising
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The winner of last month's competition with a score of 27673 was C. Moore of Patchway, Bristol, who receives £10. Entires for this month's competition close on July 31.

Notes

1) Each entry must consist of a ZX printout and your name and address.
2) Closing date for this month's *Cruising* challenge entries is July 31.
3) The highest score each month will receive £10.
4) High scores cannot be transferred from one month to another.
5) The judges' decision is final.
6) No employees of Sunshine Publications Ltd. or their families will be eligible to enter.

Blind Alley

Blind Alley is a game of strategy. In order to win you must outwit the computer, using your craft to fence in and finally destroy the enemy pursuit vehicles. But, watch out for the solid trail left by your opponents — one touch is fatal!

Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley.* To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table, together with your name and address to:

Popular Computing Weekly
Blind Alley
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

The winner of last month's competition with a score of 70625 was Stuart Williamson of Bradford, West Yorks. Entries for this month's competition close on July 31.



BBC CHARACTER GENERATOR

Menu-driven facilities include reflect, invert and 3 rotates. Display is on grid for multi-character pictures. Full load and save, etc.

AS REVIEWED IN THIS ISSUE

£9.95 P&P FREE

CHEQUES TO

VISCOUNT SERVICES LTD

2A Boulton Road, Southsea, Hants

Tel: 0705 833633

NO FUSS GUARANTEE

SPECIAL OFFER! £1 REDUCTION WITH THIS AD

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.)

ZX81, SPECTRUM, DRAGON BBC AND VIC

SOFTWARE LENDING LIBRARY

We have for hire from **50p** (including postage) programmes for your computer.

£5 for life membership (less than the cost of a single game) brings you the Software Lending Library membership kit including catalogue, news letter.

All tapes lent with full manufacturers permission.

Send a cheque or postal order for **£5** to **Software Lending Library,** PO Box 3, Castleford, West Yorks stating name, address, and computer type.

ANGLIA HOME COMPUTER BARGAINS

Dragon 32	@	£167.99	Vic20 pack	@	£137.99
Spectrum 48K	@	£127.99	Osborne D/D	@	£1,375.35
Commodore 64	@	£264.99	Epson HX-20	@	£425.45
Oric 48K	@	£158.99	Epson FX-80	@	£448.45
Lynx 48K	@	£218.99	Epson RX-80	@	£310.45

Price inc. VAT

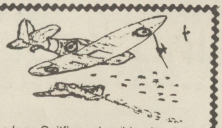
Excess HP-85 stock at half price

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

DRAGON 32 ACE HIGH



Summer 1940. You are at the controls of a lone Spitfire unleashing its eight machine-guns on a squadron of Heinkel bombers. Dodge the Heinkels' guns. Look out behind for Messerschmitt fighters (rear mirror feature). Eyes peeled for sweeping frontal attacks — and shoot down that brave German who tries to take you head-on!

Features:
High resolution graphics, 3-dimensional action, cockpit view, realistic sounds, reward system, detailed scorecard.

The keys allow choice of colour or B and W, also joysticks or cursors.

This game exploits the Dragon's facilities to the full, using all 32K.

Not available in or to libraries or club system. **£7.95** includes P&P.

TUDOR WILLIAMS

15 SUMMERHILL ROAD, BILSTON WV14 8RD

NEW FROM ASN FOR THE COMMODORE 64

NECKED

AVAILABLE IN SIX LANGUAGES

Necked is based on the pen and paper game of Hangman but requires only one person to play it. The program has a dictionary of 200 words. The Foreign Language versions display the English words on Side 1 which you must translate. On Side 2 you must translate the words back into English.

AVILABLE IN
ENGLISH, FRENCH, GERMAN, SPANISH, SWEDISH, ITALIAN

Price £7.95 INC VAT Dealer Enquiries Welcome

Send to:

ASN COMPUTER SERVICES LTD
DEPT PCW, 89 STATION CRESCENT
ASHFORD, MIDDX TW15 3HN

★ ★ Software Authors wanted. Top royalties paid for all popular micros

DRAGON 32 EDITOR

The most powerful text and program editor available, handles up to six A4 pages (22K).
Program includes merge capability for Basic programs.
Editor adds the following functions.

(1) FIND, GET, REPLACE — String commands
(2) ORGANISE, VALUE — Sort records
(3) INSERT, DELETE, MOVE — Blocks of text
(4) ADD (Join), HACK (Left), KILL (Right) — Lines of text
(5) TAB (+ or −8), CENTRE — Text/headings, page numbers
(6) TOGGLE (on/off), RIGHT JUSTIFICATION OF TEXT
(7) SPECIFIED RECORD OUTPUT TO CASSETTE AND PRINTER
(8) AUTO LINE NO., CURSOR POS, RECORD LENGTH, EOF DISPLAY
(9) CURSOR CONTROLLED CHANGE, INSERT AND DELETE CHARACTERS
(10) SINGLE KEY TEXT SCROLL

COMPLETE WITH INSTRUCTION MANUAL **£9.95**

Microplot

19 The Earls Croft, Cheylesmore, Coventry CV3 5ES.
Phone Coventry 503038

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.



ZX81 LISTINGS

Kevin Palmer of Hamble Court, Bodycoats Road, Chandlers Ford, Hants, writes:

Q I am writing to ask if it is possible to give me some information or listings that would help me become accustomed to machine code on my ZX81. It is unexpanded, but I have access to a 16K Ram pack. Also, I would be very interested to know where the nearest ZX club is to me.

A We do not have any specific listings to help you, though you will undoubtedly glean some information from working through any of the machine code listings published in *Popular Computing Weekly*.

Perhaps your best bet would be to purchase one of the many books on machine code. Two books that can be recommended are *Machine Code and better Basic* by Ian Stewart and Robin Jones (Shiva — £7.50) and *Mastering Machine Code on your ZX81* by Toni Baker (Interface — £7.50).

As to your nearest ZX club, according to my map you are halfway between Winchester and Southampton. Unfortunately, I could not find any clubs in that region. I can only suggest that you try a trip to your local library — if they do not know of any clubs, they might be willing to help you start one.

BASIC NONSENSE!

D Moore of Abridge Close, Redcar, Cleveland, writes:

Q I was recently looking through *Popular Computing Weekly* for 14-21 April and I noticed a line 0 in the Defender program. I tried to put this into my Spectrum, but all I got was the report code *'C Nonsense in Basic'*. Is there anyway that I can *Poke* in a line 0?

A The procedure for this is the same with both the ZX81 and the Spectrum — it involves *Poking* the systems variable *Prog*. All you need to do is look up the address and *Poke* it with nought. You then *Poke* the address plus one. So it is:

```
POKE 23635,0
POKE 23635 + 1,0
```

QUALITY CASSETTES

David Brown of Trewllard, nr Penzance, Cornwall, writes:

Q I wonder if you could tell me if computer quality cassettes are better than normal ones. Also, is Binatone bringing out a £50 computer that has colour and sound. They wrote a letter to my school about it months ago, and it is now well past launching date.

A Computer quality cassettes are better because they are shorter, and should have a better magnetic coating. One thing that causes problems when using a cassette is that, the longer the tape, the more work the motor has to do to keep the tape running evenly. This, in turn, makes it more likely that a fluctuation will cause a crash.

Thank you for your note about Binatone writing to schools, it is something that I did not know about. In all honesty, with new computers coming on to the market all the time, the Binatone has had a remarkable track record of engendering interest, without any sign of the product actually coming into the market place.

CRASHING PROBLEM

Martin Richards of The Green, Urchfont, nr Devizes, writes:

Q I have a most tormenting problem. When I input *Poke 65495,0* or some other sort of *Poke*, the computer crashes completely. So, I press the *Reset* button, but even then if I put in just *Enter* it comes up with *?SN Error*.

It is most frustrating, as I cannot speed up my games, and all the programs in magazines seem to contain this *Poke*. I still have my guarantee. Is it worth giving up or renewing? I forgot to mention, my computer is a Dragon.

A This problem arises from the fact that different batches of the Motorola chip seem to have been made to different standards. It must be said that all the Motorola chips used in the Dragon do meet the published specification. Some of them exceed it. This *Poke* can only be used on those chips which *exceed* that specification, since it has the effect of doubling the speed of the chip, which it was not designed for.

As far as I know, there is no way of telling from the outside what sort of chip you have inside, other than the fact that it will meet the basic specification. Neither is there, to my knowledge, a list of which addresses cause problems if *Poked* in this way. What must be said, is that you seem to say from your letter, that *every Poke* gives this effect, when in fact it should only happen on relatively few addresses. If your system crashes on *any* address you *Poke*, then there is probably a fault, and it should be returned under the guarantee.

WHAT IS FORTH-79?

David Tattnall of Bournemouth Avenue, Euston, writes:

Q I am thinking of trying to learn another computer language than Basic, namely Forth. However, I know very little about it, though I am waiting for a couple of books to come through the library.

One thing I would like to know, for a start, is what is Forth-79? Is it the language as designed in 1979? And is Fig Forth the same? Also, which does the Jupiter Ace use, if the two are different, and is *Rpn* Reverse Polish Notation?

A Forth was developed by Charles Moore in the late 60s, and early 70s. This lead to the setting up of the Forth Interest Group (FIG) who developed a standard version of the language. However, this was one of several, so a Forth standards team was formed — in 1980 they came up with Forth-79. There is still a lot of argument between the two, as to which is best.

The Ace uses a modified form of Forth-79 — again, there are arguments as to which is better. If you are new to Forth, and you start with the Ace, there should be no problems, until you try and use another standard. If you are used to Forth-79, you might find some of the omissions on the Ace annoying, on the other hand some of the extras can turn out to be very useful.

Rpn is Reverse Polish Notation, as used in all the implications of Forth.

SPECTRUM UP-GRADE

R H Crawshaw of Asket Drive, Leeds, writes:

Q Can you give me some information on the upgrade kit for the 16K Spectrum as offered by Fox Electronics. I would particularly like to know:

a) Would my guarantee from Sinclair be invalidated?
b) Would the kit make my Spectrum fully equivalent to a normal 48K Spectrum?
c) Is it possible for a complete amateur to fit the kit?

A Yes, to all three queries. If you use a non-Sinclair upgrade, then your guarantee will be invalidated. The kit does give your Spectrum 48K.

Fox will also send you advice on tuning your Spectrum to your television. All you have to do with the upgrade is put the chips into the sockets — details of which chips go where are provided.

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

SPIN A WIN FRUIT MACHINE for 16K Spectrum, featuring holds, nudges and gambling, with real graphics, £2.95. Chris Mann, 4 Hereford Close, Guildford, Surrey, GU2 6TA.

