

HOME COMPUTING WEEKLY

AN ARGUS SPECIALIST PUBLICATION

April 9-15 1985 No. 107 45p

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Tatung to enter home market?

Tatung has slashed the price of its Einstein from £500 to £350.

And rumours of a new model, which will compete with the Amstrad CPC464, are currently being bandied about.

Code-named the Micro Einstein, the new computer is reported to feature a built-in three inch disc drive, 64K of RAM, 16K of video RAM and software which includes Crystal BASIC, a BBC-like BASIC and Dr Logo.

According to a source at Tatung, the Micro Einstein will be unveiled at a trade show in May. The basic model should cost about £300 (UHF modulator extra) while the computer plus colour monitor should retail at £450.

Colin Charters, Tatung sales manager, was being cagey. "We're looking at various markets to find where the niches are," he said. "And the objective in cutting the price of



Einstein — price slashed to £350

the Einstein is to gain a larger share of the market."

The Einstein has suffered from a lack of software, but Mr Charters claims this has now

been remedied, with supporting titles from 20 software houses, amongst whom are Ocean, Software Projects and Activision.

A wafer revolution

Cheaper than a disc drive but hundreds of times faster than a cassette — it's the wafer drive.

Based on the principal of the endless loop, the tiny wafers run on compact data drives. The C64 version, from Dean Electronics, costs less than £100 and joins the Rotronics' Spectrum Wafadrive, launched last summer.

Now BSR, Dean and Rotronics have joined to promote the waferdrives. Neal Stewart, BSR deputy chairman, said: "We're aiming to replace cassette storage among low-cost computer users."

Shaun Tredinnick of Dean



C64 Quick Data Drive

Electronics explained: "Initially, we will be offering a bundle which includes the drive, quick operating system, a blank wafer and a game, at a cost of just under £100 for the C64."

Software houses interested in this storage medium include

Melbourne House, Hewson Consultants and The Edge.

The cost of each wafer ranges between £2.45 and £2.99, depending on memory: currently there is only a 44p difference between a 16K and a 128K wafer.

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Boy Wonder
See p.3**

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...7 busy characters, 10 lost chords, 15 hours, 48 Traffic Wardens, 95 London Tube Stations, 126,720 square feet of London, 7 million Londoners ... 943 action filled screens.

PAUL MCCARTNEY'S *Give my regards to*

BROAD STREET

The new single is missing and the band have gone home for the weekend — leaving you just 15 hours to re-create the missing tune.

A race against time around London to find each member of the missing band. You have to watch out for blue meanies, wardens and Rath! A clever strategy game, full of excitement, brilliant graphics and all wrapped-up with McCartney music!



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DAILY EXPRESS
says
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HOME COMPUTING WEEKLY

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April 9-April 15, 1985 No. 107

Soapbox

Hackers have been in the public eye lately. Firstly there was the publication of the Hackers Handbook, which supposedly gave information enabling widespread fraud, and now two hackers have been arrested under the Forgeries and Counterfeiting Acts.

Is it possible to forge a computer disc? Can it be mere coincidence that the first such prosecutions are directed against two well-known hackers?

It seems that the powers that be are taking the offensive on this matter. I wouldn't argue their right to do so, but does this justify making a public example of these offenders?

John

If you have anything to say — if you disagree violently with anything we write, or if you want to voice an opinion — write to us at Home Computing Weekly, No.1 Golden Square, London W1R 3AB, and get it out of your system. We send a prize to the writer of each letter.

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- Star profile on author Craig Thomas
- Kempston and Arcade joysticks — our experts look them over

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BASIC LIVING



by Jon Wedge and Jim Barker

NEWS

Hi, Robot!

Fischertechnik has added more possibilities to its computer robotics pack. Now it is possible to make 10 different robot forms from the £64.95 kit.

If you've ever wanted to build a lift with up to three floors, a dual function machine tool, pedestrian controlled traffic lights or an aerial rotor you can do so with the revised kit.

There are interfaces available for Apple II, Commodore and BBC machines, but they will cost you another £64.95. However, this is still a competitive way to start learning about computers and machine control.

Economatics, Epic House, 4 Orgreave Road, Handworth, Sheffield S13 4LQ

Gift of the gab

If you have ever wished your C64 could talk, Cheetah has made it possible with its new add-on.

The Sweet Talker connects to the computer by the rear port. A phono lead carries the signal to the internal sound system, and it's channelled through the TV or monitor.

There is no fixed vocabulary as the system uses allophones. To create words you string together the component parts and feed these codes to the unit.

For £24.95 the Sweet Talker gives you spoken error messages, warnings during game play and prompts in business programs.

Cheetah Marketing, 24 Ray St, London EC1R 3DJ



The voice of the C64

Software update

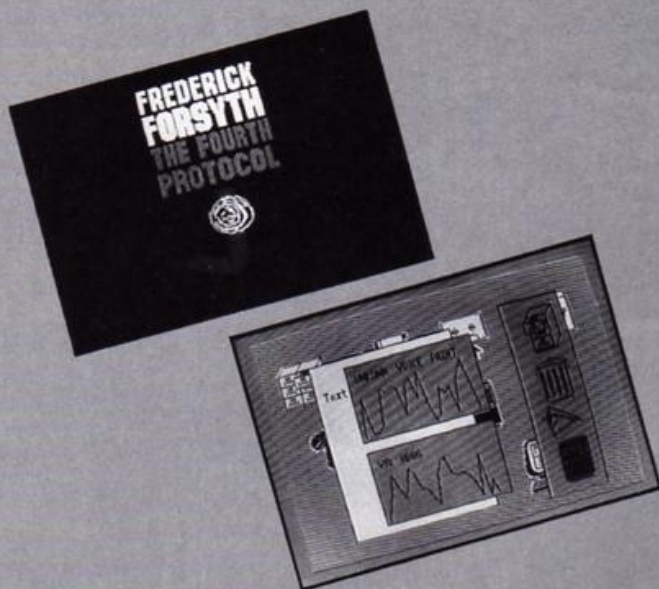
New releases are thin on the ground this week. The Fourth Protocol, based on Frederick Forsyth's best-selling novel, has been receiving pre-release promotion. Publishers Hutchinson claim advance orders of 30,000 — and the game won't be available until May 23.

Doug Fox, general manager of Hutchinson, said: "If the game goes as well as we expect it to, we have plans to follow it up with more computer games backed by authors of popular books."

And a computer adaptation of Forsyth's Day of the Jackal is on the cards, and should be in the shops by spring 1986.

Ariolasoft is enticing Lode Runner fans with promises of gold. Ten winners will each win mini-Krugerrands.

Frank Brunger of Ariolasoft said: "The game is all about retrieving stolen gold, so we thought Krugerrands would make a nice prize." To get your hands on that precious metal you must submit your best challenge screen; winning entries will feature on Ariolasoft's follow-up Championship Lode Runner, to be released in the autumn.



Screen dumps from Forsyth's Fourth Protocol

| Title | Machine | Price | Publisher |
|-----------------------|------------------|-----------------|----------------|
| Tycoon Tex | C16 | £6.75 | Gremlin Grphcs |
| Xargon Wars | C16 | £6.95 | Gremlin Grphcs |
| Petals of Doom | C16 | £6.95 | Gremlin Grphcs |
| Arnhem | Spectrum | £8.95 | CCS |
| The Fourth Protocol | Spectrum/ C64 | £12.95 | Hutchinson |
| Sub Strike | BBC | £6.50 | Dream |
| Mastermaths | | | |
| Robin to the Rescue | C16/Plus/4 | £6.95 | Solar |
| World Series Baseball | C64/ Spectrum | £7.95/ £6.95 | Imagine |

What a racket!

The end of April will be marked by the launch of Jonah Barrington's Squash by New Generation.

Available for the C64 and Spectrum, the game will simulate a full squash match and have a unique sound facility.

Jonah challenged Rod Evans of New Generation to a match and ended up teaching him some of the game's finer points, like how to stand upright when serving. It appears that the final score is a well guarded secret.

New Generation, The Brooklands, 15 Sunnybank, Lyncomb Vale, Bath BA2 4TD

Mikro-Gen mystery

A package carrying the legend "There's a big one coming your way" came through the mail recently.

Further investigation proved the contents to be a disposable nappy — part of a promotion for Mikro-Gen's new game Herbert.

The game won't be featuring Wally Week, star of the Wally games. Mikro-Gen promises that the game is easier and more lighthearted than recent release Everyone's a Wally.

MikroGen, 44 The Broadway, Bracknell, Berks

Speedy Speccy

Interface III from Evesham Micro Centre is being hailed by the company as a real breakthrough for Spectrum owners.

The unit involves both hardware and software additions to the machine and at less than £40 it is claimed it will enable you to write any cassette program to Microdrive cartridge, so that it can be run straight from the Microdrive.

Interface III allows you to stop a program at any stage and then save the result as a screen string.

With this added speed it is unlikely that Spectrum owners will be drinking much coffee anymore. They won't have time to wait for the kettle to boil while their software is loading.

Evesham Micro Centre, Bridge St, Evesham, Worcs WR11 4RY

Users unite

If you own an Enterprise or an MSX machine you can now join newly formed user groups.

Mark Lissak is interested in forming a group for Enterprise owners and will send further details to anyone who writes enclosing an SAE. He is interested in Enterprise users who can offer assistance as well as those who need it.

The MSX group being formed by Tony Brown aims to publish a newsletter featuring programming hints, technical tips and software reviews. All you need to do is send an envelope to his address below.

Mark Lissak, 40 Mansfield Rd, London NW3 3HT
Tony Brown, Emscote Mill, Wharf St, Warwick

Jonah Barrington about to squash Rod Evans

Important!

Gremlins got into our A'n'F Chuckie Egg 2 Competition last week. The clue to our code breaker was jumbled up and should have read; **DZRSOQ = EASTER.** The code breaker is still **FN BQZBJ Z BGTBJHD DFF.**

Closing date has been moved to Friday April 26 1985.

We apologise to everyone who got confused.

Top ten

George is a very popular character if our competition post bag is anything to go by. We had our biggest entry for a number of months and over half found the 13 differences between the programs.

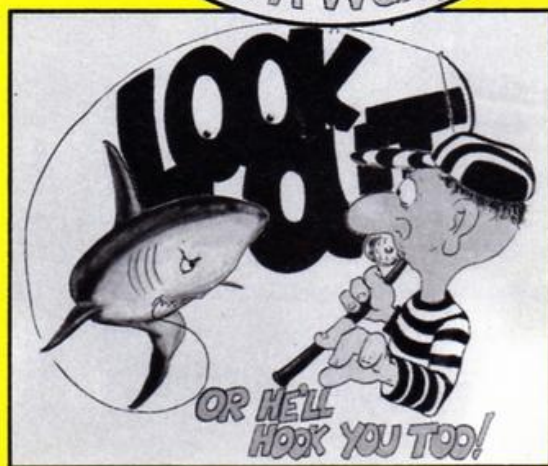
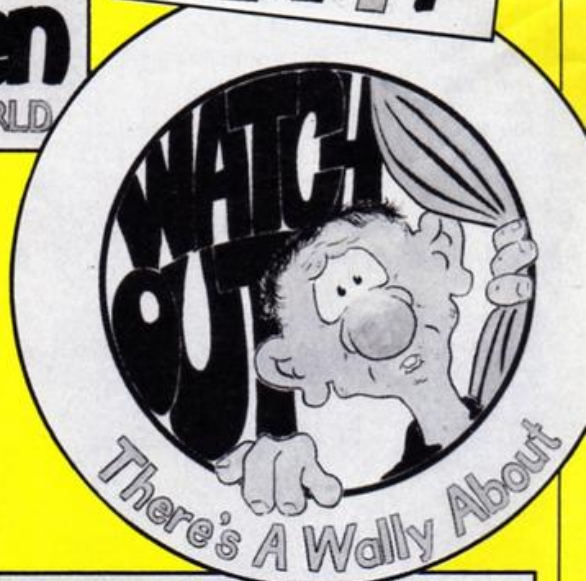
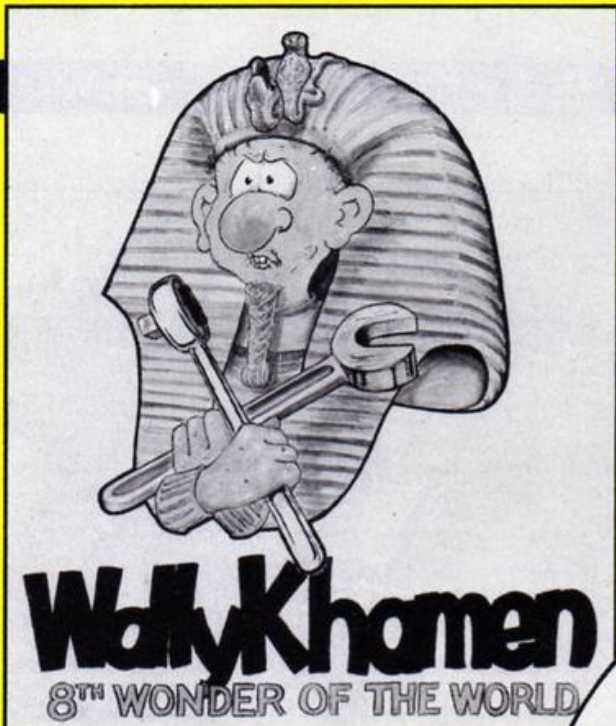
However, there was an error in the printing of the programs. The program which runs is Program B, as a number of you pointed out. Thank you to those who informed us of this error — which wasn't deliberate.

The 10 new George owners are: Arwel Hugues, Anglesey; Harish Patel, Walsall; J Liptrot, Maghull; David Cooke, Redruth; Kevin Whitfield, Haverhill; Paul Campbell, BFPO 41; Toni Sycamore, Launceton; Ian Balmer, Skelmersdale; Lisa Hadcock, Urmston; S J Widlake, Sheffield.



Design a Wally was the aim of our recent MikroGen competition and you certainly took us at our word

WONDERFUL WALLYS



After having an office full of Wallys for a number of weeks Mikro-Gen has judged the winning entrants of the Design a Wally competition.

There are 47 winners. The first prize, an all expenses paid trip to Mikro-Gen, goes to Umran Kahn of Norbury in London. His idea was the WallyKhamen Eighth Wonder of the World.

His idea, and those of the runners-up, has been produced as artwork for use by Mikro'Gen in future promotions. Posters, badges and perhaps games will feature some of these ideas.

The six winners of T-shirts and games are: Ian Malcolmson, Dromore; C A Byrne, Reading; Vijayesh Lad, Long Eaton; D E Nicholls, London; John Smith, Southampton; Mrs P Hinton, Reading.

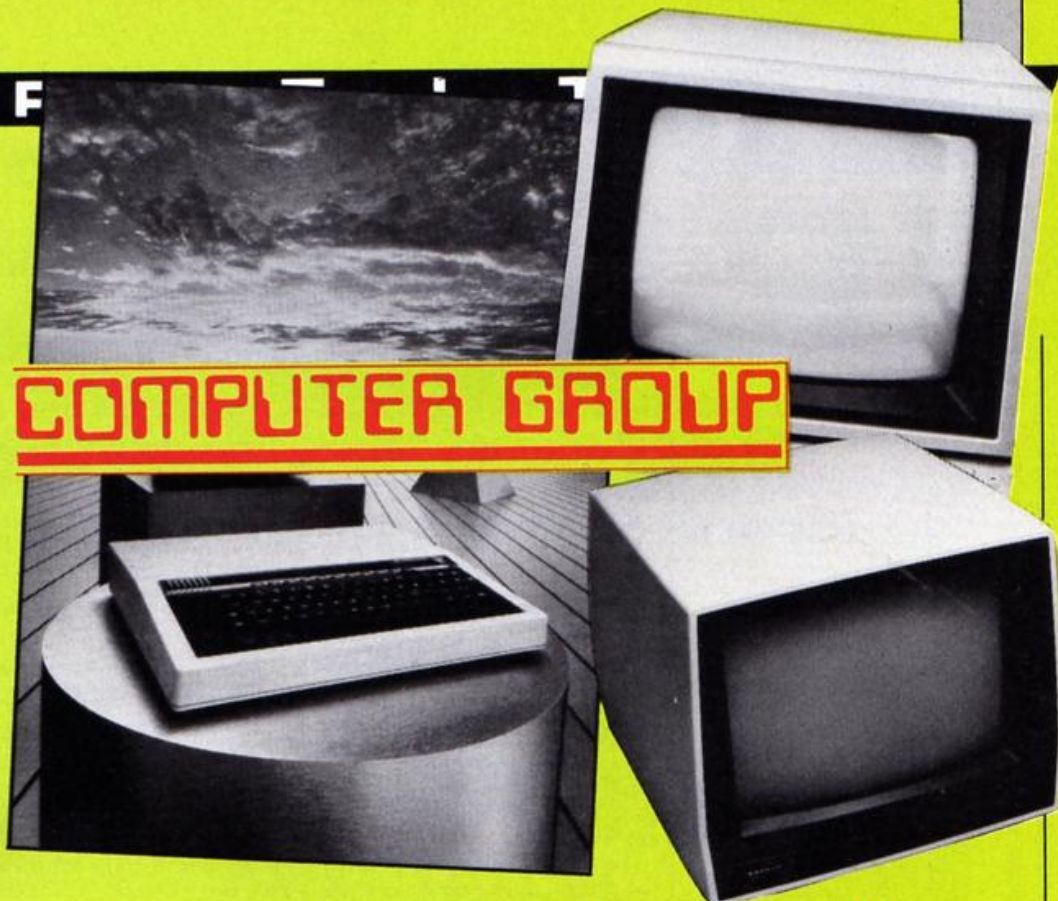
There were 40 runners-up, who each win Everyone's a Wally. Here are their names: Andrew Richmond, Chesterfield; Sarah Grant, Harlow; Nicholas Bentley, Chapel-en-le-Frith, Liverpool; Robert Anderson, Hebburn; R Barlow, Scunthorpe; Richard Curtis, Wellingborough; Niloy Acharyya, Hull; I Gardner, Barnsley; Martyn Draycott, Chesterfield; Jason Hayward, Heckmonwike; J R Gambles, Rotheham; Michael Carman, Stoke

on Trent; S Monk, Royston; Gary Hughes, Clwyd; Chris Lovelace, Weybridge; James Ellis, Ripon; Darren White, Whitstable; Phillip Cox, Cheshire; Andrew Parker, Bury; Mark Clifton, Stockton on Tees; David Scott, Bedlington; Jason Kemley, Perthshire; Diane Cherry, Co Tyrone; Brook Campbell, Brentwood; Joe James Maguire, Nr Ulverston; Michael Clarke, Consett; Graeme Murray, Sunbury on Thames; Paul Cox, Romford; Andrew Gillespie, Macclesfield; W Chalk, Sydenham; J Clemence, RAF Gutersloh; Pascal Sendron, Ballineen; Juliet Roebuck, Lymington; Don Ramsay, Bradford; Kevin Clark, Eastbourne; Nicholas Taylor, Southminster; Simon Kelleher, Middlesbrough.

AKHTER

WIN A BBC SYSTEM!

COMPUTER GROUP



There's hardware worth over £1000 on offer in our Akhter competition this week. The first prize winner will receive a full BBC system, with all cables, ready to plug in and run.

The competition is in two parts. The first part is published this week and the second appears in next week's issue. Both are easy to enter but you need both the coupons or your entry won't be valid.

The first prize is nearly £700-worth of computer equipment. A BBC micro, complete with disc interface, a Sanyo colour monitor and a monitor stand make up the package which will be sent to the top winner.

There are also two other prizes. The lucky winner of the second prize will be given a Sanyo colour monitor and stand, worth over £220, while the third prize is a green-screen Sanyo monitor and stand valued at over £125.

Akhter is a major supplier of disc drive systems for the BBC. Akhter believes these units are now so reliable that it supplies a Gold Standard, two-year guarantee on the drives.

Akhter also supplies printers, monitors, computers and software to an expanding market. The company has recently been appointed as the official educational distributor for the Sanyo computer systems.

Despite its rapid growth the company still wishes to listen to, advise and recommend systems to the individual customer and would like to hear from any reader who needs advice. Phone 0279 443521.

**We're giving away more than
£1,000-worth of hardware this week.
Jump to it! Second part next week**

How to enter

All you have to do this week is make as many words as you can from:

Akhter Computer Group

There are plenty of letters to use but all words should be more than three letters long.

You can use the words "computer" and "group". Please note that plurals and proper nouns are not allowed and all the words be found in the Concise Oxford Dictionary. You may only use each letter as often as it occurs in Akhter Computer Group.

When you think you've found as many as you can, enter the number of words on the coupon and make a neat list of the words ready for checking.

Preserve the coupon and list carefully until you have completed part two which will appear next week.

You may enter as many times as you wish, but each entry must be on an official entry coupon — not a copy — and sealed in a separate envelope.

The rules

Entries will not be accepted from employees of Argus Specialist Publications, Akhter Computer Group, and Alabaster Passmore & Sons. This restriction also applies to employees' families and agents of the companies.

No entries can be accepted without both entry coupons. One from this week's magazine and one from part two which will be printed next week.

The How to Enter section forms part of the rules.

The editor's decision is final and no correspondence can be entered into.

Akhter Competition**Entry Coupon (part 1)**

Number of words _____

Name _____

Address _____

_____ post code _____

Computer owned _____

Attach your list of words to this coupon and preserve it carefully until you have done part two of the competition which will appear next week.

In the second part of Brian Jones's series, he shows you how to start programming



WELCOME TO BASIC

Hello again. In my last article I introduced you to the origins of the language BASIC and the actions of most of the keys on the Commodore 64 keyboard. Here are the answers to your "homework".

Firstly, the graphics characters generated by the Commodore logo key which flip when the Commodore and shift keys are pressed together are ↑ and *.

To draw a diagonal line clear the screen, then enter a shifted M (i.e. hold down the shift and press M. If you get "m" flip back to capitals and graphics) then cursor down once. Continue alternating these last two steps until the bottom is reached. Easy!

The noughts and crosses board is easy once you find the right graphics characters, the ones which link up. Use the shifted -, * and + for the vertical, horizontal and cross-over lines respectively.

Now, before we get down to writing a program, try this. On an otherwise blank line type:

```
PRINT 2+2
```

and press the key marked Return. You should see 4 appear on the next line, then a blank line, READY and the cursor flashing away on the line under that. If you get anything else, clear the screen and try again. The return key is the "action" key. It tells the computer to take the action appropriate to whatever was on the line you typed. Now try:

```
PRINT 3*2+1
```

and press return. Notice that the * acts as a multiply sign.

Pressing Return is a very important step. The computer can't guess when you've finished entering the parts of your sum; you have to tell it when the calculation is ready to be done. So in general if I instruct you to enter something I mean type it in and press return. The PRINT part of the sum is an instruction from the vocabulary of BASIC which means "send the result of the following to the screen". We

can now turn this sort of instruction into a program. On a fresh line enter:

```
10 PRINT 6+4*9
```

When you pressed Return nothing much happened. Now enter the command RUN. This time when you pressed Return the answer 42 appeared. Were you expecting 90? Well, BASIC uses what is called algebraic logic. It multiplies and divides before adding and subtracting. So $6+4*9$ is effectively $6+(4*9)$. If in doubt put brackets — but round brackets () not square.

But back to why we had to type RUN before we got the answer. The 10 before PRINT $6+4*9$ made the computer behave differently. If the line to be actioned starts with a number the action taken is to store the line away in the computer's memory. If more lines starting with numbers are entered, they too are stored in memory, not in the order they are entered, but in the order of the numbers they start with. The RUN command tells the computer to go through what's in its memory and carry out those instructions in line number order.

Enter another line:

```
5 PRINT "THE ANSWER IS"
```

and RUN your two-line program. Notice that the double quotes round the message don't appear when it's RUN. Anything in quotes is reproduced on the screen exactly. Try:

```
PRINT "6+4*9" or
PRINT "2+2=5"
```

Now clear the screen and enter the command LIST. When you press Return, the two program lines are LISTed. so, we can clear the screen but it doesn't affect the program. How do we clear the program? Answer: enter NEW. Do that, and enter LIST again. All you get is the message: READY. That tells you that the computer is ready to accept your next instruction.

So far you've seen lots of arithmetic, but computer programs are usually mainly algebra — formula to get the answer, given the data. RUN this:

```
10 LET Y=15
20 LET M=8
30 LET T=Y*12+M
40 PRINT T
```

This program calculates how many months old a person 15 years and 8 months would be. Lines 10, 20 and 30 are assignment statements. Lines 10 and 20 assign values to Y and M respectively, but 30 gives a formula to calculate T. The LET is to emphasise that it is a formula to allocate a value, not an equation to be solved. However, in most versions of BASIC, including Commodore's, the LET is optional.

Let's change the program to replace the data by your age. There's no need to start all over again, just re-enter lines 10 and 20 with your values. You can use LIST to check that it's worked and RUN the new version.

Here's another one to try. NEW away the other program first.

```
10 LET M=26
20 LET K=M*1.6093
30 PRINT M;"MILES IN
KILOMETRES IS";K
```

Careful with the punctuation in line 30. See how you can mix message and results. Did you make a mistake and try to move the cursor back to correct it, or clear the screen to try again? Well, you can't! Once you type the " the cursor keys generate strange characters. I referred to this in my previous article. You can use the delete key; that's how to correct an error.

