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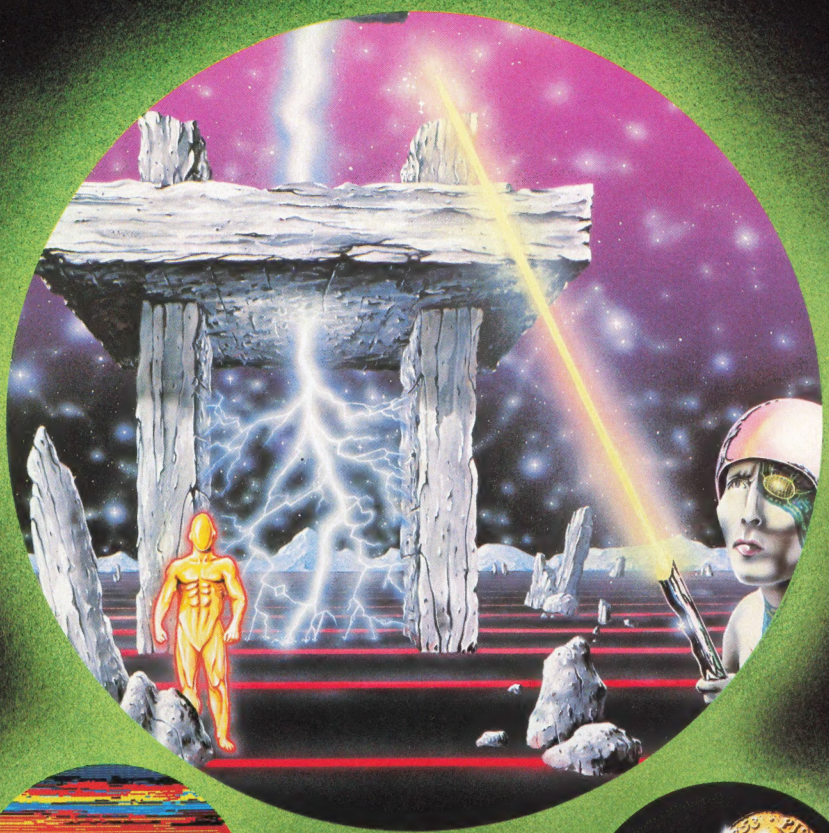

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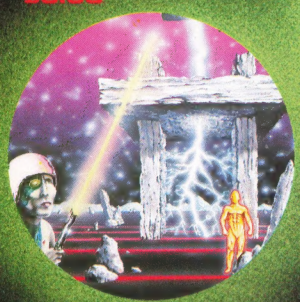
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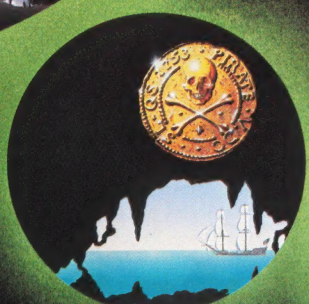
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# Personal Computing Today

VOLUME 2 NUMBER 3 OCTOBER 1983

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ABC
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Have you ripped your free **PCT Shape Maker** off the front cover yet? And, more importantly, have you tried it out? Whether you have or not I am sure it will be a Godsend in your programming when you get to grips with it. Everyone knows that working out your own individual characters can be a chore as you have to draw out your own grid more often than not, on a tatty piece of paper. Now those days are over, providing you have this issue of *Personal Computing Today*.

Our specially designed grid takes the strain out of designing user-defined graphics characters. As explained on the back of the **PCT Shape Maker,** all you have to do is shade in the squares of the grid to make the character you want to include in your program.

The beauty of the **PCT Shape Maker** is that it is reusable. Because it's made of PVC the surface area doesn't absorb ink permanently, so you can write on and rub off anything written in felt-tip pen. You may, of course, wish to keep a particularly favourite character you have defined for future use. In which case, I suggest you buy a small notebook with graph paper (or the squared paper found in maths excercise books) and you can draw the shape in the book, writing down the relevant totals next to it.

If any of you come up with some particularly interesting characters using the **PCT Shape Maker** I would love to see the program in which you have incorporated them. If any of them are really interesting, and I'm sure they will be, I'll print what we consider to be the most interesting and visually exciting program in a future issue of *Personal Computing Today*. So get out your felt tip pen and start drawing.

In addition to the **PCT Shape Maker** in this issue you'll find loads of programs to key in to your computer. There's a special software reviews section devoted to educational software packages, as well as our usual software reviews of different games programs.

Our special hardware feature this month is a comparative review of the Oric and Spectrum, with the emphasis on discovering which gives you the best value for money. Read it to help you make up your mind which computer suits you best.

Regular features include the **Hardware Factfile, Software Checklist** and **Gamesboard** which is a special article on programming techniques for the game Breakout, one of the oldest games to be written for computers.

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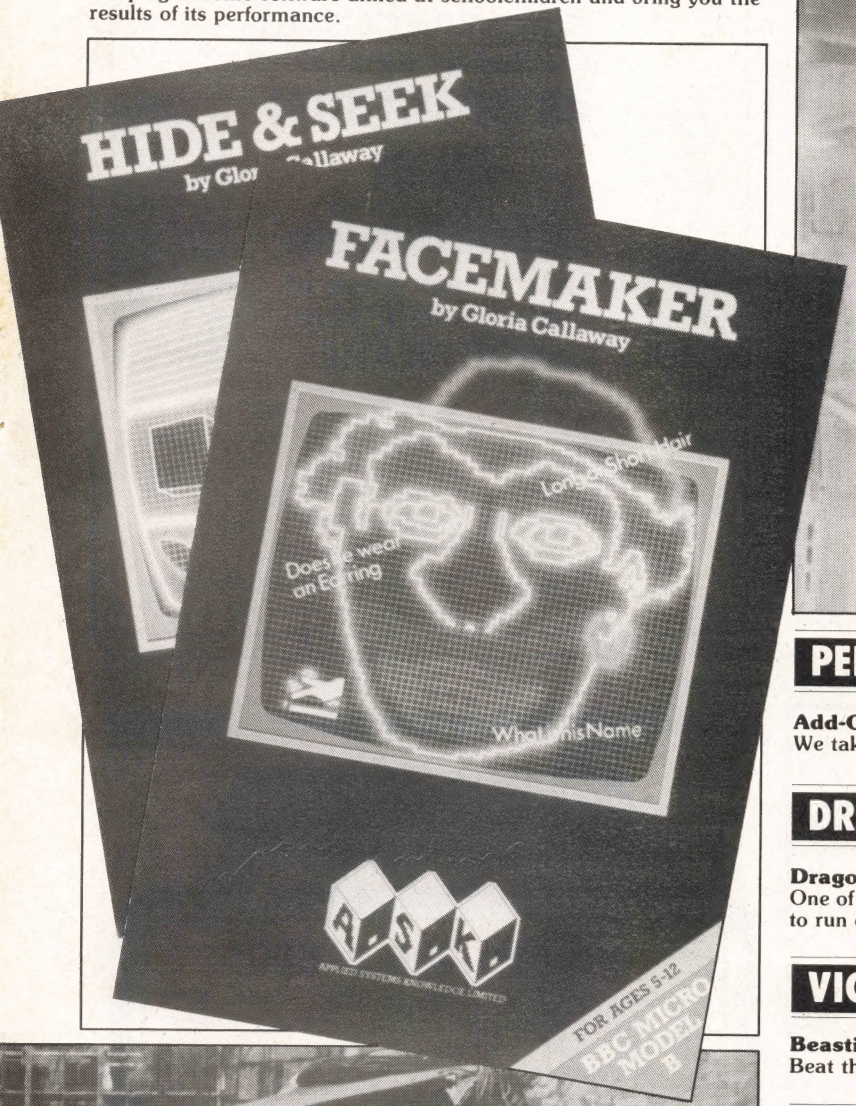
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reviews SUPERIOR SOFTWARE

# MIKRO-GEN

## SPECTRUM Software



GALAKZIONS (16K) £5.95

*You can't really **win** this kind of game — it's more a matter of how long you can stay alive. Mikrogen's version has ... effective graphics. I particularly like the continuously scrolling stars in the background.* **Home Computing Weekly**

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*I have seen other chess games for computers, but as far as I am concerned, this is the best so far, and should give hours of enjoyment to the chess buff.* **Home Computing Weekly**

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*An excellent version of an arcade game ... should be used only by those who want to wear out their laser fingers and the keyboard at the same time!* **Sinclair User**





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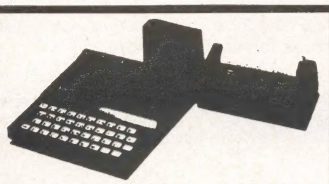
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**ORIC AND SINCLAIR COMPUTERS**

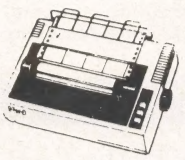
Oric 1 48K computer £147 (£158). Oric 1 16K £86.91 (£107). Oric Colour Printer £139 (£159). Sinclair Spectrum 48K £133 (£133). Spectrum 16K £86.91 (£107). 32K memory upgrade kit for 16K Spectrum (Issue 2 only) £26.09 (£28). Fuller master unit for the Spectrum including speech synthesizer, sound synthesizer, amplifier and joystick ports £47.78 (£56). ZX microdrive n/a (n/a). ZX rs232 n/a (n/a). Keyboards with space bars for the ZX81 and the Spectrum £36 (£41). ZX printer (34.74 (£50). 5 printer rolls £10.43 (£16). ZX81 £43.43 (£52). ZX81 16K ram packs £26.04 (£28). New luxury spectrum computers 48K with full sized typewriter keyboards complete with normal space bar enclosed in a larger plastic case which also houses the power supply and the computer pcb £138.20 (£174).

**COMMODORE COMPUTERS**

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32K expanded Colour Genie £146 (£166). BBC Model B £424 (£440). Texas TI99/4A £139 (£169). Atari 800 £347 (£380). Atari 400 16K with basic £173 (£215).



**PRINTERS**

New Epson RX80 £279 (£309). The Epson MX80FT/3 has been replaced by the almost identical CTI CP80 £251 (£271) and the very similar Star DP510 £251 (£271). Epson FX80 £378 (£408). Epson MX100/3 £425 (£465). New Star DP515 15" carriage printer £346 (£386). Seikosha GP100A £199 (£219). Oki Microline 80 £207 (£227). Oki Microline 82A £360 (£400). Oki Microline 84 £730. Oki Microline 92 £470. The Silver Reed, the latest miracle, a combined daisy wheel printer and electric typewriter for only £385 (£425). Juki 6100 proportional daisy wheel printer £364 (£404). MCP 40 colour printer £139 (£159). Star STX 80 thermal printer £139 (£159). We can supply interfaces to run all the above from Sharp Computers.

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## DRAGON 32

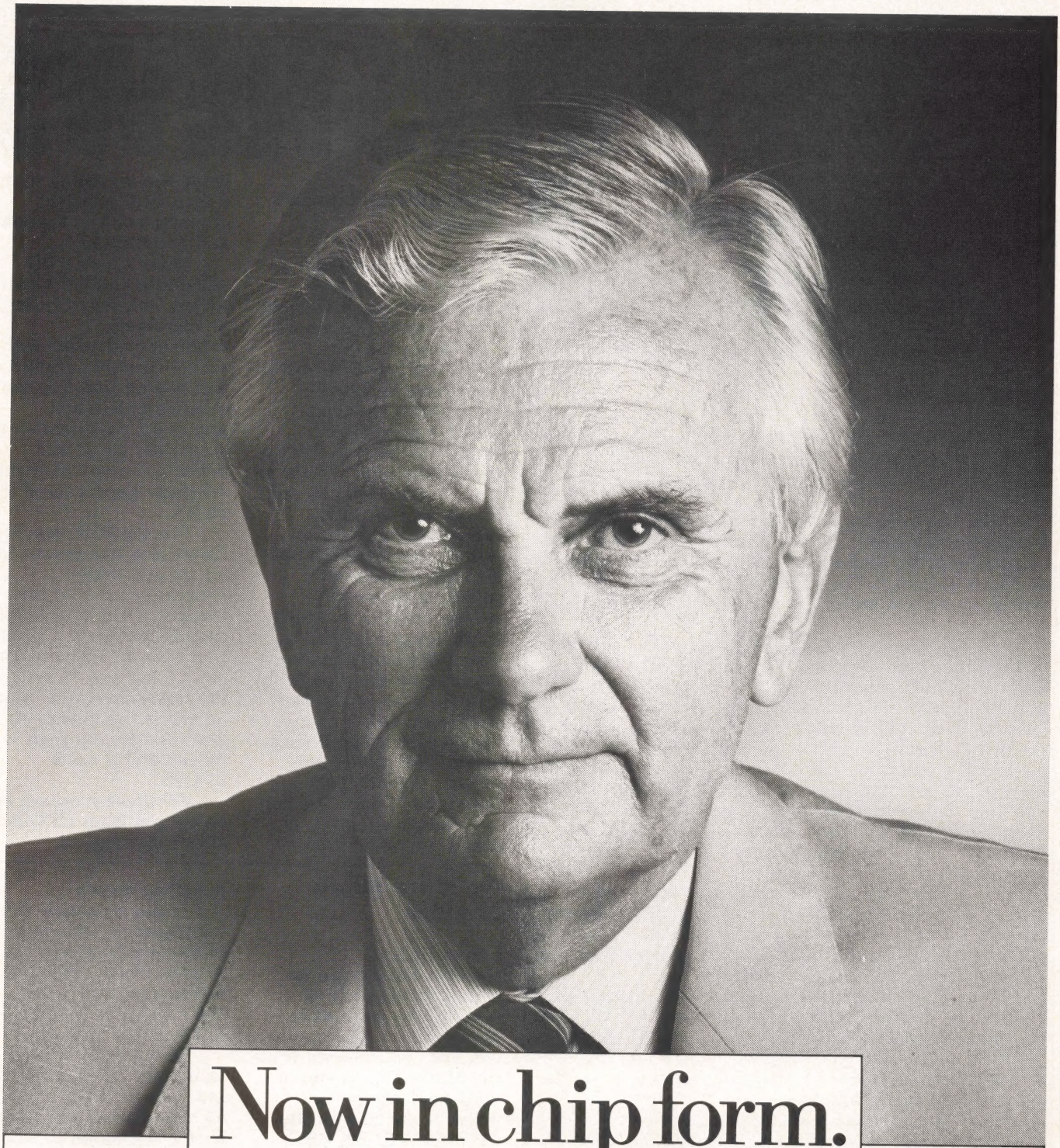
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# Now in chip form.

If your BBC Micro could talk, what sort of accent would it have?

A BBC English one, of course.

Which is exactly why Acorn Computers, who designed and built the machine, have produced its very own speech chip featuring the dulcet tones of Kenneth Kendall.

Called Speech Synthesis, it's a pair of chips that can be plugged into your BBC Micro by your local BBC/Acorn dealer. On them, you'll find 164 words/syllables spoken in familiar fashion by the famous retired newscaster, all of which can be combined to form several hundred other words.

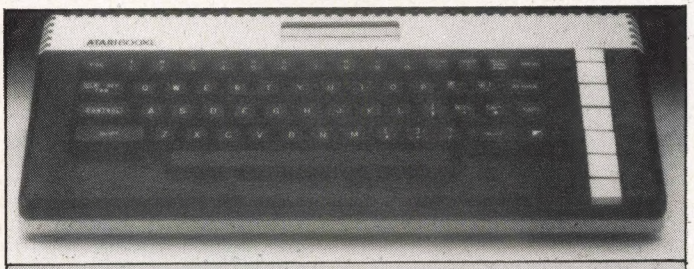
The chips also provide the 'serial' processing capability whereby future software cartridges can also be plugged into the front of your BBC Micro. (The machine's vocabulary will be widened via such cartridges.)

Priced £55, Speech Synthesis is available from your local BBC/Acorn dealer. (To find out where that is, simply call 01-200 0200.)

If you'd like more information, he'll complete the story. In plain English, of course.

ACORN COMPUTER

# NEWS NEWS NEWS



## Atari Action

In a sudden flurry of activity Atari International UK last month took the wraps off its new range of home computers which will supercede the present 400 and 800 systems.

Atari has brought the design of their new computers slap bang up to date with a brand new style exterior. The two divisions of Atari, one for the video computer system (VCS) and the home computer division have now merged and are working hand in glove.

The new computers themselves are called the Atari 600XL home computer and the Atari 800XL as well as a keyboard which upgrades the 2600 VCS into a basic home computer. In addition to these Atari's new line includes backup from new peripherals of which there are three printers of various qualities and for different purposes, a program recorder (unfortunately users still have to buy an Atari cassette recorder in order to save and load their own programs). A new disc drive is available too, as well as an expander cartridge for the Atari CPUs which means the user can have access to third party products.

One of the policies to emerge from Atari's new range of goodies is that of total compatibility between products. All the software produced will run on each machine, providing you have the correct interfaces and expansions necessary to run them.

The main differences between the new computers and the old are the on board memory facilities with the 600 having 16K RAM and the 800 64K RAM. And you'll immediately notice the absence of a touch sensitive keyboard which was previously present on the Atari 400 and was considered to be one of the machine's major drawbacks. Instead all the new computers have full stroke keyboards with 64 keys including a special HELP key, function and graphic keys.

Both computers are centred around the 6502 microprocessor as were the previous Atari computers and they are still atuned to Atari BASIC. The graphics for which Atari is so reknowned remain the same, but that is nothing to grumble about.

A minor disappointment revealed by Atari is that they are no longer bringing out the 5200 VCS in the UK. The reason for this is because that particular system would not be compatible with the rest of the range and as Atari want to achieve total compatibility they felt it would be out of character to launch it here.

To complement the launch of the new Atari hardware the firm has also brought out some more software to run on the machines along with a promise to convert some of their best-selling titles like PacMan, Centipede, and Defender to other computers by the end of the year.

## Quicksilva Games Galore

A rash of games from a leading software firm Quicksilva was unleashed on the public last month.

Games for the Spectrum and BBC micro computers included a water-sking challenge called Aquaplane in which you have to drive a motor boat with a skier in tow. And believe you me, it's not as easy as it sounds as you have to skilfully navigate the boat through a flotilla of yachts, a swarm of speedy cruisers and finally avoid being devoured by a bunch of hungry sharks. Running on the Spectrum it really is an addictive challenge. Other new releases for this machine include two adventure games, Velnor's Lair and Smugglers Cove. The first is a dungeons and dragons type adventure while the second is set in a historical scenario complete with full graphic and text display.

There's also a 3D adventure entitled Xadom which Quicksilva claim is an extremely sophisticated game with an unbelievable display, and reckon that it is the most complete and successful combination of an arcade game and adventure game available. All these games retail for £6.95.

For the BBC machine Quicksilva has produced an art and design program to extend the computer's huge graphics capabilities to the full, and it acts as a sister program to Quicksilva's Music Processor program. By all accounts the quality of Beeb-Art is very high indeed and it costs £14.95.

All these program can be bought from all Quicksilva's distributors.

## No More Micro Muddle

Cound Design Systems have come up with a handy piece of furniture for your study, frontroom, or wherever you keep your micro. It's the Micro Tidy, a sturdy purpose-designed unit, which is suitable for the CBM 64, VIC 20, BBC, Dragon, Sinclair, Epson and many other micros.

It is designed to hold the computer and tape recorder and has a separate compartment with slots to take at least 16 cassette tapes.

Cables, connectors and power blocks are tidily stored out of sight and the work table, micro and all, slides away when not in use. Most importantly, particularly for schools and colleges, the unit is lockable, keeping the computer secure and away from meddling fingers.

Enquiries should be addressed to: Abacus Marketing Limited, Abacus House, 60 Barbourne, Worcester, WR1 1JA. Tel: (0905) 611161.

Meanwhile, Silent Computers are currently marketing a VDU stand for microcomputers which is strong enough to safely support a VDU and high enough to bring the monitor up to eye level for ease of use.

Two different sizes are available and between them they cover virtually the complete range of home-computers. The stand also acts as a dust cover and protects the keyboard when the micro is not in use. The price works out at £14.99 + £2.00 postage and packing. Details from Silent Computers, 27 Wycombe Road, London N17.

# NEWS NEWS NEWS

## 3 Way Split

A new low cost switch for printers and peripherals is now available from Softronics of Maresfield in East Sussex. It is aimed at the educational and small-business market.

The Softronics 3-20 switch, priced at £99 plus VAT, makes it possible to link two or three computers, which need not be of the same type, to a single printer. This enables full use of expensive peripherals in schools and small businesses. The switch was developed at the Roedean School near Brighton by its designer, Michael Lee. It has been successfully tried and tested in the school environment for several months without problem.

Further enquiries to: Michael Lee, Softronics, The Fernery, Maresfield, East Sussex. Tel: (0825) 2179.

## More Imagination

One of the most publicised software firms to reach the public eye has just added a trio of spanking new games to its already best selling range.

Imagine, who many of you know for its young and vastly paid software writers, has 'value for money' in the form of new games in new designed packaging. The artwork on the boxes is of the same glossy high standard as the previous ones in the range but they come in a unique form of packaging. To all intents and purposes they look like normal boxes, but when you open the lid the cassette is secured inside by folds and it looms towards you.But despite the jazzed up packaging the price of the products remains the same at £5.50 each.

The firm is sticking to Spectrum compatible games for the present but Imagine partner Dave Butler says that plans are afoot to bring out software to run on the BBC Micro and the Commodore 64 and VIC 20. With any luck these should be on shop shelves some time in September.So watch out for them.

Newly released games include Zip-Zap and Zzoom for the 48K Spectrum and Jumping Jack which runs on any Spectrum. Performance-wise the games, bar Jumping Jack, have creatively used graphics and novel themes for the games.

Zzoom is based around a variation on the space war theme, the idea is for the player to protect marooned refugees set in a desert scenario. The enemy is out to destroy them by mass genocide with their exotron missile. If the refugees are hit by that then death is sudden and certain. The player's weapons are recoil machine guns housed in your ground skimmer aircraft. The screen looks a bit of a mess when run but makes for a good game once you've mastered the rules.

Zip-Zap is 'the final defence' and believe me it's going to be a difficult task to survive. You are alone in droid form on a mysterious planet and have to defend yourself against the planet's dreaded aliens.

Jumping Jack looks similar in principle to the popular Apple Panic game, in as much as it consists of manoeuvring a man — Jack — up through different levels up the screen by jumping up through gaps which randomly appear and disappear.

If you're already a fan of Imagine software then you will no doubt want to rush out and buy them. If not they are well worth taking a look at.

## Micro Drives on the move

Sinclair Research's long-awaited micro disc drives have just been officially launched and working models sent out to the media for review purposes.

The Spectrum compatible disc drives first saw the light of day as far back as June 1982, the very same day that the Spectrum was launched. Since then the trail of the drives has been very cold, but last month was scorching hot when the drives were unveiled.

They are very similar to the drives Sinclair has been advertising for several months and will run endless loop tape cartridges which will cost about £5 each.

These disc drives will make a massive difference to the capabilities of the Spectrum. User's main moan in the past is that long programs take ages to load by tape. With the micro drive's access time of 3.5 seconds and a memory storage capacity of up to 100K it means that programmers can work much more quickly.

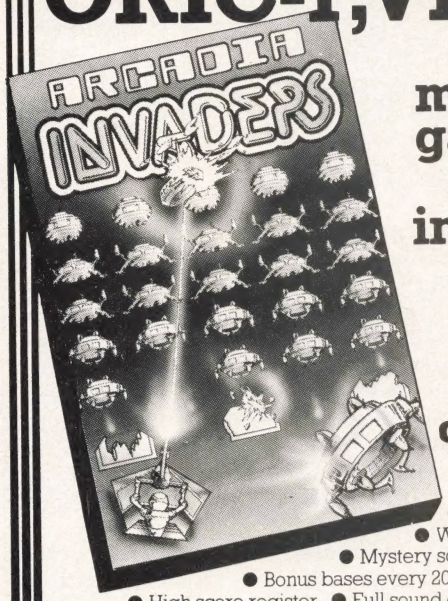
The price of the drives will be about £40 each but you will also need to buy a special interface unit which is to be priced at around £30. This unit will enable users to run a networking system as well as providing the user with the standard RS232 interface allowing other peripherals to be connected to the Spectrum.

Sinclair's new drives will not be commercially available for some time and the first batch will be sent to customers on the firm's mailing list. After distribution to those customers has been completed stocks probably will be given to WH Smiths retail outlets.

As soon as we can we will review the micro drives in *Personal Computing Today* so watch out for news of the feature.



# ORIC-1, VIC-20




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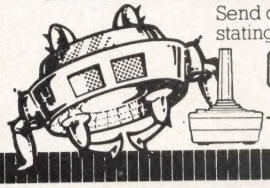
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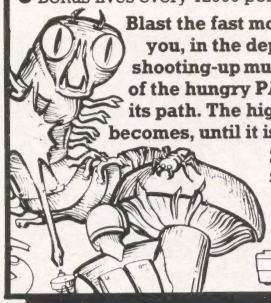

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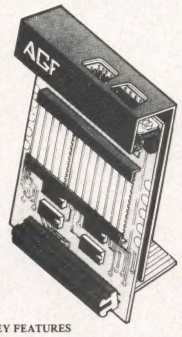
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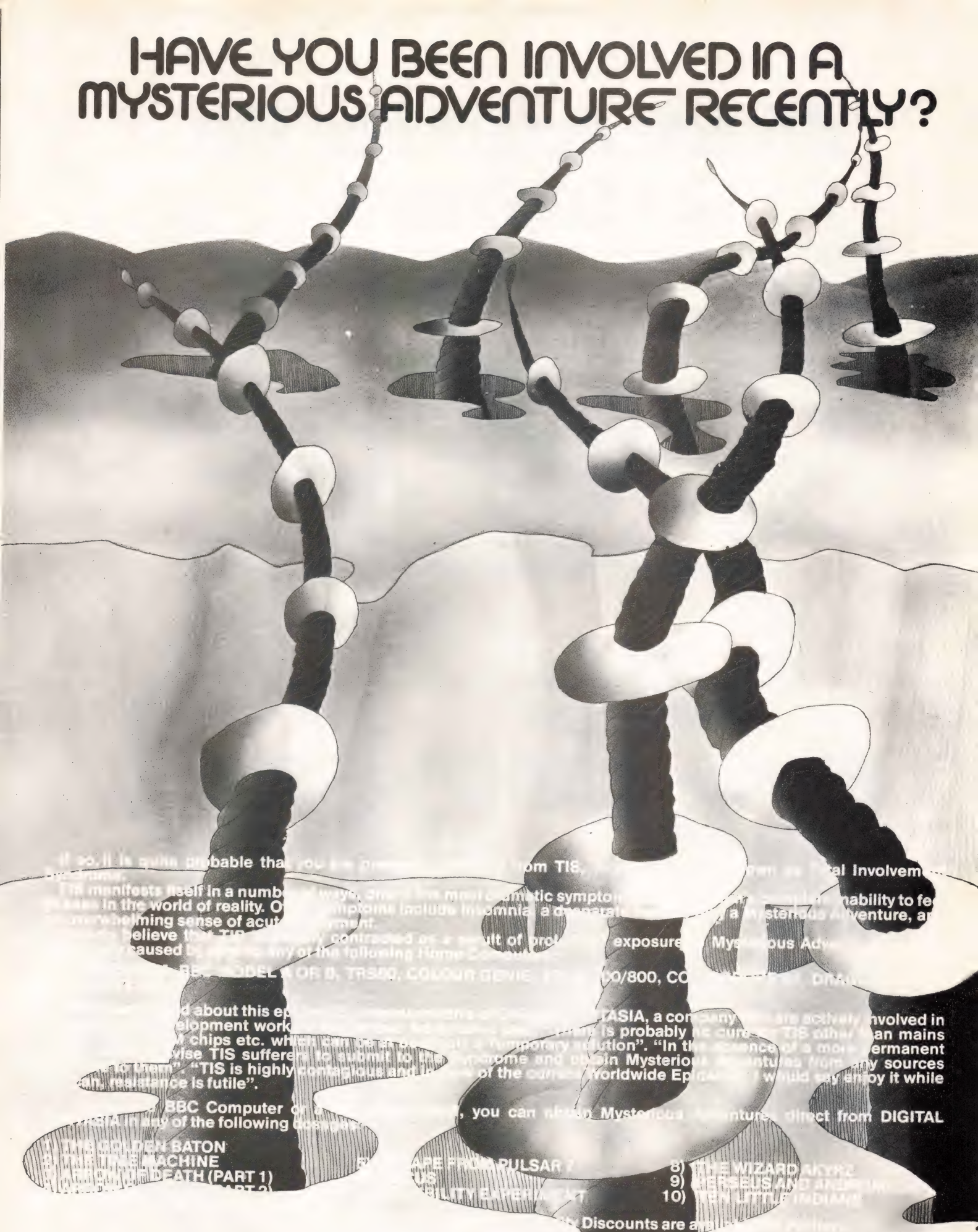
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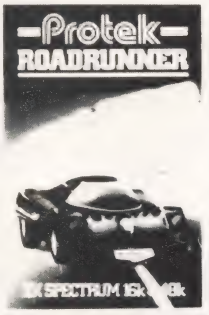
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# NEXT MONTH

## Sinclair Micro Drives

At last Sinclair Research has launched its long-awaited micro disc drives and although they won't be on sale generally for a couple of months yet there are sufficient circulating for review purposes.

So in the November issue of *Personal Computing Today* we'll be bringing you a detailed report of the new drives and how they stand up to the rigours of use with the Spectrum computer. To whet your appetite here's a brief run-down of the micro drive's specifications.

It looks very similar to the disc drive which appeared in Sinclair Research's vast advertising campaign pre-empting the arrival of the production model. In fact, the original micro drive was on show at the launch of the Spectrum way back in June 1982.

Size-wise the drives measure 3½" x 3" x 2". They are styled in the same sort of black casing as the Spectrum and have the distinctive Spectrum flash emblazoned on them. The disc drives will run an endless loop tape cartridge costing about £5 each.

The arrival of the disc drives marks an important step in the history of the Spectrum and Sinclair Research. The great gripe people have had about the Spectrum is that using tape storage it takes ages to load long programs. Using the micro disc drives the access time is reduced to 3.5 seconds which will be an enormous bonus in use of the machine.

Already other firms are trying to get hold of the micro drives to try and work ways of hooking them up to other best-selling home computers while software firms are preparing to adjust their own programs to run on the super-fast micro drives.

To find out whether or not you want to invest £40 in a micro drive don't miss your copy of *Personal Computing Today*, **November.**

## Super Software Special

By November the winter nights will be drawing in and the long summer days merely a memory. Not to worry, doubtless many of you will be taking to your computers again with holidays well out of the way. And to let you catch up on the latest software on sale *Personal Computing Today* will be running a software reviews special.

You'll find pages and pages of the newest software around for a variety of computers, so there's bound to be something for everybody. Computers we'll be covering will be the Oric, Spectrum, BBC, VIC20, Commodore 64, Atari, Dragon, and Jupiter Ace.

Don't miss the super special in the November issue of *Personal Computing Today.*

## Stop Press . . .

**Electron is here.** Read all about it in our November issue.



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# MICROGAMES

Patrick Bossert (Author of **You Can Do The Cube**) Philippa Dickinson

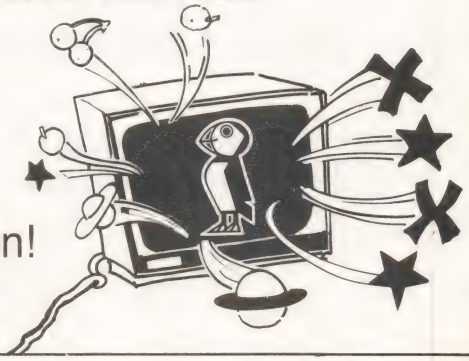
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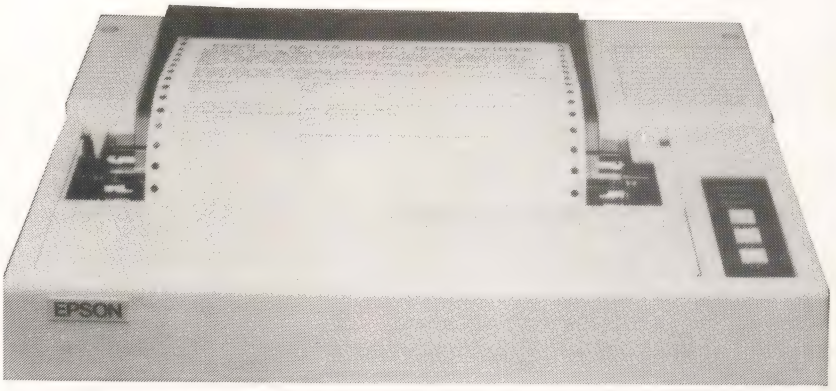
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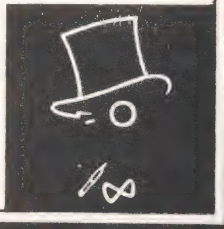
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# YOUR LETTERS

**This page is where you get the chance to put your opinions in print. Personal Computing Today welcomes letters from you on any aspect of microcomputing and views in general – as long as they're printable!**

**Please drop us a line to: The Editor, Personal Computing Today, 145 Charing Cross Road, London, WC2H 0EE.**

Dear Miss Joiner
Further to our telephone conversation dated 12 July 1983, I would like to accept your invitation to respond to an article in the Micro-Answers section of the July edition of *Personal Computing Today*.

Grundig colour television receivers for use in Great Britain are designed to receive CCIR 625 PAL I standard transmissions in the UHF band, covering channels 21 to 68 inclusive. The current remote control televisions (including the A 6400) incorporate synthesized tuning, which is very accurate. Consequently, once the channel tuning sequence has been completed and locked into the memory, any cause of poor reception must be external to the television receiver. The possible causes include a poor aerial, atmospheric conditions, and the transmission source drifting in frequency. If the latter is the cause, then obviously the television is no longer tuned to the transmission source, and re-tuning of the television receiver is necessary.

When considering micros it is obvious that the economy models are not going to perform to the same standard as the top of the range models. It must also be considered that it can prove expensive to ensure an absolutely frequency stable output from a micro. It is our experience that some micros (including the Sinclair Spectrum) can suffer from frequency instability. However, this is easily compensated for on the television by re-tuning. Such an inconvenience could be considered minor when set against the substantial saving involved in purchasing an economy priced micro.

It would appear that perhaps some manufacturers are combating possible frequency drift by incorporating composite video, and/or RGB outputs, which by-pass both the micro modulator, and the television tuner. This is obviously a significant step forward.

Our experience of the Sinclair Spectrum is that it can be subjected to frequency instability, although if it is going to drift it will do so after approximately thirty minutes, and then remain reasonably stable. There are, therefore, three very simple means by which this drift can be countered by the user:

1. Allow the micro to warm up for thirty minutes, or so before use.
2. Re-tune the television when the computer output drifts.
3. Dedicate two channels for use with the Spectrum, one tuned to the output frequency at switch on, and the other tuned to the output frequency after drifting.

Please also note that some of our television receivers have an AFC facility and providing the frequency drift is within the capture range of the AFC, no re-tuning will be necessary.

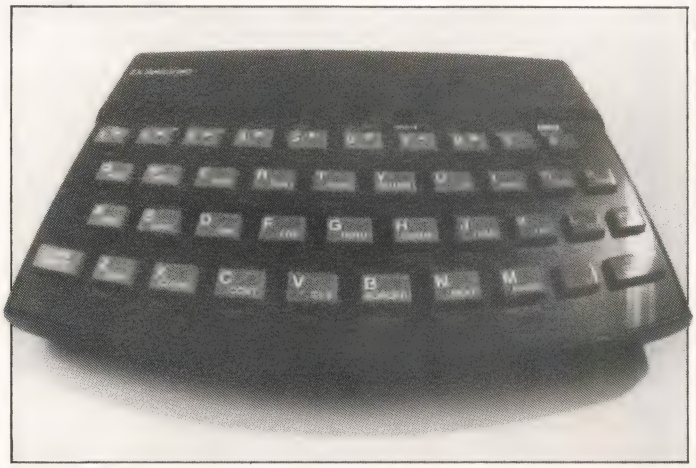
Let us consider the colour chip incompatibility referred to in your article. This incompatibility is apparent only on some of the older model televisions, (pre 1980). An investigation led us to believe that this was due to a non standard colour burst component in the Spectrum UHF output. We believe that Sinclair are examining this problem.

I hope that this has clarified the situation for you and your readers, and would advise that we are only too willing to offer any assistance in this, and other similar matters, if you so require.

If you receive enquiries which you think we may be in a better position to answer, then please do not hesitate to contact us. We can reply to yourself, or directly to your readers, if you so wish. If you would be kind enough to provide us with Mrs Morden's address and if you should wish us to do so, we would be happy to reply to her letter.

Assuring you of our best attention at all times.
Yours faithfully
Paul Golding
Technical Office Manager
Grundig International Ltd

**Editor's reply: Thank you for writing such a detailed and informative letter to clarify the matter regarding the use of a Spectrum with one of your firm's television sets. If I receive any similar enquiries I will certainly put them in touch with you. Many thanks for your help in this matter.**



Dear PCT
Re: 'Spectrum Datafile' in your July issue.
I own a 16K Spectrum and on typing in and running the program an out of memory error occurred. This can be overcome by having 30 names and addresses instead of 50. To do this lines 100-140 must be altered to read: FROM '1' TO '30'. . .

Also lines 1523/4 and 1570/80 must be deleted.

If a line reading 2175 ID N$ (x) E$ (1) THEN GOTO

2190 is inserted in the program then line 2190 will work.

This program was otherwise very good and I found it very useful.

Yours sincerely
C Cunniff
Bolton

**Editor's reply: Thanks very much for pointing that out to us. I am sure there are many other readers who will find your own alterations extremely useful.**

Dear Editor

Many thanks for publishing my letter in the May edition of *Personal Computing Today*.

In the last paragraph of that letter I indicated I would not be prepared to accept a fifth machine; however, following the intervention of Margaret Charrington (with contacts in the Ministry of Trade), a director of the 'Think British' Council, I did accept, on behalf of my son, a fifth computer. According to a letter I received from Margaret Charrington, quote: 'Mr Sandy Dow (sales manager of Acorn), has promised me that he personally will test your computer and despatch it via Securicor. . .'

The computer (a Model B) was received on 29 April and was operating satisfactorily until 18 July — approximately 10 weeks only — when it started to malfunction; namely on output to TV screen.

It has been returned via Datapost at a cost of £8. By the way can this cost be reclaimed? It is costing a small fortune in time and money continually returning these duff computers.

Please publish this letter despite the fact it seems to be a continuing saga.

Yours sincerely
R Castree

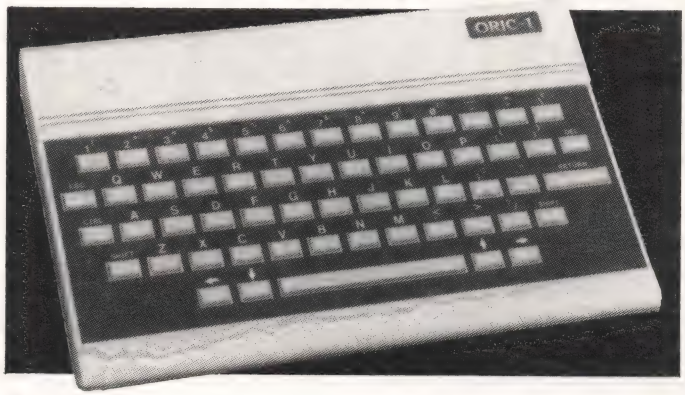
**Editor's reply: You have certainly had a very unfortunate experience with buying a computer, but yours is the exception rather than the rule. You have been extremely unfortunate in continually receiving machines which don't appear to be up to scratch. Judging from your letter Acorn are doing all they can to rectify the matter, and I am sure that you will soon be in receipt of a working Model B. Perhaps the fault this time could be with your television, not your computer? I would also like to point out to readers that Sandy Dow no longer works for Acorn Computers.**

Dear PCT

I have been shocked to see that you have not included the little software available for the Oric 1 in your software listings section. I would be glad to see a small section for the Oric, even though there is only a tiny range.

J Lingard
Manchester

**Editor's reply: There are now so many different low cost computers on the market that it is a difficult task to get each one's software listed in the Software Checklist. We are in the process of compiling a section of Oric compatible products and will publish it shortly.**

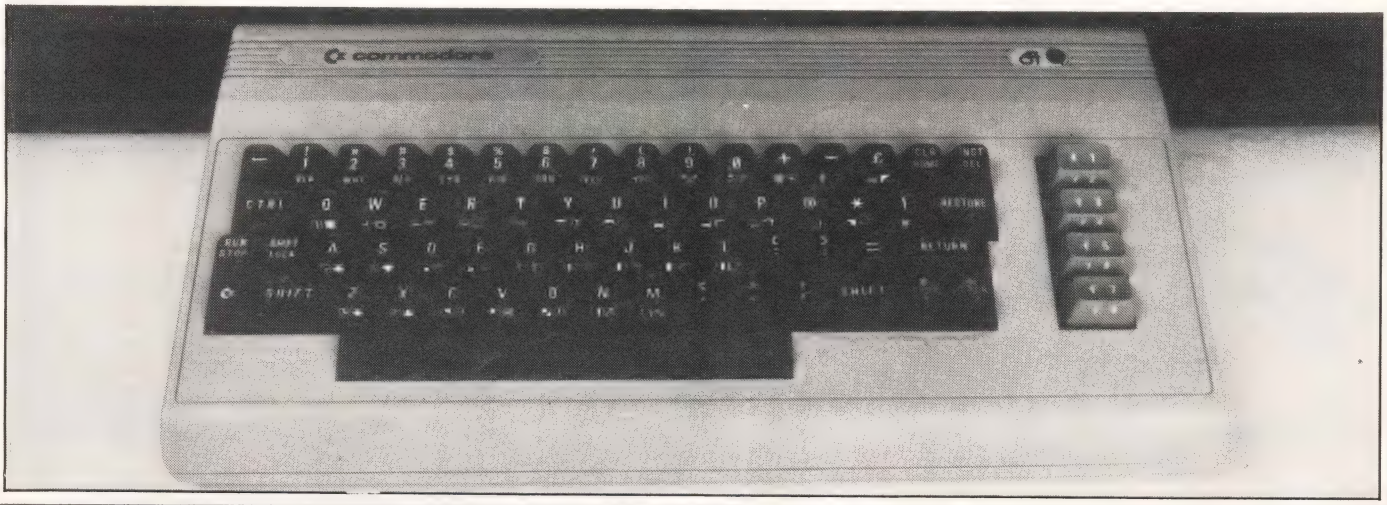



Dear PCT

My friend and I are very pleased with your Software Listings section as it has most of the VIC 20 software in it and many excellent games have been discovered by this method. Now, I have just bought a Commodore 64 (an excellent machine) and am pleased with it, but finding software is difficult so I was wondering if you were planning to include it in your Software Listings section.

Yours faithfully
Alan Heyes
Liverpool

**Editor's reply: My answer to your letter Alan, is virtually the same as that to the Oric software letter also printed on these pages. We are in the process of compiling a section containing CBM 64 software and will publish it just as soon as we have (a) done so, and (b) have the space to include it in the listings. Nevertheless, I'm pleased to hear that you have found the checklist to be invaluable in your selection of software for your computer.**



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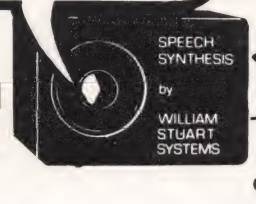
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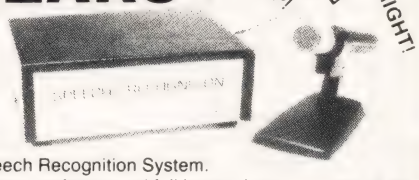
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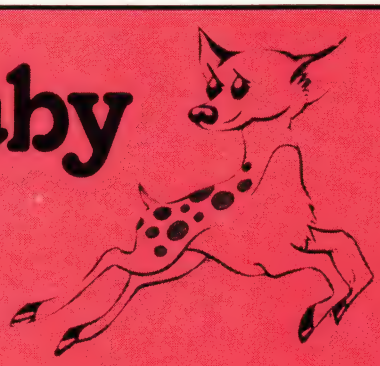
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# BREAKOUT



**Play this bat and ball arcade game on your Commodore 64. J. Brighouse wrote the program.**

The following program is a version of Breakout for the Commodore 64 computer. All instructions are included but the main object of the game is to knock all of the bricks out of the wall with the last ball. You control the bat at the bottom of the screen. At the end of the game your score is assessed.

The bat is moved by making use of the 64's sprite facility. This initially caused problems in moving in and out of the 'most significant bit' area of the screen, but this was overcome with a short subroutine. The ball is POKEd around the screen and ten points are awarded for every brick hit. You have four chances to remove all the wall and a bat size option is included. The game features sound effects and the bat is controlled by the cursor keys.

**List of Variables**

| | |
|---|---|
| BALL | Ball number. |
| SC | Score. |
| F | Bat X position. |
| X,Y | Co-ordinates of ball. |
| DX,DY | Direction of ball. |
| R | Prevents bat from being moved out of M.S.B. immediately. |
| N | Used to enter sprite data. |

## HOW IT RUNS

| | |
|---|---|
| 10-15 | Sets up sound registers. |
| 120-160 | Pokes bricks onto screen. |
| 175 | Sets sprite registers. |
| 185 | Checks for wrong bricks being hit. |
| 190 | Pokes ball. |
| 210-250 | Moves bat. |
| 276-287 | Checks for wall hit or ball off screen. Adds to variables. |
| 500-520 | Sets register out of most significant bit. |
| 1000-1040 | Sets up sprite data. |
| 1500-1530 | Ball check. |
| 2000-2180 | End of game assessment. |
| 10000-10230 | Title page — instructions. |
| 11000 | Enter bat size. |

## HINTS ON CONVERSION

The bat is moved by using the 64's sprite facility. On other machines this will have to be substituted for an alternative method. All POKEs containing the variable V are for the bat and must be altered.

The ball is POKEd around the screen. On the Commodore 64 the screen memory map is between locations 1024 and 2023 and the colour map is between locations 55296 and 56295. The sound registers are between locations 54272 and 54296. Locations 53280/1 control background, border colours.

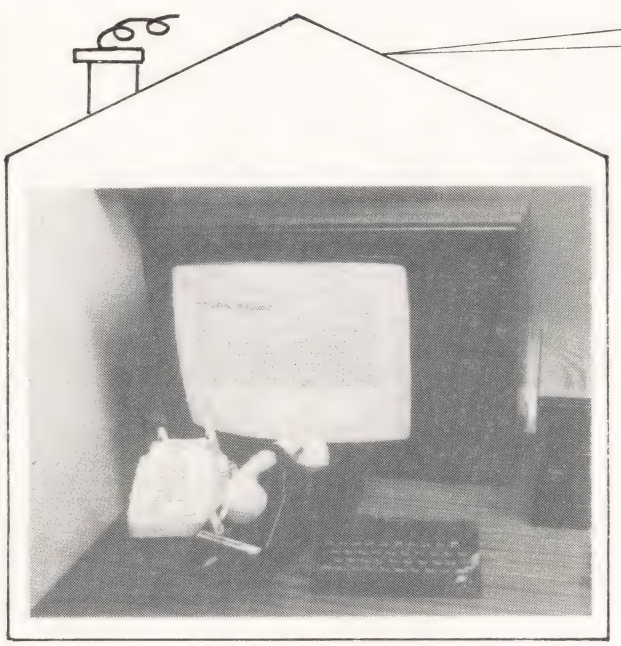
Using this information you can work out which POKE statements you will have to use in order to run the program on your own computer.

## PROGRAM LISTING

```
1 REM    *************************
2 REM    *                       *
3 REM    *   B R E A K O U T     *
4 REM    *                       *
5 REM    * J.BRIGHOUSE FEB 1980  *
6 REM    *************************
10 POKE54296,15
11 POKE54277,0:POKE54278,240
12 POKE54273,17:POKE54272,37
15 POKE54276,16
100 GOSUB10000
110 :
120 REM     DRAW BRICKS
130 :
140 POKE53280,0:POKE53281,8:PRINT""
141 FORT=55376TO55415:POKET,7:NEXTT
142 FORT=55416TO55455:POKET,2:NEXTT
143 FORT=55456TO55495:POKET,6:NEXTT
144 FORT=55496TO55535:POKET,5:NEXTT
145 FORT=55536TO55575:POKET,1:NEXTT
160 FORT=1104TO1303:POKET,227:NEXTT
171 GOSUB1000:REM  ENTER SPRITE DATA
172 :
175 POKEV+5,200:POKEV+16,0:POKEV+4,F
180 F=100:X=1:Y=7:DY=2:DX=2
185 IFPEEK(1024+X+40*(Y+1))=227THENY=Y+1
190 POKE54276,32:POKE55296+X+40*Y,0:POKE1024+X+40*Y,81
200 GETA$
210 IFA$=""THENF=F-20
220 IFA$=""THENF=F+20
225 IFF<1ANDPEEK(V+16)=0THENF=F+20
230 IFF>254THENF=0:POKEV+16,4
240 IFPEEK(V+16)=4ANDF=0THENGOSUB500
250 POKEV+4,F
265 POKE1024+X+40*Y,32:POKE1024+(X-1)+40*Y,32
266 IFPEEK(V+31)=4THENDY=-DY:POKE54276,17
270 X=X+DX
271 IFX=0ORX=39ORX=1ORX=38THENDX=-DX
275 Y=Y+DY
276 POKE54276,16
280 IFY=0ORY=1THENDY=-DY
285 IFY=23ORY=24THENGOTO1500
286 IFPEEK(1024+X+40*Y)=227THENSC=SC+10:DY=-DY:POKE54276,33
287 PRINT"    YOUR SCORE:"SC
289 GOTO185
500 R=R+1
510 IFR>1THENF=250:POKEV+16,0:POKEV+4,F:R=0
520 RETURN
1000 REM      SPRITE DATA
1010 V=53248:POKEV+21,4:POKE2042,13
1020 FORN=0TO44:POKE832+N,0:NEXTN
1030 FORN=45TO62:POKE832+N,255:NEXTN
1040 RETURN
1500 BALL=BALL+1
1510 IFBALL=4THEN2000
1511 POKE54276,17
1515 FORT=1TO1000:NEXTT
1516 POKE54276,16
1520 X=1:Y=7:DX=2:DY=2
1522 PRINT""
1525 PRINTBALL"-BALLS GONE"
1530 GOTO185
2000
2010 REM        END OF GAME ROUTINE
2020 :
2030 PRINT""
2040 POKEV+21,0
2045 IFSC=800THENPRINT"MEANS YOU GET ANOTHER GO":BALL=0:FORT=1TO1000:NEXTT:K=1
2046 IFK=1THENK=0:GOTO140
2050 POKE53280,7:POKE53281,5
2060 PRINT"END OF GAME"
2070 PRINT"YOU SCORED "SC"POINTS"
2075 PRINT"    WHICH:"
2080 IFSC>799THENPRINT"IS ABSOLUTELY BRILLIANT"
2090 IFSC<800ANDSC>600THENPRINT"IS EXCELLENT"
2100 IFSC<601ANDSC>550THENPRINT"IS VERY GOOD"
2110 IFSC<551ANDSC>400THENPRINT"IS ALRIGHT"
2120 IFSC<401ANDSC>200THENPRINT"IS NOT SO GOOD"
2130 IFSC<201THENPRINT"IS TERRIBLE"
2140 PRINT"WANT ANOTHER GAME (Y/N)?"
2150 GETA$:IFA$=""THEN2150
2160 IFA$="Y"THENRUN
2170 IFA$="N"THENPRINT"     BYE...BYE":END
2180 GOTO2150
10000 REM     TITLE PAGE
10010 PRINT"":POKE53280,14:POKE53281,6
10020 PRINT"            B R E A K O U T"
10030 PRINT"            ---------------"
10040 PRINT""
10050 PRINT"                                    "
10060 PRINT"            WANT INSTRUCTIONS?      "
10070 PRINT"                 (Y/N)              "
10080 GETA$:IFA$=""THEN10080
10090 IFA$="Y"ORA$="N"THENGOTO10100
10095 GOTO10080
10100 IFA$="N"THENGOTO11000
10110 PRINT"        I N S T R U C T I O N S "
10120 PRINT"        -------------------------"
10130 PRINT"THE OBJECT OF THE GAME IS TO GET AS"
10140 PRINT"MANY POINTS AS POSSIBLE BY REMOVING"
10150 PRINT"THE BRICKS WITH THE BALL.YOU CONTROL"
10160 PRINT"THE BAT AT THE BOTTOM OF THE SCREEN."
10170 PRINT"YOU HAVE 4 LIVES IN WHICH YOU GET YOUR"
10180 PRINT"SCORE."
10190 PRINT"USE THE FOLLOWING KEYS TO MOVE THE BAT'
10200 PRINT"<CURSOR DOWN> MOVES YOU LEFT"
10210 PRINT"<CURSOR RIGHT> MOVES YOU RIGHT"
10220 PRINT"HIT A KEY!"
10230 GETA$:IFA$=""THEN10230
11000 PRINT""
11010 V=53248
11020 PRINT"ENTER BAT SIZE"
11030 PRINT"L-LARGE BAT"
11040 PRINT"S-SMALL BAT"
11050 GETA$:IFA$=""THEN11050
11060 IFA$="L"ORA$="S"THENGOTO11070
11065 GOTO11050
11070 IFA$="L"THENPOKEV+29,4
11075 IFA$="S"THENPOKEV+29,0
11160 RETURN
```

# ATTENTION! - all ZX81 (16K) and Spectrum (48K) users - get this, the . . .

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## EDUCATIONAL SOFTWARE

# COMPUTER BLACKBOARD



**Nick Wilcox developed this program to help his neighbour's son revise for 'O' Levels. You can adapt it for your own individual uses.**

I decided to write this program during the summer months when school exams and 'O' Levels plagued children and parents alike. The victim in this instance was one of my neighbour's children and between the two of us we concocted a computerised revision programme for him.

