

# POPULAR Computing WEEKLY

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Vol 4 No 31

## Amstrad plans 16-bit portable

AMSTRAD has begun preliminary work on a new 16-bit portable computer, likely to be launched in the first months of next year.

The machine is a 256K Ram model based around the fast

16-bit version of the Z80 processor, the Z800, and could offer a degree of IBM PC software compatibility.

As well as the Z800 the machine apparently is to feature a built-in five-inch green-

screen monitor, 3 inch Hitachi-format disc drive, modem and communications software.

An Amstrad spokeswoman, however, denied that the  
**continued on page 5 ►**



*SOMEBODY'S Living in my Computer is the first personalised computer program - for the Commodore 64.*

*Not a game exactly, it features a computer 'companion' who walks around, eats, plays the piano, watches TV, listens to records and generally acts like a human being.*

*You can type messages to your companion, pet it, and get messages back. It will also 'speak' back in a language of bleeps and whistles.*

*Each companion will act differently and Activision says each disc will contain a unique character.*

*The title, available only on disc will be out next month, priced at £14.99.*



**Amstrad has settled on pricing for its CPC 6128 disc-based micros, to be launched in the UK later this year.**

**The 6128 with monochrome monitor will be priced at £299.99 while the colour display version will cost £399.99.**

**The prices of the equivalent 664 models will be reduced accordingly in September to £199 and £299.**

## AMIGA SPECIAL FEATURE ISSUE

- News: Amiga's US launch
- Preview: How the Amiga matches up to Atari's ST
- Profile: Metacomco - UK authors of the Amiga firmware

## Acorn deal saves new BBC micros

ACORN has been saved from liquidation by a complex financial restructuring operation which increases Olivetti's stake in the troubled Cambridge micro manufacturer to 78.9%.

The agreement reached last week - the second rescue package this year - means that Acorn subsidiaries Acornsoft and Acorn Video are now unlikely to be sold off to raise cash.

Acornsoft has also been freed from its exclusive commitment to Acorn micro compatible software and is to produce a range of titles for other micros.

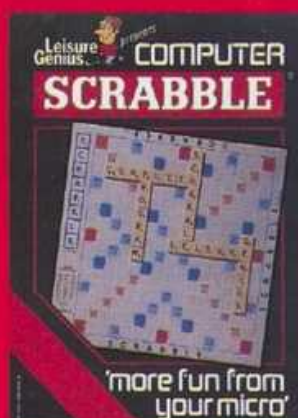
The company has also announced that it will continue to introduce new BBC micro-computer models, within a timescale now agreed by the BBC and Acorn. Development is apparently to continue with

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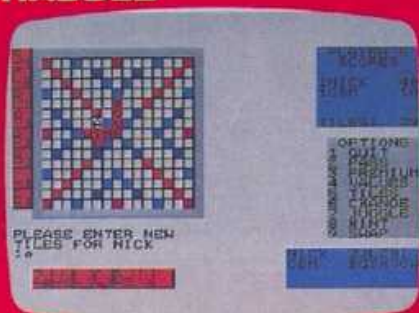
**INSIDE ► FRANKIE SAYS "WELCOME TO THE SPECTRUM" SEE P9**



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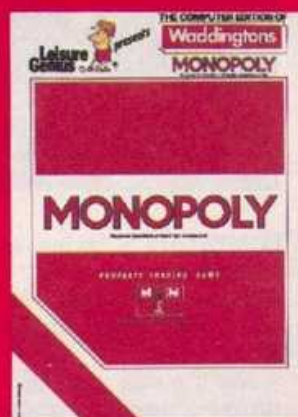
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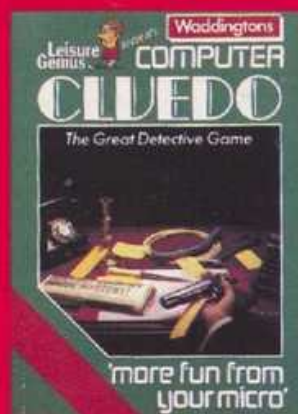
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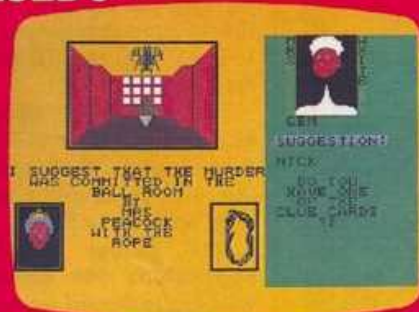


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## EDITORIAL

**A**corn's chairman Alex Reid is confident that this second rescue package for the company will be successful.

Let us hope so, both for the sake of the very large number of people who have bought BBC and Electron machines, and also for the long-term future of home computing in this country.

It is fundamentally important that the home-grown micro companies which have risen to prominence over the last five years – Acorn, Sinclair and Amstrad – survive.

The UK companies have a very different perspective from their American counterparts like Commodore and Apple.

The Americans have a far higher buying power than the majority of British consumers. Where we have the Spectrum and Commodore 64 as the main home micros they have the C64 but also the Apple II and even the IBM PC. The top whack for a big selling home micro over here is probably £400. In the US it is more than double that. Who in this country would call the Macintosh a home micro? Not many, but in the US they do.

This difference in disposable income is the reason why all software in the US is on disc and here cassette programs dominate. Sales of disc drives in the UK are very low, as a proportion of micros sold.

And this is why our own micro manufacturers must survive. Many of the new micros being developed by the big US manufacturers are now too expensive to be regarded as 'true' home micros in this country. Commodore's impressive Amiga machine launched last week should be a top-selling home micro. It will be in America I have no doubt. But over here it looks like a high-priced disc-based system. At around £900 it will only sell to a small proportion of the potential market.

Atari is showing it has the right idea by announcing a cut-down version of its 512ST – the 260ST – for the UK. But I would hate to have to rely on the big American manufacturers making concessions to the UK market.

Much better to have our own companies like Sinclair, Acorn and Amstrad, for whom the UK market is necessarily a more important consideration when designing and planning new products.

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**Computer Trade Association Magazine of the Year**



# Amiga launched in US

COMMODORE'S much feted Amiga machine was launched last week at the Lincoln Centre in New York.

Over 800 people attended the launch, including artist Andy Warhol who was called upon to demonstrate the micro's impressive graphics capabilities.

The Amiga will cost \$1295 (about £925) in the US, and is expected to reach the shops there this September.

The package will comprise the keyboard, single 3½ inch disc drive and mouse. The hi-res colour monitor is an extra at \$495 (£350).

No software is being bundled with the machine, apart from Microsoft's version of Basic, although Commodore

is hoping that by the time the micro is released, there will be between 30 and 40 titles available.

These include business suites from Chang Laboratories and Software Group, graphics programs from Island Graphics, music packages from Cherry Lane Technologies, programming utilities from Lattice and Metacomco and at least 30 entertainment packages from Electronic Arts, Mindscape, Broderbund, Synapse, Sub-Logic and Infocom. Well known titles include *One on One*, *Skyfox*, *Sargon III*, *Chess*, *Sub Logic Flight Simulator* and the complete Infocom range including *Hitch Hikers Guide to the*

*Galaxy*.

The IBM emulator disc is also expected to be available in September. "The IBM emulator will be under \$100, and there will also be an accelerator available for under \$100, which means that software such as *Lotus 1-2-3* will run

just as fast as it does on the PC. Without the accelerator the PC software does run slower," said a spokesman for Commodore US.

There is still no firm date being given for the Amiga's arrival in the UK. Commodore will be concentrating on

the C128 at the *Personal Computer World Show* in September, and the nearest that Commodore UK will commit itself is the first quarter of next year.



## Acorn deal

◀ continued from page 1

Acorn's Model B compatible W65SC816-based 16-bit BBC model.

In return the BBC has agreed to reduce royalty payments on its machines, but according to Acorn chairman, Alex Reid, this is unlikely to be reflected in a price cut on either the BBC or BBC Plus. Most of Acorn's effort is now going into the BBC B-Plus model. "The main emphasis is now on the BBC-Plus," confirmed Alex Reid.

Olivetti has agreed to invest a further £4m in Acorn, the BBC has agreed to write off some £2m in unpaid royalties on the BBC micro and Acorn's remaining main creditors will write off £7.9m – about half of the money they are owed. In return they will receive an immediate payment of £8.4m and £4.4m of loan stock.

"The financial position of Acorn is now stable," commented Olivetti's Alex Uboldi. He blamed a drop in sales between April to June that was greater than the 40% Acorn foresaw, for Acorn's second crisis and share price suspension. "The cash injection was needed for the immediate survival of Acorn."

"Development of Acorn's new products has not been affected by the problems. "The first new product – the Acorn-Cambridge 32-bit

workstation – is to be launched in August.

Commented Alex Reid "The core projects are fully funded and are going ahead.

"At a creditors meeting we put to the creditors a projection of the penny-in-the-pound rate they would get under receivership. Acorn would have gone into receivership if any of the parties had not gone along with this deal.

"Acorn is now stripped of the problems of the past – we now simply have the problems of the present and the future."

Hermann Hauser – Acorn's co-founder with Chris Curry commented, "It has been a very sobering experience to fly very high one year and very low the next." Under the restructuring deal Curry and Hauser retain a joint shareholding of 14.5%. "It is sad to see we had to reduce our overheads in the way we did." Acorn has reduced its work-force from 451 in February to 275. Also, the consumer and education divisions have now been merged into one.

Acorn is expected to go ahead with sales of its stakes in two separate ventures – Torus Systems and IQ Bio.

Acorn also now formally announced the appointment of Brian Long as its new managing director (see *Popular Computing Weekly*, July 25).

## Acorn previews 32016 processor at Barbican

THE THIRD Official Acorn User Exhibition took place at the Barbican, London last week.

Acorn showed the BBC B Plus, and previewed the 32016 second processor for the first time. The 32016 add-on effectively turns the BBC into a 256K, 32-bit machine and is being aimed at scientific and research establishments, with a four-figure price tag.

It is to be launched at the end of August at the same time as the postponed Cambridge workstations.

*Revs* and *Elite* the latter in

its more colourful second processor version were the star attractions on Acornsoft's stand.

Acorn also included a computer satellite project developed by a team of pupils from Clifton College, Bristol. The boys have been using a BBC micro to track and decode colour weather pictures from Meteostat II.

Musical demonstrations were being given on the Music 500 system, shown on Aries Computers' stand, UMusic's UMI-2B 16-track Midi sequencer, FSoft's *Music maker*, and *The Music System*, from System Software.

There were also a number of robotics products on display, notably Intergalactic's Zero 2, and Beasty from Microbotics.

## Pimania's sundial won at last



PIMANIA has at last been solved.

The search for the golden sundial of Pi, the object of Automata's adventure game *Pimania*, had been claimed to be the longest running adventure quest in history.

The winners are Sue Cooper and Lizi Newman of Ilkley

in Yorkshire, who claimed the sundial on July 22 in the horse's mouth of the chalk horse at Hindover Hill, Sussex.

A printed booklet of the solution to *Pimania*, is being prepared and will be available from Automata, PO Box 78, Portsmouth for £1.00.



# Sinclair gets new chief

SINCLAIR RESEARCH's new chief executive will be Bill Jeffrey, 40, who was previously managing director for the company's TV and Communications division.

Bill Jeffrey joined Sinclair in March 1985 from Mars Electronics where he was responsible for sales, marketing and R and D for the company's radar and navigational products.

His promotion to chief executive is seen as a direct result of his success in bringing the flat screen TV to the market.

As yet, no successor to the post of TV and Communications managing director has been appointed.

● The price of the QL is now being cut in some high street chain stores. The HMV shops are selling the machine at

£275 and the John Lewis Partnership at £299.

"Our cut is a consequence of our 'never knowingly undersold' policy", said Gerald Whiting of John Lewis. "We are simply responding to other retailers who are perhaps overstocked."

## New deal on Atari 130XE

ATARI'S 130XE is now being offered in a special value pack including a data recorder by some retail chains.

Boots is selling the bundle at £149.95 whilst Dixons and Curry's has it at £149.99 but adds the *Introduction To Basic Programming* tape.

## Amstrad portable

◀ continued from page 1  
company has any plans to develop a portable.

The Z800 is a new chip from Zilog - makers of the Z80 used in all previous Amstrad micros - which is likely to be available in the first quarter of 1986. The first Z800 chips produced will be low-power consumption CMOS devices, ideal for use in a portable.

The Z800 is software compatible with the Z80 so existing software on disc for the CPC664 and 6128 could be made to run on the machine.

It is also likely that the new portable will be IBM PC compatible. Amstrad is thought to have licensed DOS-Plus, a new software product from Digital Research, from whom Amstrad has already licensed the CP/M disc operating system used by the CPC models.

Digital Research has announced that it has signed a deal to supply the DOS-Plus operating system to one unnamed UK manufacturer.

DOS-Plus effectively emulates with software the 8088 processor used by the IBM PC enabling PC-DOS 2.1 programs to be run.

Using such an arrangement the Amstrad portable would be able to run - albeit possibly a little slower than the IBM PC - any of the huge catalogue of business packages so far developed for the IBM.

Another advantage of DOS-Plus for Amstrad is it is compact - only 64K - and therefore can be implemented on a built-in Rom for the portable.

Chris Hall of Locomotive, the systems house which wrote the Basic and operating systems for the Z80-based Amstrad micros denied knowledge of any Z800-based micro: "I don't know everything they do. I have never seen a real Z800 chip but it would certainly be of interest to anyone with a lot of Z80 code."

An Amstrad spokeswoman said, "We have no plans to launch a portable micro and there is no portable in development."

## GOODE

### SPECTRUM

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ROMPER ROOM	9.95	4.99
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THEATRE EUROPE	9.95	6.50
BRIAN JACKS SUPERSTARS	7.95	4.99
COMBAT LYNX	8.95	6.50
MINI OFFICE	5.95	4.79
ROCKY HORROR SHOW	8.95	6.50

GAME	RRP	OUR PRICE
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MOON CRESTA	8.95	4.99
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SHADOW FIRE	9.95	5.99
SHADOW FIRE (disc)	13.95	8.75
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## Satellite data for micros

ASTRID is a consumer satellite receiver produced by MM Microwave of York.

For just £149, ASTRID (Automatic Satellite Telemetry Receiver and Information Decoder) will enable you to receive data transmitted by the UOSAT satellites, record it on a cassette tape and display the information on your home computer screen.



Any computer with a standard serial port should be able to use ASTRID.

Further, software is available from AMSAT UK for graphic display of satellite

tracks, error correction of received data, and storage on disc. AMSAT UK is at 94, Herongate Road, Wanstead Park, London E12 5EQ.

Further details on ASTRID from MM Microwave, Satellite group, Thornton Road Industrial Estate, Pickering, N. Yorks (0751 75455).

## Wordstar launched for Amstrads

MICROPRO, the business software company, has announced that it is to launch its best selling *Wordstar* word processor package on the Amstrad 464 and 664 machines.

The Amstrad version will be called *Pocket Wordstar* and will retail at £149, some £150 cheaper than the full version in its basic form.

"*Pocket Wordstar* is not very different from the original. Some of the block moves are restricted in size because

## Costs of QL program duplication go up

DUPLICATION charges for Sinclair QL titles are going up this week.

Previously Sinclair paid the duplication charges at Ablex Audio Video so that the customer paid only for the blank cartridge themselves.

From August 1, repeat duplication orders will carry a recording charge of 30 pence

per cartridge.

First runs of programs, however, will continue to be subsidised by Sinclair.

Ablex hopes that its prices may soon drop sharply – the company is changing its duplication methods and the recording charge may then come down to below 10 pence per cartridge.

of memory available, but that is about all," said Robin Oliver, MicroPro's managing director.

"We are also looking at the Atari ST, C128 and Amiga for possible implementations of *WordStar*, and of course, *Pocket WordStar* should run on the Amstrad 6128. I think that Amstrad users are the group who would benefit most from a genuine business package being made available for their micro."



MicroPro MD Robin Oliver

## Letters

### Pimania

There is a 'bug' in the *Hackers* cartoon's (July 25 issue) reference book, as well as in the computer program.

Pi begins 3.1415, not 3.1417. It doesn't even round up to 3.1417. Coincidentally, the 200 millionth place is also a five.

Pythagoras  
The Mother Honeywell  
Foundation of  
Supernal Light

OK. I can't see how to get out of this. We wuz wrong.

Are you sure about the 200 millionth decimal place?

### Status Quo

The article by Boris Allan on the future of languages (July 18 issue) was very interesting but my view of the future is more pragmatic. New languages are always of interest but it seems that Basic is here to stay.

We all start with Basic because nearly every micro/

mini come with a version of Basic built-in. Who wants to program in some other language when the rest of the world is banging away in Basic? The aristocrats amongst us soon tire of this and graduate to machine-code. Which came first; the chicken or the egg?

Because beginners use Basic, new computers will continue to be provided with this high-level language and it will be expanded as new facilities become available via the hardware, in the same way that Basic always has. The intricacies of Fortran, Cobol and the like, will remain the province of the professional programmer, whilst Logo will remain in the educational world.

Larger memories, 32-bit operation, the removal of the "von-Neumann bottleneck", none of this will alter the status quo. Basic will survive, albeit in a much modified form.

But since the days of naff commercial programs are numbered, if not over, the majority of computer users

will be buying ready-made software for use with the new generation machines.

Ian R Highton  
23 Eagle Court  
London E11

### Cat problem

I think the following information may help with the problem of identifying what type of file has been saved to a ZX microdrive cartridge.

The problem arises when you *Cat* the microdrive. The *Cat* does not tell you what type of file(s) they are. Either:

- a) Program file;
- b) DATA file;
- c) SCREEN\$ file;
- d) a CODE file.

While I was fiddling with *Save*ing a file in different colours I noticed that I could *Save* programs and files with all sorts of colours. Of course the file name should not exceed more than 10 bytes. If while *Save*ing a file you restrict the actual name to 8 characters and the next 2 bytes to either one of the following; DATA, CODE, or

SCREEN\$. Either:

```
SAVE*"M";1;"namexxxxx  
DATA"DATA()
```

where DATA in the quote marks is extended mode D;

```
SAVE*"M";1;"namexxxxx  
SCREEN$"SCREEN$
```

where SCREEN\$ in the quote marks is extended mode / symbol shift K;

```
SAVE*"M";1;"namexxxxx  
CODE"CODE Address,
```

length where CODE in the quote marks is extended mode I.

Then when you do a *Cat* the following information is displayed:

```
Cartridge name  
namexxxxxx if a program  
namexxxxDATA if a data file  
namexxxxSCREEN$ if a Screen  
namexxxxCODE if machine code.
```

Of course when *Load*ing a file cartridge you have to go through the same procedure except you use *Load* instead of *Save*.

Omer Coruk  
44 Rossmore Court  
Park Road  
London NW1



# NEW TAPE - Commodore 64 - DISK SUPER-BREAKER

ALL THIS IS ONE GREAT DISK

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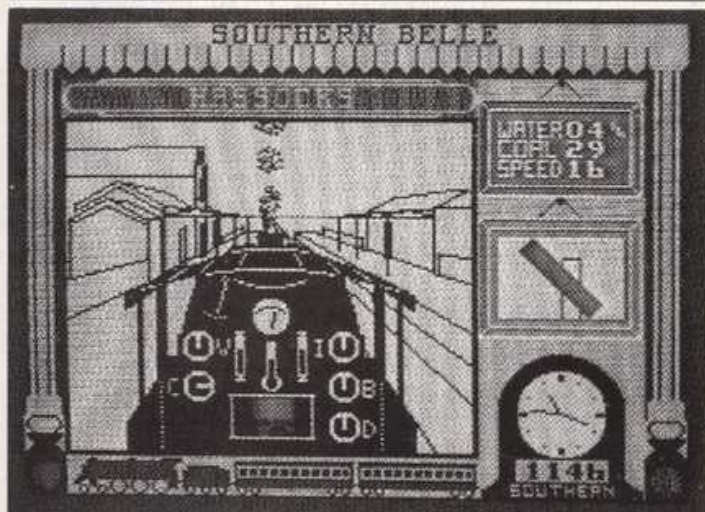
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## Well trained

**Program** *Southern Belle Micro Spectrum* 48K **Price** £7.95 **Supplier** Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon, Oxfordshire OX14 4RX

It was once every boy's dream to grow up to be a train driver (I'm afraid these were the dark ages of sexist role stereotyping) but the closest most got was their Hornby 00 gauge loco. *Southern Belle* provides a chance to fire up the old Spectrum and take part in running the pride of the Southern Railway from Victoria to Brighton.

With flight simulators I always found the hardest part was landing. This time I crashed into the buffers at 50 mph! It may come as a surprise that controlling the brute force of the iron horse takes every bit as much sensitivity as it does to land a light aircraft.

With the threat of lateness

at one extreme and running out of coal or water at the other, you've got your hands full. Luckily there's a host of options, with the computer taking control of all but three of the controls at the easiest level.

Different runs range from trainers to problem ones with stop signals, speed restrictions and other random hazards. You can even challenge the line record.

The line drawn perspective landscape moves pleasingly by your cab view, with all the important landmarks recognisable, and the piston and whistle sounds almost compensate for the lack of grease and grime. If you've not got an hour or more to devote to the journey there's a speed option but I suspect that this novel simulation will seduce a good number of people to spend their evenings guiding the six o'clock Bank Holiday special to the coast.

John Minson



## Get in line

**Program** *Azimuth Alignment System Micro* Commodore 64 **Price** £4.95 **Supplier** Challenge Research, 218 High Street, Potters Bar, Herts EN 6 5BJ

This may be the best fiver that you ever spend on your micro. Everyone will have experienced that intense frustration when a favourite game refuses to load. Usually, this is

caused by faulty alignment of the tape heads on your cassette deck, and can be easily corrected using the *Azimuth Alignment System*.

Why, you may ask, do some programs load but not others? Many tapes, particularly those saved from listings, transfer information at standard speed (300 baud). Usually these programs cause few problems, even if the tape heads are not set accurately. However, it's when it comes to the new high-tech, turbo-load, data compacted programs which need to

## Aces high

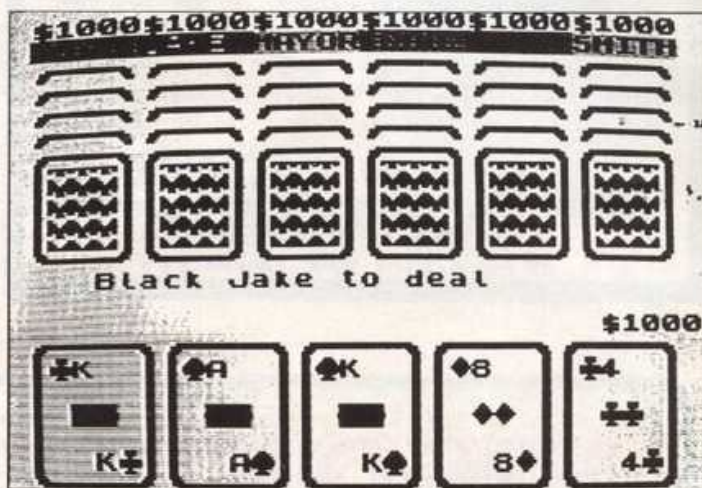
**Program** *Poker Micro Spectrum* **Price** £5.95 **Supplier** Duckworth, The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY

At last software houses seem to have realised that there's no need for the sales gimmick of 'Sexy Mandy' erotically peeling away her pixels to sell poker games. This is the second serious attempt, after CCS's *Maverick*, in a matter of months.

Once again five-card draw is the game - pity it wasn't stud - but with house rules

'em up sequence. Then there's Moll. Though she remains strictly in the hi-res of the imagination she helps out by serving drinks and offering advice on whether to raise, stay or fold.

In poker winning isn't just the main thing - it's the only thing! A program like this is a cheaper way to practise the basics than having a school of experts lighten your bank roll. Shuffling and dealing is rather slow, and I suspect that your opponents aren't quite so sophisticated in their plays as those of *Maverick*, though their more aggressive style leads to a more immediately exciting game. Without real social interaction either version could prove to be of



such as raises in \$8 units only. Your six opponents, from Billy the Kid to Doc Holliday, add to the Wild West saloon atmosphere, and make comments, scowl and even finger their guns, though the game stops short of an arcade shoot

limited addictiveness, but if you see yourself as an apprentice cardsharp this is a reasonable attempt at the game.