You might also be wondering why we number programs in tens, rather than 1, 2, 3. It's so that if we wanted to add extra lines later, in between two existing lines, there are values available. Look through some of the listings elsewhere in Home Computer Weekly and spot the late additions. Finally, two programs for you to try and write:

- 1 To convert 5 litres to pints
- 2 To calculate the full cost per tape of tapes sold in four dozen boxes for £19.95 excluding VAT. (Hint: to add 15% to anything, multiply it by 1.15).

Answers next week.

MIRRORSOFT

‘You can rerun again and again, for education or for the sheer pleasure of looking at the stars without clouds, buildings, light-glare, or driving rain.’

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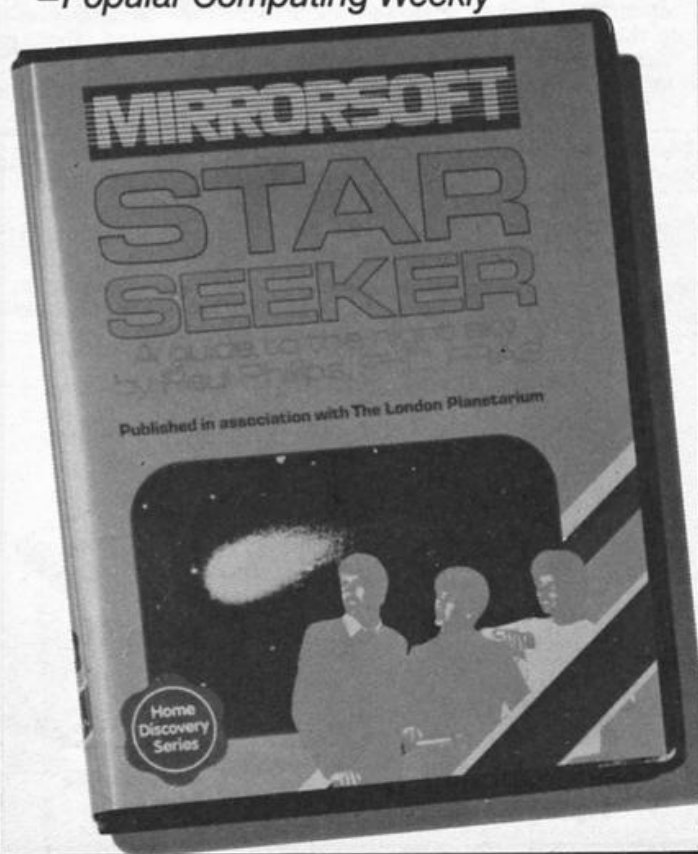
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SOUND MOVES

Clive Gifford continues his series on the Amstrad CPC464's sound capabilities

In my last article I dealt with the ENT command, but only for the creation of a single rise or fall in pitch. What happens if we want to create an envelope with multiple rises and falls? The answer is simple and helps to show the flexibility of the sound commands available to you on the Amstrad.

The group of parameters following the envelope number are all concerned with one rise or fall. For each additional rise or fall, it is just a matter of adding on a separate group of parameters. You can have up to five separate groups after any one ENT command. If you wanted a sound taking half a second to rise and a quarter of a second to fall back to the same level but each consisting of five steps, then an ENT statement could look like this:

```
ENT 1, 5, 12, 10, 5, -12, 5
```

By quickening the rise and fall in the envelope and by adding a minus sign to the envelope number we can create a tremolo effect. The minus sign makes the envelope constantly repeat itself — a very handy addition to the ENT command. Here's a good

example of a tremolo envelope:

```
ENT -1, 15, 4, 1, 15, -4, 1.
```

The Volume envelope is just as, if not more, useful than the tone envelope for creating a wide and varied range of sounds. This envelope, controlled by the command, ENV, is somewhat different to the previous envelope.

When a note is played its volume may not remain constant. Think of a piano key being pressed. It reaches its highest volume very quickly before dying away almost as fast. In contrast, a note from an organ maintains a constant volume right until the very end of the note when it fades away. This principle is behind the volume envelope and is called ADSR. The idea is that every sound goes through four volume stages; the *attack* where the volume of the note reaches its peak; the *decay* where, as its name suggests, the volume falls back from the original peak; the *sustain* where the note's volume is either maintained or gradually reduced at a slower rate than the decay stage; the *release* where the sound's volume falls to zero. The simple

graph (Fig.1) shows a typical ADSR sound shape.

The ENV command does have similarities to ENT. Both must start with an envelope number and both have groups of parameters. ENV's parameters, however, consist of number of volume steps, the size of each step and the length of time each step lasts. A simple ENV statement would look something like this:

```
ENV 1, 5, 3, 10.
```

This would result in an envelope lasting a total of half a second and consisting of five volume steps each rising three volume steps.

For a full ADSR effect, you need a full set of parameters for each of the four parts of the volume phase. This results in a veritable beast of a statement with no less than 13 different numbers. Don't be put off by this command: when broken down into separate groups of parameters, the task of constructing efficient envelopes becomes a lot easier.

Below are a few envelopes created using ENT and ENV along with a simple sound effect attempting to simulate an envelope. Pressing a key on any of the envelope-based routines will make the computer play a different note and just by hearing a few examples you will be able to hear that some

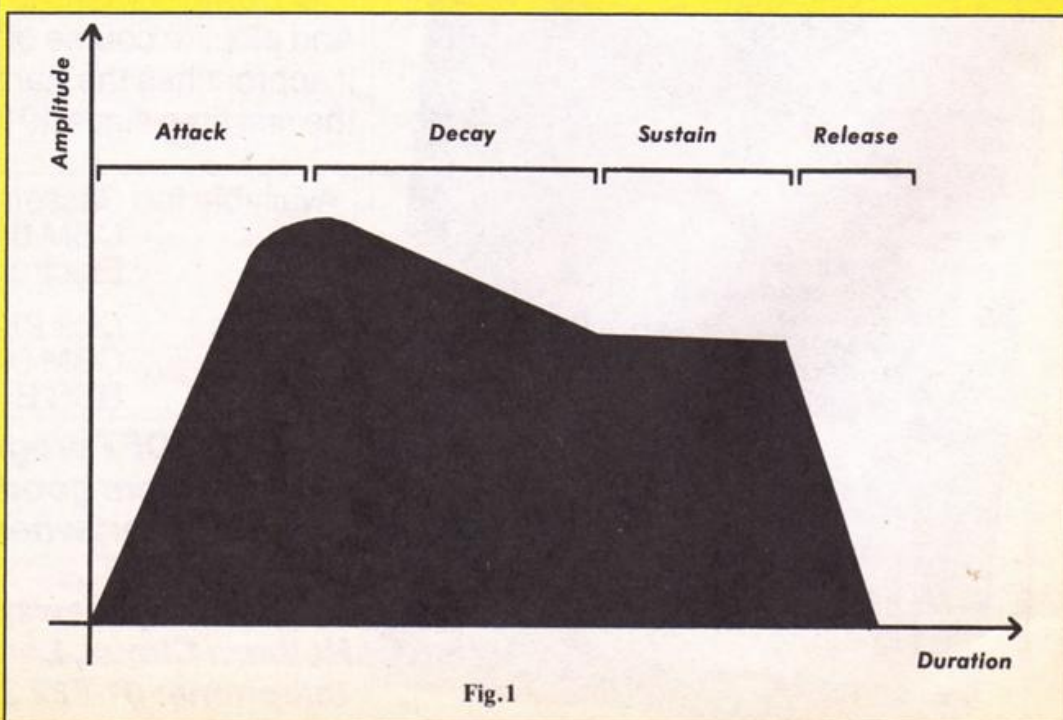


Fig.1

envelopes work best with higher and some with lower pitches of note.

Note that with SOUND statements incorporating a

volume envelope, the volume level usually controlled by the fourth parameter of the sound statement is set to 0 as control is passed to the envelope.

```
10 ENT 1,15,2,1
20 ENV 1,15,-1,1
30 WHILE INKEY$="":WEND
40 SOUND 1,INT(RND*400)+20,15,0,1,1
50 GOTO 30
```

```
10 ENT -1,5,-15,1
20 WHILE INKEY$="":WEND
30 SOUND 1,INT(RND*400)+75,50,15,0,1
40 GOTO 20
```

```
10 ENV 1,15,-1,3
20 WHILE INKEY$="":WEND
30 SOUND 1,INT(RND*300)+100,45,0,1,0
40 GOTO 20
```

```
10 FOR G=1 TO 5
20 FOR T=7 TO 0 STEP-1
30 SOUND 1,80+2*T,1+3*T,T
40 NEXT: NEXT
```



Get more out of your BBC Micro with the New Marconi RB2 Tracker Ball

Marconi's new Tracker Ball is superior to either a mouse or joystick and is easier to use.

The RB2 design incorporates Marconi's vast experience in making Tracker Balls for Air Traffic Control and professional equipments which demand maximum performance and reliability. It is drift free and gives more precise positional control - the cursor position on screen relates directly to fingertip movement on the ball. The three push buttons normally control the delete, return and copy functions but you can also assign your own functions to the buttons.



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VENTURES

Peter Sweasey's in a jam this week with Danger Mouse in Black Forest Chateau. Read on to find out more.

Time to go a-venturing once again with HCW's regular column reporting and reviewing on everything of interest from the world of adventures and arcventures (arcade adventures). This week I shall be in a jam with Danger Mouse In Black Forest Chateau, comparing Colossal Caves, and climbing Mountain Palaces. The helpline will be dealing with Valkyrie 17, amongst others. Read on, if you dare...

Reviews

Danger Mouse is one of the most famous British cartoon characters. His comic secret agent exploits, along with bungling assistant Penfold and Chief, Kernal K, have won the hearts of many of the nation's children, along with quite a few adults! After the first DM game from Creative Sparks, Double Trouble, which was more of an arcade game, comes Danger Mouse In Black Forest Chateau, an adventure designed with younger players in mind.

A puzzling pi-beam has been zapping the world's leaders, creating a sticky problem. The source is the Black Forest, and that is where you must go, to track down the evil perpetrator, who, it comes as no surprise, is a certain Baron Greenback. Penfold is close at paw all the time.

This seemingly simple scenario is far more complex once you start playing. In fact the game is in two parts, one on each side of the tape. You start in a forest clearing, depicted in excellent graphics, as are all the locations. On screen is some simple text (though far better written and slightly longer than many "adult" games), then a question along the lines of "What next?" followed by a choice to enter the forest, follow the tracks, go to the hut or climb a tree.

Control is simple. You use the space bar to highlight, then press RETURN, and the game acts accordingly.



You may think this kind of multiple choice leads to a very linear, channelled adventure. But no, DMIBFC is a very entertaining game. As I mentioned earlier, the graphics are very good, particularly those of the cartoon characters, which are drawn in highest resolution. The text is attractive and witty, and the problems whilst not stunningly original, are interesting and not always as easy as they may seem at first.

For those eight-year olds this program is aimed at, it is excellent and should provide a real challenge, whilst not being impossible (if you go hopelessly wrong Penfold often comes out with a hint). Older people will probably like it too, particularly at parties — although it's a bit pricey for them considering it won't take as long to solve. DM fans will love it, of course. Ventures rating: 4 stars. It costs £7.95 from Creative Sparks.

I recently received a large number of titles from Duckworth, the book publishers. Amongst these was the originally titled Colossal Cave Adventure, another

version of the original Crowther and Woods mainframe game, which in case you don't know, started the whole world of computer adventures (good thing too, or else I would be without a job!) The game masquerades under many titles on the home micro: Classic Adventure, Colossal Caves or the famous Level 9 version, Colossal Adventure. I thought it was time to stage a fight — so, here we go, with Level 9 vs Duckworth.

The scenario is pretty simple, but for a change I can't call it unoriginal! Having rescued a stranger from imminent mugging in a tavern, you are given a map, showing the location of some hidden caves which contain fabulous treasure. The map blows away just as you approach the entrance, and you stand alone.

First locate the entrance, then work your way through a network of rooms, passages, traps, puzzles and mazes, which are inhabited by various unfriendly creatures. Some of the problems are now classics, such as the troll, pirate, dragon and birdcage. As the



instructions to the Duckworth game say, you can't call yourself an adventurer until you have played this!

It is virtually impossible to criticise the actual game, which can be recommended to anyone, as long as you can tolerate mazes (there are plenty in this game). But which version should you choose?

On the whole, the differences are very subtle. The vocabulary is more friendly on the Duckworth version, but Level 9 provides more verbose descriptions: the former prints "You are in a maze of twisty tunnels, all alike" whilst the second says "You are in a maze of twisty little passages, all the same". The countryside is more

extensive in the Level 9 version, but I found it slow and not very responsive.

Presentation is better on the Duckworth game, which also has a redefined character set, and offers you help if you are struggling — in return for hard-earned points, however. Level 9 has better instructions and packaging, and also introduces a new end game, replacing the original two locations with 70.

I would choose Duckworth's version if I was a Commodore 64 owner. It is £2 cheaper at £7.95 and generally more pleasant to use. The Level 9 game is not up to the high standard of all its other material, but nonetheless pretty good, and of course available

on far more micros, including the oft ignored Oric and Memotech, plus even the Lynx and Nascom.

Finally this week, another Duckworth game. This uses the same programming techniques as Colossal Cave Adventure, namely those outlined by Peter Gerrard in his book *Exploring Adventures on the 64*. He was the author of the aforementioned Colossal Cave Adventure, but this is written by John D. Ryan.

You are transported, for the sake of convenience, to a mythical land, and for some reason are standing on a mountain ledge. Nearby is the

entrance to a palace, filled with — surprise surprise — treasure. Being the greedy type, you enter. The door closes behind you. Can you escape with the riches?

The fact that this palace is on a mountain seems to make very little difference in what is an excessively average game. There is nothing special, original or new; locations, descriptions and problems all seem familiar. Vocabulary is adequate. There is a real rip-off of Colossal Cave at one point — a ghost appears and keeps throwing a magic knife at you, which frequently misses.

In general, although competently written, I can't think of any reason to spend £7.95 on this, which explains my Ventures rating of 2 stars.

Helpline

My elfling secretary Gorand has been hard at work on *Valkyrie 17* recently. She did something obvious which I had overlooked — swim out to the boat then take a dive. If you're still stuck at the top of the ski slope, make sure you have read the book you found when escaping the hotel. Take the bottle from the shop to pour over those piranhas. The ring pull can be used in the telescope, and if you need some currency, pawn the necklace. You'll need fuel and a parachute for the plane, go west and search the straw. To go back up to the hotel — pull a few strings.

Spiderfans might be having problems spinning a web. You must only be carrying those chemicals you need — leave the rest behind. Then just enter the lab and mix away.

Alien 8 players might be moved away by what can be best described as "those things which look like your materialization". To regain your self-control drop something on it. The same hint stops blocks from vanishing and sinking. Thanks to Chris Lovelace for supplying those tips.

News of more tasks next time, along with the other Duckworth releases, an excellent adventure, and more exclusive hints. Happy venturing!

Send your problems, hints and views on adventure and adventure games to Ventures, Home Computing Weekly, No. 1 Golden Square, London W1R 3AB.

PERIPHERAL

Check out what our expert reviewers think of the Discovery 1 and Panda cassette interface before you buy

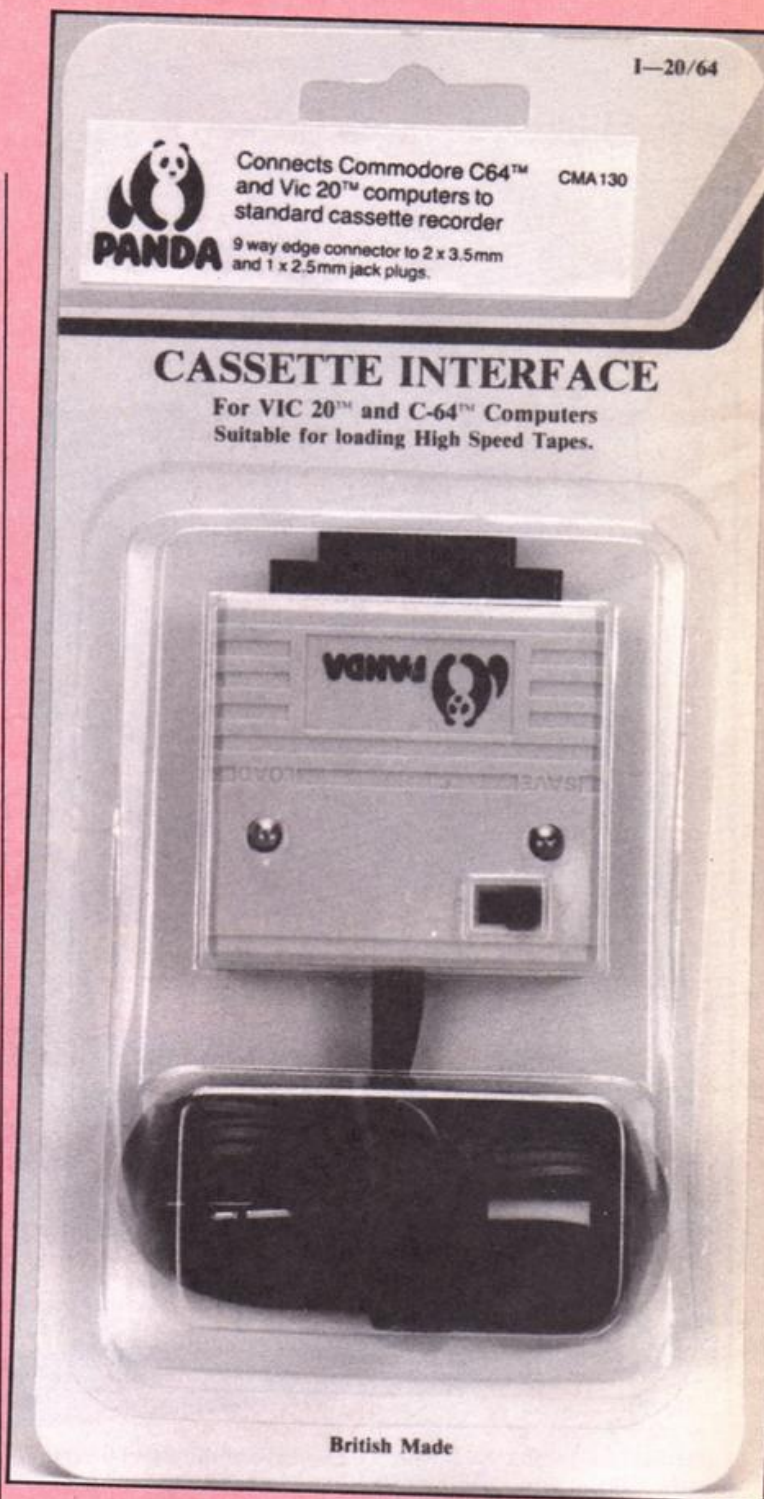
Panda Cassette Interface

One of the drawbacks of all Commodore computers is the requirement for a dedicated cassette recorder. This is not only wasteful but also expensive. A number of companies have identified this problem and produced products such as this interface to make life easier.

The concept is quite simple. This interface is a small box which plugs on to the cassette port of the 64 or VIC. The usual EAR, MIC and REMOTE leads come from the interface allowing connection to many different types of recorder.

The connection of the interface couldn't be simpler with all leads clearly marked. I would have liked an index on the unit to preclude accidental connection upside down. Saving and loading operations are much as before, except that when you press Return after entering the command the screen blanks before you see any key-pressing instructions.

To assist the use of the unit, there are two lamps, one labeled SAVE and the other LOAD. The LOAD lamp flashes when a program header is found or the program loads. This helps with the searching of the tape. The SAVE light glows when programs are saved. A phase switch is provided to cater for different recorders and tape types.



Overall, an excellent product which works well. The unit does alter the value of location 1, which could give problems with certain items of software. A.W.

Price: £17.99

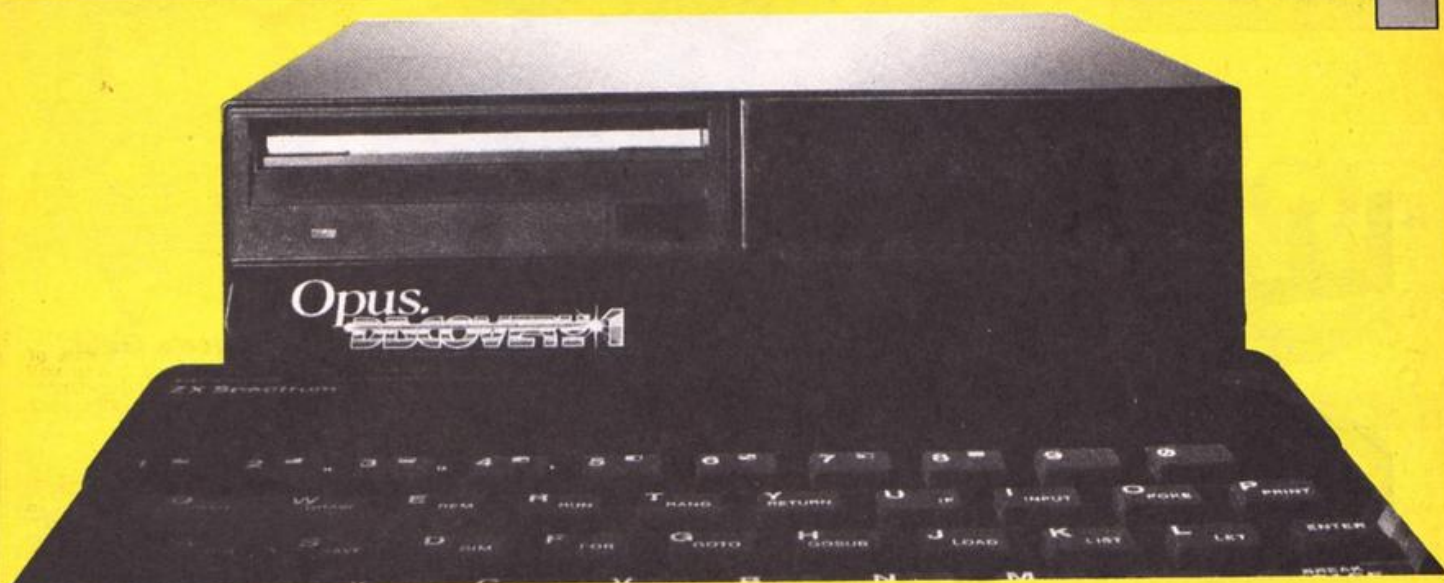
Publisher: Pact

Address: PO Box 50, Peterborough

C64

VIC-20





Discovery 1

Discovery 1 from Opus is a 3.5-inch disc drive for the Spectrum — and much more. Firstly the Discovery package also includes a joystick port and a Centronics parallel printer port.

The unit is a large black box which is attached to the rear of the Spectrum; a base plate comes under the computer and is screwed to it for security. The drive is then above the keyboard to the left, while on the right there is room for another drive. The new unit supplies power to the Spectrum via the edge connector so only one plug is necessary.

The discs operate using shortened Microdrive commands, so a catalogue is obtained by CAT 1 and a load command is LOAD *"m";1; "xxx". However this is where the similarity to Microdrives stops; the drives are much

quicker than Phloppys and, more importantly, much more reliable.

Also the use of disc rather than serial tape has allowed Opus to introduce random access files, thus making the Spectrum with Discovery 1 a much more powerful package; many more database applications may now be implemented as a file and needn't be read into memory simply to extract one item.

The printer port requires a special cable at the Spectrum end but may then be connected to any Centronics printer. The Discovery requires that an output channel be opened with OPEN£3;"t" and then programs may be listed with LLIST in the normal way. The one bad feature of this is that the Spectrum graphic characters are all printed as ? which isn't very useful!

The joystick port is switched

on with the command FORMAT "j";0, which is strange but works well enough. This does mean that you must remember to do this before loading a game from tape but I assume that any disc-based software would do this for you.

This brings me to software. Opus has scheduled a number of well known titles for the launch of the Discovery unit. The software will be supplied on 3.5-inch disc and will consist of two or three major titles, retailing at about £15 — not bad value. The Discovery 1 unit

will cost £199.95 and so is a bargain, if you consider the joystick and printer ports. Also available at the launch will be the Discovery Plus, which is the second drive for the Discovery 1 and Discovery 2 which has two drives already. Finally I should mention that Discovery is only available from Boots. J.G.D.

Price: £199.95

Manufacturer: Opus

Address: 158 Camberwell Rd, London SE5 0EE



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SOFTWARE



Wizard's Lair

This new game from Bubble Bus is an Atic Atac look-alike. However, instead of being trapped in a haunted mansion looking for the right keys to let you out, you are searching underground caverns for parts of the golden lion, the key to your escape.

The game is turbo-loaded and apart from an initial problem which was resolved by experimenting with the volume control, is quick and trouble-free. Following a colourful title screen an option page is displayed. On this you have the choice of Kempston or Sinclair 2 joysticks, keyboard control or user defined keys.

Playing the game is a fast and furious experience as you guide Pothole Pete around a vast subterranean maze of caves, rooms and passages. In the various areas of the maze there are treasures to be collected, articles of food to help your strength levels and extra weapons to aid you in your fight against the dozens of nasties you encounter.

In some rooms there are magic spells. If you collect one of these it is only utilised if you have some gold. You then have a choice of more treasure or extra strength or weapons. The graphics in the game are well done, although very similar to its predecessor. In all this would seem to be a case of looking at a good game and re-writing it with the rough edges smoothed off to make an even better game.

M.W.

Price: £6.99

Publisher: Bubble Bus

Address: 87 High St, Tonbridge Kent TN9 1RX

SPECTRUM



Sam Stoat Safe Breaker

Gremlin Graphics, who brought us such cuddly friends as Monty Mole, Beaver Bob and Percy Pigeon, now presents Sam the felonious Stoat. Your task is take Sam on his house-breaking sortie. You must find a bomb and a match with which to break into the safe, and then collect the diamond and leg it.