VIC20 OWNERS
Got your versions of Invaders and Asteroids yet? If not, why not try ours.
Invaders from Outer Space **£4.95**
Disasteroids **£4.95**
or both **£8.95**
Full, 100 % machine, Hi-res Colour Graphics for unexpanded Vic.
Send now to:
SWIFT SOFTWARE
75 Broadgate Lane, Horsforth, Leeds.

SPECTRUM. 'Bankjob Adventures'. Action Graphics!! 'Con' the Computer then escape!! Five programs on tape, £3.95. B. C. Owen, 1 The Pentre, Pendle Road, Clitheroe, Lancashire.

"FUGITIVE"
48K SPECTRUM
3 addictive games rolled into one.
Only £4.00
Cheques, POs payable to:
D. Webb, 107 Woodwarde Road
London SE22 8UP

ALLIGATOR CROSSING, new ZX Spectrum 16/48K game of skill. Send £4.50 to 23rd Century Software, "Aalsmeer", Old Road East, Gravesend, Kent DA12 1NQ.



KUDUSOFT
BBC MICRO
SOFTWARE

STARBATTLE: Destroy the Alien Starships before they get through to you. Avoid the tremendous meteorites. Full colour and sound effects. For MODEL B. £5.50 inc p&p

STARLANDER: Makes full use of MODEL A. Test your skills in landing your Starship under increasingly difficult conditions. Full colour and sound. £3.50 inc p&p.

130 MAIN STREET, TWEEDMOUTH
BERWICK-UPON-TWEED TD15 2AW

ESTUARY SOFTWARE PRODUCTS
A NEW NAME IN THE
E.S.P. 42
sinclair SOFTWARE

HITCH-HIKERS
GUIDE TO THE
GALAXY

For 48K Spectrum **£8.95**
Also for Apple 2 **£16.95**

LARGE RANGE OF SOFTWARE ON DISPLAY AT OUR SHOP

261 Victoria Avenue
Southend-on-Sea, Essex
Credit card holders may phone in their orders (0702) 43568

CARIBBEAN TRADER
48K SPECTRUM £5.95
Trade in illegal goods. Includes crew, bribery, pirates, rebels, coastguards, typhoons etc. Three levels of play, high score, moving graphics. Highly addictive.
Cheques and POs to:
EMS, 54 RYECROFT STREET
STAPLEFORD, NOTTS

LYNX 48K SOFTWARE
Labyrinth — 3D Maze Game
Othello — our version of popular board game in fast machine code
Chancellor — run the UK economy for 10 years
Space Trek — zap the Klingons.
£4.75 each inc. p&p. Cheques/P.O. to:
QUAZAR COMPUTING DEPT., PCW
17 TEG CLOSE, PORTSLADE, SUSSEX.

QUALITY ORIC SOFTWARE
THE WORD
Up-market Hangman, with colour and sound
DEATH TRAP
Moving graphics game with facility to design your own graphics
MASTERMYNDE
The fully expanded classic 1-4 players + multi-skill levels + timer!
Tapes + instructions: £4.95 each.
SAE for full range and price list.
Cheque/PO to: Headfield Technology
Lock Street, Savile Town, Dewsbury
West Yorkshire WF12 9BW

SPECIAL INTRODUCTORY OFFER
FAWKESOFT TAPE 1
16K ZX81
Contains **four** fantastic programs:
DODGE IT: Based on the arcade game of similar name, with all the exciting features of the original.
TROJAN DRAGON: Loosely-based on the hand-held electronic game of the same name, but with *many, many* more features.
DEATH TRAP: Simple but addictive. An original ZX game.
All the above **three** are written in superfast **machine-code.**
plus
TABLETS OF HIPPOCRATES: A classic adventure game. Guaranteed difficult. If you can't solve it we will send you a **free** answer sheet. Normal price £4.95, but **only £3.95** on all orders before July 14.
Send to: **FAWKES COMPUTING, 41 WOLFRIDGE RIDE, ALVESTON, THORNBURY, BRISTOL BS12 2RA.** Tel: 0454 416706
16K **ZX81**
All our products are backed by a no-quibble money back guarantee

FOR THE VIC20, from Arcsoft comes Zap-Man. Hi-res graphics, colour, sound, fast machine code action, all this for the unexpanded Vic for just £4.00 inclusive. Send cheque or PO for fast delivery, to S. Fensome (Arcsoft), 73 Blackfriars, Rushden, Northants NN10 9PF.

CHRISTINE COMPUTING
T99 4A SOFTWARE
NORTH SEA, CODE BREAK
ASTRO-FIGHTER
£3.50 each, **£6.60** for two
£9 for all three
SAE for Hardware/Software Catalogue to:
Dept PCWK, 6 Florence Close, Watford, Herts.

MISSILE. Defend your cities from the deadly onslaught. Graphics game for the BBC microcomputer (32K), only £5 inclusive, to: Paul Stevens, 11 Woodhurst Close, Cuxton, Rochester, Kent ME2 1LU.

UTILITIES

RESET YOUR VIC20, CBM 64. Go back in time at the touch of a switch! Our system restores your program in memory to the moment just before your computer crashed. It will even bring back your program if you have 'newed' by mistake. The system consists of a PCB mounted switch which plugs directly into the RS232 port and a machine code program supplied on a cassette. All this for only £7.50 + 65p p&p. Send cheque/PO to: Playbyte, 5 The Spinney, Fleet, Hants GU13 8EP.

SPECTRUM ZAPPER. A cheap but effective tape copier, which will make back-up copies of protected programs for any Spectrum, £2.90. R. Thomas, 9 The Copse, Lindfield, Sussex.

SPECTRUM
BACK-UP COPIER
First of all you had to back-up programs by making tape-to-tape copies. Now KEYSOFT present:
THE KEY
100% machine code! Copies any type of program. Easy to use
Order THE KEY for any ZX Spectrum
Only £5.95
KEYSOFT, Dept PCk
6 Bruce Grove, London N17 6RA
NB: KEYSOFT advise users not to infringe the Copyright Acts
Dealer Enquiries Welcome

VIC20 MACHINE CODE programmers, want to store machine as basic data statements? Let Datawriter do it. This machine routine converts code and actually writes lines of basic, merging them with your programs in seconds. Any expanded Vic. Full instructions. Cassette £3.50. R. Bartlett, 81 Dogfield Street, Cardiff, South Wales.

SPECTRUM KOPYKAT £4.95
100% machine code. Enables almost any ZX Spectrum program or data-file to be backed-up on to a fresh tape.
Programs over 41.5K (8.7K for 16K models) can now be copied with ease.
Plus: FREE Tape-header Reader program.
Both programs on one cassette. **Only £4.95.**
IMMEDIATE DESPATCH. Send cheque/PO to:
MEDSOFT
61 Ardeen Road, Doncaster DN2 5ER
IT CAN EVEN COPY ITSELF

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.)

			Please continue on a separate sheet of paper

I make this ..... words, at ..... per word so I owe you £ .....

Name .....

Address .....

.....

.....

Telephone .....

Please cut out and send this form to: Classified Department, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2

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

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.

007 SPY COPIER

Simply load your Spectrum then press 'C' for instant copy. With program to enable stopping to study any Bytes/Basic Program **£3.95.** (Previous 007 Spy Owners send the cassette plus **£1.50** to have update added).

BOBKER, 29 CHADDERTON DRIVE UNSWORTH, BURY, LANCS

TELETEXT ON YOUR SPECTRUM. ZX text lets you create your own personal teletext system. Similar to Ceefax and Oracle. Capacity 900 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, 12 Torry Drive, Alva, Scotland FK12 5NQ.

SPECTRUM KOPYCAT. Make security copies of your favourite programs. Copies any Spectrum tape file. 16/48K. Easy to use. £4.95 from AWA, 50 Dundonald Road, Didsbury, Manchester.

SPECTRUM 64 PRINT, Amazing Software that gives 64 characters per line instead of 32, prints anything from your Basic program, cassette, 48K or 16K, £3.50. K. Ahmed, 28 Magpie Hall Lane, Bromley, Kent.

SPECTRUM "FLOW-CHART" help plan programs, follow programs better than list. This program gives you an accurate flow-chart of basic Spectrum programs. £1.70. B. Sides, 4 Willesden Road, Cefn-Glas, Bridgend, S. Wales.

RECRUITMENT

COMPUTER SOFTWARE PRODUCTION SUPERVISOR

We manufacture Software Programs on cassette and disk and are seeking a Supervisor to control this section of our new factory at Greenford on the A40.

The successful applicant must have direct experience working with small computers, an understanding of their operating techniques and an interest in electronics, to take charge of the preparation of master programs and the large volume of duplicates for leading software houses.

If this well-paid position is of interest to you, **then Ring Don Green on 01-223 5955**

BiBi MAGNETICS

SOFTWARE

PROGRAMMERS. Take heed of The Runes. Send your Dragon, Oric or Spectrum programs to Runesoft, Charnwood House, 67 Lower Parliament Street, Nottingham NG1 3BB.

SPECTRUM SOFTWARE: Escape, Centipede, Dictator, Heathrow, Nightflite, Automonopoli, Golf, 3D Tanx, Cruising, etc. All originals. Romford 48345. Private sale.

DIET AND WEIGHT CONTROL program. The first and best, now for 48K Spectrum, £4. E. Frangoulis, 54 Holland Road, London, W14.

DRAGONEERS!
Practical programs from MB for Dragon 32

WORPES. Basic text-processor. Up to 250 lines of 80-character text can be entered, edited, stored on tape and printed with single or double spacing in part or full. Why pay £50 for a word-processor when Worpes will do all necessary for **£9.80** incl.

TELIST. Stores, alphabetises, saves on tape and gives immediate access up to 500 names with telephone number. If printer available prints telephone directory. A highly disciplined use of Dragon's 32K memory for **£8.80** incl.

QUIZZER. Set your own quizzes. Up to 50 questions with choice of 6 answers. Correct is jumbled among other five. Can be saved on tape. **£5.80** incl.

SPECIAL OFFER: All 3 for 21
Cheques/PO to: MB **Programs (CW), 3/112 Oxford Gardens, London W10 6NG**

SPECSOFT PRESENT — for 16/48K ZX Spectrum — Gamblers Compendiums, Pontoon, Hi-Lo, Bandit, Snail Race. Also Castle of Doom, 64K adventure in four parts. Only £5 each. 57 Everard Avenue, Sheffield.

