

DECEMBER 1984 95p

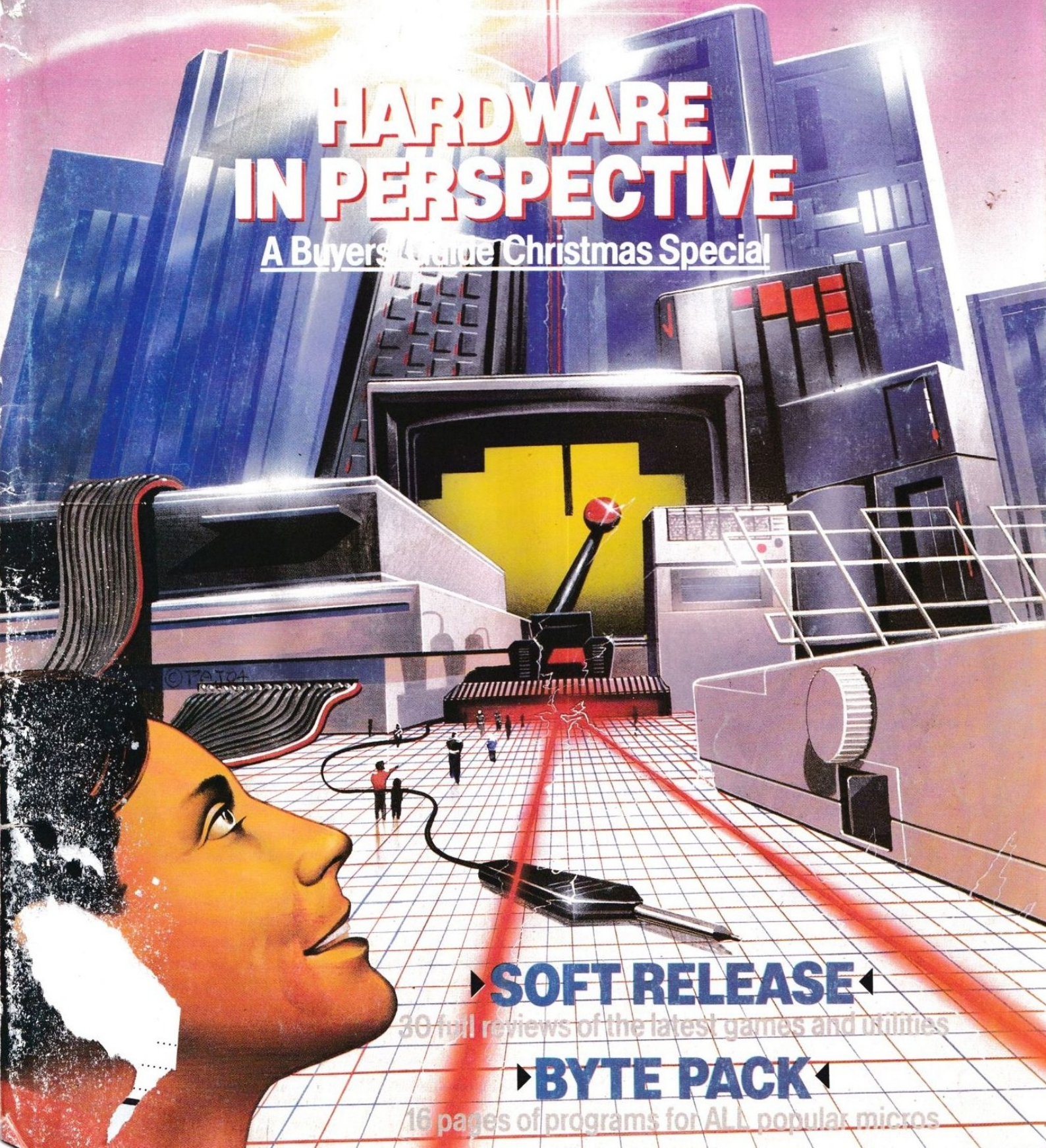
WHICH **MICRO** **& SOFTWARE REVIEW**

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HARDWARE IN PERSPECTIVE

A Buyers Guide Christmas Special



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► **BYTE PACK** ◀

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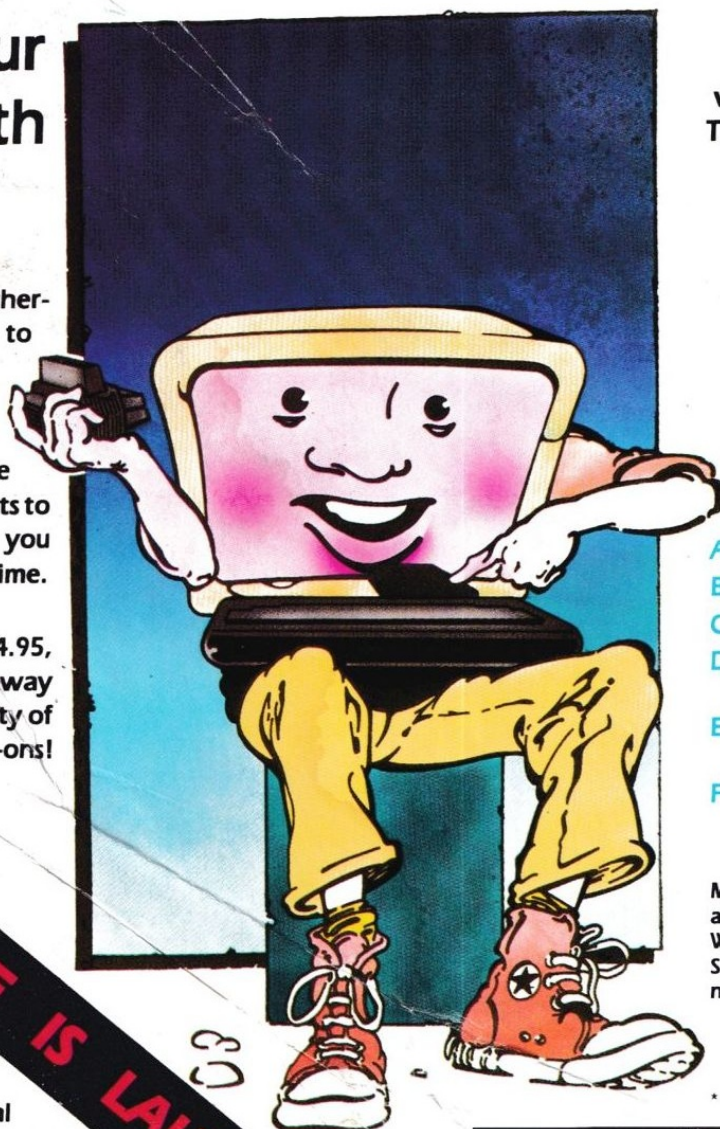
Microslot is a two-way mother-board elegantly designed to allow you the freedom to incorporate as many add-ons as you wish. The sound construction will give you the scope to add further Microslots to take all the peripherals you require, and all at the same time.

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The Commodore range includes four printers and one printer plotter.

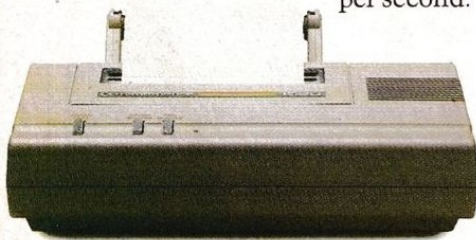
The MPS 801 dot matrix printer (so called because its characters are made up of dots) has a print speed of 50 characters per second, about five times as fast as the fastest secretary.

The MPS 802 dot matrix friction feed printer has a print speed of 60 characters per second and uses either single sheets or continuous stationery.



The DPS1101 daisy wheel printer (called that because, surprise, surprise, the print wheel looks a bit like a daisy), produces superb quality print on all letters, reports and documents (the kind of quality one desperately requires on a letter to the bank manager). There's a range of alternative type faces available on additional print wheels. Speed: 18 characters per second.

And the 1520 printer plotter (illustrated). This has 4 colours, and opens up a whole new world of graphic print-out ability. You can draw pictures, create graphic designs, plot graphs or construct bar and pie charts. Speed: 14 characters per second.



QWERTY - the 6 keys at the top left hand side of a standard typewriter. Unlike lesser machines, all Commodore computers have full-size, professional typewriter keyboards.

They have a solid, responsive feel to them. (The problem with rubber or membrane keyboards is they have a soft, spongy feel to them: you press a key, then wonder if the message got through).

RANGE. The range of Commodore software is enormous. There is something, as they say, for everyone: educational, business, home and games.



STARTER PACK. The Commodore 16 Starter Pack has been specially designed to introduce you to computing.

It contains everything you need to start home computing, complete in one box: a 16K computer, cassette unit, four superb software programs, and Introduction to BASIC Part 1.

It has a *Help* key in case you get into difficulties, and incorporates advanced BASIC, which has been specifically designed to simplify the programming process.

Other features include: 4 cursor keys, 2 joystick ports, an astonishing 121 colours, plus excellent sound and graphics capabilities.

TUNES. Commodore make software to help you compose your very own music.

All our home computers have great sound and music capabilities.

USER friendly. This is a program that explains itself as it goes along, or a computer that people can easily operate.

Every computer manufacturer now claims its products are "user friendly," but only Commodore really demonstrates it. For example, our *Help* key and use of Advanced BASIC.

VERTICAL integration is not as complicated as it sounds. All it means is that Commodore make everything to do with computers, from the silicon *chip* to the computer casing.

So we have complete control over everything, from design to manufacture.

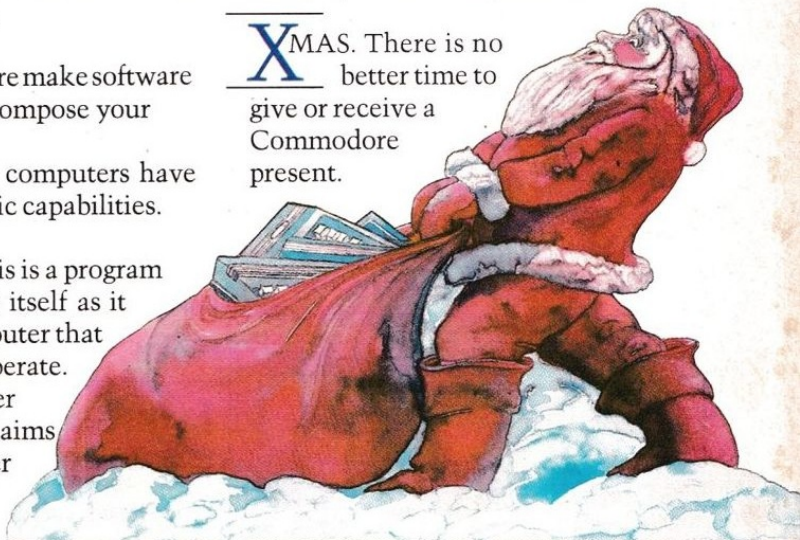
It also means, of course, that we can design everything so you're able to get the very best out of your Commodore computer system.

WOMEN also are discovering computers - and not just in offices, but at home. Computers aren't sexist.



They were invented for everyone, and the fact that they're fun, exciting, educational, practical and time-saving are benefits that apply to women just as much as to men.

XMAS. There is no better time to give or receive a Commodore present.



YIPPEE! Yes, now you know (or should do) that computers are really interesting. They're not just about space games with horrendous monsters. Nor are they horrendously complicated machines that you need a maths degree to understand.

Computers are the future, and it's important that you and, even more so, your children don't get left behind in the past.

With a Commodore computer and a *peripheral* or two (and we now know what those are, don't we?) whole new leisure and business opportunities will immediately be opened to you.

Make the choice now and (just so long as it's Commodore) we promise you will never regret it.

ZIP us a line if you'd like more even more biased information on any Commodore products.

Write or telephone: Commodore Information Centre, 1 Hunters Road, Weldon, Corby, Northampton NN17 1QX. Tel: Corby (0536) 205252.



commodore

WHICH MICRO & SOFTWARE REVIEW

Scriptor Court, 155, Farringdon Road,
London EC1R 3AD

Editor — Paul Coster BSc
Art Editor — Mike Spiller
News Editor — Caroline Fysh
Software Staff Writer — Paolo Baccanello
Editorial Assistant — Shirley Eborn
Associate Editor — Simon Craven
Publisher — Alfred Rolington

Advertising Manager — Mark Epstein
Advertising Production — Yvonne Moyser
Senior Sales Executive — Marc Peirson
Sales Executive — Martin Derr
Classified Executive — Tracey Keighley

Contributors — Barry Foster, Anna Nally, Gary Evans, Tony Eden, John Webb, Rob Horne, Clive Williamson, Mike Gerrard, Nigel Grey, Graham McLeod, Jane Robins and Chris Jenkins.

Editorial — 01 278 6767
Advertising — 01 278 6995/8
Telex — 32157 EMAPPB.G.

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Christmas is upon us once again (well, almost), and no doubt there will be the usual rush to buy that special micro you always wanted.

This year, as with last, there are a range of new machines to choose from, as well as some old favourites.

Will it be the turn of MSX to take the market by storm — we doubt it; but then anything can happen as was shown during the run-up to last Christmas when people seemed content to buy just about anything.

And whether you're a similar 'impulse buyer', or wish to ponder over what is after all a considerable outlay, we've done our best to provide the answers.

Inside this month's specially commissioned Buyer's Guide we've separated the alternatives by price and features offered, as well as suggesting best buys for particular applications.

So, turn to page 16 now!

Paul N Coster — Editor

Note. Owing to the amount of space devoted to Which Micro's comprehensive Buyer's Guide, we have held over several regular features and series. These will reappear in next month's action-packed edition.

NEWS

>SIGFILE

The latest news and information on the micro-front

Next Month

What to look forward to in the new year

FEATURES

Open Channel

Letters to the Editor

The Serious Micro

For those in search of more than fun and games



Lynx Goes Forth

Lynx comes in from the cold

Manual Override

Books reviewed before they hit the shelves

SPECIAL



Hardware In Perspective

The biggest and best Buyer's Guide yet (probably!)

Buyers' Guide Chart 92

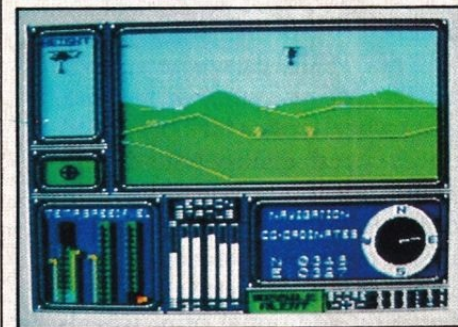
Our updated chart takes in the new MSX and Commodore machines

SERIES

Exploring BASIC

The much-talked-about finale

REVIEW

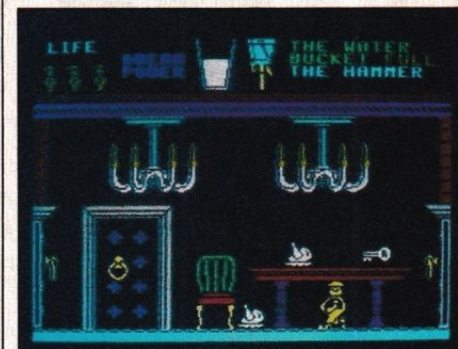


Soft Releases of the Month 75,85

Two superb games from Durrell and Acornsoft

Soft Release

Our regular review team in 'game playing' mode



Includes



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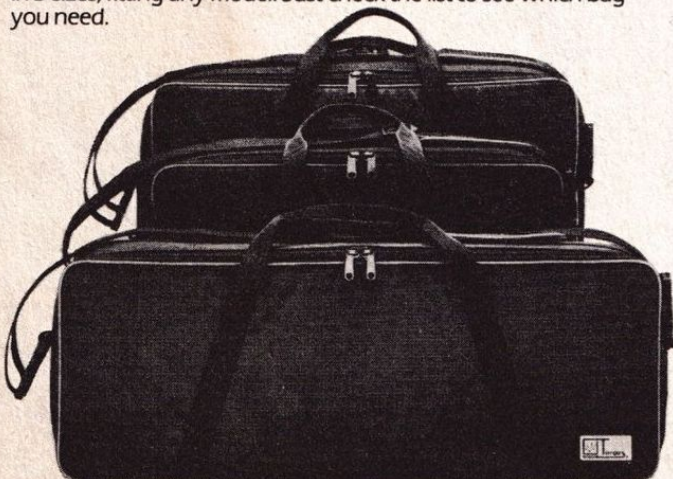
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3 THE SUPPORT IS HERE

As well as offering a wide range of useful publications (including our own magazine), PARCO ELECTRICS are enjoying a good reputation for customer service and information. If we can't solve your problem, you may be sure we know who can!

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+ many more publications.

4 THE FUTURE IS HERE

The TI-99/4A is a well established and proven machine. Even so, it has long enjoyed features that other micros are still struggling to emulate, yet there is also room for new growth.

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» SIGFILE

A couple of months ago we reported on a sale of second-hand computer equipment. Now there's a magazine dedicated exclusively to the second-hand market — specifically for home, not business machines.

Called Micro Mart it's aimed at the two and half million home users a third of whom, their research tells them, will upgrade within the next 12 months.

So the home computer has finally hit the depths of degradation finding itself alongside the second-hand car. The industry moves quickly we all know, and sure, there have been hardware developments but personally I wouldn't have thought the second-hand business was sufficiently great to warrant a fortnightly publication of its own. I s'pose we'll soon be reading: "one careful lady owner, used for domestic programs only. As new, or alternatively: 'Temperamental Spectrum needs kind new owner. Selling due to lack of patience.'"

If the second-hand market really does pick up in a big way, it could have interesting repercussions for hardware suppliers. Up until now anyone wishing to dabble and test the water to see if they are really interested in computing has had to go out and pay good money for a brand new machine. I wonder how

many people will now set about buying a cheap second hand machine, find it's not really for them and then forget the whole business, nothing lost? Or perhaps another repercussion might be that by buying a cheap, bottom of the market machine, new users will realise their limited potential, and then go straight for something more sophisticated. No-one may buy a new bottom rank machine ever again, and they will become obsolete. Or will we become a nation of two computer homes just like two car families with the second-hand model given over to the kids while the grown-ups keep the best and newest? Who knows.

Will we also see the sudden uprising of service centres for second-hand machines? At least the new magazine will give us all an indication of just how great the second-hand market is. It's no doubt an opportunity at least, for people to get rid of the machines they wished they'd never got in the first place but whose consciences prevented them throwing them out! — They can legitimately persuade themselves they are upgrading.

Caroline Fysh

● Our former fledgling, turned monster magazine, *QL User*, informs us that Microvitec are

keen to trace all Cub QL-compatible users, with models 1451/DQ/3 or 1451/MQ/3 and serial numbers between 85692 and 103317. There could be a suppliers' component fault and owners are asked to call David Kaye on Bradford 726500 to check if upgrading (FOC) is necessary.

● We also received a short informative note from the Marketing Manager of MushiCalc (followed by a rather longer tome from their MD). Ignoring the latter, we would like to correct a couple of points arising from November's *Musical Micros II*.

Firstly, MushiCalc 1 is £49.95 (not £70) and secondly, MushiCalc 4 is not available here. However, MushiCalc 1 is compatible with the Microsound 64 — a total cost together of under £200.

● Computer peripherals manufacturer Quen Data have just informed us about two new printers on the market, both competitively priced.

Prices for these models are £270.00 for the DWP 1120 daisywheel and £230 for DP 100 dot-matrix printer.

Available from Computer Intelligence, Spectrum UK and most major dealers, prospective buyers should also look out in December for four new models.

Mega Comeback

Must be something in them there original Megagames, loudly proclaimed by Imagine in their death throes — were there not, the discerning powers that be at Sinclair would hardly get involved. And, further, set about seeking out the authors.

As it is, Sinclair has acquired the rights to Bandersnatch which the company plans to make available for the QL early next year. Sinclair also has the option to purchase later Megagames as they are completed by a new Liverpool software house risen from the Imagine ashes, and run by ex-personnel Lawson and Hetherington (who only recently you will recall declared their life in the software business was at an end. Oh well, I guess we all have the right to change our minds.) The deal is incredibly complex and the duo are working for Sinclair on a fee basis while royalty payments will go to Imagine's creditors via the official liquidator.

Does all this make the Megagames one year late in coming to market, or is it two since the first noises were made? So much fuss has been made I've forgotten. It just seems like we've been hearing about them for eternity.

Ooops!

Tut! Tut! *Which Micro's* review of educational software in the October issue failed to mention the valuable work being done by the Microelectronics Education Programme — so we're mentioning it now.

The West Midlands Regional Centre for Microelectronics and Computers in Education has in fact drawn our attention to the number of programs they have produced over the last three years with Government support. All titles are thoroughly tested in schools and have gained wide approval and are available to both schools and the public. Royalties on sales go back to the Government to sponsor further research in the educational field (it's better than education cuts).

Catalogues are available from the actual producers, Learning and Training Systems Ltd., Haydon House, Alcester Road, Studley, Warwickshire B80 7AP.



Close up on Sinclair's 'plus' — a new Spectrum keypad.

A Real Plus?

Is Sir Clive finally learning the folly of his ways? The ZX Spectrum+ has been launched complete with a "full professional, typewriter action keyboard". And not only that, "significant production volumes are available immediately" they say — will

wonders never cease?

The Spectrum+ is priced at £179.95 and thrown in for good measure are six applications programs valued at over £50, and an easy to use 80 page user guide complete with introductory cassette and lots of pretty pictures. The new machine is fully compatible with all existing

Spectrum software and peripherals and has a 48k memory in addition to eight colours, high resolution graphics and sound over 20 octaves. The 17 additional keys mean many operations can be performed with just one of 'em — simpler, and simpler — while the keyboard itself can be tilted using retractable feet built into the underside of the case. A reset button meanwhile clears the computer without disconnecting the power supply.

When combined with the recently announced ZX Expansion System (retailing at £99.95 and incorporating a microdrive, Interface 1 and four microdrive cartridges) the Spectrum+ is reckoned to be able to tackle all serious home and professional tasks as well as the usual game playing associated with owning a Spectrum.

All that remains to be seen is, does it work? Sinclair Research, Stanhope Road, Camberley, Surrey.

Life Beyond The Guarantee

Micro breakdown, that well known scourge of the 80's that drives users to despair is being tackled in a positive way by a new organisation called the Micro Repair Club whose repair-guarantee-package takes over where the manufacturer's warranty leaves off.

Subscribers can have their machines repaired free of charge for anything between a year to four years depending on their membership terms. The one year package costs £24.95 and is renewable thereafter for £14.95 a year, while a four year

subscription costs £57.95 — what price your peace of mind?

Computeraid Services, part of Thorn EMI Information Technology Division, are contracted to actually do the repair work while the whole scheme is said to be backed by one of the world's leading insurance companies. All major micros are covered: Electron, Dragon, Spectrum, BBC, Commodore 64, Vic and Oric.

Future plans are for a newsletter, special offers and peripheral warranty terms. It's pleasing that at last people are admitting micros break down. The Micro Repair Club, Swan Court, Mansel Road, Wimbledon, London SW19 4AA.

Warts And All

Now this is an interesting one? We'd all like to see ourselves as others see us, warts and all, and William Stuart Systems are offering the opportunity to get pretty close thanks to a new computer program called Life-Line.

Are you (or do you think you are) a leader, co-ordinator, helper, innovator or researcher? Well now is the chance to find out. The program invites the user to select words from a large number of randomly presented choices that he feels best match up to his personality — those that describe him the most accurately and those the least. No cheating either, since this highly intelligent program can distinguish between the personality one is consciously projecting, and one's "true self" (so they say).

The output consists of a series of graphs showing the user's principal strengths and then puts a personality type to it.

Now you may consider all this is a jolly good joke but as William Stuart soberly point out Life-Line will help members of the family to a better understanding of each other, as well as helping to chart a career course.

Life-Line is currently available for the Sinclair Spectrum and will soon be at the disposal of CBM 64 and BBC personality freaks priced £14.95.

William Stuart Systems
0980 64235.

Who's Hypeing?

Now "bullshit" is hardly the kind of word to be put in print by a Managing Director extolling the virtues of his company's professionalism (nor, come to that, anyone wishing to avoid intervention from the Whitehouse brigade), but that's just the language that has come from DK Tronics MD, David Heelas: "There is far too much bullshit in the industry, especially about software. Every trade magazine I pick up is full of features on software companies attempting to hype their particular games," were his exact words concerning the company's reluctance to comment on their software based on top TV programmers and characters.

"We at DK," he goes on (holier than thou), "prefer to take a more professional approach with far less of the razzmatazz normally associated with the software industry."

I would dare to comment, Mr Heelas, that your comments about "bullshit" are merely your own form of hype — there's more than one way to skin a cat... DK Tronics 0799 26350.



Fuller in miniature?

All Systems Go!

It's all systems go one again for Fuller Micro Systems which went bust a few months ago. The entire product range has been acquired by Nordic Keyboards who are, however, quick to point out that they have not acquired the former company's delivery and service problems. "We are building stocks of all products and can deliver in three days," they proudly declare. So if you wanted a Fuller product and couldn't get it, you might now be able to. Nordic are no strangers to Fuller products since their holding company Turngrade Electronics Ltd, have been manufacturing the keyboards, master units and Fuller boxes for the past three years. New packaging, clearer instructions and "thousands of pounds" on promotion are the new order of the day along with imminent launch of the FDS Executive — a replacement keyboard for the ZX Spectrum.

Says the company's joint MD John Gray: "We believe it's a winner. It's technically sound and reasonably priced. Far from being a re-vamped design it allows the user to plug his ZX Spectrum straight into the keyboard without having to unscrew the Spectrum case."

For those with Interface 1 and microdrives, assembly is said to be "simplicity itself". There is a pre-cut panel to snap out of the back of the keyboard and both Spectrum and Interface 1 fit inside, with the microdrive plugging into the side. The Executive will retail for £59.95.

Safety In Numbers

If you can't beat 'em, join 'em — that sound philosophy — is being put into practice by software houses such as Anirog, CRL and Silversoft. They have banded together to form Omega Software, an organisation with the expressed intention of producing budget-priced titles jointly, while each continues to pursue its individual interests. Twelve titles are available for the Spectrum, ZX81, Commodore 64 and Vic 20 all at £1.99 and are said to be of a "standard so high many software houses would have released them at a much higher price."

Prized Info

Everywhere you look these days the computer business is running competitions; so here are a selection of those currently on offer to budding entrepreneurs (or people who simply want to get their hands on a few free goodies):

Compunet is offering a Commodore 1701 monitor to the entrant who designs the most original frame to introduce one of the services currently available or planned for the near future. The Compunet ad gives nearly 100 ideas to get you started. Second prize is £25 and there is £5 for anyone whose design frame is chosen to be used. In addition there's £25 for the winner of their Christmas card design competition. Both are open for entry until December 14th.

Compunet 01-637 0942.

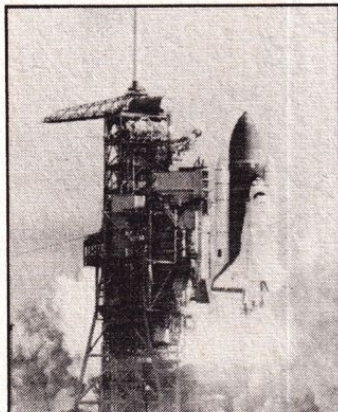
For schoolchildren is the CUB British Schools Computer Challenge sponsored by Microvitec. The prize here is a five day trip to the US taking in a 'live' scheduled shuttle launch from the JFK Space Centre in Florida. It will go to the winning team of three and their support teacher. Upper age limit is 16 and preliminary rounds are taking place in November. The finals — with the possibility of TV coverage — are planned for April and May and the prize visit next August.

Microvitec 0274 390011.

A weekend for two in Paris meanwhile is on offer from Star Dreams (Software) and it's an easy one to win (or sounds like it anyway). All you have to do is buy a copy of their game, The Sandman Cometh, then play it, and answer a question hidden within it. The adventure has to be completed to get the answer and the first correct entry opened wins the weekend.

Star Dreams 0323 892157.

A hair raising £30,000 or the famous jewel of the Golden Hare is the goodie at the end of the



We have lift-off!

rather complex Hareraiser challenge (I suppose you would have to work a bit harder for that kind of money.)

And if you live near Beckenham in Kent and ever visit the Computerworld shop a host of hardware is on offer if you spend more than £5.

An entry number is given with every purchase over a fiver and it's simply a case of deciding which prize you want and answering four questions — one of which involves the submission of a short program or routine. (Nothing grand required, they say). For every 1500 entries, another prize is put up but it's not quite clear how they are actually going to judge it!

Computerworld 01778 0479.

Music On The Cheap

Should you be a member of a user group, own a Commodore 64 and have four or more like-minded friends, you can claim a 15 per cent discount on MusiCalc — until December 31st that is. Five or more copies ordered direct will be discounted by 15 per cent while for 20 or more, 25 per cent reduction is the order of the day. MusiCalc UK 01-241 2354.

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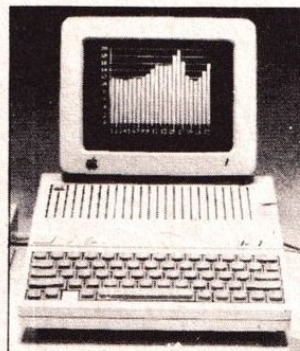
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Byte Packer's Lament

Having purchased an Amstrad CPC 464 home computer, and having no real knowledge of computers I was delighted to see that a magazine of Which Micro's calibre had published a games program, namely Night Runner.

I eagerly entered the program to find that the computer had not accepted the '£' sign and every attempt to rectify this failed. I consulted a friend of mine, who has been a subscriber to your magazine for a considerable time, and he stated that it was unlikely that a printing error had occurred. Thereafter I contacted the shop that sold the computer and they agreed to exchange my machine for another. After considerable inconvenience I found that the same problem occurred.

After six hours of trying to get the program to run I observed that when a window operation had to be entered the sign '#' was used and not '£' as stated in your magazine.

I enjoyed reading your magazine, which I have done from cover to cover, and found it to be very informative. However, although I realise that printing errors can always arise, if the present publication is an example of what I may expect to find in the future I will be extremely reluctant to purchase again.

Andrew Darcy DPA
Glasgow

For one who reads magazines from cover to cover it seems rather strange that you failed to digest the note on page 1 of BYTE PACK 1. Had you done so you would have spared yourself a great deal of inconvenience. Nevertheless, it may be fruitful to point out how and why problems like this occur.

In an effort to ensure that all programs printed are free of bugs, listings are obtained from Which Micro's printer only after a program has been tested on one of our machines. An additional benefit is that listings produced in this way are uniform in appearance and consequently improve the overall readability of Byte Pack.

There is, however, one drawback, namely that listings are only as good as the printer used to generate them. In our

case, with the printer interfaced to some ten machines certain characters cannot be reproduced.

In issues 1 and 2 of Byte Pack neither user-defined characters nor the 'hash' sign could be reproduced. Since then only the former remains unobtainable. In any case, notes to this effect were included wherever the problem arose.



MTX Plus

Being the owner of a MEMOTECH MTX 512, I was most pleased to read the October issue of your magazine and the programmes listed for this undoubtedly excellent micro. Well done, please keep up the good work as I will certainly, with this sort of coverage, remain an avid reader of your fine magazine.

Just a couple of comments on your micro buyers guide list on pages 91 and 92. While I appreciate limited available space, there is no mention of the MEMOTECH MTX 500 which, as you are no doubt aware, is at least equivalent to the Acorn Electron and probably nearer the BBC model B (at £200 less in price). Also the MTX micro has an assembler/dissassembler which is not mentioned under "language supplied".

Anyway your list will have to be updated to include MEMOTECH'S RS128, 128k user ram + 16k video ram + 2 x RS232 + all the usual features of this brilliant range of micros. All this for £399!!
A. Hall
Sheffield

If you check out our Buyer's Guide you will see that it has been extended to include the MTX 500. As for the RS128 we reserve coverage until the machine has been reviewed.

Round Two

I would not normally have written in support of G Walton had it not been for the jingoistic ticking off he (or she) received from this mag for claiming to criticise Clive Sinclair and British industry in general.

If Sir Clive was foolish enough to make promises he couldn't keep and if his company's service falls short of expectations then he deserves a 'clip round the ear' from the public, just as he deserves a pat on the head when he gets it right.

In fact I sympathise with G Walton. I've had four Oric computers in seven months. Two were faulty when unpacked. One went wrong after a day's use and one went for about five months before breaking down. Is it any wonder that this company has lost my confidence and custom? Oh yes I wrote to them outlining my gripe — didn't even get a reply.

Now that is typical of British industry and if it gains the confidence of the public, it will be because it has earned it. So no amount of jingoistic rhetoric makes up for a lack of good commercial practice and it should be borne in mind, it's the customer that is always right, not the company.

J Butler
Morganway Ganol, Wales

With a new keyboard and a revised PCB layout your major criticism of the Spectrum appear to have been anticipated (though at a price!).

Even then, far from making excuses, I agree that the Spectrum whether disguised or otherwise does show its age. But it remains true that only the Commodore 64 can compete with it in terms of the quantity and, more importantly, the quality of the software.

Bitter Controversy

Since I started the hobby, I have used these computers — ZX81, a Spectrum and an Oric 1, of which the Oric was the far superior machine. I found the Spectrum uncomfortable to use and with the exception of the remarkable software it was a very unremarkable machine which grew hot and noisy after only a few hours use, and had a crude display. As an average user I found it surprising that for the extra £10.00 the Oric costs you, you get parallel pin and centronics interfaces, RGB socket and tape (with remote)/Hi-Fi socket. Not to mention the excellent sound, superior keyboard and extra 8K memory in LORES modes and perhaps most important of all, an excellent power supply. I have often left my Oric on for several days.

But what adds insult to injury is the recommendation of the Sinclair range as 'starter computers'. There seems to be a feeling in the micro industry at the moment that cheaper, inferior computers make good micros for children. Shouldn't it be the other way around? Certainly, the most important features for a children's computer should be a good keyboard and a fast, structured Basic. The Spectrum does not fulfil any of these requirements by any stretch of the imagination.

Though the Spectrum is a decent computer with good graphics, memory and available hardware, acceptable Basic and quite good sound, it is definitely not half as good as you would have us believe. When compared to the Electron, Dragon or Atmos, it shows its age very badly, particularly in its construction. I'm sure that, as in the past, you can come up with some excuse for the machine but I have used it, as a normal user, and I was sadly let down after your glowing descriptions. If it's any consolation, you're not the only culprit, the Spectrum has plenty of literature on its own. Can't it be treated as a normal computer, not a god?

N Emerson
County Armagh, N Ireland

Microdrome?

We were horrified by the description of the game City Attack in which "you have to level the buildings to clear a landing space for your stricken craft". This is of course only a game. . . . Nevertheless, the next major war will be mainly fought by young men and women sitting at VDUs remote from the actual effects of their actions. The distinction between game and reality will be very small. General Anson has said "You've got high school boys doing computer programming, and you've got the kids jamming amusement arcades to play complicated computerised games. It's not going to be so difficult for them to handle the new machines as many think." Games such as City Attack actually prepare people for fighting electronic nuclear war. They do nothing unfortunately, to encourage an attitude which is likely to prevent it.

Is the brave new world of the microprocessor really going to be nothing more than another version of the dreary round of cheap frills and violence offered by television and comics? Can it and the very able people who work in it come up with something more constructive?

Dr P S Belton & Dr A A Cottley
Scientists against Nuclear Arms
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Because with Acornsoft's new 16K ViewSheet ROM, it develops a head for figures which can save you a vast amount of arduous brainwork.

Imagine, for instance, that you had to make several adjustments to a balance sheet.

If you made those adjustments on ViewSheet, it would revise the balance automatically in a split second.

Or imagine that you had to add 15% VAT to every figure on a price list containing 500 items.

ViewSheet can add the tax to each and every one of those items simultaneously. And once again, in virtually a second.

As simple as pencil and paper.

ViewSheet is a computer-based spreadsheet, the figure processing version of a word processor.

With 255 columns in width and 255 rows in depth, it's also one of the largest spreadsheets on the market.

Originating the sheet is as easy as originating an ordinary worksheet with pencil and paper.

Because ViewSheet comes with an easy-to-follow reference card.

It enables even the most inexperienced users to feed all the data they need to use, and store on disc or cassette, into the BBC Micro.

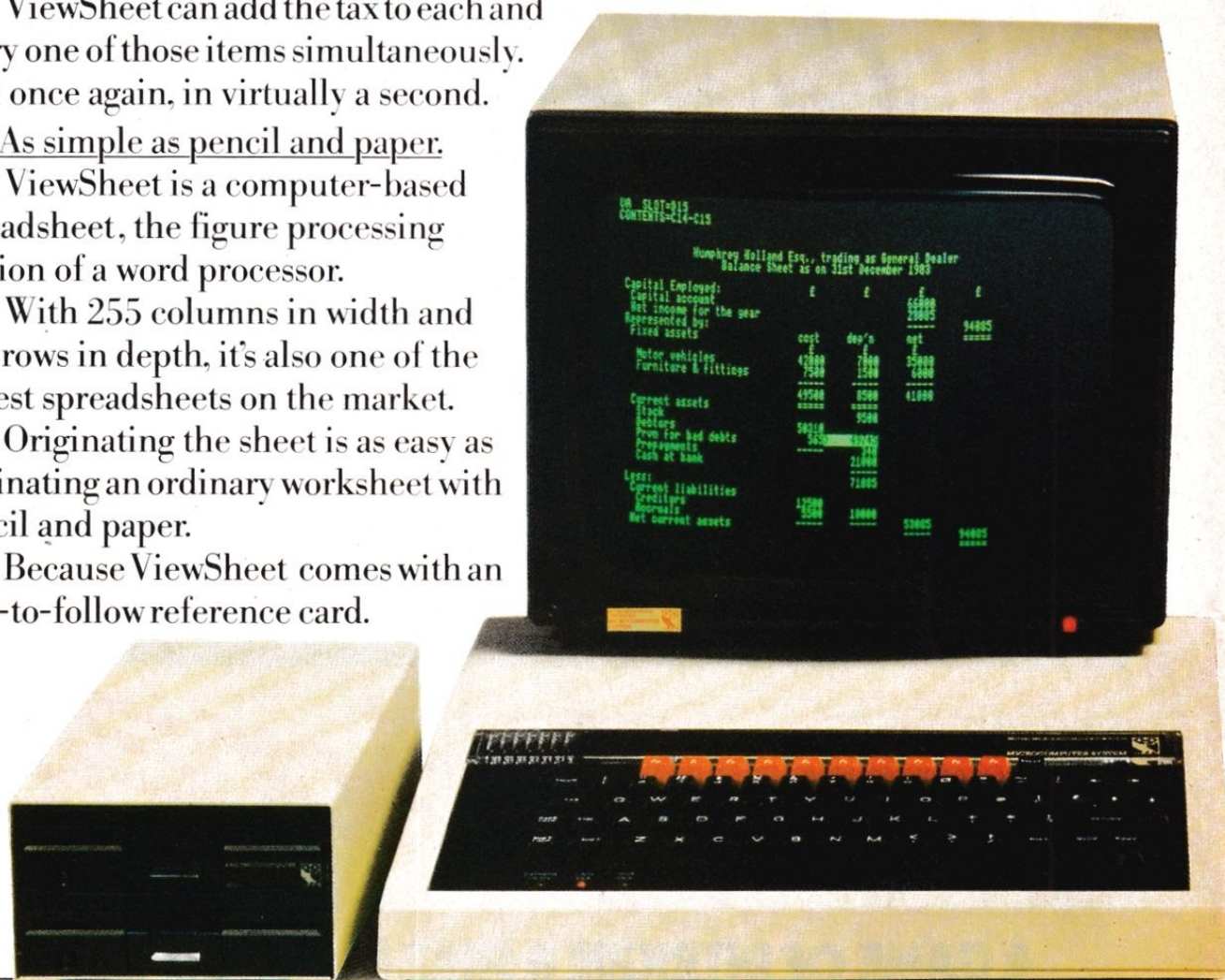
You can nominate headings and sub-headings. And you can create barcharts to display figures graphically.

Ten windows for perfect vision.

The sheer size of ViewSheet makes it impossible for the whole sheet to be visible on the monitor at once.

That's why ViewSheet has ten windows, enabling you to see up to ten different sections of the sheet at any one time.

You can summon the windows onto



Sheet in one second.

the screen at the press of a key.

You can cross-reference sections, or even reposition them on the sheet, whenever you need to.

And you can print them out individually, as well as all together.

The possibilities are virtually endless.

By creating special disc files from ViewSheet, you can link two or more spreadsheets together. This means you can build models much bigger than the BBC Micro's considerable memory.

ViewSheet is also compatible with Acornsoft's View word-processing package. This enables you to produce reports and documents which combine text and figures.

In addition, you can use ViewSheet in any screen mode,

making the most of the BBC Micro's potential. And if you use it with the 6502 second processor, you'll have no less than 30K of workspace in any mode.

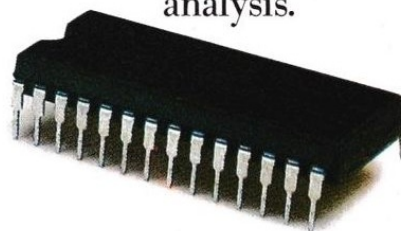
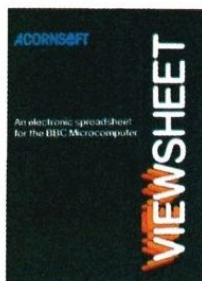
For only £59.80,

you too can have figures like this.

The ViewSheet ROM can be fitted by your BBC Micro dealer in less than three minutes. And with its straightforward user guide, function

key card and reference card, it'll soon have you juggling figures at lightning speed.

Indeed, at only £59.80, it's an invaluable asset for anyone involved in professional or personal finance, forecasts, formulae and analysis.



ViewSheet's operations and functions in brief.

The operations supported by ViewSheet are: addition, subtraction, multiplication, division, exponentiation and bracketed operations.

And the functions supported are: ABS, ACS, ASN, SIN, SGN, RAD, ATN, COS, DEG, EXP, INT, LN, LOG, PI, SQR, TAN, MIN, AVERAGE, MAX, CHOOSE, LOOKUP, COL, IF, READ, ROW and WRITE.

ACORN SOFTWARE

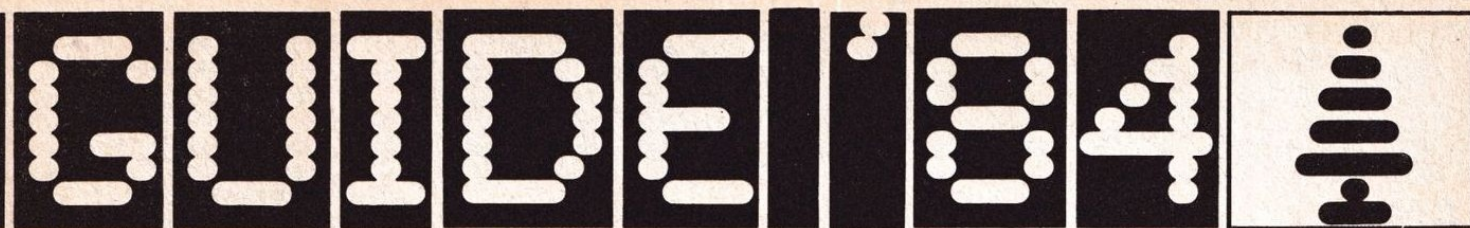
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BUYERS!

'Comprehensive' is too limited a word For what follows, so we'll just



ILLUSTRATION BY PETER JONES



leave you to wander round the *caverna-collosa* of Barry Foster's Buyers' Guide.

Thinking about buying a computer this Christmas? Congratulations, then, you've come to the right place. In our Christmas Micro Round-up you'll find all the facts and figures and mini-reviews to help you choose between the top computers in the stores.

The key is to buy one that will do everything you need. This means working out, before you buy, exactly what it is that you want from a computer. Otherwise you may end up disappointed with a computer that does less than you expected. You could go too far in the other direction, with a computer that is more powerful (and expensive) than you really need. That may not be such a disaster, as it is always possible to discover new uses.

However if your computer is less than useful, it is worse than useless, and you will become involved in extra expense, time and trouble, upgrading to the standard needed in the first place.

Price is a consideration in any purchase, and our Price Thermometer shows the comparative cost of the computers we've looked at.

Price-Wise

At the top, all by itself, is the Tatung Einstein at £499; then the BBC B, Sinclair QL and the Advance 86A, all priced at £399. The Amstrad CPC464 with a colour monitor is out on its own at £329, and after it comes a large group priced between £240 and £275. The Amstrad CPC464 with monochrome monitor is outside this group at £229.

The next group is the most competitive — the Electron, Commodore 64, Spectravideo SV328 and MTX 500, all at £199 or £200. Next the Atmos and Atari 600XL form a small group all by themselves, with the Vic 20 just outside at £140. The Spectrum 48K and the new Commodore 16 are also competitive at £130, and finally there is the Spectravideo SV318.

You might expect that computers priced at roughly the same level would all have roughly the same features, but this is not exactly true. Prices cannot be used as an absolute guide. For example, the Einstein is broadly comparable with the BBC group, exactly £100 cheaper, but the 3"

disk drive built into the Hitachi adds to its cost. The QL comes with a set of four business programs, while both the BBC and the Advance are supplied without extras either in the price or the machines. On the other hand the Amstrad CPC464, cheaper than the BBC group machines, comes with a colour monitor and cassette deck, while the MTX 512 has an extra high level language (called NODDY) and a machine code Assembler in ROM.

Goodies Galore

To help sort out these differences, we've drawn up the Goodies Table, which shows each machine and the extra facilities included in the price. Bear in mind that if you buy a computer with a built-in disk drive (for example), that's one expense you will not have in the future.

The Goodies Table shows only those extras built into the computer or normally sold with it. It does not show promotional offers such as "free software" that are sometimes available. These details, and where to look for Christmas bargains, are in the What's In Store section.

The other reason why price cannot be taken as any more than a starting point is that similarly priced computers often have wildly different features while others, priced differently, are often competitive in use.

For example the BBC Micro has an excellent BASIC, superb graphics resolution, but very limited memory if you use those graphics. The Acorn Electron, which is a scaled down version of the BBC Micro, is priced the same as the Commodore 64, which has good graphics, adequate memory, but an out-dated BASIC. However the C64 is often considered as an alternative to the BBC Micro! Confused? It's not surprising. It would be nice if we could also produce a table showing an overall rating for the computers, an all-in judgement based on the total sum of factors like the size, quality and speed of BASIC, memory size, ease of expansion and so on. Unfortunately the features of the machines, and peoples needs, vary so much that such a table would be meaningless. Our regular Buyers' Guide Chart, at the end of the magazine, will help to sort out the

performance features of each of the computers, but in the end the final decision must be based on knowing just what you want out of a machine — now and in the future.

In the mini reviews we have looked at each computer in terms of usefulness, to two separate groups of users: the 'games players' and the 'serious' users. These are arbitrary choices, because it would be unusual, to say the least, to find somebody who has only ever played computer games, or a 'serious' user who has never played a game of any type on his computer.

Of course, people do not fit neatly into boxes like that, but you should know if you are more likely to be one type or the other — remember that a gamer may well develop genuine programming talent, while a hacker might spend more time playing his own version of Pac Man than on useful program development!

There are many other uses for a computer, besides those two. Educational computing is becoming more important as educationally sound, reliable programs become available. Some readers may be considering a computer for their business activities, and this too has been accounted for in the mini-reviews.

Key To Success

At the head of each review we've summarised a few of the more significant features of each computer:

RAM/ROM: The size of the Random Access Memory in K bytes (1K = 1024 bytes) determines the size of the program — and therefore its complexity — that can be run on the computer. Generally the larger the memory the better — and more expensive — the computer, but beware of machines that consume large amounts of memory for the display. Memory dedicated to the display is shown separately (eg 64K + 16K means 64K RAM plus 16K screen memory); all other computers use main memory for the display.

The size of the ROM is an indication of the size and the power of the BASIC, though some figures also include machine code monitors, operating systems or applications software in ROM.

Display: This indicates the type

of video display unit that can be used with the computer. "TV" means a UHF PAL domestic television, usually tuned to Channel 36; "RGB" means the computer outputs Red/Green/Blue signals to drive a monitor equipped with RGB inputs; "video" is a composite video signal, usually PAL colour but not always, that can drive a suitable monitor. Two of the computers produce "colour difference" signals, and these require a special monitor or an adaptor. Monitors usually cost extra (from £100 — £300) but are worth the expense if you are spending many hours in front of the screen.

Text: Lists the minimum and maximum text formats of the unexpanded computer, eg 25 × 40 or 25 × 80. 80-column extender cards provide 80-character wide text, necessary for CP/M based software and business software generally.

Resolution: Minimum and maximum pixel definition, eg 20 × 80 or 240 × 640. Often there will be intermediate resolutions as well. Resolution is important not just for games but for any graphics-oriented application. In computers without dedicated screen memory, high resolution modes rarely leave much program memory.