You move about the various rooms via a network of mouse-holes. Each time you enter a mousehole, you must negotiate a series of poles sticking out of some water. Use these as stepping stones, but since they have a habit of moving up and down, this is rather tricky. Since I haven't managed to complete this step, I can't comment on the point of this exercise. Each room is occupied by sundry nasties, as expected, which impede your progress. There are also trinkets to pick up. Somewhere in each house is a bottle of stoat reviver which enables you to complete the task in hand.

The graphics are to a good standard with the screen representing either a room or part of a room. Animation is average. There are four houses with 20 rooms in each, which offers a fair variety. The instructions supplied with the game are poor, leaving a number of questions unanswered. The usual choice of keyboard and joystick interfaces are catered for.

Overall, rather a weak game which doesn't really compare with the state of the art software for the Spectrum and is of limited novelty.

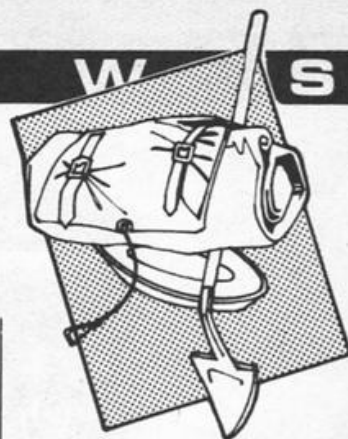
M.W.

Price: £6.95

Publisher: Gremlin Graphics

Address: Unit 10, The Parkway Ind. Centre, Heneage St, Birmingham B7 4LY

SPECTRUM



Dragon's Gold

The current dearth of moving graphic adventure games seems set to continue.

Dragon's Gold is yet another version with chunky graphics which fall well behind the quality set by others.

Without the need to collect objects en route, and with three lives to squander, success is entirely dependent upon fast reactions on the Joystick.

The gold is to be found within a six-roomed castle, small by any standards.

Hazards to be avoided are dust, bubbles, spiders, robots, moving walls and of course the dragon.

You arrive at the castle carrying an empty chest. While the chest is empty you wend your way through the castle to the dragon's room, wherein lies the gold.

On finding the gold you go to the first room where the chest was deposited and claim the reward.

A guaranteed 1000 points for bringing the gold out safely is increased by the addition of bonus points. These will accumulate each time your magic missile spell shooter annihilates one of the nasties.

Full instructions are provided on screen and are repeated on the cassette inlay.

This retrograde step in games programming lacks all signs of originality. Even the simple hi-score feature has been cut to the core.

All the rooms are presented as ground plans, with ne'er a view of the castle, however small.

Dragon's Gold certainly doesn't represent value for money in today's volatile software market, where superb graphics and sound are available in abundance.

D.H.

Price: £8.95

Publisher: Amsoft

Address: 169 Kings Rd, Brentwood, Essex

AMSTRAD





Vampire Killer

This game was originally released for the Spectrum and is now available for the Amstrad. The objective is to get from the ground floor of Dracula's house up to the 12th floor and kill Dracula before midnight, otherwise he flies away. You are allowed eight minutes to do this. On each floor there are twelve rooms. Some are empty some contain items you need to kill Dracula.

Your score depends on how many items you collect on the way. Arrive without enough of these and you can't kill him — he kills you.

There are lifts to take you between floors — some go up and some go down. On the way you meet spiders and bats which you can shoot, if you have any bullets left. Some doors hide skeletons that 'shock' you. Too many shocks and you run out of the house terrified!

I liked the title page, which is just as well as the tape takes 10 minutes to load. Loading seemed unreliable, about a 50-50 chance of first-time success. Instructions are clear and simple. There are three levels of difficulty, each successive level giving less time to kill Dracula. The graphics are colourful and the sound entertaining, although repetitious. Key response is rather slow, and our vampire-killer moves rather ponderously along the corridors.

After a while it all becomes rather predictable and tedious — I kept wanting to go for a cup of tea. However, any attempt to produce cheap software for the Amstrad should be applauded and this game is certainly very attractively priced. **A.W.**

Price: £1.99

Publisher: Scorpio Gamesworld

Address: 307-313 Corn Exchange Building, Manchester 4



Give My Regards to Broad Street

You've seen the film, heard the song, now play the game!

The plot of the film is used for the game. You play Paul McCartney and you have lost the master tape of your latest chartbuster. Thus the game involves rushing around London in your car attempting to meet up with the members of your band. This is made easier by the fact that all the band use the tube and you have a computer in your car which tells you when any member of the band uses a travelcard.

When you manage to meet a band member he gives you as many notes of the song as he can remember until the whole song is recanted.

The graphics are excellent and consists of a large map of London which scrolls in the direction of travel. Once outside a tube station the car can stop and then a view of the station is shown with a few famous landmarks in the background if appropriate. Sound consists of famous McCartney tunes such as Band on the Run and No More Lonely Nights.

The game is very difficult to master as one must first manage to control the car and then learn the likely movements of the band members from biographies on the inlay.

The game comes with a large map of London showing all the tube stations which must be memorised if any progress is to be made.

This game is excellent and highly recommended. **J.G.D.**

Price: £7.99

Publisher: Argus Press Software

Address: 222, Regent St, London W1



Andoid One

A high-speed, action packed arcade game that requires instantaneous response to the many alien attacks encountered.

These aliens are of four types: Groupies, Skaters, Bouncers and Wanderers. Each attack in their own style and need to be avoided throughout the game.

Objectively you have to overcome the defence mechanisms of the reactor complex, find the transporter capsule to enter the inner chambers and subsequently find and destroy the reactor.

On completion of this hazardous mission you then have another trip fraught with even more danger.

Good graphics and sound bring the game to life giving more depth than the two-dimensional screen imagery.

Never certain whether I had five lives or only four to squander, it did seem that a lot of playtime was spent blasting away at brick walls which were obviously built when bricks were 10 a penny.

The cleverly designed opening screen with a scrolling message along the bottom line leaves no doubt about the actions to be taken.

User-friendly throughout, an instruction page which is clear and concise is followed by a brief demonstration routine. Being largely an amalgamation of maze games and shoot-outs the program lacks any originality, but is nevertheless a good implementation of this genre.

This is grossly overpriced for this type of game, which is now outdated with the advent of 3-D graphics and expansive use of the Amstrad's sophisticated sound commands.

If you need a laser blaster then this is as good as any other, but that's all. **D.H.**

Price: £7.95

Publisher: Vortex

Address: 24 Kansas Ave, off South Langworthy Rd, Salford M5 2GL



Flipped



Hooked



Keen



Yawning

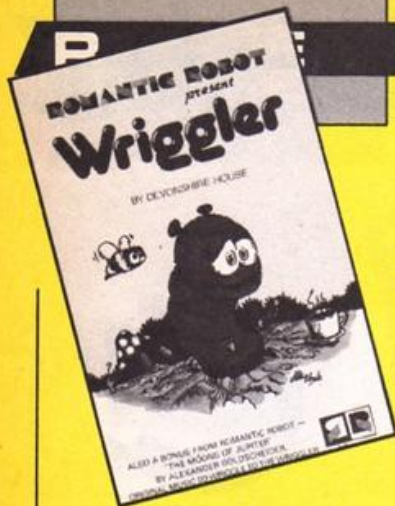


Comatose



C64





Wriggler

It's the annual Maggot Marathon, folks, so wriggle right up! You control one of the contestants at the off. As soon as you start to follow one of the other maggots, however, you soon realise that this is no ordinary arcade game.

You start in the garden, a complex maze of walls and flowers nicely executed in full colour. Though the maggot animation is good, the marauding ants, bugs and spiders which begin to assail you are really rather fine. With luck, you may find some ant powder to help you, as well as several other useful objects.

This is only the start, because if you manage to find your way out of the garden — and it's not easy — you discover that this is an adventure with many locations, broken down into four major areas, the garden, the scrubland, the underground, and the mansion, to say nothing of Hell. Each of these has its own hazards and characteristics like platforms, levels and conveyor belts.

Your eventual aim is to find the finish, but it will certainly take you many evenings of learning the significance of the different objects. You won't learn the maze, however, since it's different each time! Good sound too, with a "music to wriggle by" track on the tape.

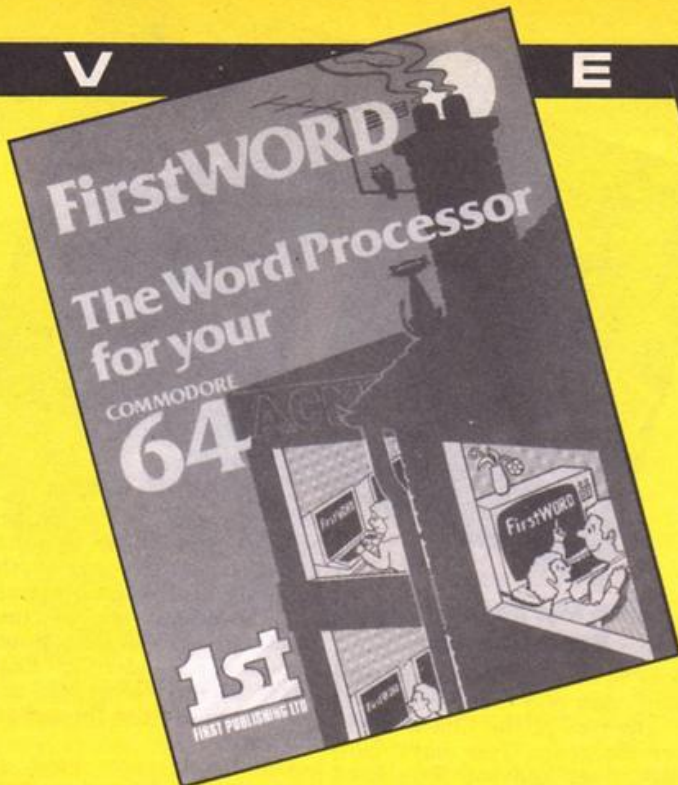
A number of keyboard control configurations are catered for, together with Kempston and Sinclair joysticks, and the package is distinguished by abnormally literate and full instructions on the illustrated inlay card. Absorbing fun, well produced and at the right price. **D.M.**

Price: £5.95

Publisher: Romantic Robot

Address: 77 Dyne Rd, London NW6 7DR

SPECTRUM



Firstword

One of the nice things about the C64 is that with a printer and disc drive it can make a useful business machine at a relatively cheap price. Firstword is a word processor for such a set-up.

It's worth mentioning that the program isn't suitable for editing sequential files created by other programs. Firstword stores data as program files and can only read files created and stored by itself.

The software is supplied on disc and will only work with a disc drive — the tape is not supported. Serial printers connected via a suitable interface (C64 printer/RS232) work, although I was unable to find out whether parallel printers connected to the user port will.

The comprehensive 60-page manual comes as a set of loose sheets held together in a hard-backed ring binder. One problem is that pages can easily get missed out — mine came without pages 39 and 43.

When entering text any leading spaces/blank lines will be ignored. These are put in using special control characters. It soon becomes apparent that the whole program is parameter driven. You can set the system to your own requirements and use it in a very flexible way.

All text editing and disc/output commands are entered using menu options which appear at the bottom of the screen. Selecting an option

Price: £34.99

Publisher: First Publishing

Address: Horseshoe Pk, Pangbourne, Berks

takes you on to a sub-menu: this may seem long-winded if you know what you are doing but if you don't have the manual handy then it can be a great help.

Insertion and deletion of single characters and lines is available directly. In block mode you may delete, copy, transfer and save blocks of text after you have specified the range of lines. Find and replace is available as a menu option. This can work with either single words or a string of up to 38 characters.

Mail merge is available, and there is a built-in calculator — very useful. You place the cursor over the various numeric sections in the text, perform the basic mathematical functions and the answer is shown somewhere else on the page. Ideal if you are preparing a bill or totalling up numbers.

When you print out your document you can specify header/footer messages, automatic page counting, right justification of text, left and right margins, print type, etc. The flexibility and versatility means that large changes in the output are very simple to achieve.

My only grumble is that the price is slightly too high for what is only a word processor. Some other packages may also be used as a text file editor; from a programmer's point of view it would be useful to be able to do this as well. **K.I.**

C64



Sir Lancelot

Interesting to compare this to Manic Miner, to which it obviously owes much. Here we have a castle with 24 rooms, but again the aim is to collect objects, whilst assailed by assorted moving bits and bobs. The intro music is catchy, but the game itself is punctuated only by zaps and zings.

Unlike MM, access to the rooms can be selected. On the initial screen, which has no "aliens", vast arrays of objects are awaiting collection. Each one represents a further room. When you collect the object you are whisked away to that room to try your luck, and if you succeed in clearing that, you are returned to Merlin's Magic Teleport, to select another object and room. The whole lot can be seen from the demo mode, and they are certainly a challenge!

Graphically, the game is slightly more sophisticated with some multicoloured sprites, and a better selection of colours, though no green-screen option. One of my tame games testers likened the graphics to those found on the Atari games console. Smooth and impressive but with a slight chunkiness.

One small idiosyncrasy is the movement of Sir Lancelot, whom you control. Surprisingly, he can be persuaded to walk on thin air, but won't jump vertically. He needs lateral encouragement too!

A tricky, addictive, absorbing game which capitalises on the Amstrad's features, without breaking the bank. It may not have the ownership "snob appeal" of the "cult" conversions, but offers many hours of torturous enjoyment. Recommended. **D.M.**

Price: £6.95

Publisher: Melbourne House

Address: Castle Yd Hse, Castle Yd, Richmond TW10 6TF

AMSTRAD





Slapshot

Well, I suppose it had to happen. After the unbeatable International Soccer it was on the cards that ice hockey would be the source of a game. The layout of the game is pretty standard. You are given the view of a section of the playing area. As the action moves, the screen will scroll to follow the action — just like a TV camera.

The game is for two players only, which is a bit of a shame. Only one player from each side is in play at any one time. This player has a different colour to the rest.

If the puck is loose, the nearest players will approach it, even if they aren't the current players under control. If another player gets near the puck, control will pass over to that player.

The goal keeper and defender are linked so that both can be controlled. By varying the handling of the joystick and firebutton you can make the players perform different actions. The goalie, for example, has three save actions. You can even bodycharge an opponent, but don't overdo it or you'll get penalised.

The graphics are excellent with accurate design of figures and realistic animation. The background is in two colours but looks effective. The crowd is a sea of faces which move during the game. The use of sound is limited but there is accurate soft speech and applause.

Overall this is an excellent and very exciting simulation which is good value at the price. **A.W.**

Price: £8.99

Publisher: Anirog

Address: Unit 10, Victoria Ind Park, Victoria Rd, Dartford, Kent

C64



Pascal 64

If you're bored with BASIC, or looking for an easy way to produce machine code programs, then this new Pascal compiler is sure to interest you. It produces true machine code programs which, once completed, can be loaded and run without using the Pascal package — and you write these programs not in a different low-level language but in a highly structured, high-level language which many people consider to be much better than BASIC.

The disc contains a loader and a linker, for inserting existing routines into new programs — both of which you can transfer to your own disc, if you wish — as well as the compiler, and comes with a smart 70-page loose-leaf manual. This is clearly intended to explain the rudiments of Pascal to experienced BASIC programmers, rather than to teach programming to complete beginners; it does not repeat any information which is adequately covered in the Programmer's Reference Guide.

If you are not already familiar with BASIC you would probably find this package incomprehensible — and if you have no previous knowledge of Pascal you would be well advised to obtain a good book on the subject, rather than relying solely on the manual. A list of suitable reference books is provided.

Pascal programs are entered using the normal BASIC editor; this is possible because the Commodore doesn't check the syntax of BASIC program lines on entry. Each line, therefore, has to start with a line number, although these aren't normally required in Pascal, and are ignored by the compiler. The program is saved on disc as a

Price: £35.99

Publisher: First Publishing

Address: Unit 20B, Horseshoe Rd, Horseshoe Pk, Pangbourne Berks

BASIC program, then the compiler is loaded and run. Compilation is a slow process; a demo program from the manual, about 25 lines long, took several minutes to complete. The compiled version is automatically saved on disc. It then has to be loaded using the special loader program; after this, it can be saved and re-loaded as a normal machine code program.

The most striking thing about Pascal is the wide range of data structures which are supported — real, integer, boolean, char, array, packed array, string, set, record, file and printer, plus user-defined data types in case these aren't enough for you. The next most significant feature is the structure of the programs, which have to be written in blocks, in the way that BASIC programs should be written but all too often aren't.

This version of Pascal includes commands to set up and clear the hi-res screen, to plot and unplot points and to define sprites, but there are no special sound commands — POKes have to be used here, as in BASIC. Machine code routines can be included; the same company produces an assembler/monitor which can be used in conjunction with this package. There is no provision for including BASIC routines, but you could presumably use Pascal to produce a machine code routine to be called from a BASIC program if you want to mix the two.

The use of files, including relative files, is well covered, and there is also an interrupt command, allowing simultaneous execution of the main program and a subroutine.

Overall it's an interesting package, and can be recommended to competent BASIC programmers wanting to move on to something different.

M.N.

C64



Estra

To the World's greatest psychic: "Recover stolen Snake God Statue, believed to be broken into 24 pieces and hidden in secret Raal Temple".

It makes a change from James Bond or the usual ladder climbing adventures. After an introduction which gives instructions and advice upon how to deal with the dangers you will encounter on your adventure, you are treated to a lengthy, virtuoso performance of computer generated music before commencing action inside the temple.

The temple cannot be physically entered so a force field is established at the centre of the screen where the recovered pieces of statue are assembled. The pieces are distributed round the edge of the screen. To begin with it seems a simple task to collect and assemble the statue but you have to contend with many types of nasties which float around and get in your way. A force field protects the pieces of statue and a real nasty, resembling a crab, can attack at any time.

Added to this is the problem of replenishing your psychic energy by collecting supplies as they appear. There is also a problem due to the narrow entrances to your force field. Any collision with its walls means a life lost.

Higher levels of play await plays who can assemble the statue but I found the first level difficult enough. There are comprehensive screen instructions delivered in a most unusual way as well as sound on/off and pause facilities. An entertaining game. **J.D.**

Price: £2.50

Publisher: Firebird

Address: Wellington House, Upper St Martin's Lane, London WC2H 9DL

BBC





Alpha-Beth / Alpha-Gen

Alpha-Beth is a computer game which is fun to play and has the added bonus of being educational. After fast loading a menu page is displayed. From this you can choose whether to play with the keyboard or joystick, change the keys used to play the game, display or alter the high-score boards or load an alternative database — this is where Alpha-Gen comes in.

The graphics consist of a screen depicting a computer. On the VDU there's a question for you to answer. You do this by making Beth jump about the keyboard to the appropriate letter and then entering that letter.

When you have completed the word or words of the answer you take Beth to the Enter key to finish.

There are, of course, the obligatory nasties trying to stop you on your journey around the keyboard — these can be a nuisance and detract from the overall performance.

Alpha-Beth comes with an in-built general knowledge database. The publishers hope that in future databases for a wide range of subjects will be available.

Alpha-Gen is a separate package which gives parents and teachers the opportunity to build sets of questions relevant to the situation.

Overall this is a good idea well implemented, with the right balance of fun and learning. At £5.75 it's a good buy. **M.W.**

Price: £5.75

Publisher: A 'n' F

Address: Unit 8, Canal Side Est, Woodbine St East, Rochdale, Lancs OL16 5LB



Quick Thinking

An educational program which is entertaining and good value for money? Read on.

There are two "games" on this cassette, each offering practice at the basic arithmetic skills.

First there is Sum Vaders. You choose whether to add, subtract, multiply or divide. A flying saucer with a number on it crosses the sky and drops a robot which also has a number. You have one chance at typing in the right answer. If you're correct you destroy the robot; wrong and it lands. When five robots land you are destroyed in a display of pyrotechnics! There is also a choice of skills which will stretch anyone.

The second program is Robot Tables. Again you can choose skill levels and specific tables. But in this program you also get to choose foreground and background colours.

The idea is to make quick decisions. A machine is chugging away making robots. Along the conveyor belt come the boxed components which are numbered and have to match the sequence in the multiplication table you're working on. Sounds confusing? It's quite a simple idea but sounds complicated when you explain it. A good feature is the ability to check for persistent mistakes after completion by the visual representation of good and deformed robots.

As the title suggests it's not intended to teach but to sharpen your reflexes. For this purpose it is excellent. So long as it's taken in small doses this cassette could prove to be quite valuable. Enjoyable graphics and simple to operate commands, which at this price has to be excellent value. **M.P.**

Price: £2.50

Publisher: Mirrorsoft

Address: Holborn Circus, London EC1P 1DQ



Tales of the Arabian Nights

"The saga of Imrahil the Kalendar Prince on a quest to free the Princess Anitra from the harem of the evil Sultan Saladin." So sayeth the blurb.

As the Prince you have to work your way through eight screens to free the Princes and fly over the city. Many of these have similar objectives: to collect the various letters which spell out the word Arabian. The first screen, for example, has you on board Sinbad's ship avoiding an octopus, cannon and a dangerous bird which I assume is a roc. Three of us were struggling for a long time to complete this screen and found it too difficult. It may be that you have to collect the As in a specific order but we couldn't get down from the rigging after avoiding other obstacles. The net result was frustration. Particularly annoying was the fact that the letters were replaced when you lost a life even when you were on the point of completion!

Perhaps in anticipation of this there is an option to view the other screens which have flying carpets, ladders, cities, a river and even a blind carpet weaver called Ahxmihnst!

Disappointing choice of colours which seemed insipid to me although the graphics were otherwise well drawn and imaginative. Some of the animation was flickering and spoiled the overall smoothness of the total effect.

A good game in principal but I would have been much happier if I could have got through the first screen, so be prepared for a tough challenge. **M.P.**

Price: £6

Publisher: Interceptor

Address: Lindon House, The Green, Tadley, Hants

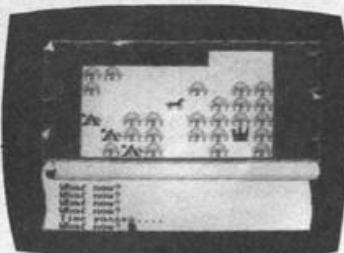


The Ring of Darkness

A conversion from the Spectrum, yet again, of a role-playing adventure/graphic/arcade game. Some combination, huh? During loading a fine screen is displayed, then you are called to define your character. Having named the noble Nurdwarbler, I chose to make him an elf with rather more intelligence than strength and agility. He could have been a warrior or a thief, but with different results.

Loading then continues, and when over, a small non-animated stick-man is shown on a map-com-maze, which is littered with forests, lakes, sea, hidden attacking bandits and the occasional castle. Enter one and the screen changes to show a plan of the interior on which your character is shown. As with the rest of the game, you can steer him via the cursor keys to the counters of the various shops where you may buy your weapons, food, transport etc.

Beware the jester, however! He nicks your goodies. In each castle is a king who, if you ask, will set a task — probably recovering an object — as you journey the land.



Though graphically rather crude — some animation would have been nice — the landscape scrolls very smoothly beneath your man. Also beneath him is a vast underground maze, which, should you enter it, is drawn in very fine 3-D perspective. Goodness knows how you get out though! I tried for ages. **D.M.**

Price: £9.95

Publisher: Wintorsoft

Address: 30 Uplands Park Rd, Enfield, Middx EN2 7PT





**3D LANDMARKS
YOU CAN FLY AROUND**

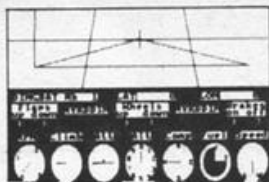
**SUPERB REAL
TIME SIMULATION**

MYRDDIN FLIGHT SIMULATION

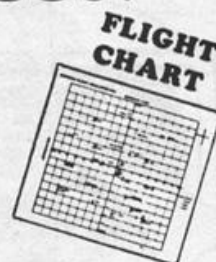
AMSTRAD CPC 464



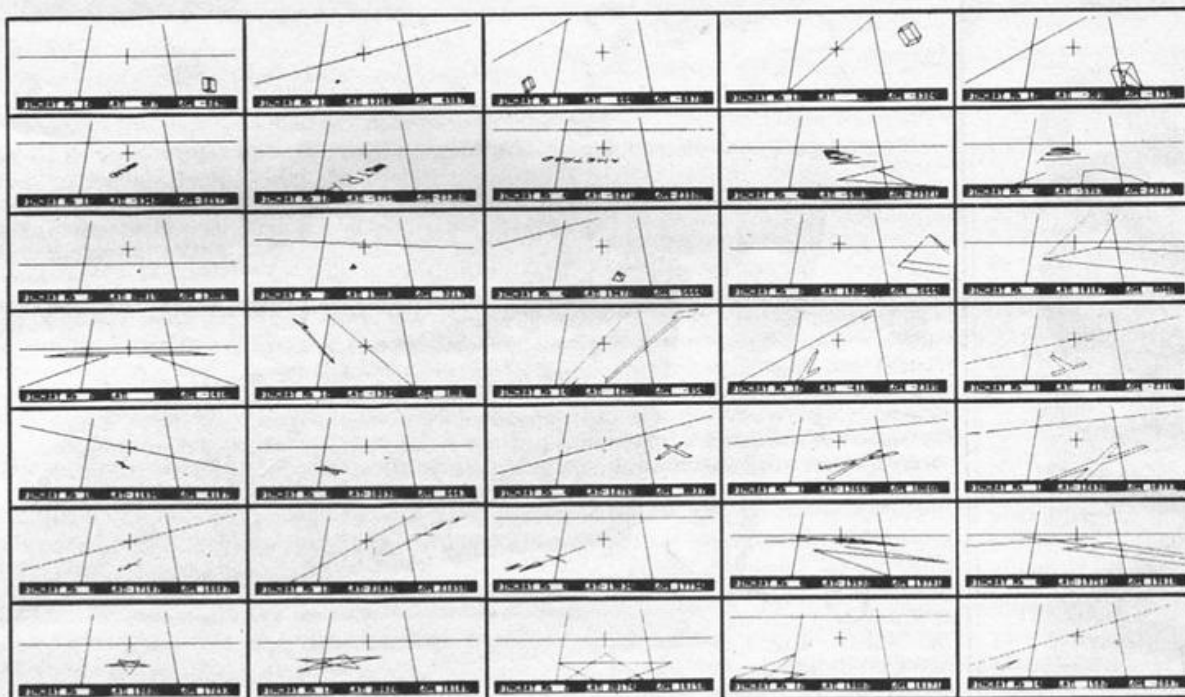
MANUAL



**FULL SCREEN
DISPLAY**



Here are some screens from a typical flight showing the view from the cockpit (top half of screen) produced as printouts of the actual simulator.