ATARI	VIC20	DRAGON

Software and hardware. All at excellent prices. SAE for catalogue to: **Shelton Software, Unit 8, Hubert Shaw Close, Derby.**

COMMODORE 64. Terrific software at very low prices. Choose from our wide range of educational and arcade games. Send SAE to 83 Ballards Road, London NW2 for list or telephone 01-450 4858 for details.

PHOTOGRAPHERS with BBC's program which keeps time for home colour slide development (Paterson etc), keeps track of stages. £6 to John Russell, 8 Croft Gardens, Ruislip, HA4 8EY.

DRAGON SOFTWARE

PARK OF DEATH — can you cross the park? Colourful game — addictive.
CONCENTRATE — Game of skill and memory for two players.
SKETCH PAD — Draw, paint and save pictures on screen. Mode 3 and Mode 4 supported. Joysticks optional.
INDEX 200 — Create a cross-referenced file of your collection.

All on cassette at £5.95 each, including P&P. Cheques, POs to **MK1 SOFTWARE, 30 Painswick Road, Birmingham B28 0HF.**

SPECTRUM SOFTWARE. Cruising, Schizoids, Battle of Britain, will swap for 3D Tanx, Penetrator or any other offers. S. Rayner, 15 Welbeck Street, Abbey Hey, Manchester.

CBM 64 PROGRAMS! Programmer's aid + Machine-Code Side-Scroll. Othello, Draughts, Slapstick, Blackjack. Colour Graphics + sound from £2.50 to £9.95. Ring 01-748 8178 Now!

MAGAZINES

ORIC USER PROGRAMS NEWS VIEWS
£10 for a year's sub
To: 20 Wynford House, Wynford Road, London N1

SERVICES

ORIC/TANGERINE PRINTOUTS. Send your programs on cassettes and I will return a high quality printout for £1.60 by return post. 50p for revised programs previously listed. Paul Weller, Arley House, Hanley Terrace, Malvern WR14 4PF. Confidentiality assured.

REQUIRE THE USE of a Printer? Join our Printer Club. Membership is available for the ZX81/Spectrum and BBC Microcomputer at £10 a year. Members' special prices: Computer listings 25p each. Graphic printouts 20p each. Send cheques and enquiries to Loophole Software, Arkwright House, Alexandra Road, Llandrindod Wells, Powys.

ACCESSORIES

ZX81

Upgrade your keyboard with this unique, low-cost kit. Gives positive feedback to each key depression making your keyboard faster and easier to use **only £1.00** (including P&P)

S. J. McQuillen, Penrhose Glyn Circle Kinmel Bay

£1 **Rhyl** **£1**

Speed up the action with

PICKARD JOYSTICK CONTROLLER

Allows use of any keys, not just cursors — no special programming — does not affect other add-ons
Price: £19.95 + £1.50 p&p
Spectrum ZX81 compatible

Success Services
154 High Street, Bloxwich
Walsall, West Mids WS3 3JT
Tel: (0922) 402403

CASSETTE LABELS PRINTED, self-adhesive, any amount. SAE samples: Six-Jays, Swanpool, Falmouth, Cornwall.

WANTED

WE ARE currently looking for original preferably debugged games and utility programs. Anything from ½K to 24K is acceptable. If you have any programs that fit these criteria write to: Bamby Software, Leverburgh, Isle of Harris.

DRAGON, ORIC AND SPECTRUM PROGRAMMERS

Runesoft require high quality programs in machine code or Basic for our new software house opening soon. Good royalties paid for accepted programs. Send demo tapes to:

RUNESOFT
CHARNWOOD HOUSE
67 LOWER PARLIAMENT STREET
NOTTINGHAM NG1 3BB

WANTED. BBC MICRO in good condition for about £200. Uxbridge 53202.

LOOKING for a market for your programs? List of 50 suppliers, UK and US who want software for ZX81, Spectrum and others. 50p including postage. ZX80/81 Register, lists suppliers, software, hardware, publications £3.95. Youngs Computer Publications, 2 Woodland Way, Gosfield, Halstead, Essex.

PROGRAMMERS WANTED

FOR:
ATARI BBC
COMMODORE 64 DRAGON

With experience on these machines using Basic and preferably Machine Code.
Salary negotiable. Age unimportant. Permanent/full-time contractors to work in East Putney.

Send cv or ring for further details:
IAN MORTON
A.S.K.
LONDON HOUSE
68 UPPER RICHMOND ROAD
LONDON SW15 2RP
Tel: 01-874 6046

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.

Ambitious Programmers with Big Ideas . . . . . become a Software Mogul!



How? By becoming a MOGUL programmer.

MOGUL SOFTWARE is part of a long-established home entertainment company with interests in video software and records. Our proven national and international marketing expertise has led to many years of success. Now we are turning our attention to games software.

We're looking for big-thinking games programmers with machine code experience who can produce exciting and innovative ideas for the Spectrum, Vic 20, Atari, Dragon, BBC, Oric, TI 99/4 and Commodore 64.

For big ideas, we'll pay big royalties. Or we'll purchase your programmes outright. If you prefer, we'll offer a mixture of the two.

Then, as a software "mogul", just watch your bank balance grow as we market your programmes in the UK, Europe and the USA . . . all with extensive advertising support.

THINK BIG . . . THINK MOGUL!

Write to: **Mogul Software, PO Box 4BT**
35-37 Wardour Street, London W1A 4BT Tel 01-437 3157

WANTED

For immediate and massive distribution in the USA:—
Quality Arcade games for VIC 20 and COMMODORE 64
Phone: BASINGSTOKE (0256) 25107 or write to:
DREAM SOFTWARE, P.O. BOX 64, BASINGSTOKE, HANTS. RG21 2LB

DREAM software

THE RUNES foretell of a new name to arise in software. Verily the need for quality programs is great. Good royalties/cash paid. Send demo tapes to Runesoft, Charnwood House, 67 Lower Parliament Street, Nottingham NG1 3BB.

DEALERS

RAWLINGS
19/21 ST JAMES ROAD
SOUTHAMPTON SO1 5FB
Tel: (0703) 772700

400 Computer + 410 TP/Rec + Basic/MM/LS + Joystick + C/game **£200.00** Inc.	800 Computer + 410 TP/Rec + Basic/MM/LS + Joystick + CTG/game **£355.00** Inc.

COMMODORE 64
£164.00 (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 Preston Road, London W10 6TH
or cheques P/P (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.

SOFT MACHINE
A large selection of the very best Software, Books and Accessories available for ZX81, Spectrum, BBC, Dragon, Vic20 and '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 £290 INC VAT

SINGLE FLOPPY 1541	**£250**
CASSETTE CN2	**£42**
RAM PACK 3, 8, 16K	**£23, £35, £60**
CARTRIDGE GAMES	**£15 AND £19**
VIC20 STARTER PACK	**£130**

ALL PRICES INCLUDE VAT, P&P EXTRA
INTECH SOFTWARE LTD
RUISLIP 30508

ZX81 High Res Graphics Unit
£32 (excl. VAT)
Tel: William Haynes **01-969 0819**
Tools for Living
Notting Dale Technology Centre
191 Preston Road, London W10 6TH
Cheque/PO (add 15% VAT) plus 75p p & p

A RETAILER for Sinclair accessories in the North of England. We are situated near the M1 and M62 motorways. As well as a complete range of hard and software, our service department can repair, modify or fit a wide range of accessories. Hours of business 10 am — 8 pm Tuesday to Saturday inclusive.
TELEPHONE PHILIP COPLEY ON 0924 272545
6 WESTLEY ST, OSSETT, W. YORKS
PLEASE RING FOR DETAILS OF OUR MAIL ORDER SERVICE

PHOENIX COMMUNICATIONS DIGITAL DIVISION
Apple 2 compatible peripherals, including:
Language card
Disk drive controller
Z80 card 80 column card
PAL colour card and many more
Check this price:
Disk Controller card **£28.00** + VAT
For more details send SAE for catalogue to:
16 Theobald Street, Borehamwood, Herts WD6 4SE. Tel: 01-207 5950

Vic20 starter pack £139.99
Commodore 64 Rams £39.95
plus other hardware from
NOLANSCO ELECTRONICS
Large selection of software, business, educational and games.
COMMODORE 64 + Vic20
SOFTWARE AND HARDWARE FROM
Phone Karen Biggleswade
(0767) 316702 (24 hrs)

CLUBS

ORIC-1 OWNERS. Tangerine created Oric-1 now TUG creates the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, meetings, software, hardware, reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send £1.00 + SAE (A4) for sample newsletter and details. Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DQ.

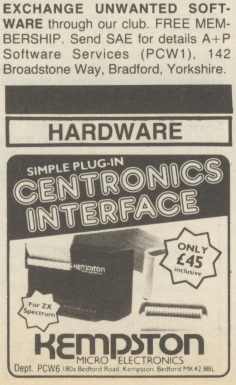
SOFTWARE EXCHANGE. Swap your used software via our club. Free membership. £1 per swap. Most computers included. SAE for details. UKSEC, 15 Turnwell Greave, Sheffield, S5 9GB.

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
16 THEOBALD STREET BOREHAMWOOD, HERTS

SUPER ZX81 CLUB for people who want the most from their ZX81. Newsletter, hints, hardware reviews, also advice. Membership fee £3 money, to: ZX81 Club, 17 Carlyon Close, Farnborough, Hants GU14 7BX.

EXCHANGE UNWANTED SOFTWARE through our club. FREE MEMBERSHIP. Send SAE for details A+P Software Services (PCW1), 142 Broadstone Way, Bradford, Yorkshire.

HARDWARE



COMMODORE 64
£269.00 inc VAT
While stocks last
Securicor delivery £10.00
Send your cheque for £270.00 to:
Currys Microsystems Ltd
653 London Road
High Wycombe
Bucks, HP11 1EZ
BARCLAYCARD VISA ACCESS

Dragon or BBC micro to Tandy printer is now possible using our special parallel cable — 6 feet long, 100 per cent tested, price **£16.00** all inclusive.
Standard cable for Seikosha or Epson also.
Please state computer and printer make:
LPCD Services, 3 Hamilton Grove, Skelling Thorpe, LN6 5TB. Tel: (0522) 684 482.

BUSINESS SOFTWARE AND HARDWARE

REDSPEC takes the drudgery out of misery! Calculates age, service, notice and payments for redundancy, written by personnel managers, £4, (16/48K). R J Fishwick, 87 Enesley Road, Sunderland SR4 7RJ.

EDUCATIONAL SOFTWARE

SPECTRUM 48K, French vocabulary programme with accents. Up to 800 words. Automatic test. Even prints crib sheet! Send £4.50 to TPA, 189 Upland Road, London SE22 0DG.