John Minson



transfer information at 3000 baud that troubles start. Quite simply, if the tape head is not positioned exactly perpendicular to the discretion of tape travel, the shorter pulses in a novaload program will merge together and corrupt the signal.

In case you are wondering what azimuth means, according to my dictionary it refers to an arc of the celestial circle, usually the bit between the zenith and the horizon. This gives a clue as to how the *Alignment System* works.

Having first loaded Side A, the test signal is then found on Side B of the tape. By inputting the signal, screen border

colour will change to indicate the state of head alignment. By adjusting a small screw, two extreme positions can be found. Bisecting the angle between these positions gives an exact setting.

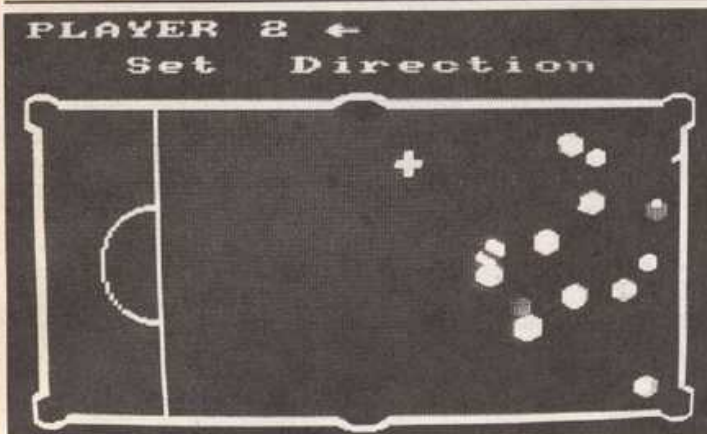
My only grumble is that some guidance could have been given on just how to bisect the extreme angle. Guessing isn't good enough.

If you've got more than one tape that will not load, rush out and buy the *Azimuth Alignment System*. It will pay for itself in minutes, and is cheaper than its competitors.

Tom Hussey







## Pot black

**Program** *Alex Higgins' World Pool Micro* Amstrad  
**Price** £8.95 **Supplier** Amsoft, Brentwood House, 169 King's Road, Brentwood, Essex, CM14 4EF

**T**he continuing saga of the Amstrad snooker games has begun to

match *Dynasty* in its convolutions. The story briefly to date was the Amsoft's *Snooker* game had some very nice touches such as numbered balls for green screen owners, attractive detailing, etc, but was slow and less playable compared to the rival *Steve Davis Snooker* and also cost a pound more – no contest in most people's minds. As an attempt to get round this Amsoft have re-released

their old game with an improvement in the coding to make it faster, and with the added attraction of carrying a licence deal with Steve's arch rival Hurricane Higgins (which I'm sure did little towards making them able to consider a price cut as well). If there is anyone left who hasn't got one or the other it may be worth a look.

Now Amstrad has released *Alex Higgins' World Pool* which stretches the relevance of the licence a bit far but is an enjoyable release.

Unlike most versions of computer pool this actually has the full number of balls and plays to the correct rules

– the attention to detail even stretches to the point where half the balls carry spots and half stripes and these are animated to move and roll the way the patterns would on a real ball. It is all very clever and probably takes up at least half of the processing time with the result that the game is, once again, slow.

Still if pool is your game rather than snooker it is the most attractive version I have seen, certainly not unplayable, and there doesn't seem to be any immediate rivals for your cash.

**Tony Kendle**



## Rare humour

**Program** *The Covenant Micro Spectrum 48K* **Price** £6.95  
**Supplier** PSS, 452 Stoney Stanton Road, Coventry CV6 5DG

**I** suspect that this successor to *Xavior* will prove something of a classic. It's one of those infuriating

causes energy drain and while some power points compensate for this others reduce it further.

None of this is startlingly original but it displays a rare humour, with really cute creatures, strategy as you discover where the objects lie and how best to reach them, and arcade skills as you float about in a bubble which is governed by laws of inertia, gravity, *et al* in a most

## Frankie speaks

**Program** *Frankie Goes To Hollywood Micro Spectrum 48K* **Price** £9.95 **Supplier** Ocean Software, Ocean House, 6 Central Street, Manchester M2 5NS

**M**agazine says review this!  
Reviewer says...  
I hate *Frankie Goes To Holly-*



wood (the 7 inch, the 12 inch, the megamix, the hype); I think their records are boring and their fans will buy this anyhow... grumble, mumble, moan...

And suddenly there came a Bang! Reviewer is taken into a corner where a computer warbles a Frankie-ish riff. Reviewer, overcome, hurries home with his copy clutched under his arm and the desire to reach the Pleasuredome.

Home is a very ordinary terrace in an ordinary street

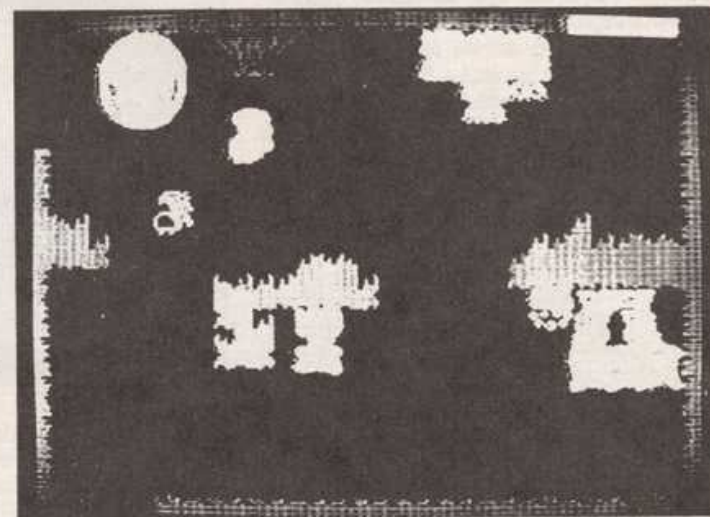
in an ordinary town. Reviewer wanders from house to house, room to room. There's a cat to feed. That results in a little pleasure, the feeling of being more of a real person. There are video games to play: more pleasure, more real. And there's a murder with clues aplenty. Sherlock Says Deduce!

This is most definitely *The Power of Denton Designs*. Somehow they have crammed a game of dazzling style and complexity into a tiny micro. Playing is a true voyage of discovery; not merely objects and how to use them but even your aims! Reviewer ventures ever deeper, stepping into windows which iris out, attempting arcade games, becoming more real.

*Two Tribes* go to war over the fact that this Spectrum version is less good than the Commodore 64 version in sound, graphics and, I suspect, game detail and complexity. But *Relax!* It's still the most infuriating and addictive game this year.

Did I say 'game'? I'm not sure this isn't more real than real life! John (52% real) Says Play It!

**John Minson**



ating games that keep you playing into the early hours.

As sole survivor of your race (wot, again?) you have to venture deep into a vast system of caverns to collect animal life to repopulate the planet. Sixty-four sections of caves, each with four screens and its own individual beastie, contain a key and section of a map, but first you have to locate and collect the particular anaesthetic that will stun the creature long enough for you to capture it. If not contact

infuriating fashion.

In addition, later screens contain nasty little surprises such as hiding the anaesthetic behind columns. Loss of lives returns you to the start, but there's a Save game feature.

A great game with one big problem – one of the worst hyper loads I've encountered. I prefer the challenge of playing the game to the frustration of loading it.

**John Minson**





## West country amigos

With Commodore's Amiga micro now launched, Metacomco – which wrote much of the operating system for the machine – is systems house of the moment. **Christina Erskine** investigates

**T**here can't be too many connections between St Paul's in Bristol, which achieved some notoriety in the summer of 1982, and Monterey in California, whose heyday was the late 60s and all that stood for. In fact, there's probably only one – Metacomco.

As a small company which up to now has hardly been involved in the glamorous side of home computing – *QL Assembler* and *QL BCPL* being two of its well-received packages – Metacomco has made the sort of shrewd moves hardly ever seen in the industry.

Last February Metacomco signed the contract to write the operating system for the new Commodore-Amiga 68000-based micro.

Quite how Metacomco – whose Monterey branch is fairly tiny – managed to leave the rest of the US giants gnashing their teeth at the starting blocks on this deal remains a mystery even to Metacomco.

"Some Amiga people came to our stand at Las Vegas Consumer Electronics Show in 1984, and asked if we did anything on operating systems," said Peter Mackeonis, Metacomco's marketing manager. "Four months later they rang us up and asked for a list of our ideas for a new machine."

Metacomco was only awarded the contract six months ago, so it has been frantic work to get the operating system, AmigaDos, ready for the machine's US launch last week.

The company probably had a head start on other contenders for the deal in that Metacomco already owned an operating system – Tripos – which in many ways was suited to the Amiga. Tripos, originally developed at Cambridge University in the late 1960s, is a single user multi-tasking system.

"We developed a number of languages to run under Tripos, which we then had to convert in various forms for the QL, and now the ST and Amiga," said Peter.

"While our AmigaDos is certainly adapted from Tripos, we have had to do a lot of modifications to make it acceptable for a modern system," added Pam Clare, Metacomco's technical manager.

"We've obviously had to customise it to make the best use of the Amiga's graphics and sound capabilities – getting it to address the Amiga's custom chips has been the major modification."

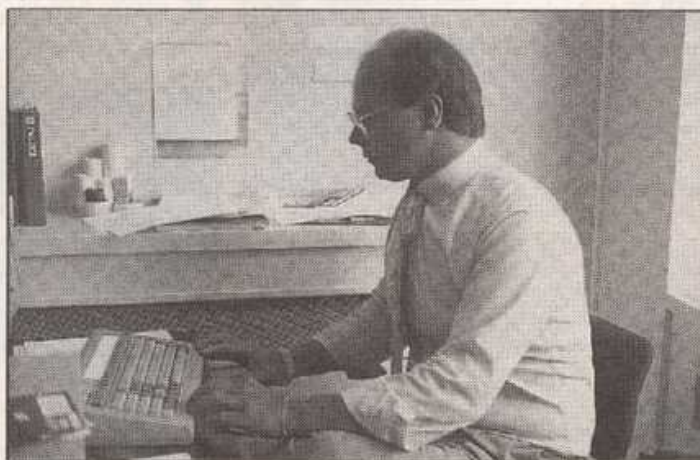
"There were also a very large number of specific requirements from Commodore," Pam continued. "For instance, under Tripos, you have to specifically boot each disc as it is inserted. Commo-

dore wanted discs to be both instantly recognised and booted."

"We're very pleased with the end product," Peter added. "We see AmigaDos as a pre-Unix system – having adapted Tripos into AmigaDos, we now intend to carry on adapting it and licensing it for other machines. It's certainly a strong contender for the 'windows market'. As yet there is no standard operating system for the 68000 chip, so it would be good if we can get Tripos going now."

"I think the feature I particularly like about it is the 'no restrictions' idea. You can have any number of directories, any number of files within them; the number is only governed by the amount of memory you buy." AmigaDos uses just 28K of code, and was originally written in BCPL, before being assembled, which, says Peter Mackeonis "kept it very tight".

That the last six months has been hectic is exemplified by the lifestyle of Tim King, who oversaw Operation



Amiga from beginning to conclusion. He would spend three weeks in rotation between Bristol, Monterey, Commodore in Pennsylvania and Amiga on the West Coast. But Metacomco's work for the Amiga does not stop at its operating system. It has also implemented three languages for the machine – Basic, Pascal and Lisp.

"Our 8086 – based Basic interpreter, which was released as Personal Basic, was Metacomco's very first product, four years ago," said Peter. "We licensed it to Digital Research for \$800,000 (about £600,000) and they in turn implemented it for the 68000 chip and licensed it to Atari for the ST."

Indeed, until Metacomco's range of languages for the QL came out, 95% of its work had been as an OEM (original equipment manufacturer). Languages

such as its Pascal and C have been sold widely to universities for use on development micros such as the Sage series. Normally, these products would cost around £300-£500, so paring away the price to make it suitable for QL, ST and potential Amiga owners has been something of a challenge.

Even so, a Metacomco language (so far, QL Assembler, QL BCPL, QL Lisp and QL Pascal have appeared) does not come cheap – around £80 for QL Pascal – but it is a comprehensive and sophisticated version.

The QL languages were Metacomco's first releases to be sold directly to the end user – how have they fared?

"We've sold 7,500 QL language packages altogether," said Peter. "That's around 15% of the market, so it's quite respectable. Obviously we'd be happier if the QL had lived up to expectations and sold a bit more."

Amiga Pascal is a particularly powerful version, MCC Pascal 68000, a complete ANSI/IEEE standard 770X3.97 (ISO 7185) compiler, which means we're talking big guns here. The Lisp is not the standard variety, but the Cambridge Lisp dialect. Commodore-Amiga will be badge marketing the languages itself.

While the languages are not being bundled with the machine, Metacomco's 68000 development tools – macro assembler, linker and editor – will, like the operating system itself, reside inside the micro as standard.

With the company's specialisation on 68000 systems, the Apple Macintosh looks strangely neglected and out in the cold. "Yes, I know, it is the odd one out," said Peter. "We've looked at the Mac and decided no. Our links with Digital Research have always been very close since Personal Basic days, and so we decided to go for Gem instead."

"Going the other way around though, we have been talking to a European development company which wants to port its Macintosh software over to the Atari."

Metacomco could probably allow itself time now to sit back on its laurels as writer of AmigaDos. However, it has taken a stand at the *Personal Computer World Show* in September, where it will be launching a C compiler for the QL, and 'fingers crossed', the first of the Atari ST packages.

"I would like to see Metacomco become a major force in the market place, the new Digital Research, if you like, but home-grown," was Peter Mackeonis's parting shot.



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## Commodore's turbo Portia

*Andrew Pennell takes a look at Commodore's exciting Amiga micro – and finds out how it compares with Atari's ST rival*

**W**hile much has been made in the press of the forthcoming Atari ST range of micros, little has been heard of its main contender-to-be, the Commodore Amiga.

The Amiga too would seem to offer a Macintosh-like windows-icons mouse-controlled operating system, but with two major improvements – multi-tasking, and amazing graphics abilities. The machine will be more expensive though – at around £1000 for the basic console and disc unit – but without a monitor.

The Amiga has had a chequered history – originally Atari commissioned a company called Amiga to design some graphics chips for their Lorraine machine. After some disagreements, Amiga returned Atari's money, and Commodore then bought the company and also the rights to the machine, now known as the Amiga.

The design philosophy of the machine seems simple – build the most amazing graphics chips and, almost as an afterthought, put a microprocessor and keyboard on it. The result is the most sophisticated graphics system yet seen on any micro, which puts many dedicated arcade machines to shame. In addition, the operating system placed on top of the hardware is a windows-icons control environment, with one major advance over the Mac and ST – multi-tasking.

## Hardware

The machine itself is based around a 68000 processor, the most fashionable chip at the moment.

To get the most from the processor, there are also three very special custom chips, and a few standard ones, along with 256K of Ram and 128K (192K possible) of Rom. The three custom chips are Agnus, Portia, and Daphne – much more interesting names than those like ZX8302, used on the QL, and much more sophisticated too.

Agnus is a general memory controller, complete with 25 direct memory access channels, a bit-image manipulator (the Blitter), and a powerful co-processor (called Copper) whose job it is to look after the screen. The large number of direct memory access channels means that operations involving peripherals such as sound and disc operations are very fast, as the 68000 processor just has to tell the chip to do the transfer, then it can do something else while the direct memory access channel does the input/output routine. The 'Blitter' is used for moving and setting blocks of memory much faster than the processor could do,

and not just continuous blocks of memory. Given, say, a rectangle on the screen, the Blitter will move it to another area on the screen. It can also draw straight lines and fill areas, so needless to say, this offers amazing possibilities for windows and animation, exploited by the Rom. The Copper co-processor is responsible for the display – where its sections are in memory, what modes they are in, and the sprites, covered in detail later.

The Portia chip controls all input output operations, including four audio channels, configured as a double-channel stereo sound, and game controller inputs, which can be mouse, trackball, analogue joystick, and switched joystick, actual disc I/O, and the complex interrupt controls.

Portia is linked directly to Agnus to allow fast direct memory access, while the third custom chip, Daphne, is the custom animation device. It combines all the signals from Agnus, then adds its own for things such as colour control, sprite priority and collision detection to actually produce a display on the TV monitor. The sound information is stored as a digitised waveform which can be sampled and manipulated – much as a sophisticated synthesiser/sound sampler works.

All these chips are wonderful in themselves, but you

figures given but is not guaranteed to be visible on ordinary screens because of overscan. The number of colours combined with the resolution means that only high-quality colour monitors can satisfactorily be used, and at the moment Commodore themselves do not offer a suitable RGB monitor. However, it is producing one for the 80-column mode of the C128, though whether it will be able to cope with the Amiga graphics is not known.

The above spec is pretty good, but there is much more to the Amiga than just this. There are three screen modes, called Single Playfield, Dual Playfield, and Hold-and-Modify.

The display can consist of multiple viewports, which are a sort of hardware window. Each viewport can be a different resolution and use different colours, though you cannot stack viewports sideways. Single Playfield mode is like most other machines screen mode, but Dual Playfield is like nothing else – you can have one 'screen' superimposed on top of another completely different one, with holes in it through which you can see the screen behind it.

The high resolution and number of colours does have a drawback though – memory used. A low resolution screen, 320 × 200 with 32 colours consumes about 40K, but a high resolution screen with 16 colours takes 128K, half the Ram on a standard machine. The system is flexible, though, so if you want fewer colours then less memory is required.

The third major mode is called Ham, for Hold and Modify. This allows an incredible 4096 colours on the screen



may be wondering what they can do. Well, the specification of the graphics on the Amiga is thus:

It has a palette of 4096 colours, though the normal limit is a choice from the palette of 32 on the screen simultaneously. Low resolution mode is 320 pixels by 200 pixels with up to 32 colours. High resolution is 640 pixels by 200 pixels with 16 colours. Using an interlaced mode the vertical resolution can be doubled to 400 pixels, and actual horizontal resolution is greater than the

simultaneously, though it is for static display only.

As well as all this, the Amiga supports sprites – pixel patterns that can be moved over the screen by the hardware. There are actually eight sprites supported by the hardware on its own, but the software switches between sprites as the display is produced, and allows more to be present, though there is a limit on how many can be shown on one horizontal scan. These sprites are known as VSprites, and are 16 pixels wide, and



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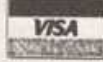
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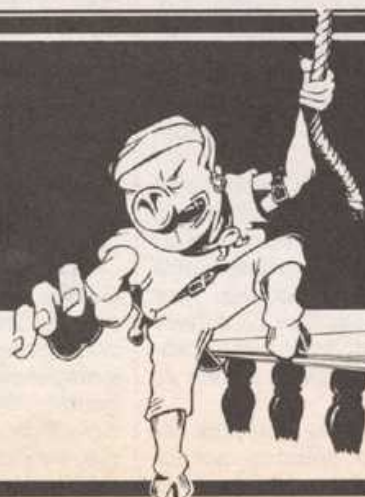
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# Amiga Preview

any number of pixels high. Each pixel in a sprite can be one of three colours, or transparent. If this is a limitation to the programmer, there are other sprites available, known as Blitter Objects, or Bobs. These use the Blitter in conjunction with the system software to put themselves on to the screen and remove them when required, and suffer none of the limitations of VSprites - they can be any size, and any number of colours (subject to the mode of the screen they are in), though they are slower than VSprites because of the software overhead. With both types of sprites there is priority encoding and full collision detection, using both hard- and software. To make the best use of the sprites there are AniMobs and AnimComps, which are a way of allowing automatic animation of shapes across the screen with little programming intervention.

If you require something like a large scrolling map, the hardware can do all the tricky stuff again, as it allows the display of any given area of memory on the screen, anywhere on the display. It does this using things called Rastors, which are a sort of massive sprite, up to 1024 pixels square. To display a part of it, you just have to tell the hardware where your map is, which bit you want displayed, and where you want it, and let it do it all for you.

Basically, the Amiga graphics system is the most revolutionary yet seen on any home micro, and thrashes the competition out of sight.

The previous best was that used on the Atari micros, but the Amiga system is a sort of 16-bit up-date of the old Atari 8-bit system. Strangely the Atari ST range uses nothing of the technology devel-

bered itself with 3 inch discs. It won't be long now before it is the only manufacturer using them, which bodes ill for the users.

I am a great fan of 3½ inch discs - they are small, and tough. The double-sided discs the Amiga uses are pricey at around £6 each, though with demand rising all the time the price should come down.

The keyboard has 89 keys, complete with numeric pad. The keyboard feel is good - to compete with the Mac it should be, though the ST, which is pitched at a similar market slot, suffers from a rather cheaper keyboard.

To communicate with the user, a two-button mouse is used, and supplied as standard. There are various ports on the back of the machine, and they show that Commodore has only been able to exert a last minute influence on it - gone at last are the non-standard, slow ports used on other Commodore machines. Instead there is a fast external disc drive port, a parallel printer port, RS232 serial port, twin joystick sockets, and a full system bus socket - which the Atari ST does not have.

There are outputs for stereo sound, which is not put through the TV unlike the C64, as well as the provision internally, via a slot in the front, for a 256K Ram up-grade, bringing the total Ram up to 512K.

Allowance has been made in the memory map for up to 8M of Ram, which may not seem so excessive with the rapidly falling price of memory.

Various peripherals are planned for the machine, apart from the Ram up-grade, including an external 3½ inch and 5¼ inch disc (8M), Midi music interface (it is data compatible with a Fairlight), 1200 baud modem, a range of printers, a sophisticated video controller package including frame grabber and Genlock interface, and, finally, a \$500 software emulator package to enable the Amiga to run some IBM PC compatible packages.

Something that often gets overlooked is processor speed - while the Amiga, ST and QL all run at a theoretical speed of around 8MHz, actual program speed is less than this to allow the hardware access to the screen Ram. The QL suffers badly in this respect, with user programs running three times as slowly as they should.

The Amiga, thanks to its graphics coprocessor and direct memory access channels runs almost at top speed, which

should result in some very fast complex software, both for business and games.

## Software

The hardware specification is very impressive, but hardware alone does not sell machines (see the old Ataris and the QL). The software makes a difference, and the Amiga firmware is a sort of cross between the user-friendly Macintosh, and the multi-tasking of the QL.



Programs are controlled via 'Intuition', the Amiga's window-icon mouse-operated environment, running on top of AmigaDOS.

Intuition is more than a simple front end (like the ACT File's Activity interface). Instead, like Gem on the ST, it is a complete multi-tasking, window environment, designed to make the best use of the machine's graphics abilities. It uses windows in a similar way to the Mac and Gem, with a title bar at the top, scroll bars along the bottom and side, and a close box. The way you arrange windows is a little different, with small 'bring to front' and 'send to back' icons.

As 'Intuition' is multi-tasking this is important. Since more than one program can run at once and each program can have one or more windows, switching between windows is very necessary. As they are proper windows (ie, when you uncover one its contents re-appear) its multi-tasking is much more practical than that used on the QL, which has simple windowing. As there is only one keyboard, whatever you type is passed only to the program that owns the front-most window, and a program that is running 'behind' it will not know you pressed a key.

Another difference between Intuition and the way the Mac and Gem work is in menus. The latter machines have menu bars across the top of the screen, but this is impractical for multi-tasking. Instead, Intuition does menus in a similar way to the original method conceived by Xerox. By pressing the Menu button on the mouse when over a window, the top of



oped for their 8-bit machines. Atari may yet pay for the lack of foresight.

So much for the graphics hardware - what of the rest of the machine? Well, Commodore has been very secretive with the Amiga (unlike Atari with all the ST hype).

The machine is in two parts, the main console incorporating the disc drive, and the keyboard. The built-in 3½ inch disc drive has the largest capacity yet - 880K formatted. It seems that everyone is going for 3½ inch discs now, with the exception of Amstrad which has lum-



the window changes into a menu bar, from which you make a selection by clicking in the Gem way.