A real time simulation with 3D graphics uses a massive 64000 x 64000 longitude & latitude flying area, making each flight completely different. Developed under pilot instruction to give realistic flight effect. The view through the cockpit gives moving 3D graphics.

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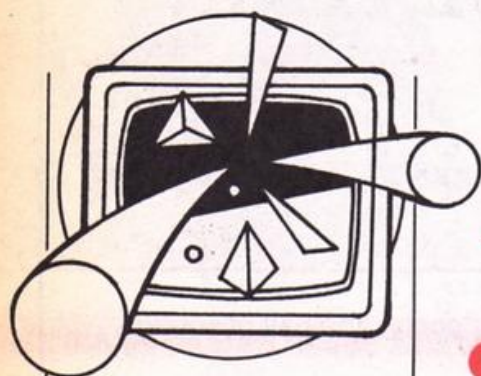
Postcode

Cheque enclosed for £11.95 (in. P.P.)
OR Debit my Access A/C No.:-

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OR Telephone through your Access Order.

Signed..... **HCW**



GRAPHICS

Jon Revis looks at new products and new ideas in the world of graphics

In this article I suggest a remedy for those desperate moments when your mum or dad pull the plug on your micro, or your wife or husband give you that "Well, will you be coming to bed at the same time as me for once this week!" look. Just curl up in bed with a good book — computing of course. I have been doing just that for several nights over the past month, thumbing my way through some of the new releases.

The first book I studied was *Soft Computing, Art and Design* by Brian Reffin-Smith. The book is not a manual on programming computer graph-

ics, but rather an exploration of the role of computers in art and design. Mr Reffin-Smith attempts to pin-point new directions which could be explored by the computer artist.

One section discusses the many and varied real life applications to which computers have been put in artistic fields. As an example of one of the more straightforward ideas, the book cited the work of Theo Goldberg, who fed a single set of data into both a graphics and a music package, and then executed the two simultaneously. Now there's an idea. How about dumping a screen from a game through the sound

generator of your micro? Then again, would the results be worth all the trouble?

Although entitled *Advanced Sound and Graphics for the Dragon Computer* by Keith and Steven Brain, only 30 of the 250 pages were dedicated to sound synthesis. The highlight of the sound section is a graphic music editor which allows you to enter musical notation on the screen and then play back the finished work.

The graphics section is well written in an easy to follow style. Amongst the techniques covered are animation, graphs, charts, 3-D graphics, and — dare I mention it — machine code routines. At £5.95 it's a book no Dragon user should be without.

Graphic Art on the





Commodore 64 by Boris Allan is an attempt to explain high resolution graphics on the C64 without getting too technical. Unfortunately the layout of the programs may prove troublesome to the less experienced programmer.

As an example, in his section on turtle graphics a seven-line program calls subroutines 20000 and 21000 yet these routines are not listed until four pages later.

Having negotiated this first hurdle you may think you're home and dry. No so! The subroutine at line 20000 calls another one at line 10000 — this routine is to be found in appendix H on page 105. Even at this point you still haven't completed your "I spy subroutines" tour of the book. If you can master the layout of the programs you'll find the remainder of the text very informative.

Turtle graphics

Officially LOGO is considered a teaching language. It is ideal for use in teaching angles and co-ordinates. As a language it is well structured, allowing the use of procedures and Repeat/Again loops. The reason for its mention in this column is the fact that it can be used to great effect to produce complex Spirograph-type patterns. One excellent version of LOGO for the BBC is called Picture Logic from Addison Wesley. Available on both cassette and disc, it costs £36.90 in disc version.

Printed below is a short LOGO routine which should run with very little modification on most LOGO programs.

*Set up variables

```
TIMES 5
LENGTH 50
ANGLE 144
```

*Define procedure Polygon

```
DEFINE POLYGON
REPEAT TIMES
FORWARD LENGTH
LEFT ANGLE
AGAIN
END
```

The procedure can then be called by typing POLYGON XReturnX. By simply changing the values of ANGLE and TIMES you can create a variety of complex shapes.

Inverted Amstrad

Here's a quickie which allows Amstrad CPC464 programmers to highlight any text you want to input. CALL &BB9C will cause any text sent to the screen to be printed in the current PAPER colour in an INK background i.e. in inverted colours. Calling the routine again reverses this effect.

Here's an example:

```
10 CLC
20 PRINT "Enter your name"
30 PRINT
40 CALL &BB9C
50 INPUT name$
60 CALL &BB9C
70 PRINT
80 PRINT "Hello";name$
90 END
```

Touch Pad

If you've ever considered buying a graphics tablet for your BBC but have been deterred by size then you should take a look at the latest gadget from Cumana.

The Touch Pad is a mere 18 x 13 x 6 cm. Constructed in the shape of a wedge of cheese, it's powered by the Beeb and gives you all the facilities of a fully fledged graphics tablet — but without having to get yourself a bigger desk in order to use it.

... IT'S
EGGSILLERATING



COSMIC CHAOS



See if you can survive in another dimension where everything is in a state of chaos.
By A P Gardner

The cruel Zacks have flung you into another dimension which is in a state of cosmic chaos. There are 28 phases in the game. In each one you are faced with a variety of different horrors, including mutant candles!

Your small, highly manoeuvrable craft has five lives and is equipped with a laser. But be careful how you use it since it is liable to overheat leaving you defenceless for a short time. Colliding with the remains of your laser blast is harmless. You complete each phase after surviving for 30 seconds.

The controls are: left arrow key — left, down arrow keys — right, up arrow key — up, P — pause, R — restart after pause.

Variables

#404 horizontal position of ship
PIS/P2S variables holding graphics characters of object to be plotted
N% number of objects plotted during each loop
R% controls horizontal position of object to be plotted
W% pause during each loop
#400 remaining time on present phase
#401 heat of laser
#402/5% score
HS highest score
NS name of high scorer
LV% present phase
LI% remaining lives
X%/Y% horizontal/vertical positions for explosions
G line number pointer for GOSUB, used when resetting variables for next phase
V% volume for music
MS data for music routine
M/C counters for music routine
C1%/C2% colour of objects/objects within firing range
KS keyboard value
#406 gives vertical position of object
#405 collision with object
Q% flag set to 1 if machine has V1.0 ROM. Used to counteract slight difference in horizontal co-ordinates between ORIC-1 and ATMOS

How it works

40 makes HIRES memory available
50 set HIMEM, switches off keyclick/cursor
60-130 the game in a series of subroutine calls
170-340 set up machine code starting at address #2B00
360-720 set up user defined characters
760-770 make adjustments to ROM calls from within machine code if machine uses V1.0 ROM
810-820 select volume level
830-870 select starting phase, set up data for music routine, clear screen to background black
910-930 set up variables
970 plots objects on screen
980-1000 call machine code, plot scores etc
1010-1040 test for object shot, collision with object, phase completed. If tests fail, pauses and loops back
1080-1100 object shot, plot

explosion

1140-1180 you're killed. Decrement lives and test for end of game
1220-1230 start of game over routine, set up new music data
1240-1270 INPUT routine for high scorer's name
1280-1320 print scores and wait for key press
1360-1460 set up screen
1500-1510 increment phase counter, check if game is completed
1520-1540 game completed routine
1550-1560 set up variables for next phase
1570-1840 data for all phases
1880-1930 routine to play music

Hints on conversion

The extensive use of machine code in the main game loop makes the program almost impossible to convert.



```

10 REM ** COSMIC CHAOS **
20 REM
30 REM BY A.P.GARDNER , JULY 1984
40 GRAB
50 HIMEM#2AFF:POKE618,10
60 GOSUB170:UDG'S & M/C
70 GOSUB810:SET LEVELS
80 GOSUB1500:LEVEL DATA
90 GOSUB910:VARIABLES
100 GOSUB1360:SCREEN
110 GOSUB970:GAME
120 GOSUB1220:END
130 GOTD70
140 :
150 REM ** UDG'S AND M/CODE **
160 :
170 FORN=#2B00TO#2C44
180 READP:P=VAL ("#+P$")
190 POKEN,P:NEXT
200 DATAD8,A0,0F,A2,1E,BD,A4,BE,9D,CC,BE,CA,D0,F7
,38,AD,06,2B,E9,28,8D,06,2B
210 DATAAD,07,2B,E9,00,8D,07,2B,38,AD,09,2B,E9,28
,8D,09,2B,AD,0A,2B,E9,00
220 DATA8D,0A,2B,88,D0,D0,A9,A4,8D,06,2B,A9,BE,8D
,07,2B,8D,0A,2B,A9,CC
230 DATA8D,09,2B,EA,EA,AE,04,04,AD,0B,02,C9,AC,D0
,03,20,CF,2B,C9,B4,D0,03
240 DATA20,D6,2B,8E,04,04,C9,9C,D0,03,4C,E5,2B,C9
,9D,D0,03,20,DD,2B,AC,01,04
250 DATAF0,06,30,04,88,8C,01,04,AC,00,04,88,8C,00
,04,AD,02,04,69,01,8D,02,04
260 DATAAD,03,04,69,00,8D,03,04,AE,04,04,A0,03,BD
,CC,BE,20,BE,2B,88,D0,F7
270 DATACA,CA,BD,A4,BE,20,BE,2B,AE,04,04,A9,5B,9D
,CC,BE,E8,A9,5C,9D,CC,BE
280 DATAA9,5E,9D,A4,BE,E8,A9,5D,9D,CC,BE,60,C9,20
,F0,0B,C9,60,F0,07,C9,5E
290 DATAF0,03,8D,05,04,E8,60,E0,02,10,01,60,CA,60
,E0,1C,30,01,60,E8,60
300 DATAAD,0B,02,C9,91,D0,F9,60,AD,01,04,C9,32,30
,03,4C,6C,2B,E8,A0,07
310 DATABD,7C,BE,C9,20,D0,17,38,AD,F3,2B,E9,28,8D
,F3,2B,AD,F4,2B,E9,00
320 DATABD,F4,2B,88,D0,E5,4C,2D,2C,98,18,69,0B,8D
,06,04,20,B5,FA,AD,02,04
330 DATA69,05,8D,02,04,AD,03,04,69,00,8D,03,04,4C
,30,2C,20,E1,FA,AD,01,04
340 DATA69,0B,8D,01,04,A9,7C,8D,F3,2B,A9,BE,8D,F4
,2B,4C,6C,2B
350 REM
360 FORP=#B400+(91*8)TOP+(34*8)+7

```



```

370 READU:POKEP,U:NEXTP
380 DATA1,2,5,11,22,44,48,32
390 DATA63,0,63,63,51,12,30,30
400 DATA32,16,40,52,26,13,3,1
410 DATA12,12,30,51,45,30,30,12
420 DATA63,33,33,33,33,33,63
430 DATA18,0,18,12,45,18,0,33
440 DATA8,4,2,63,2,4,8,0
450 DATA4,8,16,63,16,8,4,0
460 DATA3,15,63,8,8,10,26,32
470 DATA48,60,63,4,4,20,22,1
480 DATA33,36,36,26,9,5,4,3
490 DATA33,9,9,22,36,40,8,48
500 DATA3,12,48,63,59,53,46,46
510 DATA48,12,3,63,51,45,47,47
520 DATA32,46,46,63,63,48,12,3
530 DATA41,45,49,61,63,3,12,48
540 DATA0,3,25,61,59,21,9,17
550 DATA0,32,12,30,46,20,8,4
560 DATA17,25,16,16,8,5,3,4
570 DATA4,4,36,20,8,16,32,16
580 DATA0,59,42,43,43,42,58,0
590 DATA0,43,42,42,10,42,43,0
600 DATA1,1,1,1,1,1,17,15
610 DATA0,0,0,0,0,0,4,56
620 DATA14,16,16,15,15,24,20,18
630 DATA4,6,7,62,56,8,12,10
640 DATA8,8,20,20,28,8,42,62
650 DATA58,58,58,58,58,58,62
660 DATA32,16,8,4,6,7,7
670 DATA7,7,13,13,13,30,28,32
680 DATA8,8,0,20,20,0,34,34
690 DATA34,0,28,58,58,58,28,8
700 DATA12,30,55,60,63,30,12,0
710 DATA12,30,26,26,26,26,63,16
720 DATA8,15,63,30,28,63,30,0
730 :
740 REM ** ADJUST IF ORIC-1 **
750 :
760 IFPEEK(##FFFC)=#8FTHENQ%=0:RETURN
770 DOKE#2C18,##FA9B:DOKE#2C2E,##FAC7:Q%=1:RETURN
780 :
790 REM ** SELECT VOLUME **
800 :
810 CLS:PRINT:INPUT"ENTER VOLUME LEVEL (0-15)";V%
820 IFV%<0ORV%>15THENPRINT"WRONG LEVEL":GOTO810
830 CLS:PRINT:INPUT"ENTER START LEVEL (1-15)";LV%
840 IFLV%<1ORLV%>15THEN830ELSELV%=LV%-1
850 M$="4323813A13C141143238238245241143145147148
2382382"
860 M$=M$+"4124314113C13A13C24113C13A13813723813A

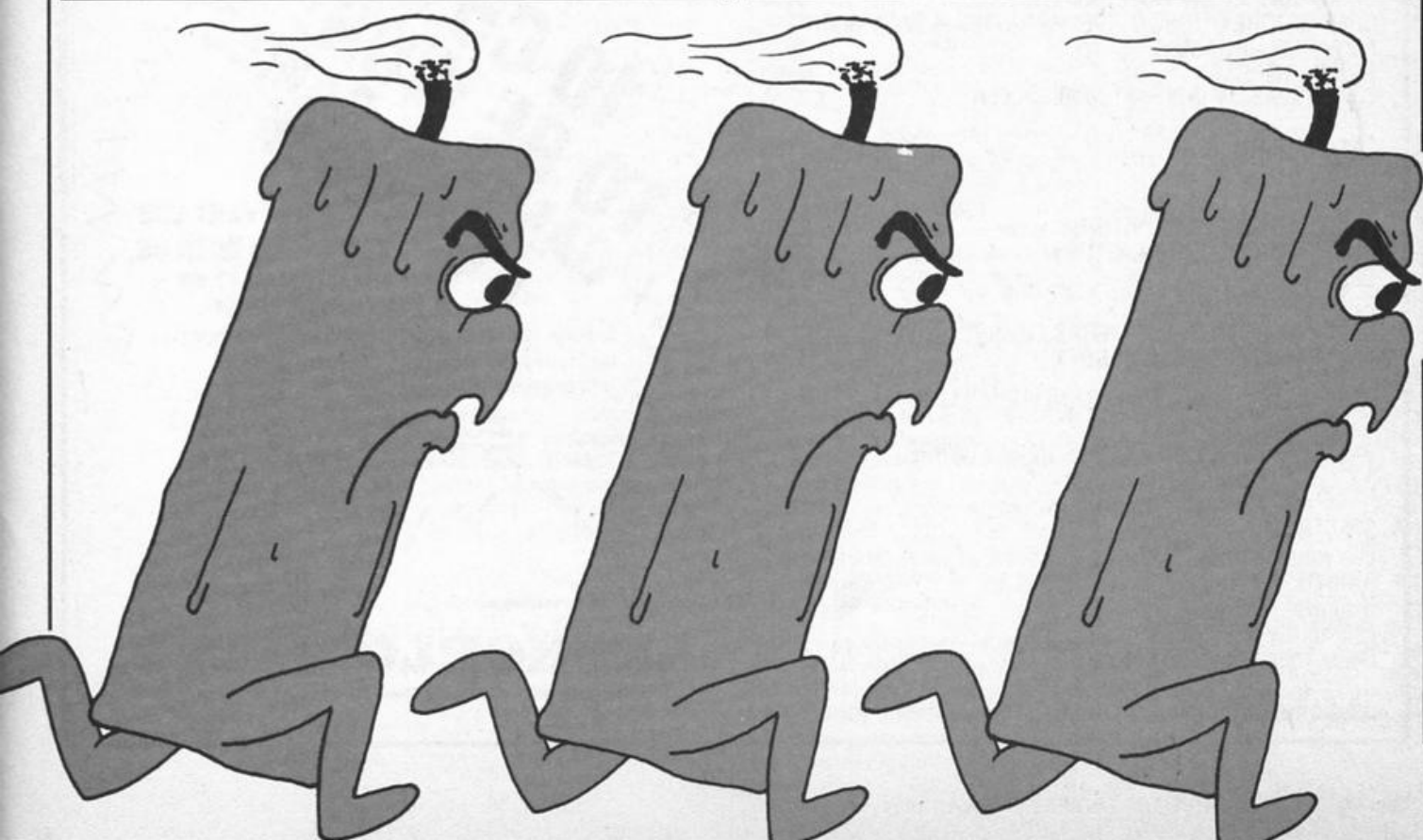
```



```

13C13813A6"
870 CLS:PAPER0:RETURN
880 :
890 REM ** VARIABLES **
900 :
910 LI%=5:DOKE#402,0:S%=0:IFH%<501THENH%=500:N$="
ORIC"
920 POKE#400,266-(W%*11):POKE#401,0:POKE#404,14:P
OKE#405,0:POKE#406,0
930 RETURN
940 :
950 REM ** GAME **
960 :
970 FORN=1TON%:R%=(RND(1)*29)+(5-Q%):PLOTX%,6,P1%
:PLOTY%,7,P2%:NEXTN
980 CALL#2B00:S%=DEEK(##402)
990 PLOT24,0,STR$(PEEK(##401))+ " "
1000 PLOT10,26,STR$(S%):IFS%>H%THENH%=S%:PLOT29,2
6,STR$(H%)
1010 IFPEEK(##405)>0THENPOKE#405,0:GOTO1140
1020 IFPEEK(##406)>0THENGOSUB1080
1030 IFPEEK(##400)=0THENGOSUB1500:WAIT200:GOTO1180
1040 WAITW%:GOTO970
1050 :
1060 REM ** OBJECT SHOT **
1070 :
1080 Y%=PEEK(##406)
1090 X%=PEEK(##404)+4-Q%:PLOTX%,Y%," "+CHR$(96)+"
":PLOTX%+1,Y%-1," "
1100 PLOTX%+1,Y%+1," ":POKE#406,0:RETURN
1110 :
1120 REM ** YOU'RE KILLED **
1130 :
1140 X%=PEEK(##404)+5-Q%:Y%=20
1150 FORN=1TO14:PLOTX%,Y%,CHR$(N+32):WAIT6:NEXTN
1160 EXPLODE:GOSUB1090:WAIT200:LI%=LI%-1:IFLI%=0T
HENRETURN
1170 GOSUB1550
1180 GOSUB920:GOSUB1360:GOTO970
1190 :
1200 REM ** GAME OVER **
1210 :
1220 M$="0044124124143844524524544144124524844844
62452434004432452464464452"
1230 M$=M$+"4324544144124524343843C2432418":N%=98
:GOSUB1880
1240 CLS:PAPER6:INK0:IFS%<H%THEN1280
1250 PRINT:PRINT:PRINTSPC(4)"CONGRATS. YOU HAVE A
HIGH SCORE"
1260 K$=KEY$:PRINT:PRINT"WHAT IS YOUR NAME (MAX 1
5 CHARS) ":INPUTN$

```




```

1270 IF LEN(N$) > 15 THEN PRINT "TOO LONG": GOTO 1260 ELSE
CLS
1280 PRINT: PRINT: PRINT SPC(11) "YOU SCORED ": S%
1290 PRINT: PRINT "HI-SCORE IS " H% " BY " N$
1300 PRINT: PRINT: PRINT SPC(10) "ANOTHER GO (Y/N)?"
1310 K$ = KEY$: GETK$: IF K$ = "N" THEN STOP
1320 LV% = 0: RETURN
1330 :
1340 REM ** SCREEN **
1350 :
1360 CLS: PAPER0: INK3
1370 PLOT1, 0, CHR$(5) + "LIVES": PLOT7, 0, STR$(LI%)
1380 PLOT12, 0, CHR$(7) + "TEMPERATURE 0"
1390 PLOT29, 0, CHR$(5) + "PHASE": PLOT35, 0, STR$(LV%)
1400 PLOT4, 26, CHR$(2) + "SCORE": PLOT10, 26, STR$(S%)
1410 PLOT21, 26, "HI-SCORE": PLOT29, 26, STR$(H%)
1420 PLOT2-Q%, 2, "
": PLOT3-Q%, 12, "a"
1430 PLOT2-Q%, 24, "
": PLOT36-Q%, 12, "b"
1440 FORN=3 TO 23: PLOT2-Q%, N, " _ ": PLOT37-Q%, N, " _ ": NE
XTN
1450 FORN=6 TO 11: PLOT4-Q%, N, C1%: PLOT35-Q%, N, 3: NEXT
N
1460 FORN=12 TO 20: PLOT4-Q%, N, C2%: PLOT35-Q%, N, 3: NEXTN: RETURN
1470 :
1480 REM ** DATA FOR EACH PHASE **
1490 :
1500 LV% = LV% + 1: P1$ = " ": IF LV% > 28 THEN 1520
1510 N% = 48: GOSUB 1880: GOTO 1550
1520 M$ = "0043C43A43840043C43A23A2384": N% = 32: GOSUB
1880
1530 CLS: PAPER5: INK0: PRINT: PRINT: PRINT " YOU MUST
EITHER BE LUCKY OR FROM"
1540 PRINT SPC(11) "ANOTHER PLANET!": PRINT: PRINT: WA
IT 200: STOP
1550 G = (1560 + (LV% * 10)): GOSUB 6
1560 C1% = (RND(1) * 7) + 1: C2% = (RND(1) * 7) + 1: IF C1% = 4 OR C
2% = 4 THEN 1560 ELSE RETURN

```

```

1570 P1$ = " ": P2$ = " ": W% = 10: N% = 1: RETURN
1580 P2$ = " !": W% = 5: N% = 1: RETURN
1590 P1$ = " y": P2$ = " z": W% = 10: N% = 1: RETURN
1600 P1$ = " w": P2$ = " x": W% = 5: N% = 1: RETURN
1610 P2$ = " st": W% = 10: N% = 1: RETURN
1620 P2$ = " qr": W% = 5: N% = 1: RETURN
1630 P1$ = " kl": P2$ = " mn": W% = 10: N% = 1: RETURN
1640 P2$ = " {": W% = 1: N% = 1: RETURN
1650 P2$ = " }": W% = 10: N% = 2: RETURN
1660 P1$ = " u": P2$ = " v": W% = 1: N% = 1: RETURN
1670 P2$ = " op": W% = 1: N% = 1: RETURN
1680 P2$ = " !": W% = 5: N% = 2: RETURN
1690 P1$ = " gh": P2$ = " ij": W% = 5: N% = 1: RETURN
1700 P1$ = " y": P2$ = " z": W% = 10: N% = 2: RETURN
1710 P1$ = " w": P2$ = " x": W% = 5: N% = 2: RETURN
1720 P1$ = " cd": P2$ = " ef": W% = 1: N% = 1: RETURN
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1740 P2$ = " qr": W% = 5: N% = 2: RETURN
1750 P1$ = " kl": P2$ = " mn": W% = 10: N% = 2: RETURN
1760 P2$ = " {": W% = 1: N% = 2: RETURN
1770 P2$ = " }": W% = 10: N% = 3: RETURN
1780 P1$ = " u": P2$ = " v": W% = 1: N% = 2: RETURN
1790 P2$ = " op": W% = 1: N% = 2: RETURN
1800 P2$ = " !": W% = 5: N% = 3: RETURN
1810 P1$ = " gh": P2$ = " ij": W% = 5: N% = 2: RETURN
1820 P1$ = " y": P2$ = " z": W% = 10: N% = 3: RETURN
1830 P1$ = " w": P2$ = " x": W% = 5: N% = 3: RETURN
1840 P1$ = " cd": P2$ = " ef": W% = 1: N% = 2: RETURN
1850 :
1860 REM ** MUSIC ROUTINE **
1870 :
1880 IF V% = 0 THEN WAIT 200: RETURN
1890 M = -2: C = 1: FORN = 1 TO N%: C = C - 1: IF C = 0 THEN 1910 ELSE
AIT9
1900 NEXTN: PLAY 0, 0, 0, 0: RETURN
1910 M = M + 3: O = VAL ("#" + MID$(M$, M, 1)): P = VAL ("#" + MID$(
M$, M + 1, 1))
1920 C = VAL ("#" + MID$(M$, M + 2, 1)): PLAY 0, 0, 0, 0: IF D > OT
HEN MUSIC 1, 0, P, V%: PLAY 1, 0, 0, 0
1930 WAIT 8: GOTO 1900

```

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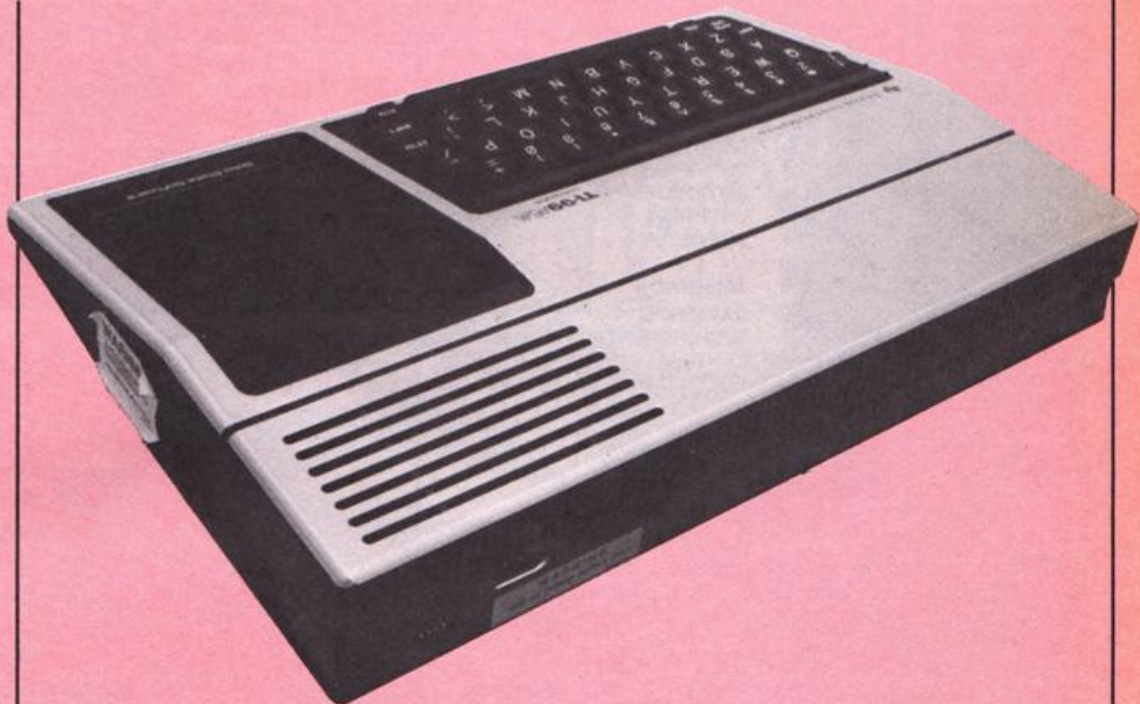
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Joe Berry shows you how to program your Texas computer with the aid of the CTRL key. It's easy once you know how



HOW TO PROGRAM YOUR TI

In his excellent book *Mastering the TI-99* published by Micro Press, Peter Brooks, describing quirks specific to the TI computer, writes... "if you type a line number followed by REM and then hold the CTRL key down and press a few others followed by ENTER, and then attempt to list the line, you will find a whole string of characters and TI BASIC words in the REM line."