Colours: Minimum and maximum number of colours on the screen at one time. This is a rough guide only, because colour definition varies widely; generally the higher the pixel resolution the fewer the colours that can be used. Colour is most important for games, but can be used effectively in all software.

Sound: Sound channels, at least three, are most useful for games. Other programs can be made more effective by the use of sound, but it is not vital.

Interfacing covers the expansion capabilities of the computer. In general the more interfaces, the more expansion that is possible. Printers can be run either from a Centronics-standard parallel interface (the most common) or from an RS232, RS232C or RS432 interface; the printer has to suit the computer interface. Some machines have "own standard" interfaces and this means only peripherals (including printers) from the manufacturer will generally work with the computer.

MICRO REVIEW

Acorn Electron

Price: £199
RAM/ROM: 32K/32K
Display: TV, RGB or video
Text: 25 × 40/32 × 80
Resolution: 25 × 40/256 × 640
Colours: 2/16
Sound: 1 channel
Interface: Cassette, expansion connector

It's easy to dismiss the Electron as just a scaled down BBC Micro, and while that is actually true, it is also true that the Electron has qualities which make it an excellent computer for newcomers.

First amongst them is the outstanding BBC BASIC, almost a reference standard now.

The Electron supports good graphics, easy to use and effective in appearance, though the single sound channel is not capable of very much. The typewriter keyboard encourages more serious use, particularly as 'Electronised' versions of BBC wordprocessors, spreadsheets etc become available.

In fact the Electron rates highly as a low-cost multi-purpose computer.

Extras: The Plus 1 extension provides many of the BBC Micro features omitted from the basic Electron.

For: The keyword for the Electron is versatile: it does a lot of things, and performs most tasks well, within its limitations.

Against: Limited facilities, but only by comparison with the BBC Micro.

Conclusion: Buyers looking for a games/educational computer ought to consider the Electron very carefully.

Compare with: Atmos, Spectrum 48K, MTX500, SV328, Atari 600XL.



Advance 86A

Price: £399
RAM/ROM: 128K + 16K/24K
Display: TV, video, RGB
Text: 24 × 40/24 × 80
Resolution: 200 × 320/200 × 640
Colours: b/w — 4 max
Sound: 1 channel
Interfaces: Centronics parallel, joystick, cassette
Supplier: Advance Ltd 01-609 0061

The Advance 86A is a 16-bit computer that can be upgraded to IBM compatibility, and this is a big plus point for users who may need to expand to a small business system.

As it stands, though, the Advance 86A is a slightly peculiar computer with some good features. The keyboard is a professional looking detached unit which works well, but the Advance scores highest when you look at the free memory left to the user; around 62K is available, and this compares well with most computers in its price range. An additional 16K is dedicated to the screen, but the display is black & white only in hi-res mode — a strange specification for a computer in the home market, where colour control is an important selling point. Another curiosity is the single sound channel and poor control instructions. The 86A cannot be equipped with disk drives without upgrading to the model B, at great

cost. (A pity really).

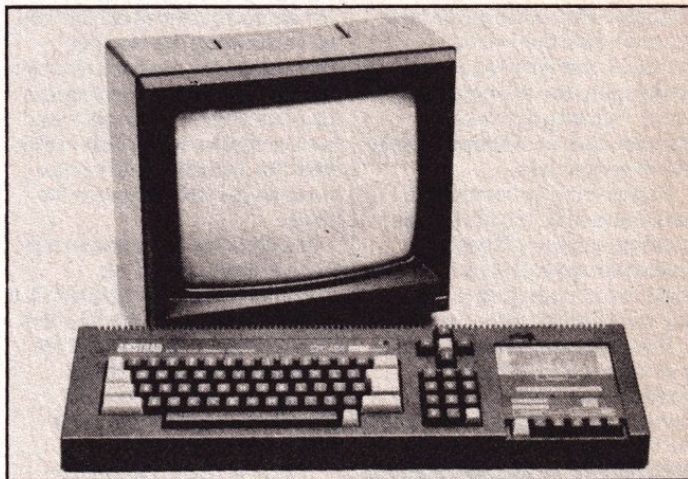
Extras: Upgrade to 86B brings twin double density disks and IBM compatibility.

For: Upwardly compatible to IBM, reasonable priced for a 16-bit computer, and heaps of memory.

Against: Lack of software, very expensive to add disks; inadequate documentation and complete absence of colour in hi-res mode.

Conclusion: The Advance 86A is an oddity as a home computer, but worth considering if IBM compatibility is the ultimate goal.

Compare with: Tatung Einstein, BBC Micro, Sinclair QL, Amstrad CPC 464, Memotech MTX512, Spectravideo SV2-728.



Amstrad CPC464

Price: £229 — £329
RAM/ROM: 64K/32K
Display: (see below)
Text: 20, 40 or 80 column
Resolution: 20 × 80/240 × 640
Colours: 16 from 27
Sound: 3 chan 'stereo'
Interfaces: Centronics parallel, disk drive/bus port, joysticks, audio
Supplier: Amstrad 0277

This Z80 based newcomer is widely tipped to be the sales success of 1984-85. The CPC464 is supplied with a built-in cassette deck and either a green screen or colour monitor—power supply is included in the price — £299 for mono, £329 for the colour version. A massive 42K of RAM is available to the user, supporting three screen modes and from two to 16 colours (from a palette of 27), depending on the mode. The graphics performance of this machine is rated as good to excellent, with the facility for independent screen windows

offering some interesting possibilities for programmers.

The keyboard has a positive action and clean feel and this, together with the ability to run CP/M, means that the CPC464 has potential as a business machine, too. Initial software support is very good, and new programs are appearing almost daily.

Extras: Joystick, printer, Disk drive, £199.95, PSU & TV modulator, (all from Amstrad)

For: An all-in-one package at an attractive price, and you get a lot of computer for your money.

Amstrad's consumer electronics experience means that reliability and supply should not be problems.

Against: If you're already a confirmed disk drive user, the built-in cassette is a waste of money; the same applies if you already have a monitor. Finally, the edge connector for the printer

is quite inadequate — a plug and socket arrangement is needed here.

Conclusion: A great buy, especially for those wanting to move on from, say, the Spectrum or Vic 20 class. Outright beginners may find it a bit complicated.

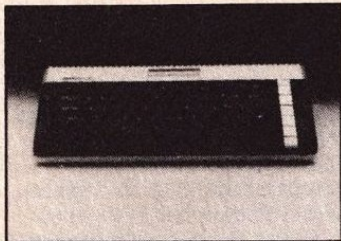
Compare with: BBC Micro, Tatung Einstein, Sinclair QL, Memotech MTX 512, Spectravideo SV1-728, Commodore Plus 4.

Atari 600XL

Price: £159
RAM/ROM: 16K/24K
Display: TV or monitor
Text: 24 × 40
Resolution: 40 × 24/192 × 320
Colours: 128 from a palette of 256
Sound: 4 channels
Interfaces: RS232C, expander, 2 × controller ports
Supplier: Atari 01-900 0511

A considerable improvement on the old Atari 400, this new model features a full stroke keyboard that includes 28 graphics keys. The





quality of construction is much improved, too. The 400/800 series were best known as games computers, and Atari have made the 600XL software compatible with all the existing software. This means that they use the same Atari graphics, sound and screen controller chips and the same old Atari BASIC, which is now a bit dated. Memory is niggardly, as can be expected from the price, but expansion to 64K is possible.

Extras: Memory expansion, and all other peripherals are available from Atari.

For: A well built computer with a large software base to draw upon.

Against: Memory is limited and the BASIC is out of date.

Conclusion: Low cost games machine, now with potential for more serious use — but count the cost of expansion.

Compare with: Electron, Spectrum 48K, Commodore 16, Commodore 64.

Atari 800XL is big brother to the 600XL, and at £250 comes equipped with 64K of RAM and has greater potential to function as a business computer. Apart from the additional memory, the 800XL shares all of the features of the smaller machine, including software compatibility with 400/800 software.

Extras: a full range is supplied by Atari. Microsoft BASIC II is available as an option.

Conclusion: Extra memory means a greater range of software can be run on the 800XL, including commercial software.

Compare with: Commodore 64, MSX computers.



Oric Atmos

Price: £170

RAM/ROM: 48K/16K

Display: TV, RGB

Text: 28 × 40

Resolution: 200 × 240

Colours: 8

Sound: 3 channel + noise, fully programmable

Interface: Cassette, Centronics

parallel, expansion port, microdisk port

Supplier: Oric 0990 27641

The Atmos replaces the ill-fated Oric 1, one of the best styled computers launched in recent years but also one which suffered from a severely bug-infested BASIC and operating system.

The Atmos has a typewriter keyboard with full travel keys, a new bug-free ROM (it will run most Oric software) but is otherwise internally identical to the old Oric. The BASIC is a version of Extended Microsoft.

The Atmos is peculiar in the way it handles screen colours; it does this using 'serial attributes' in which the code to specify colour is stored in a screen memory location and affects the colour of everything to the right of the colour attribute code (the same method used for Teletext displays). As a result the screen location where the code is stored appears either as a blank or in the background colour. While adequate for text, this does impose limitations on high resolution displays. The advantage is that it uses less memory than other methods of colour coding.

Extras: MPC colour printer/plotter, 3" microdisk drives — both from Oric

For: Reasonably priced and very efficient for text processing applications.

Against: Limited graphics unless very well thought out, slightly quirky BASIC, and the tape loading is not as reliable as it should be.

Conclusion: A good computer for small or home business use.

Compare: Electron, Spectrum 48K, C64

BBC Micro

Price: £399

RAM/ROM: 32K/32K

Display: TV, RGB, video (mono)

Text: 32 × 80

Resolution: 25 × 80/256 × 640

Colours: 16/2

Sound: 3-channel + noise; full control

Interfaces: Cassette, RS432 serial, Centronics parallel, 8-bit user port, 4 × 12-bit analogue input, 1MHz bus (Prestel, Teletext adaptors etc), Tube (second processor).

Supplier: Acorn Computers 0223 210111

Backed by a vast range of software, the BBC Micro has virtually swept the market for the 'serious' home user, and for educational applications. Much of the reason for this lies with the excellent BBC BASIC, a structured language that encourages sound programming

PRICE TABLE

500	TATUNG EINSTEIN £499
400	BBC B, SINCLAIR QL, ADVANCE 86A £399
300	AMSTRAD CPC464 COLOUR £329
200	MTX 512 £275 TOSHIBA HX-10 £269 ATARI 800XL £250, COMMODORE PLUS 4 £249, SPECTRAVIDEO SVI-728 £250 SHARP MZ700 £240 AMSTRAD CPC46C MONO £229
100	ACORN ELECTRON, COMMODORE 64 £199, SPECTRAVIDEO SVI-328 £200, MTX500 £199 ATMOS £170 ATARI 600XL £160 VIC 20 £140 SPECTRUM 48K, COMMODORE 16 £130 SPECTRAVIDEO SVI-318 £99.95





habits, and makes the transition to other languages easier to cope with.

The Beeb is a very sophisticated computer, capable of almost unlimited expansion; Acorn's own Second Processor units, and those of Torch computers, add considerably more power to the 'professional's' home computer, including the ability to run the CP/M operating system and the commercial software based on it.

On the negative side, the lack of memory is a limiting factor in some applications; although the graphics resolution is the best of any home computer, it is greedy for memory.

Extras: Disk drives and DFS operating system, ECONET network interface, speech synthesiser, Teletext and Prestel adaptors, IEEE 488 interface, 6502 and Z80 second processors and an assortment of other high level languages are all available from Acorn. Alternatives and other peripherals (such as graphics tablets, plotters, vision systems etc) are also available from a dozen suppliers.

For: the BBC Micro is technically sophisticated, has an exceptional BASIC, excellent documentation, software and hardware support, and is capable of considerable expansion.

Against: Memory limitations in highest resolution mode, and for high-powered business applications, mean expensive extensions may be required. The basic computer is now a bit overpriced in comparison with this year's new releases.

Conclusion: The leading computer in home and

educational activities. It is easy enough for the beginner to use, and complicated enough to keep the true enthusiast happy for years.

Compare with: Einstein, QL, CPC464, MTX512, SV728, Commodore 64.

Commodore Plus 4

Price: £249
RAM/ROM: 64K/52K
Display: TV, video
Text: 24 x 40
Resolution: 200 x 320
Colours: 121 shades
Sound: 1 channel
Interfaces: Commodore's own serial, cassette, cartridge and joystick ports.
Supplier: Commodore 0753-79292

With four built-in business software packages, the Plus 4 is clearly intended to cause fear and loathing in the ranks at Sinclair. The four programs reside in ROM (making up 20K of the total) and consist of a wordprocessor, a spreadsheet, a data base manager and a business graphics designer. Since all four are in ROM, data can be transferred between them very quickly — an advantage over the labouriously slow QL.

The remaining 32K of ROM is occupied by an excellent machine code Assembler/Disassembler/editor, and BASIC V3.5. This is an enhanced Commodore BASIC which includes most of the instructions made popular by BBC BASIC — in other words, Commodore have finally caught up with the times. Tedious PEEKs and POKEs have been made redundant by a set of powerful graphics commands, but sprites and the excellent C64 sound facilities have been deleted.

Sprites can be simulated by the BASIC, though, and the

programmer does have access to 121 colour shades with flexible colour definition even in hi-res mode; in multicolour mode (160 x 200 pixels) each 8 x 8 pixel character can have more than two colours. The keyboard is similar to that of the Atmos, and has a light touch; with the cursor key cluster on the right, the Plus 4 looks very like an MSX computer.

A disk drive will be essential if the built-in software is to be used effectively, and thankfully Commodore are introducing an improved (ie, faster) disk set for the Plus 4.

Extras: Disk drives, cassette, joysticks (all Commodore).

For: Excellent BASIC, for a change, with good graphics and colour; built-in suite of four useful business programs.

Against: Not compatible with C64 software, and little new software either.

Conclusion: The Plus 4 is unlikely to replace the C64 as the most popular games machine, but is a contender for the small business/serious home user market.

Compare with: Sinclair QL, Tatung Einstein, BBC Micro, Amstrad CPC464, Memotech MTX512, Spectravideo SV1/278.



Commodore 16

Price: £130 (starter pack)
RAM/ROM: 16K/32K
Display: TV
Text: 25 x 40
Resolution: 160 x 200-200 x 320
Colours: 128 shades
Sound: 2 channels
Interfaces: Cassette, cartridge, 2 x joystick, audio, serial BUS, all Commodore standard
Supplier: Commodore 0753-79292

The newly released C16 is similar in appearance to the C64, and the Vic 20, which it will replace. In essence it is a cut-down version of the Plus 4, with the same BASIC V3.5, sold as a starter pack consisting of the computer, cassette deck, four programs and the "Introduction To BASIC" book.

Since Commodore have equipped the C16 with their new BASIC it is potentially a very useful computer, but it is let down by the lack of memory. BASIC and the operating system together take 4K, leaving 12K... but hi-res graphics eat 10K out of that.

Memory expansions are going to be essential for this machine. Fortunately Commodore have left the TEDMON Assembler/Disassembler/Editor in place, and this is will hopefully encourage users to explore the fine art of machine code programming at an earlier stage in their experience.

Extras: All existing Commodore peripherals will run on the C16.

For: A much improved BASIC, very good graphics and colour; the machine code monitor.

Against: Not compatible with existing C64 or Vic 20 software, and memory is miserly, particularly when using hi-res graphics.

Conclusion: An exceptionally good computer for newcomers, who won't be bothered by the miserable memory.

Compare with: Spectrum 48K, Atari 600XL.

Commodore 64

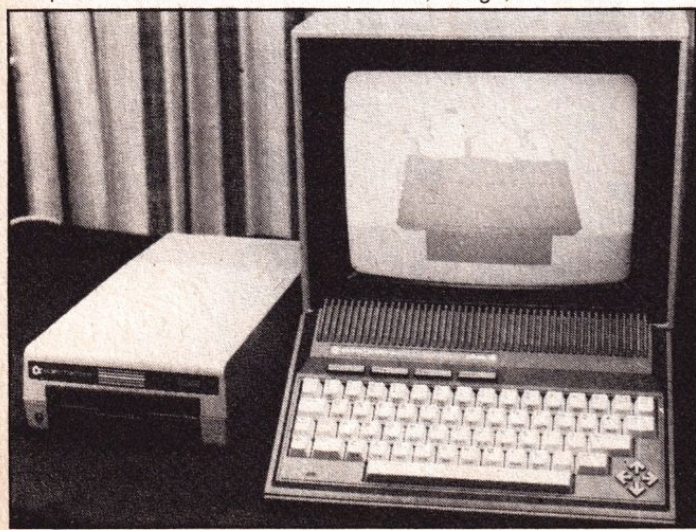
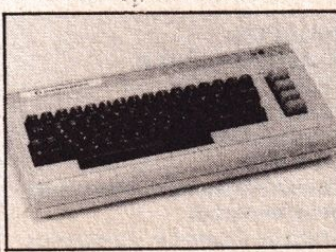
Price: £199
RAM/ROM: 64K/20K
Display: TV, video
Text: 25 x 40
Resolution: 200 x 520
Colours: 16
Sound: 3 channel, programmable.
Interfaces: RS232C serial, cartridge, 2 x joystick
Supplier: Commodore 0753-79292

The C64 has been the games machine of choice for fast-fingered fanatics because programmers have made good use of the eight sprites, the excellent sound facilities, and the fact that 38K of memory is available at all times — and BASIC can be switched out to free the entire 64K for machine code programs.

Against: this must be set a clumsy, out-dated BASIC — while all those facilities are available, using them in Commodore BASIC is hard work.

Software support is good, particularly in games, and a considerable amount of business software is also available. However disk drives are necessary and the C64 is let down badly by a notoriously slow disk set.

Extras: Z80 second processor board for access to CP/M software, modem, Prestel and



networking adaptors, light pens, paddles and joystick controllers, disk drive, printers and a BASIC extension are all supplied by Commodore. Some of the Vic 20 extensions from other suppliers may also suit the C64.

For: Excellent games machine and a good first computer with wide software support.

Against: Old fashioned BASIC is clumsy by modern standards, and the documentation is inadequate for newcomers to programming. In business applications, the disk drive is very slow.

Conclusion: High on the list if games are your first priority.

Compare with: MSX, BBC, MTX512, Atari 800XL.



MSX Computers

At the time of writing it appears that, with two definite exceptions, the Great MSX pre-Xmas Launch has fallen flat on its face, since only two makes are likely to be widely available. MSX offerings from Sony and Sanyo have been previewed in *Which Micro & Software Review*, but are not available at present. The Goldstar computer reviewed last month may well be in the stores by Christmas.

Sony's HB75 is everything you would expect from a major hi-fi and video manufacturers, and just a bit more. Its 64K main RAM and 16K video RAM are MSX standard, but a few other features set it apart from run-of-the-mill MSXs. It has two expansion slots, allowing, say, both a disk drive and an RS232 serial module (a modem for example) to be operated at the same time; and it comes with 16K of built-in utility software, consisting of a diary, a note-pad and an address book. These handy desk-top items are supported by 4K of battery-backed CMOS RAM and are instantly accessible whenever the computer is powered up. Other utilities of this type are rarely effective because they are never to hand at the exact moment you

want them. With facilities like this the HB75 has added attractions over the competition.

Sanyo's MPC100 is much more of a basic MSX machine, however they have thrown in an extra feature in the form of a light pen, something that only the MPC100 has, amongst the recent MSX releases. In addition they have taken some trouble over the documentation — full marks for that. The MPC is supplied with a BASIC manual, other manual explaining the operation of the computer, a demonstration tape that explains the MSX system, demonstrates the graphics handling and introduces keyboard typing techniques, and another tape with two games: Exploding Atoms (educational) and Vicious Vipers (that's entertainment).

Goldstar's distributors say that "First reports indicate that it has been well received by the specialist computer press".

They are expected to be in stock over Christmas and will be worth close inspection, bearing in mind the features of the other MSX computers mentioned in this issue.

Memotech MTX 500/512

Price: £199/£275
RAM/ROM: 32K+16K/16K
Display: TV, video
Text: 24 × 48
Resolution: 192 × 256
Colours: 16
Sound: 3 channel programmable
Interface: Cassette, Centronics parallel, 2 × joystick, cartridge
Supplier: Memotech 0993 2977

The MTX 500 is a very stylish, well built computer with a solid brushed aluminium frame that makes it the most rugged micro on the home market. It is plainly capable of standing up to heavy use, whether at home, in a classroom or in an office.

The technical specification is similar to that of MSX, though it is not an MSX computer. The sound and graphics facilities are to the same standard and the expansion capabilities are excellent; paged memory is another nice feature, allowing ROM-based software to be switched in and out as required.

The BASIC is quite good, though the error message and line editing systems are a bit tedious to operate.

Also included in the MTX ROM is a simplified programming language called NODDY, which is designed for text processing, and an Assembler. With this fast and efficient language machine code programs can be written and



easily called up from BASIC; the Assembler is one of the MTX's best features.

Memotech's MTX512 is identical, but for extra memory, which takes it to 64K including display RAM.

Extras: The MTX 500 can be upgraded to 64K RAM, and then up to 128K if required. A single disk drive is available, and can be extended to CP/M capability with the addition of an 80 column display card.

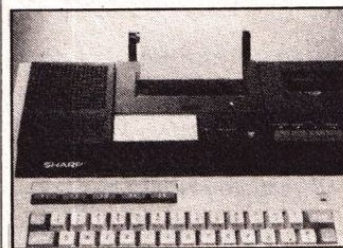
With still further extensions the computer can run hard disk systems.

For: Robust, powerful and versatile, the MTX500 is technically all that a 1984 model computer ought to be.

Against: Software support is still growing, and although the MTX is expandable, the cost is high.

Conclusion: The MTX500 has some excellent features and few drawbacks. It is an attractive computer suitable for beginners or experienced programmers.

Compare with: MTX500 — SV328, Atmos, Electron, C64.
MTX 512 — Einstein, BBC, QL, CPC464, SV728.



Sharp MZ700

Price: £240
RAM/ROM: 64K/4K
Display: TV, RGB, video
Text: 25 × 40
Resolution: 8 × 8 pixel block graphics, user programmable
Colour: 8 foreground, 8 background
Sound: 1 channel
Interface: expansion bus, 2 × joysticks
Supplier: Sharp 061 295 2333

Sharp describe the MZ700 as "a

clean machine", an expression they use because BASIC is not held in a ROM, but is loaded from cassette. In theory, then, the MZ700 could run the Z80 version of BBC BASIC, or even MSX BASIC were it available in a suitable format, however the graphics and sound commands, structured for different hardware, would produce unpredictable results.

Extras: Universal interface board for disk drives and other peripherals.

For: Well made, with unusually good documentation. Sharp owners tend to become quite fond of them.

Against: Limited graphics, and loading BASIC from cassette can become tedious.

Conclusion: A slightly dated computer of limited usefulness to anyone other than a specialist.

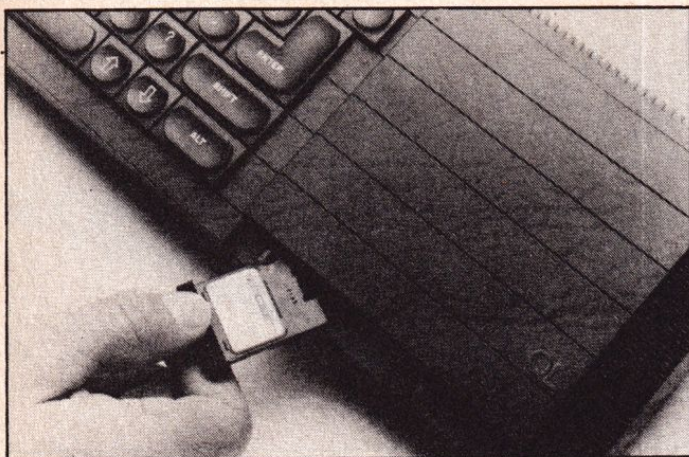
Compare with: MSX, 800XL, Commodore 64, SV328.

Sinclair QL

Price: £399
RAM/ROM: 128K/48K
Display: TV, monitor. The QL needs a special monitor (or a specially adjusted one) to cope with the 85 character wide text format. Several are available from companies such as Microvitec, Compuser, Data Efficiency etc.
Text: 25 × 85
Resolution: 256 × 256/256 × 512
Colours: 8/4
Sound:
Interface: 2 × RS232C, 2 × joystick, 2 × local area network ports, RAM/ROM expansion port, parallel port.
Supplier: Sinclair 0276 685311

There were sceptics who thought they'd never see the day, ... but the QL is at last available in the High Street stores, and without 'kludges' tacked on to make it work. As the entire country must know by now, the QL is the first 32-bit computer available at an 8-bit price.

A 32-bit processor should, in



theory, do everything four times as fast as an 8-bit processor, but in practice the QL turns out to be slower than the BBC Micro, partially because the processor's data bus is only 8-bits wide. And underneath the flashy black keyboard it seems there lurks yet another membrane keypad. Well, what did you expect for £399? What you get is a sophisticated, powerful computer with an updated SuperBASIC that owes more than a passing debt to BBC BASIC.

You also get a pair of

microdrives built in, and a set of four programs comprising Quill (wordprocessor), Abacus (spreadsheet), Archive (data manager) and Easel (business graphics designer). Together these four make up just about a complete suite of software for small business users — all that's missing is an accountancy package.

Many people feel that the QL would be a better computer without its microdrives. Unfortunately you can't do without them, at the moment; though they

are slow to load, essentially unreliable and, in the long term (some would say sooner than that) guaranteed to fail, because the tape is always in contact with the heads. Special lubricants are used to delay eventual failure but these only degrade performance, adding to the unreliability of the devices.

Extras: A number of goodies are promised, but not yet available. None are essential — except a disk drive, which does not figure in Sinclair's plans.

For: 32-bit power, good graphics and expansion capability; four effective, if not brilliant, items of software included in the price.

Against: Slower than it ought to be; the microdrives; clackety keyboard.

Conclusion: Sinclair were the first to admit that the market for the QL was an unknown — and it has to be said that they were right. The QL is an obvious up-grade for Spectrum owners who suffer from brand loyalty, and for new buyers who can make good use of the software suite. Otherwise, look around at other computers in the QL's price range...

Compare with: Einstein, BBC, CPC464, MTX572, SV728.

GOODIES TABLE

Tatung Einstein:	3" Hitachi disk drive
BBC Micro:	Nil
Sinclair QL:	Suite of four business programs on Microdrive — Wordprocessor, spreadsheet, database manager, business graphics designer.
Advance 86A:	Nil
Amstrad CPC464:	Colour monitor, which includes the computer's power supply; cassette deck in the keyboard.
Memotech MTX 512:	NODDY text processing language, machine code Assembler — both in ROM.
Toshiba HX-10:	Nil
Atari 800XL:	Nil
Commodore Plus 4:	Suite of four programs — all in ROM.
Spectravideo SVI-728:	Nil
Sharp MZ700:	Nil, but MZ711 version has a built-in cassette.
Acorn Electron:	Nil
Commodore 64:	Nil
Spectravideo SV328:	Nil
Memotech MTX 500:	As MTX 512
Oric Atmos:	Nil
Atari 600XL:	Nil
Vic 20:	Usually sold as a "starter pack" with cassette deck, instruction manual and software.
Spectrum 48K:	Usually sold with free 6-pack of software.
Commodore 16:	Usually sold as starter pack.
Spectravideo SV318:	Joystick built in.



RAM expansion is going to be needed probably sooner than later. Also all the interfaces, including the cassette, are to Spectravideo's own specification, which means that a dedicated cassette recorder is needed and all other hardware support or extension must come from the company.

Extras: A full range of peripherals and extensions are supplied by Spectravideo.

For: A Z80 based computer with almost MSX BASIC and CP/M capability; potentially good for both games and business.

Against: It will be costly to exploit the SV328's full capabilities, and is outclassed by the SV728, only £50 more.

Conclusion: With features that rival or better those of other computers in its price range, the SV328 must be considered a first rate dual purpose computer. It provides a low cost entry to CP/M, but add up the cost of all the extensions before you buy.

Compare with: Electron, MTX500, 800XL, MSX, Commodore 64.

Spectravideo 328

Price: AM/ROM: 32K/32K

Display: TV

Text: 16 × 32

Resolution: 192 × 256

Colours: 16

Sound: 3 channel

programmable

Interface: Own standards

Supplier: Spectravideo

01-330 0101

The SV328 is identical in appearance to the Spectravideo 728, but although it runs a version of MSX BASIC it is not an MSX computer. It is, however, an extremely competent machine with a well-designed (if crowded) real keyboard and the capability to run CP/M. Unfortunately it is a bit short on memory, which means a

Spectravideo SVI-728

Price: £250

RAM/ROM: 64K + 16K/32K

Display: TV, video

Text: 24 × 40

Resolution: 192 × 256

Colours: 16

Sound: 3 channel

programmable

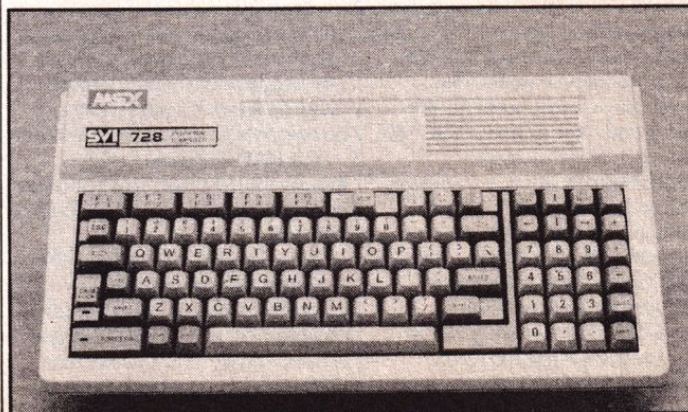
Interface: MSX expansion port,

cartridge slot, 2 × controller

ports, standard cassette.

Supplier: Spectravideo

01-330 0101





The SVI-728 is a full MSX specification machine meeting both the hardware and the software stands. Spectravideo deserve credit for the way they have built this computer. It is professionally put together and has a comfortable user-friendly feel to it, with less of the toy-like quality shared by some other MSX products. Another plus is that with the addition of an 80-column display card and disk drive, the 728 is fully CP/M compatible and provides access to the enormous range of CP/M software (if you can stand it). This will not please Microsoft, who were instrumental in the development of MSX, and whose great rivals are Digital Research, the originators of CP/M.

Extras: 320K disk drive, 80-column card, 300 Baud modem, 64K RAM extension, RS232 interface.

For: An MSX standard computer with a touch of class, readily expandable to run CP/M as well as the expected flood of MSX software.

Against: The keyboard, though very professionally designed, is a bit crowded.

Conclusion: The SVI-728 is applicable to most computing applications and should have a long and useful life.

Compare with: Other MSX computers, Memotech MTX512, Amstrad CPC464 (colour) BBC Micro, Tatung Einstein, Commodore Plus 4.

ZX Spectrum

Price: £130

RAM/ROM: 48K/16K

Display: TV, monitor (specially built or with adaptor).

Text: 24 × 32

Resolution: 192 × 256

Colours: 8 foreground, 8 background

Sound: 1 channel

Interface: Cassette, expansion bus,

Supplier: Sinclair 0276 685311

It sometimes seems that the Spectrum has *always* been with us, and it is still one of the most popular computers on the market, with the advantage of an enormous amount of software and specialist hardware support. The software covers every conceivable use for a computer, from games through utilities to commercial programs. The list of hardware add-ons is the largest for any home computer and includes memory expansions, real keyboards, hi-res graphics boards, joysticks and controllers, communications and control modules, speech and sound synthesisers and even disk drives and controllers. None of this hardware or software is essential (though a decent keyboard is a real improvement on those tacky rubber keys), but it all adds up to this: there is an awful lot you can do with a Spectrum!

Extras: ZX Microdrives, Interfaces 1 and 2, 16K RAM pack, and ZX Printer all from Sinclair. Much, much more from other suppliers.

For: Cheap, cheerful and almost universal, the Spectrum offers considerable computing power at a reasonable price and is the best supported computer on the market.

Against: The rubberoid keyboard with its multi-function keys and Sinclair BASIC, which is a bit limited.

Conclusion: Despite its drawbacks, the Spectrum is the most useful computer that can be bought at the price.

Compare with: Atmos, Atari 600XL, Commodore 16.

Spectrum + is the latest version of the Spectrum and will be on sale at the usual outlets for around £180. Looking at the machine reveals most of the differences, in that the keyboard has a new layout (*à la* QL) and a new feel. Whether these factors justify the extra £50 over the old Spectrum remains to be seen.

Tatung Einstein

Price: £499

RAM/ROM: 80K/8K

Display: TV, RGB/Colour

difference (selected by internal switches)

Text: 24 × 40

Resolution: 192 × 256

Colours: 16

Sound: 3 channels + noise

Interface: RS2323 Serial,

Centronics parallel, 2 ×

analogue, 2 × disk extension

ports, 8-bit user port, Tatung

"Pipe"

Supplier: Tatung

Quite independently or perhaps deliberately, several computer manufacturers — plus the MSX group — have settled on remarkably similar hardware specifications for their computers. The Einstein shares, with Amstrad, Memotech and MSX computers, a Z80 processor, Texas Instruments video display processor and powerful sound generator chip. And like the Amstrad and some of the MSX computers, you get a little extra for your money, in this case a built-in 3" Hitachi disk drive.

However the Einstein differs from almost all other computers in its class (the Sharp MZ700 being the one exception) in that BASIC is not resident in ROM but is loaded from disk (no messing about with cassettes here). That meagre sounding 8K ROM contains only a bootstrap operating system whose main task is to load a language or DOS (Disk Operating System) from the drive. After that it lurks in the background unless called upon by the higher level software.

The DOS is by Tatung/Crystal and is CP/M compatible, to a point, but offers several improvements (and let's face it, almost anything is an improvement on CP/M), including intelligently error messages. The point where CP/M and Tatung part company is that most CP/M software requires an 80-column text format, something that Tatung, for reasons known only to themselves, have not provided. Einstein's BASIC is also by Crystal Research and is a highly enhanced version of the original language.

The BASIC occupies 16K in memory, and after loading both Xtal DOS and BASIC, some 40K bytes are left free for the user — a generous amount by any standard.

The Einstein's disk drive is also generous. It is a double density drive of 500K capacity unformatted, but after formatting a file disk can still hold around 188K bytes per side. The Einstein is one

of the fastest computers in its class, too. Xtal BASIC runs very quickly, and the Z80 version of BBC BASIC (which the Einstein can load from disk!) runs nearly as fast as BBC BASIC on the BBC micro.

For: A compact and versatile computer that can run any Z80-based software, including CP/M, the Z80 version of BBC BASIC, and probably MSX BASIC, if it ever becomes available on disk.

Against: Its price, which puts it in the QL class.

Conclusion: A very interesting computer with great potential, more for the buyer who knows what he wants from a computer and is prepared to pay providing it meets his requirements, than it is for the novice. Definitely worth considering as an up-grade from something like the Spectrum.

Compare with: BBC Micro, Sinclair QL, CPC464, MTX512, SV728, Commodore Plus 4.



Toshiba HX-10

Price: £269

RAM/ROM: 64 + 16K/32K

Display: TV, video

Text: 24 × 32/24 × 40

Resolution: 64 × 48 (blocks)/192 × 256

Colours: 16 max.

Sound: 3-channel

programmable

Interface: Cartridge slot, cassette, Centronics parallel, audio out, 2 × joystick.

Supplier: Toshiba 0276-62222

Of the two MSX computers most likely to succeed this year (because they're the only two likely to be in the stores), Toshiba's HX-10 is more typical of MSX machines generally.

The HX-10 has 64K memory, plus 16K dedicated to the screen; some 24K plus bytes are left to the user after the operating system and BASIC have taken their chunk. The full-travel typewriter keyboard is clean and has a positive action; it is a little cramped, though, and will take some practice to avoid hitting the wrong keys — but this is true of all



keyboards. One attractive feature is that the power supply is built-in — no messing about with external PSUs cluttering up the workspace.

Apart from that, the HX-10 includes all the other MSX features — 32 sprites, good sound programming facilities, MSX BASIC and MSX expansion capability.

Extras: Joystick, 3½" disk drive, data recorder and printer are all

supplied by Toshiba. Other MSX peripherals will be available from other manufacturers in the MSX group.

For: MSX standard computer, so hardware and software support will probably be excellent once MSX finally gets off the ground. The HX-10 itself is solidly built, and would be a useful (if expensive) first computer.

Against: Some doubt remains

about the future of MSX due to supply problems and stiff competition this Christmas from new computers by Commodore, Sinclair and Amstrad. However Toshiba is not likely to give up.

Conclusion: The future of MSX aside, the HX-10 is a stock standard MSX computer, offering little in the way of the extra features of its MSX rivals, alone.

Compare with: Other MSX, Commodore 64, Atari 800XL

Vic 20

Price: £140 (starter pack)

RAM/ROM: 5K/8K

Display: TV

Resolution: 176 × 184

Colours: 8 foreground, 8 background, 8 border

Sound: 3 channels + noise

Interface: Cassette, serial, parallel, expansion bus

Supplier: Commodore 0753 792292

The Vic 20 is being replaced by the newly released Commodore

16, but will still be available over the Christmas period — probably at bargain basement prices, too. The starter pack includes a Commodore cassette deck, four cassettes and the Introduction to BASIC book, in addition to the Vic 20.

Extras: Commodore's cassette is essential if you buy the computer alone. A range of hardware accessories is available from various suppliers.

For: Good software support and a useable keyboard.

Against: The level of software support means that the Vic is still a proposition as a first computer, especially if the price is right.

Compare with: Spectrum, 600XL, Commodore 16.

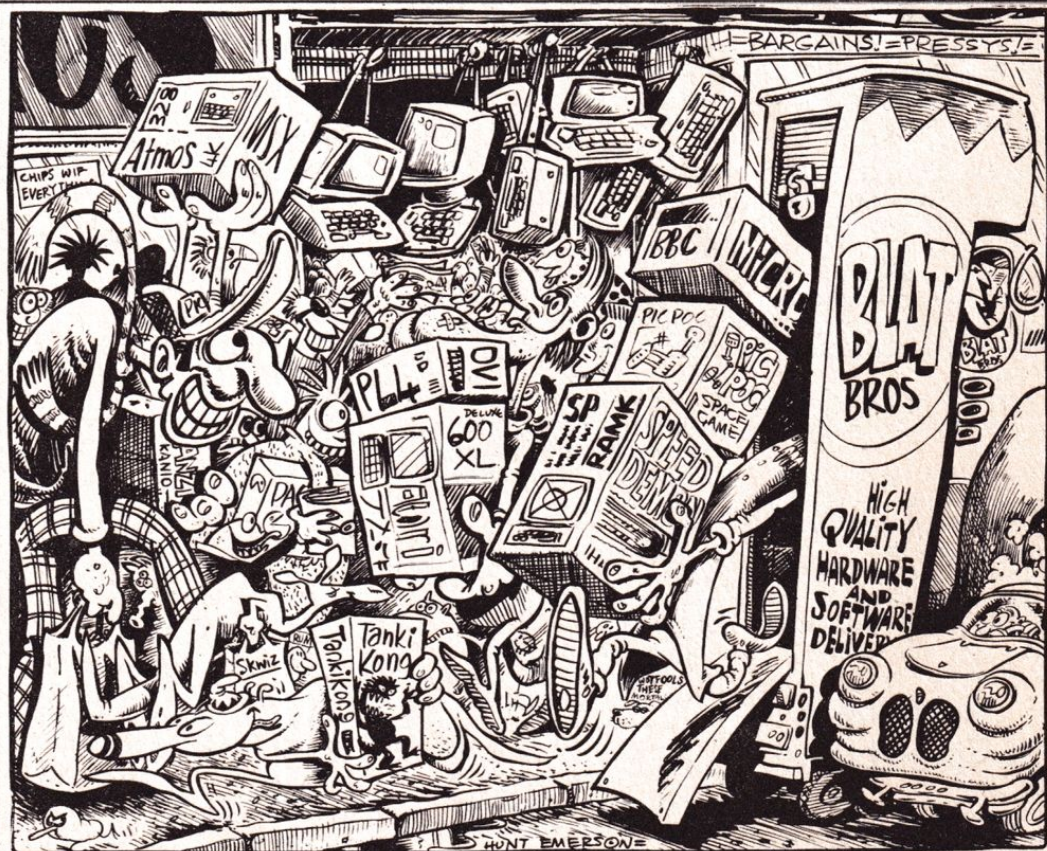


WHAT'S IN STORE

To find out what's in the shops for Christmas, we asked representatives of leading retail chains and specialist computer shops to reveal their plans:

Dixons recently came in at Number 1 in computer sales in a poll conducted by Audits of Great Britain, a success they attribute to their policy of stocking a range of computers rather than one or two best-sellers. Over Christmas they will have the new Commodore machines, the Plus 4 and the C16, and are offering the C64 with a disk drive, printer, Wordpro, database and games software all for £549 (Vic 20s are also available while stocks last at £79.99). Both the Spectrum 48K, Spectrum+ and the QL will be on sale, with a free '6-pack' of software included in the Spectrum's price. Three cassettes are included in the price of an Electron, while the BBC Micro has a Seisho datacorder and 6-pack of software included in the £399 price — Beebs fitted with the DFS are £469.

Both versions of the Amstrad CPC464 will be in the store, and the Atmos is on offer at £99.99. **Dixons** have stocks of the Toshiba HX-10 and hope to have the Sanyo and Sony MSX models soon. The Toshiba is being sold for £279 with a datacorder included. The Sharp MZ711 (the version fitted with a cassette deck) will also be available. Finally, Seisho monitors are worth a close look. The 16" and 20" models are



full television receivers fitted with Teletext and remote control, and also accept either RGB or PAL video inputs; they have an audio input as well, and are priced from £320. The 14" model is without the Teletext feature or the RGB input, and is priced at £239. We haven't seen these ourselves but they are

certainly worth further investigation.

The **Big M** dealer chain are stocking most of the popular items, including the QL, the C16 starter pack, the Commodore Plus 4 and the C64, and the Spectrum 48K and '+' versions. A limited number of BBC compatible disk

drives are in stock, and a BBC Micro, disk drive and DFS will be available for £629 all inclusive.

The Acorn Electron is being sold with either five software titles included in the price, or it can be bought together with a cassette deck and a copy of 'Me and My Micro' for £229. Another option is

the Electron, a Plus 1 expansion module, View Wordpro, Viewsheets spread-sheet ROMs and a games ROM all for £299.

Big M will have the Spectravideo 728 MSX computer at £250 including two software titles and a joystick. Your nearest *Big M* dealer can be found by looking in the specialist computer magazines.

Rumbelows have not yet completed their Christmas stocking (ho ho!) but they will have available the BBC Micro, with a free cassette and speech synthesiser included in the price. Talkative little devils, those *Rumbelows*.

The Electron is being packaged with five free titles, and the Vic 20 starter pack is going for just £99. Both Amstrads will be available, the Atmos will be sold for £89, and for £249 you can get a Commodore 64, datacard, joystick and a 6-pack of software. *Rumbelows* also stock the range of Commodore peripherals, and they hope to have the Commodore Plus 4 and 16 computers in stock in time for the rush.

They are also selling the Sharp MZ711, and hope to have both the Toshiba HX-10 and Hitachi MSX computers in store by the time you read this!

A complete range of computers will be at *Boots* specialist stores,

and some 300 other stores will stock part of the range, which includes the Atari 800XL at £169, the Spectrum 48K with software 6-pack, the Commodore 64, and the Electron with five titles included. Both versions of the Amstrad CPC464 are available, as is the QL, Toshiba HX-10 and Commodore's Plus 4 and the C16 starter pack. The standard BBC Micro is on offer with eight other titles included in the price, or with three titles and a *Boots* CR375 datacard. DFS-equipped Bees are available for £469 (these prices were not finalised at the time of writing).

Laskys 60 branches will be keeping a smaller, more specialist range of computers, including the BBC with free datacard and 6-pack of software, and the DFS-equipped version. Also in store will be the Commodore 64, the Electron, the Vic 20 starter pack, the Spectrum 48K with software 6-pack, and the Atmos. Atari's 800XL is priced at £97.90 at *Laskys*, with the 800XL at £199.

They also stock a full range of software for these computers, together with Atari and Commodore peripherals, and Brother printers.

At *WH Smith's* stores you can see — and buy — the Spectrum 48K (with 6-pack), the Commodore 64 and 16, the BBC

Micro and the Advance 86A. The Electron is bundled with some free software, or as a separate deal you can have an Electron, a Plus 1 and some business software.

Smith's also have a data recorder, under their own brand name.

Greens, at Debenhams 70 stores, are stocking up for Christmas with Sinclair's QL, Spectrum+ and Spectrum 48K (again, with free 6-pack), Commodore's 16, Plus 4 and 64 models, both Amstrad versions, and the Acorn Electron.

Eight free Acornsoft titles are included with the BBC Micro, and they will also have the DFS-fitted BBC.

Currys £10 voucher offer had just finished when we contacted them, but it may be revived for Christmas, so watch out for it in the advertising campaign they will be launching to support sales of the Sinclair Spectrum 48K and QL computers, Commodore's 64 and 16 models, the BBC Micro and Acorn's Electron, and the HX-10 from Toshiba. *Currys* 150 larger stores will be stocking a full range of software (including MSX programs) distributed by Websters, and peripherals will be available in all stores.

The *Spectrum* dealer chain will be carrying a wide range of computers as usual. The

spectrum 48K is available with a software 6-pack while stocks last, and the BBC Micro comes with five free titles until they run out. The Commodore 64 will be available with a joystick and four games cassettes for £249.95, and they will also have the new C16, the QL, and the Atari 800XL at £169.99. Oric 1 computers are available while stocks last at an incredible £55.95! Other computers being sold are the MTX 500 and 512, the Atmos, and Spectravideo's 318 and 328 models. They hope to have one or two MSX computers by Christmas, including the Goldstar MSX machine. *Spectrum* dealers also stock a large range of peripherals, and it is worth noting that their Florida holiday competition will continue to run over the holiday season!

Marins 500 branches in England and Wales will be stocking both versions of the Amstrad CPC464, Acorn's Electron, the Spectrum 48K, and Commodore's 64. Vic 20 starter packs will be on offer at £65, and they also have Oric 1 computers available while stocks last.

Finally, we tried but were unable, to speak to anybody at Comet stores' headquarters; they may well have bargains on offer to the prospective Christmas computer buyer too.

IT TRANSFORMS THE HOME COMPUTER OUT OF ALL RECOGNITION

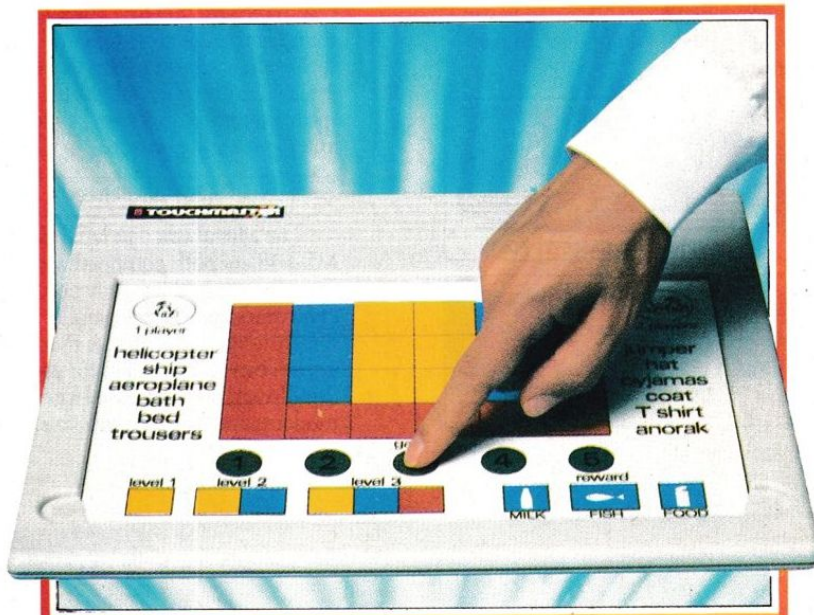
Because Touchmaster is a touch sensitive surface which effectively bypasses the keyboard, it has none of the keyboard's complications, typing skill requirements or potential errors.

To operate Touchmaster, you simply slide an overlay onto its surface, load the matching Touchware into your computer and touch the overlay.

For repeatability and resolution, no other ostensibly comparable pads can touch Touchmaster.

In fact, Touchmaster's unique technology makes it state of the art when it comes to such pads.

Other pads might fairly be described as peripherals. Touchmaster goes a lot further: it respecifies the home computer.



Now anyone can master the home computer

TOUCHMASTER

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or phone Teledata (01) 200 0200

The new Mitsubishi

For those in the know

Anyone conversant with home computers will know precisely why MSX was worth waiting for.