An improvement over its predecessors is that menus can have up to three levels – when you select something, you may get another menu, and if you select something in that one you may get a further one. This too has been borrowed from the original work at Xerox – responsible for the whole windows-icons idea – and can be very useful indeed. The Amiga allows keyboard short-cuts for menu items in a similar way to the Mac, but Gem strangely does not.

For example, using the Commodore key in conjunction with 'X' is a shortcut

Amiga has just *TextCraft*, a word processor. The success of machines now depends heavily on the software support that can be generated for it.

Commodore plans word processor, graphics, speech synthesis, music and spreadsheets packages to be ready for the Amiga before it goes on sale.

Both Atari and Commodore have realised the importance of development software, and supply to software houses most of the tools that are required. Interestingly, all the Amiga development software (except the C compiler from Lattice) is written by Bristol-based Metacomco, known for their QL software. It has developed AmigaDOS from its existing TripOS system and Lisp and Pascal languages; a macro assembler, linker and editor package have also been developed by the company for the Amiga.

The Basic to be bundled with the Amiga is apparently to be Microsoft Basic.

## Conclusions

The Amiga is aimed at the upper end of the home market and the lower end of the business market.

For the home market it has the best games potential of any machine ever. It's just a shame Commodore don't release a cut-down version without discs but with cassette port, which would be the best chance of getting into the British home market.

In the business market its main rivals are the Atari ST and the Apple Mac. The

ST is cheaper, and you get more Ram, but Intuition seems preferable to Gem. The Mac is much more expensive, you get less Ram, and no colour, but it does now have a large business and language software base. Rumours of a cheap, colour version of the Mac have been around since its launch, though September is the current date for the colour Mac's release. If the UK launch of the Amiga is in January as planned then the first machines over here should have the system software in Rom.

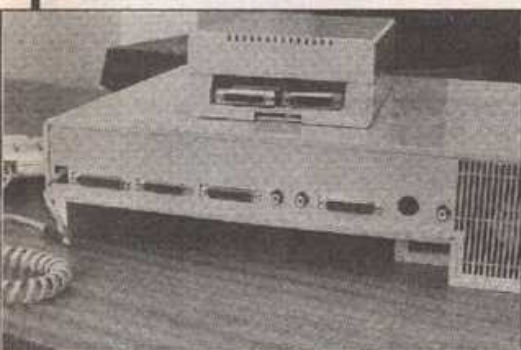
By then there will be a few more machines on the market at the same price but the chances of them being superior to the Amiga are slim.

Its main drawback is price. The basic machine – console, keyboard and disc drive – will sell for \$1295 in the US. That could translate to a UK price of somewhere just under £1000. Add in a monitor and the price goes up to nearer £1300 for a 256K machine.

Its main obvious rival, Atari's ST, is substantially cheaper. The 256K ST with disc and monitor could be as little as £650 and the 512K equivalent is £900.

Even an entry level price of just under £1000 for the Amiga is enough to ensure that, in the UK, the machine will not be a true mass market home machine. (The situation in the US, where the machine will find its main market, is rather different, with Macs, Apple IIs and IBM PC's being the main home micros.)

Nevertheless, the Amiga is technically a very exciting micro. Its graphics potential alone makes it a fascinating machine to use. If you can afford it – buy it.



for *Cut* from the *Edit* menu. Most of the short-cuts are the same keys as the Mac too. Intuition seems, on paper at least, to be the best windowing icon-based environment yet on any machine.

Few entertainment software programs will bother with Intuition, as it places certain restrictions on what can be done graphically, and the advantages of an icon-based system usually are not required for most games anyway. Games will probably by-pass Intuition and use the low-level routines in the Rom to get amazing on-screen effects. If a game is written firstly for the Amiga, any conversions on to other machines will be difficult as nothing else comes close as far as its display abilities.

The Amiga machine has been under development for several years. The time taken for development usually reflects in the operating system. (The Mac took around four years to design, and the Rom was so good that there has so far only been one version.)

In contrast, the QL was done pretty quickly with several versions of Rom, while the Atari ST was literally knocked together in a matter of months.

Now the Amiga hardware and most of Intuition is finished, Commodore is racing with Atari to see who finishes first. In the US to begin with – for the first few months – the Amiga Rom will have to be soft-loaded from disc, as with the Atari ST, before Commodore will commit itself to Rom.

Where both the Amiga and ST suffer is in the lack of language or applications software. Neither have a finished Basic yet, the only software the Atari has is *GemWrite* and *GemPaint*, while the

## Amiga Specification

Processor:	68000
Ram:	256K (expandable with expansion board to 512K)
Rom:	128K (192K possible)
Custom chips:	Agnus – memory management and graphics (handled by built-in co-processor) Portia – input/output handling (mouse, discs, and sound) Daphne – animation – sprites, colour control
Operating system:	Windows/icons mouse-controlled environment termed Intuition and AmigaDOS
Built-in language:	Microsoft Basic
Graphics:	60 or 80 column text Low resolution 320 × 200 pixels graphics in 32 colours High resolution 640 × 200 pixels graphics in 16 colours Colours chosen from palette of 4096 shades
Sound:	Four channels configured as twin stereo channels Range 9 octaves
Discs:	Built-in 3½ inch disc drive Capacity 880K formatted
Keyboard:	Detachable 89-key with separate numeric pad
Mouse:	Two-button – connects to joystick port
Input/output:	Twin joystick ports Supplementary disc port Centronics parallel printer port RS232C serial communications port Ram expansion (256K) port Stereo audio output Video: TV, RGB System Bus



# Gridbase

A treat for Dragon 32 arcade addicts – written by  
Ashley Adamson and David Bush

**T**he game is set in space and is played on the high resolution screen with 3-D perspective and alien ships which grow as they close in to invade your Gridbase. There are also two opening screens as well and a closing title screen which gives the score. The game is quite user friendly and has plenty of arcade style sound effects. It requires the use of one joystick. There are five levels of difficulty.

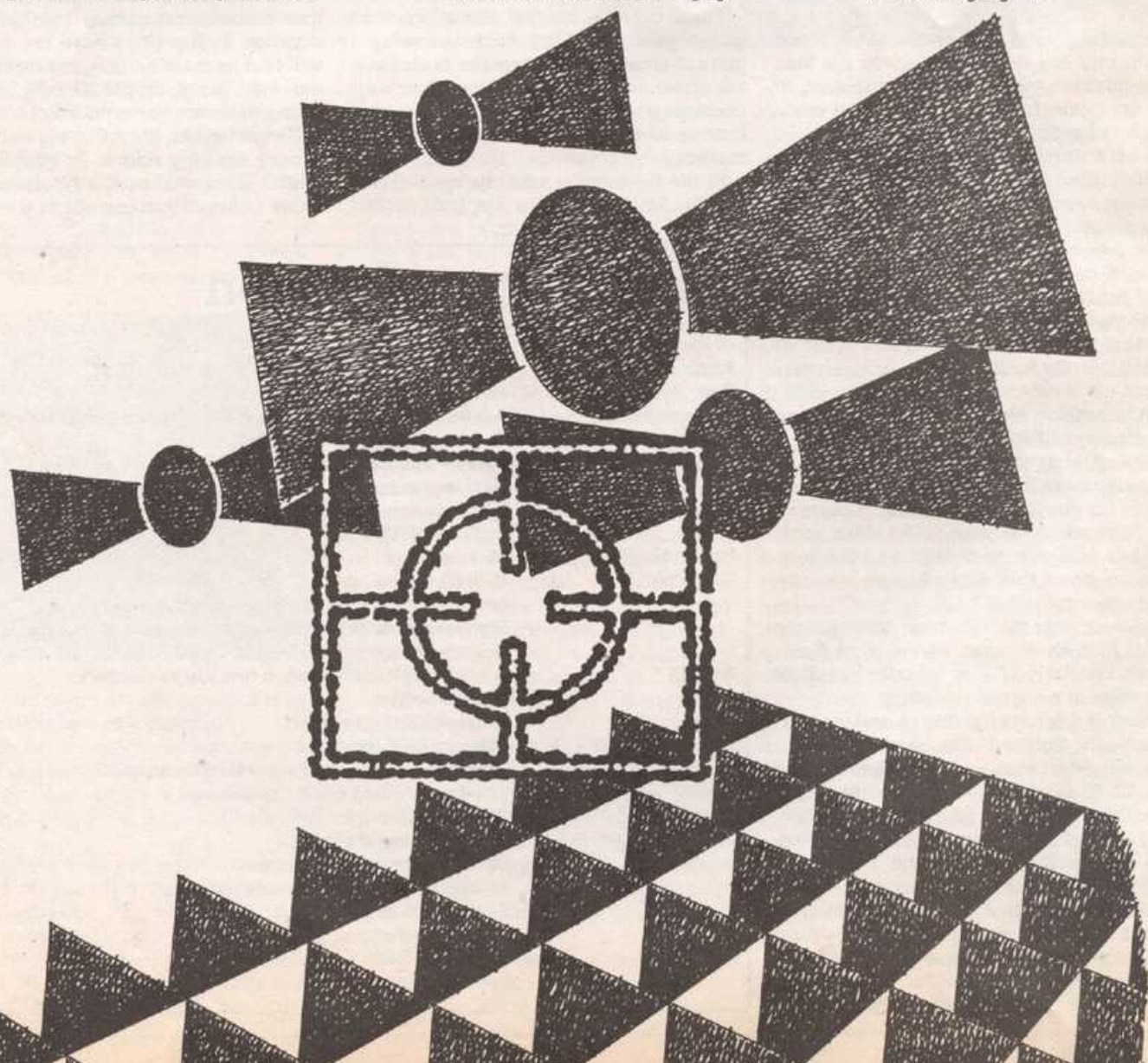
The aim is for the player to defend their Gridbase from the waves of UFO's which are trying to pass your defences. For protection you have an on-screen target-sight for your laser which must be aligned carefully with your joystick over the weak spot in the centre of the UFO. On the highest difficulty level you must

strike within one pixel of the weak spot to score a hit! Good luck!

## Program Notes

10	Sends program to subroutine in 330	200-230
40	F is the counter for the hits	240-280
50-60	Selects random co-ordinates for UFO	290-320
70	Begin loop for UFO scaling up	330
80	Puts blank area (R) after target (T)	340-370
90-110	Calculates joystick target position	380
120-130	Scales up UFO	390
140-150	Checks fire button and sounds laser	400
160-190	Checks for a hit, increments score, returns to UFO scaling up	410
		420
		430-440
		450-480
		490-510
		520-540

Draws "Game Over" in Hi-Res and waits  
Final screen gives score and asks to play again  
Waits for yes or no  
Reserves space for target (T) and its blanking area (R)  
Title screen  
Rising music precedes game  
Selects Hi-Res screen  
Draw string for alien UFO  
Draw string for target  
Target drawn centrally to start  
Gets target (T) and blanking area (R) for putting in 80 and 110  
Draws the Gridbase  
Plots the stars  
Sounds warning klaxxon and returns to begin game





```

10 GOSUB330
20 REM GRIDBASE
30 REM BY A R ADAMSON & D M BUSH
40 FOR F=1 TO 5
50 A$=STR$(RND(190)+30)
60 B$=STR$(RND(70)+30)
70 FOR I=1 TO 25
80 PUT(A,B)-(A+10,B+10),R,PSET
90 A=JOYSTK(0)*3.9:B=JOYSTK(1)*2
  .25
100 IF B>105 THENB=105
110 PUT(A,B)-(A+10,B+10),T,PSET
120 S$="S"+STR$(I)
130 DRAWS$+"C1BM"+A$+"", "+B$+U$
140 P=PEEK(65280)
150 IF P=126 OR P=254 THEN PLAY"
V31;T255;L255;O3;BAGFEDC"
160 IF ABS(A+5-VAL(A$))<LE AND A
BS(B+5-VAL(B$))<LE AND (P=126 OR
  P=254) THEN PLAY"V31;T150;L10;O3
;GGCF#CF#CF#CF#CF#CF#":H=H+1:F=F
+1:DRAWS$+"C0BM"+A$+"", "+B$+U$: IF
  F>5 THEN 200 ELSE 50
170 DRAWS$+"C0BM"+A$+"", "+B$+U$
180 NEXT I
190 NEXT F
200 COLOR1,1:LINE(97,92)-(159,98
),PRESET,BF
210 DRAW"S4BM102,93C0L4D4R4U2L2B
M+5,-2D4U4R4D2L3R3D2BM+3,+0U4F2E
2D4BM+7,+0L4U2R2L2U2R4"
220 DRAW"BM+10,+0R4D4L4U4BM+7,+0
D2F2E2U2BM+7,+0L4D2R2L2D2R4BM+3,
+0U4R4D2L3R2D1F1"
230 FOR DE=1 TO 1000:NEXT DE
240 CLS
250 PRINT@135,"YOU HIT"H"OUT OF 5"
260 FOR I=200 TO 20 STEP-20:SOUN
D I,1:NEXT I
270 PRINT@264,"WILL YOU DEFEND"
280 PRINT@326,"GRIDBASE AGAIN Y
/N"
290 Q$=INKEY$:IF Q$="" THEN 290
300 IF Q$="Y" THEN RUN
310 IF Q$="N" THEN PRINT"BYE BYE
":END
320 GOTO290

```

```

330 DIMR(4),T(4)
340 CLS3:PRINT@11,"gridbase";
350 PRINT@224,STRING$(96,143);:P
RINT@256,"LEVEL(1-5...1 IS HARDE
ST)";:INPUTLE
360 IF LE<1 OR LE>5 THEN GOTO 350
370 CLS3:PRINT@64,CHR$(128):PRIN
T@76,"GRIDBASE":PRINT@95,CHR$(12
8):PRINT@192,CHR$(128):PRINT@199
,"ALERT ALERT ALERT":PRINT@223,C
HR$(128):PRINT@329,"HOSTILE ALIE
NS";:PRINT@363,"ON SCANNER";:PRI
NT@487,"USE RIGHT JOYSTICK";
380 FOR I=10 TO 200 STEP 5:SOUND
  I,1:NEXT I
390 PMODE 4,1:PCLS 0
400 U$="G1L1H1E1R1E1F1R1F1G1L1H1"
410 T$="R6BD2BR2D6BL2BD2L6BU2BL2
U6"
420 DRAW"BM110,110C1XT$;"
430 GET(0,0)-(10,10),R,G
440 GET(108,110)-(118,120),T,G
450 PCLS0:LINE(0,120)-(255,120),
PSET
460 LINE(0,123)-(255,123),PSET:L
INE(0,128)-(255,128),PSET:LINE(0
,134)-(255,134),PSET:LINE(0,142)
-(255,142),PSET:LINE(0,152)-(255
,152),PSET:LINE(0,167)-(255,167)
,PSET
470 LINE(128,191)-(128,120),PSET
:LINE(70,191)-(115,120),PSET:LIN
E(185,191)-(141,120),PSET:LINE(2
0,191)-(95,120),PSET:LINE(236,19
1)-(162,120),PSET:LINE(0,167)-(7
0,120),PSET:LINE(255,167)-(187,1
20),PSET:LINE(0,142)-(47,120),PS
ET
480 LINE(255,142)-(210,120),PSET
:LINE(0,128)-(25,120),PSET:LINE(
255,128)-(232,120),PSET
490 FOR I=1 TO (RND(10)+40)
500 PSET(RND(255),RND(115),1)
510 NEXTI
520 FOR I=1 TO 3:SOUND 200,3:SOU
ND 100,3:NEXT I
530 SCREEN1,1
540 RETURN

```



# Super-duper Basic

Part One of a powerful extension to ZX Basic brought to you by **Stuart Nicholls**

**Z**X! Basic is an extension to Spectrum Basic that allows all existing commands to be used and provides 28 new or improved commands. This is achieved on the standard 48K Spectrum and does not need the Interface Shadow Rom. ZX! Basic commands are in the form:

!A—parameters—  
!B—parameters—

That is, the capital letters A to Z are used preceded by a ! (exclamation mark).

All new commands are checked for syntax errors both on entry and in Run time in exactly the same way as normal Spectrum Basic. One result of this entry checking is that certain Spectrum Basic commands will not allow ZX! Basic commands to follow them, but all ZX! Basic commands will allow Spectrum Basic commands on the same line. In general if a line is correct but fails syntax then the part of the line that has failed syntax must be moved to a new line.

The ZX! Basic screen is different to that of Spectrum Basic. For the two new print commands the top left hand corner of the screen is considered as 0,0; and the bottom right hand corner as 23,31; that is the *Edit* lines are part of the main screen and not just for *Input* commands.

The new commands for plotting, ie, *!P*, *!D*, *!C*, *!N*, *!B* use a 256 × 256 pixel screen in which pixel 0,0 is the bottom left corner pixel (line 23) and 255, 191 is the top right hand corner. 'Y' co-ordinates between 192 and 255 are allowed but of course will be off the top of the TV screen. This is useful when lines are required to go off screen and then back on again.

ZX! Basic is loaded in two sections and comprises approximately 7K bytes of code with a further 6.25K allocated to Sprite data (which includes a screen dump when animation is switched on).

To enter the machine code use the following simple Basic program which in fact has two functions:

1. Goto 10 - prints on the screen a Hexdump of any area of memory in blocks of eight bytes with the Hex address of the first byte in the block and also prints a Checksum byte for the block calculated as the sum of the previous eight bytes 'mod. 256', that is the remainder of the sum: Sum of 8 bytes/256.
2. Goto 1000 - allows the input of blocks of eight Hex numbers and the Checksum byte (ie, a Hexloader). If any line is incorrectly entered then there is sufficient error trapping to detect this and give a suitable error message; the line can then be re-entered. Each input should consist of 18 characters except the last line which should contain a maxi-

mum of 18 characters including the end of dump marker "ZZ".

Using *Goto 1000* enter the codes as in Part I (printed this week and next). Firstly enter *Clear 51649*, then enter the codes in blocks of eight bytes, and the Checksum byte with no spaces between each code, the start address being 51650.

When the code has been entered and the program terminated with the ZZ code (ie, the last line is 0000000000ZZ) then save it using *Save "part1" Code 51650,2100*.

Once this has been saved and verified then move on to part 2 Hexdump (which will be printed in week three) and enter the code in the same way starting at address 59904. After entering the last line in the hexdump *2ff2761b0313003E06* then enter ZZ on its own to terminate the program. Now save this code using *Save "part2" Code 59904,5464*.

After verifying part 2, the two codes can be loaded back into the Spectrum

and run using *Print Usr 62777*. You should now be able to work through the instructions checking that each one functions correctly. Should any problem occur then check your code using the Basic Hexdump program (use *Goto 10*); the easiest way to do this is to match the checksums at the end of each line.

Should all this be more than your patience can stand, then tape copies of ZX! Basic can be obtained from myself for £3.00p. Just send your requirements to me at: 82 Lays Drive, Keynsham, Bristol BS18 2LE.

Should you wish to re-enter Spectrum Basic then enter *New* (but remember to save any program in memory beforehand as this will reset the Spectrum). This will leave ZX! Basic in memory for later use. ZX! Basic leaves approximately 28K free for Basic programming. Now onto the instructions!

**!An - (Animate)**

This command is used to turn on or off the interrupt driven sprite routines. When turned on, the current screen is saved for use in erasing sprites and as such does not permit any further permanent printing to the screen, however attributes can be changed to redirect sprites. (This is discussed further in commands *!F*, *!G*, *!H*, *!J*, and *!K*)

*!AO* turns off the routine, while *!A>0* turns

## HEXDUMP + HEXLOADER

```

10 REM *****
20 REM ** HEXDUMP+CHECKSUM **
30 REM *****
40 DEF FN C()=INT (X/256)
50 DEF FN D()=X-FN C()*256
60 DEF FN E()=INT (T/256)
70 DEF FN F()=T-FN E()*256
80 DEF FN A()=INT (Y/16)
90 DEF FN B()=Y-FN A()*16
100 DEF FN C#()=CHR# (FN A()+48
+7*(FN A())>9))+CHR# (FN B()+48+7
*(FN B())>9))
110 PAPER 7: INK 0: CLS
120 INPUT "From address (DECIMA
L) "JST
130 INPUT "To address (DECIMAL)
"JEND
140 PAPER 7: INK 0: CLS
150 FOR X=ST TO END STEP 8
160 LET Y=FN C(): PRINT FN C#()
!
170 LET Y=FN D(): PRINT FN C#()
180 LET T=0
190 FOR Z=0 TO 7
200 IF X+Z>END THEN LET Z=0: G
O TO 240
210 LET Y=PEEK (X+Z)
220 LET T=T+Y
230 PRINT FN C#():" "
240 NEXT Z
250 LET Y=FN F(): PRINT "="*JFN
C#()
260 IF X+Z<END THEN PRINT : N
EXT X
270 PRINT " ZZ"
280 STOP
290
300
1000 REM *****
1010 REM * HEX I/P WITH CHECK *
1020 REM *****
1030 DEF FN G(A#,B)=CODE A#(B)-4
8-7*(CODE A#(B)>57)
1040 DEF FN H(A#)=16*FN G(A#,1)+
FN G(A#,2)

```

```

1050 PAPER 7: INK 0: CLS
1060 LET R#="0"
1070 INPUT "Start address (DECIM
AL) "JADR
1080 PAPER 7: INK 0: CLS
1090 INPUT "8 BYTES+CHK "JB#
1095 LET ST=ADR
1100 LET LEN=LEN B#: IF (INT (LE
N/2)*2<LEN) THEN PRINT "Odd no
.of chrs. "J: GO TO 1330
1110 IF LEN=10 THEN GO TO 1130
1120 IF B#(LEN-1 TO )<>"ZZ" THEN
PRINT "No 'ZZ' marker "J: GO T
O 1330
1130 FOR A=1 TO LEN-2: IF B#(A)<
"0" OR B#(A)>"F" THEN PRINT "In
valid chr. "J: GO TO 1330
1140 IF B#(A)<"A" AND B#(A)>"9"
THEN PRINT "Invalid chr. "J: GO
TO 1330
1150 NEXT A
1160 LET X=ADR
1170 LET Y=FN C(): PRINT FN C#()
!
1180 LET Y=FN D(): PRINT FN C#()
1200 LET X=X+8
1210 FOR K=1 TO 8
1220 LET A#B#( TO 2): LET B#B#
(3 TO )
1230 IF B#="ZZ" THEN LET K=9: L
ET R#B#: LET B#A#: GO TO 1280
1240 PRINT A#:" "
1250 LET P=FN H(A#)
1260 LET X=X+P
1270 POKE ADR,P: LET ADR=ADR+1
1280 NEXT K
1290 LET Y=FN D(): PRINT "="*JFN
C#():"/"*JB#
1300 LET A#B#
1310 IF Y=FN H(A#) THEN GO TO 1
350
1320 PRINT "Checksum "J
1330 PRINT "error - re enter": B
EEP .5,10: BEEP 1,5: LET ADR=ST
1340 GO TO 1090
1350 PRINT "OK": BEEP .1,20
1360 IF R#<>"ZZ" THEN GO TO 109
0
1370 PRINT "PROGRAM TERMINATED"

```



on the routine. (Note: if this is used as a direct command then be prepared for sprites in your listings!)

**!Bx,y,xo,yo** - Draw a box using the co-ordinates *x,y* and *xo,yo* as the two opposite corners of the box. This command uses the current colours. For example, **!B0,0,255,191, 20** Pause 0 will box the whole screen. The Pause 0 instruction being necessary to stop the report 'OK' on the Edit lines.

**!Cx,y,r** - (Circle)

Draw a circle with centre *x, y* and radius *r*. The values of *x* and *y* can be from 0 to 255, and *r* can be from 0 to 100. This command is many times faster than the Spectrum circle and allows part circles to be drawn without the 'Out of Screen' error report.

**!Dxo, yo** - (Draw)

As with Spectrum Basic, this will draw a line from the current plotted pixel to that specified by *x* offset, *y* offset. However with this command the offset value can be off the screen and will wrap around as necessary. Colours are supported as with Spectrum Draw. Note that the current co-ordinates are taken as on the ZX! Basic grid.

**!E** - (Erase)

Erase all 24 lines using the current attributes. This is similar to *Clis* but does not reset the print position to 0,0.