COMPLETE 'O' LEVEL REVISION aid for: Chemistry, Physics, Biology and Maths. For BBC/Spectrum Computers. Price £4.95 each or all for £14.95. Send cheque/PO to: R. Battacharya, 3 Wensley Close, Harpenden, Herts AL5 1RZ.

FOR SALE

LYNX, 48K plus Monster Mine cassette, as new, still under guarantee, plus all leads, manual, etc. Tel: 061-881 4018 after 4 pm.

SIX TOP QUALITY original tapes for 16K ZX81, worth £27, half price: £13+p&p. Tel: 0228 27700.

ATARI VCS as new with eight cartridges including Berzerk, Pacman, Missile Command. Complete with joysticks and paddle controls, £170. Tel: 01-304 9723.

16K SPECTRUM AND ZX PRINTER, £129 ono plus 20 games including Arcadia, Escape, Orbiter, Centipede, Pacman and 60 other programs. (Six months guarantee.) Tel: 035 921 208.

ATARI 400 SHAMUS £20, Canyon Climber £15, Galactic Chase £8, Preppie £15, Treasure Quest £8 and Monster Maze £15. Tel: Bury St Edmunds 64711.

MISSION IMPOSSIBLE CARTRIDGE for sale, £15 ono. Tel: 070-48 72187.

DAI 48K, assembler, games, demo tapes and magazines, £340 ono. Tel: Brighton 34493.

TI MUNCHMAN £20 or will swap for adventure module. Tel: (0623) 823216.

MATTEL INTELLIVISION plus Space Armada cartridge, perfect, virtually unused, £70. Malvern 64607.

ATARI OWNERS with disc drives. Many games, utilities for sale/exchange. Malvern 64607.

BBC B, manual, leads, 8 months old with Welcome plus 10 cassettes. Tamworth 54639.

VIC20 C2N, 16K RAM, all still under guarantee, some software, £150 ono. Tel: 980 4811, ext 420 before 5 pm or 729 5571 after 6 pm.

VIC20 + C2N CASSETTE + four slot mother board + 16K Ram + Super Expander + various excellent software. All still under guarantee. My cost £400, only £250. Tel: 051-652 1625.

UNWANTED SPECTRUM SOFTWARE. Original cassettes sell at under half-price each. All top games. D. Collins, 45 Steyning Grove, Nottingham, SE9 4NG.

COMMODORE VIC 8K RAM, £20; 16K Ram, £35. 0533 702831.

DRAGON. Brand new, complete with cassette recorder, joysticks, chess cartridge, cassettes, cost £300, best offer. Tel: Bradford 815570.

VIC20 + C2N cassette deck, joystick and dustcovers. Both parts Teach Yourself Programing, programing guide + Vic Revealed and several games, £150. Tel: Colchester 67165.

SPECTRUM 16K, manuals, demo tapes, Whist games, Nightflight, little used, £79. Devizes (0380) 3341.

ARFON EXPANSION UNIT with lid, £50. Tel: 01-850 4732 (evenings).

FOR SALE — Nascom Imp Serial Printer, excellent, £140; Seikosha GP-100A Printer, as new, £140, both with leads and documentation, can demonstrate ZX81 1K, complete, plus two books, £25; Atari Video Computer, complete, plus Space Invaders, Outlaw, Freeway, Video Olympics and Chess, £65. Ian McInnes, 76 Brunswick Street, Sheffield S10 2FL.

ATARI 400 16K Recorder, basic assembler games, joysticks, books, £150. Letchworth 70331.

DRAGON 32K, nine months old, joysticks, games book, two cartridges and over £200 worth of cassettes, £190 ono. Tel: Hornchurch 73661.

DRAGON 32, six months old, including joysticks and software, hi-res, Chess, etc, worth £400, sell for £270. Tel: Luton (0582) 27573.

SELLING! New 16K Oric. Ring 01-422 8480 between 7 and 10 pm (Craigie).

SPECTRUM 16K, £50, 48K £70, also many games from £2.50 each or £9.95 for five including Jetpac, Penetrator, Froggy, 3DVU Spawn-Evil, Time-Gate, Trans-Tower. Send PO or cheques to **Kempston Joystick** for Spectrum for sale, offers. Tel: St Helens 29874.

VIC20 CARTRIDGES AND CASSETTES for sale, including Commodore, Rabbit, Anirog. Half price. 01-574 4122.

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 SOFTWARE to swap. Please telephone Leigh (0942) 678129 evenings or weekends.

16K SPECTRUM with software and magazines. Virtually brand new, only had it a week, £95 to £100. Tel: Leek 384174.

48K SPECTRUM + over £200 of games, utilities, adventures and books. Quick sale, hence best offer over £130 accepted. Tel: 0908 75094.

SPECTRUM 8K EXPANSION. perfect condition, leads, manual, three games and Spectrum book, £120 ono. Tel: Blackpool 42923.

48K SPECTRUM + printer + 15 rolls of paper + £90 software + £22 machine code books. Worth at new price £285. Sell for £175. Tel: 6993232 before 7 pm.

48K SPECTRUM issue 2 fuller keyboard, fuller amp, cassette recorder, magazines, some software, printer to be included, £250 ono. Tel: 521-0672.

ZX SPECTRUM 48K + software, books, joystick, magazines, £200 ono. Tel: 01-840 2738 after 7 pm.

48K SPECTRUM + printer + 10 rolls + software and books, £160. Tel: South Benfleet 3909.

ZX81s for sale

ZX81 16K Zonx 81 sound pack, 10 tapes, 20 magazines, two books, £75. Tel: Crayford 524859.

ZX81, 16K plus printer plus paper and manual plus books, £70. Tel: Nutley 236925 after 6 pm.

ZX81 plus all leads, some tapes, manual, book, boxed, £35. Tel: Eccleston 453247.

ZX81 + 16K + £20 worth of software, sell for £50. Tel: Sheffield 699847.

ZX81 16K GAMES, two books and magazines. Tel: Carol on Idminston 610466, £70 ono.

16K ZX81, 4K graphics, Rom 1K, user to find graphic chip, £75 of software and magazines, £80 ono. Tel: 660 6807.

ZX81, 16K plus file, 60 keyboard, still under guarantee plus loads software, as new.Tel: (Bristol) 676194.

ZX81 with high res graphics, 16KRP + VDU, £70. Tel: 01-850 1445.

ZX81, 12 months old, with new 16KRP and power supply unit, over £30 software, magazines for £45 ono. Tel: Sid on 061-633 6887.

ZX81, 16KRP, books, magazines and games, £55 ono. Tel: Medway 252177.

ZX81, with five months guarantee to run 16KRP (eight months guarantee) plus £70 popular software including all manuals and leads, £90. H. Withecombe, 35 Northview Avenue, Bideford, North Devon.

ZX81, 16K, very good condition, keyboard, books, magazines and programs plus tape recorder (optional). Offers please. Tel: Radlett 4322.

ZX81, 16K plus books plus 45 tapes, £150 ono. Tel: Offton, Suffolk 461 between 6 and 7 pm.

ZX81, 16K, Kempston keyboard, Zonix sound unit, Spectrum extension board, £20 software, manual, leads, etc., £90 ono. Tel: 01-660 6007.

ZX81, 16K, manual, leads, power pack, £45. Tel: Hornchurch 57298.

ZX81 plus 16K plus reliable tape recorder, software worth £100 plus magazines and books, bargain at £63. Tel: Chelmsford 441948.

ZX81 + **16K** + leads and manual + book. Sell for £50. Tel: 01-274 9010, 5 pm to 9 pm.

ZX81 16K + £130 worth of software. Sell for £95 ono. Tel: 021-449 0684 (evenings and weekends).

16K ZX81, fitted with DK'Tronics graphics Rom board, sound pack, lots of software, £40 of magazines and books. All fitted in a console + black and white TV with aerial (14 inch). Sell for £200. Tel: 01-998 8117.

ZX81 + 16K, original box 22 cassettes, games, adventures, education software, three books, leads, manual. Tel: 01-883 0122 after 4 pm, £70.

MEMOTECH 64K memory pack. Little used, £40. Tel 0955 3428 evenings.

1K ZX81 + PSU, leads and manuals, two tapes. Sell for £40. Tel: 01-882 2288 after 5 pm.

Ataris for sale

COLOUR GENIE, five months old, £175. Tel: Durham 46807.

TREXAS TI994A, £100, no offers. Tel: 01-837 3300, extension 2275.

SHARP MZ 80K, 48K memory, six languages, word processor, 100 program library and machine code games, £350. Tel: Tewksbury 297579.

NASCOM 36K, NAS SYS/T4 monitors, including video monitor/hi-speed cassette interface, recorder, software and documentation. £120 ono. Tel: Huddersfield (0404) 25181 evenings.

48K ORIC 1. New. Unopened. Sale £125 cash. Tel: Croydon 654-7471.

ATARI 400 32K 2790, Atari 410 program recorder 238, basic cartridge + two manuals £35, joystick £4 plus software. Whole lot £300. Tel: Cowes 297205.

ATARI 400, 16K, tape deck, basic, assembler, joystick, games. manuals, £200 ono. Letchworth 70331 after 6 pm.

ATARI VCS + software, mint condition, boxed, as new, £65 quick sale. Tel: 01-348 5668.

ATARI 400, 48K, tape deck, basic, books, joystick, £175 ono. Tel: Edenbridge (0732) 863815 after 6 pm.

ATARI VCS + two cartridges, £65 ono. Tel: 061-6524628.

SWAP brand new Atari 800 16K Ram memory, expansion module, cost £65, for Matel Intellivision cartridges. Tel: 0726 63501 (after 5 pm).

ATARI 800 16K, 2 joysticks, chess cassette, Pacman, Centipede, Star Raider, books, £400. Tel: 01-736 3889, Mr Robinson after 6 pm.

ARATI 400 48K, disc drive, cassette recorder, joystick, Basic and manuals, plus software. £425 ono or sell separately. Tel: 01-301 3289.

ATARI VIDEO GAME SYSTEM + 3 cassettes, one year old, £60. Tel: Northern Ireland, White Abbey, 52030.

ATARI 400 16K including Basic cartridge tape recorder including various cartridges and 2 joysticks + all Basic manuals, £200. Tel: 01-435 7336.

Dragons for sale

DRAGON, joystick, games, worth £300, £165 ono or swap 48K Spectrum plus cash or games. Tel: Trowbridge 3965.

