

IS ZX BASIC DEAD? SEE OFFER ON PAGE 36!

# YOUR SPECTRUM

No.11 February 95p *Byte High, No Limit*



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# FRONT LINES

Controversial comment on the Spectrum news scene, From The Hip, QL Affairs ... and there's a quid of Hewson Consultants' Axalon to boot!

## HARE TODAY,

## E30K TOMORROW

How to go — it's just the First Step of our quest! Only it's not quite this time, but coming out the chute from an adventure program.

InterSoft, a new company on the software scene, has announced a treasure hunt based on its latest package *Wintiner*. And the winner could take away Kit Williams' Award of

the Golden Hare (of *Massacre* fame) or £30,000. And for those with a calculator that's £1,000 more than you'd win at Donkey's *Kavala*.

Who like bears enough to launch the first £1 million prize for winning a computer game? It's a question I imagine went down the tubes — that would have been right up to InterSoft.

## GOING FOR GOLD



Jet-setter Mike Hale poses with his Gold Cassettes.

Mike Hale, Hewson Consultants' *Nightlife*/*Word* *Headline* A PC programmer, has been presented with a Gold Cassette for sales exceeding 100,000 copies. "Golden Boy" Mike, spent just some of his royalties on a Kelly Tangipoo single (right) light aircraft (last slot)

on the *Late 'n' Early* (last week). *Zip*. But Mike's not the first programmer to receive the Gold Cassette award; the first one went to family White, author of *AD Ad Attack*. No doubt we can probably expect a whole flood of Gold Cassettes appearing soon!

## WHO YA GONNA CALL?

It was jolly nice of Activision to invite the *ET* staff down to a preview of the movie *Ghosts* on Halloween night. The reason for all this Year-lank generosity? Well, you're not going to believe this ... but Activision has actually managed to release *Ghosts* — the Spectrum game — before the movie goes on general release!

Following the film quite closely, you can even sing along with the theme by Ray Parker Jr by following the bouncing ball along the lyrics on the screen. Pressing the space key yields the *Ghosts* theme cheer to punctuate the race in the right place. Probably one of the best bits of the program!

The game's plot is to



All the thrills and spills of the movie — Activision's *Ghosts* comes.

avert the oncoming invasion of New York from the rapidly increasing number of ghosts, progressing to the final conflict at the Temple of Zand. Various objects can be used to help in your task — such as an Energy Detector, Image Reflector,

Marshallow Sense, Ghost Vacuum, etc. etc. It may sound scary, but go see the movie and it'll all begin to make sense.

Anyway,

*Ghosts* comes with our vote of confidence, even if it does cost £9.99. Available now from the usual stockists.

## DROP 'EM



QET drops the price of its Contronics EP to £89 + VAT.

Contronics Systems Technology has now dropped the price of its Contronics interface for the QL, as it claims demand has been so high! The Q-PI will now cost £89 excluding VAT.

The interface features an on-board driver allowing it to be driven from SuperBasic (or any other non-Basic language). More details on 0153 2245.

## MOVE OVER MOLESWORTH

If you remember taking part in "wild and pranks on your off" teach" and "stuffing your face with feelings of ginger beer after lights out", then *Microplanet's* *Silent Daze* is probably right up your street.

It's one of those jolly release games in *Parsons* *Adventure*. You see, what's happened is that all your school reports are locked up in the safe, and you have to dare, knock down or hypnotise the masters into giving you the four-letter combination.



Miss this game and *Microplanet's* got you to deliver.

Now do like every schoolchild's dream!

Phone up *Microplanet* on 01-583 9411.



This device fits the place of hardware in use on the Spectrum. It gives you control over the speed of whatever game you're not in school on. How can you see the screen down to very, very, slow, and there's also a "break" button that will return anybody taking you by surprise. If you're in the market for one of these precision add-ons (priced at £14.95) get *Contronics* Computing Research's ring on 0153 214401.

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# DEVS EX MACHINA

WRITTEN AND DIRECTED BY MEL CROUCHER

AUTOMATA thanks everyone who has taken DEUS EX MACHINA to their hearts... reviewers, wholesalers, retailers, the media, and most important of all, our public...  
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(Team EM)  
*"The first computer program to inspire a cult following. To be without it is to lose social standing!"*

(Crash Magazine)  
*"There are few things in life that can be called global certainties... this is one of them! Hypnotic, emotive, noble, humorous, absolutely excellent..."*

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## ALL MAPPED OUT

Next time you get lost in a Level-9 adventure, don't come crying to us! Maybe you should have invested in a 58-page planning pad from Prime's "Printer Products."

Adventure Planner is an A4 pad that allows you to plan, or keep a permanent record of, any adventure game. On each page, you'll find a convenient mapping system with over 150 locations, examples, hints and tips.

You have lots to look out for: Adventure Planner in the shops at a little over the £10.95. Phone 01-481-3022 for details, or mail order details at the main, expensive price of £4.50.



It's the Adventure Planner — an adventure-lover's dream come true!

## KIDDING AROUND



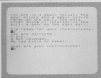
A scene from Five To Twelve, one of Five To Twelve's educational titles.

You can now get hold of a catalogue of educational software from Five To Twelve. Its programs range from those giving practice in basic programming skills to adventures, which require users to make decisions, plan ahead

and develop thinking skills.

Five To Twelve boasts that many features of popular games are included in its programs to make them more fun. Ring 0123 682150 for a brochure if you're interested ...

## PROGRAMS FOR PERVERTS?



Males' Hoopes Or Bust — top-hidden software for the over 18s.

Now, if you're under 18 years of age, you shouldn't read any further! But, for our older audience, here's news of a couple of "computer nudes" that'll certainly find

their way into the usually tasteful 15 educational titles.

Males: you ever heard of Alibon Bannery? No? Well, that's probably lucky for you as it would be a right

dirty piece of work. Males Associates has got this one out, depicting individual taking part in a couple of openly presented, sex-driven programs. The titles of these programs, if you're planning a Mary Whitehouse-type campaign to stamp out filth from our computer screens, are Fisher Sea Devils and its sequel Hoopes or Bust.

It certainly seems a shame that Males could find no better subject on which to base on a computer game. Besides wishing to downgrade their Spectrum with software of this kind can hardly find out Males's phone number for themselves.



We'd like to see a top-production keyboard unit from Monopole at the PAF Show last September — it seems they wanted our criticism before it was released. A few months later and the device looks much less scary, although Monopole claims 100 key buttons improved. Priced at £14.95, it's the only modification you'll find on software in its release, and the company will be 0241 1888. Perhaps Monopole'll listen for you ...

## PRACTICAL MACHINE CODE PROGRAMMING Steve Webb's Virgin Books

There are two fundamental approaches to the teaching of machine code. The first is to assume the reader knows nothing about computers at all, so everything kicks off from the very beginning; the other makes use of colour markers as a reference to Basic, as a way of putting over some idea of the concept behind the instruction

being taught. Personal Machine Code Programming falls into the latter camp — a sort of "soft" approach for those who already have a fair knowledge of Basic.

Steve Webb opens his account with a description of what machine code is and how numbers are stored in memory and follows that with the always tedious details of the "ins and outs" of binary and hexadecimal. The first five chapters are obviously designed to teach the basic concepts

of machine code programming. Things then get Spectrum specific, with



examples of how the display and attribute memory is arranged, and

also how you read the keyboard and create simple word-effects. The numbers in the book do have any mention of assembly or assembly language.

The book now switches track completely and starts to deal with the relevant programs that'll be linked a few simple machine code games.

Each routine is reasonably well described and accompanied by a non-standard flowchart. And, although the

programs are written in a rather non-efficient way, they are fairly easy to follow.

As usual there's a selection of standard print-out attribute-wrangling routines.

I can't say that overall the ideas in the book are my personal favourites ... certainly the volume won't be one that comes high on my recommended reading list. On the other hand, at £3.99 what have you got to lose?

Timmy Samuels

## HACKING



## AWAY

All the POKEs and more! Send your Hacking hints to Andrew Pennell, Hacking Away, Your Spectrum, 14 Rathbone Place, London W1P 1DE.