Successfully completing this experiment on line 100, I then tried typing (line 110), with the CTRL key held down, the (invisible!) vowel letters A E I O U, not forgetting to space the letters as usual. This was a REM line as before.

After pressing ENTER and LIST the following words appeared on the screen: REM ELSE GO DEF UNBREAK RANDOMIZE. I next typed, in the same method, the letter A (line 120) ELSE appeared after entering and listing. On line 130, U, as expected, came up with RANDOMIZE. Thus it seemed I could go through the alphabet, which proved to be the case, as follows:

A=ELSE, B=::, C=!, D=IF, E=GO, F=GOTO, G=GO-SUB, H=RETURN, I=DEF, J=DIM, K=END, L=FOR, M=LET, N=BREAK, N=BREAK, O=UNBREAK, P=TRACE, Q=UNTRACE, R=INPUT, S=DATA, T=RESTORE, U=RANDOMIZE, V

=NEXT, W=READ, X=STOP, Y=DELETE, Z=REM 1=TO, 2=STEP, 3=, (comma), 4=;, 5=:, 6=), 7=(, 8=OPTION, 9=OPEN, 0=THEN.

Taking the punctuation characters one finds that the semicolon (;) is the code for that important command PRINT, =ON, +=CALL, while strangely, perhaps, the comma =02 "+(!) Other BASIC WORDS like XOR, NOT, OR etc. can be found using the FCTN key in the same way.

All this of course, must be known to many, but to me — and others I hope — it's an interesting discovery. Could these letters and characters be used as a kind of shorthand code for programming, I wondered? The REM lines seemed to make this an impossibility, but I found that when running trial lines with the Extended BASIC module, one did not have to REM for single character conversion.

If you have Extended BASIC try the following two-line trial program, remembering to hold down the CTRL key while pressing the comma, adding a space then typing in the phrase enclosed in quotes.

```
100 ; 'PRESS ENTER AND
    RUN THIS LINE'
110 ; 'NOW PRESS ENTER
    AND LIST'
```

You will find that in the

listing the semicolons are replaced by PRINT, but the lines in longer programs need not be listed until it is convenient.

Now try this longer CTRL key program:

```
100 P
110 ; 'THE CODE FOR
    'TRACE' WAS THE
    LETTER P WITH THE
    CTRL KEY DOWN'
120 ; 'THE CODE FOR
    'PRINT' IS ;'
140 ; 'THIS WILL LIST AND
    RUN'
150 R 'THIS LINE WAS
    INPUT WITH THE
    LETTER 'R'. PRESS
    ENTER':AS
160 Q
170 ;
180 ; 'NOTE THAT THE
    CODE FOR 'UNTRACE'
    (LINE 160) IS Q'
190 ; 'ALL LISTINGS ARE
    DISPLAYED CORRECT-
    LY, BUT REMEMBER
    THAT WHILE HOLDING
    THE CTRL KEY DOWN
    THE CODE CHARACTER
    IS NOT VISIBLE!'
```

Is any of this of practical use, you may ask? I suggest that as one becomes conversant with the codes it should speed up programming, but in any case discovering as much as possible about the TI-99/4A will lead to a better understanding of the machine.

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THE BELLS, THE BELLS!



**In this program
by Stephen Gray
you must save
Esmerelda, but
you mustn't
stop ringing
those bells**

In this game for the BBC you play the part of Quasimodo who is again attempting to rescue Esmerelda.

You must cross 10 walls and ring the bell at the end of each one. There are arrows, rocks and holes in the wall that hinder your journey, but Esmerelda must be saved, so persevere.

You should use z — left, x — right, RETURN — jump.

Variables

X% Quasimodo's x co-ordinate
Y% Quasimodo's y co-ordinate
M% Quasimodo's leg setting
J% direction Quasimodo is facing
MX% Quasimodo's last x co-ordinate
MY% Quasimodo's last y co-ordinate
R% should rock procedure be called
S% score
L% wall
RX% rock x
SX% rock's last x
F% Quasimodo fallen off wall
JUMP% Quasimodo is jumping
N% has Quasimodo moved
Q% lives
B% bonus
AR% should arrow procedure be called
AX% arrow x
DX% arrow last x
QS,HS,IS,JS all print Quasimodo
BS black block to cover Quasimodo
CS bell
AS arrow

WS brick
RS rock
ES Esmerelda
NS (5) hi-score names
H% (5) hi-scores

How it works

80-170 initialisation
180-280 main loop
290-500 Quasimodo procedure
510-580 rock procedure
590-660 arrow procedure
670-800 print screen procedure
810-1030 initialisation procedure
1040-1250 fall procedure
1260-1310 level cleared procedure
1320-1380 print Esmeralda procedure
1390-1530 Esmeralda rescued procedure
1540-1670 print hi-scores procedure
1680-1880 new hi-score procedure
1890-1930 dead, new game procedure
1940-1990 new game tune
2000-2040 wedding tune
2050-2200 more falls procedure

10 REM *****
20 REM * QUASIMODO *
30 REM * By Stephen Gray *
40 REM * for H.C.W. *


```

50 REM * BBC model B *
60 REM * Grayface *
70 REM *****
80 *TV 255
90 MODE7
100 PROCINIT
110 S%:=0:L%:=1:Q%:=3
120 MODE2
130 VDU5
140 B%:=300
150 IF Q%:=0 GOTO 1890
160 PROCSCR
170 TIME:=0
180 PROCQ
190 IF F% PROC FALL:GOTO140
200 IF R%:=0 R%:=1:RX%:=1088
210 IF R%:=1 PROCR
220 IF L%>4 AND AR%:=0 AND B%<280 AR%:=1:AX%=-64
230 IF AR%:=1 PROCARROW
240 IF POINT(X%+65,Y%)=6 PROCBELL:GOTO140
250 IF F% PROC FALL:GOTO140
260 B%:=300-TIME DIV10:VDU4:COLOUR7:PRINTTAB(17,1
);B%:" ":VDU5
270 IF B%<0 F%:=1
280 GOTO 180
290 DEFPROCQ
300 MX%:=X%:MY%:=Y%
310 IF INKEY(-98) AND X%>0 X%:=X%-32:J%:=2:N%:=1
320 IF INKEY(-67) X%:=X%+32:J%:=1:N%:=1
330 IF JUMP%>0 N%:=1
340 IF INKEY(-74) AND JUMP%:=0 JUMP%:=5:SOUND1,1,5
6,10
350 IF N%:=0 ENDPROC
360 IF JUMP%>1 Y%:=576 ELSE Y%:=512
370 IF (RX%:=X% OR RX%:=X%+32 OR RX%:=X%-32) AND Y%
:=512 F%:=1
380 IF L%>4 AND (AX%:=X% OR AX%:=X%-32 OR AX%:=X%+3
2) AND Y%:=512 F%:=1
390 IF JUMP%<2 SOUND 1,7,40+M%*8,1
400 IF M%:=1 M%:=2 ELSE M%:=1
410 IF JUMP%>0 JUMP%:=JUMP%-1
420 MOVE MX%,MY%:PRINTB$
430 IF Y%:=512 AND POINT(X%,Y%-64)=0 AND POINT(X%
+63,Y%-64)=0 F%:=1
440 ON J% GOTO 450,480
450 MOVE X%,Y%:IF M%:=1 PRINTQ$ ELSE PRINTH$
460 N%:=0
470 ENDPROC
480 MOVE X%,Y%:IF M%:=1 PRINTI$ ELSE PRINTJ$
490 N%:=0
500 ENDPROC
510 DEFPROCRC
520 SX%:=RX%
530 RX%:=RX%-64
540 MOVE SX%,512:VDU18,0,0,255
550 MOVE RX%,512:PRINTR$
560 IF RX%<-32 RX%:=0
570 IF (RX%:=X% OR RX%:=X%+32 OR RX%:=X%-32) AND Y%
:=512 F%:=1
580 ENDPROC
590 DEFPROCARROW
600 DX%:=AX%
610 AX%:=AX%+128
620 MOVE DX%,480:VDU18,0,0,255,255
630 MOVE AX%,480:PRINTA$
640 IF AX%>1087 AR%:=0:MOVE AX%,480:VDU18,0,0,255
,255
650 IF (AX%:=X% OR AX%:=X%-32 OR AX%:=X%+32) AND Y%
:=512 F%:=1
660 ENDPROC
670 DEFPROCSCR
680 VDU23;8202;0;0;0;
690 CLS
700 IF S%:=0 AND Q%:=3 PROCTUNE
710 MOVE 0,448:FOR A=1 TO 260:PRINTW$;:NEXT
720 GCOLOR,0
730 IF L% MOD5>1 MOVE0,448:FOR A=1 TO 4:VDU9,9,2
55,255,8,8,10,255,255,11:NEXT
740 GCOLOR,6:MOVE 1152,480:DRAW 1152,900:MOVE1088
,960:PRINTC$
750 IF L%:=10 PROCES
760 X%:=0:Y%:=512:AR%:=0:M%:=1:J%:=1:R%:=0:F%:=0:JUMP%
:=0:N%:=0:RX%:=1088:AX%=-64
770 VDU4:COLOUR6:PRINTTAB(0,0);"SCORE WALL B
ONUS":COLOUR 7:PRINTTAB(0,1);S%;TAB(9,1);L%:VDU5:M
OVE 0,927:PRINT;STRING$(Q%-1,(H#+CHR#11+CHR#9))
780 VDU5

```



```

790 MOVE X%,Y%:PRINTQ$
800 ENDPROC
810 DEF PROCINIT
820 DIM N$(5),H$(5):FORA=1 TO 5:H%(A)=100:N$(A)=
"Grayface":NEXT
830 VDU 23,254,127,127,127,127,127,127,127,0
840 VDU 23,253,128,128,128,128,128,128,128,255
850 VDU23,255,255,255,255,255,255,255,255,255
860 VDU23,224,14,28,31,14,6,0,0,0,23,225,0,93,22
4,240,248,252,255,124,23,226,127,127,99,99,99,96,9
6,96,23,227,124,124,108,108,236,236,12,12
870 VDU23,228,112,56,248,112,96,0,0,0,23,229,0,7
0,7,15,31,63,255,62,23,230,254,254,198,198,6,6
,6,23,231,62,62,54,54,55,55,48,48,23,232,0,60,110,
223,223,126,60,0
880 VDU23,233,1,3,6,5,13,11,11,15,23,234,128,192
,224,224,240,240,240,23,235,7,7,15,15,15,31,63
,127,23,236,224,224,240,240,240,248,252,254,23,237
,0,0,1,2,2,4,4,0
890 VDU23,238,0,168,84,255,84,168,0,0,23,239,0,8
,12,255,12,8,0,0
900 A$=CHR#18+CHR#0+CHR#3+CHR#238+CHR#239
910 C$=CHR#18+CHR#0+CHR#3+CHR#233+CHR#234+CHR#8+
CHR#8+CHR#10+CHR#235+CHR#236+CHR#8+CHR#8+CHR#11+CH
R#18+CHR#0+CHR#7+CHR#237
920 W$=CHR#18+CHR#0+CHR#1+CHR#254+CHR#8+CHR#18+C
HR#0+CHR#3+CHR#253
930 Q$=CHR#18+CHR#0+CHR#5+CHR#224+CHR#8+CHR#18+C
HR#0+CHR#4+CHR#225+CHR#18+CHR#0+CHR#2+CHR#8+CHR#10
+CHR#226
940 I$=CHR#18+CHR#0+CHR#5+CHR#228+CHR#8+CHR#18+C
HR#0+CHR#4+CHR#229+CHR#18+CHR#0+CHR#2+CHR#8+CHR#10
+CHR#230
950 H$=CHR#18+CHR#0+CHR#5+CHR#224+CHR#8+CHR#18+C
HR#0+CHR#4+CHR#225+CHR#18+CHR#0+CHR#2+CHR#8+CHR#10
+CHR#227
960 J$=CHR#18+CHR#0+CHR#5+CHR#228+CHR#8+CHR#18+C
HR#0+CHR#4+CHR#229+CHR#18+CHR#0+CHR#2+CHR#8+CHR#10
+CHR#231
970 B$=CHR#18+CHR#0+CHR#0+CHR#255+CHR#8+CHR#10+C
HR#255
980 R$=CHR#18+CHR#0+CHR#7+CHR#232
990 ENVELOPE 1,129,-2,-2,-2,1,1,1,120,-1,-1,-1,1
20,90
1000 ENVELOPE 7,129,-1,-1,-1,10,10,10,120,-1,-1,-
1,120,90
1010 ENVELOPE 6,1,0,0,0,1,1,1,120,-1,-1,-1,120,60
1020 PROCSHOW
1030 ENDPROC
1040 DEFPROC FALL
1050 IF POINT(X%,Y%-64)=0 AND POINT(X%+32,Y%-64)<
>0 F%:=2
1060 IF POINT(X%,Y%-64)<>0 AND POINT(X%+32,Y%-64)
=0 F%:=3
1070 REPEAT
1080 MOVE X%,Y%:PRINTB$
1090 Y%:=Y%-32
1100 SOUND 2,7,Y%/3,2
1110 MOVE X%,Y%:PRINTQ$
1120 FORB=1 TO 100:NEXT
1130 UNTIL POINT(X%,Y%-32)=1 OR POINT(X%,Y%-32)=3
OR POINT(X%+64,Y%-32)=1
1140 IF F%:=2 PROC FALL2:GOTO1170
1150 IF F%:=3 PROC FALL1:GOTO1170
1160 IF X% MOD64=0 MOVE X%,Y%:VDU18,0,0,255,8,10:
PRINTW$ ELSE MOVE X%-32,Y%:VDU18,0,0,255,255,8,8,1
0:PRINTW$;W$
1170 REPEAT
1180 Y%:=Y%-32
1190 SOUND 2,7,Y%/3,2
1200 MOVE X%,Y%:PRINTQ$
1210 FORB=1 TO 100:NEXT
1220 IF X% MOD64=0 MOVE X%,Y%:PRINT W$ ELSE MOVE
X%-32,Y%:PRINTW$;W$
1230 UNTIL Y%=96
1240 IF X% MOD64=0 MOVE X%,Y%-32:PRINT W$ ELSE MO
VE X%-32,Y%-32:PRINTW$;W$
1250 Q%:=Q%-1:ENDPROC
1260 DEFPROCBELL
1270 *FX15
1280 SOUND1,1,100,50
1290 L%:=L%+1:IF L%:=11 PROCESSY ELSE FORA=1 TO 30
00:NEXT
1300 S%:=S%+B%
1310 ENDPROC
1320 DEFPROCSC
1330 MOVE960,832:PRINTW$;W$;CHR#9;CHR#9;W$

```




```
1340 VDU23,232,30,62,124,112,224,224,224,192,23,2
33,0,0,0,4,0,16,24,60,23,235,124,120,0,0,0,0,72,10
8,23,234,0,0,0,8,30,12,0,0,23,236,0,0,120,120,252,
252,0,0
```

```
1350 E# = CHR#18+CHR#0+CHR#3+CHR#232+CHR#8+CHR#18+C
HR#0+CHR#5+CHR#234+CHR#8+CHR#18+CHR#0+CHR#6+CHR#23
3+CHR#8+CHR#10+CHR#235+CHR#8+CHR#18+CHR#0+CHR#2+CH
R#236
```

```
1360 MOVE1024,896:PRINTE#
1370 VDU23,232,0,60,110,223,223,126,60,0,23,233,1
,3,6,5,13,11,11,15,23,234,128,192,224,224,240,240,
240,240,23,235,7,7,15,15,15,31,63,127,23,236,224,2
24,240,240,240,248,252,254
```

```
1380 ENDPROC
1390 DEFPROCESSY
1400 FOR B=1 TO 200:NEXT
1410 MOVE X%,Y%:PRINT#
1420 MOVE X%+64,512:PRINT#
```

```
1430 X%=X%+32
1440 REPEAT
1450 MOVE X%,Y%:PRINT#
1460 Y%=Y%+32
1470 FOR B=1 TO 200:NEXT
1480 MOVE X%,Y%:PRINT#
1490 UNTIL Y%=896
```

```
1500 PROCSONG
1510 FOR B=1 TO 10000:NEXT
1520 L%=1
1530 ENDPROC
1540 DEFPROCSHOW
1550 CLS
```

```
1560 PRINTCHR#131;CHR#157;"
1570 PRINTCHR#131;CHR#157;CHR#141;CHR#129;"
Q U A S I M O D O"
```

```
1580 PRINTCHR#131;CHR#157;CHR#141;CHR#129;"
Q U A S I M O D O"
1590 PRINTCHR#131;CHR#157;"
1600 PRINTCHR#131;CHR#157;CHR#132;"
```

```
1610 FOR A=1 TO 5:PRINT'CHR#141;;A;"",H%(A);"
";N%(A)
1620 PRINTCHR#141;;A;"",H%(A);" ";N%(A)
1630 NEXT
1640 PRINTTAB(6,22);CHR#134;"Press RETURN to sta
rt"
```

```
1650 *FX15
1660 A=GET:IF A<>13 GOTO 1660
1670 ENDPROC
1680 DEFPROCHI
1690 V%=0
```

```
1700 IF S%<H%(5) ENDPROC
1710 V%=V%+1
1720 IF S%<H%(V%) GOTO 1710
1730 IF V%=5 GOTO 1770
1740 FOR N=5 TO V% STEP-1
1750 H%(N)=H%(N-1):N%(N)=N%(N-1)
1760 NEXT
```

```
1770 PRINT""YOU'RE IN THE TOP FIVE"
1780 H%(V%)=S%
1790 PRINT""ENTER YOUR NAME"
1800 N%(V%)=""
1810 *FX15,1
1820 A=GET
1830 IF A=13 ENDPROC
1840 IF A=127 AND LENN%(V%)>0 N%(V%)=LEFT$(N%(V%)
,LENN%(V%)-1):VDUA:GOTO1820
1850 IF (A=127 AND LENN%(V%)=0) OR LENN%(V%)=15 VD
U7:GOTO1820
1860 N%(V%)=N%(V%)+CHR$(A):PRINT;CHR$(A);
1870 GOTO1820
1880 ENDPROC
1890 FOR B=1 TO 10000:NEXT
1900 MODE7
1910 PROCHI
1920 PROCSHOW
1930 GOTO 110
1940 DEFPROC TUNE
1950 RESTORE 1980
1960 FORG=1 TO14
1970 READ F,H:SOUND 1,6,F,H:NEXT
1980 DATA 25,12,21,12,5,8,25,12,21,12,5,8,13,4,13
,4,13,4,13,4,13,4,13,4,21,4,25,20
1990 ENDPROC
2000 DEFPROC SONG
2010 RESTORE 2030
2020 FOR G=1 TO19:READ F,H:SOUND 1,6,F,H:NEXT
2030 DATA 33,6,53,4,53,2,53,12,33,6,61,4,49,2,53,
12,33,6,53,4,73,2,73,6,69,4,61,2,53,6,49,4,53,2,61
,6,33,6
2040 ENDPROC
2050 DEFPROC FALL1
2060 MOVE X%,Y%:PRINT#
2070 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2080 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:PRINT
W%:VDU18,0,0,255
2090 Y%=Y%-32
2100 MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:FOR B=1 T
O 100:NEXT
2110 MOVE X%-32,Y%:PRINTW%:VDU18,0,0,255,8,8,10:
PRINTW%:VDU18,0,0,255
2120 ENDPROC
2130 DEFPROC FALL2
2140 MOVE X%,Y%:PRINT#
2150 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2160 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:VDU18
,0,0,255:PRINTW%
2170 Y%=Y%-32
2180 MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:FOR B=1 T
O 100:NEXT
2190 MOVE X%-32,Y%:VDU18,0,0,255:PRINTW%:VDU18,8,
10,18,0,0,255:PRINTW%
2200 ENDPROC
```

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,LENN%(V%)-1):VDUA:GOTO1820
1850 IF (A=127 AND LENN%(V%)=0) OR LENN%(V%)=15 VD
U7:GOTO1820
1860 N%(V%)=N%(V%)+CHR$(A):PRINT;CHR$(A);
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,6,33,6
2040 ENDPROC
2050 DEFPROC FALL1
2060 MOVE X%,Y%:PRINT#
2070 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2080 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:PRINT
W%:VDU18,0,0,255
2090 Y%=Y%-32
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O 100:NEXT
2110 MOVE X%-32,Y%:PRINTW%:VDU18,0,0,255,8,8,10:
PRINTW%:VDU18,0,0,255
2120 ENDPROC
2130 DEFPROC FALL2
2140 MOVE X%,Y%:PRINT#
2150 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2160 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:VDU18
,0,0,255:PRINTW%
2170 Y%=Y%-32
2180 MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:FOR B=1 T
O 100:NEXT
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10,18,0,0,255:PRINTW%
2200 ENDPROC
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FOR B=1 TO 100:NEXT
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W%:VDU18,0,0,255
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O 100:NEXT
2110 MOVE X%-32,Y%:PRINTW%:VDU18,0,0,255,8,8,10:
PRINTW%:VDU18,0,0,255
2120 ENDPROC
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2150 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
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10,18,0,0,255:PRINTW%
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```

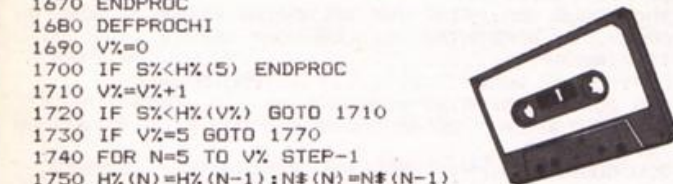
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,0,0,255:PRINTW%
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PRINTW%:VDU18,0,0,255
2120 ENDPROC
2130 DEFPROC FALL2
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FOR B=1 TO 100:NEXT
2160 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:VDU18
,0,0,255:PRINTW%
2170 Y%=Y%-32
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FOR B=1 TO 100:NEXT
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2090 Y%=Y%-32
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O 100:NEXT
2110 MOVE X%-32,Y%:PRINTW%:VDU18,0,0,255,8,8,10:
PRINTW%:VDU18,0,0,255
2120 ENDPROC
2130 DEFPROC FALL2
2140 MOVE X%,Y%:PRINT#
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FOR B=1 TO 100:NEXT
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,0,0,255:PRINTW%
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2150 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2160 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:VDU18
,0,0,255:PRINTW%
2170 Y%=Y%-32
2180 MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:FOR B=1 T
O 100:NEXT
2190 MOVE X%-32,Y%:VDU18,0,0,255:PRINTW%:VDU18,8,
10,18,0,0,255:PRINTW%
2200 ENDPROC
```