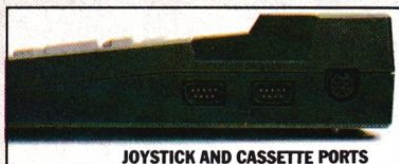
The sheer proliferation of computer and software systems flooding the market loudly underlined the need for a unified standard.

So the major companies jointly developed a single computer and software system. The result – MSX – the format that will be standard for all time.

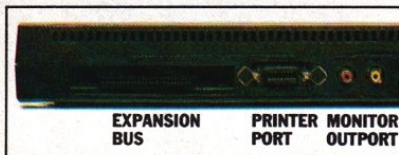
And those in the know will not be surprised that Mitsubishi are in the vanguard of the MSX movement. For, with the F-series, Mitsubishi offers everything that MSX is and more.

GRAPHICS

Maximum resolution of 256 x 192 pixels with all 16 colours available on the screen at the same time. 32 sprites in two sizes and two magnifications allowing easy creation of '3D' graphics. 255 pre-defined characters all of which can be used as straight text or easily mixed with graphics.



JOYSTICK AND CASSETTE PORTS



EXPANSION
BUS

PRINTER
PORT

MONITOR
OUTPORT

SOUND

Three independent channels which can be output through the TV loudspeakers at any volume, individually or simultaneously, at any of the available 8 octaves. All three channels can use the 'noise' generator for stunning sound effects.

KEYBOARD

73 moving keys, ergonomically designed for many hours of fatigue free use. Large cursor control keys which are excellent for both programme editing and game playing. 5 function keys giving 10 pre-defined functions which can easily be redefined from 'BASIC' using the 'KEY' command.

BASIC

MSX BASIC is possibly the most comprehensive version of the original language. There is a complete set of commands for creating graphics and sounds, manipulating text and moving sprites. In addition to this there are 'built-in' interrupt routines for detecting sprite collisions, function key selections and joy-stick fire buttons.

EXPANSION

The Mitsubishi 64k ML-F80 and 32k ML-F48 are both equipped with 2 cartridge ports, 2 joy-stick ports and a centronics compatible parallel interface. It is through these devices that the MSX system can be expanded for use with disc-drives, printers, serial interfaces, modems and other peripherals.

SOFTWARE ON CASSETTE

The MSX system can load and save data onto cassette at 1200 or 2400 baud and unlike certain other home computers, the Mitsubishi F-series can be used with a normal domestic tape recorder for this purpose.

When you put all of these features together, with the knowledge that Mitsubishi is the largest manufacturer of Mainframe computers in Japan, those in the know will immediately recognise the true potential of the Mitsubishi F-series.



Mitsubishi MSX Computers

For those who aren't

The Mitsubishi MSX family computer is everything you wanted to know about computers, but didn't know who to ask.

It's friendly, it's fun and so simple, a grown man can use it. Yet so versatile even his computer-versed children would be hard-stretched to over-tax it.

It operates with any colour TV set. Just plug it in, and the full power of the computer is instantly at your fingertips.

FOR FATHER

The Mitsubishi MSX can do many things, from keeping a simple check on the bank balance to running a complete business with customer account files, stock control programmes and word processing. It is just as much at home keeping control of your record or stamp collection or playing 'strategy' games such as chess, othello or contract bridge.

FOR MOTHER

There is the opportunity to store recipes and other household information or keeping record of the children's progress at school. Household accounts can also be recorded so that savings can be planned for holidays and other seasonal expenses.

FOR THE CHILDREN

There is education, particularly computer education. In a world where computer literacy is now of foremost importance, MSX offers a broad base of educational software. With simple programmes for the very young through to complex programmes for older students like language learning.

Also, the graphics system of the Mitsubishi computer ensures that the MSX versions of your favourite games are reproduced with incredible speed and accuracy.

Undoubtedly, MSX is the format for the future, and will become the byword for computer

education and entertainment.

And you can be secure in the knowledge that regardless of future developments, any investments made in MSX hardware, software and peripherals today will always be compatible with the Mitsubishi F-series.

So if you've waited until now to buy a computer, you couldn't have timed it more perfectly. Get to know one today.

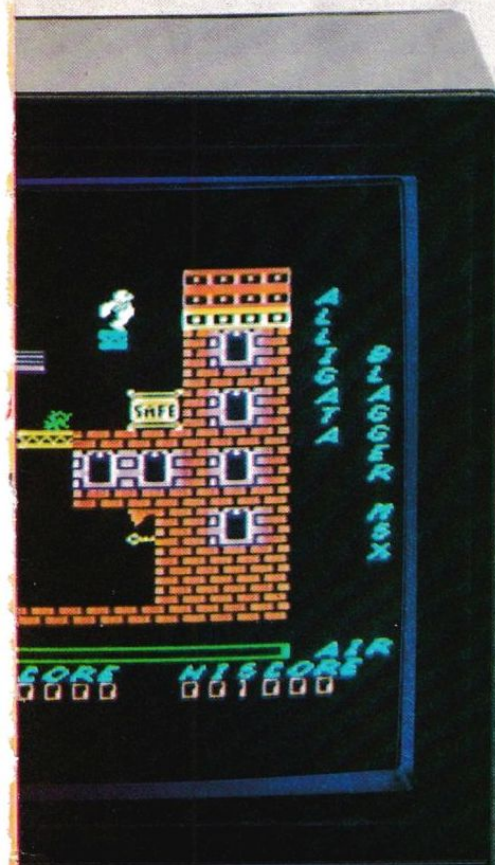


Mitsubishi Electric (UK) Ltd., Hertford Place, Denham Way, Rickmansworth, Herts WD3 2BJ. Tel: 0923 770000.

SPECIFICATIONS

CPU: Z80A (3.6 MHz)	Special keys for screen editing
Memory: ROM: 32 KB RAM: 64 KB (F80) RAM: 32 KB (F48) Video Ram: 16 KB	Sound: 8 octaves 3 channels for sound or 'noise' Output by TV sound or External Audio Amplifier
Screen Displays: *Text Mode: 40 columns x 24 lines *Graphics: 256 x 192 pixels Colours: 16 (15+ transparent) Sprites: 32 Output: RF, Composite Video	Cassette Interface: 1200-2400 baud Motor controlled by CPU
Keyboard: 73 moving-key keyboard 5 function keys Cursor control keys	Parallel Interface: Centronics Joy-Stick: 2 x 9 pin connectors Rom-Cartridge: 2 x 50 pin connector

*Subject to Scan of Monitor



ML-F80

ML-F48



MSX



WHAT MAKES VIRTUALLY EVERY HOME COMPUTER CLICK?

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The DWP1120 is a real value for money, letter quality daisy-wheel that's so versatile, it can be interfaced with virtually any micro on the market.

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practicality. With features you'd only expect to find on much more expensive machines it's a powerful companion for any home micro, giving you complete word processing, documents and data listing facilities all at the touch of a button. In fact, whatever your particular printing requirements, the Quen Data DWP1120 is almost certain to make your computer click . . .

JUST SOME OF THE POPULAR MICROS EASILY INTERFACED WITH THE DWP1120

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- BBC
- *COMMODORE 64
- ORIC
- DRAGON
- APPLE
- SIRIUS
- SAGE
- OSBORNE
- PET
- NEW BRAIN
- SINCLAIR QL
- *Special interface.

SPECIFICATIONS

Printing speed of 18 cps, bi-directional and logic seeking. Exchangeable 96 character print wheels. Friction feed as standard, tractor feed and single sheet feed are easily attached options. Interface examples; either 8 bit parallel/ centronics, or RS232C/V 24 on Sinclair QL or standard centronics. Characters per line, 120c-15p with character spacings of 10.12.15 pitch and proportional spacing. CONTACT ANY OF THE DEALERS LISTED BELOW OR QUEN DATA DIRECT FOR FULL SPECIFICATION DETAILS.

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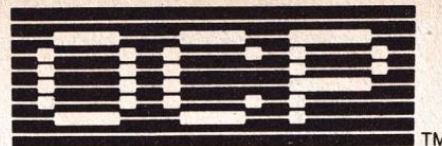
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Both programs are available in standard form which work only with ZXTM and Alphacom 32 column printers, and Plus 80 which work in conjunction with most Centronics/RS232 Interfaces and 80 column printers.

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ADDRESS MANAGER features MULTIPLE INDEXING via our 3 way 3 character index, an ability to store over 400 full names and addresses or 1500 individual names/titles.

USES include storing and updating names, addresses and phone numbers, printing out Xmas card lists, etc, mail order work, customer classification by type size (doctors have used this program to catalogue patients by treatment).

FINANCE MANAGER is a powerful, flexible and fast MENU DRIVEN general purpose program carefully designed to handle up to 255 separate accounts for domestic and business accounting applications. The magic of MACHINE CODE has enabled us to produce the very latest "on the page" presentation which lets you enter and edit data naturally, as if with a pencil and paper. That's not all, not by a long way. This program automatically raises a corresponding debit or credit for every entry, and will even open up a new account if an entry features an unrecorded account name.

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Accounts can be **MERGED**, **DELETED**, **ANALYSED**, **MARKED** as priority, **RENAMED**, **EDITED** and **SCROLLED**. Transactions can be **RECONCILED**, **AMENDED**, **DELETED**, **PRINTED**, **DESCRIBED** for analysis and **RENAMED**. Standing orders can be **APPLIED**, **REMOVED**, **DESCRIBED**, **AMENDED**, **DELETED** and even **DUMMIED** for planning purposes. Other features include **DATE CHANGE**, **RUNNING TOTALS**, **2 KEYBOARD MODES**, **PRINT PAGE/ LINE/BLOCK/FROM END/FROM START/FROM DATE etc.**, **LIST BALANCES**, **FIELD ERASE/INSERT/DELETE**, **EXIT TO BASIC**. You may not want all these features but they are there just in case.



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(Existing users wanting latest versions will receive a £3.00 rebate on return of old cassette)

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OXFORD COMPUTER PUBLISHING LTD., 4 High Street Chalfont St. Peter, Bucks. SL9 9QB.



SOFTWARE ★ ★ ★ ★ SIMPLY THE BEST

THE SERIO

Games are all very well, but when it comes to something more substantive, guidance is needed

The Sharp Spread

Sharplan is a conventional spreadsheet from Sharpsoft. It consists of 1040 cells arranged 6 down by 40 across, though only 13 by 13 are available on display at any one time. To view the entire sheet you are required to scroll up and down or left and right; though 8 windows may be defined for quick reference. These enable you to switch from one area to another at the touch of a key.

In common with most spreadsheets, cells may contain text, a value or a formula. A repeat function enables text to be repeated along a row. Another similar function allows formulae to be replicated with cell values used with the formula declared absolute or relative to the particular row. Up to 500 formulae may be input before running out of memory.

Command options are fairly standard and presented upon two menus as one letter references. The menus are alternatively displayed at the foot of the screen. Briefly, 'Jump' enables you to move to a specified cell, 'Blank' empties a range of cells, 'Justify', 'Save', 'Load' and 'Print' do what they say, and 'Ink' allows you to change foreground and background colour over a range of cells.

A format command allows you to select the precision of a cell, a range of cells (Local), or even throughout the sheet (Global). Up to 7 decimal places are allowed.

It is the last command along with 'Calculate' that show up the limitations of *Sharplan*. First, a cell can only hold 8 characters. Consequently if the chosen precision results in numerals overflowing the cell, values are displayed in exponential form

impeding readability. Also entry of text of more than 8 characters means that more than one cell will be required to hold it.

Secondly, whilst the calculate command is easy to implement, having to call it every time a new formula or value used in a formula is somewhat tedious, especially when more advanced spreadsheets running on faster processors tend to calculate automatically upon entry. However, bearing in mind the limitations of the microprocessor, reserving calculation to one particular instance certainly would speed matters up.

Crafty Calligraphy

Of the many professional word processing packages on the market, very few have been converted for use on home micros. Consequently, the standard of word processing software for the home is generally pretty poor.

Not so with Dataview's *Wordcraft* package for the Commodore 64.

Wordcraft is a comprehensive word processor with a host of features normally only found on the more expensive 'PC-compatible' programs (not surprising, since that's where the software originates).

However, by far the most impressive attribute of *Wordcraft* is its universal printer compatibility, achieved by the use of 'Printer Definition Files' which can be edited by the user to allow the program to work with any printer (Dataview will perform the task for you, if sent the printer in question).

Access to predefined PDFs and the main program is provided on the same medium, so that it is

possible to edit either the current text or call up a PDF (or any other file for that matter).

Before entering any text, however, it is desirable (though not essential) to set up certain parameters which will affect the final form of any printed output. Apart from various niceties, such as adding a title and date to each sheet used, there are a number of common-sense settings (page length, width etc) to be made along with a range of specifics — justification being a good example. All these parameters are set in what *Wordcraft* refers to as 'Command Mode'; they are usually global commands which affect all aspects of the text. More individual settings and parameters are controlled within 'Type Mode' — text is also entered in this mode.

In either mode it is possible to reset just about anything, and whatever has been typed before is automatically re-aligned to take account of the new settings.

The sequence required to enter and print out a short letter probably involves about ten settings; after which it's just a matter of typing in the text.

Any characters or words required centred, bold or underlined are all catered for within type mode (or more accurately 'Control Mode' — an extension of Type Mode). For instance, centring a line is done via the CBM key and the '=' key.

Getting used to the various options and modes takes a lot less time than it does to write about them; and once mastered, *Wordcraft* is extremely easy to use.

Taking into account its non-dependence on any one printer

and extensive extras — support of 'skeleton documents' to permit mail-out operations (as used by many firms who specialise in unsolicited mail), saving and loading of several different file types and option reset at any time during a session — this is a truly universal word processor, with applications both for the home and small business user. Dataview are to be commended for it.

Practicalities

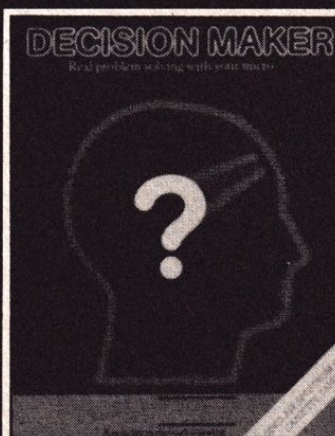
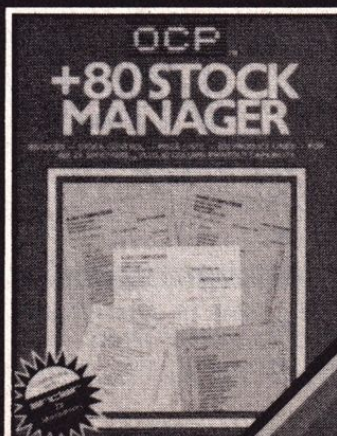
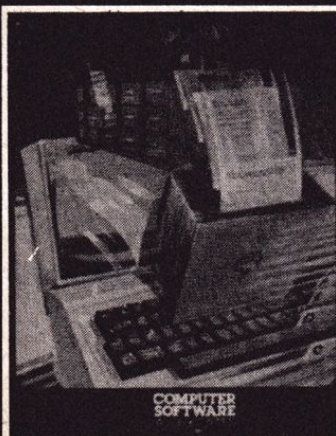
Computer Software Associates (Practicorp in the UK) produce a number of reasonably-priced programs in the spreadsheet/database format. However, the big difference between their packages and a lot of the others is that they're mutually compatible.

Practifile data files can be transferred onto the *Practicalc* spreadsheet, making it an easy task to change database file if it contains a lot of formulae.

And if the prospect of interchangeable software doesn't appeal, the CSA also have a programmable spreadsheet, which facilitates the addition of customised BASIC routines.

This trio is a pretty impressive combination, bearing in mind certain limitations inherent with any software of this kind for the CBM 64 (for instance, the limit on sorting 'keys' and number of fields for each record within the *Practifile* program).

Looking at each in turn, the database (*Practifile*) performs selective sorting, batch entry, presentation data printing, calculation and a host of other tasks. Once a particular requirement has been planned on paper, the database best suited to coping with it is soon set up.



US MICRO

— Robert Penfold, Paolo Baccanello and Yvonne Moyser investigate some serious software.

Typical applications for the home user might include sophisticated address books, recipe files, video and record collection classification — after using the program once or twice, the number of different applications becomes enormous.

If you're one of those people who like to have finger-tip access to indexed information *Practifile* is ideal. *Practicalc*, unlike the database, is slightly more difficult to justify as a home-use package. This is because whilst it's true that you could employ it to ease the hassle of household and personal accounts, *Practicalc* is more useful where a whole series of figures are planned — the domain of the small business.

Taking into account (sorry!) CSA's other similar package, *PS* (Programmable Spreadsheet), those with commercial interests at heart are well and truly covered. *Practicalc* offers a capacity of 250 rows for up to 100 columns, each permitting entry of from 3 to 38 characters; though it's more likely to use less than 10 per cell. A full range of mathematical functions is supported, along with sort routines for both alphabetic and numeric data.

Written by the same programmer, *PS* possesses similar features and the same capacity as *Practicalc*, but has a real bonus for BASIC programmers — additional BASIC subroutines can be added to the program for specialised applications. And due to the fact that each package is accompanied by some superb documentation, potential purchasers will be able to judge which best suits their particular needs.

Nice 'n Easy

Calc Result comes in two versions — an 'Advanced' one for use with a Commodore disk drive and a toned down 'Easy' version for cassette users. The former package consists of a ROM cartridge, program disk and, plastic template to position over the 64's function keys and concise manual.

The spreadsheet consists of 16256 cells arranged 254 by 64. Cells may contain numeric values, co-ordinate formulae or text. Information is stored in the 64's internal memory in a chunk known as a 'page' (made up of some 2000 cells). The disk version permits up to 4 pages to be switched in and out of memory. The 'Easy' version can only handle ONE page per session.

Calc Result offers a comprehensive range of functions. These fall into 15 categories:

(* = not on 'Easy' version)

1. Filing
— Load, save, copy and erase
2. Formatting
— (Global/local), column width (5 to 18 characters), colour, precision, justification
3. Graphics
— upright or horizontal bar charts
4. Help
— An operator's aide memoire
5. Cursor Control
— Move, goto and jump to cells
6. Mathematical
— Full range of arithmetic and relational operators plus MAX, MIN, ABS, INT, IF, THEN and ELSE
7. Position

— Auto character repeat, blank, move copy, repeat and self-reference a co-ordinate

8. Program
— Load and end program
9. Row/Column
— Move, copy and replicate an area as well as insert or delete a row
10. Recalculation
— Automatic and manual recalculation over a range or globally
11. Page*
— Add, get, copy, delete, negate, clear and renumber pages in memory
12. Disk*
— Catalog, format and copy
13. Split screen*
— Create windows and insert titles
14. Print out
— Format print-out
15. Formulae
— Move, copy and replicate references

To simplify the process of calling functions a number of one letter prompts are displayed at the top of the screen after the 'command' key F7 is pressed. Where more than a single entry is required further prompts will display. Only ranges, formulae or values need ever be explicitly specified by the operator. The process is logically consistent and quite painless. One could reasonably expect to become proficient over a matter of hours as opposed to days.

Finally *Calc Result* provides a means whereby information may be transferred from or to other packages. The problem is that the general format adopted for transfer (DIF) is totally unheard of

in this country making this facility next to useless, at least for the next few years.

Bearing in mind the constraints imposed by the Commodore 64 in terms of RAM and screen display, Handic's spreadsheet would appear to live up to the claim that it is 'easier to understand and at the same time more powerful than those which already exist'.

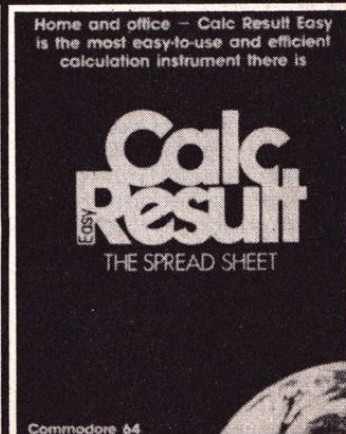
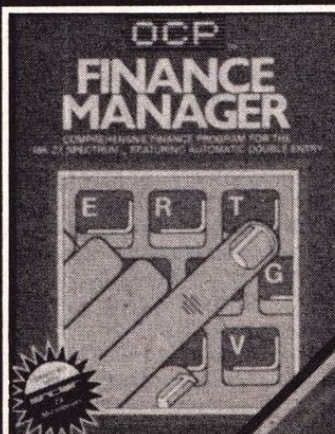
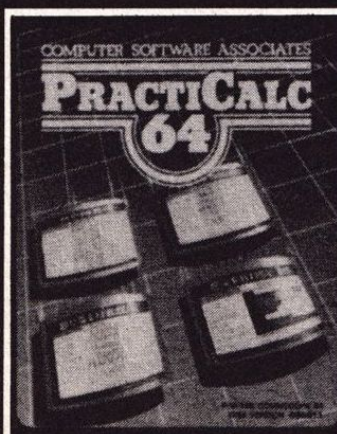
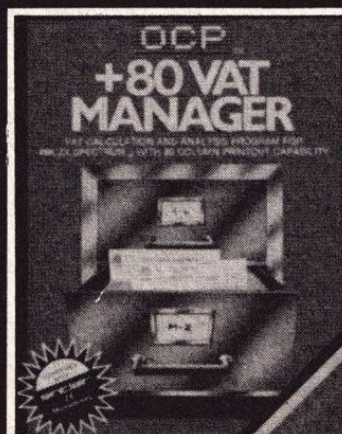
Making Decisions

Of late 'alternative' analytical software or so-called 'management advice systems' seem to be the vogue amongst software house and publishers alike. Constructed around a variety of psychological and/or statistical — probability theories these tools advise people on how to make decisions.

Some supply the user with a personality profile of his fellows and make suggestions as to how they should be treated. Others encourage one to evaluate all the probable consequences of a decision and occasionally recommend some course of action. *Decision Maker* falls into the latter group.

Users are required to build up a tree of consequences stemming from one particular decision. Branching occurs whenever further decisions have to be made or when some chance event happens. In addition to specifying the nature of each event you are required to ascribe a monetary value and determine its probability. Having done this the program applies statistical Decision Analysis to select the best course of action open to you.

To introduce the concept and explain various aspects of Decision Analysis such as Bayes



Theorem, Expected Monetary Value and Maximin, a teaching course is provided on a separate cassette. Lessons are easy to follow and backed up by a well written manual.

What lets *Decision Maker* down is the paucity of the programming. The screen displays look amateurish, the Spectrum's graphics capabilities are sorely underused and entry routines are primitive. Even something as simple as keeping a tally of accumulating probabilities is left to the user.

Overall then *Decision Maker* is an interesting idea, well documented but poorly executed. It encourages people to examine the risk element in decisions and serves as a useful complement to good old common sense, though at £14.95 it does seem a little expensive.

Cash And Carry

Cash Planner provides a simple and easy method of monitoring family income and expenses over a year.

The main display contains 40 separate accounts with 4 for income and the rest for expenses. Bottom left, overall surplus or deficit is displayed. On a lower level individual accounts are broken down into monthly parts, each of which contains a single figure which may be altered. The account total is displayed including a list of prompts. Account descriptions (max 6 characters) may be changed and monthly amounts altered. There is also a facility to calculate monthly figures from standing orders paid or received on a weekly basis (provided, of course, that you accept that every calendar month is made up of exactly 4.3 weeks).

The program permits you to generate four reports: an Annual Summary, a Cash Flow Summary, a Weekly Instalments report and a Monthly analysis. Information may be saved and loaded from cassette. Displays may be printed out on a ZX printer.

Unsophisticated and inflexible, *Cash Planner* seems to be aimed at the first time user who has little knowledge of computers and is hopeless at mathematics. Whilst it may serve as an introduction to rudimentary financial planning, its scope is too limited for it to justify the title of serious software. *Moneybox*, a personal finance program written for the Dragon computer, provides an easy to use system yet builds in considerable flexibility. The software supplied for review was the disk based enhancement of the company's cassette based program that has been on sale for some time. The move to disk has allowed a number of enhancements to be incorporated.

The most obvious of these, apart from the speed at which the program is loaded and data is stored and retrieved, is the provision of a machine code based screen driver. This replaces the rather restricted display that is generated by the computer's hardware with a 42 column by 24 row screen with true upper and lower case capability.

Further enhancements include the provision of a budgeting facility, the option of VAT analysis on transactions (so that the program can be used as a cashbook in a small business) and the ability to handle far more accounts than the cassette based version of the software.

Assuming that the Dragon computer and disk drives are correctly configured and that the *Moneybox* disk is in drive 1, it is only necessary to enter the command

RUN "MONEYBOX"

to enter the program. A menu of ten options will then be displayed. The majority of these require that the user either create (option 1) or open an existing file (option 4) prior to proceeding.

The program supports up to 99 files and each file may be password protected so as to prevent unauthorised access. (This should keep the Inland Revenue at bay for a minute or two!)

When creating a file the user will be asked for the number of transactions required during the period that the file is to cover. The largest number of transactions that any one file can handle is a generous 9999, quite sufficient for the average user.

Having created, or opened a file, it is possible to enter a range of transactions to a number of accounts under various headings. Many of these are pre-defined for convenience but the user is free to change or add any headings that are specific to their requirements.

In addition, the software features a comprehensive range of error checks to ensure that any data entered conforms to the requirements of the field to which it is to be posted. For example, the program would not permit one to enter a character string where a number is expected or vice-versa.

An important part of the *Moneybox* program is the report facility that allows the system to produce summaries of the data held within a file. The report option can provide information as to current balances, actual against budgeted expenditure and can be used to produce forecasts.

All together, *Moneybox* is an easy to use program that builds in a range of powerful facilities. It is more than capable of coping with the transactions of a typical household and should prove

adequate for many small businesses. Proper use of the system could reduce the number of those "Dear Sir, we note that your account is overdrawn" letters which in themselves are costly reminders of the efficiency of computerised accounts.

Spectrum Business Programs

These four programs by Oxford Computer Publishing overcome the two main drawbacks of the Spectrum 48K for serious use. They are compatible with Sinclair Microdrives (but can also be used in a cassette environment), and allow an 80-column printout via a range of interfaces for either serial (RS232) or parallel (Centronics-type) printers. Versions for Sinclair printer, with only a 32-column printout only, are also available at a considerably lower cost.

The programs offer the option of 15 different printer interface options. These are, for Centronics-type printers: Kempston S and E, Hilderbay, Tasman A and B, Morex, Euroelectronics Lprint 2 and 3, Micro Peripherals, Indescomp, and Direco. For RS232 serial: Sinclair Interface 1, Tasman, Morex, Euroelectronics, Indescomp. It is also possible to configure the programs to work with other interfaces, but to do this you must write your own driver routine in machine code.

The cassettes are supplied in snap-shut plastic cases. There is

room for a second cassette (a blank cassette is not supplied) and an instruction book, which helps to keep everything together. The standard of the instructions is well above average, being easy to read and understand, and presented in a logical order. But the print size may cause some people problems!

The programs perform in a similar fashion neatly slotting together as a 'suite'. They are controlled from a main menu, with sub-menus where appropriate, and have full-screen editing.

Address Manager

This is the simplest of the four programs, and consequently the easiest to use. It can maintain a file of up to 400 full names and addresses, or up to 1500 shorter entries consisting of names and indexes only. Entries can be classified with up to 3 user-defined indexes, each index consisting of 3 characters.

The main menu offers the options of locating, adding, amending, deleting, selecting, displaying or printing the entries, and maintaining the file.

The first option which must be used is Option 2 — to add an entry. The various parts of the entry are typed in, moving from field to field with the cursor keys. The fields provided are for surname, forename(s), address, postcode, phone number, and the 3 indexes. Mistakes are corrected by moving the cursor to the error



and overwriting, rather than by deleting. When the entry is complete, 'ENTER' is pressed. This stores the record and returns to the menu. But having to return to the main menu after each entry can be irksome when adding a lot of entries.

Option 1 — Locate — will search for an entry by surname. It is only necessary to type in either the initial or first few letters, not the complete name. Once an entry is located, it is displayed on the screen, and there are options to move forward or backward through the file, or return to the menu.

Once an entry has been located, Option 3 — Amend — can be selected. This is a screen-editing option. When editing is complete, press ENTER, and you then have the choice of overwriting the old entry, adding the new entry to the file and retaining the old, or discarding the amended entry and returning to the menu.

Option 4 — Delete Entry — can only be used after the entry has been located by Option 1. The entry is displayed, and you must confirm your decision via the traditional Y/N.

The Select option (5) selects entries by the user-defined indexes. You can enter up to 3 indexes for the search. Then the program will search for entries containing ANY of the indexes, or alternatively only for entries containing ALL of the indexes

specified. This option displays a list of the entries which can be printed out if desired. The multiple index facility makes this potentially a very useful program, but much will depend on the skill of the user in applying this facility.

The Display option (6) is similar to the Locate option, but only displays the name and index options in pages. And you can page forwards and backwards through the file.

The Print option (7) can print out the full entry, the name and index only (as in option 6) or the name and address (useful for labels). The position of the left margin can be set. The number of lines for each entry and for printing labels on continuous stationery is also controllable.

File maintenance (option 8) is by a sub-menu. The options are load, save, verify and clear.

There is provision to send up to 7 control codes to the printer at the start, and also at the end of each line. This means that the program can cope with printers which do an automatic linefeed and with those that do not and also switch to condensed, bold, italic or whatever typefaces the printer in use offers.

Finance Manager

This program is ideal for personal or small business accounts. It can operate up to 255 separate accounts, and hold up to about 1800 entries. It features automatic double entry, and can handle

standing orders. In fact standing orders can also be 'dummied' for planning purposes.

This is necessarily a more complex program than Address Manager, but the menu approach makes use straightforward.

Each transaction is entered in four fields, for description, who to, who from, and the amount. A food bill, for example, would be entered with 'food' as the description, the name of the foodstore as 'who to', your bank as 'who from'.

Balances for all accounts can be calculated for any given date, and running balances can be displayed at any time.

If you enter an account name that you have not used before in the 'who to' or 'who from' fields, a new account is automatically set up, with a zero balance. There is also a facility for changing the name of an account.

The transaction descriptions can be used to analyse expenditure over a period. However, the result shown is the turnover for a particular description. It is not shown as debit and credit, just as an unsigned total. This could be a serious limitation for some purposes.

Standing orders can be applied automatically at the beginning of each session, or manually, for a selected period. But in this latter case, care must be taken not to generate multiple identical transactions.

This is a flexible and well-thought-out program, and just about everybody should be able to find some use for it.

VAT Manager

This program is designed to aid completion of the form VAT 100. It produces the five separate totals necessary to complete this form, namely VAT due on outputs, VAT deductible on inputs, net VAT payable, total outputs excluding VAT, and total value of inputs. It also has facilities for analysis. It can hold around 400 transactions.

Each record has fields for gross amount, net amount, and VAT amount, who to/from, class (used for analysis), description, date, and VAT rate. It is not necessary to enter all three amounts, as if just one is entered, the other two are calculated automatically. If however the three are entered and the figures do not correlate, an error is reported.

Up to 8 classes of transaction (standard rate, zero rate, import, export, bonded warehouse, etc) can be handled.

This program should be a great help to any poor soul who has to complete VAT returns. But the instruction book with this program was not as easy to follow as the others, though this may be due to the nature of the subject!

Stock Manager

As the title suggests, the basic idea of this program is to keep a record of the current stock level, with a master file holding details of each product (Code number, product description of up to 25 characters, price, minimum stock level required, actual stock level, and VAT/no VAT indicator). Over 600 different products can be accommodated. The other usual facilities are also present, including re-order information on items that have fallen below the minimum stock level, and the ability to alter stock levels to take into account such things as returned goods or breakages. Special trading arrangements such as discounts and postage charges can also be handled by Stock Manager.

The main menu offers eight options:- invoice and stock decrease, stock decrease, stock increase, stock status, reordering, price list, amend/change, and today's sales plus save. These are mostly self explanatory, but one or two merit amplification. Invoice and stock decrease enables invoices to be printed, with the master file being automatically altered to suit. It is really this feature that makes this program worthwhile. For simple stock control, the old system of re-ordering when the box is nearly empty (and not bothering if there is more than a certain thickness of dust on the box) is difficult to better. The Price List option permits full or partial price lists to be printed. The Amend/Change option produces a sub-menu and enables details of new products to be added, or existing product information to be updated.

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Handic Software, 5 Albert Road, Crowthorne, Berks

Calc Result (Easy & Advanced)

Dr Gonza, 75 Albert Road West, Bolton

Cash Planner

OCP, 4 High Street, Chalfont St Peter, Bucks

Address Manager, Finance Manager, VAT Manager, Stock Manager

Sharpsoft, 95B Blackpole Trading Estate West, Worcester

Sharplan

Triptych Publishing, Sterling House, Station Road, Gerrards Cross, Bucks

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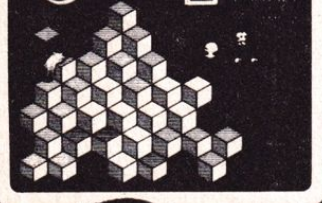
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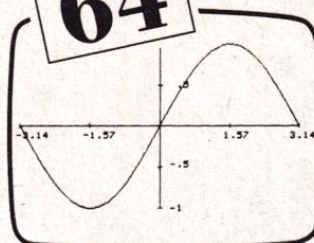
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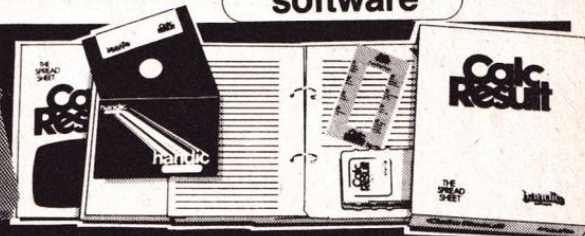
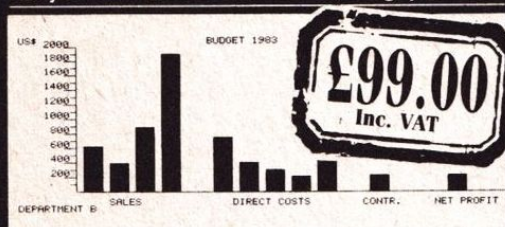
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FEATURE

The Lynx, it seems, is set for a come-back and with it some new software.

LYNX GOES FORTH

Tony Eden looks at the latest version of FORTH from Cubsoft.

For those of you who may not know, the Lynx will shortly be back in production (hopefully!), retaining its name but backed by a new company. For the 12000+ owners of a Lynx this is good news as it means that software will continue to appear. This is borne out by a new implementation of FORTH produced by the Salford-based firm, Cubsoft.

And for those of you who are new to the word, FORTH is a programming language. It is advocated by its supporters as being superior to BASIC because it is much faster, easier to write, and uses less memory. It is particularly suited for applications which need speed, such as graphics and machine control (eg, robots).

Anyone who buys a home computer receives a manual which illustrates how to write simple programs and provides examples. The language used is always BASIC because it has become widely accepted. However if you only use this then you may become competent in BASIC but you will remain blinkered to the range of the computing world. Once you have mastered BASIC then FORTH is a good stepping stone to wider horizons because it works in an entirely different way.

Once you have mastered

BASIC then FORTH

is a good stepping stone.

The essence of FORTH is the word. The word is either already defined, such as PRINT, or you make it up yourself and instruct the machine what to do when the word is encountered. An example is VAT. If you wish to calculate the VAT then in

FORTH you define the word VAT along the following lines:

```
: VAT 15 ★ 100 / . ;
```

':' shows that a word definition follows. '★' and '/' mean the same as BASIC except that they follow the numbers. '.' means print the result ';' means the end of the definition.

To find the VAT you just enter the number followed by the word (eg, 80 VAT displays 12, the result). You can add this word to the dictionary of defined words and it is always ready for use. In particular you can include this word in any other word definitions and build up a program that consists of such words. This is one of the great advantages of the FORTH language.

FORTH already exists on the Lynx under the Camsoft label. For this Cubsoft effort to be worthwhile it has to be a better job. Is this the case? The answer is an unqualified yes. It is obviously impractical to go through all the syntax and compare the two so a few examples must suffice.

EDIT Standard FORTH has 20 commands for editing the 11 'screens' of 16 by 64 characters and the keyboard buffer. On the Lynx implementation the keyboard buffer is 80 chars and only the backspace key has a function. If the line is altered its contents are wiped from the buffer and mistakes can only be rectified by retyping the line. As the display is 40 chars, each 64 char screen line occupies two display lines creating some awkwardness.

In this new version the keyboard buffer is arranged as 6 by 40 char lines with arrow keys usable. The screens now number 37, each with 8 lines of 30 chars. These screens are used as an extension of the keyboard buffer and, in effect, hold the whole program on RAM disk. There is even

a master response situation to ensure that you only complete changes you wish to accept.

Cubsoft have produced a good implementation which offers several advantages.

The Lynx has 128 user-definable graphics(UDG) chars stored from location FC00. Each character is bit-defined over a ten byte storage area. This is tedious to use. With Cubsoft the UDG are particularly easy to use. The desired bit representation of the character is given in hex, preceded by the name:

```
UDG DIAMOND 00 00 04 0E 1F  
0E 04 00 00 00
```

To call up the character simply enter the word Diamond.

Lynx FORTH has no random number generator whilst here we have two, a 32 bit number which can act as a seed or a number, and a function (RND) which places a number between 0 and 64K on the stack.

Cubsoft have produced a good implementation which offers several advantages over the Lynx version. Quibbles were minor with the exception of the documentation (where have we heard that before?). The 40-page booklet provided was well written and produced and was a complete reference to all the functions implemented, but not a single example of their use in sight. I accept that to include examples would have more than doubled the size and hence put up the cost but who minds paying an extra pound or two if it saves hours of trial and error?



ILLUSTRATION BY IVAN ALLEN

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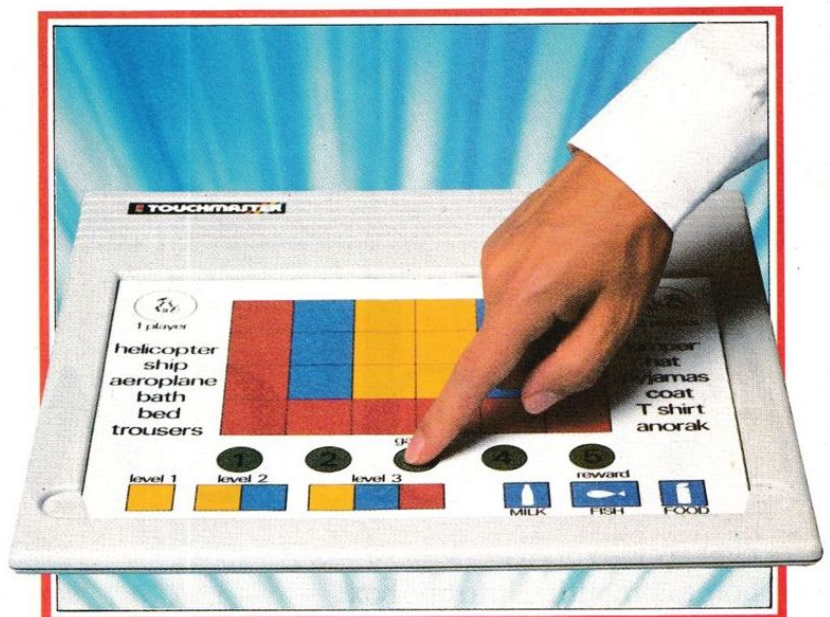
Secondly, to a whole new style of software ("Touchware"), which is not limited by the keyboard.

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WOW! THIS
COMMODORE 16
STARTER PACK'S
WIZARD!

And cwikey! i

First we jolly well put everything you need to start home computing into one box.

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Boys and girls (of all ages) will just love the Commodore 16 Starter Pack!

The computer has a 16K memory, real type-

writer keyboard, 121 colours and also superb sound and graphics.

It uses BASIC (this is the language in which you and the computer "talk" to each other, right-ho?)

The BASIC used by the Commodore 16 is very advanced, yet really simple to use. This is because it gives you more programming commands.

But just in case any of you fellows do have any



it's only £139.99.

difficulties, we also provide you with a Help key.

This helps to sort out programming errors by showing you exactly where you went wrong.

So you can get more out of your Commodore 16, the Starter Pack also includes "Introduction to BASIC," a guide to programming that any silly chump can follow.

And so you can get more enjoyment, there are

four jolly good and splendidly challenging games: X-Zap, Punchy, Picture Builder and Chess.

If you are thinking of starting home computing, there has never been a better time than now, with the Commodore 16 Starter Pack.

No matter what age you are, old thing.



commodore

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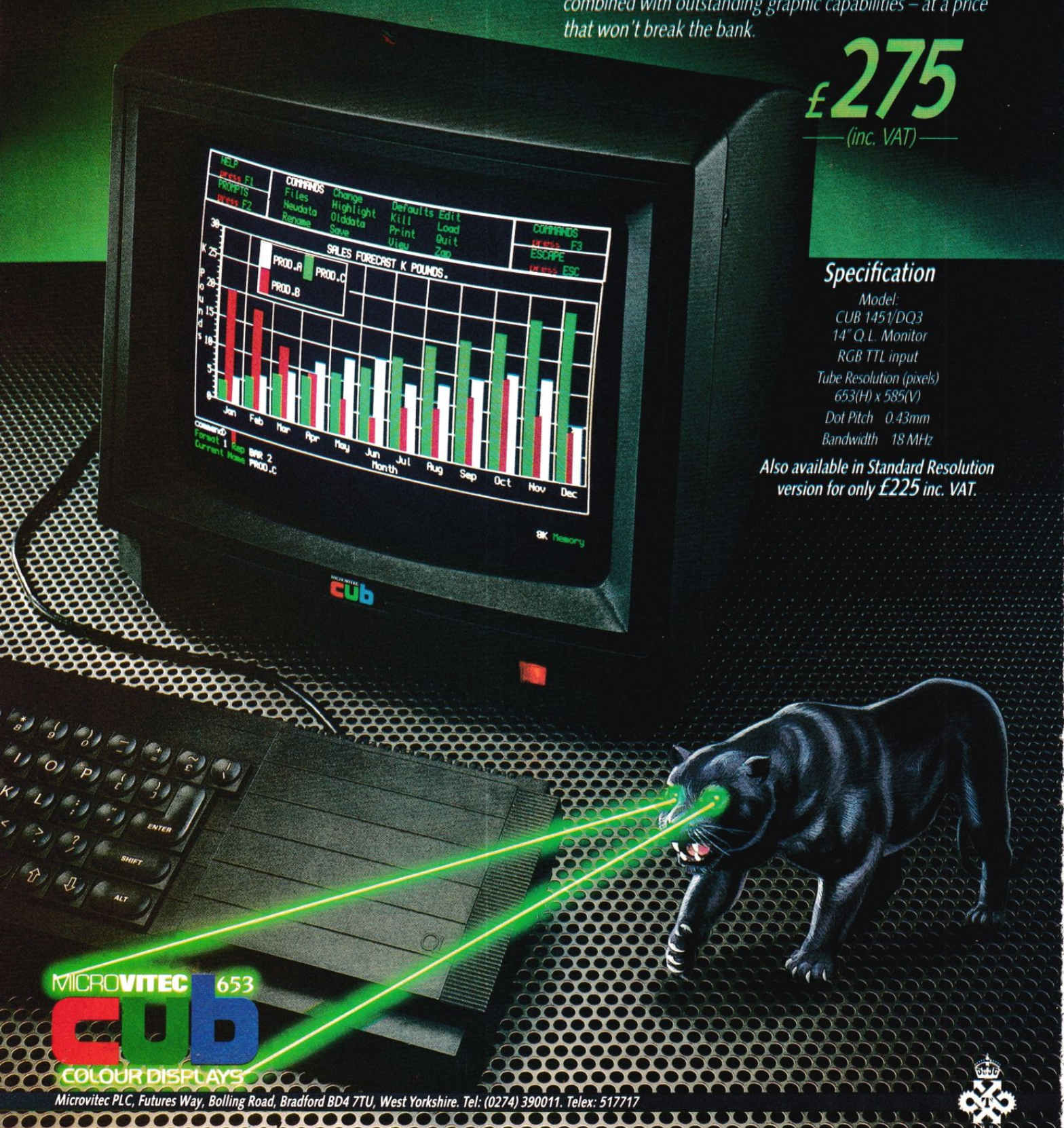
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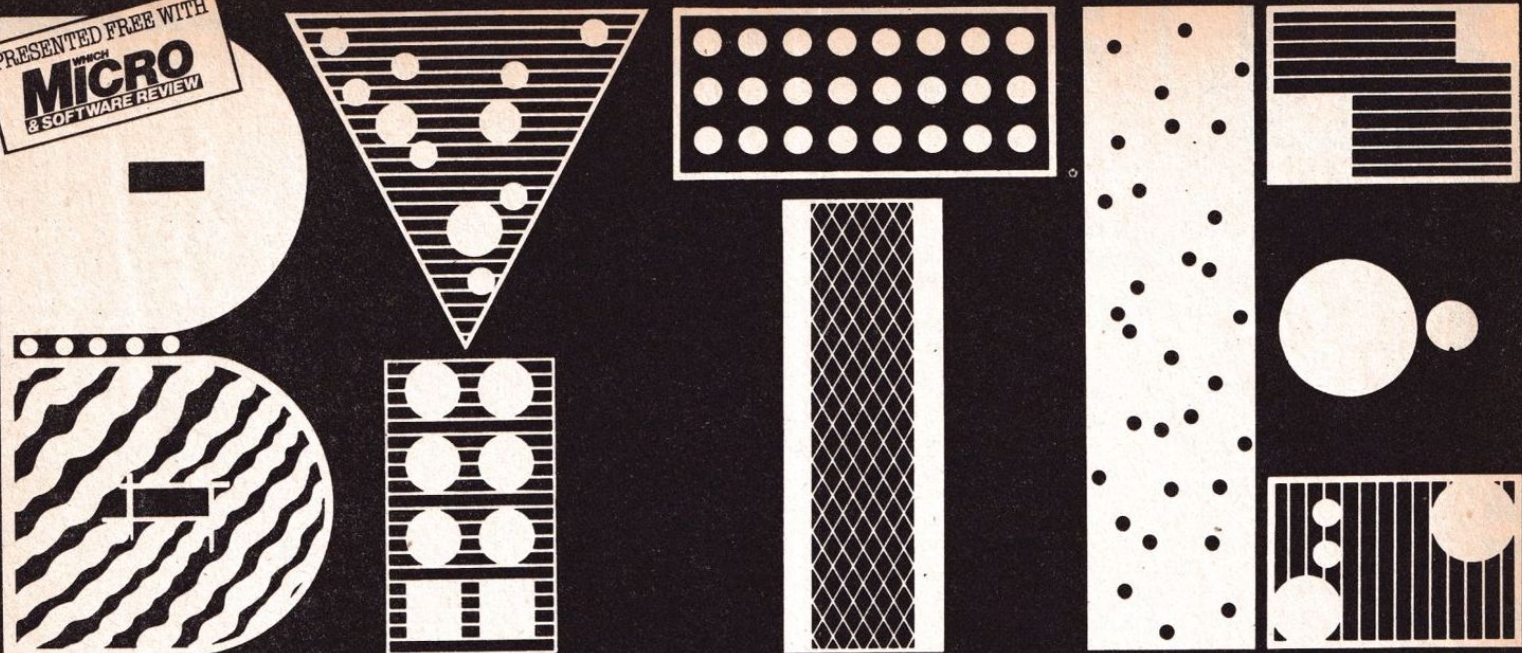


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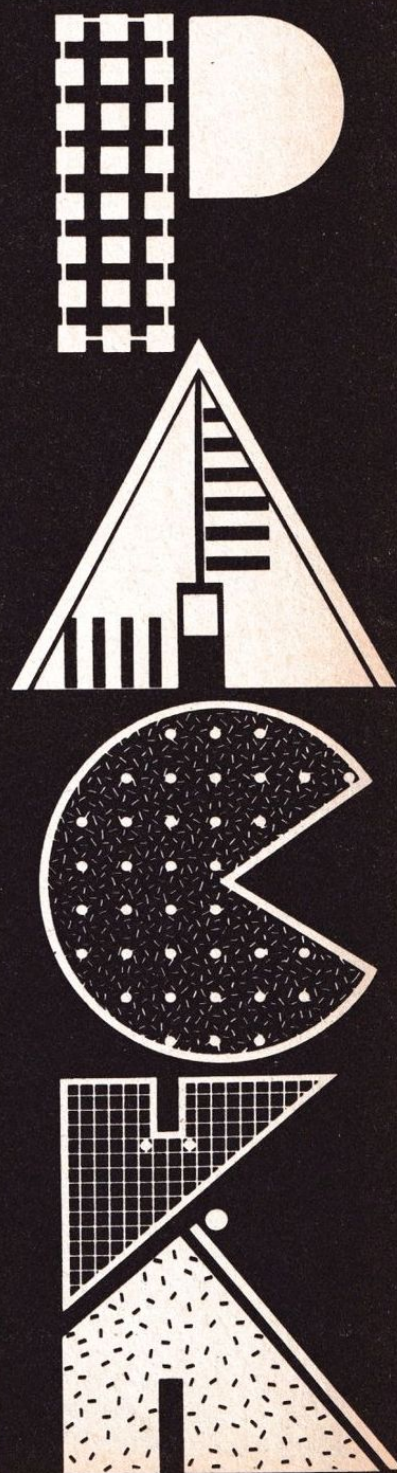
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WHICH
MICRO
& SOFTWARE REVIEW



PARA STORM
Spectrum takes
to the skies



Scriptor Court, 155 Farringdon Road, London EC1R 3AD.