DRAGON 32, 1 month old, 2 years guarantee + joystick, software, books, worth £240, yours £180 ono. Tel: Harlow (0279) 30665 after 6 pm.

DRAGON 32, £50 of software, cassette recorder, all leads, offers. Tel: 043-871 4390 (evenings).

DRAGON 32, 6 months old, excellent condition + £30 games software, £150 ono. Tel: Stanford-le-Hope 642635.

DRAGON 32, very good condition, 3 months old, guarantee and joystick, £160 ono. Tel: 01-993 5502.

Acorns for sale

BBC SOFTWARE to sell or swap. Tel: 01-808 8906 (after 6 pm).

BBC B, 1.2 OS, wordwise, joystick, £100 of software, £450 ono. Tel: 01-267 2430.

ACORN ATOM COLOUR, 24K Rom + 12K Ram with 30 software cassettes, power supply cassette recorder, 9in monitor, £180 ono. Tel: 01-487 5411 ext 54 (day), 01-229 0495 (evening).

DISC CONTROLLER CHIP (No. 8271) for BBC micro, £20 ono. Tel: Basingstoke 54426.

BBC JOYSTICK interface, compatible with Atari and Vic joysticks, £8.50 or £10 for two sockets, also on offer software for sale or swap. All types of software. Tel: 01-571 2870.

Commodores for sale

CBM DUAL DISC DRIVE for Basic 4, good condition, some software on disc, £325. Washington 091 4170754.

BRAND NEW Vic/Commodore 64, disk drive, it costs £300 but its yours for £249. Tel: Harpenden 69152 (after 6 pm) for details.

BRAND NEW VIC/Commodore 64 Printer, it costs £230, but you can have it for £195. Tel: Harpenden 69152 (after 6 pm) for details.

BRAND NEW Commodore 64 with joystick, cost £350+, but it's all yours for only £295. Tel: Harpenden 69152 (after 6 pm) for details.

VIC20 + CZN cassette, as new, no manual, £107.50 ovno. Tel: 01-253 8282 (Miss Mason).

COMMODORE VIC20, 8K, tape deck, joystick, games + books, £120. Tel: 01-560 1892.

VIC20 + cassette + 16K Ram pack + joystick + Programers Reference Guide + three cartridge games including Voodoo Castle, over £60 of other software, has still got 18 months guarantee. Cost £500, quick sale £250. Tel: 515 4696.

COMMODORE METEOR SPACE GAME, excellent value at just £1.50. D. Spencer, 230 Lowgrange Avenue, Billingham, Cleveland.

VIC20, unexpanded, games etc, 25 + cassettes at only 99p each, send £1 for list and game. D. Spencer, 230 Lowgrange Avenue, Billingham, Cleveland.

BBC MODEL B, 1.2 operating system, very good condition, includes £800 software, £545 ono. Tel: Hull 849517.

VIC20, + cassette unit, 8K Ram pack, 3K Ram pack, motherboard, 3 cartridges including Golf, joystick + 12 cassettes, magazines, books + television, £300. Tel: 061-4271605.

VIC20, program reference guide, £5 + Vic Revealed, £7, or £10 both. Tel: 01-574 4122.

VIC20 + cassette unit + dust cover and books, £95. Tel: 051-4878442.

VIC20 + cassette + 16K Ram. Introduction to Basic + 2 books, Sargon 2 + adventure cartridge, Vicmen and many games + magazines, £180. Tel: 01-205 2834.

VIC20, CZN, 16K + 3K, dust cover, joystick, adventure cartridge, over £100 software, books, cost £450, need £299 ono. Tel: Afbon 2477 after 5 pm.

VIC20 plus Commodore 16K Ram pack, cassette deck, joystick, Vic Revealed, dust cover, nine cartridges and 30 cassettes (original). Cost £600, for sale £220. Tel: (Southend) 0702 201637.

VIC20, Mission Impossible swap for Omega Race or Rat Race. Tel: 01-656 7441 (evenings).

VIC20, cassette unit, 16K, £30 of software, £180. Tel: 061-4409828.

VIC20, 19K, Stack storeboard, 4 slot motherboard, cassette unit, lots of software, books, joysticks, £150 for quick sale. Also Sargon 2, Chess + Spiders of Mars cartridges, £14 each. Tel: 01-788 8272.

VIC20, + cassette deck + lots of magazines + programs + programmers' reference guide, excellent condition, any reasonable offers. Tel: 01-866 6321.

FOR VIC20, Stack 40/80 column card, £50; Stack Vic kit 1 and 3 + 3K Ram, £30; for sale (all one month old), also Vic games, £4. Tel: 051-430 0905.

12-INCH MONITOR, satin finish case, good condition, £45. Tel: 01-207 5840.

VIC20, + cassette, immaculate condition, 18 months warranty, £150 ono. Tel: 515 4696.

VIC20, C2N cassette, 8K, expansion cartridge, joystick, Sargon Chess cartridge, intro to Basic part 1, books + magazines, £150. Tel: Coventry 614104.

VIC20, CN2 cassette deck, joystick + 7 cartridge games, £200. Tel: Harlow 417 618.

VIC20, Myriad, The Alien, Moons of Jupiter, all +3K, Vicmen, Catcha Snatcha, Ski-run, Wacky Waiters, Pit Amock, 3K Rampack. Best offers Tim, Tel: 0825 4524.

VIC 1515 PRINTER, £200 ono. Tel: Roger Chessell, 02514 23499 (after 6 pm).

SWAP VIC20, quality software, e.g. Nightcrawler, especially for Rabbit, Lamsoft, software also wanted: Solutions for Voodoo Castle on Vic20 will pay £1, will sell solutions for Adventureland. Tel: 051-327 2135.

COMMODORE PET 3008, upgraded to 16K, 40 × 25 screen complete with cassette deck, manuals + cover, £200 ono. Tel: (Luton) 0582 54155 (office hours only).

COMMODORE 64, + cassette + software, magazines, £300. Tel: 01-251 3769 (after 5.30 pm).

VIC20, 3K, memory expansion, 10 software games, computer + tape recorder, £135 ono. Tel: 021 3567973 (after 6 pm, ask for Simon).

VIC20, + cassette, also super expander, 5 games cartridges + more than £70 of software, joystick, introduction to Basic 1, 4 books and some magazines, only £235 ono. Tel: Great Harwood 0254 885333.

VIC20 cartridges for sale, open to offers. Tel: 0442-58200.

VIC20, cassette deck + 16K expander, introduction to Basic parts 1 and 2 + software, £190. Tel: Sheffield 682155.

VIC20, software for sale, cartridges, including Sargon 2 Chess, £15; + Star battle, Alias Road Race, £11 each. Tel: 01-574 4122.

VIC20 GAMES, Mission Impossible, Sargon Chess, Slot, Road Racer, Master Mind, £50 the lot. Tel: Taunton 88726.

VIC20, + tape unit + 16K switchable Ram + 3 Vic computing magazines + 4 software cassettes worth £30, £155 ono. Tel: 021-429 9617.

VIC20 8K RAM PACK for sale, £25 or swap, part exchange for 16K Ram. Tel: Johnstone 21027.

VIC20 + 24K extra Ram, Arfon expansion unit, C2M cassette unit, Vic disk drive, Vic printer, £320. Tel: 0344 886178 any time.

VIC20, still under guarantee, plus cassette recorder, cassettes, one games cartridge + eight other games on cassette + programming aids and joystick. £150 ono. Tel: 062082 2556.

COMMODORE 64, brand new, still boxed, £280. Tel: 0344 886178.

VIC 20 + Vic 1540 disc drive + cartridge, £300 ono. Tel: Exeter 3340 (Ottery St Mary).

VIC20 (unexpanded) + books, £75 ono. Tel: 0302 840768.

COMMODORE 32K 8032. Disc drive 8080 + toolkit and cable connection, some programs if required. Business machine. Can be updated. £1,000 the lot complete. Tel: 01-311 6511.

VIC20 unexpanded, £70 ono. Tel: Bristol 421962.

COMMODORE 64 + much software, one month old, still 11 months guarantee left, £290. Tel: 01-656 0511.

COMMODORE 64, still under guarantee, £280. Tel: Preston 615397.

VIC20 Programs and Part 1, various cassettes, eg. Froggers and Skramble, two cartridges including Slot Machine and Jelly Monsters, one joystick, one book of 50 games, £150. Tel: Evesham (Worcs) 45098 after 6 pm.

SWAP VIC20 Commodore 16 Ram pack for £45 worth of Dragon 32 software or sell for £45, originally cost £80. Tel: 01-303 2952 after 5 pm, ask for Andrew.

COMMODORE 64 as new, £280 ono, 1541 disc drive, latest model, £250 ono. If sold together over £100 software free. Delivery can be arranged. Tel: Burntwood 05436 72592.

VIC15/15 PRINTER + Vic winter program, £150. Tel: 01-959 7031.

VIC20 + cassette deck, 16K, 8K and Superexpander, joysticks, £550 cassette and cartridge software, £350 ono. Tel: Medway 365423.

COMMODORE 64 + latest C2N data cassette unit + reference manual (500 pages) + £100-worth of software. Guarantee for nine months. Boxed, £370. Tel: 01-450 4858.

VIC20 C2N CASSETTE DECK, software, Whacky Races, Blitz and Frogger, all boxed. Perfect condition, £120. Tel: 061-941 2553.

32K PET large keyboard, external cassette, green screen, revision and Rom, many cassettes, disk-o-pro chip. Quick sale, £350 ono. Tel: 01-398 6963.

FROGGER for 16K Spectrum, £3.50. Tel: Merston 2824.

VIC20 + C2N cassette deck, boxed, as new, urgent sale, £110 ono. Can deliver London. Tel: 01-485 7121 (Tony Marsh).

VIC20 + cassette unit, 16K and 3K Ram packs, Adventure cartridge, dust cover, joystick, £100 software, many books, all boxed, cost over £450, want £299 ono. Tel: Abson 2477 after 5 pm.

COMMODORE PET 3032, large keyboard, tool kit, super chip, manuals, £275 ono. 3022 printer, dustcover, manuals, £165 ono. Tel: 01-979 9628

VIC20, 30½K, 4 slot mother board/light pen, joystick, tool kit, hi-res graphics, £100 + software, Programmers Aid, Introduction to Basic, Part I, £400 ono. Tel: High Wycombe 30483.

SWAP VIC20, keyboard and cassette unit and small selection of games on cassette + joystick for ZX Spectrum. Tel: Medway (0634) 575102.

VIC20 plus data cassette recorder, £170. Tel: Grays Thurrock (Essex) 70623 after 6 pm.