```
1770 PRINT""YOU'RE IN THE TOP FIVE"
1780 H%(V%)=S%
1790 PRINT""ENTER YOUR NAME"
1800 N%(V%)=""
1810 *FX15,1
1820 A=GET
1830 IF A=13 ENDPROC
1840 IF A=127 AND LENN%(V%)>0 N%(V%)=LEFT$(N%(V%)
,LENN%(V%)-1):VDUA:GOTO1820
1850 IF (A=127 AND LENN%(V%)=0) OR LENN%(V%)=15 VD
U7:GOTO1820
1860 N%(V%)=N%(V%)+CHR$(A):PRINT;CHR$(A);
1870 GOTO1820
1880 ENDPROC
1890 FOR B=1 TO 10000:NEXT
1900 MODE7
1910 PROCHI
1920 PROCSHOW
1930 GOTO 110
1940 DEFPROC TUNE
1950 RESTORE 1980
1960 FORG=1 TO14
1970 READ F,H:SOUND 1,6,F,H:NEXT
1980 DATA 25,12,21,12,5,8,25,12,21,12,5,8,13,4,13
,4,13,4,13,4,13,4,13,4,21,4,25,20
1990 ENDPROC
2000 DEFPROC SONG
2010 RESTORE 2030
2020 FOR G=1 TO19:READ F,H:SOUND 1,6,F,H:NEXT
2030 DATA 33,6,53,4,53,2,53,12,33,6,61,4,49,2,53,
12,33,6,53,4,73,2,73,6,69,4,61,2,53,6,49,4,53,2,61
,6,33,6
2040 ENDPROC
2050 DEFPROC FALL1
2060 MOVE X%,Y%:PRINT#
2070 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2080 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:PRINT
W%:VDU18,0,0,255
2090 Y%=Y%-32
2100 MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:FOR B=1 T
O 100:NEXT
2110 MOVE X%-32,Y%:PRINTW%:VDU18,0,0,255,8,8,10:
PRINTW%:VDU18,0,0,255
2120 ENDPROC
2130 DEFPROC FALL2
2140 MOVE X%,Y%:PRINT#
2150 Y%=Y%-32:MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:
FOR B=1 TO 100:NEXT
2160 MOVE X%,Y%:VDU18,0,0,255:MOVE X%-32,Y%:VDU18
,0,0,255:PRINTW%
2170 Y%=Y%-32
2180 MOVE X%,Y%:PRINTQ$:SOUND2,7,Y%/3,2:FOR B=1 T
O 100:NEXT
2190 MOVE X%-32,Y%:VDU18,0,0,255:PRINTW%:VDU18,8,
10,18,0,0,255:PRINTW%
2200 ENDPROC
```



... **IT'S EGGSITING!** **CHOCCY EGG**

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RETURN TO ZARKON

You may have played David Pope's Mission to Zarkon — well, this is a follow-up. It's an independent adventure and should keep you occupied for hours



Returning from a mission on the planet Zarkon, you are contacted by the rebel forces and asked to return to the planet to find a traitor and eliminate him.

You run out of fuel before you reach the city of Zargos, where you must make contact, or be contacted by the rebels. You have 200 moves before the Zarkonian troops catch you.

There are two locations: the city of Zargos and the island of Zarg. The city and island have 90 sub-locations and 25 items between them.

Variables

m%(x,y) holds map
f% holds locations
d\$(x) describes locations
h%(x,1) pointer to items
i\$(x) describes items
w\$(x) holds inventory
v\$ player input
z\$ words understood
r\$,s\$,t\$ substrings
aa%-az%
j%,l%,c%
u%,ff%,qa%
xy%,sr%,st%
A number of moves

flags

```

10 REM***RETURN TO ZARKON*****
20
30 REM***BY DAVID JOHN POPE*****
40
50 REM***SET COLOURS*****
60 MODE 1:BORDER 5:INK 0,0:INK 1,24:INK 2,3:INK 3,
26
70 PAPER 0
80 REM ***INITIALISE GAME*****
90 DIM m%(90,4),d$(90),i$(30),w$(5),h%(30,1),z$(30
),z%(30)
100 f%=79:xy%=0:aa%=0:ab%=0:ac%=0:ad%=0:ae%=0:af%=
0:ag%=0:ah%=0:ai%=0:aj%=0:ak%=0:al%=0:am%=0:an%=0:
ao%=0:ap%=0:aq%=0:ar%=0:as%=0:at%=0:au%=0:av%=0:aw
%=0:ax%=0:ay%=0:az%=0:ans%=0
110 REM ***OPENING TITLES*****
120 GOSUB 3460
130 FOR x=1 TO 90:READ d$(x)
140 FOR y=1 TO 4:READ m%(x,y):NEXT y,x
150 FOR x=1 TO 25:READ i$(x),h%(x,1),z$(x):z%(x)=x
:NEXT
160 LOCATE 7,24:PAPER 2:PEN 1:PRINT"PRESS THE <SPA
CE BAR> TO START":PAPER 0:PEN 0
170 a$=INKEY$:IF a$<>" " THEN 170
180 CLS:WHILE az%<>10
190 REM ***MAIN LOOP STARTS HERE***
200 REM ***SET TRAPS*****
210 IF (f%=18 OR f%=20 OR f%=24) AND an%=1 THEN GO
TO 370
220 IF f%=45 THEN qa%=qa%+1:IF f%=45 AND qa%=3 THE
N i$(25)="SIX WRITHING TENTACLES!!!"
230 IF f%=45 AND qa%=5 THEN i$(25)="TEN WRITHING T
ENTACLES!!!" :PRINT "I WOULDN'T COME BACK HERE IF
I WERE YOU!"
240 IF f%=45 AND qa%=6 THEN GOTO 270
250 IF f%=12 AND ac%=0 THEN GOTO 310
260 GOTO 460
270 GOSUB 280:PRINT"YOU ARE CORDIALLY INVITED TO A
PICNIC ON THE BEACH.....
YOU ARE ON THE MENU!!!" :GOTO 3970
280 IF f%=12 THEN q%=-75 ELSE IF f%=37 THEN q%=-50
ELSE IF f%=45 THEN q%=1000 ELSE IF (f%=79 OR f%=7
4) THEN q%=-25 ELSE IF f%=68 THEN q%=2000 ELSE IF
f%=40 THEN q%=-75 ELSE IF f%=45 THEN q%=500
290 INK 0,24,6:CLS:FOR X=1 TO 20:BORDER 26,X:ENT 1
,200,4,10:SOUND 1,q%+100,50,15,1,1:NEXT:BORDER 5:I
NK 0,0:CLS:RETURN
300 GOSUB 280:PRINT"THE SPLASHING ATTRACTS SOME SH
ARKS.....SOMETHING TICKLES YOUR LEG.....
IT TINGLES.....OR WHAT'S
LEFT OF IT DOES!!!" :GOTO 3970
310 GOSUB 280:PRINT"YOU HAVE NO I.D. CARD!! AMERIC
AN EXPRESS WON'T DO ANYTHING FOR YOU HERE!!!" :BORDER
5:GOTO 3970
320 GOSUB 280:PRINT"YOU ARE IMMEDIATELY ARRESTED .
.....THE CHARGE IS MURDER!
THEY SAY THE SPICE MINES OF ARKESIA ARE VERY NICE!
LET'S HOPE SO.....YOU'LL BE THERE FOR
SOME TIME!!!" :GOTO 3970
330 GOSUB 280:PRINT"IT COMES AWAY VERY EASILY.....
.....AS DO THE OTHERS.....
THINGS BEGIN TO GET ON TOP OF YOU!!!" :GOTO 397
0
340 GOSUB 280:PRINT"NOBODY SAID IT WAS DEAD!!!"
ZILOVIAN CRABS LIKE THEIR NAP AND WHEN
WOKEN UP THEY TEND TO NIP...AND NIP.....YOU REALLY
FEEL CUT UP ABOUT THIS.....IN FACT YOU GO TO PI
ECES..LITTLE PIECES!" :GOTO 3970
350 GOSUB 280:PRINT"AS YOU JUMP THROUGH THE AIR YO
U WONDER WHY YOU ARE NOT REACHING THE OTHER SIDE!
OH DEAR! Y
OU SEEM TO BE SINKING!!!" :GOTO 3970
360 GOSUB 280:PRINT"AS SOON AS YOU GO IN YOU REALI
SE THAT...SOMETHING IS NOT QUITE RIGHT.....
COULD IT BE THAT THE TEMPERATURE IS OVER 600 C
ENTIGRADE WHICH IS.....THE AVERAGE TEMPERAT
URE ON PHENALIA!!!" :GOTO 3970
370 GOSUB 280:PRINT"SEVERAL FEDERATION TROOPERS AR
REST YOU WITH THE NOTE IN YOUR HANDS! YOUR TRIAL
IS QUITE BRIEF.....THEY SHOOT
YOU ON THE SPOT!!!" :BORDER 5:GOTO 3970
380 CLS:BORDER 9,0:FOR x=1 TO 10:ENT 1,200,30,10:S
OUND 1,2000,100,15,1,1:NEXT:PRINT"WOW..WHAT A NIGH
T YOU HAD!!"
390 h%(15,1)=38:f%=36:BORDER 5:RETURN
400 CLS:BORDER 3,1:PRINT"HE IS DEAD! NOW YOU MUST
RETURN TO YOUR PLANET TO GIVE THEM THE NEWS SO THE
Y CAN CONTINUE TO HELP THE REBELS!!!" :FOR

```



```

x=1 TO 15
410 ENT 1,20,8,8:SOUND 1,200,100,15,1,1:NEXT:CLS:B
ORDER 5:xy=1
420 d$(73)="IN A SECRET CAVE.THERE IS A DEAD BODY
ON THE FLOOR"
430 d$(68)="OUTSIDE A SECRET CAVE!!!!"
440 d$(78)="ON THE OTHER SIDE OF THE QUICKSAND"
450 d$(84)="ON A NARROW PATH. YOUR WAY IS BLOCKED
BYA SMALL POOL OF QUICKSAND":RETURN
460 REM ***CALCULATE DIRECTION*****
470 PAPER 2:PEN 1:PRINT"YOU ARE:-":PAPER 1:PEN 0:P
RINT d$(f%)
480 a$="":IF m%(f%,1)>0 THEN a$="WEST"
490 IF m%(f%,2)>0 AND LEN(a$)>0 THEN a$=a$+",NORTH
" ELSE IF m%(f%,2)>0 THEN a$="NORTH"
500 IF m%(f%,3)>0 AND LEN(a$)>0 THEN a$=a$+",SOUTH
" ELSE IF m%(f%,3)>0 THEN a$="SOUTH"
510 IF m%(f%,4)>0 AND LEN(a$)>0 THEN a$=a$+",EAST"
ELSE IF m%(f%,4)>0 THEN a$="EAST"
520 IF LEN(a$)=0 THEN a$="THINK ABOUT IT !!"
530 IF f%=90 THEN a$="...ER..UMM...ER..MMM..ERR...
."
540 IF f%=49 THEN a$="D O W N!!! ARRGH!!!!!"
550 PRINT:PAPER 2:PEN 1:PRINT"YOU CAN GO:-":PAPER
1:PEN 0:PRINT a$
560 REM ***LOOK FOR OBJECTS*****
570 u=0:FOR x=1 TO 25:ff%=0:IF h%(x,1)=f% THEN ff%
=1
580 IF ff%=1 THEN 600
590 NEXT x:GOTO 620
600 IF u=0 THEN PAPER 2 :PEN 1:PRINT:PRINT"YOU CAN
SEE:-":PAPER 1:PEN 0
610 PRINT i$(x):u=u+1:GOTO 590
620 PRINT:PRINT:PAPER 2:PEN 3:IF f%=90 OR f%=49 TH
EN GOTO 3970 ELSE PRINT"YOU HAVE";200-A;"MOVES LEF
T":PAPER 0:PEN 1
630 IF f%=90 GOTO 3970
640 A=A+1
650 IF A=200 THEN GOTO 320
660 PRINT:PAPER 2:PEN 3:PRINT"WHAT WILL YOU DO NOW
?":PRINT:PRINT:INPUT v$:PAPER 0:PEN 1
670 IF A<1 THEN GOTO 320
680 CLS
690 v$=LOWER$(v$):r$=LEFT$(v$,2):s$=LEFT$(v$,3):t$
=LEFT$(v$,4):c=FRE("")
700 REM ***PLAYER INPUT*****
710 j%=0:IF (r$="w" OR t$="go w") AND m%(f%,1)>0 T
HEN f%=m%(f%,1):j%=1
720 IF (r$="n" OR t$="go n") AND m%(f%,2)>0 THEN f
%=m%(f%,2):j%=1
730 IF (r$="s" OR t$="go s") AND m%(f%,3)>0 THEN f
%=m%(f%,3):j%=1
740 IF (r$="e" OR t$="go e") AND m%(f%,4)>0 THEN f
%=m%(f%,4):j%=1
750 IF j%=0 AND (r$="w" OR t$="go w" OR r$="n" OR
t$="go n" OR r$="s" OR t$="go s" OR r$="e" OR t$="
go e") THEN j%=1:PRINT"YOU CAN'T GO THAT WAY !"
760 IF s$="get" OR s$="gra" OR s$="tak" THEN j%=1:
GOSUB 1160
770 IF s$="dro" THEN j%=1:GOSUB 1570
780 IF s$="inv" THEN j%=1:GOSUB 1750
790 IF s$="fly" THEN j%=1:GOSUB 1810
800 IF s$="sai" THEN j%=1:GOSUB 1910
810 IF s$="lea" THEN j%=1:GOSUB 3420
820 IF s$="pad" THEN j%=1:GOSUB 1990
830 IF s$="cli" THEN j%=1:GOSUB 2130
840 IF t$="show" THEN j%=1:GOSUB 2050
850 IF s$="jum" THEN j%=1:GOSUB 3380
860 IF t$="go i" THEN j%=1:GOSUB 2220
870 IF t$="go o" THEN j%=1:GOSUB 2410
880 IF s$="buy" THEN j%=1:GOSUB 2540
890 IF s$="rea" THEN j%=1:GOSUB 2570
900 IF t$="inse" OR s$="lev" OR s$="for" THEN j%=1
:GOSUB 2650
910 IF s$="unl" THEN j%=1:GOSUB 2680
920 IF s$="sta" THEN j%=1:GOSUB 2810
930 IF t$="drin" THEN j%=1:GOSUB 2740
940 IF s$="sit" THEN j%=1:GOSUB 2780
950 IF t$="sear" OR s$="exa" OR s$="loo" THEN j%=1
:GOSUB 2840
960 IF s$="swi" THEN j%=1:GOSUB 2900
970 IF s$="pre" OR s$="pus" THEN j%=1:GOSUB 2930
980 IF s$="ref" THEN j%=1:GOSUB 2970
990 IF s$="dan" THEN j%=1:GOSUB 3030
1000 IF s$="kil" OR t$="shoo" OR s$="fir" THEN j%=
1:GOSUB 3060
1010 IF s$="mov" THEN j%=1:GOSUB 3130
1020 IF t$="go u" THEN j%=1:GOSUB 3180

```



```

1030 IF t$="go d" THEN j%=1:GOSUB 3220
1040 IF s$="ope" THEN j%=1:GOSUB 3260
1050 IF t$="go b" OR t$="go h" THEN j%=1:GOSUB 332
0
1060 IF t$="answ" THEN j%=1:GOSUB 3340
1070 IF j%=0 THEN PRINT"I'M AFRAID THAT DOES NOT C
OMPUTE!!"
1080 WEND
1090 REM***PLAYER SUCCESSFUL*****
1100 GOSUB 280:GOSUB 280:INK 0,0:INK 2,6,0:CLS:PAP
ER 1:PEN 2:LOCATE 15,6:PRINT"YOU DID IT"
1110 PAPER 0:PEN 3:PRINT:PRINT"          UNDER YOUR
EXPERT CONTROL          YOU FLY THE LYNX JET TO
YOUR          HOME PLANET. ONCE MORE YOUR
          PEOPLE CAN ASSIST THE REBELS          IN
THEIR FIGHT AGAINST THE          FEDERATION"
1120 PRINT
1130 PRINT"          ....AS YOU LEAVE THE STAR SYSTEM
YOU ARE UNAWARE OF THE PASSENGER          HIDIN
G IN THE CARGO HOLD.....          AN ANDROID WITH
AN ORANGE EMBLEM          ON HIS JACKET.....WAITIN
G.....          ....BIDING HIS TIME....."
1140 GOTO 4000
1150 REM***ROUTINES FOR PLAYER INPUT***
1160 REM***PICK UP ITEMS*****
1170 GOSUB 1480
1180 IF 1%<>1 THEN PRINT"I DON'T SEE A ";1$:RETURN
1190 u%=0
1200 FOR x=1 TO 25
1210 IF h%(x,1)=f% AND h%(z%(t),1)=f% THEN u%=1
1220 NEXT
1230 IF u%=0 THEN PRINT"IT'S NOT HERE!":RETURN
1240 IF t=2 THEN GOTO 330
1250 IF t=8 THEN ap%=1:GOSUB 440
1260 IF t=1 THEN ac%=1 ELSE IF t=3 THEN af%=1 ELSE
IF t=4 THEN am%=1 ELSE IF t=5 THEN aj%=1
1270 IF t=6 THEN ak%=1 ELSE IF t=7 THEN ai%=1 ELSE
IF t=9 THEN ar%=1 ELSE IF t=24 THEN al%=1
1280 IF f%=41 AND t=11 THEN GOTO 1460
1290 IF f%=46 AND t=11 THEN GOTO 1470
1300 IF t=12 THEN ag%=1 ELSE IF t=13 THEN an%=1 EL
SE IF t=14 THEN ao%=1:d$(13)=LEFT$(d$(13),21) ELSE
IF t=15 THEN av%=1 ELSE IF t=21 THEN aa%=1 ELSE I
F t=23 THEN au%=1
1310 IF t=10 THEN PRINT"HE CAN'T HELP YOU SO LEAVE
HIM ALONE!!!":RETURN
1320 IF t=16 THEN aq%=1:d$(32)=LEFT$(d$(32),80) EL
SE IF t=24 THEN as%=1
1330 IF t=17 THEN GOTO 300
1340 IF t=18 THEN PRINT"IT'S STUCK IN THE GROUND!!
":RETURN
1350 IF t=25 THEN GOTO 270
1360 IF t=19 THEN GOTO 340
1370 IF t=20 THEN GOTO 320
1380 IF t=22 THEN PRINT"IT'S TOO HEAVY TO PICK UP.
.TRY MOVING IT":RETURN
1390 REM
1400 REM CALCULATE PICK UP*****
1410 REM
1420 u%=0:FOR x=1 TO 4:IF w$(x)="" THEN w$(x)=i$(z
%(t)):u%=1:x=x+9
1430 NEXT x
1440 IF u%=0 THEN PRINT"DON'T BE GREEDY! ONLY 4 IT
EMS!":RETURN
1450 h%(z%(t),1)=0:RETURN
1460 f%=46:h%(11,1)=46:RETURN
1470 f%=41:h%(11,1)=41:RETURN
1480 REM***TWO-WORD INPUT*****
1490 1$="":FOR x=1 TO LEN(v$)
1500 IF MID$(v$,x,1)=" " THEN 1$=RIGHT$(v$, (LEN(v$
)-x)):x=x+50
1510 NEXT
1520 t=0:1%=0:IF LEN(1$)<2 THEN RETURN
1530 FOR x=1 TO 25
1540 IF LEFT$(z%(x),LEN(1$))=1$ THEN 1%=1:t=x
1550 NEXT
1560 RETURN
1570 REM***CALCULATE DROP*****
1580 GOSUB 1480
1590 IF 1%<>1 THEN PRINT"I HAVEN'T GOT A ";1$:RETU
RN
1600 u%=0
1610 FOR x=1 TO 4:IF w$(x)=i$(z%(t)) THEN w$(x)=""
:u%=1
1620 NEXT
1630 IF u%<>1 THEN PRINT"I HAVEN'T GOT IT!":RETURN
1640 h%(z%(t),1)=f%

```




```

1650 IF f%>47 AND f%<55 THEN GOTO 300
1660 IF t=3 AND f%=47 THEN GOTO 300
1670 IF t=15 THEN av%=0:GOTO 380
1680 IF t=7 AND f%<55 AND f%>45 THEN GOTO 300
1690 IF t=4 AND f%=30 THEN PRINT"HERE'S YOUR TICKE
T! IT COSTS 100 ZARKS!!HOPE YOU ENJOY THE FILM":a
m%=0:GOTO 2100
1700 IF t=12 AND f%=27 THEN f%=21:ag%=0:GOTO 2120
1710 IF t=1 AND ac%=1 THEN ac%=0 ELSE IF t=3 AND
af%=1 THEN af%=0 ELSE IF t=4 AND am%=1 THEN am%=0
ELSE IF t=5 AND aj%=1 THEN aj%=0 ELSE IF t=6 AND a
k%=1 THEN ak%=0 ELSE IF t=7 AND ai%=1 THEN ai%=0
1720 IF t=8 AND ap%=1 THEN ap%=0 ELSE IF t=9 AND a
r%=1 THEN ar%=0 ELSE IF t=13 AND an%=1 THEN an%=0
ELSE IF t=14 AND ao%=1 THEN ao%=0 ELSE IF t=16 AN
D aq%=1 THEN aq%=0 ELSE IF t=21 AND aa%=1 THEN aa%
=0 ELSE IF t=24 AND al%=1 THEN al%=0
1730 IF t=24 AND as%=1 THEN as%=0
4740 RETURN

1750 REM***INVENTORY*****
1760 PAPER 2:PEN 3:PRINT"YOU ARE CARRYING :-":PAPE
R 0:PEN 1:c%=0
1770 FOR x=1 TO 4:IF w$(x)<>" THEN PRINT w$(x):c%
=1
1780 NEXT:IF c%=0 THEN PRINT"NOTHING!"
1790 PRINT
1800 RETURN
1810 REM***FLY*****
1820 IF f%=79 AND as%=1 THEN GOTO 1830 ELSE 1840
1830 CLS:PRINT"YOU MAY HAVE ENOUGH FUEL TO REACH .
.... ZARGOS!GOOD LUCK!":FOR x=1 TO 10:ENT 1,25,10,
10:SOUND 1,250,100,15,1,1:BORDER x,26:NEXT:CLS:f%
=1:BORDER 5:d$(79)="BY SOME SCORCHED GRASS!":d$(80)
="AT THE FOOT OF A HILL":m%(80,1)=79:m%(79,4)=80:R
ETURN
1840 IF f%=79 AND as%=0 THEN PRINT"FIRST YOU MUST
PUT SOME FUEL IN YOUR JET":RETURN
1850 IF f%=74 AND at%=1 AND xy%=1 THEN GOTO 1090
1860 IF f%=74 AND xy%=1 AND at%=0 THEN PRINT"YOU H
AVE KILLED THE TRAITOR BUT YOU MUST REFUEL THIS JET
SO YOU CAN INFORM YOUR HOME BASE THAT THEY CAN R
ESUME CONTACT WITH THE REBELS!!!!":RETURN
1870 IF f%=74 AND at%=1 AND xy%=0 THEN PRINT"YOU M
UST FIND AND KILL THE TRAITOR BEFORE YOU LEAV
E!!!!":RETURN
1880 IF f%=74 AND at%=0 THEN PRINT"FIRST YOU MUST
PUT SOME JET-FUEL IN!!!!":RETURN
1890 IF f%=1 THEN PRINT"YOUR VIPER JET IS INOPERAB
LE!!!!":RETURN
1900 PRINT"SPROUT A PAIR OF WINGS FIRST!!":RETURN
1910 REM***SAIL*****
1920 IF f%=45 AND ai%=1 THEN f%=48
1930 IF f%=56 AND ai%=1 THEN f%=53
1940 IF f%=46 AND ai%=1 THEN PRINT"THE WATER IS TO
O SHALLOW HERE FOR A SAILING BOAT!":RETURN
1950 IF f%>47 AND f%<55 THEN PRINT"FROM NOW ON....
JUST DIRECT THE BOAT!":RETURN
1960 IF f%=57 AND ai%=1 THEN GOSUB 280:PRINT"I HOP
E YOU KNOW WHAT YOU'RE DOING!!":FOR x=1 TO 2000:NE
XT:CLS:f%=54:RETURN
1970 IF f%=45 AND ai%=0 THEN PRINT"GET A BOAT FIR
ST!!!!":RETURN
1980 PRINT"GET TO A BEACH FIRST!!":RETURN
1990 REM***PADDLE*****
2000 IF f%=46 AND af%=1 THEN f%=47:RETURN
2010 IF f%=47 THEN PRINT"FROM NOW ON.....JUST DIR
ECT THE CANOE!":RETURN
2020 IF f%=45 AND af%=1 THEN PRINT"THE SEA IS TOO
ROUGH FOR A CANOE!!!!":RETURN
2030 IF f%=46 AND af%=0 THEN PRINT"GET A CANOE FIR
ST!!!!":RETURN
2040 PRINT"GET TO A BEACH FIRST!!":RETURN
2050 REM***SHOW*****
2060 IF ag%=1 AND f%<>27 THEN PRINT"NOT HERE!":RET
URN
2070 IF f%=27 AND ag%=0 THEN PRINT"GET A TICKET":R
ETURN
2080 IF f%=27 AND ag%=1 THEN GOTO 2110
2090 IF f%=30 AND am%=1 THEN GOTO 1570
2100 IF am%=0 THEN h%(12,1)=30:h%(4,1)=9:RETURN
2110 IF f%=27 AND ag%=1 THEN GOTO 1570
2120 IF ag%=0 THEN h%(12,1)=90:RETURN
2130 REM***CLIMB*****
2140 IF f%=1 THEN f%=2:RETURN
2150 IF f%=2 THEN f%=1:RETURN
2160 IF f%=75 THEN f%=74:RETURN
2170 IF f%=74 THEN f%=75:RETURN

```