First up, thanks for all your letters — keep sending them in! What's better to start the month's column than with a couple of Ultimate programs.

Someone who lives in Rochester first tried to sign his or her letters (and in POKe 25070.25) to *Av Pac*, which will give your initials, but David Hader provided POKe

26075.0 — which allows the reader to take off, but you only need one fuel pod instead of the usual six. Nice one, David! Alternatively, try *A Hatter's* POKe 25070.0 to give you true random lives. He also supplied POKe 24864.8 for random lives on *Powerlord* also POKe 26144.0 for *Zookey*.

Next, *Laser Practice* went in POKe 26177.8 for *Cookie*, which stops the bin monitor from throwing its rubbish out of the bin. I like this sort of modification in a game — it alters the tactics you use for play, without making it too easy. Andrew Dawson wrote in with POKe 26179.8 for random fire for *Air Ace*, and notes that when you use it the membranes are reluctant to appear after the first few deaths. He also submitted POKe 26460.0 for a similar effect on *Laser Arkanoid*, though he says it's not much help when you're!

### ON THE OCEAN WAVE

On the international front, I received a letter from L.J. Page Said, Brunel, containing just what I needed from POKe. A hint from my old Silverdell's *Arkanoid*

Age — POKe 24610.0, Autodesk's *TV-Buddies* POKe 44436.4, where 's' is any number of lives, and *Orion's Moon Aler* — POKe 25724 for random lives, POKe 42444.4, for 's' lives (page 14 only) and POKe 42654.055 for immortality!

The letter also admitted that the task of putting *Walt of the Thingies* on Microdrive had proved too difficult. Well, *Cyber's* leader is certainly a tricky beast, but I'm sure one of our readers has cracked it.

Getting back to *Osamu's Moon Aler*, Nicholas Smith sent in POKe 42344.24 to stop the time going down, and POKe 42355.7 and 42366.2 to keep it scrolling fast in all parts of the screen. He's also included POKe for *Arkanoid* — what you have to do is load the game (except the last part), type *WORLDWIT*, and POKe 26224.8 POKe 26236.0 for random fire. POKe 41068.17,

POKe 41099.32, POKe 40189.1, POKe 41100.0 for random moe, and POKe 26142.62, POKe 26143.255, POKe 26144.0 for random organs. Nicholas points out that some of his mods work on the final level due to some silly stupidity — checking by the program itself — thank!

Paul Hastings supplied POKe 26277.7 for 's' lives) in *POk's Frank N Stein*. He also asks for infinite lives for *Money Make*, as he can only get to the 2nd screen! Well, I know for a fact that Dave Nichols has cracked this one open, so I'll try and print the secret out of him in time to report back next issue. OK?

If you've got any POKe or tips on programs, or need an unusual feature added to a game, drop a line to Andrew Pennell, Hacking Away, Your Spectrum, 14 Rathbone Place, London W1P 1DE. Of course, don't be shy!

### POKES & TABLES

OK, now that you've got the POKes, what do you do with them? First, load the game using *MEME*™ (unless you're told otherwise), press Enter and start the tape — just as you would do for a normal disk!™ When the 'W' message pops up on screen, a top the tape, then type 000 and make the appropriate adjustment as detailed in the article. Once done, press F10 and Enter, and start the game again. That's all there is to it!

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Utilising Hardware Programmed technology you have the benefit of automatic eight direction control, no power-down programming loss, guaranteed conflict-free operation with other peripherals, including microdisks, and no extra software to load or awkward joystick movements and key presses to make each

time you load another game. The keyboard remains fully operative at all times.

It's also perfectly possible to connect up to five Protocol 4's on one Spectrum, each programmed separately, for multiple player control — only possible with the hardware programmed design.

Incorporated into the design is a computer Reset button for clearing the computer memory between games without pulling the power plug-out.

Fully guaranteed for 18 months, Protocol 4 comes supplied with five CustomCards, ten Quick Reference Programming Cards and complete instructions.



PROGRAMMABLE  
INTERFACE

ROMSLOT

INTERFACE  
II



ROMSHOT

ROMSHOT

## PROGRAMMABLE INTERFACE

As the first fully hardware programmed joystick interface, this product has become well established over the past year and will accept ALL standard joysticks or controllers, including Quickshot II with "signature", for use with ALL Spectrum or ZXII software — not just those with a joystick option.

- No Software programming required.
- Programming is verified when power is disconnected between games.
- 8 directional movement — with or without the fire/button pressed — only requires setting of the four normal directions.
- Compatibility is guaranteed with ALL key reading techniques — machine code or BASIC.

Several interfaces can be separately programmed and fitted to one computer for multiple player games.

Keyboard operation is totally unaffected by this interface, as with all AGF add-ons, and will never conflict with any other device fitted at the same time.

Twelve months guarantee, key programming information and a pack of Quick Reference Cards, is spread over writing of the chips, also supplied with full instructions.

## INTERFACE II

The AGF Interface II represents the best low cost introduction to joystick control.

The AGF system standard is now offered by over 100 games or utility programs for use with any joystick or trackball.

Any game which is controlled by the cursor movement keys (A, T, B) or has a Pokes option is also compatible with Interface II.

A rear connector allows other peripherals to be connected at the same time.

This product is available for either the Spectrum or ZXII, is supplied with full instructions, a 12 month guarantee, and a 10% discount voucher against further AGF mail-order purchases.

## ROMSLOT

The new AGF Romslot is designed for anyone who already owns a programmable joystick interface, or prefers to use the keyboard to control games, and would like to add the facility of ROM cartridge software to their system.

Romslot will accept the greater range of instant loading games and will also be compatible with the new releases from Pinter Software — exciting new games only to be available in ROM format.

This system allows instant play, your computer memory size is not important and you will be able to play games that could ordinarily require more RAM.

Romslot incorporates an extra feature called "Reset". This allows you to instantly restart the ROM game.

Romslot is guaranteed for 12 months and has a full width expansion connector to accept joystick interfaces, speech units and printers etc.

## QUICKSHOT

The Quickshot system is an excellent value game controller incorporating a custom chip for sure-footed precision with a comfortably contoured handle offering a convenient top firing button as well as one on the base.

## QUICKSHOT II

Quickshot II has improved styling with a trigger type firing button as well as the top firing action, with a broader base for greater sector stability.

It also has a unique Auto-Fire facility which at the flick of a switch provides a constant rapid firing action simulating a fast trigger finger.

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Trade and export enquiries welcome



## LOVE BYTES

St Valentine's Day (February 14th to you!) is only just around the corner — and many of you might be making that fatal move towards true love. Well, don't do it! At least, not until you've consulted the oracle, anyway ...

Solar Publishing, playing on everyone's emotional insecurity, has released a package called *The Love Oracle*, which is based on the ancient Chinese I-Ching. Dealing with questions like 'Are we compatible?', 'Does my partner love me?' and 'What do I want from life?', the answers are typically philosophical and open to all sorts of interpretations (Gata has reading all you'd like). (Tin, TP)

The package is quite expensive at £14.99, but that's because you get a lengthy book called *The I-Ching On Love* by Guy Darrin-Knight thrown in. Consult the oracle on 01-291 8128.

## NORDIC, NEÉ FULLER



The Nordic range of games ... as advertised by Fuller!

Well, it was on the cards that Fuller would eventually crash — but was it really necessary for the company to switch orders of keyboards right up until the day it went into voluntary liquidation? Here at FS, there's been quite a few calls from upset customers, some of whom actually sent their Spectrum in to be fixed up along with hard-wired cash. Needless to say, that's the last they've heard.

And now, a press release tells us of a new company that have taken over the entire rights to Fuller's product range. Nowak grant that, according to ex-Fuller man Frank Lawton, over half of the Nordic arm are from Fuller.

Here at FS, we'd be very interested to hear any problems you may be having reclaiming your equipment from the old Fuller. Let's be hearing from you ...

## PRANG!

Here we are, in the last few weeks both as Christmas and all the software houses are eagerly producing arcade games to see the world's light. So what do CRL come up with ...

*The Highway Snake!* Approved by the Automobile Association it includes over 100 questions, the answers of which can all be found in the HMSO learner book

on the highway code. Chase you've answered those questions, you're given a percentage rating ... and that's it.