FOR YOUR VIC20, stack super charger including Vic kit 1 and 3 + 3K of Ram, £30, 40-80 column card £45, selection of games £3 each. Tel: 051-4300905.

VIC20, with C2N cassette deck and 3K, 8K and 16K Ram Pack, with programmers aid and machine code monitor + joystick and paddle, with four cartridge games, £130 cassette software introductory to basic Part 1 and 2 with Vic revealed and programmers reference guide, worth £665, sell for £300, still under guarantee. Tel: 01-892 8768.

BBC MODEL B+ 1.2 OS + disc interface, plus tons and tons of software, £550. Tel: 01-574 4122.

VIC20 + cassette, printer, joystick, RS 232, super expander, Getting Acquainted with Vic20, carry case, printer paper, lots of games and mags, £420 ono. Tel: Weston-super-Mare 813056.

VIC 1213 machine language monitor cartridge, £20 ono (recent let down sale). 49 Beed Avenue, Brentford, Middx.

VIC20 still under guarantee plus CZN cassette unit, 13 tapes, Introduction to Basic, Part 1, plus joystick, boxed as new, £150. Tel: Thetford 5665.

ACOUSTIC MODERN 8010, as new, £70 ono. Tel: 0403 731650 after 6 pm

For sale

COLONEL'S HOUSE CASSETTE for Vic20 for £7 or swap for another adventure. Tel: 021-472 4534 after 4 pm.

48K APPLE II, £425 ono. Tel: Bookham 53974 after 7 pm.

GENIE I (16K), integral cassette + EG 101 12in screen prosphor monitor, under guarantee. Any reasonable offer. Tel: Roberts Bournemouth (02027) 292719.

ATARI VCS CARTRIDGES: Dragster £6; Outlaw, Basketball, Surround, Space War, Blackjack, £8 each; Bowling, Street Racer, Video Olympics, Circus, Maze Craze, £10 each. Tel: 01-669 7590 after 6 pm.

TI 994A as new plus joysticks, tape, lead and Grammar for Beginners cartridge, £100. 01-515 7962 after 2 pm.

TI 994/A, 6 months old including cassette leads and cassette player, also TI Invaders and Munchman, Command modules, various cassettes, £125 ono. Tel: 0924 863230 anytime.

LYNX 48K COMPUTER FOR SALE, brand new with all leads, 2 software cassettes, must sell, emigrating, only £199. Tel: Saffron Walden (0799) 22207, Steve after 6 pm.

ZX PRINTER, 8 months old + 4 rolls of paper + 3 ZX Forth, £37.50. Tel: 061-4347026.

BASIC TELEVISION CONSOLE in need of attention, £10. Tel: Chelmsford 50092.

SHARP MZ 80K, 48K Ram, integral monitor and cassette recorder, perfect condition, £200 of software, J. White. Tel: 06286 4377, ext 4307, 9 am to 5 pm only.

LYNX 48K, 3 months old, £190 ono. Tel: Huntingdon 0480 215557 (evenings).

LYNX 48K, with cassette recorder plus three tapes, £210. Tel: Swansea (0792) 891578.

JUPITER ACE, as new, with user magazines, bought for £90, quick sale for £60. Tel: Farnborough, Kent, 57482.

SWAP TEXAS TI 994A, five cartridges, a pair of joysticks and cassette lead for a Dragon 32. Tel: Whitney 2494.

MAGAZINES FOR SALE, most back issues of Popular Computing Weekly, Personal Computer World, Y.C, P.C., ETCM, ZXC, M.C.P., S.U., C.T., P.C.T., since 1981, and some others. Tel: 0259 60840 after 6 pm.

TORCH 280 DISC PACK for BBC B micro, 1 month old, hardly used, only £620. Tel: 0344 886178 (anytime).

ASTROL TELESCOPE 60/60 and extending wooden tripod, swap for Spectrum 16K or above. Tel: 01-701 3091.

BACK ISSUES of computer magazines for sale including PCN, Personel Computer World, Your Computer, Sinclair Programs, Sinclair User, Practical Computing, PCT and others, offers, ring for details, 01-949 0225.

LYNX, 2 weeks old, as new, £200, or swap for Dragon 32. Tel: Richmond, North Yorks, 832210, 4.30 pm to 6 pm.

JUPITER ACE, £60 + adaptor + all leads. Tel: Toddington 2470.

ZENTRONX 730 PRINTER, 80 or 132 column, 100 CPS, £100 ono. Tel: Ipswich 50836.

SEIKOSHA GP100A PRINTER, adapted for Vic 20 computer, + paper. £200, two months old. Tel: Cardiff 569752.

SEIKOSHA GP100A, 4 months old, £115 ono. BBC cable, £7.50. Hemel Hempstead 48141 (6 pm).

TEXAS TI 99/4A, unwanted xmas present, dual recorder leads, 4 cassette games, Munch Man modual, Speech Editor module, £130. Tel: 0302-723571 (daytime only).

SPECTRUM "FLOW-CHART" help plan programs, follow programs better than list. This program gives you an accurate flow-chart of basic Spectrum programs, £1.70. 4 Willesden Road, Cefu-Glas, Bridgend, S. Wales.

DIABLO 2.5 meg hard disc and power supply, Pertech 7-track tape deck, Texas silent-type printer. No reasonable offer refused. Tel: 0422 843348 evenings only.

BBC SOFTWARE, Alien Dropout, Centipede by Superior software, £3. Tel: 0482 849517.

HP 41CV swap for 48K Spectrum or sell for £150 plus games pack and manuals inclusive, mint condition. Tel: 01-272 7205 (ask for Mick).

SPECTRUM SOFTWARE, many well-known games to swap, will also buy your unwanted software. Tel: Basingstoke 56426.

INTELLIVISION CARTRIDGES, includes Lock 'n' Chase, Star Strike, Sea Battle, Golf, etc, £11 each. Tel: 0608-737224.

SWAP my Sharps Carousel Microwave oven with cookery books for Dragon 32 or Spectrum. Mrs P. A. Hudson, Crailyhe House Cottage, Muston, Filey YO14 0EQ.

VIC20, Jelly Monsters, £13. Tel: Stafford 663166.

Wanted

ZX SPECTRUM, with software up to £50. Tel: 01-688 0673.

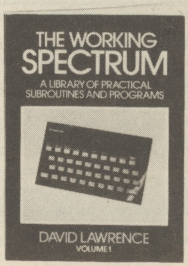
DISC DRIVE for the Vic20 around £150, also Trackball suitable Atari, Vic20 around £30. Tel: 01-840 3610.

COMPILER REQUIRED for Spectrum, must be orginal with manual, will offer some of my original tapes or my Hempstom joystick if other software accompanies compiler. Tel: Rayleigh (0268) 779045, ask for Ray.

WANTED in good condition, Dragon 32, Spectrum 48K, Vic64 or BBC model B. Tel: Hemel Hempstead 68586.

WANTED, Commodore 8K Ram pack. Tel: 0442 58200.

Better books from Sunshine



A collection of sophisticated Basic programs and subroutines including Unifile, Renumber (handles Gotos and Gosubs) education, accounts, games and scores of essential routines. Put your Spectrum to work with what must be the most comprehensive Spectrum book. 248pp **£5.95***

Some of the more advanced programs in this collection include a word processor and text editor, a music and sound syntheiser, a sprite editor and a program which allows you to enter high resolution graphics mode. This is not available in the standard Basic. 160pp **£5.95***





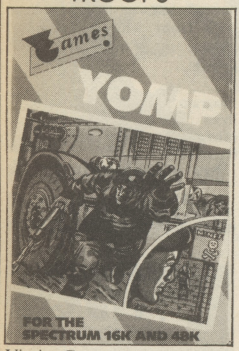
This computer has capabilities far beyond most other computers in this price bracket. With this collection of Basic programs and routines David Lawrence introduces word processing, music and shows you how to mix text and high resolution graphics. As with the other books in this series, each program is built up out of re-useable subroutines. 160pp **£5.95***

*Available through W H Smith's and computer dealers

Trade/dealer enquiries welcome

NEW RELEASES

TROOPS



Virgin Games has issued its first batch of games for the Spectrum, Vic and BBC micros.

The pricing of the games is interesting, in that they cost £7.95 each. Whilst this is fairly cheap for the BBC, it is decidedly expensive for the Spectrum — Virgin must be confident.

The first Spectrum releases contain some surprisingly conventional games, *Golf* and *Sheepwalk* for example. *Yomp*, you may remember, was the name given to the mode of travel adopted by the British troops across the Falklands — it is also the title of another of the Virgin releases.

You must command the Paras and guide your platoon across a busy enemy highway containing two lanes of traffic, which will run you over if . . . hang on I've heard this before somewhere . . .

If you succeed in getting three troops across the motorway, you can activate your radar scanner and direct your men across a minefield. Naturally, this involves not bumping into things or alerting the sentry — if you make it, your platoon gets three extra men.

Program *Yomp*
Price *£7.95*
Micro *Spectrum 16/48K*
Supplier *Virgin Games*
61-63 Portobello Road
London W11 3DD

NOVICE

Cesil is a computer language that was specially developed to teach computer programming to novices — the letters stand for Computer Education in Schools Instruction Language. The language is now available for the Spectrum on a cassette from Gilsoft.

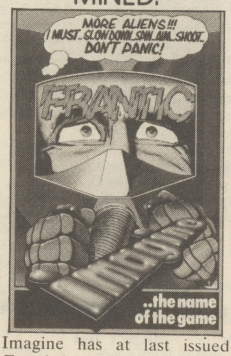
Cesil divides programming commands into three types: Label, Instruction and Operand. Label is the actual command word like *Loop*. Instruction is the specific task, like *Print*, and the Operand is the actual data like *"Hello"*.

This format is capable of handling more or less all that Basic can and is supposed to be a better grounding for other computer languages.

The cassette comes with a 15 page instruction manual. A ZX81 version is also available.

Program *ZX-Cesil*
Price *£5.95*
Micro *Spectrum*
Supplier *Gilsoft*
30 Hawthord Road
Barry S Glamorgan
CF6 8LE

MINED!



Imagine has at last issued *Frantic* for the Vic20.

The aim of the game is to excavate and mine Spectrum's moons and, while you're at it, kill off various aliens whose home you are presumably exploiting.

You have a two-way radar, indicating the position of the aliens relative to you, and a laser with which to dispatch them.

Frantic was coded and designed by Eugene Evans who was featured in a number of articles in the national press and so is the closest to a programmer "celebrity" the industry yet has.