**!Fn, s, lo, l, c, b, f** - (Format)

The first of the Sprite handling commands used to set up a Sprite prior to turning on that sprite (see !G).

There are 16 sprites available in ZX!Basic of

which 15 are computer controlled, the 16th being controlled from the keyboard using the cursor keys. Each of these sprites has its own set of sprite attributes (sets up by !F) as follows:

**n** - sprite no, (1 to 16)

**s** - speed 0 to 255 (the lower the value the faster the sprite) use values 0, 1, 3, 7, 15, 31, 63, 127 and 255 for smooth movement, other values will give jerky movement.

**lo** - line offset value. 0 is no movement vertically, 1 is down, 255 is up.

**co** - column offset horizontally, 1 is right, 255 is left.

**l** - start at line (0 to 23)

**c** - start at column (0 to 31)

**b** - value of screen attribute that will cause a bounce, (0 to 255).

**f** - figure to be used for sprite. (1 to 16)

ZX!Basic has 16 different figures that can be used or you may design your own figures using the ZX!Sprite Designer program to be printed later in the series. All sprites move by character squares and can be any size from 1 pixel to 16x16 pixels. Offset values control the initial movement of the sprites. This will change on striking a barrier. If no barrier is set up then the sprite will wrap around the screen.

**!Gs, n** - (Go)

Switches On/Off a sprite. Once a sprite has been formatted using !F then it can be put on the screen or taken off the screen with this command. *s* is the sprite in question (1 to 16) and *n* turns it on/off (0 is off, >0 is on).

**!Hs, n** - (Speed)

Changes the speed of a sprite. The sprite can be on screen or off. *s* is the sprite in question. (1 to 16) and *n* the new speed value (see !F).

**!Js, n** - (Jump)

Changes the figure used for a sprite: *s* is the sprite in question (1 to 16) and *n* is the new figure, (1 to 16).

**!Ks, n** - (Knock)

Changes the barrier value for a sprite: *s* is the sprite in question (1 to 16) and *n* is the new screen attribute for barrier, (0 to 255).

**!Ix, y, n** - (In fill)

This command will paint any shape starting from co-ordinate *x, y* using colour as specified by attribute value *n*. Any shape however irregular can be filled quickly, but ensure that the shape is complete with no gaps for the 'fill' to escape through. The command has a Break routine built in 'just in case'.

For example, **!I127,96,4020 !I127,96,56** will draw a circle in the middle of the screen then fill it in black.

**!L address, n** - (ZX!Poke)

A special Poke instruction to allow the setting up of sprite figures. The Spectrum Poke command will result in a parameter error report if attempts are made to Poke into addresses 51680 to 65359. Address between 51680 and 65359 and *n* has a value 0 to 255.

Remember, to install ZX!Basic, use the hexloader printed this week to load the data that will be published over the following issues.

Next week, more instructions and more data.

#### ZX Spectrum 48K HEXDUMP

Part 1 : CODE 51650,2100

```

C9C2 CD 14 23 F5 CD F5 F6 CD = 7E
C9CA 0D F0 F1 32 0F 5C ED 43 = 43
C9D2 7C CA CD DC FD C0 21 00 = CD
C9DA 08 22 7A CA ED 4B 7C CA = E4
C9E2 0C 79 A7 28 07 C5 CD DC = C9
C9EA FD C1 2B F4 0D 21 01 01 = 0A
C9F2 22 70 CA ED 43 7C CA CD = A7
C9FA E2 F6 ED 4B 7C CA 70 3C = 0A
CA02 FE C0 20 1F 47 C5 CD DC = BA
CA0A FD C1 2B 05 32 78 CA 10 = 77
CA12 12 3A 70 CA A7 20 0C C5 = 2E
CA1A 2A 7A CA 23 22 7A CA AF = A6
CA22 32 78 CA ED 4B 7C CA 70 = 6A
CA2A 3D FE FF 20 1F 47 C5 CD = 5A
CA32 DC FD C1 2B 05 32 79 CA = 3C
CA3A 10 12 3A 79 CA A7 20 0C = 82
CA42 C5 2A 7A CA 23 22 7A CA = BC
CA4A AF 32 79 CA ED 4B 7C CA = A2
CA52 0D 79 FE FF 20 0E C5 CD = 4B
CA5A DC FD C1 2B 06 7C 54 1F = 90
CA62 30 02 CF 14 2A 7A CA 7C = 07
CA6A B5 C8 2B 22 7A CA C1 ED = BC
CA72 43 7C CA C3 E2 C9 01 01 = F9
CA7A 03 00 70 74 21 17 C6 1E = 00
CA82 C1 C9 49 F3 D0 F5 00 3E = C9
CA8A AA 55 AA 55 AA 55 AA 55 = FC
CA92 AA 55 AA 55 00 00 00 00 = FE
CA9A 00 00 00 00 AA 55 AA 55 = FE
CAA2 FF 99 99 99 99 99 FF = 94
CAA8 00 66 66 66 66 66 66 00 = 64
CAE2 00 00 FF 99 99 FF 00 00 = 30
CAB2 00 00 00 66 66 00 00 = CC
CAC2 00 00 66 FF FF 66 00 00 = CA
CACA 00 00 00 00 00 00 00 00 = 00
CAD2 00 22 22 22 22 00 22 00 = AA
CADA 00 55 55 00 00 00 00 00 = AA
CAE2 00 00 55 77 55 77 55 00 = ED
CAEA 00 22 77 66 33 77 22 00 = CB
CAF2 00 CC DD 22 44 BB 33 00 = FD
CAFA 00 66 AA 44 DD AA DD 00 = 96
CB02 00 22 22 00 00 00 00 00 = 44

```

```

CB0A 00 22 44 44 44 44 22 00 = 54
CB12 00 22 11 11 11 11 22 00 = 80
CB1A 00 00 55 22 77 22 55 00 = 65
CB22 00 00 22 22 77 22 22 00 = FF
CB2A 00 00 00 00 00 22 44 00 = 66
CB32 00 00 00 00 77 00 00 00 = 77
CB3A 00 00 00 00 00 00 22 00 = 22
CB42 00 11 11 22 22 44 44 00 = EE
CB4A 00 33 55 55 55 55 66 00 = ED
CB52 00 66 22 22 22 22 22 00 = 10
CB5A 00 22 55 11 22 44 77 00 = 65
CB62 00 77 11 22 11 11 66 00 = 32
CB6A 00 44 55 55 77 11 11 00 = 87
CB72 00 77 44 66 11 11 66 00 = A9
CB7A 00 33 44 66 55 55 22 00 = A9
CB82 00 77 11 11 22 44 44 00 = 43
CB8A 00 33 55 22 55 55 66 00 = BA
CB92 00 22 55 55 33 11 66 00 = 76
CB9A 00 00 00 22 00 22 00 00 = 44
CBAA 00 00 00 22 00 22 44 00 = 98
CBBA 00 00 11 22 44 22 11 00 = AA
CBB2 00 00 00 77 00 77 00 00 = EE
CBBA 00 00 44 22 11 22 44 00 = DD
CBC2 00 22 55 11 22 00 22 00 = CC
CBCA 00 66 DD DD BB 00 77 00 = DA
CBD2 00 22 55 55 77 55 55 00 = ED
CBDA 00 66 55 66 55 55 66 00 = 31
CDE2 00 33 44 44 44 44 33 00 = 76
CDEA 00 66 55 55 55 55 66 00 = 20
CDF2 00 77 44 66 44 44 77 00 = 20
CBFA 00 77 44 66 44 44 44 00 = ED
CC02 00 33 44 44 55 55 33 00 = 98
CC0A 00 55 55 77 55 55 55 00 = 20
CC12 00 77 22 22 22 22 77 00 = 76
CC1A 00 11 11 11 11 11 66 00 = BB
CC22 00 55 55 66 55 55 55 00 = 0F
CC2A 00 44 44 44 44 44 77 00 = CB
CC32 00 55 77 77 55 55 55 00 = 42
CC3A 00 66 55 55 55 55 55 00 = 0F
CC42 00 22 55 55 55 55 22 00 = 98
CC4A 00 66 55 55 66 44 44 00 = FE
CC52 00 22 55 55 55 77 33 00 = CB
CC5A 00 66 55 55 66 55 55 00 = 20

```

```

CC62 00 33 44 22 11 11 66 00 = 21
CC6A 00 77 22 22 22 22 22 00 = 21
CC72 00 55 55 55 55 55 33 00 = DC
CC7A 00 55 55 55 55 55 22 00 = CB
CC82 00 55 55 55 77 77 55 00 = 42
CC8A 00 55 55 22 22 55 55 00 = 98
CC92 00 55 55 55 22 22 22 00 = 65
CC9A 00 77 11 22 22 44 77 00 = 87
CCA2 00 66 44 44 44 44 66 00 = DC
CCAA 00 44 44 22 22 11 11 00 = EE
CCB2 00 33 11 11 11 11 33 00 = AA
CCBA 00 22 77 22 22 22 22 00 = 21
CCC2 00 00 00 00 00 00 00 FF = FF
CCCA 00 33 44 66 22 44 77 00 = BA
CCD2 00 00 66 11 77 55 77 00 = BA
CCDA 00 44 66 55 55 55 66 00 = 0F
CCE2 00 00 33 44 44 44 33 00 = 32
CCEA 00 11 33 55 55 55 33 00 = 76
CCF2 00 00 22 55 77 44 33 00 = 65
CCFA 00 11 22 77 22 22 22 00 = 10
CD02 00 00 33 55 55 55 33 66 = CB
CD0A 00 44 66 55 55 55 55 00 = FE
CD12 00 22 00 22 22 22 11 00 = 99
CD1A 00 22 00 22 22 22 22 44 = EE
CD22 00 44 55 66 66 55 55 00 = 0F
CD2A 00 22 22 22 22 22 11 00 = BB
CD32 00 00 55 77 77 55 55 00 = ED
CD3A 00 00 66 55 55 55 55 00 = BA
CD42 00 00 22 55 55 55 22 00 = 43
CD4A 00 00 66 55 55 55 66 44 = 0F
CD52 00 00 33 55 55 55 33 11 = 76
CD5A 00 00 33 44 44 44 44 00 = 43
CD62 00 00 33 44 22 11 66 00 = 10
CD6A 00 22 77 22 22 22 11 00 = 10
CD72 00 00 55 55 55 55 33 00 = 87
CD7A 00 00 55 55 55 55 22 00 = 76
CD82 00 00 55 55 77 77 55 00 = ED
CD8A 00 00 55 55 22 55 55 00 = 76
CD92 00 00 55 55 55 55 33 66 = ED
CD9A 00 00 77 11 22 44 77 00 = 65
CDA2 11 22 22 44 22 22 11 00 = EE
CDA8 00 22 22 22 22 22 22 00 = CC

```



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## In plain terms

Part Two of an Input routine for QL users written by Jonathan Prestidge

**T**his week, an explanation of the Input parameters, plus the rest of the Super Basic listing. Next week, a short example of the command in action.

[field] is used when you want data to be updated. If you make the field string the information to be updated, then that information will be displayed on the screen so that the user can change the parts he or she wants, or not as the case may be. The information does not have to be already on file; you could put the default for the input here instead, which in the case of a date input, for instance, might be today's date.

[ranges] is a string which holds the inclusive range of the input. If the information entered by the user is outside of this range then an error message will result, and the user will be able to correct the information. The range string has dual syntax, the first being between two ranges and has the form "n to m",

where n is the smaller number or word/character, and m is the larger. The second form is: "a,b,c,...z" where a to z are numbers or words/characters separated by commas (without spaces).

[qualifiers] is a string containing any qualifier/qualifiers needed. A qualifier is an optional command which changes the way in which the routine interprets or displays the information input. For example, the qualifier "0 = 0" makes the routine display any zero characters as 'oh' characters. So if you prefer the 'oh' to be used in the input, include this command in the format string. You can use as many qualifiers as are available (see Table Two for full list) and in any order, as long as you make sure they're in the correct syntax as shown in Table One. Two valid examples are:

"With Quiet, No buffer, No SP"

"Default = '06-May-84' Counter, 0 = 0, Cursor = '\*'"

You may notice in the first example I

have used the word *With*. I've just included it so that it makes more sense - it is not actually necessary as you can see in the other example. With qualifiers you can add your own personal look to the inputs - for instance, by using the Back = 'x' qualifier you could change the under line character (which is used to display the field) for one of your choice; perhaps a user graphic that you have defined.

Here are some examples of whole commands with descriptions:

Input At 10, 2, "£229.99", "2.2", ".99 To 100", "With 0 = 0" This inputs a price with a default of £2.20, allowing a range of 99p to £100, the initial display being: £ 2.20.

Input At 0, 0, "? A99999(a)", "", "", "No Buff" This formats an input for a stock code, the display appearing as ? \_\_\_\_\_. The input has no field string or range check.

When typing the program in, I should omit any unnecessary spaces and Rem statements as it will use up less Ram and run faster. You can renumber the routine with out affecting its running. It's probably best to merge the routine into your program instead of actually including it in every program.

Table ONE Formatting characters

Char	meaning
A	Capital letters and spaces only.
a	Lower case letters and spaces only.
X	Upper case letters numbers & spaces only (alpha numeric).
x	Lower case letters and numbers only.
M	Mixed case letters only.
C	Any displayable characters.
9	Numeric only. A zero will be displayed in this position on entering the input.
Z	Leading numbers. Any leading zeros in this position will be displayed as spaces.
B	Trailing numbers. Any trailing zeros in this position will be displayed as spaces.
=	(small 's') Mathematical symbols only, eg. * - + /
.	If an X is typed in, in this position it will be changed to a computer style multiply sign ie. '*'
.	Decimal place. If the user is entering a numeric field he or she can right justify their input before the decimal point and position the cursor just after the decimal point by pressing the fullstop key when this formatting character is used in the format string.
6	Any symbol.
1	This is a definable formatting character. You define it by setting the variable USER1# so that it contains all the characters allowed in this position. See the main listing on line 1000. The variable must be set before the input is called .... yet can be set and reset as many times as required throughout your program.
2	The same as '1' but use USER2# instead.
3	The same as '1' but use USER3# instead. Note that the example in line 1000 is set up as a HEX formatting character.

Table Two Qualifiers

Qualifier	Min. abbrev.	Function Of Qualifier
0 = 0	10 = 0	Makes zero appear as '0'
NO SPACES	NO SP	Allows no spaces in the input. Ideal for key fields
NO BUFFER	NO BUFF	Clears key board buffer before input, ie. cancels any type ahead made
WAKE UP!	WAKE	Sounds a tone before the input. Example: to notify the user after long microdrive operations, that the computer is ready for input.
BE QUIET	QUIET	Disables the error tone (but not the WAKE UP! tone).
COUNTER	COUNT	Displays the character pos. by the side of the input (reset by CNTRL-F4).
GHOST CURSOR	none	Displays no cursor but makes the letter under the cursor flash.
CURSOR = 'x'	none	Makes the cursor character (which is normally an under line character) into character x.
BACK = 'y'	none	Makes the back-ground character (which is normally an under line character) into character y.
DEFAULT = 'z'	none	Where string z is the default for the input... obtained when a blank field is entered by the user or CNTRL-F3 is pressed. String z has to be the correct length, ie that of the field.



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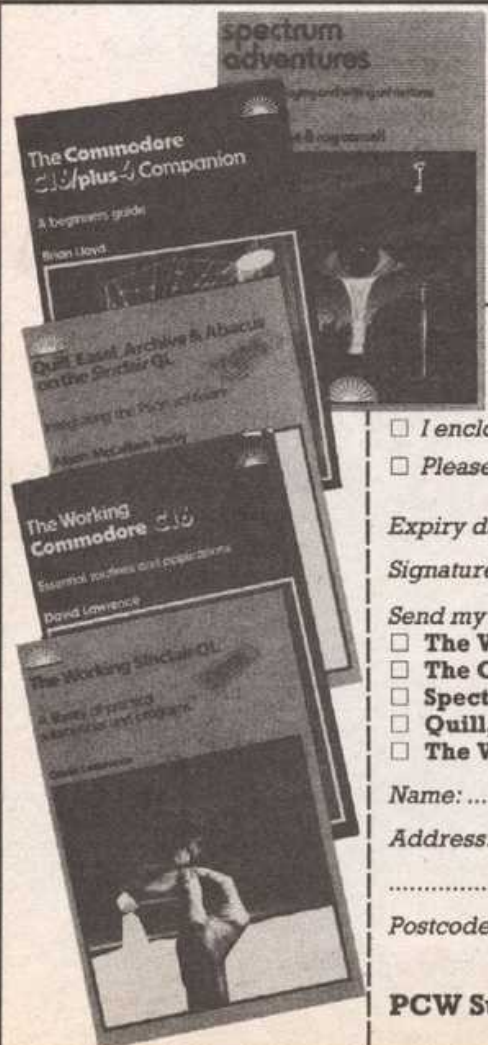
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```

6120 LET ER$ = "OK" : REMark Error flag
6130 IF CP = 1 THEN GO TO 6200
6140 IF I$ = " " AND INP$( CP - 1 ) <> " " AND TYPE$( CP - 1 ) = "Z" THEN
6150 IF INP$( CP - 1 ) <> " " THEN GO TO 6200
6160 FOR A = CP - 1 TO 1 STEP -1
6170 IF TYPE$( A ) <> "Z" THEN GO TO 6200
6180 IF INP$( A ) <> " " THEN LET ER$ = "ERROR"
6190 NEXT A
6200 GO TO 5610
6210 REMark ===== Check and evaluate input before exiting =====
6220 LET STAT$ = "RETURN"
6230 IF I = 27 THEN STAT$ = "ESC"
6240 IF I = 232 THEN STAT$ = "F1"
6250 IF I = 236 THEN STAT$ = "F2"
6260 IF I = 240 THEN STAT$ = "F3"
6270 IF I = 244 THEN STAT$ = "F4"
6280 IF I = 248 THEN STAT$ = "F5"
6290 IF I = 208 THEN STAT$ = "UP"
6300 IF I = 216 THEN STAT$ = "DOWN"
6310 LET MARK2 = 1 : MARK = 0
6320 FOR A = MARK2 TO NUM
6330 IF TYPE$( A ) = "Z" OR TYPE$( A ) = "9" THEN MARK = A : GO TO 6360
6340 NEXT A
6350 GO TO 6430
6360 LET MARK3 = 0
6370 FOR A = MARK TO NUM
6380 IF INP$( A ) <> " " THEN LET MARK3 = 1
6390 IF MARK3 = 1 AND INP$( A ) = " " THEN IF TYPE$( A ) = "Z" OR
        TYPE$( A ) = "9" THEN DISP_ERROR E$ &
        "Disjointed Numbers not Allowed" : GO TO 5400
6400 IF TYPE$( A ) <> "Z" AND TYPE$( A ) <> "9" THEN LET MARK2 = A :
        IF MARK2 < NUM THEN GO TO 6320
6410 NEXT A
6420 REMark ===== Out put strings =====
6430 LET DE = "DEFAULT = " INSTR QUAL$ :
        QUAL$( DE + 11 TO DE + NUM + 10 )
6440 LET FUL_INP$ = TYPE$ : LET STR_INP$ = INP$
6450 FOR A = 1 TO NUM
6460 IF TYPE$( A ) INSTR ALLOWED$ THEN LET FUL_INP$( A ) = INP$( A )
6470 IF TYPE$( A ) = "." THEN LET STR_INP$( A ) = "."
6480 AT LIN, COL + A - 1 :
        IF TYPE$( A ) = "9" AND FUL_INP$( A ) = "0" THEN PR
        INT ZERO$ : ELSE PRINT FUL_INP$( A )
6490 IF NO_SPACES AND A > 2 AND A < NUM THEN
        IF INP$( A-1 ) <> " " AND INP$( A+1 ) <> " " AND IN
        P$( A ) = " " THEN DISP_ERROR E$ & "No Spaces allowed in this field" :
        GO TO 5410
6500 NEXT A
6510 FOR J = 1 TO NUM
6520 IF STR_INP$( J ) <> " " THEN GO TO 6540
6530 NEXT J
6540 FOR I = NUM TO 1 STEP -1
6550 IF STR_INP$( I ) <> " " THEN GO TO 6580
6560 NEXT I

```

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## Expert advice

Part Two of the Exsys expert system written by D F Murphy

**T**his week, the rest of the Basic listing, plus a step-by-step dummy run for you to follow.

R means press Return here. Firstly, Load and Run EXSYS. Then press f1. Input the name of the file, eg, "weather". R. For Variate one put min.T.C\*10. For Variate two input max.T.C. R. Variate three rain-mm. R. For Variate four input sun.hrs\*10. R. Variates 5 to 8 just R. This defaults to 0.

Variates five to eight inclusive are not being used for this practice run. For 'result' input tomorrow as you are trying to find the probability of it raining tomorrow, given today's weather.

Now press f3, input day 1, under code, R. Then input 94,R. Then 11,R. Then 18,R, and so on, copying the figures on the 'sample data' sheet for the 'weather' file. (Fig one).

Note that to get the next row you will need to R again. The last column of the data should be ignored at this stage.

The first column is the minimum temperature in degrees centigrade, \*10. The second column is the maximum temperature, but this time rounded to the nearest degree; notice the need to round, or multiply, for integers. The third column refers to rainfall in millimetres, and is rounded. The fourth column is sunshine in hours, and is multiplied by 10 and rounded. (ie, 99 may be input, which means 9.9 hours of sunshine during that day, not 99.)

When you set to columns 5 to 8 you can R to save time. When you have finished each row of figures Exsys will provide a probability figure, which, initially, will not mean a thing!

This is because Exsys has no data in its results known file and simply refuses to give an estimate of probability higher than 1%. Note that if p% was 0% then Exsys would be saying that the result is impossible.

When you have input 15 rows of data you will be given a new 'page', just carry on as before. Incidentally these pages are meant to be useful in certain circumstances.

You might decide, for instance, to use Exsys to predict the winner of a horse race, and it would be useful to put each race meeting on a separate page.

You should, on completion of this input session, have 30 rows of data. If you find yourself on a new page (page 3) and Exsys wants you to input data for row 31 then you pressed return once too many times. If this does happen then just R for each column. This will upset the probability and system efficiency figures but it is only a practice run so don't worry about it.

Next press f3. You will be presented with the codes for each row and Exsys will be expecting input of either one or zero. The last column of the 'Sample data' sheet gives the input.

'One' represents the fact it rained the following day, (ie, result true) and that it was dry, (ie, result false). You can check the data

to verify it.

Press f4. You will be asked which rule you wish to test. Input '1' then R. Then input '>', then R, then input 40, then R.

Disregard what Exsys displays and press 'y' R. Now press f4 again and tell the system you want to test rule 2, inputting <R, 12R.

Continue the process until you have input for rule 3, >1, and for rule 4, <35.

Press f3. Input the data on the forecast data sheet, in any order that you like, and this time the probability figures will mean something.

An example of the forecast data is in Fig Two.

If you don't want to go to the effort of typing the rather long listing in, I would be pleased to supply a copy of the program on tape for £3. Send it to me at Llanerch-y-Mor, Marianglas, Anglesey, Gwynedd, LL73 8PA.

Fig 1

Exsys-Forecast Data-File name>Weather

Page 1									
1	day 1/2	81	11	2	30	0	0	0	99
2	2	40	12	4	50	0	0	0	99
3	3	32	12	1	80	0	0	0	11
4	4	28	13	0	89	0	0	0	11
5	5	35	12	0	56	0	0	0	11
6	6	31	11	0	22	0	0	0	1
7	7	78	9	1	6	0	0	0	1
8	8	56	9	3	16	0	0	0	99

Fig 2

Exsys-Sample Data-File name>Weather

day 1	94	11	18	32	0	0	0	0	1
2	42	13	4	62	0	0	0	0	1
3	76	11	8	11	0	0	0	0	1
4	57	11	2	43	0	0	0	0	0
5	30	12	0	95	0	0	0	0	0
6	44	10	0	35	0	0	0	0	0
7	48	9	0	99	0	0	0	0	1
8	18	9	6	78	0	0	0	0	1
9	24	10	5	41	0	0	0	0	1
10	55	13	4	38	0	0	0	0	1
11	37	11	4	92	0	0	0	0	1
12	59	10	5	71	0	0	0	0	1
13	30	12	1	83	0	0	0	0	0
14	54	12	0	18	0	0	0	0	1
15	88	9	9	0	0	0	0	0	1
day 16	24	9	3	31	0	0	0	0	1
17	43	11	4	43	0	0	0	0	0
18	34	11	0	66	0	0	0	0	1
19	44	8	5	7	0	0	0	0	1
20	51	8	3	1	0	0	0	0	1
21	44	7	1	0	0	0	0	0	0
22	56	14	0	68	0	0	0	0	0
23	57	14	0	88	0	0	0	0	0
24	29	14	0	95	0	0	0	0	0
25	58	16	0	99	0	0	0	0	0
26	39	17	0	99	0	0	0	0	0
27	38	18	0	83	0	0	0	0	0
28	58	15	0	70	0	0	0	0	1
29	67	9	6	42	0	0	0	0	0
30	45	10	0	88	0	0	0	0	1