The first program we put together needed several alterations because we came across a couple of difficulties. These were:

1. The program took a question and answer format and we wanted to hold the questions in DATA statements, but these only hold a maximum of 88 characters. To overcome this the questions had to be severely condensed and they appeared crammed into the first four lines of an otherwise empty screen.

2. The basic program had to be easily adaptable to cope with a varying number of questions for different subjects. Therefore, the use of FOR . . . NEXT loops round the main program structure was impractical.

In Fig. 1 you'll see details of the flow chart we devised which solved our problems. The chart works for any type of question/answer program, as long as the objectives are to:

**Display a question**
**Accept an answer**
**Decide if the answer is correct**
**Respond to the answer**

By using "markers" within the DATA statements, the VIC is able to distinguish between the many lines which make up the question, and the single line including the answer. A separate marker advises when the last question has been answered.

To adapt this program for your own use, simply insert your own

# COMPUTER BLACKBOARD

questions and correct answers into the data statements. I found it helpful to restrict each DATA statement to 22 or less characters. This avoids splitting words across two lines, and enables the questions to be formatted on the screen.

The marker xxx has been used to denote the end of a question, and ZZZ to denote the end of all the questions:

```
6000 DATAPUT YOUR QUESTION
6010 DATAHERE USING AS MANY
6020 DATALINES AS YOU LIKE
6030 DATAXXX
6040 DATACORRECT ANSWER
6050 DATANEXT QUESTION
6060 DATAXXX
6070 DATANEXT ANSWER
. . . . . .
800 DATAZZZ
```

Improvements to the program could include saving the questions which were answered incorrectly, and repeating them at a later stage.

### List of Variables

| | |
|---|---|
| S | Score counter |
| Q | Question number |
| x | Delay loops |
| A$ | Input Answer |
| C$ | Correct Answer |
| Q$ | Question |
| KK | Local variables in subroutines. |

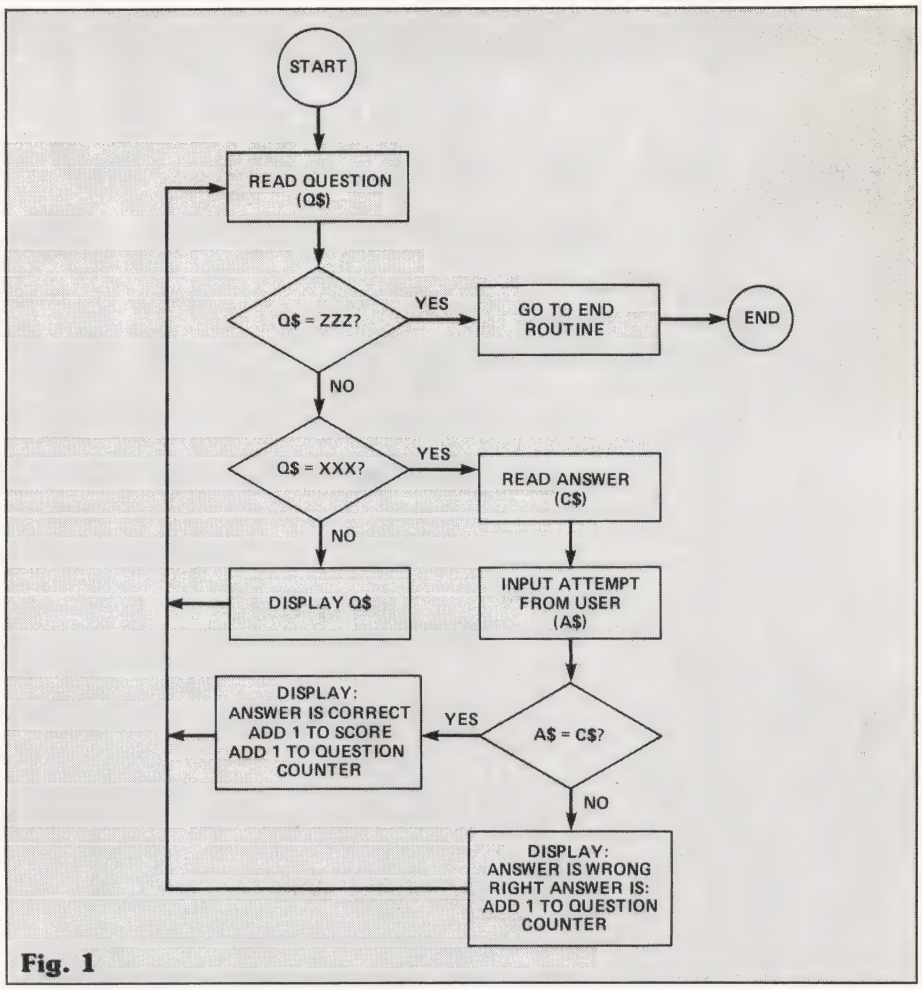



**Fig. 1**

## HOW IT RUNS

| | |
|---|---|
| Line 5 | Selects upper/lower case mode to make questions easier to read. |
| Lines 20-200 | Initial display and instructions. |
| Line 210 | Holds instructions until a key is pressed. |
| Line 220 | Clears screen and changes cursor to black. |
| Line 230 | Sets score and question counters. |
| Line 240 | Pause. |
| Lines 250-265 | This is the question display section, which reads and displays the data until ZZZ or XXX is reached. The program will then jump out of the loop either to the answer section or the end routine. |
| Lines 270-280 | Accept the answer and compares it to the correct answer. |
| Lines 285-340 | Acknowledge a wrong answer, by calling the subroutine at 1000, displaying the correct answer, and incrementing the question counter. The program then mvoes back to 240 to read the next question. |
| Lines 500-540 | Acknowledge a correct answer given by calling the subroutine at 2000. Both the score and question counters are increased, and the program returns for the next question. |
| Lines 1000-1090 | This subroutine changes the screen and border to black, makes a rude noise, and then restores the display. |
| Lines 2000-2080 | Similarly, this subroutine changes screen and border, but to blue for a correct answer. A noise is made, and the display restored. |
| Line 5000 | As the score and question counters are incremented before each question is asked, at the end of the program the question counter must be reduced by one to give the exact number of questions. |
| Lines 5001-5060 | Here the final result is determined as a percentage, and the VIC decides whether success or failure has been achieved. Note the use of "endless loops" to acknowledge the final result. |
| Line 6000 | DATA statements. |

## HINTS ON CONVERSION

This program should easily convert to any machine which supports DATA and READ statements. The only areas exclusive to the VIC are the control characters in lines 20-200 which control the colours of the initial screen, and the POKE commands in the subroutines at 1000 and 2000, and line 5.

The initial screen may be designed to suit your own machine, and the two subroutines may be altered to PRINT statements, to acknowledge whether a question has been answered correctly. Line 5 may be omitted.

Finally, the reverse heart image (or reversed 'S' in lower case mode) used in print statements clears the screen.

# PROGRAM LISTING

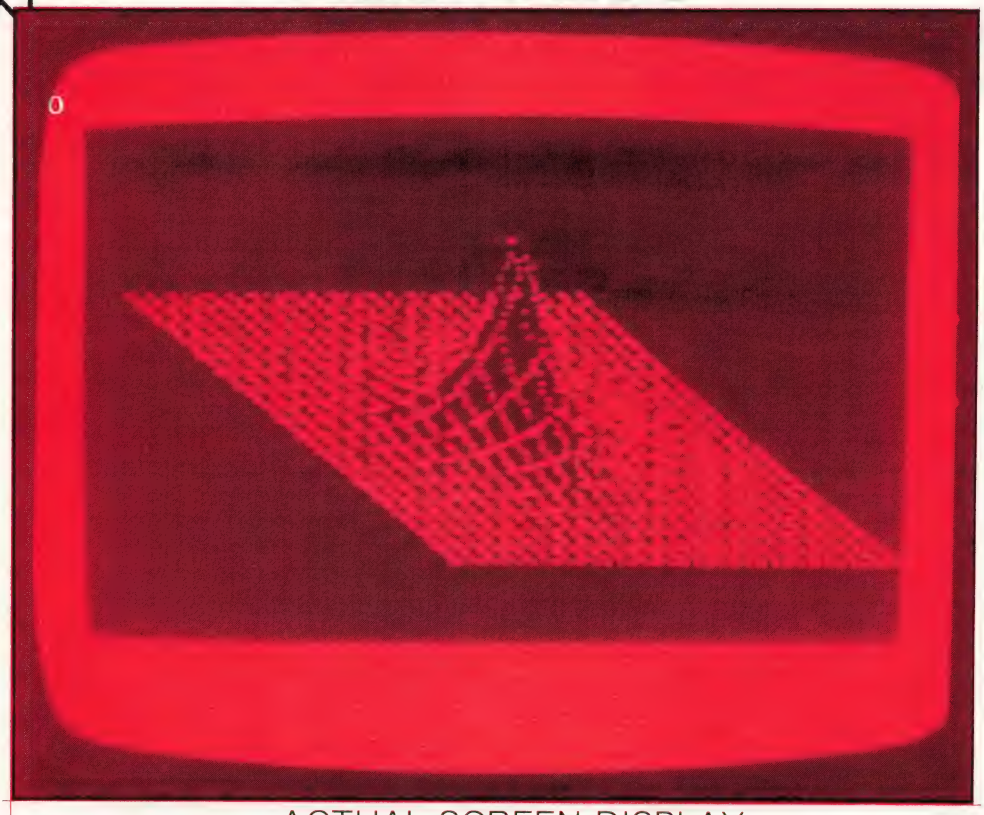
```
5 POKE 36869,242
10 REM BACKUPEVISION
15 REM PEEKY LEN DOPENARSHALL AND
   DCLOSE CATALOGILCOX
20 PRINT"□";
30 PRINT:PRINT
40 PRINT"■       ■           ■"
50 PRINT"■       ■           ■"
60 PRINT"■       ■           ■"
70 PRINT"■        REVISION "
80 PRINT"■       ■           ■"
90 PRINT"■       ■           ■"
100 PRINT"■       ■            ■"
110 PRINT:PRINT:PRINT
120 PRINT" TYPE IN YOUR ANSWER"
130 PRINT"  TO EACH QUESTION"
150 PRINT
160 PRINT" PRESS [_] /_/] AFTER"
170 PRINT"       EACH ANSWER"
180 PRINT
190 PRINT"      PRESS ANY KEY"
200 PRINT"       TO CONTINUE"
210 GET A$:IFA$=""THEN210
220 PRINT"■□";
230 S=0:Q=1
240 FOR X=1 TO 2500:NEXT
245 PRINT"□SCORE ";S
247 PRINT
250 READ Q$
255 IF Q$="ZZZ"THEN 5000
257 IF Q$="XXX"THEN 270
260 PRINT Q$:PRINT
265 GOTO 250
270 INPUT "ANSWER";A$:READ C$
280 IFA$=C$GOTO 500
285 REM WRONG ANSWER
290 GOSUB 1000
300 PRINT"□THE CORRECT ANSWER IS"
310 PRINT:PRINT:PRINT
320 PRINTC$:FOR L=1TO1000:NEXT
330 Q=Q+1
340 GOTO240
500 REM RIGHT ANSWER
510 GOSUB 2000
520 S=S+1:Q=Q+1
540 GOTO 240
1000 REM WRONG
1010 FOR KK=1 TO 50
1020 POKE 36878,15
1030 POKE 36875,150
1040 POKE 36879,10
1050 NEXT
1060 POKE 36878,0
1070 POKE 36875,0
1080 POKE 36879,27
1090 RETURN
2000 REM RIGHT
2010 POKE 36878,15
2015 POKE 36879,110
2020 FOR KK=1 TO 255STEP1
2030 POKE 36876,KK
2040 NEXT
2050 POKE 36876,0
2060 POKE 36878,0
2070 POKE 36879,27
2080 RETURN
5000 Q=Q-1:PRINT"□ YOU HAVE ANSWERED"S
5001 PRINT:PRINT"RIGHT OUT OF";Q
5002 PRINT:PRINT"QUESTIONS. AT O'LEVEL"
5003 PRINT:PRINT"THIS RESULT WOULD BE"
5004 PRINT:PRINT:PRINT
5005 PRINT INT(S/Q*100);" PERCENT -"
5006 IF INT(S/Q*100)<45 THEN 5045
5020 FOR X=1TO2500:NEXT
5030 PRINT:PRINT"A PASS",
5040 GOTO 5030
5045 FOR X=1TO2500:NEXT
5050 PRINT"A FAILURE",
5060 GOTO 5050
6000 DATAIN TRIGONOMETRY THE
6010 DATASIDE OF A TRIANGLE
6020 DATAOPPOSITE TO THE RIGHT
6030 DATAANGLE IS CALLED THE
6040 DATA[A] OPPOSITE
6050 DATA[B] ADJACENT
6060 DATA[C] HYPOTENUSE,XXX,C
6070 DATATHE FORMULA FOR
6080 DATACALCULATING AVERAGE
6090 DATASPEED IS
6100 DATA[A] V=T/D
6110 DATA[B] D=M/V
6120 DATA[C] V=D/T,XXX,C
6130 DATAMOMENTUM IS
6140 DATA[A] MASS/VELOCITY
6150 DATA[B] MASS*VELOCITY
6160 DATA[C] MASS+VELOCITY,XXX,B
6170 DATA FORCE MAY BE DEFINED
6180 DATAAS
6190 DATA[A] MASS*ACCELERATION
6200 DATA[B] MASS*VELOCITY
6210 DATA[C] MASS*DENSITY,XXX,A
6220 DATAOHM'S LAW STATES
6230 DATA[A]I=V/R
6240 DATA[B]I=W/A
6250 DATA[C]W=V*A,XXX,A
6260 DATAIN THE LAST QUESTION
6270 DATAWHAT DID 'I' STAND FOR
6280 DATA[A] IMPULSE
6290 DATA[B] STRENGTH
6300 DATA[C] POTENTIAL,XXX,B
6310 DATATO CALCULATE THE
6320 DATADENSITY OF AN OBJECT
6330 DATA WE NEED
6340 DATA[A] MASS AND VELOCITY
6350 DATA[B] VOLUME & MOMENTUM
6360 DATA[C] MASS & VOLUME,XXX,C
6370 DATAA VECTOR HAS BOTH
6380 DATADIRECTION AND
6390 DATA[A] SIZE
6400 DATA[B] ENERGY
6410 DATA[C] MASS,XXX,A
6420 DATAZZZ
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# TECHNICAL ENQUIRIES

**MICROANSWERS is Personal Computing Today's Technical Enquiries Service. Each month we will endeavour to answer your questions on the subject of micro-computing. We would love to hear of your problems (honest!) as it is certain that if you are having trouble then other users of your machine will also be suffering.**

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**If you wish a personal reply, please enclose a stamped addressed envelope *and the reply coupon from this page*. This is to enable us to give priority to regular readers of PCT.**

Dear Sir,

I recently purchased the August edition of your publication *Personal Computing Today* after noticing it had a program for the TEXAS TI99/4A computer included.

The program in question was entitled GORILLASSI. However after several attempts to run it I found it would not. After checking that it was entered correctly I tried to find the reason for the problem. I found several errors and after making the appropriate changes succeeded in running the program.

Listed below are the errors I found and the changes I made in order to run it.

LINE 460 . . . There were only 57 characters in string E$ and also the character 1 was printed twice. So I changed the second 1 to ? and added D, X and lower case L

LINE 910 . . . I changed this line to read
B = A$C(SEG$(E$,K,1)) – 20

LINE 1040 . . . I changed this line to read
A$(1,A – 1) = C$(1,1)

LINE 1050 . . . I changed this line to read
A$(1,A) = C$(1,2)

Also, including lines 2820 to 3220 complete, caused my computer to run out of memory.

So I erased lines 2850 to 2900
2970 to 3020
3090 to 3140

and incorporated these into a subroutine.

After including the above changes the program runs without any trouble.

I must take this opportunity to say how much I enjoy GORILLASSI and I hope by informing you of these errors you can help other TI99ers to play it.

Finally I must congratulate you on a super mag, especially as you include programs for the TI99/4a.

Yours faithfully,
A.D. Jephson
Sutton-in-Ashfield

---

Dear Sirs,

I have a 48K Spectrum and I am proposing to buy an Olivetti PRAXIS electronic typewriter. My problem is how to do this.

The articles in magazines, and adverts for interfaces, all talk about the interface for the printer — or the interface for the computer. Does this mean you need two interfaces, one for the computer and one for the printer — and then you link them together in the middle?

Then there is the question of whether to use an RS232 or a Centronics interface. Can you choose, and what's the difference?

Assuming that the subject is too vast for you to deal with in your reply, perhaps you can recommend a suitable book to me?

Yours truly,
C.H. Thomas
Epsom

**You only need one interface for your Praxis typewriter to be linked to your computer for starters.**

**The difference between an RS232 interface and Centronics one is that the RS232 is for serial transmission while the Centronics is for parallel transmission. In essence the real difference is that the RS232 interface transmits data at a much slower speed than the other one.**

**You must now find out what sort of interface you need to suit your printer/computer. A firm called Hilderbray make an interface which is suitable for use with a Praxis typewriter and you can contact them on 01-485 1059.**

Dear Sir,

I have a Sharp MZ80A and am having trouble loading programs originally designed for the Sharp MZ80K computer.

Can you tell me how these programs can be adapted?

Thank you
Mrs J Edwards
Christchurch

**There is no reason why you should be experiencing difficulty loading programs on your MZ80A even though they were written for the 80K. The only possible cause of the problem is that the two machines have different screen sizes. This means that if a program contains POKE statements the program will not run.**

**You must find out what the differences in screen sizes are and make the necessary alterations concerning memory locations in your POKE statements. Your manual will tell you your own machine's screen size and Sharp itself can let you know that of the MZ80K.**

Dear PCT

I have purchased a VIC-20 which I bought without the Commodore cassette recorder. I also possess an ITT cassette recorder (SL 54 Automatic). I want to connect this to the VIC computer. I have acquired a plug which fits into the VIC's cassette port made by my family, as they know about making leads.

In the back of my cassette is a female five pin din plug. It reads:

PINS
2 is the screen
1 + 4 are Input or Output
3 + 5 are the opposite of 1 + 4.

(1 + 4 and 3 + 5 are joined inside because the cassette is mono). It still doesn't seem to work.

Secondly, where can I purchase a 'VIC Progrmmer's Reference Guide' and how much will it cost?

I have every confidence in you and I hope you can help me. I think that your magazine is great, but could you feature more about the VIC-20?

Yours faithfully
Shaun Carlton
Dover

**What you need is a specially compatible interface to use with your VIC-20 and tape recorder. Swanley Electronics make a kit interface which permits the use of an ordinary mono cassette recorder with the VIC-20. It only costs £6. Contact the firm at 32 Goldsel Road, Swanley, Kent BR8 8EZ.**

**You can buy the VIC Programmer's Reference Guide direct from Commodore Computers who are at 675 Ajax Avenue, Slough, Berkshire. Write to, or ring up both these firms for details of their goods.**

---

*Last month we published a letter from S Y Low who wanted to know how to disable the RUN/STOP key on the Commodore VIC-20. Contrary to some people's belief this isn't a commonly known thing, but* ***Personal Computing Today*** *readers leapt to the rescue with suggestions. The POKE statements seemed to be the same no matter who sent them in, but we thank all who took the time and trouble to do so and help out programmers in a predicament.*

*Here are a couple of letters explaining how to disable the RUN/STOP key.*

Dear PCT

Having read the letter from S.Y. Low in your August 1983 edition of PCT, I am writing to tell you about the disabling of the RUN/STOP key. This key can be disabled using:

POKE 788,194

and enabled again using:

POKE 788,191

This will affect both the TI clock and the cassette system, so re-enable before using tape files.

The restore key can be disabled using:

POKE 37150,2

This clears the interrupt enable bit in the 6502 via. To reset it use:

POKE 37150,130

The rate that the TI clock is changed can be altered by POKEing into locations 37156 and 37157. The normal values are:— 38 in 37156 and 72 in 37157. The frequency of interrupts is given by 1108200/(36 + 256 * 72) in this case, which is 60Hz. POKEing 74 into 37156 and 43 into 37157 gives 100 interrupts/second so TI now increments in hundredths of a second (but note that TI$ is now completely wrong, as it will count every 60 interrupts).

Hope these notes are useful.

J. Brawn
Barrow-on-Humber

PCT

The simple answer to disabling the STOP key on the VIC-20 is:

POKE 788,194.

But that is not enough. Pressing STOP and RESTORE together will generate a NMI (Non Maskable Interrupt) and the program will stop.

It is therefore also necessary to disable the restore key using:

POKE 37150, 3 (or 2).

To use F1 as a start key is simple. Look for the ASCII equivalent (131) and branch (use GET).

Why do you not belong to the ICPUG who could answer such queries if you do not know the answer?

John Borland
ICPUT Membership No 11387

**Our thanks go to all those who wrote in, not only the letters which we have printed here. We have noted your comments and welcome any advice readers might like to give.**

**PRIORITY REPLY**

**October 1983**

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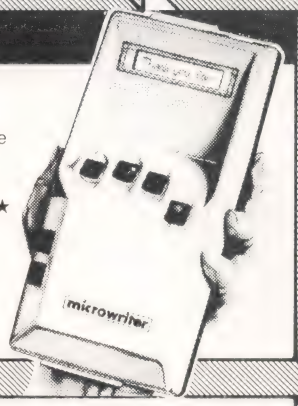
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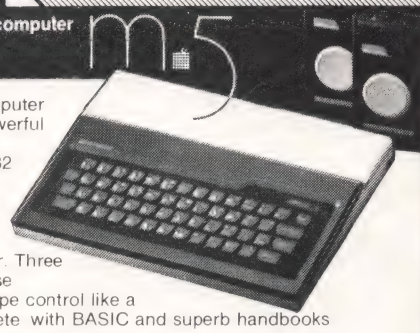
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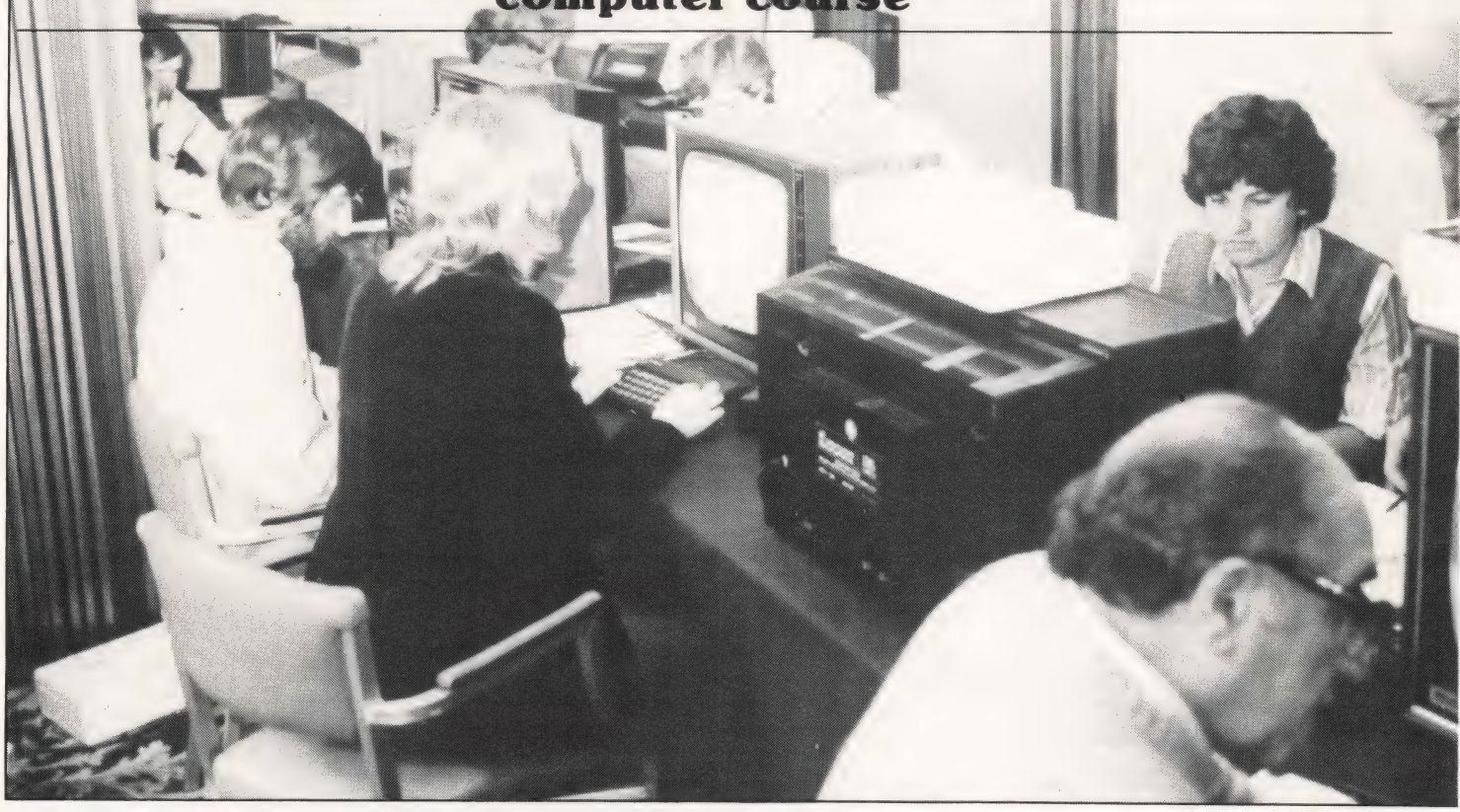
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# ON COURSE

## Sue Denham reports on a weekend residential computer course



Learning to program isn't all hard graft, on the contrary the owner of a Worcestershire hotel has successfully combined business with pleasure in the form of residential weekend programming courses.

Chris Dale, who runs the Gainsborough House Hotel just outside Kidderminster, had a brush with computing and came up with the brainwave of running courses at his hotel as an all-in package.

Aimed at beginners each course can cope with between 15 to 20 people under the guidance of one lecturer, ex-polytechnic teacher Harry Siddell, who exuded so much enthusiasm you felt guilty if yours began to wane. Fortunately the vast majority of the students were keen to glean as much as possible from him.

The equipment used on the course were Sinclair ZX81s, which may not be the best in terms of keyboard usage but served their purpose as an introduction to programming perfectly adequately. The Gainsborough course runs from a Friday evening through to Sunday afternoon and during that time you get about 15 hours tuition including several hours of hands-on experience. When I was there the lecturer was so keen he kept the class going until 11pm and 12pm at night — don't worry, it wasn't compulsory. If you had had enough by then you could quite happily retire to the hotel bar to down a few well-earned beers.

### Previous Experience

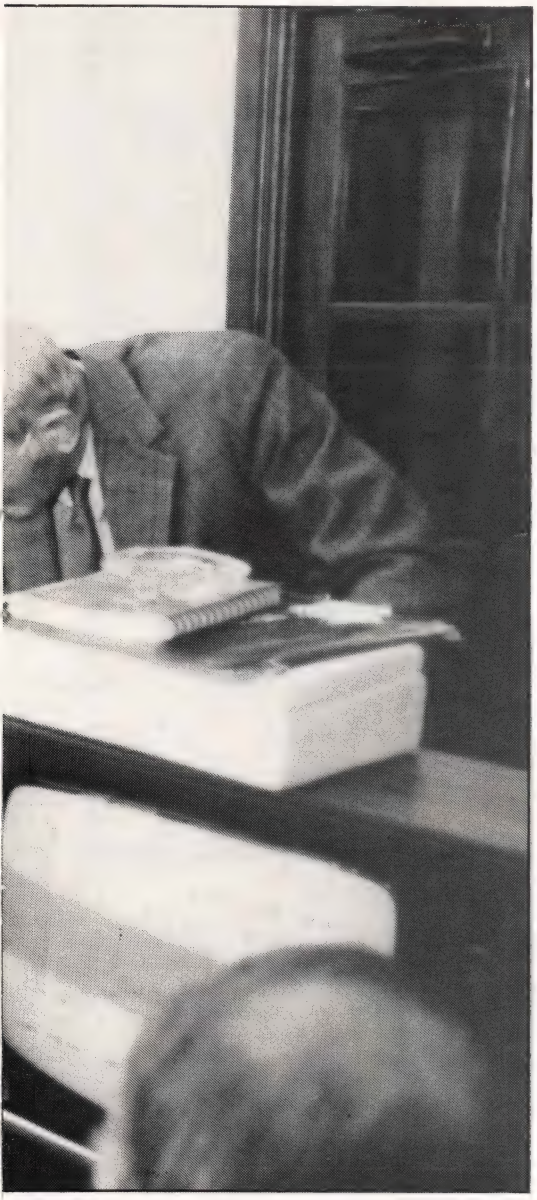
Many of the people on the course had already had some computer experience prior to joining the course and brought their own computer along to use instead of the ZX81. As the machines used on the course were Sinclairs it was only natural that the students owned either a ZX81 or Spectrum.

Despite this the level of the students' knowledge was very basic. The people on the course range from schoolchildren with their mums to young people keen to have a close encounter with new technology through to retired people wanting to find a new way of spending their time.

### On Course

Most of them seemed to cope with the course content well, and even if they got lost during the class Harry Siddell made sure he helped them out — as long as they let him know they were stuck. Keeping quiet about a problem doesn't help you.

On the first evening of the course Harry gave an introduction to computers and programming in which he explained something



about the way computers work, what you can use them for and a potted history of the computer. He stressed that they are merely tools to use to your advantage.

He also took them through the first steps of programming using the Sinclair manual as a reference book and the programs contained within as working examples for the students to follow. By the end of the first evening they were all familiar with the symbols on the keyboard and in the programs so that they understood what they were doing.

The pupils work in pairs, teaming up quite naturally because all but one of them had come with another person, be it a relative or friend.

After being taught the theory of one particular technique in a lesson they were left to get on with the program themselves, typing it in, sorting out any bugs and crying for help if they got stuck and couldn't get the program to run. They didn't have to stick by the Sinclair book, some of the students had brought along computer magazines like ZX Computing and Sinclair User and keyed in programs carried within their pages.

On the second day — Saturday — there was an early start at 9.00am straight after breakfast. By this time they had progressed to FOR...NEXT loops, graphics and graph plotting. To the initiated it sounds like child's play but if you can remember when you first started it took some time to get the hang of all the little intricacies involved in programming.

Harry Siddall took trouble to explain everything in plain, simple terms when he was going through a program. For instance he explained the function of a semi colon in a program as meaning 'on the same line'. He also touched on the differences between Sinclair BASIC and other forms of BASIC. The prime example was the use of the colon in Sinclair BASIC.

The whole atmosphere was very informal yet everyone on the course took it seriously. There was no sense of having to participate if you felt you didn't want to.

Siddall said: 'The course is run as a fun and interest programme. We aren't suggesting that anyone goes away actually trained in computing, but they will have had some fun and learnt a few basics about it.'

It makes a nice weekend to escape into the countryside particularly as the hotel's standards are very high. The food, which was all inclusive in the price of the course, was excellent. A variety of cold meat and salad for lunch, and a hot meal in the evenings. The staff were, without exception, friendly and helpful under the expert guidance of the assistant manager Ellis Soulsby. The weekend was livened up by an entire Welsh rugby team who were in quite literally 'full spirits'.

## Extra Curricula Activities

In your time off (mainly Saturday afternoon) there's plenty to do roundabout. Just five minutes drive from the hotel is the West Midlands Safari Park, which is well worth a visit. And a little further on is the Severn Valley Steam Railway, which was the first line to be taken over by enthusiasts and run as a viable working service. Although I didn't take a trip on the railway the locals say that the journey is definitely worth doing because of the scenery and the experience of travelling on a steam train.

Having had some fresh air it's back to work at the hotel. Virtually all the people on the course felt they had benefitted from it. One lady and her daughter had had no experience in programming and found they were out of their depth.

Generally, the students were satisfied with both the course and the hotel. Margarat Sheerin who came with her 11 year old son Andrew said: 'We came because my son got a ZX81 at Christmas but found it was a little too much for him. He has picked up a lot more than I have, but I will do more when we get home. The lecturer is very patient and instructs for hours if we want. He was here till midnight apparently last night!'

Shuj Raby had brought along his own Spectrum with him in the hope of learning more about the machine. He wants to use it to help in his small business but found that he didn't have the time to learn to program it. 'The only way was to do it was to take the time off work and spend an intensive period learning the basic programming essentials.

Sheila Daly and Yvonne Peers came along to find out what computing involves. 'I found it quite good because I did a little bit on another course, but it's quite difficult if you are coming completely fresh to it.' They all agreed that the weekend made a pleasant break and was worth travelling some distance to reach. People came from such diverse places as Croydon, Essex, Cornwall, Brighton and West Yorkshire.

The course costs £55 all-inclusive of board and tuition which is very good value for money. They are scheduled to start again in the autumn with more up-to-date equipment.

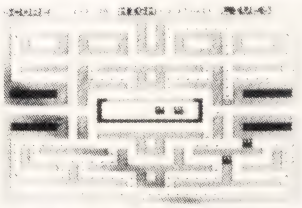
According to Harry Siddall they are contemplating swopping the ZX81s for either Spectrums, Orics, or VIC20s. 'The trouble is,' he said 'that computers tend to become outdated so quickly.'

For further information concerning the courses contact:
Chris Dale,
Managing director,
Gainsborough House Hotel,
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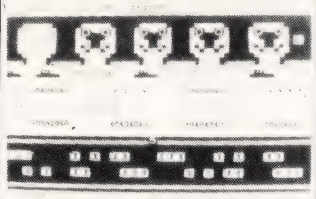


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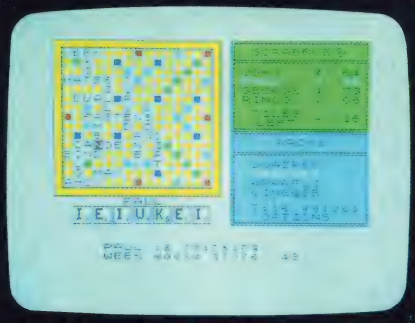
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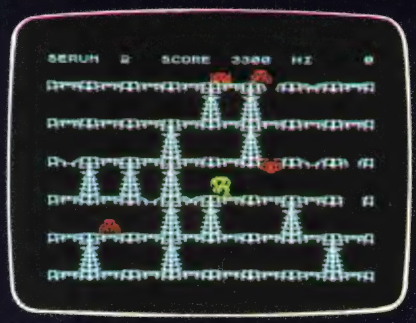
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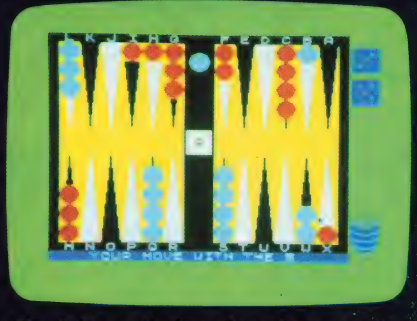

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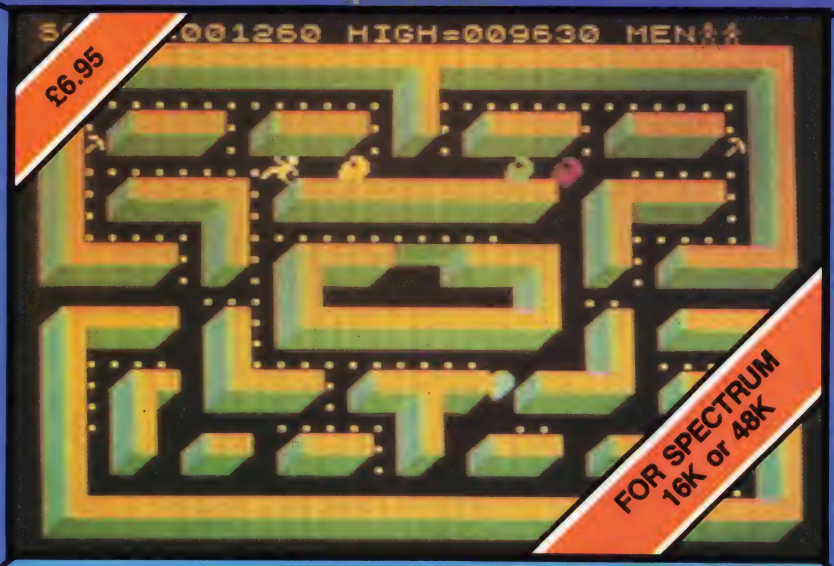
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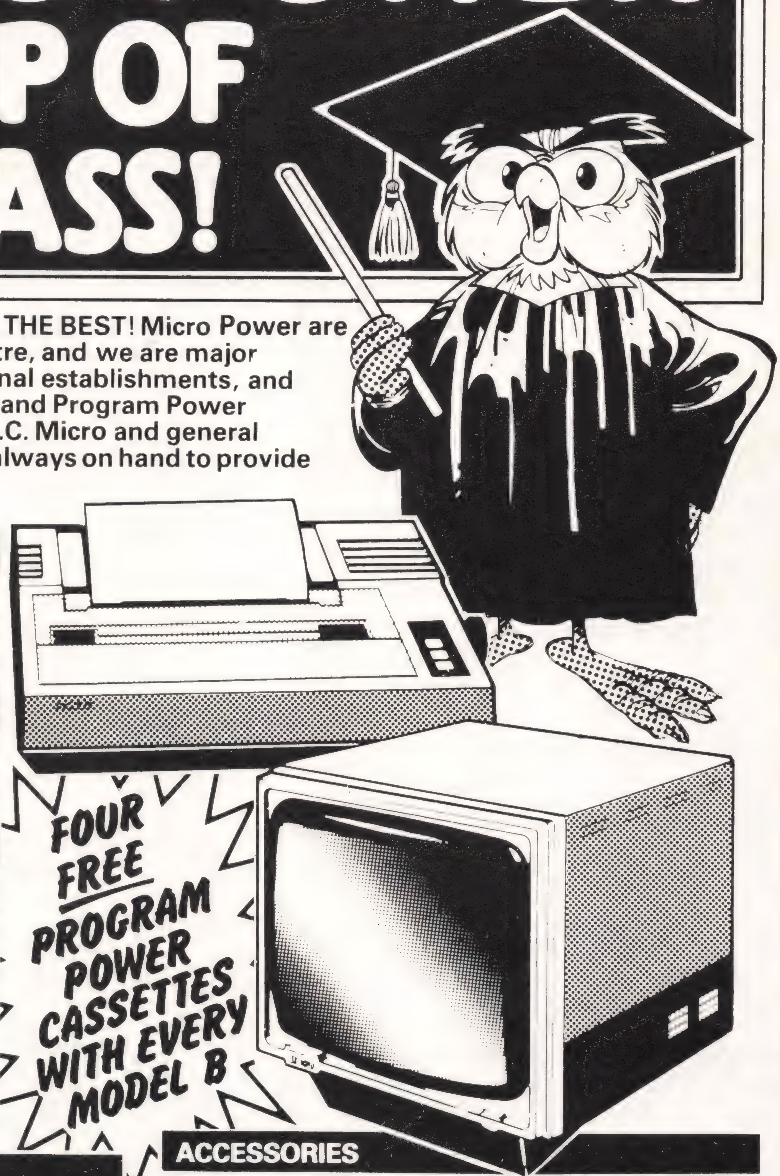
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# SOFTWARE REVIEWS

Each month PCT will be presenting pages of reviews of the computer programs currently available. We have engaged a team of reviewers, each of whom is a seasoned user of his/her particular machine — and has the crazy streak that means they enjoy playing computer games!

All types of software will, however, be reviewed in these pages; but with around 85% of all home-computer software being of the playful variety, you will be seeing more games than anything else!

Our 'Ratings Table' headings are:

## Program Quality

Here we're looking to see how well written the program is, and how well it exploits the computer's capabilities. Also, how logical is the structure of the program? Does it require the user to make guesses to use it?

## Crashproofing

We all hit the wrong key sometimes, do we not? Go on, admit it. If the program has been well written, all should not be lost. If, for example, the machine is asking you to enter "Yes" or "No", then any other key except Y or N should illicit no response whatsoever. In other words, how tolerant is the program of us humans?

## Value For Money

Quite frankly, some software on sale today is vastly overpriced. With the low cost of cassette tapes, why *should* simple games cost up to £12 per tape? We judge this one on an overall basis — how much work have the suppliers put into the program and is the price reasonable?

## Presentation On-screen

How good are the graphics used in the program? If the instructions are provided on screen, are they both readable and easy to understand? This section examines the visual aspects of the package — vital for games!

## Ease Of Use

If the program is for, say, an 'action' game, then the author's choice of keys is very important. Try playing "Invaders" with the movement keys reversed, and the "Fire" button right next to 'Reset'! There are many, many ways in which life can be made easy for the program user. We want to see them *all* used!

## Supplied Instructions

Regardless of whether the instructions come on sheets of paper, or are presented as text on-screen, they should be as clear and as concise as possible.

Ratings are done on a "Five stars is excellent, one is hopeless" basis, with the reviewer then scoring the supplied package as a whole on a percentage scale.

| | |
|---|---|
| **Title:** | **Manic Miner** |
| **Type:** | **Tape** |
| **Supplier:** | **Bug Byte** |
| **Machine:** | **ZX Spectrum** |
| **Price:** | **£5.95** |




Quite a daunting game this — especially once you've seen the many and various stages of the game in the demo which appears once you have loaded the program into your 48K ZX Spectrum.

The plot so far is that you are Miner Willy and during a prospecting trip down Surbiton way, you fall down a long forgotten mine-shaft. The mine-shaft was set up by an ancient civilisation (in Surbiton?) who have since given up the ghost — however, no one thought to stop the mining operation, including the deadly robots who frequent the mine. And that's where you come in . . .

You can move your character around the screen using selected keys on the top row to move left and right, and any key on the bottom row to make a leap. In each stage of the game, there are items you must collect such as keys, 10p coins, snow shoes, etc, and a wide variety of things that kill you including the mine robots, penguins, the Eye of Death, and would you believe, killer toilets!

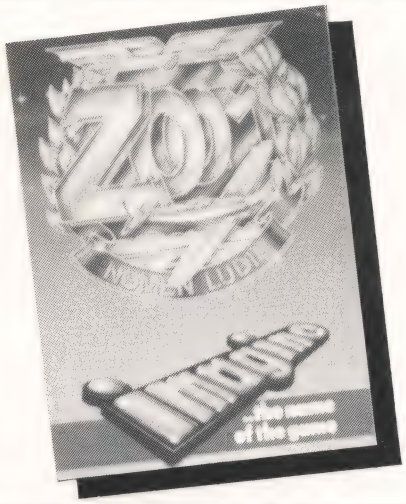
Moving around each stage of the game, and there are 20 in all, is great fun and the various problems you come across are frustrating but from my own experience, not frustrating enough to make you walk away from the keyboard.

After a half hour's play, I was cursing my lack of success on the fourth stage of the game, and it was with great reluctance that I abandoned my efforts for the day. Just wait till I get at those killer toilet seats tomorrow!

All in all, one of the best games I have seen this year for the Spectrum.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * * |
| Value for Money | * * * * |
| Presentation On-screen | * * * |
| Ease of Use | * * * * |
| Crashproofing: | * * * * |
| Overall | 85% |




| Title: | Zzoom |
|---|---|
| Type: | Tape |
| Supplier: | Imagine |
| Machine: | Spectrum 48L |
| Price: | £5.50 |

Latest from the Imagine stable comes Zzoom. In this game you are placed in charge of a powerful fighter and your task is to defend your troops from the ravages of the ever-present enemy.

The theme of the game is a mix of Choplifter and 3D defender. The first screen has you flying over a landscape in an attempt to stop the enemy bombers from making mincemeat of the men on the ground.

Your display shows the view out of the cockpit window. Around the edges are displayed your autopilot status, shields, DIBAR indicator long range radar, attack condition and score. These are perpetually updated during the course of the game.

The 3D effect is caused mainly by the enemy bombers. When they first appear they are vague shapes in the distance, then they peel off and swoop down to attack the men at the bottom of the screen. To destroy them you have to manoeuvre your ship so the cross hair sights line up and then let rip with a blast from your machine guns. If you fail to destroy a bomber before he starts his attack run then you will be rewarded by the sight of your men being blown into the air.

Control is achieved by the usual groupings of keys found on most Imagine tapes. At first I found this a little difficult to get to grips with, but with practice you soon get the hang of it.

The game progresses through different scenarios, including a sea battle (although I must admit I never got beyond the first stage.)

I get the feeling that with this game you are going to have to devote a lot of time to it in order to get the most out of it. The graphics and sound are good, but not quite as impressive as the cover boasts.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * * |
| Value for Money | * * * * |
| Presentation On-screen | * * * * |
| Ease of Use | * * * |
| Crashproofing | * * * * |
| Overall | 80% |

| Title: | Bug Bomb |
|---|---|
| Type: | Tape |
| Supplier: | Virgin Games |
| Machine: | BBC B |
| Price: | £7.95 |

Bug Bomb's a great game in which you have to blast bugs instead of the usual green beasties.

In fact there are lots of bugs for you to shoot and they all dart around the screen faster than the speed of light. Their objective in existing is to search you out and kill you. They chase you round an electric grid and you either must dodge them before they shoot or kill them with your energy blasts.

By the way you control a character called Henry and if Henry misses his shot the blast remains active and will destroy everything in sight — including Henry. A justly deserved fate.




And if you think that sounds bad enough just wait till you clap eyes on one of the stray green bullets which zoom around the grid. They tend to be deadly accurate and the best tactic to adopt is to try and dodge their path. But as with most arcade style games the degree of difficulty increases as the game progresses and Bug Bomb runs true to form. So watch out.

Graphics and sound are both good and you can keep track of your score and the number of lives you have left from the figures at the top of the screen.

Bug Bomb is not to be missed.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * * |
| Value for Money | * * * |
| Presentation On-screen | * * * |
| Ease of Use | * * * * |
| Overall | 85% |

| Title: | Shark Attack |
|---|---|
| Type: | Tape |
| Supplier: | ROMIK |
| Machine: | VIC-20 |
| Price: | £9.95 |

Romik are hell-bent on establishing themselves as the number one VIC games software company. Some might say they already are. Their method is to advise and assist their programmers on how to squeeze their coding into an unexpanded VIC, while still adding the finishing touches of attractive presentation and sound effects.

By the way, Romik program tapes usually contain two versions of the game, so that whatever expansion you have, the correct one is loaded. It does mean, however, that removing the expansion pack may mean a shorter load time.

I like Shark Attack; it's a goodie. It's particularly to be recommended for those with fire-button fingeritis, since there's no shooting to do. It still needs quick thinking and speedy reactions though, for your task is to lay, rather like an underwater spider, your 'atomic net' web over the screen, while dodging the attacking sharks. Obviously if you can ensnare the sharks you can get on with filling the screen in safety, but don't hang around, they eat their way out to chase you again.

You score points for each square that you lay your net on, then suddenly you're on to the next screen, with a bonus. That's when the octopi appear (static ones, thank goodness). Collision with one of them means the loss of one of your three lives. As you survive

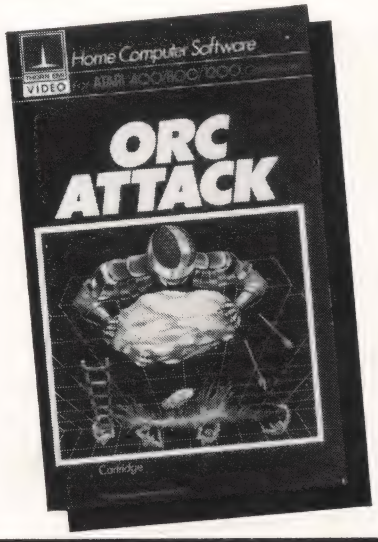
# SOFTWARE REVIEWS

another screen, more octopi appear. To urge you on, there is one of those infuriatingly catchy musical doodles.

The graphics and overall presentation are absolutely excellent for a program that fits into 3.5K. An addictively simple game which is well presented. Must be a winner.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * * |
| Value for Money | * * * |
| Presentation On-screen | * * * * |
| Ease of Use | * * * * |
| Crashproofing | * * * * |
| Supplied Instructions | * * * |
| Overall | 91% |




| | |
|---|---|
| **Title:** | **Orc Attack** |
| **Type:** | **Cartridge** |
| **Supplier:** | **Thorn EMI** |
| **Machine:** | **Atari 400/800 16K** |
| **Price:** | **£0.00** |

Being under siege by a bunch of Orcs isn't quite as exciting as it might sound.

Unfortunately, Orc Attack didn't capture my imagination or my attention for long. The theme of the game dates back to medieval times when pouring boiling oil over the heads of attacking hoardes was a popular means of defence.

You have to control a man who alone is defending his castle from the battlements. At either side of the screen are two paraphets from which you can take different weapons — either rocks to drop on the enemy's heads, or brodswords to cut off their heads. It's a bit gory if you take a successful swipe at one of the Orcs as you see his severed head plummet to the ground.

The Orcs scale the walls of the Castle via ladders which they place one on top of the other. If they reach the top of the battlements they attack you with their swords. While defending yourself from this you also have to dodge the Orcs accurately aimed crossfire bolts.

During the game the type of weapon available for your use changes and if you run out of bricks you'll find it more difficult to defend yourself with just your sword as your weapon. Keep your eyes peeled for the Minja Orcs who have the un-nerving ability to scale the castle walls unaided.

Doubtless this will suit many games player's but I found it slow, the joystick unresponsive and the object of the game a bit pointless.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * |
| Value for Money | * * |
| Presentation On-screen | * * |
| Ease of Use | * * * |
| Crashproofing: | * * * * |
| Overall | 50% |

| | |
|---|---|
| **Title:** | **Everest** |
| **Type:** | **Tape** |
| **Supplier:** | **Salamander Software** |
| **Machine:** | **Dragon 32** |
| **Price:** | **£7.95** |

Everest is an adventure game in which you are given the choice of climbing to the summit of three peaks in the Himalayas.

This type of game is fairly standard apart from the graphic display as well as text. Although the graphics aren't stunningly good it makes a change to look at a picture on the screen instead of words.

Unfortunately when I tried to climb Mount Everest I was thwarted by a bug in the program. Undeterred I opted for Mount Nuptse and began by ascent. You can choose your climbers from a team of six and load each one up with equipment for the journey to a camp of your choice. The maximum load is 60lb per climber so you must choose carefully from food supplies, tents, ropes, ladders, and oxygen.

Taking a stab at Nuptse were Hank and Tom. Hank fared better than Tom by actually making it to Camp 2. Sadly, despite Tom wanting to move on to Camp 2 the program was unwilling to let him do so for no apparent reason.

The instruction leaflet that comes with the program is fairly detailed and lists all options open to you and your climbers. There is an information service which you can access any time during a climb giving important facts about the weather, supplies, medical reports, climbers' positions and climbers' loads.

Needless to say, I didn't reach the top of Nuptse — I don't think I am cut out for climbing mountains. Everest is the type of game which you either love or hate to play. You do need to spend time tackling this one but give Salamander their due they have tried to make their version as up-to-date and realistic as possible. For instance recent Himalayan lightweight expeditions have not made use of Sherpas and consequently they have been omitted from the game.

**Rating Table**

| | |
|---|---|
| Program Quality | * * |
| Value for Money | * * |
| Presentation On-screen | * * * |
| Ease of Use | * * * |
| Supplied Instructions | * * * * |
| Overall | 45% |

| | |
|---|---|
| **Title:** | **Gridrunner** |
| **Type:** | **Tape** |
| **Supplier:** | **Salamander Software** |
| **Machine:** | **Dragon 32** |
| **Price:** | **£7.95** |

Originally written for the Commodore 64 this version is slightly inferior although the theory of the game remains the same. But it unfortunately falls down on graphics.
'You' are the ship, Gridrunner and can only move in the first four levels of the grid.

You must dodge the Gridsearch Squads's fire, but as they quickly move down the grid towards you it gets very difficult to shoot the Squad (which looks something like a train). If a droid (part of the Squad) is hit they turn into an ever-growing Pod which eventually turns into a dose of lethal energy. If you don't destroy it the Pod will blow up wiping out everything surrounding it — including the Gridrunner.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * |
| Value for Money | * * * |
| Presentation On-screen | * * |
| Ease of Use | * * * |
| Crashproofing | * * * |
| Overall | 60% |

# CHOOSING A HOME MICRO

WARNING

**Choosing a home micro can be a daunting task to the newcomer, and with an ever increasing number of micros emerging on the market, even up-grading, say, from a ZX81 can be a risky and expensive exercise if the wrong decision is made. It is important to look at the real facts and specifications, and check exactly what you get for your money before choosing your micro-computer system.**

## THE PITFALLS

### "DON'T LET THE ADD ONS ADD UP"

A number of large companies are offering packages that seem to be good value and low cost.
These offers usually have a hidden sting inasmuch as the essential accessories such as connection leads, peripherals and software often carry very high cost premiums.
e.g. software for low cost hardware usually costs between £29 and £49 for a ROM cartridge!!

## CHECK THE QUALITY OF THE PRODUCT.

Raw materials are now an area where corners can be cut, and shoddy workmanship during 'building' can effect the 'up-time' of your unit.
Areas to watch out for are unreliable edge connectors, corrosion and poor quality P.C.B.s. Low quality components and bad design will seriously effect the reliability of the end product, and can lead to false economy.

## DON'T BUY A GAMES MACHINE

Unless you want just games and nothing else! With a games computer you are limited.
Some computers, however, have the advantage of both games facility plus the whole world of computing to explore, as your interest and skills develop. A real computer system will allow you to expand your knowledge of the Hi-Technology world, and help earn its keep with its added uses in the field of education, communication and home business use.

## SOFTWARE

Make sure the system you choose has a growing library of support software, to enable you to realize the full potential of your machine.

## KEY POINTS TO LOOK FOR

### ● High Resolution Colour

In general most home computers have a poor graphics resolution (or detail). Check on the vertical and horizontal resolution in graphic mode and multiply the two numbers together. If the result is less than 35,000, then the graphics can hardly be considered high resolution.
Without high resolution graphics displays such as those used in games tend to be "Chunky" in appearance.

### ● High Quality Sound

Some computers claim to provide a sound channel when in reality all that can be found inside the computer is a small buzzer controlled by electronic pulses. At the very least a sound facility should provide more than one channel and a raise channel as well (for gun shot effects in games for example). The best systems also provide envelope control of the sound channels to produce very sophisticated effects; very important for generating music. Also look for the ability to connect to external amplifiers.

### ● Keyboard

For accurate entry of programs and data into a computer it is important that the keyboard has a good tactile feel in operation. Coupled with acoustic feedback the user is fully aware when the computer has accepted his/her actions. Also of importance in a keyboard is layout. A standard computer keyboard layout will familiarise the user with the vast majority of computers used in the world of business and professional applications; very important if the purpose of purchasing a computer is educational.

### ● RAM

One of the most important features of a computer is the amount of RAM, or memory, included. In general the more powerful and exciting a computer program is the more RAM it requires. But take care, all computers are advertised quoting the total RAM used in the system. Computers use up a great deal of their own RAM for storing essential data and particularly in supporting the graphics display and the CPU.
If it is less than 32K think again, is it enough?

### ● Computer Language

It is too dificult to program a computer in its own binary language so high level languages are used, the most popular being BASIC. However, there are a number of BASICs, some being very different from the rest.
A de facto standard in the computer industry is Microsoft BASIC.
Learn this one and you will be able to program in the majority of computer BASICs; such an important point if a home computer is to be used to educate your children to face the technology of the future.

### ● Expansion

As your interest and knowledge of computing grows, you will need a computer system that will grow with you; able to accommodate Printers, Disk-drives, Joysticks, Communications Modem, and Colour Monitor, as well as produce HI-FI sound effects.



*Choosing the right system carefully will save you from throwing your money away. Check full specification, plus peripherals and software prices, before you buy. Preferably choose a Real computer system that can expand to meet your needs.*

### ● Software

The computer you choose should have a growing selection of utility software to make the most of its capability.
Remember, computing is here to stay. You can't learn to compute on a toy, or a device which does not behave like a real computer.
In short, look out for a computer which offers all the points above, and you will be sure of getting the best value for money.

## To find out which company offers you the right choice, with:-

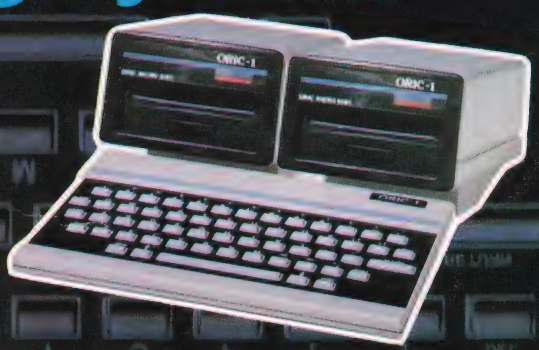
- Good value, high specification, quality micros.
- A quality, 4 colour, plain paper printer/ plotter.
- Communications Modem.
- Micro Disk Drives.
- Comprehensive and growing range of software

**TURNOVER...** →




# The Growing System




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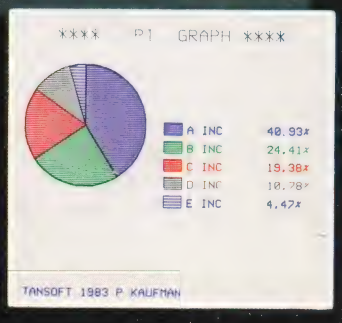
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A traditional adventure game in which the player has to find the 12 cunningly hidden signs of the Zodiac which lead him to greater treasures. The player manipulates objects through simple sentences which the program can understand and can ask for his score at any time. A save game feature is also included. Requires a 48k machine.
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This is a cassette-based implementation of FIG-FORTH, the language distributed by the Forth Interest Group in the United States. It has been extended to utilise the graphics and sound capabilities of the Oric. It is supplied with an editor and a full Forth assembler. A 96-page manual is included in the package. A demonstration music program is also supplied. Requires a 48k machine.
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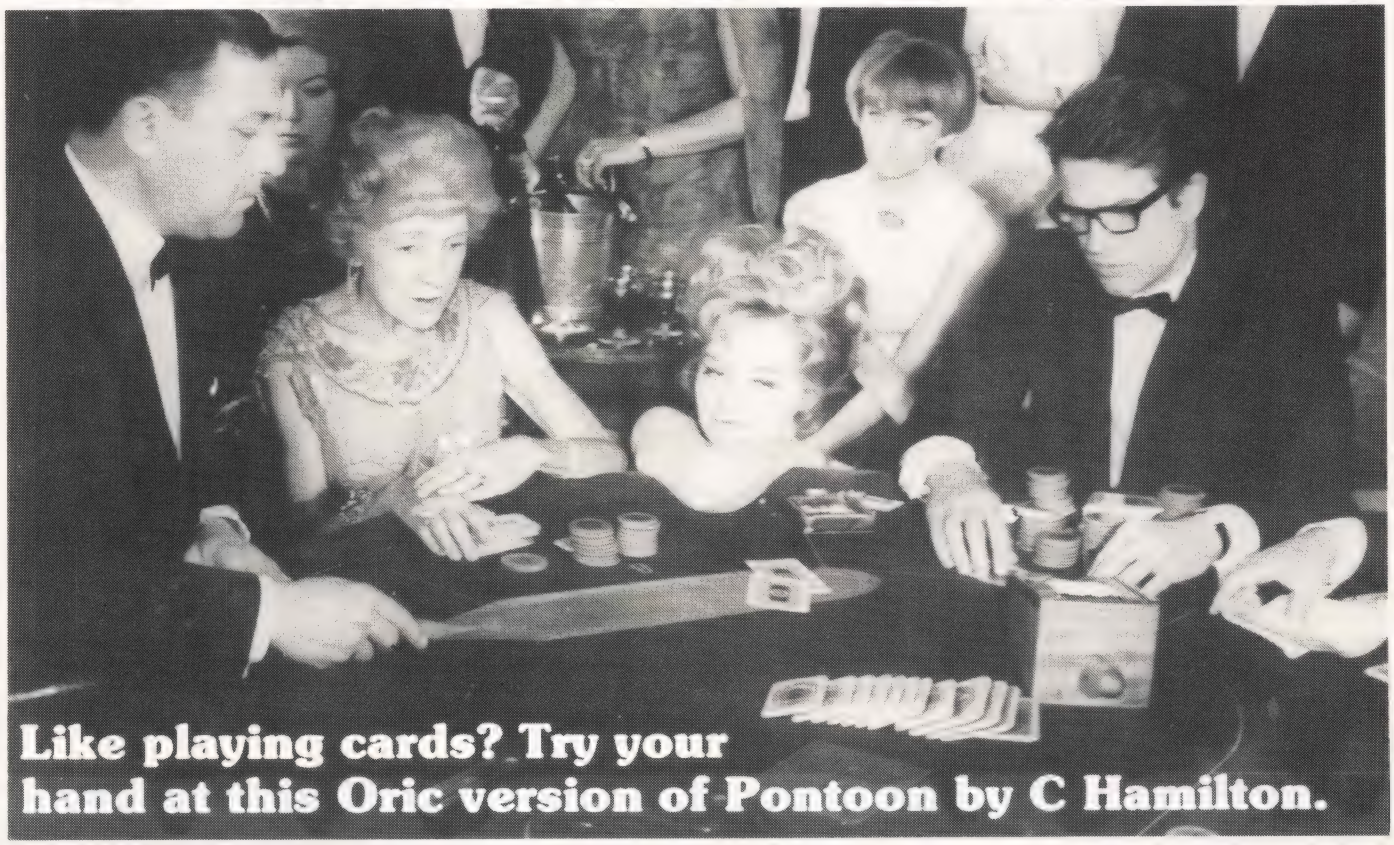
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## SOFTWARE

# TWISTER



**Like playing cards? Try your hand at this Oric version of Pontoon by C Hamilton.**

Twister is a card game which many of you will know better by its traditional names Pontoon or 21. Card sharpers amongst you will no doubt like this game as once addicted, always addicted.

It runs on an Oric 1 with 48K of memory. If you are unfamiliar with this game here's a brief run-down of it. The object of Twister is to build up a hand of cards totalling as close a number to 21 as possible without exceeding it. This version allows the ace tobe counted either as one or 11 as you chose. The face cards (Jack, Queen and King) are worth 10 points while all the others are scored by their pips.

In the program the computer takes the bank and deals, which means that to win you must *beat* the computer's hand. Equalling it just isn't good enough.

The game proceeds as follows:

a) Brief instructions are given.
b) You are asked to input the number of players, (up to six can play), and their names.
c) The computer shuffles the cards and deals one to itself and one to each player.
d) The players each have a turn to stake some money, you start with £100, the house limit is £499 and the smallest allowed is £1.
e) If the computer particularly likes its first card it can force the players to double their stakes. If a player can't he looses his stake and drops out of that hand.
f) The computer deals a second card to itself and each of the players.
g) Each player then, in turn, has a chance to 'twist' more cards or to 'stick' with what he has, with three exceptions — if your first two cards total 21 then you have a 'natural' and the computer assumes you want to stick, secondly if your last twist took you over 21 you are declared 'bust' and thirdly, if you manage to draw five cards which still total 21 or less you have a '5 & under' which is worth the same as a 21 (except a natural). Anyway you're only allowed five cards!
h) When all players have bust or decided to stick the computer can then draw cards.
i) The computer collects or pays out according to its and the players hands, the following grid shows each player's profit or loss; + = profit, − = loss and the numbers refer to multiples of each player's stake as shown in Fig. 1.
j) The game repeats from c) until all the players are out.

# TWISTER

**Fig. 1**

| Computer | Player | | | |
|---|---|---|---|---|
| | Natural | 21 or '5 & under' | under 21 | bust |
| Natural | -1 | -2 | -3 | -3 |
| 21 or '5&under' | +2 | -1 | -2 | -2 |
| under 21 | +3 | +2 | -1 or +1 | -1 |
| bust | +3 | +2 | +1 | -1 |

## HOW IT RUNS

The workings of the program are explained within REM statements so I won't duplicate them here but this list of variables will be useful.

| | |
|---|---|
| A$ | single character input |
| ACE% | number of aces in a hand |
| BUST | flag — score greater than 21 |
| CARD% | postion of card in hand |
| CARD$() | the cards |
| CM$ | players' command ie. twist or stick |
| CR%() | players' credits |
| CS% | value of computer's hand |
| HND$() | the hands |
| IN() | flags — players in game |
| IN | number of players still in game |
| LEGAL | flag — validity of stake |
| MS$ | message to be displayed |
| NC% | next card to be dealt |
| NM$() | players' names |
| NP% | number of players |
| PX%(),PY%() | co-ordinates for displaying cards |
| PY% | amount to collect/pay each player |
| S$() | values of cards, used in constructing cards |
| S0%,S1%,T$ | temporary variables in shuffle routine |
| SC%,SC%() | value of hands |
| ST$,ST% | stake input |
| ST%() | players' stakes |
| TS% | top players' score |
| V% | value of card |
| EQ$,SP$,TITLE$ | display strings |
| C,I,J,L,P,PP | loop counters |

## HINTS ON CONVERSION

The program has been written as a collection of subroutines, most of which could be transferred either directly or with little modification to most other machines. The three routines which involve graphics — BOARD, DEAL and MESSAGE — however will almost certainly have to be rewritten but the layout isn't really crucial. The PEEKs and POKEs used are explained in the REMs, some can be ignored on other machines or alternatives found. The same goes for the MUSIC, PLAY and PING commands. They're not essential but they do add something to the programs.

On those machines without REPEAT UNTIL it may be simulated as follows: replace the REPEAT line with REM REPEAT, replace the UNTIL with IF NOT (condition) THEN GOTO line number of REPEAT eg.