```

2180 IF f%=80 THEN f%=79:RETURN
2190 IF f%=79 THEN f%=80:RETURN
2200 IF f%=69 THEN f%=75:RETURN
2210 PRINT"TRY SOMETHING ELSE!":RETURN
2220 REM***GO IN*****
2230 IF f%=31 AND am%=0 THEN PRINT"THE AUTOMATIC D
OOR DETECTS YOU HAVE NO MONEY...NO MONEY...NO ENT
RY!!!!":RETURN
2240 IF f%=35 THEN f%=34:RETURN
2250 IF f%=42 THEN f%=43:RETURN
2260 IF f%=44 THEN f%=40:RETURN
2270 IF f%=86 THEN f%=87:RETURN
2280 IF f%=65 THEN f%=64:RETURN
2290 IF f%=14 THEN f%=9:RETURN
2300 IF f%=15 THEN f%=89:RETURN
2310 IF f%=18 THEN f%=90:RETURN
2320 IF f%=31 THEN f%=30:RETURN
2330 IF f%=83 THEN f%=82:RETURN
2340 IF f%=68 AND st%=1 THEN f%=73:RETURN
2350 IF f%=26 THEN PRINT"YOU HAVE TO BE AN ANDROID
TO GET IN!":RETURN
2360 IF f%=25 THEN GOTO 360
2370 IF f%=27 AND ag%=0 THEN PRINT"GET A TICKET FI
RST!":RETURN
2380 IF f%=27 AND ag%=1 THEN PRINT"SHOW YOUR TICKE
T!":RETURN
2390 IF f%=63 OR f%=68 THEN PRINT"IT'S LOCKED!":RE
TURN
2400 PRINT"TRY SOMETHING ELSE!":RETURN
2410 REM***GO OUT*****
2420 IF f%=89 THEN f%=15:RETURN
2430 IF f%=34 THEN f%=35:RETURN
2440 IF f%=21 THEN f%=27:RETURN
2450 IF f%=40 THEN f%=44:RETURN
2460 IF f%=43 THEN f%=42:RETURN
2470 IF f%=64 THEN f%=65:RETURN
2480 IF f%=30 THEN f%=31:RETURN
2490 IF f%=9 THEN f%=14:RETURN
2500 IF f%=82 THEN f%=83:RETURN
2510 IF f%=87 THEN f%=86:RETURN
2520 IF f%=73 THEN f%=68:RETURN
2530 PRINT"TRY SOMETHING ELSE!":RETURN
2540 REM***BUY*****
2550 IF f%=30 AND am%=1 THEN PRINT"SHOW ME YOUR MO
NEY!":RETURN
2560 IF f%=30 AND am%=0 THEN f%=31:RETURN
2570 REM***READ*****
2580 IF f%=65 THEN PRINT"IT SAYS.....ZARB IS
LAND.....EAST: TO THE BEACH":RETURN
2590 IF f%=19 AND an%=1 THEN GOTO 2600 ELSE 2610
2600 d$(19)="IN THE CROWDED SQUARE":IF ad%=0 THEN
PRINT"MEET CONTACT... EMPTY HOUSE... NEAR THE DOCK
S....GET RID OF NOTE!":RETURN
2610 IF ao%=1 THEN GOSUB 280:PRINT"FIND TRAITOR...S
CARRED FACE..THE ISLAND OF ZARB....BEACH HOPPER..
...BY THE DOCKS....KILL TRAITOR AND FLY HOME!.....
...YOU WILL NEED SOME NEW JET-FUEL!":RETURN
2620 IF f%=9 THEN PRINT"FOR THOSE WITHIN THIS MARB
LE HALL.....PLEASE USE THE PAPER AND NOT THE WAL
L!!!!":RETURN
2630 IF f%=64 THEN PRINT"IT SAYS :- DO NOT PRESS!!
":RETURN
2640 IF an%=0 OR ao%=0 THEN PRINT"YOU HAVEN'T GOT
ANYTHING TO READ YET!":RETURN
2650 REM***INSERT/LEVER/FORCE*****
2660 IF f%=58 AND aj%=1 THEN PRINT"YOU MANAGE TO F
ORCE THE DOOR OPEN!":d$(58)="STANDING BY AN OPEN D
OOR":d$(63)="DEEP IN THE TUNNEL BY AN OPEN DOOR":m
%(58,3)=63:m%(63,2)=58:RETURN
2670 PRINT"THAT DOESN'T SEEM TO HELP!":RETURN
2680 REM***UNLOCK*****
2690 IF f%=68 AND aa%=1 THEN GOTO 2700 ELSE 2720
2700 IF ar%=1 OR as%=1 THEN PRINT"SLOWLY THE DOOR
OPENS..!!!!":d$(68)="OUTSIDE A SECRET CAVE!":st%=1:
RETURN
2710 IF ar%=0 AND as%=0 THEN PRINT"YOU SUDDENLY RE
ALISE THAT YOU HAVE NO GUN OR PISTOL..IF THE TRA
ITOR IS BEHIND THE DOOR..IT WOULD BE SUICIDAL TO E
NTER!":RETURN
2720 IF aa%=1 THEN PRINT"THE KEY DOESN'T FIT.....
.....TRY USING SOMETHING ELSE!!!!":RETURN
2730 PRINT"GET A KEY OR SOMETHING!":RETURN
2740 REM***DRINK*****
2750 IF f%<>38 THEN PRINT"GO TO THE BAR IF YOU MUS
T HAVE A DRINK!":RETURN
2760 IF f%=38 AND av%=0 THEN PRINT"YOU HAVE TO GET
IT FIRST!!!!":RETURN

```




```

2770 IF av%=1 THEN GOTO 1570
2780 REM***SIT*****
2790 IF f%=13 THEN d$(13)="YOU ARE SITTING DOWN..T
HERE IS SOMETHING UNDER YOUR SEAT..":m%(13,3)=0:RET
URN
2800 PRINT" THERE IS NOWHERE TO SIT!":RETURN
2810 REM***STAND*****
2820 IF f%=13 THEN d$(13)="IN THE BALCONY SEATING
AREA ..THERE IS AN EMPTY SEAT IN ROW...2..":m%(13
,3)=16:RETURN
2830 PRINT"NOT HERE":RETURN
2840 REM***EXAMINE*****
2850 IF f%=88 THEN GOSUB 280:PRINT"IT'S THE ROOF!!
!":RETURN
2860 IF f%=13 THEN h%(14,1)=13:RETURN
2870 IF f%=19 THEN h%(13,1)=19:h%(9,1)=19:d$(19)="
IN THE CROWDED SQUARE":RETURN
2880 IF f%=4 THEN PRINT"THERE SEEMS TO BE SOMETHIN
G UNDER THE CRATE!":RETURN
2890 PRINT"YOU SEE NOTHING OF IMPORTANCE":RETURN
2900 REM***SWIM*****
2910 IF f%=45 OR f%=46 OR f%=56 OR f%=57 THEN GOTO
300
2920 PRINT"DON'T BE A SILLY BILLY!":RETURN
2930 REM***PRESS*****
2940 IF f%=64 THEN f%=90:RETURN
2950 PRINT"THE ONLY THING THAT NEEDS PRESSING....
.IS YOUR BRAIN!!!!":RETURN
2960 RETURN
2970 REM***REFUEL*****
2980 IF f%=74 AND aq%=1 THEN PRINT"...RE-FUELING..
.":FOR x=1 TO 2000:NEXT:PRINT"FUEL LOADED":at%=1:R
ETURN
2990 IF f%=79 AND ap%=1 THEN PRINT"...RE-FUELING..
.":FOR x=1 TO 2000:NEXT:PRINT"FUEL LOADED":as%=1:R
ETURN
3000 IF f%=74 AND ap%=1 THEN PRINT"DO NOT ATTEMPT
TO LOAD THIS FUEL! IT IS THE WRONG MIXTURE F
OR THIS JET!":FOR x=1 TO 10:ENT 1,10,10,5: BORDER
x,26:SOUND 1,50,100,15,1,1:NEXT: BORDER 5: RETURN
3010 IF f%=1 THEN PRINT"YOUR VIPER JET IS INOPERAB
LE!":RETURN
3020 PRINT"GET SOME FUEL FIRST!":RETURN
3030 REM***DANCE*****
3040 IF f%=37 THEN GOSUB 280:PRINT"WHAT A DANCER!
!!!!!!!!!!!!":f%=38:RETURN
3050 PRINT"FIND A PARTNER FIRST!":RETURN
3060 REM***KILL*****
3070 IF f%=73 GOTO 400
3080 IF f%=44 THEN PRINT"YOU NEED TO GET CLOSER..A
ND YOU NEED A....WEAPON....BE VERY CAREFUL!":RETUR
N
3090 IF f%=40 AND ar%=0 THEN GOTO 320
3100 IF f%=40 AND ar%=1 THEN GOSUB 280:PRINT"THE G
UARD LIES DEAD!! HIS VICTIM IS YOURCONTACT!! HIS L
AST WORDS ARE..GO AND SEE ....BUTCH...":d$(40)="IN
A ROOM WITH 2 DEAD BODIES":d$(44)="AT THE TOP OF
THE STAIRS..OUTSIDE A ROOMWITH 2 DEAD BODIES IN IT
!"
3110 IF f%=40 THEN d$(42)="AT THE END OF ZYLKA ST
OUTSIDE A HOUSE. IT SEEMS SOMEONE HAS KILLED A ZAR
KONIAN GUARD.THERE ARE TROOPS EVERYWHERE!!!!!!!!":d$
(43)="AT THE FOOT OF SOME STAIRS":RETURN
3120 GOTO 320
3130 REM***MOVE*****
3140 IF f%=4 THEN bb%=bb%+1
3150 IF bb%=1 AND f%=4 THEN PRINT"THE CRATE SLOWLY
MOVES TO ONE SIDE...":h%(21,1)=4:RETURN
3160 IF bb%>1 AND f%=4 THEN PRINT"IT'S BEEN MOVED
ONCE ALREADY!":RETURN
3170 PRINT"NOT HERE!":RETURN
3180 REM***GO UP*****
3190 IF f%=43 THEN f%=44:RETURN
3200 IF f%=17 THEN f%=16:RETURN
3210 PRINT"TRY SOMETHING ELSE":RETURN
3220 REM***GO DOWN*****
3230 IF f%=16 THEN f%=17:RETURN
3240 IF f%=44 THEN f%=43:RETURN
3250 PRINT"TRY SOMETHING ELSE":RETURN
3260 REM***OPEN*****
3270 IF ak%=1 AND sr%=1 THEN PRINT"IT'S EMPTY!":RE
TURN
3280 IF ak%=1 THEN h%(5,1)=f%:sr%=1:RETURN
3290 IF f%=70 AND ak%=0 THEN PRINT"YOU HAVEN'T GOT
IT YET!":RETURN
3300 IF f%=63 OR f%=68 OR f%=58 THEN PRINT"IT'S LO
CKED!":RETURN

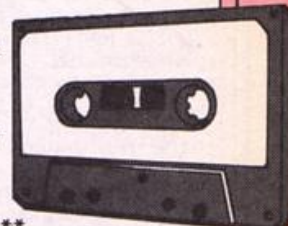
```



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3310 PRINT"TRY SOMETHING ELSE!":RETURN
3320 REM***GO BEACH/HOPPER*****
3330 PRINT"JUST GET IT IF YOU WANT A RIDE!":RETURN
3340 REM***ANSWER*****
3345 IF ans%=1 AND f%=8 THEN PRINT"IT'S NOT RINGIN
G!!":RETURN
3350 IF f%=8 AND aa%=1 THEN ans%=1:GOSUB 280:PRINT
"ONCE YOU ARE FAST THE CHECK-OUT YOU CAN DISPENSE
WITH YOUR I.D.CARD. I WILL MEETYOU IN ZARKONIA SQU
ARE...":d$(7)=LEFT$(d$(7),62):d$(8)=LEFT$(d$(8),3
5):RETURN
3360 IF f%=8 AND aa%=0 THEN ans%=1:GOSUB 280:PRINT
"GET THE KEY UNDER THE CRATE AND ONCE YOUARE THROU
GH THE SPACE-PORT CHECK-OUT YOU CAN DISPENSE WITH Y
OUR I.D.CARD.....":d$(7)=LEFT$(d$(7),62):d$(8)
=LEFT$(d$(8),35):RETURN
3370 PRINT"NOT HERE!":RETURN
3380 REM***JUMP*****
3390 IF f%=84 THEN GOTO 350
3400 IF f%=78 THEN GOTO 350
3410 PRINT"DON'T BE SILLY":RETURN
3420 REM***LEAP*****
3430 IF f%=84 THEN f%=78:RETURN
3440 IF f%=78 THEN f%=84:RETURN
3450 PRINT"DON'T BE SILLY":RETURN
3460 REM***OPENING TITLES*****
3470 CLS:PAPER 2:PEN 1:LOCATE 11,2:PRINT"RETURN TO
ZARKON"
3480 PAPER 0:PEN 3:PRINT:PRINT" YOU A
RE ON YOUR WAY HOME FROM THE PLANET ZARKON,
WHERE YOU HAVE BEEN HELPING THE REBELS FIGHT
THE EVIL FEDERATION OF ZARKONIA....."
3490 PRINT:PRINT" YOU RECEIVE A SIGNAL FROM
THE REBEL COMMAND BASE THAT YOUR HOME
PLANET CANNOT SEND INTELLIGENCE REPORTS TO
THEM BECAUSE THERE IS A TRAITOR INSIDE THE R
EBEL CAMP..!!!"
3500 PRINT:PRINT" THE SUSPECT HAS FLED AND
MUST BE ELIMINATED! HE HAS INTERCEPTED
SOME VITAL SIGNALS AND INTENDS TO HAND THEM
OVER TO THE FEDERATION!!"
3510 PAPER 2:PEN 1:LOCATE 4,22:PRINT"PRESS THE <SP
ACE BAR> TO CONTINUE"
3520 a$=INKEY$:IF a$<>" " THEN 3520
3530 PAPER 0:CLS:PAPER 2:LOCATE 11,2:PRINT"RETURN
TO ZARKON"
3540 PAPER 0:PEN 3:PRINT:PRINT" YOU ARE ORD
ERED TO FLY TO THE CITY OF ZARGOS AND MAKE
CONTACT WITH REBEL FORCES THERE. THE CITY
HAS MANY DANGERS AND MANY STRANGE INHABI
TANTS!!"
3550 PRINT:PRINT" UNFORTUNATELY, YOU RUN OU
T OF FUEL BEFORE YOU REACH ZARGOS!!!!!"
3560 PRINT:PRINT" COMPLETE THE TASK AT HAN
D BY USING TWO-WORD COMMANDS SUCH AS...
-GO IN- OR -SWIM SEA- OR -FLY JET-"
3570 PRINT:PRINT" LIKE ALL CITIES ON ZARKO
N .. TROOPS ARE ON THE LOOK-OUT FOR ANY
REBEL SUSPECTS!!! BE VERY CAREFUL!"
3580 PRINT:PRINT" YOU HAVE 200 MOVES BEFORE
YOU ARE CAPTURED!! GOOD LUCK"
3590 RETURN
3600 REM***DATA*****
3610 DATA SITTING IN YOUR VIPER SPACE JET.
DAMAGE REPORT INDICATES YOUR JET IS NO LONGER OPE
RABLE.,0,0,0,0,OUTSIDE YOUR VIPER SPACE-CRAFT NEAR
A LARGE WAREHOUSE.,0,0,6,3
3620 DATA INSIDE A DIMLY LIT WAREHOUSE.,2,0,0,4,IN
THE WAREHOUSE. THERE ARE SOME CRATES STACKED AGAI
NST ONE WALL.,3,0,0,5,OUTSIDE A WAREHOUSE AND NEAR
THE MAIN TERMINAL BUILDING.,4,0,7,0
3630 DATA BY THE SPACE-PORT PERIMETER FENCE.,0,2,0
,0,INSIDE THE TERMINAL. SOME GUARDS ARE AT THE CHE
CK-OUT CONTROL. SOMEWHERE CLOSE APHONE IS RINGING
...???",0,5,12,8,IN THE TERMINAL BY SOME TELEPHON
ES. ONE OF THEM IS RINGING.,7,0,0,0
3640 DATA IN THE TOILETS. THERE IS A MESSAGE.....
ON THE WALL!,0,0,0,0,OUTSIDE THE SPACE-PORT BY TH
E PERIMETER FENCE.,0,0,0,11,BY THE ENTRANCE TO THE
TERMINAL BUILDING,10,0,15,12,AT THE CONTROL EXIT.
ZARKONIAN GUARDS ARECHECKING I.D.CARDS!!.,11,7,0,0
3650 DATA IN THE BALCONY OF THE CINEMA.THERE IS AN
EMPTY SEAT IN ROW 'Z',0,0,16,0,IN THE REAR OF THE
STALLS OUTSIDE.....A TOILET!!.,0,0,17,0
3660 DATA ON THE WAY TO THE TOWN CENTRE NEXT TO A
CAKESHOP..IT IS REALLY A FRONT FOR A COMPANY TH
AT MAKES ILLEGAL SAUSAGES!.,0,11,18,0

```



3670 DATA AT THE TOP OF THE STAIRS BY THE BALCONY SEATING AREA.,0,13,0,0,AT THE FOOT OF A STAIRCASE IN THE FOYER.,0,14,21,0,ON THE N.W.CORNER OF ZARKO NIA SQUARE OUTSIDE A DRATONIAN JOKE SHOP. THERE ARE MANY GUARDS AROUND!,0,15,23,19

3680 DATA IN THE SQUARE. IT IS VERY CROWDED. YOU FEEL A HAND BRUSH YOUR POCKET!.,18,0,24,20,ON THE N.E. CORNER OF THE SQUARE.A GUARD SEEMS TO BE WATCHING YOUR MOVEMENTS.,19,0,25,0,IN THE FOYER BY THE EXIT.,0,17,0,0

3690 DATA ON ZYLKA ST. SOUTHWARDS.....IT LEADS TO THE OLD PART OF TOWN NEAR THE DOCKS.,0,0,28,23,ON THE S.W. CORNER OF THE SQUARE.,22,18,0,24,IN THE SQUARE.,23,19,0,25,ON THE S.E. CORNER OF THE SQUARE OUTSIDE A PHENALIAN SAUNA.,24,20,0,26

3700 DATA ON ZEEDA ST...BY AN ANDROID STRIP JOINT!,25,0,29,27,OUTSIDE A CINEMA. THE FEATURE FILM IS...BUTCH MARTIAN AND THE SUNDANCE ANDROID!.,26,0,0,0,ON ZYLKA ST. IT IS DESERTED AND QUIET.,0,22,31,0

3710 DATA ON ZOOLAM ST. THERE'S A BODY BY YOUR FEET.,0,26,35,0,INSIDE THE OFFICE. YOU CAN BUY TICKETS FOR THE CINEMA HERE.,0,0,0,0,ON ZYLKA ST. OUTSIDE THE ZARGOS TOURIST OFFICE.,0,28,36,0

3720 DATA NEAR A TABLE.AN ANDROID WEARING A JACKET WITH AN ORANGE EMBLEM ON IT IS SLEEPING.THERE IS A FUEL CAPSULE ON THE TABLE!.,0,0,0,0,33

3730 DATA STANDING BY A TABLE FULL OF STRANGE LOOKING ZARKONIAN GUARDS!.,32,0,37,34,INSIDE THE BAR BY THE EXIT.,33,0,38,0

3740 DATA ON ZOOLAM ST. OUTSIDE A BAR CALLED..... 'THE FLASHING BLADE'!.,0,29,0,0,ON ZYLKA ST. THE SEA AIR IS COLD AND DAMP,0,31,39,0,ON THE DANCE FLOOR. AN ARKTURIAN DESERTWORM ASKS YOU FOR A DANCE!.,0,0,0,0

3750 DATA STANDING AT THE BAR.,37,34,0,0,ON ZYLKA ST. THE SEA AIR IS COLDER AND DAMPER!.,0,36,42,0,JUST INSIDE THE ROOM.THE ZARKONIAN HAS NOT SEEN YOU YET!.,0,0,0,0,ON ZARTON AVE. THERE IS A BEACH HOPPER ABOUT TO LEAVE FOR THE BEACH.,0,0,0,42

3760 DATA ON ZARTON AVE NEXT TO AN EMPTY HOUSE.YOU CAN HEAR SOME NOISES COMING FROM IT!.,41,39,0,0,IN THE HOUSE. THE NOISES ARE COMING FROM UPSTAIRS.,0,0,0,0

3770 DATA AT THE TOP OF THE STAIRS.BY AN OPEN DOOR YOU CAN SEE A ZARKONIAN TROOPER BEATING SOMEBODY!.,0,0,0,0,ON A DESERTED COVE. THERE SEEMS TO BE AN ISLAND ACROSS THE BAY...THERE ALSO SEEMS TO BE SOMETHING MOVING UNDER THE SAND!.,0,0,0,46

3780 DATA STANDING BY A BEACH HOPPERON A DESERTED COVE.!!!!,45,0,0,0

3790 DATA OUT AT SEA.THE CURRENT IS STRONG HERE... SORT OF CIRCULAR.,0,46,49,0,OUT AT SEA..JUST OFF ZARGOS.....THROUGH THE MIST YOU SEE AN ISLAND TO THE SOUTH!,0,45,50,0,THE CURRENT IS GETTING STRONGER! IN FACT YOU HAPPEN TO BE IN A WHIRLPOOL!.,0,0,0,0

3800 DATA CLOSE TO THE ISLAND. THE SEA IS VERY CALM,0,48,53,51,FOLLOWING THE LINE OF THE COAST. THE SEAS A LITTLE CHOPPY HERE.,50,0,0,52,NEAR A ROCKY COVE.THE SEA IS ROUGH HERE!,51,0,54,0,NEAR THE SANDY BEACH. THE SEA IS CALM.,0,50,56,0

3810 DATA CLOSE TO THE ROCKY BEACH!!! IT IS A VERY DANGEROUS PLACE TO LAND THE BOAT!.,0,52,57,0,IN A NARROW PASS NEAR THE BEACH.,0,0,59,56,ON THE BEACH. YOU CAN JUST MAKE OUT THE LIGHTS OF ZARGOS ACROSS THE BAY..TO THE NORTH.,55,0,0,0

3820 DATA ON THE ROCKY BEACH!..... THE WAVES ARE CRASHING IN!!!!,0,0,61,0,DEEP IN THE TUNNEL. THERE IS A DOOR SET IN THE ROCK.,0,88,0,0,DEEP IN THE NARROW PASS.,0,55,66,0,ON A DIRT TRACK.