```

7600 REM ***** EXISTING RULESET-DISPLAY *****
7601 REM *****
7602 REM *****
7610 SU=((2*EVX(10))+TSX+H2-RSX(10))/TSX*100:IFSU>99THENSU=99
7690 PRINT"EXISTING SVSTEN EFFICIENCY:SU:W":RETURN
7900 REM ***** RULE INCLUSION IN SET *****
7901 REM *****
7910 PRINT"RULE INCLUSION IN SET *****"
7915 LINE=21:PL=24:PR=PL:PL=11
7920 GOSUB10010:IFTS="0"THEN7920
7930 IF TS="1"THENRETURN
7934 E#(R1)=E#F:PRINT"LEFTS(VE#3):LEFTS(HOB,(R1#5)+1):"
7935 PRINT"LEFTS(VE#3):LEFTS(HOB,(R1#5)+1):"E#(R1):"E"
7950 FORL=0TO255:RSX(L)=RXX(L):IVX(L)=BX(L):NEXT
7970 FORD=0TOT55-1:TDX(D,9)=DXX(D):NEXT
7990 RETURN
8000 REM ***** FORECAST *****
8001 REM *****
8002 REM *****
8010 IF RFX THEN GOSUB 12110:RETURN
8020 PR#1:GOSUB20110:FD#0:PR#1
8025 IF PR#6 THEN TF#FD:RETURN
8026 LINE=0:PRINT"R#1:R#2:R#3:R#4:R#5:R#6:R#7:R#8:R#9:R#10:R#11:R#12:R#13:R#14:R#15:R#16:R#17:R#18:R#19:R#20:R#21:R#22:R#23:R#24:R#25:R#26:R#27:R#28:R#29:R#30:R#31:R#32:R#33:R#34:R#35:R#36:R#37:R#38:R#39:R#40:R#41:R#42:R#43:R#44:R#45:R#46:R#47:R#48:R#49:R#50:R#51:R#52:R#53:R#54:R#55:R#56:R#57:R#58:R#59:R#60:R#61:R#62:R#63:R#64:R#65:R#66:R#67:R#68:R#69:R#70:R#71:R#72:R#73:R#74:R#75:R#76:R#77:R#78:R#79:R#80:R#81:R#82:R#83:R#84:R#85:R#86:R#87:R#88:R#89:R#90:R#91:R#92:R#93:R#94:R#95:R#96:R#97:R#98:R#99:R#100:R#101:R#102:R#103:R#104:R#105:R#106:R#107:R#108:R#109:R#110:R#111:R#112:R#113:R#114:R#115:R#116:R#117:R#118:R#119:R#120:R#121:R#122:R#123:R#124:R#125:R#126:R#127:R#128:R#129:R#130:R#131:R#132:R#133:R#134:R#135:R#136:R#137:R#138:R#139:R#140:R#141:R#142:R#143:R#144:R#145:R#146:R#147:R#148:R#149:R#150:R#151:R#152:R#153:R#154:R#155:R#156:R#157:R#158:R#159:R#160:R#161:R#162:R#163:R#164:R#165:R#166:R#167:R#168:R#169:R#170:R#171:R#172:R#173:R#174:R#175:R#176:R#177:R#178:R#179:R#180:R#181:R#182:R#183:R#184:R#185:R#186:R#187:R#188:R#189:R#190:R#191:R#192:R#193:R#194:R#195:R#196:R#197:R#198:R#199:R#200:R#201:R#202:R#203:R#204:R#205:R#206:R#207:R#208:R#209:R#210:R#211:R#212:R#213:R#214:R#215:R#216:R#217:R#218:R#219:R#220:R#221:R#222:R#223:R#224:R#225:R#226:R#227:R#228:R#229:R#230:R#231:R#232:R#233:R#234:R#235:R#236:R#237:R#238:R#239:R#240:R#241:R#242:R#243:R#244:R#245:R#246:R#247:R#248:R#249:R#250:R#251:R#252:R#253:R#254:R#255:R#256:R#257:R#258:R#259:R#260:R#261:R#262:R#263:R#264:R#265:R#266:R#267:R#268:R#269:R#270:R#271:R#272:R#273:R#274:R#275:R#276:R#277:R#278:R#279:R#280:R#281:R#282:R#283:R#284:R#285:R#286:R#287:R#288:R#289:R#290:R#291:R#292:R#293:R#294:R#295:R#296:R#297:R#298:R#299:R#300:R#301:R#302:R#303:R#304:R#305:R#306:R#307:R#308:R#309:R#310:R#311:R#312:R#313:R#314:R#315:R#316:R#317:R#318:R#319:R#320:R#321:R#322:R#323:R#324:R#325:R#326:R#327:R#328:R#329:R#330:R#331:R#332:R#333:R#334:R#335:R#336:R#337:R#338:R#339:R#340:R#341:R#342:R#343:R#344:R#345:R#346:R#347:R#348:R#349:R#350:R#351:R#352:R#353:R#354:R#355:R#356:R#357:R#358:R#359:R#360:R#361:R#362:R#363:R#364:R#365:R#366:R#367:R#368:R#369:R#370:R#371:R#372:R#373:R#374:R#375:R#376:R#377:R#378:R#379:R#380:R#381:R#382:R#383:R#384:R#385:R#386:R#387:R#388:R#389:R#390:R#391:R#392:R#393:R#394:R#395:R#396:R#397:R#398:R#399:R#400:R#401:R#402:R#403:R#404:R#405:R#406:R#407:R#408:R#409:R#410:R#411:R#412:R#413:R#414:R#415:R#416:R#417:R#418:R#419:R#420:R#421:R#422:R#423:R#424:R#425:R#426:R#427:R#428:R#429:R#430:R#431:R#432:R#433:R#434:R#435:R#436:R#437:R#438:R#439:R#440:R#441:R#442:R#443:R#444:R#445:R#446:R#447:R#448:R#449:R#450:R#451:R#452:R#453:R#454:R#455:R#456:R#457:R#458:R#459:R#460:R#461:R#462:R#463:R#464:R#465:R#466:R#467:R#468:R#469:R#470:R#471:R#472:R#473:R#474:R#475:R#476:R#477:R#478:R#479:R#480:R#481:R#482:R#483:R#484:R#485:R#486:R#487:R#488:R#489:R#490:R#491:R#492:R#493:R#494:R#495:R#496:R#497:R#498:R#499:R#500:R#501:R#502:R#503:R#504:R#505:R#506:R#507:R#508:R#509:R#510:R#511:R#512:R#513:R#514:R#515:R#516:R#517:R#518:R#519:R#520:R#521:R#522:R#523:R#524:R#525:R#526:R#527:R#528:R#529:R#530:R#531:R#532:R#533:R#534:R#535:R#536:R#537:R#538:R#539:R#540:R#541:R#542:R#543:R#544:R#545:R#546:R#547:R#548:R#549:R#550:R#551:R#552:R#553:R#554:R#555:R#556:R#557:R#558:R#559:R#560:R#561:R#562:R#563:R#564:R#565:R#566:R#567:R#568:R#569:R#570:R#571:R#572:R#573:R#574:R#575:R#576:R#577:R#578:R#579:R#580:R#581:R#582:R#583:R#584:R#585:R#586:R#587:R#588:R#589:R#590:R#591:R#592:R#593:R#594:R#595:R#596:R#597:R#598:R#599:R#600:R#601:R#602:R#603:R#604:R#605:R#606:R#607:R#608:R#609:R#610:R#611:R#612:R#613:R#614:R#615:R#616:R#617:R#618:R#619:R#620:R#621:R#622:R#623:R#624:R#625:R#626:R#627:R#628:R#629:R#630:R#631:R#632:R#633:R#634:R#635:R#636:R#637:R#638:R#639:R#640:R#641:R#642:R#643:R#644:R#645:R#646:R#647:R#648:R#649:R#650:R#651:R#652:R#653:R#654:R#655:R#656:R#657:R#658:R#659:R#660:R#661:R#662:R#663:R#664:R#665:R#666:R#667:R#668:R#669:R#670:R#671:R#672:R#673:R#674:R#675:R#676:R#677:R#678:R#679:R#680:R#681:R#682:R#683:R#684:R#685:R#686:R#687:R#688:R#689:R#690:R#691:R#692:R#693:R#694:R#695:R#696:R#697:R#698:R#699:R#700:R#701:R#702:R#703:R#704:R#705:R#706:R#707:R#708:R#709:R#710:R#711:R#712:R#713:R#714:R#715:R#716:R#717:R#718:R#719:R#720:R#721:R#722:R#723:R#724:R#725:R#726:R#727:R#728:R#729:R#730:R#731:R#732:R#733:R#734:R#735:R#736:R#737:R#738:R#739:R#740:R#741:R#742:R#743:R#744:R#745:R#746:R#747:R#748:R#749:R#750:R#751:R#752:R#753:R#754:R#755:R#756:R#757:R#758:R#759:R#760:R#761:R#762:R#763:R#764:R#765:R#766:R#767:R#768:R#769:R#770:R#771:R#772:R#773:R#774:R#775:R#776:R#777:R#778:R#779:R#780:R#781:R#782:R#783:R#784:R#785:R#786:R#787:R#788:R#789:R#790:R#791:R#792:R#793:R#794:R#795:R#796:R#797:R#798:R#799:R#800:R#801:R#802:R#803:R#804:R#805:R#806:R#807:R#808:R#809:R#810:R#811:R#812:R#813:R#814:R#815:R#816:R#817:R#818:R#819:R#820:R#821:R#822:R#823:R#824:R#825:R#826:R#827:R#828:R#829:R#830:R#831:R#832:R#833:R#834:R#835:R#836:R#837:R#838:R#839:R#840:R#841:R#842:R#843:R#844:R#845:R#846:R#847:R#848:R#849:R#850:R#851:R#852:R#853:R#854:R#855:R#856:R#857:R#858:R#859:R#860:R#861:R#862:R#863:R#864:R#865:R#866:R#867:R#868:R#869:R#870:R#871:R#872:R#873:R#874:R#875:R#876:R#877:R#878:R#879:R#880:R#881:R#882:R#883:R#884:R#885:R#886:R#887:R#888:R#889:R#890:R#891:R#892:R#893:R#894:R#895:R#896:R#897:R#898:R#899:R#900:R#901:R#902:R#903:R#904:R#905:R#906:R#907:R#908:R#909:R#910:R#911:R#912:R#913:R#914:R#915:R#916:R#917:R#918:R#919:R#920:R#921:R#922:R#923:R#924:R#925:R#926:R#927:R#928:R#929:R#930:R#931:R#932:R#933:R#934:R#935:R#936:R#937:R#938:R#939:R#940:R#941:R#942:R#943:R#944:R#945:R#946:R#947:R#948:R#949:R#950:R#951:R#952:R#953:R#954:R#955:R#956:R#957:R#958:R#959:R#960:R#961:R#962:R#963:R#964:R#965:R#966:R#967:R#968:R#969:R#970:R#971:R#972:R#973:R#974:R#975:R#976:R#977:R#978:R#979:R#980:R#981:R#982:R#983:R#984:R#985:R#986:R#987:R#988:R#989:R#990:R#991:R#992:R#993:R#994:R#995:R#996:R#997:R#998:R#999:R#1000:R#1001:R#1002:R#1003:R#1004:R#1005:R#1006:R#1007:R#1008:R#1009:R#1010:R#1011:R#1012:R#1013:R#1014:R#1015:R#1016:R#1017:R#1018:R#1019:R#1020:R#1021:R#1022:R#1023:R#1024:R#1025:R#1026:R#1027:R#1028:R#1029:R#1030:R#1031:R#1032:R#1033:R#1034:R#1035:R#1036:R#1037:R#1038:R#1039:R#1040:R#1041:R#1042:R#1043:R#1044:R#1045:R#1046:R#1047:R#1048:R#1049:R#1050:R#1051:R#1052:R#1053:R#1054:R#1055:R#1056:R#1057:R#1058:R#1059:R#1060:R#1061:R#1062:R#1063:R#1064:R#1065:R#1066:R#1067:R#1068:R#1069:R#1070:R#1071:R#1072:R#1073:R#1074:R#1075:R#1076:R#1077:R#1078:R#1079:R#1080:R#1081:R#1082:R#1083:R#1084:R#1085:R#1086:R#1087:R#1088:R#1089:R#1090:R#1091:R#1092:R#1093:R#1094:R#1095:R#1096:R#1097:R#1098:R#1099:R#1100:R#1101:R#1102:R#1103:R#1104:R#1105:R#1106:R#1107:R#1108:R#1109:R#1110:R#1111:R#1112:R#1113:R#1114:R#1115:R#1116:R#1117:R#1118:R#1119:R#1120:R#1121:R#1122:R#1123:R#1124:R#1125:R#1126:R#1127:R#1128:R#1129:R#1130:R#1131:R#1132:R#1133:R#1134:R#1135:R#1136:R#1137:R#1138:R#1139:R#1140:R#1141:R#1142:R#1143:R#1144:R#1145:R#1146:R#1147:R#1148:R#1149:R#1150:R#1151:R#1152:R#1153:R#1154:R#1155:R#1156:R#1157:R#1158:R#1159:R#1160:R#1161:R#1162:R#1163:R#1164:R#1165:R#1166:R#1167:R#1168:R#1169:R#1170:R#1171:R#1172:R#1173:R#1174:R#1175:R#1176:R#1177:R#1178:R#1179:R#1180:R#1181:R#1182:R#1183:R#1184:R#1185:R#1186:R#1187:R#1188:R#1189:R#1190:R#1191:R#1192:R#1193:R#1194:R#1195:R#1196:R#1197:R#1198:R#1199:R#1200:R#1201:R#1202:R#1203:R#1204:R#1205:R#1206:R#1207:R#1208:R#1209:R#1210:R#1211:R#1212:R#1213:R#1214:R#1215:R#1216:R#1217:R#1218:R#1219:R#1220:R#1221:R#1222:R#1223:R#1224:R#1225:R#1226:R#1227:R#1228:R#1229:R#1230:R#1231:R#1232:R#1233:R#1234:R#1235:R#1236:R#1237:R#1238:R#1239:R#1240:R#1241:R#1242:R#1243:R#1244:R#1245:R#1246:R#1247:R#1248:R#1249:R#1250:R#1251:R#1252:R#1253:R#1254:R#1255:R#1256:R#1257:R#1258:R#1259:R#1260:R#1261:R#1262:R#1263:R#1264:R#1265:R#1266:R#1267:R#1268:R#1269:R#1270:R#1271:R#1272:R#1273:R#1274:R#1275:R#1276:R#1277:R#1278:R#1279:R#1280:R#1281:R#1282:R#1283:R#1284:R#1285:R#1286:R#1287:R#1288:R#1289:R#1290:R#1291:R#1292:R#1293:R#1294:R#1295:R#1296:R#1297:R#1298:R#1299:R#1300:R#1301:R#1302:R#1303:R#1304:R#1305:R#1306:R#1307:R#1308:R#1309:R#1310:R#1311:R#1312:R#1313:R#1314:R#1315:R#1316:R#1317:R#1318:R#1319:R#1320:R#1321:R#1322:R#1323:R#1324:R#1325:R#1326:R#1327:R#1328:R#1329:R#1330:R#1331:R#1332:R#1333:R#1334:R#1335:R#1336:R#1337:R#1338:R#1339:R#1340:R#1341:R#1342:R#1343:R#1344:R#1345:R#1346:R#1347:R#1348:R#1349:R#1350:R#1351:R#1352:R#1353:R#1354:R#1355:R#1356:R#1357:R#1358:R#1359:R#1360:R#1361:R#1362:R#1363:R#1364:R#1365:R#1366:R#1367:R#1368:R#1369:R#1370:R#1371:R#1372:R#1373:R#1374:R#1375:R#1376:R#1377:R#1378:R#1379:R#1380:R#1381:R#1382:R#1383:R#1384:R#1385:R#1386:R#1387:R#1388:R#1389:R#1390:R#1391:R#1392:R#1393:R#1394:R#1395:R#1396:R#1397:R#1398:R#1399:R#1400:R#1401:R#1402:R#1403:R#1404:R#1405:R#1406:R#1407:R#1408:R#1409:R#1410:R#1411:R#1412:R#1413:R#1414:R#1415:R#1416:R#1417:R#1418:R#1419:R#1420:R#1421:R#1422:R#1423:R#1424:R#1425:R#1426:R#1427:R#1428:R#1429:R#1430:R#1431:R#1432:R#1433:R#1434:R#1435:R#1436:R#1437:R#1438:R#1439:R#1440:R#1441:R#1442:R#1443:R#1444:R#1445:R#1446:R#1447:R#1448:R#1449:R#1450:R#1451:R#1452:R#1453:R#1454:R#1455:R#1456:R#1457:R#1458:R#1459:R#1460:R#1461:R#1462:R#1463:R#1464:R#1465:R#1466:R#1467:R#1468:R#1469:R#1470:R#1471:R#1472:R#1473:R#1474:R#1475:R#1476:R#1477:R#1478:R#1479:R#1480:R#1481:R#1482:R#1483:R#1484:R#1485:R#1486:R#1487:R#1488:R#1489:R#1490:R#1491:R#1492:R#1493:R#1494:R#1495:R#1496:R#1497:R#1498:R#1499:R#1500:R#1501:R#1502:R#1503:R#1504:R#1505:R#1506:R#1507:R#1508:R#1509:R#1510:R#1511:R#1512:R#1513:R#1514:R#1515:R#1516:R#1517:R#1518:R#1519:R#1520:R#1521:R#1522:R#1523:R#1524:R#1525:R#1526:R#1527:R#1528:R#1529:R#1530:R#1531:R#1532:R#1533:R#1534:R#1535:R#1536:R#1537:R#1538:R#1539:R#1540:R#1541:R#1542:R#1543:R#1544:R#1545:R#1546:R#1547:R#1548:R#1549:R#1550:R#1551:R#1552:R#1553:R#1554:R#1555:R#1556:R#1557:R#1558:R#1559:R#1560:R#1561:R#1562:R#1563:R#1564:R#1565:R#1566:R#1567:R#1568:R#1569:R#1570:R#1571:R#1572:R#1573:R#1574:R#1575:R#1576:R#1577:R#1578:R#1579:R#1580:R#1581:R#1582:R#1583:R#1584:R#1585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```



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# Arcade Avenue



## Working versions

One of the most annoying problems we have had in the column in the last few months has concerned the game *Monty Mole* – ever since I printed some Pokes that were sent in for extra lives, etc, which I had tested on my copy, I have been besieged by complaining letters from people who couldn't get them to work. It turns out that two versions of the game exist, one of which was owned by me and the people who sent in the original routines, and the other owned by just about everyone else in the world which had a headerless loader.

Anyway, to cut a long story short, Andrew Davies who you will remember for hacking the extra room in JSW wrote to me asking for a 'hacker's challenge' and after hearing of our problems with this game he writes, "I locked myself into the bedroom and set about finding a way to get around the long headerless block which some of the tapes have. The problem with this version is that every spare byte is used, so you don't have any spare space to put a normal routine in. To get round this my routine (fig A) loads *Monty* lower in memory than normal, poking the lives then moving the code back into its original position before running it. Just type this routine in, run it and follow the prompts. Unfortunately the loading screen is all messed up by the displaced code, but don't worry about that.

"The next listing is to get endless lives on Thor's *House Jack Built* – again follow the prompts (fig B).

"To get endless lives on Quicksilver's *Zombie Zombie* follow these instructions (fig C). A lot of the game is in Basic, which surprised me – when the main menu is up (red background and border) hold P down and press caps shift – you should get an input prompt. Rub out the

Fig A

```
10 DATA 62,113,221,33,165,51,1
7,0,192,55,205,85,5,23,5,254,17,
0,64,1,30,0,237,175,125,0,54,49,
232,95,33,167,253,17,255,255,1,1
67,181,237,184,175,50,124,148,50
,125,148,50,126,148,195,144,210
20 CLEAR 65535. FOR I=0 TO 50:
READ a: POKE 65000+I,a: NEXT I
25 PRINT PAPER 1: INK 5: " ENDL
ESS LIVES FOR 'MONTY MOLE' "
30 PRINT : PRINT FLASH 1: "READ
Y": PRINT : PRINT "Wind original
to just before the long headerle
ss part, then press play an
d hit a key."
40 IF INKEY$="" THEN GO TO 25
50 PRINT : PRINT FLASH 1: "Here
we go... please wait"
60 RANDOMIZE USA 65000
```

Fig B

```
10 CLEAR 24249: BORDER 1
20 PRINT "Wind tape to just be
fore the
title screen, then p
ress any
letter."
25 PAUSE 0
30 POKE 23505,80: POKE 23507,2
40: LOAD "CODE": LOAD "CODE":
RANDOMIZE USA 24485: POKE 26822,
0: RANDOMIZE USA 26543
```

Fig C

```
2010 IF PEEK 46154: >e THEN GO SU
5 1600: LET q=USA 33957: POKE 46
119,e: GO SUB 1130: POKE 46117,2
: POKE 46115,2: IF boy=e THEN RE
TURN
```

quotes and type the keywords *Chrs\$* *Usr* 4867 and press enter. You should now be in Basic with an OK message – DON'T list the program, just type in this line and then *Run*.

"Whilst on the subject of this game – you have the option to *Load* a city, but you don't get a chance to *Save* one until you have killed all the Zombies. For those that can't wait, the city is stored at address 49152 and is 16384 bytes long – filling these with the values 255 gives a completely packed city. I am working now on a city designer program and also a routine for saving the *Ant Attack* city to load it into *Zombie*, if anyone is interested.

"I have just bought *Jetset Willy II* which is better made than the original. It loads in one long headerless block like *Monty Mole*, but after cracking *Monty* it only took me five minutes to get into it." Thanks for those tips Andrew, and we will look forward to seeing the JSWII pokes when ready.

Now then – a change of machine for a very important message. The routine for breaking into *Jetset Willy* in

the Amstrad had a typing error in Vol 4 No 22. There needs to be ",AC" added to the end of the last data statement in line 110. We had spotted this error and the idea was that the correct version would be printed in the Pokes special issue No 24. As life would have it the new version, despite being originally produced from a computer listing of the program, had a whole chunk missing from it – refer to issue 22 for the closest thing to a working version.

Sticking with the Amstrad for a while – Bill McMillan of Knottingly has written again. "Can one of your super-hackers help us with the much needed Pokes for *Chuckie Egg* or the brilliant game *Knight Lore*. I and my other CPC users are totally besotted with both of these games but are not proficient enough to advance very far. My personal best on *Chuckie Egg* is 42550 (level 36) but the wife is an expert." Well Bill, we are still waiting eagerly for the first person to crack *Knight Lore* on the CPC but as for *Chuckie Egg* – cop this from Tony Coxon of Calverton. "Use this to replace the Basic

loader:

```
10 Memory 32767
20 Load """,32768
30 Poke 40175,255
40 Call 39575
```

"Also I have finished *Knight Lore* on this machine with 74%. Am I the first?" Sorry Tony, since you didn't date your achievement I don't know. However, David Litherland of Bolton finished with 67% and 26 days on 28th May. From the message that appeared on his game it looks as though Amstrad users as well as Spectrum owners will be able to look forward to *Mire Mare*.