Anyone with more money than sense can lock out £9.95 for the software version of the manufacturer HMSO booklet. Smart software for Christmas? Well, it all depends on how you define the word 'smart' really ...



So intimidating stuff from CRL — guaranteed to drive you off the wall!

# FROM THE HIP



Post's phone lines were open from 10am-1pm and 7-10pm on Wednesday and Friday. Ring 01-636 2416 on these numbers ...

Last month was probably the busiest so far — the phones never stopped ringing! Most of my comments were asking about *Thinking Party* in issue 9

— a definitely seems to have caught your interest and approval. But John Malt of *Massive* referred many of your queries which he asked how he could actually put these intricate POKEs into his programs.

Well, there's a boxed-off bit about POKEing problems; i.e. I know it's hard, but for most games you'll find that the method, simple though it may be, actually works (of course, some games require special attention, but this will usually amount to given in the piece. To help you out with this month's selection of code, I'll deal with getting Ultimate POKEs to work (I've just had a book over the Editor's shoulder, and I'm not sure it's that obvious from Andy's piece). I'll see that!

Ultimate's range of software all have a one-line loader — and just to make things that little bit harder, it's a one-line code, but there's a simple solution. First up, load the tape with MESSAGES, and stop the tape once you get the 'DK' message. Now, I'll find what you've got on the disk copy it down on to a piece of paper. One that's right, now pull the plug and into the tape's disk, to connect it back to the power. No-type the one-line

loader, but this time in line one, not zero — and add the POKEs acquired after the last LOAD "" CODE; and before the RAND ROM sec. From there and run the tape up again. Easy really, no? ...

While we're on the subject of POKEs, an anonymous letter left a message for me while I was out, telling me of a magical POKE to disable the Break key. Unbelievably, it won't work with the Interface 1 attached, but I'm sure someone out there will be able to put it to good use. Simply type in

POK ENCLEREN 0706 01

To re-enable the Break key, see the following:

POK 0001, 0008 0706 01

I had a few calls from readers who'd tried Dave Nicholls' walk-on from POKEs for L, some of whom are given in issue 9 — apparently they were wrong. The POKEs should have been POKE 00004, 0204 and POKE 00005, 3. Sorry — but that holds — especially as all the readers I spoke to were extremely polite when they told me what they had to state for proof of this ... something about being forward to play *Traveller* from Power for 24 hours non-stop, but I'd stopped listening by

that! Problems, problems, problems! CRL, we had a few with *Ocean Explorer*, one of our more in Program Power in the last issue. In short, the machine code loader we gave you was missing a line — here it is.

POK 00 00

Apologies to all those readers who typed it all in without realising the mistake. Also, in that program note that our capital or printer keeps churning out pound signs (£) instead of hash signs (#). If you haven't done so already, replace those 'PRINT £1' statements with the necessary hash signs.

Big news last I got so many calls last month that we almost broke the telephone exchange coming into the FS news block (see last). As a result I've been assigned my own number (that's power at last!) — 01-636 2416 — and you can reach me on Wednesdays and Fridays between 10am and 1pm, and 7pm and 10pm (I'll be told that should have been 10.15). If I'm on the phone, you'll get my engaged tone — so don't try any other numbers as I'm already on the phone! Don't have a bit of patience and ring the back on 01-636 2416 later.

Catch you on the 'phones ...



Here's what you can see and hear. Micro-Best's Holly Hains — with her eye fixed the company's sponsoring on the video conferencing, which means computer graphics was at 75 (we think of that girl involved in the racing world were James, James? Well they all seem to be smiling, an maybe there's no real reason for someone (QA, you can get the straight answers every half. 88.2)

## NOT THE YS HELPLINE

British Telecom claim to have started the first computer information service in the UK. Calls to the Resident one-on-one dial number 722632 and hear a three-minute tape of somebody waddling on about computers. The contents of the tape are updated every two weeks and will be tailored to meet the demands of the customers and will cost for all needs.

Maybe someone should have pointed out that YS has had a computer information service since February last year, and you might get a free response from Troubleshooter's Post (Oh yeah, Ed). So keep those calls coming to us, and remember that Pete's new phone number is 01-436 2416.

## HYPE A SPY



Module Password? Espionage — a Hyper Battle?

A new company called Modular Resources literally flooded the YS office with the promotional material its putting out for Espionage.

Large posters, small posters, car stickers, pens, club memberships, small stickers and table displays came stuffed in a large brown envelope. Oh yes, and there was

also a copy of the game!

Espionage is a game of "intelligence and skill in the art business". Fair enough, the game seems quite good as it happens, but has the market got so rough that a program need this many gimmicks tied to its rear end to help it sell? Maybe the software business is going the way of the pop world? Worrying stuff...

# CONCURRENT QL AFFAIRS

All the latest news and views of things QL, courtesy of John Forshaw and Tim Hartwell.

### DISCLAIMER PLEASE!

Just recently, I've been hearing all sorts of rumours of users who've returned their QLs to be "de-dogmified", without enclosing the single mail. Sharlar Research don't seem to notice and lucky users receive an updated machine and get to keep the doggie. Anyone else there got any useful applications for a slightly used doggie... attention on a postcard, one! And keep them clean, Ed.

Sharlar Research also seems to be sending some users their Microdrive cartidges! The mysterious (jiffy bags appear quite of the bag with a complimentary slip and no explanation. It would be that Sharlar Research has chosen the method of compensating users for various faults: they have to put up with while their machines were being repaired. Of course, it would just be on a random basis... in which case,

why haven't I had one yet?

Staying with Sharlar Research for a couple more columns makes, I'd just like to see one more thing about the late arrival of large two-of-QL DR News. Here's at least one QLUB member who's also received three copies of the first issue. What worries me most is that if you re-read the initial QLUB application form, it merely states that members will receive six newsletters a year... not that each newsletter will be different. Worrying stuff...

### NOT QL BASIC

Basal software house, Microscience, is about to release a BCPL Compiler for the QL. And what, I hear you ask, is BCPL. Well, it stands for Basic Combined Programming Language, and it's intended for systems programming — writing operating systems, editors, compilers and the like. In spite of its name, BCPL has

nothing at all to do with Basic, and all of Microscience will save for the QL (including LHM, Editor/Assembler and the BCPL Compiler itself) is written in the new language. Its compiler is a basic Kinoshita of the new language developed for its baby business machine that it's commissioned Microscience to develop a Pascal Compiler using 8434.

Still on languages, in 35 issue 9 I stated incorrectly that Computer One's Editor/Assembler package was written partly in SuperDink. I'm told it's written in assembly language — sorry about that, Computer One.

### ONE LANGUAGE OR TWO?

QL-FORTH is a compiled language, running very quickly (typically, ten times faster than SuperDink), and is aimed at exploiting the full power of the QL. It's a complete implementation of FORTH in the latest 783 PRO standard, and comes with a full-screen editor, the Microdrive cartridge is accompanied with all sorts of goodies, such as example games and utilities.

However, the language implementation is not restricted to just the PRO standard, as it takes advantage of the QL's sound and graphics. Computer One's

FORTH provides three channels called 'input', from which all input is taken, 'output', to which all its output (including the ubiquitous "OK" that appears liberally in FORTH), and 'word', to which all the graphics and windowing words apply.

The documentation explains that the language implementation is not intended to teach FORTH, but only to show how it runs. The first 400 accompanying Computer One's QL-Pascal makes the same disclaimer about not being intended to teach Pascal. But working through the clearly-outlined example programs will certainly introduce you to many aspects of the language and its operational demands.

QL-Pascal's main drive and there's a 'help' window to prompt you whenever data input is required. The compiler produces data code which is interpreted when the program is run. Complete with a full-screen editor, it's a fairly comprehensive version of the language plus various QL-specific extensions.

QL-FORTH is £28.95 and QL-PASCAL is £39.99. Computer One is at Science Park, Milton Road, Cambridge CB1 3RH.