```
100 REPEAT          becomes    100 REM REPEAT
 .                               .
 .                               .
 .                               .
 .                               .
 .                               .
 .                               .
 .                               .
190 UNTIL A>10                  190 IF A<=10 THEN GOTO 100
```

In line 1070 the function SCRN (X,Y) returns the ASCII value of the character in the position with co-ordinates X,Y (NB. 0,0 is top left). It could be replaced with a PEEK, the purpose is to check whether or not the 'B' of "Banker" is where it should be, if it isn't then the screen must have scrolled and therefore the board needs to be redrawn.

On the Oric, and most other computers, TRUE = 1 ie. PRINT 1 = 1 will print -1, however some computers use 1. In these cases line 4540 must be changed to SC% = SC% + V% + 10 * (V% < 2).



# PROGRAM LISTING

```
1 REM ********************
2 REM **    Pontoon     **
3 REM ** © C Hamilton **
4 REM **  6th June 83   **
5 REM ********************
6 REM
7 REM
9 REM ** Goto preliminaries
10 GOSUB10000
99 REM ** Main Loop **
100 REPEAT
110 :  GOSUB SETUP      'Initialise
120 :  GOSUB SHUFFLE    'Shuffle pack
130 :  REPEAT
140 :    GOSUB PREPARE 'Reset variables
149 REM ** Deal first card to each player
150 :    CARD% = 1
159 REM ** Only deal to those players who are still in
160 :    FOR P=0 TO NP%
170 :      IF IN(P) THEN GOSUB DEAL
180 :    NEXT P
190 :    GOSUB STAKE    'Get each player's bet
199 REM ** If banker has a good card then double
200 :    IF VAL(HND$(0,1))<3 THEN GOSUB DOUBLE
209 REM ** Deal second card to each player
210 :    CARD% = 2
220 :    FOR P=0 TO NP%
230 :      IF IN(P) THEN GOSUB DEAL
240 :    NEXT P
250 :    GOSUB TWIST    'Give each player a chance to twist or stick
260 :    GOSUB BANKER   'Banker's turn
270 :    GOSUB PAYOUT   'Pay and collect
280 :    WAIT 300
289 REM ** Count the number of players still in
290 :    IN = 0
300 :    FOR P=1 TO NP%
310 :      IN = IN+IN(P)
320 :    NEXT P
329 REM ** Finish when all out
330 : UNTIL IN=0
339 REM ** Display message
340 : MS$ = "                    All out !" :GOSUB MESSAGE
350 : WAIT 200
359 REM ** Offer another game
360 : MS$ = "Another game ? " : GOSUB MESSAGE
370 : REPEAT
380 :    GET A$
390 : UNTIL A$="Y" OR A$="N"
400 UNTIL A$="N"
409 REM ** Restore screen
410 CLS
419 REM ** Clear top line
420 FOR I=#BB80 TO #BBA7
430 : POKE I,32
440 NEXT I
450 END
999 REM **  Get stake from each player **
1000 FOR P=1 TO NP%
1009 REM ** Check if player is still in
1010 : IF NOT IN(P) GOTO 1130
1020 : REPEAT
1030 :    LEGAL = TRUE
1039 REM ** Display credit and request bet
1040 :    MS$ = NM$(P)+" you have £"+MID$(STR$(CR%(P)),2)+" bet = "
1050 :    GOSUB MESSAGE
1059 REM ** Get bet
1060 :    INPUT ST$ : ST% = VAL(ST$)
1069 REM ** Check to see if screen layout has been corrupted
1070 :    IF SCRN(16,1)<>66 THEN GOSUB BOARD
1089 REM ** Check for house limit
1090 :    IF ST%>499 THEN LEGAL = FALSE
1099 REM ** Check that bet is possible
1100 :    IF ST%>CR%(P) OR ST%<1 THEN GOSUB BETBAD
1109 REM ** Repeat until a good bet is given
1110 : UNTIL LEGAL
1119 REM ** Store player's bet and display it beside his name
1120 : ST%(P) = ST% : PLOT 10,PY%(P),ST$
1130 NEXT P
1140 RETURN
1999 REM ** Player twists **
2000 FOR P=1 TO NP%
2009 REM ** Check if player is still in
2010 : IF NOT IN(P) GOTO 2130
2019 REM ** Calculate value of hand so far
2020 : GOSUB COUNT
2029 REM ** Check for 'Natural'
2030 : IF SC%=21 THEN GOSUB NATURAL : GOTO 2130
2039 REM ** Cards so far
2040 : CARD% = 2
2050 : REPEAT
2059 REM ** Offer option twist or stick
2060 :    MS$ = NM$(P)+" twist or stick " : GOSUB MESSAGE
2069 REM ** Get choice and check if layout corrupted
2070 :    INPUT CM$ : IF SCRN(16,1)<>66 THEN GOSUB BOARD
2079 REM ** Check for twist
2080 :    IF CM$="TWIST" OR CM$="T" THEN CARD% = CARD%+1 : GOSUB DEAL
2089 REM ** Recalculate value of hand
2090 :    GOSUB COUNT : SC%(P) = SC%
2094 REM ** Check for 'bust'
2095 :    IF BUST THEN MUSIC 1,0,1,0 : PLAY 1,0,1,800
2100 :    IF BUST THEN MS$ = NM$(P)+" you're bust !" : GOSUB MESSAGE : WAIT200
2109 REM ** Stop when bust or stick or 5 cards in hand
2110 : UNTIL CARD%=5 OR CM$="STICK" OR CM$="S" OR BUST
2119 REM ** Check for 21 and '5 & under' award bonus
2120 : IF (CARD%=5 AND NOT BUST) OR SC%(P)=21 THEN SC%(P) = 100
2130 NEXT P
2140 RETURN
2998 REM ** Banker's play **
2999 REM ** Reveal banker's hand
3000 FOR C=1 TO 2
3010 : PLOT PX%(0,C),PY%(0),MID$(HND$(0,C),2)
3020 NEXT C
3029 REM ** Calculate banker's value
3030 P = 0 : GOSUB COUNT : CS% = SC%
3039 REM ** Check for 'Natural'
3040 IF CS%=21 THEN CS% = 1000 : PING : RETURN
3049 REM ** Decide whether or not to stick
3050 IF CS%>17 AND RND(1)>.1 THEN RETURN
3059 REM ** Find top players' score
3060 TS% = 0
3070 FOR P=1 TO NP%
3080 : IF NOT IN(P) GOTO 3100
3088 REM ** Only consider those hands that aren't bust
3089 REM ** or 'naturals', a 'natural' can only be beaten by a 'natural'
3090 : IF (SC%(P)<22 OR SC%(P)=100) AND SC%(P)>TS% THEN TS% = SC%(P)
3100 NEXT P
3109 REM ** If better than players' top score then stick
3110 IF CS%>=TS% THEN RETURN
3120 P = 0 : CARD% = 2
3130 REPEAT
3139 REM ** Twist a card
3140 : CARD% = CARD%+1 : GOSUB DEAL
3149 REM ** Calculate new value
3150 : GOSUB COUNT : CS% = SC%
3154 REM ** Check for bust
3155 : IF BUST THEN MUSIC 1,0,1,0 : PLAY 1,0,1,800
3160 : IF BUST THEN MS$ = "Banker has bust !" : GOSUB MESSAGE : WAIT 200
3169 REM ** Check for 21 and '5 & under' and award bonus
3170 : IF (CARD%=5 AND NOT BUST) OR CS%=21 THEN CS% = 100
3179 REM ** Stop at 5 cards or bust or better than players' top
3180 UNTIL CARD%=5 OR BUST OR CS%>=TS% OR (CS%>17 AND RND(1)>.1)
3190 RETURN
3999 REM ** Pay out **
4000 FOR P=1 TO NP%
4009 REM ** Check if player is still in
4010 : IF NOT IN(P) GOTO 4200
4019 REM ** Check for draw, banker collects stake
4020 : IF CS%/SC%(P)=1 THEN PY% = -ST%(P) : GOTO 4150
4029 REM ** Check for banker having 'natural'
4030 : IF CS%<1000 GOTO 4070
4039 REM ** If player has 21 or '5 & under' then collect double stake
4040 : IF SC%(P)=100 THEN PY% = -2*ST%(P)
4049 REM ** If player is bust or under 21 then collect treble stake
4050 : IF SC%(P)<100 THEN PY% = -3*ST%(P)
4060 : GOTO 4150
4069 REM ** Check for banker having 21 or '5 & under'
4070 : IF CS%<100 GOTO 4110
4079 REM ** If player has 'natural' then pay treble stake
4080 : IF SC%(P)=1000 THEN PY% = 3*ST%(P)
4089 REM If player is bust or under 21 then collect double stake
4090 : IF SC%(P)<100 THEN PY% = -2*ST%(P)
4100 : GOTO 4150
4108 REM ** Banker is bust or under 21
4109 REM ** If player has 'natural' then pay treble stake
4110 : IF SC%(P)=1000 THEN PY% = 3*ST%(P)
4119 REM ** If player has 21 or '5 & under' then pay double stake
4120 : IF SC%(P)=100 THEN PY% = 2*ST%(P)
4129 REM ** If player's hand is closer to 21 then pay stake
4130 : IF SC%(P)>CS% AND SC%(P)<100 THEN PY% = ST%(P)
4139 REM ** If banker's hand is closer to 21 then collect stake
4140 : IF SC%(P)<CS% AND SC%(P)<100 THEN PY% = -ST%(P)
4149 REM ** Display verdict
4150 : IF PY%<0 THEN MS$ = NM$(P)+" owes the bank £"+MID$(STR$(PY%),2)
4160 : IF PY%>0 THEN MS$ = "Banker pays "+NM$(P)+" £"+MID$(STR$(PY%),2)
4170 : GOSUB MESSAGE : WAIT 200
4179 REM ** Pay or collect
4180 : CR%(P) = CR%(P)+PY%
4189 REM ** Check for player out of money
4190 : IF CR%(P)<1 THEN GOSUB BROKE
4200 NEXT P
4210 RETURN
4498 REM ** Count score on cards **
4499 REM ** Reset counters and flag
4500 SC% = 0 : ACE% = 0 : BUST = FALSE
4509 REM ** Total value of cards
4510 FOR C=1 TO 5
4519 REM ** Check for empty hand
4520 : IF HND$(P,C)="" THEN C = 5 : GOTO 4560
4529 REM ** Find value of card, check for ace
4530 : V% = VAL(HND$(P,C)) : IF V%=1 THEN ACE% = ACE%+1
4539 REM ** Add value of card to total, check for 10 and face cards
4540 : SC% = SC%+V%-(V%<2)*10
4560 NEXT C
4569 REM ** Decide whether aces to be 1 or 11
4570 REPEAT
4579 REM ** If there is an ace and the score > 21 then use ace as 1
4580 : IF SC%>21 AND ACE%>0 THEN SC% = SC%-10 : ACE% = ACE%-1
4590 UNTIL SC%<22 OR ACE%=0
4599 REM ** Check for bust
4600 IF SC%>21 THEN BUST = TRUE : SC% = 1
4610 RETURN
4998 REM ** Banker doubles **
4999 REM ** If card is a 10 or face card then only double sometimes
5000 IF VAL(HND$(0,1))=0 AND RND(1)>.6 THEN RETURN
5009 REM ** Inform players of doubling
5010 PING : WAIT 50 : PING
5020 MS$ = "         Banker doubles !" : GOSUB MESSAGE
```



# TWISTER

```
5025 WAIT 200
5029 REM ** Double stakes
5030 FOR P=1 TO NP%
5039 REM ** Check for player still in
5040 : IF NOT IN(P) GOTO 5080
5049 REM ** Check whether player has enough credit to double
5050 : IF CR%(P)<2*ST%(P) THEN GOSUB CANT : GOTO 5080
5059 REM ** Double stake
5060 : ST%(P) = 2*ST%(P)
5070 : PLOT 10,PY%(P),MID$(STR$(ST%(P)),2)
5079 REM ** Display doubled stake by player's name
5080 NEXT P
5090 RETURN
5098 REM ** Player can't double **
5099 REM ** Inform player of his predicament
5100 MS$ = NM$(P)+" you can't double"
5105 GOSUB MESSAGE : WAIT 200
5110 MS$ = "You're out !"
5115 GOSUB MESSAGE
5119 REM ** Display 'OUT' where his stake was
5120 PLOT 10,PY%(P),"OUT"
5129 REM ** Remove player from the game
5130 IN(P) = FALSE
5140 WAIT 200
5150 RETURN
5198 REM ** Player has natural **
5199 REM ** Inform player he has a 'natural'
5200 MS$ = NM$(P)+" you have a natural !"
5210 GOSUB MESSAGE : PING
5219 REM ** Award bonus
5220 SC%(P) = 1000 : WAIT 200
5230 RETURN
5298 REM ** Illegal bet made **
5299 REM ** Inform player that his bet is illegal
5300 MUSIC 1,1,1,0 : PLAY 1,0,1,800

5309 REM ** Check if bet exceeds credit
5310 IF ST%>CR%(P) THEN MS$ = "You only have £"+MID$(STR$(CR%(P)),2)
5319 REM ** Check if bet is stupid !
5320 IF ST%<1 THEN MS$ = "Ok, joker ! Try again."
5340 GOSUB MESSAGE
5350 WAIT 200
5359 REM ** Set flag
5360 LEGAL = FALSE
5370 RETURN
5498 REM ** Print message in reserved area
5499 REM ** Clear bottom three lines
5500 FOR L=24 TO 26
5510 : PLOT 1,L,SP$ : PLOT 8,L,SP$
5520 NEXT L
5529 REM ** Set cursor to 25th line
5530 POKE #268,25
5539 REM ** Print message
5540 PRINT : PRINT MS$;
5550 RETURN
5598 REM ** House limit **
5599 REM ** Clear bottom three lines
5600 FOR L=24 TO 26
5610 : PLOT 1,L,SP$ : PLOT 7,L,SP$
5620 NEXT L
5629 REM ** Set cursor to 25th line
5630 POKE #268,25
5639 REM ** Display message
5640 PRINT : PRINT "          House limit = £499"
5650 MUSIC 1,1,1,0 : PLAY 1,0,1,800
5660 WAIT 200
5669 REM ** Set flag
5670 LEGAL = FALSE
5680 GOTO 1100
5681 REM ** Nb. GOSUB not used because it would exceed max. nesting
5698 REM ** Player's credit exhausted **
5699 REM ** Remove player from the game
5700 IN(P) = FALSE
5709 REM ** Inform player of his demise
5710 MUSIC 1,1,1,0 : PLAY 1,0,1,3000
5720 MS$ = NM$(P)+" is broke, goodbye !"
5730 GOSUB MESSAGE
5740 WAIT 200
5750 RETURN
5999 REM **  Shuffle cards **
6000 MS$ = "Shuffling, please wait." : GOSUB MESSAGE
6009 REM ** Shuffle cards by repeatedly picking two and swapping them
6010 FOR C=1 TO 104
6020 : S0% = RND(1)*52+1 : S1% = RND(1)*52+1
6030 : T$ = CARD$(S0%) : CARD$(S0%) = CARD$(S1%) : CARD$(S1%) = T$
6040 NEXT C
6050 NC% = 1
6060 RETURN
6498 REM ** Deal a card **
6499 REM ** Assign card to player P's hand and increment next card pointer
6500 HND$(P,CARD%) = CARD$(NC%) : NC% = NC%+1
6509 REM ** Check for end of pack
6510 IF NC%>52 THEN GOSUB 6000
6518 REM ** Display card
6519 REM ** Don't display banker's first two cards
6520 IF P=0 AND CARD%<3 THEN PLOT PX%(P,CARD%),PY%(P)," ???"
6530 IF P>0 OR CARD%>2 THEN PLOT PX%(P,CARD%),PY%(P),MID$(HND$(P,CARD%),2)
6540 RETURN
6998 REM ** Prepare variables and screen **
6999 REM ** Clear stakes and cards
7000 FOR P=0 TO NP%
7010 : PLOT 9,PY%(P),SP$
7019 REM ** Empty hands
7020 : FOR C=1 TO 5
7030 :   HND$(P,C) = ""
7040 : NEXT C
7049 REM ** Reset stakes
7050 : ST%(P) = 0
7060 NEXT P
7070 RETURN
7999 REM ** Display board **
8000 CLS              'Clear screen

8009 REM ** Display top line
8010 FOR I=1 TO 40
8020 : POKE #BB7F+I,ASC(MID$(TITLE$,I,1))
8030 NEXT I
8039 REM ** Display headings in magenta (colour 5)
8040 PLOT 16,1,"BANKER" : PLOT 16,7,"PLAYERS" : PLOT 15,1,5 : PLOT 15,7,5
8049 REM ** Display separating lines (lines of ='s)
8050 PLOT 1,5,EQ$ : PLOT 1,23,EQ$ : PLOT 0,5,5 : PLOT 0,23,5
8060 PLOT 1,9," NAME   STAKE   CARDS" : PLOT 0,9,5
8069 REM ** Display players' data
8070 FOR PP=0 TO NP%
8079 REM ** Display name
8080 : PLOT 1,PY%(PP),NM$(PP)

8089 REM ** If player is out the display 'OUT' where stake would be
8090 : IF NOT IN(PP) THEN PLOT 10,PY%(PP),"OUT" : GOTO 8140
8099 REM ** If there is a current stake then display it
8100 : IF ST%(PP)>0 THEN PLOT 10,PY%(PP),MID$(STR$(ST%(PP)),2)
8109 REM ** Display cards
8110 : FOR C=1 TO 5
8120 :   PLOT PX%(PP,C),PY%(PP),MID$(HND$(PP,C),2)
8130 : NEXT C
8140 NEXT PP
8150 RETURN
8999 REM ** Set up game **
9000 CLS : PRINT : PRINT : PRINT
9009 REM ** Ask for number of players
9010 PRINT "How many players (max. = 6) ? ";
9019 REM ** Get number of players, only accept the numbers 1 to 6
9020 REPEAT
9030 : GET A$ : NP% = VAL(A$)
9040 UNTIL NP%>0 AND NP%<7
9045 PRINT A$ : PRINT : PRINT : PRINT
9049 REM ** Get each player's name
9050 FOR P=1 TO NP%
9060 : PRINT : PRINT "Player "P"'s name is ";
9069 REM ** If name is longer than 8 characters then just use first 8
9070 : INPUT NM$ : NM$(P) = LEFT$(NM$,8)
9080 NEXT P
9089 REM ** Player 0 is the computer
9090 NM$(0) = "COMPUTER"
9099 REM ** Set credit, stake and log player in
9100 FOR P=0 TO NP%
9110 : CR%(P) = 100 : ST%(P) = 0 : IN(P) = TRUE
9119 REM ** Empty hand
9120 : FOR C=1 TO 5
9130 :   HND$(P,C) = ""
9140 : NEXT C

9150 NEXT P
9159 REM ** Set computer's credit to max. (£32768)
9160 CR%(0) = #7FFF
9170 GOSUB BOARD
9180 RETURN
9998 REM ** Preliminaries **
9999 REM ** Clear screen and make it blue/white
10000 CLS : PAPER 7 : INK 4
10009 REM ** Dimension arrays
10010 DIM CARD$(52),HND$(6,5),NM$(6),S$(13)
10020 DIM IN(6),SC%(6),ST%(6),CR%(6),PY%(6),PX%(6,5)
10029 REM ** Define characters
10030 FOR I=1 TO 8
10040 : READ C
10050 : FOR J=0 TO 7
10060 :   READ D : POKE #B400+8*C+J,D
10070 : NEXT J
10080 NEXT I
10090 DATA 64,1,7,15,15,13,1,3,7      'Left half of spade
10091 DATA 91,0,48,56,56,24,0,32,48   'Right half of spade
10092 DATA 92,3,7,3,29,63,29,1,3      'Left club
10093 DATA 93,32,48,32,28,62,28,0,32  'Right club
10094 DATA 94,12,30,31,31,15,7,3,1    'Left heart
10095 DATA 123,24,60,60,60,56,48,32,0 'Right heart
10096 DATA 124,1,3,7,15,15,7,3,1      'Left diamond
10097 DATA 125,0,32,48,56,56,48,32,0  'Right diamond
10098 REM ** Build cards
10099 REM ** S$() = list of values
10100 FOR I=1 TO 13 : READ S$(I) : NEXT I
10105 DATA 1 A,2 2,3 3,4 4,5 5,6 6,7 7
10106 DATA 8 8,9 9,010,0 J,0 Q,0 K
10109 REM ** For each value
10110 FOR I=1 TO 13
10119 REM ** Spades
10120 : CARD$(I) = LEFT$(S$(I),1)+CHR$(0)+RIGHT$(S$(I),2)+"@["
10129 REM ** Clubs
10130 : CARD$(I+13) = LEFT$(S$(I),1)+CHR$(0)+RIGHT$(S$(I),2)+"\]"
10139 REM ** Hearts
10140 : CARD$(I+26) = LEFT$(S$(I),1)+CHR$(1)+RIGHT$(S$(I),2)+"^{"
10149 REM ** Diamonds
10150 : CARD$(I+39) = LEFT$(S$(I),1)+CHR$(1)+RIGHT$(S$(I),2)+"|}"
10160 NEXT I
10164 REM ** Cards are 6 characters long as follows:
10165 REM ** Chars    Meaning
10166 REM **    1     value for scoring routine
10167 REM **    2     colour: 0 = black, 1 = red
10168 REM **  3-4     value for display
10169 REM **  5-6     suit symbol
10199 REM ** Read in co-ords for plotting each players cards
10200 FOR P=0 TO 6
10210 : READ PY%(P)
10220 NEXT P

10225 DATA 3,11,13,15,17,19,21
10230 FOR C=1 TO 5
10240 : READ X%
10250 : FOR P=0 TO 6 : PX%(P,C) = X% : NEXT P
10260 NEXT C
10265 DATA 14,19,24,29,34
10299 REM ** Define line-numbers
10300 STAKE = 1000 : TWIST = 2000 : BANKER = 3000
10310 PAYOUT = 4000 : COUNT = 4500: DOUBLE = 5000
10320 CANT = 5100 : NATURAL = 5200 : BETBAD = 5300
10330 MESSAGE = 5500 : HOUSELIMIT = 5600 :BROKE = 5700
10340 SHUFFLE = 6000 : DEAL = 6500 :PREPARE = 7000
10341 REM ** This is not necessary but it does make reading the program easier
10350 BOARD = 8000 : SETUP = 9000
10398 REM ** Define strings
10399 REM ** 17 spaces, PONTOON, 16 spaces
10400 TITLE$="                PONTOON                "
10409 REM ** 30 spaces

10410 SP$ = "                              "
10419 REM ** 36 ='s
10420 EQ$ = "===================================="
10499 REM ** Instructions
10500 PRINT : PRINT : PRINT
10510 PRINT "  This is the game of PONTOON" : PRINT : PRINT
10520 PRINT "  To play you try to get a hand of" : PRINT
10530 PRINT "cards which totals as close to 21 as" : PRINT
10540 PRINT "possible, aces count as either 1 or" : PRINT

10550 PRINT "11 as you wish and all face cards" : PRINT
10560 PRINT "count as ten." : PRINT : PRINT
10570 PRINT "  You are playing against the bank" : PRINT
10580 PRINT "and must beat it to win." : PRINT : PRINT
10590 PRINT "  The house limit on bets is _499."
10600 PRINT : PRINT
10610 PRINT "      Press SPACE to continue.";
10619 REM ** Wait until SPACE is pressed
10620 REPEAT : GET A$ : UNTIL A$ = " "
10900 RETURN
```

# Announcing more exciting programs for the BBC.

Acornsoft is the software division of Acorn Computers, the company that designed and built the BBC Microcomputer. Here are four more exciting programs, all designed to get the most from your BBC Micro.

Starship Command (£9.95) is a demanding high-resolution graphics game in which you command a starship against attacking alien ships. You control the forward drive and rotational thrust of your ship, which is equipped with shields, long and short-range scanners and a sector display of the stars and alien ships.

Countdown to Doom (£9.95) is a race against time as you strive to repair your damaged space ship in the corrosive atmosphere on the planet Doomawangara (Doom). Beat the clock or resign yourself to a life in the wilderness of Doom.

Business Games (£9.95) is a cassette containing two games designed for economics, business or general studies teaching.

In Stokmark, up to eight players compete in buying and selling shares aided by a screen display of relevant market information.

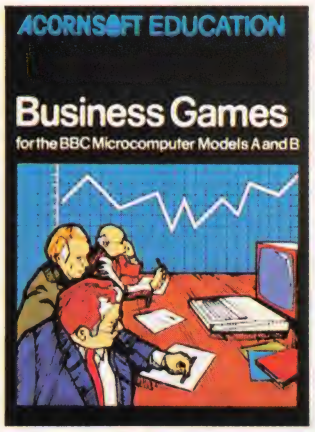
In Telemark, players compete to dominate in the manufacture and sale of televisions. The winner is the one who makes the largest profit or controls over half the total market.

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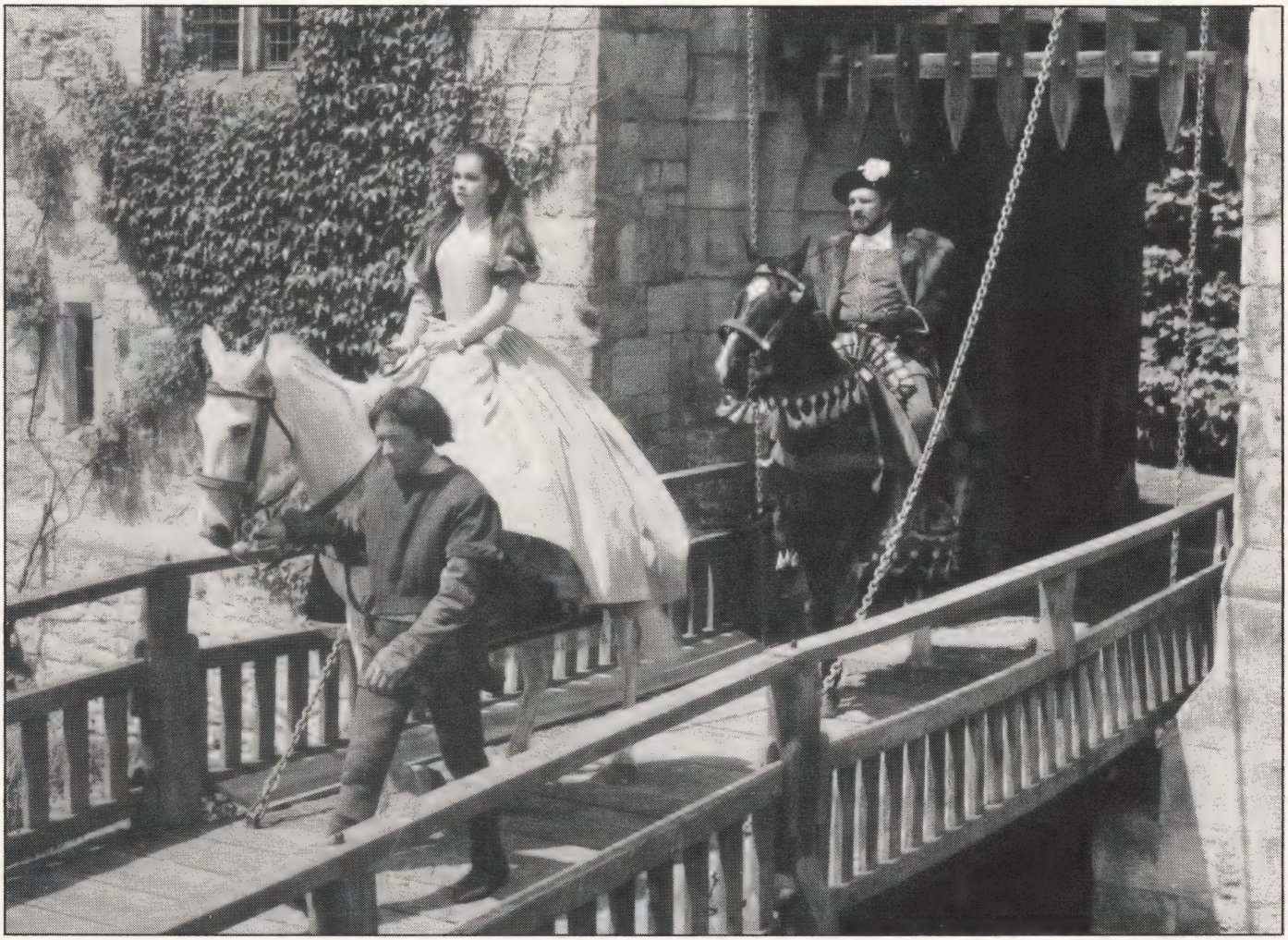
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SOFTWARE

# KING OF THE CASTLE



## Teaching your children to count? Try out this program written specifically for this purpose by N L Biggs.

King of the Castle is designed for very young children who are learning to count. It does not presuppose any ability to read or recognise number symbols, so it really is for beginners.

A man stands at the foot of a flight of steps. The object of the game is to put him on the top step, the number of steps being a random number between three and 10. His movement is controlled by the red keys f0-f9, representing the numbers from 1 to 10.

If the correct number is chosen, the man stands on the top step, with hands raised, and sings that old ditty 'I'm the king of the castle'. If a smaller number is chosen, the man stands on the corresponding lower step. If a larger number is chosen, he falls to the ground with appropriate sounds and gestures.

The program is written in a straightforward style and could easily be adapted to teach simple sums or the recognition of number symbols. For very young children, all the keys except the top row could be covered in some way, and the confusing symbols f0-f9 could be obscured by opaque tape. As an extra precaution against trigger-happy toddlers, the BREAK key is redefined as a restart button!

## HINTS ON CONVERSION

On machines other than the BBC, the user-defined function keys f0-f9 must be replaced by appropriate alternatives, possibly the ordinary numerical keys.

If user-defined characters are not available, then sutiable dots and letters may suffice to represent the man. It is really a matter of defining your own character. Why not use the PCT Shape Maker free with this issue?

As always, the standard methods of replacing procedures with GOSUBS, and REPEAT...UNTIL loops with blocks followed by IF (condition not satisfied) THEN GOTO (start of block) can be used.

# KING OF THE CASTLE

## HOW IT RUNS

**Lines 30-300** The main block of the program. Line 40 switches off the cursor. Lines 60-70 draw the steps and line 90 calls for the response. The screen is cleared of previous attempts in lines 100-130, and then the new response is implemented. It goes to line 230 if the response is correct or too large, while if it is too small then lines 170-200 put the man on the appropriate step. Lines 210-220 clear the sound buffer and await the next response. Finally, lines 250-300 allow a three-second pause before a new problem is set up.

**Lines 310-480** This procedure sets up the user-defined characters (in lines 320-360) and assigns the relevant values to the keys f0-f9 (in lines 370-460). Lines 470 ensures that the BREAK key functions as a restart button.

**Lines 490-590** This procedure draws the flight of steps.

**Lines 600-710** PROCking puts the man on the top step with arms raised (lines 610-620), and plays 'I'm the king of the castle' (lines 630-700).

**Lines 720-930** This procedure draws the falling man, with sounds and gestures. Lines 730-810 print the man in a succession of positions, and ends with a groan (line 830). Then the man sits on the ground shaking his fist (lines 840-920).

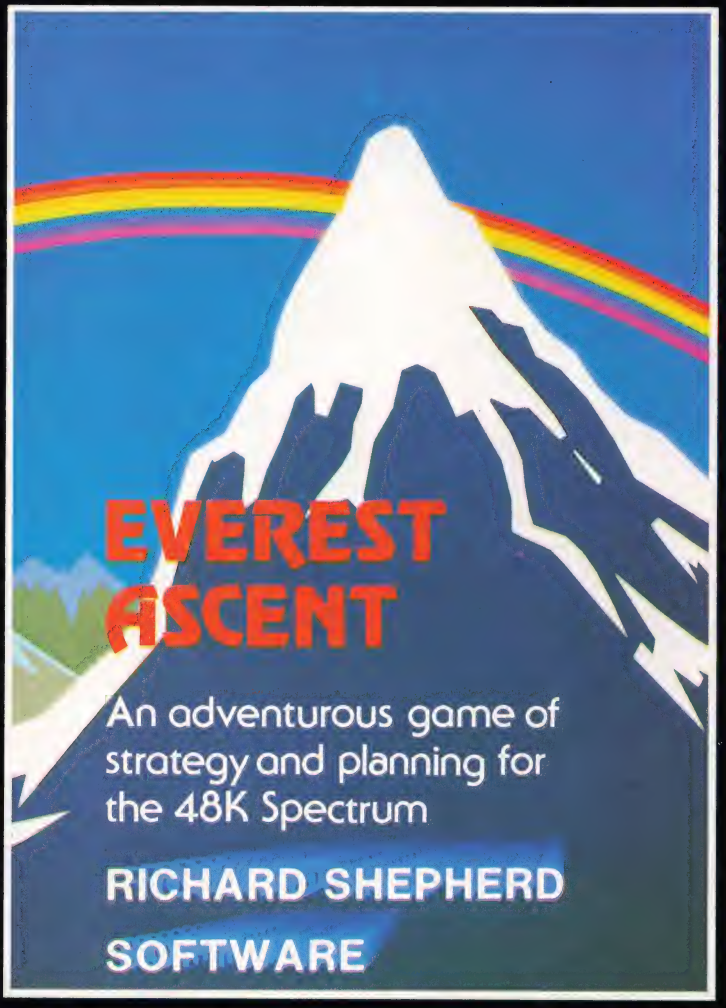
**NOTE** In order to restore the usual function of the BREAK key after running this program it is necessary to type Escape, Return, *Key 10, Return. The BREAK key then functions normally.

## PROGRAM LISTING

