AN ARGUS SPECIALIST PUBLICATION

September 1984

85p

Personal Computing Today

Japanese launch MSX attack: the Toshiba HX-10 interrogated

Making a computer programme:

behind the scenes of TV's Database

Easy and entertaining–

programs to use for Atari, BBC, CBM64, Spectrum



Software Reviews

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Shopping at Home

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Personal Computing Today

VOLUME 3 NUMBER 2 SEPTEMBER 1984

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ABC

This month, PCT has a rather Japanese slant to it (no pun intended!). There is an in-depth review of the new MSX standard BASIC, and one of the first of the MSX micros to reach our shores, the Toshiba HX-10, has been bench-tested. Since the MSX family of home computers, which will be launched by various Japanese manufacturers later in the year, will differ only in their packaging, our review will give you details on what you can expect from them.

The much bandied advantages of this group of micros centres on the fact that software produced for one will run on all the others. No longer will you have the frustration of being unable to play your friends' games, software can be swopped about at random. Not to be ignored, however, are the many disadvantages of a standard based on what some people (Sir Clive Sinclair among them) view as outmoded technology. Not only this, but standardisation could lead to stagnation and the computer industry, as much as any other, must progress to survive. Only time will tell whether the Japanese attempt to corner the home computer market will be successful, but read our report and draw your own conclusions.

It's a bumper month for hardware reviews and we have yet another bench-test, this time of the Advance Model 86A which slipped quietly into the shops a few months back. It has attractive features for the home enthusiast, not least of which is the relatively low price, and can be upgraded to a full blown IBM compatible business machine for some extra cash.

Testbed contains the concluding part of our special report on graphics hardware and software. This includes a look at the Acorn Bitstick and a surprisingly cheap video camera and software which can be added to your micro to produce computerised images. Fun which may be out of reach for some of you, but turn to this section for test reports of the much cheaper software packages around to boost your design and drawing potential.

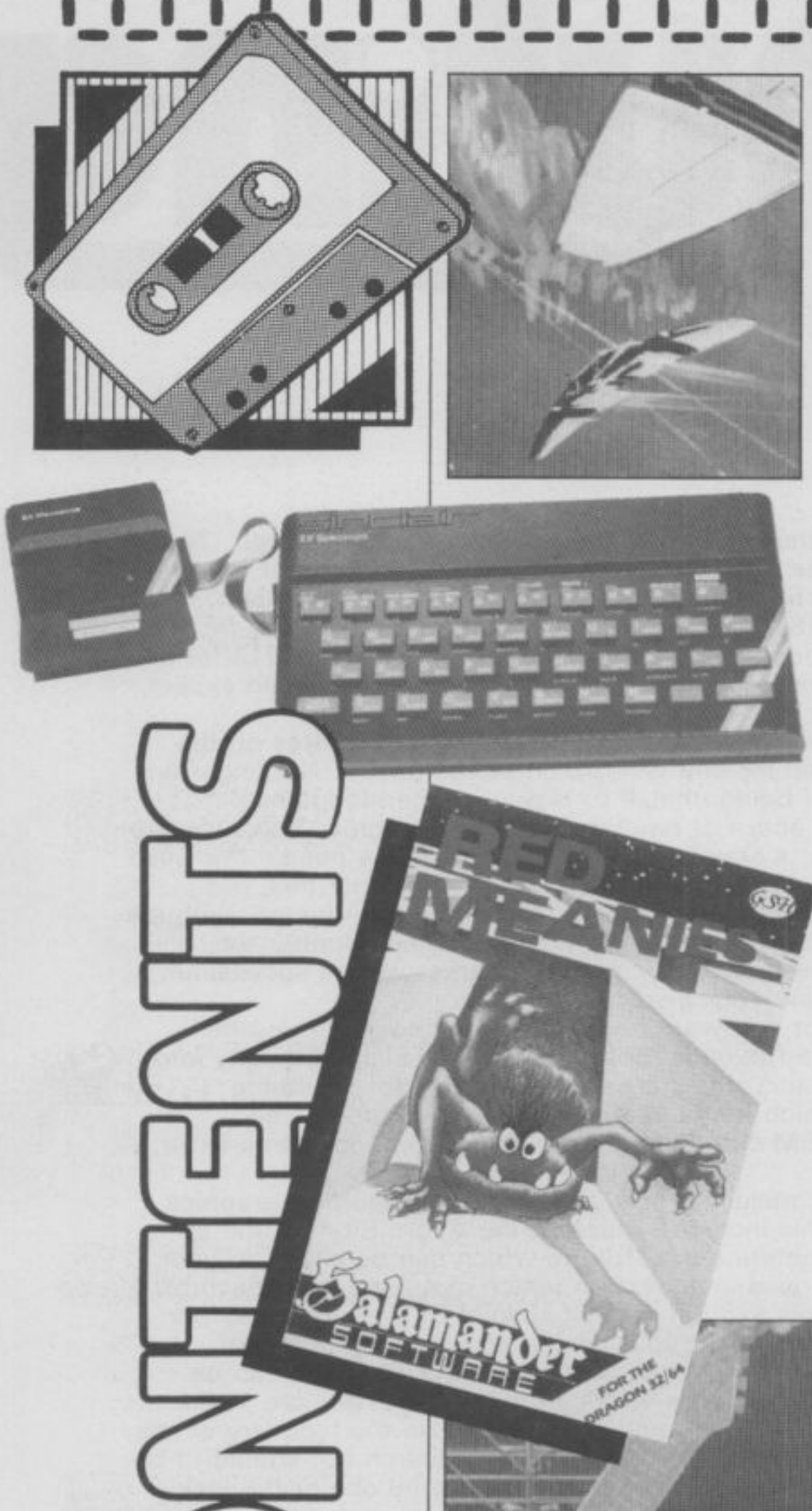
There is an easy to enter quiz, most of the answers to which can be found by reading the following pages *very* carefully. The prizes are 100 copies of R & R Software's exciting new game based on the recovery of the P.S. Titanic. One of the questions will need a little research but shouldn't be beyond you. Get your entries in as soon as possible to be one of the lucky recipients.

The rapid escalation in the number of home computer owners has promoted many television networks to produce programmes on the subject. Thames Television invited PCT behind the scenes of the Database programme and this issue contains an article on the team and the method of production.

Modems and associated vdeotext services are springing up in homes all around the country. For as little as £80 you can plug yourself into a 'network' and run up your 'phone bill while checking on your finances and contributing to your outgoings! We have an article explaining what services are available and how they work.

This issue is packed with all your favourite regular slots such as software reviews, letters, news and programs and instruction articles galore, so turn over for a full list of the contents and settle down for a good read.

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R & R have raised the Titanic and provide you with the opportunity of winning one of the games. An easy to enter quiz provides the challenge!

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ER 1984

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Have your own light and sound show in your living room! This program lets you choose the music while the computer produces a changing pattern of images in synchronised time.

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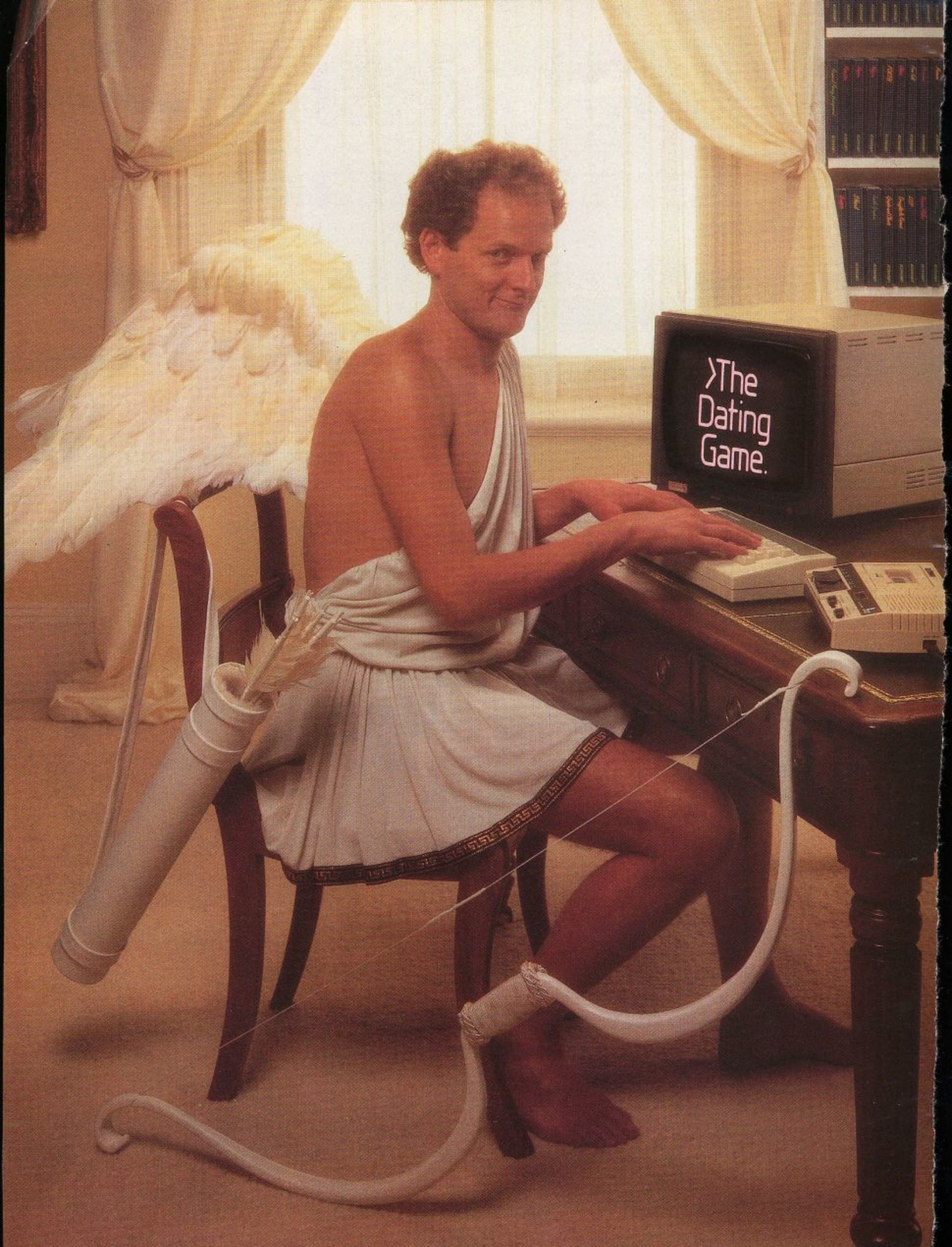
VIEWS

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TEACH IN

VIC 20 for Beginners 79
Purely for novices. This continuing series strips down the VIC 20's basic functions.




>The
Dating
Game.

The Electron has added even more strings to its bow.

The list of top quality software for the Acorn Electron is growing all the time.

As you can see, there's already an outstanding selection of exciting programs covering everything from monsters to music and murder to marriage guidance.

And ultimately, the Electron will enjoy a range of software as comprehensive as that of its illustrious big brother, the much-acclaimed BBC Micro.

You'll find all the programs featured here at your local Acorn stockist. (To find out where that is, simply call 01-200 0200.)

Alternatively, you can send off for the Electron catalogue and order through the post by writing to Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Tel: 0933 79300.

GRAPHICS: Graphs & Charts, Creative Graphics, Picture Maker.

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LANGUAGES: LISP, FORTH, S-Pascal, Turtle Graphics.

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QUIZZES: Theatre Quiz, Crime and Detection Quiz, Music Quiz, History Quiz, Science Fiction Quiz, '...I Do', The Dating Game.

CHILDREN'S EDUCATIONAL SOFTWARE: Happy Numbers, Timeman One, Timeman Two, Wordhang, Happy Letters, Map Rally.

ACORNSOFT



News

CHEAP ELECTRON PRINTER INTERFACE

First Byte Computers have broken the price barrier on printer interfaces for the Electron by producing a unit which requires neither software driver nor Eprom.

This product is housed in a neat plastic case and has an ultra low power design which avoids compatibility problems with other peripheral interfaces, an important consideration in view of the Electron's limited power supply. The unit, costing £34.95 will be avialable in August from computer dealers who stock First Byte Products.

HARERAISING FUN

The bejewelled hare which hit the headlines in the early years of this decade and caused no end of damage to property all round the country has raised its beautiful head again.

The original hare from Kit William's now famous 'Masquerade' treasure hunt was found in 1982 by Ken Thomas who ultimately sold it to a new software company called Haresoft. Recently valued at £30,000 the hare is once again the subject of a 'treasure hunt', yet this time the hunt has been brought up to date and takes the form of a computer puzzle.

To avoid further desecration of the countryside and fruitless wandering by thousands of latter day 'gold-diggers' the hare has not been buried and the winner will merely have to pin-point its location.

The puzzle is contained in two programs, being produced separately and released at 12 week intervals. The first cassette is available now (**Hareraiser Prelude**) and the subsequent part (**Hareraiser Finale**) will be released in September. Both tapes run on the Commodore 64, Spectrum, expanded VIC20, Oric/Atmos, 32K BBC, Dragon and Amstrad and cost £8.95 each.

Hareraiser Prelude will get you started on the hunt but the solution can only be determined by combining clues from both tapes and the hare cannot be won unless verification of purchase of the two tapes can be provided. As a further precaution against piracy, registration cards will be supplied with the two tapes and the numbers must correspond to the tapes.

The winner of this valuable hare will be the first person to pinpoint its location and to produce verification of legitimate purchasing of both programs. Should you prefer hard cash, Haresoft will present you with £30,000.



VIC20'S BLAZE OF GLORY

Shortly to be phased out by Commodore, the top selling VIC20 is going out in a blaze of glory.

News has reached these offices that even fire and water can't deter the intrepid micro from its machinations. A recent fire in Rudi Westfold's home damaged one of his most prized possessions, his VIC20 computer. First it was blackened and half-melted in the blaze, then it was completely swamped with water. Yet, the micro was still in perfect working order! A real test by fire!

WARNING — COMPUTERS MAY BE HARMFUL TO YOUR HEALTH

Several investigations carried out in the U.K., U.S.A. and worldwide, by such bodies as the Health and Safety Executive and the Institute of Opthalmology, have brought evidence to light that the home computer user may be subject to health harzards such as vision problems and backache.

Based on results of surveys carried out among business users, these bodies have found that continual viewing of monitors or T.V. screens is responsible for eye strain leading to blurred vision, watering and itchy eyes and headaches.

One solution to these problems is a filter which prevents glare. Romag, a U.K. specialist technical glass manufacturer for over 40 years, have approached the problem with space age technology and have produced a profiled filter which is fixed to the screen by velcro fasteners and costs under £20. The screen will sell through computer outlets such as W.H. Smith or by mail order from Romag, Patterson Street, Blaydon-on-Tyne, Tyne & Wear NE21 5SG.

SOFTWARE SNIPPETS

Last month we reviewed the very popular game, **The Savage Pond**, by **Starcade software**. This has been so successful in the Atari version, that it has now been converted to run on the Commodore 64, BBC and Electron, the latter two versions becoming available at the beginning of September.

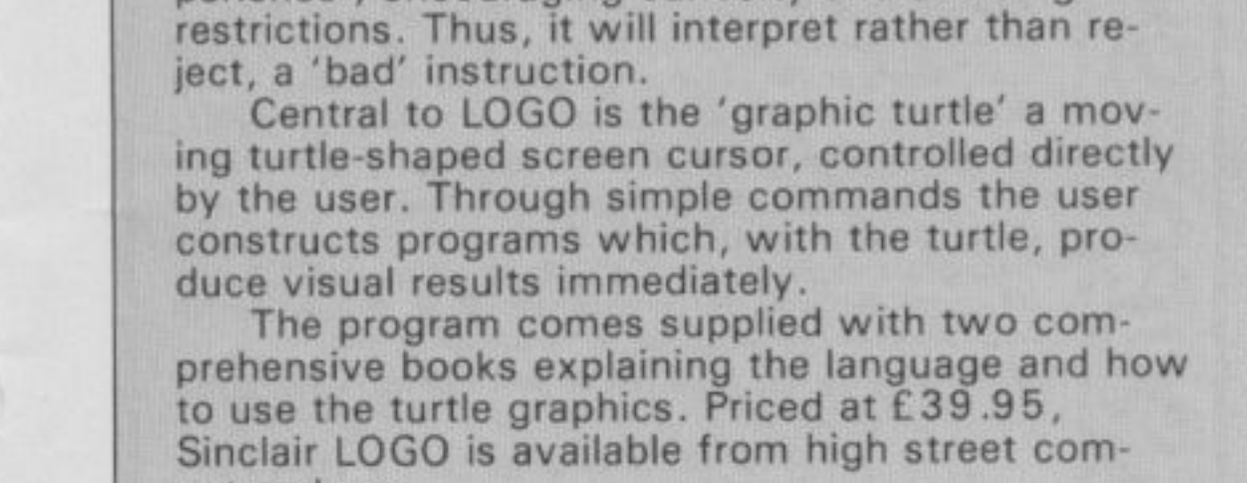
In the game, the user plays the unusual role of a tadpole climbing up the evolutionary ladder avoiding all the usual problems on the way! It is written in fast machine code and requires a joystick. The game is available on cassette or disk (except the Electron version) and costs £7.95. Starcade can be contacted by writing to 2 Elworthy Avenue, Liverpool L26 7AA or telephoning 051-487 0808.

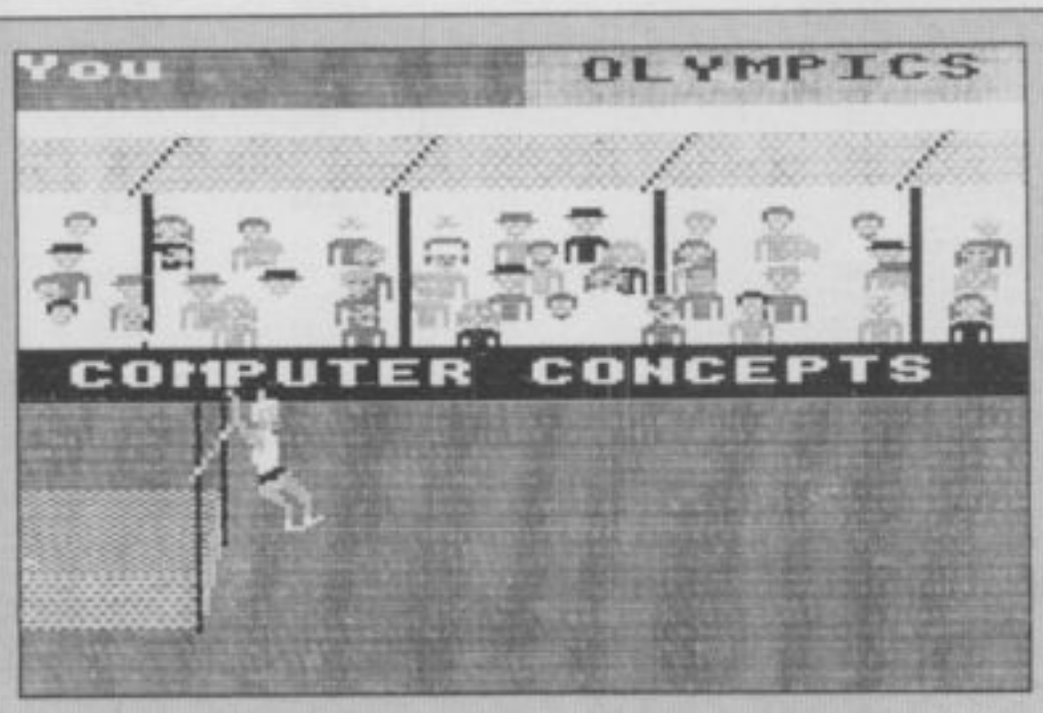
LOGO, the famous 'turtle graphics' computer language generally acknowledged as the best for beginners, is now available from Sinclair Research for the ZX Spectrum (48K). The program adopts a method whereby the user 'learns through experience', encouraging curiosity and avoiding restrictions. Thus, it will interpret rather than reject, a 'bad' instruction.

Central to LOGO is the 'graphic turtle' a moving turtle-shaped screen cursor, controlled directly by the user. Through simple commands the user constructs programs which, with the turtle, produce visual results immediately.

The program comes supplied with two comprehensive books explaining the language and how to use the turtle graphics. Priced at £39.95, Sinclair LOGO is available from high street computer shops.

Bubble Bus has also been busy converting. Their top selling game **Hustler**, which was launched for the Commodore 64 is now available in the Spectrum version from high street outlets.





Database Publications have chosen a very topical theme for its new game. Based on the Olympic Games, **Micro Olympics** is a simulation of the major track and field events which will be filling our T.V. screens in August.

Having superior skills, the computer achieves the current world record in all cases. The player participates by trying to better these times and so establish a world record of their own!

Database have discovered a built-in bonus with the game. The screen shots of the track, complete with the ubiquitous advertising hoardings, provide a perfect space for real advertising and several computer companies have jumped in, so to speak, and have bought space to have their names added to the graphics. This is a new idea and Database are certainly leading the field in this area! Micro Olympics is available for the BBC and Electron and costs £5.95 for the cassette version and £6.95 for the disk.

Martech are going for the high jump with their new game **Jump Challenge**. It is based on the daring exploits of motor cycle stunt man, Eddie Kidd, and challenges the player to try and match Eddie's skills and courage in leaping over increasingly difficult and dangerous obstacles. Jump Challenge will be launched in August, initially for the Commodore 64 and 48K Spectrum. Versions for other micros will follow.

Micro Power, well known for their BBC and Electron programs, have launched a whole suite of power-loaded programs for the Commodore 64. All priced at £6.95 they are conversions of their popular BBC/Electron games, **Ghouls, Cybertron Mission, Felix in the Factory** and **Swoop**.

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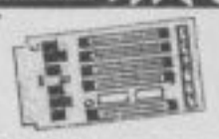
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ON SALE FROM 7 SEPT

Next Month



A WHOLE WORLD OF EDUCATION

To welcome back the schools after their long summer break and in preparation for the hard slog of the autumn term, we are giving an educational slant to the October issue of *Personal Computing Today*.

Output of educational programs from all the major software companies, not forgetting the smaller houses, has lead to a plethora of choice in this area of computing. Good judgement (and not a little inside knowledge) is a vital requirement for potential purchasers of educational software. Next month, *PCT* provides all the information you will ever need to help you decide which hardware and software to buy to make the most of your computer as a learning tool.

The Educational Philosophy

A team of writers has been roaming the market place for *PCT*. Their brief....to boldly go where no magazine has been before, to discover the views of teachers and parents, to find out what they want and compare it with what is provided and to unearth the philosophies of the people manufacturing and marketing hardware and software for the educational scene!

Brian Boyd-Shaw, an ex-teacher with years of experience in the use of computers in schools, has been evaluating software for all age groups. His report provides a comprehensive survey of what is on the market for students from the age of three to seventy-three. His comments on what is provided as opposed to what is required make for very interesting and controversial reading. His researches have also lead to profiles on some of the leading educational software producers and these also, will be presented in the bumper educational section in the October issue of *PCT*.

Our software evaluators for the October issue are all teachers who have had experience of using the computer as a teaching aid. Read their impresssions of some of the software produced commercially in our longest ever educational software review section.

We also have a report from a teacher of long experience on the kind of hardware which can be added to a micro to turn it into an invaluable tool. Don't miss it!

TEST REPORT OF AMSTRAD CPC464

The October issue of *Personal Computing Today* will contain an in-depth test report on the new Amstrad microcomputer. Called the CPC464, this innovative micro sports 64K of RAM, an integral hi-speed 2000 baud cassette deck and its own monitor. A complete system for under £230! There must be a catch? Well, our reviewer couldn't find one. The Amstrad offers exceptional value for money and with its excellent BASIC rivals the BBC Micro at almost half its cost.

Make up your minds after reading our extensive report on both machine and its software in next months issue.

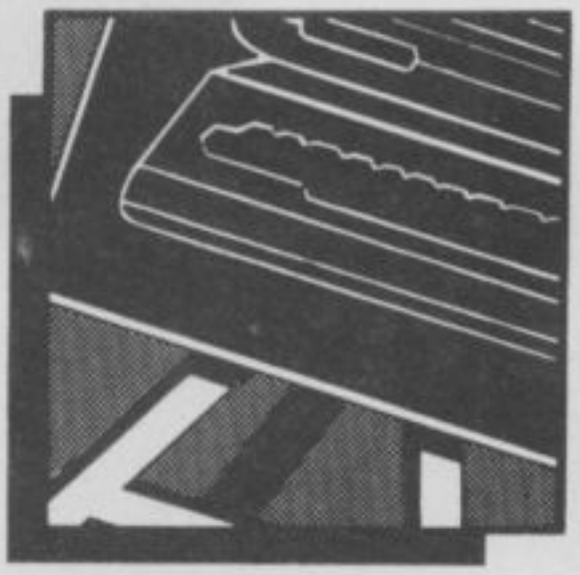
EDUCATION FOR ALL

Our own education continues via *PCT's* Teach-in series which now cover programming aspects on four micros!

In keeping with our educational theme the October issue of PCT contains programs for you to type into your own micro so that you can learn while having fun! There aré programs with a educational slant but also lots of games and utilities to keep you amused and make your life happier.

The October issue of PCT provides a wealth of information and is a jolly good read. Don't miss it!

Teach in



BBC/ELECTRON

Graphic Animation

Fouad Katan begins an easy to follow novice's course on animating graphics on your BBC or Electron.

Probably one of the reasons you bought your BBC Micro was for its superior graphic abilities. The sales people usually demonstrate the machine with some very impressive graphic programs or beautifully presented games. You go home expecting to be the next Leonardo Da Vinci of micro computers only to find that it's not as easy as it seems. In this article I will try to explain the fundamentals of the BBC Micro's graphics and show you some simple techniques that you could employ in your own programs.

BASIC beginnings

It is assumed that you are familiar with the BBC graphic and character coordinate systems and also the standard BASIC graphic commands. Here is a brief run down of all the display associated commands available in BBC BASIC:

TAB(X,Y) — Move text cursor to X,Y (X and Y limits vary depending on the current display MODE), with the origin at the top left hand corner.
COLOUR value — Sets the foreground and background colours.
CLS — Clears text display area.
VDU vdu type, v1, v2....vx — Performs miscellaneous tasks, look at the user guide for a full list.

For the rest of the commands X can carry the values 0 to 1279, and Y 0 to 1023. Here the origin is at the bottom left hand corner.
MOVE X,Y — Moves the cursor to X,Y.
DRAW X,Y — Draws a line from the cursor position to X,Y.
PLOT plot type,X,Y — Allows a number of different types if plotting, i.e. line, triangle and point plotting all with various variations.
POINT(X,Y) — Returns the colour of the specified point on the screen
GCOL mix type,colour — The mix type specifies how the colour is placed on the screen, this will be explained later in the article. The colour defines the foreground and background colours.
CLG — clears graphic screen.

Simple graphics by text

The simplest form of graphics or animation can be produced in text mode. Text can be printed on any part of the screen in any combination of col-

Program 1

```
10 MODE 2
20 REPEAT
30 FOR loop=65 TO 90
40 COLOUR RND(7)
50 COLOUR RND(7)
60   PRINT  TAB(20,15)
   CHR$(loop);
70 NEXT loop
80 UNTIL FALSE
```

ours. Program 1 will print the letters 'A' through to 'Z' at the same point on the screen in different colours.

The problem with program 1, is that the characters are updated much too quickly for the human eye. The sequence of characters is also pretty meaningless. It would be much better if we could for example, display a sequence of characters showing a man walking. To do this we first have to understand how we can create our own **User Definable Characters.**

User Definable Graphics

Every character is made up of 8 by 8 pixels (a pixel is the smallest displayable graphic point on the screen, this may vary in size depending on the display MODE used). Figure 1 shows how you can define a figure in pixels. XX signifies that a pixel is present.

Every column has a respective value. For the mathematically minded 'value=2 column', if the column furthest to the right is column 0. Whenever a pixel is set in a particular column it takes the column's value (shown at the top of the grid). For a whole row of pixels the values are added together to give a pixel image variable for that row. If this is repeated for every row the eight numbers obtained can be used to define that character. This is shown in Figure 1. The man can be programmed as any of the characters put aside for the user (characters 224 to 225). To define any character we have to use the 'VDU 23, character, r1,r2,r3, r4,r5,r6,r7,r8' command (where r1,...r8 are the rspective row values). Therefore to program this as character 224 type:

```
VDU 23,224,24,24,
12,58,8,54,99,1
```

To confirm the definition:

```
PRINT CHR$(224)
```

If we decide to program the man in another pose to simulate some type of walk or run, then the shape shown in figure 2 would do the job. To define it type:

```
VDU 23,225,24,24,
12,28,8,28,22,50
```

We can now re-write program 1 to use these two characters instead. This is Program 2. Notice that we have also put a delay so that the man remains visible. The movement is quite jerky so try adding another frame to the motion to improve it.

128	64	32	16	8	4	2	1	
			XX	XX				16 + 8 = 24
			XX	XX				16 + 8 = 24
				XX	XX			8 + 4 = 12
		XX	XX	XX		XX		32 +16 + 8 + 4 = 58
				XX				8 = 8
		XX	XX		XX	XX		32 + 16 + 4 + 2 = 54
	XX	XX				XX	XX	64 + 32 + 2 + 1 = 99
							XX	1 = 1

Figure 2 showing pixel representation of new pose

Program 2

```
10 MODE 4
20 VDU 23,224,24,24,12,58,8,54,99,1
30 VDU 23,225,24,24,12,58,8,54,99,1
40 REPEAT
50 PRINT TAB(20,15);CHR$(224);
60 FOR DUMMY=0 TO 400
70 NEXT DUMMY
80 PRINT TAB(20,15);CHR$(225);
90 FOR DUMMY=0 TO 400
100 NEXT DUMMY
110 UNTIL FALSE
```

Graphics in motion

Now that we have simple animation we can start playing around with the character's position so that he can actually walk around the screen. Some games have a movement table which the aliens can follow and in BASIC, arrays can be used just as effectively. You can define a two dimensional array with a number of different possible patterns, then pick one at random to give the animation more realism.

One final note on character graphics; so far you have only been able to position text in a character cell only. You can position a character anywhere on the screen by typing VDU 5. All text printed after this command will be printed at the graphics cursor; the only drawback is that this is very slow and should only be used for intricate movements. It should also be noted that it will be printed in current graphics colours rather than the text colours.

In a subsequent article we will delve more deeply into hi-resolution graphics, and the mixing of colours.

128	64	32	16	8	4	2	1	
			XX	XX				16 + 8 = 24
			XX	XX				16 + 8 = 24
				XX	XX			8 + 4 = 12
			XX	XX	XX			16 + 8 + 4 = 28
				XX				8 = 8
			XX	XX	XX			16 + 4 + 2 = 22
			XX		XX	XX		16 + 8 + 4 = 28
		XX	XX			XX		32 + 16 + 2 = 50

Figure 1 showing pixel representation of a man

Now, the BBC

The BBC Micro has now taken a giant step into the world of business computing.

With the addition of its new Z80 second processor, it is the first computer at anywhere near its price to become fully compatible with CP/M software.

As most business computer users can verify, CP/M is the most widely used form of software in business today.

For £299, you're well and truly in business.

At £299, the Z80 adds 64K of usable RAM to the BBC Micro. And it allows you to use the CP/M 2.2 computer operating system.

It's extremely fast.

And besides giving you access to a vast new area of software, it enables you to use GSX graphics-based programs, the perfect complement to the BBC Micro's own superb graphics.

Free software and languages.

The Z80 second processor comes complete with five CP/M business programs.

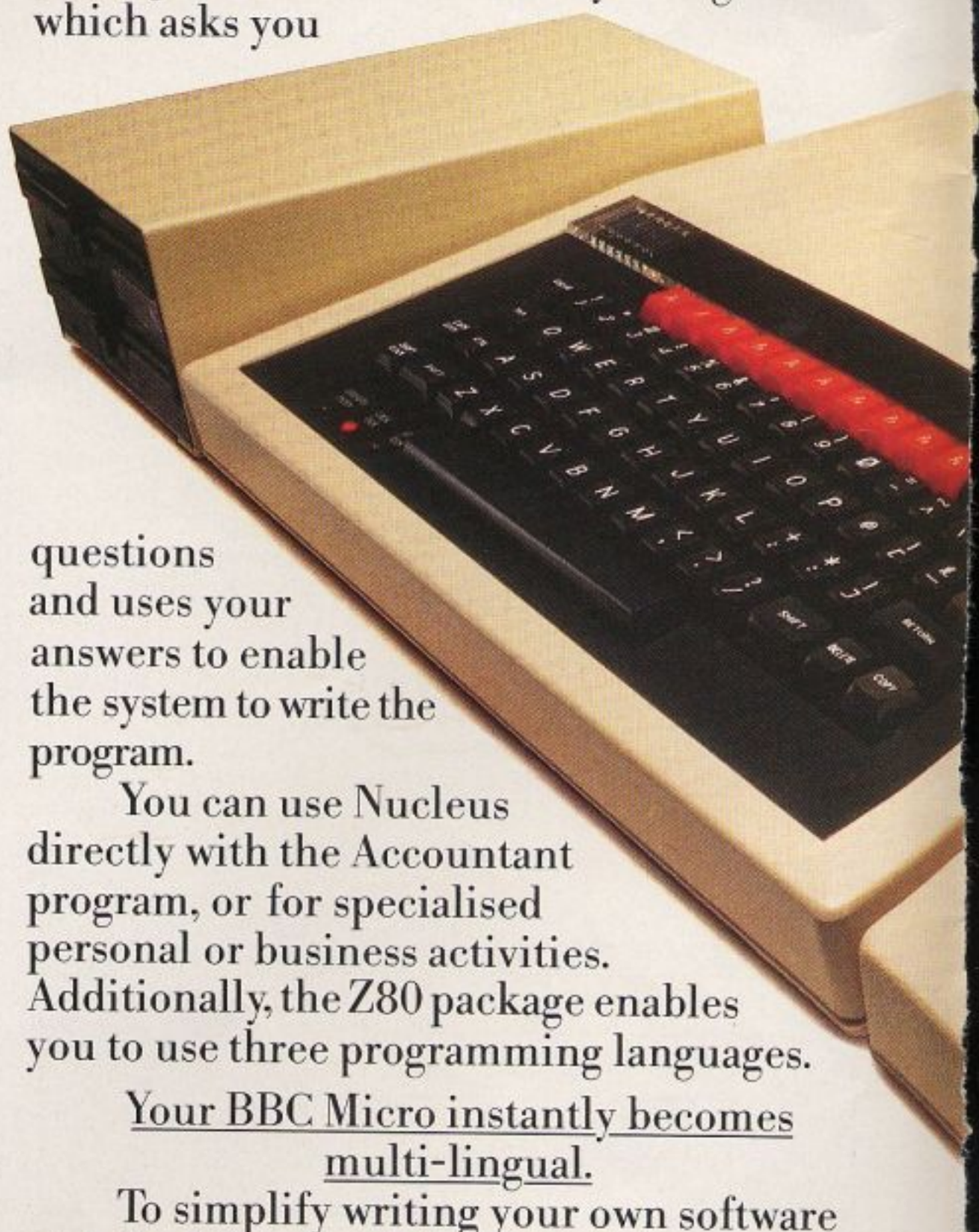
To handle your word processing, there's MemoPlan. It's a program with some highly sophisticated features, such as a safeguard against data loss through power cuts and the ability to show two documents simultaneously on the screen.

To form your CP/M personal database, there's FilePlan. It stores names, addresses, telephone numbers, stock listings and more. And if you use it with MemoPlan, you can generate personalised letters, labels and mail shots.

To produce forecasts and analyse groups of figures diagramatically, simply use the GraphPlan program. This is incredibly helpful in working out vital business calculations, converting them into graphs and charts.

Meanwhile, in the book-keeping department, there's the Accountant program. Use it to enter day-to-day transactions into the computer. Then, at any time, you can ask the computer to produce lists, summaries, reports, audit trails and trial balances. You can readily expand this package to a fully ledger based system, complete with payroll and more.

Finally, to help you to develop your own programs without having specialised experience, the Z80 comes with another software package called Nucleus. It's a system generator which asks you questions and uses your answers to enable the system to write the program.



You can use Nucleus directly with the Accountant program, or for specialised personal or business activities. Additionally, the Z80 package enables you to use three programming languages.

Your BBC Micro instantly becomes multi-lingual.

To simplify writing your own software with the Z80, there's BBC BASIC.

For running professionally written business programs, there's Professional BASIC.

And then there's CIS COBOL, the leading microcomputer version of COBOL, the language used in mainframe computer applications throughout commerce and industry.

With CIS COBOL, the Z80 also gives you two sophisticated programming aids.