Porgram *Frantic*
Price *£5.50*
Micro *Vic20*
Supplier *Imagine Software*
Masons Buildings
Exchange Street East
Liverpool
Merseyside L2 3PN

MARTIAN



Programmer, Gregory Trezise.

Given the quality of the machine (and forgetting the price), it is surprising there are not more arcade style games for the BBC B. Virgin has released three games for this machine as part of its move into the software market.

Landfall requires you to pilot your spacecraft to a safe landing on Mars. This is made difficult because you are running out of fuel. Success involves juggling with your velocity to keep it low.

The screen displays an instrument panel and a view from the cockpit window.

Program *Landfall*
Price *£7.95*
Micro *BBC B*
Supplier *Virgin Games*
61-63 Portobello Road
London W11 3DD

MONSTERS



Protek is an Edinburgh-based company that has moved into the ZX market. At the recent microfair, it unveiled its first few releases.

Byter is a version of *Puckman* for the ZX81. The machine code program has all the appropriate trappings like power pills and monsters but, unlike some other versions, you are given a choice of skill levels.

Program *Byter*
Price *£4.95*
Micro *ZX81 16K*
Supplier *Protek Computing*
Clydesdale Bank
Building
High Street
South Queensferry
Edinburgh EH30 9HW

COMMANDED

KayJay Electronic Services is a company that has previously specialised in hardware. It has now moved into the home computer market with *DISMON* — a machine code monitor for the Dragon.

The monitor gives all the usual functions through single letter entry. There are 20 commands, including a full disassembler and a load and save option.

Program *DISMON*
Price *£18.86*
Micro *Dragon 32*
Supplier *KayJay Electronic*
Services
13 The Boulters
Gorleston
Great Yarmouth
NR31 6TF

ACCOUNTED

The spreadsheet is a common accounting tool that has been made available for a number of micros. This now includes the 16K ZX81, following a new release from Myrmidon Software.

Draft comprises a program and 12 page instruction booklet. The program sets up a tabular worksheet into which is entered figures, formulae and text.

A report generator allows you to display any three columns on the screen and list all the information the sheet is carrying — unlike the usual technique, which is to create a "text window" which you move over the sheet using cursor keys.

Program *Draft*
Price *£7.50*
Micro *ZX81*
Supplier *Myrmidon Software*
PO Box 2
Tadworth
Surrey KT20 7LU

NEW RELEASES

T-TEST

Rainbow Research has a number of packages available for home micros, particularly for the BBC B.

Statistics is a scientific and educational package which includes all the most common statistical procedures including T-test, chi-squared test, standard deviation, etc.

Program *Statistics*
Price *£6.00*
Micro *BBC B*
Supplier *Rainbow Research*
288 High Street
Ponders End, Enfield
Middlesex EN3 4HF

X 3

Tape 9 from Remsoft contains three games featuring the sound capabilities of the Jupiter Ace.

Bomber is a version of the classic *Blitz* game in which you have to demolish buildings before you can land. *Bouncy* is a version of *Breakout*, while *Gorger* is claimed to be a truly original program.

Program *Tape 9*
Price *£5.50*
Micro *Ace*
Supplier *Remsoft*
18 George Street
Brighton BN2 1RH

ODYSSEY

Astrodynamics seems to have been inspired by the film *2001*. Its *2002* is a program for the 32K BBC machine, based on the 'space station docking sequence from Kubrick's famous film.

You guide your spaceship into dock with a 3D high-res representation of the double wheel space station, using the six directional keyboard controls.

The instruction manual that comes with this program is sufficiently complex to make me think that this will not be a good game for those lacking in patience.

Program *2002*
Price *£6.95*
Micro *BBC 32K*
Supplier *Astrodynamics*
30 Canberra Road
Leyland, Lancs

RESCUED!

Solar Soft is a new company in the BBC market. Its first release is *Zany Kong*, a version of the arcade game *Donkey Kong*.

The game requires 32K and will work on all the operating systems.

For the few people who have never heard of the game, it features a little man you must guide up a series of ladders. At the top of the ladders stands a giant monkey which is hurling things at you — your mission is to reach the top and rescue a girl from a fate worse than death.

Program *Zany Kong*
Price *£6.50*
Micro *BBC (32K)*
Supplier *Solar Soft*
5 Westmorland Drive
Camberley
Surrey GU15 1EW

CHINESE

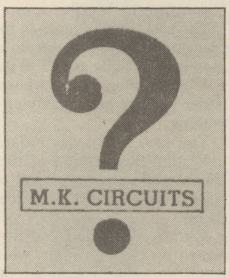
Viscount Software's first release is *Character Generator* for the BBC.

The character set can be defined on an 8 by 8 grid. This means that, for example, you could make your BBC print in Arabic or Chinese.

The program features a number of other options like inversion and rotation of characters, as well as saving characters to tape for use in your own programs.

Program *Character Generator*
Price *£9.95*
Micro *BBC A or B*
Supplier *Viscount Services*
Computer World
24 Boulton Road
Southsea
Hants

HIGH IQ



Micro IQ is an educational program for the Spectrum. It manages to squeeze 250 questions and 1,000 possible answers into the machine, by dividing the test into nine separate parts which are loaded in sequence.

Although called *IQ*, the questions are about the history of computers and the Spectrum.

Your percentage score is given as you go along — the correct answer being one of four from which you must choose in a multiple choice format.

Program *Micro IQ*
Price *£5.00*
Micro *Spectrum 16/48K*
Supplier *MK Circuits*
63 Felstead Road
Grimsby
South Humberside

JR!



Cases Computer Simulations has a number of "tactics and strategy" type games available on the Oric and Spectrum.

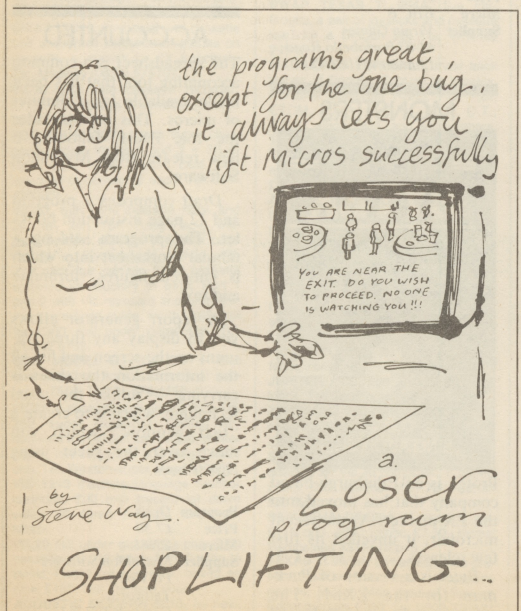
Dallas for the 48K Oric is a business simulation taking oil as its theme. Like ruthless entrepreneur J. R. Ewing, you must develop and exploit a number of oil fields until you have accumulated 280 million dollars in cash and assets.

The program gives you a menu of options like drilling and seismic survey. Various disasters can be expected like blow-outs, tornados and, worst of all, government tax increases.

A Spectrum version is also available.

Program *Dallas*
Price *£7.95*
Micro *Oric 48K*
Supplier *Cases Computer Simulations*
14 Langton Way
Blackheath
London SE3 7TL

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



A question of interpretation

Last week I described a program to turn a decimal value into its binary equivalent:

```
 10 DIM WORD$ (15)
 20 INPUT "Value";X
 30 FOR I = 0 TO 15
 40 WORD$(I) = CHR$(48 = FNBIT(X))
 50 X = FNBODY(X) : NEXT I
 60 FOR I = 15 TO 0 STEP -1
 70 PRINT WORD$(I)
 80 NEXT I : PRINT
 90 PRINT "BODY IS ";X
1000 DEF FNBIT(X) = X - INT(X/2)*2
2000 DEF FNBODY(X) = INT(X/2)
```

The binary value is stored in successive elements of the character array *Word$*.

If the value 65535 is entered, then the binary equivalent is found to be 1111 1111 1111 1111, and the body is 0. When the value −1 is then tried, the equivalent is also 1111 1111 1111 1111, but the body is −1 for this negative number. It is found for any negative number that the body is always negative.

What is −3/2 in integer arithmetic? We can find out quite simply by *Print Int*(−3/2) which reveals that the answer is −2. Why?

Enter the value −3 in the program, and you get the answer 1111 1111 1111 1101. Moving it all one place to the right produces 0111 1111 1111 1110 (the binary equivalent of 32766). This is not correct: but perhaps as the body is −1 (ie *X* when all is finished), the result of moving to the right should be 1111 1111 1111 1110 (the binary equivalent of −2)?

That computers tend to use binary arithmetic (and the strange form we have discovered) is why we find that *Int*(1/2) = 0, but *Intf* − 1/2) = −1 (check the binary equivalents).

The *Int* operation (on most computers) rounds *down*, because the last bits are lost. The binary value 1111 1111 1111 1111 is what is termed the *two's complement* of the decimal value −1, and helps explain why on many computers the size of integer numbers varies from 32767 to −32768.

Using the program with the decimal value 32767 produces 0111 1111 1111 1111, whereas −32768 produces 1000 0000 0000 0000 (which, incidentally, is also the value produced by 32768).

Comparing the two values gives the clue. If there is a zero in the left-most bit, then the number is treated as if it were positive; if there is a one in the left-most bit, then the number is treated as if it were negative.

If we perform the addition 32767 plus 1 in integer arithmetic (assuming two bytes), we either find that the result is −32768 (in Forth and in a very few Basics) or we find that there is an overflow error. There is an overflow because we have added two positive numbers to produce a negative number. Depending on how good the Basic interpreter is, such errors are always picked up — some interpreters can be fooled with strange arrangements, and it is possible for the interpreter to accept the sequence:

```
20000 - 10000 + 20000
```

but not:

```
20000 + 20000 - 10000
```

because, in the second case, 20000 + 20000 is 40000 and produces an overflow.

The Acorn Atom has no error checks for the size of numbers and is an ideal machine on which to investigate computer arithmetic. You do not have to construct the equivalent of a two-byte integer (note that the BBC and Atom have four-byte integers) to investigate the vagaries (or what seem to be vagaries) of computer arithmetic. It is very simple to illustrate computer arithmetic by the use of commands to store and fetch numbers from bytes (*Poke* and *Peek*).

On most microcomputers (ie, not the BBC or Atom) to put the value *X* in the location *L*, we write *Poke L,X* — different computers have differing restrictions on the values that *X* can take.