Tim Hartwell

The Sinclair

QL

and you



### Exploring the Sinclair QL — An Introduction to SuperBASIC Andrew Nelson, £4.95

The QL has a rich, new programming vocabulary, and this great book gives you the chance to master the best of new words Sinclair has added! Sure, you can use the QL more or less just like a Spectrum, but if you do, you are missing the extraordinary power which lies behind the radical concepts of SuperBASIC. Commanded by command, statement by statement, Andrew Nelson takes you through the richness of QL SuperBASIC in *Exploring the Sinclair QL — An Introduction to SuperBASIC* just £4.95 and available from most book and computer shops. In case of difficulty, you can order directly from Interface Publications, using the coupon below. (Trade only: Interface Publications are distributed exclusively in the UK and Euro by W H S Distributors. Export orders handled by Interface Publications.)

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QY3

**INTERFACE**  
**PUBLICATIONS**



— We're the experts! —

## AVALON OFFER SAVE £1!

Hewson Consultants has been pretty successful with the response it's had to Avalon — but its records show conclusively that one or two of you haven't actually invested in a copy as yet. Well, maybe the seasonal spirit hasn't died down just yet or whatever, but Hewson Consultants has decided to allow readers of *Your Spectrum* the exclusive opportunity to try



A valuable \$5.95 — instead of the usual \$7.99! Simply fill in the form below for a photocopy of yours (and send it off to Hewson Consultants, 56th Mill Lane, Tring, Hemel Hempstead, Herts. SG13 7JN).

Enter, Milton, Abingdon, Oxon.

GO TO PAGE 42 →

→ to win a Mega Keyboard in our Avalon competition.

Being a right kind reader of *Your Spectrum*, all you're going to get out of me is a really cheap Postal Order for £4.99. Please send me a copy of it when? To the reason to be identity?

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Complete the above form, enclose a cheque/Postal Order (made payable to Hewson Consultants) for £4.99 and send it off to Hewson Consultants, 56th Mill Lane, Tring, Milton, Abingdon, Oxon. If you don't want to trouble your time, send a photocopy here instead!

## CHEAP

## TRILOGIES

## THE KET TRILOGY



Putting 'em in! Special £200 presentation packs from Interactive Software.

Re-packaging games is definitely 'fresher of the month', especially with Interactive looking on the horizon. One more company who've succeeded in Innovative Software by including all three of its Ket Trilogy adventures in a presentation pack.

And if the thought of saving £3.99 doesn't send your pulse racing, there's a whole load of prizes to be won, such as a video recorder and the

title 'Britain's Best Adventure' (Wow! £4). All you have to do is score 100 per cent (!) on all three games, thus revealing the three-part secret message.

The £5 price release claims a number of 'special' features such as 'interactive hints', 'on-screen scoring' and a 'unique fast-response combat system' — but it maybe more exciting than that? Check 'em out in your nearest stockist.

## Microdrive Microdrive Microdrive Microdrive Microdrive

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# YS TOP TWENTY CHART

Rank	Change	Score	Title	Developer	Quote
1	↑2	5	SABRE WOLF ULTIMATE	BACK IN THE POLE POSITION! DIVE AGAIN, BUT WHAT DO YOU THINK OF UNDERWORLD?	
2	↑6	1	DALEY'S DECATHLON OCEAN	ARMCHAIR OLYMPICS, DEFINITELY SEEM TO BE THE FLAVOUR OF THE MONTH.	
3	↓1	8	JET SET WILLY SOFTWARE PROJECTS	WHERE WOULD THE CHARTS BE WITHOUT THIS ONE?	
4	↑5	7	TRASHMAN NEW GENERATION	TRASHMAN'S STILL A FIRM FAVORITE WITH THE GAMS, BUT IT LOOKS LIKE TRAVEL WITH TRASHMAN'S DESTINED FOR THE TOP.	
5	↑15	3	MATCH POINT PSION	FROM SCORES AS AGE WITH THIS UNUSUAL, UNBLENDED TENNIS SIMULATION.	
6	↑10	5	LOORDS OF MIDNIGHT BEYOND SOFTWARE	YOU'VE GOT THE TOP ADVENTURE OF THE MONTH! CRIMINAL, YOU HOBBIER AND MURKLE BEHOLD, DON'T LET YOUR GAMS GO TO SLEEP!	
7	↓4	8	ATIC ATAC ULTIMATE	LOSING ONE'S MIND? ATIC ATAC GOES SET TO CRASH OUT OF THE CHARTS — IT WON'T GET A CHANCE!	
8	↑16	1	FIGHTER PILOT DIGITAL INTEGRATION	HAVEN'T SEEN THIS ONE FOR A WHILE... BUT IT'S BACK INTO THE TOP TEN LIKE A BULLET.	
9	↑14	5	WORLD CUP ARTIC	WELL IT TOOK INTO THE FOOTBALL SEASON TO START AND THIS ONE TOOK OFF WITH IT.	
10	↑16	1	MONTY MOLE GREMLIN GRAPHICS	SUPPOSED CONTROVERSIAL GAME, BUT IS IT SO? GIVE THE GAMES TO THE MIMMERS' STRIKE!	
11	↑11	5	MUGSY MELBOURNE DRAW	GANGSTER THILLS FROM THE MELBOURNE HOUSE!	
12	↑19	2	TIL VORTEX	DID YOU KNOW THE COMPANY'S JUST RELEASED A SIMILAR GAME BASED ON HELICOPTERS?	
13	↓7	8	CHEQUERED FLAG PSION	THE RACE IS STILL ON, BUT IT LOOKS LIKE THE ONE'S GONE DOWN TO GAMBOL. CHEQUERED FLAG HAS UP ITS SLEEVES, ONLY TO FIND OUT IT'S IN REVERSE.	
14	↓8	7	LUNAR JETMAN ULTIMATE	LOOKS LIKE EVERYBODY'S PLAYING BRIBED LORE ABOUT THIS GAME. NOTHING ABOUT ANYMORE.	
15	↑16	1	KOKOTONI WILF ELITE	WOW, WHERE TO THIS ONE SPRING FROM?	
16	↑16	1	SHERLOCK MELBOURNE HOUSE	WE HAD A SUSPICION THIS ONE WOULD GET THE CHARTS, BUT WHAT ABOUT THIS PERSIAN?	
17	↑16	1	FULL THROTTLE MICROMEGA	MICROMEGA GETS ON ITS BURN AND STARTS REVVING UP ITS ENGINE TO SPEED UP THE CHARTS.	
18	↓9	7	WHEELIE MICROSPHERE	WHAT'S ALL THIS NONSENSE ABOUT DOUBLE DECKER WHEELS AND MAKING HEADS-NOST? WELL, YOU'LL PROBABLY DON'T CARE.	
19	↑16	1	PSYTRON BEYOND SOFTWARE	WELCOME TO THE CHARTS — IT'S YOUR TASK TO BLAST THE ALIEN NAUGHTS FROM THE SPACE STATION.	
20	↓13	3	THE HOBBIT MELBOURNE HOUSE	THIS COULD BE THE LAST TIME YOU SEE THIS ADVENTURE IN THE CHARTS.	

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# THE YS TOP 20



Well, by the time you read this, lots of you will have received all sorts of software goodies from Baza — and we want to be first in line to hear all about it. Remember this in your chest — as long as you keep telling us what you think in the foot software around. Letters from software houses containing personal cheques will not be accepted (unless they're exceptional examples of goodwill). (Of course, there's a chance you could be the lucky winner of these pieces of Spectrum software — all you have to do is to tell your letters first out of the lidlows, but when we come to count up the votes. This month's winner is Mark Franklin of Thebyn Book, Essex — nice one, Mark!

As usual, you're used to the coupon below, complete with your top five (or three) rates, as well as your top three (which will be used in Baza together a Top Turkey chart for 1985). (Er, excuse me, are you talking about the precise art of constructing an order for a future issue, isn't it?)

Post off your entries to YS Charts, Your Spectrum, 14 Rathbone Place, London W1P 1DB.

### YOUR SPECTRUM

### THE YS TOP 20 READER POLL

My top five (or three) of the Spectrums are:

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_

My three top (or two) of the Spectrums are:

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

I understand that when this chart was tested — eight out of ten entries satisfied Spectrums preferred it. (What?!)