K. THERE ARE MOUNTAINS TO THE WEST.,0,0,67,61

3830 DATA IN A CLEARING NEAR THE BEACH.AN OLD SIGN SAYS.....ZARB MINING Co.",60,57,0,0,DEEP IN THE TUNNEL. THE SUPPORT BEAMS DONOT LOOK SAFE!.,0,0,68,63,DEEP IN THE TUNNEL. THERE IS A DOOR SET IN THE ROCK!.,62,0,0,64

3840 DATA IN THE TUNNEL BY THE EXIT. IN THE ROCK THERE IS A BUTTON WITH SOMETHING WRITTEN ON IT! IT IS OFDRATONIAN ORIGIN!,63,0,0,0,OUTSIDE A WELL LIT TUNNEL!.,0,0,69,66,NEAR A SHEER ROCK FACE BY A NARROW PASS.,65,59,0,0

3850 DATA ON A WINDING TRACK.,0,60,71,0,DEEP IN THE TUNNEL. THERE IS AN OLD DOORSET IN THE ROCK.,0,62,0,0,AT THE FOOT OF A STEEP HILL.,0,65,0,0

3860 DATA ON THE DIRT TRACK.THERE IS A PILE OF OLD MINING EQUIPMENT AND A LARGE BOX.....IT DOESN'T SEEM TO BE LOCKED!.,0,0,76,71

3870 DATA AT A FORK IN THE TRACK. THE TRACK RISES TO THE EAST.,70,67,0,72,ON A SLOPING TRACK.,71,0,77,0,IN A SECRET CAVE BY AN OPEN DOOR.....YOU CAN SEE A MAN WITH A SCAR ..!!!!!!.,0,0,0,0

3880 DATA SITTING IN A LYNX SPACE-JET.,0,0,0,0,AT THE TOP OF THE HILL NEXT TO A LYNX JET WITH AN ORANGE EMBLEM ON IT!! THE HILL SLOPES DOWN TO THE NORTH.,0,69,80,0

3890 DATA STANDING IN SOME THICK VEGETATION.,0,70,81,0,ON THE TRACK.,0,72,83,0,ON THE OTHER SIDE OF THE QUICKSAND. THE MAN HAS GONE!.,0,0,0,0,SITTING IN YOUR VIPER JET.,0,0,0,0,OUTSIDE YOUR VIPER JET AT THE FOOT OF A HILL.,0,75,85,0

3900 DATA DEEP IN THE UNDERGROWTH. THERE IS A PASS TO THE WEST BUT IT IS BLOCKED BY SOME BOULDERS.,0,76,86,0,IN THE TUNNEL BY THE EAST EXIT.,0,0,87,83,OUTSIDE THE ENTRANCE TO A TUNNEL WHICH IS COLD BUT WELL LIT.,0,77,0,0

3910 DATA ON A NARROW PATH. A POOL OF QUICK SAND BLOCKS YOUR WAY. BEYOND IT YOU CAN SEE A FUEL CAPSULE AND A MAN PEERING AT YOU FROM BEHIND A TREE..,0,0,0,85,ON A NARROW PATH.,84,80,0,0

3920 DATA OUTSIDE A WELL LIT TUNNEL!.,0,81,0,0,IN THE TUNNEL BY THE WEST EXIT.,0,82,0,88,DEEP IN THE TUNNEL. THERE IS SOMETHING ABOVE YOUR HEAD!.,87,0,58,0,IN THE SHOP. YOU CAN HEAR PIGS SQUEALING FROM SOMEWHERE AT THE BACK OF THE SHOP!.,0,0,0,0

3930 DATA IN THE..OH DRAT...IT'S A DRATONIAN JOKE!.,0,0,0,0

3940 DATA AN I.D. CARD,56,card,A STURDY BEAM,68,beam,A CANOE,46,canoe,100 ZARKS(MONEY),56,money,A HEFTY CROWBAR,90,crowbar,A LARGE BOX,70,box,A SAILING BOAT,45,boat,A FUEL CAPSULE,78,fuel

3950 DATA A LASER GUN,90,gun,A SAD LOOKING BEGGAR,24,beggar,A HOPPER,41,hopper,A CINEMA TICKET,90,ticket,A NOTE,90,note,A SECRET MESSAGE,90,message,A GLASS OF SAJJI (JUICE),38,juice

3960 DATA A JET-FUEL CAPSULE,32,jet-fuel,A BASKING SHARK,53,shark,A SIGN POST,65,sign,A BODY,29,body,A BLOODSTAINED KNIFE,29,knife,A KEY,90,key,A LARGE CRATE,4,crate,SOME ROPE,70,rope,A LASER PISTOL,77,pistol,A TENTACLE,45,tentacle

3970 PAPER 2:PEN 1:LOCATE 10,20:PRINT"PRESS THE <SPACE BAR>

3980 a\$=INKEY\$:IF a\$<>" " THEN 3980

3990 CLS:LOCATE 10,12:PRINT"IT'S ALL OVER!!"

4000 PAPER 1:PEN 2:LOCATE 3,23:INPUT"DO YOU WANT TO PLAY AGAIN. <Y/N>":m\$

4010 a\$=INKEY\$:IF m\$="Y" OR m\$="y" THEN RUN: IF m\$<>"y" OR m\$<>"Y" THEN 4030

4020 a\$=INKEY\$:IF a\$="N" OR a\$="n" THEN GOTO 4030

4030 PAPER 0:PEN 1:CLS:LOCATE 10,12:PRINT"THANK YOU FOR PLAYING":END



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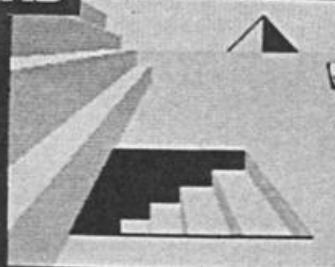


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SORTING AT THE SPEED OF LIGHT

Many utility programs — personal files, spreadsheets, club membership lists etc, make use of a sort routine. Commonly, a Bubblesort routine is used. This has the advantage of being simple to program, but gives you time to make a cup of coffee and let it get cold before it has finished sorting large files.

This article demonstrates the Quicksort algorithm for sorting an array of alphanumeric characters with a Spectrum. This algorithm has the benefit of being very efficient for highly random arrays with many items to be sorted, taking a matter of seconds instead of minutes.

In addition, the routines described here allow you to sort the elements of an array by blocks of characters within each element. For instance, you may have an array which has each element containing name, height, inside-leg measurement etc, and you want to sort in order of height.

In BASIC, you could rearrange the array, element by element, to put height first and sort using the normal sort routines. Alternatively, you could use a modified sort as illustrated in Program 1 (Bubblesort) or Program 2 (Quicksort), where *f* and *t* define the block of columns by which the routine is to sort. Better still, you use the machine code version of Quicksort! Table 1 shows the enormous improvement in speed possible.

What makes Quicksort so efficient? The Quicksort algorithm uses the result of each comparison to help decide which elements to check next. It takes the bottom element of the array and carries out a series of tests and exchanges so that this element is left in its final position. All elements of lower value form a subarray below this element and all higher value elements form another subarray above it. These subarrays are treated in the same way until each subarray consists of one element. The array is then sorted.

Table 1. Time to sort single column arrays in seconds

| Sort type | Rows | Array — type | | |
|--------------------------|------|--------------|--------|---------|
| | | Ordered | Random | Inverse |
| Bubblesort | 10 | 2 | 2.1 | 2.1 |
| | 100 | 166 | 196 | 166 |
| | 200 | 662 | 777 | 663 |
| Quicksort (BASIC) | 10 | 1.5 | 1.9 | 1.9 |
| | 100 | 17 | 27 | 19 |
| | 200 | 39 | 57 | 42 |
| Quicksort (machine code) | 10 | 0.2 | 0.2 | 0.2 |
| | 100 | 0.6 | 0.6 | 0.5 |
| | 200 | 0.7 | 1.4 | 0.8 |

```

98 REM Program 1
99 REM bubblesort
100 FOR i=1 TO row-1
110 LET j=i+1
120 FOR k=j TO row
130 LET l=row+j-k
140 IF a$(1,f TO t)>a$(i,f TO t) THEN GO TO 160
150 LET d$a$(1): LET a$(1)=a$(i): LET a$(i)=d$
160 NEXT k
170 NEXT i
180 RETURN
  
```

The Bubblesort algorithm starts with the bottom element of the array, compares it with higher elements until an exchange is needed, swaps the elements and continues up the elements in a similar fashion until it gets to the top. It then goes back to the bottom and repeats the whole process until the array is sorted. It is simple but slow.

A BASIC version of the Quicksort method is given in Program 2 and should be compared with the Bubblesort method of Program 1. Quicksort needs two arrays to hold markers for the subarrays. The size of these arrays varies with the size of the array to be sorted. Program 2 will cope with arrays of up to about 4,000 elements. The machine code version will handle arrays with up to 255 elements, each of which can be up to 255 characters in length.

Before entering the machine code version of Quicksort you should make space above RAMTOP.

Key in the following statement as a direct command:

```
PRINT (PEEK 23730+256*
      PEEK 23731-600)
```

Press ENTER and note down the number shown. This number will be referred to as 's'

for the rest of the article and will be the start location for the machine code after RAMTOP has been lowered by 601 bytes. Again, as a direct command, key in

```
CLEAR (s-1)
```

and then press ENTER. RAMTOP has now been lowered to make room for the code.

Program 3 gives a loading routine for the machine code held in the data statements. Type this in and save it on tape as 'load code'. When you have verified the tape you are ready to load the code above the lowered RAMTOP.

RUN Program 3, entering the value of *s* when prompted for 'start address of code?'. If you made an error when keying in the program, you will see an error warning as the program stops. If an error is trapped, correct the data in the line indicated, save the corrected program and run it again until the 'Data correct' message is achieved.

As written, the code will run on a 48K Spectrum directly below the user defined graphics area. If you have a 16K Spectrum or your 'start address of code' is lower than 64767, you need to key NEW and key in Program 4. RUN this program and again answer with the value of *s* when prompted

SORTING AT THE SPEED OF LIGHT

```

9498 REM Program 4
9499 REM Relocate code
9500 DEF FN l(c)=c-FN h(c)*256
9510 DEF FN h(c)=INT (c/256)
9520 INPUT "start address of code?";s
9530 FOR n=1 TO 9
9540 READ a,b
9550 LET c=s+b
9560 POKE s+a, FN l(c)
9570 POKE s+a+1, FN h(c)
9580 NEXT n
9590 DATA 48,0,27,562,247,579,268,579,337,579,514,
255,528,562,551,220,559,206

```

```

398 REM Program 5
399 REM test
400 CLEAR : INPUT "Set array size""rows?",row: I
NPUT "cols?",col
410 CLS : INPUT "Set array type""o=ordered""r=r
andom""i=inverse ordered",o$
420 DIM a$(row,col): RANDOMIZE 1
430 FOR r=1 TO row
440 FOR c=1 TO col
450 IF o$="o" THEN LET a$(r,c)=CHR$ r
460 IF o$="r" THEN LET a$(r,c)=CHR$ (RND*9+48)
470 IF o$="i" THEN LET a$(r,c)=CHR$ (256-r)
480 NEXT c
490 NEXT r
500 BEEP .25,1
510 INPUT "sort from col?",f: INPUT "sort to col?
",t
520 INPUT "Enter type of sort""b=bubblesort""q=
basic quicksort""m=machine code quicksort",s$: IN
PUT "start timer & press ENTER",z$
530 IF s$="b" THEN GO SUB 100
540 IF s$="q" THEN GO SUB 200
550 IF s$="m" THEN POKE 64767+35,f: POKE 64767+3
6,f: RANDOMIZE USR (64767+46)+CODE a$(1)
560 CLS : PRINT AT 11,13;"SORTED": BEEP .25,1: ST
OP

```

to clear the basic program from memory. Then key in Programs 1, 2 and 5. RUN this combined program by keying

GOTO 400 ENTER

each time you want to try a new sort.

As an example, let's set up a 20-row, 10-column random array.

Key GOTO 400 ENTER

When prompted for 'rows?', key

20 ENTER

When prompted for 'cols?', key

10 ENTER

and when prompted for 'array

type?', key

r ENTER

Wait for a BEEP which shows that the array has been set up.

Let's sort the array in order by the block from column 2 to column 3. When prompted by 'sort from col?', key

2 ENTER

When prompted by 'sort to col?', key

3 ENTER

When prompted for 'type of sort?', key

b ENTER

for the Bubblesort method. Then simultaneously start a timer and press ENTER. Stop the timer when the BEEP is heard. The sort has been completed. If you print the array using

```
FOR n=1 TO row:PRINT a$(n):NEXT n
```

as a direct command, you can see that the array has been sorted by columns 2 and 3.

Note that this demonstration program assumes that the product of rows*columns does not exceed 255.

Table 1 was produced with this program using single column arrays. The improved speeds of the Quicksort routines are clearly shown.

All that remains is for you to incorporate the Quicksort routines into your own programs. Shame about the coffee!



Study our book reviews before you invest your money. It's worth while!



The Art of Micro Computer Graphics for the BBC Micro and Electron

The graphics commands in BBC BASIC are some of the most powerful available on a home computer. They are also some of the most complex. The time taken to master such commands can be greatly reduced with the help of a good manual.

This book could be just the thing as it must be one of the most comprehensive texts available. In 430 pages it covers every aspect of graphics on the BBC. Just a few of the topics are the GCOL statement, two- and three-dimensional drawing, hidden surface removal, mixing colours, graphics input devices. The list is endless.

The book is liberally sprinkled with illustrations. Having glanced through the colour plates at the centre I was itching to type in one of the tessellation programs. Tessellations are shapes which fit together so they cover a surface leaving no gaps, and creating fascinating patterns.

All programs included are beautifully structured, making it very easy for the user to take procedures from the book and put them to work in programs.

This book, whilst not being the cheapest around, weighing in at £14.95, is definitely excellent value for money. **J.R.**

Price: £14.95

Publisher: Addison Wesley

Address: 53, Bedford Square, London WC1B 3DZ

BBC

ELECTRON



Advanced machine language book for the Commodore 64

The majority of machine language and reference books cover an introduction to assemblers, machine code and how to create a few effects on your C64. This book continues where the others finish.

The first chapter starts by giving all of the theory behind floating point arithmetic: how it is stored and how to understand its binary form. It then goes on to list methods of converting between the various numeric formats within the C64. The maths routines in the ROM chip are explained in detail, as are the methods of using them. The chapter finishes by giving an explained listing of a program to calculate polynomials.

In the second chapter everything you always wanted to know about interrupts is covered. This includes descriptions of the ROM routines used. It then continues to give examples of how to handle your own interrupts which can be generated by some of the controlling chips within the computer. There are numerous program examples; these are all annotated and help understand a much avoided subject by other books.

The third and final chapter covers methods of expanding the operating system to include your own routines. Example programs are given covering a multitude of extensions to the BASIC language. One of these allows you to create new BASIC keywords for your own commands. The book finishes by explaining the theory behind connecting a Centronics printer to your computer: as usual it gives an example which proves the point.

This unique book is aimed at machine code programmers. It is truly a m/c Bible! **K.I.**

Publisher: First Publishing

Address: Unit 20B, Horseshoe Rd, Horseshoe Ind Est, Pangbourne, Berks

C64



BASIC Programming on the Amstrad

The manuals supplied by computer manufacturers vary tremendously from the painstaking and often witty Sinclair, through the deliberately skeletal Commodores, to the vastly detailed adventure game of the BBC! Amstrad seems to have taken a middle course giving plenty of detail, a few program fragments, and explanations rather too terse for the first time user.

Wynford James' 229 page volume makes no assumptions about what you know, starting right from the beginning with a clear description as to what a computer is and does, then gets you straight into the business of printing to the screen so at least you can see something for your labour! The style is easy going and informative which is quite rare. Most computer experts are not good when explaining to beginners.

The reader is taken through simple programming, then quickly on to simple graphics. Loops of the WHILE-WEND and FOR-NEXT varieties, IF-THEN decisions, and arrays are all covered, as are games and graphics, sound and music, and cassette files. There is also a very worthwhile chapter on program planning.

Nothing of substance is missed out, yet all the facilities which will interest the first time user are clearly explained with the aid of diagrams and computer originated listings for you to type in. It's much easier to understand than the manual, and by the time you've done all the exercises you should be well and truly in command of the 464. Not cheap, but definitely valuable! **D.M.**

Price: £7.95

Publisher: Micro Press

Address: Castle House, 27 London Rd, Tunbridge Wells, Kent

AMSTRAD



BOOKS

You've spoilt it!

I think HCW has been spoilt completely.

If I want to read jokes, I'll buy a comic or a jokebook.

It seems that HCW favours Amstrad, BBC and Spectrum machines (in that order). Commodore and Oric follow. Texas has fallen behind and Atari seems right out of it. It must be seven or eight weeks since an Atari program was published.

I have an Atari 800XL and I can only read adverts and the occasional decent letter. I think 45p is too much for that.

N Middleton, Immingham

Penpal Patrick

I am a 16-year-old Belgian VIC-20 owner and I would like to correspond with an English VIC-20 owner. It will help my English, which isn't very good, and we will also be able to swap ideas etc.

I have had my VIC-20 for about three months now and it is still unexpanded. Here in Belgium, it's sometimes difficult to get good software. I think that's a pity because the VIC-20 is a very good machine.

Oh, yes, you can get games here but serious software is very hard to find and when you do find some it's often on disc and I've only got a C2N datasette.

I'd like to know how the situation in the UK compares with this.

**Patrick Verhoeven, Ertbrug-
gestraat 37, 2uo Wijnegem,
Antwerp, Belgium**

Secret of success?

I would like to ask Neil MacLennan a question: how did you manage to beat the computer 9-0 and 7-0 on Match Day? The most I can manage is something like 1-0 and 2-1 although I have won the FA cup twice and got to the semis on numerous occasions.

R Wibberley, Wombwell

High price of repair

Our computer was taken into a local shop for repair two weeks ago. Today we heard that Texas Instruments, to whom the computer was sent, is asking £65 before the computer is opened up to see what is wrong. Apparently if the modulator is at fault it will cost us a little under £40 to put right.

To me, this is exorbitant. Not only has Texas ceased to produce the computer, hence reducing its price drastically, but the cost of expanding has remained high. By charging £65 for repair, however major or minor, we find that it is not worth having our computer repaired and we are not in a financial position to buy another.

The cause of our trouble was that, when in extended BASIC, I typed ON ERROR and then started to type the program line indicated in ON ERROR. Once I had typed in the line number concerned the computer locked. I then switched the computer on and off but from then on I have been unable to tune in the master system. Has anybody got any ideas on this?

I would obviously be very interested in other readers' experiences of Texas Instruments' support for this computer and I would also like to know if anyone else has had a similar problem when typing in a listing.

**Anne Thomas, 15 Anson Way,
Braintree, Essex CM7 6TN**

Micros aren't indisposable

I am writing in answer to the letter "I'm alright Jack" in HCW 90. I agree with the reader who sent this.

In summer 1982 I bought an Oric 48K. That was before anyone could clearly see what would happen with software support. At several points I found Oric better than Spectrum when comparing the two.

There are many people who thought the same, and if you look in magazines for used machines I think you'll find that Orcs come cheaper. This too can count for some people who just want a machine to learn BASIC etc.

I'm still satisfied with my machine. I've got the programs I need, a printer and I'm in the process of buying a disc drive. Why do people need to buy all those

games? I've got about 20 which I've bought and about 50 which I've found in magazines and some are great fun to play.

But I did not buy the machine just to play the latest games. Those people who have, should buy another computer if they can afford it. Micros and hardware are not things we can change every month, not to mention software.

I hope other readers don't expect their parents to spend lots of money buying the latest chartbusters.

I think all computer owners (and those thinking of buying one) should bear in mind that with the state of the industry micros which are new today will be old tomorrow.

**Jorg Bjosvik, Halden,
Norway**

Long-term reader

I buy your magazine every week and I have got every copy of it since the first one. I like the new look to the magazine because it has got some great features, but I would just like to say that you should expand your cartoon to about half a page.

I own a C64 and ever since I got the first magazine I have typed in every single program

and read probably every single review. Your reviews give me lots of ideas of what games I should buy. I have bought over 200 games by reading your magazine every week. Altogether I have played over 300 games and most of them are due to your great magazine.

**Nicholas Greenhalgh, Rad-
cliffe**

Home Computing Weekly,
No 1 Golden Square,
London W1R 3AB.

LETTERS PAGE

Help me with my typing!

I am a Pakistani student in my first year and have been awarded the Pakistani Science and Computer Club medal. I am very pleased to have the opportunity to write to you and I would like to say that HCW is the best computer magazine around.

I am an SV1.328 owner and I would like to thank you for your support of my SV1 computer. I would also like to thank you for publishing yet another excellent game for the Spectrum by S Roberts in HCW97.

I am very worried about the computer programs that you publish because when I sit in front of my computer and start to type, it takes three to four hours to complete a program. Perhaps you could help me with this problem.

Adnan Ahmed Oureshi,
Karachi, Pakistan

It takes everyone a long time to type in a good computer program and although it may seem a lot of work is usually worth the effort. There is no way to speed up your typing apart from practicing and taking care. If we published shorter listings then the resulting games would not be nearly as interesting.

True to life

May I compliment you on your new look magazine. I find it most interesting. I especially liked The Laws of Computing (HCW 103). I thought it extremely funny and very true to life — it sounds just like my computer.

I agree with L Tomlinson in HCW 103. Could you please give tips on adventures? Perhaps you could have a tips page?

C Tomlinson, Havant

Hints and tips on adventures are covered in our regular Ventures column, by Peter Sweasey. If you have any adventure queries — or solutions — write to him, care of HCW, No.1 Golden Square, London W1R 3AB.

Chart mix-up

While reading HCW 100, I noticed a letter about a confusion with the Gallup chart. I also see a possible source of mix-up. I think M Ayland was referring to the fact that, in the individual lists a game could be, for instance, second, but in the overall charts it could be overtaken by something lower down in the list.

I realise that the reason is that some games are for more than one computer. Please could you have clearer charts without all the different makes of one game bunched together, even if it does mean some computers don't get a look in.

S Paget, Uckfield

The Gallup chart is an accurate reflection of the overall sales of a game. We include individual charts so that owners of the most popular computers can understand how the chart is broken down into machine specific components.

Don't forget the Apple

As I have looked through your magazine in the newsagents, I have been very disappointed to find that you do not appear to have any coverage of one of the best machines on the market — in my opinion even better than the Spectrum and Atari — in the home end of the market and superior to the Apple IIe.

Chess problem

I feel I must comment on DM's review of Superchess in HCW 103. The review appears to be that of the Amstrad version which seems to be similar to a version of Superchess 2 of earlier Spectrum days.

The picture above the review shows Superchess 3.5 which is a fairly strong Spectrum program which replies in 5-999 seconds per move, has an on-screen clock, displays up to 10 half moves (plies) and can solve problems of up to mate in four. The review would there-

Letter from abroad

I understand Mark Ottaway's criticisms (HCW 97) and I agree with his point of view as here in Portugal the situation is quite similar concerning the TI computer. You know, it's very hard and awfully expensive to get programs, hardware, or even assistance as the computer is not seen in the shops anymore and mail order takes a long time, effort and money.

I don't have a single program that has been bought on cassette. All of them are from magazines or books or bought in modules. I don't know the English or American program standard so you can imagine how important HCW is to me!

The situation of the Spectrum over here is the opposite — thousands of games (Portuguese and

British), astonishingly quite recent; any kind of hardware (even floppy discs); hundreds of magazines and books.

If in England the Texas can be considered a dead machine, in Portugal it is dead and buried as it has practically no support (except some magazines like HCW, a few books and the most valuable help from Parco Electronics and the TI Home Computer Users Club).

In my opinion there should be a book for the TI with hints and tips with special colour graphics and sound effects subroutines. These are often discovered by chance and many of us TI users know little tricks that help or that have impressive results. I have got a few little programs.

Pedro Magalhaes, Portugal

the Commodore and many other eight-bit machines in the business area.

I have used the Apple IIe and the Commodore for business and I have now spent over £1500 on my selection of hardware and software. The choice, needless to say, was none of the above machines, but a Memotech RS 128 with twin disc drives, printer equivalent to an Epson MX80 and monochrome screen, all as a bundle from Memotech. The machine is supplied with an excellent word processor and spreadsheet. It is capable of operating what appears to be many of the normal industry standard CP/M programs. The drives can be configured to emulate a number of other

machines, including IBM PC and Kaypro.

As the machines in the Memotech series become more and more popular the potential readership will grow. If you are not featuring the machine in your magazine you will of course be losing out on the number of readers. I would therefore strongly recommend that you start to feature this machine and, I understand from the User's Club, that you may actually gain another advertiser in the form of Memotech themselves, who have given me very good support both on their hardware and software.

C J Greenway, Chipping Norton

fore midlevel readers and deter them from buying 3.5.

My own view is that the earlier Superchess 3.0 plays a better game at level nine than any of 3.5 levels. I have found that when entering problems from newspapers and magazines version 3.0 is more likely to play the best move.

The problem mode for mates of up to four seems to be the same in both versions, taking the same time to solve identical problems.

However, it would probably be a good idea to

ask chess experts to review programs such as the above, as the majority of reviews I have read, not only in your magazine, appear to be misleading and inaccurate.

David Egdoll, Glasgow

As far as we are aware, the review is for the correct chess program. At HCW we try to match the program with the reviewers interests; however, we are interested in hearing from specialist users who would like to review software in a particular field.

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Elliot Mason, Hove

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Can you work out how to do it? To start you off we've put in the digits for 1985 (Fig.2), so you shouldn't take all year to complete the trick.

Fig.1

| | | | |
|----|----|----|----|
| 16 | 15 | 14 | 13 |
| 9 | 10 | 11 | 12 |
| 8 | 7 | 6 | 5 |
| 1 | 2 | 3 | 4 |

Fig.2

| | | | |
|---|--|--|---|
| | | | |
| 5 | | | 8 |
| | | | 9 |
| 1 | | | |

Readers' hi-score table

| Name | Game | Machine | Score |
|-----------------|------------------|---------|-----------|
| James Hogan | Killer Gorilla | BBC | 43,700 |
| Edwin Armstrong | Defenders | TI | 2,615,300 |
| Paul Crawley | Falcon Patrol II | C64 | 90,690 |
| Peter Devine | Blue Max | C64 | 42,710 |
| Jason Langridge | Tombstone City | TI | 344,250 |

NORTH EAST TI USERS CLUB

5 Saville Place, Newcastle upon Tyne NE1 8DQ

Dear ACW,

Thank you for publishing my previous letter about the North East TI Club in your magazine. During that time we had a substantial increase in membership and we have now modified our meeting times.

The North East TI-users Club, which is specially devoted to the Texas Instruments Home Computer now meets every fortnight (from Saturday March 30th) at the Newcastle City Library, 5th floor, in the Beswick room between 1.00 pm and 4.30 pm.

We can help on all aspects of computing and we also have software at discount prices together with a lot of cartridges which are swapped between members. Members can also bring their own equipment to the club if they wish.

New members are always welcome. (Please ask for Phil or Ewen)

Yours faithfully,

P Coates

Philip Coates

Solution to last week's puzzle

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | 4 | 3 | 0 | 0 | 1 | 1 | 2 |
| 0 | 3 | 2 | 2 | 2 | 2 | 4 | 5 |
| 6 | 5 | 4 | 1 | 5 | 1 | 6 | 6 |
| 2 | 3 | 5 | 5 | 0 | 0 | 5 | 2 |
| 4 | 4 | 5 | 4 | 3 | 6 | 0 | 6 |
| 0 | 1 | 3 | 6 | 4 | 6 | 1 | 2 |
| 5 | 4 | 1 | 3 | 0 | 1 | 3 | 3 |

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