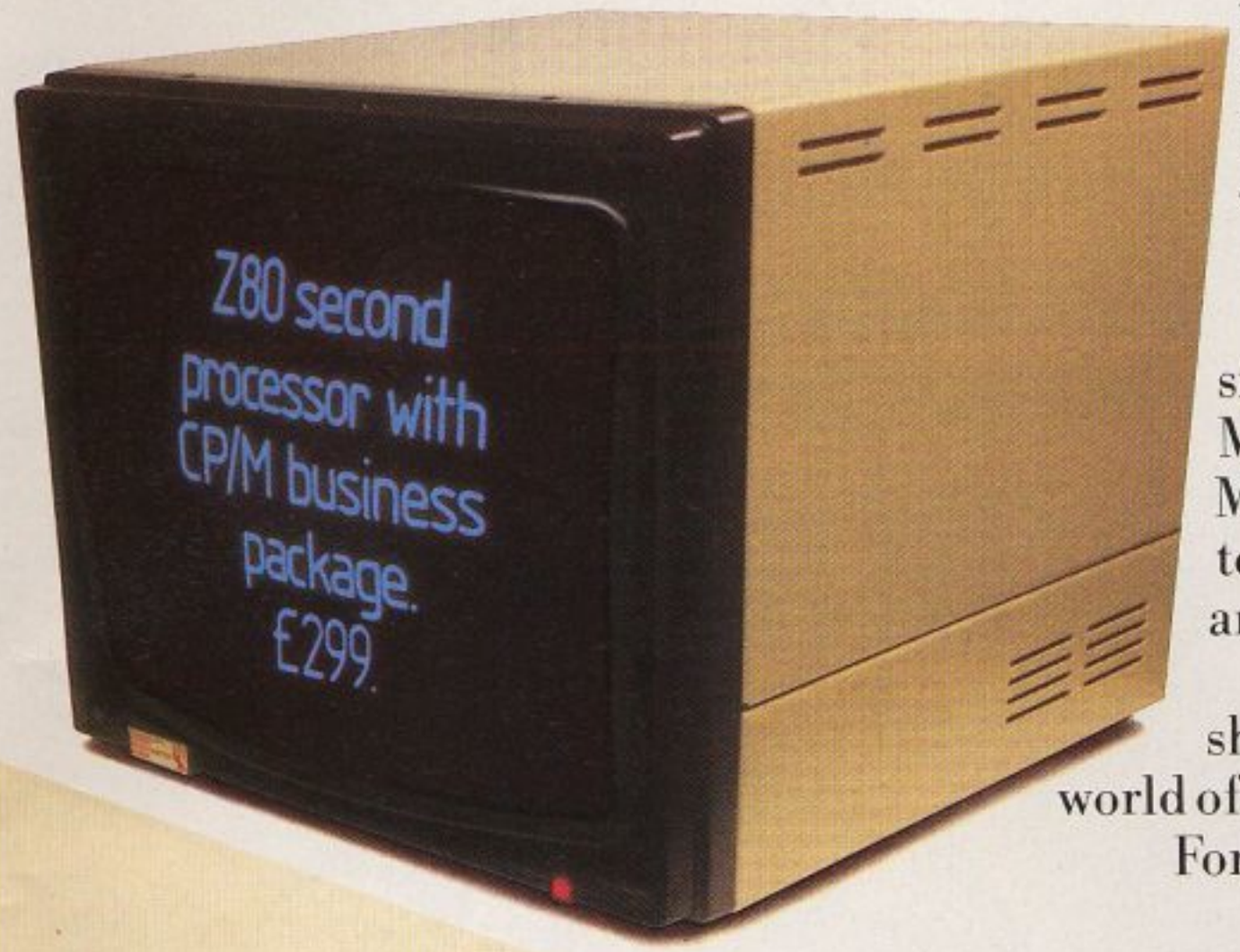
CP/M is a registered trademark of Digital Research Inc.

Macro.

One is Animator, an award winning debugging tool which enables you to identify programming errors quickly and easily.

The other is FORMS 2, which helps you to write your own interactive programs in COBOL.

With all these sophisticated features, the Z80 package is exceptional value for money. Indeed, bought separately the programs and languages could cost as much as £3,000.



See the Z80 at work.

The Z80 second processor is designed to be used with the BBC Micro Model B incorporating a Series 1.2 Machine Operating System and linked to a dual 80-track disc drive, a printer and monitor.

Ask your BBC Micro dealer to show you just how far it can go in the world of serious business computing.

For your nearest dealer, ring 01-200 0200.

Technical specification.

The Z80 has a 64K Random Access Memory, running CP/M 2.2 which provides approximately 55K bytes of RAM for user programs.

It operates at a clock rate of 6MHz.

Power supply is integral. Height, 70mm. Width, 210mm. Depth, 350mm.



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COMPETITION

Competition

Get fishing for one of a hundred copies of 'Titanic' in this great competition.

Here is yet another exciting competition coming to you courtesy of *Personal Computing Today*! This time we have collaborated with the small but successful West Country firm of *R & R Software*. Recently awarded a prize for the most playable game of 1983 by a French organisation, R & R specialise in arcade games for the Spectrum, Commodore 64 and Oric micros. Their most successful game to date has been Golf, which is available for the Spectrum, ZX81 and Oric. R & R are now making plans to cover other popular home computers and will soon have programs ready for the BBC and Amstrad micros.



Titanic prizes

The prizes we are giving away are 100 copies of R & R Software's latest adventure (and winner of that coveted French award) called 'Titanic'. This exciting game takes its theme from the tragic and rapid sinking of the ill-fated cruise liner at the beginning of this century. Not only were hundreds of lives lost, but the Titanic took with her to the murky Atlantic depths, a vast fortune in gold.

Your task is to recover that gold by getting together an expedition, locating the sunken vessel and bringing the booty to the surface. Lots of disasters befall you and it takes a brave person to pursue this goal!

QUESTIONS (answer in space corresponding to question number on entry form)

1. Name three Japanese manufacturers who are producing MSX computers for the U.K. market.
2. Name the presenters of Thames Television's Database programme.
3. In what year did the sinking of the Titanic take place?
4. What is the name of the computer manufactured by Ferranti?
5. Which Building Society offers a videotext service to its members?

Competition

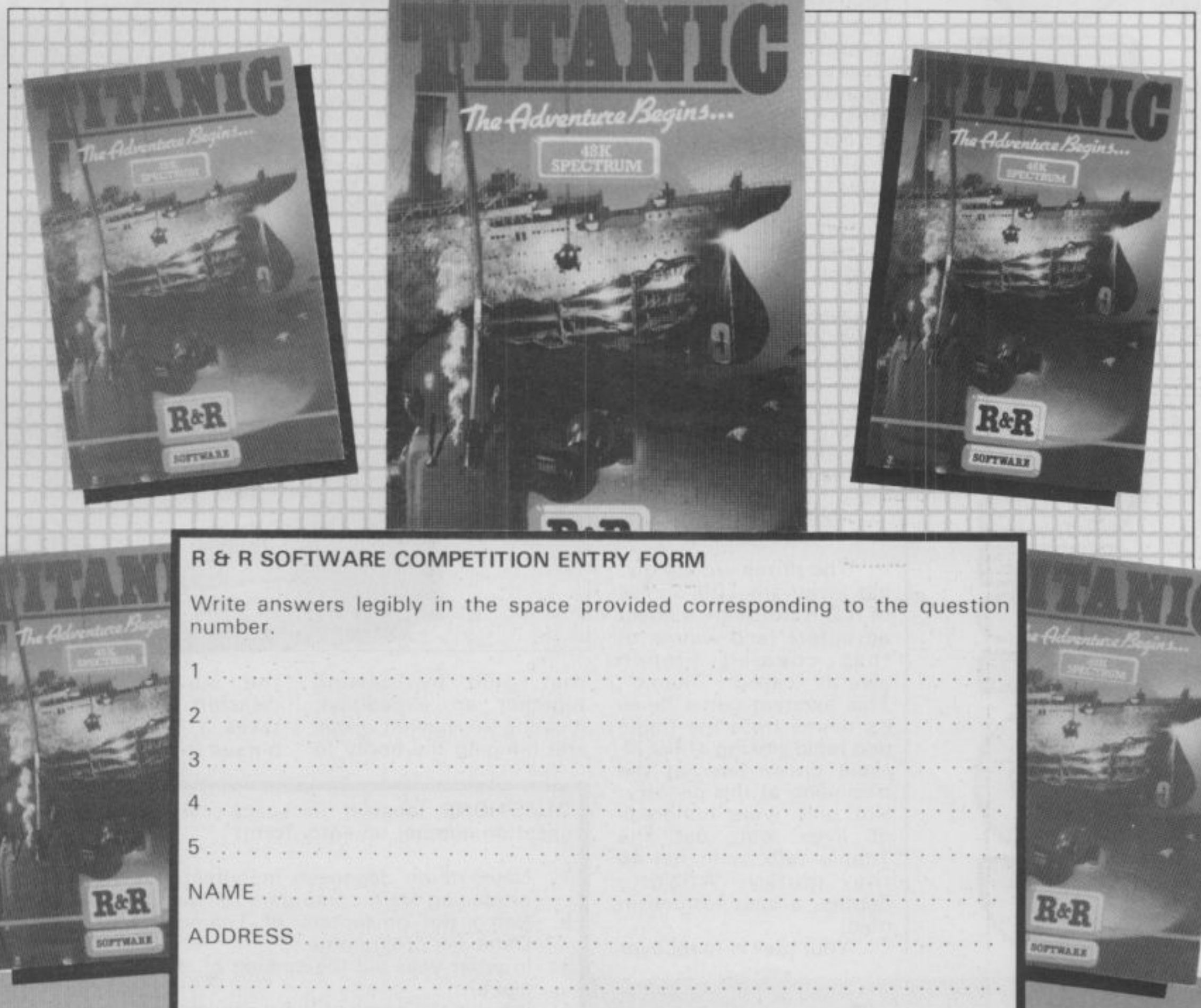
Nitty gritty

So, how do you win one of these coveted prizes? Well it's very simple really. As a change from our usual pattern of getting you to name products or taxing your brain with puzzles, all we require of you this time are the answers to five easy questions and to make it even simpler, the answers to four of them are contained between the covers of this magazine. The remaining question may take a little researching but even this is not difficult.

When you have tracked down the information required, complete the entry form on this page and send it to: Personal Computing Today, 1 Golden Square, London W1R 3AB, marking the envelope 'R & R Software Competition'. Don't forget to mark whether you want a copy of 'Titanic' for the Spectrum or the CBM64. Good luck and get those entries flooding in!

RULES AND REGULATIONS

1. The competition is open to all UK and Northern Ireland readers of *Personal Computing Today* except employees of Argus Specialist Publications Ltd, their printers and distributors, R & R Software Ltd or anyone associated with the competition.
2. All entries must be written legibly and submitted on the entry form from the magazine — PHOTOCOPIES WILL NOT BE ACCEPTED.
3. As long as the correct form is used there is no limit to the number of entries you may submit.
4. The prizes will be awarded to the first 100 correct entries opened. No correspondence will be entered into with regard to the competition results and it is a condition of entry that the editor's decision is final.
5. The closing date for the competition is 30th September, 1984 and entries will be accepted with postmark of that date.



R & R SOFTWARE COMPETITION ENTRY FORM

Write answers legibly in the space provided corresponding to the question number.

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2 . . . . . .

3 . . . . . .

4 . . . . . .

5 . . . . . .

NAME . . . . . .

ADDRESS . . . . . .

. . . . . .

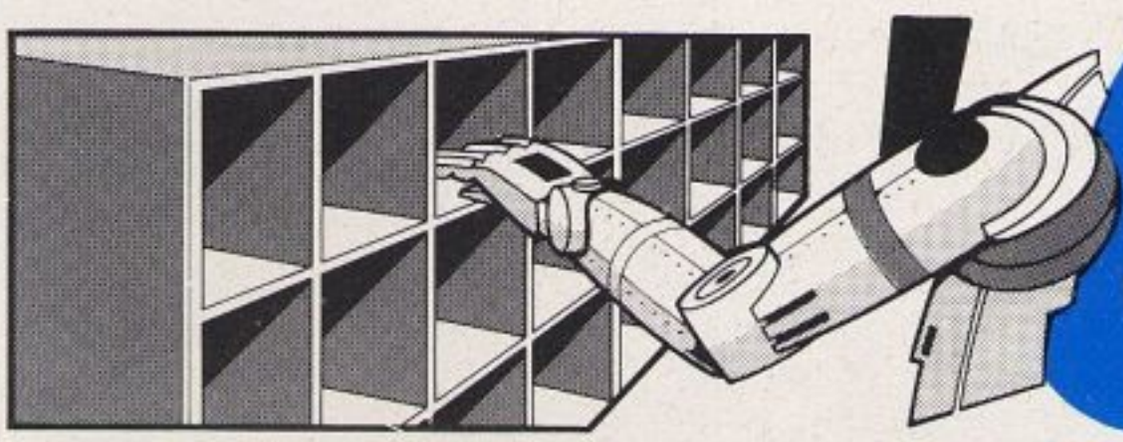
. . . . . POSTCODE . . . . . .

State which computer you require software to run on . . . . . .

Teach in

Machine Code





64

Delving deeper into the mysteries of machine code, Simon Rockman this month deals with mathematics in binary. Remember the article is relevant to all computers.

Because computers work in binary code they see the world of mathematics from a different angle to we humans who are used to base ten (denary). Remember, in Part two of this series (July '84) we looked at how to count in binary. Each time we added one it was necessary to go onto the next column. Binary has some unusual properties which can be used to speed up programs. The machine code instruction set allows us to make the most of these.

Adding up

The first problem is encountered when counting to a number greater than 255. It is not possible to add an extra column as with pencil and paper arithmetic. To do this it is necessary to add eight extra columns (one byte). To work out what is needed in computer arithmetic it helps to analyse precisely what happens in the pencil and paper version (the same laws still apply). Do this sum:

```
  5
 +5
 10
```

One way of looking at this is as five plus five makes 0, carry 1. Now look at this binary sum:

```
  10000000
 +10000000
 100000000
```

Again it can be looked at as 205 plus one carry. We saw before that the command for adding numbers is:

ADC standing for ADd with Carry

and for subtract it is:

SBC standing for Subtract with Carry.

This allows multiple byte maths. You must always add to the lower half of a number (known as the least significant byte — or LSB) and then work on the upper half (known as the most significant byte — MSB). This is the same as moving from right to left when adding up columns of figures. The carry will look after itself to a certain extent, we just have to tell the computer when it is needed. A routine to add two sixteen bit numbers would look like this:

```
10 CLC
20 LDA  # 128
30 ADC  # 128
40 STA $FC
60 LDA  # 20
70 ADC  # 19
80 STA $FB
```

This adds the numbers 5248 (20 * 256 + 128) and 4992 (19 * 256 + 128). It puts the result in the zero page

Machine Code '64

locations at FB and FC. You can check the result by PEEKing the values out from BASIC.

Simple subtraction

When subtracting it is necessary to set the carry first. This is done with the SEC (SEt Carry) command e.g.

```
10 SEC
20 LDA # 100
30 SBC # 90
40 STA $FC
50 LDA # 110
60 SBC # 90
70 STA $FB
```

This will again put the answer in locations FB and FC. For the moment we can only deal with whole numbers (integers), floating point is VERY complicated.

Multiplication

There are two main ways to multiply numbers using machine code. The first is repeated addition. 5 times 2 is the same as 2+2+2+2+2. The second way is to shift bits. Think back to the pencil and paper way of multiplying by 10 e.g. 9 * 10 = 90. All you have done is moved the nine along by one column. The same can be done in binary, however for each shift there is only a multiplication factor of two. Think, if you have the binary number 00001000, which equals eight, and you shift all the columns left one bit you get 00010000 which equals sixteen. The operation to do this is called ASL, or Arithmetic Shift Left.

Just doubling up a number is simple, providing the answer will still fit into eight bits. This means that it is possible to keep doubling up until a value of 128 is reached. Judicious use of this command will allow the multiplication of any eight bit number.

The carry again routine becomes useful when dealing with large numbers. The command ROL, standing for ROtate Left, also moves characters to the left, but in this case the bits which move over do not fall off, they move into the carry and then back onto the right hand side. Because the first shift does not fill with a zero but with the value found in the carry and, because a bit which shifts off the left of an ASL falls into the carry, it is possible to do multiplication over as many bytes as is necessary.

Because bit manipulation is a process that it is often desirable to perform on the accumulator it is possible to specify ROL A to rotate left the bits in the accumulator. To complement the left movements there are corresponding right movements. ROR and ROR A ROtate Right both a number and the accumulator respectively.

Mathematics is difficult in low level languages, however the tools to make it possible are there, all that is required is clear, slow logical thought. Binary maths is very neat and once in the swing of it can be done as easily as the old, familiar base ten stuff. Good luck.

lts Competition Results Results Results Resu

We had a gratifying response to the Alligata Software competition which we ran in the May issue. Obviously lots of you had your eye on the 101 prizes which included a spanking new Commodore 64 computer! Although you can't all be winners, everyone stood a very good chance.

You had to identify the packaging from 12 of Alligata's range of exciting programs. The correct answers are as follows:
A3, B13, C17, E15, F7, G6, H9, I10, J4, K12, and L14.

And the winners . . . . . .



First prize of a CMB64 computer, joystick and software goes to **Paul Dolan** of **Didcot.**
Runner up prizes of joysticks and software to **Iain Wain,** Sutton Coldfield; **Joshua Berke,** London; **J. Ashraf,** Edinburgh; **Michael James Jackson,** Bacup; **David Naish,** Salisbury.

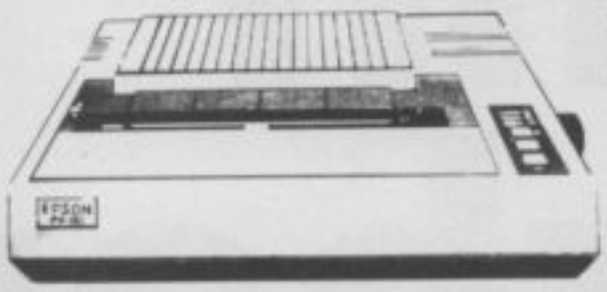
Congratulations to all those lucky people. A further 95 entrants have won themselves one of the Alligata's games! When you've recovered from this excitement, turn to our new competition and win yourself a copy of 'Titanic' from R & R Software.

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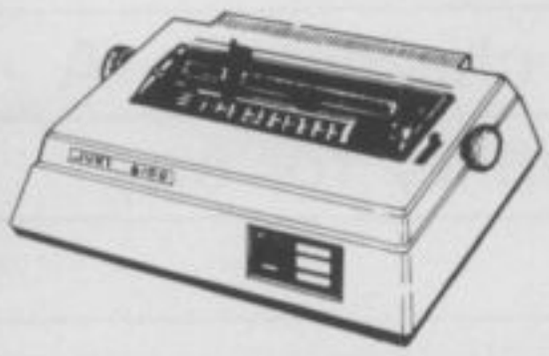
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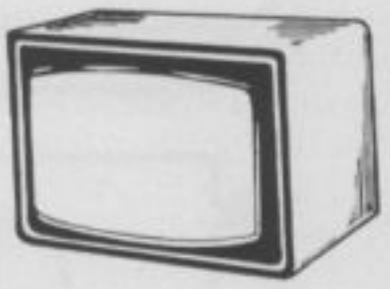
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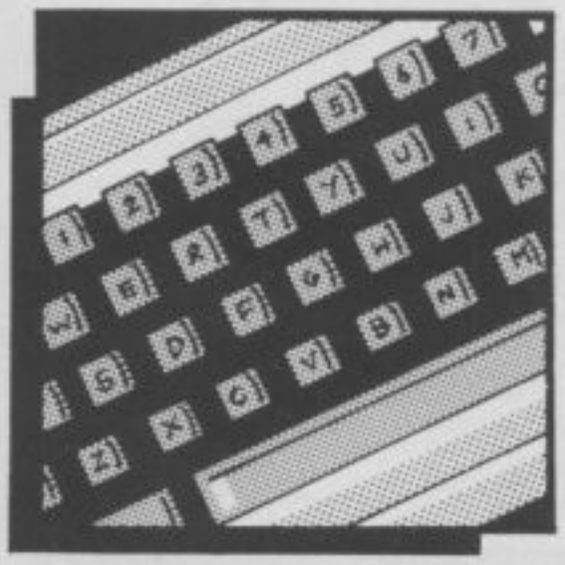
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Column Stretcher

Stretch your columns to 64 characters. A long awaited and essential utility for any Spectrum by C.J. White.

One of the main disadvantages of the ZX Spectrum for text display or word processing is that it is only capable of producing 32 characters per line. Having seen 80 column displays on the BBC Micro and other more powerful computers, I decided to write a similar routine to implement this on the Spectrum.

A 64 column display was finally chosen in preference to an 80 column one because this allows the new characters to be defined on a 4 pixel x 8 pixel grid — the same height, but half the width of the normal Spectrum characters. A new character set, therefore, had to be defined in this format and is included in the appropriate program listings below.

Take your choice

Programs for both the 16K and 48K Spectrum are provided. There is one large program for the 48K machine and two smaller ones for the 16K machine. If you have a 48K machine, enter and run the 48K loader program. If the program displays one or more "ERROR in line XX" messages, check the offending lines with the printed listing, correct and re-RUN. When everything is satisfactory, prepare a tape to save the data. Press any key to save and when prompted, rewind and start the tape to verify it. If a tape loading error occurs, type "GOTO 150" to re-save.

If you have a 16K machine, first enter the 16K loader program number 1 and RUN it. If there are any mistakes, check the data and re-RUN. If it displays "All OK", enter "NEW", which will erase the program but leave the data stored in memory intact. Next enter and run the second 16K loader program, number 2. When this is correct, prepare a tape and save the data as explained in the above paragraph for the 48K version.

Finally, if you have an Assembler, you can enter the program directly from the disassembly given. Note, this is for the 48K



version only, it will not work on the 16K machine.

Program use

To actually use the routine, the ASCII codes of the characters to be printed should be POKEd into memory from address 64600 upwards (31600 for the 16K machine). The codes should be terminated with a '0' so that the program will know when it has reached the end of the data. The codes may be found in the Spectrum manual (Appendix 'A') or the Text Entry programs given may be used. Note that only codes 32 to 127 inclusive may be used. For example, to print "A" (character 65), enter 'POKE 64600, 65' or 'POKE 64600, CODE "A"' ('POKE 31600, 65' or 'POKE 31600, CODE "A"').

You can enter as many characters as you wish provided each is given an address one greater than the last, e.g. first character 64600, second 64601, third 64602, and so on. At the next address after the final character, enter 'POKE 64XXX, 0' ('POKE 31XXX, 0') which will terminate the text.

In order to print the character(s) in the required position on the screen, it is necessary to specify the column and line numbers where the text is to commence. Columns (across) are numbered 0 to 63 and lines (downwards) from 0 to 21. This is done simply by entering 'POKE 64998, X' and 'POKE 64999, Y' ('POKE 31998, X' and 'POKE 31999, Y') where X and Y are column and line numbers respectively. For example, to print a character at column 32 and line 11 (approximately the screen centre) enter 'POKE 64998, 32' and 'POKE 64999, 11' ('POKE 31998, 32' and 'POKE 31999, 11'). If an invalid parameter is used the report "B: integer out of range" will be given when the machine code program is run. Finally, to actually see the characters on the screen, enter 'RANDOMIZE USR 65000' ('RANDOMIZE USR 32000').

Large text entry

The above procedure is really only suitable for the entry of single characters or short words. For larger text entry, the TEXT ENTRY programs (16K or 48K versions) should be used. This will enable you to enter words in the normal format and the program will then convert them to the new 64 characters per line version. Obviously you still need to enter the column and line numbers before it can be printed.

These programs work out the ASCII code of each character using the CODE a$(X) function on the Spectrum and POKE them into the relevant memory. Two programs are given — a 16K and 48K version.

N.B. The assembly listing is provided to help you understand how the program works. This is produced by running the BASIC loader programs and should not be typed in.

variables used

Machine code program

ERRNR — System variable for error handling
CHARS — Character(s) to be printed start address
CBASE — Character set base address
XPOS — Column number
YPOS — Line number
CADD — Location which stores the location in character set memory of the character to be printed
XCO — Line's X co-ordinate
YCO — Line's Y co-ordinate
RPLOT — ROM plotting routine

Text entry program

a$ — Text to be printed
X — Column to be printed at
Y — Line to be printed at
F — Loop control



Column Stretcher

how it runs

1. *Machine Code Program*
The following refers to the disassembly of the machine code.

Line	Effect
10	Sets assembly address
20-110	Set up variables
130	Gets character code
140-150	Check for invalid code
180	If code is 0 then finish
210-290	Calculate where given character is stored in the character set memory.
300-450	Calculate hi-res co-ordinates from the line and column numbers given.
460-470	Set up count for each line in the character.
510	Gets character code in A
550-580	Shift into right hand 4 bits if not already there
590	Saves in E register
600-630	Put hi-res co-ordinates in B and C for the ROM's plot routine.
640	Restores character line
650	Call testing routine (line 790)
660-700	Test if 8 lines have been printed. If so, then go to next character routine (line 970). If not, continue
710-730	Decrease Y co-ordinate for next part of character
740-760	Increment pointer to get next part of character from memory
760-890	Test each of the 4 bits of character line and if a bit is set then plot a point. If not, continue.
890-910	Save registers because ROM plots corrupts all registers
920	Calls ROM plot routine
930-950	Restore registers
970	Increase character pointer
980-990	Increase column position
1000-1070	If column number is 64 (end of line) reset it to 0 and increase line (move to beginning of next line)
1080	If bottom of screen (line 22) move back to top (line 0)
1140-1150	Set up Error number system variable
1160	Calls ROM error handling
1170	Returns from program

2. *Text Entry Program*

10-30	INPUT parameters — text to be printed, line number and column number
40-60	POKEs ASCII code of each character in a$ into address 64600 (31600 for 16K program)
70	Terminates with a 0
80-90	POKE in line and column parameters
100	Calls machine code program

hints on conversion

The program cannot easily be converted for other machines because it is written in machine code and it uses some of the routines in the Spectrum ROM. These are the hi-res plotting routines and ERROR message printing. If you know where the relevant routines are in your machine's ROM, or you can write your own, there is no reason why the program should not work on other machines. The routine will only print characters on a 4 x 8 pixel grid, which may be unsuitable for other machines.

For 6502 based machines — Oric, Vic 20, CBM 64, BBC, etc., the machine code will need to be translated into the relevant 6502 instructions. However, some machines (BBC and Electron for example) already have suitable screen widths and so this routine will not be needed!

program listing

16K loader program number 1

```
 1 REM 64 char per line  (1)
 2 REM 16K only
 3 REM1984 C.J. White
 5
10 CLEAR 30999
20 PRINT "Please wait ..."
30 LET li=200: LET err=0
40 FOR x=31128 TO 31511 STEP 8
50 LET cs=0
60 FOR y=0 TO 7
70 READ n
80 POKE (x+y),n
90 LET cs=cs+n
100 NEXT y
110 READ csum
120 IF csum<>cs THEN  PRINT "ERROR in line ";li: LET err=1
130 LET li=li+5
140 NEXT x
145 IF err=1 THEN  PRINT "Correct mistakes and re-run": STOP
150 PRINT "All OK, enter 'NEW' and type in program 2"
190
200 DATA 4,4,4,4,4,0,4,0,24
205 DATA 160,170,14,10,14,10,0,0,378
210 DATA 2,74,226,196,104,234,72,0,908
215 DATA 66,162,64,192,160,64,32,0,740
220 DATA 36,66,66,66,66,66,36,0,402
225 DATA 0,68,228,78,228,68,0,0,670
230 DATA 0,0,0,14,0,32,32,64,142
235 DATA 2,2,4,4,4,8,72,0,96
240 DATA 68,172,164,164,164,164,68,0,964
245 DATA 204,162,34,76,130,130,108,0,844
250 DATA 142,136,136,172,226,34,44,0,890
255 DATA 110,130,130,196,164,168,72,0,970
260 DATA 68,170,170,70,162,162,76,0,878
265 DATA 0,0,68,0,68,8,0,0,144
270 DATA 0,32,78,128,78,32,0,0,348
275 DATA 4,138,66,36,68,128,4,0,444
280 DATA 4,74,234,238,234,138,106,0,1028
285 DATA 198,168,168,200,168,168,198,0,1268
290 DATA 206,168,168,174,168,168,206,0,1258
295 DATA 230,136,136,232,138,138,132,0,1142
300 DATA 174,164,164,228,164,164,174,0,1232
305 DATA 234,42,42,44,42,170,74,0,648
310 DATA 138,142,138,138,138,138,234,0,1066
315 DATA 164,234,234,170,170,170,164,0,1306
320 DATA 196,170,170,202,138,138,132,2,1148
325 DATA 198,168,168,196,162,162,172,0,1226
330 DATA 234,74,74,74,74,74,68,0,672
335 DATA 170,170,170,170,234,78,74,0,1066
340 DATA 170,170,170,74,164,164,164,0,1076
345 DATA 230,36,36,68,68,132,230,0,800
350 DATA 140,132,68,68,68,36,44,0,556
355 DATA 0,64,224,64,64,64,64,14,558
360 DATA 96,128,128,198,138,138,230,0,1056
365 DATA 0,128,128,198,168,168,198,0,988
370 DATA 0,32,32,108,170,172,102,0,616
375 DATA 0,96,128,134,202,134,130,12,836
380 DATA 0,132,128,204,164,164,164,0,956
385 DATA 0,72,8,74,76,74,74,128,506
390 DATA 0,128,128,138,142,138,74,0,748
395 DATA 0,0,0,196,170,170,164,0,700
400 DATA 0,0,0,198,170,170,198,130,866
405 DATA 0,0,0,102,132,130,142,0,506
410 DATA 0,0,128,202,138,138,100,0,706
415 DATA 0,0,0,0,170,170,78,74,492
420 DATA 0,0,0,170,74,166,162,12,584
425 DATA 6,4,4,232,68,132,230,0,676
430 DATA 76,68,68,66,68,68,76,0,490
435 DATA 4,174,10,14,14,10,4,0,230
```

program listing

16K loader program number 2 (with SAVE routines)

```
 1 REM 64 char per line  (2)
 2 REM 16K only
 3 REM1984 C.J. White
 5
10 CLEAR 30999
20 PRINT "Please wait ..."
30 LET li=500: LET err=0
40 FOR x=32000 TO 32215 STEP 8
50 LET cs=0
60 FOR y=0 TO 7
70 READ n
80 POKE (x+y),n
90 LET cs=cs+n
100 NEXT y
110 READ csum
120 IF csum<>cs THEN  PRINT "ERROR in line ";li: LET err=1
130 LET li=li+5
140 NEXT x
145 IF err=1 THEN  PRINT "Correct mistakes and re-run": STOP
150 PRINT "All OK, prepare tape to save"
160 SAVE "64CPL"CODE 31000,1215
170 PRINT "Rewind tape and start for verify": VERIFY ""CODE
495
500 DATA 221,33,112,123,221,126,0,254,1090
505 DATA 128,210,206,125,254,32,48,7,1010
510 DATA 254,0,202,214,125,62,31,203,1091
515 DATA 135,111,38,0,41,41,17,24,07
520 DATA 121,25,17,252,124,34,252,124,949
525 DATA 58,254,124,254,64,210,206,125,1295
530 DATA 203,39,203,39,50,250,124,58,966
535 DATA 255,124,254,22,210,206,125,203,1399
540 DATA 39,203,39,203,39,71,62,175,831
545 DATA 144,50,251,124,62,7,50,249,937
550 DATA 124,42,252,124,126,95,221,126,1110
555 DATA 0,203,71,32,10,123,203,47,689
560 DATA 203,47,203,47,203,47,95,58,903
565 DATA 250,124,79,58,251,124,71,123,1080
570 DATA 205,140,125,58,249,124,254,0,1155
575 DATA 40,49,61,50,249,124,120,61,754
580 DATA 50,251,124,42,252,124,35,34,912
585 DATA 252,124,24,197,203,95,196,159,1250
590 DATA 125,12,203,87,196,159,125,12,919
595 DATA 203,79,196,159,125,12,201,197,1172
600 DATA 221,229,245,205,223,34,241,221,1619
605 DATA 225,193,201,221,35,58,254,124,1311
610 DATA 60,254,64,32,2,62,0,50,524
615 DATA 254,124,254,0,32,13,58,255,990
620 DATA 124,60,254,22,32,2,62,0,556
625 DATA 50,255,124,195,4,125,62,10,825
630 DATA 50,58,92,205,3,19,201,0,628
```

program listing

16K text entry program

```
  1 REM Text Entry program
  2 REM 16K only
  3 REM1984 C.J. White
 10 INPUT "Text ";a$
 20 INPUT "Column ";x
 30 INPUT "Line ";y
 40 FOR f=1 TO LEN a$
 50 POKE 31599+f,CODE a$(f)
 60 NEXT f
 70 POKE 31599+f,0
 80 POKE 31998,x
 90 POKE 31999,y
100 RANDOMIZE USR 32000
110 GO TO 10
```

program listing

48K loader program with SAVE routines

```
 1 REM 64 char per line loader
 2 REM 48K only
 3 REM1984 C.J. White
 4
10 CLEAR 63999
20 PRINT "Please wait ..."
30 LET li=200: LET err=0
40 FOR x=64128 TO 65214 STEP 8
50 LET cs=0
60 FOR y=0 TO 7
70 READ n
75 IF n=9999 THEN  LET li=500: LET x=65000: GO TO 50
80 POKE (x+y),n
90 LET cs=cs+n
100 NEXT y
110 READ csum
120 IF csum<>cs THEN  PRINT "ERROR in line ";li: LET err=1
130 LET li=li+5
140 NEXT x
145 IF err=1 THEN  PRINT "Correct mistakes and re-run": STOP
150 PRINT "All OK, prepare tape to save"
160 SAVE "64CPL"CODE 64000,1215
170 PRINT "Rewind tape and start for verify": VERIFY "64CPL"CODE
180 STOP
190
195 REM character data
200 DATA 4,4,4,4,4,0,4,0,24
205 DATA 160,170,14,10,14,10,0,0,378
210 DATA 2,74,226,196,104,234,72,0,908
215 DATA 66,162,64,192,160,64,32,0,740
220 DATA 36,66,66,66,66,66,36,0,402
225 DATA 0,68,228,78,228,68,0,0,670
230 DATA 0,0,0,14,0,32,32,64,142
235 DATA 2,2,4,4,4,8,72,0,96
240 DATA 68,172,164,164,164,164,68,0,964
245 DATA 204,162,34,76,130,130,108,0,844
250 DATA 142,136,136,172,226,34,44,0,890
255 DATA 110,130,130,196,164,168,72,0,970
260 DATA 68,170,170,70,162,162,76,0,878
265 DATA 0,0,68,0,68,8,0,0,144
270 DATA 0,32,78,128,78,32,0,0,348
275 DATA 4,138,66,36,68,128,4,0,444
280 DATA 4,74,234,238,234,138,106,0,1028
285 DATA 198,168,168,200,168,168,198,0,1268
290 DATA 206,168,168,174,168,168,206,0,1258
295 DATA 230,136,136,232,138,138,132,0,1142
300 DATA 174,164,164,228,164,164,174,0,1232
305 DATA 234,42,42,44,42,170,74,0,648
310 DATA 138,142,138,138,138,138,234,0,1066
315 DATA 164,234,234,170,170,170,164,0,1306
320 DATA 196,170,170,202,138,138,132,2,1148
325 DATA 198,168,168,196,162,162,172,0,1226
330 DATA 234,74,74,74,74,74,68,0,672
335 DATA 170,170,170,170,234,78,74,0,1066
340 DATA 170,170,170,74,164,164,164,0,1076
345 DATA 230,36,36,68,68,132,230,0,800
350 DATA 140,132,68,68,68,36,44,0,556
355 DATA 0,64,224,64,64,64,64,14,558
360 DATA 96,128,128,198,138,138,230,0,1056
365 DATA 0,128,128,198,168,168,198,0,938
370 DATA 0,32,32,108,170,172,102,0,616
375 DATA 0,96,128,134,202,134,130,12,836
380 DATA 0,132,128,204,164,164,164,0,956
385 DATA 0,72,8,74,76,74,74,128,506
390 DATA 0,128,128,138,142,138,74,0,748
395 DATA 0,0,0,196,170,170,164,0,700
400 DATA 0,0,0,198,170,170,198,130,866
405 DATA 0,0,0,102,132,130,142,0,506
410 DATA 0,0,128,202,138,138,100,0,706
415 DATA 0,0,0,0,170,170,78,74,492
420 DATA 0,0,0,170,74,166,162,12,584
425 DATA 6,4,4,232,68,132,230,0,676
430 DATA 76,68,68,66,68,68,76,0,490
435 DATA 4,174,10,14,14,10,4,0,230
440 DATA 9999
490
495 REM machine code data
500 DATA 221,33,88,252,221,126,0,254,1195
505 DATA 128,210,182,254,254,32,48,7,1115
510 DATA 254,0,202,190,254,62,31,203,1196
515 DATA 135,111,38,0,41,41,17,0,383
520 DATA 250,25,17,228,253,34,228,253,1288
525 DATA 58,230,253,254,64,210,182,254,1505
530 DATA 203,39,203,39,50,226,253,58,1071
535 DATA 231,253,254,22,210,182,254,203,1609
540 DATA 39,203,39,203,39,71,62,175,831
545 DATA 144,50,227,253,62,7,50,225,1018
550 DATA 253,42,228,253,126,95,221,126,1344
555 DATA 0,203,71,32,10,123,203,47,689
560 DATA 203,47,203,47,203,47,95,58,903
565 DATA 226,253,79,58,227,253,71,123,1290
570 DATA 205,116,254,58,225,253,254,0,1365
575 DATA 40,49,61,50,225,253,120,61,859
580 DATA 50,227,253,42,228,253,35,34,1122
585 DATA 228,253,24,197,203,95,196,135,1331
590 DATA 254,12,203,87,196,135,254,12,1153
595 DATA 203,79,196,135,254,12,201,197,1277
600 DATA 221,229,245,205,223,34,241,221,1619
605 DATA 225,193,201,221,35,58,230,253,1416
610 DATA 60,254,64,32,2,62,0,50,524
615 DATA 230,253,254,0,32,13,58,231,1071
620 DATA 253,60,254,22,32,2,62,0,685
625 DATA 50,231,253,195,236,253,62,10,1290
630 DATA 50,58,92,205,3,19,201,0,628
```