For a few computers no restrictions are placed on the value taken by *X*: one byte has eight bits, so it can take values from 0 to 255. Thus for these computers *X* is then turned into a value from 0 to 255. If *X* is 500 then the value 500 − 256 = 254 is stored in the byte.

Many others will allow values from −255 to 255 — try +1 (ie, *Poke L*, −1) to be followed by Print *Peek*(*L*). The value fetched by the *Peek* is 255, which as eight bits is 1111 1111. ■

Boris Allan

Puzzle

The case of the missing digits

Puzzle No 62

Professor Otto Hex was posing mind-boggling questions to his students again: "It's just a matter of even numbers," he remarked, plastering equations all over the blackboard.

$\sqrt{E} = E$
$\sqrt{EE} = E$
$\sqrt{EEE} = EE$
$\sqrt{EEEE} = EE$
$\sqrt{EEEEE} = EEE$
$\sqrt{EEEEEE} = EEE$
$\sqrt{EEEEEEE} = EE0E$
$\sqrt{EEEEEEEE} = EEEE$

"In each of the above expressions the letter *E* indicates any even digit — 2, 4, 6 or 8. *E* never equals zero, although there is one zero shown in the last but one equation.

"Can you fill in the missing digits?" he demanded. "Not a chance," they responded. Can you?

Solution to Puzzle No 57

First we need to find all possible right-angle triangles with integral sides, having a perimeter of 360 yards. (The hypotenuse of such a triangle must lie between 360/2 and 360/3 yards).

Using the following program:

```
10 FOR H = 360/3 TO 360/2. 20 FOR S = 1 TO H - 1.
30 LET T = SQR (H * H - S * S). 40 LET T = VAL
STR$ T. 50 IF H + S + T = 360 THEN PRINT T;"
";S;" ";H. 60 NEXT S. 70 NEXT H.
```

The program reveals four such triangles with sets of sides: (36,160,164); (60,144,156); (72,135,153); and (90,120,150). The relevant areas of each can be found by finding half the product of the first two figures in each set.

As we know that all the statements were false then Farmer Giles cannot live at Mayfield, nor Farmer Stiles at Hilltop. Farmer Miles does not live at Cowslip or at Hilltop (the farmyard with the longest side).

The only farm with any non-even sides is Dewdrop, so this is where Farmer Wiles must live. Thus, Farmer Miles must live at Mayfield, Farmer Stiles at Cowslip and Farmer Giles at Hilltop.

Winner of Puzzle No 57

The winner is: Cliff Hicks, Burdale Close, Norton, Malton, N Yorks, who receives £10.

Top 10

Dragon

1	(1)	The King	(Microdeal)
2	(3)	Planet Invasion	(Microdeal)
3	(2)	Space War	(Microdeal)
4	(5)	Dragon Trek	(Salamander)
5	(—)	Defence	(Microdeal)
6	(4)	Katerpiller Attack	(Microdeal)
7	(9)	Chess	(Dragon Data)*
8	(7)	Grand Prix	(Salamander)
9	(—)	Computer Voice	(Dragon Data)
10	(—)	Dragon Quest	(Dragon Data)

*Cartridge
(Figures compiled by Boots & Co, London)

BBC*

1	(2)	Killer Gorilla	(Program Power)
2	(3)	Great Britain Limited	(Simon W Hessel)
3	(1)	Word Wise	(Computer Concepts)
4	(4)	Rocket Raid	(Acornsoft)
5	(—)	View	(Acornsoft)
6	(—)	Landfall	(Virgin Games)
7	(—)	Forth	(Acornsoft)
8	(9)	Home Finance	(BBC)†
9	(—)	Moon Raider	(Program Power)
10	(6)	Inheritance	(Simon W Hessel)

*Model B only except where shown. †Runs on Model A or B.
(Figures compiled by Micro Management, Ipswich 0473 59181)

Spectrum

1	(1)	Flight Simulation	(Psion)*
2	(3)	Penetrator	(Melbourne House)*
3	(4)	Transylvanian Tower	(Richard Shepherd)*
4	(2)	Jet Pac	(Ultimate)
5	(5)	The Hobbit	(Melbourne House)*
6	(6)	3D Tanx	(DK 'Tronics)*
7	(8)	Horace Goes Skiing	(Psion/Melbourne House)
8	(7)	Ah Diddums	(Imagine)
9	(—)	Orbiter	(Silversoft)
10	(9)	Arcadia	(Imagine)

*Requires 48K.
(Figures compiled by W H Smith and Son Ltd)

ZX81*

1	(1)	3D Monster Maze	(New Generation)
2	(2)	Flight Simulation	(Psion)
3	(4)	QS Scramble	(Quicksilva)
4	(7)	Alien Dropout	(Silversoft)
5	(5)	Galaxians	(Artic)
6	(3)	Chess	(Psion)
7	(9)	10 Games for 1K	(J K Greye)†
8	(—)	Asteroids	(Asteroids)
9	(8)	Avenger	(Abacus)
10	(—)	Night Gunner	(Digital Integration

*All 16K except where shown. †Runs in 1K.
(Figures compiled by W H Smith and Son Ltd)

Atari

1	(4)	Escape from Perilous	(English Software)
2	(1)	Zaxxon	(Datasoft)
3	(—)	Stone of Sisyphus	(Adventure International)§
4	(—)	Xenon Raid	(English Software)
5	(3)	Time Warp	(English Software)
6	(6)	Preppie 2	(Adventure International)
7	(—)	Air Strike	(English Software)
8	(—)	Pharaoh's Curse	(Synapse)†
9	(8)	Castle Wolfenstein	(Muse)‡
10	(—)	Defender	(Atari)

†32K cassette. ‡32K disc. §48K disc.
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Books

1	(1)	Vic Programmer's Reference Guide, *Commodore*	(Commodore)
2	(4)	Assembly Language Programming for the BBC Micro, *Birnbaum*	(Macmillan)
3	(8)	Enter the Dragon, *Carter*	(Melbourne House)
4	(2)	Spectrum Hardware Manual, *Dickens*	(Melbourne House)
5	(—)	Programming the BBC Micro, *Williams*	(Newnes)
6	(6)	Spectrum Rom Disassembly, *Logan*	(Melbourne House)
7	(9)	6502 Machine-code For Beginners, *Stephenson*	(Newnes)
8	(5)	6809 Assembly Language Programming, *Leventhal*	(Osbourne)
9	(10)	Dynamic Games for Your Dragon, *Hartnell*	(Interface)
10	(3)	Commodore 64 Programmer's Reference Guide, *Commodore*	(Commodore)

(Figures compiled by Watford Technical Books, Watford 0923 23324)
(Last week's position in brackets)

Vic20

1	(1)	Panic	(Bug-Byte)
2	(3)	Arcadia	(Imagine)
3	(4)	Cosmiads	(Bug-Byte)
4	(2)	Wacky Waiters	(Imagine)
5	(8)	Catcha Snatcha	(Imagine)
6	(7)	Amok	(Audiogenic)
7	(6)	Asteroids	(Bug-Byte)
8	(—)	Blitz	(Commodore)
9	(—)	Introduction to Basic Part 1	(Commodore)
10	(—)	Choplifter	(Audiogenic)

(Figures compiled by Boots & Co, London)

PiMan awarded a Knighthood

The home-micro-world is still in a state of hangover, following the celebrations marking the Knighthood recently bestowed on the PiMan. In the latest Honours List "Sir" PiMan was commended for 'spreading joy and happiness across the planet,' with his cult adventure quest PIMANIA!! But our ace reporter, Ivor Duff-Sinclair, has discovered a sinister political motive behind the PiMan's elevation to the House of Lords.

The Hideous Truth

During the recent election campaign the entire Labour Party spent all of their time palying "PIMANIA, the best adventure game ever reviewed" and consequently lost their marbles. The SDP / Liberal Alliance unfortunately couldn't get any programs to load. But amazingly, the whole Conservative Party dedicated their campaign to palying the PiMan's new game "AUTOMONOPOLI", recognised as the best version available of this classic game, where you can play a dinamic challenge against your own computer! The PiMan's Knighthood is a blatant reward for these services. Several leaders of British political parties have now announced their resignations so that they can devote the rest of their lives to revelling in the wonderful software produced by... AUTOMATA, "WE PUT SOME TING IN COMPUTING"

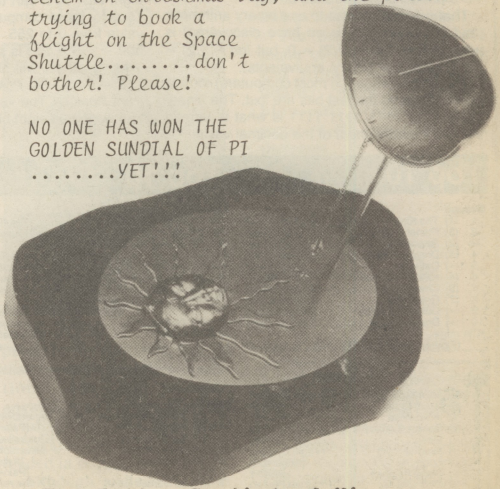


Since the launch of PIMANIA nine months ago, there have been several imitations of this brilliantly original program. Some 'prize games' were launched, and never heard of again, some were won within 72 hours, and some others were a load of old CENSORED! (see you in court, baby.)

Giving away £6,000 worth of gold and diamonds that have been exquisitely crafted by the winner of The De Beers-Diamond International Award is quite a serious business.....hic.....So we are taking the trouble to restate the rules now, that are clearly set out in every copy of PIMANIA:- here goes.....

Any PIMANIAC who believes that they have solved the Quest, must be present at the right place, at the right time, on the right date. It is in the nature of the Quest that there can only be ONE WINNER. No correspondence please, the PiMan's decision will be final. And by the way, to the loonies going to Bethlehem on Christmas Day, and the person trying to book a flight on the Space Shuttle.....don't bother! Please!

NO ONE HAS WON THE GOLDEN SUNDIAL OF PI .....YET!!!



The Golden Sundial of Pi

DEAR AUTOMATA, DESPITE YOUR VERY SILLY ADVERTISING, I AM ORDERING THE FOLLOWING COMPUTER SOFTWARE FROM YOU.....

AUTOMONOPOLI	(Spectrum 48K) @£6.00p	tick
PIMANIA	(Spectrum 48K) @£10.00p	
PIMANIA	(Dragon32) @£10.00p	
PIMANIA	(BBC Micro 32K) @£10.00p	
PIMANIA	(ZX81 16K) @£5.00p	

I enclose the right money, TOTAL £

or please charge my ACCESS/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 welcomed.

---

please leave blank:
DESPATCH NUMBER....