To finish this week here are a couple of quick Dragon Pokes – from Shane Cheasley of Midsome Norton for *Chuckie Egg* – "Cloadm""",512 then replace tape – Csave, "Chuckie", 13824, 3000, 16640. Reset computer. Load with Cloadm""", 65024: Poke 16641, &H34: Poke 16688, (lives): Exec 16640." From John Martin of Upminster – *Donkey King* – Poke 12914,n where n is lives. Also after losing all your lives in *Dungeon Raid* press 'c' to continue."

Tony Kendle

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Between now and September Tony Kendle will be keeping you up to date on the *Arcade Avenue* page with just who has the scores to beat. Then, in September, the top three scorers on each machine will battle it out for a place in the final and the chance to be the first to play our 'top secret' games.

	Commodore	BBC	Spectrum	Amstrad
Game 1	Suicide Express	Elite	Technician Ted	Sorcery
Game 2	Beach Head	Jet Pac	3D Star Strike	Splat!
Game 3	Shoot the Rapids	Chuckie Egg	Cyclone	Manic Miner

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# Tony Bridge's Adventure Corner



## Bored of the Rings

**M**ore letters from abroad this week, the first from Peter Martins from the lovely island of Cyprus: "Dear Tony, this is the first time that I am writing for Help, and that is because I'm really desperate. In *Bored of the Rings* – can you help me get out of the Old Forest? The game is terrific and the jokes are hilarious. *Tir Na Nog* – What are the 'f' and the 'c' signs, how can you get past Nathair, where are the Antlers and the second half of the Torc. I have roamed all over Lon Liath with the Spade, but I have still not found the Torc."

To deal with these problems in reverse order, Peter – you'll find more information about *Tir Na Nog* in the Corner of 21-27 March 1985, so I suggest you look at that, which should explain some of the thinking behind the program. The 'f' sign, however, indicates the Stone of Fal, while 's' is a pun (as most of the door names are) on 'Seaside = beach = sand'. The Antlers are behind the 'O' (or Ring) door on the Plain of Lies. To get past Nathair (which will lead you to the fourth part of the Seal) is of course rather difficult, but you should probably be looking at ways of getting *behind* the Dragon. As for *Bored of the Rings*, I'm glad to see that I am getting more questions about this one – now all I need is some information about it! I have done a little of the adventure, but not enough to answer this question.

Writing on the same subject, Charles Flynn ('I'm sorry that I don't have a butch nickname like Orc-Slayer, but there you have it!') accuses me of reducing him to a

5-stone insomniac, and all because I recommended this program – sorry, Charles, but I'm not going to suffer alone! "This game really is excellent; if Melbourne House need any help with *Lord of the Rings*, they should have a look at this. Despite being a complete novice at adventures, I managed to complete the first of the three parts in around four hours; try dropping the pepper from Weatherwop at the gates of Mororia – the effect is staggering (and also a free clue to MATC, says the Elf!). However, Part Two is causing me sleepless nights. How in Middle Earth do I get Fordo and his motley company out of Mororia? I have tried everything!" Obviously there is at least one thing that you have forgotten, Charles. You may hold me responsible, but it is up to another reader to help you out, I'm afraid. Any help on *Bored* would be very welcome.

Back overseas, Jose Pedro writes from Faro in Portugal. He makes a point that is not always appreciated by those whose native language is English – that many players are not so lucky as to be able to negotiate all the subtleties of this weird language of ours. In particular, Jose is having trouble with *Mountains of Ket* form Incentive Software. "I can't cross the river – do I need to use the log, and if so, how? Also, what does TALPS mean?" There should be no problem in crossing the river, Jose. The Log has nothing to do with this, you should chop them using the axe which you will have bought in the village. Now give the logs to the Cartographer, or Map-maker, TALPS is the password that you will need at a later location, the Stairs. A much-used device in adventures is the secret code word, which takes many forms (anagrams and so on), and this example is one of the most common. Simply type the word *backwards*. It helps, of course, to be able to recognise quickly which form the code takes, and this particular word is a little unfair, I feel, to someone who may not know Incentive's past history – SPLAT is the name of their first game. Still, this is a good object lesson, as weird words seen written on walls, or whispered by strange disembodied voices should be put to stringent decoding.

Incidentally, Jose, let me give you another bit of inside information. British adventurers will be well aware of a

sweet called Polo. It is a *mint with a hole* (hint, hint!) – this knowledge will be needed at a later stage of *Ket*.

Jose is also playing *Valhalla*, *The Hulk*, *Tir Na Nog* and *Colditz* (what would you use to climb out of a window – the Rope of course! And you'll need the Hacksaw to open the Coffin). If you'd like to write to him, his address is: Rua Ataide de Oliveira, No 97, 20 audar, ap.E 8000 Faro, Portugal.

From a few miles north, from Cascais near Lisbon, writes Vasco de Oliveira, and he has some questions about *Eureka*! I still have not been able to get very far into this multiple-part adventure – the slowly-drawn graphics (though they are quite artistic, especially the animated pictures), the ceaseless 'music' whenever anything remotely unusual happens, those stupid 'arcade' sequences before each game and the frequent long silences while commands are processed go to make an adventure that is hard to play. There is some atmosphere, certainly, as you might expect knowing that Ian Livingstone, author of a few million Role-Playing books, has written the storyline; but I find the programming does not do it justice and think all five adventures are like a steamed pudding – very sticky, very stodgy and very hard going.

"In *Roman Times*, how do I enter the Army Camp, and what must I do there? In *Modern Caribbean*, I can't get out of the Ore Crusher. In the Uranium Mine, I don't seem to have the object to use. Is the plane important? Can we enter the doors? Finally, one other question – can you advise me about other adventure magazines, since *MicroAdventurer* disappeared?"

To get into the Army Camp, you must simply wait until nightfall, and this takes just one move (type Wait). This is a good idea in many adventures – if something doesn't work first time, try waiting around! Once in, you'll find some interesting items in the Tents, though they may be hidden from immediate view. Waiting also pays dividends in the Crusher – if you wait until the roof is just 18 inches from your head, then Use Pump and then, at the earliest opportunity, Jump, you should find yourself out of immediate trouble. In the mines, draw a little map (a good idea in any adventure, of course), and then progress clockwise. The plane is near the start, but the climax of this section will take place here.

There are, I'm sorry to say, no other adventure magazines published now that MAD has gone, although as you'll know, most micro computing magazines include an adventure column such as this. You should try contributing to a reputable Adventure Club (see the Corner of a couple of weeks ago for addresses), you'll find most of them have a good in-house magazine.

If you want to chat to a Portuguese adventurer, write to Vasco at Rua Joao de Moura, 52, 2750 Cascais, Portugal.

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**T199/4A** joystick, new £5. Early Reading £2, Number Magic £3, Touch Typing £10, Household Budget Management £8.50, joystick adaptor £2.50. All new, 32 Glenshesk Park, Dunmurry, Belfast. Tel: 0232 623001.

**BBC SOFTWARE**, Ultracall 2 Spreadsheet Rom £45. Also Merlin Scribe Rom Wordprocessor £25. Both are in VGC and boxed. Tel: 01-659 1303 (after 7pm).

**SINGLE DISC DRIVE** 40 track 100K for BBC Micro, leads, manual, formatting disk inc vgc, £75 ono. Tel: Yateley (0252) 878148, NE Hants.

**COMMODORE** Software at low prices: On Field Football, Knockout, Bruce Lee, Raid Over Moscow, Cricket, Ghostbusters, all as new, £3 and £4 each. Tel: 01-470 0861 (East London).

**AMSTRAD** and Spectrum originals for sale, 12 Spectrum originals and 13 Amstrad originals, all £3. Tel: Wareham (09295) 2218, any time after 4 pm.

**AMSTRAD** original software, Harrier Attack £3, Hunter Killer £3.50, War Zone £4, Battle for Midway £6, Software Star £4.50, prices include postage. C. Klokalis, 47 Fernbank Ave, Sudbury Hill, Wembley, Middx HA0 2TT.

**AMSTRAD DMP1** Printer plus Easi-Amstrad excellent condition, Bargain price, £120. ZX interface and Microdrive £55. Tel: 0506 37602.

**AMSTRAD SOFTWARE**, Combat Lynx, 3D Star Strike, Star Commando, Roland, Cave, Galactic Plague, Music Composer (including manual) Hunter Killer, Galactic Plague. All originals as new £4.95 ea or £30. Tel: John on 01-743 3931.

**APPLE II+** disc drive, BBC B 1.20.5. Best offers accepted. Dawson, 2 Stocks Court, Poulton Le Fylde, FY6 7TA. Tel: 0253 886545.

**AMSTRAD PENPAL** wanted. I have a colour CPC464 with a Quickshot II joystick. Write to Gary Pearce, 17 Uplands Way, Halesworth, Suffolk IP19 8JW.

**AMSTRAD SOFTWARE** Boxed originals at 1/3rd. Masterfile Tasword, Taspint, Amcalc, Grasp, Toolbox, Flexibrend, Spannerman, Glaxia, Reportwriter, Manic Miner, Star Commando, Project Planner, Decision Maker. Tel: Evenings Bradford (0274) 872350.

**FOR SALE** Frankie, Bruce Lee, Bounty Bob, Gryphon, Pitstop II, Shadowfire, £3 each or £16 together. F. Buys, Fahrenholt, Laan 14, 4532 JR, Fenneusen, Holland.

**SWAP TANDY** TP-10 Thermal printer works with Spectrum Int/1 or Coco Dragon for Prism VTX5000 Modem or sell £40. Tel: 0742 471160 after 7pm.

**OL TOOLKIT** from Sinclair, new boxed only £10. Tel: Portsmouth (0705) 824309. 1541 Disc Drive, excellent condition, still under guarantee + £200 worth of original disc s/w £250 ono. Tel: Corby (0536) 63700.

**LYNX 48K**, good condition, boxed, complete with manuals and leads, plus £50 worth of s/w and magazines, want £110 ono. Tel: 01-895 2111, ask for Mark.

**CGL SORD** M5 computer 20K with manual and games hardly used, still under warranty, £50 Tel: Sossuthend, Essex 0702 541639.

**CAMBRIDGE** Program, Mable joystick interface for Spectrum complete with

Cambridge Joystick and tape. Also included Quickshot Two joystick. Sell for £18 ono. Still boxed, very good condition. Jon Bruce, 4 Ford Ave, Loscoe, Derbyshire DE7 7LR. Tel: 0773 714795 between 9pm and 9.30pm.

**80K** Memory Coleco Adam, Data drive, integrated Smartwriter, Letter quality printer, game console basic, Filer, Games, Educational, under guarantee, takes extra data or disk drives, CP, £245. Tel: 051-263 0196.

**BROTHER** HR5 Printer Centronics Interface, never used, boxed, complete with £40 worth Thermal paper etc. £110 for quick sale. Tel: Bradford 872350 evenings.

**PRISM** VTX5000 Modem, brand new, and ready to connect to any Spectrum boxed with all leads, £40 ono or may swap for BBC B modem. Tel: 021 523 0452 (B'ham).

## Spectrum for Sale

**SPECTRUM 48K "O"** Level Chemistry teaching programs £4 each. Titles include Atomic Theory, Bonding, Chemical Arithmetic, Equations and Carbon. Tel: Larges (0475) 874256.

**SPECTRUM 48K III** Quickshot II joystick, interface, data recorder, 11 games. Bargain £130. Tel: Bolton (0204) 46972.

**48K SPECTRUM** for sale c/w interface one, microdrive, Kempston Eprom Centronics printer interface, Fuller FDS, Tasword, Tasmerge, Taspint, Masterfile, Omnicalc, etc on Microdrive. All boxed in vgc £200. Tel: Andy 021-422 7446.

**SPECTRUM** Devpac 3, complete Spectrum ROM Disassembly and Spectrum Machine Language for the Absolute Beginner, £20 the lot inc P&P in UK. Tel: Bedworth 491719.

**SPECTRUM PLUS**, microdrive, joystick + interface, s/w. Swap CBM64 with C2N data recorder with s/w. Tel: 01-878 0118.

**SPECTRUM** + Kempston interface, joystick, recorder, Alphacom printer, over £250 software, books, guarantee, £400 new, sell £250 ono. Also old model Spectrum mains leads only, sell £50. Tel: W'boro (0933) 677113.

**SPECTRUM** + Interface, Kempston joystick, Alphacom printer, cassette recorder, £200 worth s/w, books, worth over £400 new, sell for £200 ono. Excellent condition, still guaranteed. Tel: Rick, W'boro (0933) 677113 anytime.

**ZX SPECTRUM** for sale, with 20 original games also Currah microspeech Kempston and Sinclair Interface II, Quickshot II and pro joysticks, programming book and all introductory manuals, vgc, £230. Tel: 223 7475, with box.

**48K SPECTRUM** + Microdrive + interfaces 1+2, ZX printer + paper + 3 Microdrive cartridges, lots of software, books + magazines, will sell for £250 ono. Tel: 0202 473770 & ask for Richard (eves only please).

**SINCLAIR QL**, s/w, brand new. Tel: 0602 505674.

**80K UPGRADED SPECTRUM** with DK trionics keyboard, programmable interface, joystick, tape recorder, £120 original s/w, £190. Tel: Blackburn 0234 48475, after 5pm.

**48K SPECTRUM**, 2 Microdrives, Interfaces, 15 blank cartridges, joystick interface, cassette data recorder, professional IBM keyboard, cost £600, sell £265. Tel: 0903 210670.

**48K SPECTRUM**, Cheeta Sweettalker, carrying case, tape recorder, over £100 worth of original software, books, etc. Bargain at £100. Tel: 01-391 0450 (Chess).

**SPECTRUM 48K**, keyboard, interface, 2 Microdrives, 8 cartridges, programmable joystick interface, £225 or original s/w £200 ono. Tel: 04842 65978, after 7pm. **SPECTRUM 48K**, joystick interface, joystick, new tape recorder and light pen, 135 games, books etc, £150 ono. Tel: Romford 62487.

**48K SPECTRUM** £70, interface 1, £30, 2 Microdrives, £30 each. Interface 2, £8. Rom games, Jetpac, Transam, £6 each. Tel: Glasgow (041) 958 6125 and ask for Gregor.

**SPECTRUM** computer case, joystick + interface, tape recorder, ZX printer and Zaxxon, Hobbit, Starstrike, 6-pack Softaid, Stop Express, plus more software, Swap for C64 + accessories or £200. Tel: Coventry 463425, ask for Simon.

**SPECTRUM 48K Plus**, 2 joysticks, interface, cassette recorder, swap CBM64. Tel: Chesterfield 204794.

**SPECTRUM 48K** with 6 months g/tee, new tape recorder, 80 games, £130 or swap for Commodore 64. Tel: 061-831 7167, Rajhida.

**SPECTRUM 48K** joystick, interface, Currah Micro Speech unit, £150 of s/w, sell £100. Tel: 01-868 5190.

**SPECTRUM** VTX5000 modem, 2 months old. Original packing. £40. Tel: 01-870 9633.

**MARK 3** Spectrum, Kempston programmable interface + joystick, data recorder, boxed. Sound amplifier, s/w and mags. Serious offers only. Tel: 01-267 7741.

**48K SPECTRUM**, fuller keyboard, £200 of original s/w, Kempston Interface, £275. Tel: 01-274 6391.

**48K SPECTRUM** + tape recorder, Kempston plus joystick interface, Quickshot I joystick sound box, s/w mags, £150 or swap CBM 64, tape recorder + joystick. Tel: 01-624 8862.

**SPECTRUM 48K plus**, 2X Interface I, 2 microdrives, 20 cartridges in transform box, Brother HR5 printer. Much business s/w + games only £245. Tel: 01-549 8280.

**SPECTRUM** dot matrix GP100A printer with Tasman Interface, Trojan lightpen, dual-port joystick interface, Tasword Two, Paintbox, VU-3D utilities, worth £270 quick sale £190. Tel: (0584) 3048 anytime, ask for Dominic.

## COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP or telephone 01-437 4343.

All software offered through computer swap must be in original condition and for private sale only.

It cannot be swapped.  
**Warning:** It is illegal to advertise pirated software.

## COMPUTER SWAP

Please write your copy in capital letters on the lines below.


Name .....

Address .....

Telephone .....



**48K SPECTRUM** + for sale with Kempston and Interface 2. Also Currah Micro Speech, Quickshot 2 and programming book, complete with manuals, VGC (with box) £220 ono. Tel: 01-223 7475.

**48K SPECTRUM**, Sinclair ZX printer, data recorder, printer paper, magazines, £120 of software, all boxed, VGC worth £300 sell for £100. Tel: (0480) 76683 after 7pm.

**48K SPECTRUM** Protek switchable interface. New data recorder. Good software collection, books, magazines and Quickshot II joystick, only £110 ono. Tel: 021 556 3402.

**SPECTRUM 48K** + DK'Tronics keyboard + Kempston compatible joystick + Currah Uspeech + £240 worth of software (over 35 tapes - all originals). Sell for £185 or split. Tel: Llanelli (0554) 772132 evenings or weekends.

**SPECTRUM: KEMPSTON INTERFACE.** Quickshot joystick case + Penetrator, Escape, Diddums, Softaid, Hobbit, H.G. Skiing, Trashman, Ch. Flag, Starstrike software. Starr, Zaxxon, VGC (all boxed). Swap for CBM 64 or offers. Simon. Tel: Coventry 463425.

**SPECTRUM 48K.** Brand new Currah Micro Speech, DK'Tronics light pen, all boxed. With S/W inc: Spy Hunter and Alien 8 etc. £95. Tel: Hornchurch 42642 after 4pm.

**SAGA EMPEROR SPECTRUM KEYBOARD** for sale. 66 keys and full sized space bar. Extra shift keys. Six months old, only £25 ono. Tony. Tel: Bath 314283.

**48K SPECTRUM**, £200 of original S/W, Kempston joystick and interface. Currah Speech, guarantee, £100. Tel: 01-809 2841.

**48K SPECTRUM** (Issue 3) PWs ZX81 books, joystick interface, all for £100. Tel: 01-472 5331.

**WANTED** ZX81 software and hardware especially high resolution, utilities and machine code books. Tel: 0279 445204.

**ALPHACOM PRINTER** for Spectrum computer, used once, two weeks old, worth £70, will accept £55 ono. Eddie. Tel: 01-459 055.

**SPECTRUM 48K**, low profile keyboard, Protek Interface, £100s worth of mags and over £200s worth of games inc Baseball, Moon Cresta and Grand National. Accept a reasonable offer around £230. Tel: 0924 408364 between 4pm and 6pm.

**SPECTRUM PROGRAMMERS KIT**, compiler, character set designer, M/C sound library, Sprite generator. Cost £28 accept £8. Write: S. Johnson, 78 Nairn St, Crookes, Sheffield S10 1UN. Tel: 0742 861671.

**SPECTRUM BOOKS FOR SALE.** 40 best M/C routines, super charge your Spectrum, M/C for absolute beginner £2.50 each. Write: S. Johnson, 78 Nairn St, Crookes, Sheffield S10 1UN. Tel: 0742 661671.

**48K SPECTRUM WITH PRINTER.** 4 rolls of paper, light pen, Quickshot II joystick + interface, carry case, lots of software and few books and magazines, £200 the lot (may separate). Tel: Romford 44332.

**SPECTRUM 48K** with tape recorder, Currah micro speech, Pro 5000 Interface with Kempston joystick. Games and mags. All in mint condition with boxes only £150 ono. Tel: 021 556 0898 after 6pm ask for Stu.

**FOR SALE:** DK'Tronics lightpen for 16/48K Spectrum; only £15 for quick sale (P&P excluded). Remember first come, first served. Hurry! Richard. Tel: 037284 3668 between 5 and 9pm.

**SPARE SPECTRUM KEYBOARD** for sale, includes top casing. Also spare membrane, keys and overlay. No reasonable offers refused. Gordon. Tel: 0382 459645.

**48K SPECTRUM** (boxed), Kempston joystick interface, cassette recorder, games including Underwurde, Ghostbuster, DT's Decathlon, Avalon, etc. Programme book, manuals, Intro

DIARY				
Event	Dates	Venue	Admission	Organisers
Computer Show	August 3 10.30am-5.00pm	Co-op Hall 190 Wallsgrave Road Coventry	50p	CJS Northleach 04516 609
Computer Show	August 10 10.30am-5.00pm	Percy Boys Club New King Street Bath	50p	CJS/Northleach 04516 609
The Micro Trend 85	Aug 11	Burnley General Hospital	60p adults 30p children	Patons Computer Services 0282 53241
Small Business and Home Computer Exhibition	Aug 19-20 10.00am-9.00pm	"Goldiggers" Timber St Chippenham Wiltshire	£1.50 adults £1.00 children	Kevin Angell/ Simon Main 0249 656444
Personal Computer World Show	September 4-6	Olympia London	£2.00	Montbuild 01-488 1951

tape. Worth £185, sell £125. (Offers welcome.) Tel: 0752 813046.

**48K SPECTRUM** full sized DK'Tronics keyboard, Currah Speech, £170 worth of software, £30 worth of books, S/W includes Mega Basic, assembler and disassembler, White Lightning, make-a-Chip, £160. Tel: Bilton (0272) 326863.

**48K SPECTRUM** upgraded from 16K. Excellent condition with all leads plus software, book and many magazines, £95 ono. Tel: 0270 623254 office hours.

**48K SPECTRUM**, Alphacom 32 line printer, Kempston Interface, tape recorder, £125 worth software includes P. Position, Strangeloop, DT Decathlon, blank tapes, manuals worth £350, sell for £250. Tel: Felixstowe 274493 for details.

**48K SPECTRUM** low profile keyboard, joystick interface, ZX Box sound trip. Plus £150 of original S/W. Cost £345, sell £170 ono. Tel: 01-884 1204 after 6pm.

**SPECTRUM PLUS 48K**, 5 months old, £10 of original S/W. Jet Set Willy and Avalon, all books and leads, £135. Inc tape recorder. Tel: 0630 57129.

**48K SPECTRUM**, leads, manuals. Kempston interface, joystick, lots of S/W. Sell for £90. James. Tel: 01-870 1163.

**48K SPECTRUM**, excellent condition. Joystick and Interface. Books and mags, Currah speech, £230 of original S/W, £170 or swap for CBM64 with tape recorder. Tel: South Benfleet 52275.

**SPECTRUM** +, Currah Speech unit, joystick I/F, £100+ worth S/W, misc books mags, £180 ono. Tel: Selsey (0243) 602363.

**SPECTRUM KEYBOARD** by advanced memory systems. 53 keys, new, unused, boxed. Unwanted gift cost over £50; £22.50 inc post. Tel: 0428 713019.

**SPECTRUM PLUS**, 11 months' guarantee, Kempston interface, joystick, programmable interface, cassette recorder, Alphacom printer over £300 S/W, many books over £500 new, sell for £275 ono. Tel: W'boro (0933) 677113.

**SPECTRUM 48K FOR SALE** complete cassette recorder, joystick interface and several books. Only £79 ono. Tel: 0243 692128.

**48K SPECTRUM**, real keyboard, TV sound, two tape recorders, programmable joystick interface, joystick, £500 + originals. Worth over £700, accept £200 ovno. Bryan. Tel: Grantham (0476) 67975 after 6.30pm.

**SPECTRUM PLUS 48K** 5 months old, as new, with 11 games including JSW and Pyjamarama. With all leads and books, hardly used, £140 or nearest. Tel: 0630 57129 after 5pm.

**BARGAIN! SPECTRUM 48K**, printer Alphacom 32, W.H. Smith's cassette deck and over £250 of software worth £500; sell for £200 ono. Mr Hester. Tel: 061-432 2538, 6-8pm.

**SPECTRUM 48K**; interface 1/2, microdrives; Alphacom printer; WHS

Data Recorder; Transform keyboard and VT55000. Plus software including Tasword 2, Masterfile, Beta Basic on cartridge, plus books and mags. Offers for all or part. Tel: 0706 227672 evenings (Rossendale, Lancs).

**UPGRADED SPECTRUM** +, joystick interface, Currah speech synth, power on/off switch, cassette recorder, mags, and over £400 worth of the latest software (original). Worth over £650, sell for £300. Tel: (0602) 267946.