Column Stretcher

program listing

48K text entry program

```
 1 REM Text Entry program
 2 REM 48K only
 3 REM1984 C.J. White
10 INPUT "Text ";a$
20 INPUT "Column ";x
30 INPUT "Line ";y
40 FOR f=1 TO LEN a$
50 POKE 64599+f,CODE a$(f)
60 NEXT f
70 POKE 64599+f,0
80 POKE 64998,x
90 POKE 64999,y
100 RANDOMIZE USR 65000
110 GO TO 10
```

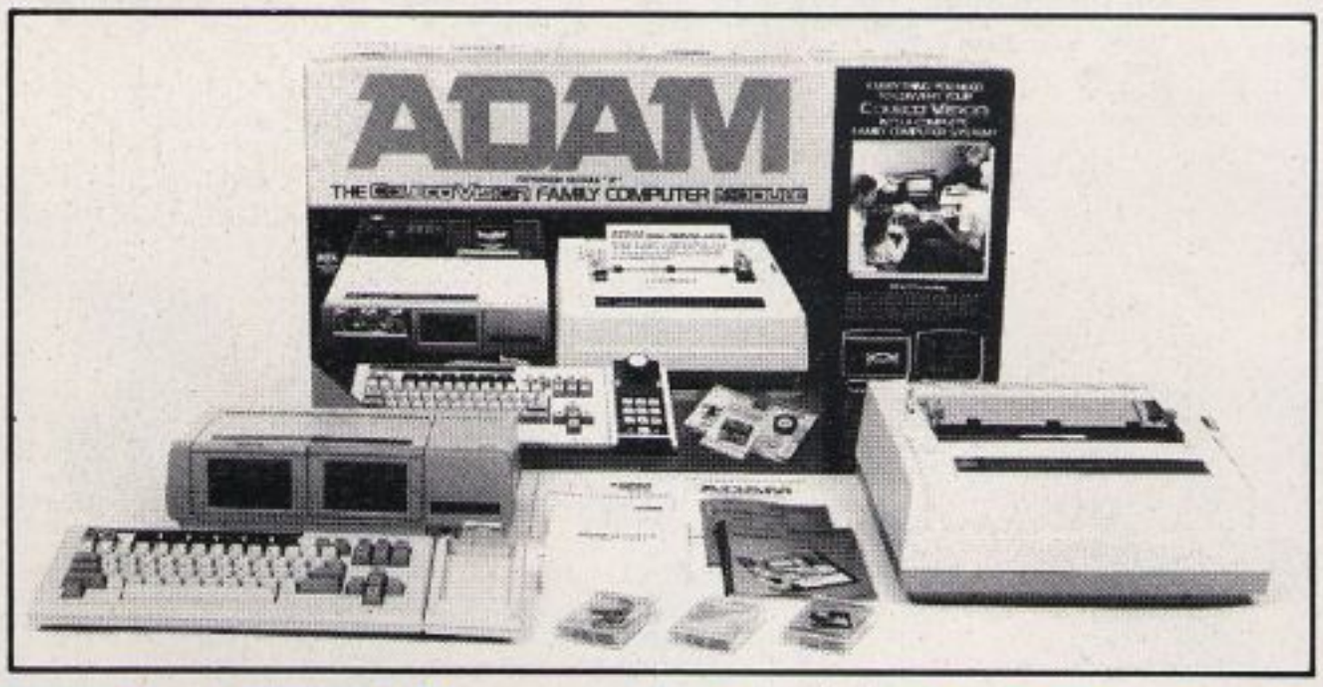
program listing

Assembler Listing

```
 10                ORG   65000
 20 ERRNR          EQU   23610
 30 CHARS          EQU   64600
 40 CNT            EQU   64993
 50 CBASE          EQU   64000
 60 XPOS           EQU   64998
 70 YPOS           EQU   64999
 80 CADD           EQU   64996
 90 XCO            EQU   64994
100 YCO            EQU   64995
110 RPLOT          EQU   8027
120                LD    IX,64600
130 START          LD    A,(IX+00)
140                CP    128
150                JP    NC,ERROR
160                CP    32
170                JR    NC,L01
180                CP    0
190                CP    0
200                JP    Z,FINISH
210 L01            LD    A,31
220                RES   0,A
230                LD    L,A
240                LD    H,0
250                ADD   HL,HL
260                ADD   HL,HL
270                LD    DE,CBASE
280                ADD   HL,DE
290                LD    DE,CADD
300                LD    (CADD),HL
310 COORDS         LD    A,(XPOS)
320                CP    64
330                JP    NC,ERROR
340                SLA   A
350                SLA   A
360                LD    (XCO),A
370                LD    A,(YPOS)
380                CP    22
390                JP    NC,ERROR
400                SLA   A
410                SLA   A
420                SLA   A
430                LD    B,A
440                LD    A,175
450                SUB   B
460                LD    (YCO),A
470 SETUP          LD    A,7
480                LD    (CNT),A
490 L02            LD    HL,(CADD)
500                LD    A,(HL)
500                LD    E,A
510                LD    E,A
520                LD    A,(IX+00)
530                BIT   0,A
540                JR    NZ,L03
550                LD    A,E
560                SRA   A
570                SRA   A
580                SRA   A
590                LD    E,A
600 L03            LD    A,(XCO)
610                LD    C,A
620                LD    A,(YCO)
630                LD    B,A
640                LD    A,E
650                CALL  TEST
660                LD    A,(CNT)
670                CP    0
680                JR    Z,NEXT
690                DEC   A
700                LD    (CNT),A
710                LD    A,E
720                DEC   A
730                LD    (YCO),A
740                LD    HL,(CADD)
750                INC   HL
760                LD    (CADD),HL
770                JR    L02
780
790 TEST           BIT   3,A
800                CALL  NZ,PLOT
810                INC   C
820                BIT   2,A
830                CALL  NZ,PLOT
840                INC   C
850                BIT   1,A
860                CALL  NZ,PLOT
870                INC   C
880                RET
890
900 PLOT           PUSH  BC
910                PUSH  IX
920                PUSH  AF
930                CALL  RPLOT
940                POP   AF
950                POP   IX
960                POP   BC
970                RET
980
990 NEXT           INC   IX
1000               LD    A,(XPOS)
1010               INC   A
1020               CP    64
1030               JR    NZ,L04
1040               LD    A,0
1050               LD    (XPOS),A
1060               JR    L06
1070 L04           LD    A,(YPOS)
1080               INC   A
1090               CP    22
1100               JR    NZ,L05
1110               LD    A,0
1120               LD    (YPOS),A
1130 L05           JP    START
1140
1150 L06           LD    A,10
1160 ERROR         LD    (ERRNR),A
1170               CALL  4867
1180 FINISH        RET
```

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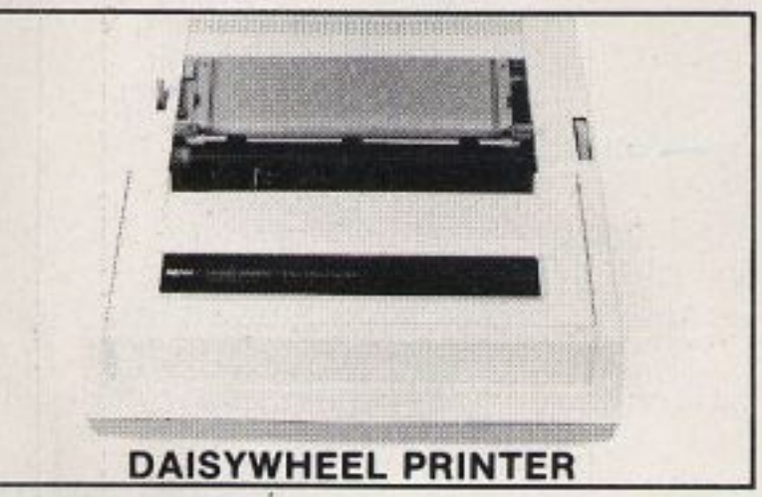
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If you're looking for real value in a computer system, one which can handle anything from serious Word Processing to enhanced Colecovision style video games such as Buck Rogers, look no further. The Coleco Adam is here with a package which will make you wonder if you're dreaming when we tell you about it. A price breakthrough in computer systems, Adam is comprised of an 80K RAM memory console with a built-in 256K digital data drive; a professional quality, stepped and sculptured 75 key full-stroke keyboard; a letter quality daisywheel printer and a full word processing program built into the Console. Two additional pieces of software, Smart BASIC and also 'Buck Rogers - Planet of Zoom' (the ultimate in advanced video games), are included as well as a blank digital data pack. Adam can be used with any domestic colour Television set.*

MEMORY CONSOLE/DATA DRIVE: *The heart of the Adam system is the 40K ROM and 64K RAM memory console which combines with the 32K ROM and 16K RAM in Colecovision to give you a total of 72K ROM (including 24K cartridge ROM) and 80K RAM (expandable to 144K). Built into the memory console is a digital data drive which accepts Adam's digital data packs, a fast and reliable mass storage medium that is capable of storing 256K of information, that's about 250 pages of double spaced text! The console is also designed to accomodate a second optional digital data drive.

FULL STROKE KEYBOARD: The Adam keyboard has been designed as a professional quality keyboard that combines ease of use with an impressive array of features. It is stepped and sculptured for maximum efficiency and has 75 full stroke keys which include 6 colour coded Smart Keys which are redefined for each new application; 10 command keys which are dedicated to the word processing function, and 5 cursor control keys for easy positioning of the cursor at any point on the screen. You can attach a Colecovision controller to the keyboard to function as a numeric keypad for easy data entry. It can also be held like a calculator, a feature which makes working with numbers particularly easy. The joystick part of the hand controller can be used in the same way as the cursor control keys, to move the cursor around the screen.

LETTER QUALITY PRINTER: The Smart Writer letter quality daisywheel printer is a bi-directional 80 column printer which prints at a rate of 120 words per minute. It uses standard interchangeable daisywheels, so a variety of typestyles are available. The printer has a 9.5 inch wide carriage for either single sheets or continuous fan fold paper and uses standard carbon ribbons. It is comparable to many printers which cost as much as the total Adam package. The printer can be used either with the Adam's Smart Writer word processing program or as a stand alone electronic typewriter.

BUILT-IN WORD PROCESSOR: Adam comes with Smart Writer word processing built-in. This program is so easy to use that you only have to turn the power on and the word processor is on line and ready to go. Detailed instruction books are not necessary as the Computer guides you step by step, working from a series of Menu commands. It enables you to type in text, then completely edit or revise it with the touch of a few keys. Changes are readily made and a series of queries from the computer confirm your intentions, so that you can continuously double check your work as you type.

COMPATIBILITY WITH COLECOVISION: By using high speed interactive microprocessors in each of the modules, the Coleco Adam is designed to take additional advantage of both the 32K ROM and 16K RAM memory capability in the Colecovision. If you do not already own a Colecovision Console (£99 inc VAT), then you will need to purchase this when you initially purchase your Adam Computer package (£499 inc VAT), making a total purchase price of (£598 inc VAT).

WHAT IS COLECOVISION: Colecovision is one of the worlds most powerful video game systems, capable of displaying arcade quality colour graphics of incredible quality on a standard Colour TV set. The console (see picture bottom left) accepts 24K ROM cartridges such as Turbo and Zaxxon and is supplied with the popular Donkey Kong cartridge and a pair of joystick controllers. Colecovision has a range of licenced arcade hits available such as: Gorf, Carnival, Cosmic Avenger, Mouse Trap, Ladybug, Venture, Smurf, Pepper II, Space Panic, Looping, Space Fury, Mr Do, Time Pilot, Wizard of Wor and many others. So there you have it, Adam plus Colecovision the unbeatable combination. Send the coupon below for your FREE copy of our 12 page Colour brochure giving details on the complete Adam system.

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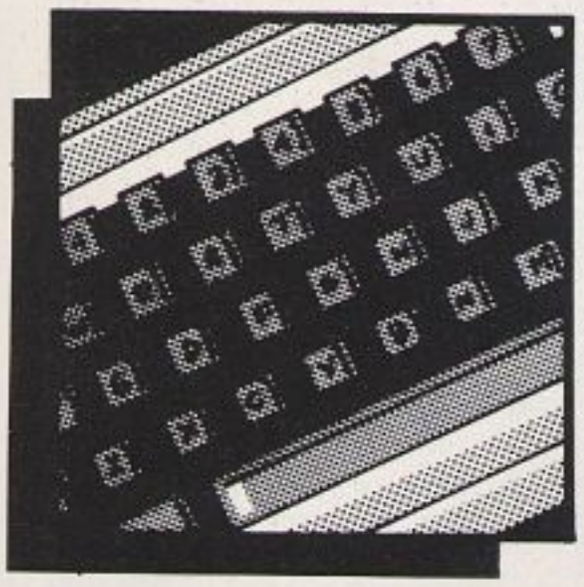
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Rev 2



Toshiba MSX Launch

While many people agree there is a need for a degree of standardisation in the computer industry, have the Japanese got it right with their MSX code? Simon Rockman explains the standards and reviews Toshiba's model micro.

Sony, Toshiba, Yamaha, Cannon and most of the other large Japanese corporations are working up to a massive computer launch. To date about 17 manufacturers have subscribed to the MSX standard developed by the American company, Microsoft. They are all Far Eastern companies, mainly Japanese but also some from Korea. Dragon had planned an MSX machine but since the future of that company is now in doubt such a launch is unlikely.

Strength in standards

The greatest strength of the MSX standard is compatibility since MSX software will run on all MSX machines. Any machine specific software does not comply to the standard. Spectravideo produced a MSX-similar computer and were severely criticised by the manufacturers of true MSX computers for being non-standard. The MSX computer we examined is the Toshiba HX-10. It costs £269 without a cassette deck and is totally MSX compatible.

These days the price set for a computer often has more to do with marketing policy than with manufacturing costs. The price tag of the Toshiba HX-10 positions it well above the Sinclair Spectrum but below the BBC and places it in the middle range of home computers along with the new Commodore Plus 4 and the Amstrad CPC 464.

Toshiba HX-10 Home Computer.



MSX



Rear view of HX-10 showing connector ports.

Consumers' dream

Like all the slick Japanese products the HX-10 comes in a tidy cardboard box and is well packed with card and foam. A surprisingly wide and flat machine, it has no doubt been engineered to realise the typical consumer's idea of what a computer should look like. This is no bad thing and there is not a lot you can do with a keyboard and a case. However, Toshiba have done a good job; even Commodore's short lived Model 500 which had its case designed by Porsche did not look spectacularly different.

The HX-10 has similar dimensions to an Electron with a plus one interface fitted, or if you prefer, a squarer version of the BBC. The black on white keys are easy to read and the whole keyboard very comfortable to use. However, there is more than sufficient travel in the keystroke and I would have preferred the keyboard to be more steeply raked. Bearing in mind that the majority of users will be first time buyers not used to other micros and that they will not, in the main, be able to touch type or be too fussy, and HX-10's keyboard does its job perfectly. My favourite feature is the diamond shaped cluster of cursor keys to the side. After using these it beats me why manufacturers should go for any other arrangement.

Standard ports

The external connectors on the HX-10 all conform to the MSX standard, an essential feature before a machine can proudly wear the MSX badge on its case. Working round from the right there are two joystick ports with Cannon/Atari D9 sockets, and the 14 way centronics Amphenol connector. This allows the user to connect a wide range of printers, and while the plug chosen may not be an existing standard, Centronics is and so there should be no problem getting the correct cables once the computers are available.

The main feature of the back panel is the 50 way MSX bus. This is the micro's main way of talking to the rest of the MSX world. Also on the back panel is the modulated RF output to plug into a domestic television set. The HX-10 comes with a robust lead for this purpose. There is also a DIN cassette tape socket to allow loading and saving to a domestic cassette recorder and once again, leads are included. The monitor output has probably been included for the sake of completeness and is a nice touch. The power supply is integral, a useful feature if you have several micros but only one screen.

Cartridge software

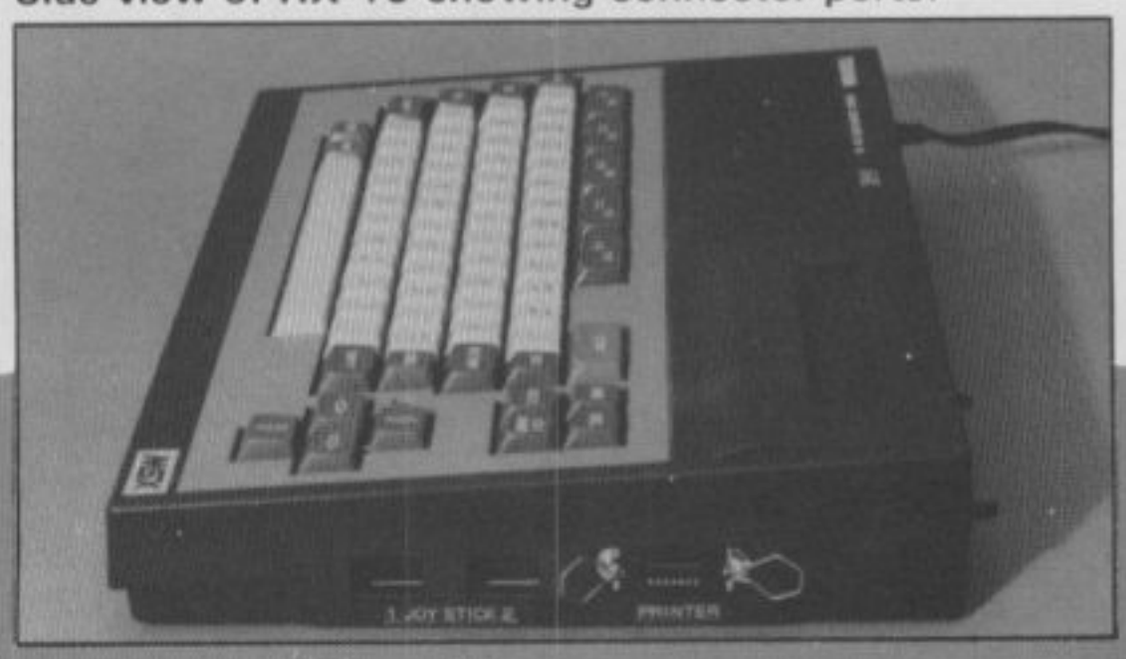
On the top surface is a single cartridge slot. I very much hope that cartridges will be the main medium for large scale commercial software since they reduce software piracy considerably and if, like Commodore cartridges, they contain good software and are cheap and easy to buy, the MSX cartridges should take off. Most manufacturers have shied away from cartridges because of the cost. However, the large scale of production which can be afforded with MSX, will allow even smallish companies to benefit from economies of scale.

The last external feature is the rocker switch for power on/off. When I switched on I was greeted with a copyright and version number screen with the information in the centre of the display. This informed me that the version of MSX fitted was 1.0. The documentation I had was for 1.4 but I found no discrepancies. I was delighted to learn that the final documentation is being written in Britain so it will be in true English rather than the hybrid of English and Japanese which characterised early Sharp manuals. The language known as BASIC has never been standard although many versions claimed to be so. The original was designed to teach FORTRAN students and as new machines came along they brought with them new and improved versions. The closest BASIC ever got to being standard was Microsoft Basic. This drew its strength from the fact that most major manufacturers bought their BASICs from Microsoft, among them Tandy, Commodore, Dragon, and Oric.

Microsoft BASIC

Since Microsoft drew up the standard for MSX it makes sense that it is the latest version of their BASIC which is included in the HX-10. This is version 4.5 and the main area of improvement has been in terms of graphics handling and sound. The IF . . . THEN structure has ELSE added to it but there are none of the increasingly more popular structures such as procedures, REPEAT . . UNTIL, DO . . . . WHILE, or CASE statements which are finding favour in most educational establishments. Some Universities prefer students with no knowledge of programming to those with sloppy

Side view of HX-10 showing connector ports.



Toshiba MSX Launch

BASIC. It is of course still possible to produce neat and readable programs with GOTO's and line numbers but it is more difficult and the end result is not QUITE as good.

There are all the usual string handling commands in version 4.5; these include — LEFT$, MID$, RIGHT$, LEN etc. Converting the average text only adventure from the Commodore 64 to MSX should be a doddle.

Sound

The sound is provided by the same AY-3-8910 chip as is used in the Oric. This gives three voices over eight octaves and sound is produced through the TV's speaker which means there is a volume control readily at hand for late night alien zapping. The only and slight drawback of doing this is that it is necessary to hook up a separate speaker if you wish to use a monitor but as the HX-10 does not produce 80 column text, not many people will be spending as much as the computer again on a monitor. The sound has a wide range of commands which allow you to change tempo and shape envelopes. My favourite sound command is PLAY which is like LOGO for sound and works along a string playing the notes in it with extra letters and symbols for sharps, changing octaves, lengths and rests. This is a very compact way of expessing music saving on DATA and array space.

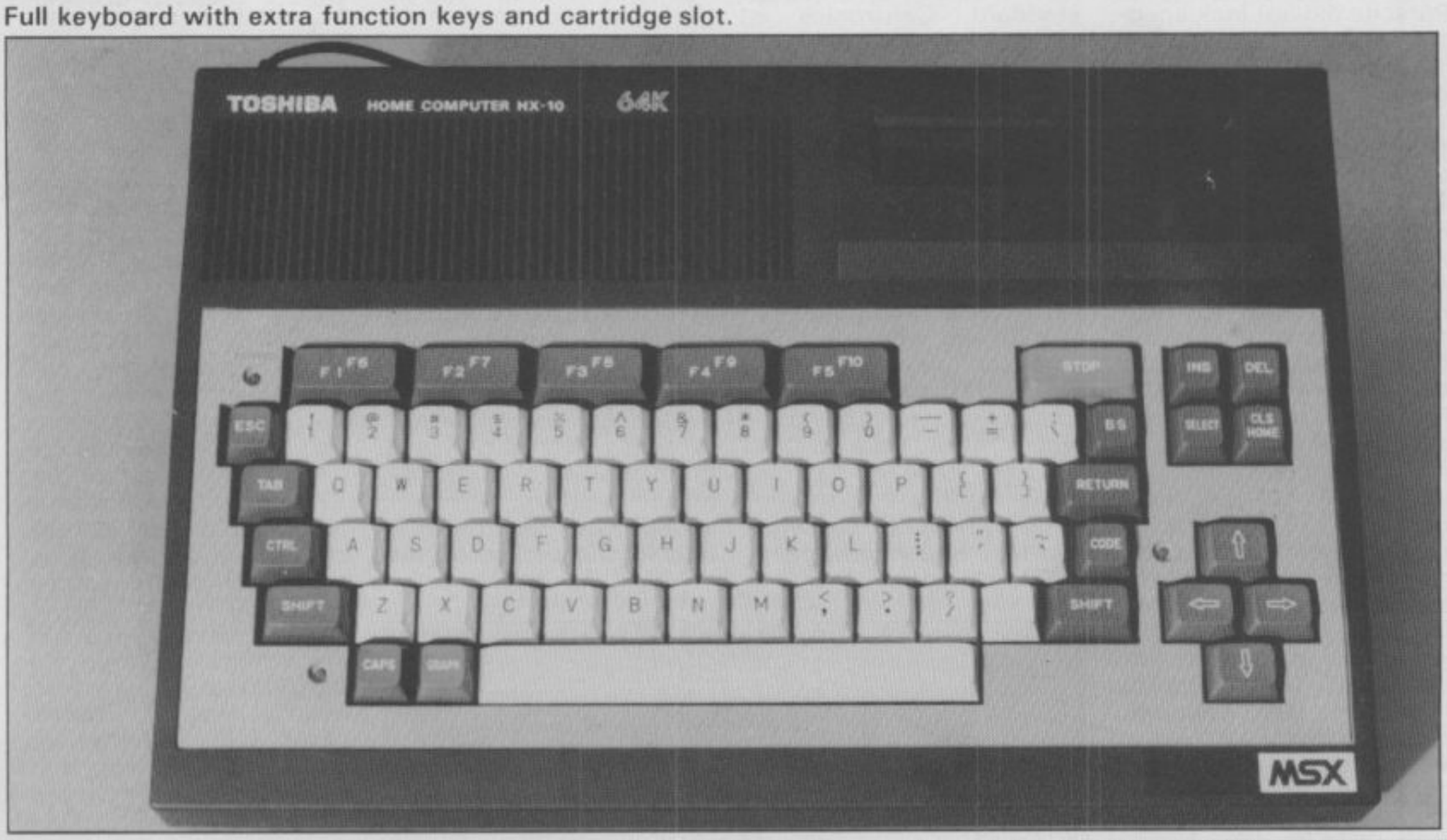
Graphics

The graphics commands give easy access to sprites and high resolution. Colour, not surprisingly has become color, but then the US market is so much larger than ours we must expect this for the sake of compatibility. There are 16 colours, and up to 32 sprites. The eight by eight and sixteen by sixteen sprites are a little too small for my liking, they are fine for missiles and aliens but not sufficient for Manic Miner type characters. By the way I understand that Software Projects (who wrote Manic Miner) are working on a MSX version of some of their games. Another restriction to using sprites is that you can only have four on any one line, the fifth one does not appear properly if you try. The sprite handling commands are very good but fall down on the collision detection which is rather weak.

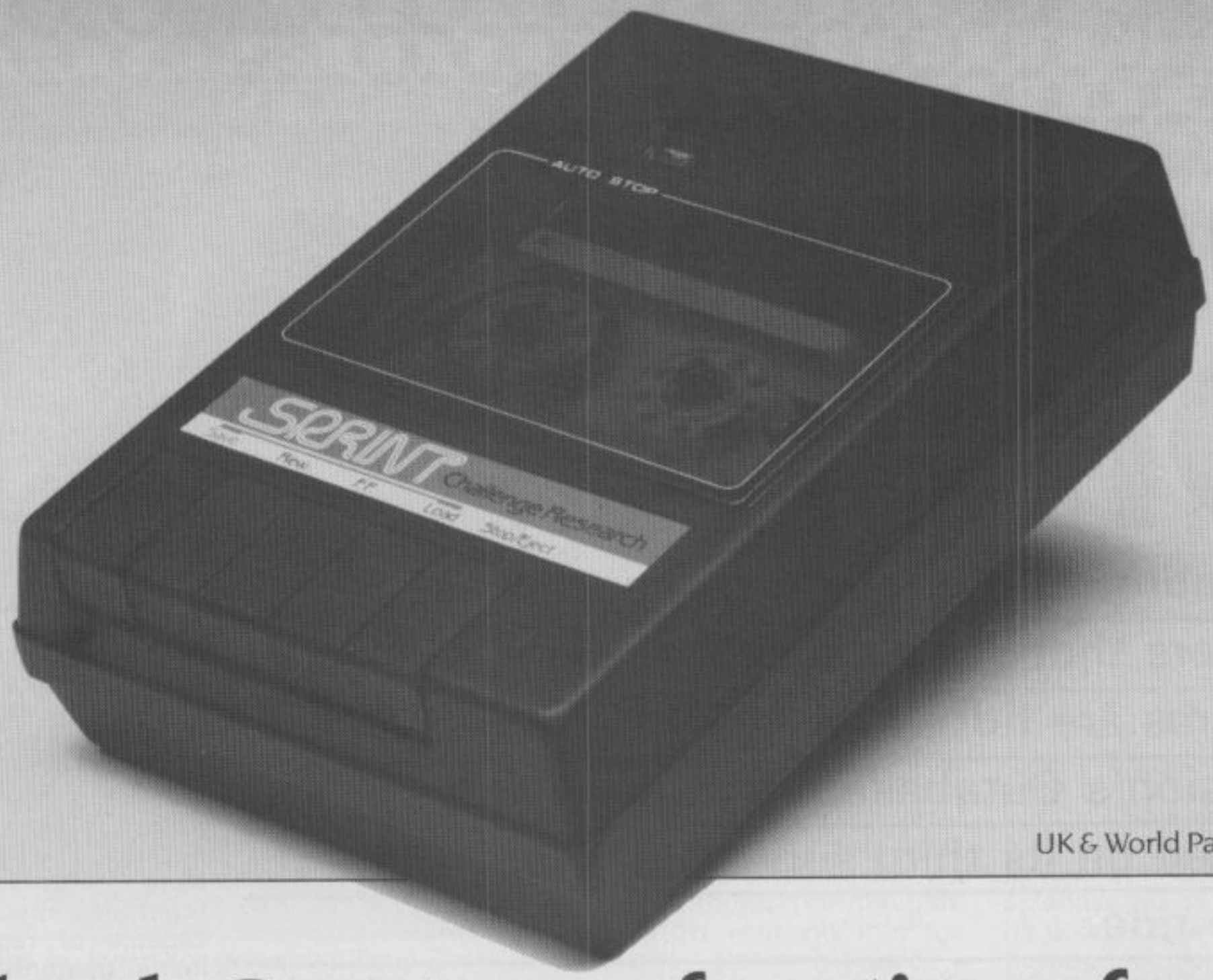
Conclusion

All in all the HX-10 is a stable, if a trifle ordinary computer. It is the sort of machine which PR people describe as 'proven' and rivals call 'restricting'. Sir Clive Sinclair has spoken out about the MSX standards. He feels that standardisation based on this outmoded technology will freeze future developments in the industry. In the long run, such a situation cannot be in the consumer's interests. He is concerned at 'the fairly stupid attitude' from some British retailers about MSX. They obviously feel it's marvellous because of the 'standardisation', but should consider the wider implications of it being so out of date before readily stocking and pushing the MSX machines. Sir Clive believes that 'MSX is not giving the public the best product for their money'. The debate will continue!

Full keyboard with extra function keys and cartridge slot.



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PCT9 84

Feature

Database On Show

Computing as a hobby now has so many followers that supportive television programs are hot property! When Thames Television's Database programme was launched on its third series, *PCT* was there for the ride.

Once upon a time computers were distant and very mysterious boxes which sent out final demands for £0.00. Now they have passed into our everyday lives, machines to be utilised rather than feared. Our High Streets are full of shops proudly displaying the multifarious products of the silicon revolution.

Rating figures

When a product is owned by more than one in ten households, the potential viewing figures for televison programmes centring on that product are not often ignored by TV programme planners. So it is the case with computers — the producers of radio and television shows were quick to spot the potential draw of this subject and have produced series accordingly. Some of them could be readily confused with an Open University slot, but others are designed to arouse curiosity about the roles computers can play in improving our lives, while providing basic instruction in the art of programming.

All 'togged' up to play an active role in a review of computer games, presenters Jane Ashton and Mike Thorne prepare to enter into the fun of a mini drama.



Database's brief

Now into its third series, the producer of Database is in the fortunate position of being fore-armed as it were. The first series went out as long ago as September 1982 and a second series followed a year later but both of these were localised in the London area. Feedback from a mail sort helped determine audience requirements of such a programme. Details such as the type of equipment viewers wanted to hear about and popular feature slots helped the producer, Michael Feldman, get together a specialist team capable of reporting on items guaranteed to interest the rapidly growing audience.

The rating figures are increasing so rapidly that for the first programme of the third series, audiences in London alone were larger than those switched on to a popular sports quiz programme broadcast simultaneously on a competitive channel.

The success of the previous series has enabled Thames Televsion to widen their broadcasting to ITN nationwide, although the programme times are staggered around the country. So you all have the opportunity of seeing the exciting programmes Database has in store.

The current series has been termed Level A and is aimed at people who have little or no knowledge of computers. There is a very definite Japanese slant to the programmes with reports each week of devel-



Fish and chips in Japan for presenter Tony Bastable. That's a typical Japanese meal of raw fish in front of him. . . and a microchip in his chopsticks.

opments in the Japanese computer industry. Communication via modems was demonstrated in the first programme with information being sent via telephone linkages from Japan to London. Major reports of fifth generation research and development in Japan followed in later programmes, including the latest voice activated games software from that country. This was paralleled with UK developments.

Flexible Production

Although items are planned for broadcast throughout the series, the producer is very flexible in terms of what is included each week. The programme aims to be topical and items can be switched at the last moment to bring viewers up to date and to include newsworthy items such as the covering of the recent London Computer Fair, where Database had something of a scoop in interviewing the man of the moment, Sir Clive Sinclair. Viewers were given the opportunity of writing in with questions on Sinclair's latest and much discussed micro, the QL, and these were put to him during the interview.

Each programme also has regular slots with UK experts presenting items on new hardware and software and offering consumer advice. The programme was a leader in transmitting software, to receiver feedback as to which is the most successful method of downloading software to viewers.

Studio delights

Our trip to the studio to view a taping of one show showed us just how much work goes into half an hour of television. Arriving late we went straight to Studio Three. The door we were directed to opened up into the studio but placed us between the curtain, which formed a backdrop for the set, and the outer wall. Not sure of what was going on the other side of the fabric wall we crept round from the dark narrow walkway into the large, gleaming studio.

This was the second programme in the series and was a little different to the others. Most of the programmes are filmed (taped) in one day. However, Database's aim to carry newsworthy information took it to the Computer Fair. This opened on the day of transmission, so the other parts of the programme had to be recorded the preceding Monday. This meant that there was extra studio time on that day, used up in recording sections of later programmes.

Awards ceremony

Database sponsored some of the British Microcomputing awards, in particular the award for the best home and business software. The home award went to Acornsoft for View. David Johnson-Davies was interviewed about his product and went on to demonstrate its text formatting properties to viewers.

The business award was shared between two very successful products, Lotus 1-2-3 and Concurrent CP/M operating systems. An operating system is very difficult to demonstrate because the user has so little to do with it. However, Digital Research who developed Concurrent CP/M did a splendid job of explaining its powers briefly without getting technical.

One problem I did not see resolved was the voice-over for the rest of the awards. A loop of tape showed all the award winners and one of the programme's presenters, Tony Bastable, had to read out the name of the award. The problem was that the name of the award and its winner was so lengthy that it over-ran the time allotted. This was a job for the editing department at a later date. The programmes are shot in short bursts and then threaded together like some technological jigsaw puzzle.

Database is very big on MSX, the Japanese attempt to standardise all

Jane Ashton flight-testing simulation software.



computers. A host of manufacturers had representatives at the studio to make sure they got 'fair' coverage. Since the only difference between the computers is the shape, size and colour of the outer casing, the MSX manufacturers' P.R. men were almost aggressive in their battling for their machine's superior position. When they had fought it out and had arranged their machines into a semblance of a display, the director came along and 're-arranged' them in a more aesthetic form for the cameras!

British spokeman

The highlight of the programme was the interview with Sir Clive Sinclair, who was condemning in his attitude to MSX. On the QL front he could only apologise. Sir Clive did not try to cover up Sinclair Research's shortcomings but failed to persuade Tony Bastable that it is a wonder machine!

Language and flight

Mike Gruneberg and Tony Bastable explained the rationale behind Mr. G's 'Linkword' approach to teaching languages. This will be tested by a team of reviewers who could write in for free copies of the software and then report on it. The demand must have been phenomenal!

The next scene was the first one filmed and the first time Jane Ashton had presented anything on television, not that one could have guessed. This section contained a direct comparison between flight simulation software and the real thing. This is where television presentation comes into its own and the shots through the cockpit of a plane allowed a realistic comparison between that and the simulation on a computer screen.