```
 10REM KING OF THE CASTLE
 20REM COPYRIGHT N L BIGGS 1983
 30MODE4
 40VDU23;8202;0;0;0;
 50PROCdefns
 60R%=RND(8)+1
 70PROCsteps(R%)
 80X%=1:Y%=1
 90K%=GET
100PRINT TAB(3,19);" "
110PRINT TAB(3,18);" "
120PRINT TAB(X%,Y%+1);" "
130PRINT TAB(X%,Y%);" "
140N%=K%-46
150X%=3*N%:Y%=19-N%
160 IF N%)=R%+2 THEN GOTO 230
170PRINT TAB(X%,Y%);CHR$(224)
180PRINT TAB(X%,Y%+1);CHR$(225)
190L%=5+8*N%
200SOUND&0011,-10,L%,10
210*FX 15,1
220GOTO90
230IF N%=R%+2 THEN PROCking(X%,Y%)
240IF N%)R%+2 THEN PROCfall(X%,Y%)
250TO=TIME
260REPEAT UNTIL (TIME-TO) ) 300
270*FX 15,1
280CLS
290GOTO60
300 END
310DEF PROCdefns
320VDU23,224,0,0,24,24,16,124,186,185
330VDU23,225,56,56,56,40,44,36,36,36
340VDU23,226,0,0,154,154,146,124,56,56
350VDU23,227,124,90,82,124,56,56,56,239
360VDU23,228,121,89,82,124,56,56,56,239
370*KEY0 0
380*KEY1 1
390*KEY2 2
400*KEY3 3
410*KEY4 4
420*KEY5 5
430*KEY6 6
440*KEY7 7
450*KEY8 8
460*KEY9 9
470*KEY10)"OLD IM RUN IM"
480ENDPROC
490DEF PROCsteps(R%)
500MOVE165,380
510FOR S%=0 TO R%
520DRAW165+95*S%,410+32*S%
530DRAW260+95*S%,410+32*S%
540NEXT S%
550DRAW260+95*R%,380
560 DRAW165,380
570PRINT TAB(3,19);CHR$(225)
580PRINT TAB(3,18);CHR$(224)
590ENDPROC
600DEFPROCking(X%,Y%)
610PRINT TAB(X%,Y%);CHR$(226)
620PRINT TAB(X%,Y%+1);CHR$(225)
630SOUND1,-10,117,5
640SOUND1,0,117,3
650SOUND1,-10,117,3
660SOUND1,-10,110,5
670SOUND1,-10,117,5
680SOUND1,-10,121,5
690SOUND1,-10,117,10
700SOUND1,-10,101,10
710ENDPROC
720DEFPROCfall(X%,Y%)
730FOR H%=Y% TO 17
740L%=193-8*H%
750SOUND1,-10,L%,2
760FOR T=1 TO 100:NEXT T
770PRINT TAB(X%,H%+1);" "
780PRINT TAB(X%,H%);" "
790PRINT TAB(X%,H%+2);CHR$(225)
800PRINT TAB(X%,H%+1);CHR$(224)
810NEXT H%
820PRINT TAB(X%,18);" "
830SOUND1,-12,5,30
840T1=TIME
850REPEAT
860PRINT TAB(X%,19);" "
870PRINT TAB(X%,19);CHR$(227)
880FOR T=1 TO 600:NEXT T
890PRINT TAB(X%,19);" "
900PRINT TAB(X%,19);CHR$(228)
910FOR T=1 TO 600:NEXT T
920UNTIL (TIME-T1) )300
930ENDPROC
```

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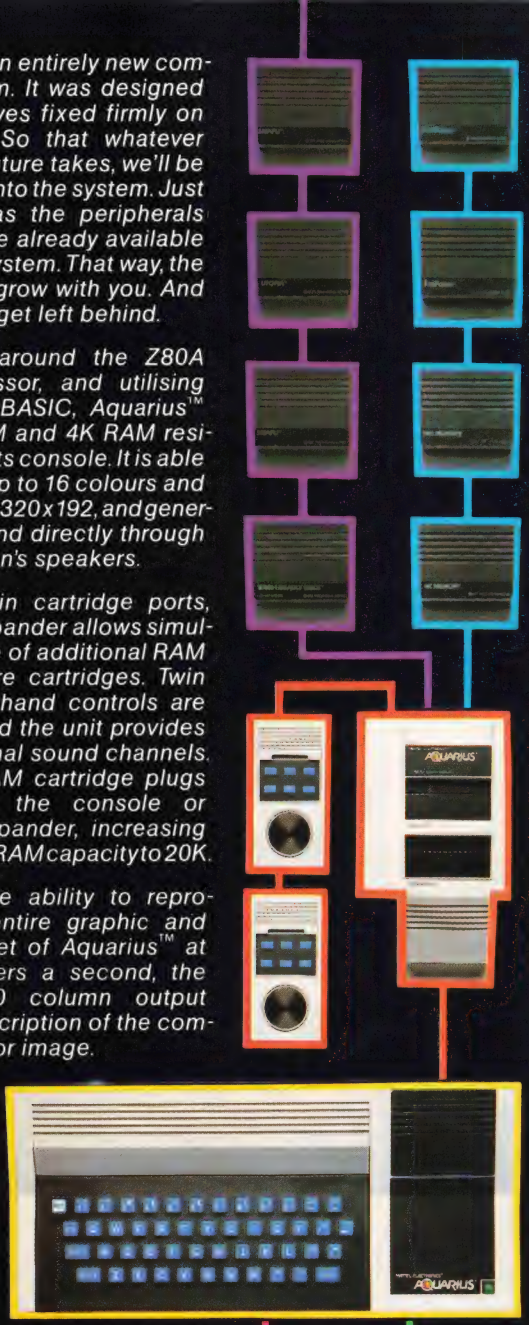
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● *With twin cartridge ports, the mini-expander allows simultaneous use of additional RAM and software cartridges. Twin disc game hand controls are included and the unit provides two additional sound channels. The 16K RAM cartridge plugs into either the console or the mini-expander, increasing Aquarius™'s RAM capacity to 20K.*

● *With the ability to reproduce the entire graphic and character set of Aquarius™ at 80 characters a second, the printer's 40 column output allows transcription of the complete monitor image.*



● *Using standard audio cassettes, the data recorder provides storage for programs and information, and allows the use of cassette based software. Incorporating a digital tape counter and transmission indicator, it operates sequential searching.*

● *A large number of games, designed to take advantage of Aquarius™'s sophisticated colour and sound capabilities, are available on cartridges that plug into the console either direct, or through the mini-expander. Cassette based games can be used via the data-recorder.*

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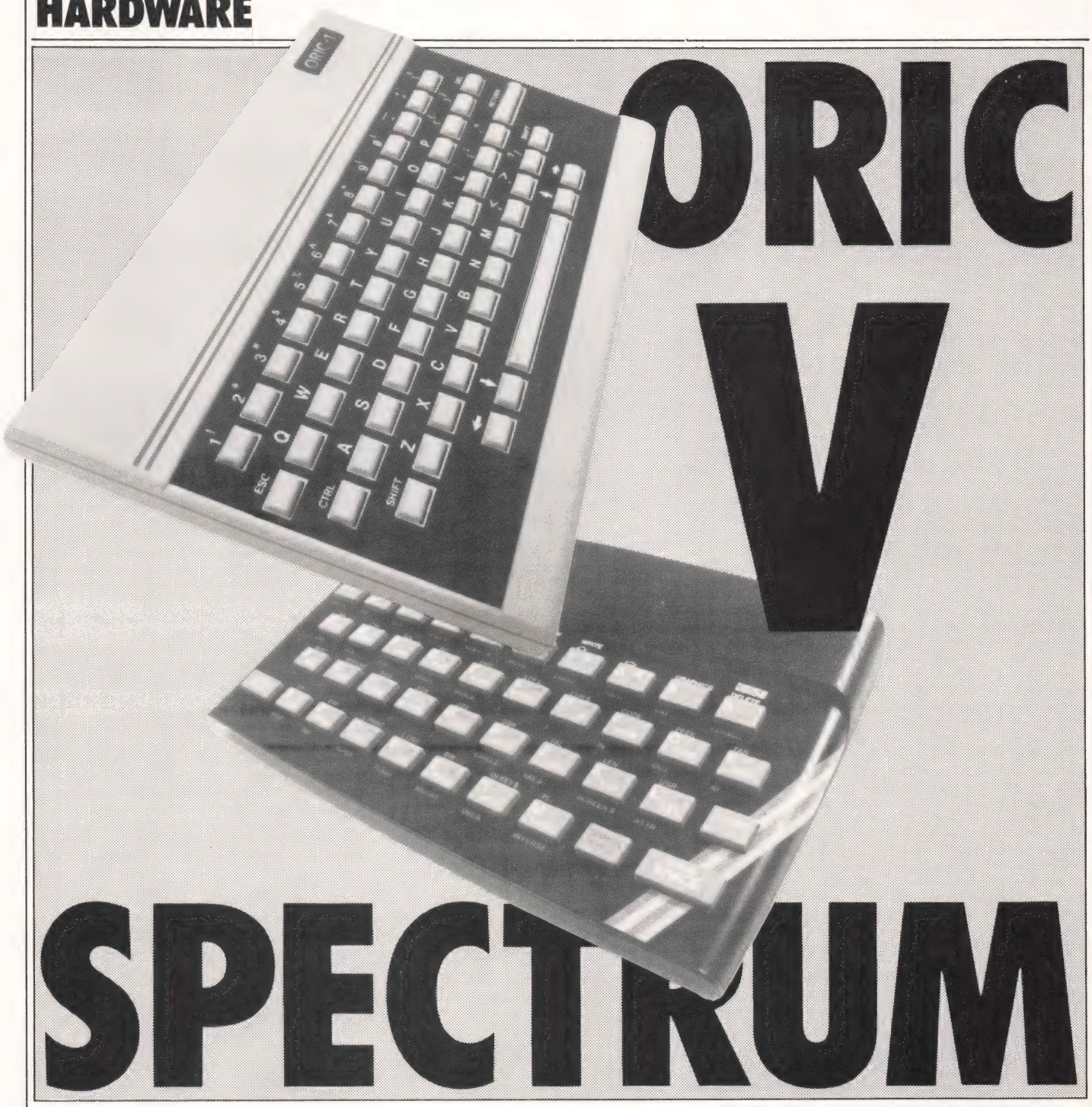
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## HARDWARE



# ORIC V SPECTRUM

**With the recent Oric price drop making it a more direct competitor to the Spectrum we thought it was time to find out which computer gives the best value for money. David Nowotnik sits in judgement.**

How things have changed in a year. Last summer, if you wanted a cheap home computer you had a frustrating wait, often months, for your micro to be delivered by post. Now, you just pop into your local retail store, hand over cash, and take it away. However, in certain ways, things were easier then; there were fewer models to choose from, and the price usually dictated which one you bought. Now, there are so many it's difficult to make a choice.

To try and help you with that decision, I'm taking a side-by-side look at two of today's most popular computers, the ZX Spectrum and the Oric. Both cost around £100, and both offer colour, high resolution graphics, and sound.

So how do you decide between them? There may be individual features which will attract you to one or the other, or it may be an overall impression. So, I shall be looking at several aspects of these computers. As a summary, I have awarded each ▶

# ORIC V SPECTRUM

computer a mark out of ten in each category (Fig 1.), so you should see at a glance which I consider better in each area. To start off we're getting....




## Down to Basic

Both computers offer BASIC as their standard programming language. The Oric offers a variant of Microsoft BASIC, one of the accepted computer industry standards, while the Spectrum has its own 'Sinclair' BASIC.There are several differences, notably the string handling routines, high resolution, and sound capabilities. So, if your choice of computer is one of a stepping stone to a more powerful model later, the Oric might be a better choice.

Overall, the Spectrum offers a more powerful translator. The Oric lacks VERIFY, MERGE, facilities for saving files, and no in-built disc handling commands. There are several unforgivable 'bugs' in Oric's ROM (although, it is rumoured that a new ROM is being produced).

With the Oric, you have the conventional system of typing in every letter of a program line; the Spectrum has a keyword system. This means, you'll be typing programs into the Oric faster than the Spectrum when you first get the computer home. With the Spectrum, you'll need to understand a little bit about BASIC first, and learn to find the keywords. Once you do, keying a program into the computer should be faster on the Spectrum.

A big plus for the Spectrum is the syntax check on entry. This prevents you making a syntax error in all program lines. On the Oric, you have to RUN the program to be informed of syntax errors. Most system messages are less helpful on the Oric than the Spectrum. Spectrum-1, Oric-Nil!

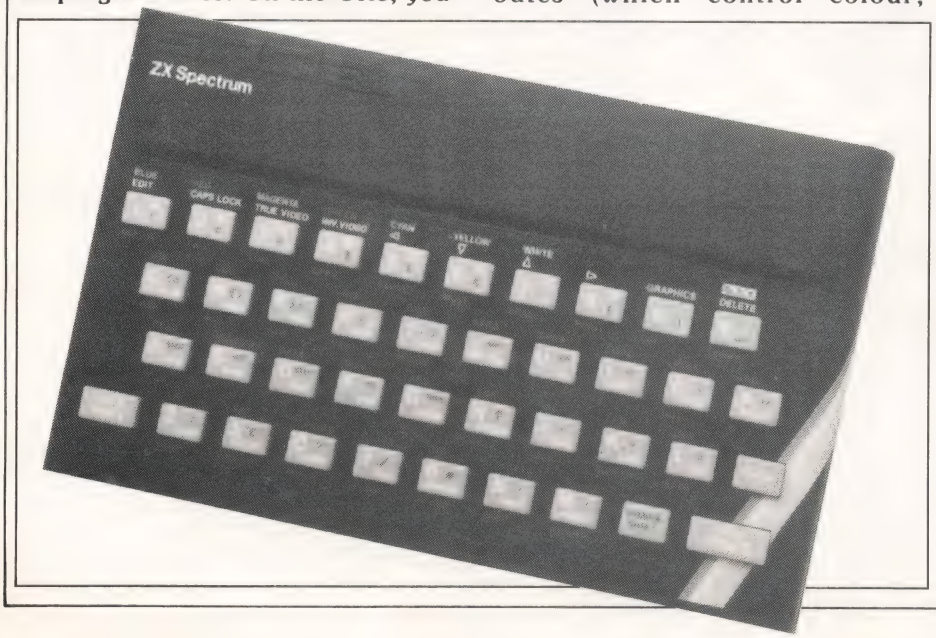
## The display

If you take a PEEK at my ratings, you'll see I've given the two computers equal marks on display. This is not to say that they are the same, but they have equal, but different, merits. Let's take a look at the Spectrum first.

The Spectrum display provides 32 x 24 characters in low resolution, and 256 x 192 pixels in high resolution. Low and high resolution can be freely mixed, although control of colours is confined to low resolution only. Although the display file has a complex layout, this is of no concern to the BASIC programmer. Attributes (which control colour, BRIGHT, and FLASH) are stored in a separate area of RAM, which is suited to easy programming.

The Oric has two display modes, TEXT and HIRES. In TEXT you set 40 x 28 characters (normally reduced to 38 x 27). You are provided with two character sets, the normal alphanumeric characters plus the teletext set. Any character can be redefined, if required (the Spectrum provides 21 user defined graphic characters). HIRES mode gives you control of 240 x 200 pixels, with three lines of TEXT at the base of the screen.

Both computers give you eight colours, and a modest range of high resolution commands. The Oric has a serial arrangement for attributes, which saves on RAM, but can make programming for colourful moving graphics a nightmare. So, the Spectrum will be better for games, but the larger screen format and small display file of the Oric make it better for 'serious' applications.




## Sound

There can be no question that the Oric wins in this category. Although some impressive effects can be achieved on the Spectrum with BEEP, or in machine code, the hardware is so arranged that while you are producing sound, the computer cannot do anything else. Also, the volume of sound on the Spectrum is very timid.

By comparison, the Oric has a powerful sound generator chip in-built. There are four pre-programmed sounds plus commands SOUND, MUSIC, and PLAY to create your own sounds. The Oric has three channels of sound, compared with one on the Spectrum.




## Keyboard

Both computers are let down by the quality of their keyboards. They both have moving keys (just!); on the Spectrum the keys are made of rubber. The best description I've heard is — it feels like 'cold flesh'! The Oric keys are white plastic. The separation of keys on the Oric is standard, but the keys are under half size, which makes typing difficult, to say the least.

Although I have a preference for the Spectrum keyboard, it seems to be a minority view. The Oric does have the advantage of a proper space bar, with cursor control keys sited conveniently beside the Space key. So, the Oric just wins here.

## Expansion

Ever since it was launched, the ZX printer has been available to produce hard copies of programs and data. Although the quality of the printer is poor, it remains excellent value for money. However, other add-ons for the Spectrum have been slow to emerge from Sinclair. Still, there are quite a few small companies producing interfaces and other goodies. And, at long last, we have the Microdrives and RS232 interface from Sincliar.

Included in the price of an Oric is a Centronics-type interface which allows you to plug into the Oric a good quality printer. (You have to pay extra for this with the Spectrum). At the time of writing, Oric microdisc drives are promised. Having become cynical about computer manufacturers promises, I can't take this into consideration. So, the Spectrum has the advantage of more expansion possibilities, although the Oric is better designed for expansion. Therefore, time might alter my ratings.

## Software

If you're going to depend a lot on commercial software to feed your micro, then the Spectrum has a big advantage. There must be programs on almost every conceivable home use, and an almost endless stream of games. The quality is often excellent, and the price reasonable.

Early Oric commercial software was attrocious. The quality is improving, and the price is falling, but there still isn't much *good* software about. However, there is never likely to be as much high quality software for the Oric as the Spectrum.

## Value for money

Tumbling prices in the face of competition has been good news for the consumer. Both computers represent excellent value for money. Both 16K models are priced at £99.95; the 48K Spectrum is £10 cheaper than its Oric counterpart at £129.95. So, the value for money rating just favours the Spectrum. Personally, I believe the Spectrum is a better computer, and a better buy. But, beauty, they say, is in the eye of the beholder!

**Fig. 1. Ratings of the Spectrum and the Oric**

| | Basic | Display | Sound | Keyboard |
|---|---|---|---|---|
| Oric | 5 | 7 | 8 | 5 |
| Spectrum | 8 | 7 | 4 | 4 |
| | **Expansion** | **Software** | **Value for money** | **Average** |
| Oric | 4 | 3 | 8 | 6 |
| Spectrum | 6 | 8 | 9 | 7 |

# 'NOW WIN THE POOLS'

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I know that you are now utterly flabbergasted, it always happens to everyone with whom I come into contact. Please just sit back and **imagine** for a moment my **FIRST DIVIDEND** wins alone — they now number 765 (seven hundred and sixty-five) and will probably be even more by the time this advertisement appears in print.

I AM NUMBER ONE IN THE WORLD AND NO ONE DISPUTES IT.

For as long as I continue to enter the Football Pools my wins will continue. I have already said, they apply, with equal success to both English and Australian Football Seasons.

I intend to release a STRICTLY LIMITED NUMBER of copies of my cassette, (either for Sinclair ZX81 or Sinclair Spectrum) — DO NOT DELAY AND FIND YOU ARE TOO LATE, in which case I would have to refund your money.

I am so confident of **YOUR** success that if do **not** win at least THREE FIRST TREBLE CHANCE DIVIDENDS in the first 20 weeks of entering, I will completely cancel the balance of the purchase price and you do not have to pay me another penny, at any time, no matter how vast your winnings.

I only wish that space would allow me to give you photographs of my winnings slips, cancelled cheques, etc, but it is of course impossible — they now number 8,201 dividends. I have however given JUST A FEW EXTRACTS from ORIGINAL LETTERS I hold from my small Clientele.

I am the Inventor and Sole Proprietor of my method, Registered as EUREKA — ('I have found it'). I am known as The Professor in Pools Circles — I am of the Highest Rank in Forecasting — this is beyond dispute. I am marketing a limited number of Computer Cassettes, under my Registered Company — FOOTBALL ENTERPRISES.

My initial charge for a copy was £75, but for this SPECIAL REDUCED PRICE OFFER I will send you a copy, (for ZX81 or Spectrum) for £20, (twenty pounds) ONLY, plus your Promise to pay me the balance of £55 — **ONLY** IF YOU WIN AT LEAST THREE FIRST TREBLE CHANCE DIVIDENDS IN YOUR FIRST 20 WEEKS OF ENTERING — otherwise you owe me NOTHING FURTHER.

This is surely proof absolute of my supreme and utter confidence in my own abilities and in the capabilities of my discovery. I could easily CHARGE £2,000 per cassette on the evidence I possess, but that would not be fair to everyone, which is what I want to do.

My method is WORLD COPYWRIGHT, any infringement and immediate proceedings will be taken, without prior warning. It is truly ingenious and has stood the test of time.

My cassette is simplicity itself to operate and you'll be given FULL DETAILS for weekly calculating. Your entry need not involve you in any large weekly stakes, you can enter for as little as 25p, if you wish.

I charge NO COMMISSION on any of your wins — no matter how BIG they may be.

I realised a long time ago, that it was no good sitting down and **dreaming** about winning the pools, so I burnt the candle at both ends, working late into the night, occasionally RIGHT THROUGH THE NIGHT, I **KNEW** there was a way, eventually it all paid off and has been doing so ever since.

I am unable to vary my offer to anyone, so please do not request it, as I shall very easily dispose of the cassettes I have prepared and am making available.

IMMEDIATELY I perfected my method I commenced winning right away, (first with just a little £163, the first week I used it), I HAVE NEVER LOOKED BACK SINCE, amongst all those dividends was one for over **EIGHT THOUSAND POUNDS** for just **one eighth of a penny stake.**

I will release a copy on cassette, to you, on receipt of the completed order form and your Signature thereon, confirming you will treat it in the STRICTEST CONFIDENCE between us and retain it for your **OWN USE ONLY.**

**PLEASE NOTE:**
If you happen to be the proud owner of a Computer, **other than** a Sinclair ZX81 or Sinclair Spectrum, you can still purchase a copy of my method, for the same price and program it YOURSELF on to YOUR OWN COMPUTER.

Don't take my word for it, read what people write about me and my method:—

*I won on Zetters last weekend. It was not a big sum, but all the same it was a very nice surprise for me.* J.C., Lancs.

*I appreciate the straightforward method you adopt, which is such a contrast to the rubbish of misrepresentation which is so common in the Betting World, by unscupulous and self-opinionated charlatans.* C.H., Devon

*Winnings cheque received today, sincere thanks.* D.N., Devon

*I congratulate you on your achievement.* R.R., Wales

*I should like to thank you for a most exciting season and look forward to hearing from you again.* J.C., Hants.

*I would like to acknowledge cheque and say how much I appreciate your integrity.* J.M., Scotland

*Many thanks for your system, it is all you say and more.* J.C., Lancs.

*Your wonderful system won me £3,527. I intend to visit London soon and will be able to come and see you personally.* (Overseas Client). P.M., Kampala.

*Many thanks for trying so hard to please us all, your brother should be thanked also. One of our daughters, WHOSE HUSBAND YOU HELPED ENORMOUSLY, has just phoned, the four of them have just spent a lovely holiday in Spain.* K.R.,Isle of Man.

*I sent in my FIRST entry last week and won 2nd and 3rd dividends, as you will see from the enclosed certificate. One more and I would have collected over £400 for FIRST dividend. Once I've won a fair amount I shall be staking from winnings and at 2p per line, A FIRST DIVIDEND last week at this would have been over £3,000.* C.A., Yorks.

I am very interested indeed and enclose £20 herewith. I agree to pay you the balance of £55 **ONLY** if I win at least THREE FIRST TREBLE CHANCE DIVIDENDS in my first 20 weeks of entering — otherwise I owe you NOTHING FURTHER at any time — no matter how much money I win. My Signature below is my Undertaking to retain complete and absolute confidence about the method.

Name.....

Address.....

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.....

Signature ..... PCT 2

**The Managing Director,**
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**'Anvon',**
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Please tick if cassette is for:
Sinclair ZX81 (16K) ☐
Sinclair Spectrum (48K) ☐
Any other Computer ☐

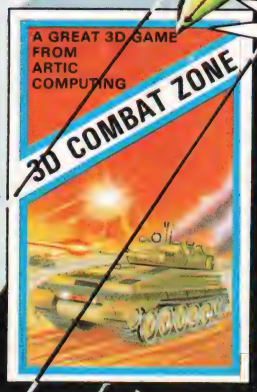
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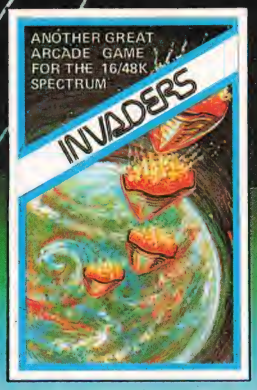
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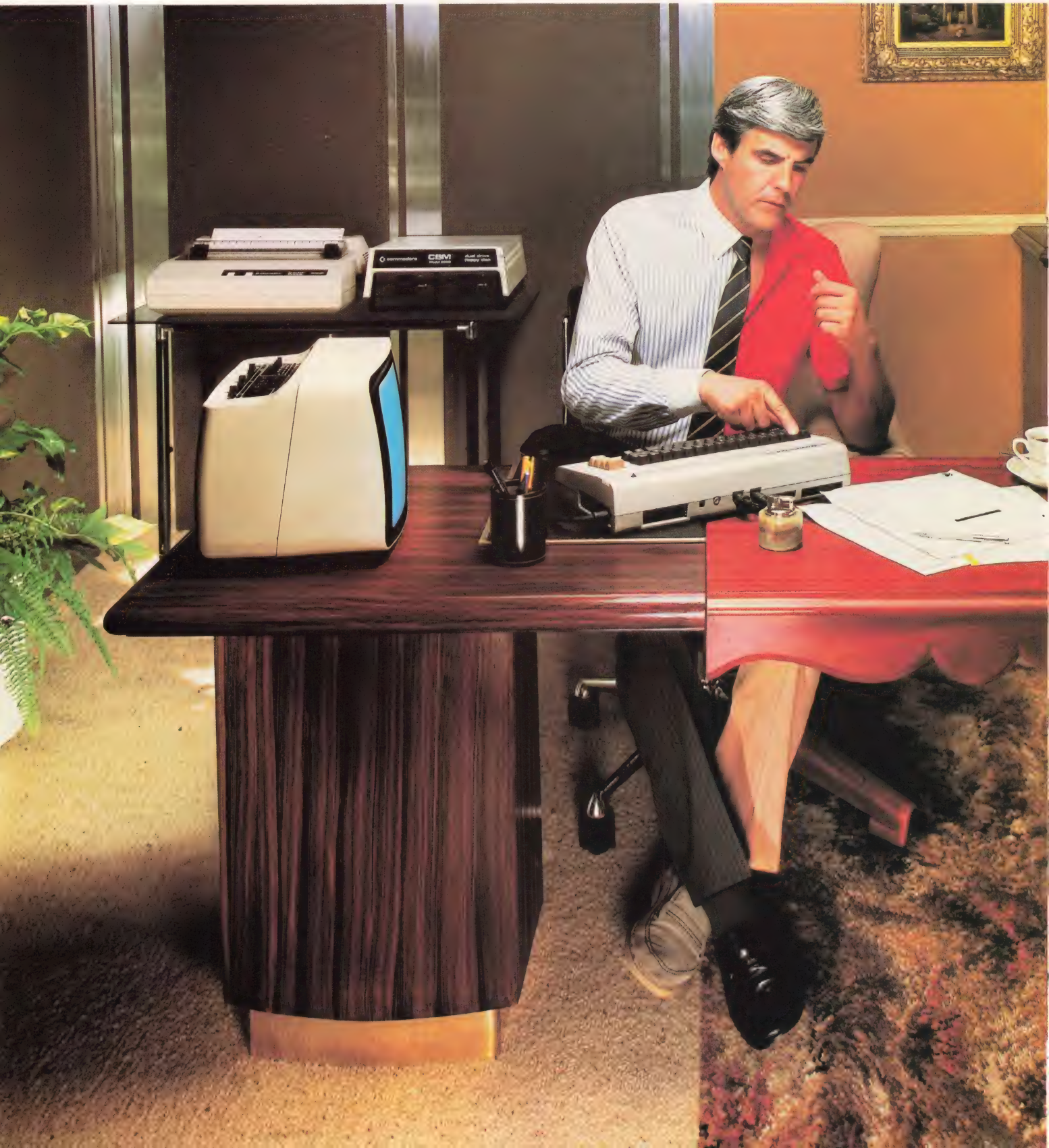
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# FUN AT THE FAIR

## Try out this fun fairground program on your Spectrum.

How about a visit to the funfair, you know that you'd enjoy it!

All you have to do is shoot down an assortment of ducks, rabbits, koala bears, apples and other things to win. Movement is described in the instructions which are part of the program.

When you start the game you have 30 bullets, and a gun, shown at the bottom of the screen. As the assorted targets appear in three rows above you, just try to hit them. The only problem is that each time you fire your store of bullets is decreased by one. Fortunately a series of "10"s and "5"s appear and you can gain more bullets by hitting these figures. (The appropriate number is added to your store).

Occasionally you may be attacked by a duck. It will fly from the lowest of the three rows of targets, and more points than usual are scored for shooting this renegade bird. Should you miss him he will land in your bullets and eat them, not all mind you, only five.

Every so often a number of bullets will appear in the box at the top left hand corner of the screen, prefixed by a "+" or a "–". A shot hitting this box will add to or subtract from your score or bullets, depending on the sign. This means that you must take care when shooting on this side of the screen.

Should you happen to hit the box on the right hand side of the screen, which contains your score, then the score will be returned to zero.

As you progress, more ducks, "10"s and "5"s will appear in the rows. Once all three rows have been cleared, and all the round targets at the very top of the screen have been hit, you will pass on to stage 2 of the game. If some of the top targets remain when everything else has been shot, ducks, "10"s and "5"s continue to appear, and must be destroyed before you can go on to stage 2.

### Stage two

After your bonus, given as a reward for any bullets remaining, has been shown, the screen will clear and Percy the Tightrope Walking Bear walks slowly along his rope. If you shoot at him and hit him (it doesn't hurt him), he turns round and walks slightly faster the other way, as he hates being disturbed. Points are awarded for the number of times Percy turns, before he eventually reaches the end of the tightrope.

Following this the game returns to stage 1, but you start with 5 fewer bullets.

The game continues in this vein until you finally run out of bullets. When this occurs the game ends and your final score is shown.

## HINTS ON CONVERSION

The game as listed was written on a 48K Spectrum, but should work without any instructions or REM's on the 16K model. A prototype was conceived a couple of years ago on an 8K PET, but the lack of user definable graphics made the game difficult to visualise.

Several methods were considered for moving the rows of targets across the screen, but in the interests of speed the final method, using string slicing was adopted. This means that the program as it stands contains quite a lot of Sinclair's own string working instructions, which would involve a few calculations regarding string lengths etc. on other machines. It may be that on a faster machine a completely different approach could be used.

The use of the string technique means that hits can be calculated inside the machine, without resorting to scanning the screen mapping (which I find too complicated to bother about when writing a game.)

Extensive use is made throughout the game of the PRINT AT instruction (2 dimensional TAB). The Spectrum screen is 32 characters by 21 for this instruction.

Sounds have been omitted in order that the game is not unbearably slow, but could be included if so wished.

REMarks have been sprinkled throughout the program, most of which are at the start of a subroutine. Occasionally a subroutine is accessed in the middle, from another main subroutine. A REM has been placed in these situations if it was thought it would aid comprehension. All the REMS can be omitted when typing in the program if so wished, as they are on odd line numbers and are not jumped to. It is felt, however that they are of great help in finding any errors made during typing.

The typing in of the program is greatly simplified if the two parts of the program in which the user defined characters are set up are typed in and run before the rest, as then the correct character is easier to identify during the typing in of the remainder of the program.

The subroutines dealing with moving the gun, firing and registering a hit and removing the appropriate character from the taret strings is done twice in the main loop, so that the player can catch up with a specific target, or move to intercept a duck. This could be altered to change the relative speeds of targets and gun.

A list of variables and a run down of subroutines follows.

### VARIABLES USED

| | |
|---|---|
| A1,A2,A3,A4 | Used in defining chars. |
| D | Row of targets hit, used to calculate gunfire, default value = 4.6 |
| D1 | Movement of flying duck. |
| F2 | No. of bonus bullets. |
| G | Position of gun. |
| H | Vertical position of flying duck. |
| I | General loops. |
| J | General loops. |
| K | Horizontal position of flying duck. |
| L | Bonus score. |
| Q | Flag for flying duck. |
| S | Score. |
| S2 | Bondus score in box. |
| T | Used in calculating starting bullets. |
| Y | Position of bear. |
| Y1 | Movement of bear. |
| Z | Position of new flying duck. |
| A$ | Holds chars. to be used in rows; used as input. |
| C$ | Used as dummy row. |
| D$ | Target hit. |
| E$ | Used to see if "BONUS" hit. |
| F$ | Bullets to be printed. |
| H$ | Row of top targets. |
| L$ | Bonus string; final score string. |
| S$ | Score string. |
| X$,Y$,Z$ | Rows of targets. |

# HOW IT RUNS




| | |
|---|---|
| Line 10 | Set up variables — set cursor to captial mode. |
| Lines 20-40 | Set up defined characters — instructions — set variables & screen. |
| Lines 30-180 | Main program loop. |
| Lines 200-400 | Set up defined characters. |
| Lines 410-520 | Set up three rows of randomly distributed characters. |
| Lines 530-600 | Move the rows along using string slicing techniques. |
| Lines 610-620 | Print gun character in position on screen. |
| Lines 630-670 | Check if move key pressed; if so add or subtract value and position. |
| Lines 680-690 | Check if firing; if so is flying duck hit. |
| Lines 700-720 | Check if row hit. |
| Line 730 | Check if score box hit. |
| Line 735 | Check if bonus box hit. |
| Lines 737-739 | Check if top targets hit. |
| Lines 740-760 | Draw gunfire. |
| Lines 770-860 | Check character hit; adjust bullets and score. |
| Line 870 | Check for "bonus". |
| Line 900 | Check score is not less than zero. |
| Line 910 | Print score. |
| Lines 920-950 | Print bullets. |
| Lines 960-1000 | Choose random contents of bonus box. |
| Lines 1010-1120 | Print contents of bonus box. |
| Lines 1130-1170 | Add box to score or bullets. |
| Lines 1180-1290 | If duck flying of starting to fly print in new appropriate position. |
| Lines 1300-1325 | Check if all targets shot. |
| Lines 1340-1360 | Add extra targets in spaces. |
| Lines 1370-1390 | Move and print top targets. |
| Lines 1410-1500 | Escaped duck eating bullets. |
| Lines 1510-1580 | Calculate and print bonus. |
| Lines 1590-1630 | Set up bear characters. |
| Lines 1640-1650 | Set up screen and variables for bear. |
| Lines 1660-1680 | Move bear. |
| Lines 1700-1710 | Move gun. |
| Line 1720 | Check hit. |
| Line 1740 | Reduce bullets. |
| Line 1750 | Start again. |
| Lines 1760-1815 | End game. |
| Lines 1820-2020 | Print instructions. |
| Lines 9000-9170 | Set up variables and screen. |

# PROGRAM LISTING

```
    5 REM Fun at the Fair
   10 LET S=0: LET T=0: POKE 2365
8,8
   20 GO SUB 200: GO SUB 1820
   30 GO SUB 9000
   40 GO SUB 410
   50 GO SUB 530
   60 GO SUB 610
   70 GO SUB 630
   80 GO SUB 680
   90 GO SUB 960
  100 GO SUB 610
  110 GO SUB 630
  120 GO SUB 1180
  130 GO SUB 1300
  140 GO SUB 680
  150 GO SUB 1370
  180 GO TO 50
  199 REM Graphics set up
  200 FOR I=0 TO 7
  210 READ A1,A2,A3
  220 POKE USR "A"+I,A1: POKE USR
  "B"+I,A2: POKE USR "C"+I,A3
  230 NEXT I
  240 DATA 0,72,70,0,40,201,14,24
,73,10,52,73,143,24,73,252,60,73
,254,126,73,124,60,230
  250 FOR I=0 TO 7
  260 READ A1,A2,A3
  270 POKE USR "D"+I,A1: POKE USR
  "F"+I,A2: POKE USR "G"+I,A3
  280 NEXT I
  290 DATA 254,99,7,128,127,15,12
8,42,63,252,54,31,2,28,30,130,62
,44,130,127,4,124,62,0
  300 FOR I=0 TO 7
  310 READ A1,A2,A3
  320 POKE USR "H"+I,A1: POKE USR
  "I"+I,A2: POKE USR "J"+I,A3
  330 NEXT I
  340 DATA 26,0,0,5,8,24,28,8,36,
62,8,153,127,24,90,127,40,60,62,
40,24,20,40,36
  350 FOR I=0 TO 7
  360 READ A1,A2
  370 POKE USR "K"+I,A1: POKE USR
  "E"+I,A2
  380 NEXT I
  390 DATA 0,60,24,66,36,189,24,1
65,90,165,189,189,24,66,36,60
  400 RETURN
  409 REM Set up rows
  410 LET A$="AAAAAABBBBFFFGGGHHH
BONUSDDDDCC": LET G=15
  420 FOR I=1 TO 3: LET C$=" "
  430 FOR J=1 TO 10
  440 LET A=INT (RND*LEN (A$))+1
  450 LET C$=C$+A$(A)+" "
  460 LET A$=A$( TO A-1)+A$(A+1 T
O )
  470 NEXT J
  480 IF I=1 THEN LET X$=C$( TO 3
0)
  490 IF I=2 THEN LET Y$=C$( TO 3
0)
  500 IF I=3 THEN LET Z$=C$( TO 3
0)
  510 NEXT I
  520 RETURN
  529 REM Move rows
  530 PRINT AT 7,0;X$'''Y$'''Z$''

  540 LET Y$=Y$+X$(30)
  550 LET Z$=Y$(1)+Z$
  555 IF Z$(30)=" " AND X$(1)=" "
  AND X$(2)=" " AND Z$(29)=" " AN
D Z$(28)=" " AND RND<.1 THEN GO
SUB 1340
  560 LET X$=Z$(30)+X$
  570 LET X$=X$( TO 30)
```

# FUN AT THE FAIR

```
 580 LET Y$=Y$(2 TO )
 590 LET Z$=Z$( TO 30)
 600 RETURN
 609 REM Gun
 610 PRINT AT 19,G;" I "
 620 RETURN
 629 REM Move gun
 630 IF INKEY$="" THEN RETURN
 640 LET I$=INKEY$
 650 IF I$="R" AND G>0 THEN LET
G=G-1: RETURN
 660 IF I$="Y" AND G<27 THEN LET
 G=G+1
 670 RETURN
 679 REM Shoot
 680 IF INKEY$<>"T" THEN RETURN
 690 IF K=G+1 THEN LET Q=0: PRIN
T AT H,K;" ": LET H=0: LET K=0:
LET S=S+100: GO SUB 910: LET D=.
7: GO TO 740
 700 IF Z$(G+3)<>" " THEN LET D$
=Z$(G+3): LET D=1: GO SUB 770: L
ET Z$=Z$( TO G+2)+" "+Z$(G+4 TO
): GO TO 740
 710 IF Y$(G+1)<>" " THEN LET D$
=Y$(G+1): LET D=2: GO SUB 770: L
ET Y$=Y$( TO G)+" "+Y$(G+2 TO ):
 GO TO 740
 720 IF X$(G+3)<>" " THEN LET D$
=X$(G+3): LET D=3: GO SUB 770: L
ET X$=X$( TO G+2)+" "+X$(G+4 TO
): GO TO 740
 730 LET D=4.6: IF G>21 THEN LET
 S=0: PRINT AT 1,25;"000000"
 735 IF G<7 THEN GO SUB 1130
 737 IF G<14 OR G>15 THEN GO TO
740
 739 IF H$(G-7)="E" THEN LET S=S
+100: LET H$=H$( TO G-8)+" "+H$(
G-6 TO ): GO SUB 920
 740 PLOT (G+1)*8+4,24: DRAW INK
 2;0,(2+3*D)*8
 750 OVER 1: PLOT INK 2;(G+1)*8+
4,(5+3*D)*8: DRAW INK 2;0,-((2+3
*D)*8+1): OVER 0
 760 GO SUB 920: RETURN
 769 REM Score
 770 IF D$="B" THEN LET S=S+25:
GO TO 900
 780 IF D$="C" THEN LET F$=F$+"|
|||||||||": LET S=S+10: GO TO 90
0
 790 IF D$="D" THEN LET F$=F$+"|
||||": LET S=S+10: GO TO 900
 800 IF D$="F" THEN LET S=S+30:
GO TO 900
 810 IF D$="G" THEN LET S=S+30:
GO TO 900
 820 IF D$="H" THEN LET S=S+50:
GO TO 900
 850 IF D$="A" THEN LET S=S+20:
GO TO 900
 860 LET S=S+10
 870 LET E$=E$+D$: IF E$="BONUS"
 THEN LET S=S+1000
 900 IF S<0 THEN LET S=0
 909 REM Print Score
 910 LET D$="": PRINT AT 1,25;"0
00000";AT 1,(31-LEN (STR$ (S)));
S: RETURN
 919 REM Print bullets
 920 LET F$=F$( TO LEN (F$)-1)
 930 PRINT AT 20,0;(F$+G$)( TO 6
4)
 940 IF F$="" THEN GO TO 1760
 950 RETURN
 959 REM Contents of left hand b
ox
 960 IF RND>.04 THEN RETURN
 965 PRINT AT 1,1;"      "
 970 IF RND>.5 THEN LET S2=0: LE
T F2=0: RETURN
 980 IF RND>.5 THEN GO TO 1030
 990 LET S2=(INT (RND*150))*10-7
40
1000 IF S2<100 AND S2>-100 THEN
LET S2=-100
1010 IF S2>0 THEN PRINT AT 1,1;'
+";S2: RETURN
1020 PRINT AT 1,1;S2: RETURN
1030 LET F2=INT (RND*10)-5: IF F
2=0 THEN LET F2=-1
1040 IF F2<0 THEN PRINT AT 1,1;'
-";: GO TO 1060
1050 PRINT AT 1,1;"+";
1060 FOR I=1 TO ABS F2
1070 PRINT "|";
1080 NEXT I
1120 RETURN
1129 REM Box hit
1130 IF S2<>0 THEN LET S=S+S2: L
ET S2=0: PRINT AT 1,1;"      ":
GO SUB 900: RETURN
1140 IF F2>0 THEN FOR I=1 TO F2:
 LET F$=F$+"|": NEXT I: LET F2=0
1150 IF F2<0 THEN LET F$=F$( TO
LEN (F$)+F2): LET F2=0
1160 PRINT AT 1,1;"      "
1170 RETURN
1179 REM Duck flight
1180 LET Z=INT (RND*27)+1: IF Z$
(Z)="A" AND RND>.6 AND Q=0 THEN
LET Q=1: LET H=14: LET K=Z
1190 IF Q=0 THEN RETURN
1195 PRINT AT H,K;" "
1200 IF Q=1 THEN LET Z$=Z$( TO Z
-1)+" "+Z$(Z+1 TO )
1210 LET Q=Q+1
1220 IF K=0 OR K=31 THEN GO TO 1
410
1230 IF RND>.3 THEN GO TO 1250
1240 LET D1=INT (RND*3)-1: IF D1
=0 THEN GO TO 1240
1250 LET K=K+D1
1260 IF RND>.7 THEN LET H=H+1: I
F H=19 THEN GO TO 1410
1270 IF Q/2=INT (Q/2) THEN PRINT
 AT H,K;"J": GO TO 1290
1280 PRINT AT H,K;"K"
1290 RETURN
1299 REM Finish
1300 IF X$<>"
                " THEN RETURN
1310 IF Y$<>X$ THEN RETURN
1320 IF Z$<>X$ THEN RETURN
1325 IF H$<>"                " OR
Q<>0 THEN RETURN
1330 GO TO 1510
1339 REM Add Ducks etc.
1340 IF RND>.3 THEN LET Z$=Z$( T
O 29)+"A": RETURN
1350 IF RND>.3 THEN LET Z$=Z$( T
O 29)+"D": RETURN
1360 LET Z$=Z$( TO 29)+"C": RETU
RN
1369 REM Targets
1370 LET H$=(H$(14)+H$)( TO 14)
1380 PRINT INK 5;AT 1,9;H$
1390 RETURN
1409 REM Duck eating bullets
1410 PRINT AT H,K;" ": FOR I=0 T
O 4
1420 PRINT AT 20,I;"A"
1430 BEEP .1,0: BEEP .2,-2
1440 PRINT AT 20,I;" "
1450 NEXT I
1460 IF LEN (F$)<6 THEN GO SUB 1
760
1470 LET F$=F$( TO LEN (F$)-5)
1480 LET Q=0
1490 GO SUB 920
1500 RETURN
1509 REM Bonus
1510 PAPER 0: CLS : INK 7: BORDE
R 1
1520 PRINT AT 5,14; PAPER 2;"BON
US"
```

```
1530 LET L=10*LEN F$
1540 IF LEN F$>32 THEN PRINT AT
8,0;F$( TO 32): LET F$=F$(33 TO
)
1550 PRINT AT 10,(32-LEN F$)/2;F
$
1560 LET L$="BONUS : "+STR$ (L)
1570 PRINT AT 14,(32-LEN L$)/2;L
$
1580 LET S=S+L
1589 REM Bear characters
1590 RESTORE 1630: FOR I=0 TO 7

1600 READ A1,A2,A3,A4
1610 POKE USR "L"+I,A1: POKE USR
 "M"+I,A2: POKE USR "N"+I,A3: PO
KE USR "O"+I,A4
1620 NEXT I

1630 DATA 0,0,0,0,16,0,2,0,112,0
,3,128,223,128,126,192,127,192,2
55,128,31,192,254,0,29,192,238,0
,24,192,198,0
1639 REM Bear run
1640 FOR I=1 TO 200: NEXT I: CLS
 : PRINT AT 1,5; INK 2;"HERE'S "
;: FOR I=1 TO 150: NEXT I: PRINT
 FLASH 1;"PERCY."
1650 LET Y=1: LET Y1=.3: LET G=1
4: PLOT 0,70: DRAW 254,0: PLOT 0
,20: DRAW 4,50: DRAW 4,-50: DRAW
 -8,0: PLOT 246,20: DRAW 4,50: D
RAW 4,-50: DRAW -8,0
1660 IF Y1>0 THEN PRINT AT 12,Y-
1;"   NO "
1670 IF Y1<0 THEN PRINT AT 12,Y;
" LM   "
1680 LET Y=Y+Y1
1700 PRINT AT 20,G;" I "
1710 GO SUB 630
1720 IF INKEY$="T" THEN PLOT (G+
1)*8+4,24: DRAW 0,46: DRAW OVER
1;0,-46: IF G=INT Y OR G=INT Y+1
 THEN LET Y1=-1.4*Y1: LET Y=Y+Y1
: LET S=S+200
1730 IF Y>1 AND Y<29 THEN GO TO
1660
1740 IF T<3 THEN LET T=T+1

1750 GO TO 30
1759 REM Game end
1760 PAPER 0: INK 7: CLS : BORDE
R 5
1770 PRINT AT 5,11; INK 0; PAPER
 5;"GAME OVER"
1780 LET L$="000000"+STR$ S
1790 LET L$=L$(LEN L$-5 TO )
1800 PRINT AT 10,9;"SCORE : ";L$
: PRINT AT 17,2; FLASH 1;"PRESS
 ""Y"" FOR ANOTHER GAME.": FOR I=
1 TO 20: NEXT I
1810 LET A$=INKEY$: IF A$="" THE
N GO TO 1810
1815 IF A$="Y" THEN CLS : LET S=
0: LET T=0: FOR I=1 TO 100: NEXT
 I: GO SUB 1880: GO TO 30
1817 STOP

1819 REM Instructions
1820 PAPER 1: CLS : BORDER 2: IN
K 7
1830 PRINT AT 5,8;"FUN AT THE FA
IR": PLOT 60,126: DRAW 126,0
1840 FOR I=1 TO 50: NEXT I
1850 PRINT AT 10,5;"  D.C.PENN"
1860 PRINT AT 12,8;"& A.A.LIVESE
Y"
1870 FOR I=1 TO 50: NEXT I
1880 PRINT AT 15,3;"DO YOU WANT
INSTRUCTIONS ?"
1890 PRINT AT 17,5;"TYPE Y (YES)
 OR N (NO)"
1900 LET A$=INKEY$
1910 IF A$="" THEN GO TO 1900
1920 IF A$="N" THEN RETURN
1930 IF A$<>"Y" THEN GO TO 1910
1940 BORDER 1: CLS
1950 PRINT AT 2,10;"INSTRUCTIONS
": PLOT 76,150: DRAW 102,0
1960 PRINT AT 4,3;"PRESS ""R"" T
O MOVE LEFT"
1970 PRINT AT 6,3;"PRESS ""Y"" T
O MOVE RIGHT"
1980 PRINT AT 8,3;"PRESS ""T"" T
O "; PAPER 2;"FIRE"
1990 PRINT AT 11,2;"YOUR GUN IS
REPRESENTED BY I"
2000 GO SUB 2190

2010 PRINT AT 2,4;"A - 20  POINT
S";AT 4,4;"B - 25  POINTS"
2020 PRINT AT 6,4;"F - 30  POINT
S";AT 8,4;"G - 30  POINTS"
2030 PRINT AT 8,4;"H - 50  POINT
S";AT 10,4;"J - 100 POINTS"
2040 PRINT AT 10,4;"E - 100 POIN
TS";AT 12,4;"C - 10  POINTS & 10
 BULLETS"
2050 PRINT AT 14,4;"D - 10  POIN
TS &  5 BULLETS"
2055 PRINT AT 16,2;"THE LETTERS
 ""BONUS""IN ORDER:";AT 18,10;"10
00 POINTS"

2060 GO SUB 2190
2070 PRINT AT 4,3;"PERCY,THE TIG
HTROPE-WALKING";AT 6,14;"BEAR"
2080 PLOT 110,118: DRAW 36,0: PL
OT 22,134: DRAW 220,0
2090 PRINT AT 8,1;"AFTER THE FIR
ST SET OF TARGETS";AT 10,1;"HAS
BEEN CLEARED,YOUR BONUS "
2100 PRINT AT 12,1;"WILL BE GIVE
N FOR BULLETS LEFT.";AT 15,7;"TH
EN "; BRIGHT 1;"PERCY"; BRIGHT 0
;" APPEARS."
2110 PRINT AT 17,0;"HIT HIM AS M
ANY TIMES AS YOU CAN"

2120 GO SUB 2190
2130 PRINT AT 3,2;"IF YOU HIT TH
E TOP LEFT BOX ";AT 5,1;"ITS CON
TENTS ARE ADDED TO OR"
2140 PRINT AT 7,1;"SUBTRACTED FR
OM YOUR SCORE OR";AT 9,1;"BULLET
S."
2150 PRINT AT 12,2;"IF YOU HIT T
HE SCORE BOX,YOUR";AT 14,1;"SCOR
E RETURNS TO ZERO."
2160 PRINT AT 17,0; FLASH 1;"PRE
SS ANY KEY TO START THE GAME."
2170 PAUSE 0
2180 RETURN
2190 PRINT AT 20,3; FLASH 1;"PRE
SS ANY KEY TO CONTINUE."
2200 PAUSE 0
2210 CLS
2220 RETURN
8999 REM Variable set up etc.
9000 BORDER 4: PAPER 1: CLS : IN
K 6: RANDOMIZE
9010 LET Q=0: LET D1=0: LET S1=0
: LET F2=0: LET S2=0
9020 LET E$="": LET G$="
"