Send your completed coupon post-paid to:  
**YS TOP TWENTY, YOUR SPECTRUM, 14 RATHBONE PLACE, LONDON W1P 1DB.**



## ERROR CODE

I have just built the Commodore interface, as described by John Flewley in *ISSUE 6*. I've even used this and a version of his software (*ISSUE 7*) to write this letter. However, before anyone else tackles this project, it's important to bring your reader's notice to a couple of errors in the software.

The first is to do with the recognisability of the code. It has a **BREAK** function which John treats as a sub-routine, unlike other 'calls' the address is not adjusted during the M-C loading process — that, it'll only work while the original un-relocated code is still intact.

The solution is only really open to those of us who use assembly language, but it can be tackled in two ways: add another adjusting 'bit' (perhaps) to the loader, or do what I did — add the program to the **BREAK** is part of the main program (it was only called once anyway).

The other program is the I/O address of the interface. It's consistently quoted as being at 213, whereas making the hardware exactly as shown in *ISSUE 6* gives it a range of addresses, of which the highest being 256 is 433 specifically. The interface will exist in any I/O address with bits 6 and 7 1,0,0.

Once again the solution is easy for those of us with a systems language, but there's a tedious alternative for those using the three-processor design. Look for the three occurrences of '00' near the middle of the first line first is preceded by '00', the other by '01' and the next one with '0'. Then, adjust the characters for these **LINKS**, the first must be '00', the second '01' and the third '0'.

I enjoyed the experience of the project — I can't agree with some aspects of the software (I've re-written parts of it) but you can get that down to you as just a programmer! Mike Mackin, London

Thanks Mike, it's good to know that you've got the project up and running. If anyone's got any queries on this project, please write to John Flewley, c/o Your Spectrum, 14 Rathbone Place, London W1P 1JL, UK.

## A TIP FOR THE HIP

With reference to From The Hip, *ISSUE 5*, Troubadour's Pete (single to David Williams about memory left was rather too complicated. Would avidly studying my

# FORUM

**Witty, intelligent and imaginative readers write to Forum, Your Spectrum, 14 Rathbone Place, London W1P 1JL. So why haven't we heard from you yet?**

copy of The Complete Spectrum ROM Assembly for useful routines, I came across page 103 (it's usually after page 102, Ed) which includes a 'five memory' sub-routine; it's good to see if there's enough room for whatever task the Spectrum is carrying out, such as loading a program. The sub-routine is used in the following format:

```
00000000 00 79d
```

This gives the number of that byte left in a 48K machine; I suspect that if you 'PRINT %d' in the above format, you'll be given the five memory for the 128 Kspecy. I reckon that's much more than all that **PEEKING** stuff that Pete suggested. Bill Adams, Watlington

Pete, when I'd A, I don't mind a reminder computer even whether you're using a 128 or 48K machine. Well, I need you always a **ROM** (not a computer) and, for your efforts, Troubadour's Pete

## FROM THE CAP!

OK Troubadour's Pete, all up and below (as the letter's name be the best thing that's happened to you since my last one).

With regard to your **From The Algorithms** in *ISSUE 8*, I'm pleased to say you're actually getting something right this time. Your knowledge of the Spectrum's ROM is good to know. While the ROM routine at 0443D does indeed print the contents of the BC register pair, it only does so correctly for numbers below 255,000 (this is because its proper use is to print basic file numbers). To print any number in BC, you'll have to call the **STATKBC** (11,346 decimal and 2028H) and then **PPRINT%** (11,347 decimal and 2029H). The list of those routines tracks the contents of BC to floating point then, while the second prints the last entry on the calculator stack. Cool that? Good.

Moving on to another topic — one of the biggest problems facing games programmers using basic is the extent of the

Spectrum's **SCREENING** function to recognise UDC characters. Well, good news! The following line will return the variable 'c' with the UCODE of the UDC on (y,x) on a 48K Spectrum:

```
POKE 2000,200 LET C=CODE  
W00000000 00 79d
```

Then, 'CHR\$(c)' will be the character at (y,x). I'll leave you to figure out how this works and to show your membership (sorry, membership) what to do if they're only got a dummy 128 under their keyboard.

Now, if you'll excuse me, I really must go and review Alpha-Continuum before it's brought back into the back shop. — Captain Critical, Banstead, Kent

PS. Please let me know of anyone I've forgotten to thank. Oh yes, and I suspect I might just help you out on my second point if you really've fallen in out for yourself.

Dick? (When's something I can't stand... it's a clever dick. And I think the line we hear about 'the more black hole things' 'the better' Troubadour's Pete.

## WHAT'S NEW?

Thank you for the interesting article on the ZX Spectrum<sup>TM</sup>. So much for Mr Scott's 'disappointing' words of the 'new' machine's existence — Well, I suppose it makes a change from Sinclair Research announcing a new computer and then not releasing it for six months or so!

In the same issue, Troubadour's Pete (in answer to Patrick Fox's letter on Ian Boardman's **Cash**) writes that "the Spectrum doesn't do a normal NEW, it performs a system reset which has the same effect as pulling the plug...". The Spectrum NEW is unusual in some ways, but the above description isn't quite accurate; it's not identical to pulling the plug (although this can be simulated by **RAMDISK**, **USR 0**) as NEW does protect some memory areas above

**RAMTOP**. Try the following as direct commands:

```
POKE 200,0  
PRINT '0'  
NEW  
PRINT '0'  
RAMDISK 0  
PRINT '0'
```

This illustrates that the NEW created from Ian's **Cash** Theory is behaving in a normal NEW and a system reset. John Kinroy, London

Thanks a lot for clearing that up, John. Andy Patrick (for words to write in and not on) that it's not halfway, but actually five-eighths of the way between a normal NEW and a system reset, we're not interested! Troubadour's Pete.

## LET'S BE MODEST

By all the Silicon deities in **Andy de la Smith**, you at the fine establishment of 15 are incredible!

On October 22nd I picked up a brilliant copy of issue 9 and paid my 85p (via VAT) and in two hours I had read it from cover to cover, forwards and backwards (through enjoyment) and my tiny brain went into a frenzied state as your **Spectrum** article. Still in a hazy coma, I wandered down to shop, dark Lewisham WH Smiths where, in and behind, was the one and only **SPRACKY+0**. What a mood, it was exactly as you'd predicted!

I've figured you're either amazing, psychic, or have a spy deep in the heart of Sinclair Research!

Thomas 'Trang' Smith, Lewisham

A really it was just a lucky guess! Along with, my psychic powers tell me that you've printed one of your letters before... issue 8, unless the situation I've getting over right now? C'mon you're not dead. This man's had two letters printed and we've not heard from you yet? Ed.

## LEADING QUESTIONS

In *Forum*, *ISSUE 4*, there's a letter from a Mr Rittman explaining that the load connections on Interface 1 are apparently wired back to front. My own problem is that in making up a lead for an RS232 printer (the Brother M-1000) as opposed to RS232C (as mentioned between computers, should it follow the



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# HEADING FOR TROUBLE

Continuing his codebusting theme, Terry Buffin dives deeper into the loading methods used to 'protect' commercial software from the prying eyes of hackers. This month, he takes a look at programs claiming to be 'headerless'.

If all you're looking for in this article is a foolproof method of breaking into any software package and then copying it for all your mates, I'm afraid you're going to be upset. Software piracy is both illegal and unethical, and there's no way that (or this magazine can condone it — under any circumstances.

That said, under the copyright laws of this fair country, it's perfectly legal to make a copy of work for the purposes of private academic study... and that's all we're proposing here. The only stipulation is that you mustn't use your copy for any other purpose than private study, or pass it on to your friends. There's no legal or moral objection to breaking the protections on a program in order to examine the programming methods, make alterations or just show off your programming prowess.

## LOSING YOUR HEAD

Keeping the above firmly in mind, let's move on to the concept of loading a computer program from tape. Basically, to load anything at all, the computer must be told the start address and the length of the load, and what type of load it is (Basic or binary). Usually, this information is in the 'header' which precedes each program, saved in the normal way. This makes things too easy for the hacker though, and hence the popularity of the 'headerless' load; however, the computer still needs to know this information, so it has to be told in another way. This is done with a short piece of machine code which puts the information into the appropriate Z80 registers and then calls the routine in the ROM which performs the load. This piece of code must be present for the headerless load to work. If you can't find it, then you're looking in the wrong place!