**SPECTRUM** + Interface 1, microdrive, printer, 4 cartridges, 3 books, cassette recorder, over £120 software, magazines, all excellent condition. worth about £435. Bargain at £320 ono. Tel: (0703) 738432 after 6pm.

**SPECTRUM 48K** still under guarantee joystick and programmable interface. Over £200 of recent software. Cost over £400, offers over £150. All in perfect condition. Tel: (0968) 75732.

**48K SPECTRUM FULLEN KEYBOARD**, microdrive and Interface One, Kempston compatible joystick interface, over £150 worth of original software. Worth over £350, sell for £180. Tel: (0260) 279199 ask for Sean after 6pm.

**48K SPECTRUM**, tape recorder, joystick and interface, DK'Tronics keyboard, 240 games, books. Only £165. Also Crash Issue One, £2.50. Tel: Southwell (0636) 813589 (Notts).

**SPECTRUM 48K**, DK'Tronics keyboard interface 2, Quickshot 2, ZX printer. DK'Tronics sound synthesiser and books and £200, S/W £250 ono. Tel: 01-534 3805 ask for John.

**QL AS NEW.** Used only twice unwanted gift. 12 Microdrives. Only £300 ono. John. Tel: 0422 63716.

**ZX SPECTRUM** plus ZX microdrive, Interface I, six cartridges, software. Will separate, £165. Tel: after 6pm. Tel: cheilmsford (0245) 380 731.

**48K SPECTRUM**, cassette player, Kempston interface, seven games, mags, £135 ono. Tel: Stoke-on-Trent 730 3630.

**48K SPECTRUM** plus Panasonic cassette recorder, £45 of games, inc: Deus ex-Machina, Ghost Busters, Alien 8, £120. Tel: Colchester 870084.

**SPECTRUM 48K** plus £75 of S/W. Cassette recorder, £99. Or will swap for Atari 800XL. Tel: 01-300 6074.

**SPECTRUM PLUS**, 4 months old, 14 original programs, £90. Tel: 0222 705860.

**SPECTRUM 48K**, 7 months old, in computer case. Full series of input magazines also additional mags/ books, £120. Tel: 01-840 2987.

**SPECTRUM WAFADRIE**: 6 Wafas, S/W, 6 months' guarantee, £160. Sell for £80 ono. Tel: (0925) 51753.

**FOR SALE 48K SPECTRUM** with selection of games, plus tape recorder, joystick and interface, £130 or nearest. Raymond Massey, 43 Elisabeth Cres-

## ADVENTURE

## HELPLINE

**The Hulk on Commodore 64.** Where is the last gem? I have 16 and a score of 94? I have lost the bio-gem. Andrew Harris, 30 Plas Newydd, Raglan Moors, Port Talbot, West Glamorgan, South Wales.

**Williamsburg Adv 3 on C 16.** How do I get out of the tavern after buying map, etc? How do I get the guns from the stockade? D Edwards, 28 Central Avenue, Chadsmoor, Cannock, Staffs.

**Eureka! on Spectrum.** Arthurian part. How do you kill the questing beast? What are the coconut shells for? What significance is Monty Python? Richard Rudkin, 25 Broom Close, Stanley, Co Durham, DH9 0HH.

**Snowball on Commodore 64.** I can't find the crew member in the green mortuary. H Jones, 122 Queens Road, Vicar's Cross, Chester Tel: 0244 28991.

**Wheel of Fortune on Electron.** The beggar lets go of the windlass when we are three-quarters of the way down the well and we can't get beyond that. Heather Harrison, 15 Elmfield Crescent, Birmingham B13.

**Inca Curse on Spectrum.** I can get past the pannelled room and the fire but I don't know what objects I need to go down the pothole. Help! Graeme Cloughley, 36 Mungalhead Road, Bainsford Falkirk, Scotland.

**Hobbit, Valhalla and Eureka on Commodore 64.** Any help please. Alan Jarman, 111 Shaws Road, Birkdale, Southport, Merseyside.

**Mission 1 Project Volcano on Amstrad.** How do I get past the grille without getting an electric shock before floor 1. Carl Jones, 4 Harley Street, Rosyth, Dumfries, Scotland.

**System 1 5000 on Commodore 64.** I cannot get into Selcra Secs because I can't find the enquiry code. Barry Evans, Baabeweg 6, Vorwerk, 3100 Celle, W. Germany.

**Zkul on QL.** When 'Gossat' is typed how do you get out of the room that crushes you? R. J. Franklin, The Greyhound, Line Street, Eldersfield, Glos.

**Arrow of Death (Part 1) on BBC.** I am hopelessly stuck - any help please - I'm new to this! Mark James, 26 Whitecote Cottages, Whitecote Lane, Bramley, Leeds.

**Sherlock on Spectrum.** How do I convince Lestrade that Foulkes is innocent? How do I enter Basil's house? David Ashford, 700/10 Hillpark Drive, Glasgow G43 2PU.



cent. Oldbury, Warley, West Midlands B88 9PR.

**48K SPECTRUM**, cassette recorder, Saga 1 keyboard, £220 or games including Hulk, Match Point, Knightlore, Valhalla; magazines etc. Centronics printer interface. All worth over £500; want £200 ono. Tel: Worksp 476837.

**48K SPECTRUM**, interfaces; joystick; cassette recorder (new) and lots of software. Manual and leads. Sell for £150. Tel: 363 9430 after 6pm.

**SPECTRUM + INTERFACE 1**, ZX microdrive, 15 cartridges, Cambridge interface, Kempston pro interface, Quickshot 2+2 joystick, ZX printer, 5 rolls paper, 120 approx games, sound amplifier. Sale price £200. Pretty good condition. Tel: Wokingham (0734) 790210.

**KEMPSTON CENTRONICS 'E' INTERFACE** for Spectrum. Latest design, as new, boxed, £15. Tel: Brighton 607188 after 5pm.

**48K SPECTRUM** fitted with DK'Tronics keyboard plus 3-channel sound synth, Kempston compatible interface and 30 original games. Total cost new approx £400, bargain at £220. Tel: Mansfield (0623) 861149.

**SPECTRUM** expansion system, plus a second microdrive with extra cartridges all boxed with instructions, never used, upgraded, £140. Tel: Gareth on Skewer (0792) 814680 after 6pm.

**48K SPECTRUM**, tape recorder, joystick interface, printer, s/w, mags. Sell £450 ono. Tel: 01-691 8448.

**SPECTRUM PLUS**, boxed as new, £90 ono. Tel: 01-388 4840, Room 14.

**48K SPECTRUM** £110 of original s/w. £110. Tel: 01-520 0168.

**SPECTRUM PLUS**, data recorder, joystick programmable interface, £100 of original s/w. £150. Tel: 01-556 9511.

**ZX SPECTRUM**, ZX printer, Quickshot 2 j/s, Kempston pro-interface, mags, £135 original s/w, carrying case. Worth £400 accept £200. Dave, 9 Horley, 331 London Road, Ipswich.

**48K SPECTRUM** + cassette player, £700 of s/w (original), Kempston joystick and interface, £25 of mags. All excellent condition. £180 ono. Tel: (Steyning) 815096.

**SPECTRUM** Currah Microspeech £15. Sound Sampler £30. Tel: 0908 643215 eves.

**48K SPECTRUM**, Interface I, microdrive, printer, joystick interface, Saga Emperor keyboard, £120 of s/w. Excellent condition. Worth £450, sell £300. Tel: 041-638 5334.

**SPECTRUM 48K**, joystick interface, Currah Microspeech, £150 of original s/w. Sell £90. Tel: 01-868 5190.

**SINCLAIR QL**, 9 months old, 4 business packages (Psion). Hardly used. £330 ono. Tel: 01-328 1697.

**CURRAH** Microspeech (Spectrum) for sale with manual etc. only £16. Wanted: ZX printer paper, will pay £1.25 ono per roll. Phone Bookham 58327.

**ZX 48K SPECTRUM**, printer, speech unit, cassette recorder, computer desk, desk lamp, fifteen games, educational software, 12 months program magazines, two basic manuals, Logic 3 Learn Basic tutorial. Cost £350 will accept £250 ono. Mr R. M. Burnett, 28 Blackley Court (5th floor), Bridgwater Road, Blackley, Manchester M9 3HL.

**SPECTRUM PLUS** with Alphacom printer Pro 5000 Kempston interface, joystick DK'tronics programmable interface, over £350 s/w, books etc. Under guarantee. Worth over £500 new, sell £275 ono. Tel: (0933) 677113.

**SPECTRUM 48K** in Fuller keyboard, Currah speech, plus software. £120. Phone Wellingborough 681561.

**FOR SALE** 48K Spectrum, £300 of software, cassette recorder and joystick interface. Worth £430. Offers or exchange for Atari 800XL and 1050 disc drive. Howard Tinker, 197 Liverpool Rd, Birkdale, Southport, Merseyside PR8 4PH.

**48K SPECTRUM**, microdrive, Alphacom printer, Cheetah speech software, Tasword Masterfile, toolkit, games etc, books. £200 ono. Would exchange for CBM64 or other disc system. Tel: 031-667 9849.

**SPECTRUM PLUS**, Interface I, microdrive, 4 cartridges. Hardly used, £190 ono. Chris, 8 Boulton Grove, Hull, HU9 3ED. Phone Hull (0482) 782933 after 6pm.

**48K SPECTRUM** and O.E.L. TTX 2000 Teletext adaptor (cost £144) + £65 software + £20 magazines. All for £250 ono. D. Maynard, 112 Hartfield Road, Forest Row, Sussex RH18 5LY.

**SPECTRUM 48K** with DK'tronics keyboard, Alphacom printer, cassette recorder, Currah microspeech, joystick interface, two micro slots, approx £100 of original software. £230 ono. Tel: Upminster 25528 evenings only.

**48K Spectrum** with tape recorder, joystick, interface and software, including Lords of Midnight, Doomdarks, Quill, Starstrike, Pyjamarama, Project Future. Tel: 01-363 6571, ask for Dom, £140.

**SINCLAIR QL**, Psion Package, 4 blank tapes with Western Adventure, 6 books + mags, good condition, £275. Tel: Burntwood 72260.

**SPECTRUM +**, Interface I, Microdrive, Printer, 4 Cartridges, 3 books, cassette recorder, over £120 software, magazines all excellent condition, worth about £435. Bargain at £320 ono. Tel: 0703 738432 after 6pm.

**48K Spectrum**, Saga 1 keyboard, ZX printer, Kempston + Quick II, DK'tronics light pen, + 15 originals inc Hunchback II, Pitfall II, etc. Swap for Commodore 64 + tape player or sell (was £310) for £230. Tel: 430 6940, ask for Andrew.

**SINCLAIR QL**, JM version rom, new software, 16 blank drives, 3 months old, perfect condition, £300 ovno. Tel: 061 368 6601, after 6pm.

**SINCLAIR QL** and brother HR5 Printer with lead, BCP4, Assembler, Pascal, Psion upgrades and Sinclair Toolkit, advanced user guide and other various books. Tel: 01-593 2644, £500 ono.

**SINCLAIR QL**, hardly used, to swap for BBC B or sell £300. Tel: 01-946 4821.

**48K Spectrum Plus** only 2 weeks old, as new, with recorder, joystick interface, + joystick (Super Champ), 3 Rom cartridges, bargain at £149. Tel: 0705 373 455.

**SPECTRUM 48K** and interface II, Quickshot joystick, leather carrying case, machine code manual, £90 original software including Underwilde, Alien 8, Boulder Dash, lots of mags, £100. Tel: 0302 842553, ask for Tony.

**ZX PRINTER** with original roll of paper, £15 ono. Mapsoft Spectrum keyboard, perfect working condition, £15. Tel: 0900 2478.

**SPECTRUM** keyboard, DK'tronics, for any Spectrum, only £20. Tel: 01-348 3924 and ask for Graham.

**SPECTRUM Training Manual** and tapes by Logic 3, for sale only £10. Excellent for beginners, Tel: 01-348 3924 and ask for Graham.

**SPECTRUM** Kempston Centronics Epm Printer Interface £20, Finance Manager (+80 and normal) £7.50, Picturesque Assembler and Monitor plus four Melbourne House M/c books £12.50. Vucaic, Vufile £5. Tel: Crawley (0293) 882892.

**SPECTRUM 48K**, Kempston Joystick, cassette recorder, also 60 games including Underwilde, Bruce Lee, Buggy Blast, etc, £130 ono. Tel: Boston 812177.

**SPECTRUM** microdrive and interface 1, six blank cartridges, hardly used, £55 or nearest offer. Tel: 0875 62984.

**SINCLAIR Spectrum** + DK'tronics keyboard also Interface 2 with joystick and Currah Microspeech and light pen, some software included. All boxed only £200 the lot. Tel: Rugeley (08894) 5981, may split.

**QL** with JM Rom, mags, software, blank cartridges, RS232C and network leads,

boxed and ready to post, Immac condition, bargain at £280 or nearest offer. Tel: Paul at 0278 684 770.

**SPECTRUM** Interface 1, 2 Microdrives, sound synth/DK microspeech, DK/Slomo cassette recorder, joystick, software, books, mags including YS & C&VG, all vgc, worth £800 will sell for £400 ovno. Tel: Southampton 443858.

**SPECTRUM 48K**, Saga Keyboard, cassette recorder, joystick interface, many games and mags, £120. Contact: Neville Blenkinsopp, 14 Rush Park, Bishop Auckland, Co Durham, (0388) 661498, price includes all postage charges.

**SINCLAIR QL**, Assembler, Sprite Designer, m/c tutor, games, perf cond, boxed, still under guarantee, no longer needed, £325. Michael Fox, Aldridge (0922) 52230, anytime.

**SPECTRUM OWNERS** I have a graphics program for you, only £4 inc VAT, P&P and list of other Spectrum goods. Tel: Knighton (0547) 528395 and ask for Tony.

**SPECTRUM PLUS**, tape recorder, over £100 of original s/w. Microspeech, light pen, joystick + interface, manuals, one book, worth £330. Sell for £199. Tel: Harrogate 886326.

**30K upgraded Spectrum**, DK Tronics Keyboard, programmable joystick interface, joystick, tape recorder, £120 of original s/w, £180 ono. Tel: Blackburn (0254) 48475 after 5pm.

**48K Spectrum Plus** with Comcon and Quickshot 2, plus recorder and S/W, inc Spy Vs Spy etc, £140 or swap for CBM64. Tel: 021-558 1100 (days).

**48K Sinclair Spectrum**, 40 games (original), Currah Microspeech, Quickshot J/s, Magazines, books, £115 ono. Tel: 01-452 8547.

**SINCLAIR QL**, hardly used, Psion s/w and games, £270. Tel: 01-586 3163.

**SPECTRUM 48K**, boxed, Segs keyboard, 4 sound box, DK Tronics, Cassette Recorder, s/w, books, £400. Sell £160. Tel: 025 485 2044.

**SPECTRUM PLUS 48K** with Comcon and Quickshot 2 plus 2 recorder s/w inc: Starries, Spy Vs Spy etc, £140 or swap for CBM64. Tel: 021 558 1100.

**48K SPECTRUM**, low profile professional keyboard, £200 original s/w, Kempston Interface, + joystick £200 ono. Tel: 0260 275126.

**SPECTRUM** Recoil keyboard, £10. Tandy MC10 Com colour, USA model, £10. Tel: Romford 46948.

**SINCLAIR 48K Spectrum**, DK Tronics Keyboard, Joystick Interface, s/w, mags, £170. Tel: 0922 612081 after 4pm. **SELL SPECTRUM BETA** Basic V18 for £6. Write to A. M. Scott, 30 Talbot Street, Grangemouth FK3 8HU.

**SPECTRUM** Software for sale: All original includes Knight Lore, Alien 8, Project Future and 30 more titles, all very cheap, prices from only £1. Tel: Arborfield X 760190 (evenings).

**SPECTRUM** Originals for sale, Kong, Swordfight, Schizoo, Softalk 1, Robotics, Digger Dan, Snooker, Jungle Trouble, Everest Ascent, Missile Defence £3 each, £25 the lot. J. Monk, Highlands, Blue Boys Park, Minchinhampton, Glos.

**SPECTRUM 48K** computer with joystick interface, Quickshot II joystick, and over £150 worth of original s/w and extra manuals, all boxed, in excellent condition for sale, as complete package, £160.

**SPECTRUM + Interface Mk II** + Quickshot 2 joystick + mags and mag clippings + 40 s/w titles, brand new, still boxed, under guarantee, worth £330. Sell for £150.

**SPECTRUM 48K** in Lo Profile keyboard, plus £400 worth of s/w plus tape recorder plus joystick and interface. Worth £650 will sell for £199 ono. Telephone Woking 25795.

**SPECTRUM 48K**, joystick, interface and Speech Connector, Microspeech and interface plus £70 worth of games and books £140 ono. Tel: Miles, evening or W/end on 01-907 4879.

**BARGAIN SPECTRUM 48K** + over £600 soft and hardware, Matchday, Knight Lore, Baseball, Currah Speech Interface 2, Five joysticks, £250. Contact Marc Henrie, 9 Ardmore Gardens, Drymen, Glasgow G63 0BD.

**SINCLAIR QL**, 6 months old, Excellent condition, still boxed, £250. Tel: Stone 817591.

**SINCLAIR QL Micro Monitor**, 6 months old (Monitor), cost £300 sell £150. Excellent. Tel: Stone 817591.

**QL VERSION II** s/w, Psion Chess, many MDV carts, leads, etc. Loads of listings/programs, new car forces sale! Accept £350. Tel: Ian on Brentwood (0277) 222084.

**SPECTRUM PLUS** boxed with guarantee, software pack, 13 games, Turbo joystick interface £219, sell for £170. Tel: 01-452 5259, offers invited.

**48K SPECTRUM**, interface plus joystick, £60 s/w including Band Aid, Fighter Pilot, most ultimate games plus other software, sell for £150. Tel: Mark, 0942 716341.

**SPECTRUM SOFTWARE**. All originals, Kong £2.75, Penetrator £2.75, Mr Wimpy £2.95, Meteor Storm £1.75, Life Expectancy £2.75, Converter £2.75, The lot for £14. Tel: Kings Langley 66501.

**SPECTRUM 48K** (complete with manuals, PSV etc), cassette recorder, Currah Microspeech, 2 joysticks, Hardware programmable interface, sound amplifier, ZX Printer, £130 s/w (plus complete mains plus system £175. Tel: 01-806 4044.

**SPECTRUM GAMES** Sherlock, White Lightning £7.50 each. Write to Neil Varden, 30 Homefield Lane, Bothley, Leicester LE7 7NE.

**48K SPECTRUM** in DK Tronics Keyboard, good working order, £79. Apply: Mr Shutts, 103 St Lukes Road, Southend SS2 4AE.

**SPECTRUM PLUS**, under guarantee, £90 ono. Also s/w 50 tapes £70. Will split, SAE for lists, Sinclair Printer £25. A. McKelvie, Flat 17, 8 Courtfield Gnds, London SW5. Tel: 01-370 4658.

**SINCLAIR PRINTER** to sell £30 ono. Near new two rolls used only might swap Ram Turbo plus, Quickshot Two.

**SWAP 16K ZX81** with software for a working, good condition Currah Microspeech (Spectrum). Tel: Richard after 4pm or w/ends (0252) 877058.

## Tandys for Sale

**TANDY MODEL 2** with three 8 inch disk drives £750. Tandy FP-125 flatbed plotter four pens £150. Buzz Box Modem 300 Baud £40. Tel: 04865 2323.

**PORTABLE** computer Tandy 100 24K Ram c/w with built-in s/w LCD Batt/AC plus Acoustic coupler, ideal for Telecom AC/ADP printer cable £350 also printer Spec/Drac compatible £30. Tel: 0742 471160.

**APPLE II** computer + 2 disc drives, 1 Microdrive printer + monitor, £1,500. Tel: 01-508 3179.

**PORTABLE** Computer Tandy model 100 plus AC/ADP manual case printer cable. Some software 24K ram £400. Tel: 0742 471160 after 7pm.

**TI 99/4A** with Parsec and Invader modules, only £40 ono. Tel: 0472 822955 (Grimsby) any time.

## Wanted

**WANTED** Cheetah Rat, will buy or swap. Cambridge programmable interface. Daniel. Tel: Radlett 2673.

**SWAP** Durst C35 colour enlarger and dark room equipment plus 100 watt amplifier for Amstrad disc drive or any reasonable offer. Tel: 0733 267978.

**SWAP 48K SPECTRUM** tape recorder, joystick and interface, £170 of original software, for Atari 800XL, some games tape recorder and/or disk drive. Gordon. Tel: 0674 76678 weekends.



# Charts

## Amstrad

1	(3)	Dun Darach	(Gargoyle)	£9.95
2	(1)	Beachhead	(Access/US Gold)	£9.95
3	(4)	Alien 8	(Ultimate)	£9.95
4	(2)	Knight Lore	(Ultimate)	£9.95
5	(5)	Rocky Horror Show	(CRL)	£9.95
6	(-)	Red Moon	(Level 9)	£6.95
7	(6)	Mini Office	(Database Publications)	£5.95
8	(7)	Minder	(DK'Tronics)	£9.95
9	(9)	Sorcery	(Virgin)	£9.95
10	(-)	Snooker	(Amsoft)	£8.95

### Bubblers:

Ghettoblaster	(Virgin)	£8.95
Pool	(Amsoft)	£8.95

## Atari

1	(3)	Airwolf	(Elite)	£6.95
2	(-)	Bounty Bob Strikes Back	(US Gold)	£9.95
3	(1)	Drop Zone	(Microprose/US Gold)	£9.95
4	(2)	Archon	(Ariolasoft)	£11.99
5	(4)	Miner 2049'er	(Big 5)	£9.95
6	(5)	Hard Hat Mack	(Ariolasoft)	£9.95
7	(8)	Bruce Lee	(Datasoft/US Gold)	£7.95
8	(5)	Colour Space	(Llamasoft)	£7.95
9	(7)	Mule	(Ariolasoft)	£14.95
10	(9)	Decathlon	(Activision)	£9.99

### Bubblers:

Ghostbusters	(Activision)	£14.99
Kissin Cousins	(English Software)	£6.95

## BBC

1	(1)	Revs	(Acornsoft)	£14.95
2	(2)	Alien 8	(Ultimate)	£9.95
3	(4)	Repton	(Superior)	£9.95
4	(3)	Atic Atac	(Ultimate)	£7.95
5	(8)	Magic Mushrooms	(Acornsoft)	£12.95
6	(6)	Confuzion	(Incentive)	£8.95
7	(5)	Knight Lore	(Ultimate)	£9.95
8	(7)	Elite	(Acornsoft)	£12.95
9	(10)	Wizardore	(Imagine)	£7.95
10	(9)	Lode Runner	(Software Projects)	£9.95

### Bubblers:

Mini Office	(Database Publications)	£5.95
Football Manager	(Addictive)	£7.95

## Commodore 64

1	(1)	Way of the Exploding Fist	(Melbourne House)	£9.95
2	(2)	Elite	(Firebird/Acornsoft)	£14.95
3	(-)	Hypersports	(Imagine)	£7.95
4	(4)	Shadowfire	(Beyond)	£9.95
5	(3)	Dambusters	(Sydney/US Gold)	£9.95
6	(5)	Soft Aid	(Various Artists)	£4.99
7	(-)	Nick Faldo's Golf	(Mind Games)	£9.95
8	(9)	International Tennis	(Commodore)	£5.99
9	(7)	Pistop II	(Epyx/US Gold)	£9.95
10	(8)	View to a Kill	(Domark)	£10.99

### Bubblers:

Thing on a Spring	(Gremlin)	£7.95
Fourth Protocol	(Hutchinson)	£14.95

## Spectrum

1	(1)	Hypersports	(Imagine)	£7.95
2	(-)	Frank Bruno's Boxing	(Elite)	£6.95
3	(3)	Jet Set Willy 2	(Software Projects)	£7.95
4	(9)	Glass	(Quicksilver)	£7.99
5	(5)	Shadowfire	(Beyond)	£9.95
6	(2)	Rocco	(Gremlin Graphics)	£7.95
7	(6)	Soft Aid	(Various Artists)	£4.99
8	(4)	Spy vs Spy	(Beyond)	£9.95
9	(7)	Nodes of Yesod	(Odin)	£9.95
10	(-)	Dynamite Dan	(Mirrorsoft)	£6.95

### Bubblers:

Monopoly	(Leisure Genius)	£9.95
Fourth Protocol	(Hutchinson)	£14.95

All figures compiled by Ram/C

## Top Twenty

1	(2)	Way of the Exploding Fist (C64)	Melbourne House
2	(3)	Hypersports (Spectrum/C64)	Imagine
3	(1)	Elite (C64/BBC/Electron)	Firebird/Acornsoft
4	(-)	Frank Bruno's Boxing (Spectrum)	Elite
5	(4)	Soft Aid (Spectrum/C64)	Various Artists
6	(5)	Jet Set Willy 2 (Spectrum/C64)	Software Projects
7	(18)	Glass (Spectrum)	Quicksilver
8	(8)	View to a Kill (Spectrum/C64)	Domark
9	(9)	Spy vs Spy (Spectrum/C64)	Beyond
10	(11)	Cauldron (Spectrum/C64)	Palace
11	(10)	Dambusters (C64)	Sydney/US Gold
12	(12)	Shadowfire (Spectrum/C64)	Beyond
13	(7)	Rocco (Spectrum)	Gremlin
14	(6)	Dun Darach (Spectrum/Amstrad)	Gargoyle
15	(15)	Alien 8 (Spectrum/BBC/Amstrad)	Ultimate
16	(14)	Revs (BBC)	Acornsoft
17	(13)	Nodes of Yesod (Spectrum)	Odin
18	(17)	Herbert's Dummy Run (Spectrum/C64/Amstrad)	Mikro-Gen
19	(16)	Rocky Horror Show (Spectrum/C64/Amstrad)	CRL
20	(19)	Knight Lore (Spectrum/BBC/Amstrad)	Ultimate

Figures compiled by Ram/C

## Readers' Chart No 35

1	(2)	Soft Aid (Spectrum/C64)	Various Artists
2	(1)	Elite (C64/BBC/Electron)	Firebird/Acornsoft
3	(6)	Dun Darach (Spectrum/Amstrad)	Gargoyle
4	(8)	Shadowfire (Spectrum/C64)	Beyond
5	(3)	Spy vs Spy (Spectrum/C64)	Beyond
6	(7)	Confuzion (Spectrum/Amstrad/C64/BBC/Electron)	Incentive
7	(-)	Hypersports (Spectrum)	Imagine
8	(4)	Knight Lore (Spectrum/BBC/Amstrad)	Ultimate
9	(-)	View To A Kill (Spectrum/C64)	Domark
10	(-)	Revs (BBC)	Acornsoft

Winning phrase No 35: "Neil talks to the fridge" from A Houston of Falkirk, who receives £25. Others who came close include "Frankie goes to the till" from Rob Strudwick of London NWS.