9030 LET F$="||||||||||||||||||||
||||||||||"( TO 30-5*T)
9040 PLOT 195,175
9050 DRAW 0,-20: DRAW 60,0
9060 GO SUB 910
9070 PLOT 60,175
9080 DRAW 0,-20: DRAW -60,0
9100 GO SUB 920
9110 LET H=0: LET K=0
9120 PLOT 195,155
9130 DRAW -60,0
9140 PLOT 60,155
9150 DRAW 60,0
9160 LET H$=" E E E   E E E"
9170 RETURN
```

# QUESTION

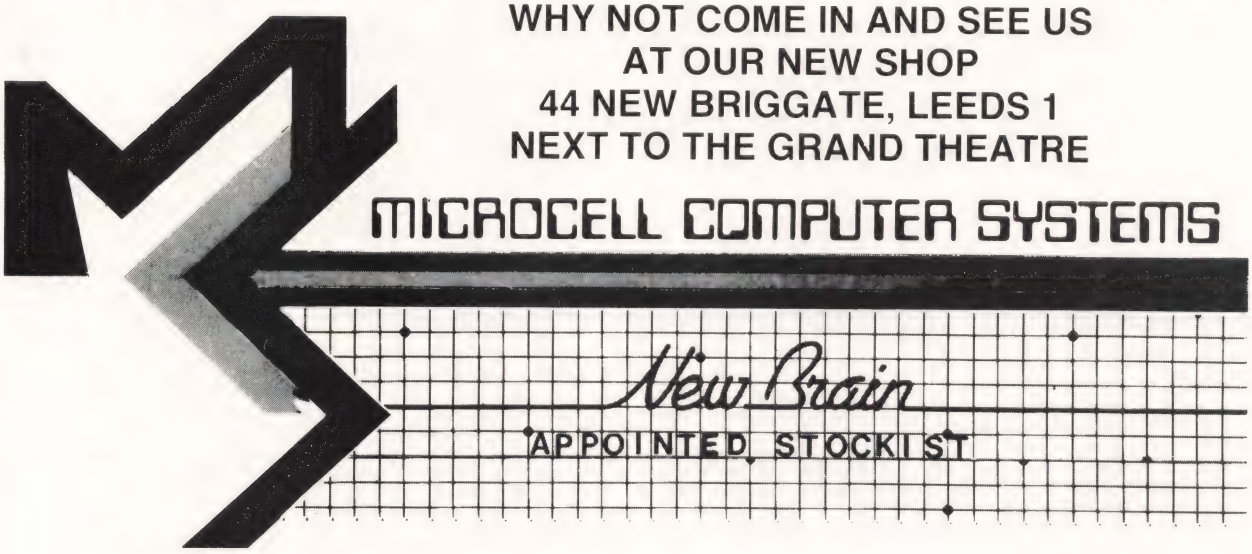
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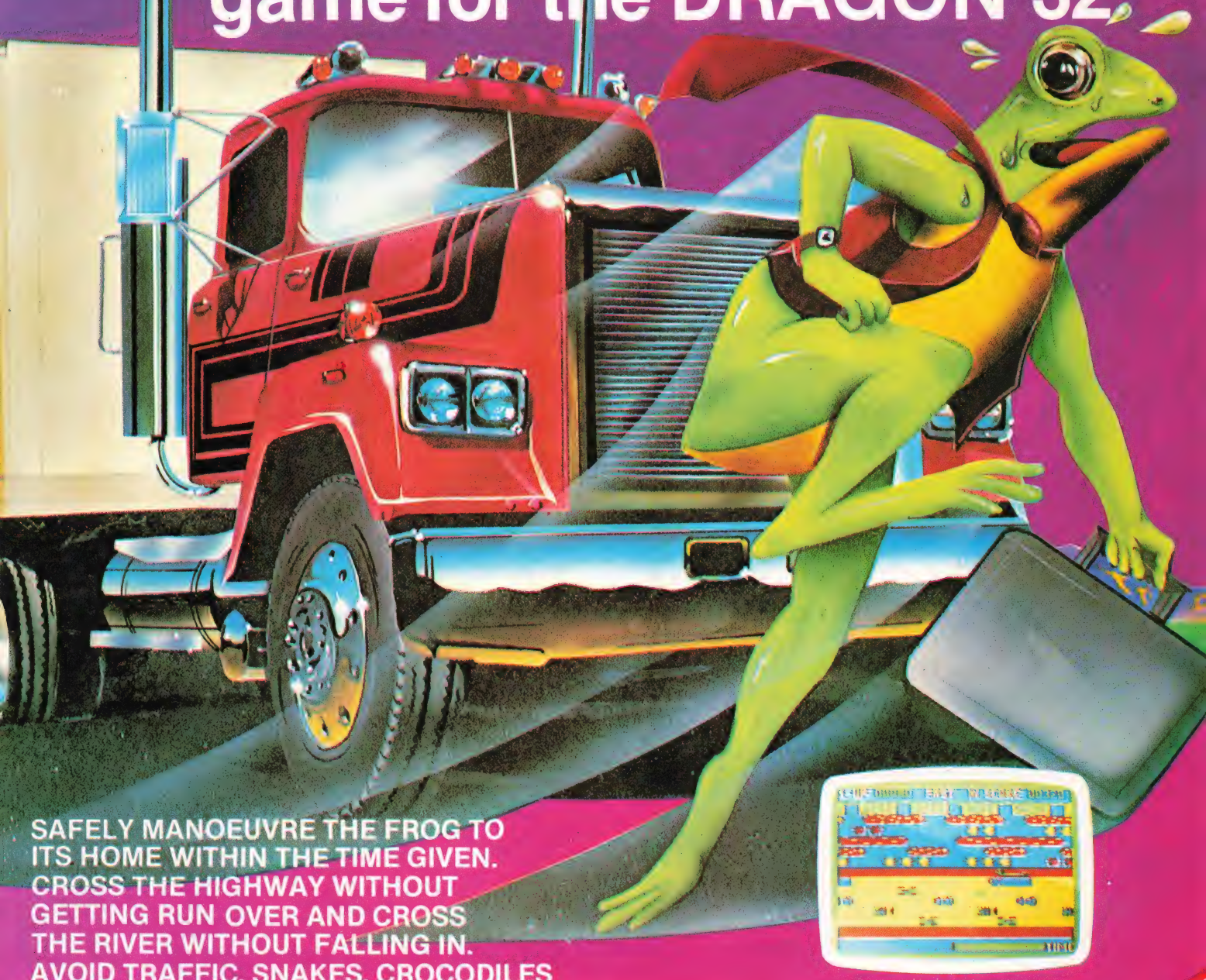
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# Why the BBC Micro? It might be fairer to let someone else answer that question.

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

---

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

---

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

---

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

---

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

---

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

---

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

"No other computer can offer such ease of use when dealing with complex sound effects."
*Which Micro, June '82.*

---

"It isn't often a journalist can sit down to write about a computer with the certain knowledge that he has never seen a nicer machine."
*Guy Kewney, Personal Computer World, Dec. '82.*

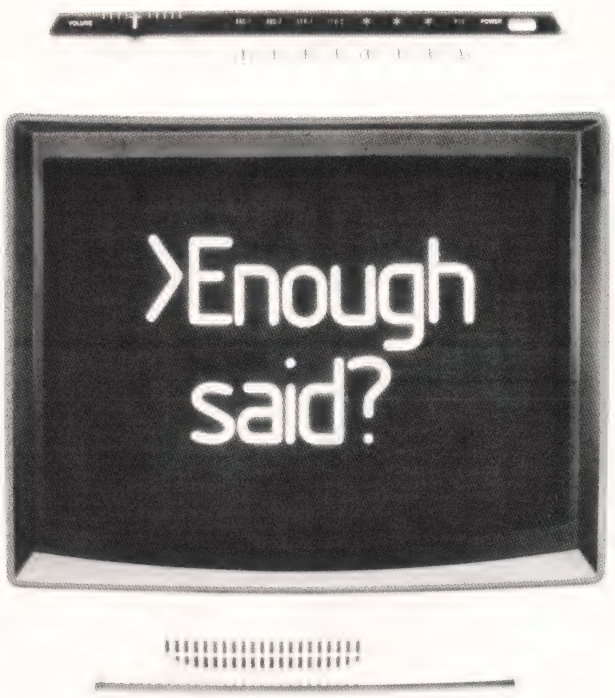
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"It has got huge potential. Besides playing the games, the whole family are learning basic programming."
*Mr. P. S. Green, a BBC Micro owner from Staffordshire.*

---

"Everything possible seems to have been done to ensure that this is not a 'dead end' machine..."
*Paul Beverley, Personal Computer World, July '82.*






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

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

And now for some facts about the machine itself.

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



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

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

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

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

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

All this for only £399.

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

Both models are available from local stockists and the BBC Micro B from W.H. Smith Computer Shops.

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

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

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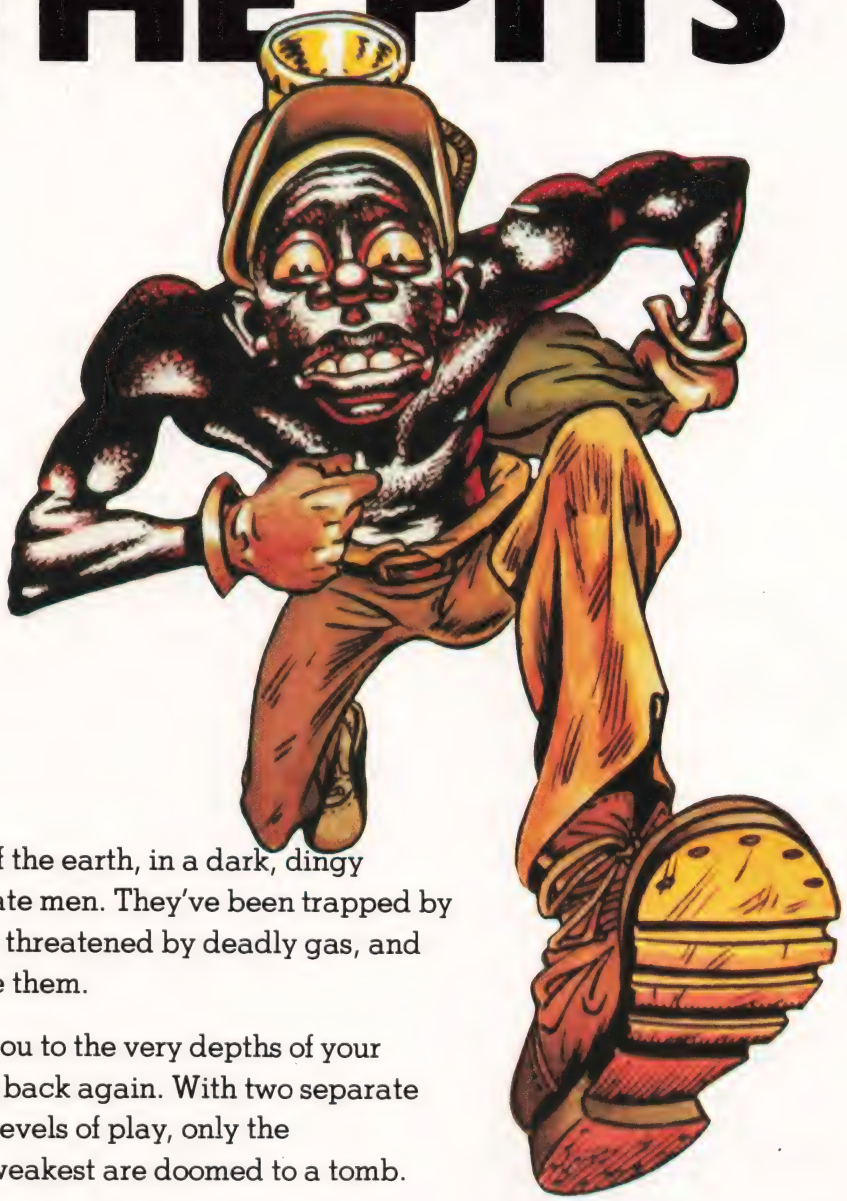
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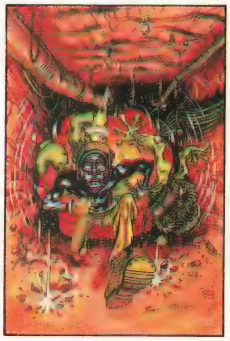
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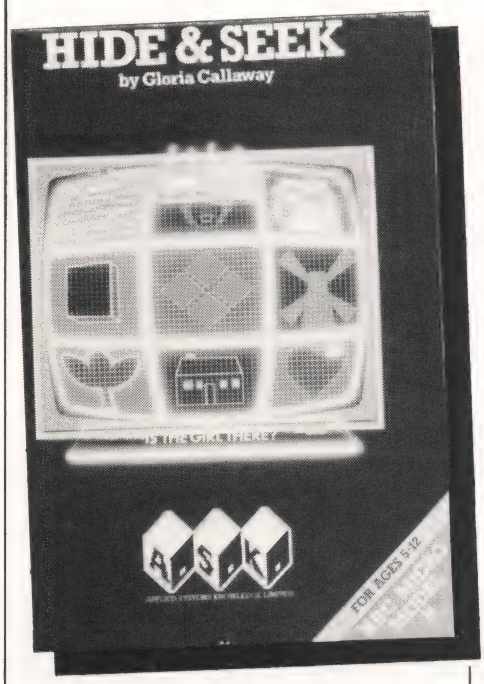
SHEER PANIC VS-03-16



SNOOKER VS-03-1/4

## EDUCATIONAL SOFTWARE SPECIAL

# EDUCATION SPECIAL




| Title: | Hide and Seek |
|---|---|
| Type: | Tape |
| Supplier: | Applied Knowledge Systems |
| Machine: | BBC Model B |
| Price: | £9.95 |

Hide and Seek is one of a new range of educational programs from Advanced Knowledge Systems — impressive name at least. They include Number Gulper, Let's Count and Number Puzzler. These titles are obviously designed to help children with their arithmetic but Hide and Seek is all about another of the three Rs, reading.

The games in Hide and Seek are variations on Pelmanism, the age old Kims game and that tray of varied objects present at every children's party.

The menu offers three choices: A — find it, B — Seek it, C — What's Missing? 'Find it' is the most straightforward of the variations and best to start with. Six boxes are drawn on the screen and one by one filled with an object such as a car, tree or man. When all the boxes are full their shutters close but of course we have to remember where each of the objects is located. A cursor square is moved to the chosen box by pressing the Space bar and the choice made with Return.

A correct answer is greeted with text congratulations and a simple musical celebration. If wrong, a second attempt is allowed. Wrong again and the correct box is opened up for you.

Seek it introduces a nine box variation of the game, with options to choose which box each object should go into and to guess the contents of a box chosen by the cursor.

In What's Missing? the names of the objects are given in association with their picture. When the shutters close accompanied by a fairly musical beep, the program asks 'What's missing?". Pressing the space bar reveals all the possible options one by one and the choice is made. A further option involves spelling the name of the object which has been revealed as missing from its square.

All these games are highly entertaining accompanied as they are by appropriate sound and employing attractive graphics.

The drawings are especially nice and include various shapes, creatures, people, vehicles, buildings and plants. Full documentation is included explaining how to load and use the program as well as educational notes.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * * |
| Value for Money | * * * * |
| Presentation On-screen | * * * * |
| Ease of use | * * * * |
| Crashproofing | * * * * |
| Supplied Instructions | * * * * * |
| Overall | 80% |

| Title: | World Geography |
|---|---|
| Type: | Tape |
| Supplier: | Program Power |
| Machine: | BBC Model B |
| Price: | £5.95 |

Your knowledge of capitals and populations of the entire world are under interrogation by the computer in this educational program.

There are no instructions which go with the program but while you wait for the thing to load a world map coloured green on blue appears on the screen. This forms the basis of the quiz.

The quiz offers three options for you to choose to be tested on: questions on population levels, questions on capital cities of countries, or both. Naturally, you can choose which country you wish to be tested on — so if you feel your geographical knowledge is rock solid you can opt for an obscure country. You'll see a white dot appear on the world map to mark the location of the country in question.

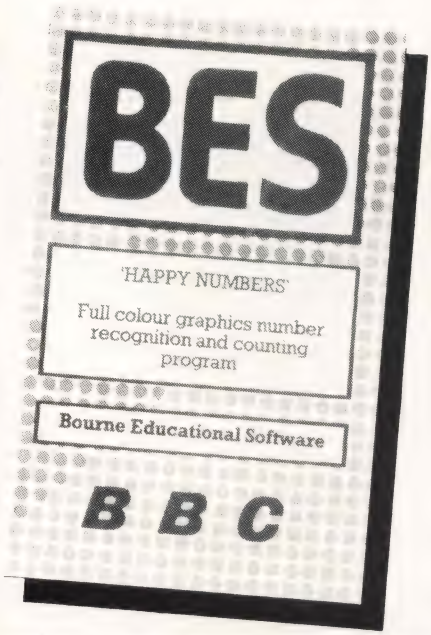
If your answer is correct the computer rewards you with a loud wail (of delight or annoyance?). If you get the answer wrong it makes a strange sounding noise something like a badly blown raspberry. Getting a population figure exactly right is difficult but you'll be

pleased to know that the computer allows you to get it right within a certain number either side of the correct answer. It's not quite as lenient on the capital city questions. You must get the right spelling of the city.

The program's value as an educational tool is rather limited because although it gives facts and figures which a child will learn by rote there is no explanation behind them, nor is there any indication as to how these facts and figures can be put to good use.

**Rating Table**

| | |
|---|---|
| Educational Value: | * * * |
| Documentation: | * * * |
| Value for Money: | * * * |
| Graphics: | * * * |
| Overall | 50% |




| | |
|---|---|
| **Title:** | **Happy Numbers** |
| **Type:** | **Tape** |
| **Supplier:** | **Bourne Educational Software** |
| **Machine:** | **BBC Model B** |
| **Price:** | **£7.80 + VAT** |

Happy Numbers is Bourne's attempt to make elementary arithmetic learning fun.

There is no doubt that children will learn about counting while playing this program. The emphasis really is on *playing*.

The parent or teacher selects a random sequence or preset sequence of numbers. The preset option is specifically designed in the event of a child having a particular problem differentiating between two numbers or recognising one particular number. This problem can be recognised through the monitor facility, which adds real educational potential to this kind of program.

In the beginning the happy face is neither smiling nor grimacing. To create an effect the child has to press the correct key the correct number of times. This physical action of counting corresponds to the use of fingers or objects. Each time the key is pressed a colourful flower appears.

A pattern of flowers is created in the main panel and a tally of correct and incorrect responses is displayed below.

Each correct answer also causes a colourful patterning of the number shapes. The musical reward is volume adjustable.

Bourne Educational seem uniquely to use number shapes which are half-screen size or larger. On screen prompts are good, BBC facilities fully utilised and documentation complete.

This may be programmed learning but it is also 'hands on' arithmetic. This sort of quality software should free the teacher, make learning enjoyable and may one day replace the equivalent text.

**Rating Table**

| | |
|---|---|
| Educational Value: | * * * * |
| Documentation: | * * * * |
| Value for Money: | * * * * |
| Graphics: | * * * |
| Overall | 85% |

| | |
|---|---|
| **Title:** | **Sentence Shaker** |
| **Type:** | **Tape** |
| **Supplier:** | **G E D Software** |
| **Machine:** | **Model B** |
| **Price:** | **£4.50** |

Sentence Shaker displays groups of words or single words which have been jumbled up and appear to make no sense. However, in their correct order the different sections make up legible sentences. Each part of the solution sentence has its own box on the screen and each box a corresponding number. The aim of the test is for the child to choose one of the numbers which are alternately displayed on the left of the screen and which correspond to the boxes.

The choice is make by pressing the Space Bar when the appropriate number appears. Any mistaken press can be removed with Delete key and another attempt is allowed. The progam is simple but instructive. The way the screen is split into different boxes helps understanding of what is happening during the test. Its educational value is limited to improving children's recognition of sentence construction and does nothing to explain the sequence which they have to choose. The program is useful as an exercise or practice routine.

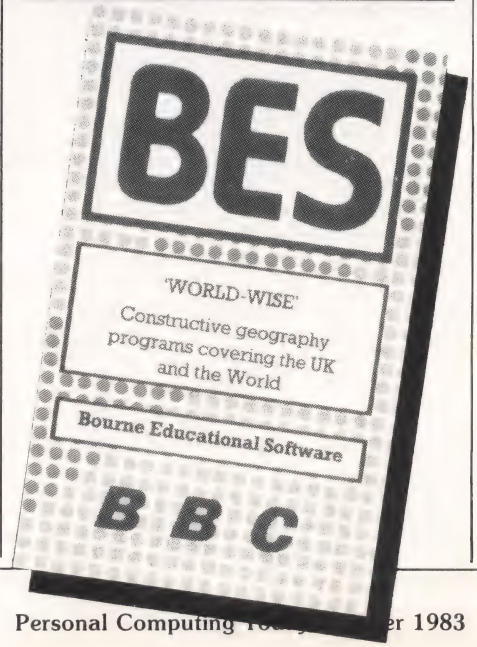
Since the test involves text handling there is not much room for graphics, but I might have expected a bit more colour or the use of bolder type.

One very useful feature is the documentation supplied for the teachers' use. The various sentence parts that are presented on screen are held in lines of DATA and G E D give hints about amending those lines to allow further variations. This is a straightforward operation and extends the program's usefulness considerably.

**Rating Table**

| | |
|---|---|
| Educational Value | * * * |
| Documentation: | * * * * |
| Value for Money: | * * * |
| Graphics: | * * * |
| Overall | 70% |

| | |
|---|---|
| **Title:** | **World-wise** |
| **Type:** | **Tape** |
| **Supplier:** | **Bourne Educational Software** |
| **Machine:** | **BBC B** |
| **Price:** | **£7.80 + VAT** |



Learning the lie of the land is much more fun if you can use your computer to help you.

This tape contains two programs which enable children to build up their own geographical and maritime records on a large scale. There is one program for the UK and another which deals with the whole world. Both give you 10 categories for storing information on rivers, towns, mountain ranges and continents.

When you run the program you are given sets of 'knowledge' for each category and the computer asks you to teach it more (a clever way of reversing the roles) by inputting more information. You have to think of a particular feature and correct it if the computer makes a wrong guess.

What you must do is make sure you ask the computer a question which differentiates between the computer's guess and the correct answer. The program has been well written to help the user along with the question and answer sequence, and updates the user on the state of the computer's memory.

Although this is a text-only game Bourne have done their best to make the program look as attractive as possible. Just one thing, the program only accepts features of no more than 15 characters in length so the clever clogs amongst you be warned.!

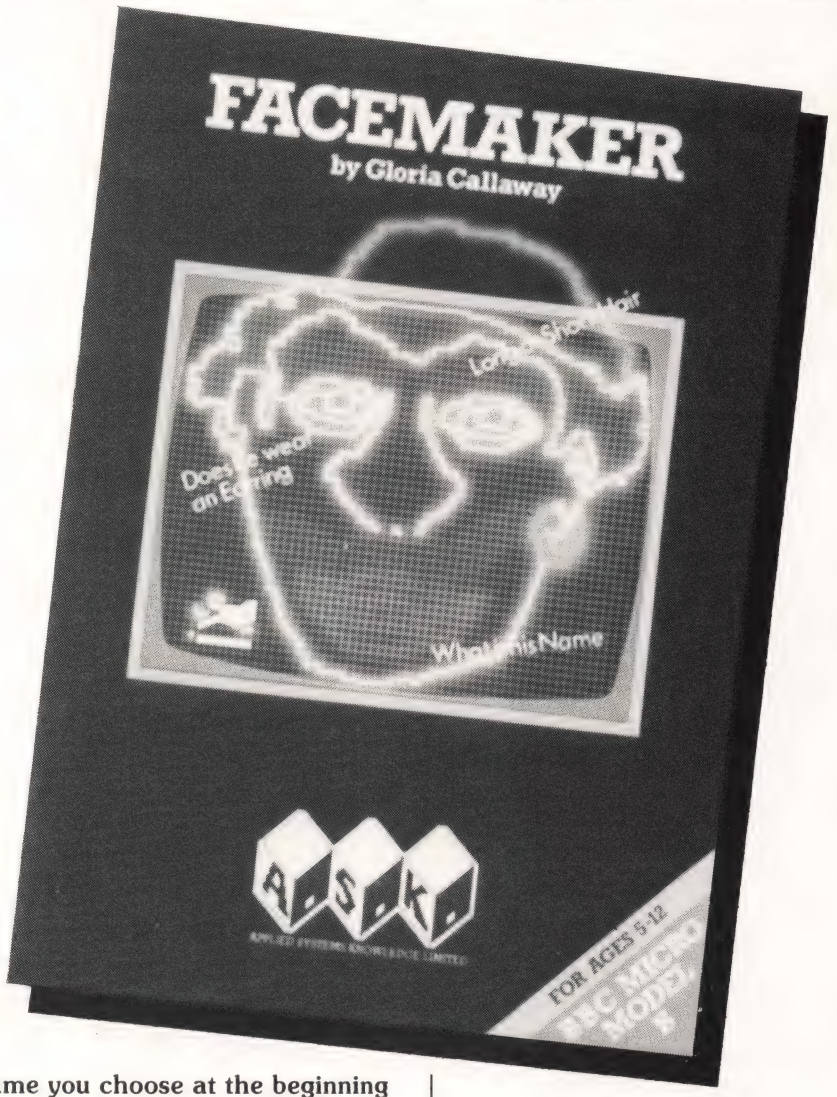
**Rating Table**

| | |
|---|---|
| Educational Value: | * * * * |
| Documentation: | * * * * |
| Value for Money: | * * * |
| Graphics: | N / A |
| Overall | 85% |

| | |
|---|---|
| **Title:** | **Facemaker** |
| **Type:** | **Tape** |
| **Supplier:** | **Applied Systems Knowledge Ltd** |
| **Machine:** | **BBC Model B** |
| **Price:** | **£9.95** |

Facemaker starts off with a friendly welcome and the information that loading will take four minutes and thirty five seconds. I suggest that you sit back and read the ASK documentation while the computer takes on board the many and various sections of code which seem to make up this program. . .

It's well worth the wait. The text prompts you to input information about a character of your choice, a character whose




name you choose at the beginning of the game. Your own name is also asked for and recognised throughout the program. Physical characteristics are chosen from the on screen prompts concerning different aspects of the face; eyes, nose, mouth and hair. Features like eyebrows and moustache/ beard are themselves allowed various attributes like thin, curly, straight and wavy.

Inevitably the program cannot hope to reproduce accurately any one human face but trying to get even an approximation is terrific fun.

After each group of information input the program invites us to take a look at how our face is taking shape. If necessary alterations can be made before continuing with the input.

Each characteristic has to be typed into the keyboard in its full form and with correct spelling. All ASK programs have standard graphic prompts in case mistakes occur. Pressing the Space Bar either sets the program on its way or offers the chance of another attempt.

The actual graphic display of the human face is colourful and attractive. The endless number of possible combinations and especially the ability to create a personality behind the face by specifying whether the face looks kind, friendly or bad tempered, make Facemaker a thoroughly enjoyable game.

The educational value of the program lies in the vocabulary which young children will pick up and the discussion which Facemaker will inspire in the classroom or the home.

**Rating Table**

| | |
|---|---|
| Program Quality | * * * |
| Value for Money: | * * * * |
| Presentation On-screen | * * * * |
| Ease of use | * * * * * |
| Crashproofing | * * * * |
| Supplied Instructions | * * * * * |
| Overall | 90% |

# EDUCATION SPECIAL

| Title: | Picture Spell |
|---|---|
| Type: | Tape |
| Supplier: | G E D Educational Software |
| Machine: | Model B |
| Price: | £5.00 |

The program is aimed at pre-readers and early-readers and tests various skills associated with picture and word recognition. There are six sections which are accessed from a main menu by teacher or parent. The main program is preceeded by fairly comprehensive documentation. This details all the various possible tests that can be performed with the main program. The opportunity is also given to choose between upper and lower case text, and whether to have music or not.

With each section a picture is displayed along with its corresponding word or letters, depending on the option chosen. The child then matches or adds the appropriate words or letters. Input is achieved by pressing the Space Bar to make a selection from the choices which are displayed beneath the picture.

When the correct word or combination of letters is selected then a large tick is displayed. if a wrong choice is made then a cross is drawn. There is ample use of sound and colour which makes it ideal for the target age range. The pictures are crude and conventional but colourful and no doubt effective in this context. Nor is the sound too obtrusive.

Possible tests include picture and word recognition, finding the missing letters, adding missing letters and spelling words.

**Rating Table**

| | |
|---|---|
| Educational Value: | * * * |
| Documentation: | * * * |
| Value for Money: | * * * |
| Graphics: | * * * |
| Overall | 60% |

| Title: | Animal Vegetable Mineral |
|---|---|
| Type: | Tape |
| Supplier: | Bourne Educational Software |
| Machine: | BBC Model B |
| Price: | £7.80 + VAT |

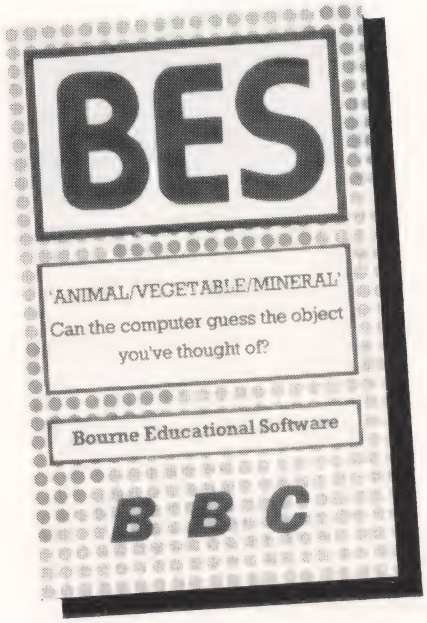
This tape is to all intents and purposes the same piece of software which you get in the Worldwise package.

The differences are merely in the text, instructions and prompts, and in the small database of computer 'knowledge'.

It sets out to establish a general knowledge database whereas Worldwise is specifically geographical. Considering the limited memory and the fairly unintelligent way the computer uses its sparse resources, the more specialised database seems a more suitable application.

This does not mean that it's still not fun collaborating with the computer to set up a structured record of objects animal, vegetable and mineral. All the necessary saving and loading procedures are available. Both the Escape and Break keys send the program back to either the main menu or the initial screen, followed by normal operation.

Although the words 'Mmm . . . let me think' don't fool anyone for long, still this sort of touch somehow makes the pause while the D-type latches clatter more acceptable. After all we have to live with our own memories.




The usual excellent Bourne features of large text and use of contrasting colour make the program a pleasure to use. Something teachers might appreciate would be some form of program description and hints about how to change the relevant text and data statements/arrays to perform with different subjects.

**Rating Table**

| | |
|---|---|
| Educational Value | * * * * |
| Documentation: | * * * |
| Value for Money: | * * * |
| Graphics: | N / A |
| Overall | 75% |

| Title: | Robotic Sums |
|---|---|
| Type: | Tape |
| Supplier: | GED Educational Software |
| Machine: | Model B |
| Price: | £4.50 |

This program is an arithmetic contest for two people. Each player takes turns trying to answer an addition or subtraction sum. The length of time taken in answering is crucial and on this depends the score awarded to the opposition. If the sum is left unanswered when the maximum time is up then the correct answer is displayed. This may come as no consolation since the other player will have gained maximum points. The maximum answer time can be reset at any time.

There are three levels to choose from according to ability and the appropriate type can be selected by parent or teacher. They are sums involving numbers up to nine, involving numbers up to 99 without carry, and numbers up to 99 with carry.

The answers have to be entered with the Return key and in the case of entering, for instance, 170 the seven has to be entered into the tens first. The players' scores are represented graphically which is a nice game playing touch.

In fact Robotic Sums turned out not to be at all robotic and should be a must for those young maths whizz kids who like to pit their wits against the clock. The competitive element has its positive side but might not always be appropriate as a teaching aid. General program design in this case is good but the graphics capabilities of the BBC might have been stretched a bit further. Unfortunately graphics do sometimes cause memory problems with the BBC Micro and this may have been a stumbling block for GED.

**Rating Table**

| | |
|---|---|
| Educational Value: | * * * |
| Documentation: | * * * |
| Value for Money: | * * * |
| Graphics: | * * |
| Overall | 65% |

# sinclair special 3







## Inside...
## The New ZX Microdrive!
## Latest software...
## Latest prices...

# The ZX Microdrive- and more!

For some time now, the new ZX Microdrive has been the subject of much discussion. Which is only to be expected, when the object of everyone's anticipation is *completely* new to the world of computing.

Microdrive provides high-speed access to truly massive storage. With just one Microdrive, you'll have at least 85K bytes of storage, and the ability to LOAD and SAVE in mere seconds. Yet the ZX Microdrive is about the size of a Spectrum mains adaptor, and costs less than £50!

First stocks are now in. Microdrives will be released on an order of priority basis. Spectrum owners who purchased by mail order, direct from us, will be sent full details including how to order, in a series of mailings that begins with the earliest names on our list.

## And if you didn't buy by mail order?

Don't worry — for a colour brochure with full information on Microdrives, including how to order, just send us your name and address (use the coupon at the back of this issue of Sinclair Special). But remember, the sooner you send us your name, the sooner you'll get on the list.

Of course, there's much more to Sinclair than Microdrives, as you'll see on these pages. The latest releases of Spectrum and ZX81 software have been amongst the most successful ever. Prices of most established Sinclair products are at their lowest ever. To buy what you want, just use the Order Form.

Until the next issue of Sinclair Special, and more good news ...

Nigel Searle

*Nigel Searle, Managing Director, Sinclair Research Ltd.*

PS: Come and see us — and all that's new at Sinclair — at the PCW Show, Barbican Centre, from Sept 28th to Oct. 2nd. We'll be pleased to see you!

# ZX Microdrive System preview!



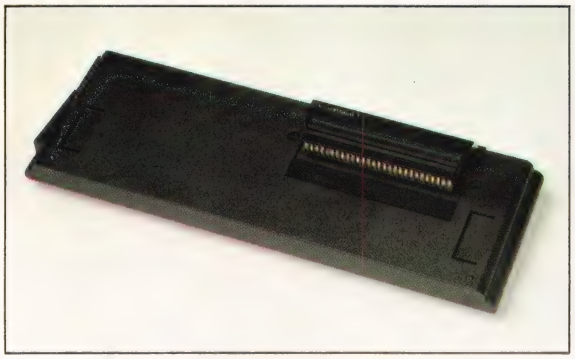

## ZX MICRODRIVE

At least 85K bytes storage, loads a typical 48K program in as little as 9 seconds: £49.95.




## ZX MICRODRIVE CARTRIDGE

Compact, erasable, revolutionary. Complete with its own storage sleeve. Contains up to 50 files, with a typical access time of 3.5 seconds: £4.95.



## ZX INTERFACE 1

Necessary for sending and receiving data from ZX Microdrive. Includes RS232 interface, enables creation of local area network of 2 to 64 Spectrums. Attaches to the underside of your Spectrum. Purchased with ZX Microdrive, just £29.95. As separate item, £49.95.




# Six new ways to make more of your Spectrum

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

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

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

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

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

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

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

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

*Overleaf – your Sinclair order form.*

# Latest ZX81 software




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

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

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**City Patrol.** You are the Commander of a laser-firing ship. Your task is to intercept and destroy alien suicide ships descending on your city.

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

**FORTH.** Discover a new programming language which combines the simplicity of BASIC with the speed of machine code. FORTH's compiled code occupies less than a quarter of the equivalent BASIC program and runs ten times as fast. Free User-Manual and Editor Manual with each cassette.

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

# Prices round-up

ZX Spectrum 48K
now just **£129.95.**

ZX Spectrum 16K
now just **£99.95.**

ZX81 now just **£39.95.**

16K RAM Pack for ZX81
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1.2A ZX Mains Adaptor
**£7.95.**

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**Section A: hardware purchase**

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

**Section B: software purchase**

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

*Delete/complete as applicable.

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

Signature

Mr/Mrs/Miss

Address

PCT 909

(Please print)

# ZX Microdrive information request

Please send me a colour brochure with full specifications of ZX Microdrive/Interface 1, *and* add my name to the Microdrive Mailing List! *(tick here)* ☐ (Remember to include your name and address on the form above).

## PERIPHERALS

# ADD ONS

**This month we look at a selection of devices to use with the Spectrum, VIC-20 and Atari computers.**

### PROTEK JOYSTICK INTERFACE

**Manufacturer: Protek Computing**
**Price: £14.95 including VAT**

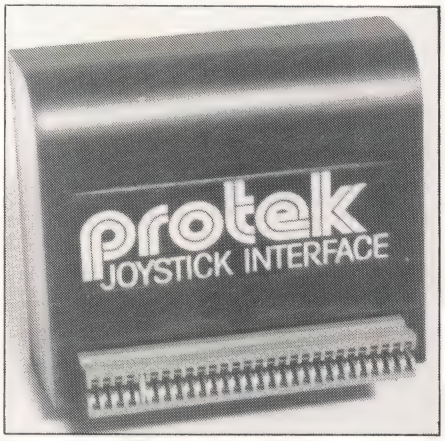
This special interface unit is designed to be plugged into the ZX Spectrum and allows you to use a variety of joystick controllers with the Spectrum. Using the interface makes games playing much easier and gives you greater control than specifically designated keys. Often you find that keys are badly grouped together and are therefore awkward to use.

The Protek joystick interface means that you can use any joystick which has a nine pin connector attached to it. The manufacturer particularly recommends products from Spectravision to be used with the interface.

Coming with the interface unit is a comprehensive instruction leaflet which also includes a program lising to test whether or not the unit works.

Another advantage with this interface unit is that it enables you to draw pictures as well as play games more easily with a joystick. Any programs which use the cursor control keys (five to eight) and 0 to fire will react to the joystick, according to the manufacturers. Protek also say that the interface will work with any program which runs with an AGF joystick interface.

Among the programs which are known to work with the Protek interface unit are Pilot, Venture, Roadrunner and Spectrapede — all produced by Protek Computing. Also Flight Simulator and VU-3D from Psion, the Hobbit from Melbourne House, Embassy Escape from ICL, Silversoft's Cyber Rats, Slippery Sam and Ground Attack, as well as Escape and 3-D Tunnel from New Generation Software.




The unit is available from: **Protek Computing, Clydesdale Bank Building, High Street, South Queensferry, Edinburgh EH30 9HW.** For further information telephone **031-331 4400.**

### IEEE-488 Cartridge

**Manufacturer: Stack Computer Services**
**Price: £39.00 excluding VAT**

Many of you more experienced VIC-20 owners will possibly want to expand your computer further and extend the uses to which you can put it.

By plugging this IEEE cartridge into the memory expansion slot at the back of your VIC-20 the use of a wide range of Commodore PET peripherals will be open to you. There are also many Hewlett Packard peripherals which can be used in conjunction with the Stack IEEE and your VIC-20.

Stack intended to produce a device which would provide the VIC owner with a cheap, efficient and durable means of using IEEE-488 devices. They seem to have achieved it in this product.

Full instructions consisting of typed A4 sheets come with the cartridge. These explain clearly how to use the cartridge with a VIC-20 and what extra facilities it will provide you with. The instructions contain all the practical, technical and operational details of the cartridge and list a number of peripherals you can use it with. These include the PET floppy disc, PET printer, VIC floppy and VIC printer — all of which have different device numbers and different memory locations. These are given to help you get the most efficient use out of your cartridge.

Stack are contactable at **290-298 Derby Road, Bootle, Liverpool L20 8LN** or telephone **051-933 5511**.

### FOUR SLOT MOTHERBOARD

**Manufacturer: Stack Computer Services**
**Price: £18.00 excluding VAT**

Tired of the limitations of your unexpanded VIC 20? Why not try out expansion devices such as this Four Slot Motherboard which enables you to plug in a number of extra memory boards including 3K, 8K and 16K as well as input and output boards.

Stack's Motherboard comes in a tough, plastic casing housing four slots which can be plugged into the peripherals of your choice, be it programmers aid, super expander, VICKIT ROSM or socket storeboard. It plugs directly into the VIC-20 memory expansion slot at the back of the VIC-20. Each connector located on the Motherboard has a special peg which prevents the user from plugging cartridges in the wrong way round. All cartridges plug into the sockets with the uppermost side of the cartridge facing the VIC-20. ▶

# ADD-ONS

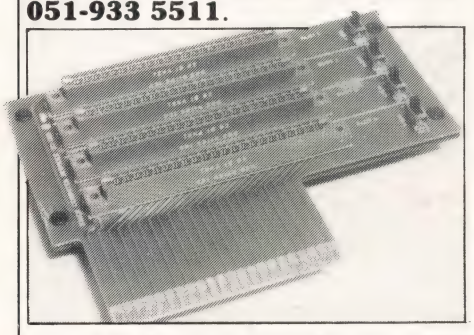
This prevention device is extremely useful because it stops you from damaging the unit if a cartridge is plugged in the wrong way round. This is easy to do if you are unfamiliar with the Motherboard's operation.

Another useful feature of the Stack Four Slot Motherboard is the presence of a small power switch on each of the four connectors. This allows the user to choose particular cartridges at power up without having the inconvenience of plugging in, or unplugging cartridges which have conflicting memory addresses.

Once again, Stack has provided comprehensive instructions in the form of a typewritten leaflet. There's a page of tips and hints to help you if your VIC fails to initialise once everything is plugged in, and also to check that the amount of free memory space is correct.

You'll also find a table listing devices which you can use with your motherboard, some of which have been mentioned earlier in this feature. The table also gives memory locations in decimal and the hexadecimal equivalent, the type of memory and the cartridge type.

Stack's Four Slot Motherboard can be obtained from the firm directly, or through one of its distributors. Details of dealers can be obtained from Stack at **290-298 Derby Road, Bootle, Liverpool L20 8LN**, or telephone the firm on **051-933 5511**.



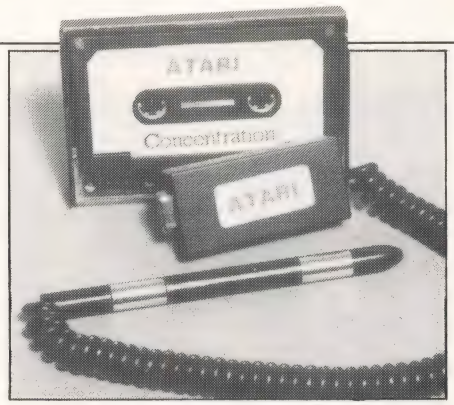
## ATARI LIGHT PEN+

**Manufacturer: Stack Computer Services**
**Price: £25.00 excluding VAT**

If you haven't yet bought a light pen for your Atari computer but want to invest in one this Stack product could be the answer for you.

Lightpens are used as a device to generate pictures on the television/monitor screen and are an alternative to digitisers or graphics tablets.

Stack's lightpen is a neat little device consisting of a black and silver pen attached to an interface




unit with a nine pin plug. With the lightpen comes a demonstration cassette in the form of Concentration.

What is particularly useful about the Stack lightpen is its instruction leaflet. It explains exactly how the pen works, what adjustments you must make to either your computer, or your television, how to calibrate it (if this is necessary), how to use the pen to obtain the best results, and provides you with a couple of programs to illustrate the lightpen's uses.

For instance you can select a character anywhere on the screen using the lightpen to make it flash. Alternatively, you can put your computer into graphics mode and draw lines with the aid of the lightpen. Continuously touching the contact area will make the pen draw a continuous line.

Stack also produce a light pen for the BBC computer which retails at the same price as the Atari lightpen. Software available from Stack for use with both these products include Othello, Life, Go, Draughts, Seek and Destroy, Lost in the Labyrinth, Atari Simon (or Beeb Simon) and Crossword Twister. All the software packages cost £5.00 excluding VAT.

The firm's products are available from local dealers. You can find out your nearest Stack dealer by contacting Stack at: **290-298 Derby Road, Bootle, Merseyside L20 8LN**, or telephone Stack on **051-933 5511.**

## QUICKSHOT

**Manufacturer: Spectravision**
**Price: £11.95 including VAT**

Spectravision has done much for the range of joysticks available to complement their own brand name computer games, and make life for games players much more fun.

One of the latest to emerge is the Quickshot de luxe joystick controller. It looks quite sophisticated in design with a black outer casing and the joystick itself is styled to fit snugly into your hand for maximum comfort. On the front of the joystick is a moulded hand grip which is extremely well-designed. There are so many of this type of grips that do not fit the hand so making the controller uncomfortable to hold.

You have the option of two fire buttons to use. One is located on the front, left-hand side of the unit, where you will also find a special grip for your left hand. The other button is positioned on the top of the joystick.

Movement of the stick is governed by a ball and socket type joint giving you movement in four directions, left, right, up and down — which is pretty standard. What makes this joystick de luxe, claim the makers, is its second, non-standard, fire button (the one at the top of the stick). This is supposed to give you positive response in your firing.

A well thought-out design feature is that you have the option of using the controller in the conventional manner, i.e. holding the unit in both hands.

Alternatively, you can use it as a fixed unit by attaching the four rubber suction feet supplied with the controller, although you do need to use some strength to do so. These allow you to use the controller either with one hand, or two.

Spectravision's Quickshot is available from retail outlets and proves quite good value for money. It is compatible with both Atari 400 and 800 computers, as well as the Commodore VIC-20.

For further information contact the main UK distributor **Vulcan Electronics**, at **200 Brent Street, Hendon, London NW4** or telephone **01-203 6366**.



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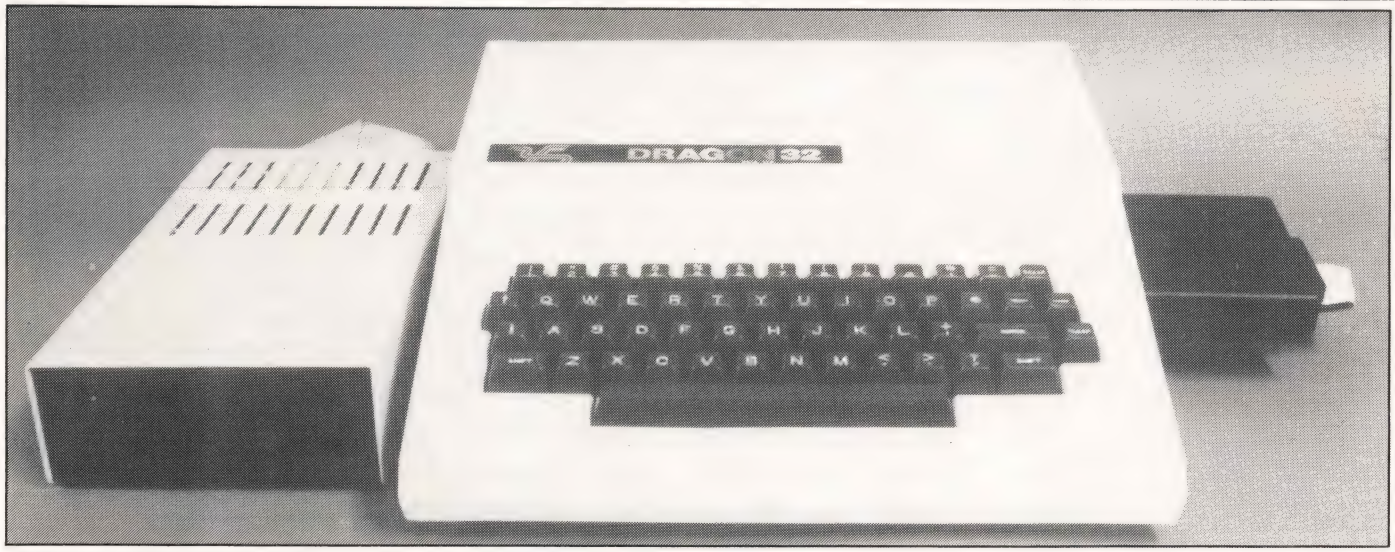
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***Trade: please write for details of our complete software list.***

## GAMESBOARD/SOFTWARE

# BREAKOUT (GAMESBOARD)

**This version of the classic game Breakout can be used as a teaching program as well as a fun game. D Podmore wrote the program.**



Breakout is one of the oldest computer games in existence but is still extremely popular with games players. The idea behind this version is that it can also be used as a teaching program and it can be listed and edited to suit your own specific requirements in the game.

I have explained both the principles of the game and suggested some changes which can be made to further reinforce points raised. To play the game you'll need a single joystick or paddle but instead could incorporate a short routine in order to use the keyboard for control of the bat.

This program deals with the creation of moving graphics on the text screen using the statement PRINT @. Once you understand the principles used you will be able to write your own programs. In the meantime have fun playing 'Breakout' and learning to write your own programs.

### Loading Up

Initially you will have to key the program listing in to your Dragon 32 but after that make sure you save it on tape and you can easily use it again later. Once saved on tape load it in the usual manner by typing CLOAD "BREAKOUT". Then type RUN and play the game until you are familiar with what happens.

For those of you who are unfamiliar with the game here's a brief description of it. The player controls a bat with which you have to hit a ball. You must bounce the ball against several rows of bricks at the top of the screen in order to knock them out. You get points for each brick dislodged.

You'll notice in this version that the bat moves up towards the wall if the score exceeds 500 points. It moves even closer to the wall if you reach 1,000 points. When you feel you have caused enough demolition move on to the next screen.

### Looking at the Program

Setting the screen:— Type LIST — 30
The first line of the program reads;

```
IOCLSO: S = 0: B = 0:BY = 448: TIMER = 0: GOSUB
1000
```

That's a good start, we don't begin here but at line 1000. The reason for this is that we want to keep the lowest numbered lines for the main part of the program. Each time you ask the computer to go to a line number it runs through the lines from the beginning. Therefore it will find a low numbered line faster than a high numbered one. By keeping the main part of the action at ▶

# BREAKOUT (GAMESBOARD)

the beginning of the program we ensure that it runs as quickly as possible.

O.K. so LIST 1000-1050. This is the sub-routine which draws the three rows of bricks, the side walls and the bat. Line 1010 draws the top row using CHR$ (159). This character is in fact, CHR$ (143 + 16) which gives a yellow rectangle. This yellow rectangle is then printed at each of the locations specified by the variable 'W' in the for-next loop. (See the print-at map on page 140 of the Dragon manual.)

The next two rows of bricks are drawn in a similar way but this time using CHR$ (191), a red rectangle and CHR$ (207), a buff coloured rectangle. Now this is fairly easy because the wall does not move, but if you want to try something different then get the program to build a multi-coloured wall.

Edit lines 1010 to 1030 to read:

```
1010FOR W=64 TO 95: PRINT @ W, CHR$ (143+RND (7)*16); : NEXT W
1020'FOR W=96 TO 127: PRINT @ W, CHR$ (143+RND (7)*16); : NEXT W
1030FOR W=128 TO 159: PRINT @ W, CHR$ (143+RND (7)*16);: NEXT W
```

Now type RUN and see the effect of this change. You can experiment by changing bits of the program like this at any time. Remember that the original program is still safe on tape and can be reloaded (remember to type NEW before re-loading). If you prefer the changed version of the program then save it on a tape of your own for future use.

Line 1060 draws the side walls. It does this by printing CHR$ (131) at the start of each line and then at a point 31 squares further on. This is, of course, the right hand end of the line. Look at the map on page 140 of the manual again if you're not sure.

Notice too that each time we use the command PRINT @ address, CHR$ (number) we also include a semi-colon at the end. To see what would happen without it, remove the one at the end of line 1030, and RUN. (Don't forget to put it back again when you've seen what it does.)

## On the Move

Let us now look at the things that move in the program: the **bat** and the **ball.** In order to produce the illusion of movement it is necessary to print a character on the screen at a certain position. Then we work out its new position and print a blank at its present position. Finally we print the character at its new position.

If this process is repeated quickly enough the eye is deceived into seeing the action as continuous motion. Let us examine how each of these steps is carried out in the program. LIST 20. You can see a variable Y1; this is the ball's first position. At the start of the game the value of Y1 is set at 448 + RND (30). This means that if we use PRINT @ Y1, CHR$ (130) then a small green rectangle will be printed somewhere at random along the bottom line of the screen. Refer to pages 138 and 140 of the manual if this is not fully clear. If we say that this first position has a value of 460 then our ball would be printed at location 460.

If the ball is to move vertically up by one square then the next location it has to be printed at is 428 (that is 460 – 32). If we subtract 32 from any print position we get the location immediately above it. Similarly adding 32 to a location gives the next location down. Now to make the ball go up we need to work out the new ball position, then blank out the old ball position and finally print the ball at its new position. So we could say, let the new position be Y2 and the old position be Y1. The ball is to go up so the new position Y2 is equal to (Y1 – 32). Having worked out the new position Y2, we can now print a blank at Y1 to get rid of the old ball and print the new ball at position Y2.

We then let Y1 equal Y2 so that the next time we work out the new ball position we work from its present position. The problem with this system is that to get the ball to change direction and move downwards we need to use the formula Y2 = Y1 + 32. In other words we must change the sign from – to +. If we use the number 32 it is not easy to do this but if we use a variable it is easy. In the program we use the variable YA. We let YA equal + 32. To change direction we simply say let YA = – YA and that takes care of the change in vertical direction.

So far so good. We have got the ball bouncing up and down, but we also need the ball to bounce at 45° to the vertical. Remember how we worked out the ball's new position using Y2 = Y1 – YA where YA was equal to 32? Well, if we have another variable DI (for DIrection) and we make the formula for the new position Y2 = Y1 – YA2 + DI then the value of DI controls the horizontal direction of the bounce. If DI = 0 then the bounce is vertical.

If DI = 1 then the bounce is upwards and to the right. If DI = – 1 then the bounce is upwards and to the left. Substitute some numbers in the formula and look at the print at map if you can't see how it works. Use 460 for Y1, 32 for YA and – 1 for DI, then check the new position Y2 to see where the ball will be printed next.

You will see in lines 20, 50 and 60 that we calculate the value of DI by using the formula DI = 2 – RND (3). Remember that RND (3) gives a random number between 1 and 3, so the formula gives DI the value – 1, or + 1 randomly and so gives a random direction of bounce. To change the diagonal direction of the ball bouncing off the side wall we use the same trick as before by simply saying let DI = – DI. Now you know the principles let's look at the program in detail.

**LIST 30-60.**

This is our formula for the ball's new position and it lies in line 30. The PEEK command checks to see if we've hit a side wall and if so changes DI to – DI to change the diagonal direction of the bounce and returns to itself to work out the new position.

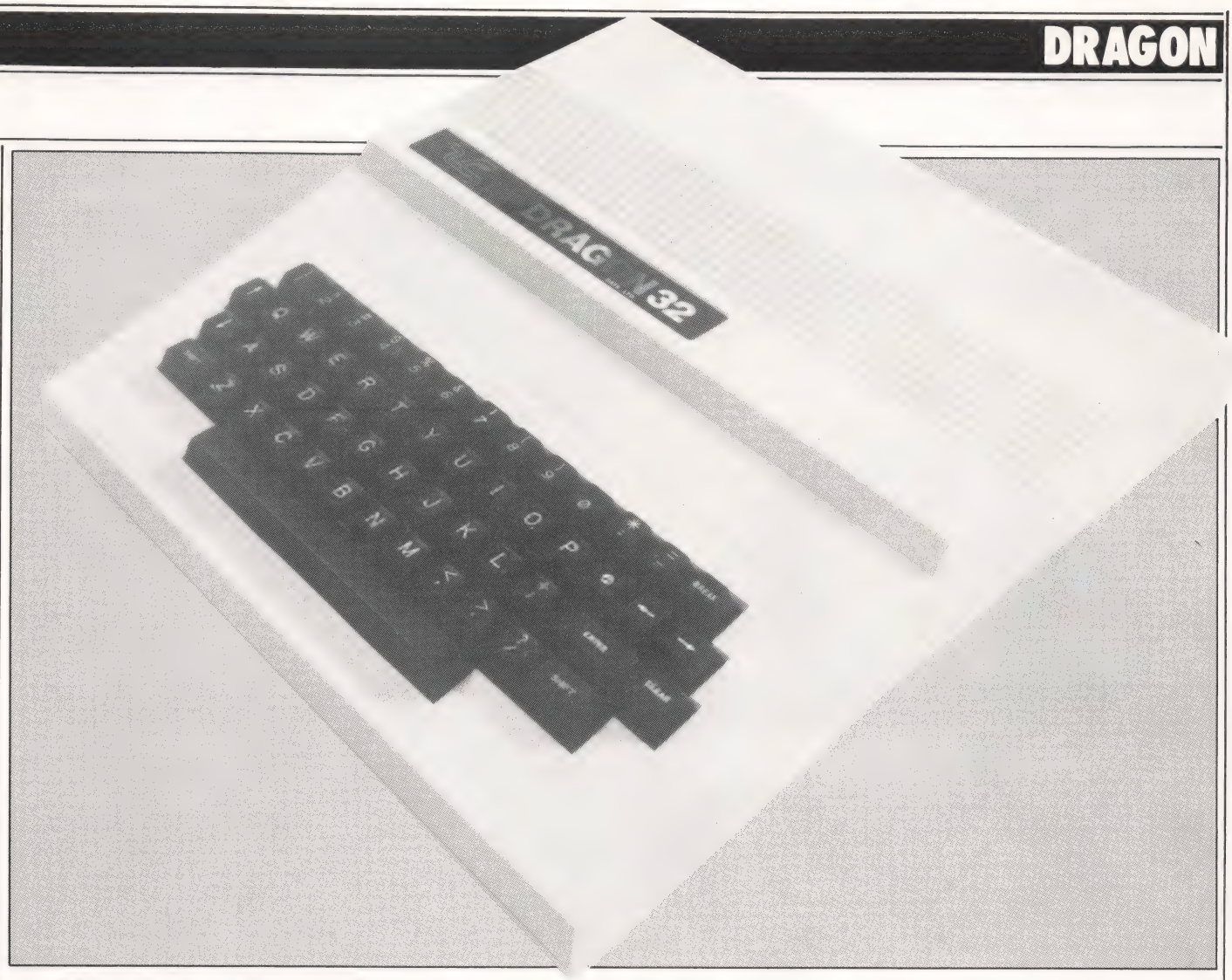
**Line 40** checks to see if the ball has been missed and is going off the screen. Plays a sad fanfare (in effect giving a time penalty because the clock is still running), and checks to see if you've used up your ten balls. If not, it goes to line 20 to set up for a new ball.

**Line 50** checks for a bounce off the ceiling and if so awards 100 points, and changes the vertical direction of the bounce (YA = – YA).

**Line 60** checks for a hit against the wall or the bat. If Y2 is less than 320 then it must be the wall and a brick is blanked out by printing CHR$ (128) at that position. Also ten points are added to the score.

Finally list **line 70** and there you have the line that blanks out the ball's old position. The last bit of the line Y1 = Y2 moves the old position variable to the ball's present position. Notice that the ball is blanked and then immediately printed at its new position. This keeps the ball on the screen for the maximum length of time. This is the golden rule of moving graphics.

If you don't like the square ball then change the CHR$ (130) in line 70 to some other character number (Try CHR$ (111))




## Moving the bat using joystick

The ball was a single character but the bat is formed by two characters side by side. So that we can specify the bat's position easily we combine the symbols to form a string called B$ (BAT $).

**LIST 1040.** On line 1040 we also form a string of blank characters and call it BL$ for each character in B$. Try changing line 1040 as follows:
1040 B$ = CHR$ (174) + CHR$ (172) + CHR$ (173): BL$ = CHR$ (128) + CHR$ (128) + CHR$ (128).

RUN to see the effect of the change.

So B$ draws the bat by printing characters side by side but how does the bat move? The movement of the bat is done in much the same way as the ball movement. That is we work out the new position, blank out the old bat and print the new bat. Lines 80 and 85 do this. Line 80 blanks out the old bat, gets the new position from JOYSTCK (0) and limits the value to 58 to keep the bat on one line. Line 85 prints the bat at its new position (using the new value of BA taken from JOYSTCK (0). The BA value has to be divided by two because JOYSTCK (0) returns a value between 0 and 64, so this has to be scaled to match our print positions which are 0 to 32.

Notice in lines 80 and 85 that we use the variable BY to control the bat's vertical position. At the start of the game it is set to 448 in line 10. When the score reaches 500 the value of BY is changed to 416, see line 35. At a score of 1000 or more BY is changed to 352 (see line 36). The effect is to move the bat up each time nearer the wall making the game more difficult by speeding up the action. The variables '0' and 'Q' are used to record that this action has taken place so that lines 35 and 36 are not repeated unnecessarily.

There are two ways the game can end — running out of time and running out of balls. Line 40 checks the number of balls and line 95 checks the time. Both direct the program to line 500 which is an end of game subroutine. You can use this subroutine with suitable changes to round off your own games. Now do you want to play Breakout again or are you going to write your own game?

## PROGRAM LISTING

```
5 '*****BREAKOUT********
6 '---BY D.PODMORE------
7 '--------5/12/82-------
10 CLS0:O=0:S=0:Q=0:B=0:BY=448:TIMER=0:GOSUB1000
20 Y1=448+RND(30):YA=32:DI=2-RND(3)
30 Y2=Y1-YA+DI:IFPEEK(SC+Y2)=131THENDI=-DI:SOUND150,1:GOTO30
35 IFS>500ANDO=0THENPRINT@(BY+BA/2),BL$;:BY=416:O=1
36 IFS>1000ANDQ=0THENPRINT@(BY+BA/2),BL$;:BY=352:Q=1
40 IFY2>479THENPRINT@Y1,CHR$(128);:YA=-YA:PLAY"O1CDGDC":B=B+1:IFB=10THENGOTO500E
LSEGOTO20
50 IFY2<32THENS=S+100:YA=-YA:SOUND100,1:DI=2-RND(3):Y2=Y1-YA+DI
60 IFPEEK(SC+Y2)>131THENS=S+10:SOUND200,1:YA=-YA:DI=2-RND(3):IFY2<320THENPRINT@Y
2,CHR$(128);:Y2=Y1-YA+DI
70 PRINT@Y1,CHR$(128);:PRINT@Y2,CHR$(130);:Y1=Y2
80 PRINT@(BY+BA/2),BL$;:BA=JOYSTK(0):IFBA>58THENBA=58
85 PRINT@(BY+BA/2),B$;
90 T=TIMER:PRINT@0,"TIME "(5000-T);:PRINT@20,"SCORE "S;
95 IFT>5000THEN500
100 GOTO30
500 CLS:PRINT@0,"YOU SCORED ";S;"POINTS":IFS>HS THEN HS=S
510 PRINT"YOU LOST",B;"BALLS"
520 IFT>5000THENPRINT"YOU RAN OUT OF TIME"
530 PRINT"HIGH SCORE IS"HS
540 PRINT"PLAY AGAIN? Y/N":INPUTA$
550 IFA$="Y"THEN GOTO10 ELSE PRINT"BYE BYE ":END
1000 SC=1024
1010 FORW=64TO95:PRINT@W,CHR$(159):NEXTW
1020 FORW=96TO127:PRINT@W,CHR$(191):NEXTW
1030 FORW=128TO159:PRINT@W,CHR$(207);:NEXTW
1040 B$=CHR$(163)+CHR$(163):BL$=CHR$(128)+CHR$(128)
1050 PRINT@BT,B$;
1060 FORJ=0TO448STEP32:PRINT@J,CHR$(131);:PRINT@J+31,CHR$(131);:NEXTJ:RETURN
```

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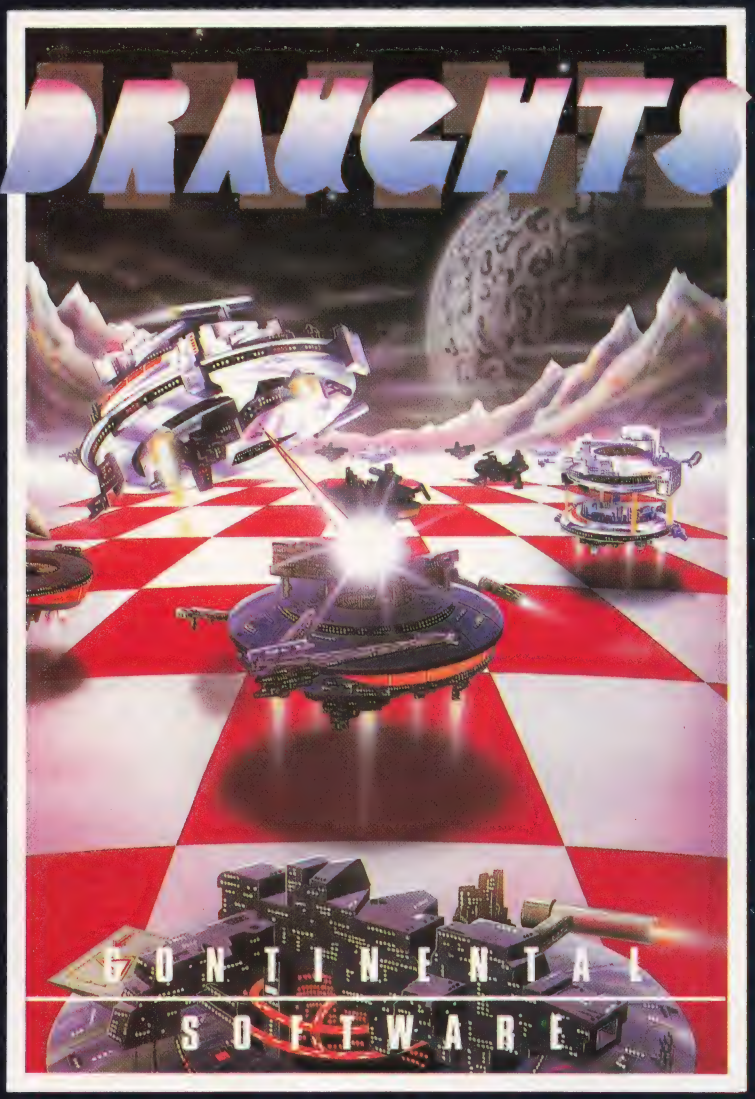
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Use the F and H keys to control your laser-equipped ship to dodge the aliens' fire. To retaliate press the F1 key to activate your missile launcher. 10 points are yours for every alien or bomb you hit. The game ends if a bomb hits you or if your time limit of one and a half minutes runs out.

So leap into this new sky-battle and make your score reach the moon.

# BEASTIE BOMBARDMENT

### List of Variables

| | |
|---|---|
| A | Chr. used for ship's exhaust. |
| B | If B = 0 then there is no missile on the screen. If B = 1 your missile is still on the screen. |
| C | Position of ship. |
| D | Position of missile. |
| E | Value that must be added to F to give the aliens new Position on screen. |
| F | Position of alien. |
| FM | Value that must be added to bomb's position to give its new position. |
| G | Alien Character. |
| H | if H = 0 an alien is not on the screen, if H = 1 an alien is on the screen. |
| HS | High Score. |
| I | Aliens starting position + 22 i.e. when I = F the alien is taken off the screen. |
| J | Is a random number which is added to the start position of alien to determine how far the alien will travel before it drops a bomb. |
| D3 | When D3 is set to one it means that there is a bomb on screen. |
| K | Variable used to check that volume level does not go below 0. |
| K1 | Value of key currently pressed. |
| L | Volume level. |
| N | In line 78 one is added to N until it = 4 then it is set back to 0 and the character which is used for the exhaust of ship is changed. |
| O | Bombs current position. |
| P | General purpose variable used in time delays etc. |
| VI | Used for colour and sound. |
| Y | Volume of explosion. |
| Y1 | General purpose variable which just makes the program repeat the fire routine four times. |
| OF | OF is the difference between 7680 and 38400. Therefore, to get the location (in colour memory) of any character POKEd on the screen simply add 30720 |
| TI | Is the VIC's internal clock. |

## HOW IT RUNS

| | |
|---|---|
| Line 0 | The program jumps out to line 4999 for the introduction. |
| Lines 1-4 | User-defined graphics routine. |
| Line 16 | Initialises some variables and clears the screen. |
| Line 18 | More variables. |
| Line 20 | Set colours to black screen and cyan border. |
| Lines 30-35 | Print screen display and show high score. |
| Lines 70-71 | Check timer and move ship. |
| Lines 72-109 | Firing routine. |
| Lines 120-140 | Move alien. |
| Lines 140-160 | Move bomb. |
| Lines 200-210 | Decides which direction alien is going to come from and where it will drop its bomb. |
| Lines 500-800 | Alien explosion. Updates score and high score. |
| Lines 2010-2070 | DATA for defined characters. |
| Line 3000 | Check time. |
| Lines 3010-3080 | Game over/another game routine. |
| Lines 4999-5050 | Prints instructions. |
| Lines 9000-9030 | Ship colliding with a bomb routine. |

## HINTS ON CONVERSION

All the data in lines 2010-2070 are used for user-defined graphics so you will have to change this to your own machine's format.

Lines 1-3 read this data and POKE it into memory. POKE 36869,255 in line 14 activates the new character set.

Colour and sound are accessed using the POKE command: 36879 controls the colour e.g. POKE 36879,8 will change the screen and border colours to black. 36877 produces white noise and 36878 controls volume.

The screen on the VIC is 22 * 23 and screen memory begins at 7680 (top left) and ends at 8185 (bottom right). The VIC also has a second memory map which begins at 38400 and ends at 38906. This is used to colour characters which have been placed on the screen. e.g. POKE 7680,1 will place an 'A' at the top of the screen and POKE 38400,0 will colour it black. PEEK (197) returns the value of the key currently pressed and GET works just like INKEY$ on other micros.

### User Defined Graphics

The defined character used in this program go from A-M. The following list shows which character will appear on the screen when you POKE its screen code.

| | |
|---|---|
| 1-2 | Alien character. |
| 3 | Missiles. |
| 4-9 | Explosion. |
| 10 | Ship. |
| 11 | Bomb. |
| 12-13 | Ship's exhaust characters. |



# PROGRAM LISTING