Editor — **Paul Coster BSc**

Software Editor — **Paolo Baccanello**

Production Assistant — **Shirley Eborn**

Art Editor — **Mike Spiller**

Publisher — **Alfred Rolington**

Featured Computers: Amstrad, Atmos/Oric 1, BBC/Electron, Commodore, Dragon, Memotech, QL, Spectrum.

Notes for Contributors

All material published will be paid for at a rate of £60 per printed page, up to a maximum of £100 total payment. (Issue 1 average payment = £60.)

Due to problems in reproducing user-defined characters in print, all appearances of non-ASCII characters should be detailed. Listings, programs structures and tables of arrays and variables will be appreciated, however, program selection will depend exclusively upon merit and not good documentation.

In future, machine code submissions will only be considered where hash totals have been incorporated for every line of hex.

Finally, all games are tested on our own machines prior to listings being produced. Consequently all listings published represent unmodified and (hopefully!) bug free code taken from working programs.

Games

Para Storm — Spectrum 48K

Worm Run — Dragon 32/64

Treasure Hunt (II) — BBC/Electron

Snake Wars — Amstrad

Mastermind — QL

Tahir Abbas

Michael Edwards

Halvor Heuch

D & B Lewis

N Mane

Utilities

Monitor — Commodore 64

Synth — Atmos/Oric 48K

Renumber — Memotech

Nils Von Hinten

D Loughlane

Eric Roy

Memotech Fans

Our apologies to all those disgruntled and in some cases vociferous MTX users who missed Eric Roy's RENUMBER utility in issue 2 of Byte Pack. Well its here at last and you can look forward to a lot more for your machine.

And, we would like to pass on our thanks to Memotech for supplying the Alphacom printer competition prizewinner with a free RS232 interface — what a good bunch they are!

Another '63' bus wheezes past outside. Inside, monitors and TV screens grey in anticipation. A door groans on its hinges. Footsteps pad across the carpet. Sixteen plugs in sixteen sockets wait on a switch. . . . Click . . . all systems go.

Power supplies buzz. The Beeb beeps, TI warms and Spectrum radiates. Commodore and VIC shake over an interpod. Static builds up and screens glow. The ZX81 has a fit. Cassette recorders are open mouthed and hungry. Microdrives whine and disks purr . . . the start of some colossal adventure — well, sort of . . .

Before long, hordes of snakes, invaders and maze crawlers will have run amok. A thousand space age battles will have been fought. Joysticks throttled in a fanfare of discord. Bits flown at Baud rates. Programs crashed or never

loaded. Listing paper, code cornered and BASIC battered, rising like the tide. And all for what?

A subtle blend of caustic code and vitriolic vectors. A prison for poisonous procedures where only the fastest survive. A realm of razor sharp routines, terrifying text and gruesome graphics. And that's just the bright side.

So if you think your game, adventure, utility or whatever is mean enough weather the onslaught, then send it in. If you do survive and make it into BYTE PACK, and that's a big IF, you'll get your hero's due and you'll have made your mark. If your program falls by the way, we'll notify you so that you can send in reinforcements. So, remember, when the going gets tough, the tough get programming.

Para Storm — Spectrum

You pilot a helicopter which patrols the skies above a small alpine village, dominating the skyline is a massive hydroelectric dam.

Unfortunately for you, both dam and village have been earmarked for destruction by a hostile regime. Paratroopers, like kamikazee lemmings, descend from a plane circling out of range. On their way down, they fire off rockets at the dam in an attempt to breach it and if more than 40 manage to land safely they blow up the entire valley. Your task is to annihilate them and intercept their missiles before all is lost.

As *Para Storm* is made up of a collection of short self-contained machine code routines called from a BASIC program Byte Packers will have to use the hex loader supplied to enter the code.

The procedure is as follows:

1. Set 'CAPS LOCK ON' and enter listing 1 then 'RUN'.

2. Enter the values given opposite the various addresses on the machines code listing. These values should be entered in pairs.

For example:

'D9' 1st value entered
'E5' 2nd value entered
'D9' 3rd
'CD' 4th
'A3' and so on . . .

It is advisable to enlist the help of a friend so that one of you can enter the values whilst the other calls them out. This encourages accuracy and speeds matters up.

3. Once the values have been entered they should be saved immediately. Enter

SAVE "mc" CODE 29500, 2700

and then verify using:

VERIFY "mc" CODE

4. Finally, enter the BASIC listing in the normal fashion. Be sure that INK & PAPER colours are not altered as pixel colour values are used to control the program's flow.

5. Having entered the BASIC

program enter as a direct command:

GOTO 9900

Keyboard controls are: Q = UP, Z = DOWN, P = FIRE.

Machine code Routines

Address in Hex:

733C Drives all other routines

73A1 Reset all variables used

73EE Routine governing helicopter's flight and guns

74ED Put parachutists on screen

751E Move rockets towards dam and scan for different colour attributes.

7602 Move para down screen checking colour attributes

767C Explosion routine

7726 Check to see if copter has destroyed anything

781B Check to see if copter shield hit

786D Scroll plane at top of screen

78C4 Misc screen and sound routines

79A3 Set-up score line and double height characters

79E7 Score routine

7A83 Record Hits and Shields on screen

7B27 General purpose routines: x,y finder, screen to ATTR, ATTR to screen, print character, print space, random numbers

7BFF End of game explosion

BASIC Program Structure

220 Call subroutines

1000 Call machine code routines

1500 Set up user defined graphics

1650 Screen display

1900 Dam breached

3000 Flood village

3060 Have 40 paras landed?

3500 Copter shield gone?

5000 Score routine

5060 New Game

9000 Choose skill level

9200 Tape commands

5 POKE 23658,8: REM CAPS LOCK ON

10 LET A=10: LET B=11: LET C=1

2: LET D=13: LET E=14: LET F=15

15 FOR V=29500 TO 32170

20 INPUT H\$: IF LEN H\$<>2 THEN

GO TO 20

40 IF CODE H\$(1)<48 OR CODE H\$(

(1)>70 OR CODE H\$(2)<48 OR CODE

H\$(2)>70 THEN PRINT AT 0,0:"INVA

LID ENTRY.PLEASE RE-ENTER.": BEE

P 1,10: GO TO 20

60 LET Q=16+VAL H\$(1)+VAL H\$(2

)

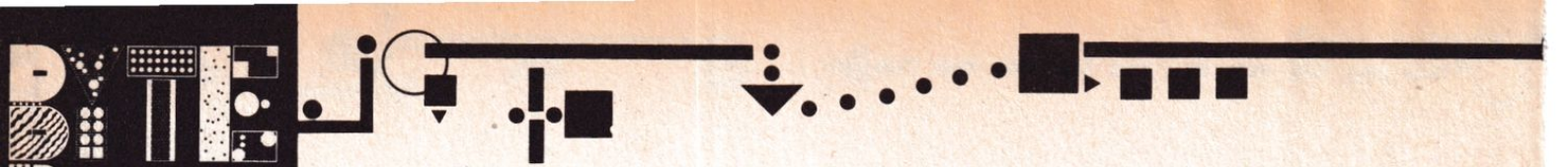
70 POKE V,Q: PRINT AT 21,0;V,Q

;"---";H\$: LET I=USR 3582

100 NEXT V

110 STOP

733C	D9	7406	CDB37B	740F	32107D	7578	FE01	762D	ED52
733D	E5	7409	E1	74D2	32137D	757A	2008	762F	C1
733E	D9	740A	23	74D5	2A117D	757C	3E01	7630	10E8
733F	CDA379	740B	E5	74D8	77	757E	32487D	7632	C9
7342	CDA173	740C	CDB37B	74D9	C9	7581	223473	7633	112000
7345	00	740F	E1	74DA	00	7584	23	7636	19
7346	00	7410	2B	74DB	110204	7585	00	7637	E5
7347	CDC478	7411	220D7D	74DE	2A0D7D	7586	3607	7638	7E
734A	CD1B78	7414	00	74E1	19	7588	E5	7639	FE44
734D	CD2279	7415	00	74E2	36FF	7589	CDE87B	763B	282E
7350	CDEE73	7416	CD8E02	74E4	22117D	758C	CDB37B	763D	ED52
7353	CD6877	7419	7B	74E7	3E01	758F	E1	763F	23
7356	CD4C78	741A	FE25	74E9	32107D	7590	23	7640	3607
7359	CD6974	741C	2831	74EC	C9	7591	3607	7642	CDE87B
735C	CDE074	741E	FE1F	74ED	00	7593	CDE87B	7645	CDB37B
735F	CD0276	7420	283A	74EE	00	7596	CDB37B	7648	E1
7362	CD1E75	7422	CD687B	74EF	00	7599	C9	7649	3605
7365	CD7C76	7425	220D7D	74F0	21A058	759A	23	764B	E5
7368	CD6877	7428	11EB7C	74F3	3A887D	759B	3607	764C	CDE87B
736B	CD6D78	742B	E5	74F6	FE17	759D	CDE87B	764F	11157D
736E	210A00	742C	CDA57B	74F8	280D	75A0	CDB37B	7652	CDA57B
7371	CD978	742F	E1	74FA	FE19	75A3	00	7655	E1
7374	3A487D	7430	23	74FC	2609	75A4	00	7656	E5
7377	FE01	7431	E5	74FE	FE28	75A5	00	7657	3A437D
7379	2822	7432	CDA57B	7500	2805	75A6	C9	765A	57
737B	3A867D	7435	212B02	7502	FE1B	75A7	E5	765B	3E64
737E	FE28	7438	CD978	7504	2601	75A8	C5	765D	CDBE7B
7380	281B	743B	E1	7506	C9	75A9	3E02	7660	D65A
7382	FE29	743C	2B	7507	00	75AB	CDBE7B	7662	3002
7384	2817	743D	E5	7508	5F	75AE	FE00	7664	E1
7386	FE2A	743E	CDA57B	7509	1600	75B0	2804	7665	C9
7388	2813	7441	E1	750B	19	75B2	FE01	7666	E1
738A	3A877D	7442	23	750C	E5	75B4	2306	7667	2B
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738F	280C	7444	CDA57B	750F	CDBE7B	75B9	C1	766A	C9
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7395	E601	744D	E1	7516	E1	75BC	112D7D	766E	3607
7397	20AD	744E	C9	7517	23	75BF	C1	7670	CDE87B
7399	00	744F	3A0C7D	7518	23	75C0	E1	7673	CDB37B
739A	00	7452	FE07	7519	3605	75C1	C9	7676	D9
739B	00	7454	28CC	751B	C9	75C2	11257D	7677	CD837A
739C	00	7456	3D	751C	E1	75C5	C1	767A	D9
739D	D9	7457	320C7D	751D	C9	75C6	E1	767B	C9
739E	E1	745A	18C6	751E	00	75C7	00	767C	00
739F	D9	745C	3A0C7D	751F	00	75C8	00	767D	00
73A0	C9	745F	FE12	7520	00	75C9	00	767E	00
73A1	00	7461	28BF	7521	00	75CA	00	767F	00
73A2	AF	7463	3C	7522	21357D	75CB	ED58367D	7680	21467D
73A3	32887D	7464	320C7D	7525	35	75CF	2A3A7D	7683	35
73A6	32867D	7467	18B9	7526	7E	75D2	0602	7684	7E
73A9	32487D	7469	00	7527	FE00	75D4	C5	7685	FE00
73AC	32477D	746A	00	7529	C0	75D5	D5	7687	C0
73AF	32497D	746B	00	752A	3E06	75D6	E5	7688	3E06
73B2	21687D	746C	3A107D	752C	32357D	75D7	CDB503	768A	32467D
73B5	77	746F	FE01	752F	00	75DA	2A3E7D	768D	00
73B6	216C7D	7471	283C	7530	00	75DD	110300	768E	00
73B9	77	7473	CD8E02	7531	21A058	75E0	19	768F	00
73BA	21707D	7476	7B	7534	06E0	75E1	223E7D	7690	00
73BD	77	7477	62	7536	C5	75E4	ED4B3E7D	7691	00
73BE	21747D	7478	FE47	7537	0602	75E8	E1	7692	00
73C1	77	747A	2809	7539	C5	75E9	ED4A	7693	218040
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73C5	32137D	747E	281A	753B	7E	75EC	C1	7698	CDC676
73C8	21137D	7480	FE21	753C	FE03	75ED	10E5	769B	210048
73CB	77	7482	2856	753E	CC4D75	75EF	C9	769E	06FF
73CC	21787D	7484	C9	7541	E1	75F0	00	76A0	CDC676
73CF	77	7485	CDEE73	7542	23	75F1	21367D	76A3	210050
73D0	217C7D	7488	110204	7543	C1	75F4	3603	76A6	0660
73D3	77	748B	2A0D7D	7544	10F3	75F6	2A3A7D	76A8	CDC676
73D4	21807D	748E	19	7546	C1	75F9	3602	76AB	213F57
73D7	77	748F	36FF	7547	10ED	75FB	211E00	76AE	0640
73D8	21847D	7491	22117D	7549	C9	75FE	223E7D	76B0	CD1177
73DB	3C	7494	3E01	754A	00	7601	C9	76B3	21FF4F
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73EE	00	74AF	2A117D	7559	283F	7613	00	76C9	FE70
73EF	00	74B2	3A137D	755B	23	7614	00	76CB	280E
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73FF	00	74C8	C9	756F	CDA57B	7625	E1	76DB	3600
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7401	00	74CA	CD978	7573	CD737A	7627	C1	76E0	112000
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76EE	CD0979	77B1	23	7865	3607	7910	CD0E7B	79BC	10ED
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7702	CD987B	77BF	3607	7872	7E	791F	E1	79CE	11897D
7705	111F00	77C1	00	7873	FE00	7920	C1	79D1	E5
7708	ED52	77C2	CDE779	7875	C0	7921	C9	79D2	CD457B
770A	CDE87B	77C5	CDE779	7876	3E04	7922	00	79D5	E1
770D	360E	77C8	AF	7878	32A97D	7923	00	79D6	23
770F	18C4	77C9	32107D	787C	00	7924	CD4379	79D7	E5
7711	C5	77CC	32137D	787E	3A887D	7927	3A877D	79D8	CD457B
7712	ES	77CF	CD075	787F	3C	792A	FE03	79DB	E1
7713	7E	77D2	21117D	7880	FE1F	792C	C0	79DC	23
7714	FE1C	77D5	3600	7882	2805	792D	212150	79DD	E5
7716	2825	77D7	C9	7884	32887D	7930	111700	79DE	CD457B
7718	FE38	77D8	00	7887	1004	7933	3E87	79E1	E1
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7722	C1	77E3	3607	7892	110001	793C	10FC	79EB	223273
7723	10EC	77E5	28	7895	0600	793E	19	79EE	21687D
7725	C9	77E6	3607	7897	C5	793F	C1	79F1	34
7726	3600	77E8	23	7898	E5	7940	10F5	79F2	7E
7728	CD0979	77E9	23	7899	061F	7942	C9	79F3	FE0A
772B	CD987B	77EA	23	789B	7E	7943	3A867D	79F5	CCFC79
772E	112000	77EB	360E	789C	23	7946	FE22	79F8	CD267A
7731	19	77ED	23	789D	77	7948	2809	79FB	C9
7732	CDE87B	77EE	360E	789E	2B	794A	FE23	79FC	21687D
7735	110007	77F0	11FD06	789F	2B	794C	2805	79FF	3600
7738	19	77F3	19	78A0	10F9	794E	FE24	7A01	216C7D
7739	36E0	77F4	361C	78A2	E1	7950	2801	7A04	34
773B	18E3	77F6	2B	78A3	19	7952	C9	7A05	7E
773D	3600	77F7	361C	78A4	C1	7953	00	7A06	FE0A
773F	CD0979	77F9	23	78A5	10F0	7954	213858	7A08	CC0C7A
7742	CD987B	77FA	23	78A7	00	7957	111900	7A0B	C9
7745	111F00	77FB	23	78A8	00	795A	3E87	7A0C	216C7D
7748	19	77FC	3638	78A9	219F40	795C	0602	7A0F	3600
7749	CDE87B	77FE	23	78AC	118040	795E	C5	7A11	21707D
774C	110007	77FF	3638	78AF	0608	795F	0607	7A14	34
774F	19	7801	00	78B1	7E	7961	77	7A15	7E
7750	361C	7802	2A117D	78B2	12	7962	23	7A16	FE0A
7752	18CC	7805	3600	78B3	D5	7963	10FC	7A18	CC1C7A
7754	3600	7807	00	78B4	110001	7965	19	7A1B	C9
7756	CD987B	7808	CDE779	78B7	19	7966	C1	7A1C	21707D
7759	112100	780B	AF	78B8	D1	7967	10F5	7A1F	3600
775C	19	780C	32107D	78B9	E5	7969	C9	7A21	21747D
775D	CDE87B	780F	32137D	78BA	EB	796A	00	7A24	34
7760	110007	7812	CD075	78BB	110001	796B	AF	7A25	C9
7763	19	7815	21117D	78BE	19	796C	21C840	7A26	21803D
7764	3638	7818	3600	78BF	EB	796F	0602	7A29	ED58747D
7766	1888	781A	C9	78C0	E1	7971	CD8879	7A2D	0608
7768	00	781B	00	78C1	10EE	7974	210848	7A2F	19
7769	00	781C	112000	78C3	C9	7977	0608	7A30	10FD
776A	00	781F	21B658	78C4	00	7979	CD8879	7A32	113240
776B	3A107D	7822	3E00	78C5	21A97D	797C	210850	7A35	EB
776E	FE01	7824	0603	78C8	35	797F	0603	7A36	CD4A7B
7770	C0	7826	77	78C9	7E	7981	CD8879	7A39	21803D
7771	2A117D	7827	19	78CA	FE00	7984	00	7A3C	ED5B707D
7774	CD987B	7828	10FC	78CC	C0	7985	00	7A40	0608
7777	7E	782A	00	78CD	3E03	7986	00	7A42	19
7778	FE05	782B	00	78CF	32A97D	7987	C9	7A43	10FD
777A	2808	782C	AF	78D2	216158	7988	E5	7A45	113340
777C	FE03	782D	214357	78D5	116058	7989	E5	7A48	EB
777E	2859	7830	061D	78D8	011F00	798A	77	7A49	CD4A7B
7780	23	7832	77	78DB	EDB0	798B	111700	7A4C	21803D
7781	7E	7833	23	78DD	211E58	798E	19	7A4F	ED5B6C7D
7782	FE03	7834	10FC	78E0	111F58	798F	77	7A53	0608
7784	2853	7836	AF	78E3	011F00	7990	E1	7A55	19
7786	C9	7837	32FF48	78E6	EDB8	7991	110007	7A56	10FD
7787	3607	783A	21A040	78E8	112000	7994	19	7A58	113440
7789	CDE87B	783D	0620	78EB	215F58	7995	77	7A5B	EB
778C	E5	783F	77	78EE	0603	7996	111700	7A5C	CD4A7B
778D	CD837B	7840	23	78F0	7E	7999	19	7A5F	21803D
7790	E1	7841	10FC	78F1	19	799A	77	7A62	ED5B687D
7791	2B	7843	00	78F2	77	799B	E1	7A65	0608
7792	3607	7844	CD6A79	78F3	ED52	799C	112000	7A68	19
7794	2B	7847	00	78F5	ED52	799F	19	7A69	10FD
7795	3607	7848	C9	78F7	10F7	79A0	10E6	7A6B	113540
7797	23	7849	219558	78F9	212058	79A2	C9	7A6E	EB
7798	23	784C	00	78FC	0603	79A3	00	7A6F	CD4A7B
7799	3670	784D	2A0D7D	78FE	7E	79A4	210058	7A72	C9
779B	23	7850	CD987B	78FF	ED52	79A7	3E01	7A73	E5
779C	360E	7853	E5	7901	77	79A9	0644	7A74	D5
779E	23	7854	7E	7902	19	79AB	77	7A75	C5
779F	360E	7855	FE07	7903	19	79AC	3C	7A76	21F401
77A1	11FD06	7857	2008	7904	10F8	79AD	FE07	7A79	110500
77A4	19	7859	23	7906	00	79AF	2002	7A7C	CD8503
77A5	361C	785A	7E	7907	00	79B1	3E01	7A7F	C1
77A7	2B	785B	FE07	7908	C9	79B3	C5	7A80	D1
77A8	361C	785D	2002	7909	00	79B4	E5	7A81	E1
77AA	23	785F	E1	790A	C5	79B5	F5	7A82	C9
77AB	23	7860	C9	790B	E5	79B6	CD0278		

7A83	21E803	7B46	13	7BEB	7C	7C8F	FE06	7D28	F8
7A86	110500	7B47	10DE	7BEC	F618	7C91	281A	7D29	F8
7A89	CDB503	7B49	C9	7BEE	CB27	7C93	00	7D2A	76
7A8C	00	7B4A	0602	7BF0	CB27	7C94	C9	7D2B	00
7A8D	3A867D	7B4C	C5	7BF2	CB27	7C95	3E4F	7D2C	00
7A90	3C	7B4D	E5	7BF4	D6A8	7C97	181A	7D2D	00
7A91	32867D	7B4E	0604	7BF6	67	7C99	3E57	7D2E	0176FF
7A94	21787D	7B50	1A	7BF7	19	7C9B	1816	7D31	FD+
7A97	34	7B51	77	7BF8	C9	7C9D	3E5F	7D32	76
7A98	7E	7B52	D5	7BF9	2B	7C9F	1812	7D33	010005
7A99	FE0A	7B53	110001	7BFA	7C	7CA1	3E60	7D36	03
7A9B	CCA27A	7B56	19	7BFB	B5	7CA3	180E	7D37	00
7A9E	CDAC7A	7B57	77	7BFC	20FB	7CA5	3E68	7D38	00
7AA1	C9	7B58	19	7BFE	C9	7CA7	180A	7D39	00
7AA2	21787D	7B59	D1	7BFF	00	7CAF	1802	7D3A	010000
7AA5	3600	7B5A	13	7C00	0632	7CA9	3E70	7D3D	00
7AA7	217C7D	7B5B	10F3	7C02	C5	7CAB	1806	7D3E	1E00
7AAA	34	7B5D	E1	7C03	CD197C	7CAD	3E78	7D40	00
7AAB	C9	7B5E	D5	7C06	CD397C	7CB1	00	7D41	00
7AAC	00	7B5F	112000	7C09	CD9076	7CB2	00	7D42	00
7AAD	00	7B62	19	7C0C	CD717C	7CB3	210058	7D43	32030B
7AAE	21803D	7B63	D1	7C0F	CD047C	7CB6	110158	7D45	02
7AB1	ED5B7C7D	7B64	C1	7C12	00	7CB9	01BF02	7D47	00
7AB5	0608	7B65	10E5	7C13	00	7CBC	77	7D48	00
7AB7	19	7B67	C9	7C14	00	7CBD	EDB0	7D49	00
7AB8	10FD	7B68	3A0C7D	7C15	C1	7CBF	210A00	7D4A	53
7ABA	113D40	7B6B	D610	7C16	10EA	7CC2	CDF97B	7D4B	48
7ABD	EB	7B6D	3011	7C18	C9	7CC5	C9	7D4C	49
7ABE	CD4A7B	7B6F	3A0C7D	7C19	00	7CC6	210058	7D4D	45
7AC1	21803D	7B72	D608	7C1A	21447D	7CC9	110158	7D4E	4C
7AC4	ED5B787D	7B74	3005	7C1D	35	7CCC	01C002	7D4F	44
7AC8	0608	7B76	210040	7C1E	7E	7CCF	3607	7D50	3A3130
7ACA	19	7B79	1808	7C1F	FE00	7CD1	EDB0	7D53	2A2A53
7ACB	10FD	7B7B	210048	7C21	C0	7CD3	C9	7D56	43
7ACD	113E40	7B7E	1803	7C22	3E03	7CD4	215F40	7D57	4F
7AD0	EB	7B80	210050	7C24	32447D	7CD7	CDE17C	7D58	52
7AD1	CD4A7B	7B83	3A0C7D	7C27	3E19	7CDA	214057	7D59	45
7AD4	C9	7B86	D608	7C29	CDBE7B	7CDD	CDE17C	7D5A	3A3030
7AD5	00	7B88	161F	7C2C	3C	7CE0	C9	7D5D	3030
7AD6	21C800	7B8A	47	7C2D	3C	7CE1	AF	7D5F	2A2A48
7AD9	110500	7B8B	82	7C2E	3C	7CE2	0621	7D62	49
7ADC	CDB503	7B8C	10FD	7C2F	5F	7CE4	77	7D63	54
7ADF	00	7B8E	57	7C30	1600	7CE5	23	7D64	53
7AE0	21807D	7B8F	3A0B7D	7C32	218048	7CE6	10FC	7D65	3A3030
7AE3	35	7B92	82	7C35	19	7CE8	C9	7D68	0600
7AE4	7E	7B93	5F	7C36	3601	7CE9	00	7D6A	00
7AE5	FEFF	7B94	1600	7C38	C9	7CEA	00	7D6B	00
7AE7	CCE7A	7B96	19	7C39	00	7CEB	0F	7D6C	08
7AEA	CD87A	7B97	C9	7C3A	218048	7CEC	00	7D6D	00
7AED	C9	7B98	7C	7C3D	0620	7CED	40	7D6E	00
7AEE	21807D	7B99	E618	7C3F	C5	7CEE	BF	7D6F	00
7AF1	3609	7B9B	CB2F	7C40	E5	7CEF	B2	7D70	03
7AF3	21847D	7B9D	CB2F	7C41	7E	7CF0	4F	7D71	00
7AF6	35	7B9F	CB2F	7C42	FE01	7CF1	00	7D72	00
7AF7	C9	7BA1	C658	7C44	CC4D7C	7CF2	1F	7D73	00
7AF8	00	7BA3	67	7C47	E1	7CF3	FE20	7D74	00
7AF9	21803D	7BA4	C9	7C48	23	7CF5	7E	7D75	00
7AFC	ED5B847D	7BA5	0608	7C49	C1	7CF6	F1	7D76	00
7B00	0608	7BA7	1A	7C4C	C9	7CF7	F9	7D77	00
7B02	19	7BA8	77	7C4D	2B	7CF8	FE30	7D79	00
7B03	10FD	7BA9	13	7C4E	3607	7CFA	FE00	7D7A	00
7B05	112840	7BAA	D5	7C50	2B	7CFC	00	7D7B	00
7B08	EB	7BAB	110001	7C51	3607	7CFD	40	7D7C	04
7B09	CD4A7B	7BAE	19	7C53	23	7CFE	BF	7D7D	00
7B0C	21803D	7BAF	D1	7C54	23	7CFF	B2	7D7E	00
7B0F	ED5B807D	7BB0	10F5	7C55	3670	7D00	4F	7D7F	00
7B13	0608	7BB2	C9	7C57	23	7D01	00	7D80	02
7B15	19	7BB3	AF	7C58	360E	7D02	1F	7D81	00
7B16	10FD	7BB4	110001	7C5A	23	7D03	00	7D82	00
7B18	112940	7BB7	0608	7C5B	360E	7D04	207E	7D83	00
7B1B	EB	7BB9	77	7C5D	11FD06	7D06	F1	7D84	00
7B1C	CD4A7B	7BBA	19	7C5D	19	7D07	F9	7D85	00
7B1F	3A877D	7BBB	10FC	7C60	23	7D08	FE30	7D86	2802
7B22	3D	7BBD	C9	7C61	361C	7D0A	FE09	7D88	1EC0
7B23	32877D	7BBE	F5	7C63	2B	7D0B	0A	7D8A	C0
7B26	C9	7BBF	3E4B	7C64	361C	7D0C	0A	7D8B	B0
7B27	00	7BC1	ED5B765C	7C66	23	7D0D	49	7D8C	BF
7B28	00	7BC5	CD097B	7C67	23	7D0E	48	7D8D	BF
7B29	00	7BC8	A7	7C68	36E0	7D0F	0600	7D8E	EF
7B2A	D5	7BC9	4F	7C6A	23	7D11	5E	7D8F	33
7B2B	E5	7BCA	ED42	7C6B	3638	7D12	4C	7D90	FF
7B2C	E5	7BCC	3601	7C6D	23	7D13	00	7D91	00
7B2D	21003D	7BCE	2B	7C6E	3638	7D14	0A	7D92	03
7B30	1A	7BCF	22765C	7C70	C9	7D15	3C	7D93	7F
7B31	D620	7BD2	54	7C71	00	7D16	66	7D94	C1
7B33	110800	7BD3	5D	7C72	3E08	7D17	81	7D95	C1
7B36	C5	7BD4	F1	7C74	CDBE7B	7D18	5A	7D96	C4F8FF
7B37	47	7BD5	CD097B	7C77	FE00	7D19	3C	7D99	00
7B38	19	7BD6	C9	7C79	281A	7D1A	1818	7D9A	FF
7B39	10FD	7BD9	0608	7C7B	FE01	7D1C	24	7D9B	81
7B3B	C1	7BD8	210000	7C7D	281A	7D1D	7E	7D9C	81
7B3C	EB	7BDE	29	7C7F	FE02	7D1E	FF	7D9D	FF
7B3D	E1	7BDF	17	7C81	281A	7D1F	FF	7D9E	03
7B3E	C5	7BE0	3003	7C83	FE03	7D20	FF	7D9F	01FF00
7B3F	CD4A7B	7BE2	19	7C85	281A	7D21	7E	7DA2	F8
7B42	C1	7BE3	CE00	7C87	FE04	7D22	3C	7DA3	A6
7B43	E1	7BE5	10F7	7C89	281A	7D23	1818	7DA4	A7
7B44	23	7BE7	C9	7C8B	FE05	7D25	00	7DA5	FF
7B45	D1	7BE8	110028	7C8D	281A	7D26	00	7DA6	86
						7D27	76	7DA7	FCF803
								7DAA	03


```

10 REM Para-Storm
20 REM Written by Tahir Abbas.
150 CLS
160 LET hs=0
170 LET x=31743
180 LET fi=30305
190 POKE 29971,40
200 GO SUB 1000: REM user
      graphics.
211 CLS
212 GO SUB 9000: REM choose
      level.
215 OVER 0: BRIGHT 0: INVERSE 0
BORDER 3: PAPER 0: INK 7: CLS
220 GO SUB 1500: REM set up
      screen.
250 REM set up variables
280 PRINT #1; INK 9; TAB 2; "HI-S
CORE=";hs;" ";TAB 16;"@ TAHIR A
BBAS."
300 LET l=USR 29500
330 IF PEEK 32072=1 THEN GO TO
2500
340 LET N=PEEK 32134: IF N=40 O
R N=41 OR N=42 THEN GO TO 3000
350 IF PEEK 32135=0 THEN GO TO
3500
900 STOP
1000 REM set up
      user graphics.

1010 FOR f=USR "a" TO USR "i"+7
1020 READ a: POKE f,a
1030 NEXT f
1060 RETURN
1070 DATA 247,247,247,0,239,239,
239,0
1080 DATA 170,85,170,85,170,85,1
70,85
1090 DATA 24,60,126,255,219,255,
231,231
1100 DATA 0,0,99,66,66,66,66,231
1110 DATA 0,0,0,0,60,255,255,102
1120 DATA 0,0,0,102,102,255,102,
153
1130 DATA 82,42,166,100,28,24,24
,126
1140 DATA 0,0,32,36,24,137,73,82
1150 DATA 72,36,165,74,44,16,16,
56
1500 REM set up
      screen display.

1510 PRINT AT 0,0;" "
1520 PRINT AT 3,0;" "
1530 PRINT AT 1,0;" ";AT 2,0;" "
;AT 1,31;" ";AT 2,31;" "
1540 FOR f=1 TO 2: PRINT PAPER 1
; INK 7;AT f,1;" "
      NEXT f
1550 FOR f=7 TO 21: PRINT INK 1;
AT f,0;" ";NEXT f
1560 FOR f=6 TO 21: PRINT BRIGHT
1; INK 6;AT f,2;" ";NEXT
f
1570 PRINT INK 5;AT 5,2;" "
1580 PRINT INK 4;AT 21,0;" "
1600 INK 3: PLOT 70,22: DRAW 20,
0: PLOT 71,21: DRAW 18,0: PLOT 7
2,20: DRAW 16,0
1610 INK 3: FOR F=74 TO 87 STEP
3: PLOT F,19: DRAW 0,-11: NEXT F
1620 INK 3: FOR F=20 TO 8 STEP -
2: PLOT 74,F: DRAW 12,0: NEXT F
1630 INK 7
1640 PRINT INK 6;AT 20,11;" "
1650 PRINT BRIGHT 1; INK 4;AT 19
,23;" ";AT 20,23;" "
1900 RETURN
2500 REM Dam breached.
2510 LET w=256+(PEEK 29493)+(PEE
K 29492)
2520 LET w1=w-22528
2530 LET w2=w1/32
2532 GO SUB 9200
2535 OVER 1: INK 1
2537 BEEP 1,0
2540 PRINT AT w2,2;" "
2550 FOR f=w2+1 TO 21: BEEP .1,f

```

```

-10: PRINT AT f,3;" ";NEXT f
2560 FOR f=30 TO #3-1 STEP -1: B
EEP .1,f-20: BEEP .05,RND#20-20:
PRINT AT f,4;" "
      NEXT f
2570 OVER 0: INK 7
2580 FOR f=1 TO 300: NEXT f
30 CLS
2600 PRINT " " The dam has been
breached" " and the town has
been flooded."
2610 GO SUB 5000
2620 GO SUB 5060
2630 GO TO 211
3000 REM para's landed.
3010 CLS
3020 LET l=USR x
3022 LET l=USR x
3025 CLS
3030 PRINT " " 40 para's have
landed" " and have blown up t
he town" " and the dam."
3040 GO SUB 5000
3050 GO SUB 5060
3060 GO TO 211
3500 REM copter shield gone.
3510 CLS
3520 LET l=USR x
3522 LET l=USR x
3525 CLS
3530 PRINT " " Your helicopter
has been" " destroyed."
" " The dam and the town have "
" " been blown up."
3540 GO SUB 5000
3550 GO SUB 5060
3560 GO TO 211
5000 REM score routine.
5005 LET sc=256*(PEEK 29491)+(PE
EK 29490)
5010 PRINT AT 12,3;"your score="
;sc
5020 IF sc>hs THEN FOR f=1 TO 20
: BEEP .01,f-10: BEEP .01,f: BEE
P .01,f+10: NEXT f: PRINT AT 14,
3;"which is a new high score."
LET hs=sc
5050 RETURN
5060 REM new game.
5070 PRINT AT 16,3;"Another game
(Y/N) ?"
5080 INPUT a$
5090 IF a$="y" OR a$="Y" THEN RE
TURN
5100 PRINT AT 18,3;"Thank you fo
r playing."
5110 STOP
9000 REM choose skill
      level.
9010 CLS
9015 FOR f=1 TO 5: BEEP .01,f: B
EEP .01,f-1: PRINT AT f+5,4;f: N
EXT f: PRINT AT 6,5;"....Easy";A
T 10,5;"....Hard"
9020 PRINT AT 3,3;"Please choose
skill level."
9030 INPUT l
9040 IF l<1 OR l>5 THEN GO TO 90
30
9050 IF l=1 THEN POKE fi,90
9055 IF l=2 THEN POKE fi,80
9060 IF l=3 THEN POKE fi,75
9065 IF l=4 THEN POKE fi,65
9070 IF l=5 THEN POKE fi,60
9100 RETURN
9200 FOR f=5 TO 18: BEEP .01,f+1
0: BEEP .01,f: BEEP .01,f-10: PR
INT AT f,8;" "
      NEXT f: PRINT AT 4,0;" "
9210 RETURN
9900 SAVE "para" LINE 9910: SAVE
"mc"CODE 29500,2700: STOP
9910 LOAD "mc"CODE 29500,2700
9920 GO TO 150

```

GRAPHIC CHARACTERS.

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A----■ D----|| G----?
B----■ E----■ H----y,
C----■ F----■ I----?

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Worm Run — Dragon 32/64

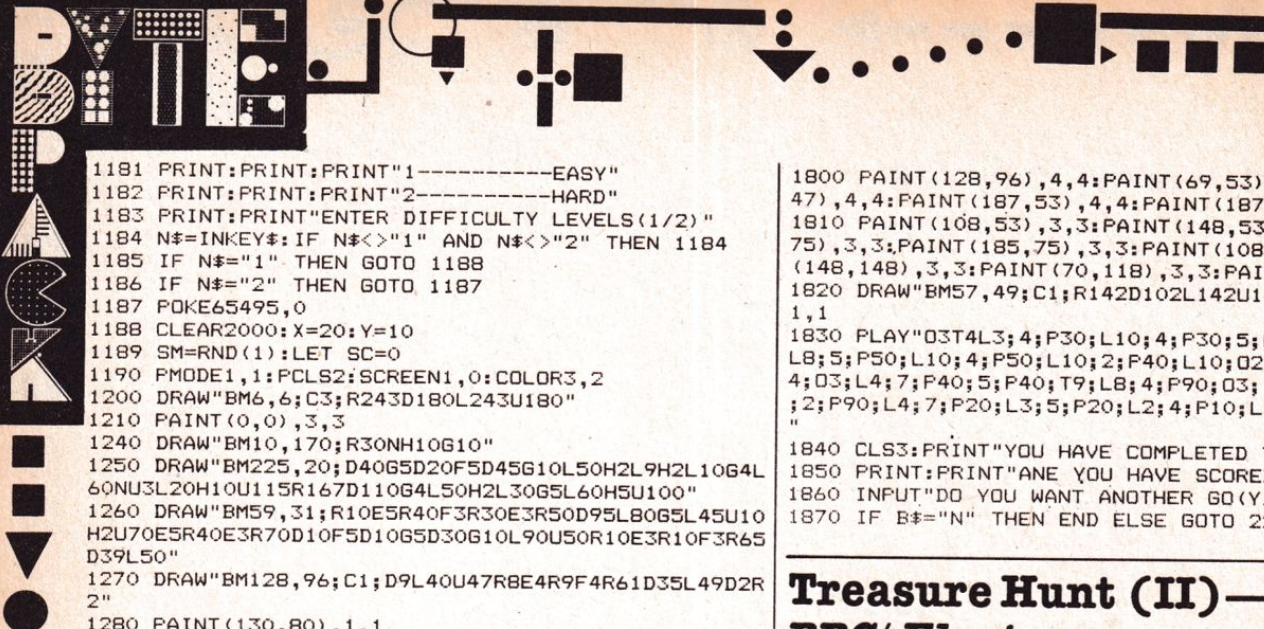
'Worm Run' consists of two games, both concerned with guiding a fast moving snake across your screen. The object of the first game is to eat as much fruit as possible whilst at the same time avoiding an assortment of obstacles placed in your way. In the second game you have to negotiate a tricky spiral

which is far from regular in shape.

The program provides ample instructions for playing either game and affords two levels of difficulty. Bearing in mind that no joystick option has been provided both games rely heavily upon the kind of digital dexterity that arcade professionals have.

```
4 REM **** BYTE PACK ****
5 REM **** DEC 1984 ****
10 PMODE3,1:PCLS2:SCREEN1,0
20 DRAW"BM75,107C4R68NE18L68L14G18D12F15R82":CIRCL
E(105,80),100,4,.8,.96,.2:CIRCLE(178,70),24,4,1.3,
.4,0
30 PAINT(178,80),4,4
40 CIRCLE(190,65),5,1,1.5:CIRCLE(169,65),5,1,1.5:P
AINT(169,65),1,1:PAINT(190,65),1,1:CIRCLE(190,65),
2,2:CIRCLE(169,65),2,2
50 CIRCLE(180,78),10,1,.5,0,.5
60 DRAW"BM5,5;C3;R5F20E10F10E20R5G25H10G10H25"
70 PAINT(10,7),3,3
80 DRAW"BM90,5;C3;R30G25L30E25BM92,10;R15G15L15E15
"
90 PAINT(95,6),3,3
100 DRAW"BM140,5;C3;R25G10L18F15L9H11G12L5E25BM143
,9;R12G3L12E3"
110 PAINT(142,6),3,3
130 DRAW"BM190,5;C3;R3F10E10R3F25L6H20L2G10H10L3G2
0L5E25"
140 PAINT(192,6),3,3
150 DRAW"BM63,165;C3;R25G10L18F15L9H11G11L6E25BM66
,169;R12G3L12E3"
160 PAINT(64,166),3,3
170 DRAW"BM115,165;C3;R5G20R25E20R5G25L37E25"
180 PAINT(115,166),3,3
190 DRAW"BM175,165;C3;R8F20E20R7G25L8H20G20L7E25"
200 PAINT(177,167),3,3
210 PLAY"D1V15ABP5ABP5L4GG6BL5"
220 CLS:PRINT"WHICH GAME WOULD YOU LIKE >GAME 1< O
R >GAME 2< (1/2)"
230 A$=INKEY$:IF A$<>"1" AND A$<>"2" THEN 230
240 IF A$="1" THEN GOTO 260
250 IF A$="2" THEN GOTO 1070
260 CLS:PRINT"DO YOU WANT INSTRUCTIONS FOR >GAM
E 1< (Y/N)
270 B$=INKEY$:IF B$<>"Y" AND B$<>"N" THEN 270
280 IF B$="Y" THEN GOTO 300
290 IF B$="N" THEN GOTO 361
300 CLS:PRINT@10,"INSTRUCTIONS";
310 PRINT:PRINT"THE OBJECT OF THIS GAME IS TO GI
DE YOUR WORM AROUND A SCREEN COVERED WITH OBSTACL
ES."
315 PRINT"IF YOU HIT ONE OF OBSTACLES OR THE SIDE
S OF THE SCREEN YOU ARE DEAD AND THE GAME IS OVER."
320 PRINT"BUT THERE IS ALSO FOOD ON THE SCREEN W
HICH YOU MUST EAT TO SCORE POINTS."
330 PRINT"IF YOU EAT SO MUCH FOOD THE GAME WILL OR
TAMATICLY GET HARDER."
340 PRINT"YOU MOVE YOUR WORM BY USING THE KEYBOARD
"
350 PRINT@454,"hit a key to carry on"
355 IF INKEY$<>"A" THEN 355
360 IF INKEY$="A" THEN 361
361 CLS:PRINT@7,"DIFFICULTY LEVELS"
362 PRINT:PRINT:PRINT"1-----EASY"
363 PRINT:PRINT:PRINT"2-----HARD"
364 PRINT:PRINT:PRINT"ENTER(1/2)"
365 C$=INKEY$:IF C$<>"1" AND C$<>"2" THEN 365
366 IF C$="1" THEN GOTO 369
367 IF C$="2" THEN GOTO 368
368 POKE 65495,0
369 CLEAR 2000:X=128:Y=96
370 SM=RND(4):SC=0:ML=10
375 PMODE1,1:SCREEN1,0:PCLS2:COLOR4,2
380 DRAW"BM6,6;C4;R243D180L243U180"
390 PAINT(0,0),4,4
391 DRAW"BM10,170;E30"
392 DRAW"BM128,30;L50"
```

```
393 DRAW"BM170,170;H30"
394 DRAW"BM230,30;F10D10L10"
400 GOSUB 420:GOTO 490
410 REM PUT FOOD ON SCREEN
420 A=RND(240)+8:D=RND(178)+8
430 FOR M=1 TO RND(4)
440 IF PPOINT(A+M,D+M)=4 THEN 420
450 PSET(A+M,D+M,1)
460 SOUND 90,1
470 NEXT M
480 RETURN
490 ON SM GOTO 550,620,690,760
500 IF B$=CHR$(94) THEN 550
510 IF B$=CHR$(10) THEN 620
520 IF B$=CHR$(8) THEN 690
530 IF B$=CHR$(9) THEN 760
540 GOTO 500
550 B$=INKEY$:IF B$=CHR$(10) OR B$="" THEN Y=Y-2 E
LSE 500
560 IF PPOINT(X,Y)=4 THEN 840
570 IF PPOINT(X,Y)=1 THEN GOSUB 960
580 PSET(X,Y,4)
610 GOTO 550
620 B$=INKEY$:IF B$=CHR$(94) OR B$="" THEN Y=Y+2 E
LSE 500
630 IF PPOINT(X,Y)=4 THEN 840
640 IF PPOINT(X,Y)=1 THEN GOSUB 960
650 PSET(X,Y,4)
680 GOTO 620
690 B$=INKEY$:IF B$=CHR$(9) OR B$="" THEN X=X-2 EL
SE 500
700 IF PPOINT(X,Y)=4 THEN 840
710 IF PPOINT(X,Y)=1 THEN GOSUB 960
720 PSET(X,Y,4)
750 GOTO 690
760 B$=INKEY$:IF B$=CHR$(8) OR B$="" THEN X=X+2 EL
SE 500
770 IF PPOINT(X,Y)=4 THEN 840
780 IF PPOINT(X,Y)=1 THEN GOSUB 960
790 PSET(X,Y,4)
820 GOTO 760
830 REM PRINT SCORES
840 FOR Z=0 TO 250:NEXT Z
850 PMODE3,1:PCLS:SCREEN1,1:COLOR3
860 DRAW"BM110,180;U80L50U30R50U50R30D50R50D30L50D
80L30"
870 PAINT(121,170),3,3
880 COLOR 1
890 DRAW"BM70,93;U16R10DBL10FB"
900 DRAW"BM125,93;R5L10R5U16R5L11"
910 DRAW"BM170,93;U16R10DBL10"
915 POKE 65494,0
920 PLAY"D1V31T2L4GGL8GGL4B-AA6GF+G"
930 CLS3:PRINT@130,"YOU DIED!!";
940 PRINT@193,"YOU SCORED"S"POINTS."
950 INPUT"DO YOU WANT ANOTHER GO(Y/N)";K$:IF LEFT$
(K$,1)<>"N" THEN 960 ELSE END
960 REM SEARCH FOR FOOD
970 FOR B=-2 TO 2
980 FOR V=-2 TO 2
990 IF PPOINT(B+X,V+Y)=1 THEN 1000 ELSE 1030
1000 SOUND 200,1
1010 S=S+6
1020 PRESET(B+X,V+Y,2)
1030 NEXT V,B
1040 GOSUB 420
1050 ML=ML+1
1060 RETURN
1070 CLS:PRINT"DO YOU WANT INSTRUCTIONS FOR >GA
ME 2< (Y/N)"
1080 G$=INKEY$:IF G$<>"Y" AND G$<>"N" THEN 1080
1090 IF G$="Y" THEN 1110
1100 IF G$="N" THEN 1180
1110 CLS:PRINT@10,"INSTRUCTIONS"
1120 PRINT"THE OBJECT OF THE GAME IS TO GET TO THE
MIDDLE OF THE SPIRAL."
1130 PRINT"TO DO THIS JUST USE THE ARROW KEYS."
1140 PRINT"IF YOU TOUCH THE SIDES OF THE SPIRAL
OR ANY OBSTACLES THEN YOU ARE DEAD."
1141 PRINT"THERE IS AN ARROW AT THE BOTTOM LEFT.TH
IS IS SHOWING YOU THE WAY TO GO."
1150 PRINT@452,"press a key to continue"
1160 E$=INKEY$:IF E$<>"A" THEN 1160
1170 IF E$="A" THEN GOTO 1180
1180 CLS:PRINT@7,"DIFFICULTY LEVELS"
```

```
1181 PRINT:PRINT:PRINT"1-----EASY"
1182 PRINT:PRINT:PRINT"2-----HARD"
1183 PRINT:PRINT"ENTER DIFFICULTY LEVELS(1/2)"
1184 N$=INKEY$:IF N$<>"1" AND N$<>"2" THEN 1184
1185 IF N$="1" THEN GOTO 1188
1186 IF N$="2" THEN GOTO 1187
1187 POKE65495,0
1188 CLEAR2000:X=20:Y=10
1189 SM=RND(1):LET SC=0
1190 FMODE1,1:PCLS2:SCREEN1,0:COLOR3,2
1200 DRAW"BM6,6;C3;R243D180L243U180"
1210 PAINT(0,0),3,3
1240 DRAW"BM10,170;R30NH10G10"
1250 DRAW"BM225,20;D40G5D20F5D45G10L50H2L9H2L10G4L
60NU3L20H10U115R167D110G4L50H2L30G5L60H5U100"
1260 DRAW"BM59,31;R10E5R40F3R30E3R50D95L80G5L45U10
H2U70E5R40E3R70D10F5D10G5D30G10L90U50R10E3R10F3R65
D39L50"
1270 DRAW"BM128,96;C1;D9L40U47R8E4R9F4R61D35L49D2R
2"
1280 PAINT(130,80),1,1
1290 ON SM GOTO 1500,1400,1450,1550
1300 IF B$=CHR$(94) THEN 1350
1310 IF B$=CHR$(10) THEN 1400
1320 IF B$=CHR$(8) THEN 1450
1330 IF B$=CHR$(9) THEN 1500
1340 GOTO 1300
1350 B$=INKEY$:IF B$=CHR$(10) OR B$="". THEN Y=Y-2
ELSE 1300
1360 IF PPOINT(X,Y)=3 THEN 1550
1370 IF PPOINT(X,Y)=1 THEN 1700
1380 PSET(X,Y,3)
1390 GOTO 1350
1400 B$=INKEY$:IF B$=CHR$(94) OR B$="" THEN Y=Y+2
ELSE 1300
1410 IF PPOINT(X,Y)=3 THEN 1550
1420 IF PPOINT(X,Y)=1 THEN 1700
1430 PSET(X,Y,3)
1440 GOTO 1400
1450 B$=INKEY$:IF B$=CHR$(9) OR B$="" THEN X=X-2 E
LSE 1300
1460 IF PPOINT(X,Y)=3 THEN 1550
1470 IF PPOINT(X,Y)=1 THEN 1700
1480 PSET(X,Y,3)
1490 GOTO 1450
1500 B$=INKEY$:IF B$=CHR$(8) OR B$="" THEN X=X+2 E
LSE 1300
1510 IF PPOINT(X,Y)=3 THEN 1550
1515 LET SC=SC+1
1520 IF PPOINT(X,Y)=1 THEN 1700
1530 PSET(X,Y,3)
1540 GOTO 1500
1545 IF D$<>X OR D$<>Y THEN LET SC=SC+1
1550 FOR Z=0 TO 250:NEXT Z
1551 FMODE3,1:PCLS:SCREEN1,1
1560 COLOR 3
1570 DRAW"BM110,180;UB0L50U30R50U50R30D50R50D30L50
DB0L30"
1580 PAINT(121,170),3,3
1590 COLOR1
1600 DRAW"BM70,93;U16R10DBL10FB"
1610 DRAW"BM125,93;R5L10R5U16R5L12"
1620 DRAW"BM170,93;U16R10DBL10"
1630 POKE65494,0
1640 PLAY"D1V31T2L46GL86GL4B-AA6GF+G"
1650 CLS3:PRINT@130,"YOU DIED!"
1660 PRINT"YOU SCORED"SC"POINTS."
1670 INPUT"DO YOU WANT ANOTHER GO(Y/N)";B$
1680 IF B$="N" THEN END ELSE GOTO 220
1700 FOR C=1 TO 10
1705 SCREEN1,1
1710 PLAY"T200L45FED"
1720 SCREEN1,0
1730 PLAY"T230L50Q3DEL8001FGA"
1740 NEXT C
1750 LET SC=SC+500
1760 FMODE3,1:SCREEN1,0:PCLS2
1770 DRAW"BM118,50;C4;R20D40R60D20L60D40L20U40L60U
20R60U40;BM113,50;C3;D35H35R35;BM68,50;C4;F35L10H3
5R10"
1780 DRAW"BM58,85;C3;R25H25D25;BM58,115;R25G25U25;
BM58,150;C4;E35R10G35L10;BM113,150;C3;U35G35R35"
1790 DRAW"BM143,150;C3;U35F35L35;BM188,150;C4;H35R
10F35L10;BM198,140;C3;U25L25F25;BM198,85;L25E25D25
;BM198,50;C4;G35L10E35R10;BM143,50;C3;R35G35U35"
```

```
1800 PAINT(128,96),4,4:PAINT(69,53),4,4:PAINT(69,1
47),4,4:PAINT(187,53),4,4:PAINT(187,147),4,4
1810 PAINT(108,53),3,3:PAINT(148,53),3,3:PAINT(70,
75),3,3:PAINT(185,75),3,3:PAINT(108,148),3,3:PAINT
(148,148),3,3:PAINT(70,118),3,3:PAINT(185,118),3,3
1820 DRAW"BM57,49;C1;R142D102L142U102":PAINT(1,1),
1,1
1830 PLAY"D3T4L3;4;P30;L10;4;P30;5;P30;5;P5;4;P30;
L8;5;P50;L10;4;P50;L10;2;P40;L10;02;12;P40;L3;11;P
4;03;L4;7;P40;5;P40;T9;L8;4;P90;03;12;P90;03;5;P90
;2;P90;L4;7;P20;L3;5;P20;L2;4;P10;L2;2;02;L1;P5;12
"
1840 CLS3:PRINT"YOU HAVE COMPLETED THE GAME"
1850 PRINT:PRINT"ANE YOU HAVE SCORED"SC"POINTS."
1860 INPUT"DO YOU WANT ANOTHER GO(Y/N)";B$
1870 IF B$="N" THEN END ELSE GOTO 220
```

Treasure Hunt (II)— BBC/ Electron

This is the final part of an epic full-length text adventure. Your task, in case BYTE PACK II isn't handy, is to pick up ten items of treasure. In each location you have to pit your wits against the computer. If it proves to be your match you're done for. Clues as to how to succeed are given in the descriptions of each location.