Viewer involvement

Database aims for maximum contact with its viewers. Page 182 on Oracle provides a resumé of the programs and page 557 gives background information on what is happening in the computer World. Viewers with access to Prestel can even send messages to the show's producer.

Database profits from the production team's knowledge of computers which is tempered by a refreshing ability to stand apart from them. Michael Feldman has a good and detailed knowledge of micros. Database was his idea and its success owes much to him. The other presenters have similar backgrounds. Guy Kewney is one of the leading computer journalists with many contacts in the trade and Dr. Mike Thorn is clearly more than an academic scientist and shows interest in even the humble Spectrum and the use of GOTOs. Jane Ashton is a leading light at Apple Computers with a special interest in the Lisa and Macintosh. On the other hand, seasoned presenter, Tony Bastable does not profess to be a computer expert but balances out the show by putting forward the interested man-on-the-street's viewpoint.



Computer communications on the move is one of the subjects investigated in the series, and they could scarcely move much faster than the facilities presenter Tony Bastable put to the test (top picture) on a journey between Tokyo and Kyoto in Japan's ''bullet train'' (lower picture).

Son, or rather father, of Database goes out in the autumn and this will be a more advanced programme aimed at aficianados of computing. This series will deal with more complex aspects of the hobby and go into great detail suiting the people who talk in bits, bytes and baud.

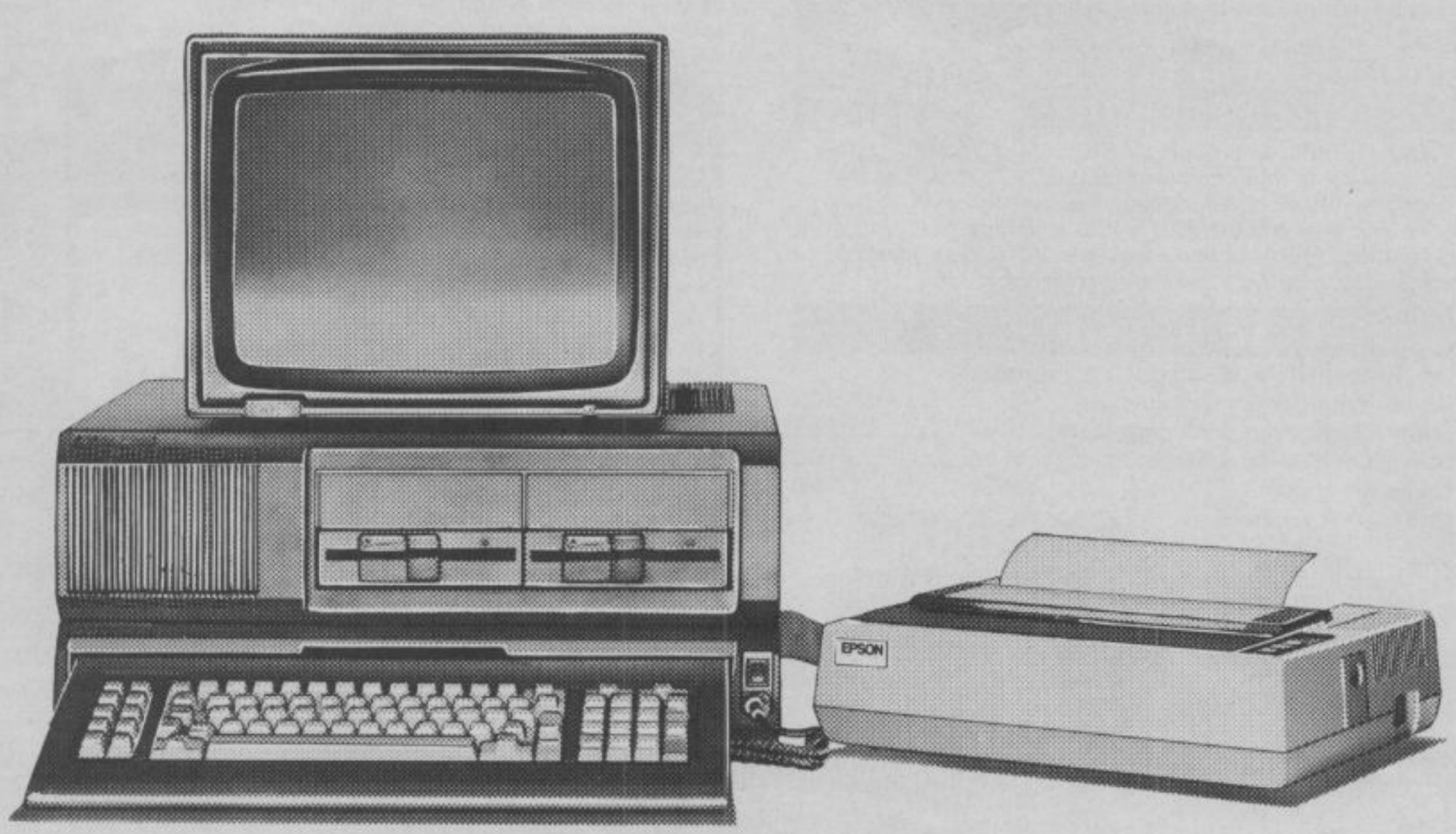
Finale

From the opening titles, which show a spinning Commodore 8000, to the final shot of a wall of TV screens backed by the high pitched whine of program transmission via a sound channel, Database is intelligent, amusing and enthralling.

The end in the studio is much more sudden. The 'goodbye' sequence was one of the first to be recorded so when taping was over, the brilliant white lights were dimmed to domestic yellow and creaking sounds were audible as the booms wound themselves back to the ceiling. Well there's always the next series to look forward to!

MICROPOWERMICROPOWERMICROPOWERM

Why you should buy a computer you've never heard of, when you know you want an IBM PC.



Advance 86b specification. Intel 8086 CPU. MS DOS operating system. Twin-disk drives. 128K RAM expandable to 640K. Interfaces for light pen, printer/plotter, joystick, monitor and RS232C. Capacity for 4 expansion boards, plus a further 2 true 16 bit slots. Graphics – 16 colours, 80/40 columns x 25 row text, 640 x 200 pixels. Package illustrated Epson RX80 F/T Printer (£325 inc. VAT) and Microvitex monitor (£249 inc. VAT).

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You've probably never heard of the Ferranti Advance 86b. But then, once upon a time you'd probably never heard of the Sinclair ZX81 either.

In 1981, we became the exclusive stockists of this computer, which has since gone on to become the best selling personal computer ever.

In 1982, we were the first High Street retailer to make the Sinclair Spectrum available to the general public. Again, most people at first knew nothing of its existence, and again we've sold thousands.

In 1983, we were the first national High Street retailer to stock Acorn's domestic version of the highly successful BBC Micro, the Electron. And now, in 1984, we're continuing the story by stocking a new, advanced, business computer.

The Advance 86b Personal Computer, made by Ferranti.

So far, of course, few people have heard of it. The Advance 86b, based on a true 16-bit micro-processor, has a user memory of up to 640k, and dual 360k disk drives. It runs IBM software, and runs it faster than any equivalent IBM PC. Simply because the microchip it uses is more advanced.

The Advance 86b costs £1,499 (inc. VAT) and comes complete with four free software programs – spreadsheet, wordchecker, word processor and database.

The package shown includes a monitor and printer and at £2,073 (inc. VAT) costs less than half of the equivalent IBM PC package.

What's more, your Advance 86b will be backed up by a full 12 month warranty.

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Son et Lumière

Create your own sound and light extravaganza using this unusual program by F.M. O'Dwyer.



Have you ever seen a light and music show where the images on a screen are synchronised to the sound being played? This technique has been exploited by discos and television music programs to provide an interesting form of entertainment. Now you and your Atari can produce a light show in your own home.

This program takes musical sound from a cassette in the Atari's cassette drive and produces a graphic display based on the frequencies of the music. It is written entirely in Assembly language and is approximately 150 bytes long when assembled. The program works by reading bit 4 of memory location 53775, which returns a value governed by the signal on the digital track of the tape. However, since the tape is a music tape, the sound from the right-hand stereo track will be read instead and thus some idea of the frequencies in the music can be formed. This value is then used in the graphics routine to generate a display which changes in keeping with the music.

Go to it!

To use the program insert a music cassette in the tape drive and press PLAY. Then run the BASIC program. The cassette should turn on and you should see a changing graphics display which alters in keeping with the music. If you don't or if the program crashes, check that you have typed in all the DATA statements correctly (make sure that you SAVE a copy before running it).

The program works best if the music has long instrumentals and a strong beat. Due to the limitations of the sampling system used, only one stereo track is sampled so vocal sound can sometimes drown out other sounds as far as the program is concerned. The track that you hear through the speaker of the TV set is the other stereo track and this can also lead to discrepancies between what is heard and the images produced. None of these problems apply to mono recordings however, and the program works surprisingly well for all the stereo recordings I have tried — from UB40 to Joe Jackson.

ATARI 16

how it runs

The BASIC listing is simply a machine code loader. It POKEs in the bytes generated by the Assembler, then runs them as a machine code program. The program will then continue to run until RESET is pressed. Rather than give a line-by-line description of the BASIC listing therefore, it is more useful to give a description of the assembly language program. In the following discussion the line numbers refer to the assembly listing, and not the BASIC program. The assembler program should not be typed in. It is for explanation only. Readers with knowledge of programming could use the assembly listing to make adjustments to the utility. Note, however, that you will need to use an Editor cartridge.

Line	Effect
1090-1130	These define the addresses & constants used in the program, i.e. 53775 The Atari location which refers to the cassette port. Bit number 4 here responds to the signal on the digital track of the cassette, and by sampling this we can get an idea of the frequencies in the music. 54018 This location controls the cassette motor. If 54 is stored here, the motor turns on. DOOA This location helps to avoid flicker in the graphics. If you execute a STA to this location you will be synchronised with the screen update. 560,561 This location points to the display list. Normally it points to a display list generated by the operating system, but this program uses it to get into GRAPHICS 3 mode.
1150-120	These change display list pointer to point to graphics 3 display list, and turn on the cassette motor.
1210-1220	Sets the graphics pattern to be a right-hand stripe. (when STRIPE=OF the pattern is a right-hand stripe; when STRIPE=FO the pattern is a left-hand stripe)
1230-1250	Zero the screen index Y used for screen access, and zero the COUNT byte used to model the frequency of the music.
1260-1280	Sample bit 4 of the cassette port. If it is zero then stop incrementing count.
1290-1310	Increment count and wait one jiffy, then go back to line 1260
1320-1330	These lines choose a random colour for the stripe pattern, and set it to appear on either the right to left hand side of each column.
1340-1360	Fill screen with stripe pattern.
1370-1390	Decide whether or not to change the stripe pattern by comparing the most recent value of COUNT with an arbitrary threshold value.
1400-1420	Change the stripe pattern to appear on the alternate edge of each column.
1430-1560	Repeat the sampling process for the opposite value of bit 4 of the cassette port, then go to line 1240.
1580-1600	Declare space for variables used.
1640-1680	Display list for graphics 3.
1700-1780	Delay subroutine to wait one jiffy. Uses timer location 20, which increments once every jiffy.

variables used

COUNT — holds number of jiffies bit 4 was set/reset

STRIPE — holds 'Stencil' or 'mask' for graphics pattern

THRESH — holds an arbitrary value of 3, this byte determines the variance of the pattern.

hints on conversion

This program is virtually impossible to convert to other micros, however it should not prove too difficult to write a similar program from scratch. Most computers have a location whose value reflects the signal on the cassette tape and this can be used to set parameters in a graphics routine. In general, computers that feature cassette handling fall into two categories:

1) Those in which a bit in some location reflects the cassette signal (e.g. Spectrum, Atari, Apple)

2) Those in which whole bytes are fetched from the tape port. (e.g. BBC B, Electron)

If your computer is in category 1 then you can use the same approach as this program, however if you own a computer in category 2 you will have to experiment with various music sources to see what sorts of values are returned from the tape.

Son et Lumière

line assembler

Assembler listing

```
1000 ;
1010 ;              SOUND TO LIGHT
1020 ;
1030 ;       program by Frank O'Dwyer
1040 ;             (c) 1984
1050 ;
1060                .TITLE "SOUND TO LIGHT"
1070                *= 600
1080 ;
1090 SOUND=53775
1100 MOTOR=54018
1110 ON=54
1120 WSYNC= D00A
1130 DL=560
1140 ;
1150 INIT           LDA #DLIST&255
1160                STA DL
1170                LDA #DLIST/256
1180                STA DL+1
1190                LDA #ON
1200                STA MOTOR
1210                LDA # OF
1220                STA STRIPE
1230                LDY #0
1240 SCAN           LDA #0
1250                STA COUNT
1260 SCAN1          LDA SOUND
1270                AND # 10
1280                BEQ STOP
1290                JSR DELAY
1300                INC COUNT
1310                JMP SCAN1
1320 STOP           LDA 53770
1330                AND STRIPE
1340 PUT            STA (88),Y
1350                INY
1360                BNE PUT
1370                LDA COUNT
1380                CMP THRESH
1390                BCC SKIP
1400                LDA STRIPE
1410                EOR #255
1420                STA STRIPE
1430 SKIP           LDA #0
1440                STA COUNT
1450 SCAN2          LDA SOUND
1460                AND # 10
1470                BNE STOP1
1480                JSR DELAY
1490                INC COUNT
1500                JMP SCAN2
1510 STOP1          LDA 53770
1520                AND STRIPE
1530 PUT0           STA (88),Y
1540                INY
1550                BNE PUT0
1560                BEQ SCAN
1570 ;
1580 COUNT          .BYTE 0
1590 STRIPE         .BYTE 0
1600 THRESH         .BYTE 3
1610 ;
1640 DLIST          .BYTE  70, 70, 70,
48, 40, 3C
1650                .BYTE 8,8,8,8,8,
8,8,8,8
1660                .BYTE 8,8,8,8,8,
8,8,8,8,8
1670                .BYTE 8,3,8,8,65
1680                .WORD DLIST
1690 ;
1700 DELAY          LDA #0
1710                STA 20
1740 WAIT           LDA 20
1750                CMP #1
1760                BNE WAIT
1770                STA WSYNC
1780                RTS
```

program listing

BASIC Program

```
10 REM *** SOUND TO LIGHT by Frank O'Dwyer ***
20 REM
30 FOR N=0 TO 152:READ A:POKE 1536+N,A:NEXT N:POKE 764,
255:GRAPHICS 0
40 CLOSE #1:OPEN #1,4,0,"K:":? "INSERT MUSIC CASSETTE I
N TAPE DRIVE":? "AND PRESS PLAY & THEN ANY KEY TO BEGIN
"
50 GET #1,K:X=USR(1536)
1000 DATA 169,107,141,48,2,169,6,141
1010 DATA 49,2,169,54,141,2,211,169
1020 DATA 15,141,105,6,160,0,169,0
1030 DATA 141,104,6,173,15,210,41,16
1040 DATA 240,9,32,139,6,238,104,6
1050 DATA 76,27,6,173,10,210,45,105
1060 DATA 6,145,88,200,208,251,173,104
1070 DATA 6,205,106,6,144,8,173,105
1080 DATA 6,73,255,141,105,6,169,0
1090 DATA 141,104,6,173,15,210,41,16
1100 DATA 208,9,32,139,6,238,104,6
1110 DATA 76,75,6,173,10,210,45,105
1120 DATA 6,145,88,200,208,251,240,174
1130 DATA 0,0,3,112,112,112,72,64
1140 DATA 60,8,8,8,8,8,8,8
1150 DATA 8,8,8,8,8,8,8,8
1160 DATA 8,8,8,8,8,8,8,8
1170 DATA 65,107,6,169,0,133,20,165
1180 DATA 20,201,1,208,250,141,10,208,96
```

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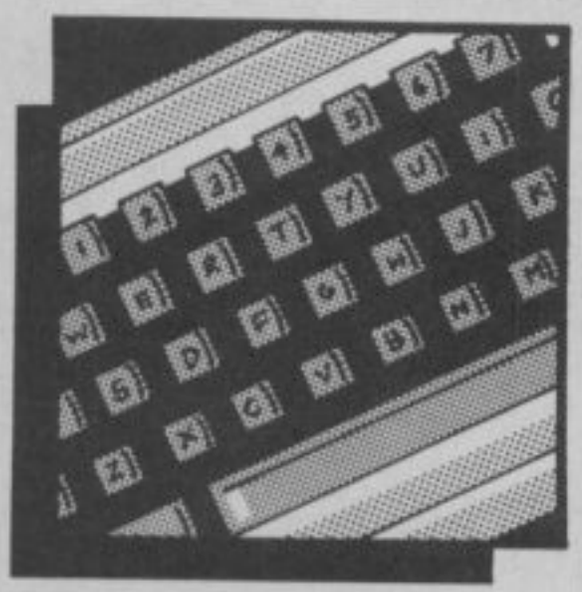
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Advance 86A Attack

Martin Edwardes sums up the British micro, the Advance. It has many interesting features and the two models bridge the gap between the home and business markets.

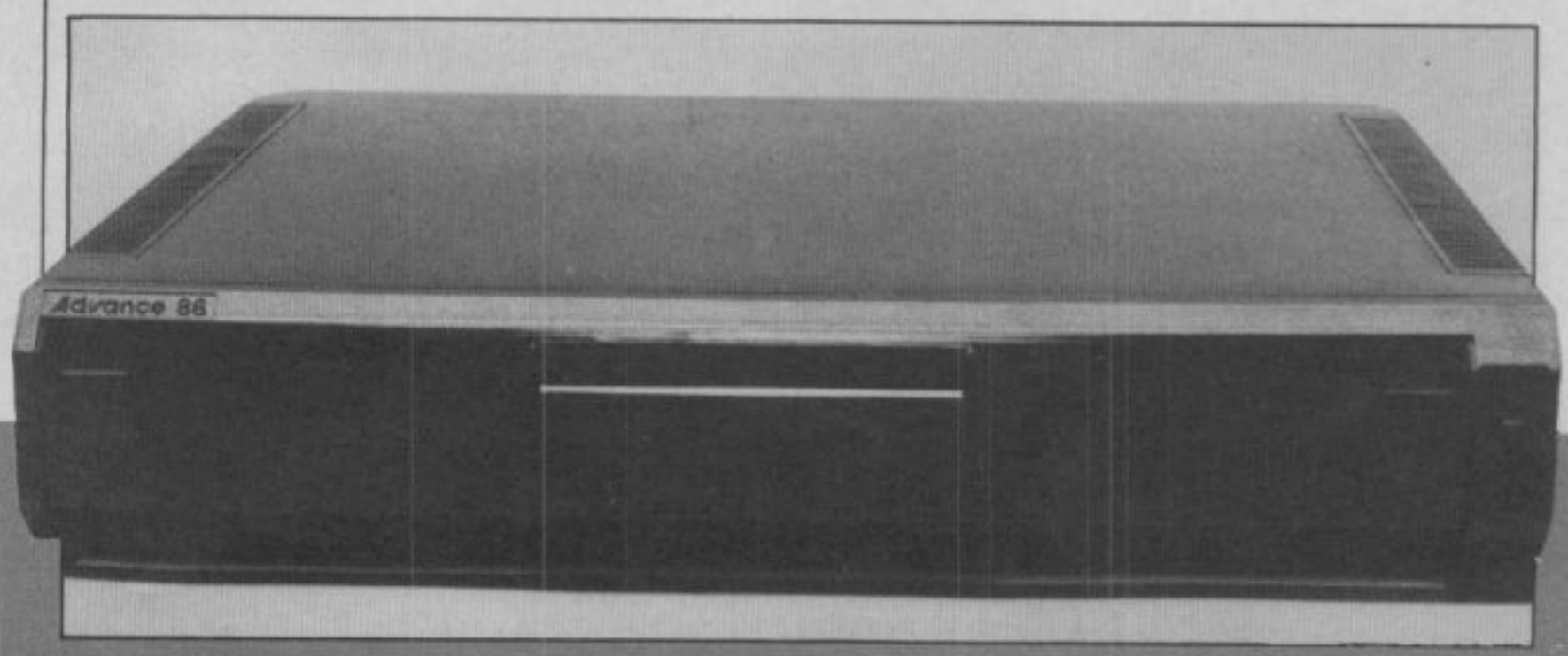
The Advance 86 is a British micro manufactured by Ferranti. It is available in two models: the Model B which is an IBM compatible micro with built-in disk drives, and the Model A which is the subject of this review. Since the Advance 86 Model A is classed by its manufacturers as a home computer, I will be comparing it with other micros in its price range.

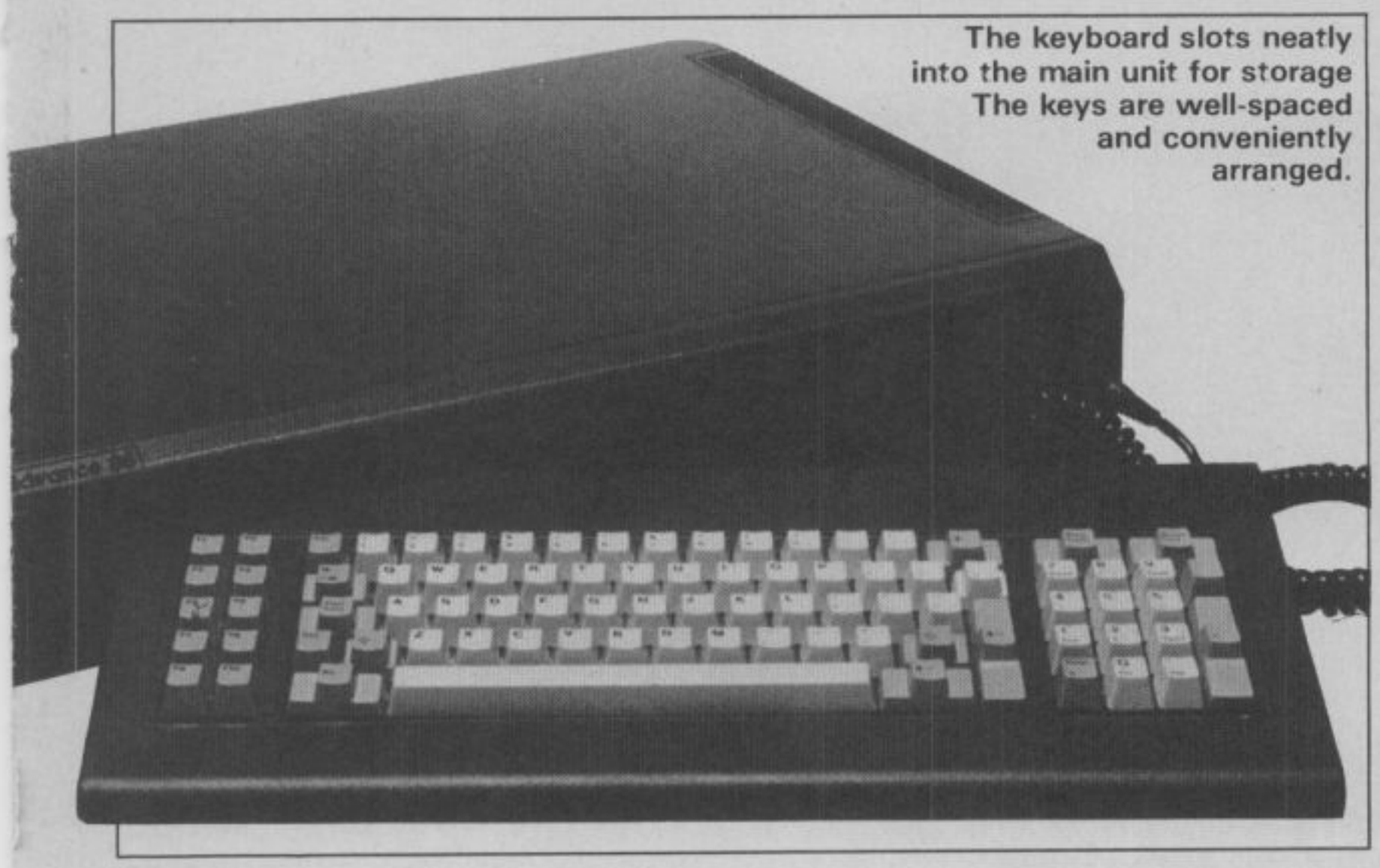
Price and packaging

The price of the Advance 86A is 'less than £350*' according to the advertisements. The asterisk leads you to a small note stating 'EX VAT', so £350 soon becomes a rather more expensive £400 for all but the rarest home computer purchaser.

For this money you get a large box about 50cm wide by 40cm deep. This is large for a modern computer but the box is sturdily built to support the weight of a TV set or monitor on its top surface, so in terms of room taken up by the 'system' it is quite acceptable. There is a pull down flap at the front of the box, into which the keyboard may be inserted and stored when not in use, a neat way of keeping the keys free from dust and grime. The keyboard connects to the main unit via a spiral cable. This means that you can sit the keyboard on your lap up to a metre away from the main unit. When using the family TV as your VDU this is distinctly advantageous.

The complete unit is sleekly designed and takes up little space for storage. A T.V. set or monitor can be placed on the top surface.





The keyboard slots neatly into the main unit for storage The keys are well-spaced and conveniently arranged.

Keyboard

The keyboard has 84 keys including the position keys and a numeric keypad. The function keys are situated at the left side of the keyboard which is unusual but not inconvenient.

There is a positive feel to the keys but it is a little noisy in use. Also some of the keys need a very definite punch to connect which makes touch typing slightly difficult. The keyboard can be tilted to the optimum angle for the typist.

Internally

Inside the computer is 128K of RAM and an extra 16K for screen memory. Connections with the outside world include a standard RV socket, a composite video interface, a light pen and joystick port and a cassette interface which can connect to a standard cassette unit. There is a power in socket and of particular use, a power out socket so that you can run another device from the computer. The computer also comes with a User's guide covering both models.

Power up

When you switch on the Advance, the screen clears while the computer performs a self-test. Then a message appears telling you that 62K of memory is available. The full 128K is not available from BASIC, but no further memory is lost for the video display.

These figures compare favourably with other micros. The Commodore 64 offers 64K, but gives 38K when switched on and takes another 8K for a high-resolution screen; the BBC Micro offers 32K, giving 29K when switched on and takes another 20K for the hi-res screen; the Atari 800XL offers 48K and ends up with 30K in the hi-res mode.

The display itself consists of 26 lines with a single line at the bottom to show the status of the first five function keys. This line remains on screen but the other 24 lines scroll in the usual way. The bottom line can be programmed to display any message but it will never scroll. The picture is subject to some judder when scrolling and looks slightly squashed vertically. This is due to differences in UK and US output standards and the US standard has been used. The characters themselves are well formed and easy to read.

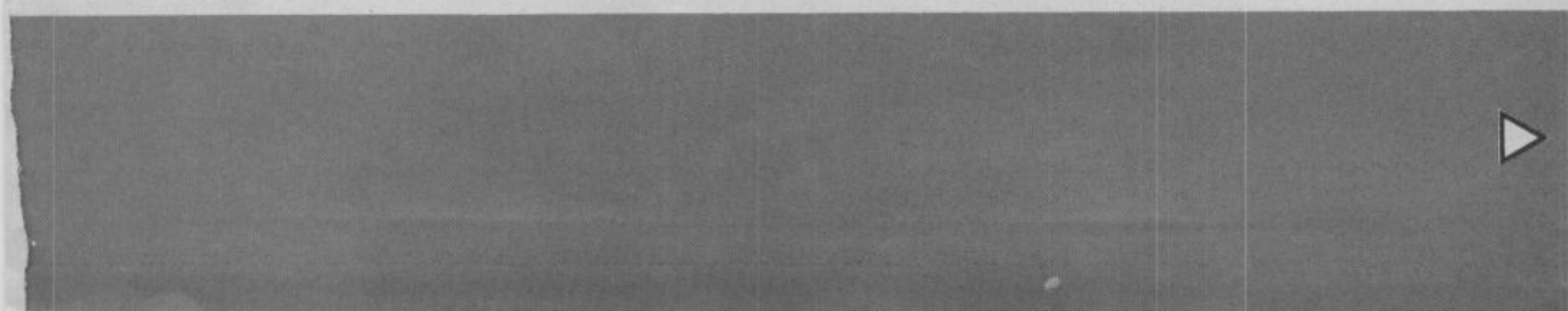
Colour screen

The screen can be used in several modes. The power up mode is 24 lines by 40 characters and is perfectly legible. By using the width 80 command this can be converted to 24 lines of 80 characters. However, in this mode the text is not readable on an ordinary TV and legibility on a monitor could be better. There are also two graphic screen modes. The first offers 320 × 200 pixels in four colours taken from one of two preset palettes; the second offers 640 × 200 pixels in black and white. Text can be put onto the graphics screen without too much trouble.

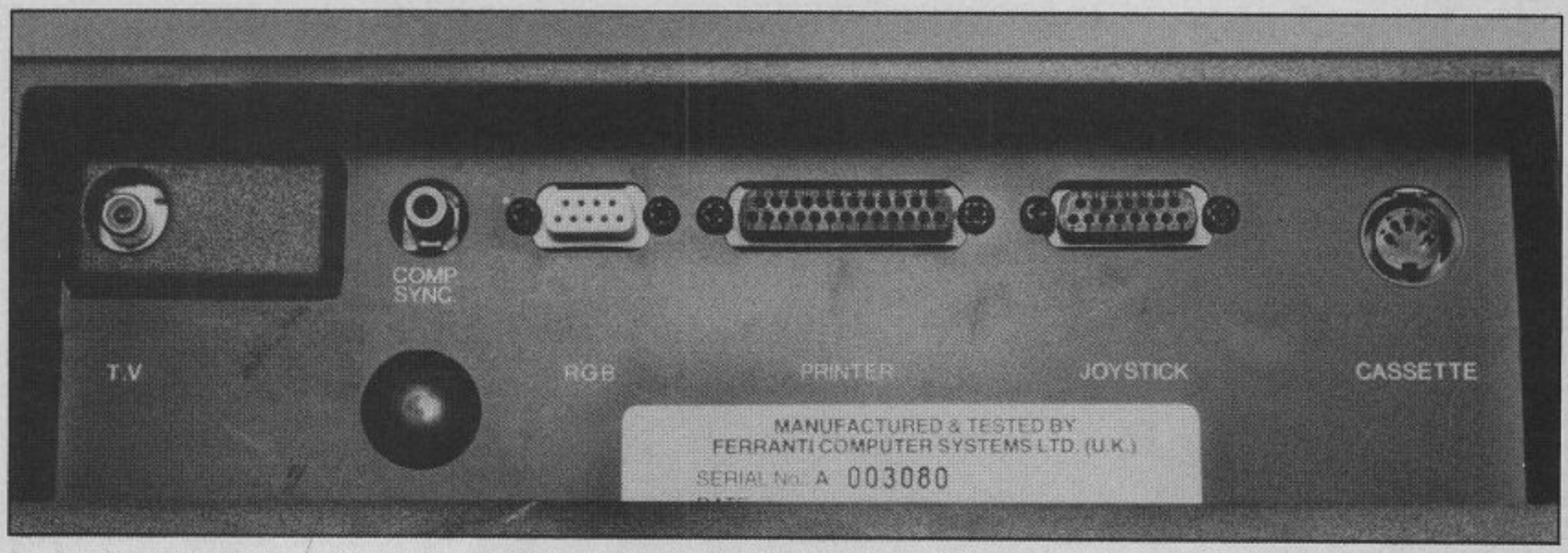
One advantage of the Advance is that screen memory does not take up any of the RAM, as it is already allocated. Also, as the text modes do not use up anything like the allotted area, provision has been made for the storage of multiple pages. The Advance compares well on display with all comparable micros, although the limitation of palette is a black mark.

Sound

The Advance is at its weakest here. Only one voice is available compared to the BBC and Atari's four, and three on the Commodore 64. Also, there is very little control over either volume or shape of sound. All of the other machines mentioned have much more sophisticated sound generators. The reason for the poor sound is to achieve compatibility with the IBM PC. In the Model B this compatibility is important but in the Model A it is merely restrictive. The sound is produced through a speaker inside



Advance Attack



Rear view of unit showing ports. Note the BBC style analogue joystick port and the RS232 printer connection.

the main body of the computer.

BASIC and documentation

The Advance 86 BASIC inbuilt in the micro, is an adequate application of the language. Sufficient extra commands are included to ensure that the sound and graphics capabilities of the micro can be used to the full with the minimum of fuss. This compares well with other micros, especially the Commodore 64 which needs more POKEs than an old fire to produce any effect!

The BASIC interpreter is rather quirky in that it needs spaces after keywords, even when the keywords are followed by numbers. Provision is made for integer numbers between −32765 and +32767, single precision numbers of eight digit accuracy and double provision numbers of sixteen digit accuracy. Strings can be up to 255 characters in length and can be dimensional.

The BASIC interpreter has a peculiar habit of converting numbers after entry. This can actually cause some interesting problems where certain numbers are uncontrollable! However, the effect on accuracy is very slight and in most circumstances will not matter.

The interpreter contains the usual functions and commands plus a list of useful extras such as ERASE to delete arrays, and OPTION BASE to change the first array position from zero to one. Overall the BASIC compares well with other micros' versions.

The manual, however, is a disappointment. From this the beginner will not get a very clear idea of how to use the machine to its fullest. The BASIC part of the manual is just over 70 pages long and is not very clear. There is plenty of scope here for independently written books on how to use the machine. To be fair, only the BBC has a good manual.

Expansion

As mentioned, the Advance comes with all the necessary ports to talk to the outside world. There is also room for the addition of another box which fits on top of the main box and converts it into a Model B. This contains two double density disk drives and converts the Advance into an IBM compatible computer, one of the cheapest available. This box costs an extra £1000, but includes a whole bundle of software which is sufficient to run a small business system.

In expansion capability the Advance has the edge over the opposition, mainly because IBM compatibility is such a good selling point. In cost it is behind the others, but not significantly.

Conclusions

The Advance 86 Model A is a strange machine, full of potential but in itself not very interesting. As a home computer in its own right it is somewhat expensive for what it offers. However, its big brother, the Model B, is a shining light on the micro scene. Perhaps the greatest advantage of the Model A is that it can become a Model B with little effort and some extra cash.