Sometimes the code will have a false header, one which is there only to mislead you. If the loading program will have





two machine code loading routines, the first of which is just there to throw away the header, the second one then loads the code to a different address. Very drill.

The simple way of dealing with the headerless load is to tack a header of your own manufacture on to the front of it. To do this you'll need to know the start and length numbers, and they'll be somewhere in the loader program. They have to be, so keep looking. Have a look at the example code with this article — it should look something like that.

There may be a good deal more code in the loader, but there cannot be less. It might check that certain bytes in the Basic have not been messed with, or it may load the registers from some address the Protection Artist (PA, to you, John!) notices you may have disturbed by breaking in. If you make a mistake, don't tell anyone about it and get laughed at — just try again, dummy, until you can bring about what a second you say.

If the PAs are being clever, they'll ring some changes in the fairly straightforward routine. For instance, the jump address may be pushed on to the stack and jump to the ROM routine instead, which will cause the routine to return from the ROM to the address on the stack. Perhaps the code is made to load over the top of the jump address, changing it to something else. It could even be arranged for the code to load over the stack, changing the return address stored there by the old instruction. Protection artists like to think they're smart, so watch for that extra wrinkle.

If it looks like there's just a simple jump to the M-C program on return from the load, then you could substitute an address of your own, one that goes somewhere safe (1305 Hex is worth remembering) or perhaps a little routine to unset all the bombs first.

## FAST AND FURIOUS

The headerless load may not be headerless, it may be loaded by a special routine — a fast loader perhaps — rather than using the Spectrum ROM. In this case you have a program loading a program to load a program. The way is in the same. The first 1305D has to use the standard Spectrum ROM routines.

That's the 'fast', but 'furious' is you when the fast load fails for the fifth time running. This is one that won't respond to a false header, because the actual bytes on the tape are different from the standard format. Most of these fast loaders (and the spring routines for that matter) are pinched from the Spectrum ROM. Talk about piracy! All that's changed is the delay in the timing loops and sometimes the header colonon. In fact, you may find that the routine calling the fast load routine is just like the code above for the headerless load. That's a useful head-start.

To get the main program ahead, you'll have to use the fast load routine ... nothing else will read the tape. But first

you'll want to re-write the fast load a little, so you keep control. The principle of such a fix is the same as for the headerless load, and the fast load routine will be loaded in a way that's protected by the same methods as the headerless loader.

## DANGER UXB

There are two popular bombs which most people know about. POKE 23650,0 will allow us lines in the lower screen (so any error message will crash the machine) — so does 'Nerd!' and so will C.T.S. This limitation means the bomb is only good for very short programs. Imagine a program that could neither clear nor scroll the screen!

The other bomb-step is to copy corrupting ERB SP at 23613 and 23614. The idea is to POKE in the address of a pair of bytes holding zero. With the power-up RAMTOP of 65367 it's usually sufficient to POKE 23613,0 and let 23614 risk. Then whenever there is an error (BREAK is an error condition) the computer will collect an address from the address pointed to by ERB SP — which should be in the stack — and jump to it.

*It's never impossible to break into a program by sheer ingenuity and persistence...*

Point ERB SP at some zeros and the Spectrum ends up jumping to zero. This bomb will only work provided you are prepared to do without GOSUBs. A GOSUB doesn't crash the machine, it just corrupts ERB SP.

A much more useful variation is to POKE out ERB SP itself, but the address that it's pointing to in the stack. This is not vulnerable to the GOSUB dog-eating. Instead of zeros, you could put in the address of your own machine code routine.

```
WALT 4=POKE 23613=23614:POKE 23614:
POKE 0,0:POKE 0=1
```

Defusing these traps is mostly a matter of not letting them be set. Don't let the program that does the POKEing run in the first place. However, the technique of LOADING a Basic program complete with the system variables as a block of code can also set these traps.

## TOO MUCH

Some programs LOAD in as many as six chunks. There were two companies who used the same method of multiple LOADs for a while, specifically to combat the copying programs which were selling so widely. These put small

LOADs of just a few bytes into places whose particular copy tapes kept their own info; the main program would check to see that these bytes were undisturbed before a second run.

The detriment of these short LOADs would put a certain value into the system variables FRAMES (which is changed every 50th of a second by the computer when the interrupts are disabled); you can't do this from Basic. The LOAD routine in the RAM makes the interrupts at the end of a load, so FRAMES starts changing as soon as it's loaded. The main program can therefore easily tell if someone's been fiddling.

This is easily enough dealt with in machine code, but it's meant to stop copying only, and doesn't keep you out of the main program — I shall oblige you to work out your own methods.

## WAY TOO MUCH!

One of the hardest things to deal with is the CODE LOAD which starts at the bottom of the screen and carries on right to the last byte of the memory. If you try to make such a recording yourself, you'll find that it crashed on loading; it took in. The reason is you've loaded over the stack, and when the LOAD routine in ROM continues the return after LOADING, it takes the (in this case) wrong number from the stack.

The problem is that, with the whole of the RAM being LOADED, there's no room anywhere for your own routine. However, with luck, a short cut may work. It's a time-consuming short cut unfortunately, because such attempts require about six minutes just for the loading time. What you do is change the RAMTOP to put the stack in a different place, then load as normal. The idea is to get a helpful address to LOAD on to the part of the stack that the ROM is using. While this approach is rather hit and miss, it does work. For a start, try two lines (stack addresses are all two bytes, though RAMTOP can be even or odd) more or less than the standard RAMTOP, which is 65367 in 48K Spectrums. I do know programs that this also works on.

Theoretically, this method must work if you guess the RAMTOP used by the server, and there should be any number of happy accidents to be had. But why guess? Why not LOAD the first half of the code, screen and all, higher up than it's meant to go, say at 26384 instead of 16384. That helps you find the start of Basic which will then be at 37753 (you won't be trying to do this with Microdrive!). Then the RAMTOP is set so at the time of saving can be found at 33780. Try loading with a RAMTOP a few bytes either side of that.

If this fails then you have to disassemble and reconstruct job. You can easily LOAD the first half of the CODE high up. Then you can get the rest of the code into the screen memory by loading the whole file higher up and (you

# CODEBUSTERS

48000 or so) and letting it wrap around, loading past the end of memory, over the ROM and into the screen. If you, you know! SAVE the pieces and LOAD them all back together into a single lump.

Naturally this is more trouble than it sounds, and you may need to use fake loaders and write your own headless load routines to get things into the right places and stop code from lapping over into the system variables. But I reckon you're the sort of person who rises to a challenge, right?

## WHEN ALL ELSE FAILS

As software (that's the organic/heard-of hardware) you carry about within your osmium) ages, it gets tired more quickly. Mine does anyway. At about 5am, I start making dumb mistakes instead of the clever ones I usually make. It's never impossible to break into a program by sheer ingenuity and persistence, but it can be a lot of work; a truly ingenious hacker avoids that particular four letter word.

So you may wish to consider cheating a little. That is, you may decide to cheat unfairly, using not brainpower, but the crude brute force of hardware. I refer, of course, to the Soft-ROM project in Y2Sim-2. Obviously it's much easier to get code around any protection if you can subvert the ROM routines themselves. You could even re-write the reset routine to

return you to Basic without wiping the memory, then a bomb would definitely be a BOMB routine. This is advanced cheating not within the abilities of everyone: it will, however, give the beginner at skulltaggery something to aim for.

## LAST BIT

Well, that's it for now ... the rest is up to you. Messing about with code may be a little bit harder than attempting to crack the unprotectible level of any game — but you'll find it's much more rewarding. As I said last month, don't be discouraged by trying your new-found tricks of the trade

on anything too difficult, pick a game that's a couple of years old and have a look at that ... you'll soon get the hang of it.