A list of useful commands is not given as you should be able to work out what these are by studying procedure definitions and listings. In other words, the more you know about programming the greater your chances of finishing the adventure.

Procedures

1390-1550 Proc GO — tests user input
1560-1670 Proc GET — Tests to see whether you can take or get an object
1680-1790 Proc DROP — Tests to see whether an object may be

dropped

1800-1860 Proc KILL — Tests to see whether an object can be killed
1870-1980 Proc EXAM — Validates a statement beginning with examine
1990-2130 Proc CLI — Validates a climb command
2140-2190 Proc DRI — Validates a drink command
2210-2320 Proc DARK — Displays message in darkness
2330-2400 Proc SETUP — Defines variables and dimensions arrays
2410-2480 Proc READATE — Reads data for object names and positions
2490-2590 Proc INS — Displays instructions
2600-2610 Data to be read in

```
LIST 1381,
1381 REM **** BYTE PACK ****
1382 REM **** DEC 1984 ****
1383 REM **** PART TWO ****
1390 DEFPROC GO
1400 IFRIGHT$(F$,4)="WEST"ANDPOX=49 OR RIGHT$(F$,
4)="EAST"ANDPOX=48THENPRINT" You walk straight in
to the river!The tremendous current whisks you a
way down stream whereby you are bashed against t
he jagged rocks!":END
1410 IFRIGHT$(F$,5)="NORTH"AND N%=1 THEN POX=POX+
10:P%=1
1420 IFRIGHT$(F$,5)="SOUTH"AND S%=1 THEN POX=POX-
10:P%=1
1430 IFRIGHT$(F$,4)="WEST" AND POX=22 AND QZ=2AND
DDZ=0 OR RIGHT$(F$,4)="EAST" AND POX=22 AND QZ=1AN
DDZ=0 THENPRINT" You had to cross right in front
of the dragon.Its powerful sense of smell awokeit
from its sleep,it then sent a huge "
1440 IFRIGHT$(F$,4)="WEST" AND POX=22 AND QZ=2AND
DDZ=0 OR RIGHT$(F$,4)="EAST" AND POX=22 AND QZ=1AN
DDZ=0 THENPRINT" jet of flame directly at you and
you were fried to a crisp!":END
1450 IFRIGHT$(F$,4)="WEST"AND W%=1 THEN POX=POX-1
:P%=1
1460 IFRIGHT$(F$,4)="EAST"AND E%=1 THEN POX=POX+1
:P%=1
1470 IFRIGHT$(F$,2)="UP"AND U%=1 THEN POX=POX-1:P
%=1
```


Cumana, now the best name in sight.

Cumana, the best name in memory for a range of disk drives, now introduce the first of a new range of computer products. A low cost and fully guaranteed graphic plotting aid for the BBC Micro. This compact display cursor moving device simplifies programming with the touch of the stylus. The product comes complete with a programming instruction booklet and has uses in graphics, computer aided design, education and games.

- Mouse substitute
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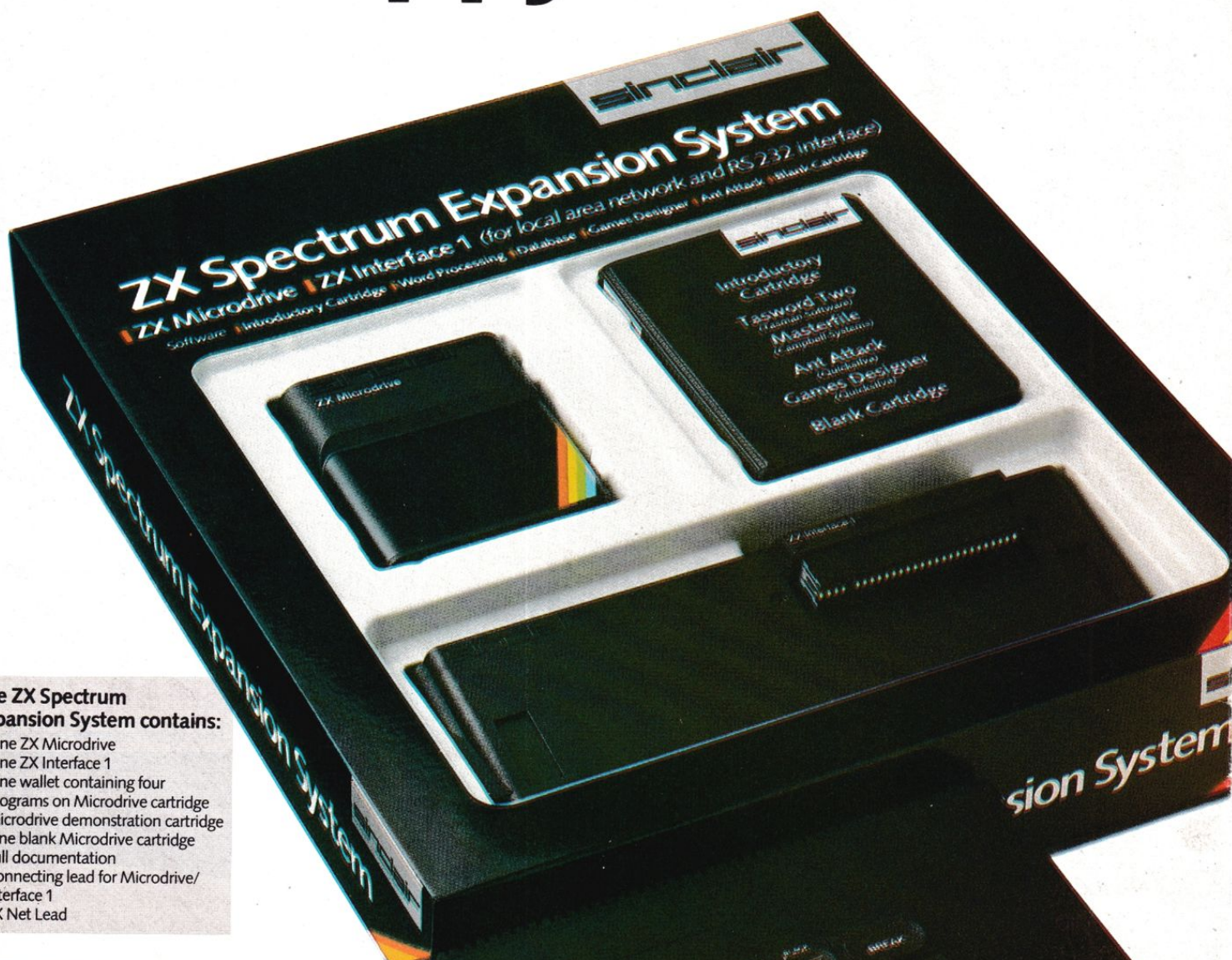


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The ZX Spectrum
Expansion System. Only £99.⁹⁵

Sinclair's complete alternative to floppy discs...



**The ZX Spectrum
Expansion System contains:**

- One ZX Microdrive
- One ZX Interface 1
- One wallet containing four programs on Microdrive cartridge
- Microdrive demonstration cartridge
- One blank Microdrive cartridge
- Full documentation
- Connecting lead for Microdrive/Interface 1
- ZX Net Lead

The new ZX Spectrum +

Fully compatible with all Spectrum software and peripherals, including this Expansion System



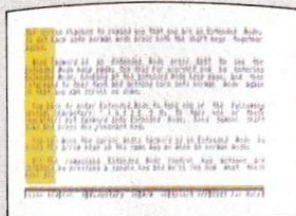
Tasword Two word processor

Turns your ZX Spectrum into a high-quality word processor!

Tasword Two has all the essential features of professional word processing packages – move and copy, insert, margin settings, 'help' pages, find and replace, and much more.

Written by Tasman Software Ltd.

Usual price (RRP): £13.90.



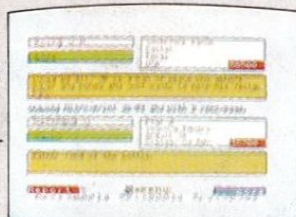
Masterfile filing system

Address lists...personal files...stock inventories...stamp or album collections...club records...recipes...if you can file it, you can Masterfile it!

Masterfile is a menu-driven filing and retrieval system of immense power. Display formats are user-defined, so the range of applications is enormous.

Written by Campbell Systems Ltd.

Usual price (RRP): £16.95.



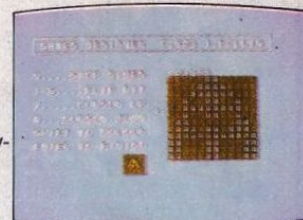
Games Designer

Now, all you need to create original games are original ideas – and Games Designer! It has eight, very different, pre-programmed games for you to play as they are – or modify out of all recognition!

There's never before been an easier, more enjoyable, way into games design.

Written by Quicksilver Ltd.

Usual price (RRP): £14.95.

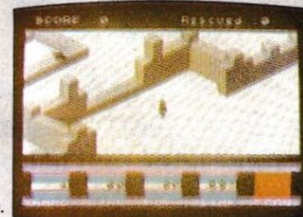


Ant Attack

The all-time classic 3D strategy game. Ant Attack combines stunning Escher-like graphics with fast-moving action and a real tactical challenge.

Your task is to enter the walled city, seek out your captured partner, and escape. At all times you can choose from four angles of view. But beware: the city is patrolled by giant ants...

Written by Quicksilver Ltd. Usual price (RRP): £6.95.



All programs run on a 48K Spectrum or Spectrum+. Recommended retail prices are for each program on cassette.

...includes this great set of Microdrive programs!



The unique ZX Microdrive system sets the Spectrum apart from all other home computers.

It gives you all the advantages of floppy disc drives – at a fraction of the cost. And tests show the Microdrives are faster than some disc drives.

Now, the complete Microdrive system comes in one package – together with four of the best-ever Spectrum programs, on Microdrive cartridges.

This software alone would normally cost you over £50.

Yet the Sinclair price for the complete ZX Spectrum Expansion Pack is just £99.95!

You'll find full details of its contents in the panel opposite.

ZX Microdrives – another Sinclair first!

The ZX Microdrive is a revolutionary fast access/mass storage device. And it's the only truly affordable alternative to disc drives ...

- Loads or saves up to 85K of program or data from Microdrive cartridges.

- Just 3.5 seconds to access a typical file.

- Only 9 seconds to load a typical 48K program.

The ZX Microdrive cartridge – a unique storage medium.

Smaller than a matchbox, the ZX Microdrive cartridge packs in a massive amount of data and programs.

Each Microdrive cartridge holds at least 85K bytes of data or programs (that's 30 pages of A4 text). And you can store up to 50 different data files per cartridge, identified by titles of your choice.

Every cartridge comes in its own protective case. Simply remove the cartridge, slot it into the Microdrive, and it's ready to use.

ZX Interface 1 – adds powerful new capabilities to your Spectrum.

ZX Interface 1 connects to the back of your Spectrum and controls up to 8 Microdrives. (Additional Microdrives are available for £49.95 each.)

It also gives you:

- An RS 232 interface – to link your Spectrum with full-size printers, other

computers using RS 232 (the industry-standard interface) and provide data transmission over telephone lines, via modems.

- ZX Net – lets you set up a local area network of up to 64 Spectrums, for high-speed data communications between you and Spectrum-owning friends.

At your local Sinclair stockist – today!

The ZX Spectrum Expansion System adds an exciting new dimension to Spectrum and Spectrum+ computing. At £99.95 it's superb value too.

To find out more, call in at your local Sinclair stockist now!

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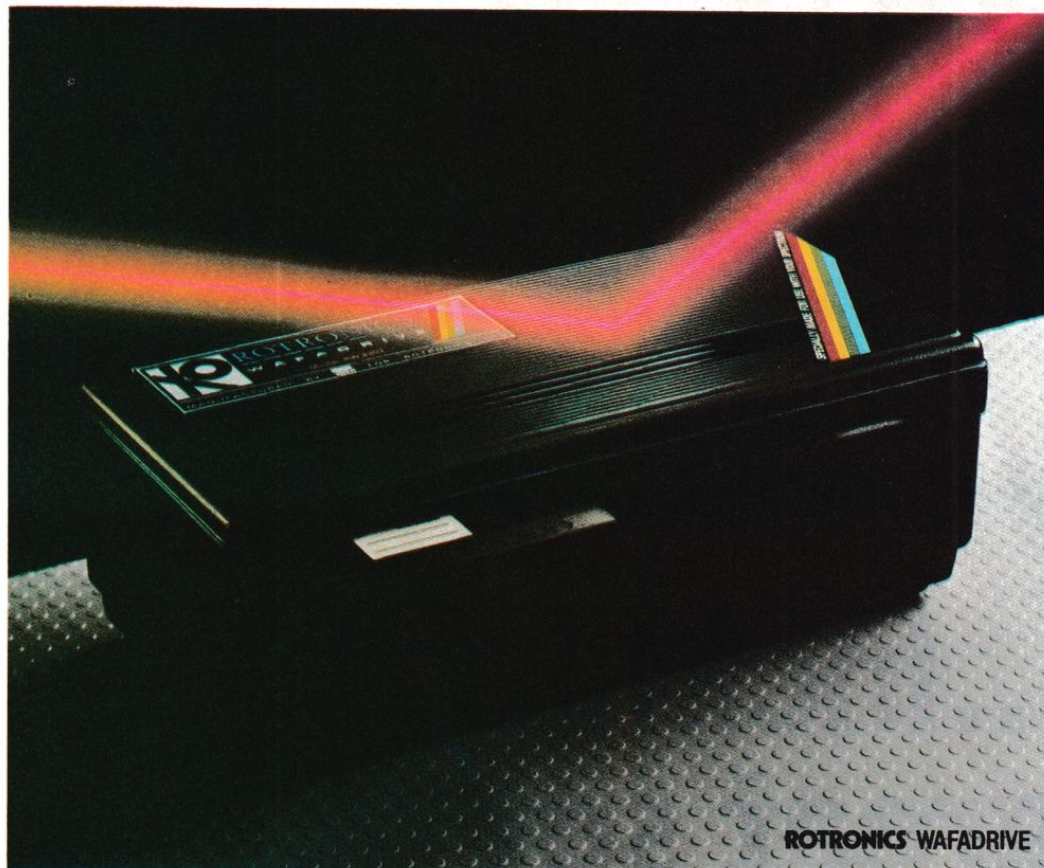
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sinclair



How much would you expect to pay for a dual 128K fast access storage system for your Spectrum that included Centronics and RS232 interfaces and free word processing software as standard?

Chances are it's a lot more than £129.95. But this is what will buy you the incredible Rotronics Wafadrive unit. There are no extras - this price includes VAT and postage.



ROTRO... WAFADRI...

A fast reliable dual-drive storage system

Integrated System

The Wafadrive is a complete system which contains the micro interface, two 128K drives, RS232 and Centronics ports, all in one attractively-styled, compact unit. There is a minimum of connecting leads and no extra boxes to clutter the desk top. Like the majority of professional systems, the units are dual drive. This offers the optimum balance between system flexibility and cost. Built-in serial and parallel interfaces allow the direct connection of just about any popular printer.

Fast and Reliable

The Wafadrive achieves very fast loading and saving, but not at the expense of reliability. Extensive research and the use of high grade materials ensure that the Wafadrive will give years of dependable operation. Data

integrity is on a par with floppy disk. The fully interchangeable wafers are available in three sizes - 128K, 64K and 16K. Low capacity wafers give faster access. They are therefore most suitable for program development applications. The high capacity wafers are suitable for more general data storage. Loading rate is well over ten

times as fast as cassette!

Software

Armed with the comprehensive user manual, blank wafer and word processor supplied, you can use your Wafadrive straight away. There is also a rapidly growing range of software to enable the programmer and

games player to exploit the Wafadrive system to the full.

Wafadrive for the 16/48K Spectrum is available now. Versions for other popular home computers are under development.

Send a 16p stamp for a full colour brochure and information on software and accessories.

FOR USE WITH THE SINCLAIR SPECTRUM

Please send me (enter as appropriate):

- | | |
|---|----------------|
| — ROTRONICS Spectrum Wafadrive(s) | @ £129.95 each |
| — 16K wafer(s) | @ £3.45 each |
| — 64K wafer(s) | @ £3.65 each |
| — 128K wafer(s) | @ £3.95 each |
| — Heathrow/Nightflite II (48K: Hewson) | @ £14.95 each |
| — Space Wars/Seiddab Attack/Luna Attack (48K: Hewson) | @ £14.95 each |
| — Bear Bovver/Wong's Loopy Laundry/World Cup (48K: Artic) | @ £9.95 each |
| — Starbike (48K: Softek) | @ £7.95 each |
| — The Artist - graphic utility (48K: Softek) | @ £9.95 each |
| — ZAP machine code development package (48K: Hewson) | @ £19.95 each |
| — RS232 lead | @ £9.95 each |
| — Centronics lead | @ £9.95 each |

All prices include VAT and P&P

TOTAL £

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WM/12/84

Send to (no stamp required): **SMT, FREEPOST, Greens Norton, Towcester, Northants, NN12 8BR**

Please allow 28 days for delivery.



SMT


```

1480 IFRIGHT$(F$,4)="DOWN"AND D%=1 AND PO%=32 THE
N PO%=33:P%=1
1490 IFRIGHT$(F$,4)="DOWN"AND D%=1 AND PO%=80 THE
N PO%=70:P%=1
1500 IFRIGHT$(F$,4)="DOWN"AND D%=1 AND PO%=69 THE
N PO%=68:P%=1
1510 IFRIGHT$(F$,2)="UP"AND U%=1 AND PO%=67 THEN
PO%=69:P%=1
1520 IFF$="GO UP" AND OB$(8)=32 AND PO%=32 THEN O
B$(8)=-1
1530 IFRIGHT$(F$,5)="STUMP"AND PO%=70 AND TC%=1 T
HEN PO%=69:P%=1
1540 IFF%<>1 THENPRINT"CHR$134"You can't go that
way!":P%=3:ENDPROC
1550 ENDPROC
1560 DEFPROCGET
1570 IFC%=6 THENPRINT" You can't carry any more!
":P%=3:ENDPROC
1580 V%=0
1590 FORI%=1TO23
1600 IFF$="GET "+OB$(I%) AND OB$(I%)=PO% OR F$="T
AKE "+OB$(I%) AND OB$(I%)=PO% THEN OB$(I%)=0:P%=2:
V%=I:I%=23:C%=C%+1
1610 NEXT
1620 IF RIGHT$(F$,4)="TREE"THENPRINT" What on ear
th would you do with a tree? You can't carry one a
nyway.":P%=3
1630 IFFO%=32 AND V%=9 AND OB$(16)=-1 THEN OB$(16
)=32:P%=1
1640 IFFO%=50AND V%>13 THEN SC%=SC%-1
1650 IFFO%=32 AND V%=8 THEN D%=1:P%=1
1660 IFFO%=40 AND C%>2 THEN P%=1
1670 ENDPROC
1680 DEFPROCDROP
1690 IFC%=0 THENPRINT" You aren't carrying anyth
ing!":P%=3:ENDPROC
1700 V%=0
1710 FORI%=1TO23
1720 IFF$="DROP "+OB$(I%) AND OB$(I%)=0 OR F$="LE
AVE"+OB$(I%) AND OB$(I%)=0 THEN OB$(I%)=PO%:P%=2:V
%=I:I%=23:C%=C%-1
1730 NEXT
1740 IFF%<>2 THENPRINT" You haven't got it to dro
p!":P%=3
1750 IFFO%=50AND V%>13 THEN SC%=SC%+1
1760 IFFO%=32AND V%=8 THEN D%=0:P%=1
1770 IFF$="DROP ALE"ANDPO%=51ANDOB$(2)=51 THEN BR
%=1:PRINT" Scarcely had you put down the ale when
the old man grabs it and empties it of its co
ntents, half of it spilling on the ground. Thank y
e kindly sir! "
1780 IFF$="DROP ALE"ANDPO%=51ANDOB$(2)=51 THEN BR
%=1:PRINT" To your astonishment he produces a small
well cut gem from a pocket and places it in your ha
nd!":OB$(14)=0:OB$(2)=-1:C%=C%+1
1790 ENDPROC
1800 DEFPROCKILL
1810 IFRIGHT$(F$,6)="DRAGON" ANDDD%=0 ANDPO%=22 A
NDOB$(3)=0 THEN DD%=1:P%=1:OB$(23)=PO%ELSE IFRIGHT
$(F$,6)="DRAGON" AND DD%=0 ANDPO%=22 THENPRINT" Y
ou don't even penetrate the monsters skin! It turn
s and roasts you with a yellow jet of flame.":
END
1820 IFRIGHT$(F$,7)="WARRIOR" AND PO%=60 AND WD%=
0 THENGOTO2270
1830 IFRIGHT$(F$,3)="MAN" AND PO%=51 AND MD%=0 AN
D OB$(3)=0 THEN PRINT" You cruel thing, with one b
low you put him out of his misery!":MD%=1:P%=2
1840 IFRIGHT$(F$,3)="MAN" AND PO%=51 AND MD%=0 AN
D OB$(3)<>0 THEN PRINT" After a long battle you d
on't seem to have got anywhere.":P%=3
1850 IF DD%=1 AND WD%=1 AND MD%=1 THENPRINT" Rig
ht little murderer aren't we?":P%=3
1860 ENDPROC
1870 DEFPROCEXAM
1880 IFRIGHT$(F$,4)="TREE" AND PO%=49 AND RT%<2 T
HENPRINT" You find the marks were made from rope
scraping the bark off.":P%=2
1890 IFRIGHT$(F$,7)="WARRIOR" AND PO%=60 AND WD%=
1 AND OB$(18)<0 THENPRINT" To your amazement you
find a dagger with rubies cast into the handle!
":OB$(18)=PO%:P%=2
1900 IFRIGHT$(F$,7)="WARRIOR" AND PO%=60 AND WD%=
0 THENPRINT" He is not amused!":P%=3
1910 IFRIGHT$(F$,7)="WARRIOR" AND PO%>60 AND WD%

```

```

=0 THENPRINT" There aren't any warriors to examin
e!":P%=3
1920 IFRIGHT$(F$,3)="MAN" AND PO%=51 AND MD%=1 AN
D OB$(14)<0 THENPRINT" You find a small pricey ge
m in a pocket":OB$(14)=PO%:P%=2
1930 IFRIGHT$(F$,3)="MAN" AND PO%=51 AND MD%=0 OR
RIGHT$(F$,4)="BOOT" AND PO%=51 AND MD%=0 THENPRIN
T" The man shouts- 'Hey, what do you think you're
doing?':P%=3
1940 IFRIGHT$(F$,3)="MAN" AND PO%<>51 THENPRINT"
You can't see a man to examine!":P%=3
1950 IFRIGHT$(F$,4)="BOOT" AND PO%=51 AND MD%=1 A
ND OB$(22)>-1THENPRINT" Greedy, greedy! There is no
thing else in there.":P%=3
1960 IFRIGHT$(F$,4)="BOOT" AND PO%=51 AND MD%=1. A
ND OB$(22)<0 THENPRINT" To your astonishment you
find his shoe contains a secret compartment and in
it you find a magical ring of invisibility!":P%=
2:OB$(22)=PO%
1970 IF RIGHT$(F$,4)<>"TREE" AND RIGHT$(F$,4)<>"B
OOT" AND RIGHT$(F$,3)<>"MAN" AND RIGHT$(F$,7)<>"WA
RRIOR"THENP%=0
1980 ENDPROC
1990 DEFPROCCLI
2000 IFRIGHT$(F$,4)="ROPE" AND PO%=49 AND RT%=3 A
ND C%<3 THEN PO%=48:P%=2:PRINT" You make it acros
s by the skin of your teeth!":ENDPROC
2010 IFRIGHT$(F$,4)="ROPE" AND PO%<>49 AND PO%<>4
8 OR RIGHT$(F$,4)="ROPE" AND PO%=49 AND RT%=0 OR R
IGHT$(F$,4)="ROPE" AND PO%=48 AND RT%=0 THENPRINT"
There is no rope to climb!":P%=3:ENDPROC
2020 IFRIGHT$(F$,4)="ROPE" ANDPO%=49 ANDRT%=3 OR
RIGHT$(F$,4)="ROPE"ANDPO%=48 AND RT%=3 AND C%>3 T
HENPRINT" Your weight is too much for the rope ,
it snaps, you fall into the stream , get taken down
stream and bashed to pieces on a jagged rock.":END
2030 IFRIGHT$(F$,4)="ROPE" AND PO%=48 AND RT%=3 T
HEN PO%=49:P%=2:PRINT" You just make it across by
the skin of your teeth, as you reach the far bank
therope snapped and sailed down the stream, lost fo
rever!":OB$(1)=-1:RT%=0:ENDPROC
2040 IFRIGHT$(F$,4)="ROPE" AND PO%=48 AND RT%=2 O
R RIGHT$(F$,4)="ROPE" AND PO%=49 AND RT%=1 THEN PR
INT" You swing across the river tarzan style but h
it the far bank and slide into the stream to be wh
isked away by the current":
2050 IFRIGHT$(F$,4)="ROPE" AND PO%=48 AND RT%=2 O
R RIGHT$(F$,4)="ROPE" AND PO%=49 AND RT%=1 THEN PR
INT" and bashed against the jagged rocks downst
ream!":END
2060 IFRIGHT$(F$,4)="ROPE" AND RT%=2 AND PO%=49 O
R RIGHT$(F$,4)="ROPE" AND RT%=1 AND PO%=48 THENPRIN
T" You climb up the vertical rope but get nowhere
, especially not across the stream":P%=2:ENDPROC
2070 IFRIGHT$(F$,4)="ROPE" AND RT%=0 AND PO%=49 A
ND OB$(1)=0 THEN PRINT" You leap into the stream,
sail down with the currents and are bashed to piece
s on the jagged rocks!":END
2080 IFRIGHT$(F$,4)="TREE" AND PO%=70 AND TC%=0 A
ND OB$(4)<>0 THEN PO%=80:P%=1:ENDPROC
2090 IFRIGHT$(F$,4)="TREE" AND PO%=70 AND TC%=0 A
ND OB$(4)=0 THENPRINT" You reach about twenty fee
t up but then your chain mail lets you down and you
fall to your death!":END
2100 IFRIGHT$(F$,4)="TREE" AND PO%=70 AND TC%=1 T
HENPRINT" You can't climb a tree that has been
chopped down previously!":P%=2:ENDPROC
2110 IFRIGHT$(F$,4)="TREE" AND PO%<>48 AND PO%<>4
9 AND PO%<>70 THENPRINT" I'm sorry but if you rea
lly must climb a tree make sure you find one befor
e you start to climb!":P%=3:ENDPROC
2120 IFRIGHT$(F$,4)="TREE" AND PO%=48 OR RIGHT$(F
$,4)="TREE" AND PO%=49 THENPRINT" The tree is so
slippery, with no foot holds that you can't get a
nywhere.":P%=3
2130 ENDPROC
2140 DEFPROCRI
2150 IFRIGHT$(F$,5)="WATER" AND PO%=48 OR RIGHT$(
F$,5)="WATER" AND PO%=49 THENPRINT" You drink som
e and fall into an everlasting sleep!":END
2160 IFRIGHT$(F$,5)="WATER" AND PO%<>48 AND PO%<>
49 THENPRINT" You can't find any water to drink!
":P%=3
2170 IFRIGHT$(F$,3)="ALE" AND OB$(2)=0 THENPRINT"
You become giddy and find it very difficult

```



```

to walk in a straight line!":OB%(2)<>0 AND P%>3:Z%=Z%
-1:ENDPROC
2180 IFRIGHT$(F%,3)="ALE" AND OB%(2)<>0 THENPRINT
" You haven't got any to drink!":P%=3
2190 ENDPROC
2200 DEFPROCDAK
2210 PRINT " It is so dark in here that you cannot
find your way out,you wonder around for a while
trip over a rock and break your neck!":END
2220 Z%=0:PRINT CHR$(134)"You are carrying the foll
owing":FORI%=1TO23
2230 IFOB%(I%)=0 THENPRINTOB%(I%):".":Z%=1
2240 NEXT
2250 IFZ%=0 THENPRINT"Nothing!"
2260 GOTO910
2270 IF OB%(3)<>0 AND RND(10)>1 THENPRINT" You ha
d a long and bloody battle,but finally you were
defeated!":END
2280 IF OB%(3)<>0 THENPRINT" You had a long and b
loody battle but miraculously you managed to kil
l him with his own sword!":P%=1:WD%=1:Z%=GET$
2290 IF OB%(3)=0 AND OB%(22)<>0 AND RND(3)>1 THEN
PRINT" You had a vicious fight but it was not long
before he finished you off!":END
2300 IF OB%(3)=0 AND OB%(22)<>0 THENPRINT" You ha
d a long battle,your superior speed and agility
paid off and you killed him off with a nasty
slash across the chest.":P%=1:WD%=1:Z%=GET$
2310 IF OB%(3)=0 AND OB%(22)=0 THENPRINT" Althoug
h the warrior was much stronger than you the fact
he could only guess at your location paid off,and y
ou soon finished the battle with a nasty slash
across the chest.":P%=1:WD%=1:Z%=GET$
2320 GOTO1830
2330 DEFPROCSETUP
2340 SC%=0:DIMOB%(23):DIMOB$(23)
2350 DIMRE$(3):PO%=50
2360 LA%=0:TC%=0:RT%=0:K%=0
2370 LF%=0:RD%=0:OD%=0:H%=0:V%=0
2380 FT%=0:DD%=0:WD%=0:P%=0:Z%=0
2390 MD%=0:BR%=0:DM%=0:X%=0:C%=1
2400 ENDPROC
2410 DEFPROCREADATA
2420 RE$(1)="O.K."
2430 RE$(2)="I don't understand."
2440 RE$(3)="What is your next command?"
2450 FORI%=1TO23
2460 READOB%(I%),OB$(I%)
2470 NEXT
2480 ENDPROC
2490 DEFPROCINS
2500 CLS
2510 PRINTCHR$(130)CHR$(141):" TREASURE HUN
T":PRINTCHR$(130)CHR$(141):" TREASURE HUNT"
2520 PRINT" In this text only adventure you must
move around from location to location, solving
problems and overcoming hazards,gaining treasure
as you go along. There are ten treasures in all,once
you have"
2530 PRINT"found the ten and deposited them in th
e correct place your quest has come to an end."
2540 PRINT" To move around and such like you ente
r a series of short sentences commanding the comp
uter what to do, eg: GO NORTH would tell the com
puter to go to the location north of the presen
t location."
2550 PRINT" SCORE would display how many treasure
s you had found and deposited up to now."
2560 PRINT" Each time you arrive at a location th
e computer prints a message explaining what you
can see and where you can go. There are twenty
of these locations in all and many problems to ove
rcome."
2570 PRINT" Good luck! - Press a key to start."
2580 A$=GET$
2590 ENDPROC
2600 DATA32,ROPE,0,ALE,52,LONG SWORD,52,CHAIN MAI
L,52,SHIELD,33,DUSTY OLD LAMP,47,OIL FLASK,32,CARP
ET,32,FLOOR BOARD,69,RUSTY KEY,60,BATTLE AXE,80,NO
TE,40,TINDER BOX,-1,SMALL GEM,80,POT OF RUBIES,-1,
SILVER NECKLACE,47,GOLDEN BROACH
2610 DATA-1,MAGICAL DAGGER,33,GOLDEN LAMP,21,JEWEL
ENCRUSTED CROWN,68,SILVER CHEST,-1,RING OF INVISI
BILITY,-1,PILE OF GOLD PIECES

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Snake Wars — Amstrad CPC464

Combining arcade action with strategy, this game brings back memories of the lightning fast laser cycle race in the film, Tron. Named 'Snake Wars' because of the deadly serpentine trails you leave behind you, the object is to out-manoeuvre your opponent by heading him off so that he collides with the ever diminishing confines of the circuit. Of course, he's out to write you off as well.

The game is for two players, though you can nominate the computer as the opposition. It can be played with joysticks or on the keyboard with each combatant selecting a set of keys to control direction (up, down, left and right). Finally, scoring is based upon the time it takes to wipe out the other player. The less time you take the higher your score. Good luck and may the MCP be with you!

```

10 REM **** BYTE PACK ****
20 REM **** DEC 1984 ****
99 REM Snake Wars D. & B. Lewis 6/8/84
100 GOSUB 800
110 GOSUB 700
120 EVERY clock,1 GOSUB 300
129 REM Get moves & execute them
130 IF autoone THEN x=x1:y=y1:GOSUB 400:offx1=offx
:offy1=offy:GOTO 180
140 IF INKEY(up1)=pressed THEN offy1=2:offx1=0:GOT
O 180
150 IF INKEY(down1)=pressed THEN offy1=-2:offx1=0:
GOTO 180
160 IF INKEY(left1)=pressed THEN offx1=-4:offy1=0:
GOTO 180
170 IF INKEY(right1)=pressed THEN offx1=4:offy1=0
180 IF autotwo THEN x=x2:y=y2:GOSUB 400:offx2=offx
:offy2=offy:GOTO 230
190 IF INKEY(up2)=pressed THEN offy2=2:offx2=0:GOT
O 230
200 IF INKEY(down2)=pressed THEN offy2=-2:offx2=0:
GOTO 230
210 IF INKEY(left2)=pressed THEN offx2=-4:offy2=0:
GOTO 230
220 IF INKEY(right2)=pressed THEN offx2=4:offy2=0
230 x1=x1+offx1:y1=y1+offy1:x2=x2+offx2:y2=y2+offy
2
240 IF (TEST(x1,y1)<>8 OR TEST(x2,y2)<>8) THEN 500
250 SOUND 129,y1:SOUND 130,y2
260 PLOT x1,y1,2:PLOT x2,y2,3
270 GOTO 130
299 REM Count score down
300 score=score-1:IF score<10 THEN score=10
310 PEN 7:LOCATE 9,25:PRINT score;
320 RETURN
399 REM Computer opponent
400 offx=0:offy=0:offy3=0:IF RND<0.5 THEN b1=-4:b2
=4:b3=8 ELSE b1=4:b2=-4:
b3=-8
410 FOR offx3=b1 TO b2 STEP b3
420 IF (TEST(x+offx3,y+offy3)=8 AND offx=0) THEN
offy=offy3:offx=offx3:RETURN
430 NEXT offx3
440 offx3=0:IF RND<0.5 THEN a1=-2:a2=2:a3=4
ELSE a1=2:a2=-2:
a3=-4
450 FOR offy3=a1 TO a2 STEP a3
460 IF (TEST(x+offx3,y+offy3)=8 AND offy=0) THEN
offy=offy3:offx=offx3:RETURN
470 NEXT offy3
480 RETURN
499 REM Calculate scores
500 dummy=REMAIN(1):score=CINT(score/10)
510 IF (TEST(x1,y1)<>8 AND TEST(x2,y2)<>8) THEN PE
N 15:LOCATE 9,25:PRINT "DRAW!":GOTO 570
520 IF TEST(x1,y1)=8 THEN score1=score1+score:hit=
TEST(x2,y2):lost=2 ELSE score2=score
e2+score:hit=TEST(x1,y1):lost=1
530 PEN 15:LOCATE 2,25:PRINT "Player!":lost;
540 IF hit=2 THEN PRINT "has hit 1!";
550 IF hit=3 THEN PRINT "has hit 2!";
560 IF hit=5 THEN PRINT "hit Wall!";
570 IF (autoone AND autotwo) THEN FOR pause=1 TO 9
99:NEXT pause ELSE WHILE INKEY

```



```

$<>"" :WEND:WHILE INKEY$="" :WEND
580 IF (score1<100 AND score2<100) THEN 110
599 REM A winner !!!
600 PEN 14:LOCATE 1,25:IF score1>99 THEN PRINT "PL
AYER ONE HAS WON !"; ELSE PRINT "PLAY
ER TWO HAS WON !";
610 FOR N=0 TO 26:INK 0,n:INK 8,26-n:SOUND 1,n*9.8
:SOUND 2,255-n*9.8
620 NEXT n:INK 0,1:INK 8,13
630 WHILE INKEY$<>"" :WEND:WHILE INKEY$="" :WEND
640 RUN
699 REM New screen
700 CLS #2:ORIGIN 0,0,8,630,348,66:CLG 8:ORIGIN 8,
50,0,639,0,399
710 x1=150:y1=150:x2=490:y2=150:score=99
720 offx1=4:offy1=0:offx2=-4:offy2=0
730 PEN 2:LOCATE 7,24:PRINT score1
740 PEN 3:LOCATE 17,24:PRINT score2
750 PEN 7:LOCATE 9,25:PRINT score;
760 RETURN
799 REM Initialisation etc
800 MODE 0:RANDOMIZE TIME
810 WINDOW #1,1,20,3,25
820 WINDOW #2,1,20,25,25
830 PAPER #1,0:pressed=0
840 PEN 1:LOCATE 7,1:PRINT "Amstrad":LOCATE 5,2:PR
INT "Snake Wars"
850 play$="One":GOSUB 1000:IF press$="c" THEN auto
one=1 ELSE autoone=0:u
p1=up:down1=down:left1=left:right
t1=right
860 play$="Two":GOSUB 1000:IF press$="c" THEN auto
two=1 ELSE autotwo=0:u
p2=up:down2=down:left2=left:right
t2=right
870 CLS #1:PEN 14:LOCATE 5,15:PRINT "Press any key
",,, " OR fire button"
880 IF INKEY$="" THEN 880
890 clock=30+30*autoone+30*autotwo
900 PEN 2:LOCATE 1,23:PRINT "PLAYER ONE":LOCATE 2,
24:PRINT "SCORE";score1
910 PEN 3:LOCATE 11,23:PRINT "PLAYER TWO":LOCATE 1
2,24:PRINT "SCORE";score2
920 ORIGIN 0,0,0,639,356,58:CLG 5
930 RETURN
999 REM Choose i/p method
1000 CLS #1: PEN 11:LOCATE 1,7:PRINT "Player ";pl
ay$
1010 PEN 15:LOCATE 13,7:PRINT "J":LOCATE 13,8:PRIN
T "K":LOCATE 13,9:PRINT "C"
1020 PEN 6:LOCATE 14,7:PRINT "oystick":LOCATE 14,8
:PRINT "eyboard":LOCATE 14,9:PRINT "omputer"
1030 press$=INKEY$:IF (press$<>"j" AND press$<>"k"
AND press$<>"c") THEN 1030
1040 IF press$="c" THEN RETURN
1050 IF press$="k" THEN 1100
1060 PEN 9:LOCATE 2,15:PRINT "Press FIRE BUTTON"
1070 press$=INKEY$:IF (press$<>"X" AND press$<>"g"
) THEN 1070
1080 IF press$="X" THEN up=72:down=73:left=74:right
t=75 ELSE up=48:down
=49:left=50:right=51
1090 RETURN
1099 REM Which keys?
1100 PEN 9:PRINT:PRINT "Press key for"
1110 PEN 15:LOCATE 15,13:PRINT "UP ";:GOSUB 1200
:up=m
1120 PEN 15:LOCATE 15,14:PRINT "DOWN ";:GOSUB 1200
:down=m
1130 PEN 15:LOCATE 15,15:PRINT "LEFT ";:GOSUB 1200
:left=m
1140 PEN 15:LOCATE 15,16:PRINT "RIGHT";:GOSUB 1200
:right=m
1150 RETURN
1199 REM Value of key pressed
1200 press$=INKEY$:IF press$="" THEN 1200
1210 m=100
1220 FOR n=0 TO 79
1230 IF INKEY(n)=pressed THEN m=n
1240 NEXT n
1250 IF m=100 THEN 1220
1260 PEN 9:PRINT press$;
1270 IF INKEY(m)=pressed THEN 1270
1280 WHILE INKEY$<>"" :WEND
1290 RETURN

```

Mastermind—QL

Mastermind, a game where you have to deduce a particular pattern of coloured pegs, makes ideal material for one's computer. Once a pattern has been selected at random all the computer has to do is catalogue the state of play. This it does by telling you how many pegs of the right colour are in the right slot and how many are not. The rest is up to you.

This particular version has good graphics and 4 levels of difficulty.

Only masters of the subtle processes of elimination which the game demands will, with a bit of luck, win through to level 4 where you have no more than six attempts to deduce an arrangement of seven different colours.