```
0 GOTO 4999
1 POKE52,28:POKE56,28:CLR
2 FORY1=7168TO7679:POKEY1,PEEK(Y1+25600):NEXT
3 FORY1=7176TO7279:READA:POKEY1,A:NEXT
14 POKE36869,255
16 VI=36864:OF=30720:PRINT"□"
17 FORA=7746TO7767:POKEA,227:NEXT
18 C=8113:A=12:POKEC,10
20 POKEVI+15,11
30 PRINT"■■■ALIEN ATTACK HI=";HS:TI$="000000"
35 PRINT"■R■=10:■B■=10"
70 POKEC+22,160:GOSUB3000:K1=PEEK(197):IFK1=42THENPOKEC,160:C=C-1:
   POKEC,10
71 PRINT"■■■■■■■■■■■■■■■TI= ■";RIGHT$(TI$,3):IFK1=43THENPOKEC,160:
   C=C+1:POKEC,10
72 GETA$:IFA$="■"ANDB=0THENB=1:POKEC+22,160:D=C-22:K=1:POKE36877,
   253:L=16
73 IF K=1 THENL=L-1:POKE36878,L
74 IFL=0THENK=0:POKE36877,0
75 IFC=8098THENPOKEC,160:C=8119:POKEC,10
76 IFC=8120THENPOKEC,160:C=8099:POKEC,10
77 POKEC+22,A:POKEC+22+OF,3
78 N=N+1:IFN=4THENN=0:A=A+1:IFA=14THENA=12:
80 IFB=0THEN110
90 FORY1=1TO4:POKED,160:D=D-22:IFPEEK(D)=1ORPEEK(D)=2THENGOSUB500:
   GOTO70
95 IFPEEK(D)=11THENPOKEO,5:FORT=1TO100:NEXT:POKEO,160:D3=0:SC=SC+10
100 IFD<7768THENB=0:GOTO110
105 POKED,3:NEXT
110 IFH=0THEN200
115 IFH=0THEN70
120 POKEF,160:F=F+E
124 IFF=0THEND3=1
125 IFF=ITHENPOKEO,160:D3=0:H=0:GOTO70
130 IFPEEK(F)=3THENGOSUB500:GOTO70
140 POKEF,G:IFD3<>1THEN70
145 IFG=2THENFM=23:GOTO150
146 FM=21
150 POKEO,160:O=O+FM:IFPEEK(O)=100RPEEK(O+1)=10THEN9000
153 POKEO,11
155 IFO>8165THEND3=0:POKEO,160
160 GOTO70
200 H=1
204 J=INT(RND(0)*20)
205 IFINT(RND(1)*2)=1THENE=-1:F=7702+(INT(RND(1)*10)+6)*22:I=F-22
    G=1:O=F-J:GOTO115
210 E=1:F=7680+(INT(RND(1)*10)+6)*22:I=F+22:G=2:O=F+J:GOTO115
500 B=0:H=0:D3=0
501 SC=SC+10:PRINT"■■■■SCORE=";SC:IFSC>HSTHENHS=SC:PRINT
    "■■■■■■■■■■■■■■■■■";HS
502 POKEF+OF,1:POKEF+1+OF,5:POKEF-1+OF,5
503 POKEF-23+OF,5:POKEF+OF+22,5:POKEF-22+OF,5:POKEF+OF-21,5
510 POKEF,5:POKEF+1,6:POKEF-1,7:POKEF-22,4:POKEF-23,8:POKEF-21,9
521 POKE36877,163:POKEO,160
522 FORY=16TO0STEP-1
523 POKE36878,Y
524 FORP=1TO80:NEXT:NEXT
530 POKEF,160:POKEF+1,160:POKEF-1,160:POKEF-23,160:POKEF-22,160:
    POKEF-21,160
531 POKEF+OF,1:POKEF+1+OF,1:POKEF-1+OF,1
532 POKEF+OF+22,1:POKEF-22+OF,1:POKEF+OF-23,1:POKEF+OF-21,1
533 POKE36877,0
800 RETURN
2010 DATA 0,0,60,90,255,90,24,0
2015 DATA120,172,66,126,66,172,120,0
2020 DATA16,8,16,8,16,8,16,8
2025 DATA129,68,170,85,98,41,42,68
2035 DATA0,92,84,84,84,92,0,146
2040 DATA85,224,80,12,242,25,170,68
2045 DATA1,11,53,74,178,77,242,64,1
2050 DATA0,1,34,156,98,45,82,41
2060 DATA0,128,170,123,255,250,64,0
2065 DATA16,40,40,108,170,170,108,146
2066 DATA 00,56,16,56,124,56,40,40
2070 DATA129,42,20,16,12,8,0,0,36,36,24,16,0,0,0,0
3000 IFTI$<"000130"THEN RETURN
3010 POKE36877,0:POKE36869,240:PRINT"□■■■■■■■■GAME OVER"
3020 PRINT"■■■YOUR SCORE WAS ";SC
3030 PRINT"■■THE HIGH SCORE IS ";HS
3050 PRINT"■■■■■■■■■ANOTHER GAME? (Y/N)"
3060 GETR$:IFR$=""THEN3060
3065 IFR$="N"THENEND
3070 IFR$<>"Y"THEN3080
3075 SC=0
3078 K=0:B=0:H=0:D3=0:C=0:GOTO14
3080 GOTO3060
4999 POKE36878,15
5000 PRINT"□■■■■■■■■BEWARE":PRINT"■■F■=LEFT ■H■=RIGHT":PRINT
    "■■F1■=FIRE"
5030 PRINT"■■■■■■■■■HIT ANY KEY"
5040 GETS$:IFS$=""THEN 5040
5050 PRINT"□■■■■■■■■■■PLEASE WAIT":GOTO1
9000 POKEC,4:FORT=1TO99:NEXT:PRINT"□■■■■";
9010 PRINT"■■■■GAME OVER":PRINT"■■R■■■HIT ANY KEY"
9020 GETF$:IF F$=""THEN9020
9030 GOTO3010
```



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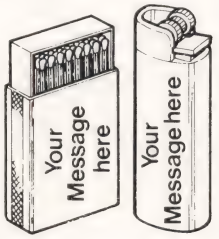
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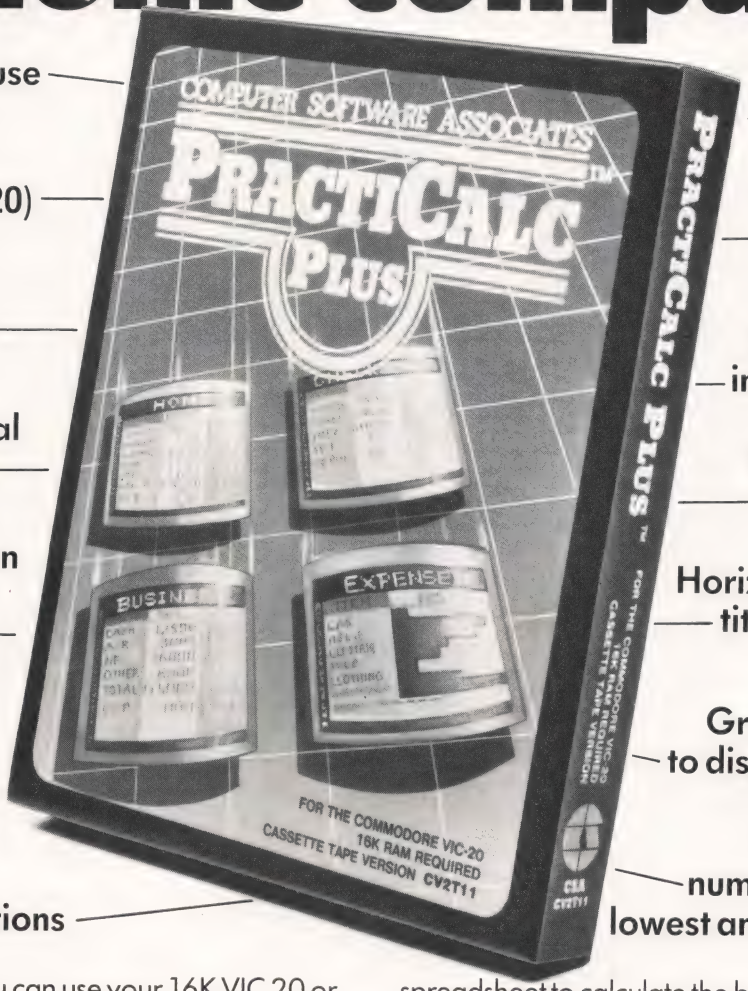
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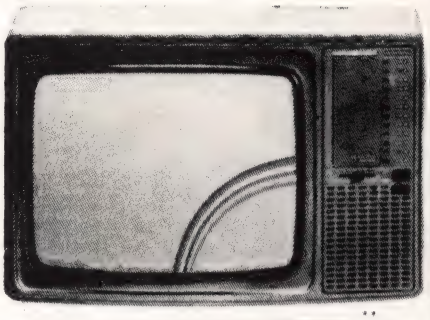
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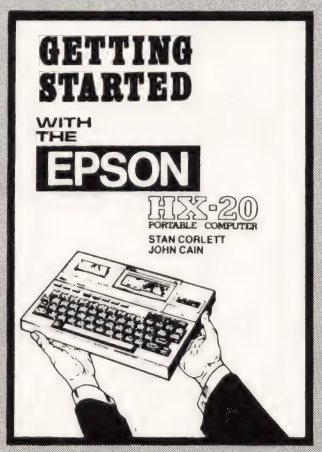
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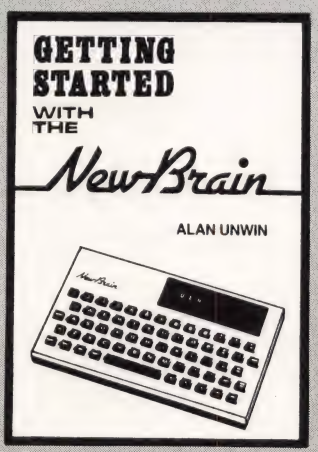
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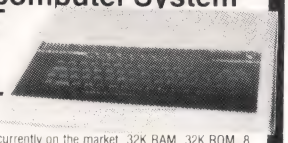
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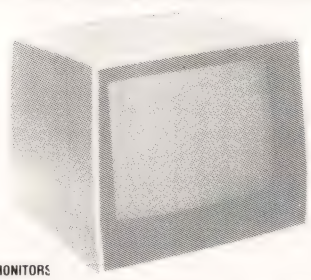
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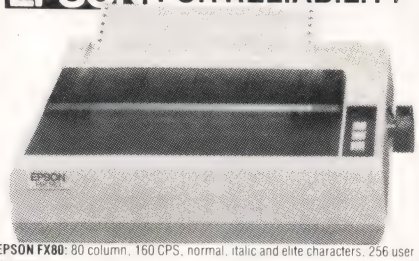
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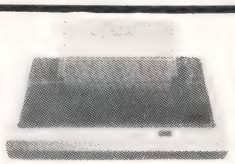
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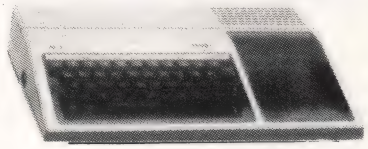
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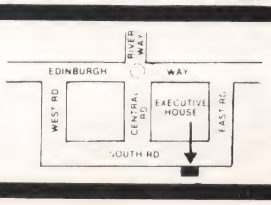
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# MICROTERMS

**Address**
A label or name (usually a *binary* or *hexadecimal* number) specifying a particular *memory* location.

**Array**
A special variable that is used to hold large amounts of string or numeric information in a row and column format.

**Assembly Language**
Means of representing *program* statements in mnemonics and conveniently handling *memory* addressing by use of symbolic terms.

**BASIC**
Beginner's All Purpose Symbolic Instruction Code. An easy to learn, widely used computer language.

**Bit**
A single *binary* digit, representing either a 'one' or a 'zero'.

**Bug**
An error in *software*.

**Byte**
A *binary* number, usually of eight *bits*. It can represent a number from 0 to 255 (8-bit byte) as there are 256 possible combinations of "ones" and 'zeros" eight bits long.

**Cartridge**
A self-contained unit storing either ROM or RAM which plugs into a computer to expand the memory or provide a program.

**Character Set**
The list of letters, numbers and symbols that you can use to write programs and display information.

**CP/M**
A standard disc operating system that in theory allows software packages to be run on different machines. It stands for Control Program for Microcomputers.

**Cursor**
Character or graphic symbol used by the computer to denote where it's printing. Also used as a prompt to input information or a command.

**Data**
Simply, information. The raw material that the computer processes.

**Debug**
To correct the errors in a *program*.

**Disc**
Magnetic storage device allowing fast random access to a large volume of *data*. A full-size hard disc will hold, say, 5 *megabytes* or more; a smaller *floppy disc* typically holds from 80 to 250 *kilo* bytes but in either case the capacity is being increased all the time.

**Display Mode**
Means of indicating the form in which the computer's output will appear on the *VDU* screen. It is either text only, text and graphics or graphics only. The display mode is usually represented by a number and the difference between these numbers indicates the change in the display capabilities of the screen, for instance on the BBC computer Mode O gives a higher resolution than Mode 1.

**DOS**
Disc Operating System. This refers to the piece of computer code that controls the action of the disc drive. On some machines this code has to be loaded into the machines memory and on others it is present in the *ROM* onboard the disc drive. The DOS tells the disc drive how to load and save programs on the disc as well as carrying out any disc management functions such as updating the directory.

**Dummy Variable**
This is a variable that is defined at the beginning of a program that has no use until later on in the program.

**EPROM**
Erasable Programmable Read Only Memory. When programming, writing typically takes one minute and erasing, by ultra-violet light, 10 minutes or longer.

**Get**
A BASIC command. It tells the computer to search the keyboard and bring back the value of the first key pressed.

**Gosub**
A BASIC command telling the computer to go to a subroutine within a program.

**Gcol**
A colour command used in BBC Basic.

**Hard Copy**
A computer printout or listing on paper.

**Hardware**
All the electronic and mechanical components making up a computer system.

**Hex**
Shortened version of hexadecimal, meaning '6 plus 10', which is a funny way of saying 16. It refers to the number system with a base of 16. This uses 0 to 9 and then A to F of the alphabet to represent its 16 digits. Two hex digits can be conveniently used to represent a byte (eight bits).

**High Resolution**
This means that you can pinpoint one dot on a screen rather than one square, giving you graphical pictures of much greater detail and accuracy.

**Instruction**
A set of *bits* which causes the *CPU* to carry out a particular task in a program.

**Interface**
Circuit which connects different parts of a system together and performs any processing of signals in order to make transfer possible (ie serial-parallel conversion).

**I/O**
Input/Output. A computer generally has one or more *ports* through which it communicates with 'the outside world' — *peripheral* devices such as a *keyboard*, video display *(VDU), printer* etc. An I/O port may be just an input or just an output or it can be bidirectional.

**Kilo (K)**
Normally means 1000, but stands for1024 ($2^{10}$) when referring to memory.

**Language**
A repertory of commands — symbols, expressions etc, used to 'call up' the instructions or procedures a *processor* can execute.

**Location**
Physical position; *memory* location is the same as *address*.

**Loop**
*Program* technique where one section of program (the loop) is performed many times over.

**Machine Language (or Code)**
The lowest (and most tediously detailed)

level of *program instructions*. All higher level coding must be converted to *machine language* (by *compiler* or *interpreter)* before a *processor* can obey it.

## Memory Map
Chart showing how *memory* is used by a computer. The arrangement of *data* and *program* within the memory.

## Menu
A set of options displayed on-screen by a computer program from which the computer user can make a selection to implement.

## Modulator
A device, included in every good hobby computer, which takes the computer's output and converts it to an RF signal on a suitable TV channel, giving you a cheap, convenient visual display.

## Monitor
(1) The first level of computer *operating systems:* the *program* which turns *machine code* commands into action, managing input, output etc.
(2) A TV-type device which is specially constructed to handle video signals from a computer that does not have a *modulator*.

## Parallel/Serial
Denotes the manner in which the computer's output is sent to its peripheral devices. Serial means that the information is passed out one byte after another and it uses a system of special characters to signify control codes of the device. Parallel communications are sent out along a series of wires using the high or low state of the wire to indicate which bits are set and therefore making up a byte.

## Pascal
A very powerful, structured computer language, available on a variety of microcomputers.

## Peek
This BASIC command reads a value from a location in the computer memory. It can be used to access either RAM or ROM.

## Peripheral
Device attached to a computer, eg *printer, plotter, disc* unit, but not necessarily essential to its use.

## Pixel
The single dot that is used to create characters displayed on the VDU. Also the smallest display unit when using high resolution graphics.

## Poke
This command places a value in a location of the computer's memory. It can only be used to access RAM or control registers.

## Port
*Terminal* which the *CPU* uses to communicate with the outside world.

## Print At
A BASIC command telling the computer where to begin printing.

## Print Out
Same as *hardcopy*.

## Program
A set of *instructions*, which tells the computer to perform a sequence of tasks also called software.

## PROM
Programmable Read Only Memory. Proms are a special form of *ROM*, which can be individually programmed by the user.

## Qwerty
The traditional typewriter keyboard layout adopted by computer designers.

## RAM
Random Access Memory. *Data* may be written to or read from any location in this type of memory.

## Register
A general-purpose *memory*, or set of memory *locations*, built into the *microprocessor* itself. Sometimes, particular registers may be designated for a specific purpose.

## RND
In BASIC this stands for RANDOM and instructs the computer to select random numbers, it is often used in games programs. Because the numbers thrown up are mathematically related to the number preceding they are called pseudo-random numbers, not true random-numbers.

## ROM
Read Only Memory. *Memory* device which has its *data* content established as part of manufacture and cannot be changed.

## Routine
A whole *program* or part of a program designed to perform a single function or action.

## RS232
A communications *interface* used for *modems* and for serial *printers*.

## Sequential File
This is a data file that can be created on either a disc or a cassette system. As its name suggests, the information is stored one piece after another. If this information is to be changed or modified in any way then the whole file has to be read back into memory and then written back again once the changes have been made.

## Software
The different kinds of *program* required to work a computer.

## Source Code
*Program* written in one of the *high-level languages* and requiring *compilation* into *machine language* before use.

## String
A sequence of characters used in a program.

## Subroutine
A part of a *program* which performs a specific task and which is available for use elsewhere in a program, as often as you like.

## Syntax
The grammar of a programming *language*.

## Tab
Really stands for tabulate and allows you to automatically put figures and/or words into columns, forming a table.

## Toolkit
Name given to a piece of code that runs in a computer independantly of any other programs and adds commands to the machines language to make the process of programming or debugging easier. Commands such as Renumber, Auto and Trace are common in toolkits. Toolkits take the form of a program that is loaded into the machine on power-up or a chip that is inserted on the circuit board which is then initialised by a SYS or USR call from the operator.

## Variable
A symbol used in programming which is assigned a numeric memory address. You can change the value of variable at will to suit the program you are writing.

## VDU
Visual Display Unit. Usually a TV set in hobby computers, but may be a video monitor which accepts the output directly from the computer.

## Z80
Widely used microprocessor. It is used in the ZX81, Spectrum and TRS-80.

## 6502
Another widely used microprocessor. It is the heart of the PET, Apple and Atari computers.

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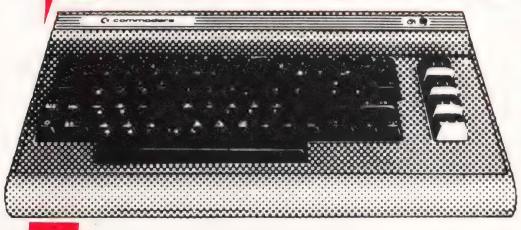
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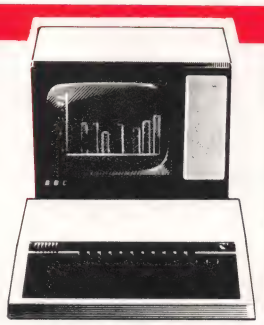
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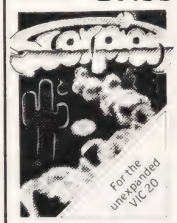

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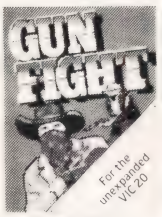

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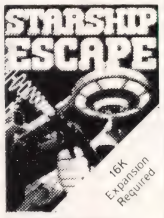

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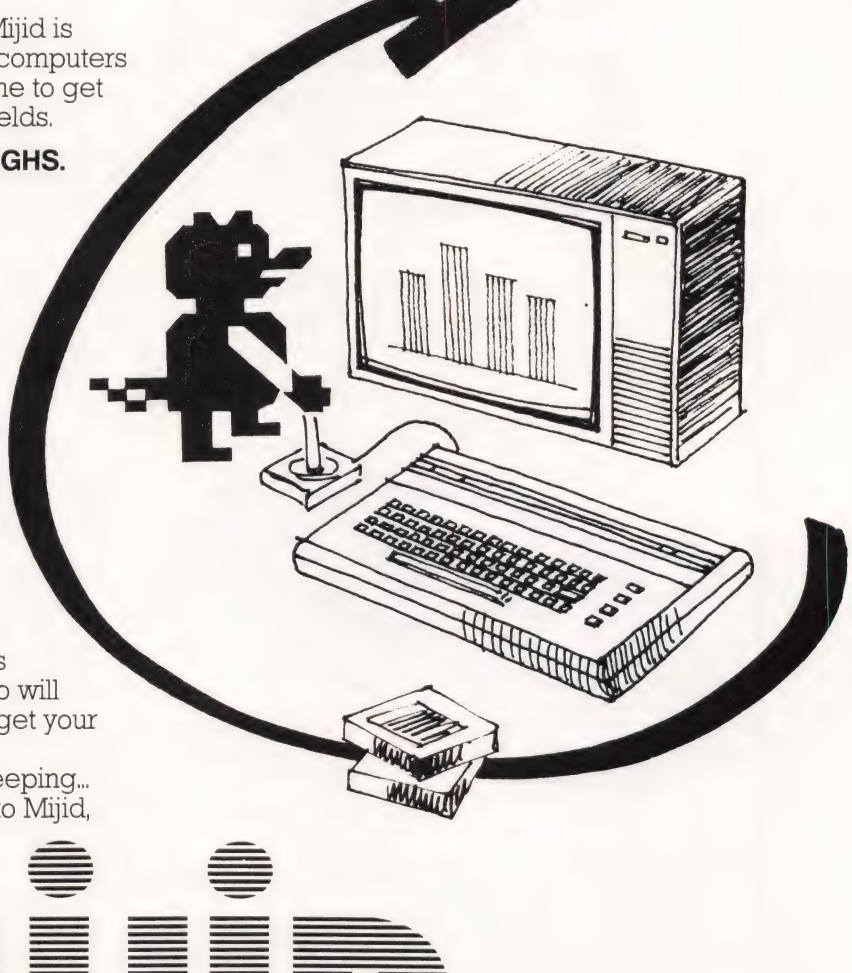
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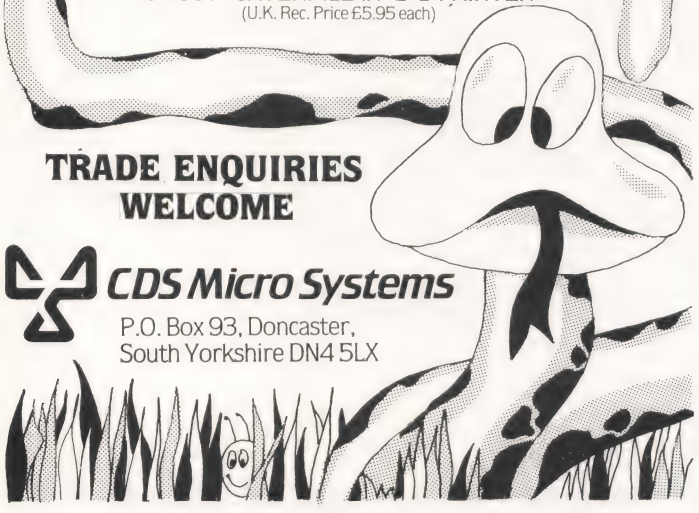
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# SOFTWARE LISTING

## Looking for a program to buy? Look no further! If it's available, it's listed here in our exclusive and comprehensive software checklists.

Looking through any computer magazine can be a bewildering experience if you're in search of a program. Count the hundreds of ads and thousands of titles on sale and it would be easy to lose heart!

We've tried to sort out the confusion, and the sheer numbers, to present an easily understood list for each machine. Where possible, we have eliminated duplications, so that the same tape with a different label is not listed twice. Rather it should be credited once, with as many suppliers as we could find.

### Table Codes

In order to fit as many programs as possible into our pages, we have had to use codes for some columns, considerably shortening the wording.

The information given for each program is: Title, memory required to run it, company producing it, whether tape/cartridge or disk, type and supplier and price.

The codes we have used are:

**Program Type**

GM = Game
BS = Business routine
UT = Utility (ie. programming aid)
DO = Domestic
ED = Educational

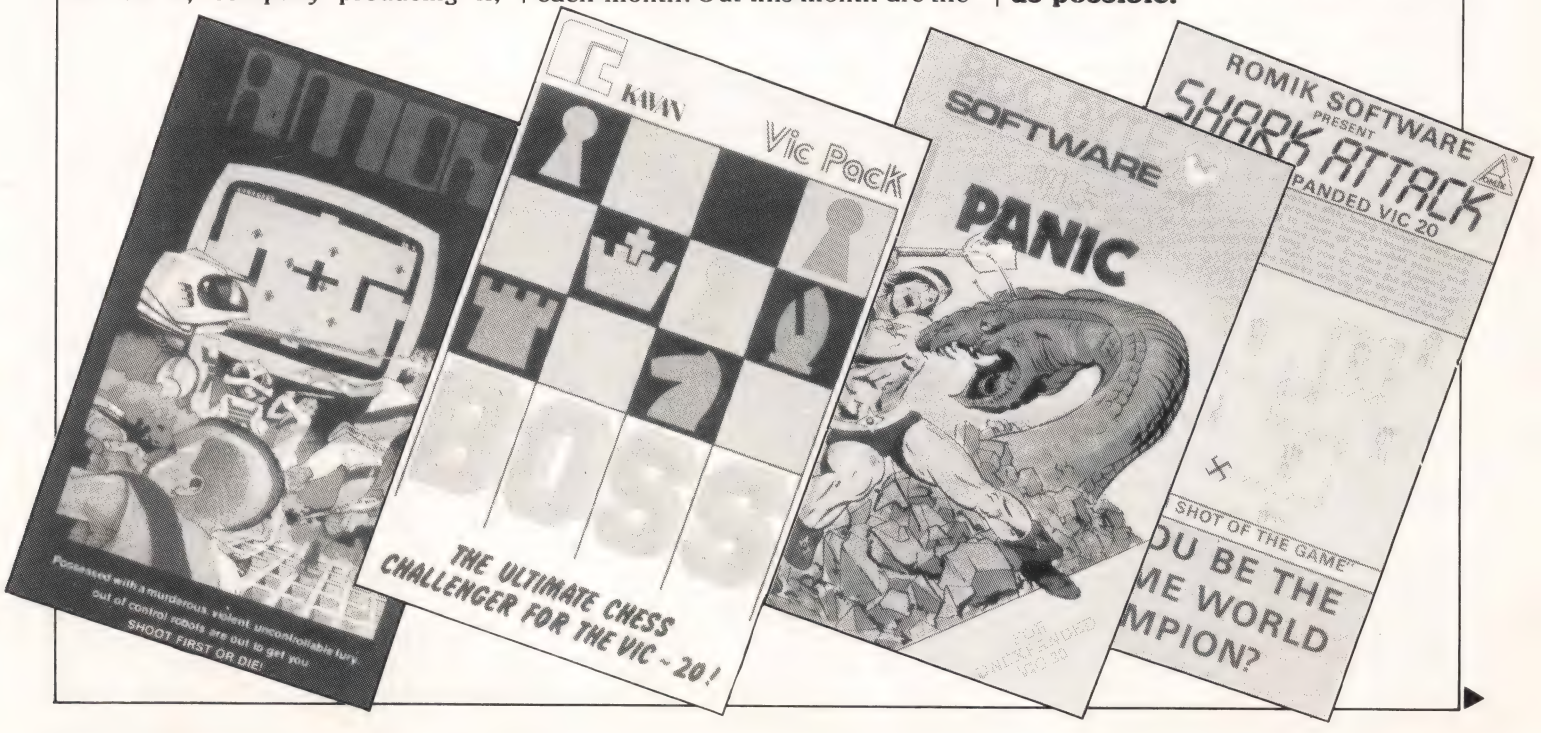
**How Sold**

R = Cartridge (may include memory)
C = Tape (cassette)
D = Disc (for expanded systems)
L = Listing (sold as print-out)

Due to overwhelming response we have been forced to alternate machines included in our checklist each month. Out this month are the Atari, ZX81 and VIC 20. But don't panic they will be featured in November for you to make your software selection. You'll notice that this month we have unavoidably been forced to omit some of the dealer names and addresses. Our apologies.

### Not Here?

**To companies whose products are not listed herein we can only say TELL US ABOUT IT! This applies particularly to the smaller retailer who may sell only half a dozen or so programs for one machine. If you produce software for *any* of the machines on the market today, then we would love to include your wares in our checklists. Send it in to us, marked for the attention of the Editor (in our format *Please*!) or ring Chris Palmer on 01-437 1002 as soon as possible.**



# SOFTWARE LISTING

## ATOM

| Title | Program Type | Program Produced By | Memory Req'd | How Sold | Supplier Codes | Prices |
|---|---|---|---|---|---|---|
| 3-D Asteroids | Gm | Program Power | 5K | C | GK | £6.85 |
| 747 Flight simulator | Gm | Bug Byte | 12K | C | CH,GA,GB | £8.00 |
| Adventure | Gm | Program Power | 12K | C | CH,GK | £9.15 |
| Adventures | Gm | Acornsoft | 12K | C | EJ | £30.00 |
| Air Attack | Gm | Program Power | 12K | C | CH,GK | £9.15 |
| Air Attack | Gm | Program Power | 12K | C | GK | £7.95 |
| Air Strike | Gm | Pro S/W | 9K | C | LD | £6.00 |
| Alien Maze | Gm | Program Power | 8K | C | GK | £5.69 |
| Astrafire | Gm | Program Power | 5K | C | GK | £4.54 |
| Astro Birds | Gm | Program Power | 12K | C | CH,GK | £9.15 |
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| Atom Adventure | Gm | Hopesoft | 12K | C | JV | £6.75 |
| Atom Breakout | Gm | Bug Byte | 4K | C | HO | £4.00 |
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| Atom Business Cassette | Bs | Acornsoft | | C | AL | £7.50 |
| Atom Business Pack | Bs | Acornsoft | | C | AY,FA | £11.50 |
| Atom Chess | Gm | Acornsoft | 12K | C | GA,EA,AL | £11.50 |
| Atom Chess | Gm | Acornsoft | 12K | C | GK | £11.44 |
| Atom Forth | Ut | Acornsoft | | C | GA,EJ,AL | £11.50 |
| Atom Invaders | Gm | Bug Byte | 12K | C | HO | £8.00 |
| Atom Life Category | Bs | Acornsoft | | C | AL,GA | £11.50 |
| Atom List | Ut | Acornsoft | | C | AL | £17.25 |
| Atom Man | Gm | Hopesoft | 12K | C | JV | £6.75 |
| Atom Store | Bs | Program Power | 12K | C | GK | £9.15 |
| Atom Synthesiser | Gm | Acornsoft | 12K | C | AL,GA | £11.50 |
| Atomic Cube | Gm | A&F S/W | 12K | C | GE | £4.95 |
| Backgammon | Gm | Bug Byte | 7K | C | GA | £7.00 |
| Blitz | Gm | Rucksoft | 4K | C | KO | £2.65 |
| Chaser | Gm | Hopesoft | 4K | C | JV | £3.75 |
| Chess | Gm | Bug Byte | 12K | C | CH,GA,GB | £9.00 |
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| Cowboy Shootout | Gm | Program Power | 12K | C | CH,GK | £7.99 |
| Cylon Attack | Gm | A&F S/W | 12K | C | GE | £4.95 |
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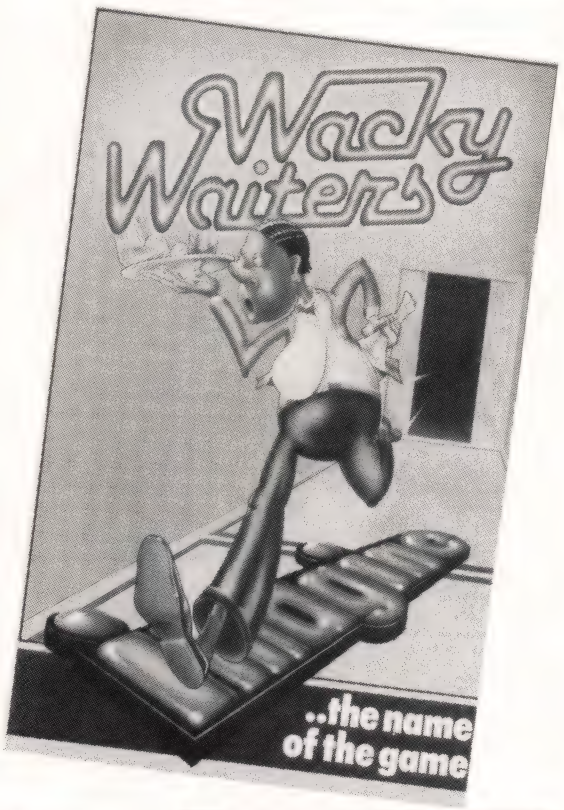
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| Star Trek | Gm | Program Power | 5K | C | GK | £6.85 |
| Star Trek | Gm | Bug Byte | 12K | C | HO | £5.00 |
| Statistics Pack | Ut | Bug Byte | 12K | C | Ho | £20.00 |
| Stockbroker | Gm | Program Power | 5K | C | GK | £4.54 |
| Super Race Track | Gm | Program Power | 12K | C | GK | £5.69 |
| Squares, Simon and Parachute | Gm | Bug Byte | 7K | C | HO | £5.00 |
| Tangle | Gm | A&F S/W | 6K | C | GE | £3.95 |
| The Soft VDU | Gm | Acornsoft | 8K | C | AY,FA,GA EJ,AL,CH,FZ | £11.50 |
| The Park | Gm | Program Power | 12K | C | GK | £5.69 |
| Time Tutor | Ed | A&F S/W | 6K | C | GK | £3.95 |
| 2K Programs (1) | Gm | Bug Byte | 2K | C | HO | £4.50 |
| 2K Programs (3) | Gm | Bug Byte | 2K | C | HO | £4.50 |
| Typist | Ut | Bug Byte | 6K | C | HO | £4.00 |
| Tunnel | Gm | Rucksoft | 6K | C | HO | £2.65 |
| UFO Bomber | Gm | Bug Byte | 7K | C | HO | £4.00 |
| Utility Pack 1 | Ut | Acornsoft | 2K | C | FA,GA,AL,GA | £11.50 |
| Warlords | Gm | Program Power | 12K | C | GK | £7.99 |
| Word Pack ROM | Ut | Acornsoft | 8K | C | AJ,EJ,GA | POA |
| Word Processings Pack | Bs | Acornsoft | 8K | C | FA | POA |
| Word Tutor | Bs | Acornsoft | 12K | C | GA,EJ,FA,AL | £11.50 |
| Write Your Own Adventure | Ut | Hopesoft | 12K | C | JV | £5.75 |
| Yan | Gm | Program Power | 3K | C | GK | £5.69 |
| Yellow Pearl | Gm | Rucksoft | 7K | C | HO | £3.30 |

# SOFTWARE DEALERS

**BG** Elcon Research Ltd
Viking Way
Banhill
Cambridge CB3 8EZ
0954 81825

**BH** Avalon Hill Games
650 High Street
North Finchley N12
445 3044

**BI** Call Apple (UK)
c/o SBD Software, Freepost
Richmond
Surrey
940 5194

**BJ** Lifeboat Associates
PO Box 125
London WC2H 9LU
836 9028

**BK** L & J Computers
192 Honey Pot Lane
Queensbury
Stanmore
Middlesex HA7 1EE
204 7525

**BL** Peach Tree Software
International
MSA House
99 King Street
Maidenhead
Berks
0628 71011

**BM** ACT (Microsoft) Ltd
Freepost
Birmingham B16 8BR
(David Low)
021 454 8585

**BN** Personal Computer Palace
4-6 Castle Street
Reading
Berks
0734 589249

**BO** Sinclair Software
Sinclair Research Ltd
6 Kings Parade
Cambridge
CB2 1SN
0276 66104

**BP** Leicester Computer Centre Ltd
67 Regent Road
Leicester
LE16YF
0533 556268

**BQ** TABs Ltd
Sopers House
Chantry Way
Andover
Hants
SP10 12U
0264 58933

**BR** IBR Microcomputers
Suttons Industrial Park
London Road
Earley
Reading
0734 664111

**BS** Computer Plus
47 Queens Road
Watford
Herts
WD1 2LH
0923 33927

**BT** The Essential Software Co.
(Visconti Ltd)
47 Brunswick Centre
London WC1
866 5445

**BU** Guestel
8-12 New Bridge Street
London EC4
583 2255

**BV** Lowe Electronics
Chesterfield Road
Matlock
Derbyshire DE4 5LE
0629 4995

**BW** Gate Micro System Ltd
The Nethergate Centre
35 Yeaman Shore
Dundee
0382 28194

**BX** Abbey House
Bothwell Street
Glasgow
041-221-9372

**BY** Almarc Data Sytems Ltd
Great Freeman Street
Nottingham
NG3 1FR
0602 52457/8/9

**BZ** Interam Computer Systems Ltd
46 Balham High Road
London SW12
675 5325/6/7

**CA** Terodec Ltd
Unit 58
Suttons Park
Avenue
Earley
Reading
0734 664343/6

**CB** Poolsoft
17 Blatchington Road
Saford
East Sussex
0323 890604

**CC** Highlight Software
3 Nether Court
Halstead
Essex
0787 475714

**CD** Omega Plus
2c Graham Road
London E8 1BZ

**CE** Southern Software
PO Box 39
Castleigh
Hants S05 5WQ

**CF** Sigma Systems
54 Park Place
Cardiff
Cardiff 21515/34869

**CG** Planet Software
10 Norton Drive
Eaton
Norwich

**CH** Brighton Gamer
24 Gloucester Road
Brighton
Sussex
0273 698424

**CI** Picturesque
6 Corkscrew Hill
West Wickham
Kent BR4 9BB

**CJ** 7 Lidgett Crescent
Roundhay
Leeds

**CK** Chrisalid
13 High Street
Berkanstad
Herts
74569

**CL** MED
640 melton Road
Thurmaston
Leicester
Leicester 704492

**CM** Simple Software
15 Havelock Road
Brighton
Sussex
0273 504879

**CN** Buffer Micro Shop
374A Streatham High Road
London SW16
769 2887

**CO** Pixel Productions
39 Ripley Gardens
London W1 48HF

**CP** Computics Microsoft
1 Bell Lane
Wheatley
Oxford
0X9 1XY

**CQ** KW Software
155 Ronginglow Road
Sheffield
S11 7PS

# SOFTWARE LISTING

## ZX SPECTRUM

| Title | Program Type | Program Produced By | Memory Req'd | How Sold | Supplier Codes | Prices |
|---|---|---|---|---|---|---|
| 3D Mazenture | Gm | Softek | 48K | C | OK | £3.95 |
| 3D Tanx | Gm | dK'tronics | 16/48K | C | EE | £4.95 |
| 3D Tunnel | Gm | New Generation | 16/48K | C | OM | £4.95 |
| Adventure | Gm | Foilkade | 16/48K | C | ON | £5.95 |
| Adventure | Gm | Abersoft | 48K | C | HX | £9.95 |
| Adventure 1 | Gm | D J Moody | 16K | C | OO | £5.00 |
| Adventure 2 | Gm | D J Moody | 16K | C | OO | £5.00 |
| Adventure 3 | Gm | D J Moody | 16K | C | OO | £5.00 |
| Adventure 4 | Gm | D J Moody | 16K | C | OO | £5.00 |
| Adventure Quest | Gm | Level 9 | 48K | C | CU | £9.90 |
| Airline | Gm | Cases Computer Simulations | 16K | C | KZ | £5.00 |
| Alien | Gm | Spectra Soft | 16K | C | JJ | £3.95 |
| Alien Command | Gm | Microware | 16K | C | OP | £4.75 |
| Angles | Ed | AVC Software | 16K | C | IM | £3.00 |
| Arcade Pack 1 | Gm | Ohmega Electronics | 16K | C | IO | £4.82 |
| Arcadia | Gm | Imagine Software | 16/48K | C | OR | £5.50 |
| Aspect Assembler | Ur | Bug-Byte | 16/48K | C | FL | £9.00 |
| Assembler | Ur | Artic | 16K | C | EH | £9.95 |
| Assembler/Disasembler | Ur | Hewson | 16/48K | C | DT | £8.95 |
| Associateive Database System | Do | Docimodus | 16K | C | HE | £15.00 |
| Asteroids | Gm | Abbex Electronics | 16K | C | OT | £5.95 |
| Astro Scramble | Gm | C Tech | 16/48K | C | OU | £2.95 |
| Atoms | Gm | Cornhill | 16K | C | JK | £5.50 |
| Audio Sonics | Ur | Work Force | 16/48K | C | FO | £4.99 |
| Autochef | Do | Cases Computer Simulations | 16K | C | KZ | £5.00 |




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|---|---|---|---|---|---|---|
| Avenger | Gm | Abacus Electronics | 16K | C | OS | £4.95 |
| Awari | Gm | Foilkade | 16/48K | C | ON | £5.95 |
| Backgammon | Gm | Microware | 16K | C | OP | £5.00 |
| Battle Of Britain | Gm | MS | 48K | C | OW | £5.95 |
| Bermuda Triangle | Gm | Kricon Ltd | 48K | C | QK | £9.75 |
| Bit, Byte Rotation | Ut | Cornhill | 16K | C | JK | £4.50 |
| Biorhythms | Do | ICL | 16K | C | OX | £6.95 |
| Black Crystal | Gm | Carnell Software | 48K | C | OY | £7.50 |
| Bridge | Gm | ZX SAS | 16K 48K | C | OV | £6.50 |
| Bomber | Gm | Llamasoft | 16K | C | KG | £2.95 |
| Business Bank Account | Bg | Transform | 16K 48K | C | GZ | £8.75 |
| Business Model Modeller X | Bg | Cases Computer Simulations | 16K | C | KZ | £8.00 |
| Business Pack | Bg | Transform | 16K 48K | C | GZ | £25.00 |
| Breaker | Gm | Wizard | 48K | C | PA | £3.50 |
| Cabman | Gm | Micro Power | 16K | C | OZ | £3.95 |
| Centipede | Gm | dK'tronics | 16/48K | C | EE | £4.95 |
| Chess | Gm | Artic | 48K | C | EH | £9.45 |
| City | Gm | Docimodus | 48K | C | HE | £8.00 |
| Club Record Collector | Do | ICL | 48K | C | OX | £9.95 |
| Collector's Pack | Do | ICL | 48K | C | OX | £9.95 |
| Colossal Adventure | Gm | Level 9 | 48K | C | CU | £9.90 |
| Commercial Accounts | Do | Gemini | 16/48K | C | PB | £19.95 |
| Compiler | Ut | Softek | 48K | C | PC | £14.95 |

## SOFTWARE DEALERS

**CR** Sideline Freepost
Oxford 0X2 8BR

**CS** IQ Services
Canal House
Ardrigshaig
Argyll
Scotland
0546 3212

**CT** Willow Software
PO Box 6 Crediton
Devon
EX17 1DL

**CU** Level 9 Computing
229 Hughenden Road
High Wycombe
Bucks

**CV** J Perves
12 Stobhill Road
Gorebridge
Midlothian
EH23 4PL

**CW** Cambell Systems
Rous Road
Buckhurst Hill
Essex
IG9 6BL

**CX** Microdeal
Deal House
Bridges
Bodmin
Cornwall

**CY** Prof. F. H George
Bureau of Information Science
Commerce House
High Street
Chalfont St Giles
Bucks

**CZ** J Wolstencroft
Sagar Fold
Preston
Chipping (09956) 327

**DA** Ground Control
Alfreda Avenue
Hullbridge
Essex SS5 6LT
Southend (0702) 230324

**DB** Mick Bignell
01 953 8385

**DC** Giltrole Ltd
PO Box 50
Rugby
Warks CV21 4DH

**DD** Deep Thought Software
20 Chauntsinger
Alton
Hants

**DE** Silversoft
40 Empress Avenue
Ilford
Essex

**DF** Michael Orwin
26 Brownlow Road
Willesden
London NW10

**DG** Hisoft
60 Hallam Moor
Liden
Swindon
Wiltshire

**DH** The Soft Option
Bamberplan Ltd
PO Box 11
Cranbrook
Kent
058080 310

**DI**

**DJ** Microcomputer Spacedrome
3 Westholm
London NW11
01 458 5845

**DK** Spider Software
98 Avondale Road
Wouth Croydon
Surrey
01 680 0267

**DL** Xavier Business Systems
7 North Lane
Clayton
Scarborough
Yorkshire
(0723) 583509

**DM** Camden Electronics
(Systems Division)
462 Coventry Road
Small Heath
Birmingham
021 773 8240/021 772 5718

**DN** Sumlock Electronic Services
Royal London House
198 Deansgate
Manchester
M3 3NE

**DO** Microstyle
29 Belvedere
Landsowne Road
Bath (0225) 334569

**DP** Small Systems Engineering Ltd
2-4Canfield Place
London NW6
01 328 7145

**DQ** Woodland Software
103 Oxford Gardens
W10 6NF
01 960 4877

**DR** Telesytems Ltd
PO Box 12
Great Missenden
Bucks
HP16 9DD

**DS** Macronics
26 Spiers Close
Knowle
Solihull
West Midlands
B93 9ES

**DT** Hewson Consultants
7 Graham Close
Blewbury
Oxon
(0235) 850075

**DU** Silicon Office Servies
240 Durants Road
Enfield
Middx EN3 7AZ
01 805 0903

**DV** Sirton Computer Systems
Unit 14
29 Willow Lane
Mitcham
Surrey
01 640 6931

**DW** Psion Ltd
2 Huntsowrth Mews
Gloucester Place
NW1 6DD

**DX** JRS Software
19 Wayside Avenue
Worthing 65691 (evening and weekends only)

**DY** Calisto Computers Ltd
119 John Bright Street
Birmingham B1 1BE
021 632 6458

**DZ** Micro Gen
24 Agar Crescent
Bracknell
Berks
0344 27317

**EA** Anglia Computer Centre
88 St. Benedicts Street
Norwich
NR2 4AB
0603 26002

**EB** SBD Software
15 Jocelyn Road
Richmond TW9 2TJ
01 948 0461

**EC** Abacus Software
PO Box 7211
Grand Rapids
Michigan USA 49510

**ED** Qdos Business Software
9 Tintern Close
Streetly
Birmingham
021 353 0058

**EE** dK'tronics
23 Sussex Road
Gorleston
Great Yarmouth
Norfolk
(0493) 602453

| | | | | | | |
|---|---|---|---|---|---|---|
| Compufile | Do | Jaysoft | 16/48K | C | PD | £4.95 |
| Conflict | Gm | Martech Games | 48K | C | PE | £9.50 |
| Cosmos | Gm | Abbex Electronics | 16K | C | OT | £4.95 |
| Count-down | Ed | AVC Software | 16K | C | IM | £3.00 |
| Crevasse/Hotfoot | Gm | Microsphere | 16K | C | PF | £4.95 |
| Dallas | Gm | Cases Computer Simulations | 16K | C | KZ | £5.00 |
| Database | Do | Buffer | 16K | C | CN | £4.50 |
| Data Base | Ut | Gemini | 16/48K | C | PB | £19.95 |
| Derby Day | Gm | Computer Rentals | 48K | C | PG | £5.95 |
| Digital X-Word Compiler | Gm | N Darwood | 16K | C | JB | £6.00 |
| Dragon Adventure | Gm | Level 9 | 48K | C | CU | £9.90 |
| Editor/Assembler | Ut | Picturesque | 16/48K | C | PH | £8.50 |
| Educational Quiz | Ed | Rose Cassettes | 48K | C | GT | £4.50 |
| Electronics | Ed | Spectre | 48K | C | PJ | £5.95 |
| English Literature | Ed | ICL | 16K | C | OX | £6.95 |
| Escape | Gm | New Generation S/W | 16K | C | OM | £4.95 |
| Espionage Island | Gm | Artic | 48K | C | EH | £6.95 |
| ETX | Gm | Abbex Electronics | 16K | C | OT | £5.95 |
| Everest Ascent | Gm | Richard Shepherd | 16/48K | C | PK | £6.50 |
| Evolution | Gm | Microsphere | 48K | C | PF | £6.95 |
| Faust's Folly | Gm | Abbex Electronics | 16K | C | OT | £5.95 |
| Figaro II | Do | Saxon | 48K | C | PL | £14.95 |
| Football Manager | Gm | Addictive Games | 48K | C | PM | £7.95 |
| Football Pools | Gm | Hartland | 48K | C | PN | £5.95 |
| Fortune | Do | AVC Software | 16K | C | IM | £3.00 |
| French | Ed | AVC Software | 16K | C | IM | £3.00 |
| Frog/Showdown | Gm | Artic | 16/48K | C | EH | £4.95 |
| Frogger | Gm | A&P Software | 48K | C | GE | £7.00 |
| Fruita | Gm | Wizard | 48K | C | PA | £6.50 |
| Hangman | Gm | Spectre Soft | 16K | C | JJ | £4.95 |
| Hangperson | Ed | AVC Software | 16K | C | IM | £3.00 |
| Harrier | Gm | Abbex Electronics | 16K | C | OT | £5.95 |
| Headbanger | Gm | Llamasoft | 48K | C | KG | £4.95 |
| High Noon | Gm | Abbex Electronics | 16K | C | OT | £5.95 |
| History 1 | Ed | ICL | 16K | C | OX | £6.95 |
| Home Accounts | Do | Gemini | 16/48K | C | PB | £19.95 |
| Horace Goes Skiing | Gm | Psion | 16/48K | C | DW | £5.95 |
| Hungry Horace | Gm | Psion | 16/48K | C | DW | £5.95 |
| Inca Curse | Gm | Artic | 48K | C | EH | £6.95 |
| Income Tax | Do | ZX SAS | 16/48K | C | OV | £6.50 |
| Index/Retrieval System | Do | ZX SAS | 16/48K | C | OV | £4.50 |
| Infrared | Ut | ACS Software | 16/48K | C | PS | £6.75 |
| Inheritance | Gm | S W Hessel S/W | 48K | C | IW | £5.95 |
| Intermediate English 1 | Ed | Rose Cassettes | 16K | C | GT | £4.50 |
| Intermediate English 2 | Ed | Rose Cassettes | 48K | C | GT | £4.50 |
| Intermediate Maths 1 | Ed | Rose Cassettes | 48K | C | GT | £4.50 |
| Intermediate Maths 2 | Ed | Rose Cassettes | 48K | C | GT | £4.50 |
| Invaders | Gm | Artic | 16/48K | C | EH | £4.95 |
| Invasion | Gm | Abbex Electronics | 16K | C | OT | £5.95 |
| Inventions 1 | Ed | ICL | 16K | C | OX | £6.95 |
| Jackpot | Gm | Computer Rentals | 48K | C | PG | £5.95 |
| Jackpot Fruit Machine/ Submarine Attack | Gm | Richard Shepperd | 48K | C | PK | £4.95 |
| Junior Education | Ed | Calpac | 16/48K | C | KL | £5.50 |
| KRAKIT | Gm | Artic | 16K | C | EH | £9.95 |
| Krazy Kong/Panic Island | Gm | C Tech | 16/48K | C | PO | £5.00 |
| L-Game | Gm | Quicksilva | 16K | C | GD | £3.95 |
| Learning | Ed | AVC Software | 16K | C | IM | £3.00 |
| Machine Code Test Tool | Ut | Oxford Computer Publishing | 16/ 4 8 K | C | PI | £9.95 £3.50 |
| Magic Cards | Gm | Cornhill | 16K | C | JK | £19.95 |
| Mailing List | Do | Gemini | 16/48K | C | PB | £6.95 |
| Masterchess | Gm | Mikro Gen | 48K | C | PQ | £15.00 |
| Masterfile | Do | Cambell Systems | 48K | C | PR | £8.00 |
| Maths | Ed | ZX SAS | 16/48K | C | OV | £4.95 |
| Mazing | Gm | Spectre Soft | 16K | C | JJ | £4.95 |
| Mazeman | Gm | Abersoft | 16K | C | HX | £4.95 |
| Meteor Storm | Gm | Quicksilva | 16K | C | GD | £4.95 |
| Meteroids | Gm | Softek | 16/48K | C | OK | £4.95 |
| Meteroids | Gm | dK'tronics | 16/48K | C | EE | £4.95 |
| Mined-out | Gm | Quicksilva | 48K | C | DG | £5.95 |
| Mines of Moria | Gm | Severn Software | 48K | C | PP | |
| Mines of Saturn/Return To Earth | Gm | Saturn Developments | 16/ 48K | C | PU | £7.50 |
| Monitor | Ut | Picturesque | 16/48K | C | PH | £7.50 |
| Monitor and Disassembler | Ut | Crystal Computing | 16/48K | C | PV | £8.95 |
| Mortgage | Do | ZX SAS | 16/48K | C | OV | £5.00 |
| Multi Function Cash Controller | Do | Richard Shepherd | 48K | C | PK | £10.00 |
| Muncher | Gm | Silversoft | 16/48K | C | PE | £5.95 |
| Music 1 | Do | ICL | 16K | C | OX | £6.95 |
| Namitar Raiders | Gm | Artic | 16K | C | EH | £3.95 |
| Night Flight | Gm | Hewson | 16/48K | C | DT | £5.95 |
| Numerics | Ed | Spectre | 48K | C | PJ | £5.95 |
| O-Level Chemistry | Ed | Calpac | 48K | C | KL | £5.50 |
| Omnicalc | Do | Microsphere | 48K | C | PF | £9.95 |
| Oro | Gm | Impact Software | 48K | C | PW | £5.00 |
| Orbiter | Gm | Silversoft | 16/48K | C | PE | £5.95 |
| Over The Spectrum No. 1 | G/U | Melborne House | 16K | C | PX | £5.95 |
| Over the Spectrum No. 2 | G/U | Melborne House | 16K | C | PX | £5.95 |
| Parity | Ed | N Darwood | 16K | C | JB | £6.00 |
| Pascal 4 | Ut | Hisoft | 48K | C | PY | £25 |
| Pastimes 2 | Gm | ICL | 16K | C | OX | £4.95 |
| Payroll | Bg | Hilderbay | 48K | C | FW | £25 |
| Penetrator | Gm | Melbourne House | 48K | C | PX | £6.95 |
| Personal Accounting Utility Ledger | Do | Jaysoft | 48K | C | PD | £8.95 |

# SOFTWARE DEALERS

**EF** Computech Systems
168 Finchley Road
London NW3 6HP
01 794 0202

**EG** Electronics Experts
Avondale Workshops
Woodland Way
Kingswood
Bristol
BS15 1QH

**EH** Artic Computing
396 James Reckitt Avenue
Hull HU8 0JA

**EI** Knights TV & Computers
108 Rosemount Place
Aberdeen
0224 630526

**EJ** Microage Electronics
135 Hale Lane
Edgware
Middx
01 959 7119

**EK** Holly Products
Blackthorn House
Dukes Lane
Gerrards Cross
Bucks

**EL** I O Systems
6 Laleham Avenue
Mill Hill
London NW7
01 959 0106

**EM** Merton Electronics
85/87 Station Road
W Croydon
680 8606

**EN** DaVinci Computer Shop
65 High Street
Edgware
Middlesex

**EO** Calco Software
Lakeside House
Kingstone Hill
Surrey
01 546 7256

**EP** Richard Francis
22 Foxhollow
Barhill
Cambridge

**EQ** Microtek Ltd
15 Lower Brook Street
Ipswich
Suffolk
(0473) 50512 or 52466

**ER** Diskwise Ltd
25 Fore Street
Callington
Cornwall
05793 3780

**ES** Control Technology
39 Gloucester Road
Gee Cross
Hyde
Cheshire
SK14 5JG
061 368 7558

**ET** Comp Shop
311 Edgware Road
London W2
01 262 0387

**EU** Micro Computer Products
Cambridge House
Cambridge Road
Barking
Essex IG11 8NT
01 591 6511

**EV** GW Computers
55 Bedford Court Mansions
Bedford Avenue
London WC1
01 636 8210

**EW** C/WP Computers
108 Rochester Row
London SW1P IJP
01 828 3127

**EX** Metrotech Mail Order
Waterloo Road
Uxbridge
Middx
0895 588111 x 274/269

**EY** Microsystems Ltd
Summerfield House
Vale
Guernsey
0481 473377

**EZ** Superior Systems Ltd
178 West Street
S14ET
0742 755005

**FA** Control Universal Ltd
Unit 2
Andersons Court
Newnham Road
Cambridge
0223 358757

**FB** Pete & Pam Computers
98 Moyser Road
London SW16
01 677 2052/7341

**FC** Zenith Data Systems
Bristol Road
Gloucester
0452 29451

**FD** Commodore Information
675 Ajax Avenue
Slough
Berks
Slough 79292

**FE** Logic Computers
31 Palmer Street
London SW1H OPR
01 222 1122/5492

**FF** Overseas Computer Systems Cons.
182a Queens Road
Watford
Watford 48580

**FG** Blyth Computers
Wenhaston
Halesworth
Suffolk
050 270 565

**FH** Taurus Computer Design
47 High Street
Baldock
Herts
SG7 6BG

**FI** HITEC
Zollergasse 15
A-1070
Vienna
Austria
01043 222 934331

**FJ** Graffcom Systems
102 Portland Road
Holland Park
London W11
01 727 5561

**FK** Electronic Aids
Mythe Crest
The Mythe
Twekesbury
Glos GL20 6EB
0386 831020

**FL** BUG-BYTE
98-100 The Albany
Old Hall Street
Liverpool

**FM** Learning Computer Systems
37 St Andrews Drive
Seaford
Sussex
BN25 2SB

**FN** Jentech Services Ltd
Nordley
Bridgenorth
Shropshire
WV16 4SU
07462 5287

**FO** Work Force
140 Wilsden Avenue
Luton
Beds
LU1 5HR

**FP** Twickenham Computer Centre
72 Heath Road
Twickenham
Middx
892 7896 or 891 1612

**FQ** Sbd Software
15 Jocelyn Road
Richmond
948 0461

# SOFTWARE LISTING

## ZX SPECTRUM

| Title | Program Type | Program Produced By | Memory Req'd | How Sold | Supplier Codes | Prices |
|---|---|---|---|---|---|---|
| Personal Banking System | Do | Hilton | 48K | C | PZ | £9.95 |
| Phantasmagraphics | Do | Saxon | 16/48K | C | PL | £6.95 |
| Pharoah's Tomb | Gm | Software For All | 48K | C | KN | £6.95 |
| Physprob | Ed | AVC Software | 16K | C | IM | £3.00 |
| Pilot | Gm | Hewson | 16K | C | DT | £5.95 |
| Pimania | Gm | Automats | 48K | C | QA | £10.00 |
| Planet Of Death | Gm | Artic | 16/48K | C | EH | £6.95 |
| Pools | Gm | Kricon Ltd | 16K | C | QK | £4.95 |
| Primary Arithmetic | Ed | Ross Cassettes | 48K | C | GT | £4.50 |
| Print Shot | Gm | Cases Computer Simulations | 16K | C | KZ | £5.00 |
| Programmer's Dream | Ut | Work Force | 16/48K | C | QB | £6.99 |
| Programmer's Toolkit | Ut | JRS Software | 16/14K | C | DX | £5.95 |
| Programs From Spectrum Machine Language Book | G/U | Melbourne House | 16K | C | PX | £5.95 |
| Purchase Day Book | Bg | Transform | 16/48K | C | QC | £8.75 |
| Purchase Ledger | Do | ZX SAS | 16/48K | C | OV | £10.00 |
| Quarterly Analysis | Bg | Transform | 16/48K | C | QC | £4.75 |
| Renumber Delete | Ut | Work Force | 16/48K | C | QB | £4.75 |
| Rescue | Gm | Computer Rentals | 48K | C | PG | £5.95 |
| Retail Accounting | Do | ZX SAS | 16/48K | C | OV | £10.00 |
| Reversi | Gm | Sinclair Research | 16K | C | BO | £7.95 |
| Reversi | Gm | Spectre Soft | 16K | C | JJ | £4.95 |
| Roman Empire | Gm | M C Lothiorian | 16/48K | C | QD | £5.50 |
| Rox III | Do | Llamesoft | 16K | C | KG | £2.95 |
| Sales Day Book | Bg | Transform | 16/48K | C | QC | £8.75 |
| Sales Ledger | Do | ZX SAS | 16/48K | C | OV | £10.00 |
| Samurai Warriors | Gm | M C Lothiorian | 16/48K | C | QD | £5.50 |
| Schizoids | Gm | Imagine Software | 16/48K | C | OR | £5.50 |
| Scramble | Gm | Work Force | 16/48K | C | QB | £4.95 |
| Scramble | Gm | Mikro Gen | 16/48K | C | PQ | £5.50 |
| Shaken But Not Stirred | Gm | Richard Shepherd | 48K | C | PK | £6.50 |
| Ship Of Doom | Gm | Artic | 48K | C | EH | £6.95 |
| Ship Of The Line | Gm | Richard Shephard | 16/48K | C | PK | £6.50 |
| Snackman | Gm | Amba Software | 16K | C | QE | £4.95 |
| Softtime | Do | Softek | 16/48K | C | PC | £3.95 |
| Sorcerer's Castle | Gm | Mikro Gen | 48K | C | PQ | £5.50 |
| Space Intruders | Gm | Quicksilva | 16K | C | GD | £4.95 |
| Space Raiders | Gm | Psion | 16/48K | C | DW | £4.95 |
| SPDE | Do | Cambell Systems | 16K | C | PR | £5.95 |
| Speakeasy | Ut | Quicksilva | 48K | C | GD | £4.95 |
| Spec Bug | Ut | Artic | 16/48K | C | EH | £6.95 |
| Spectral Invaders | Gm | Bug Byte | 16K | C | FL | £5.00 |
| Spectrec | Gm | Palantir | 48K | C | QF | £5.00 |
| Spectres | Gm | Bug-Byte | 16/48K | C | FL | £8.00 |
| Spectrum Games | Gm | JRS Software | 16K | C | DX | £4.95 |
| Spectrum Zap ZX Reactor | Gm | ASP Software | 16K | C | OD | £8.50 |
| Spectsound | Do | PDQ Software | 16K | C | QG | £5.95 |
| Spookyman | Gm | Abbex Electronics | 16K | C | OT | £4.95 |
| Starfighter | Gm | Impact Software | 16K | C | PW | £5.00 |
| Starship Enterprise | Gm | Silversoft | 48K | C | DE | £5.95 |
| Startrek | Gm | Gemini Software | 48K | C | PB | £5.95 |
| Star Trek | Gm | Fuller Micro | 16K | C | QH | £5.50 |
| Star Trek | Gm | Impact Software | 16K | C | PW | £5.00 |
| Star Trek | Gm | R&R Software | 48K | C | HD | £4.95 |
| Statistics | Do | Severn Software | 16/48K | C | PP | £6.95 |
| Stock Control | Do | Gemini | 16/48K | C | PB | £19.95 |
| Stock Control | Do | Hilderbay | 48K | C | FW | £25 |
| Storm-Fighters | Gm | John Prince | 16/48K | C | HI | £4.95 |
| Sub Track | Gm | Amba Software | 16K | C | QE | £4.95 |
| Superdeflex | Do | Llamasoft | 48K | C | KG | £4.95 |
| Super Glooper/Frogs | Gm | Sinclair Research | 16K | C | BO | £4.95 |
| Superpack 1 | Do | Video Software | 48K | C | QI | £7.00 |
| Superplan | Do | Video Software | 48K | C | QI | £12.00 |
| Tables | Ed | AVC Software | 16K | C | IM | £3.00 |
| Taipen | Gm | Jaysoft | 16/48K | C | PD | £4.95 |
| Tasword | Do | Tasman | 48K | C | QJ | £7.95 |
| The Chess Player | Gm | Quicksilva | 48K | C | GD | £6.95 |
| The Hobbit | Gm | Melbourne House | 48K | C | PX | £14.95 |
| The Orb | Gm | Computer Rentals | 48K | C | PG | £4.95 |
| The Quest | Gm | Impact Software | 48K | C | PW | £5.00 |
| The Valley | Gm | ASP Software | 48K | C | OD | £11.45 |
| The Zolan Adventure | Gm | Softek | 16K | C | PC | £4.95 |
| Thro' the wall/Scramble | Gm | Sinclair Research | 16K | C | BO | £4.95 |
| Time-Gate | Gm | Quicksilva | 48K | C | GD | £6.95 |
| Toolkit | Ut | Sinclair Research | 16K | C | BO | £5.95 |
| Transylvanian Tower | Gm | Richard Shepherd | 48K | C | PK | £6.50 |
| Treasure Hunt | Gm | Amba Software | 16K | C | QE | £4.95 |
| Triplet | Gm | Wizard | 48K | C | PA | £5.50 |
| Turtle | Ed | AVC Software | 16K | C | IM | £3.00 |
| Tyrant of Athens | Gm | M C Lothlorian | 16/48K | C | QD | £5.50 |
| Ultraviolet | Ut | ACS Software | 16/48K | C | PS | £7.50 |
| User-Defined Graphics | Ut | Cornhill | 16K | C | JK | £1.50 |
| Video Pack | Do | C Tech | 16/48K | C | OU | £5.00 |
| Vu 3-D | Do | Sinclair Research | 48K | C | BO | £9.95 |
| Viewpoint | Ut | ACS Software | 16/48K | C | PS | £6.50 |

## SOFTWARE DEALERS

**FR** Beebug
PO Box 50
St Albans
Herts
(Independent User Group for BBC Micro)

**FS** RAM Computer Services Ltd
15-17 North Parade
Bradford
0274 39116

**FT** Ozwise Computers
28 Crofts Road
Harrow
Middx HA1 2PH
01 863 2309

**FU** Compusense
PO Box 169
Palmers Green
London N13 4HT
01 882 0681

**FV** The Avery Computer Company
13 The Mall
Bar Hill
Cambridge
(Crafts Hill 80991)

**FW** Hilderbrey Ltd
8/10 Parkway
Regents Park
London NW1
01 485 1059

**FX** Micromedia
Vine Cottage
Tentelow Lane
Norwood Green
Middx
01843 9457

**FY** Wida Software
2 Nicholas Gardens
London W5 5HY
01 567 6941

**FZ** Superior Systems Ltd
178 West Street
Sheffield
0742 755005

**GA** Eltec Services Limited
231 Manningham Lane
Bradford
BD8 7HH
(0274) 491372

**GB** Anglo American Software
138a Stratford Court
Sparkhill
Birmingham
021 771 2995

**GC** Castle Electronics
15 Castle Street
Hastings
East Sussex
0424 437875

**GD** Quicksilva
95 Upper Brownhill Road
Maybush
Southampton
Hants
0703 771248

**GE** A&F Software
830 Hyde Road
Manchester
M18 7JD
061 223 6206

**GF** SRS Microsystems
161 Bramley Road
Oakwood
London N14 4XA
01 363 8060

**GG** Stirling Microsystems
241 Baker Street
NW1
01 486 7671

**GH** Microtanic Software
234 Dulwich Road
London 0BD
01693 7659

**GI** Lander Microsystems
32 Clokchouse Lane
Collier Row
Romford Essex
Romford 26325

**GJ** Computer Concepts
16 Wayside
Chipperfield
Herts
09277 62955

**GK** Program Power
5 Wensley Road
Leeds LS7 2LX
0532 683186

**GL** Syrtis Software
23 Quantock Road
Bridgewater
Somerset

**GM** Lutterworth Software
6 Cromwell Close
Walcote
Lutterworth
LE17 4JJ

**GN** Collins Computing
The Gatehouse
Whinburgh
Dereham
Norfolk

**GO** Datafax
Riviera House
Queens Road
Buckhurst Hill
Essex

**GP** C C Soft
83 Longfield Street
Soutfields
London SW18

**GQ** Microx
52 The Strand
Worthing
Sussex
Worthing 49584

**GR** Pro Software
121 Tyn-Y-Twr
Baglan
Port Talbot
West Glamorgan
SA12 8YE

**GS** Sussex Software
Wallsend House
Pevensey Bay
East Sussex

**GT** Rose Cassettes
148 Widney Lane
Solihull
West Midlands
B91 3LH

**GU** Axis
71 Brockfield Avenue
Loughborough
Leics
LE11 3LN

**GV** PR Software
28 The Fairway
South Ruislip
Middx
HA4 0RY

**GW** Bridge Software
36 Fernwood
Marple Bridge
Stockport
Cheshire
SK6 SBE

**GX** Video Software Limited
Stone Lane
Kinver
Stourbridge
West Midlands
Kinver 2462

**GY** J M Steadman
6 Carron Close
Leighton Buzzard
Beds LU7 7XB

**GZ** Transform Ltd
41 Keats House
Porchester Mead
Beckenham
Kent
01 658 1661

**HA** Baust Computing Consultants
31 Peak Lane
Fareham
Hants PO14 1RX
0329 281480

**HB** University Computers
5 St Barnabas Road
Cambridge CB1 2BU

**HC** Educare
139a Sloane Street
London SW1X 9AY

| | | | | | | |
|---|---|---|---|---|---|---|
| Voice Chess | Gm | Artic | 16/48K | C | EH | £9.95 |
| Vu-Calc | Do | Psion | 16/48K | C | DW | £8.95 |
| Winged Avenger | Gm | Work Force | 16K | C | QB | £4.50 |
| Wordprocess | Bg | Spectre Soft | 16K | C | JJ | £4.95 |
| Zeus Assembler | Ut | Crystal Computing | 48K | C | PV | £8.95 |
| ZX Forth | Ut | Artic | 48K | C | EH | £29.95 |
| ZX Games 1 | Gm | ASP Software | 16K | C | OD | £5.99 |
| ZX Sideprint | Ut | Microsphere | 16K | C | PF | £4.95 |
| ZX Utility 1 | Ut | ASP Software | 48K | C | OD | £5.99 |

## ORIC

| | | | | | | |
|---|---|---|---|---|---|---|
| ORIC Base | Do | Tansoft | 48K | C | QR | £14.50 |
| Oric—Chess | Gm | Tansoft | 48K | C | QR | £9.99 |
| ORIC-Flight | Gm | Tansoft | 48K | C | AR | £4.50 |
| ORIC Forth | Ut | Tansoft | 48K | C | QR | £15.00 |
| Multi-Games | Gm | Tansoft | 48K | C | QR | £6.90 |
| Wriggler | Gm | FBC Systems | 48K | C | QL | £5.50 |
| Zodiac | Gm | FBC Systems | 48K | C | QR | £9.99 |

## SHARP

| | | | | | | |
|---|---|---|---|---|---|---|
| 3-D Basic | Gm | Kuma | 6K | C | AX,AO,AB | £6.32 |
| 3-D Space Battle | Gm | Sumlock | 48K | C | DN | £8.00 |
| Acrobat | Gm | Sumlock | 48K | C | DN | £6.33 |
| Address Book | Gm | Highlight S/W | 4K | C | CC,AB | £4.60 |
| Address Book | Do | DCS | 48K | C | JQ | £3.00 |
| Address/Telephone Book | Do | Plymouth Computers | 6K | C | OG | £4.99 |
| Agent 007 | Gm | DCS | 24K | C | JQ | £3.00 |
| Air Bomber | Gm | Plymouth Computers | 6K | C | OG | £4.99 |
| Aladdin's Cave | Gm | Kuma | | C | AX,CH | £6.32 |
| Aldebaren I | Gm | Sharpsoft | 20K | C | CH | £5.85 |
| Alien Attack | Gm | Sumlock | 48K | C | DN | £6.50 |
| Alien Attack | Gm | J Wolsencroft | 24K | C | CZ | £4.60 |
| Analysis Book | Bs | Microtek | 48K | C | EQ | £95.00 |
| Animate | Gm | Kuma | 48K | C | AX,AB,AO | £9.20 |
| Apollo Front Panel | Bs | Kuma | 20K | C | AX | £14.35 |
| Apolloword | Bs | Kuma | 48K | C | AX,AC,AO | £28.70 |
| Apolloword | Bs | Kuma | 48K | D | AX,AC,AO | £63.25 |
| Ardensoft Toolkit | Ut | Kuma | 20K | C | AX | £40.25 |
| Artillery/Biorythms | Gm | DCS | 24K | C | JQ | £3.00 |
| Asteroids | Gm | Sharpsoft | 20K | C | CH | £5.85 |
| Astor Dodge | Gm | Kuma | | C | AX,CH | £6.32 |
| Astor Shoot | Gm | Sumlock | 48K | C | DN | £6.33 |
| Auto Cross | Gm | Highlight S/W | 6K | C | CC,AB | £4.60 |
| Backgammon | Gm | Highlight S/W | 10K | C | CC,AB | £5.75 |
| Bank Account | Do | Highlight S/W | 6K | C | CC,AB | £4.60 |
| BASIC-C | Ut | DCS | 24K | C | JQ | £16.00 |
| BASIC-B | Ut | DCS | 24K | C | JQ | £12.00 |
| Basic Compiler | Ut | Sharp | 48K | C | AB | £34.50 |
| Basic Extensions | Ut | Kuma | 20K | C | AX,AO,AB | £14.95 |
| Basic Mod | Ut | DCS | 20K | C | JQ | £5.00 |
| Basic Plus | Ut | Kuma | | C | AX | £13.80 |
| Battleships | Gm | DCS | 24K | C | JQ | £3.00 |
| Bean Feast | Gm | DCS | 24K | C | JQ | £3.00 |
| Bingo Caller | Gm | DCS | 48K | C | JQ | £3.00 |
| Bio-Rhythm | Gm | Highlight S/W | 6K | C | CC,AB | 4.60 |
| Block QC | Gm | Sharpsoft | 20K | C | AB | £3.50 |
| Block Stop | Gm | J Wolstencroft | 24K | C | CZ | £4.60 |
| Blockade | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Bomb Run | Gm | Sumlock | 48K | C | DN | £7.50 |
| Bomber | Gm | Kuma | 6K | C | AX,AO,AB | £6.32 |
| Breakout | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Breakout | Gm | Sharpsoft | 20K | C | AB | £5.75 |
| Bridge | Gm | Highlight S/W | 22K | C | CC | £12.95 |
| Broadwater Economic Simulations | Ed | BES | 16K | C | KX | £28.75 |
| Brownian Motion | Ed | Kuma | | C | AX | £12.00 |
| Bytesaver | Ut | DCS | 20K | C | JQ | £4.00 |
| CPM | Ut | Chrystal | 48K | C | AX,AO | £172.50 |
| Calc II | Bs | Kuma | 20K | C | AX,AO,FZ | £39.65 |
| Camelot | Gm | Kuma | 48K | C | AX,AC,AB AO,FZ | £6.32 |
| Carols | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Cash Book | Bs | Microtek | 48K | C | EQ | £95.00 |
| Cash Flow Projection | Bs | NCG Ltd | 36K | C | KW | £95.00 |
| Castle Bloodstone Adventure | Gm | Sumlock | 48K | C | DN | £17.25 |
| Casino | Gm | Kuma | | C | AX | £6.32 |
| Catch 2000/Invader | Gm | Kuma | 12K | C | AX,AO,AB | £6.32 |
| Cesil III | Ed | Kuma | 20K | C | AX | £17.20 |
| Chase | Gm | Highlight S/W | 6K | C | CC,AB | £5.75 |
| Chess | Gm | Kuma | 12K | C | AX,AO,FZ,CH | £12.00 |
| Children's Maths | Ed | Kuma | | C | AX | £6.32 |
| Chrystal Basic | Ut | Chrystal | 48K | C | AX,AO | £46.00 |
| Code Breaker | Gm | Plymouth Computers | 15K | C | OG | £4.99 |

# SOFTWARE DEALERS

**HD** Simon Software
Freepost
New End
Redditch

**HE** Docimodus
161 Walmersley Road
Bury
Lancashire
BL9 5DE

**HF** M C Associates
4 Granby Road
Cheadle Hulme
Cheshire SK8 6LS

**HG** Addictive Games
PO Box 278
Conniburrow
Milton Keynes
MK14 7NE

**HH** J K Greye Software
16 Park Street
Bath
Avon BA1 2TE

**HI** John Prince
29 Brook Avenue
Levenshire
Manchester M19

**HJ** Titan Programs
83 Ashwood Road
Rudloe
Corsham
Wiltshire
SN13 0LG
(0225) 810132

**HK** Micro Computer Softare
Unit D6
Pear Industrial Estate
Stockport Road
Lower Bredbury
Stockport
SK6 2BP
061 494 2441

**HL** Phipps Associates
99 East Street
Epsom
Surrey KT17 1EA

**HM** Gemini Electronics
50 Newton Street
Manchester M1
061 236 3083

**HN** The Vic Centre
154 Victoria Road
Acton
London
W3 6UL
01-992-9904

**HP** R & R Software
34 Bourton Road
Gloucester
GL4 OLE
0452-502819

**HQ** Town Book & Toys
15 Eastgate Street
Gloucester
Glos

**HR** Screen Scene
144 St Georges Road
Cheltenham
Glos

**HS** Software Masters Ltd
30 Lincoin Road
Olton
Birmingham

**HT** John Prince Software
29 Brook Avenue
Levenshulme
Manchester M19

**HU** Nick Godwin
4 Hurkur Crescent
Eyemouth
Berwickshire
TD14 5AP

**HV** A Parsons
23 Coxhill Gardens
River
Dover
Kent

**HW** Bryants (Educational) Software
1 The Hollies
Chalcroft Lane
North Berstead
Bognor Regis
West Sussex
PO21 55X

**HX** Abersoft
7 Maes Afallen
Bow Street
Dyfed
SY24 5BA

**HY** D.C. Roberts
107a Royal George Road
Burgess Hill
Sussex

**HZ** Hard & Soft
85 Snowdown Avenue
Hillingdon
Middx
UB10 0SE

**IA** Microdeal
Deal House
Luxulyan
Bodmin
Cornwall
PL30 5E
0726-850-821

**IB** Aztec Software
25 St Mark Road
Deepcar
Sheffield
S30 5TS

**IC** Orgre Games & Software
Fantasy Department
47 Chislehurst Avenue
Liverpool 25
Merseyside

**ID** Tridata Micro's Ltd
Smithfield House
Digbeth
Birmingham
B5 6BS
021-662 6085/6

**IE** Plympton Computer Services
5 Turnbill Gardens
Plympton
Plymouth
Devon
PL7 3XF
0752-330176

**IF** Electronics Applied
4 Dromore Road
Carrickfergus
Co Antrim
BT38 7PJ

**IG** Emjay
17 Langbank Avenue
Rise Park
Nottingham
NG5 5BU

**IH** Kansas City Systems
Unit 3
Sutton Springs Wood
Chesterfield
0246-850357

**II** Serious Software
7 Woodside Road
Bickley
Bromley
Kent BR1 2ES

**IJ** Computercat
224 Chapel Street
Leigh
Lancashire
WN7 2DW
0942-605730

**IK** Silica Shop
1-4 The Mews
Hatherly Road
Sidcup
Kent
DA14 4DX

**IL** V & H Computer Services
182c Kingston Road
Staines
Middx

**IM** AVC Software
PO Box 415
Harborne
Birmingham
B17 9TT

**IN** Computator
3 Thalia Close
Greenwich
SE10 4NA

**IO** Omega Electronics
37 Chichester Square
Carrickfergus
Co Antrim
BT38 8JU

# REFERENCE

# SOFTWARE LISTING

## SHARP

| Title | Program Type | Program Produced By | Memory Req'd | How Sold | Supplier Codes | Prices |
|---|---|---|---|---|---|---|
| Colditz | Gm | Sharpsoft | 20K | C | CH | £8.46 |
| Combat | Gm | Highlight S/W | 6K | C | CC,AB | £5.75 |
| Combat | Gm | Kuma | 12K | C | AX,AO,AB | £6.32 |
| Commands | Gm | Sharpsoft | 20K | C | AB | £5.85 |
| Composer | Gm | Highlight S/W | 6K | C | CC,AB | £5.75 |
| Concentration | Gm | Kuma | 12K | C | AX,AO,AB | £6.32 |
| Conflict | Gm | Sumlock | 48K | C | DN | £6.33 |
| Connect 4 | Gm | Highlight S/W | 6K | C | CC,AB | £4.60 |
| Connect Four | Gm | DCS | 24K | C | JQ | £3.00 |
| Cosmiad | Gm | Highlight S/W | 10K | C | CC,AB | £5.75 |
| Cosmiad | Gm | Kuma | 12K | C | AX,AC,AO,AB | £9.20 |
| Count and Add | Ed | Highlight S/W | 22K | C | CC,AB | £5.75 |
| Cribbage | Gm | Kuma | 12K | C | AX,AO | £12.00 |
| Critical Path Analysis | Bs | NCG Ltd | 36K | C | KW | £40.00 |
| Cricket | Gm | Kuma | | C | AX | £6.32 |
| Cursed Chambers | Gm | J Wolstencroft | 48K | C | CZ | £5.75 |
| Data Bank | Ut | DCS | 48K | C | JQ | £6.00 |
| Data Base | Bs | Kuma | 48K | C | AX,AO | £33.95 |
| Data File | Gm | Gamer | 48K | C | CZ | £29.95 |
| Defender | Gm | Plymouth Computers | 20K | C | OG | £4.99 |
| Deferment Allowances | Bs | DCS | 32K | C | JQ | £3.00 |
| Demons Castle | Gm | DCS | 48K | C | JQ | £3.00 |
| Demon Drive | Gm | DCS | 24K | C | JQ | £3.00 |
| Disassembler | Ut | Kuma | 20K | C | AX,AO,AB | £12.00 |
| Donky Derby | Gm | Kuma | 12K | C | AX,AO,AB | £6.32 |
| Double Precision Basic | Ut | Sharp | 48K | C | AB | £28.75 |
| Double Precision Basic | Ut | Sharp | 48K | D | AX | £46.00 |
| Drunken Driver | Gm | Highlight S/W | 6K | C | CC,AB | £5.75 |
| Dybug | Ut | Kuma | | C | AX | £16.65 |
| Editor Assembler | Ut | Sharp | 48K | C | AB | £15.50 |
| Editor Assembler | Ut | Sharp | 48K | D | AX | £51.75 |
| Editor/Disassembler | Ut | DCS | 20K | C | JQ | £12.00 |
| Election '84 | Gm | Sharpsoft | 20K | C | CH | £8.45 |
| Electronic Organ | Gm | Kuma | 12K | C | AX | £6.32 |
| Electronic Organ | Gm | DCS | 48K | C | JQ | £3.00 |
| Electrons I | Ed | Kuma | | C | AX | £12.00 |
| Electrons II | Ed | Kuma | | C | AX | £12.00 |
| Empire II | Gm | Sharpsoft | 20K | C | AB | £5.85 |
| Enigma | Gm | Kuma | 12K | C | AX | £6.32 |
| Escape Forth | Gm | J Wolstencroft | 24K | C | CZ | £4.60 |
| Evasion | Gm | Kuma | 6K | C | AX,AO | £6.32 |
| Executive | Gm | Kuma | 6K | C | AX,AB | £9.20 |
| Exploring Africa | Gm | Kuma | 6K | C | AX,AB | £6.32 |
| F DOS | Ut | Sharp | 48K | C | AB | £57.50 |
| Fall Out | Gm | Kuma | 6K | C | AX,AO | £6.32 |
| Finance | Bs | DCS | 20K | C | JQ | £3.00 |
| Fireballs | Gm | Kuma | 6K | C | AX,AB | £6.32 |
| Fishing | Gm | Sumlock | 48K | C | DN | £8.50 |
| Football League | Do | Plymouth Computers | 10K | C | OG | £4.99 |
| Football Manager | Gm | Highlight S/W | 10K | C | CC,AB | £5.75 |
| Forth | Ut | Kuma | | C | AX | £40.20 |
| Foundry Package | Bs | Microtek | 48K | C | EQ | POA |
| Four in a Row | Gm | Kuma | 6K | C | AX,AO,AB | £6.32 |
| Fox and Geese | Gm | Highlight S/W | 6K | C | CC,AB | £4.60 |
| French Vocab | Ed | DCS | 20K | C | JQ | £3.00 |
| Fruit Machine | Gm | Kuma | 6K | C | AX,AO,AB | £6.32 |
| Fruit Machine | Gm | DCS | 20K | C | JQ | £3.00 |
| Full Accounting | Bs | Microtek | 48K | C | EQ | POA |
| Games Pack 1 | Gm | Sumlock | 48K | C | DN | £8.50 |
| Games Pack 2 | Gm | Sumlock | 48K | C | DN | £8.50 |
| Gamestape 1 | Gm | DCS | 48K | C | JQ | £8.00 |
| Gamestape 2 | Gm | DCS | 48K | C | JQ | £8.00 |
| Gamestape 3 | Gm | DCS | 48K | C | JQ | £8.00 |
| Gamestape 4 | Gm | DCS | 48K | C | JQ | £8.00 |
| Geography | Ed | DCS | 20K | C | JQ | £3.00 |
| Guess Word | Gm | Kuma | 6K | C | AX,AB | £6.32 |
| Hangman | Gm | Kuma | 6K | C | AX,AO,AB | £6.32 |
| Hangman | Gm | DCS | 20K | C | JQ | £3.00 |
| Head On | Gm | Highlight S/W | 10K | C | CC,AB | £6.90 |
| Head On | Gm | Kuma | 6K | C | AX,AO,AB | £6.32 |
| Head On | Gm | Sharpsoft | 20K | C | CH | £5.85 |
| Hissing Sid | Gm | Kuma | | C | AX | £6.32 |
| Home Budget I | Do | Kuma | 6K | C | AX,AC,AO,AB | £6.32 |
| Hunter Killer | Gm | Kuma | 48K | C | AX,AB | £6.32 |
| I Spy | Ed | Highlight S/W | 22K | C | CC | £5.75 |
| Instant Addition And The Four Rules | Ed | Kuma | | C | AX | £6.32 |
| Intruder | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Invaders | Gm | Kuma | 20K | C | FZ | £6.30 |
| Invoice Control | Bs | David Computer Software | 48K | C | JQ | £6.00 |
| J S Line 4 | Gm | Kuma | 48K | C | AX,AB | £6.32 |
| Junior Maths and Stepping Stones | Ed | Kuma | | C | AX | £6.32 |
| Juntori | Gm | Sharpsoft | 20K | C | AB | £5.85 |
| Kentucky Derby | Gm | Kuma | | C | AX | £6.32 |

## SOFTWARE DEALERS

**IP** A.V.O. Software Distribution
131 Lord Street
Hoddesdon
Hertfordshire
EN11 8NG

**IQ** Big Softie
5 Aston Park
Finaghy
Belfast
BT10 0JQ

**IR** Adamsoft
18 Norwich Avenue
Rochdale
Lancs
OL11 5JZ

**IS** Microcomputer Applications
41 Queens Road
Blandford Forum
Dorset
DT11 7LA

**IT** I.J.K. Software
55 Fitzroy Road
Bisphan
Blackpool
Lancs

**IU** Aardvark Software
15 Queensbury Avenue
Hartlepool
Cleveland
TS26 9NW

**IV** James Hager
7 Basset Street
Cambourne
Cornwall

**IW** Simon Hessel Software
15 Lytham Court
Cardwell Crescent
Sunninghill
Berkshire

**IX** Mayday Software
181 Portland Crescent
Stanmore Middx
HA7 1LR

**IY** Persoft
Freepost
Baildon
Shipley
West-Yorkshire
BD17 6EQ

**IZ** Micro-Aid
25 Fore Street
Praze-An-Beeble
Cambourne
Cornwal
TR14 0JX

**JA** Hexagon Software
17 Cambridge Green
Otley

**JB** N. Darwood Ltd
Halfacres
Stroud
Petersfield
Hampshire

**JC** Futura Software
63 Lady Lane
Chelmsford
Essex
CM2 0TQ

**JD**

**JE** Ultra-Tech Services
30a Billing Road
Northampton
NN1 5AZ

**JF** 9 Franklin Road
Saltcoats
Ayrshire
KA 21 5AT

**JG** Gary Smith
'Brynllwyd'
Capel Seion
Aberystwyth
Dyfed

**JH** Aquarius Software
53 Towncourt Crescent
Petts Wood
Kent
BR5 1PH

**JI** Precision Software Engineering
20 Shelton Avenue
Newark
Notts
NG24 4NX

**JJ** Spectre Soft
Dunelm Cottage
Maltmans Lane
Gerrards Cross
SL9 8RS

**JK** Cornhill Services
2 Penrith Way
Aylesbury
Bucks
HP21 7JZ

**JM** Morris Associates (Computing)
37 St Catherines Road
Baglan
Port Talbot
SA12 8AT

**JN** Terminal Software
28 Church Lane
Prestwich
Manchester
M25 5AJ

**JO** Mossoft Microcomputer Software
10 Garden Street
Norwich
Norfolk
NR1 1QX

**JP** Romik
24 Church Street
Slough
SL1 1PP

**JQ** David Computer Software
38 South Parade
Bramhall
Stockport
SK7 3BJ

**JR** Creative Software
48 Hartlip Hill
Newington
Sittingbourne
Kent
ME9 7NZ

**JS** Allrian Data Services
100a Uxbridge Road
Hayes
Middx
UB4 ORL

**JT** Apex Trading Ltd
115 Crescent Drive South
Brighton
BN2 6SB

**JU** TX Software
109 Abbotsweld
Harlow
Essex
CM18 6TQ

**JV** Hopesoft
Hope Cottage
Winterbourne
Newbury
Berks
RG16 8BB

**JW** GT Software
8 Bull Street
Potton
Sandy
Bedfordshire
SG19 2NR

**JX** Garland Computing
35 Dean Hill
Plymouth
PL9 9AF

**JY** Corona Software
Corona House
21 Tennyson Avenue
London
E11 2QN

**JZ** MP Software & Services
165 Spital road
Bromborough
Merseyside
L62 2AE

**KA** Ludinski Computer-Assisted Learning
26 Avondale Avenue
Staines
Middlesex
0784-58771

**KB** B.B.C. Publications
The British Broadcasting Corporation
35 Marylebone High Street
London
W1M 4AA

| | | | | | | |
|---|---|---|---|---|---|---|
| Knights Commander | Ut | Knights | 48K | C | AX | £28.75 |
| Knights Commander | Ut | Knights | 48K | D | AX | £74.75 |
| Knights Fortran | Ut | Knights | 48K | C | AX | £34.50 |
| Knights Wee Pascal | Ut | Knights | 48K | C | AX | £23.00 |
| Kentucky Derby | Gm | Kuma | | C | AX | £6.32 |
| Knights Commander | Ut | Knights | 48K | C | AX | £28.75 |
| Knights Commander | Ut | Knights | 48K | D | AX | £74.75 |
| Knights Fortran | Ut | Knights | 48K | C | AX | £34.50 |
| Knights Wee Pascal | Ut | Knights | 48K | C | AX | £23.00 |
| Large Display | Gm | Kuma | 48K | C | AX | £6.32 |
| Las Vegas | Gm | Sharpsoft | 20K | C | AB | £5.85 |
| Ledger | Bs | NCG Ltd | 40K | C | KW | £90.00 |
| Letterwriter WP | Bs | David Computer Software | 48K | C | JQ | £10.00 |
| Life | Gm | Kuma | 48K | C | AX,AO,AB | £9.20 |
| Linear Programming | Bs | NCG Ltd | 20K | C | KW | £45.00 |
| LP Gas Flow | Bs | DCS | 20K | C | JQ | £3.00 |
| Lunar | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Lunar Lander | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| MZ Othello | Gm | Kuma | 48K | C | AX | £12.00 |
| Machine Code Editor | Ut | DCS | 24K | C | JQ | £14.00 |
| Machine Code Editor | Ut | DCS | 48K | C | JQ | £14.00 |
| Madness | Gm | J Wolstencroft | 24K | C | CZ | £4.60 |
| Mailing List | Bs | DCS | 48K | C | JQ | £6.00 |
| Maniac | Gm | Highlight S/W | 6K | C | CC,AB | £5.75 |
| Man on the Run | Gm | Sumlock | 48K | C | DN | £6.33 |
| Map of England | Gm | Kuma | 48K | C | AO | £6.32 |
| Map of Englad | Gm | Kuma | 48K | D | AX | £12.00 |
| Marauders | Gm | Plymouth Computers | 13K | C | OG | £4.99 |
| Mastermind | Gm | Highlight S/W | 6K | C | CC,AB | £4.60 |
| Mastermind | Gm | Kuma | 48K | C | AX,AO,FZ,AB | £6.32 |
| Match the Character | Ed | Highlight S/W | 22K | C | CC,AB | £4.60 |
| Match the Word | Ed | Highlight S/W | 22K | C | CC,AB | £5.75 |
| Maths | Ed | Highlight S/W | 22K | C | CC | £5.75 |
| Maths 1 | Ed | DCS | 48K | C | JQ | £3.00 |
| Maths 2 | Ed | DCS | 48K | C | JQ | £3.00 |
| Maths 3 | Ed | DCS | 48K | C | JQ | £3.00 |
| Maths 4 | Ed | DCS | 48K | C | JQ | £3.00 |
| Maths 5 | Ed | DCS | 48K | C | JQ | £3.00 |
| Maths 6 | Ed | DCS | 48K | C | JQ | £3.00 |
| Melody | Gm | Kuma | 48K | C | AX | £6.32 |
| Memory Tests | Ut | Kuma | 20K | C | AX,AO,AB | £6.32 |
| Minefield | Gm | Kuma | 48K | C | AX | £6.32 |
| Missle Defence | Gm | Sumlock | 48K | C | DN | £8.50 |
| Missile Defence | Gm | Plymouth Computers | 18K | C | OG | £4.99 |
| Miz-Maze | Gm | Kuma | 48K | C | AX,AO | £6.32 |
| Monkey Climb | Gm | Kuma | 48K | C | AX,AO | £6.32 |
| Moonlander | Gm | Highlight S/W | 10K | C | CC,AB | £5.75 |
| Mortar Attack | Gm | Kuma | 48K | C | AX,AO | £6.32 |
| Munchie Men | Gm | Plymouth Computers | 22K | C | OG | £4.99 |
| Music Composer/Editor | Ed | Kuma | 48K | C | AX,AC,AB | £12.00 |
| Multiple Regression | Ed | NCG Ltd | 24K | C | KW | £65.00 |
| Narpex | Ed | Kuma | | C | AX | £28.70 |
| Newton/Conservation | Ed | Kuma | | C | AX | £12.00 |
| Number Advance | Gm | Plymouth Computers | 3K | C | OG | £4.99 |
| Oil Strike | Gm | Plymouth Computers | 14K | C | OG | £4.99 |
| Pac Man | Gm | Kuma | | C | AX | £9.20 |
| Pascal | Ut | Sharp | 48K | C | AB | £34.50 |
| Patience | Gm | Kuma | 48K | C | AX,AO | £6.32 |
| Payroll | Bs | Microtek | 48K | C | EQ | £65.00 |
| Payroll | Bs | NCG Ltd | 40K | C | KW | £150.00 |
| Payroll 81-C | Bs | Sumlock | 48K | C | DN | £74.75 |
| Payroll 81-D | Bs | Sumlock | 48K | D | DN | £74.75 |
| Payroll | Bs | Tridata | 48K | D | ID | £170.00 |
| Pelmanism | Gm | Sumlock | 48K | C | DN | £5.75 |
| Physics 1 | Ed | DCS | 48K | C | JQ | £3.00 |
| Physics 2 | Ed | DCS | 48K | C | JQ | £3.00 |
| Picture Count | Ed | Highlight S/W | 22K | C | CC,AB | £5.75 |
| Pilot | Ut | Kuma | | C | AX | £17.25 |
| Poker | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Polaris | Gm | Sumlock | 48K | C | DN | £6.50 |
| Pontoon | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Poseidon | Gm | Highlight S/W | 6K | C | CC, AB | £5.75 |
| Poster Printer | Bs | DCS | 48K | C | JQ | £3.00 |
| Princess & Monster Maze | Gm | Kuma | 48K | C | AX,AB | £6.32 |
| Program Filing Index | Bs | Kuma | 20K | C | AX | £6.32 |
| Quadrax | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Quest | Gm | J Wolstencroft | 48K | C | CZ | £4.60 |
| Race Track | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Racing | Gm | Kuma | 48K | C | AX | £6.32 |
| Raider | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Ram Test | Ut | DCS | 48K | C | JQ | £3.00 |
| Reactor | Gm | Kuma | 48K | C | AX,AB | £6.32 |
| Reportwriter WP | Bs | David Computer Software | 48K | C | JQ | £8.00 |
| Rhymes | Gm | Kuma | 48K | C | AX,AB | £6.32 |
| Road Alignment | Bs | Canal Computing | 16K | C | OF | £60 |
| Road Hunter | Gm | Kuma | 48K | C | AX,AO,AB | £6.32 |
| Rocket | Ed | Kuma | | C | AX | £6.32 |
| Roulette | Gm | Sumlock | 48K | C | DN | £6.33 |
| Tank Wall | Gm | Kuma | 48K | C | AX,AO | £6.32 |
| Tank Practice | Gm | DCS | 48K | C | JQ | £3.00 |
| Target Practice | Gm | DCS | 48K | C | JQ | £3.00 |
| Tape Copier | Ut | DCS | 20K | C | JQ | £4.00 |
| Tenpin Bowling | Gm | Kuma | 48K | C | AX,AO | £6.32 |

# SOFTWARE DEALERS

**KC** Miking Software
28 New Road
Northbourne
Bournemouth
Dorset
BH10 7DS

**KD** Inverse
'Orchard View'
Droitwich Road
Fernhill Heath
Worcester
WR3 7T2

**KE** Alan Turnbull
65 Vicarage Road
Cale Green
Stockport
Cheshire

**KF** Chromasoft

**KH** Llamasoft Computer Software
49 Mount Pleasant
Tadley
Hants
07356-4478

**KH** Superior Software
69 Leeds Road
Bramhope
Leeds
0532-842714

**KI** Earthshock Software
15 Eden Avenue
Wakefield
WF2 9DJ

**KJ** Bridge Software
36 Fernwood
Marple Bridge
Stockport
Cheshire
SK6 5BE

**KK** ME & P Micro Products
The Old Oast House
Malting Lane
Cambridge
CB3 9HF

**KL** Calpac Computer Software
108 Hermitage Woods Crescent
St Johns
Woking
Surrey
GU21 1UF

**KM** KCET Software
17 Torry Drive
Alve
0259 60840

**KN** Softare for All
72 North Street
Romford
0708-60725

**KO** Rucksoft
10 The Moorlands
Hanley Road
Malvern Wells
Worcestershire
WR14 4PS

**KP** Liverpool Computer Centre

**KQ** W. E. Hunt

**KR** ABC Software

**KS** Rainbow Software

**KT** Chalksoft
Lowmoor Cottage
Tonedale Wellington
Somerset TA2 OAL

**KU** Wizard Software

**KV** Data Brain Software

**KW** NCG Ltd,
Lettergesh
Renvyle,
Co. Galway
Republic of Ireland

**KX** Broadwater Economic Simulations
24 Hill Barn Lane
Worthing
West Sussex

**KY** Kent Computer Company
Alders of Bromley
High Street
Bromley
Kent

**KZ** Cases Computer Simulations
14 Langton Way
Blackheath
London
SE3 7TL

**LA** Juniper Computing
8 Pembroke Green
Lea
Malmesbury
Wiltshire
SN16 9PB

**LC** Computersmith
40 Greensfields Avenue
Bromborough
Wirral
Merseyside
L62 6DD

**LD** Pro Software
121 Tyn-y-Twr
Baglan
Port Talbot
West Glamorgan
SA12 8YE

**LE** Sumlock Electronic Services (M/cr) Ltd
Royal London House
198 Deansgate
Manchester
M3 3NE
061-834 4233

**LF** Mavac Enterprises
101a Underdale Road
Monkmoor
Shrewsbury
Shropshire
SY2 5EF

**LG** Sospan Soft
1 Warborough Close
Old Road
Llanelli
Dyfed

**NP** Program Direct

**NR** Foilkade

**NT** Digital Fantasia

**NU** Database Software

**NV** CJE Microcomputers

**NW** Eduquest

**NX** Davansoft

**NY** Square Software

**NZ** Salamander Software
27 Ditchling Rise
Brighton
East Sussex
BN1 4QL

**OA** Anirog Computers

**OB** Golem Ltd
77 Qualitas Road
Bracknell
Berkshire
RG12 4QG

**OC** A Lane Software

**OD** ASP Software
145 Charing Cross Road
London
WC2H 0EE
437-1002

**OE** Micromail

**OK** Softek
329 Croxted Road
London SE24

**OM** New Generation Software
Freepost
Oldland Common
Bristol
BS15 6BR

**ON** Foilkade Ltd
66 Littledean
Yate
Bristol
BS17 4UQ

**OO** D.J. Moody
1 Starnhill Cottages
Granby Lane
Bingham
Notts
NG13 8DH

## MICROSPOT

# SCROLL ON!

### Get things moving on your Atari – sideways!

This short program will be useful for anyone who wants to write a defender or scramble type program.

When run, the program will scroll whatever is on the computer's display from right to left. It achieves this by POKEing a new value into the computer's display list. The display list is the part of memory where the Atari keeps the working information for producing the screen display.

Unfortunately the position of this list varies according to the memory size of your computer and the graphics mode you are working in. To find out the location of the display list in memory you must PEEK out the values of locations 560 and 561. Once you have these values add them together and multiply by 256. Finally, add four to this value to select a horizontal scrolling function. All this procedure must take place after the graphics mode has been selected.

## HOW IT RUNS

| | |
|---|---|
| 5 | Set graphic mode. |
| 10 | Set first value of T and cavern bottom. |
| 30 | Works out address for horizontal scrolling in the display list (DL) |
| 40-50 | T is increased by 0.25. When T is POKEd into DL the screen moves to the left. Unfortunately the X co-ordinates move to the left at the same rate. To compensate for this X is re-calculated. |
| 550-100 | Draws one pixel at a time the landscape at the right side of the screen. At the same time the old landscape is erased. |
| 105 | Loops back. |

## PROGRAM LISTING