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Colour palette	xxx	xxx	xxxx	xxx
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Sound effects	x	xxxx	xxx	xxxx
BASIC interpreter	xxx	xxxx	xxx	xx
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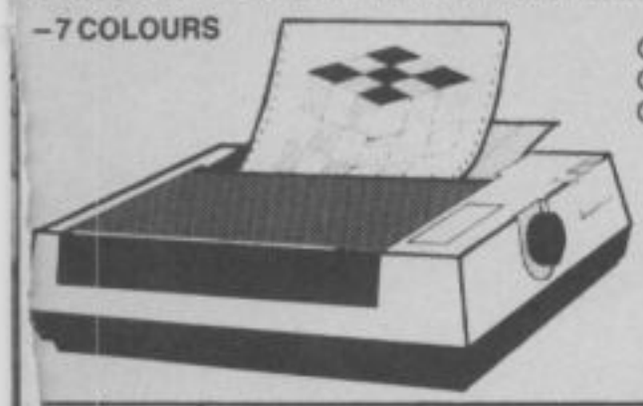
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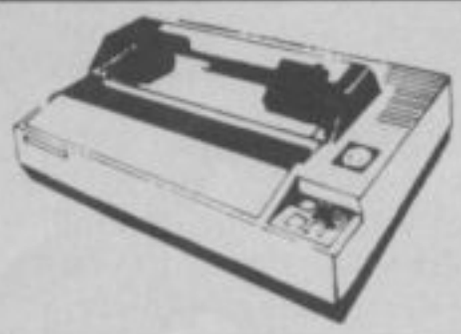
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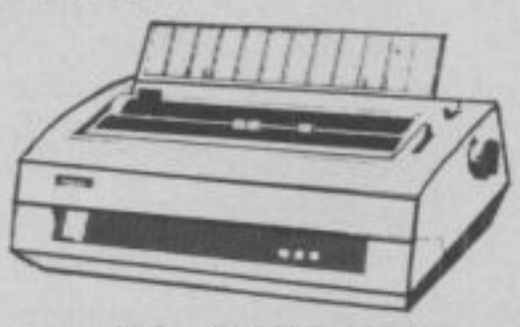
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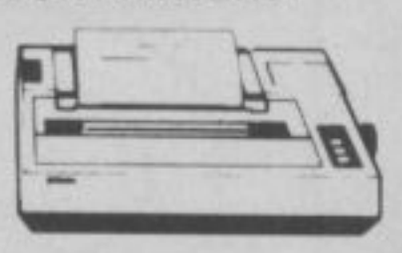
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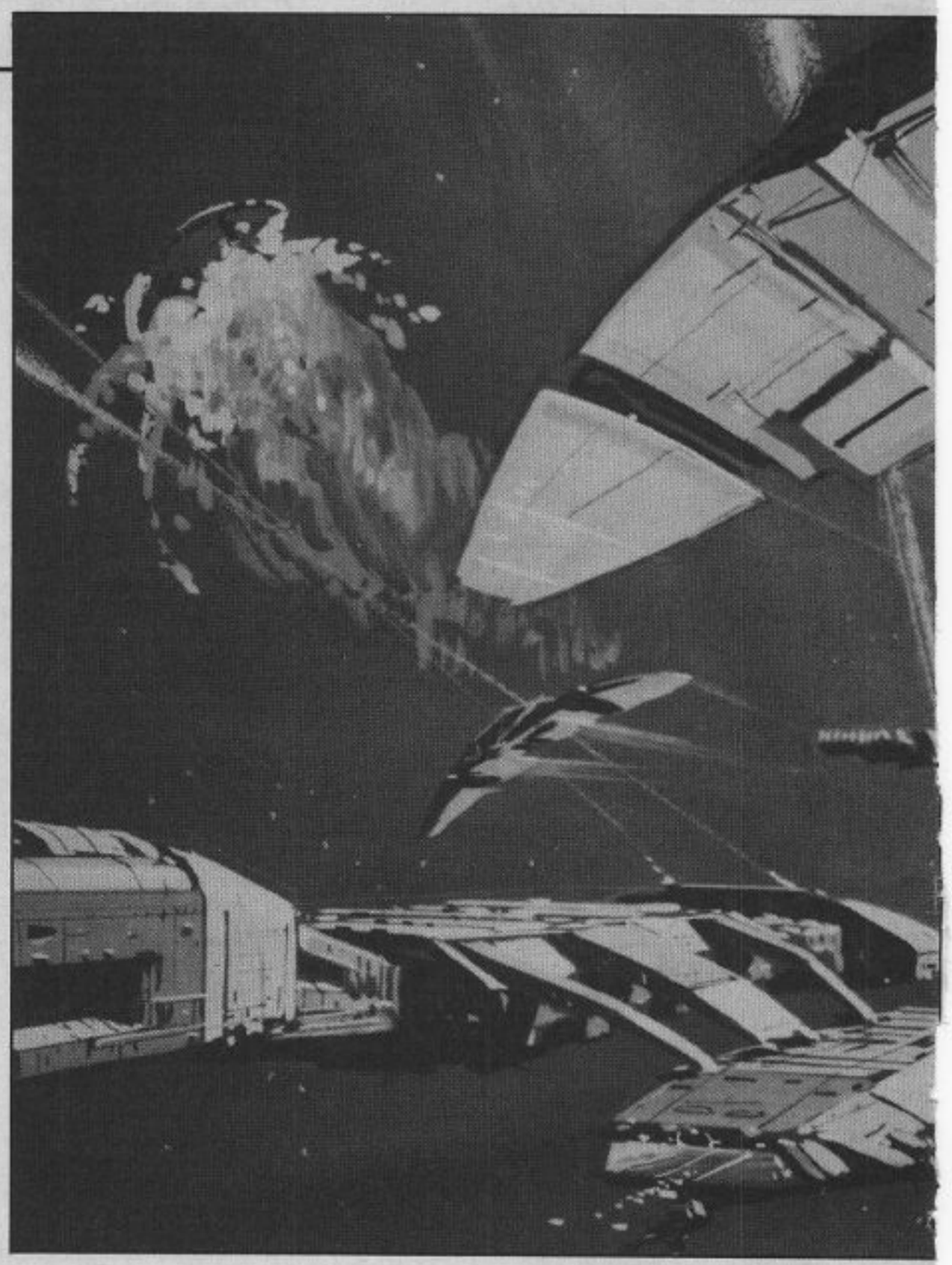
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Alien Fallout

As the sole defender of the planet Xogon your task is to save your people from obliteration by hideous green monsters. Are you up to the task? Program by Shingo Sugiura.



You are the last of the warriors of the planet Xogon. All comrades have been destroyed during previous attacks by the hideous creepy green monsters from outer space. They suddenly appear in the sky and slowly descend towards your planet to ultimately conquer it. How long can you hold them off? The few survivors that remain depend on you!

When you run this program, a new font will be created. This process takes a couple of seconds after which a brief set of instructions will be printed on the screen. When you press the space bar, the game will begin. Aliens will appear at the top part of the screen and will then start to descend. You control your little ship at the bottom of the screen left and right by pressing the left and right shift keys respectively. To fire press CTRL. You cannot fire a missile while there is one on the screen so you must aim carefully. One mis-aimed shot can leave you helplessly watching the creepy weirdoes getting ever closer to your home planet. When you manage to blast all the aliens out of the sky (i.e. screen), they will return with another squadron until finally, you bite the dust. However, if you have zapped enough aliens, you will be asked to input your name in the hall of fame for posterity.

ORIC 48K

how it runs

Line	Effect
10-20	REM statements.
40	Select text mode and set HIMEM
50	Defines DIM's.
60	Calls a subroutine which redefines characters.
70	Calls a subroutine which prints the instructions.
80-120	Main-loop.
160	Beginning of game itself.
170	Calls a subroutine which initialises variables.
180	Calls a subroutine which sets up the screen before a game.
190-240	Play until you are dead or you have cleared a screen.
250	If you have cleared a screen, increment wave counter. If you are dead, explode.
260	End of loop.
270	End of game subroutine.
300	Rubs out the old image of alien.
310	Updates position of alien.
320	Checks whether it has landed.
330	Plots alien at the new position.
340	End of alien moving subroutine.
370	Erases old image of missile.
380	Updates position of missile.
390	Checks whether it has hit anything.
400	Checks whether it has reached the top of the screen.
410	Plots missile in its new position.
420	End of missile moving subroutine.
450	Peek location 521.
460	Updates position of base.
470	Checks if the CTRL key has been pressed and whether a missile is on the screen.
480	Prints the base in its new position.
490	End of base moving routine.
520-540	Initialise variables for missile. This routine is called when the CTRL key is pressed.
570-630	Hit an alien.
660-690	The aliens have landed.
720-790	Zapped all the aliens on the screen.
830-860	A subroutine to initialise various variables at the beginning of a game.
990	Beginning of Hall of Fame subroutine.
1000	Calls a subroutine which updates the scores.
1010-1060	Print the table of scores.
1070-1080	Wait for the space bar to be pressed.
1110	Beginning of subroutine which updates the scores (this is called from within the Hall of Fame subroutine).
1120	Checks whether your score is lower than the lowest score in the score table.
1130-1330	Input name.
1340	End of this subroutine.
1360	Beginning of subroutine to print the instructions.
1370	Gets rid of key-click and flashing cursor.
1380	Initialises parameter table.
1390	Gets rid of CAPS message at the top of the screen.
1400	Clears screen and sets foreground and background colours.
1410-1520	Print the instructions.
1530	Defines the base as ship string.
1540-1560	Initialise the table of scores and names.
1570	Waits until the space bar is pressed.
1580	End of this subroutine.
1610-1640	Redefine characters.
1660-1860	Data for the new characters.

hints on conversion

Because Oric BASIC is fairly standard (if such a thing is possible!) and I have tried to write it using modular programming techniques used in structured languages, you should not find it too difficult to convert this program to run on other machines. You might have to adjust the speed of the converted program by inserting a delay loop as Oric BASIC is extremely slow (just slightly faster than Spectrum BASIC, in fact!).

The data for the characters cannot be used on other machines as Oric characters are 6x8.

In various places, this program uses boolean logic. Take into account that TRUE and FALSE in Oric BASIC have values of — 1 and 0 respectively. To aid readability and for cosmetic reasons, use lower case letters for variable names. For some chronic reason, the Oric only allows you to use upper case letters!

The good thing about Oric BASIC is that it has REPEAT UNTIL, but unfortunately, this feature is not implemented on many other micros so they must be replaced by a messy GOTO statement.

All the characters that are printed in the form CHR$(X) are control characters and can be ignored.

Alien Fallout

variables used

SC%	Current score.	A	The number of aliens to be moved.
DEAD	A boolean which indicates whether you're dead or not!	KILL	The number of aliens that have been zapped on the current screen.
XC%	X co-ordinate for the base.	AL(36)	An array holding the Y co-ordinates of the aliens.
WAVE	Counter for level.		
BX%,BY%	X and Y co-ordinates for the missile.	FAME(9)	An array holding the top eight scores.
BOMB	A boolean which indicates whether there's a bomb on the screen or not.	NA$(9)	An array holding the names of the top eight scorers.