```

100 CLEAR
110 REMark **** BYTEPACK ****
120 REMark **** DEC 1984 ****
190 PAPER 0 : INK 7
200 INK #0,0 : PAPER #0,6
210 SCALE 100,0,0
220 DIM temp(6),sl(4),tran$(6),mouse(4),param$(7)
230 begin
240 REMark *** main loop ***
250 CLS : CLS#0
255 STOP
260 DEFINE PROCEDURE main_loop
270 FOR x=1 TO dog : READ param$(x)
280 LET up = 4 : right=0 : near=0
290 LET try = 0 : in = 6
300 secret
310 screen
320 board
330 get
340 check1
350 show
360 END DEFINE main_loop
370 REMark *** draw board on screen ***
380 DEFINE PROCEDURE board
390 PAPER 0 : INK 7
400 POINT 45,0
410 LINE_R 0,0 TO 0,choice TO 40,0 TO 0,-choice
420 FOR x= 1 TO choice STEP 8
430 POINT 45,x
440 LINE_R 0,0 TO 40,0
450 END FOR x
460 FOR y = 50 TO 80 STEP 10
470 FOR t = 4 TO choice STEP 8
480 CIRCLE y,t,3
490 END FOR t
500 END FOR y
510 END DEFINE board
520 REMark *** get player colour choice ***
530 DEFINE PROCEDURE get
540 CLS #0
550 PRINT #0," go - ";try+1;" type in four colour
rs "
560 PRINT #0," and press ENTER ";
570 PRINT#0:PRINT#0
580 IF dog=6 THEN PRINT #0, "Possible colours- b,r
,g,m,c,y ";
590 IF dog=7 THEN PRINT#0, "Possible colours b,r,g
,m,c,y,w ";
600 INPUT #0,code$
610 trap
620 try=try+1
630 LET tran$=code$
640 INK 7: CURSOR 15,in,0,0
650 PRINT code$(1 TO 4)
660 swap
670 CLS #0
680 show
690 check1
700 END DEFINE get
710 REMark ** change colours to colour numbers ***
720 DEFINE PROCEDURE swap
730 FOR x=1 TO 4
740 IF tran$(x)="B" OR tran$(x)="b" THEN temp(x
)=1
750 IF tran$(x)="R" OR tran$(x)="r" THEN temp(x
)=2
760 IF tran$(x)="M" OR tran$(x)="m" THEN temp(x
)=3

```



```

770 IF tran$(x)="G" OR tran$(x)="g" THEN temp(
x)=4
780 IF tran$(x)="C" OR tran$(x)="c" THEN temp(x)
)=5
790 IF tran$(x)="Y" OR tran$(x)="y" THEN temp
(x)=6
800 IF tran$(x)="W" OR tran$(x)="w" THEN temp(
x)=7
810 END FOR x
820 END DEFine swap
830 REMark *** draw coloured pegs ***
840 DEFine PROCEDURE show
850 LET x=1
860 FOR A= 50 TO 80 STEP 10
870 INK temp(x)
880 FILL 1
890 CIRCLE A,up,3
900 FILL 0
910 x=x+1
920 END FOR A
930 up=up+8
940 END DEFine show
950 REMark *** get secret code ***
960 DEFine PROCEDURE secret
970 hid$=""
980 FOR x=1 TO 4
990 LET sl(x)=RND(1 TO dog)
1000 LET hid$=hid$&sl(x)
1010 END FOR x
1020 END DEFine secret
1030 DEFine PROCEDURE check1
1040 right=0
1050 FOR x=1 TO 4
1060 IF temp(x)=hid$(x) THEN right=right+1
1070 END FOR x
1080 check2
1090 END DEFine check1
1100 REMark *** check for white pegs ***
1110 DEFine PROCEDURE check2
1120 near=0
1130 LET rat$=hid$
1140 FOR x=1 TO 4
1150 FOR y=1 TO 4
1160 IF temp(x)<>rat$(y) THEN GO TO 1200
1170 near=near+1
1180 rat$(y)=0
1190 GO TO 1210
1200 END FOR y
1210 END FOR x
1220 near =near-right
1230 INK 7
1240 CURSOR 100,in,0,0
1250 PRINT right&" "&near
1260 IF right=4 THEN PAUSE 80 :win
1270 IF try=(choice/B) THEN PAUSE 80 :lose
1280 in=in+8
1290 get
1300 END DEFine check2
1310 REMark *** winner routine ***
1320 DEFine PROCEDURE win
1330 CLS
1340 PRINT :PRINT:PRINT
1350 FLASH 1
1360 CSIZE 3,1
1370 PRINT " WELL DONE "
1380 CSIZE 2,0
1390 PRINT " YOU FOUND THE CODE"
1400 FLASH 0
1410 more
1420 END DEFine win
1430 REMark *** set up screen headings ***
1440 DEFine PROCEDURE screen
1450 INK 7
1460 BLOCK 120,200,0,0,5
1470 BLOCK 218,200,230,0,5
1480 IF level=1 OR level=2 THEN
1490 BLOCK 130,40,100,0,5
1491 GO TO 1520
1500 ELSE
1510 BLOCK 130,104,100,0,5
1520 CURSOR 45,100,0,0
1530 CSIZE 3,0
1540 UNDER 1
1550 PRINT "MASTERMIND"
1560 UNDER 0
1570 CSIZE 0,0
1580 CURSOR 90,90,0,0
1590 PRINT "pos/col col/only"
1600 CURSOR 95,85,0,0
1610 UNDER 1
1620 PRINT "right right"
1630 UNDER 0
1640 CURSOR 18,90,0,0
1650 PRINT "your"
1660 CURSOR 12,85,0,0
1670 UNDER 1
1680 PRINT "choices"
1690 UNDER 0
1700 END DEFine screen
1710 REMark *** loser routine ***
1720 DEFine PROCEDURE lose
1730 INK 7
1740 CLS : CLS #0
1750 CURSOR 58,60,0,0
1760 PRINT "you lose "
1770 CURSOR 20,50,0,0
1780 PRINT "the correct combination was"
1790 INK 7
1800 A=50
1810 FOR x=1 TO 4
1820 INK hid$(x)
1830 A=A+10
1840 FILL 1
1850 CIRCLE A,30,4
1860 END FOR x
1870 FILL 0
1880 FOR x=1 TO 4
1890 IF hid$(x)="1" THEN hid$(x)="b"
1900 IF hid$(x)="2" THEN LET hid$(x)="r"
1910 IF hid$(x)="3" THEN LET hid$(x)="m"
1920 IF hid$(x)="4" THEN LET hid$(x)="g"
1930 IF hid$(x)="5" THEN LET hid$(x)="c"
1940 IF hid$(x)="6" THEN LET hid$(x)="y"
1950 IF hid$(x)="7" THEN LET hid$(x)="w"
1960 END FOR x
1970 CURSOR 58,20,0,0
1980 FOR x=1 TO 4
1990 PRINT hid$(x)!:
2000 END FOR x
2010 more
2020 END DEFine lose
2030 REMark *** ask if player wants ***
2040 REMark *** another game or to change level **
*
2050 DEFine PROCEDURE more
2060 CLS #0
2070 PRINT :PRINT:PRINT
2080 INK 7
2090 FLASH 1
2100 PRINT #0, " Press any key for another game"
\ " or ENTER to change level"
2110 FLASH 0
2120 A=CODE(INKEY$(-1))
2130 IF A=10 THEN
2140 begin
2150 main_loop
2160 ELSE
2170 RESTORE
2180 CLS : CLS #0
2190 main_loop
2200 END DEFine more
2210 REMark set up instructions
2220 REMark and get difficulty level
2230 DEFine PROCEDURE begin
2240 RESTORE
2250 MODE 4
2260 CSIZE 2,0
2270 UNDER 1
2280 AT 0,12 : PRINT "Mastermind"
2290 UNDER 0
2300 CSIZE 0,0
2310 PRINT " You have to guess the correct c
ombination of colours."
2320 PRINT: PRINT " There are 4 levels of diff
icultv -:"
2330 PRINT " 1 : Six possible colours and ten
attempts."
2340 PRINT " 2 : Seven possible colours and te
n attempts."
2350 PRINT " 3 : Six possible colours and six

```




```

attempts."
2360 PRINT "      4 : Seven possible colours and si
x attempts."
2370 PRINT:PRINT "      You are told whether-"
2380 PRINT "      1- The colour and position "
2390 PRINT "      are correct"
2400 PRINT "      or"
2410 PRINT "      2- if the colour only is correct.
"
2420 PRINT:PRINT:PRINT "      Possible colours in 1
evels 1 and 3 -: b,r,g,m,c,y"
2430 PRINT "      Possible colours in levels 2 and
4 -: b,r,g,m,c,y,w"
2440 PRINT #0, "      . Please put in your choice o
f difficulty "
2450 LET level=INKEY$(-1)
2460 IF level<1 OR level > 4 THEN GO TO 2440
2470 IF level = 1 THEN choice = 80 : dog = 6
2480 IF level = 2 THEN choice = 80 : dog = 7
2490 IF level = 3 THEN choice = 48 : dog = 6
2500 IF level = 4 THEN choice = 48 : dog = 7
2510 CLS #0 : PRINT #0, "      Press any key to play
"
2520 INPUT INKEY$(-1)
2530 CLS: CLS#0
2540 MODE 8
2550 CLS
2560 PAPER 0: INK 1
2570 main_loop
2580 END DEFine begin
2590 REMark check inputs for correct characters
2600 DEFine PROCedure trap
2610 IF LEN(code$)<> 4 THEN CLS #0:PRINT #0, "
put in four colours eg brgm,":PAUSE 120:CLS #0: GO
TO 550
2620 FOR y=1 TO 4
2630 FOR x=1 TO 7
2640 IF param$(x)<>code$(y) THEN
2650 NEXT x
2660 IF dog =6 : CLS #0:PRINT #0," only the 1
etters\" b,g,m,c,y,r are valid":PAUSE 120:CLS #0
: get
2670 IF dog =7 : CLS #0:PRINT #0," only the 1
etters\" b,g,m,c,y,r,w are valid":PAUSE 120:CLS
#0: get
2680 ELSE
2690 NEXT y
2700 END DEFine trap
2710 DATA "b","r","c","m","g","y","w"

```

Spectrum Windows

To get your Spectrum Windows to work you will be required to use the following machine code routine in the manner indicated last month.

Screen Save — Spectrum

Here's a short machine code routine that stores a screen display (including colour) in memory. Once saved the picture may then be recalled by a simple command. Because this routine is particularly useful an assembler listing of the code used has also been given.

```

10 CLEAR 58598
20 DATA 33,0,64,17,255,228,
1,0
21 DATA 27,237,176,201,33,
255,228,17
22 DATA 0,64,1,0,27,237,176,
201
25 FOR n = 58599 to 58622
30 READ a: POKE n,a: NEXT n
Having entered the program
RUN it, then type NEW. Finally,
save it using:
SAVE "screen" CODE 58599,24
To store a screen in memory
enter

```

```

RANDOMIZE USR 58599, and
to recall it,
RANDOMIZE USR 58611.
To save a stored screen to tape
enter:
SAVE "name" CODE 58623,
6912
The screen is saved from
address 58623 to 65535. The
routine is situated at 58599.
Those interested in how the
routine works may find it useful
to study the following assembler
listing.
5 ORG 58599
6 ENT 58599
10 LD HL, 16384
20 LD DE, 58623
30 LD BC, 6912
40 LDIR
50 RET
60 GET LD HL, 58623
70 LD DE, 16384
80 LD BC, 6912
100 RET

```

Monitor — CBM 64

The 64's BASIC is primitive when compared with those available on other machines. As a consequence the only way to exploit the Commodore's graphics and sound capabilities is to give up BASIC and start coding proper. To this end we include this simple but very effective machine code monitor.

The program will permit you to edit, save and load code, move and

display memory. All operations are provided as menu options so few difficulties will be encountered in running the program. Furthermore, as the monitor is written in BASIC and contains numerous REM statements it provides a valuable insight into the manner in which low and high level languages can be made to mesh together.

```

0 GOSUB 3000
1 DEV=1:BASE=16
3 DEFFNDEC(X)=X-48+(X>57)*7
4 POKE53280,14:POKE53281,14:POKE646,3
8 REM **** BYTE PACK ****
9 REM **** DEC 1984 ****
10 REM****CONTROL****
11 POKE646,0
20 PRINT "{CLR}":POKE198,0
30 PRINT "{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{
RHT}{RHT}{RHT}{RHT}{RVS}MONITOR 64{ DN}{ DN}"
40 PRINT "{RVS}{S}{OFF} SAVE MEMORY"
50 PRINT "{RVS}{L}{OFF} LOAD MEMORY"
60 PRINT "{RVS}{M}{OFF} MOVE MEMORY"
70 PRINT "{RVS}{F}{OFF} FILL MEMORY"
80 PRINT "{RVS}{R}{OFF} DISPLAY REGISTERS"
90 PRINT "{RVS}{A}{OFF} ALTER REGISTER VALUES"
100 PRINT "{RVS}{K}{OFF} DISPLAY MEMORY"
110 PRINT "{RVS}{D}{OFF} BASIC DATA"
115 PRINT "{RVS}{J}{OFF} MEMORY MODIFY"
125 PRINT "{RVS}{E}{OFF} EXECUTE MACHINE CODE"
130 PRINT "{RVS}{X}{OFF} EXIT PROGRAM"
140 INPUT "{ DN}{ DN}{ DN}{RVS}ENTER COMMAND:":CO$
150 N$=LEFT$(CO$,1)
160 IFN$=""THEN20
170 IFN$="S"THEN1510
180 IFN$="L"THEN1620
190 IFN$="M"THEN800
200 IFN$="F"THEN910
210 IFN$="R"THEN1010
220 IFN$="J"THEN1710
225 IFN$="A"THEN1100
235 IFN$="E"THEN1460
240 IFN$="K"THEN650
245 IFN$="D"THEN1880
250 IFN$="X"THENPOKE53280,6:PRINT "{CLR}{RVS}PROGRA
M ENDED":END
260 GOTO20
270 REM*****
280 REM PRESS ANY KEY
290 REM*****
295 POKE198,0
300 PRINT "{RVS}{ DN}{ DN}PRESS ANY KEY TO CONTINUE
"
310 GETCO$:IFCO$=""THEN310
320 RETURN
330 REM*****
340 REM START
350 REM*****
360 INPUT "{RVS}{CLR}{ DN}{ DN}{ DN}{ DN}{ DN}{ DN}{
DN}{ DN}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}START
ADDRESS:":SA
370 N=SA
380 IFN<0ORN>65535THEN360
390 RETURN
400 REM*****
410 REM FINISH
420 REM*****
430 INPUT "{RVS}{CLR}{ DN}{ DN}{ DN}{ DN}{ DN}{ DN}{
DN}{ DN}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}{RHT}FINIS
H ADDRESS:":EA
440 N=EA
450 IFN<0ORN>65535THEN430
460 RETURN
470 REM*****
480 REM HEX TO DECIMAL

```



```

1230 GOSUB270
1240 GOTO20
1460 REM*****
1470 REM EXECUTE M7C
1480 REM*****
1490 GOSUB330:SYS(SA):GOSUB270:GOTO20
1500 REM*****
1510 REM SAVE MEMORY
1520 REM*****
1530 GOSUB330:GOSUB400
1540 SYS49169,SA,EA
1550 GOSUB270
1560 GOTO20
1620 REM*****
1630 REM LOAD MEMORY
1640 REM*****
1650 SYS49152
1660 GOSUB270:GOTO20
1710 REM*****
1720 REM MEMORY MODIFY
1730 REM*****
1740 GOSUB330
1750 N=SA:GOSUB550
1760 PRINTH$TAB(10)"(SH 3)";P$=" "
1770 GOSUB2200
1780 SA=SA-1
1790 PRINTH$SPC(10);
1800 INPUT"(RVS)F(OFF),(RVS)B(OFF),(RVS)I(OFF),(RV
S)E(OFF)";T$:IN$=LEFT$(T$,2)
1810 IFIN$="F"THENSA=SA+1:GOTO1750
1820 IFIN$="B"ANDSA>0ANDSA<65535THENSA=SA-1:GOTO 1
750
1830 IFIN$="E"THEN20
1840 IFIN$("<")I"THEN1750
1850 INPUT"(RVS)INPUT BYTE<DEC.>";N%
1860 POKESA,N%
1870 GOTO1750
1880 REM*****
1890 REM CREATE DATA STATEMENTS
1900 REM*****
1902 S=0:E=0:LN=0
1905 INPUT"(CLR)(RVS)( DN)( DN)( DN)( DN)( DN)(RHT
)(RHT)(RHT)(RHT)START ADDRESS";S
1910 INPUT"(CLR)(RVS)( DN)( DN)( DN)( DN)( DN)(RHT
)(RHT)(RHT)(RHT)FINISH ADDRESS";E
1915 INPUT"(CLR)(RVS)( DN)( DN)( DN)( DN)( DN)(RHT
)(RHT)(RHT)(RHT)START LINE#";LN
1920 F=S+16:IFF$ETHENF=E
1925 PRINT"(CLR)"LN"DATA";
1930 FORI=STOF
1935 C=PEEK(I)
1940 C#=MID$(STR$(C),2)
1945 CK=CK+C
1950 PRINTC#;
1955 IFI<FTHENPRINT",";
1960 NEXT
1970 PRINT
1975 S=F
1980 IFS<ETHENPRINT"LN="LN+10":S="S+1":E="E":GOTO1
920"
1985 IFS=ETHENPRINT"LIST"
1990 POKE198,3
1992 POKE631,19
1995 POKE632,13:POKE633,13
1997 END
2200 REM*****
2210 REM BYTE INTO HEX
2220 REM*****
2230 N=PEEK(SA):SA=SA+1
2240 GOSUB550
2250 IFLEN(H$)<2THENH$="0"+H$
2260 P$=P$+H$
2270 RETURN
3000 DATA169,1,160,255,162,1,32,186,255,169,0,32,1
89,255,76,213
3010 DATA255,32,253,174,32,138,173,32,247,183,165,
20,133,254,165,21,133,255
3020 DATA32,253,174,32,138,173,32,247,183,169,1,16
0,255,162,1,32,186,255
3030 DATA169,0,32,189,255,169,254,166,20,164,21,76
,216,255
3040 FORA=49152TO49217
3050 READD:POKEA,D
3060 NEXT
3070 RETURN

```


Synth — Atmos/Oric 48K

This month we give machine coders a rest and concentrate on the Oric/Atmos's sound facilities. Whilst not up to BBC, Commodore or MSX standards the Oric has a reasonable range and this program amply demonstrates it.

Byte Packers will be able to dredge up a variety of vaguely musical sounds using the top two rows of the keyboard. Amplitude may be varied and four effects are obtainable: Cello, Chord, Whirl and Bass.

However, through no fault in the program, it is unlikely that even those who are not tone deaf will be able to distinguish which key plays what note, or whether any notes are in fact being played at all.

Nevertheless we strongly recommend this as the ideal tool for writing digital dirges for defunct Daleks — though we do appreciate that there is, today, little demand for such outside the Top Ten.

```

2 POKE 48035,0:PAPER5:INK7
3 REM ***** BYTE PACK ****
4 REM ***** DEC 1984 *****
5 CLS
7 CLS
10 PRINT CHR$(6):PRINT CHR$(17)
15 MUSIC2,7,12,0:PLAY0,0,0,0:CLS:PLOT2,1,"USE THE
TOP ROW OF"
18 PAPER5:INK7
20 PLOT 2,3,"THE KEYBOARD TO GO UP IN PITCH"
30 PLOT 2,5,"PRESS 'A' FOR DELAY,USE WHITH BASS"
40 PLOT 2,7,"PRESS 'B' FOR BASS. EFFECT"
50 PLOT 2,9,"PRESS 'S' FOR WHIRL EFFECT"
60 PLOT 2,11,"PRESS 'D' FOR CHELO EFFECT"
70 PLOT 2,13,"PRESS 'Z' TO END,(ALL WILL BE LOST)"

71 PLOT 2,15,"PRESS 'M' TO GOTO MENU"
72 PLOT 2,17,"PRESS 'C' FOR CHORD EFFECT"
73 PLOT 2,19,"WHEN PLAYING CHORD,USE THE SECOND R
OW OF THE KEYBOARD"
74 PLOT2,23,"PRESS 'F' TO CONTINUE":GETA$:IFA$="F
"THENGOTO50 ELSE GOTO 74
75 CLS:PAPER3:INK0:PLOT11,8,"ORIC-1 SYNTH"
76 PLOT 10,10,"-----"
77 PLOT 10,11,"| | | | | | | |"
78 PLOT 10,12,"| | | | | | | |"
79 PLOT 10,13,"| | | | | | | |"
80 PLOT 10,13,"-----"
82 PLOT 1,1,"TO SELECT OCTAVE 1 - 6 !"
83 PLOT 1,2,"PRESS G H J K L ; !"
84 PLOT1,3,"OCTAVE 1 2 3 4 5 6!"
85 PLOT1,4,"-----"
86 PLOT10,15,"WHIRL,CHORD,CHELO"
87 PLOT10,16,"PLAY THE NOTES"
88 PLOT10,22,"|C,C#|D,D#|E,F|F#|G,G#|"
89 PLOT10,23,"|A,A#|B":GOTO 97
90 CLS:PAPER4:INK7:PLOT6,10,"PRESS > TO TAKE LEN
GTH"
91 PLOT6,24,"PRESS 'X' TO CONTINUE"
92 PLOT6,11,"OF NOTE UP BY 50"
94 PLOT6,15,"PRESS < TO TAKE LENGTH"
96 PLOT6,16,"OF NOTE DOWN BY 50":GETA$:IFA$="X"TH
ENGOTO75 ELSE GOTO 96
97 GET A$
98 IF A$="M" THEN GOTO 15
100 IF A$="B" THEN GOTO 254
105 IF A$="S" THEN GOSUB 306
110 IF A$="D" THEN GOSUB 445
115 IF A$="C" THEN GOTO 650
120 IF A$="Z" THEN PAPER7:INK0:CLS:NEW:PRINT:PRIN
TCHR$(6):PRINTCHR$(17)
254 PLOT 15,20," ":PLOT 15,20,"BASS.":GOTO 255

```

```

255 GET A$
260 IF A$="1" THEN SOUND1,1000,15
265 IF A$="2" THEN SOUND1,900,15
270 IF A$="3" THEN SOUND1,800,15
275 IF A$="4" THEN SOUND1,700,15
280 IF A$="5" THEN SOUND1,600,15
285 IF A$="6" THEN SOUND1,550,15
290 IF A$="7" THEN SOUND1,500,15
293 IF A$="C" THEN SOUND1,9000,0:GOTO 650
295 IF A$="8" THEN SOUND1,400,15
296 IF A$="9" THEN SOUND1,300,15
297 IF A$="0" THEN SOUND1,200,15
298 IF A$="-" THEN SOUND1,180,15
299 IF A$="=" THEN SOUND1,140,15
300 IF A$="M" THEN SOUND1,9000,0:GOTO 15
301 IF A$="Z" THEN SOUND1,9000,0:GOTO 120
302 IF A$="S" THEN SOUND1,9000,0:GOTO 306
303 IF A$="D" THEN SOUND1,9000,0:GOTO 445
304 IF A$="A" THEN SOUND1,9000,0:GOTO 305
305 MUSIC2,2,5,6:PLAY3,0,4,230:GOTO 255
306 PLOT 15,20," ":PLOT15,20,"WHIRL"
308 GET A$
315 IF A$="1" THEN MUSIC2,C,1,12:PLAY2,4,4,V
320 IF A$="2" THEN MUSIC2,C,2,12:PLAY2,4,4,V
330 IF A$="3" THEN MUSIC2,C,3,12:PLAY2,4,4,V
340 IF A$="4" THEN MUSIC2,C,4,12:PLAY2,4,4,V
350 IF A$="5" THEN MUSIC2,C,5,12:PLAY2,4,4,V
360 IF A$="6" THEN MUSIC2,C,6,12:PLAY2,4,4,V
370 IF A$="7" THEN MUSIC2,C,7,12:PLAY2,4,4,V
380 IF A$="8" THEN MUSIC2,C,8,12:PLAY2,4,4,V
390 IF A$="9" THEN MUSIC2,C,9,12:PLAY2,4,4,V
400 IF A$="0" THEN MUSIC2,C,10,12:PLAY2,4,4,V
410 IF A$="-" THEN MUSIC2,C,11,12:PLAY2,4,4,V
420 IF A$="=" THEN MUSIC2,C,12,12:PLAY2,4,4,V
421 IF A$="G" THEN C=1
422 IF A$="H" THEN C=2
423 IF A$="J" THEN C=3
424 IF A$="K" THEN C=4
425 IF A$="L" THEN C=5
426 IF A$=";" THEN C=6
430 IF A$="M" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO
15
431 IF V<=10 THEN GOTO 434
432 IF A$="," THEN V=V-50
433 IF V>= 15000 THEN GOTO 432
434 IF A$="." THEN V=V+50
435 IF A$="D" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO
445
437 IF A$="B" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO
254
438 IF A$="C" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO
650
440 GOTO 308
445 PLOT 15,20," ":PLOT 15,20,"CHELO":GOTO 450
450 GET A$
460 IF A$="1" THEN MUSIC2,C,1,0:PLAY3,0,7,V
470 IF A$="2" THEN MUSIC2,C,2,0:PLAY3,0,7,V
480 IF A$="3" THEN MUSIC2,C,3,0:PLAY3,0,7,V
490 IF A$="4" THEN MUSIC2,C,4,0:PLAY3,0,7,V
500 IF A$="5" THEN MUSIC2,C,5,0:PLAY3,0,7,V
510 IF A$="6" THEN MUSIC2,C,6,0:PLAY3,0,7,V
520 IF A$="7" THEN MUSIC2,C,7,0:PLAY3,0,7,V
530 IF A$="8" THEN MUSIC2,C,8,0:PLAY3,0,7,V
540 IF A$="9" THEN MUSIC2,C,9,0:PLAY3,0,7,V
550 IF A$="0" THEN MUSIC2,C,10,0:PLAY3,0,7,V
560 IF A$="-" THEN MUSIC2,C,11,0:PLAY3,0,7,V

```



```

570 IF A$="=" THEN MUSIC2,C,12,0:PLAY3,0,7,V
571 IF A$="G" THEN C=1
572 IF A$="H" THEN C=2
573 IF A$="J" THEN C=3
574 IF A$="K" THEN C=4
575 IF A$="L" THEN C=5
576 IF A$=";" THEN C=6
577 IF V<=10 THEN GOTO 582
578 IF A$="," THEN V=V-50
580 IF V>=17000 THEN GOTO 578
582 IF A$="." THEN V=V+50
584 IF A$="M" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 15
590 IF A$="Z" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 120
597 IF A$="S" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 306
598 IF A$="B" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 254
615 IF A$="C" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 650
620 GOTO 450
650 PLOT 15,20," ":PLOT15,20,"CHORD"
660 GET A$
670 IF A$="Q" THEN MUSIC2,C,1,0:PLAY3,0,1,V
680 IF A$="W" THEN MUSIC2,C,2,0:PLAY3,0,1,V
690 IF A$="E" THEN MUSIC2,C,3,0:PLAY3,0,1,V
700 IF A$="R" THEN MUSIC2,C,4,0:PLAY3,0,1,V
710 IF A$="T" THEN MUSIC2,C,5,0:PLAY3,0,1,V
720 IF A$="Y" THEN MUSIC2,C,6,0:PLAY3,0,1,V
730 IF A$="U" THEN MUSIC2,C,7,0:PLAY3,0,1,V
740 IF A$="I" THEN MUSIC2,C,8,0:PLAY3,0,1,V
750 IF A$="O" THEN MUSIC2,C,9,0:PLAY3,0,1,V
760 IF A$="P" THEN MUSIC2,C,10,0:PLAY3,0,1,V
770 IF A$="[" THEN MUSIC2,C,11,0:PLAY3,0,1,V
780 IF A$="]" THEN MUSIC2,C,12,0:PLAY3,0,1,V
781 IF A$="G" THEN C=1
782 IF A$="H" THEN C=2
783 IF A$="J" THEN C=3
784 IF A$="K" THEN C=4
785 IF A$="L" THEN C=5
786 IF V<= 10 THEN GOTO 789
787 IF A$="," THEN V=V-50
788 IF V>=17000 THEN GOTO 787
789 IF A$="." THEN V=V+50
790 IF A$="Z" THEN GOTO 120
800 IF A$="B" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 254
805 IF A$=";" THEN C=6
810 IF A$="S" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 306
820 IF A$="D" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 445
825 IF A$="M" THEN MUSIC2,7,12,0:PLAY0,0,0,0:GOTO 15
830 GOTO 660

```

Renumber — Memotech

Another practical machine code utility to enhance Memotech BASIC. Renumber is designed to work both on its own as well as slot into an interrupt-driven repertoire (see last issue).

Quite simply, the program enables you to renumber line numbers on a BASIC program. (It does not renumber line references on GOTOs, GOSUBs or RESTOREs.) This is extremely useful when it comes to merging one program or subroutine into the body of another (see last issue).

To test the program enter the following commands substituting step size for ST and the line number from which you wish to begin renumbering for FL:

```

POKE (48925),ST
POKE (48926),FL—INT (FL/256)
★256
POKE (48927),INT (FL/256)

```

```

10 REM **** BYTE PACK ****
20 REM **** NOV 1984 ****
100 CODE

```

```

803B CHECK: LD HL, (#FACC) ; Check for program in memory.
803E LD A,H
803F OR L
8040 RET Z ; Return if no program to renumber.
8041 LD BC, (#BF1D)
8045 LD B,0 ; BC=Step between lines 0 to 255.
8047 LD HL, (#BF1E) ; HL=First line number.
804A RENUMR: LD IX, (#FAAA) ; IX=Start of basic.
804E REPEAT: LD E, (IX+0)
8051 LD D, (IX+1) ; DE=Line length.
8054 LD (IX+2),L
8057 LD (IX+3),H ; Poke new line number into place.
805A ADD HL,BC ; Add step size to HL.
805B PUSH HL
805C ADD IX,DE ; IX=Address of next line.
805E PUSH IX
8060 POP DE ; DE=Address of next line.
8061 LD HL, (#FAAC) ; HL=Top of basic.
8064 AND A
8065 SBC HL,DE ; Subtract line address from top of basic.
8067 JR C,END ; END if address of line > top of basic.
8069 LD A,H
806A OR L
806B JR Z,END ; END if address of line = top of basic.
806D POP HL
806E JR REPEAT ; Not finished, renumber next line.
8070 END: POP HL
8071 RET

```

Symbols:

CHECK	803B	RENUMR	804A
REPEAT	804E	END	8070

```

110 REM *****
120 REM **** RENUMBER BASIC LINES ****
130 REM **** MTX 500,512 MICROs ****
140 REM **** (c) E.Roy June,84 ****
150 REM *****

```

Next Month...

Free inside Which Micro Byte Pack brings you the best in programs, utilities, hints and tips for your Dragon, Spectrum, Memotech, BBC, Oric, Commodore, Texas, Amstrad, QL and Electron. BYTE PACK IV heralds the New Year's festivities with...

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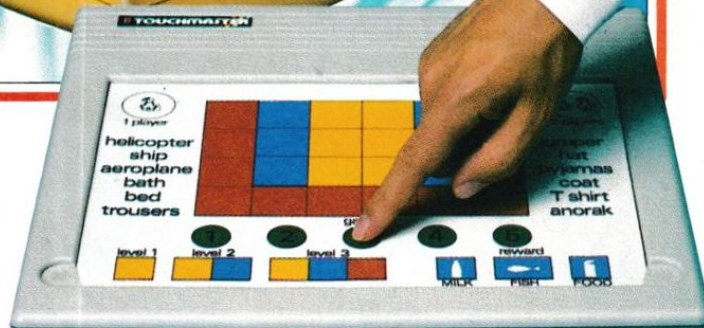
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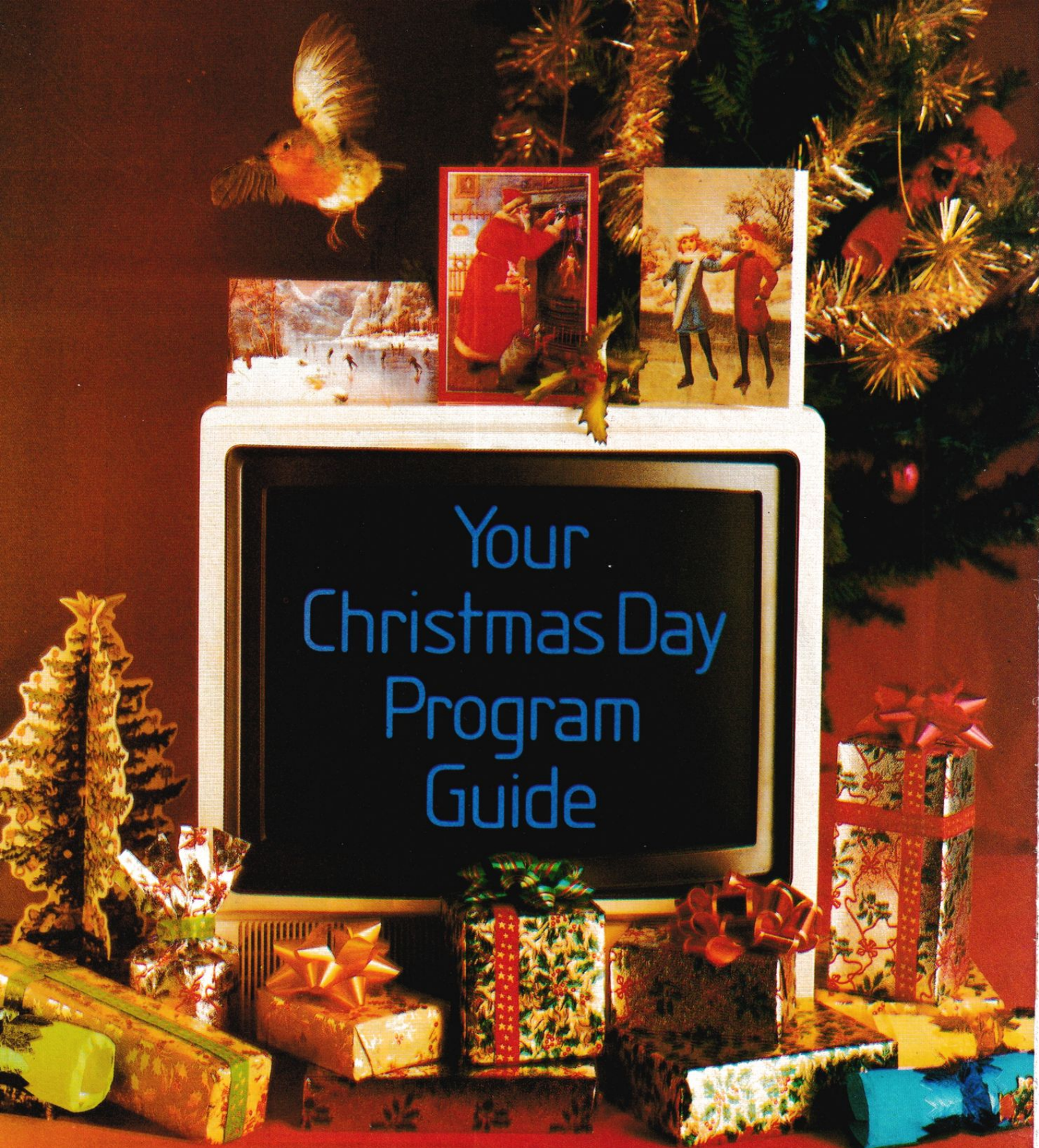
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9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

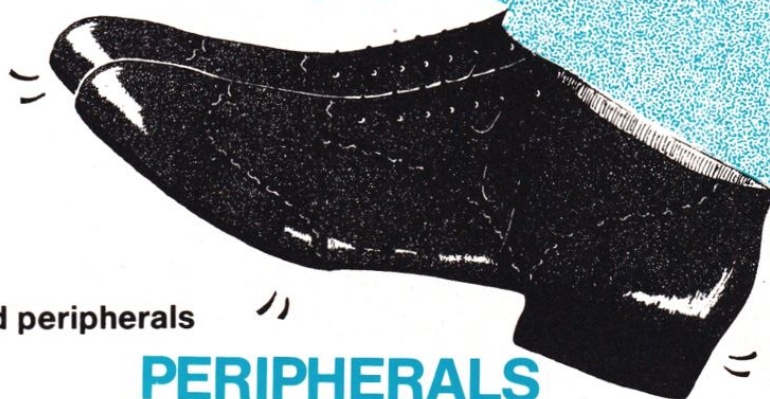
5.00 The Complete Cocktail Maker

With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

6.00 Paul Daniels' Magic Show

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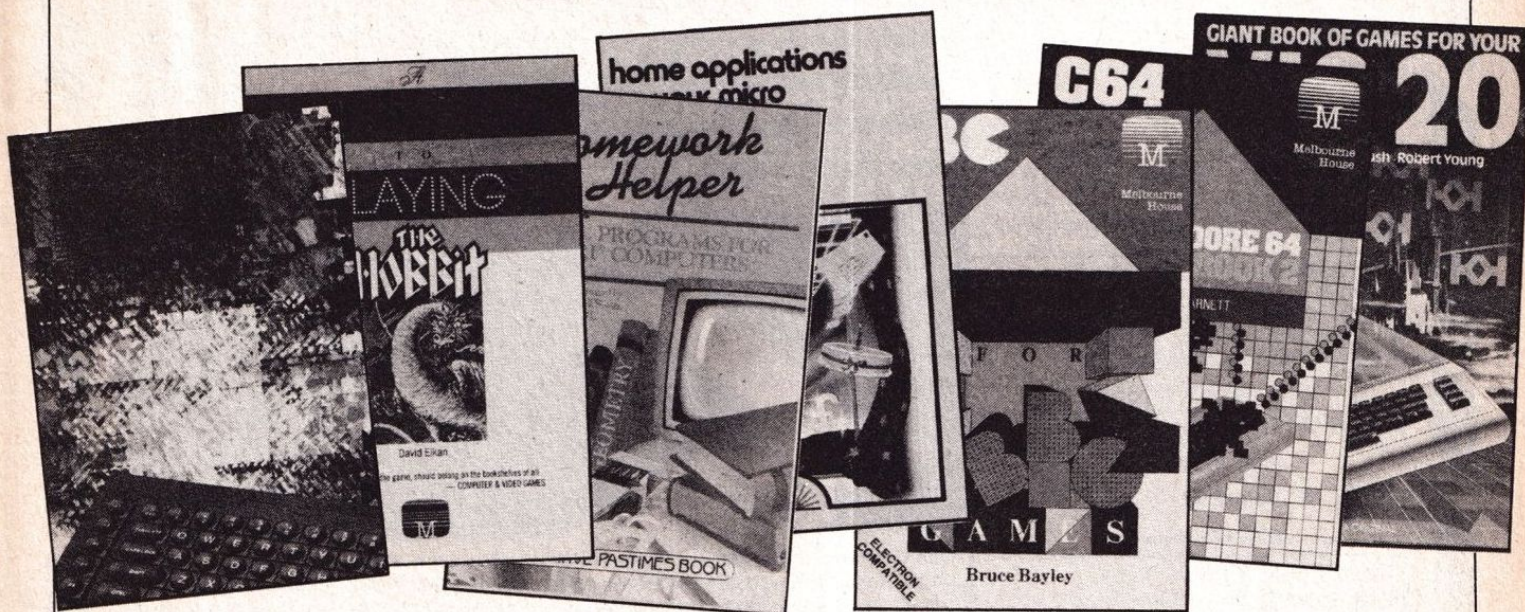
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Jane Robins looks out another selection of computer books from the *Which Micro* library.

MANUAL OVERRIDE



Good Programming with QL Superbasic

Ray Atherton, Longmans

One of a series of five books published by Longmans, this one is devoted to programming with Superbasic. The editor, a teacher, has an impressive pedigree and takes a constructive approach. The aim is to take beginners through the various concepts of programming, including running, storing, editing etc, to thinking in a methodical fashion about problem solving.

You are advised to 'work' through chapters 1 to 4, answering questions and problems at the end of each chapter (the answers and solutions are also provided) to help consolidate information. Then cover items such as graphics and data in more detail.

A Guide to Playing The Hobbit

David Elkan, Melbourne House, £3.95

Before throwing away your copy of *The Hobbit* in disgust — this book may come to the rescue. It aims to help you play it successfully (and maybe even complete it). Though there's not just one way of completing the adventure, the solutions offered have been tried and do work!

The book is divided into three parts. Part one contains general ideas and hints on what to look out for in the game. Part two adds to

the first by using the HELP command (hopefully you will be able to solve any problems). Part three acts like a reference section, listing locations, exits etc. ‡

Useful programs for Atari computers

Michael Potts with Herbert Kohl, A Creative Pastime Book £6.95

This will appeal to children, parents and teachers alike by its subject matter and its layout which are clear and simple. Divided into three sections, the first is suitable for 4-9 year olds, and covers counting and spelling. The second is for 7-13 year olds and covers learning games, and the third, the advanced, concentrates on how to illustrate, organize and calculate on the computer.

The idea is through the learning process itself, children will learn how to use BASIC as well.

Practical Ideas for Home Users

Mike Grace, Sunshine Books, £6.95

This book is for those people who feel their computers have more potential and could be put to 'serious use', either for helping run a business, making your accountant redundant or whatever. It covers word processing, financial spreadsheets and databases in detail explaining to the potential

user how the applications work and what they do.

The book is not machine specific as it covers general principles. But for those who own a Commodore 64 (as does the author) there is a personal recommendation for tried and tested products.

Building Blocks for the BBC

Bruce Bayley, Melbourne House, £5.95.

Here is a book about structured programming and the use of procedures and REPEAT-UNTIL loops. A variety of programs including arcade, utility and simulation are pieced together. Short self-contained routines act like building blocks. Instructions on how to use the techniques and incorporate them into your own projects are also included.

This book is also compatible with the Electron and features the CHEXUM program validation mentioned in the *Commodore 64 Games Book 2*.

Commodore 64 Games Book 2

Greg Barnet, Melbourne House, £6.95.

This is the successor to the previous publication, *Commodore 64 Games Book*. It features 30 games ranging from arcade, adventure (including the latest craze — arcade-adventures) and

strategy, to ones you can modify and develop yourself.

To help with those frustrating *trying* errors a program validation is included. Two short routines, CHEXUM and MERGE are keyed in and saved before starting to key in any other program. By using these routines you will know if there are any keying errors before running the program.

Giant Book of Games for your Vic 20

Tim Hartnell, Roger Bush, Robert Young, Fontana Original £3.95.

One of the latest books written by or with Tim Hartnell, this is for the Vic 20. It contains over 30 play-tested programs ranging from arcade to simulation and adventure games. Also included are chapters on games using defined graphics for expanded Vics and utility programs. The User-Defined graphics chapter explains the methods used in producing the games, with reference to the programs.

Trying to make things easier for the reader, the authors would appear to have got themselves in a knot. The program listings are printed with the Vic-1520 plotter-printer but, this doesn't reproduce certain symbols or characters in the Vic 20 character set. To get round this, REM statements and a list of these symbols and their meanings have been included.

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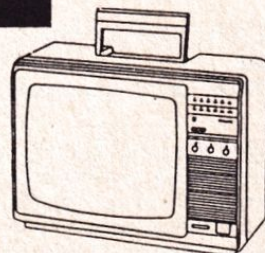
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The last part of our beginner's introduction to BASIC, written by John Webb and Rob Horne, brings together all aspects of programming and points to some real-time applications.

SERIES

EXPLORING BASIC



ILLUSTRATION BY MARTIN HANDFORD

One area of programming we have not entered is simulation. This is the area between games and application programming where a program given data and rules for manipulating that data simulates a *real* situation. For games purposes the relationships involved may be invented or may be simplified versions of real life. An example is the game of Life. Here, an initial colony of cells is set up on a grid by the user. This colony grows according to three simple rules:-

- 1) If a cell has 4 or more neighbours or 0 or 1 neighbours it dies (that is it is removed from the next generation).
- 2) If a cell has 2 or 3 neighbour cells within the 8 adjacent positions it survives into the next generation.
- 3) Each position which is empty but has 3 neighbours is a birth cell and a new cell will appear there in the next generation.

A good idea when playing is to print off a hard copy (if you have a printer of course!) of the development of the colony. To do this it is a simple matter of inserting an appropriate command before the RETURN statement in the subroutine at line 1000, that is between lines 1090 and 1100. In some versions of BASIC the command required is COPY.

```
10 REM "LIFE" PROGRAM
20 REM WRITTEN BY J.WEBB
30 PRINT TAB 12;"*LIFE*"
40 PRINT
50 DIM A(16,16)
60 DIM B(16,16)
70 DIM AS(6,6)
80 G=0
90 REM ENTER START COLONY
```

```
100 PRINT "ENTER START COLONY ON"
110 PRINT "A 6X6 GRID BY INPUTTING"
120 PRINT "SIX STRINGS OF SPACES"
130 PRINT "AND ASTERISKS (*)"
140 PRINT
150 FOR N=1 TO 6
160 PRINT "STRING ";N;
170 INPUT AS(N)
180 PRINT " ";AS(N)
190 NEXT N
200 REM PLACE COLONY IN ARRAY
210 FOR M=1 TO 6
220 FOR N=1 TO 6
230 IF AS(M,N)="*" THEN B(M+5,N+5)=1
240 NEXT N
250 NEXT M
260 GOSUB 1000
270 G=G+1
280 FOR X=2 TO 15
290 FOR Y=2 TO 15
300 C=0
310 REM CHECK NEIGHBOURS
320 IF A(X-1,Y)=1 THEN C=C+1
330 IF A(X-1,Y-1)=1 THEN C=C+1
340 IF A(X-1,Y+1)=1 THEN C=C+1
350 IF A(X,Y-1)=1 THEN C=C+1
360 IF A(X,Y+1)=1 THEN C=C+1
370 IF A(X+1,Y-1)=1 THEN C=C+1
380 IF A(X+1,Y)=1 THEN C=C+1
390 IF A(X+1,Y+1)=1 THEN C=C+1
400 REM DECIDE IF BIRTH OR DEATH
410 IF A(X,Y)=0 AND C=3 THEN B(X,Y)=1
420 IF A(X,Y)=1 AND (C>3 OR C<2)
    THEN B(X,Y)=0
430 NEXT Y
440 NEXT X
450 GOTO 260
1000 REM PRINT ARRAY SUBROUTINE
1010 CLS
1020 PRINT AT 0,1;"GENERATION ";G
1030 FOR X=1 TO 16
1040 FOR Y=1 TO 16
1050 A(X,Y)=B(X,Y)
1060 IF A(X,Y)=1 THEN PRINT AT X+2,Y+6;"*"
1070 IF A(X,Y)=0 THEN PRINT AT X+2,Y+6;" "
1080 NEXT Y
1090 NEXT X
1100 RETURN
```


A Real Good Time

The term 'Real Time' programming may be familiar to most of you but unfortunately only a few micros will support this capability. Real Time is defined by the software's ability to interact with the real world immediately on a source of external stimulus.

It is easy to poll for an expected event, for example: IF INKEY\$="" THEN ... wait for a key depression. But an unexpected event from another source, for example data from a joystick, cannot be received unless it is explicitly expected. A program can be forced to branch away from its main activity by attaching an external source or driver to an interrupt. As it's name implies, an interrupt will disturb the main sequence of the program and cause a transfer to a prior defined location. The code at this location is in the form of a subroutine (usually) and on completion the main program sequence can be returned to. The interrupt service routine can act upon the data and fire a rocket for example or buffer incoming data and set a data received flag. It may even transmit characters across an interface from a previously established pool.

A critical feature often associated with real time programming is the maintenance of a clock. Clocks can be used to establish driver rates or "timeouts". Most computers will have a clock of some description which will increment unit time (where one unit is usually in the range 1 to 5 milliseconds). These clocks are not always readily available and again, those who can access a clock are very fortunate. Superior versions of BASIC support a real time clock and even allow interrupts to be derived from it at a programmable rate. This facility can be very useful for updating displays on a regular basis or even waiting a fixed period of time, for example;

```
110 T=TIME
120 IF TIME-T+100 THEN 120
130 REM waits 100 time units before
    continuing.
```

Sound Of Music

Another aspect of certain home micro architecture is the provision of a sound generator. Besides the white noise function which provides explosions and the like you can produce quite involved tunes especially if your computer has more than one sound channel.

Often, however, sophisticated sound capabilities are matched equally by an enormous amount of parameters! These are associated with volume and tone envelopes which dictate the overall sound of the note; though they are not necessary to play decent simple tunes. Given below is an example program to generate a three channel sequence of notes. The sounds are stored in general arrays for both pitch and duration. On a regular basis derived

from a timer interrupt, the next sounds are loaded into their respective channels and put into a hold status. When all three channels have been primed they can then be triggered simultaneously.

The following program was written for the Amstrad CPC464 to demonstrate some of these facilities.