## Now voting on week 37 - £25 to win

Each week *Popular* is compiling its own special software top ten chart - compiled by YOU.

And each week we will send £25 to the person who sends in, with their chart votes, the most original (witty, neat or clever - but never rude) phrase or sentence made up from the letters (you don't have to use them all) in the titles of the top three programs in this week's chart, published above.

You can still vote in the chart without making up a slogan - but you won't be in with a chance of winning the prize.

All you have to do is fill in the form below (or copy it out if you don't want to damage your magazine) and send it off to: Top 10, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP.

Voting for Week 37 closes at 2pm on Wednesday August 7 1985. Entries received after that time will not be eligible for inclusion in that week's voting. The judges decision is final. Only one entry per individual per week will be allowed.

Name .....	My top 3: Voting Week 37
Address .....	1.....
.....	2.....
.....	3.....
My phrase is: .....	



# New Releases

## AUTHENTIC

*April Showers* is an arcade game from Bevan Technology who are a company new to me and strangely have issued a batch of five Electron/BBC games.

*April Showers* falls firmly into the category of 'cute' since its plot consists of a) being a cloud b) collecting water c) raining on budding vegetation; threat takes the form of umbrellas that waft about the sky. As you can see Rambo it's not.

The graphics are better than average – the cloud has little eyes that roll about and as you water the plant it grows in authentic fashion. It even hangs together in a slow, gentle way as a game – though it can't honestly be said to raise the adrenalin much. As a program for younger children it may have some fans, personally I think it would have made a good cheapie at £2.50 or so.

**Program** *April Showers*  
**Price** £7.95  
**Micro** BBC



**Supplier** Bevan Technology  
Gresham  
Chambers  
14 Lichfield  
Street  
Wolverhampton  
West Midlands  
WV1 1DG

## ZAPPED

I'm sure we all remember *Boulderdash*, (a distant relation to *Mr Do*) which when released last year by Statesoft gained a select – albeit rather small – following.

Well now, those particular addicts can queue up for a second helping of the same, in the shape of *Rockford's Riot*, from Monolith.

As in *Boulderdash*, you tunnel your endearing (and impatient) sprite through various caves, collecting and sometimes creating, jewels – a number of which you must collect before exiting the cave via a magic door – all within a strict time limit. Death will occur if you are crushed by falling rocks or jewels, or zapped by fireflies.

Perhaps the game's best feature is its long lasting playability. The 16 screens are arranged in four groups of four, and you can start the game on the first screen of any group. Combine this with the fact that there are five levels of difficulty and you get endless permutations of play.

Although there are extra features here, *Rockford's Riot* isn't going to convert anyone who didn't like the original (added as a freebie on Side Two of the tape by the way).

And how the hell are those funny shaped cassette boxes going to fit on the shelves of WH Smiths?

Pick of the week

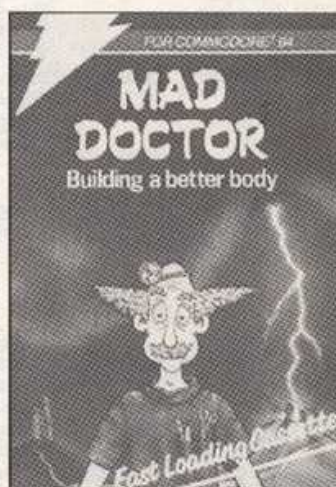
## EXAMINE BRAIN

*Mad Doctor* is one of the most entertaining Commodore 64 arcade games I've seen in a long while. Not only is it ingenious, inventive and compulsive it's also ghoulishly funny.

Try this for a plot: you are a mad doctor and to prove your mad genius to an indifferent world, seek to create a monster in human likeness. To create this monster it so happens that a few villagers will have to be sacrificed for spare bodily parts and you'll also need a few other objects as well, most importantly a bolt. (Can you imagine any self-respecting monster without one? I mean, without a bolt it'd be unhinged.)

The game has (kind of) 3D graphics, in that you appear to walk into the screen and uses a joystick controlled menu system to make choices like Prepare Body, Examine Brain, etc. The game consists of finding the key ingredients and bashing unsuspecting villagers to death and carting off their bodies for inspection. Not just any villager, though; you need to choose the parts carefully, lest your final monster prove unsound by, for example, beating you to death.

All the villagers wander around according to set patterns as the day moves on. Anyone you kill will, at some point, be missed and people will come looking for him or



her. More generally, as people start to disappear from the village, other inhabitants get more suspicious, making your life more difficult and making it harder to knock off more spare parts.

Although the characters are fairly small, generally the graphics are very effective. This is definitely one of the more original games around at the moment. Hide it from impressionable parents.

**Program** *Mad Doctor*  
**Price** £8.95  
**Micro** Commodore 64  
**Supplier** Creative Sparks  
Thompson House  
296 Farnborough  
Road  
Farnborough  
Hampshire  
GU14 7NF

**Program** *Rockford's Riot*  
**Price** £9.95  
**Micro** CBM 64  
**Supplier** Monolith

Lector Court  
151 Farringdon  
Road  
London EC1

# This Week

Program	Type	Micro	Price	Supplier	Program	Type	Micro	Price	Supplier
Chiller	Arc	Amstrad	£1.99	Mastertronic	April Showers	Arc	BBC	£7.95	Bevan Tech'logy
Locomotion	Arc	Amstrad	£1.99	Mastertronic	Boffin	Arc	BBC	£9.95	Addictive
Airwolf	Arc	Amstrad	£8.95	Amsoft	Mayday	Arc	BBC	£7.95	Bevan Tech'logy
Finders Keepers	Arc	Amstrad	£1.99	Mastertronic	Digital Defender	Ed	BBC	£7.95	Bevan Tech'logy
Boulder Dash	Arc	Amstrad	£9.95	Mirrorsoft	Mad Doctor	Arc	Commodore 64	£8.95	Creative Sparks
Nonterraqueus	Arc	Amstrad	£1.99	Mastertronic	Mig Alley Ace	Arc	Commodore 64	£9.95	Centre Soft
Alien	S	Amstrad	£8.95	Amsoft	Whurlinurd	Arc	Commodore 64	£9.95	Centre Soft
Grand Prix Rally II	S	Amstrad	£8.95	Amsoft	Chicken Run	Ad	Dragon	£2.95	Impsoft
Amstra Draw	Ut	Amstrad	£12.95	Amstra Draw	Fruity	Ad	Dragon	£2.95	Impsoft
Transact	Ut	Amstrad	£8.95	Amsoft	Tournament Snooker	S	Einstein	£14.95	Hard Software
Boulder Dash	Arc	Atari	£9.95	Mirrorsoft	Mordon's Quest	Ad	Enterprise	£7.95	Enterprise
Aabatron	Arc	BBC	£7.95	Bevan Tech'logy	Red Moon	Ad	Enterprise	£6.95	Level 9
					First Steps w Mr Men	Ed	MSX	£8.95	Mirrorsoft



## LAYERED

*Popeye* the computer game has been imminent for ages now - DK'Tronics seem to have been tinkering with it for a year or more. Now it is here.

The first thing you notice about the game is that the graphics are very large and cartoon like, more so than any other Spectrum game I know - this is a definite plus. On the other hand, to begin with at least, playing the game is terribly confusing. Whilst the controls, up, down, left, right, sound reassuringly simple, in practice they have a variety of different functions according to location. For one thing, there are 'layers' of background, ie, if you see a window you may appear either behind or in front of it according to which 'layer' you have entered. In this context, the up and down keys sometimes mean forward and backwards, similarly they may on occasion mean up and down rope.

You do get somewhat used to it but it remained an irri-

tant. Another problem is that, perhaps because of the big sprites, everything happens slowly. This also serves to reduce the tension somewhat and detract from the game.

Nevertheless the graphics, particularly the way they almost totally avoid colour resolution problems, are very impressive and you do somewhat get the hang of the game after a while. The plot is the bog standard collect the (hearts) and dodge the (vultures, Brutus and other less easily described objects) format.

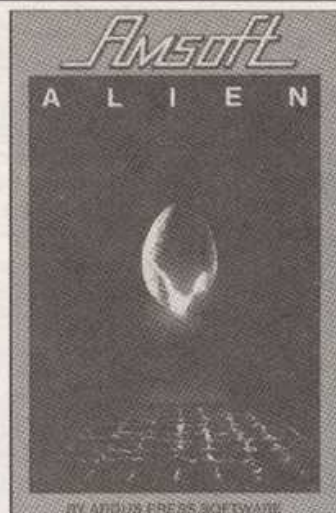
At £5.95 it's reasonably priced and certainly worth persuading someone else to buy so that you can look at it. I think that probably younger arcade addicts will be most impressed.

**Program** *Popeye*  
**Price** £5.95  
**Micro** *Spectrum*  
**Supplier** *DK'Tronics*  
*Unit 6*  
*Shire Hill Industrial*  
*Estate*  
*Saffron Walden*  
*Essex*  
*CB11 3AQ*

## INVADED

*Alien* was, retrospectively, a much underrated game - tremendously difficult to get into and lacking spectacular graphics, it got criticised and reviewers missed the subtlety of the plot and the generation of real tension.

There is a chance to look at it afresh with the latest conversion of the game to the Amstrad. The program remains the same, although the packaging has shrunk to include a booklet that fits in a



normal size cassette box.

The game requires strategy more than anything else. Your spaceship *Nostramo* has been invaded by an Alien, actually 'invaded' is hardly the word. Pick your own term for 'to spew viciously from John Hurt's stomach'. Somehow you have to get rid of it - either by forcing it out of the spaceship or by getting all the crew safely off the spaceship and setting it to auto destruct, complete with alien.

The game uses a series of menus through which you control the movements of the members of the crew and instruct them to pick up and use any useful objects that might be lying around. Occasionally crew members may report that grilles have been removed, evidence that the nastiness is crawling around nearby.

*Alien* also features that nebulous and usually fraudulent computer game concept, 'independent characters', this means, roughly that, sometimes crew members will not do as they are told, eg, if they are cowardly and think they're likely to get slurped.

*Alien* is really a very ingenious game and should particularly appeal to wargamers who won't be put off by the relatively primitive graphics.

**Program** *Alien*  
**Price** £7.95  
**Micro** *Amstrad*  
**Supplier** *Amsoft*  
*Brentwood House*  
*169 Kings Road*  
*Brentwood*  
*CM14 4FF*

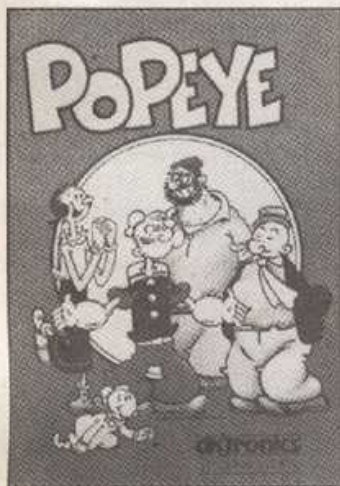
## UNGAINLY

US Gold is shortly to launch more titles for the Commodore 64. Winner of most bizarre title this week is *Whirlinurd*, a game with wackiness seeping out of every corner. The main game character is a nurd (foolish, gawky, ungainly, utterly uncool, usually male) with helicopter rotors on his head.

Your nurd can fly around bouncing up and down and has to eat a variety of wacky objects, getting to them only by negotiating a host of wacky obstacles. The graphics won't astound anybody except in terms of their oddness; the sound effects, though, are entertaining.

This would be a game with some fans at £5 or £6, but at the standard US Gold price of £9.95 it isn't really special enough.

**Program** *Whirlinurds*  
**Price** £9.95  
**Micro** *Commodore 64*  
**Supplier** *US Gold*  
*Unit 10*  
*The Parkway*  
*Industrial Estate*  
*Heneage Street*  
*Birmingham*



<b>Starseeker</b>	Ed	MSX	£9.95	Mirrorsoft
<b>Popeye</b>	Arc	Spectrum	£5.95	DK'Tronics

**Key:** Ad - adventure      S - strategy-simulation  
Arc - arcade              Ut - Utility  
Ed - education

**Addictive**, 7A Richmond Hill, Bournemouth, BH2 6HE, 0202 296404. **Amsoft**, Brentwood House, 169 Kings Road, Brentwood, Essex, 0277 230222. **Amstra** Draw, 1 Cowleaze, Chinnor, Oxford

OX9 4TD, 0844 52426. **Bevan Technology**, Gresham Chambers, 14 Litchfield Street, Wolverhampton W1 1DG. **Centre Soft**, Unit 10, Parkway Industrial Centre, Heneage Street, Birmingham, 021 359. **Creative Sparks**, Thompson House, 296 Farnborough Rd, Farnborough, Hants, 0252 543333. **DK'Tronics**, Unit 2, Shire Hill Industrial Estate, Saffron Walden, Essex, 0799 26350. **Enterprise**, 31-37 Hoxton Street, London N1 6NJ, 01-739 4282. **Hard Software**, 6 Drum Way, Leicester LE3 6NB, 0533 873247. **Impsoft**, 149 Balham Hill, London SW12, 01-675 5577. **Level 9**, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG, 0494 26871. **Mastertronic**, Park Lorne, 111 Park Road, London NW8 7JL, 01-402 3316. **Mirrorsoft**, Mirror Group, Holborn Circus, London EC1P 1DQ, 01-353 0246.

## This Week





## In the future

**H**as anybody actually thought of a sensible use for Compact Disc Rom players?

An awful lot of people are putting an awful lot of time and money into CD Rom technology, and it seems to me that they are trying to write the future of micros before reading the present.

I read in a magazine that "compact disc players look set to make a significant impact in the micro world" and "the market is forecast to reach half a billion dollars in five years". Enthusiastic as these statements are, I feel that CD Roms have been tremendously over-hyped. While they do have massive storage capabilities and fast access times, they are Roms and as such their applications are extremely limited.

Putting *Encyclopedia Britannica* on CD and putting a copy in every library is not exactly a massive market. Anyway, it's cheaper to buy a copy of *Britannica* than the computers to run it on, and there is less maintenance.

Well under half of the home users in Britain have a disc drive (costing at least £200) so who is going to spend £450 on an inflexible CD player before they buy a disc drive?

Sales of Rom based software and utilities are notoriously low. Look at the Interface 2 at only £20 and £15 for a Rom. After the initial launch nobody took it up. If they don't want relatively cheap Roms (people wince at £60 for Maxam on the Amstrad), what chance do you have of selling extremely expensive CD's.

It is said that hardware manufacturers are pushing CD Roms because they are not copyable. A far more sensible way of

stopping copying is the Eprom cartridge. (You remember? - Having a master terminal in the shops that programmed your Eprom with your choice of game which you then took home and plugged in to your machine. The one that two years ago every one said would make the cassette game obsolete by 1985!)

Manufacturers seem to be shying away for this - new computers don't seem to have cartridge slots any more. Perhaps they feel that all that re-usable hardware wouldn't be as profitable.

As to the idea of very large adventure programs, I have yet to see an adventure with the 150K of object code that it would take to fill a 5¼" or 3" disc. The market of disc owning adventurers is not yet big enough for programs to be written to disc sizes, so they are still just another medium for cassette sized software. As discs haven't reached that point yet, I hardly think CDs are ever likely to.

Admittedly, the possibilities of masses of pictures loading instantly off CD in adventures sounds nice, but in such an adventure, with at the very least 200 locations, who's going to pay for 200 high-res full screen pictures?

Software is never going to reach the sort of sizes that a Sony 3½" drive cannot cope with (500K) and that costs less than a CD and can be written to.

"Write Once" CDs have also been suggested. These would have a use as compact permanent archival storage for large companies, but not in the home micro scene.

So CDs only use is for massive databases. How many massive collections of information that never change (remember you can't write) does the average person in the street need, let alone want, or is prepared to pay £450 for? Certainly not bank accounts, or letter writing, or stamp collections. Not even the last three million years football results for the pools prediction program; after all, it would be out of date in a week! Hardly a \$500,000,000 business. Information that does not change is history, and I doubt that all the historians in the world have that much money!

Michael Fox

## Exclusive primes

### Puzzle No 168

Professor Otto Hex was in a state of great excitement. "At last," he exclaimed, "I have found that mystic secret that mathematicians have been seeking for centuries - a formula for generating exclusively prime numbers!" Indeed, such a thing, should one exist, would bring fame if not exactly fortune to its lucky discoverer.

Professor Hex had been studying a table of prime numbers and had noticed that 31, 331, and 3331 were all prime. This led him to further experiment and he soon found that 33331, 333331, and 3333331 were prime also.

"By repeating this procedure of adding an extra '3' to the left of each preceding number, we can generate an endless series of primes."

Unfortunately, this was not the first time that such a rash statement had been made, nor was it the first time that such a statement had been shot down in flames. To save Professor Hex any further embarrassment, can you find the lowest of these 'Hex' primes that is, in fact, composite?

### Solution to Puzzle No 164

Apart from the two examples given in the question (2800 and 7600), the only other four-digit number that regenerates is 3792.

```
10 FOR N=1000 TO 9999
20 LET SQ=N*N
30 LET SQ$=STR$(SQ)
40 IF LEN(SQ$)<8 THEN SQ$="0"+SQ$:GOTO 40
50 LET Z$=MID$(SQ$,3,4)
60 LET Z=VAL(Z$)
70 IF Z=N THEN PRINT Z
80 NEXT N
```

The program works by squaring in sequence all four-digit numbers. Those which produce a seven-digit square are prefixed by a zero.

By using the *Mid\$* function, the middle four digits are extracted from the squares so produced and compared with the original number.

### Winner of Puzzle 164

The winner is Nick Weatherhead of Hulcott, Aylesbury who receives £10.

### Rules

The closing date for Puzzle 168 is August 28.

## The Hackers







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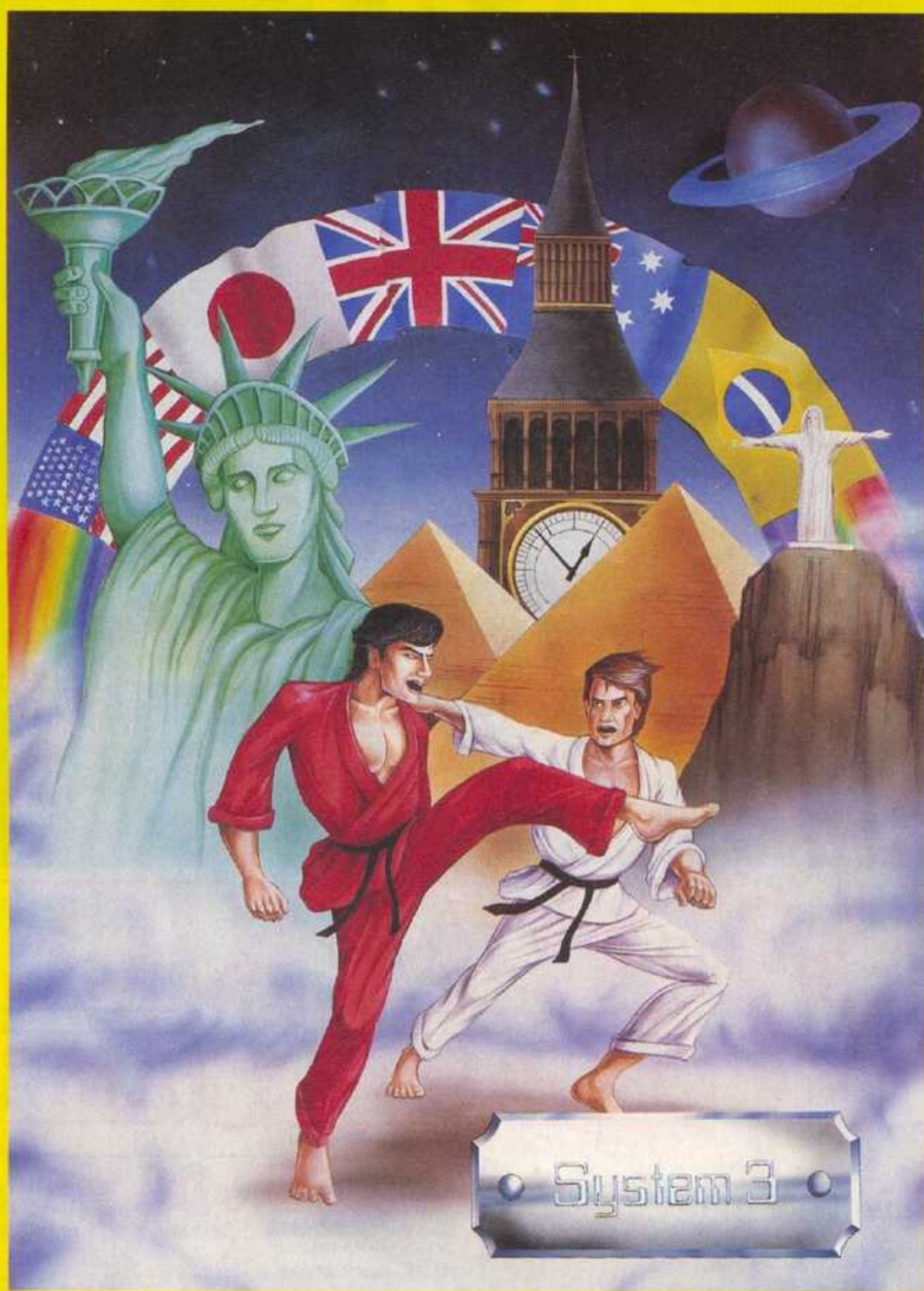


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