One more thing before I take my leave: it's not clever to pirate software — not only is it dishonest (and get you into a lot of trouble as a result) but it's also contributing to the high price of commercial games ... if the companies can afford to publish their own the first place that is OK, swap has session over — but it is important. Remember, the only way to get more out of your Spectrum is to just more in — keep on hacking! **BT**

## EXAMPLE LOADING PROGRAM

DEC	HEX	ASSEMBLER	COMMENT
221	00	LD R, 71??	Load IX register pair with the 222H address of the load.
221	21		
001	11		
001	11		
11	11	LD, 00, 71??	Load DE register pair with the length.
001	11		
001	11		
50	27	BCF	Get carry flag for LOAD (not VLOAD).
01	00	LD A, 7F	Indicates code not Basic.
200	20	CALL 0000	Call loading routine ROM.
00	50		
5	00		
001	23	JR 71??	Jump to actual MFC program
001	11		
001	10		

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# TOUCH AND GO!

We've seen a few digitizers around for the ZX Spectrum, but only one that's been promoted heavily as a replacement for the keyboard! The Touchmaster graphics tablet also claims to operate (with a suitable interface, of course) with almost all the current home computers.

## UNDER PRESSURE?

Based on an A4-sized pressure sensitive membrane, the Touchmaster comes in a neat grey case measuring some 350mm by 180mm by 25mm. The back of the case is raised slightly so that it fits the tablet to form a convenient drawing surface. All connections to the tablet are at the rear, and it's here that one of the differences between the Touchmaster and its rivals becomes obvious.

Power is supplied from a plug-in transformer and a single red LED shows that the power is on ... but there's no power switch fitted. Presumably, to allow the tablet to be used with as many home computers as possible, there are both parallel and serial interface sockets on the rear panel, together with an uncer-

There've been several digitizers on the market for the Spectrum, but only the Touchmaster claims to be a keyboard replacement. Henry Budgett puts theory into practice — check out his findings ...



The end of the pencil ... or an expensive alternative?

## THE SOFT TOUCH

A drawing program called *Multipaint* comes with the Touchmaster and, while it does provide a demonstration of how software *could* operate the device, it's not the best example.

You control the program from the tablet's surface; the only other time you need to use the keyboard is when you want to write on screen or select a filename when saving or loading pictures. Providing a physical 'status' of the facilities available, a plastic template fits over the top of the drawing surface; the right-hand edge of the template is marked with two columns of options and those currently selected are displayed in a status

window at the bottom of the screen.

Five different brush types can be selected and each of these can be any width from two pixels to 32 pixels, in steps of two. Once you've selected the required colours and brush types, further options are available allowing you to create boxes, circles, polygons and 'rubber-banded' lines. Once created on-screen, the program offers the option of **MOVING** to tape and then **LOADING** them back. Actually sketching the required design on the tablet is best achieved with a stylus (a suitable one is supplied with the Touchmaster) but a finger can be used instead.

Unfortunately, *Multipaint* offers no more than the most basic of features. A

'Fill' option is marked and documented but, certainly on the version I tested, it didn't appear to operate in the expected manner ... or, to put it another way, it didn't appear to work at all! Neither is there any facility for magnification or editing, but possibly the more obvious omission is the lack of any means of editing the screen — irrespective of the INK colours used. On an attribute-based system like the ZX Spectrum, where it's often easier to draw in black and white before adding the colours, this is an essential facility!

There's no way that *Multipaint* can be compared with something like *MetaPaint Draw* because, although they're fairly similar, the latter does actually work!



Despite my attempts to look at artistic *MetaPaint* drawn with the lightbox, making it marginally easier to build up the background of a landscape.



Creating some grass in the foreground, *Multipaint* allows the length to be adjusted in such a way as to simulate grass from the background.



It's not sure what's gone wrong here ... but I think it's got value to do with the Spectrum's handling of graphics than a fault with the Touchmaster!

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plained socket for a 'foot switch' — should you want to play 'Footie' with the device, maybe? Whatever it's for, it's not mentioned in the accompanying hardware manual.

Using the same sort of membrane technology as ZX81/Spectrum keyboards, the tablet provides a 256 by 256 point resolution. The upper, carbon fibre, layer is held away from a lower resistive film by an insulating mesh. Thus, if you apply pressure to any point on the upper layer, the two layers are forced into contact: the actual pressure point is determined as a co-ordinate by a microprocessor built into the tablet that scans the top film in one direction while scanning the lower resistive film in the other. Once a point of contact has been established, the co-ordinate is relayed to the Spectrum via the parallel interface.

(On a point of interest, it's worth noting that the Touchmaster's resolution is well below the Hi-res screen displays on several of the home computers it's available for; for example, it'll be impossible to resolve the Touchmaster's output to a single dot on the BBC Micro in Mode 01.)

A plug-in interface is provided as part of the Touchmaster package to connect it up to the Spectrum. Along with a generous length of ribbon cable, the 'black box' interface unit contains a standard ZX81 PLA chip; an extension connector is provided out the back of the unit for additional peripherals. The unit's definitely over-sized and projects far more than it needs to from the Spectrum's rear,

but this is no doubt the result of using a standard box rather than *your* design.

#### THE BITTER PILL

Any piece of hardware, the Touchmaster tablet would seem to have a lot going for it — especially when compared with its rivals like the Grafpad. It's built robustly and offers a full A4-sized drawing area that can be used for both drawing and the touch selection of menus. I suppose it could be considered an advantage that the Touchmaster, with new interface and software, would work with another computer — should you commit the cardinal sin of attempting to upgrade from the Spectrum (fah, so why? fah).

It's a shame that the documentation should be so poor compared with the standard of the tablet itself; the hardware manual covers the connection of the tablet and provides a number of simple BASIC programs to read co-ordinates from it... but little else. Touchmaster's manufacturers are bringing out a range of software called 'Touchware', designed specifically for use with the graphics tablet: games and educational programs seem to form the bulk of the planned material, but the real proof of success will come if independent software houses decide to support it as well. Of course, the main stumbling block will be its price — nowadays, an independent hardware add-on has to justify its relatively high price to an awful lot of users before the market accepts it as standard.

The Touchmaster graphics tablet does

provide users with the means to copy drawings and diagrams from paper to the Spectrum's screen, although the screen area will probably be forced to re-load the picture under control of something like *MetaSource* (Draw to make the final version worth close inspection).

As for replacing the keyboard with a Touchmaster... well, the keyboard's cost that great, but I still have my doubts. Until there's adequate software support, the use of the tablet would be restricted to the selection of on-screen options or simple games control... and you'll still need the keyboard for data entry, and loading up *Multiport* and the like. It's a nice thought to be going on with... ■

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# ROUTINE ERRORS

Error messages on the Spectrum never seem to account fully for their sudden appearance. John Dural has come up with an interesting piece of code that'll use the error handling routine in ROM to give control to the user's program in the event of overflows, keying errors and the like.

Here come two ways of making the Spectrum 'error' routine do something more useful than simply drop back into the command mode, with appropriate message.

Before using either of them, it's as well to make sure that the program is not going to generate any real errors, that is, it should be properly de-bugged, so that any 'errors' are ones that can be dealt with by the program itself. This limits the possible errors mainly to Break effects — or perhaps, overflows, keying errors, undefined variables and the like. The reason for this is fairly obvious. If your program generates a really serious error, the appropriate message is the best possible response; that way you have a chance of doing something to stop it happening again. Any 'automatic' response is likely to push you deeper into the mire.

## CHANGE OF ADDRESS

The easiest way of changing the error response is simply to alter the address in ERR — SP and make it point — say — to the start of a routine (a menu, or something similar). This works pretty well with an all-machine-code program and I've used it to send any kind of Break back to the main menu — usually a Break during LOAD, or SAVE, or a pre-programmed Break key input. Unfortunately, it doesn't work at all well from a Basic program, tending to do nothing at all, or create NEW.

A more elaborate system, which will work from a Basic program involves the old idea of making changes to the Interrupt mode. By altering the Interrupt mode from one to two, you can arrange for ERR — SP to be scanned at each interrupt. If the routine finds anything other than FF (which means 'all clear'), it does a jump to a routine which sets up the data for a command — such as 'GO TO KEY IN LINE' — and then executes it.