```
100 CLS:GOSUB 200
110 bpm=60
120 timebase=INT(3000/(bpm*16)+0.5)
125 REM; generate interrupts 1/16 beat
130 EVERY timebase GOSUB 100
140 IF INKEY$="" THEN 140
145 REM: freeze sound and exit
150 a=REMAIN(0):END

195 REM: Initialisation subroutine
200 DIM chana(1000),dura(1000)
210 DIM chanb(1000),durb(1000)
220 DIM chanc(1000),durc(1000)
230 count=1
240 ptr=32
250 repeat=1
255 REM: chans a to c hold status
260 codea=1+64
270 codeb=2+64
280 codec=4+64
295 REM: load channel data
300 FOR i=1 TO ptr
310 READ chana(i),dura(i)
320 READ chanb(i),durb(i)
330 READ chanc(i),durc(i)
340 NEXT
395 REM: channel data , tone and dur chans a to c
400 DATA 100,10,50,5,150,5
410 DATA etc
420 RETURN

1000 REM: music handler
1010 IF chana(count)>0 THEN SOUND codea,
    chana(count),dura(count),7
1020 IF chanb(count)>0 THEN SOUND codeb,
    chanb(count),durb(count),7
1030 IF chanc(count)>0 THEN SOUND codec,
    chanc(count),durc(count),7
1035 REM: trigger
1040 RELEASE 7:IF count=ptr THEN 1100
1050 count=count+1:LOCATE 20,20:PRINT count
1060 RETURN
1100 IF repeat=1 THEN count=1:RETURN
1110 PRINT "End of sequence":END
```

BASIC Interpretations

Programming is fun, but to program well is a very disciplined art. It is not really necessary to know all the tricks of the trade but writing high speed action games (in BASIC — joke!) requires careful consideration. It is very difficult to do anything quickly in home micro BASIC due to the massive overheads in it's very nature as an interpreted language.

Compiled BASIC is much faster and machine code goes like greased lightning (if you have at least a 1MHz clock).

The trouble with interpreted BASIC is that the computer spends most of it's processing power actually decoding the BASIC into executable code. It will do this every time you run an interpreted BASIC program. At least with compiled BASIC the interpretation is done before run time so all the computer has to do is execute the assembled machine code. However the machine code generated by a compiled language is still inherently inefficient.

Generally writing programs in machine code is a headache. The software is not easily understandable and difficult to maintain. Assemblers should only be used where necessary, for example in

interfacing with peripherals or where speed is the main criterion. Many liberties can be taken with machine code and a lot less memory is used by low level languages than by a compiled language. But life is a lot harder so only use machine code (if you can!) when you really have to.

If you have timer facilities with your processor you may like to perform a few "bench mark" tests on various constructs. It is quite fascinating to see how apparently inconsequential statements can take much longer than similar alternatives. The time differences are very small in real terms but the composite result of repeating a command can be astonishing!

Bench mark tests can be performed by timing a certain statement execution several times in succession, for example in a loop of 1000 counts as below:

```
10 T=TIME
20 FOR I=1 TO 1000
30 NEXT I
40 PRINT "ELAPSED TIME ";
    (TIME-T)/300
50 END
```

(NB line 40 contains a divide by 300 to convert the time into seconds because the Amstrad computer increments time in three hundredths of a second units.)

The basic loop time is 1.14 seconds. Performing the loop using an IF ... THEN construct, ie, replacing lines 20 and 30 with