program listing

```
10 REM Alien Fallout
20 REM By Shingo Sugiura
30 :
40 TEXT:HIMEM#97FF
50 DIM AL(36),FAME(9),NA$(9)
60 GOSUB1600:REM Redefine characters
70 GOSUB1370:REM Instructions
80 REPEAT
90 SC%=0:WAVE=1
100 GOSUB160:REM Game itself
110 GOSUB1000:REM Hall of Fame
120 UNTIL FALSE
130 END
140 :
150 REM Game itesl f
160 REPEAT
170 GOSUB820:REM Initialise
180 GOSUB890:REM Screen
190 REPEAT
200 A=A+1:IF A>36 THEN A=4
210 GOSUB450:REM Scan keys
220 IF BOMB THENGOSUB370:REM Move missile
230 IF AL(A)<>0 THENGOSUB300
240 UNTIL KILL>32 OR DEAD
250 IF DEAD THENGOSUB660ELSEGOSUB720
260 UNTIL DEAD
270 RETURN
280 :
290 REM Move alien
300 PLOTA,AL(A)," "
310 AL(A)=AL(A)+1
320 IF AL(A)>24 THEN DEAD=TRUE
330 PLOTA,AL(A),"<"
340 RETURN
350 :
360 REM Move missile
370 PLOTBX%,BY%," "
380 BY%=BY%-1
390 IF SCRN(BX%,BY%)<>32 THENGOSUB570:RETURN
400 IF BY%<3 THEN BOMB=FALSE:RETURN
410 PLOTBX%,BY%,"!"
420 RETURN
430 :
440 REM Scan keys
450 K=PEEK(521)
460 XC%=XC%+(K=164 AND XC%>3)-(K=167  AND XC%<36)
470 IF K=162 AND NOT BOMB THENGOSUB510
480 PLOTXC%,24,SHIP$
490 RETURN
500 :
510 REM Fire Missile
520 BX%=XC%+1:BY%=23
530 BOMB=TRUE
540 RETURN
550 :
560 REM A hit
570 ZAP:SC%=SC%+10:KILL=KILL+1
580 PLOTBX%,BY%,"*"
590 BOMB=FALSE
600 AL(BX%)=0
610 PLOT7,0,STR$(SC%)
620 PLOTBX%,BY%," "
630 RETURN
640 :
650 REM Landed
660 EXPLODE
670 PAPER7:WAIT10:PAPER0
680 WAIT200
690 RETURN
700 :
710 REM Zapped all aliens
720 PLAY7,0,0,0
730 FOR A=12 TO 0 STEP-1
740 MUSIC1,4,1,A:MUSIC2,4,5,A:MUSIC3,4,8,A
750 WAIT12
760 NEXT A
770 PLOT13,10,CHR$(5)+"WAVE"+STR$(WAE)+CHR$(5)+"CLEARED"
780 WAIT200
790 WAVE=WAVE+1
800 RETURN
810 :
820 REM Initialise
830 INK2:A=4
840 XC%=20:KILL=0
850 DEAD=FALSE:BOMB=FALSE
860 RETURN
870 :
880 REM Set up screen
890 CLS
900 PLOT0,25,19
910 PRINTCHR$(131)"SCORE";CHR$(130);SC%;
920 PRINTSPC(15);CHR$(131);"WAVE";CHR$(130);WAVE
930 FOR A=4 TO 36
940 AL(A)=RND(1)*WAVE*2+WAVE*3
950 PLOTA,AL(A),"<"
960 NEXT
970 RETURN
980 :
990 REM Hall of Fame
1000 CLS:GOSUB1120
1010 PRINT:PRINTSPC(5);CHR$(131);"ALIEN FALLOUT HALL OF FAME"
1020 FOR A=1 TO 8
1030 PLOT2,A*2+3,STR$(A)+".":PLOT8,A*2+3,STR$(FAME(A)):PLOT20,A*2+3,NA$(A)
1040 PLOT8,A*2+3,1
1050 NEXT A
1060 PLOT1,23,6:PLOT2,23,12
1070 PLOT4,23,"Press the SPACE BAR to replay."
1080 REPEAT:UNTIL KEY$=" "
1090 RETURN
1100 :
1110 REM Update Scores
jN$=""
1140 FOR A=8 TO 1 STEP-1
1150 IF SC%>FAME(A) THEN FAME(A+1)=FAME(A):F=A:NA$(A+1)=NA$(A)
1160 NEXT A
1170 FAME(F)=SC%
1180 REM Input name
1190 PLOT11,2,"CONGRATULATIONS"
1200 PLOT11,6,"YOUR GREAT SCORE"
1210 PLOT3,8,"QUALIFIES FOR THE HALL OF FAME"
1211 PLOT8,10,"PLEASE ENTER YOUR NAME"
1220 PLOT9,14,22:PLOT28,14,16
1230 PLOT9,15,22:PLOT28,15,16
1240 PLOT9,16,22:PLOT28,16,16
1250 INK1
1260 REPEAT
1270 GET A$
1280 CALL#FB0B
1290 IF ASC(A$)=127 AND LEN(N$)>=1 THEN N$=LEFT$(N$,LEN(N$)-1)
1300 IF ASC(A$)<>127 AND LEN(N$)<15 THEN N$=N$+A$
1310 IF LEN(N$)<15 THEN PLOT11,15,N$+" " ELSE PLOT11,15,N$
1320 UNTIL ASC(A$)=13
1330 NA$(F)=N$:CLS
1340 RETURN
1350 :
1360 REM Instructions
1370 POKE#26A,10
1380 POKE#2E0,0
1390 POKE#BBA3,0
1400 CLS:PAPER0:INK7
1410 PRINT:PRINTCHR$(131);SPC(10);"ALIEN FALLOUT"
1420 PRINT:PRINT:PRINTCHR$(130);SPC(8);"By Shingo S:giura"
1430 PRINT:PRINT"  You are the sole defender of planet"
1440 PRINT"Xogon. All the others have been"
1450 PRINT"destroyed in the previous attacks":PRINT
1460 PRINT"They attack in rows so shooting them"
1470 PRINT"It's a matter of shooting them all.."
1480 PRINT:PRINTSPC(10);"CONTROLS":PRINT
1490 PRINT"     LEFT SHIFT ... LEFT"
1500 PRINT"    RIGHT SHIFT ... RIGHT"
1510 PRINT"           CTRL ... FIRE":PRINT
1520 PRINTCHR$(134);CHR$(140);"Press the SPACE BAR to play."
1530 SHIP$=" = "
1540 FOR A=0 TO 8
1550 FAME(A)=120-A*10:NA$(A)="SHINGOSOFT"
1560 NEXT A
1570 REPEAT:UNTIL KEY$=" "
1580 RETURN
1590 :
1600 REM Redefine character set
1610 FOR A=46080+(ASC("0")*8) TO 46079+(ASC("Z")*8)
1620 READ B:POKE A,B
1630 NEXT A
1640 RETURN
1650 :
1660 DATA #1C,#32,#32,#32,#32,#32,#1C,#00,#0C,#1C,#0C,#0C,#0C,#0C,#0C,#00
1670 DATA #1C,#26,#06,#0C,#18,#30,#3E,#00,#1C,#26,#06,#0C,#06,#26,#1C,#00
1680 DATA #0C,#1C,#3C,#2C,#3E,#0C,#0C,#00,#3E,#30,#3C,#0E,#06,#26,#1C,#00
1690 DATA #1C,#32,#32,#30,#3C,#32,#32,#1C,#00,#3E,#06,#06,#0E,#1C,#38,#30,#00
1700 DATA #1C,#32,#32,#1C,#32,#32,#1C,#00,#1C,#26,#26,#1E,#06,#26,#1C,#00
1710 DATA #00,#00,#08,#00,#00,#08,#00,#00,#00,#00,#08,#00,#00,#08,#08,#10
1720 DATA #21,#12,#1E,#3F,#2D,#3F,#2D,#12,#00,#0C,#0C,#0C,#2D,#3F,#2D,#3F
1730 DATA #00,#00,#00,#38,#3C,#16,#3F,#00,#1C,#22,#04,#08,#08,#00,#08,#00
1740 DATA #22,#3E,#22,#3E,#22,#3E,#22,#3E,#1C,#32,#32,#3E,#32,#32,#32,#00
1750 DATA #3C,#32,#32,#3C,#32,#32,#3C,#00,#1C,#32,#30,#30,#30,#32,#1C,#00
1760 DATA #3C,#32,#32,#32,#32,#32,#3C,#00,#3E,#30,#30,#3C,#30,#30,#3E,#00
1770 DATA #3E,#30,#30,#3C,#30,#30,#30,#00,#1C,#32,#30,#30,#36,#32,#1C,#00
1780 DATA #32,#32,#32,#3E,#32,#32,#32,#00,#18,#18,#18,#18,#18,#18,#18,#00
1790 DATA #06,#06,#06,#06,#06,#26,#1C,#00,#32,#32,#36,#3C,#3E,#36,#32,#00
1800 DATA #30,#30,#30,#30,#30,#30,#3E,#00,#22,#36,#2A,#2A,#22,#22,#22,#00
1810 DATA #32,#32,#3A,#3E,#36,#32,#32,#00,#1C,#32,#32,#32,#32,#32,#1C,#00
1820 DATA #3C,#32,#32,#3C,#30,#30,#30,#00,#1C,#32,#32,#32,#32,#34,#1A,#00
1830 DATA #3C,#32,#32,#3C,#32,#32,#32,#00,#1C,#32,#30,#1C,#06,#26,#1C,#00
1840 DATA #3E,#18,#18,#18,#18,#18,#18,#00,#32,#32,#32,#32,#32,#32,#1C,#00
1850 DATA #32,#32,#32,#32,#32,#1C,#08,#00,#32,#32,#32,#32,#32,#3A,#14,#00
1860 DATA #22,#22,#14,#08,#14,#22,#22,#00,#32,#32,#32,#1C,#08,#08,#08,#00
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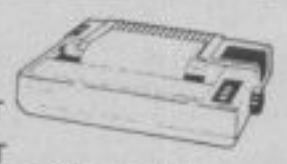
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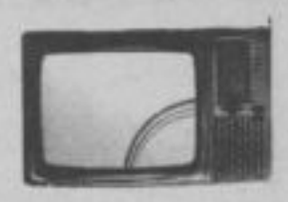


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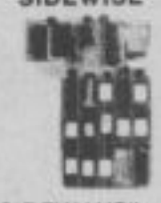
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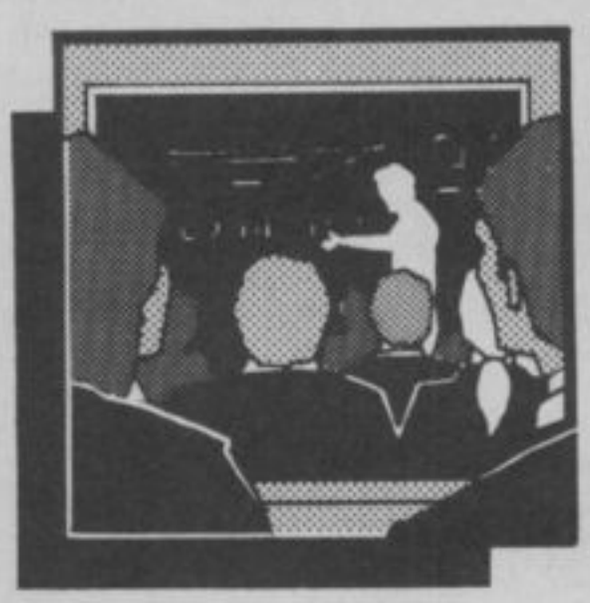
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Primary Selection

Software, software all around but not a tape to learn from. Brian Boyde-Shaw casts an experienced eye over the primary educational market and picks out the excellence.

While in the home microcomputers are an innovation, the latest in a long line of electronic gadgetry, in schools they have been an acceptable and desirable piece of equipment for some time. Until recently, however, they have been confined to secondary and a few upper junior and middle schools. The pioneers and innovators in these areas saw the micro as a tremendously efficient and extensive classroom aid to learning and pecked away at computer keyboards and stroyboards in order to design, trial and implement their experimental computer programs.

Birth of an era

The outcome of all this activity was the growth of various educational software companies, dealing with both infant/junior and secondary areas of schools' curricula. This article will deal with the former area. I am aware of several *serious* educational software producers and these are listed at the end of the article, together with the programs available, prices, versions and company addresses.

It takes only one spark to set the wheels, or in this case, tapes, turning. The catalyst in this instance is the Government of the day. This is not to say that without the Government's Micros in Primary Schools Project, we would not have seen the steady and gradual increase in the use of micros in primary schools. There are a number of pressures that I could mention, but the Department of Industry scheme seems to have been the one much needed impetus. The scheme ends later this year, when according to the Prime Minister, it is the Government's fervent hope that they will have funded the installation of at least one microcomputer in every primary school in the country. The micros covered by the scheme are the BBC Model B, 48K Spectrum and RML Link 480Z and as a consequence most of the educational software around today is for one of these micros, and is also one of the main reasons why educational software aimed solely at the home market concentrates on the BBC or the Spectrum, or both. I doubt if there are many RML's gracing the coffee tables of our nation's lounges.

Homework

Shiva Publishjing Ltd have brought out a series of introductory maths pro-

grams for five to eight years olds, based on Iris Hewitt's research at Leicester University. At £14.95 each, they are written for the BBC, though Commodore 64, Spectrum and Electron versions are promised. Many software producers acknowledge that the home market should not be ignored, which perhaps accounts for this promise. In addition Electrons are quite likely to be the extra computers purchased for schools when they feel the need to increase their stock.

Full documentation is supplied with Shiva's programs, with a promise of no more boring *repetitive exercises.* This leads me to think that perhaps one reason why Maths is such a poorly understood subject in schools and afterwards is these boring repetitive exercises. Then again, teachers must be to blame for that and in order to lift maths from the status of a 'boring' chore we didn't have to await the arrival of the school computer?

Ask and be taught

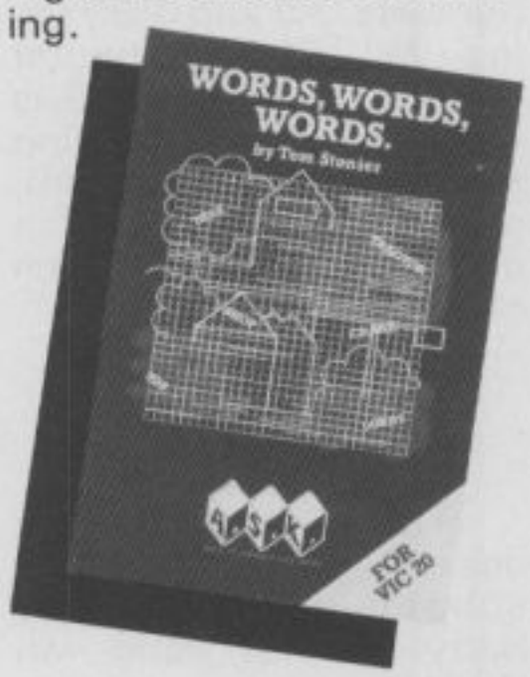
Another company which has spread its wings into the home market is Applied Systems Knowledge, or ASK for short. At the moment they have no less than ten programs for the BBC, with copies of some for the VIC20 and Dragon 32. The programs are all available on tape or disk.

The mentor at ASK is Tom Stonier, Professor of Science and Society at Bradford University, in association with Don Walton, a pioneer in educational software, and Dr. Michael Thorne, writer and broadcaster in educational technology. I have seen all the programs and have used some of them in an infant school project. I would wholeheartedly recommend them. They are entertaining and educational and well worth their initial cost. **Facemaker** allows the child to gradually build up any one of a million faces but due to the vocabulary used, is more suitable for upper infants and juniors. It could be ideal for a human biology project with a difference. In **Number Gulper** the child has to drive a gulper (or number eater) around a maze, eating numbers on its way, until the child's number is the same as the computer's, before the time runs out. The numbers all have operators attached, which can be chosen before the program starts.



Let's count is for three year olds upwards. It is a colourful graphs program that introduces numbers up to nine by using the concepts of matching, numerals and ordering, including less than, more than, and equality. **Number Puzzler** practices addition and subtraction by means of noughts and crosses. There are various levels of difficulty, the final one using the Magic Square concept.

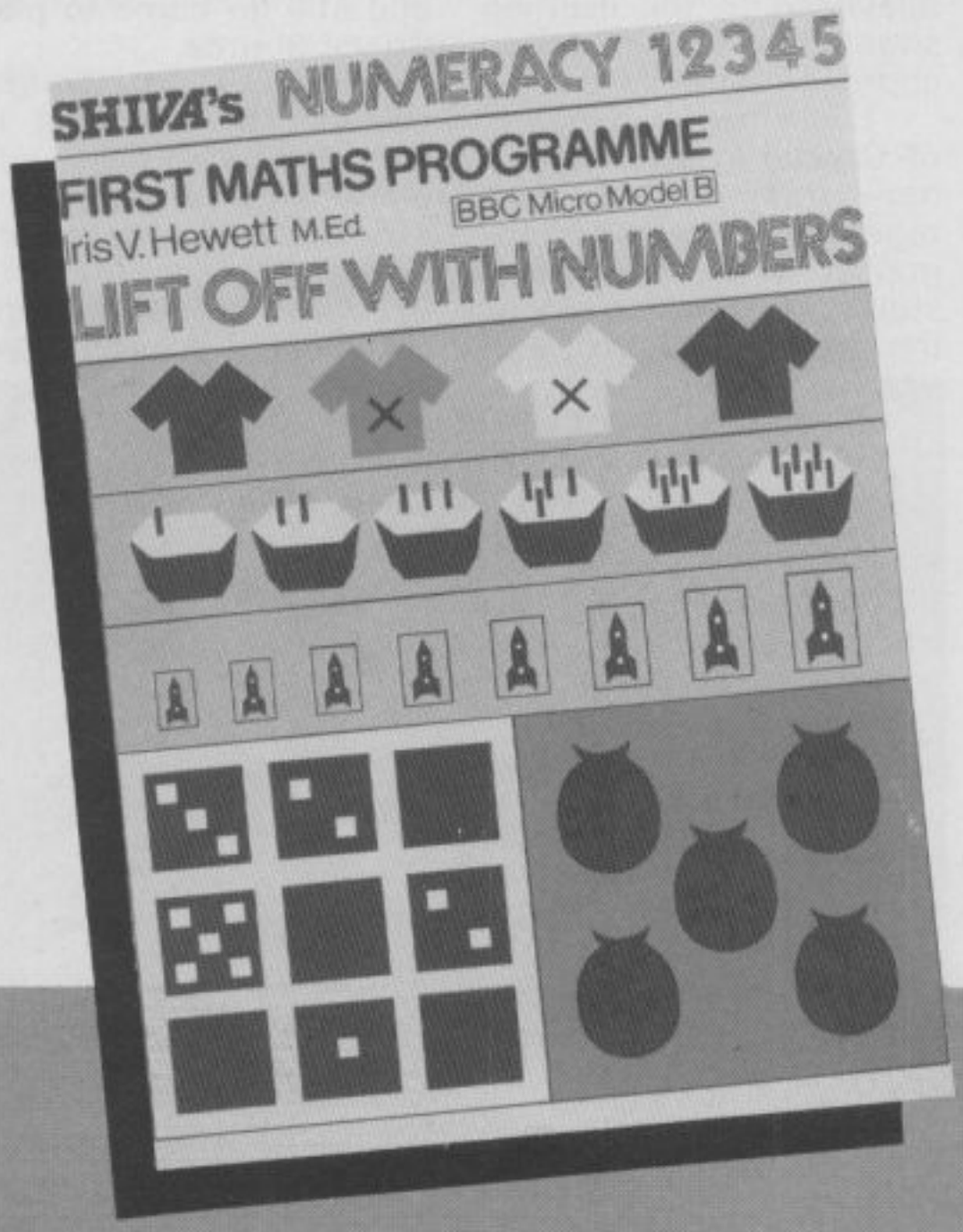
Number Chaser deals with estimation, while **Table Adventures** reinforces the tables through the use of factorisation, rather than straight multiplication. **Cranky** allows children to experiment with maths through the use of a faulty pocket calculator. The remaining two programs deal with language, **Words, Words, Words,** gives young children the chance to build their own stories on the screen and is the least exciting of the set. **Children From Space** practices tenses, word ordering and sentence structuring.



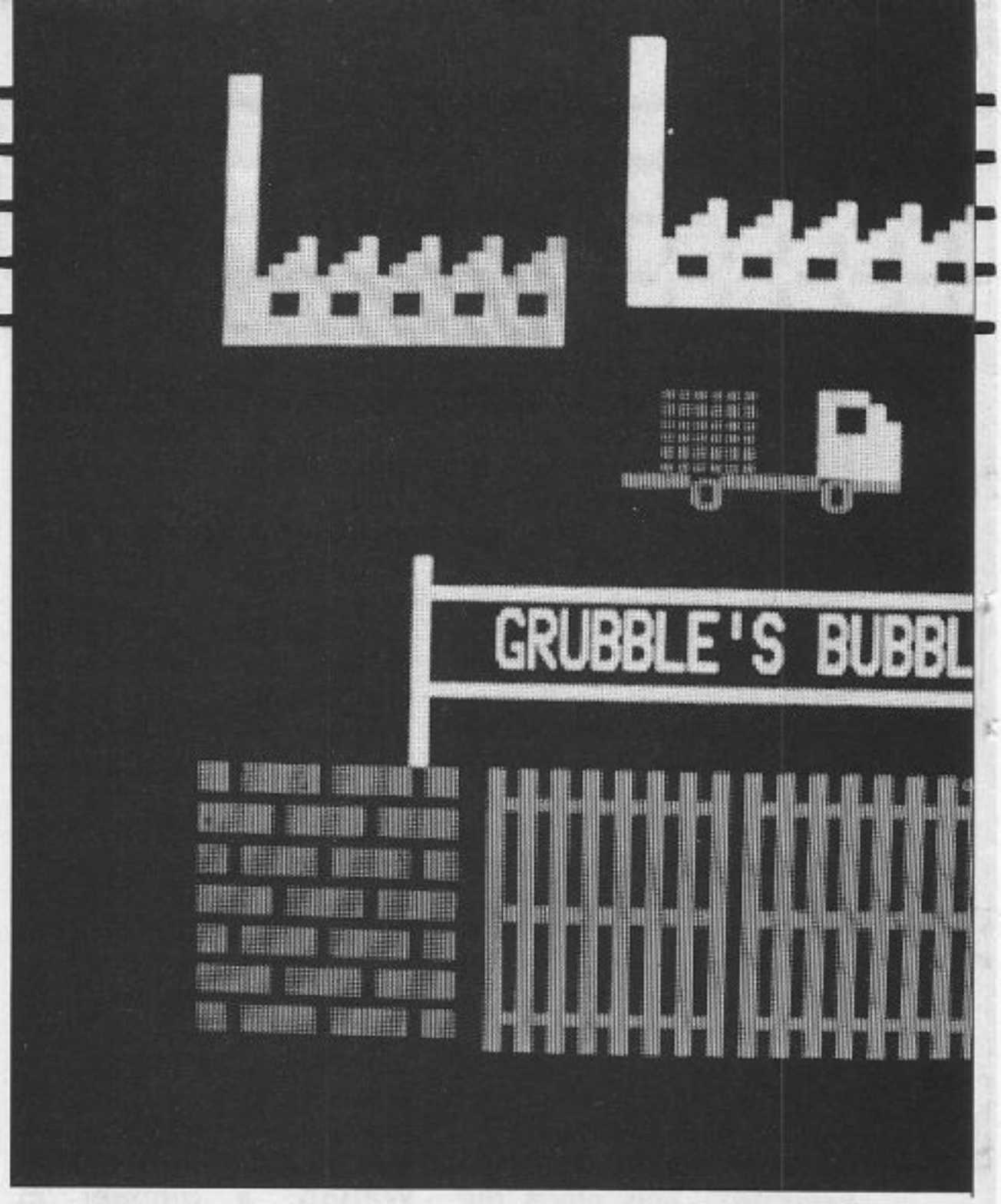
New phase of education

Publishers Ginn and Company have, according to Educational Computing, entered 'a new phase in the use of the micro in Primary Schools,' They have produced a range of programs for the BBC micro, 48K Spectrum, 480Z, 16K PET and Apple 2, under the general title of 'Simulations', which provide for group learning activities, involving, and I quote, ''problem solving discussion, teamwork, role play and interpreting and recording information, with creative writing and artwork, research and the use of resources playing an important part.''

Two important objectives of the programs are the need to make one computer available to as many children as possible and the need to provide teachers with the means to make the best possible educational use of ''this powerful new resource''.



Primary Selection



These have been achieved by ensuring maximum use of associated work of all kinds away from the computer.

In addition Ginn have produced two early maths programs for four to eight year olds dealing with numbers 0-9 and 0-99 using full BBC computer graphics. Finally there is **Shopkeeper**, a learning activity for all four computers. A full description of all the programs can be obtained from Ginn.

Informed authors

The programs were designed by two primary school headteachers, Barry Holmes, and Ian Whittington. Barry Holmes was also, until recently, chairman of MAPE (Micros and Primary Education). This group is now chaired by Ron Jones, and is the referral centre for primary educational computing. They put the use of computers as resource banks combined with other relevant resource material, high on the list of uses for the in-school microcomputer.

Pandora's Box

It is my opinion that the ideal uses for a computer in school are as stimulatory experiences, both from a simulation and problem solving point of view. Problems can be solved away from the computer using whatever associated reference materials are available, books, slides, audio tapes, music, conversation, discussion, or whatever comes to hand. And this, in my opinion, includes learning how to program the beast, not to specifically learn programming, but to use it more as means of logical problem solving.

MAPE also produce a worthwhile magazine called microscope, which should be subscribed to by all primary teachers, who consider themselves 'child based' as against 'teacher based', when it comes to the learning environment. They are also starting to produce 'MAPE Tapes', Microscope 'specials', in the form of a cassette of seven programs, all donated by MAPE members, representing a cross section of software for the primary area. The programs range from counting practice for infants, to a scientific approach to investigation for upper juniors. Available for both the BBC and the 480Z on one tape, and complete with a descriptive booklet, the seven programs do illustrate what members of the teaching profession and not professional programmers, are capable of when it comes to designing and programming their own ideas. Though I must admit most of them are not inexperienced!

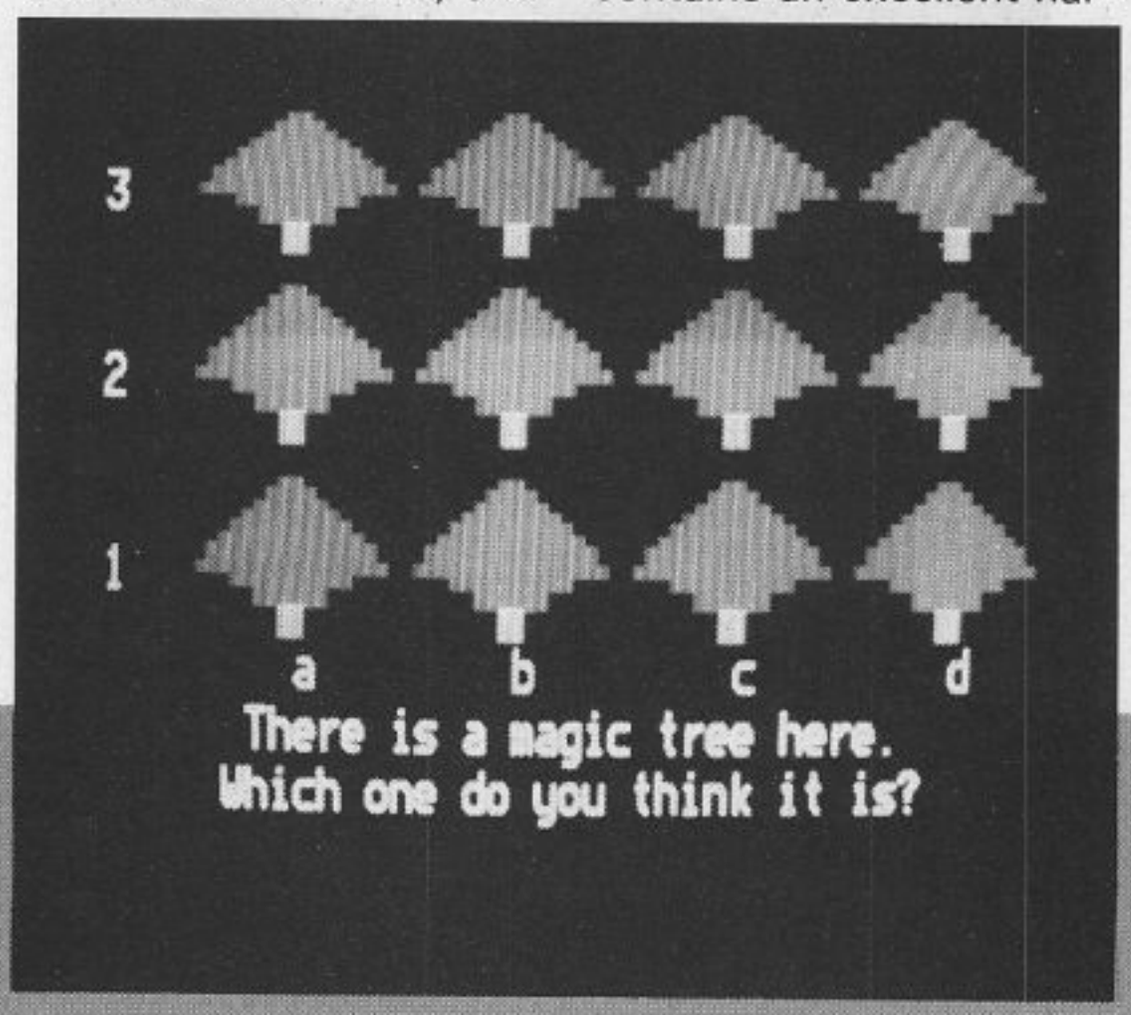
For juniors there are two simulation exercises, a game of Othello and a maths exercise which I feel could have been done just as well with a sheet of paper and a calculator. For infants MAPE produce rectangle and number matching programs, and a game of Mousey, Mousey that reinforces UP, DOWN, LEFT, and RIGHT.

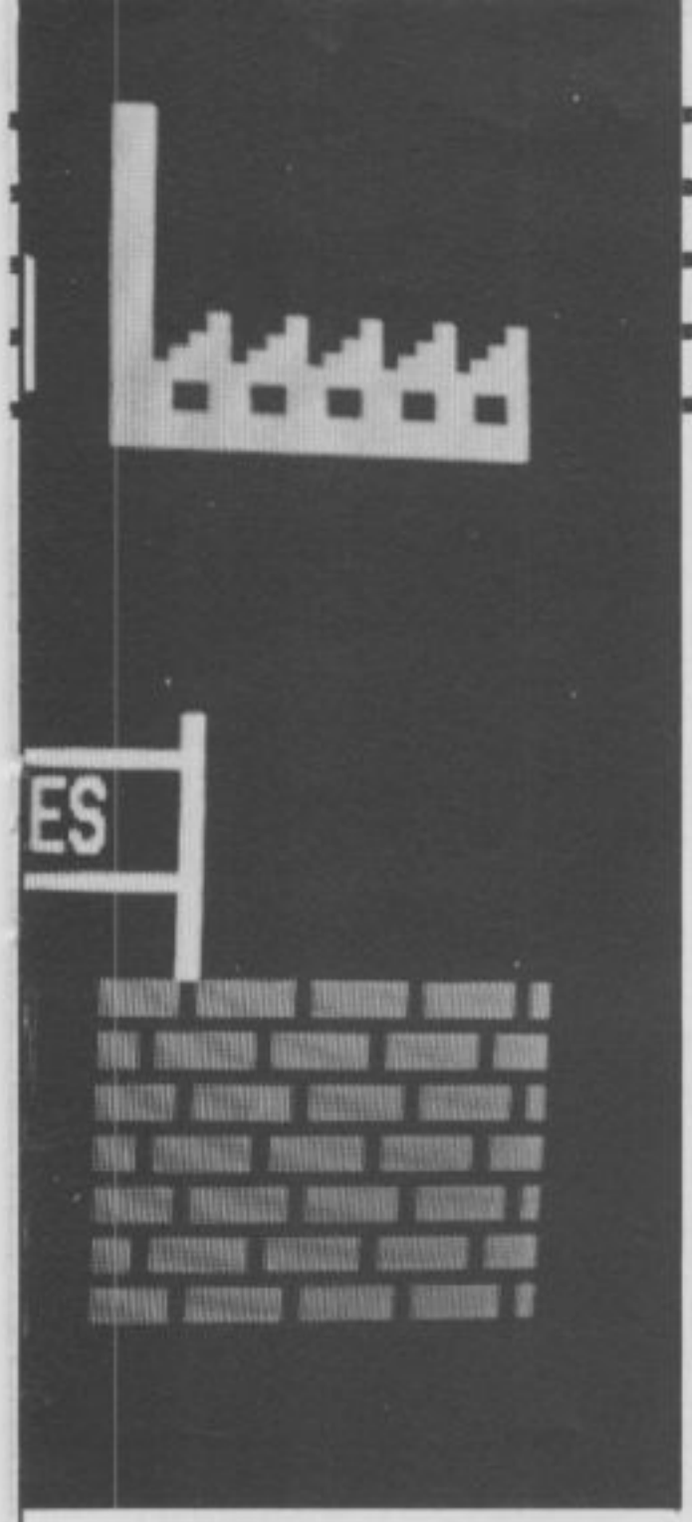
MATing software

Another pioneer in the simulation area is Mike Matson of 4MAT Educational Software whose latest creation, Flowers of Crystal, joins Granny's Garden and the Spacex adventure programs for the classroom. So far over 4000 copies of GG have been sold, which gives some indication of the relevance to the learning situation of the simulation approach for children.

I will review **Flowers of Crystal** in some depth here, as I feel that together with Ginn's programs, it forms a major step forward in the use of the micro in schools, and not only in the primary area. A chain reaction in chemistry, for example, is somewhat difficult for the average science teacher to stage, but simulated on a computer, pre and post-investigation by a class is! They could blow up the world many times a day, and still go home to play Space Shuttle.

Flowers of Crystal comes in a large illustrated board box, complete with two tapes, a story book, teachers notes and a map of Crystal. The first tape contains an excellent nar-





ration of the story by two radio broadcasters, complete with music and special effects. The second tape has four programs, a screen version of the story in double height text, one page at a time with overlap to aid continuity. A utility program that prints out all the necessary documentation, log, note sheet and Grubble's Gum Forest Grid, just in case you have a printer and if you haven't, copies are supplied with the package. The other two programs are the two part adventure, and quite an adventure it is. I gave up at 3am, but I was into the second part, and had not even attepted any of the associated work.

In the adventure you have newly arrived on the planet Crystal from Earth. Your mission, with the help of Super Jim, a kind of Crystal Redeemer, is to find the last remaining Crystal Flower previously hidden for posterity by an ancient Crysallian female Guru called Rumala. Crystal is in a bad way due to the machinations of a certain Mr Grubble, a large fat man whose sole concern is to make money. In the usual 4MAT fashion, finding that illusive flower is not easy, but it is logical and with a suitably kept log etc, children will eventually complete their task.

This, however, is not the main objective. The package is a colourful, musical, well written, well produced, computerised stimulus to discussion and resource investigation for children, that with a motivated teacher or dedicated and resourceful parents, will provide tremendous opportunity for enquiring children to experience the art of logical problem solving. Life is an adventure, a continuing experience, some children have more opportunites for investigation than others with books, music, pictures, conversation and constructive argument available at home. This program, and others like it, provide a central core of experience for all children, but it's up to the teacher or parent to provide the right conditions! If you can only afford two tapes, then it's this one and Number Rally.

Databases

Children having amassed oceans of information during a simulation exercise may have difficulty in keeping it all together, and it is here that another use of the primary micro arises, the Database. **Factfile**, an interactive primary school database program from Cambridge Micro Software, aims to introduce the micro as an information store and to stimulate children's imagination and improve the organisation of their thinking and research. This is achieved by using a 'content free' database which permits the accumulation of increasingly complex information, so helping the children to pace themselves in choosing the sort of problem they set out to solve.

Factfile is available for the BBC, 480Z and the Spectrum, and comes complete with a teachers' handbook at £1.00. If a school buys their micro through the DOI scheme, one copy of Factfile comes free! Included in the package is a sample program on dinosaurs on a separate cassette, and an introductory program designed to make collecting, ordering and retrieving information easy, and can in fact be used by a full class to record set items of information about themselves — a kind of benevolent classroom 'Big Brother'. I highly recommend this package, and for a school with two reference computers, environmental studies using this program could take off like a shot.

Longman launch

Longman, in association with Tony Gray of Loughborough University of Technology, have entered the school micro market in two ways. Their Ladybird/Longman software covers maths and english with three programs each for juniors for the BBC. The maths programs come complete with teachers' notes and pupil cards. The **Basic Number** program offers practice in basic number skills, using the full variety of language related to this. Help A deals with addition and subtraction up to 10 and up to 20. Help B with hundreds, tens and units. Animated graphics, but not of the twenty one gun salute and Red Arrows fly past variety, are provided when help is required, either because of a wrong answer or on request.

However, if you can only afford one tape for number work, then I would advise **Rally A** and **Rally B** two programs in one package designed to improve the speed and accuracy of childrens' computation. The two programs simulate a car rally, where the children must visit various towns on a grid or matrix, obtaining fuel as they complete questions of graded difficulty, using the four rules of number. Quite excellent, and what I feel is a welcome bonus, it is also available for the home market, without the teachers notes or pupil cards, under the name of **Number Rally** at £9.95.

Also available from Longman, under the MEP, ITMA, Investigation on Teaching with Microcomputers as an Aid banner, is 'Micros in the primary classroom', available on disk for the 480Z, 380Z and BBC B only. The package consists of five modules, and is primarily



Primary Selecti



aimed at the classroom teacher, by way of an in-service course, though the material discussed in Module 2, 'The curriculum and the Micro', can be developed by the teacher with her children through the use of a number of programs also available on cassette. This associated software is also available separately complete with Teachers' Handbook and a free Testdrive program plus booklet, the aim of which is to illustrate the use of the programs in detail.

A 32 page book by Pamela Fiddy and David Wharry, written in 1982, is available at £2.25. This discusses the use of computers in primary schools, and could make for an interesting and absorbing evenings read, being a good introduction to the subject for interested newcomers.

In this article I have not covered even half of the material available for the primary area, but shall continue my guest next month. My advice is that if you think that a micro computer could influence the teaching strategies you employ, or feel that perhaps you ought to enquire further, then Join MAPE, read the back issues of Microscope, and load the MAPE tape into your school computer. If you're not a 'joiner', then contact me via the magazine, and I'll do my best to help you.

Primary Software Index Part One

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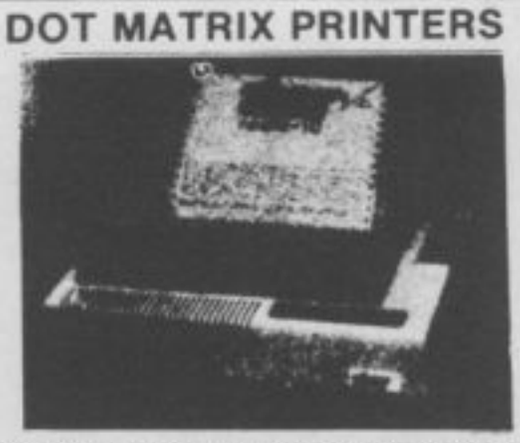
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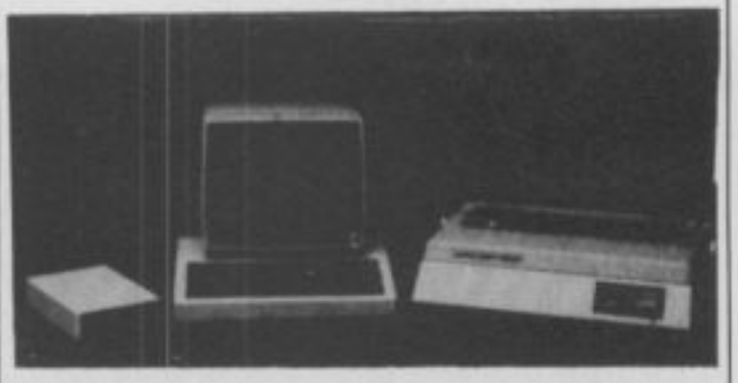
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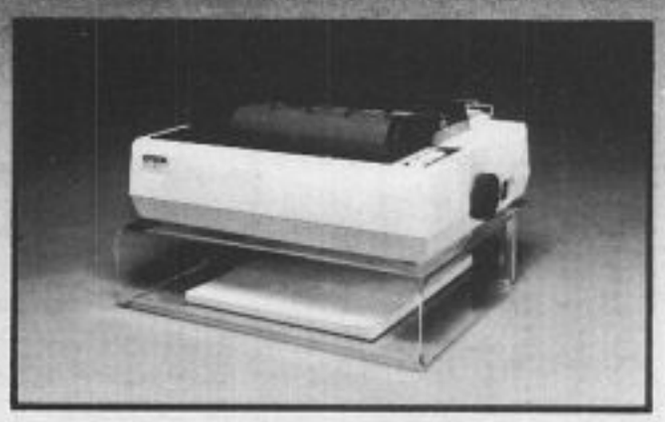
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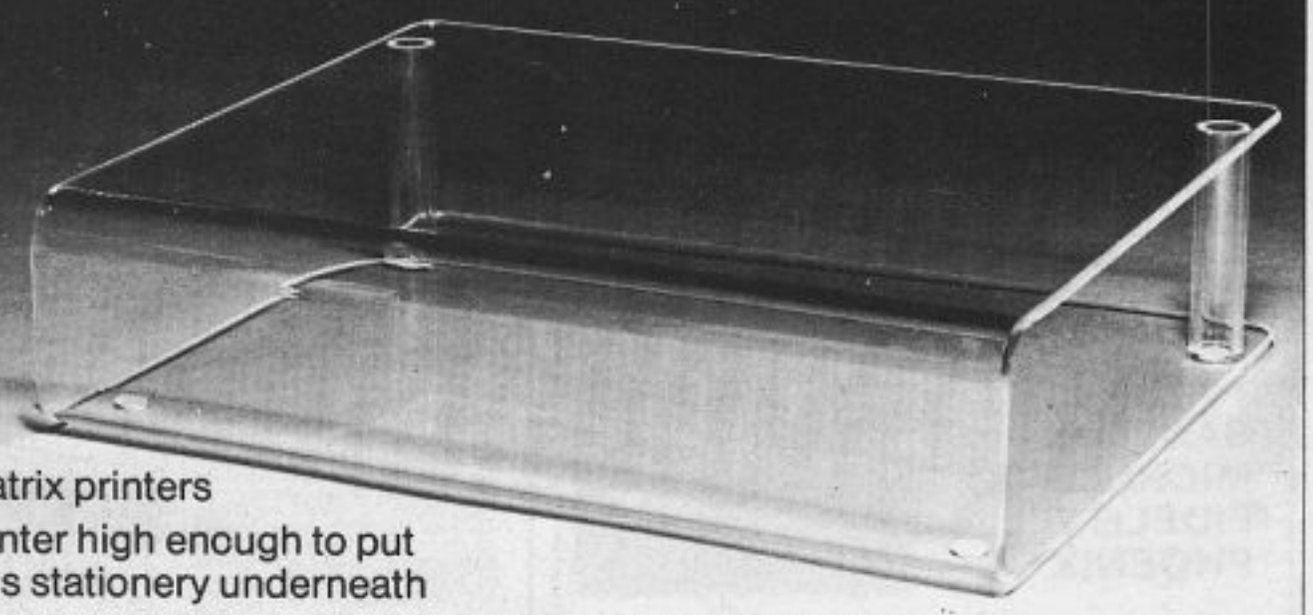
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Software Reviews

REVIEWS

Title:	**Stock Car**
Format:	**Tape**
Software House:	**Micropower, Northwood Hse, North St, Leeds LS7 2AA**
Price:	**£7.95**
Machine:	**BBC Model B**

"Stock Car" is the BBC version of the pub classic that was a hit just after Breakout but it has been improved out of all recognition by the use of multi-coloured characters, smooth and realistic animation and realistic sounds. For those unfamiliar with the game, let me explain. You control a stock car and must compete over a certain number of laps against other manic drivers. Simplicity itself, or is it?

In this version you have many options including one or two player, number of laps, choice of race tracks, variable skid, oil patches and the choice of four gears. Difficulty arises from the fact that the other cars tend to bump you off the track and oil patches send you whizzing off in totally wrong directions. As I said earlier, graphics, animation and sound are all excellent. A variety of nice touches such as sound on/off hall of fame etc. are of course available.

Although the concept of this game is simple, it is incredibly addictive and has just the right amount of frustration element (especially two player games). The slick presentation is well up to the very high standard of other Micropower games and the sheer addictiveness makes this game a must for all arcade game freaks. **S.S.**

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * * *
Ease of use	* * * *
Overall	95%

Title:	**Space Panic**
Format:	**Tape**
Software House:	**Solo S/W Ltd, 95B Blackpole Trading Estate West, Worcester WR38TJ**
Price:	**£7.95**
Machine:	**Sharp MZ700**

A good game with joystick option, which is an unusual feature of MZ700 software. The graphics are good and the game is guaranteed to cause frustration! This soon turns to determination, however — not to beat your latest score, but to get your own back on those beastly things which eat you from the head downwards (jelly babies' revenge??). After hours of playing I found it as entertaining as at the beginning.

An excellent game and super value. **RGC.**

STAR TABLE	
Screen display	* * * * *
Addictiveness	* * * * *
Ease of use	* * * *
Overall	95%

Software Reviews

Title: Red Meanies
Format: Tape
Software House: Salamander Software, 17 Norfolk Road, Brighton, Sussex, BN1 3AA
Price: £9.95

Machine: Dragon 32

In this game you play the part of a cheese shuffler and wander around an intergalactic maze eating red cheeses but occasionally some very smelly green cheese. Unfortunately for you, there are also five nasty red meanies in the maze who will eat you. But, when you eat a green cheese the smell given off changes them into blue loonies which you can eat!

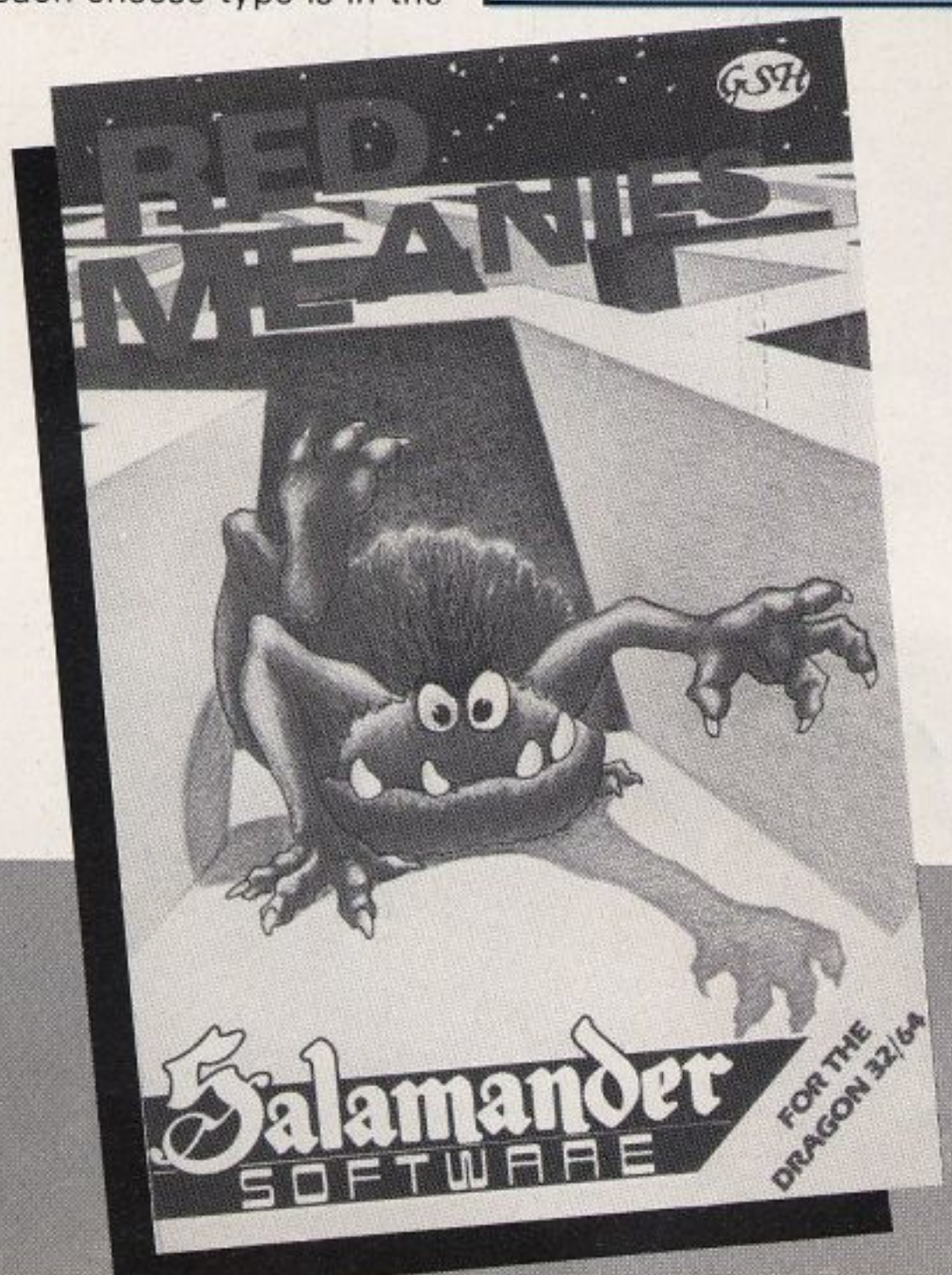
Luckily you have two new inventions with you the ''handy-dandy-super-intergalactic-cheese-detector-and-combination toothbrush'' and the ''Acme-digital-fingernail-clipper-and -red-meanie-counter''. The first one tells you how many of each cheese type is in the maze and the second tells you how many are blue loonies and how many are red meanies.

The display is 3-dimensional and is set up to give you the impression of walking down a hallway. However, the wafer thin walls spoil this effect. It also doesn't show any cheeses in the turnoffs or neighbouring passages which are visible.

Overall I thought it was a good game but it did not have the excitement of a 2-D Pac-man.

S.F.

STAR TABLE	
Screen display	★ ★ ★ ★
Addictiveness	★ ★
Ease of use	★ ★ ★
Overall	60%



Title: Glug Glug
Format: Tape
Software House: CRL, CRL House, 9 Kings Yard, Carpenters Road, London, E15 2HD
Price: £5.50

Machine: Spectrum 48K

This game is set below the sea, and follows a diver's attempts to recover three treasures from the sea bed. Several sea creatures attempt to prevent him from doing this and attack him. The diver is armed with a harpoon gun with which he can shoot the various nasties.

On later screens sharks appear who eat through the diver's oxygen pipe, piranahs who go straight for the diver, crabs which cannot be shot. Even more nasties await you on higher levels, and since there are 32 in all, this game will last a long time!

The graphics are good, as are the sound effects and the keys used are very sensible. Overall a very good game. S.J.M.

STAR TABLE	
Screen display	★ ★ ★ ★
Addictiveness	★ ★ ★ ★
Ease of use	★ ★ ★ ★ ★
Overall	85%

Title: Star Trucker
Format: Tape
Software House: Clever Clogs, APS, 1 Golden Square, London WIR 3AB
Price: £7.95

Machine: Spectrum 48K

Take control of the S.T. Jupiter, and become a Star Trucker with hyper-drive and force-field protection!

This program is beautifully written, and does what it tries to do very well. It is a general knowledge quiz linked to an inter-galactic trading game. You are presented with a commission to travel through hyper-space to trade with distant planets and come back with power Crystals. There is a secret 'parents page' so you can put in up to 100 questions each with up to 20 character answers.

I can imagine a teacher coding his or her own questions into this program and integrating it as a welcome part of a series of work for children in need of a little motivation or light relief.

Taken as a game for one player, it is entertaining and fun, in much the same way as is the adult game ''Trivial Pursuits''.

T.R.W.

STAR TABLE	
Screen display	★ ★ ★ ★
Educational value	★ ★ ★ ★
Ease of use	★ ★ ★ ★
Overall	80%

Title: Lionel and the Ladders
Format: Tape
Software House: Intrigue Software, Cranbrook Road, Tenterden, Kent, TN30 6UJ.
Price: £7.95

Machine: TI 99/4A with Extended BASIC



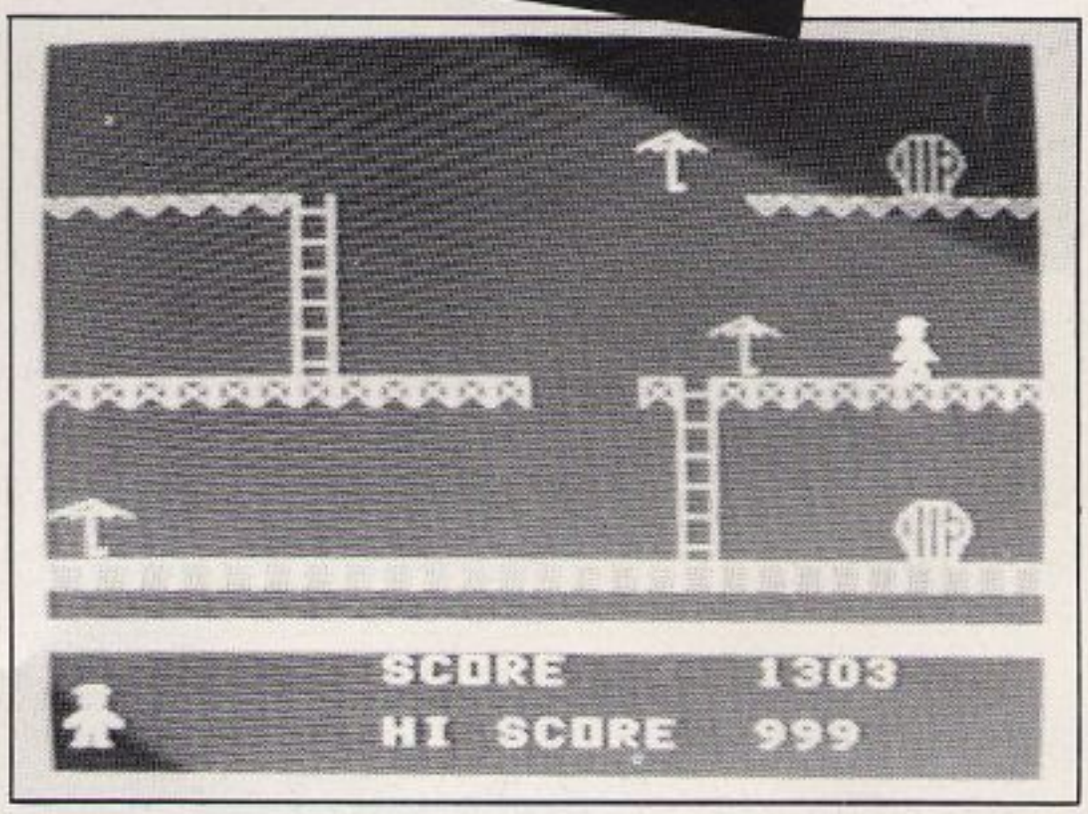
This software comes complete with a colouful inlay card and full instructions in its own smart wallet. The program itself combines action and adventure on a series of multiple screens.

Our hero, Lionel, wanders through a labyrinth searching for a captive princess. Using designated keys, or those of your own choice, he climbs ladders and jumps across holes in floors. By finding keys to unlock doors he ventures further into the depths of the labyrinth. Only when all the doors have been opened will he find his sweetheart.

The drawbacks? Well the princess is guarded of course — by the Sun of Mars, Shades of Wrath (someone's sense of humour showing here as these are umbrellas) and Death Stars. Avoiding these isn't easy as Lionel can only go up ladders and not down, so a decision has to be made on whether to beat a hasty retreat or make a daring jump over the pursuers.

On the whole, a good entertaining game which requires advance planning and quick reactions.

J.V.W.



STAR TABLE	
Screen display	* * * *
Addictiveness	* * * * *
Ease of use	* * * *
Overall	80%

Title: Draw 15
Format: Tape
Software House: Fowler Software, Hendon Mill, Nelson, Lancs
Price: £5.00

Machine: Spectrum 48k

This utility is designed to make drawing pictures easier. The user can draw part of screens on any paper, ink, bright or flash and put coloured borders around the picture.

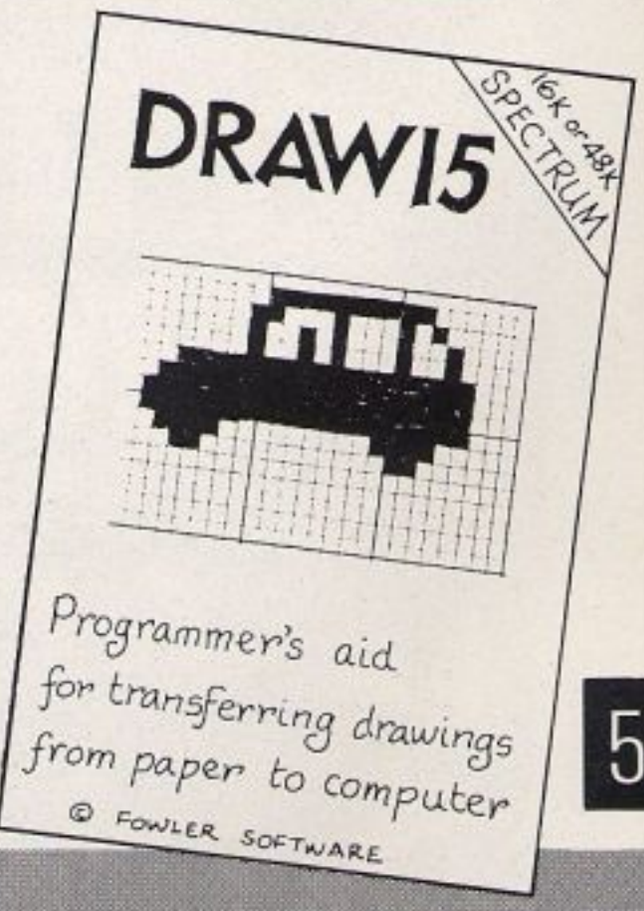
The catch is that only an eight by eight section can be defined at a time — no drawing of lines, arcs, and filling in shapes here! This restricts use a great deal.

The finished sections can be saved and loaded from tape, but first time users may experience problems with coping with inputting start and end addresses.

The documentation is very good, but the implementation is flawed by being restricted to defining eight by eight squares.

SJM

STAR TABLE	
Screen display	* * *
Usefulness	* *
Ease of use	* * *
Overall	50%



Software Reviews

Title:	**Look Sharp!**
Format:	**Tape**
Software House:	**Widget Software, Mirrorsoft, Holborn Circus, London EC1P 1DQ**