```
5 GRAPHICS 7:SETCOLOR 2,0,0
10 T=96:CB=10:X=0
30 DL=PEEK(560)+PEEK(561)*256:DL=DL+4
40 X=X+1:IF X>159 THEN X=0
45 T=T+0.25:IF T>255 THEN 5
50 POKE DL,T
55 C=RND(0):IF C>0.5 THEN CB=CB-1
60 IF C<0.5 THEN CB=CB+1
85 COLOR 0:PLOT X,0:DRAWTO X,40:COLOR 1
90 IF CB<2 THEN CB=CB+10
95 PLOT X,83:DRAWTO X,CB-1
100 COLOR 2:PLOT X,CB
105 GOTO 40
```



## FACTFILE

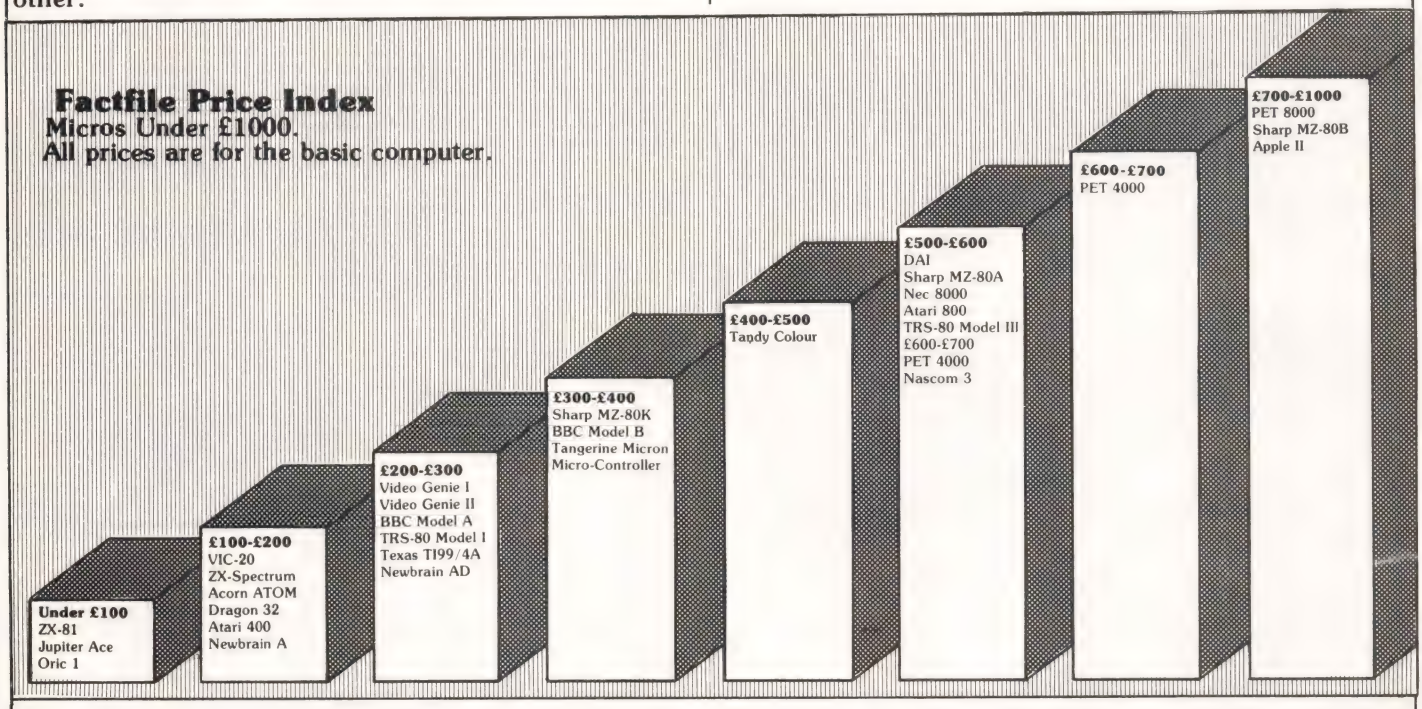
# MICRO FACTFILE

Factfile is our regular buyer's guide to microcomputers. Herein you will find all the important facts and figures on 28 of the most important micros on the market under £1000. The idea is that you are able to directly compare what different manufacturers are offering you and how much they are charging you for it. Many brochures and adverts bury the reader in a mass of irrelevant facts and figures, which make it difficult to judge one against the other.

Factfile sorts it all out for you!

Just look down the price index to discover which machines are in your price-range and then consult the 'cards' on each. All the information is in a standard form and has all been checked by our technical staff. The section is presented alphabetically.

As new machines become available, we will add them into the FACTFILE as soon as we can.




## Factfile

**RAM:** Stands for Random Access Memory and it is in there to accept the user's programs. Amount of memory is measured in "thousands of bytes" or "K" ie, 8K. A byte is a computer 'word' or single piece of information, made up of eight 'bits' which are just 1 or 0. Hence you need thousands of bytes to store a reasonable size program, since each letter, number, full stop, comma, line number, etc, uses up computer 'words' quite rapidly.

As a guideline – you can get about 50 program lines into 1K and 250 into 8K. This is a rough estimate – don't take it literally! The figures are not straight multiples, because you need to allow the machine space to work on your listing, once you've typed it in.

**ROM:** Read Only Memory. The machine can look and see what is stored in the memory, but it cannot alter the contents, nor store anything new. Generally used for control programs, where the micro consults the memory to see what to do next at various points in the program. Languages, such as BASIC, are stored in ROM and allow the machine to interpret what you type in, in terms of its own 'machine code'.

**SIZE OF BASIC:** The number of bytes occupied by the BASIC language is important, as it is an approximate guide to the BASICs versatility. The more powerful the language, the easier it should be to use.

**BUS CONNECTION:** A socket on the micro which allows it to be linked up to various add-ons. This can take the form of many various items, ie, expansion box, printer, disc drives, plotting device. In short a BUS is an information 'window' through which the micro communicates with the outside world.

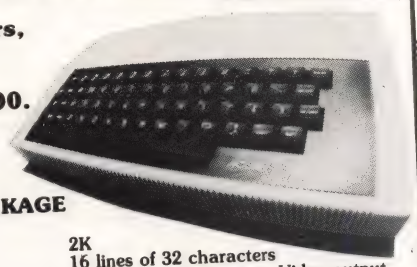
**SERIAL/PARALLEL OUTPUT:** This refers to the manner in which the micro transmits data to other units. If it puts out information in a long string, one bit after another, down a single wire or connector, it is a serial output. Parallel output is where pins or wires carry information simultaneously and are 'read' together as a block by whatever it is the micro is communicating with.

**VIDEO OUTPUT:** an output which will drive a monitor, as opposed to a TV set, allowing it's use as a screen for the computer.

# FACTFILE

## ACORN ATOM

**Acorn Computers,**
**4A Market Hill,**
**Cambridge.**
**Tel: 0223-245200.**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 2K |
| Screen Size | 16 lines of 32 characters |
| Expansion Sockets | BUS connector, Printer, Video output |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£140 kit, £174.50 built** |

### MANUFACTURER'S EXPANSIONS

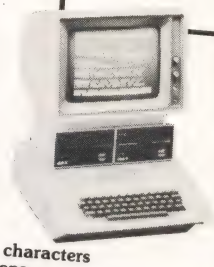
| | DETAILS | PRICE |
|---|---|---|
| RAM | 12K internal, 32K external options | £45-149 |
| Printer | Yes | £232 |
| Monitor | No | — |
| Disc Drives | Yes | £299 |
| Other Languages | Yes | £11.50 |
| Multi-user Capabilities | Yes | — |
| BASIC extensions (Toolkits) | Yes, BBC BASIC | £50 |

**OTHER ADD-ONS:**

**Centronics-type connector,** Technomatic Ltd, 17 Burnley Road, London NW10, £8.50; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **DUO-1 64K add-on,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £64 kit, £70 built; **MZ163 RAM expansion boards,** Timedata Ltd, 57 Swallowdale, Basildon, Essex SS15 5BZ, £59.50-76.

## APPLE II

**Apple Computer (UK) Ltd,**
**Finway Road,**
**Hemel Hempstead,**
**Herts, HP2 7PS**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 48K |
| Screen Size | 24 lines of 40 characters |
| Expansion Sockets | BUS connections |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8 or 12K |
| **Average Price** | **£812** |

### MANUFACTURER'S EXPANSIONS

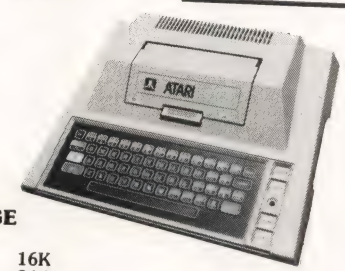
| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | Yes various | £200-1700 |
| Monitor | Yes | £134 |
| Disc Drives | Yes | £379 |
| Other Languages | Yes | £84-500 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | Yes | £26 |

**OTHER ADD-ONS:**

**TMS 5100 Talking Board,** GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Multifunction Card,** Datex Micros, 193 Touring Road, Worthing, W. Sussex, £85; **5¼" Winchester disc drive,** Independent Computer Engineering Ltd 16/18, Littleton Road, Ashford, Middlesex, TW15 1UQ; **16K RAM Board,** DDP Research & Marketing, 17 Novel Square, Basildon, Essex, SS13 1LP, £75; **U-port, 8 serial interfaces,** U-Microcomputers, Ltd, Winstanely Industrial estate, Long Lane, Warrington, Cheshire, WA2 8PR, £195.

## ATARI 400

**Atari UK Ltd,**
**Atari House,**
**Railway Terrace,**
**Slough, Berks**
**SL2 5BZ.**




### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16K |
| Screen Size | 24 lines of 40 characters |
| Expansion Sockets | Serial output, BUS connector |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£149.99** |

### MANUFACTURER'S EXPANSIONS

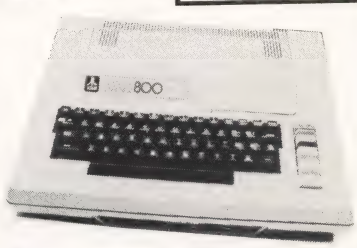
| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | Yes | £199.90 |
| Monitor | No | — |
| Disc Drives | Yes | £299.99 |
| Other Languages | Yes | £39-79 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | Yes | TBA |

**OTHER ADD-ONS:**

**TMS 5100 Talking Board,** GM Microctonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95

## ATARI 800

**Atari UK Ltd,**
**Atari House,**
**Railway Terrace,**
**Slough, Berks**
**SL2 5BZ.**




### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 48K |
| Screen Size | 24 lines of 40 characters |
| Expansion Sockets | Serial output, BUS connector |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£399.95** |

### MANUFACTURER'S EXPANSIONS

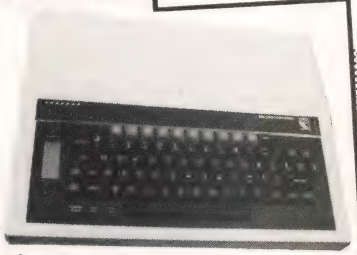
| | DETAILS | PRICE |
|---|---|---|
| RAM | Yes | £199.99 |
| Printer | No | — |
| Monitor | Yes | £299.99 |
| Disc Drives | Yes | £39.79 |
| Other Languages | No | — |
| Multi-user Capabilities | Yes | TBA |
| BASIC extensions (Toolkits) | | |

**OTHER ADD-ONS:**

**TMS 5100 Talking Board,** GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Carrying case,** CJE Microcomputer, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50

## BBC MICROCOMPUTER

**BBC Model A,**
**BBC Microcomputer**
**Systems,**
**PO Box 7,**
**London W3 6JX.**



**STANDARD PACKAGE**

| | |
|---|---|
| Memory Size (RAM) | 16 |
| Screen Size | 32 lines of 40 characters (max) |
| Expansion Sockets | Parallel serial output, analogue output, Bus connection |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 16K |
| **Average Price** | **£299** |

**MANUFACTURER'S EXPANSIONS**

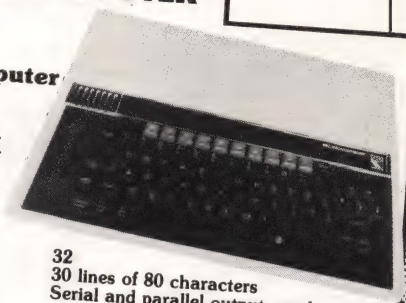
| | DETAILS | PRICE |
|---|---|---|
| RAM | up to 32K | £100 |
| Printer | TBA | — |
| Monitor | Yes | £200 |
| Disc Drives | TBA | — |
| Other Languages | TBA | — |
| Multi-user Capabilities | Yes | — |
| BASIC extensions (Toolkits) | TBA | |

**OTHER ADD-ONS:**

**Disc drives, single and dual,** Cumara Ltd, 35 Walnut Street Close, Guildford, Surrey GU1 4UN, Tel: 0483 50321, £199-799; **BBC Cassette Recorder,** Microage Electronics, 135 Hale Lane, Edgeware, Middx, £28; **Colour Monitor,** PortaTel Conversions Ltd, 25 Sunbury Cross Centre, Staines Roach West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Newitt House, Northgate Street, Bury St. Edmunds, Suffolk IP33 1HQ, £95.00; **Analogue Joystick, Light Pen,** Stack Computers, 290-298 Derby Road, Bootle, Liverpool.

## BBC MICROCOMPUTER

**BBC Model B**
**BBC Microcomputer**
**Systems,**
**PO Box 7,**
**London W3 6JX**



**STANDARD PACKAGE**

| | |
|---|---|
| Memory Size (RAM) | 32 |
| Screen Size | 30 lines of 80 characters |
| Expansion Sockets | Serial and parallel output, analogue output, printer BUS connection |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 16K |
| **Average Price** | **£399** |

**MANUFACTURER'S EXPANSIONS**

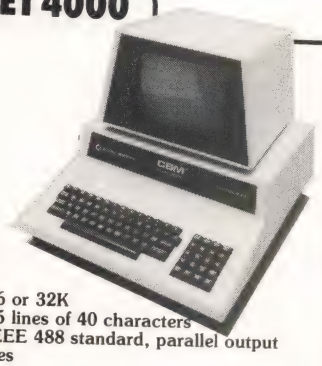
| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | TBA | TBA |
| Monitor | No | — |
| Disc Drives | TBA | TBA |
| Other Languages | TBA | TBA |
| Multi-user Capabilities | Yes | — |
| BASIC extensions (Toolkits) | TBA | TBA |

**OTHER ADD-ONS:**

**Disc drives, single and dual,** Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, Tel: 0483 503121, £199-799; **BBC Cassette recorder,** Microage Electronics, 135 Hale lane, Edgware, Middx, HA8 9QP, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Saires Road West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Hewitt House, Northgate Street, Bury St. Edmunds, Suffolk, IP33 1HQ, £95.00; **Carrying Case,** CJE Microcomputers, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50.

## COMMODORE PET 4000

**Commodore,**
**675 Ajax Avenue,**
**Slough, Berks**



**STANDARD PACKAGE**

| | |
|---|---|
| Memory Size (RAM) | 16 or 32K |
| Screen Size | 25 lines of 40 characters |
| Expansion Sockets | IEEE 488 standard, parallel output |
| Tape Included? | Yes |
| Display Unit Included? | Yes |
| Usable Domestic TV? | No |
| Size of BASIC | 12K |
| **Average Price** | **£632.50, £799.25** |

**MANUFACTURER'S EXPANSIONS**

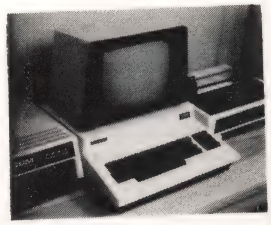
| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | Yes several | £454-1604 |
| Monitor | N/A | — |
| Disc Drives | Yes | £396 |
| Other Languages | Yes, single or dual | £454-1029 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Universal Interface,** Technomatic Ltd, 17 Burnley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Estate, Ashford, Kent, £82.95; **64K DRC Module,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

## COMMODORE PET 8000

**Commodore,**
**675 Ajax Avenue,**
**Slough, Berks**



**STANDARD PACKAGE**

| | |
|---|---|
| Memory Size (RAM) | 32K or 96K |
| Screen Size | 25 lines of 80 characters |
| Expansion Sockets | IEEE 488 standard, parallel output |
| Tape Included? | Yes |
| Display Unit Included? | Yes |
| Usable Domestic TV? | No |
| Size of BASIC | 12K |
| **Average Price** | **£980, £1374** |

**MANUFACTURER'S EXPANSIONS**

| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | Yes various | £454-1604 |
| Monitor | N/A | — |
| Disc Drives | Yes single or dual | £454-1029 |
| Other Languages | Yes | — |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Universal Interface,** Technomatic Ltd, 17 Bunley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Easte, Godinton Road, Ashford, Kent, £82.95; **64K DRC Module** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

# FACTFILE

## COMMODORE VIC20

**Commodore,**
**675 Ajax Avenue,**
**Slough, Berks**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 5K |
| Screen Size | 23 lines of 22 characters |
| Expansion Sockets | BUS connection, Disc, Printer, Serial output, joystick |
| Tape Included? | Yes |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£129.99** |

### MANUFACTURER'S EXPANSIONS

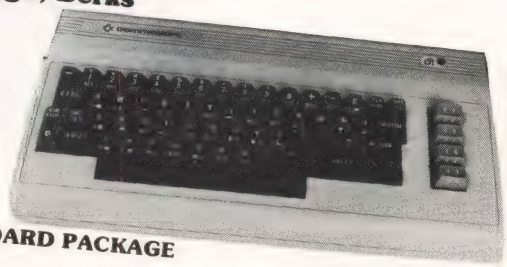
| | DETAILS | PRICE |
|---|---|---|
| RAM | 3K,8K,16K expansion options | £30,£45,£75 |
| Printer | Yes | £270 |
| Monitor | No | — |
| Disc Drives | Yes | £396 |
| Other Languages | Yes | £38.95 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**VCR-20, 20K RAM cartridge,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea SS5 2JJ, £39 kit, £45 built; **Expansion Board,** 3K-16K, Arfon Microelectronics Ltd, Gibyn Industrial Estate, Caernafon, Gwynedd, Wales LL55 2BD, £220. Languages: VIC Forth, Adda Computers, 154 Victoria Road, Acton, London, W3.

## COMMODORE 64

**Commodore,**
**675 Ajax Avenue,**
**Slough, Berks**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 64K |
| Screen Size | 25 lines of 40 characters |
| Expansion Sockets | BUS, Serial, Video |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£350** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | Yes | £230-276 |
| Monitor | No | — |
| Disc Drives | Yes | £299 |
| Other Languages | Yes | — |
| Multi-user Capabilities | Yes | — |
| BASIC Extensions | Yes | — |
| **OTHER ADD-ONS:** | | |

**Light Pen, 4 slot motherboard, Joystick, RS232 Interface,** Stack Computers, 290-298 Derby Road, Bootley Liverpool. 051-933 5511.

## DAI

**Data Applications UK Ltd,**
**16B Dyer Street,**
**Cirencester,**
**Gloucestershire,**
**GL7 2PF**




### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 48K |
| Screen Size | 24 lines of 60 characters |
| Expansion Sockets | BUS connection, Serial output, joystick socket |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 16K |
| **Average Price** | **£575** |

### MANUFACTURER'S EXPANSIONS

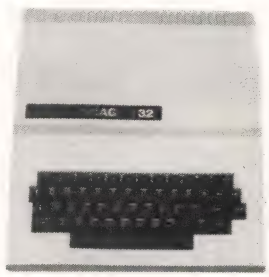
| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | No | — |
| Monitor | No | — |
| Disc Drives | Yes | TBA |
| Other Languages | No | — |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | Yes, maths pack | £149 |

**OTHER ADD-ONS:**

**None Reported**

## DRAGON 32

**Dragon Data Ltd**
**Queensway,**
**Swansea**
**Industrial Estate,**
**Swansea, SA5 4EH**




### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 32K |
| Screen Size | 16 lines of 32 characters |
| Expansion Sockets | Yes |
| Display Unit Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 16K |
| **Average Price** | **£199** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | — | — |
| Printer | No | — |
| Monitor | No | — |
| Disc Drives | No | — |
| Other Languages | Yes | — |
| Multi-user | No | — |
| Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Joystick, Light Pen, 4 slot motherboard,** Stack Computers 290-298 Derby Road, Bootle, Liverpool. 051-933 5511.

## JUPITER ACE




**Jupiter Cantab**
**22 Foxhollow**
**Bar Hill**
**Cambridge**
**CB3 8EP**

### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 3K |
| Screen Size | 24 lines of 32 characters |
| Expansion Sockets | Not known |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | Resident language is FORTH at 8K |
| **Average Price** | **£89.95** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | TBA | – |
| Printer | TBA | – |
| Monitor | TBA | – |
| Disc Drives | TBA | – |
| Other Languages | TBA | – |
| Multi-User Capabilities | TBA | – |
| BASIC extensions (toolkits) | TBA<br>N/A | – |

**OTHER ADD-ONS:**

**None Reported.**

## NASCOM 3



**Lucas Logic, NASCOM**
**Microcomputers Division,**
**Welton Road,**
**Wedgenock Industrial**
**Estate,**
**Warwick, CV34 5PZ.**
**Tel: 0926-497733**

### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 0-48K |
| Screen Size | 25 lines of 40 or 80 character |
| Expansion Sockets | Parallel & serial outputs, BUS connections |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8-10K |
| **Average Price** | **£549** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | up to 48K (max) | £130 |
| Printer | Yes | £215-1285 |
| Monitor | Yes | £99-120 |
| Disc Drives | Yes, single or dual | £470-685 |
| Other Languages | Yes | £50 |
| Multi-user Capabilities | No | – |
| BASIC extensions (Toolkits) | Yes | -15-50 |

**OTHER ADD-ONS:**

**Olivetti disc drives, single and dual,** Kram Electronics, Victoria House, 17, Highcross St., Leicester, LE1 4PF, £179-349; **A/D Board,** 10, Research Ltd, 6, Laleham Avenue, Mill Hill, London NW7 3HL, £120 + VAT; **Hobbit – mini-cassette system,** Ikon Computer Products, Kiln Lane, Laugharne, Covnathen, Dyfed, £99 + VAT; **Disc drives, single and dual,** Micro-Spares, 19, Roseburn Terrace, Edinburgh, EH12 5N9, £199-279.

## NEWBRAIN



**Grundy Business**
**Systems Ltd,**
**Grundy House,**
**Somerset Road,**
**Teddington**
**TW11 8TD.**

### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 32K |
| Screen Size | 25 lines of 40 or 80 characters |
| Expansion Sockets | Printer, serial, video, data bus |
| Tape Included? | No |
| Display Unit Included? | No (Single line option on model AD) |
| Usable Domestic TV? | Yes |
| Size of BASIC | 18K |
| **Average Price** | **£199 model A, £299 Model AD** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | 64 – 512K, | £75 – £445 |
| Printer | | |
| Monitor | | |
| Disc Drives | NYA | – |
| Other Languages | NYA | – |
| Multi-user | NYA | – |
| BASIC extensions | NYA | – |

**OTHER ADD-ONS:**

**None Reported.**

## ORIC 1



**Oric Products International,**
**Coworth**
**Mansion,**
**Coworth Park,**
**London Road,**
**Sunninghill, Ascot,**
**Berkshire, SL5 7SE.**

### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16K, 48K |
| Screen Size | 28 X 40 |
| Expansion Sockets | Yes |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£99, £139.40** |

### MANUFACTURER'S EXPANSIONS

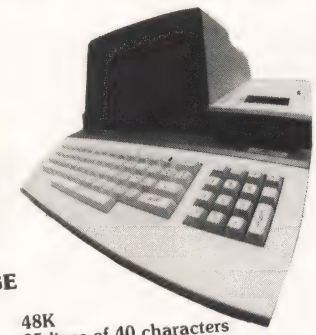
| | DETAILS | PRICE |
|---|---|---|
| RAM | N/A | – |
| Printer | TBA | – |
| Monitor | No | – |
| Disc Drives | TBA | – |
| Other Languages | N/A | – |
| Multi-user Capabilities | No | – |
| BASIC extensions | TBA | – |

**OTHER ADD-ONS:**

# FACTFILE

## SHARP MZ-80A

**Sharp UK Ltd,**
**Thorn Road,**
**Newton Heath,**
**Manchester**
**M10 9BE**
**Tel: 061-205 2333**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 48K |
| Screen Size | 25 lines of 40 characters |
| Expansion Sockets | BUS connector |
| Tape Included? | Yes |
| Display Unit Included? | Yes |
| Usable Domestic TV? | No |
| Size of BASIC | 12K |
| **Average Price** | **£549** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | No | – |
| Printer | Yes | £450-800 |
| Monitor | N/A | – |
| Disc Drives | Yes, dual | £600 |
| Other Languages | Yes | £45 |
| Multi-user Capabilities | No | – |
| BASIC extensions (Toolkits) | No | – |

**OTHER ADD-ONS:**

**None Reported**

## SHARP MZ-80B

**Sharp UK Ltd,**
**Thorn Road,**
**Newton Heath,**
**Manchester M10 9BE**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 64K |
| Screen Size | 25 lines of 40 or 80 characters |
| Expansion Sockets | BUS connector |
| Tape Included? | Yes |
| Display Unit Included? | Yes |
| Usable Domestic TV? | No |
| Size of BASIC | 16K |
| **Average Price** | **£990** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | Yes | £120 |
| Printer | Yes | £450-800 |
| Monitor | N/A | – |
| Disc Drives | Yes, dual | £600 |
| Other Languages | Yes | £45 |
| Multi-user Capabilities | No | |
| BASIC extensions (Toolkits) | No | – |

**OTHER ADD-ONS:**

**Multi-vision and triple-vision,** Datron Micro Centre, 2 Abbeydale Road, Sheffield S7 1FD, £35-79

## SHARP MZ-80K

**Sharp UK Ltd,**
**Thorn Road,**
**Newton Heath,**
**Manchester**
**M10 9BE**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 48K |
| Screen Size | 25 lines of 40 characters |
| Expansion Sockets | BUS connector |
| Tape Included? | Yes |
| Display Unit Included? | Yes |
| Usable Domestic TV? | No |
| Size of BASIC | 12K |
| **Average Price** | **£350** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | No | – |
| Printer | Yes | £450-800 |
| Monitor | N/A | – |
| Disc Drives | Yes, dual | £600 |
| Other Languages | Yes | £45 upwards |
| Multi-user Capabilities | No | – |
| BASIC extensions (Toolkits) | No | – |

**OTHER ADD-ONS:**

**None Reported**

## SINCLAIR ZX 81

**Sinclair Research,**
**6 Kings Parade,**
**Cambridge CB2 1SN**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 1K |
| Screen Size | 24 lines of 32 characters |
| Expansion Sockets | BUS connections |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8K |
| **Average Price** | **£49.95 built** |

### MANUFACTURER'S EXPANSIONS

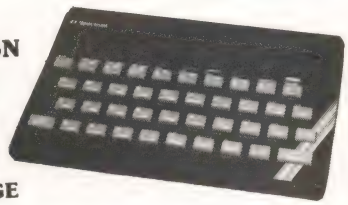
| | DETAILS | PRICE |
|---|---|---|
| RAM | 16K RAM pack | £29.95 |
| Printer | ZX Printer | £59.95 |
| Monitor | No | – |
| Disc Drives | No | – |
| Other Languages | No | – |
| Multi-user Capabilities | No | – |
| BASIC extensions (Toolkits) | No | – |

**OTHER ADD-ONS:**

**Memory expansion unit 16K or 64K,** Memotech Ltd, 3 Collins St, Oxford OX4 1XL, £39.95-79; Memory Expansion 64K, Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashtead, Surrey; £59.95; **Key Bleep Unit,** Microtronix, 3 Buxton Avenue, Coulton, Nottingham, N94 3RR, £8.85 kit, £9.95 built; **Maximem 1.1,** East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London, EB4 BT, £93.50; **Music Synthesiser + 16 line control port,** William Stuart Systems Ltd, Dower House, Billicicay Road, Herongate, Brentwood, Essex CM13 3SD, £19.50; **Full-size keyboard,** Protos Computer Systems, Frome Computing, 20 Ashtree Road, Frome, Somerset, BA11 2SF, £64.95; **ZX99 Automatic tape control,** Data-cassette, 44, Shroton Street, London NW1 6UG, £59.95.

## SINCLAIR ZX SPECTRUM

**Sinclair Research,**
**6 Kings Parade,**
**Cambridge, CB2 1SN**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16-48K |
| Screen Size | 24 lines of 32 characters |
| Expansion Sockets | BUS connections |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 10K |
| **Average Price** | **£125 or £175** |

### MANUFACTURER'S EXPANSIONS

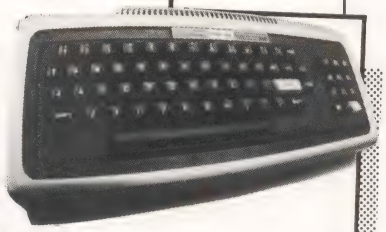
| | DETAILS | PRICE |
|---|---|---|
| RAM | 48K RAM for 16K version | £60 |
| Printer | ZX Printer | £59.95 |
| Monitor | No | — |
| Disc Drives | ZX Microdrive | TBA |
| Other Languages | No | — |
| Multi-user Capabilities | No | TBA |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Memory Expansion 32K,** Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashtead, Surrey; £42.50

## TANDY TRS 80 I

**Tandy Corporation,**
**12th Floor,**
**Tameway Tower,**
**Walsall,**
**West Midlands**
**WS1 1LA.**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 4 or 16K |
| Screen Size | 16 lines of 32 or 64 characters |
| Expansion Sockets | BUS connection |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8 or 12K |
| **Average Price** | **£229 or £339** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | 32K extra in expansion unit | £349 |
| Printer | Yes | £239-1200 |
| Monitor | Yes | £100 |
| Disc Drives | Yes | £369 |
| Other Languages | Yes | £100 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | Yes | £100 |

**OTHER ADD-ONS:**

**Disc drives, single and dual,** Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kran Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC) 46 Middle Street, Blackhall, Marlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

## TANDY TRS 80 III

**Tandy Corporation,**
**12th Floor,**
**Tameway Tower,**
**Bridge Street,**
**Walsall,**
**West Midlands,**
**WS1 1LA**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 4-48K |
| Screen Size | 16 lines of 32 or 64 characters |
| Expansion Sockets | BUS connection, parallel & serial output |
| Tape Included? | No |
| Display Unit Included? | Yes |
| Usable Domestic TV? | No |
| Size of BASIC | 16K |
| **Average Price** | **£599-1799** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | 16K modules | £70 |
| Printer | Yes various | £239-1200 |
| Monitor | N/A | — |
| Disc Drives | Yes | £600 |
| Other Languages | Yes | £100 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | Yes | £100 |

**OTHER ADD-ONS:**

**Disc drives,** Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17, Highcross St, Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC), 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

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**Tameway Tower,**
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**Walsall,**
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### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16-32K |
| Screen Size | 16 lines of 32 characters |
| Expansion Sockets | Serial output, ROM pack, joystick socket |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 8-16K |
| **Average Price** | **£499** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | No | — |
| Printer | Yes various | £239-1200 |
| Monitor | No | — |
| Disc Drives | Yes | £439 |
| Other Languages | No | — |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349.

# FACTFILE

## TEXAS TI 99/4A

**Texas Instruments,
European
Consumer
Division,
Manton Lane,
Bedford MK41 7PA**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16K |
| Screen Size | 24 lines of 32 characters |
| Expansion Sockets | ROM pack, Bus connector, joystick, socket |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 14K |
| **Average Price** | **£199** |

### MANUFACTURER'S EXPANSIONS

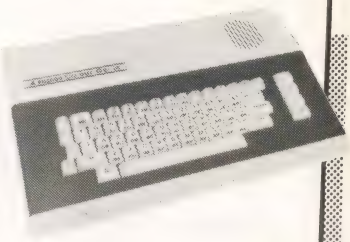
| | DETAILS | PRICE |
|---|---|---|
| RAM | up to 48K (max) | £300 |
| Printer | Yes | £275 |
| Monitor | No | — |
| Disc Drives | Yes | £300 |
| Other Languages | Yes | £50-£100 |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | Yes | £100 |

**OTHER ADD-ONS:**

**Speech Synthesiser,** Texas Instruments, £46.60; **Terminal Emulator II,** Texas Instruments, £37.80; **RS232 Interface,** Texas Instruments.

## COLOUR GENIE

**Lowe Computers,
Bently Bridge,
Chesterfield Road,
Matlock
Derbyshire DE4 5LE
Tel: 0629 4995/4057**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 32K |
| Screen Size | 24 lines of 40 characters |
| Expansion Sockets | Parallel & serial output, expansion BUS |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 16K |
| **Average Price** | **£168** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | 16K | £38.56 |
| Printer | Yes | £220 |
| Monitor | No | — |
| Disc Drives | No | — |
| Other Languages | No | — |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

## VIDEO GENIE I

**Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire,
DE4 5LE**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16K |
| Screen Size | 16 lines of 64 characters |
| Expansion Sockets | BUS connector |
| Tape Included? | Yes |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 12K |
| **Average Price** | **£279** |

### MANUFACTURER'S EXPANSIONS

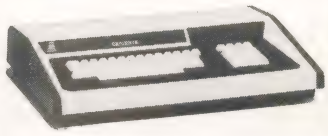
| | DETAILS | PRICE |
|---|---|---|
| RAM | optional 48K in expansion unit | £200 |
| Printer | Yes | £210 |
| Monitor | Yes | £69-99 |
| Disc Drives | Yes, single and dual | £220-375 |
| Other Languages | No | — |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Disc drives, single and dual,** Cumara Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213 **48K Internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Martlepool, Cleveland, £70 + VAT: **32K RAM Card** Audio Computer, 87 Bournmouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

## VIDEO GENIE II

**Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire DE4 5LE**



### STANDARD PACKAGE

| | |
|---|---|
| Memory Size (RAM) | 16K |
| Screen Size | 16 lines of 32 or 64 characters |
| Expansion Sockets | BUS connector |
| Tape Included? | No |
| Display Unit Included? | No |
| Usable Domestic TV? | Yes |
| Size of BASIC | 13K |
| **Average Price** | **£299** |

### MANUFACTURER'S EXPANSIONS

| | DETAILS | PRICE |
|---|---|---|
| RAM | optional 48K in expansion unit | £200 |
| Printer | Yes | £210 |
| Monitor | Yes | £69-99 |
| Disc Drives | Yes, single and dual | £220-375 |
| Other Languages | No | — |
| Multi-user Capabilities | No | — |
| BASIC extensions (Toolkits) | No | — |

**OTHER ADD-ONS:**

**Disc drives, single and dual,** Cumana Ltd, 35, Walnut Tree Close, Guildford, Surrey, Gul 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213; **48K internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM Card** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

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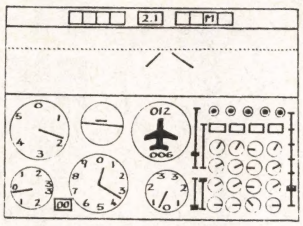
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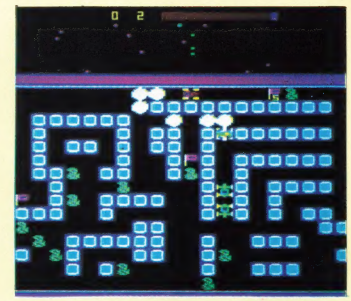
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●●● NEW RELEASE ●●●



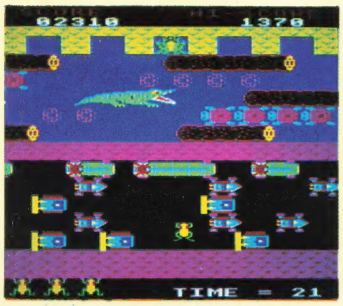

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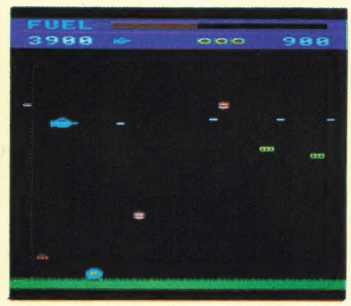

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The only full feature machine-code version of the arcade game available for the BBC micro. Features include: scrolling screen, radar display, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty, and sound effects.
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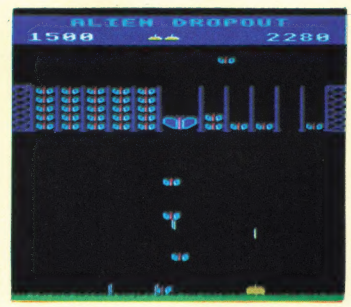

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Not just another version of Frogger . . . this is the arcade-quality version that you've been waiting to see. Graphically brilliant with gaping-mouthed crocodiles, diving turtles, flies, and frogs that flex their legs as they jump along. Increasing difficulty, and responsive controls.
(For use with KEYBOARD or JOYSTICKS).
*". . . very good indeed . . . fast flicker-free graphics and a frog that really hops!"*
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**SPACE FIGHTER (32K)** £7·95

Arcade-style game based upon features from DEFENDER and SCRAMBLE. 5 types of menacing alien fire at you and may attempt to ram you. Separate attack phases, fuel dumps, repeating laser cannon, asteroids, smart bombs, hi-score, rankings, 6 skill levels, sound effects.
*"A thoroughly enjoyable program, well worth the money . . ."* ... HOME COMPUTING WEEKLY



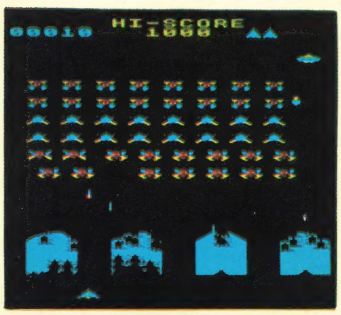

**ALIEN DROPOUT (32K)** £7·95

Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground.
(For use with KEYBOARD or JOYSTICKS).
*". . . these moths are out to get more than the clothes in your wardrobe"* ... YOUR COMPUTER




**GALAXIANS (32K)** £7·95

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*". . . well produced, with colourful graphics, responsive controls and the usual bunch of extra terrestrials."* ... YOUR COMPUTER




**INVADERS (32K)** £7·95

Superb version of the old classic arcade game, with novel enhancements. 48 marching invaders drop bombs that erode your defences, and two types of spaceship fly over releasing large bombs that penetrate through your defences. Increasing difficulty, hi-score, superb graphics and sound.
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**CRIBBAGE (32K)** £6·95

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**PONTOON (32K)** £6·95

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