```
20 I=1
30 IF I<1000 THEN I=1:GOTO 30
```

40 REM takes 3.39 seconds! The statement to be tested can be placed on line 25 and the GOTO 30 changed to GOTO 25.

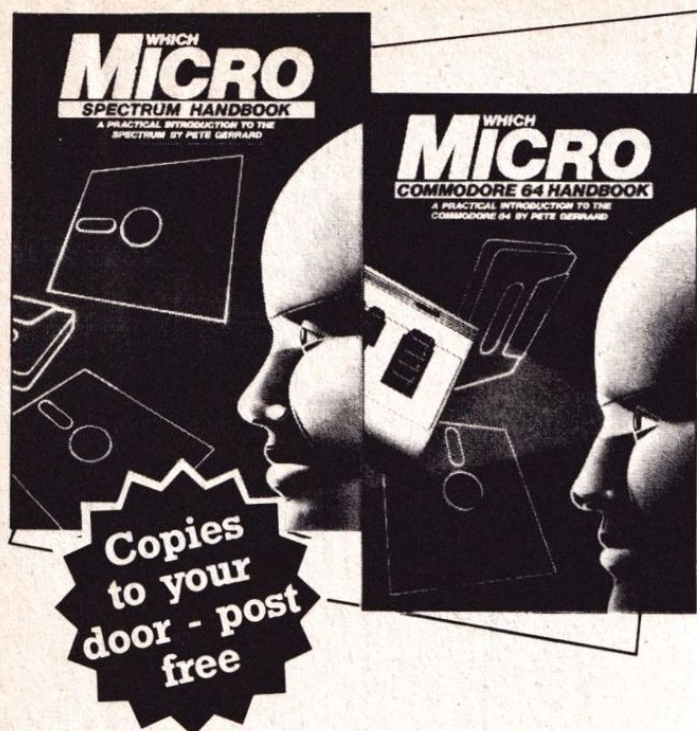
Using the FOR loop program (which takes 1.14 seconds), placing a simple REM in line 25 causes the program to be executed in 1.34 seconds! So it takes 0.2 seconds to execute 1000 REMs which is astounding because a REM is theoretically superficial to the program (and annoying because all through the series we have encouraged you to put in remarks freely!)

This difference may be due to the program having to skip the REM statement with an internal jump statement which would not be necessary without the REM.

Another fascinating difference can be observed in the use of a 'multiply by 0.5' as opposed to a 'divide by 2', essentially the same you'd think!. The division algorithm is very expensive in processing time and smaller integers are easily manipulated. Multistatement lines are also slightly more efficient.

There are many more differences in seemingly similar constructs which are certainly too numerous to mention here; patience and investigation will reveal them and after a while you may gain the knowledge to write faster programs.

One final word on efficient programming — efficiency can often lead to unreadable programs so you must use your discretion. Speed can be maintained by using simple variables (rather than arrays) which can result in the use of more RAM. This is another trade-off which must be carefully balanced. The language is your tool so treat it with respect and you can build quite beautiful works.



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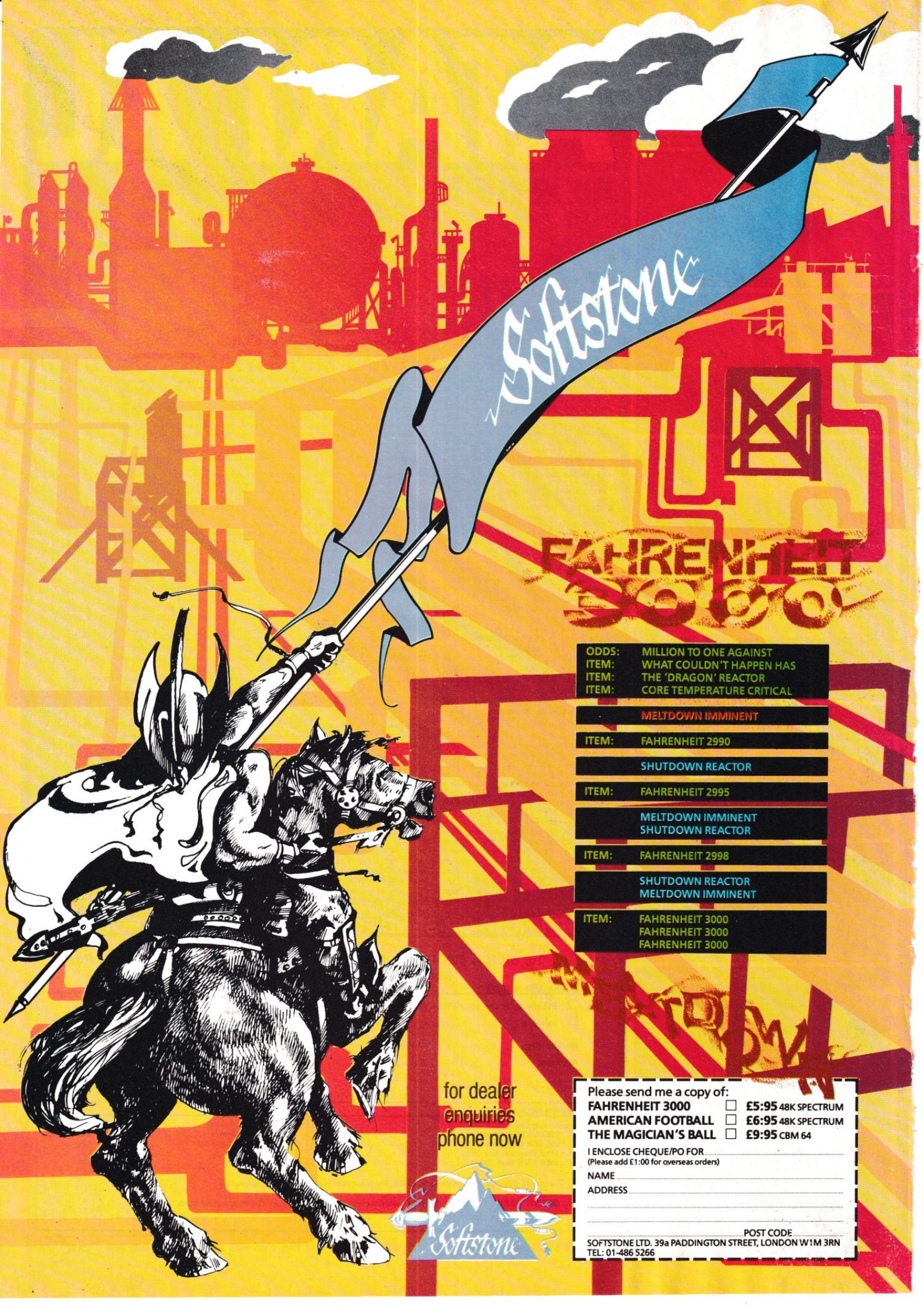
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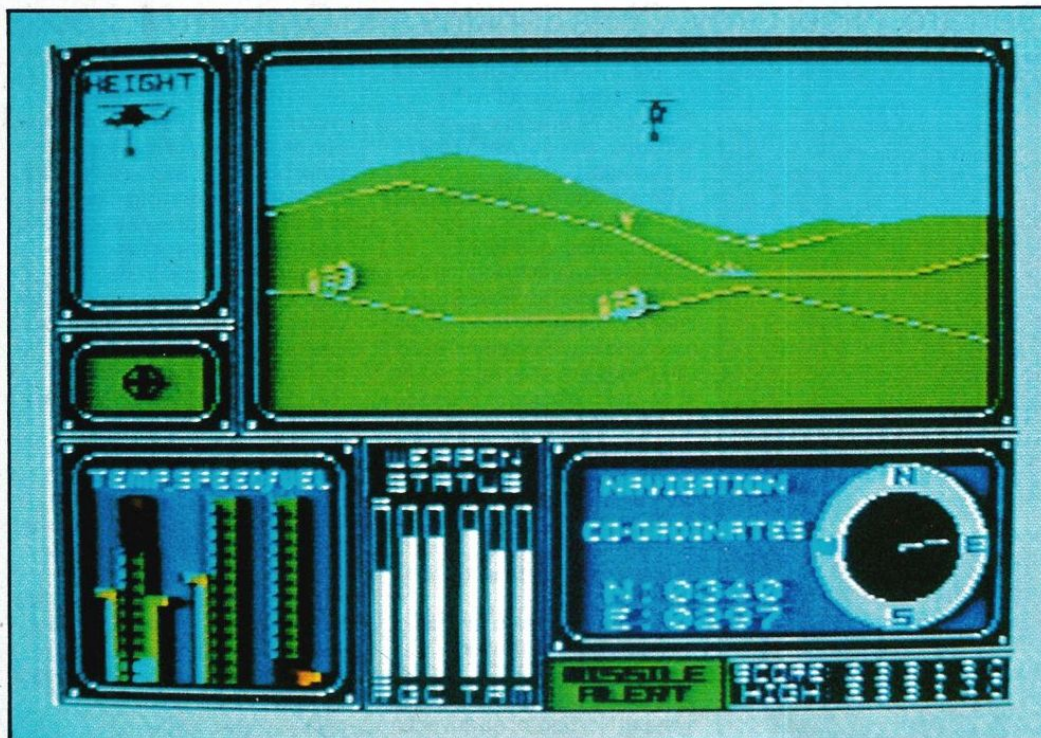
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COMBAT LYNX



A high-flying helicopter spectacular, courtesy of
Durell Software, and reviewed by
'Mister Chopper' himself — Mike Gerrard.

There can't be many pieces of software that would put *Sherlock* in the shade, but in a month with a wealth of excellent releases, pride of place has to go to *Combat Lynx* from Mike Richardson, author of *Harrier Attack*, (who also seems to have been having a quick look at *Aviator* and *Fighter Pilot*). His new title is destined to join those others as a must for flying freaks.

For those daunted by the flight simulators where you need at least 18 fingers and a full pilot's licence to play them, *Combat Lynx* keeps those controls simple and concentrates more on weaponry and navigational skills. With technical support credited to Westland Helicopters, and a 100% machine code program, the result is bound to be fast and furious.

The game is described as an air to ground battle simulation, and your *Combat Lynx* 'copter is the only air support you have — anything else in the skies is hostile, though both sides have ground support. The reason for that is a practical one — if you spot something on the ground, you can check the Intelligence Map (the

'M' key calls up this instantly to replace the landscape display), where allied vehicles are indicated with a circle round them. But when something flashes out of the skies at you there's no time for such subtleties, it's either kill or be killed.

The game is compatible with Protek, Interface 1 or any other joystick that scans the keyboard, or you can choose your own control keys if you wish. Better to take the ones on offer, as just about every key on the keyboard controls something. There are four skill levels, and these dictate whether you have three, four, five or six ground bases to provide support for. At the end of your three lives you're given a note of the time you spent in the air, a score for enemy destroyed, and an efficiency rating. You can SAVE and LOAD score tables, as well as your preferred keyboard layout. There's also a PAUSE feature and an option to have the sound on or off. In short, they've thought of everything bar a parachute for bailing out; but then, who needs one!

Almost half the display is a view

of your 'copter against the scrolling 3-D landscape, complete with trees, houses, hills and vehicles that scroll reasonably smoothly as you fly along. There are four viewpoints for the compass points, with about three or four key presses to left or right shifting you from one perspective to the next with a brief blackout inbetween. A slight irritation this, but you can hardly expect the landscape to smoothly slide round through 360°, I suppose. When you're moving though, the ground slips beneath you very convincingly. Flying the Lynx is a simple case of moving left or right, up or down, and increasing or decreasing speed.

One advantage over a plane from a novice player's point of view is that you can have zero speed without crashing, but you have to be careful to land very gently. It's in this display that the Intelligence Map also appears when you call it up, and you can scroll round this independently, at fast or slow speeds, to check out where the bases and land vehicles are, with north and east co-ordinates being indicated. You

can then try to match these up with your own co-ordinates, on display beneath the window.

There are numerous other displays around the screen, indicating your height, temperature, speed, fuel, weapon status, compass bearing, score, high score and a missile alert warning. These might sound bewildering all in one go, but you soon get used to them, and you don't need to keep an eye on everything the whole time.

You begin the game hovering above your Base 0, which has a limitless supply of weapons and personnel. You can load up to a maximum of 2145 kg, and the display switches allowing you to flip through the various weapons, adding and removing them till you've got the load you want. You can use the weapons while in the air, or off-load them to add to the defences of other bases. You must also ferry your injured troops back to Base 0 for medical treatment. While doing this, the vehicles and planes of your enemy are moving about independently, threatening any bases that may be too weak, and you must aim to keep the bases fully operational as well as fighting off the enemy in the sky and on the ground.

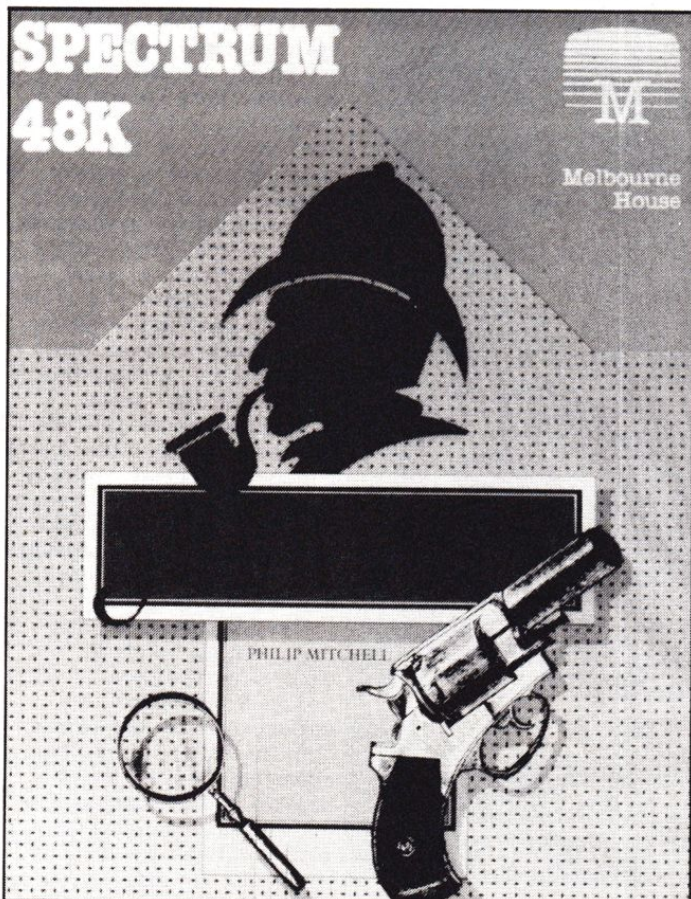
Those of particularly violent disposition might prefer to dispense with the troop-carrying and simply load up with wire-guided or heat-seeking weapons and aim to blast as many of the enemy out of the heavens as possible. This is exciting stuff, as the jets, planes and choppers whizz out of the sky at you, and you have to turn and keep them in your sights, then try to decide which weaponry to use. For firing at the ground you can activate a cross-hair sight, and move this around separately using the cursor keys. If you have two joysticks, incidentally, you can set them both to govern different controls.

All this and I haven't even mentioned the message micro-screen (a large letter M flashes when there's a message for you), plus one or two other features, which indicates the scale of the game. One glaring problem that can't be overlooked is the difficulty of actually getting the program up and running. One side of the cassette loaded more successfully than the other, but both were prone to crashing at various stages. This is annoying enough at the start of the game, but causes rude words when you're well into playing.

Apart from that, though (and we may just have had a poor review copy), *Combat Lynx* is very impressive and definitely one to add to the shopping list for those who fancy taking their chopper out and giving it a whirl.

SOFT RELEASE

THE definitive reviews of software on cassette and disk. Compiled, this month, by Mike Gerrard, Nigel Grey, Chris Jenkins and Graham McLeod.



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 Castle Yard House, Castle Yard,
 Richmond TW10 6TF

At last here's a game that's taken five people 18 months to develop, and at a reputed cost of about £250,000. All the average micro

owner wants to know, though, is "Is it worth nearly £15?" The answer to that is definitely "Yes," and that's about the only answer that's definite in *Sherlock*, where you play the part of Victorian England's most famous detective and must solve not one but several crimes. There is less emphasis on graphics than with *The Hobbit*, as not every location is illustrated, and those that are are kept fairly

simple. In fact you can dispense with graphics altogether by Pressing 'N' when the adventure is loaded, and you won't really miss much.

Where *Sherlock* is an advance on *The Hobbit* is in the large number of independent characters roaming around the game. People like Watson and Inspector Lestrade don't merely enter and leave locations, or do silly things like sit down and sing about gold. Watson may decide to go off to his surgery, leaving you a note to read, while Inspector Lestrade has to be tracked down early on in the adventure and consulted over a crime he's been called in to investigate... you might have read about it in the *Daily Chronicle*.

Among *Sherlock*'s 'simple' features, like an 800 word vocabulary of ENGLISH, is a fully-functioning London underground system! Not bad for an adventure program. It's a variation on the

modern Circle line, taking you round Paddington, Victoria, Aldgate and King's Cross, and you can alight at any of these, go to other platforms, and wait there for another train to turn up. There's a clock visible on screen at all times, and extracts from railway timetables come with the packaging. You have to get out of London to the scene of the crime Lestrade is investigating, and preferably on the same train as him. If you miss the train (and on one occasion it pulled out with Lestrade before we could climb aboard) then it will no doubt hamper your investigations.

As with *The Hobbit*, the game is a delight to play and will set new standards for the future. It is expensive, and you don't even get a book with the package this time, but you're guaranteed months of perplexing adventure playing. **MG**



Lazy Jones

Computer: Commodore 64
Price: £7.95
Supplier: Terminal Software,
 Derby House, Derby St, Bury

Terminal have been responsible for some very good software, and for some real bums — witness *Super Dogfight*. Happily, *Lazy Jones* is certainly the best game to emerge from the company combining wit, originality and value for money. As caretaker Lazy Jones, you have to negotiate the three floors of a hotel visiting each of the eighteen rooms. Lazy has to leap over the manager, the ghost of the previous manager, and a sinister cleaning trolley.

The real joy of this game is that Lazy's preferred occupation is playing video games, and in 15 of the 18 rooms he finds a video screen with a game to can play. The games are all eccentric variations on well-known themes, such as *Eggie Chuck* and *Wild Wafers*. Each one is very simple but quite playable, so in effect Lazy Jones is 16 games for the price of one!

Some surrealistic sequences feature in the non-games rooms — a nightmare where ghostly managers float around Lazy's head, and a visit to the gents



accompanied by music from Blancmange's *Living on the Ceiling*. In fact the excellent soundtrack is peppered with extracts from electro-pop classics — *Fade To Grey*, *99 Red Balloons*, and so on. Programmer David Whittaker obviously has good taste in music as well as a zany sense of humour.

The graphics are colourful and incorporate some stylish scroll and animation effects. All in all you'd have to be a pretty dull person not to get a great deal of fun from this unusual offering. **CJ**



RULE OF THUMB

Each review carries our exclusive "Rule of Thumb" to give you an instant guide to how we rate it. Our chart shows how the system works.



Brilliant!



Better than most — probably a good bet.



Only average, but no major faults.



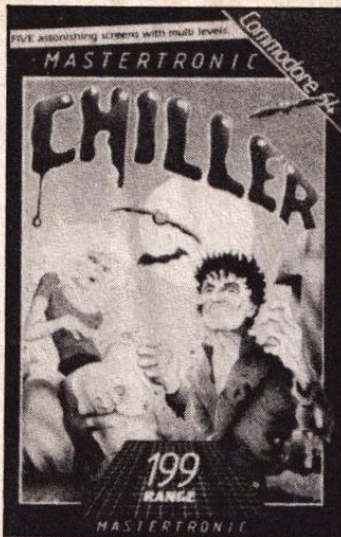
Noticeable, though not crippling, defects.



Contains flaws which affect the program's value.



Avoid at all costs.



Chiller

Computer: Commodore 64
Price: £1.99
Supplier: Mastertronic, 48 George St, London W1

Time was when it could be fairly said that Mastertronic games were good for the price. No-one expected anything remarkable for £1.99, and you didn't get anything remarkable. Well, times have changed. If Mastertronic can put out games of the quality of *Chiller* it may well be time for the other companies charging seven or eight pounds for their games to look to their profit margins and distribution methods, and try to become more competitive.

Chiller is written by the Darling brothers, and loosely based on Michael Jackson's Thriller video, a horror mini-epic which has become the world's top-selling music video. Since the game's music is also a rip-off of Jackson's album, and knowing the American penchant for taking legal action, Mastertronic may soon find hefty writs winging their way. (And indeed they have — Ed).

Enough of that. The five screens — graveyard, cinema, forest, ghetto and haunted house are very well drawn, and through them your lycanthropic (look it up) figure must be guided in search of your missing girlfriend. Encounters with ghouls, zombies, bats and skeletons drain your energy, which can be replenished by eating magic mushrooms (not the hallucinogenic ones, we hope).

Collecting five crosses gets you onto the next screen, and once your girlfriend is rescued you must get back to the car.

It's nothing more than another "platforms" game dressed up in a tasty package, but *Chiller* entertains and holds the attention. There aren't any cut corners — music, sound effects and graphics are equally well done.

CJ



Sadim Castle

Computer: BBC model B
Price: £7.50
Supplier: M.P. Software Ltd, 165 Spital Road, Bromborough, Merseyside

Text adventures have now reached a pretty standard format and "Sadim Castle" is no different.

Having said that it's as good as most others of this type and shouldn't be dismissed right away.

The background story won't make the top ten best sellers for originality, but it'll do. The tale goes something like this: Long ago Lord Sadim lived with his beautiful wife in this castle (where else!). Then he goes away to fight for the king. While he's away his wife is unfaithful to him. On returning he finds out and locks her up for good. One assumes she dies, and later he gets killed in a mysterious accident.

Having rendered the castle a



no-go zone for most decent folk, it's our job to fight the spooks and such-like, find her body and give her a proper burial. A welcome change from boring old treasure at least.

This is a 'real time' adventure so

the game still runs while you're making a decision. If you're a 'take it easy' adventurer, the escape key will freeze the game to take pressure off a bit.

You won't want to hang around too long though as there's plenty to do, such as climbing trees, dodging angry bulls, even repairing somebody's leaky roof.

The commands are the usual "GET KEYS", N, S, E, W directions and so on. The on-screen information is good and the commands are in their own window, the previous three remain on the screen.

The first few games won't really get you far but you'll soon get the hang of what to find and where to go. Beware of the cheetah, once he's mentioned you haven't much of a chance of getting away alive.

Well... another adventure for that inevitable rainy day.

NG



Havoc

Computer: Commodore 64
Price: £9.95
Supplier: Dynavision Production Studio, PO Box 96, Luton

There have been many versions of *Zaxxon* for every popular home computer, but this one takes the cake. It's certainly better than the official version released by US Gold, which has disappointing sound effects and poor animation.

Havoc starts off by employing a unique angle of view. It's approximately 12½ degrees rather than 45 degrees from the lateral, giving a pleasantly subtle perspective.

The scenario is that your fighter

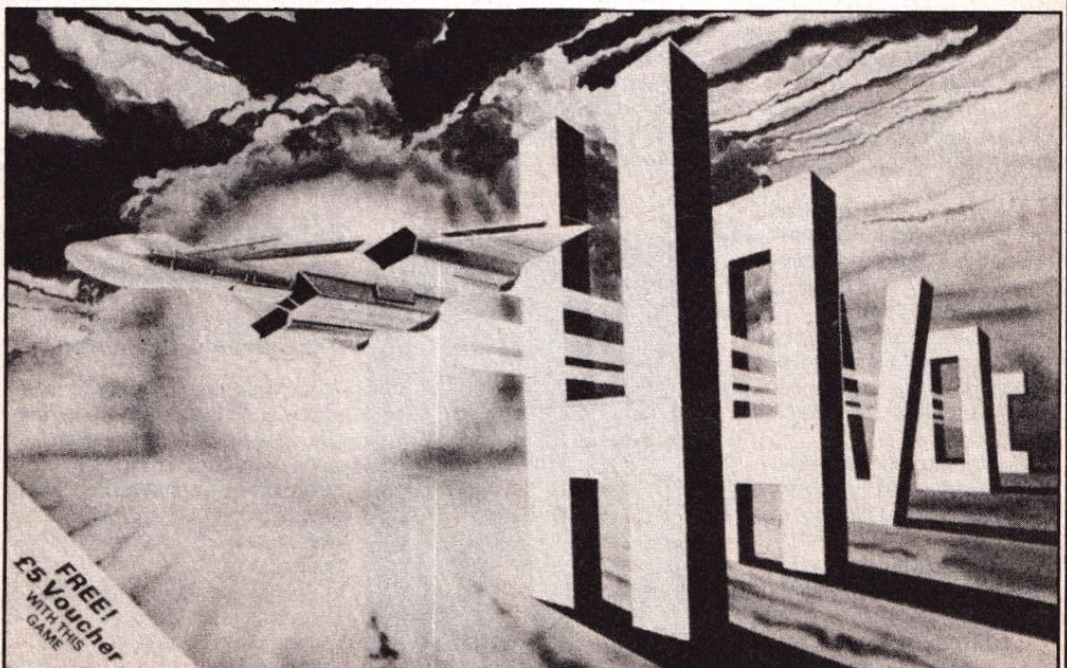
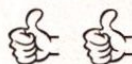
plane must negotiate a landscape of pillars, walls and weird buildings in order to reach and destroy the home base of an evil warlord. He has launched homing missiles at your homeland, which must be destroyed on your journey (otherwise you won't have a homeland to go home to). Mysterious glowing globes, raining bombs which blow you off course, and almost impossible mazes of pillars make your journey fraught with peril.

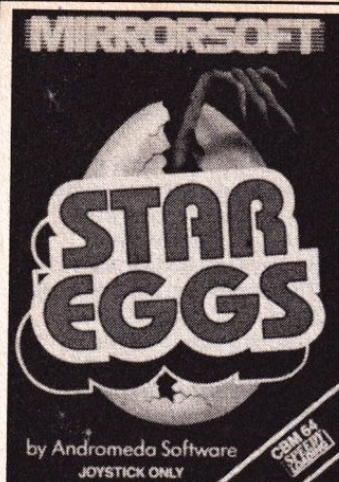
This is the only game I know of where the sound effects are actually frightening. There's a low hum throughout the game which puts your nerves on edge, and the zaps and blaps are quite nerve-tingling. An eight-minute demo

routine will let you see some of the perilous terrain to be negotiated, without giving away the secret of the enemy base. Watching this demo is almost compulsory — some of the gaps you must pass through are so small that you need plenty of warning in order to line your ship up in time. The trick is to use the cannon to clarify your line of movement before trying to slot yourself through one of those teeny little holes.

Havoc is an excellent debut from a new company, and can be recommended for those after pure arcade which will take hours of practice to master.

CJ





Star Eggs

Computer: Commodore 64
Price: £6.95, Disk £9.95
Supplier: Mirrorsoft, Holborn Circus, London EC1

Star Eggs is another product of those wacky Hungarians, Andromeda Software. It departs from Andromeda's usual style in two ways. Firstly, Andromeda games are normally non-violent and this one includes quite a lot of shooting and exploding, and secondly, Andromeda games are usually good and this one isn't.

As if two inadequate ideas had been stuck together to form one game, *Star Eggs* has two stages. In the first, you man a super-duper-proton-powered star

destroyer, and must chase alien egg hatcheries around the cosmos until a gap in their forcefields allows you to blast your way in.

Having gained access, the space pod lands you on a series of ladders and platforms scattered with alien eggs. As each egg begins to hatch, you must negotiate the ladders and elevators to reach the egg and smash it before the beastie within floats out. If you succeed the egg blackens and vanishes, and you must go for the next one. Failure means that a nasty alien floats out of the egg, spitting something nasty at you, and zooms out of the porthole to do unspeakable things.

Managing to clear a screen of eggs, you have the honour of starting again with another lot. On later screens you get a little gun to help you out, but to be honest I'd have quite happily turned it on myself by that stage if the program had let me. It was with great relief that I reached the sequence where the aliens fly towards an unsuspecting Earth and erase it from the face of the universe. Dreadfully dull, I'm sorry to say, and fortunately not at all representative of the usual high standard of Andromeda or Mirrorsoft games.

CJ



SENSATIONAL SOFTWARE FROM MIKRO-GEN



AIR TRAFFIC CONTROL

FOR 48K ZX SPECTRUM

Air Traffic Control

Computer: 48K Spectrum
Price: £9.95
Supplier: Mikro-Gen, 44 The Broadway, Bracknell, Berks

The mind boggles at the thought of what would happen if Mikro-Gen's Wally Week character were put in charge of *Air Traffic Control*, and this release is certainly a contrast from their more usual arcade and adventure titles.

There's a twenty-page training manual which admits that the hardest of the nine skill levels 'is virtually impossible to handle, and would be even for the best real-life

controller'. Reassuring, and real-life wallies might prefer to practise on level 1, the equivalent of a quiet winter's day in the Hurn sector of the London Air Traffic Control Centre, this being where the action takes place and situated roughly over the Bournemouth-Southampton area.

The main screen display is a simple black and white map of the sector, which has a real-time clock in the corner (you're meant to play for one hour or until you QUIT) and which has radio beacons and airports marked with crosses and circles. Press the MAP key (there's a keyboard overlay) and you switch to a more detailed map which names the various features

Osprey

Computer: BBC B/Electron
Price: £9.95, disk £11.95
Supplier: Bourne Educational Software Ltd., Bourne House, The Hundred, Romsey, Hampshire SQ5 8BY

Osprey is an educational package produced in conjunction with the RSPB and includes a game, a 32 page full colour booklet and an RSPB leaflet.

The game has been named Microdealer's educational program of the year, so it's worth a look.

The booklet is excellent and provides information on the history of ospreys in Scotland, other books to read and full information for playing the game.

The game itself is based on the RSPB's site at Loch Garten in Scotland. As the chief warden you have to administer the protection of the ospreys.

On starting you'll be asked which year to start from, between 1965-1979; the earlier the year the harder it is.

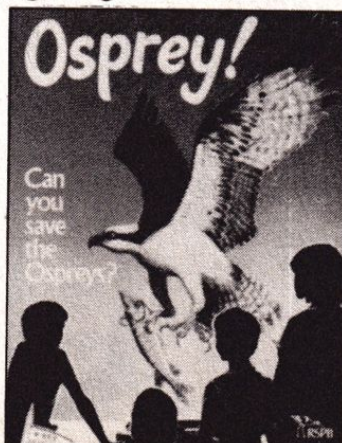
You are told the number of breeding birds and the number of wardens at your disposal. Next, allocate the wardens to look after the main site, stopping egg

stealers and arranging publicity about the ospreys.

When you've entered that lot you'll see a picture of the site, with birds flying around, people stealing the eggs and cars parking in the car park — all the drivers of which seem to be expert in sideways skids. There are two seasons for each year and if you don't kill or drive away all the birds you'll keep going until 1979.

It's a game really for bird-lovers so those looking to blast ospreys out of the sky will have to look elsewhere.

NG



Ad Infinitum

Computer: Commodore 64
Price: £7.50
Supplier: Mr Chip Software, No 9, Caroline Road, Llandudno

There's nothing like a good mega-zap, and *Ad Infinitum* is — nothing like a good mega-zap. The basic idea is very sound, since it's based on a reasonably successful arcade game, *Astro Blaster*. Unfortunately it's not a very good adaptation.

Your space fighter moves right and left on the bottom of the screen, while wave after wave of dancing aliens descend upon you.

You must zap them as quickly and efficiently as possible to earn bonus points. Any missed on the first attempt pass off the bottom of the screen and reappear at the top.

While all this is going on your fuel is running out, and if the laser is used too enthusiastically it will seize up, leaving you defenceless for a time. Should you defeat a sufficiency of baddies, you have the chance to negotiate a meteor storm, avoiding hurtling boulders and trying to catch fireballs to refuel. Later on you can dock with a mothership to fill up the tanks. Then it all starts again with the next wave. There are 256 alien

for you, but doesn't illustrate the flight paths of the planes.

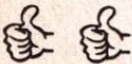
The first two pages of the manual are taken up with a glossary of the terms and abbreviations in common use — essential if you can't tell your Airspace from your Terminal Area. By the end of the manual your mind is reeling as if you've just completed the three years' basic training of a real controller.

Skill level 1 will give you 15 aircraft to handle, and these come on from the edges as diagonal bars, alongside which are the flight details. They move a pixel at a time and the aim is obviously to give these safe passage through your area. The manual suggests you choose a skill level of about five and sit back and watch the way the planes move. The fact that you can do this is an indication that for a lot of the time your attention is not really needed. At the end you're given an overall rating and a note of how many near-collisions there were, how many planes you didn't hand over correctly to the next sector, and so on.

To communicate with a particular aircraft you move a square using the cursor keys till it's over the craft, and then type in the instructions beneath if you want to alter its height, heading, speed etc. A military danger area is indicated on the screen, and you must also keep planes out of that, if possible. Then at higher skill levels there are other hazards such as radio and pressurisation failure to cope with.

There's no doubt this is a thorough program, and if you're interested in the subject then it will probably keep you enthralled for months. But we suspect it's probably too thorough for the average micro owner who's no doubt keener on zapping things out of the skies rather than keeping them flying.

MG



types in all, some will cross the screen from side to side, giving you a few seconds to wipe them out before they drop upon you and extinguish you.

Had this game been released a year ago it would have been a big hit. As it is, it's not a patch on the original, with limp sound effects, unimaginative sprites and no real challenge compared to the current standard of 64 games. A pity, since the 64 has the potential to present a faithful adaptation of the original arcade game, or indeed something many times better.

CJ



High Noon

Computer: Commodore 64
Price: POA
Supplier: Ocean Software, Ocean House, 6 Central St, Manchester 2

High Noon is a little gem, and those of you old enough to remember the film of the same name, starring Gary Cooper will get an extra thrill from reliving this classic Western scenario. Though there's nothing remarkable about the graphics, the music is lovely ("Do Not Forsake Me, Oh My Darling" rendered in true cowboy style) and the gameplay is original, which makes a change from the usual shoot-'em-ups.

Your well-animated Sherrif strides out of the jailhouse door into the middle of the street, and



has to gun down ruthless bandits as they attempt to rob the bank or carry off the saloon girls. The sprite graphics are fairly chunky but nicely animated, and the whole

thing is done with a sense of humour — in order to clear the screen of corpses, an undertaker, Riga Mortis, comes and drags them off.

Fast-draw shootouts earn bonus points between rounds, and later elements include baddies on horseback, dynamite-throwing villains, and a show-down at their camp.

You soon learn some winning strategies. For instance, hiding in the saloon until the bankrobbers have their hands full of loot or girls, then shooting them in the back. It may not be fair play but it works! On the whole, Manchester-based Ocean have come up with one of the best games in the West (Midlands).

CJ



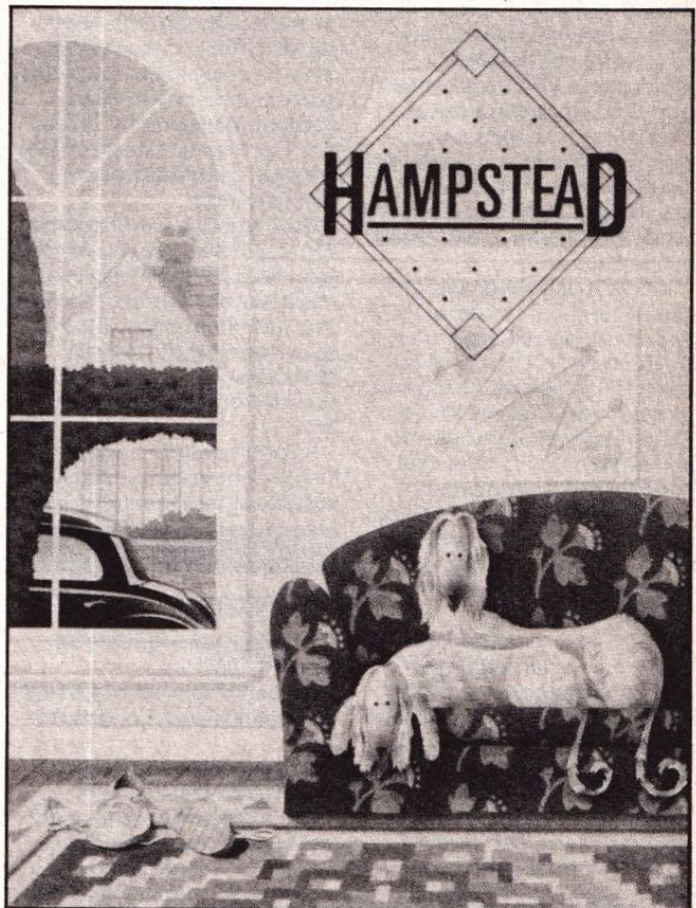
Hampstead

Computer: 48K Spectrum (Commodore 64 soon)
Price: £9.95
Supplier: Melbourne House, Castle Yard House, Castle Yard, Richmond TW10 6TF

In this Quill'd adventure the goal is to attain Hampstead, which is a different thing altogether from merely reaching that fashionable address in London NW3. The location itself is easy enough to find, you go out of your back yard and make six moves EAST... but when you get there you'll find you haven't attained Hampstead, you aren't wearing the right clothes, haven't met the right people, and haven't got a wife called Pippa (sorry, ladies, this one assumes you're a man). So, you have to set about those various tasks.

Getting there is going to be quite an achievement, as you begin in a smelly council flat watching "3-2-1" on the TV. If you're lucky and explore the flat you might find a UB40 and a banana and cod sandwich. What use the sandwich is we haven't yet figured out, though for nourishment you're probably better off eating the UB40. On second thoughts, don't do that, cash it instead and collect your £20. But do you then spend that on a rail ticket or a Sony Walkman? Maybe you need both, so how can you manage that? And how can you get the tweed jacket and trousers in the Oxfam shop, assuming they're of some use to you?

Regular adventurers will spot that this text-only game does bear a few resemblances to *Urban Upstart* (the grimy streets to begin with, the muggings and the indecent exposure problem), but the humour is rather different. In fact, though it's sold as a different



and humorous adventure, that very aspect may let it down a little. There are some interesting problems and some unusual uses of The Quill's features, but we're not sure how many regular adventure players will be amused by the jokes about the social pretensions of living in (or aspiring to live in) Hampstead. Jokes about Afghan hounds and 2CV's may not tickle the ribs of your verage troll-bashing treasure-seeking adventurer, but may well appeal to parents: giving a copy of *Hampstead* will probably be a very

Hampstead thing to do this Christmas. If you enjoy a laugh at the expense of the more pretentious social climbers, then you should enjoy *Hampstead*, but if you're looking for a new mega-adventure to play then this isn't it, particularly at £9.95, accounted for by the handsome packaging and the illustrated booklet. But if you do buy it and find a use for the banana and cod sandwich, then let us know.

MG





Faulty Towers

Computer: Commodore 64

Price: £6.95

Supplier: Harbour Software, 134 East Weare Road, Portland, Dorset

Harbour have a bit of a reputation for producing healthy smut like *Love Bytes* and *Jolly Jack*, respectively a VERY adult forfeits game and a rollicking adventure. *Faulty Towers*, though, is good clean fun suitable for all the family, and in view of its notable resemblance to the characters of a certain well-known comedy series it should do well.

It's a text-only adventure, and though the current mode is to go for graphics as well, there are still plenty of players I'm sure who prefer to use their imaginations to provide the illustrations. There should be plenty of scope in this one, as you, playing harassed hotelier Basil, have to avoid the beady eye of the ghastly Sybil and keep the hotel running, with the help — or despite the help — of the hopeless Manuel (he's from Barcelona) and Polly.

As text adventures go, it went — it's fairly predictable stuff, with various hidden objects and little problems to solve. There's a good deal of fun involved if you're familiar with the TV version, but I suspect little if you're not.

The program is written with the adventure generator, The Quill, but the vocabulary verb-noun doesn't seem too limited and all the usual conventions are adhered to. So there are no major frustrations in making your way through the adventure. If Sybil gives you an order you must carry it out in an unspecified number of moves, and the ultimate aim is to tidy all the Faulty skeletons into the appropriate cupboards before the health inspector comes and finds out how you run the hotel (probably extremely badly).

A good lark, all in all — funny the BBC didn't think of it first. **CJ**



Jet Pac

Computer: BBC model B

Price: £7.95

Supplier: Ultimate Play The Game, Ashby Computers and Graphics Ltd., The Green, Ashby de la Zouch, Leicestershire LE6 5JU

Jetpac has been around for computers like the Spectrum and others for some time and with impressive packaging it's at last available for the Beeb.

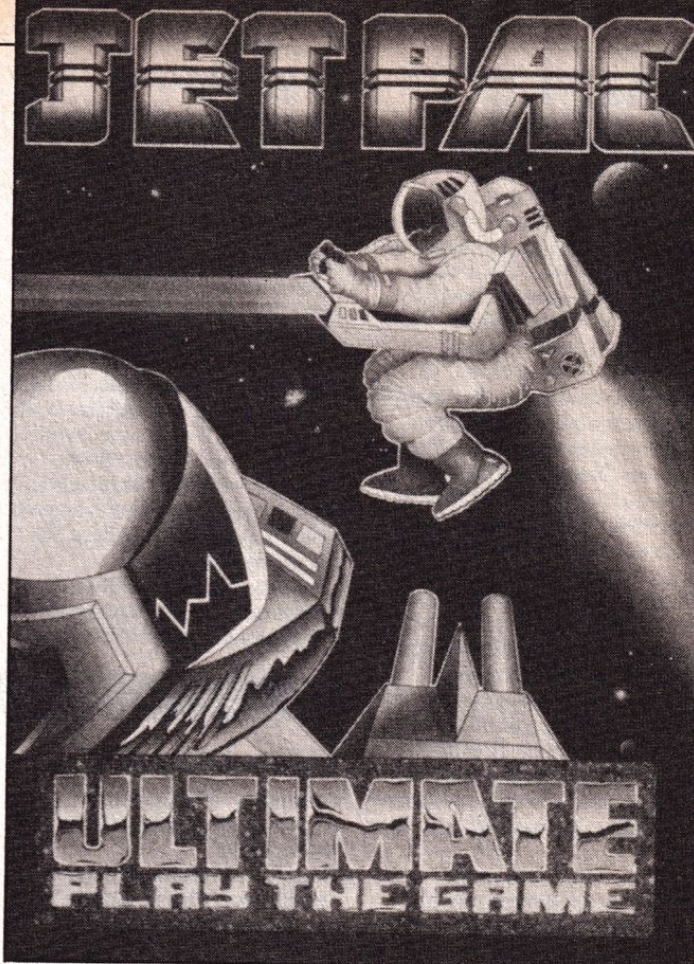
Apparently, the "Acme Interstellar Transport Company" are delivering spaceship kits to various planets in the Solar System.

You, as chief test pilot, have to assemble the kits and blast off to the next destination. If you're greedy and long to be rich you can pick up gems and gold on the way as perks of the job.

The bits of the rocket are dotted around the screen. There is only the middle and top of the ship to get, which for the uninitiated is quite an achievement. There has to be a catch and there is, the mission is hampered by 'fizzers' that fly across the screen. These, however, can be blasted away using your lazer.

Having got the rocket together don't relax, because you've now got to fill it up with six fuel pods, which take some getting, and blast your way to the bottom of the screen again and to the ship. Quite a task for the first screen. You will then take off for screen two.

A tip for screen one is to stay at the top of the screen as much as possible as the fizzers are few and



far between there.

For the second screen the ship stays in one piece so all you have to do is refuel it. The fizzers have mutated into pin cushion affairs that tend to move towards you, so watch out for them.

There are keys for left, right, thrust and fire and which take getting used to. There's a joystick option but these seem as hard to

use, so each to his own here.

Patience is a must as the first few games often last less than a minute.

Graphics are good and fast moving. The idea of the game is quite original and should keep you amused, we recommend it. **NG**



Sorcery

Computer: Commodore 64

Price: £7.95

Supplier: Virgin Games, 61-63 Portobello Road, London W1

It's magic! (Well, you'd expect comments like that.) In fact Virgin's latest offering has more tricks up its sleeve than Paul Daniels, and certainly proves Virgin mean what they say when claiming that from now on they're concentrating on releasing fewer games, but of higher quality.

Sorcery is in the popular format of an arcade-adventure (that is, although success in the game depends largely on a quick hand on the joystick, there's also an element of strategy and a definite storyline to follow). In this case you are the last powerful magician left to fight against the power of the dreaded Necromancer. You must negotiate seventeen screens packed with magical foes, until arriving at Stonehenge where you place a mystical object on the



altar. In clashes with ghoulies and ghosties, all well-animated and suitably scary, you are helped or hindered by various objects which can be picked up by positioning the Sorcerer over them, and pressing the fire button.

Although swords, spell books

and clubs can be useful in opening doors between scenes, fighting off evil spirits and so on, some of the objects are deadly and must be avoided at all costs. This is where the element of "adventure" comes in. Each time you play the game you learn a little more about the way to win.

A graphic representation of a crumbling Stonehenge indicates the time you have left in which to complete your quest, and your inventory and energy are indicated in flowing runic script at the bottom left of the screen. You can refuel by finding pots of magic brew along the way, but the further you go the quicker and more loathsome the evil spirits become. It's very much an *Atic Atac* viewed from the side rather than the top, but with great spooky music, fast action and nice packaging, this shouldn't be allowed to put you off. Get *Sorcery* or you'll turn into a frog. **CJ**



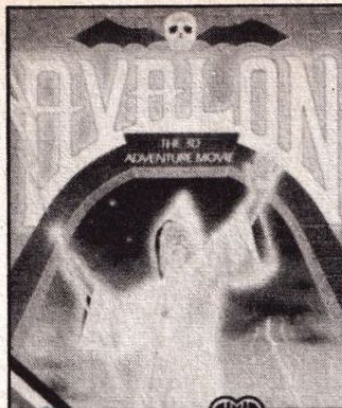
Avalon

Computer: 48K Spectrum
Price: £7.95
Supplier: Hewson Consultants,
 60A St Mary's Street,
 Wallingford, Oxon

Hewson are quite well known for their flight simulators and 3-D arcade games, and now they've combined the two and taken them One Step Beyond as you control the astral body of Maroc the Wizard in what they're pleased to call a 3-D Adventure Movie. Don't expect *Valhalla* or a laser disc extravaganza, but *Avalon* is certainly up there in the First Division.

As Maroc you have to seek out the dreaded Lord of Chaos in *Avalon* on the Isle of Glass, and being a wizard you don't book with Thomas Cook, you send your astral body instead. This has one great advantage in that you can't kill an astral body. The worst that can happen is being sent back to the start, though you do keep any spells and status made upon the way. You begin *Avalon* as an Apprentice Lore Seeker, and must aim to become a Supreme Lore Lord. If you think that's going to be easy, remember that there are 126 stages in between the two.

Maroc floats on the screen,



initially in a room with one door on the right. Control is by Kempston, AGF or Sinclair joysticks, or keyboard, and you can SAVE a game in progress if you're managing to work your way up through the eight levels of *Avalon*, beginning with the Gate House Level and going via places like the Mines of Despair.

Initially Maroc just has the MOVE spell at his command, though in the first few rooms he might be able to add things like FREEZE and UNSEEN. A list of available spells is shown at the foot of the screen, and you can scroll through these to the one you want to activate. There's even a SERVANT spell which gives you a little ghostly sprite. When you

activate this, control passes from Maroc to the sprite, who flits about the room perhaps opening doors that are locked to you, or putting objects into your sack.

Map-making is essential, and aided by the PAUSE feature, though hindered by the fact that going NORTH through one door might cause you to enter the next room from the EAST. The background graphics are kept simple but the 3-D perspective is excellent, moving with you, and

the ghosts and guards you meet along the way move about most convincingly. You have to work out which spells are effective against which enemies, while watching your energy level at the foot of the screen. The permanent border graphics are beautifully done, with devils, snakes, angels and scrolls, and *Avalon* is one of the best in a very good software month. **MG**



Aztec

Computer: Commodore 64
Price: £8.95
Supplier: Beyond Software,
 Lector Court, 151 Farringdon
 Road, London EC1

Beyond have a reputation, built up with games like *Lords of Midnight* and *Psytron*, for releasing complex, graphically sophisticated games. *Aztec*, despite being an import from US company Datamost, continues the tradition, though it's in the wearisomely familiar "search the lost caverns for hidden treasures and battle against the terrifyingly nasty monsters" vein.

Another drawback to the game is that the controls are not so much a handful, more two hands and two feetful. Your hero (based I would venture to guess on Indiana Jones) can walk, run, crawl, place

dynamite, shoot, open boxes, and would probably wipe his nose with a handkerchief if you could find the right key — but since there are 15 control keys you're not likely to find it in time to stop his nose running.

Having voiced those criticisms, there are many good points in the game. Some of the cavern monsters, such as dinosaurs and snakes, are excellently animated, and the game has a real feeling of depth.

Aztec is certainly a step up from the usual run of "lost treasures" games, but it's a pity the primitive sound effects don't match the high quality of the graphics and animation. Also, someone should tell Datamost how to spell "archaeological". **CJ**



Bumble Bee

Computer: Acorn Electron
Price: £6.95
Supplier: Micro Power,
 Sheepscar House, Sheepscar
 Street South, Leeds LS7 1AD

There's a real shortage of innovative, quality software for the Electron. That's something Micro Power are working to improve. *Bumble Bee*, a very simple idea, and a clever variant on the *Pac-man* theme, represents a real addition to Electron owners. The game takes place in a maze — a maze of turnstiles which can be swung by the player, creating and blocking pathways at will. That, however, is about the only thing going for the luckless Bee, the rest of the game is about survival.

You are the bee, running through the maze, turning the turnstiles, eating the pollen and collecting points. Chasing you are some persistent and hostile spiders which emerge from a central lair. These nasties can only be killed by luring them onto the burning fire-barrels, a task requiring a measure of skill and a lot of luck. The aim is to clear one screen and enter the next, avoiding not only the spiders, but also the fire-barrels and toadstools — deadly obstacles blocking the maze in random

positions with each new screen.

Bumble Bee is smooth and well implemented. Both graphics and sound are excellent, and a present high score table, complete with some rather unconvincing names (anyone here called 'Ilbert') gives a good measure of achievement. Joysticks are supported, but the game is playable using the keys.

What is lacking is any means of getting aggressive. Unlike *Pac-man* there are no 'Power Pills' and therefore no chance to get even. The adrenalin flows, but it's difficult to get that excited over a game which is really about running away. The other let down is the logic. The spiders move smoothly towards you and kill with the lightest touch, but are just not bright enough to be either tricked or properly lured, displaying an annoying tendency to go round in circles. It's thus easy to stay out of their way, and by far the best policy. Although the playing gets faster as you progress through the screens, it doesn't get much faster — another programming opportunity missed. Nevertheless, playing is fast and panicky, often frustrating, but always absorbing.

A worthy successor to the compulsive *Snapper*, *Bumble Bee* does produce an itch or two. **GM**



Pyjamarama

Computer: 48K Spectrum

Price: £6.95

Supplier: Mikro-Gen, 44 The Broadway, Bracknell, Berks

At the conclusion of our review of Mikro-Gen's first game to feature Wally Week, *Automania*, which was based none too loosely on *Manic Miner*, we asked rather tongue-in-cheek if we'd next be having something called Jet-Set Wally. Surprise surprise, here's *Pyjamarama* in which you move Wally Week around the rooms of a large mansion collecting objects and avoiding assorted enemies.

The story is that Wally is actually asleep and having a nightmare, the character you're controlling being in Wally's imagination only. You have to find the sleeping Wally and wind his alarm clock up, which will wake him from the nasty dream. Finding him isn't too difficult, but winding the alarm clock is another matter, this being the kind of game where you need one object before you can get another or certain keys to open certain doors, and so on. Though at the end you're told how many paces Wally took and what percentage of the adventure was completed, this is out-and-out arcade, with three lives and options for Sinclair or Kempston joysticks, and to define your own

keyboard controls.

Lives are indicated at the top of the screen by a slowly-emptying glass of milk, indicating your snooze level. When that empties Wally floats up to the ceiling, but stays in the room where he died to resume play. You start at the foot of a staircase carrying a round key and a radio. Next to you is a door handle, which you can pick up by walking through it, though you can only carry two objects at a time. Handles and keys are very handy for getting through doors, but you'll also have to figure out the purpose of things like a pot plant, a pound coin (changeable for something else) and a beach ball, as well as working out a map of the mansion and noting which barrels transport you to which rooms.

The graphics are much chunkier than something like *Jet Set Willy*, but if you don't mind the fact that it's a blatant copy of the basic idea then you should still enjoy *Pyjamarama*, as there's plenty of running and jumping to keep you entertained, with lots of rooms and amusing little routines. But what will Mikro-Gen do till the *Jet Set Willy* follow-up comes out? Why, they might even have time to think of something original... they've certainly got the skill. **MG**



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COMPUTER SOFTWARE

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TWINCASSETTEPACK**

Summer Games

Computer: Commodore 64

Price: £14.95

Supplier: Quicksilva Ltd,
Palmerston Park House,
13 Palmerston Road,
Southampton

Summer Games is an American program by Epyx, and sets new standards for graphics and animation. The opening sequence is enough to make your jaw drop — it's more like watching a cartoon than a computer game, as an athlete runs up a dais and applies his torch to the Olympic brazier. White doves fly across the screen and an anthem plays — it's incredible!

You can compete in any one of the eight events, or in each event in turn. One to six players can participate, each electing to represent a different country. The national flags of many countries are displayed, and having made a selection with the joystick you hear the appropriate national anthem.

The eight events each present marvellous opportunities for the programmers to show off their skills in animation, graphics and control. The backgrounds are beautifully detailed and coloured, and animation of the athletes' figures is astonishing. In the diving option, for instance, the joystick can be used to make your athlete

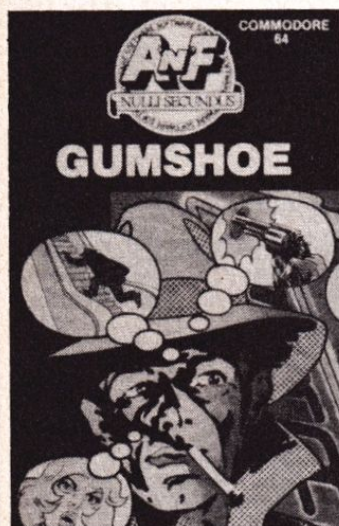
jump from the board, roll, tuck, straighten out, and slice into the water (or belly-flop if your timing is wrong).

The judges' scores are displayed, and a score board indicates if you've broken the world record.

The running events are controlled by waggling the joystick furiously from side to side to make the athlete run faster, whereas in the swimming events timing is everything; your strokes and turns must be accurate to a split second to make the best times.

The pole vaulting event contains some of the most impressive animation. Both timing and dexterity take a part, as you must judge the right place to start your leap and the exact second in which to release the pole. Skeet shooting is a matter of a fast hand on the joystick, and gymnastics, like diving, is a combination of thought and skill.

The only drawback to the program is the necessity of having to load each section separately from tape. It's the best argument I know of to get a disk drive. Otherwise, *Summer Games* is so impressive that I think it could well be used as a demonstration of the full graphics potential of the Commodore 64. **CJ**



Gumshoe

Computer: Commodore 64

Price: £7.90

Supplier: A & F Software, Unit 8,
Canalside Industrial Estate,
Woodbine Street East,
Rochdale, Lancs

It was one of those days when the rain turned the streets into a skating rink, and all the skaters carried coshes. It's a tough life being a gumshoe, and the toughest case I ever took was tracking down a millionaire's daughter. She was a good-looking

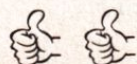
broad, but I didn't let that influence me none. Once I'd traced her kidnappers to the seedy hotel where they'd holed up, it was just me and my gat against 'em, on 150 floors, chasing 'em through trapdoors, down garbage chutes, up elevators and escalators.

I took a few knocks, but what shamus doesn't? I reckon my chances in a fight were fifty-fifty, but a bullet in the back is a sure way to the big sleep.

If I'd known before I started that them A & F guys could have given me a map of the tower block for 50p plus an SAE, I'd have leaned on them pretty hard. Still, a guy like me shouldn't have much trouble sorting out a bunch of cheap hoodlums — they don't get about too quick.

I reckon the only screwy thing about this case is the sound effects. Is that crazy noise supposed to be doors opening? Sounds to me more like the noise a guy makes when you pistol-whip him — in self-defence of course.

As cases go, this was pretty good. Real tough luck that my medical bills, plus the cost of ammunition, came to more than the reward money... **CJ**





Falcon Patrol 2

Computer: Commodore 64
Price: £7.95
Supplier: Virgin Games, 61-63 Portobello Road, London W1

Many of you will be familiar with Steve Lee's original *Falcon Patrol*, which was arguably Virgin's first real success, and is still available, now at a reduced price of £2.99. Even if you've got *FP1*, you should check out *FP2*. It's like meeting an old friend with a different hairstyle — it may take some time to get used to, but it has all the same lovable qualities.

Falcon Patrol 2 is still very much a Defender-type game, with a sideways screen-scroll (smoother than the original) and a central-screen fighter craft dodging and battling airborne enemies. In the original it was jet-planes, which were very difficult to catch, in *FP2* it's well animated helicopters of various types. Some dodge around the sky just trying to make you ram them, others fire missiles and land deadly anti-aircraft batteries or radar jammers. The radar screen shows what's coming, and excellent sound effects also act as useful aids — an alarm sounds when you're running low on fuel, and have to find a pad to land on.

There's no object to the game other than to clear the screen of enemies and survive for as long as possible, but then that's life! The beautifully-detailed backgrounds, showing ruined hotels, pyramids and crashed helicopters, are enough to make the game worth buying in itself, but the speed of the action, excellent graphic explosion effects and thrill of martial theme music (by Steve's brother Dave) are also persuasive.

If you're in search of a good shoot-'em-up with no pretensions of being an intellectual challenge, this may well be your best choice of the moment.



Kentilla

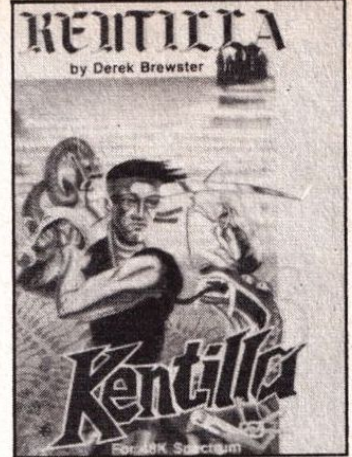
Computer: 48K Spectrum
Price: £6.95
Supplier: Micromega, 230-236 Lavender Hill, London SW11

Micromega established their name with several 3-D style arcade games, many written by Derek Brewster who here turns his hand to the adventure market with what turns out surprisingly to be a follow-on from *Velnor's Lair*, published by Quicksilver. Velnor is planning his revenge, and has found the "nefarious Tones of Grako". Grako in his turn over-powered Velnor, and is now threatening to take over Caraland, where you live and turn it into an evil place of eternal darkness, filled with the walking dead (sounds like the London underground to me). But no, the purpose of the adventure is only revealed by playing it, as there's no detailed explanation given, though the instructions for inputs etc are very helpful.

Commands aren't limited to NOUN-VERB, though that's the most common form you'll use. You can for instance SAY TO CAVEZAT "GIVE ME ROPE", or

PUT SWORD INTO CHEST. The LOOK command is quite versatile, for as well as being used on its own to redescribe the location, you can LOOK INTO CHEST, or LOOK SOUTH to forewarn you of what's coming up. If you LOOK EAST from your first location outside Ogeron's house, for example, you'll see an ugly Urga-Maul, along with a nasty one, a fat one, a thin one and a small one, although random factors ensure it's not necessarily the same each time. Enough to discourage you from going east in any case, though if you insist on it you'll only get thrown in the Urga-Mauls' Dungeon.

Going south into the house of Ogeron (you have by now realised this adventure is filled with people and places bearing funny names) you'll be given a sword and a few clues as to your task, then off you go into the dense forests and scorched plains of Caraland. A visit to the Cavezats' Cavern reveals a rope, though if you take it the creatures (whatever they are) won't allow you to leave. Well, not unless you... but that would be giving the game away. Cross the River Cara and you may find



yourself in the vile swamps of Caradom.

Some of the locations have very simple pictures, and the program seems to have been thoroughly tested, with no annoying little bugs that we could see, apart from the Giant Spider, of course. The text perhaps lacks a little in atmosphere, but fans of *Velnor's Lair* will no doubt be kept occupied for months to come with *Kentilla*, a better-than-most adventure. **MG**



Tarzan

Computer: BBC model B
Price: £7.95, Disk £11.95
Supplier: Alligator Software Ltd, 1 Orange St, Sheffield S1

Alligator have come up with a game on the lines of *Donkey Kong* etc, where you have to battle your way from one part of the screen to the other, only to be rewarded by an even worse trip on the next screen.

The gist of it is that you are "Tarzan of the Jungle" and you have to fight your way through perilous undergrowth to save your one and only love, Jane, from some unspeakable fate worse than death.

She, naturally, is several screens away, so getting to meet her will take some doing. There are a total of four awesome screens to contend with in all. You can't skip any screen but the "Demo mode" will give a taste of things to come.

In this digital jungle the traditional swinging vines have been replaced by moving lifts. Other goodies are: snakes, cheetahs, teeth and so on.

When getting around the screen, watch the lifts as you will get squashed on some of them if you stay on too long. Impeccable timing comes in handy otherwise you won't get very far.

A hint for the second screen, staying where the computer starts you off you will die while

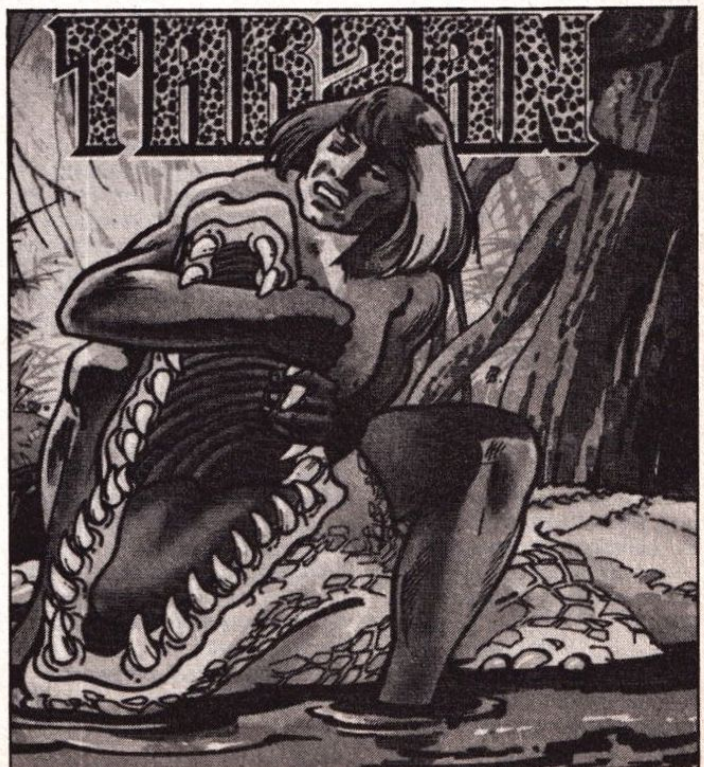
wondering what on earth to do next. So move to the left right away, this will save smashing your computer after taking so much trouble to get there. If all that isn't enough, you're also on a time limit so don't hang around.

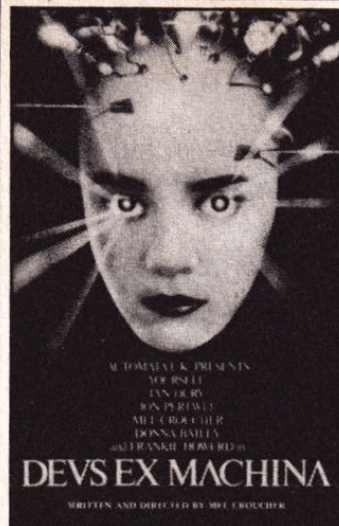
The keys are simple enough, with caps lock, control for left, right and return to jump. You also have the option of a joystick but this can

take time to master.

Graphics are very good and the screen is full of moving things, the animation of which is smooth.

The game presents quite a challenge as you certainly won't get through it in a few minutes. Definitely worth buying. **NG**





Deus Ex Machina

Computer: 48K Spectrum
Price: £15

Supplier: Automata, 27
Highland Road, Portsmouth,
Hants PO4 9DA

"*Deus Ex Machina* is a completely new form of entertainment," just like every other piece of software that comes out these days, what with computer movies, 3-D adventures and what-have-you. In this case it does happen to be true, depending on your idea of entertainment, that is. What

Automata have done is provide one cassette of computer program (double-sided, with 80K of code) and one of music and voice-overs from the likes of Frankie Howard, Jon Pertwee, Ian Dury and Donna Bailey. By a counting device at the start of each side, you run the program and soundtrack simultaneously, then sit back to watch and listen.

The trouble is, that's about all you do for the following hour. Automata describe it as an experience rather than a game, but there are some experiences one can do without, and sitting through boring, pretentious twaddle is one of them.

Another claim is that the software enables you "to play the leading character in a fully-animated televised fantasy", which makes *Deus Ex Machina* sound like a laser-disk controlled piece of software, where there is constant interaction between you and the program. This is simply not true, as for 90% of the time you simply watch and listen, with keyboard or joystick lying idle. On occasions when you are allowed to participate you get games that, with a little effort, might make passable versions of *Breakout* or *Tempest*. Your success or otherwise at these provides you with a lifetime percentage indicating how well you are going

which as the storyline criticises high-scoring games-playing, is something of a contradiction. The final game... sorry, experience, is a version of the ancient fairground and pub favourite where you move a metal ring along a zig-zagging wire, trying to avoid contact.

In the software's favour is that it is an attempt to do something different. If the music were by Pink Floyd or Mike Oldfield, say, you might be tempted to listen to it over and over while admiring the graphics (which are excellent), but while parts of the music do bear a passing resemblance to extracts from *The Dark Side of the Moon*, in no way is it good enough to warrant repeated, or even a second, playing. You can run through the program on its own, if you wish, but even if you found a

bit of it that you liked there would be no way to linger over it.

The storyline is a futuristic cautionary tale, set in 1994, of a society run by computers, and it follows through Shakespeare's seven ages of man, from the foetus to old age. The lack of interaction, though, and the miserable moralising (we happen to like getting high scores on arcade games, without letting micros completely run our lives) mean that *Deus Ex Machina* is not a piece of software we would run out and pay £15 for.

Presumably Automata's moralising about dangers of micros doesn't mean that people shouldn't spend a lot of money buying their software. **MG**



Kokotoni Wilf

Computer: 48K Spectrum
Price: £5.95
Supplier: Elite, 55 Bradford
Street, Walsall

Any resemblance between *Kokotoni Wilf* and *Sabre Wulf* is purely deliberate, particularly in the sales figures Elite no doubt hopes. There's also more than a sneaking similarity with *Manic Miner*, in that you must collect one object from each screen in this multi-screen arcade-adventure.

The object in this case is one piece of the legendary Dragon Amulet (no relation to the legendary Dragon computer), fragments of the Amulet having been scattered throughout time. As Wilf, you are sent back first to 1,000,000 BC to collect all the pieces of the Amulet that landed in that time zone, when dinosaurs ruled the earth, not to mention mobile Venus Fly-Traps, bats, sharks, pterodactyls, snakes, sabre-toothed tigers and other creatures that made life so pleasant in those days.

As Wilf you are armed with a pair of wings, so to speak, and

your Spectrum can be armed with a Kempston, Interface 2 or any programmable joystick. Alternatively you use the keyboard, which has a choice of three combinations for left and right movement, and either the 1 or 0 key to flap your wings. Keeping the key or firebutton pressed keeps you flying, you don't need continual presses, though this advantage becomes tricky where you need to fly in a straight line or delicately descend or ascend.

On the first screen you have a dinosaur to avoid, a couple of deadly bushes, and a rather nasty cloud that floats across the top of the screen. This is a tame introduction to the game, where nabbing the Amulet fragment becomes much harder as you fly or walk through the succeeding screens. The Fly-Traps are particularly vicious, and on one screen there are two of them either side of an Amulet fragment. They move up into the air, but too quickly to allow you to sneak beneath them. You have to descend between them, and the positioning of the character has to be almost pixel-perfect to make it down and fly back up again.

The graphics won't impress you as much as *Manic Miner* or anything by Ultimate, but this is still an enjoyable game that challenges your delicate reflexes and where keyboard control is just as good (or bad) as joystick. There's precious little sound, and even with six lives we haven't yet managed to get out of the first time zone—collect all Amulet fragments from one zone and a time-gate opens to another zone, but you're not told how many fragments or zones there are. **MG**



Country Cottages

Computer: 48K Spectrum (also Amstrad)
Price: £5.95 (£7.95 Amstrad)
Supplier: Sterling Software, 86-88 Edgware Road, London W2

There are some games where your heart just sinks as you embark on them, with boredom looming ominously over the horizon, and with *Country Cottages* boredom not merely loomed it leapt at us and pummelled us into submission. The idea of this two-player simulation game is that you buy, rent and sell country cottages. It sounds, and is, about as exciting as watching paint dry.

Having typed in your names and chosen a skill level from 1-9, as well as the target you have to make between £20,000 and £100,000, you take it in turns to play. When a cottage comes on the market you can view it, and a picture of the said cottage appears on the screen. The program apparently embodies "Landscape Creation", which is claimed to be a revolutionary concept in computer graphics, randomly creating different scenic views throughout the game. And if you want a program displaying an

infinite number of country cottages, this is definitely it.

Having bought a cottage with the generous help of your bank manager, you can then advertise for tenants. Not only are the cottages different in every game, but "so are the tenants' names—which can be hilarious!" Yes, really hilarious names such as Mr Senshine, Dr Mugjump and Mr Kerlwhine.

Having found tenants you can then go on to do really exciting things like raising the rent, passing a turn, or abandoning the game altogether. You can sell a cottage if it is untenanted, and the way to get it in that state is simply to raise the rent to an exorbitant amount. There are random factors included, such as fires, storms, burglars and ghosts. The idea of the game is that you must make more in rent and profits on selling cottages than you pay out in bank interest on the loans enabling you to buy them in the first place.

The game plods on, each player taking one turn at a time, until one or other of you make the target amount or decide there must be more interesting things to do with one's time... like homework or hoovering the carpet. **MG**



At last! A really stunning game for the BBC Micro. Acornsoft's *Elite* is an amazing combination of flight simulator, arcade action and strategic adventure, and casts the player in the rôle of Captain of a Cobra Mk III trading and combat spacecraft. The object of the game is to make your fortune by trading — either legally or illegally — through known space.

The packaging is the first really noticeable thing about *Elite* — excellent artwork has been provided by airbrush artist Philip Castle — and in addition to the cassette or 40/80 track disk (depending on which version you buy), the chunky box contains a wealth of detailed paperwork! A poster shows all the different space-ships you are likely to encounter on your voyage; there is a short story to set the scene for the adventure; a function key strip; an extensive Space Trader's Flight Training Manual; and a

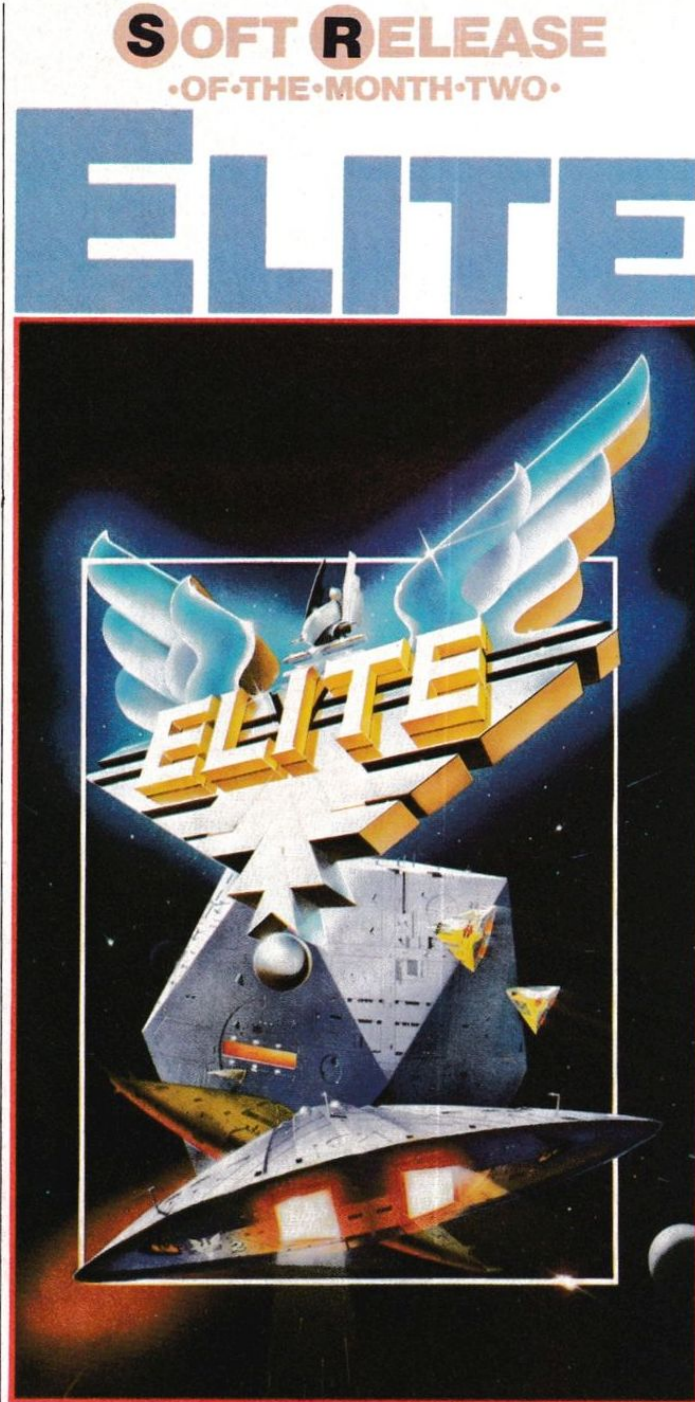
Don't expect to finish this superb game in a hurry

quick-reference card listing all the commands.

In the Training Manual, a drawing of the Cobra spaceship's bridge shows that the main command keypad bears a remarkable resemblance to a BBC Micro! Above the keypad there is an elaborate split-screen display, and this, of course, is what you see on your monitor when you play the game. The larger portion of the display is the scanner screen, which gives a wire-frame view of space to the front, back, or either side of your ship. The other part of the screen shows the 'astrogation' console and main systems monitor, including a complicated flight grid scanner, ship's compass, gyros, and read-outs of altitude, velocity, fuel, and so on.

You begin the game with a limited supply of hyperspace fuel and weaponry, and a combateer rating of 'Harmless'. Your ship is docked at a Coriolis space station, high above the planet Lame, and the first task is to master the controls before setting off on your journey. Laser fire and movement of the craft can be governed by a joystick or the keyboard — the other controls are all on the keyboard.

It seems that there are several ways to make a living in space — asteroid mining; trading in legal or illegal goods; piracy; even bounty hunting — the choice is yours, and the profits can be spent on extra weaponry or hi-tech equipment for your ship. Hazards include space



The second of our top programs for December — Clive Williamson tests his skills against Acornsoft's *Elite*.

pirates who will try to rob you of your livelihood, and the GalCop police force, who take exception to those get-rich-quick pilots who deal in contraband, or those piracy themselves.

According to the way you act, your Legal Status may change from 'Clean' to 'Offender', or even worse, 'Fugitive', and as you build up experience in space, your combateer rating gradually changes. 'Mostly Harmless' is the first step up, and you can improve on this by several stages to become 'Competent',

'Dangerous' and even 'Deadly'. The Training Manual says that 'at last, a few will become ELITE!!' While you are docked, you can save your rating and experience on tape or disk for next time.

To help you on your journey, the function keys give you access to lots of information about your ship and its cargo, and about surrounding space. There are charts of each galaxy and textual details about each inhabited planet; although the Manual ominously warns that the Orbit Space Authority takes no responsibility for the accuracy of planetary data. The potential for adventure is enormous, as the eight galaxies each contain over 250 recognised planets with various life-forms and political climates. Don't expect to finish this game in a hurry.

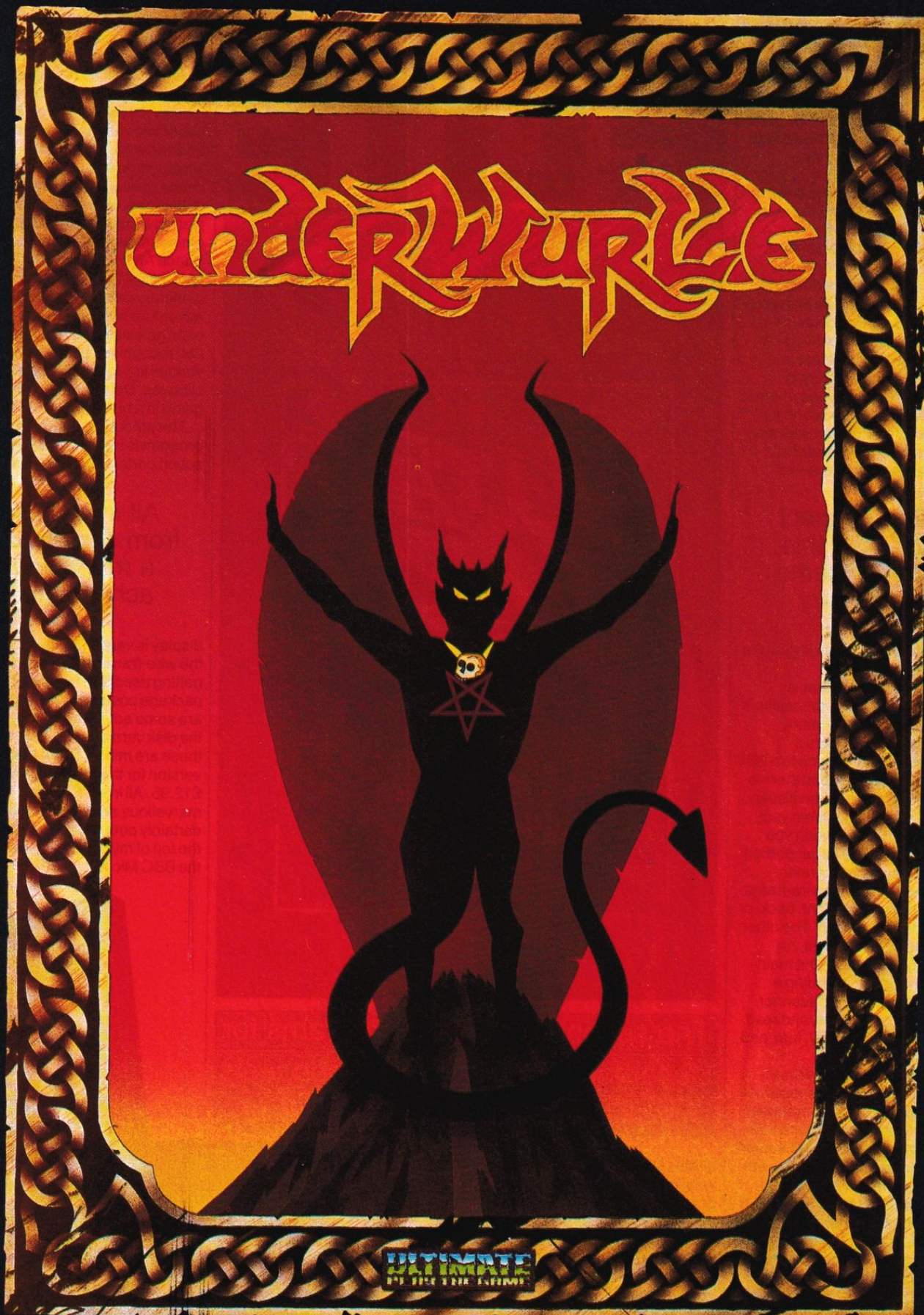
The amount of data held in the program is incredible, and the action portrayed by the screen

All in all, *Elite* from Acornsoft is a marvellous achievement

display is very smooth, although the wire-frame style takes a little getting used to. The cassette package costs £14.95, and there are some advantages in getting the disk version at £17.65, but these are minor. There is also a version for the Electron, selling for £12.95. All in all, *Elite* is a marvellous achievement, and it certainly puts Acornsoft back at the top of my chart for games on the BBC Micro.



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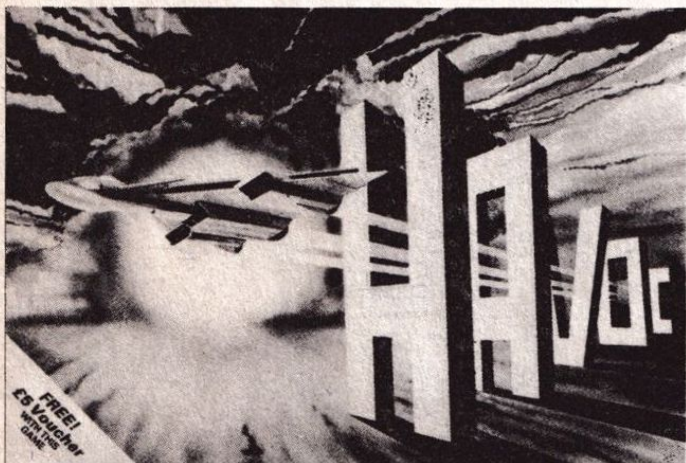
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Atari 800XL	£250	£250	Home	64K	24K	RS-232C	128
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BBC Model B	£399	£399	Home/ education	32K	32K	RS-423, parallel, The Tube	8 (+ 8 flash)
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Commodore Vic 20	£140	£140*	Home	5K	8K	Serial, parallel (own)	8
Mitsubishi ML-F 48	£249		Home/ business	32K	32K	Parallel	16
Mitsubishi ML-F 80	£299		Home/ business	64K	32K	Parallel	16
Sony HB-75	£300		Home/ business	64K + 16K video	32K+16K Firmware	Parallel	16
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Max no colours	Max text display	Max graph resolution	Language supplied	Sound channels	On board speaker?	Command system	Review date	Supplier
27	80×25	640×200	BASIC	3	Yes	CP/M or BASIC	July 84	Amstrad Consumer Electronics PLC 0277 228888
16	80×2	640×200	BASIC	1	Yes	CP/M		Advance Technology (01) 609 0061
256	40×24	320×192	BASIC	4	No	BASIC	Dec 83	Atari helpline 0753-24561
256	40×24	320×192	BASIC	4	No	BASIC		Atari 0753 33344
8 (+ 8 flash)	80×32	640×256	BASIC	1	Yes	BASIC	Sept/Oct 83	Acorn Computers 0223 210111
8 (+ 8 flash)	80×32	640×256	BASIC Assem	4	Yes	BASIC, *FX	May/June 83 March 83	Acorn Computers 0223 210111
28 shades	40×25	320×200	BASIC	2	No	BASIC		Commodore 0753 79292
121 shades	40×25	320×200	BASIC	1	No	BASIC		Commodore 0753 79292
16	40×25	200×520	BASIC	3	No	BASIC	March 83 June 84	Commodore 0753 79292
8 foregrnd 8 backgrnd	23×22	184×176	BASIC	3	No	BASIC	Sept/Oct 82 May 83	Commodore 0753 79292
16	40×24	256×192	MSX BASIC	3	Yes	BASIC		Mitsubishi Electric (UK) Ltd. 0923 770000
16	40×24	256×192	MSX BASIC	3	Yes	BASIC		Mitsubishi Electric (UK) Ltd. 0923 770000
16	40×24	256×192	MSX BASIC	3	Yes	BASIC		Sony (UK) Ltd Staines 61688
16	40×24	256×192	MSX BASIC	3	Yes	BASIC		Sanyo Maruben (UK) Ltd Watford 46363
16	40×24	256×192	BASIC, Noddy	4	No	CP/M or BASIC	Dec 83	Memotech 0993 2977
16	40×24	256×192	BASIC Noddy	4	No	CP/M or BASIC		Memotech 0993 2977
16	40×24	256×192	MSX BASIC	3	Yes	BASIC		Micro Peripherals 0256 473232
8	40×28	240×200	BASIC	3	Yes	BASIC	April 84	Oric Products International 0990 27641
8 full col 8 backgrnd	40×25	80×50	BASIC	1	Yes	BASIC	Sept 83	Sharp 061 295 2333
4 3	85×25	512×256 256×256	Super-BASIC	1	Yes	QDOS	Mar/May 84	Sinclair Research 0276 685311
16	40×24	256×192	MSX BASIC	3	Yes	MSX-DOS + CP/M	Sept 84	Spectravideo 01-330 0101
8 foregrnd 8 backgrnd	32×24	256×192	BASIC	1	Yes	BASIC	Feb 83	Sinclair Research 0276 685311
16	32×16	256×1923	BASIC	3	Yes	Own or CP/M		Spectravideo 01-330 0101
16	40×24	256×192	BASIC	3	No	BASIC	Dec 83	Spectravideo 01-330 0101
16	40×24	256×192	MSX BASIC	3	Yes	BASIC	Aug 84	Toshiba (UK) Ltd 0276-62222
8	40×24 32×24	256×192	BASIC	4	Yes	XTAL DOS	July 84	Tatung, Bridgnorth, Shrops. WV25 6BQ
16	40×24	256×192	BASIC	3	No	BASIC		Parco Electrics 0404 44425
8	32×16	256×192	BASIC	1	No	BASIC		Tandy 0922 648181

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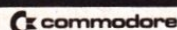
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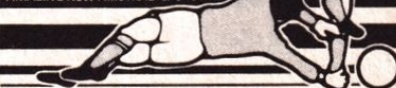
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AD. INDEX

Acorn	14 & 15, 62 & 63
Atari	10 & 11
Automata	67
Care Electronics	66
Commodore	Gf, 3, 38 & 39
Crestmatt	68, 89
Cumana	49
Currah	99
Datatech	71
Durell Software	100
Dynavision	89
Electronic Aids	9
Folly Micros	88
Handic	34 & 35
Harbour Software	72
Hisoft	68
Hornby Software	9
Hutchinsons	98
J.P. Magnetics	71
M.P. Software	34
Mayfair Micros	35
Micronet 800	90 & 91
Mitsubishi	26 & 27
Microvitec	40
Modular Resources	13
Oxford Computer Publishing	33
Parco Electronics	6
Quendata	28
J.J. Silber	5
Selec Software	72
Silica Shop	73
Sinclair	50 & 51
SMT	52
Spectravideo	97
Softstone	74
Touchmaster	25, 37, 61
Turner & Sons	71
Ultimate Play the Game	86 & 87
Worldwide Computers	64

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ALL you need to know about computers can be summed up in one word: Commodore. (Well, we did tell you this would be biased).

We make everything you'll ever need to get the most out of home computing: all the *hardware* and all the software. (And if you don't understand what that means, simply look under "H").

That's what these three pages are all about: explaining what computers are (without the scientific jargon), how they work (without any technical mumbo-jumbo), and how you can get more enjoyment out of them (without much difficulty).

BASIC. Most home computers speak the same language. It's called BASIC. This is a more friendly way of saying "Beginners All-Purpose Symbolic Instruction Code."

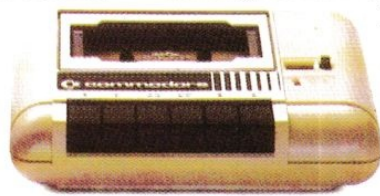
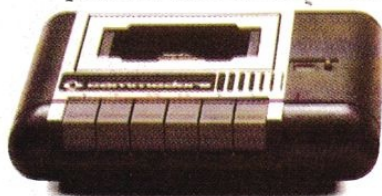
There are different kinds of BASIC and, like languages, some are a little easier to understand than others. Like, BASIC 3.5 in the *Commodore Plus/4* and *Commodore 16*.

BOOKS you can read: "Teach Yourself Computer Programming With The Commodore 64" and "Programmers Reference Guide."

CASSETTE. Just as you keep your favourite music on cassette, so you can also keep your favourite computer programs on cassette.

You can either buy pre-recorded programs in a shop, or you can write them yourself. Cassettes are just one form of program storage and playback – see also *Cartridges* and *Disk Drive*.

To play cassette software you need a cassette unit. The Commodore 1530 and 1531 cassette units have been specifically designed to get the very best out of our computers, and provide consistently reliable results.



CARTRIDGES. These are programs that plug directly into the back of the computer itself.

CPU stands for Central Processing Unit. This is the computer's "brain," and as such it's what does all the hard work.

CHIP: silicon. A very complex electrical circuit miniaturised in silicon. It carries out the functions in the computer. Unlike other home computer companies, we make our own chips, so maintaining quality.

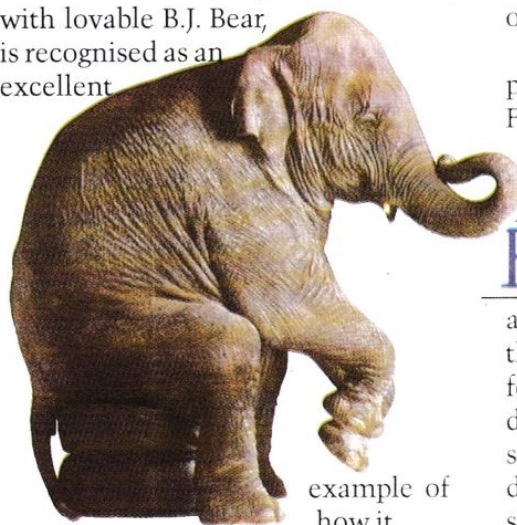
DISK drive. A program and data storage system, just like cassettes, but much faster. You can find and load the program you're looking for in seconds instead of minutes.

Diskettes, which can be used repeatedly for recording or re-recording programs, transfer information or instructions to and from the computer.

EDUATION software from Commodore. We work non-stop with educationalists, improving our range of programs for the pre-school to "O" level age groups and beyond.

Computers are an invaluable educational tool – versatile, patient and able to present information in an exciting way.

Our "Get Ready to Read" series, with lovable B.J. Bear, is recognised as an excellent



example of how it is possible to develop reading and writing skills in pre-school children.

ELEPHANT: well-known symbol of the *Commodore 64*'s enormous 64K memory. And don't you forget it!

FOUR is for Commodore Plus/4, our very latest home computer with four, very popular built-in programs: word processing, spread-sheet (financial planning), database (filing), and graphics.



It has an extensive 64K memory, with an exceptionally large 60K available for use. The Plus/4 comes equipped with the Commodore BASIC 3.5 with over 75 programming commands.

Other features include sound facilities, comprehensive graphics and 121 colours.

GORTEK and the Microchips is a unique programming course, for children of all ages, that links learning exercises with a space adventure story. **GRAPHICS.**

The pictures and diagrams on a monitor or TV screen, either high or low resolution.

All Commodore home computers have 62 graphic symbols to create low resolution pictures and diagrams, or high resolution modes that allow you to specify each pixel (or dot) on the screen.

(There can be up to 64,000 of these).

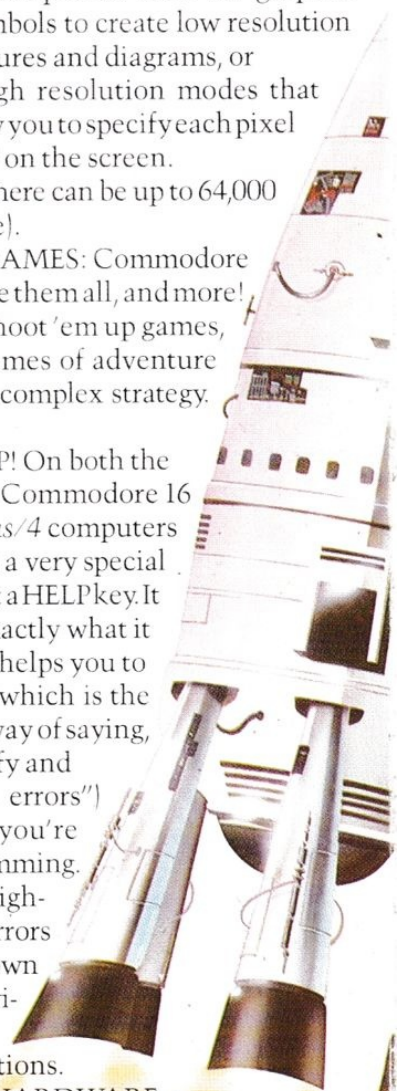
GAMES: Commodore produce them all, and more! From shoot 'em up games, to games of adventure and complex strategy.

HELP! On both the Commodore 16 and Plus/4 computers there is a very special feature: a HELP key. It does exactly what it says: it helps you to debug (which is the smart way of saying, "identify and correct errors") when you're programming.

It highlights errors right down to individual instructions.

HARDWARE.

The computer itself – you can touch it. Whereas software's a program you can only see or hear (on the monitor) when it's running in the computer.



INTEGRAL software is software that is actually built into the computer, as on the Commodore Plus/4, the very latest in home computing.

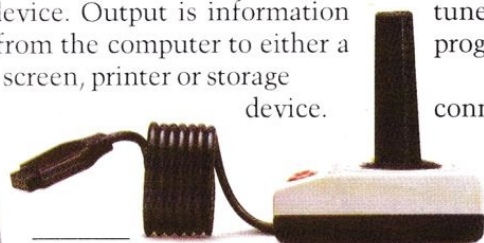
INTRODUCTION to BASIC. Just as you don't need to understand how a car works to be able to drive it, you don't have to understand how a computer works to be able to use one.

But you will definitely get more enjoyment out of it if you do have a basic knowledge of programming.

Which is why "Introduction to BASIC" has become the most popular software tutorial.

It comprises 2 cassettes and an easy-to-follow, step-by-step manual.

INPUT/output: Input is information put into the computer from either the keyboard or a storage device. Output is information from the computer to either a screen, printer or storage device.



JOYSTICK and paddles. As well as improving speed and accuracy, these make games more real by putting the control of whatever it is on the screen directly into your hands.

KILOBYTE is 1,024 bytes. So "K" stands for a unit of 1,024 or 2^{10} . A 64K byte memory unit contains 64×2^{10} or 65,536 bytes of memory. And if you don't understand all that, don't worry.

All that's important is knowing you can run more complex programs through a computer with a large memory, than one with a small memory.

LANGUAGE. This is a system of coding that can be understood by a computer. It allows you to "speak" to the computer, and for the computer to "speak" to you. Most home computers speak BASIC, but there are also other languages available for Commodore computers that have been designed for specific uses. For example, LOGO and PILOT in education.

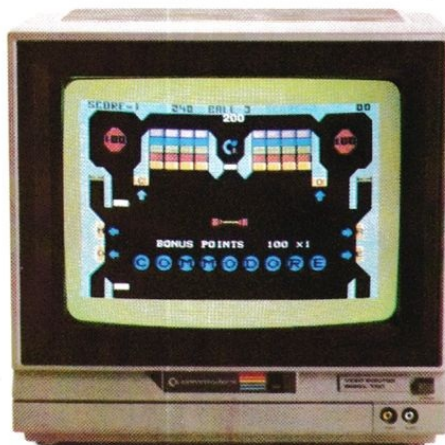


MONITOR: this is the screen on which you can see what you've typed into the computer, and also what the computer is saying back to you. You can use an ordinary TV screen, but more preferable is a colour video monitor, like the Commodore 1701.

This is a special device that produces much higher resolution than a TV, and so offers superb reproduction and clarity.

On top of which it allows the rest of the family to stay tuned-in to their favourite TV programme while you're tuned-in to your favourite computer program.

MODEMS allow computers to connect via a telephone line to other computer systems. Commodore 64 modem owners can communicate with other owners, join systems like Prestel/Micronet and an exciting new system called Compunet, where quality software is available cheaply or even free.



MEMORY. There are two basic types of memory: ROM and RAM.

Read Only Memory (ROM) is the computer's permanent built-in memory which tells the computer what to do. It doesn't disappear when the computer's switched off.

Random Access Memory (RAM), however, is for temporary storage.

It is the part of the computer's memory that's free for you to use. It can be erased and used over and

over again.

It stores both data and instructions during the execution of a computer program. These are lost when you switch the machine off - unless, of course you store them on cassette or diskette.

NUMBER ONE. In the whole wide world, Commodore is No. 1 in microcomputers, and the Commodore 64 is the No. 1 best seller.



ORIGIN of the computer. In the 19th Century an Englishman, Charles Babbage, invented the first true computer. But his "Analytical Engine" was so ahead of its time, it turned out to be impossible to build!

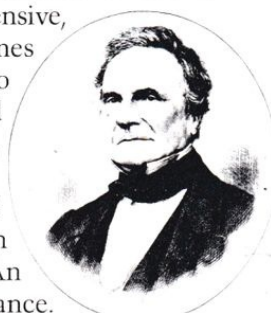
The modern computer first appeared around the time of World War II. Britain's "Colossus" was vast, consumed vast amounts of electricity, required its own air-conditioned room, was unreliable and difficult to operate.

It had its limitations.

Then came the amazing transistor... integrated circuits... and microcomputer.

The first desk top microcomputer in the world was the Commodore PET (this was a friendly name for Personal Electronic Transactor), in 1977.

In effect Commodore had taken hitherto huge, expensive, mysterious machines accessible only to eggheads, reduced the size and price, and put them into the hands of ordinary mortals in ordinary offices. An extraordinary advance.



PERIPHERALS. These are separate add-ons that will extend your computer's capabilities. Like our printers, storage devices and monitor.

PRINTER: One of the ways a computer can "speak" to us.

It means you can produce charts, letters, documents, pictures on paper.