Price:	**£7.95**
Machine:	**48K Spectrum**

There are two programs using memory and observation. **Old MacDonald** (for ages 4-7 years) has four pictures. If you can remember which animal was displayed where, you will do well. The second game has a Spot the difference theme and is, called **Odd One Out. Snap** is for two young players — the first to respond to a pair wins.

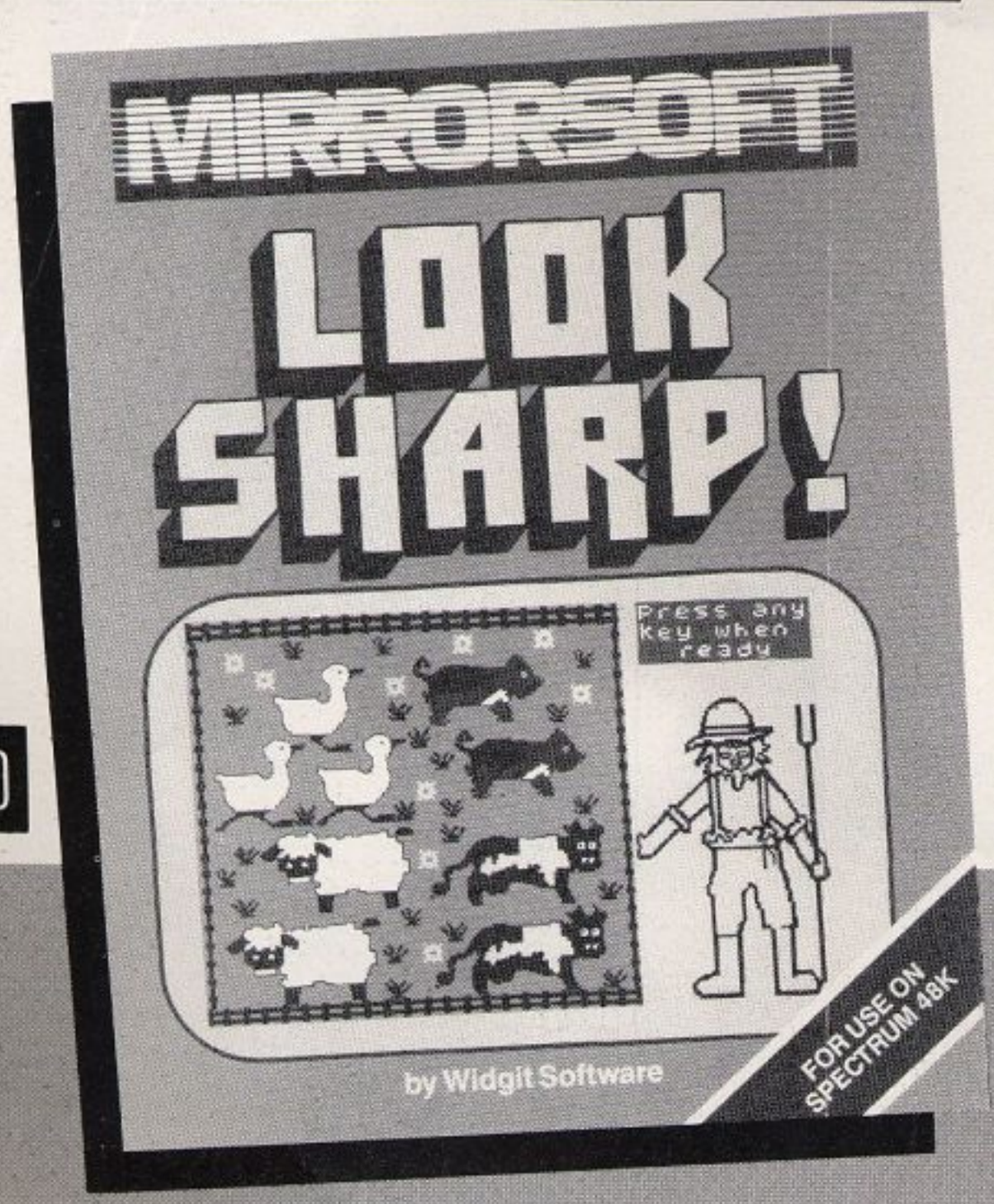
Space Observer Recruitment Test (ages 7 up) is also based on pictures but is much faster and more sophisticated. The odd one out is now one of six pictures of weird space creatures, rockets, and lunar landscapes. In the Kim's game you have to remember the order of nine unfamiliar pictures, as you are trained for your space mission. There is also a simple matching game.

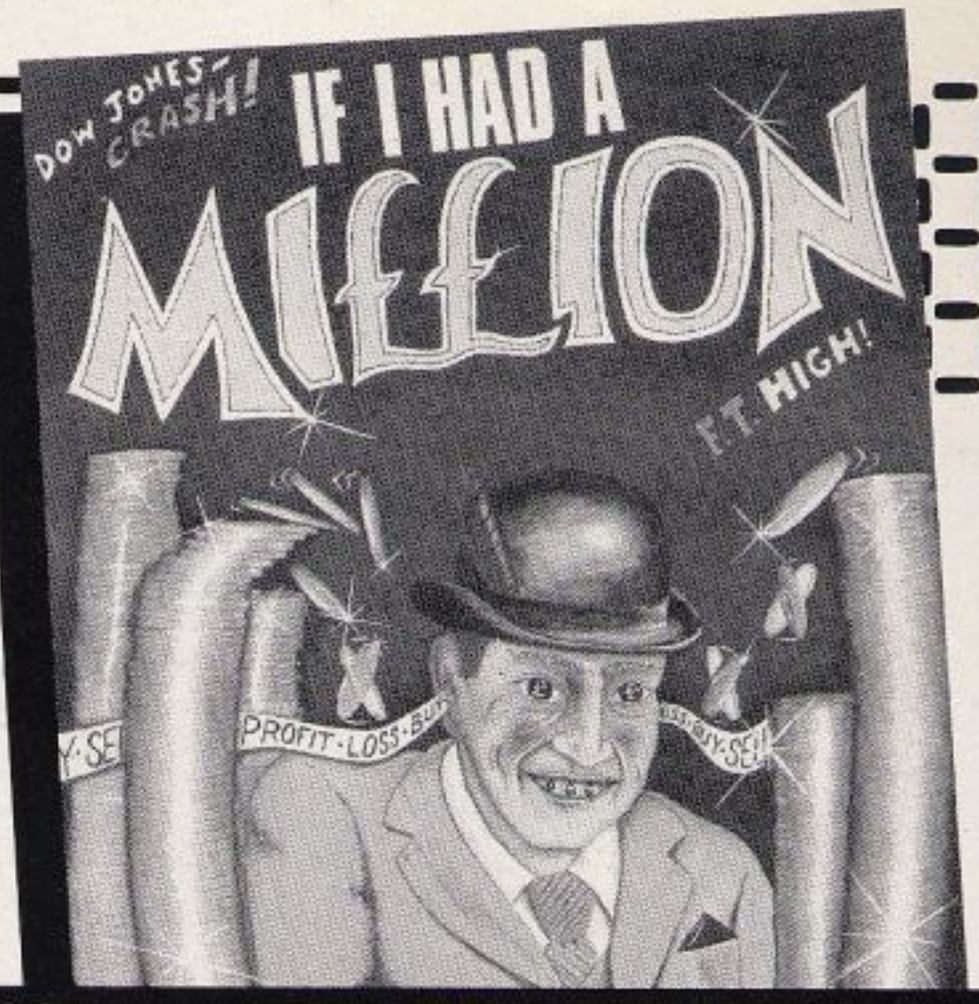
An exciting atmosphere and style are maintained with a ''computer'' type font like the numbers on your cheques, and a lively and clickety use of the BEEP command.

T.R.W.

STAR TABLE

Screen display	* * * *
Educational value	* * *
Ease of use	* * * *
Overall	75%





Title:	**If I Had A Million**
Format:	**Tape**
Software House:	**Phoenix Software, Spangles House, 116 Marsh Road, Pinner, Middlesex**
Price:	**£9.99**
Machine:	**Dragon 32**

This comes in two parts — a monopoly type game, and an investment simulation. In the monopoly game you need to transform your £1,500 into £20,000 so you can obtain the entry code for the next part. To achieve this you are able to do the familiar property dealings. It does cover all the traditional rules well, however, a few bugs and idiosyncrancies appear.

The input routine needs a bit of improvement — it counts the 'clear key' as part of an input, therefore making it invalid, fast typing is not allowed as the routine is fairly slow. Whilst mortgaging property you are required to enter the full name of the property, making it tedious to use, therefore I would have preferred it if it had been possible to use reference numbers.

Also, should the same number of people play each time, the dice throws will be exactly the same, therefore I recommend entering, before 'running', the command 'PRINT RND (-TIMER)'. Also there was not the option of playing against the computer, this means you need between two and six people to play.

In the second part you have to increase £1,000,000 lent to you into £5,000,000 in limited time. To achieve this you can dabble on the Stock Market or invest in properties, software companies, new musicals, etc. This part also contains a few bugs.

In all quite an entertaining game but not addictive enough for me.

Phoenix are now marketing their combination arcade/adventure software on one cassette instead of two. This has reduced the size of packaging and the price to £6.99.

STAR TABLE

Screen display	* * *
Addictiveness	* *
Ease of use	* *
Overall	50%

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While hunting the many beasties you must never cross your own tracks. The speed gradually increases — PANIC!!!!

ALADDIN'S CAVE
Avoiding the crazed geni, you must find the fastest way out of the caves and collect as many jewels as you can.

UP YOURS
A humorous (not to say insulting) character analysis program based on the answers you give to some probing and personal questions.

SAFE-CRACKER
Catch the robbers who have broken into the bank vaults without getting clobbered.

PARA-SHOOT
Your gun tower is under attack from parachutists. Either shoot the planes before they drop the troops or kill the commandos as they descend.

CHANNEL TUNNEL
Race the computer guided French to complete your tunnel in the most economic way. Avoid digging through solid rock as this slows you down.

HEADACHE
Try to escape from this labyrinth of corridors whilst being chased by a maniac with a lawn-mower.

LAZER BLAZER
You must destroy all the invaders before your time runs out — but you must kill them in the right order to score maximum points.

OFFER ONLY AVAILABLE FOR:
SHARP MZ-700 SERIES

SUPER-MOUSE
A cat and mouse game where you are the cat searching for the real mouse. But watch out for SUPER-MOUSE because he kills pussies like you!

FISHERMAN FRED
For the younger games player. Try to help Fred catch some fish for his tea. Six skill levels.

THREE CARD BRAG
The traditional card game but you must play the computer. You may bluff if you wish but so will he and he's pretty good at it!

GOLD MINER
Find the real gold hidden in the mine-maze whilst being chased by the miner. Don't get walled in.

DOMINATION
A game of battle and conquest for two players. Each side takes turns to attack, defend or retreat. Based on strategy — not luck.

INCA GOLD
Fend off the horde of bandits who are attempting to rob the tomb. You can move the gold or kill the bandits with your sword.

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Learn your way about the standard QWERTY typewriter keyboard. Tests at 4 skill levels and gives scores in words per minute. Really useful.

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An all-action simulation of a slot machine complete with HOLD and even a handle to pull. Scores for 2 or 3 of a kind plus mystery pay-outs.

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HEADACHE	**LASER BLAZER**	**SUPER-MOUSE**	**GOLD MINER**
DOMINATION	**THREE CARD BRAG**	**TRACKER**	**UP YOURS**
FISHERMAN FRED	**SNAKER**	**INCA GOLD**	**CONVEYOR**
TYPE TRAINER	**COMPUT-A-SLOT**		

I ENCLOSE A *CHEQUE/*POSTAL ORDER/*CREDIT CARD NUMBER FOR £ _____

MY *ACCESS/*BARCLAYCARD Account Number is _____
*delete where applicable

NAME _____

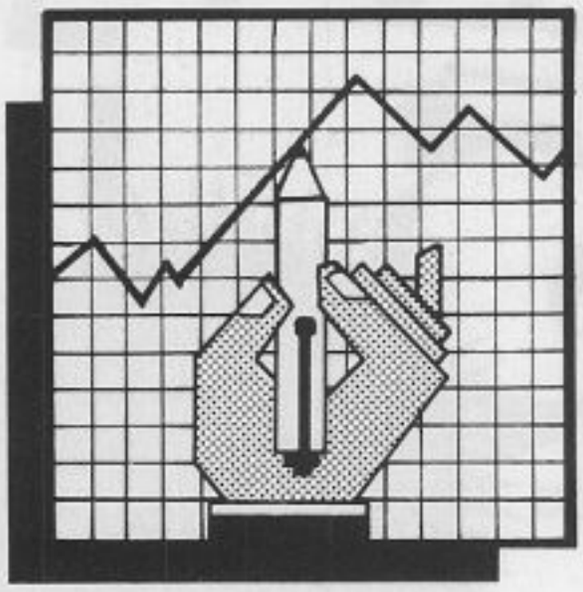
ADDRESS _____

For 24 hour telephone service you may order on ACCESS or BARCLAYCARD

SOLO SOFTWARE

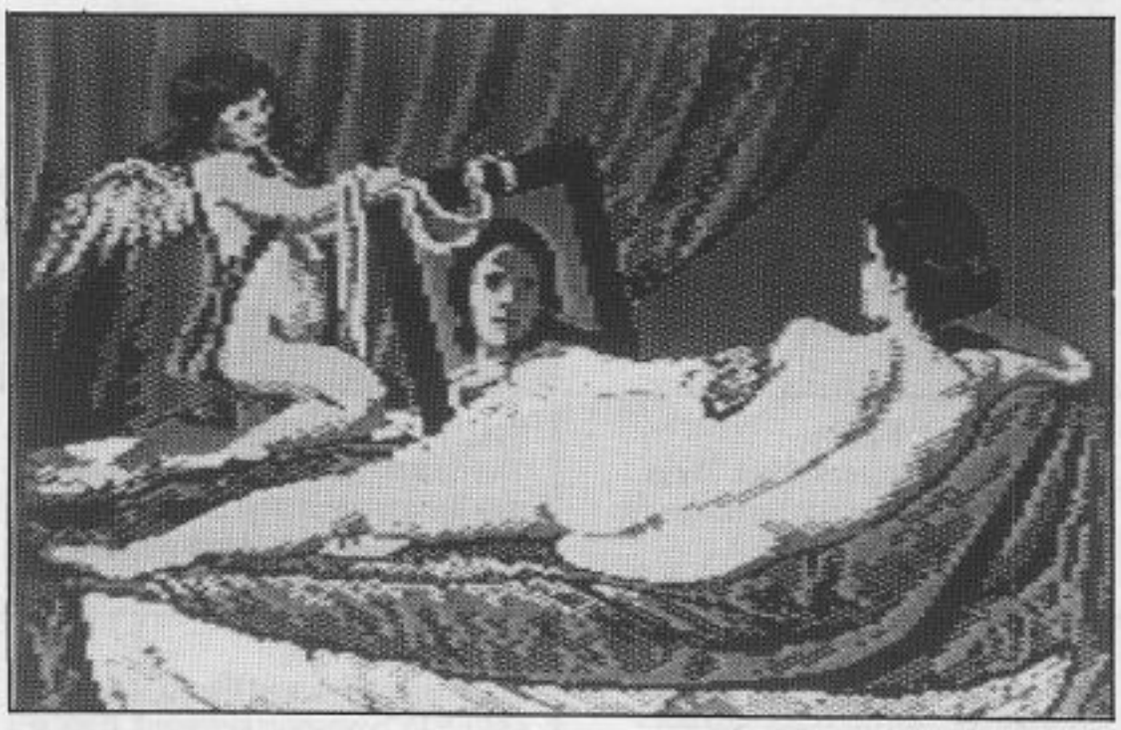
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Testbed

Investigate the graphic potential of your micro. Continuing from last month, this special Testbed takes a look around the hardware and software available to turn your computer into a drawing/design tool.



The August issue of *Personal Computing Today* contained the first part of an extended *Testbed* section on how to get your computer involved in the world of graphics. That section dealt with light pens and graphics tablets, medium priced products which are simple and fun to use.

This section includes reports of advanced (and consequently more expensive) graphic tools but also covers a few of the less complex hardware and software packages which can be purchased relatively cheaply and provide you with hours of entertainment.

Software selection

As we explained last month it is the software driving a graphics package which is all important. It is not therefore necessary to buy extra hardware in order to use your computer as a drawing tool. We have taken a look at some software packages operated via the keyboard. These are relatively cheap and can provide hours of fun.

DRAW — Spectrum
Manufacturer: Melbourne House
Price: £8.95

Melbourne Draw enables the user to create pictures on the screen with the minimum of fuss. Basically, you use the Q,W,E,D, C,X,Z and A keys like the points of a compass, to move a cursor around the screen and either set, reset, invert or skip pixels. The program also gives you these functions for the attributes, which you can set to any colours with control over flashing and brightness. There is a nice function that displays a grid on the screen to enable you to position the picture correctly for the attributes.

You are able to create user defined graphics from any character position on the screen. This can be useful for repeating a pattern throughout the picture or saving certain parts you wish to use again. Any shape however irregular, can be filled, at the touch of a button which is a great help when drawing large, solid figures. You

may also magnify the screen to either 4 or 16 times its original size, enabling you to add detail to your picture very easily. Other functions include scrolling the whole screen in any direction enlarging and reducing the picture and the entry of text in four directions (upside-down writing!?). Both pictures and user defined graphics can be loaded, saved or verified from within the program adding to the user friendliness of the package.

My only qualm about this program is that there is no provision for drawing curves or circles, but I do feel that it is a nice piece of software and can be recommended to anyone wanting to create graphics on the Spectrum.

SPECGRAF — Spectrum
Manufacturer: Anirog Software
Price: £9.95

This utility program enables user definable graphics to be created on the screen in various formats and allows special editing and designing functions.

The user can select various grids where up to nine UDG's can be designed at once. This is a very useful feature since if you are designing characters using more than one square this feature enables you to see what your large multi-square graphics will look like en masse.

The special features include a rotate function or mirror image. This would be useful when designing something like a pacman character. Once one image or position has been defined then it can be stored and the image rotated to produce another position.

As well as these functions there is a demonstration program on the flip side along with a 'Toolkit' showing how to use your graphics in your programs, but like the rest of the tape it is hard to understand despite many instructions.

PAINT PIC — CBM64
Manufacturer: Kuma Computers Ltd
Price: £19.50

The 50 plus page book supplied with Paint Pic gives you all of the information you require to load, save and operate the program. From this you can safely assume no detail is left to the imagination. The program is well thought out, giving help screens if you get into difficulty, together with a good selection of commands including box, triangle, parallelogram circle, ellipse, arc, etc., with full control over colour (foreground, background, paint etc.). Working through the examples is the best way to get acquainted with the facilities, going from simple shapes to changing brushes to different widths, filling shapes and erasing mistakes.

You can save all your efforts to disk or tape with no problems — reloading is just as easy. On the whole a good program providing plenty of scope for drawing particularly for children.



GRAFPAD — BBC Micro
Manufactured by: British Micro
Price: £125 + VAT

One of the newest CADs. The basic British Micro Grafpad package includes the Grafpad, manual, and two simple programs.

The Grafpad is similar to an electronic notebook, with a stylus hanging loose from the main graphics tablet used for drawing. The tablet plugs into the BBC's user port which is located just under the keyboard. Instead of using a joystick, digitiser or keys to move a cursor around the screen, all you need to do is to position the customised pen anywhere on the tablet, and when you press it down the cross hair on the screen will be moved to the corresponding position.

The software included is reasonably simple, but quite powerful graphics can be generated. There are a number of operating modes which allow a variety of shapes including lines, rectangles, circles, triangles and freehand drawings. To activate any function, the first letter of the function name has to be pushed on the keyboard, ie C for circle, L for line etc. The freehand option is probably the most powerful, where an exact trace of the stylus movement is produced on the screen. The other keyboard options available are load screen, save screen, clear screen, palette definitions, erase area, fill area, dump screen to printer and quit.

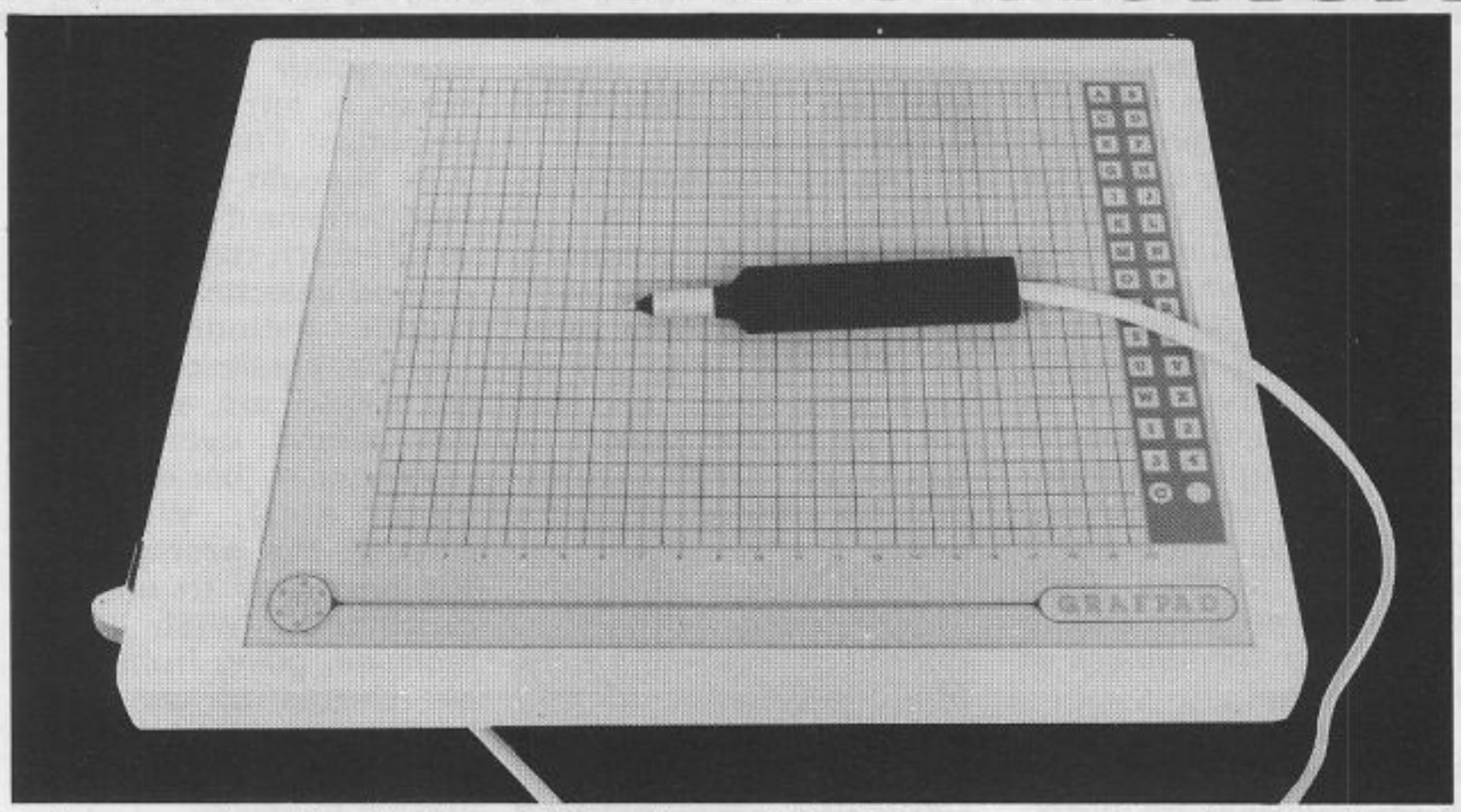
The Grafpad system is proving to be very useful, especially for educational and simple technical en-

vironments. A CAD program is available for a further £19.95, which allows shapes to be defined and reproduced. The price system seems a bit steep and the CAD software should come as standard. The Grafpad is also available for the Spectrum and Commodore 64 from **British Micro, Unit Q2 Penfold Works, Imperial Way, Watford WD2 4YY. Tel: (0923) 48222.**

ADVANCED GRAPHIC TOOLS

So far in this article we have discussed hardware and software which is within the reach of the average computer hobbyist. Application of the microcomputer in technical and business environments has resulted in some very advanced developments particularly in the field of graphic art.

This section takes a look at two very advanced drawing and design aids. However, research and development takes time and money and must be paid for by the consumer. The Acorn Bitstick and MicroSight system may seem expensive but remember, they represent the frontier of computer aided design.



THE BITSTICK — BBC Micro with second processor + 800K disk storage
Manufacturer: Acorn
Price: £347

The latest addition to the considerable armoury of the BBC Microcomputer system is the Computer Aided Drawing package, Bitstik. Originally produced for the Apple by Robocom, the Bitstik is now available to any BBC Model B owner who also has the 6502 second processor and 800K of disk storage (thus effectively limiting it to the business and education sectors).

From scratch the system would cost at least £1,500 although the Bitstik element would account for only £347 of this. For your money you get the controller, the graphics utility service ROM and some highly complex and powerful software.

Some of the software is in the ROM which fits into one of the paged ROM sockets of the BBC. The rest is on the system master disk. Two other disks provide buffer storage and a library. The supplied library disk comes complete with some sample drawings. The system puts its own special format onto Library and Archive (long term library) disks, as well as normal formatting if required.

Bitstik world

The world of Bitstik is a potentially enormous work page on which the user can draw in great detail and with great accuracy using the various menu functions, selected and controlled by the joystick-like controller. The controller moves different cursor types (depending on the function) around the screen in the X and Y axes.

The "Z" controller is used to increase and decrease size and one of its more interesting uses is in ZOOMing in on a particular part of the screen. The screen in this context must be seen as a window on the Bitstik world, a window which you move around in two dimensions, (PAN), and which can magnify a selected region, (ZOOM).



Budding computer artists will enjoy the 16 colour palette (which can be redefined), the variable width nib which shades and hatches and the near instant colour fill (PAINT). Circles, arcs, ellipses, all easily implemented and with technical accuracy using the angle and grid locks. These lock the cursor into a chosen angle or grid matrix so that perfect accuracy can be achieved for those using the system for more serious and profitable purposes.

Finished drawings are filed to a Library and can be copied back to the work page with a number of special facilities available. Perhaps you have traced a photograph of the family pet. You can now reproduce that drawing any number of times at any size, rotated through any angle, stretched or squeezed in either direction. It can be fun but such operations have serious applications for the technical artist.

Bitstik is tremendously easy to learn and use. The controller looks and works like a joystick with consistent use of the three buttons to select, action and escape from the drawing and utility functions. All the menu options are selected from the screen. The keyboard is used only occasionally. Its main use is for entering text which can then be manipulated like any other drawing. The manual has good tutorial and reference sections and there is a fair amount of advice within the program.

Output from the Bitstik is currently a drawback being a black and white printout only. A colour plotter would do the system justice and increase its effectiveness as a serious challenger to the more expensive CAD combinations. Acorn have promised further developments. Of course you can always take a photograph of the screen, and screens can be saved full size to transfer out of the system.

We are not all going to rush out and give the bank manager a heart attack by purchasing a Bitstik but wherever there is one installed as a shared resource it will be well worth joining the queue to have a go.

MICROSIGHT VIDEO DIGITISER
Manufacturer: Digithurst
Price: £495 + VAT (Basic system for BBC, CBM64, IBM PC)

Competition in this area of the CAD market is not particularly fierce at present but even allowing for this, Digithurst's MicroSight System promises to establish itself as the market leader in terms of a low-cost image analysis system for micros.

Anyone who watched the Winter Olympics this year will have seen some of the very latest image processing technology in action. The BBC have been experimenting with computer aided special effects to make their productions more visually stimulating to the viewer. One offshoot of research and development in this area is the appearance of relatively low-cost systems which have been devised as peripheral elements to a host microcomputer. Such systems allow a user to seize a single video frame via a camera, transfer it into the screen memory of the host micro and manipulate the image using standard memory-manipulation techniques. Home users are now able at least to experiment with the new art of image processing.

The Digithurst MicroSight system consists of a video camera, a video digitiser which is an interface allowing the computer to grab a picture frame produced by the camera, connecting cables, Microscale software and documentation. The ITC Ikegami video camera is basic but functional and is capable of producing a very accurate image even under low lighting conditions. It is a mono camera but by a very clever system of filters, 'coloured' images can be obained. The aperture is adjustable.

The MicroSight manual was very easy to follow, as was the guide for setting up the system. Putting it to use was no more difficult and essentially consisted of pointing the camera at an object and pressing 'R' on the keyboard. The picture builds up in about two to three seconds requiring a reasonable amount of stability from the subject. We nearly always managed to get a good picture providing that the camera was focused initially. After taking and storing the picture, the fun really begins! Using the supplied software the image can be manipulated and different aspects highlighted to give exciting effects.

The software supplied with the basic system comes on three disks. The first of these is the 'photo disc' which enables the user to capture an image, display it on a Mode 2 screen and store it for future use. The 'MicroSight 1' disk is more flexible in that it will allow an image once captured in the micro's screen memory to be manipulated to give different effects, such as silhouetting.

The MicroSight system is a relatively inexpensive image analysis system and represents extremely good value for money, especially as the price includes the camera. The software, despite its disappointing appearance, functioned well.



Feature

Silicon Supermarket

The race to hook into videotext services is on. Rupert Goodwins explains what is available and how to get plugged in!

One of the buzzwords for today's personal computer owner is videotext. This isn't the same as teletext, which some televisions are fitted with, but encompasses a huge range of computer-based services on the end of a telephone line. Almost anything you can imagine is available, from banking services to banana buying, and from sports results to holiday booking.

Entry Requirement

All you need to enter this burgeoning world is a modem and a computer. Hopefully you'll know what a computer is, and all the average user (that's you!) needs to know about the technical marvels of a modem is that it converts computer data into sounds that can be squirted down a telephone line, and turns those sounds back into data again for the computer to read. An added pre-requisite is an understanding bank manager for when the telephone bill comes in!

Depending upon what kind of computer you've got, the modem (that's short for MODulator DEModulator, by the way) will either plug into the general serial port, or into the expansion bus. It's not important how it does it though, as all you have to do is connect computer to modem, modem to telephone line, load in the appropriate software, and off you go.

Types of Modem

The most popular modem for the ZX Spectrum, the VTX5000, automatically loads in its own software when you turn it on, but all other modems for other computers need the software to be loaded in from tape, disk or ROM. The way in which the modem connects to the telephone line is also important; some of the older ones just 'talk' into the telephone mouthpiece using an el cheapo loudspeaker and pull the data from the earpiece with a microphone. As you might imagine, this can be a little tricky, and any noise in the room where the modem is can upset things generally. This kind of modem is called an 'acoustically coupled' modem, and is really best left alone!

The other kind of modem plugs directly into the telephone line via 'modular' socket (BT series 600), and is infinitely more reliable. If you don't have such a socket, British Telecom will be more than happy to fit one for you, as you can then spend lots of money on fancy telephones as well! The VTX5000 is a good example of this kind of modem, known as 'direct connect', and like many others has a socket in the back to enable you to plug in a telephone as well.

Types of database

So now you have a modem and a computer, but not much idea of how to use them! The best and biggest videotext database in the UK, and probably Europe, is the Prestel system. This is truly massive and to be able

Recipes are just one example of the information available from videotext services.



to access it you have to pay a quarterly charge of £5, with a further £8, payable if you want to belong to the Microcomputer group. This allows you access to all of Micronet's and Viewfax's pages, those being the two main micro-based information providers.

An information provider, known to all and sundry as an IP, is a company who hire a section of Prestel (or any other database, for that matter) and use it to advertise or offer their services. In Micronet's case, this means computer software, news, classified ads etc, all biased towards the average micro user.



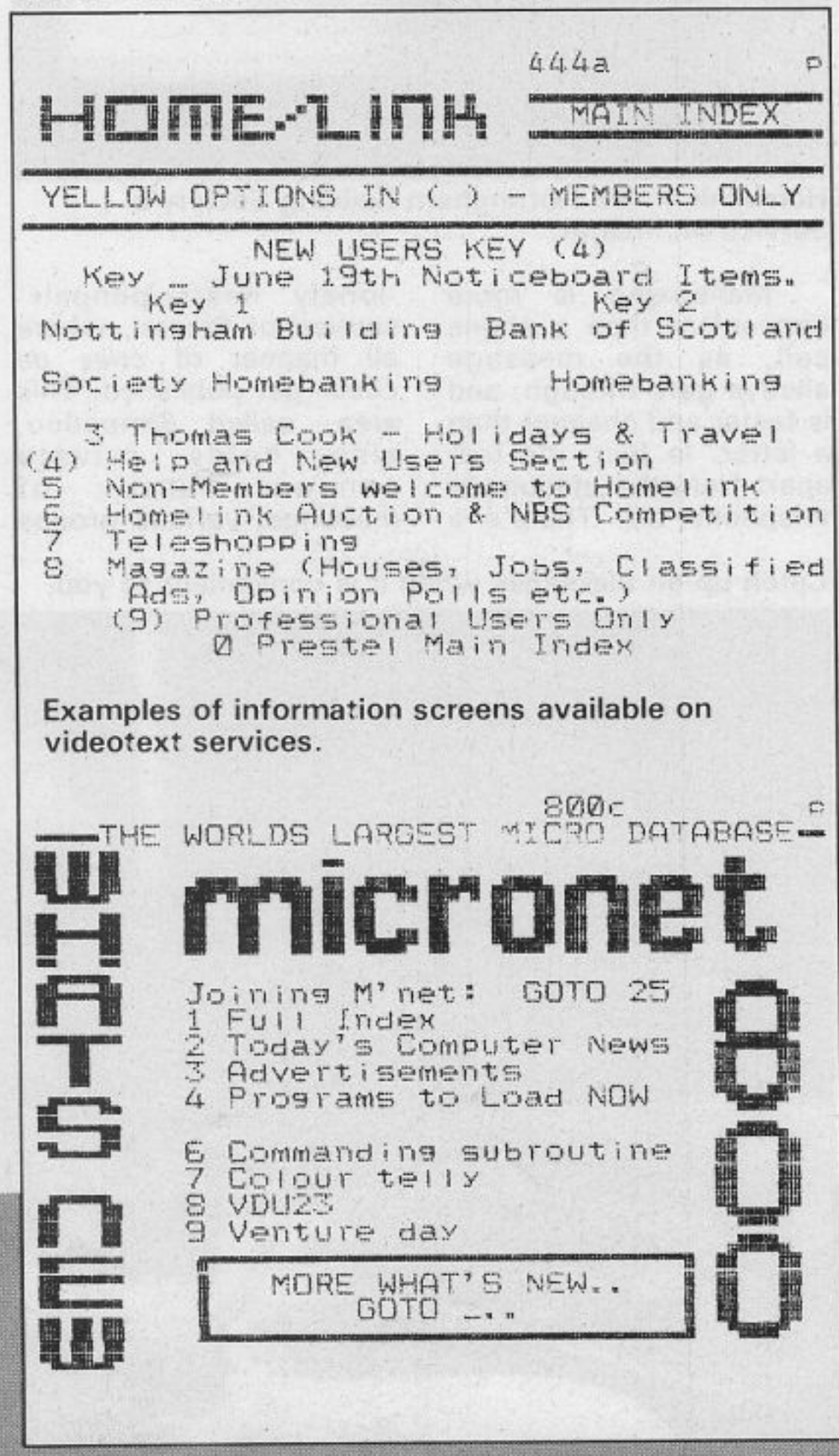
Browse through the Home Buyer's guide at your leisure.

Homelink's always open

Another good example of an IP is Homelink. This offers everyone on Prestel most of its news and general services, but also allows Nottingham Building Society members and Bank of Scotland members a complete banking service in the home (homebanking or telebanking).

There is a link between the specialised computers of the building society/bank and the all-purpose Prestel computers. This high speed data link, called a Gateway, allows anyone who is authorised to call up a page on Prestel and then, for no extra charge, use the Prestel computer to access the banking computer. There are no extra telephone bills, and to the user it still looks like he's hooked into Prestel, but he can now interrogate his account, pay his Visa bills and generally move his cash about, 24 hours a day, 7 days a week.

There are also facilities for 'teleshopping' (you'll notice that all these activities have 'tele-' shoved in front of them to make them seem hi-tech!), and while most of the best things like Hi Fi special offers and discounted services are strictly Members Only, there are still a lot of good buys available to the non-member.



Examples of information screens available on videotext services.

Join the club

It's worth at this point showing how the membership system works on Prestel. Every time a page is 'created', that's to say written on the system, the IP who wrote it has the choice of putting the page into a CUG. A CUG, short for Closed User Group, is rather like an exclusive club. If a page is put into a CUG, only those users whom the IP has chosen to make members of that CUG can view it. Those

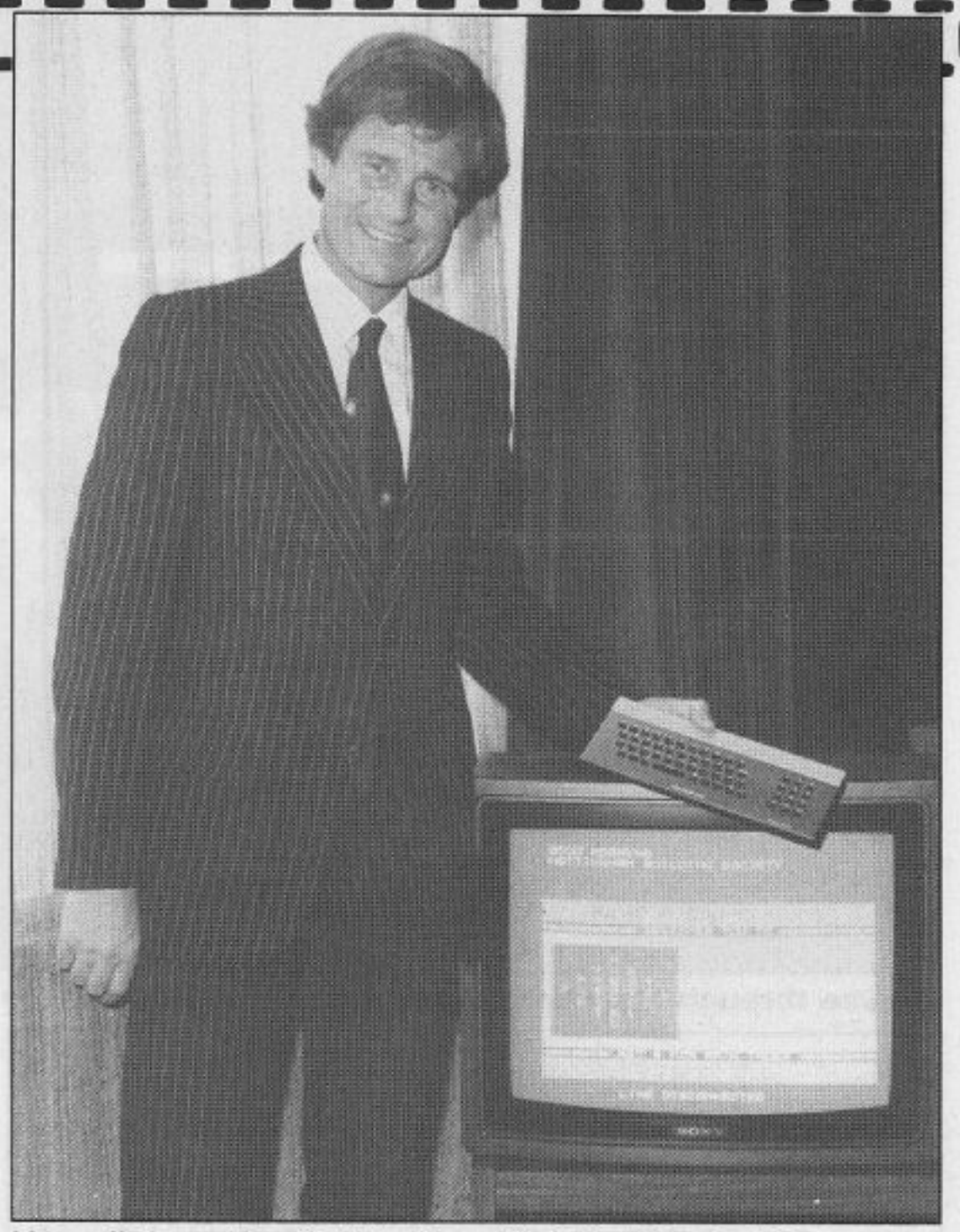
unfortunates who aren't in the CUG and try to read the page, get "PRIVATE PAGE" from the Prestel computer. Usually, a user has to pay to belong to a CUG, but some are professional groups like doctors or solicitors, or trades like Travel agents.

Holiday selection

An awful lot of Prestel is taken up with travel agents, as it's popular for airline bookings and checking for free places. Another useful part of Prestel is the electronic mail system (Email) called Mailbox. Many users find this one of the most handy features of the system and it is being given increasing importance by Prestel itself.

Electronic mail

What happens is that you select a special page on Prestel, address it to another user, write a message on it and despatch it to the dark depths of the Prestel computer. The address takes the form of a nine-digit number which is usually the person's telephone number for convenience, but can be 'ex-directory' and the mailbox is then transferred to that person's mailbox store. When the user next logs into the computer, he/she gets a little flashing message saying 'NEW MESSAGES FOR YOU — KEY 1'. The user then presses 1, and his mail is put onto his computer screen in the order people sent it to him. Each user has a store for three mailboxes, where he can keep old messages which might need later action.



Homelink — the Nottingham Building Society's Service on Prestel.

Mailboxing is more convenient than a phone call, as the message always gets through, and is faster and cheaper than a letter. In fact, it's free apart from the ubiquitous telephone bill! There's a 'lonely hearts/penpals' section of Prestel, where all manner of *cries de coeur* get published. This area, called Simpatico, also holds private announcements of meetings, various groups and all manner of extremely funny 'personal column' type adverts. This too is free, and makes for a happy half-hour's browse.

Micronet and Timefame (another publicly available IP) also have 'bulletin boards', areas which just display readers' letters but which are updated once or twice a day.

Moving into the home

So what of the future? Certainly the emphasis is moving from business users to the home/hobbyist computer user, and a lot more user interaction is slowly coming into being. There are some exciting technical innovations just around the corner, real-time chatting between several users online and the ability to search the database for a word or subject being just two of the more exciting developments. Now is definitely the time to get hooked into the Videotext revolution! You have nothing to lose but your wires!

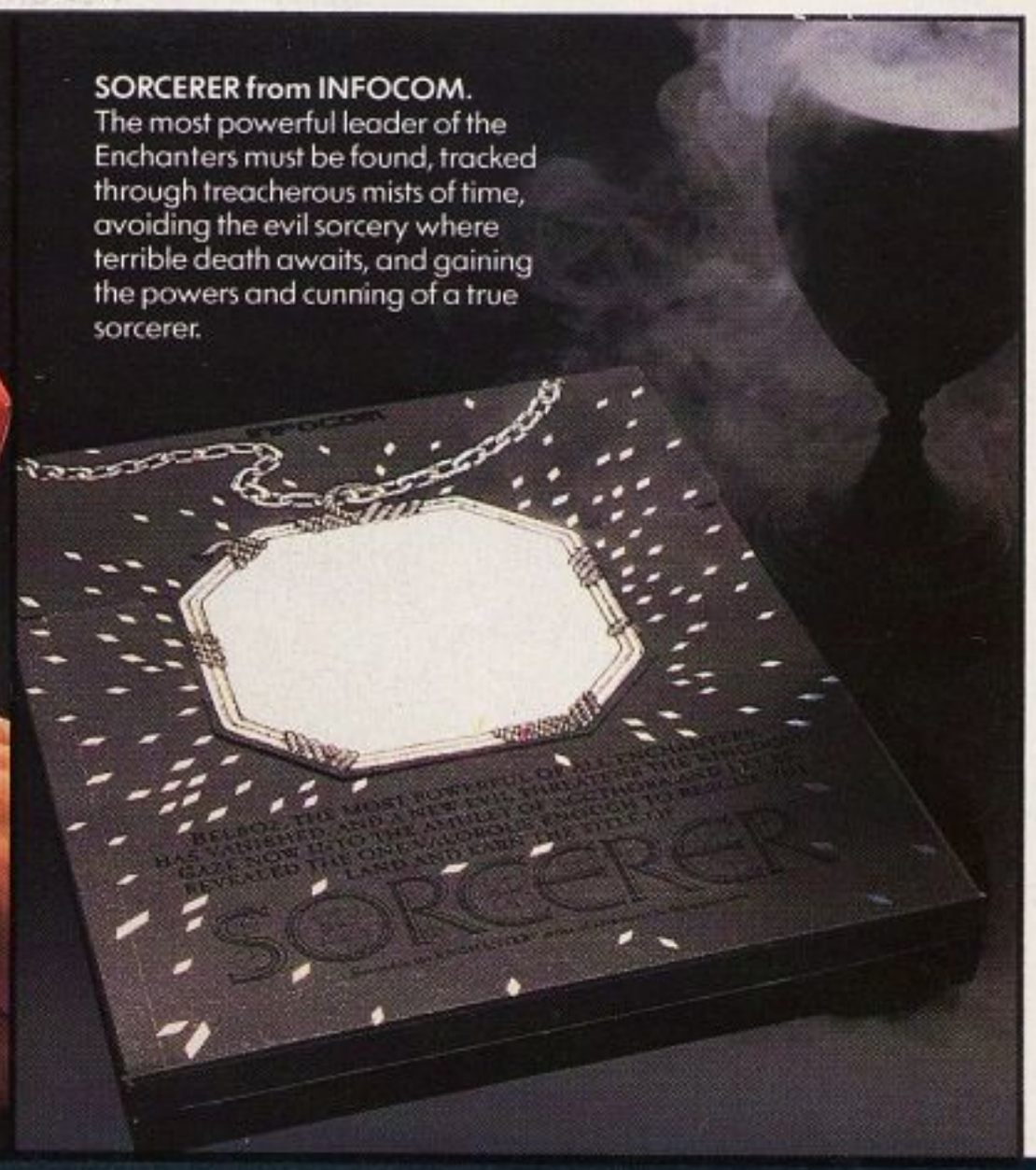
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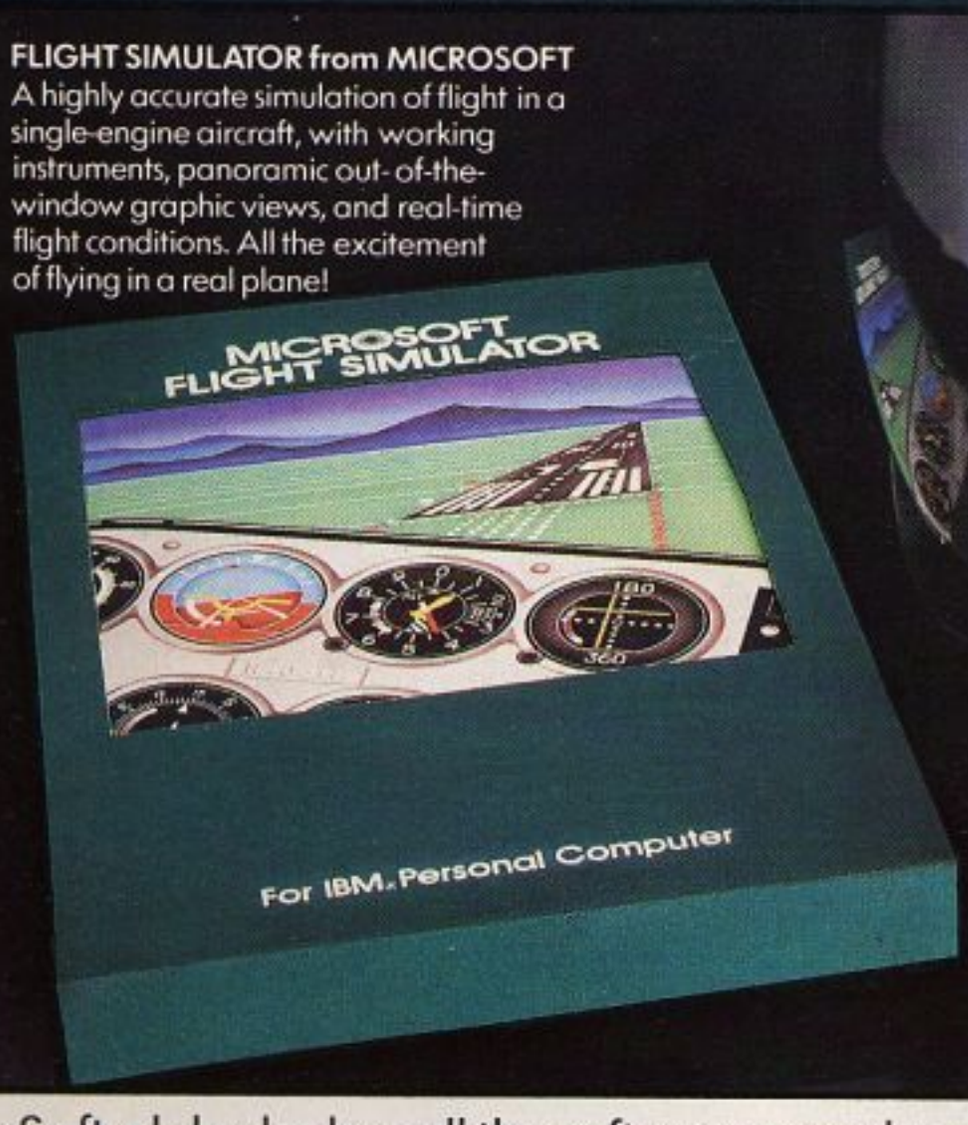


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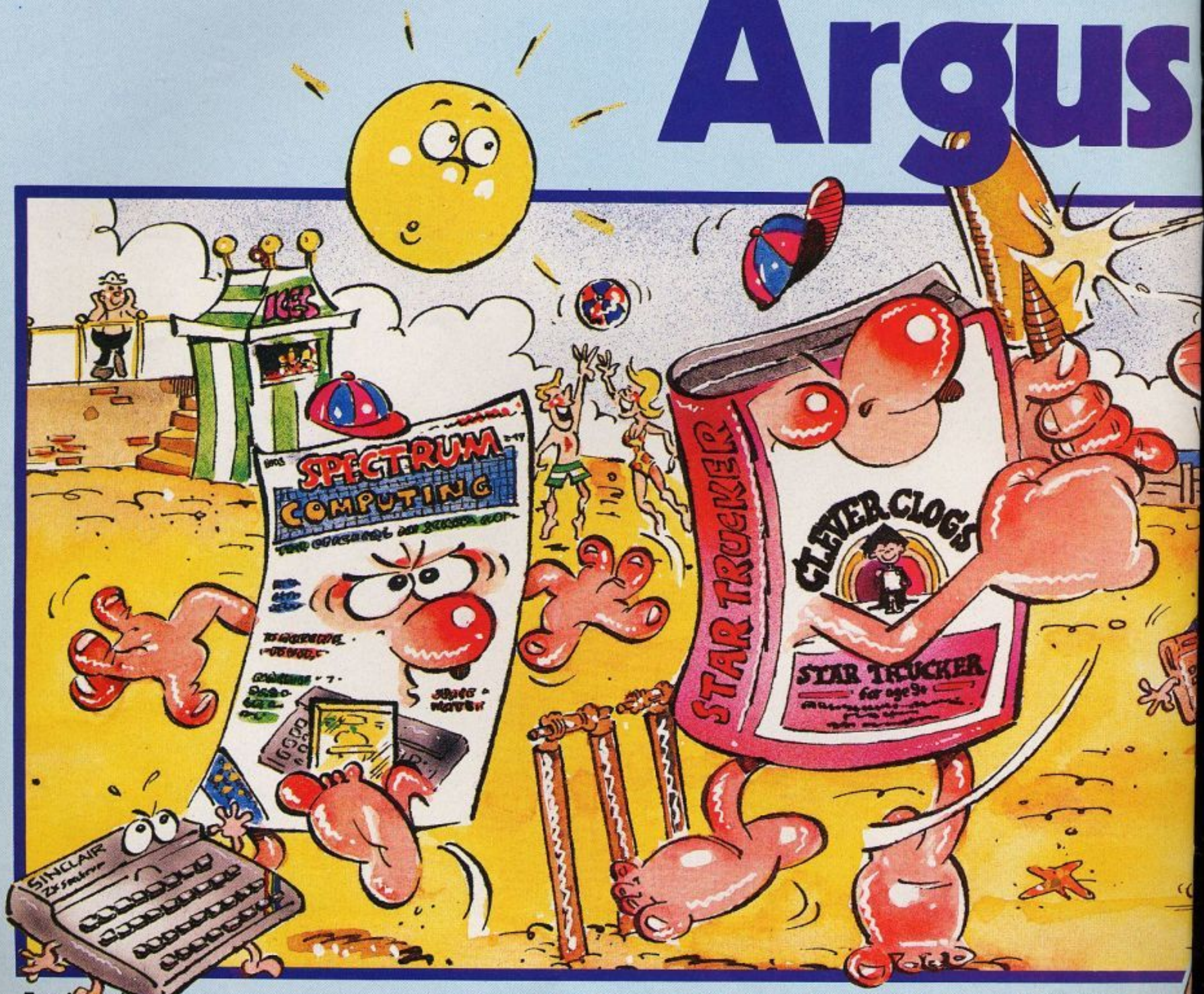
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Software



Rally Driver



Put yourself in the hot seat of rally driving

and mind those bends! By Jamie Clyde.

Rally Driver is a road race game for the CBM64. It runs in under 10K and comprises two programs. The first is an instruction one, which tells you how the game is played and the second contains the program itself.

Briefly the instructions are as follows. The object of the game is to finish a three stage rally race. The first section takes place in a narrow lane through which you must drive, avoiding the hedges! The second scene is rather frightening and is more hazardous. You are on the wrong side of a motorway and so must avoid all the oncoming cars at speed! Finally you have to dodge tyres which obstruct your path of travel. A rather unusual road race!

There are five skill levels. Five is the easiest level but level one is nearly impossible. The level is altered by pressing F1 when the title page appears. When you have selected your chosen level, press the space bar and the game will begin.

Sprite graphics

All the cars on the screen are, of course, sprites and by using the two collision registers (sprite-sprite location 30 and sprite-background data location 31), a collision with a car or the edge of the road is discovered. When typing in the program, omit the statement 'POKE 808,225' because this disables the RUN/STOP and RESTORE keys.

List of variables used

V	Start of sprite control locations in memory.
S1	Start of sound control locations in memory.
H%	Hi-score.
S	Score.
LC	Skill level.
W$	Width of road.
ROS	Road in stage 2.
RIS	Road in stage 1.
T( )	Tune pitch.
D( )	Tune duration.
AS	Road direction in stage 1.
x	x coordinate of car.
Y( )	y coordinate of other cars in stage 2.
N	Stage number.
C	y position of road in stage 1.
HS	Champion.
SPS	Space string.



C64 GBH

how it runs

100-300	Set Up game
350-410	Stage 1.
420-500	Stage 2.
510-600	Stage 3.
1000-2000	Read sprite data & initialise variables.
2000-3000	Restart.
3000-4000	Print road for Stage 1.
4000-5000	Move car.
5000-6000	Crash routine.
6000-6500	Finish stage.
6500-7000	New champion. Enter name etc.
7000-8000	Title page.
10000-19000	Sprite data
20000	Road data.
21000	Tune data.

hints on conversion

It would not be very difficult to conert this program to other machines. However, this would mean totally rewriting the sprite routines and all the other graphics routines because of the 64's terrible BASIC. If you decide to take on this task, I will assist you by giving a list of peculiarities:

POKEv +	1	Sprite #0 Y coord.
	2	Sprite #1 X coord.
	3	Sprite #1 Y coord.
	4	Sprite #2 X coord.
	5	Sprite #2 Y coord.
	6	Sprite #3 X coord.
	7	Sprite #3 Y coord.
	21	Enable sprite.
	30	Sprite-sprite collision.
	31	Sprite-background collision.
	39	Sprite #0 colour etc.
Other Pokes		
	650	Repeat on keys.
	2040	Sprite control locations.
	53281	Background colour.
	53280	Border colour.



program listing

Loader Program

```
0 REM * LOADER FOR RALLY RACER *
10
100 POKE53280,0:POKE53281,5
110 PRINTCHR$(142)CHR$(8)
120 POKE53272,21
130 PRINT"■"
140 PRINT"
150 PRINT"■ ■■■
```

Rally Driver

program listing

Main Program

```
0 REM ************************
1 REM * R A L L Y  R A C E R *
2 REM *                      *
3 REM *   FOR COMMODORE64    *
4 REM *                      *
5 REM *WRITTEN BY JAMIE CLYDE*
6 REM *                      *
7 REM *                      *
8 REM ************************
9 :
100 S1=54272:V=53248:POKEV+21,0
200 GOSUB1000
300 GOSUB2000
350 REM * STAGE 1 *
360 PRINT"■":FORT=1TO3:R1$(T)=R$(T)+"■     "+W$+R$(T):NEXT:POKES1+4,17
370 POKEV,100:POKEV+1,50:POKEV+21,1:X=100:C=9:N=0
380 FORH=1TO200:R%=RND(1)*2+1:ONR%GOSUB3000,3100
390 GETR$:IFR$<>""THENGOSUB4000
400 IFPEEK(V+31)=1THEN5000
410 POKES1+1,10:NEXT:S=S+100:W=W+1:GOSUB6000
420 REM * STAGE 2 *
430 PRINT"■";:POKEV+21,0:FORG=1TO3:X(G)=100:POKEV+G*2,X(G):Y(G)=75*G+25:K=10
435 POKEV+21,15:POKES1+4,17
440 POKEV+1+G*2,Y(G):NEXT:X=100:POKEV,X
450 FORF=0TO26:PRINT"■■          ■■■ ■■■■"W$" ■■                              ":NEXT
460 FORH=0TO200:FORH1=1TO3:R%=RND(1)*2+1:ONR%GOSUB3200,3300
470 Y(H1)=Y(H1)-15:IFY(H1)<30THENY(H1)=255
475 POKEV+1+H1*2,Y(H1):POKES1+1,H/10
480 NEXT:GETR$:IFR$<>""THENGOSUB4000
490 P1=PEEK(V+30):IFPEEK(V+31)=(@OR1)ORPEEK(V+30)<>0THEN5000
500 NEXT:S=S+100:W=W+1:GOSUB6000
510 REM * STAGE 3 *
520 POKEV+21,1:X=150:POKEV,X:PRINT"■"
525 QP=PEEK(V+31)
530 R0$="■■            ■■■          ■■■                    ":POKE53281,9:POKES1+4,3
535 FORH=0TO200:PRINTR0$
540 R%=RND(1)*3:IFR%=1THENPRINT"■"TAB(13+RND(1)*8)"■o":POKES1+1,100
545 POKE1983,160:POKE56255,5
550 GETR$:IFR$<>""THENGOSUB4000
560 IFPEEK(V+31)=1THEN5000
570 POKES1+1,0:NEXT
580 FORHJ=1TO100:POKE53280,HJ:PRINT"■■■■
```

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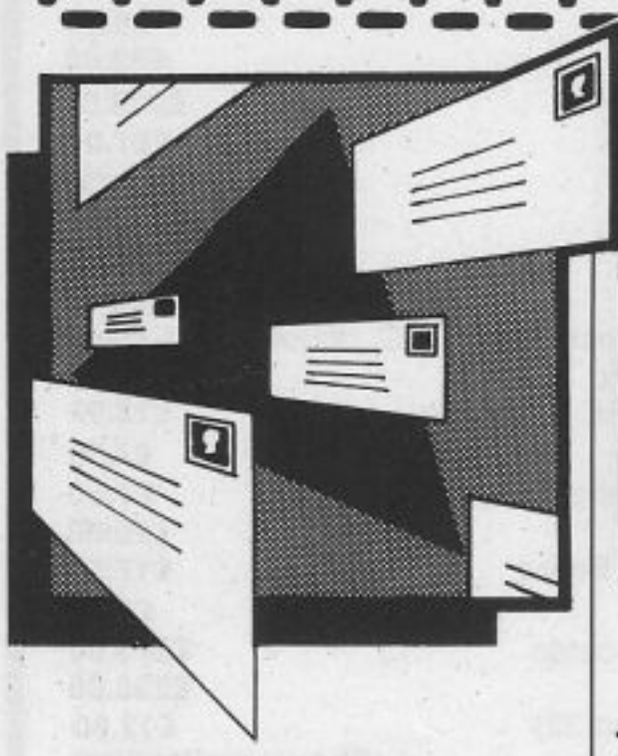
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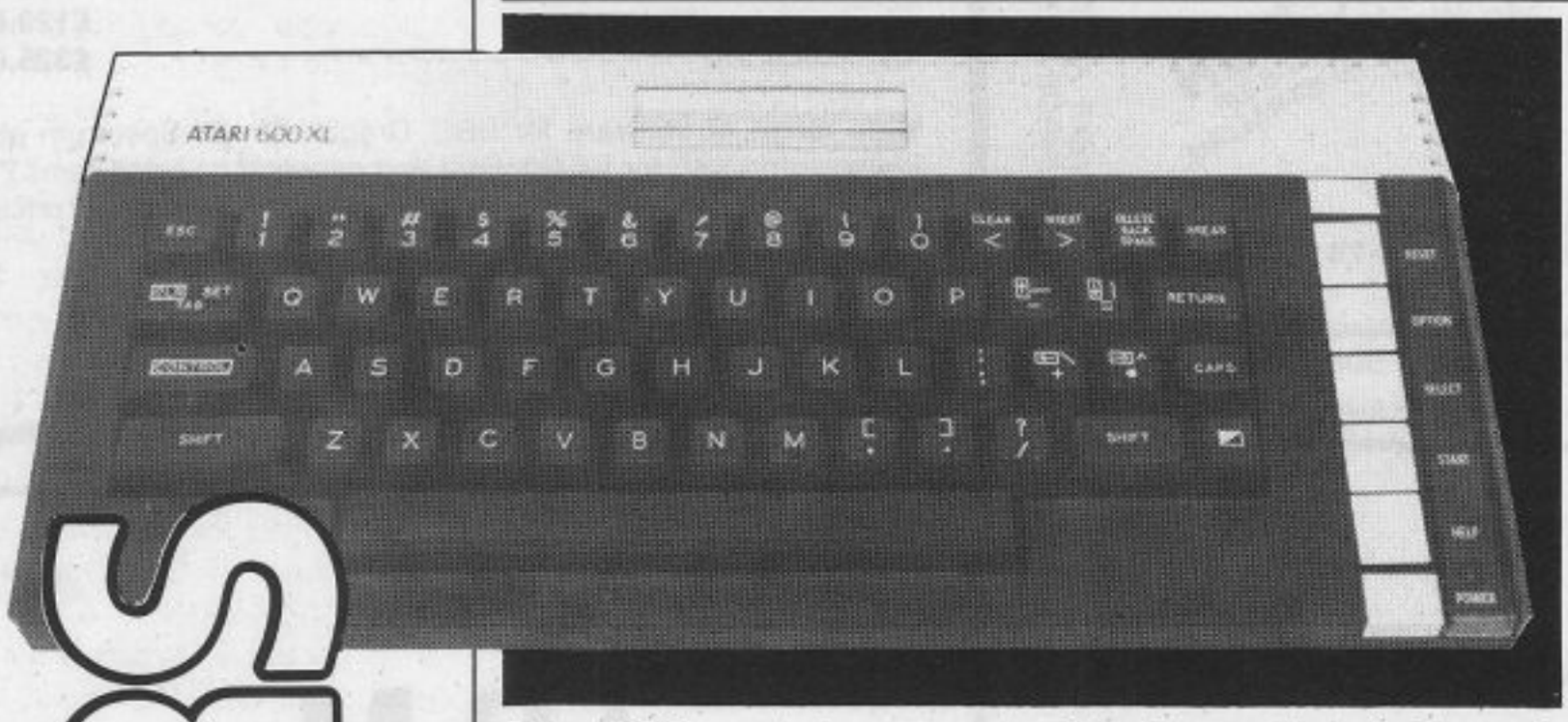
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Input

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LETTERS

Dear PCT
I am considering buying an Atari 600XL computer and would be grateful if you could clear up a few nagging doubts. For instance, is this micro compatible with any tape recorder or is the Atari model 1010 essential?

Also when you reviewed the 600XL you stated that it was not possible to specify file names. What exactly does this mean? Finally will a 16K program run on the unexpanded 600XL?
Yours faithfully
J A McKay
Northern Ireland

Since the 600XL contains some special circuitry, an Atari cassette deck such as the model 1010 is essential to the proper functioning of the system. On most computers it is possible to give each program a name on saving it. This aids in documenting and finding the programs again at a later date. The Atari cannot do this because it doesn't have the command built into the BASIC. However, this is not a major disadvantages and in no way affects saving and loading times.
The answer to your last question is that yes, the 600XL is a 16K machine and will therefore run 16K software without any expansion.

Dear PCT
I spent a whole day recently typing in a long program from a book only to be thwarted at the end as I could not get it to load onto tape. Afer I had calmed down, I tried to save a couple of shorter programs. After typing 'SAVE' and VERIFY, I was delighted to get the message 'O.K.'.

Feeling very pleased with myself, I then wrote a short program to calculate VAT and again got the O.K. message after verification. As a double check I then tried to re-LOAD the programs (one at a time) and much to my disappointment was confronted with the message 'R TAPE LOADING ERROR'. The same thing happened again when I repeated the whole procedure.
So please, to help my sanity would you give me a checklist of what I should be doing and tell me what I must be doing wrong. By the way I am using a 48K Sinclair Spectrum.
Yours faithfully
Marion MacDonald
Strathpeffer
Scotland

If you get a verify 'OK' message on the Spectrum, then you have carried out the SAVE procedure corectly. I would suspect that you have a faulty cassette recorder or lead, which are causing incomplete or damaged SAVEs. Try changing these and repeat the SAVE procedure as detailed in the Spectrum user manual.

Dear PCT
I am wondering whether it is possible to add a low cost plotter with an RS232 interface to my 48K Sinclair Spectrum. I would like a plotter similar to an Oric or Commodore one. Although I have a ZX printer already, I would like to do screen dumps of coloured graphics.

Also could you please tell me when the first Microdrive software will be out. Thanks for a great magazine, keep up the good work!
Yours faithfully
John Morrell
London

Tandy make a low cost plotter with an RS232 interface. It is the CGP115, which costs £150 and was reviewed in the June 1984 issue of this magazine. If you purchase one from your local Tandy store, ask them to supply or make a lead for the Interface 1 as both ends will be non-standard.

I'm afraid that we haven't been able to discover much about the availability of Microdrive software. Richard Shepherd Software produce an accounts package 'Cash Controller' which can be downloaded from cassette onto a Microdrive cartridge. We tried to get further information from Sinclair Research and Psion but both companies were non-committal about future programs on Microdrive cartridge.

Dear PCT
Could you please tell me how to disable the RESET and ESC keys on the Oric Atmos as I have just written a program which I want to protect with a password.

I would also like to know how information can be updated without altering the basic program. I enjoy your magazine very much.
Yours faithfully
C Williams
Plymouth

Dear PCT
I own an Oric Atmos 48K and I am trying to write an adventure game on it. I would like to know how to write a game save routine. Any advice in this direction would be of enormous help.

Thank you for a great magazine from which I always learn something.
Yours hopefully
Michael Lane
Norwich

These problems are so similar that we will answer them together. The RESET Key is disabled by POKE#22B,#60. I think you want to disable the Control C command rather than the ESC key. This information can be found in the Atmos manual.
One of the major advantages of the Oric 1 is the ability to load and save data. This feature should be exploited in the writing of adventure games and is carried out by the use of the STORE and RECALL commands which are explained in detail on page 66 of the Atmos manual.

Dear PCT
With reference to David Ellis's article in the June issue of *PCT* which dealt with POKEing around on the Oric, I have written a short program which other novices (like myself) may find interesting.

```
10 FOR E=48000 TO 49119 STEP 1
20 POKE E, N
30 NEXT E
```

N must be a number between 0 and 255. To change the value of N use CTRL L and edit line 20 then RUN again. This program should also run on other micros which use a 6502 chip or similar. I think the 6510 is one example.
Yours faithfully
P Steel
East Ham

Dear PCT
I can't get the collision detectors to work on my CBM64 — sprite to data or sprite to sprite. Please could you tell me how to use this function for all eight sprites. Also is it possible in a sprite to data collision, to find out what data the sprite has collided with?
Yours faithfully
Mark Hula

Collision detection is one of the best features of sprites. The key to detection is locations 53278 and 53279. If you PEEK these locations they will tell you what factors are involved i.e. 53278 for sprite to sprite collision detection and 53279 for sprite to data. The value returned after PEEKing tells you which has been involved in the collision. A zero tells you that no sprites have collided; a one tells you that sprite zero has hit something, two that sprite one has collided, four that sprite two has collided and so on. Thus, if PEEK (53278) gives you the value ten then you can determine that sprites one and four have collided with each other.
The location from 53278 upwards denote the X and Y coordinates of the sprite. So once you have obtained a value by PEEKing 53279 you can tell which sprite has been involved and by then PEEKing the appropriate X and Y registers you can find out where it is on the screen. Divide these two values by eight and multiply the Y value by forty, then add the coordinates together. Now by adding the screen start value (usually 1024) you will obtain a value which will tell you where the data are on the screen map. PEEK this and you will get the value for the object which has been hit. A fairly complicated but interesting process!



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VIC20 Basics

Get those screen shapes moving! Bob Wallace continues his travels through the world of VIC computing.

Last month we looked at how to position text on the screen and to produce it in various colours. This is done by using the 'PRINT' statement which is fine for text, but how can we create moving objects as in arcade type games?

We could bring about the impression of movement by *PRINTING* objects, erasing them and then printing them again in another position, but this is a slow process. To make the job simpler we can use two new commands.

PEEKing and POKEing

The first command is called POKE. In order to understand what POKEing does, we must look at the VIC's memory and find out how it is arranged. The unexpanded VIC comes with 3583 bytes of memory which can be used for writing programs. Into these 3583 bytes you can enter BASIC or machine code programs. When you enter a program the contents of these bytes will change under the control of the computer. When the program is RUN, the contents of these bytes are INTERPRETED and the result you want will be brought about providing that is, that no mistakes have been made. Apart from the 3583 bytes used for your programs, there are 506 bytes that the computer reserves for the screen memory. It is these 506 bytes that are of interest to us.

Each of the 506 bytes and all other free bytes can be thought of as a box into which a number in the range 0 to 255 can be placed. Depending on what number is placed in each box or LOCATION, different effects can be obtained. To put a number into a location we use the POKE command. This is done as follows: POKE LOCATION, NUMBER.

Let's try POKEing a special location with a number. This location is responsible for screen colour on the VIC, and has a value of 36879.

Type in, without a line number, POKE 36879, 127 and hit RETURN. You should find that the whole of your T.V. screen has turned yellow — not bad for one command? Now type in directly PRINT PEEK(36879) and hit RETURN. The computer should print 127, which is the number you put into location 36879. Try POKEing in other numbers and then PEEKing at location 36879. You should find that by POKEing into 36879, you place a number there. By PEEKing at the same location you can find out what number is stored there.

Now to the moving objects. Just as we can put numbers into location 36879, we can also POKE objects onto the screen. The screen memory occupies locations 7680 to 8185 inclusive and any of these can be POKEd to, and depending on what you POKE into it, a symbol or letter will be seen in that location. Try this for illustration: Type in directly; POKE 36879,8:POKE 7680,42 and hit RETURN. In the top left of the screen you should see an asterisk or star shaped object. You put the star there by POKEing 7680 with the number 42.

Now type in POKE 7680,32 and hit RETURN. The star should now have disappeared from the screen. By putting 32 into location 7680 you have erased the star. Now let's see if we can get our star to move across the top of the screen. Type in program 1 which is heavily REMmed and watch what happens when it is run. So you see, writing programs for screen movement is really quite simple. See how well you can develop the technique.

Program 1 Demonstration of moving objects

```
5 PRINT"J":REM CLEAR SCREEN
10 POKE36879,8:REM CHANGE SCREEN TO BLACK
20 SS=7680:INC=1:REM START OF SCREEN AND NUMBER ADDED TO START OF SCREEN
30 POKESS,42:REM POKE STAR INTO TOP LEFT OF SCREEN
40 FOR T=1TO 90:NEXT:REM WAIT A LITTLE WHILE FOR COMPUTER TO COUNT 90
50 POKESS,32:REM ERASE THE STAR
60 SS=SS+INC:REM MAKE SCREEN START ONE LOCATION FURTHER ON,ADD INC TO SS
70 IF SS=7701 THEN INC =-1:REM CHECK IF YOU HAVE REACHED THE END OF THE TOP LINE
80 REM IF SO THEN MAKE INC NEGATIVE SO AS SS BECOMES LESS BY ONE
90 REM IF NOT THEN GO BACK AND RE-POKE THE STAR AT NEXT LOCATION
100 IFSS=7680THENSS=7680:INC=1:REM CHECK FOR START OF TOP LINE AGAIN
110 GOTO30:REM DO IT ALL AGAIN
```

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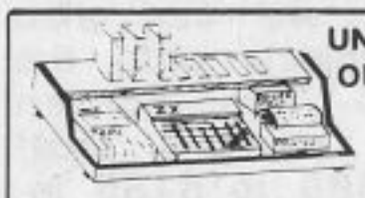
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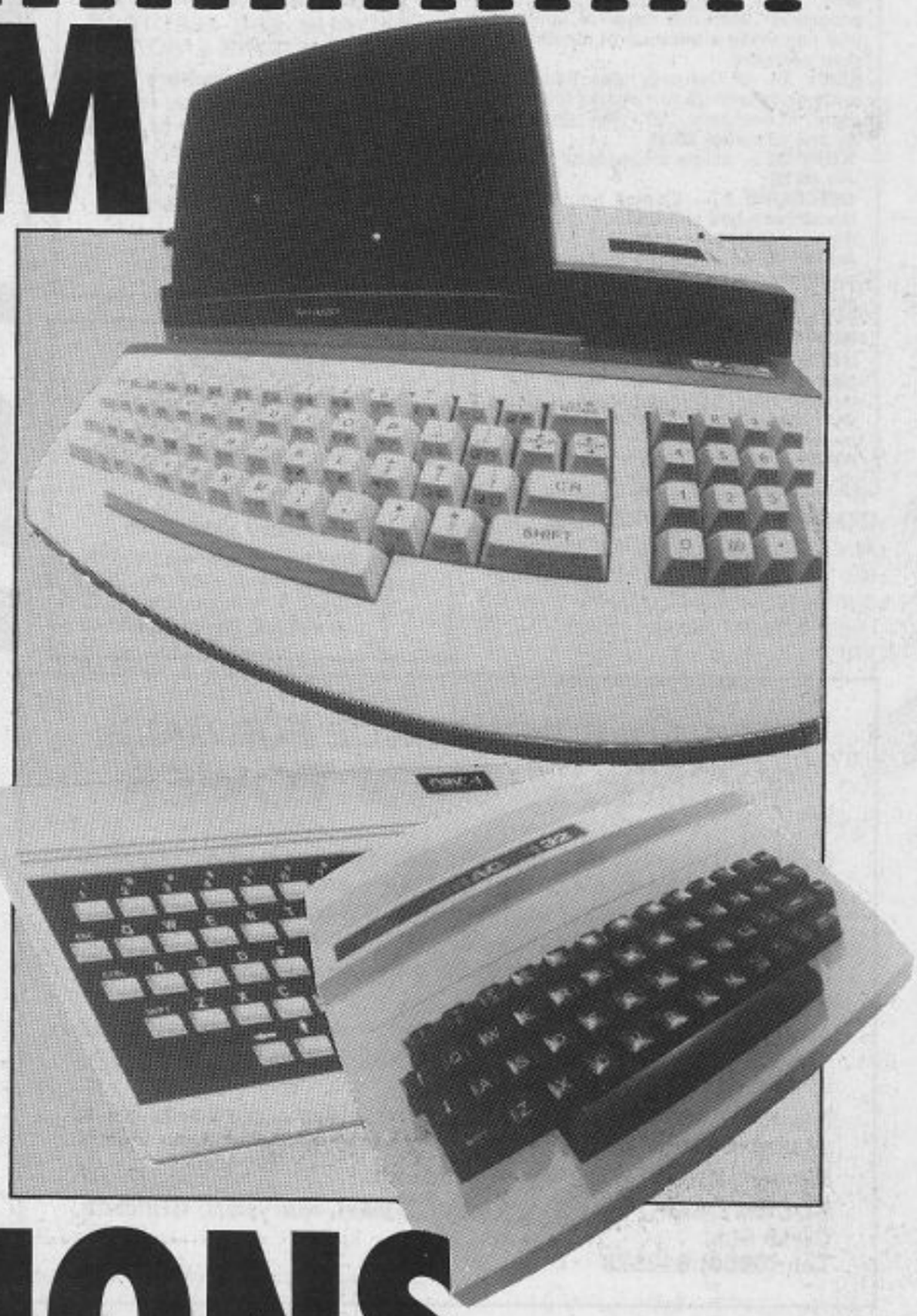
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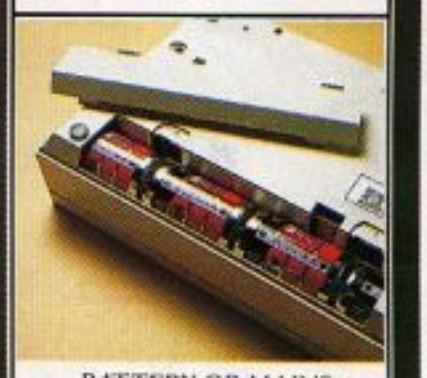




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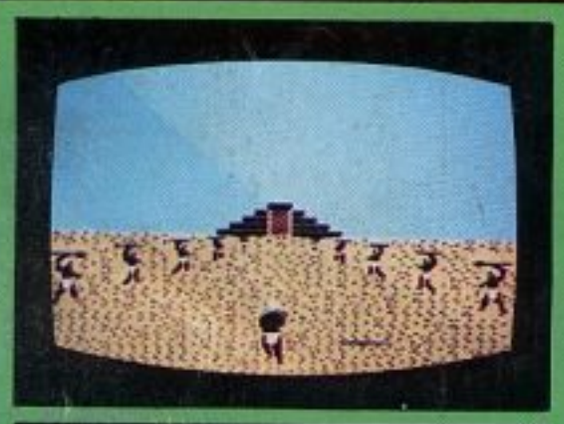
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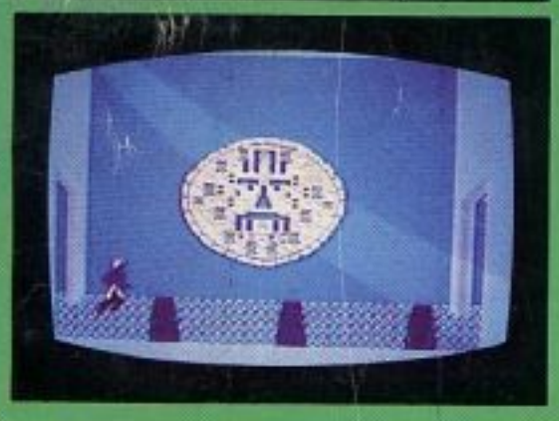
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