This seems virtually fool-proof, except that — occasionally — it's possible to overcover the editing space. The Spectrum gives a mighty beep (from independent) and comes up with the message 'GO TO KEY' (or whatever) in the lower screen. However, if you press Enter, it does what it's told, as good as gold.

The answer is very simple — 'GO TO KEY' consists of nine bytes, as follows:

EE 31 2E 0E 00 0A 0A 00 00

EE is the token for 'GO TO'; 31 and 2E stand for 'KEY' in ASCII; 0E indicates that a number follows; and the last five bytes hold the number ten, in integer form (10).

## ERROR OPERATIONS

The remainder of the routine carries out four operations; it restores ERR — SP to the 'OK' condition, by making it FF; it clears the editing area by using the ROM routine SET — MP, at 1000; it makes a nine byte space in the editing area by using another ROM routine, MARK — ROM, at 1025; and finally, it loads the nine prepared bytes, which make up the command, into the editing area and then jumps back to the ROM at 10E2, to execute.

You'll also need to enter the two short routines — to alter the Interrupt mode and then to change it back again. Just for laughs (and for convenience) I've put them in ROM locations, so you can call them with the commands, USR USR "M" and USR USR "N".

The 'Returns to IM7' routine is needed if ever you want to be able to list your Basic programs. But, of course, if you are very security conscious, you don't have to tell anyone what key entry will give you RANDOMIZE USR USR "N".

NOTES	HEX	ASSEMBLER
Interrupt mode address	FEFF 02 FF00 FF	
Interrupt routine	FF02 F5 FF03 3A 3A 5C FF06 3C FF07 20 04 FF07 F1 FF0A C3 2E 00  FC0D F1 FF0E 3C FF FF90 32 3A 5C  FF93 C0 80 16  FF96 2A 59 5C FF99 01 09 00 FF9C C0 25 16  FF9F 2A 59 5C FFA2 11 6F FF FFA5 01 09 00 FFA8 EB FFA9 ED 80  FFAB FB FFAC C3 E2 12	PUSH AF LD A, (5C3A) INC A JR NC, FF0D POP AF JP 003B  POP AF LD A, FF LD (5C3A), A  CALL 1680  LD HL, (5C9F) LD BC, 000F CALL 1680  LD HL, (5C59) LD DE, FFAF LD BC, 000F EX DE, HL LDIR  EI JP 12E2
ORG 'GO TO KEY'	FFAF EC 31 2E 0E 00 0A 0A 00 00	
Set Interrupt USR USR "M"	FFB0 3E FE FFB0 8D 47 FFB2 C7 5E FFB2 C7	LD A, FE LD I, A IM2 RET
Returns Interrupt USR USR "N"	FFC0 3E 3F FFC2 EB 47 FFC4 ED 56 FFC6 C7	LD A, 3F LD I, A IM1 RET



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# ZX BASIC?

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Civa Gifford dined the *YS Adventure Helpline* and came up trumps with Neil Mackintosh, Gary Smart and Peter Marmant. Reviewing credits go to ace hacker, Dave Nicholls.

# HAILING THE HELPLINE

Set to help *YS* readers with their adventuring problems, the helpline seems to be a resounding success. Samaritans, Neil Mackintosh and Gary Smart, have both been flooded with calls from near-suicidal adventurers. So much so that Peter Marmant has passed their ranks. Here are some of the biggest problems, along with Neil's and Gary's solutions...

Most of the readers' calls were concerned with the old favourites like *The Hobbit* and *Colonial Adventure*. But there were a few newcomers, such as *Snowball* — with its nightingales and waldroids proving the major blemish to many. (By the way, if you're having trouble getting up the one-time ramp, go and rub the cat, drop it on the ramp and watch it clear the way for you by slapping up all the slime. Yeah!)

There were also some calls from adventurers stuck in *Planet Of Death*, *Knight's Quest* and *Prince's Lair*. If any of you are trapped in the same locations, here's some tips. To pass the lower field in *Planet Of Death*, you must hit the laser twice into the field and then dance. In *Knight's Quest*, if you want to make your way through the "almost impenetrable" forest, go (what you reach the edge of the lake) 'S', 'N', 'S', 'N', 'E', 'T', 'CLIMB TREE', 'S' and 'S'. Finally, to get through the Cave of Spores in *Prince's Lair*, put the salt barrel/brick around your face and progress as normal.

Other specific problems came from Andrew Tennant and Andrew Nixon. Mr Nixon seemed to have trouble with the shadow guarding the hole in *Golden Apple*. You'll kick yourself, Andy! Just turn off the lamp and the shadow disappears. Mr Nixon's problem is solved in a much more obvious way. If you're trapped in Digital Fantasy's time machine — try typing 'LEAVE MACHINE' — that's all there is to it!

It's probably worth mentioning a few techniques for problem-solving at this stage. If a command doesn't seem to work, check your surroundings for any signs of change and have a look at your inventory — mysterious things can happen in adventures, few of which are actually announced on-screen! Also, if an obvious command doesn't seem to work, try using one like it — not all adventures have the vocabulary you yourself have. Finally, as we've seen from Murray Nixon and Tennant, the answers

to most of the problems are staring you right in the face — you've just got to stop being and start trying!

Yours truly, here's a few cryptic clues for all you buffy *Colonial Adventure* — to get out of the flooding maze, it's initially really done; *Snowball* — has clever to pass the waldroid; *Lords of*

*Time* — to escape the blast, remember to 'bore' on time; and, of course, *The Wizard* — waiting at the magic door has a familiar ring to it. ☺

## YS ADVENTURE HELPLINE

England and Wales: Gary Smart (0204) 76955 and Peter Marmant (0264) 66646.  
Scotland: Neil Mackintosh 041 332 2116.

## VENTURING OUT

### VALKYRIE 17

Bam Jam Corporation/ESM

Most adventures tell you somewhere near the beginning of the game itself exactly what you're expected to do — *Valkyrie 17*, of course, has to be the exception.

The fact the game never reveals that you've discovered some anonymous messages (found on side two of the tapes that tell you that *Valkyrie 17* is active again (?). Further discovery comes from writing through the dozens of pages, memos, etc. that accompany the tapes, you find out that *Valkyrie 17* is actually an experimental Nazi laser weapon from the Second World War.

OK, you're now ready to start the game and only your experience and cunning as a rocket agent will get you through. As soon as you start playing, though, any thoughts of "strategies" go straight out of the window — the game is very loose, especially in response to most "standard" commands. Technically, the game's not particularly out of the ordinary, with simple verbs, some many of most commands.

*Valkyrie 17* has been written so as to give the player as much freedom as possible; so much you'll encounter some "real" problems you can go almost anywhere you like! This, in my mind, is the real charm of the game. All but one or two of the problems to be overcome are completely logical on one occasion, the solution to each of them was sometimes for me to work out and I'm indebted to Trevor Jones of the Bam Jam Corporation for putting me out of my misery.

To finish up, *Valkyrie 17* is a very well thought out program, with very nice graphics and a wonderful sense of being there.

The price of £8.95 is on a par with other adventures and I think it easily justifies the cost. Highly recommended.



It's laughter all the way in this James Bond spoof package — so long as you know what you're in for in this, that's it!

### TIR NA NÓG

Gargoyle Games/ESM

Gargoyle Games' first release was the very well received *Ad Aran*, a 3D "shoot 'em up" space game. But *Tir Na Nog* could hardly be more different. It's an adventure that combines the "what you see is what's there" graphical style of *Falkenhorn's* simple no-text keyboard controls. (That comparison is rather unfair though, because the graphics in *Tir Na Nog* reflect all the adventures in programming techniques that have occurred since *Falkenhorn* appeared!)

The hero of the game *Cuchulainn* (Cavan for short) is represented by a 3Dy-animated graphic almost one-third of the screen high. He wears the Land of Youth (*The Na Nog*) for the four pieces of the seal of Calann in an effort to re-locate them to defeat the great enemy.

Cavan's only mode of transport is to walk. You control the hero using simple "walk left" and "walk right" keys. Two more keys are used to pick up and drop the many objects and weapons littered around the paths.

Weapons are very important here for Cavan. An 8's can almost be *Tir Na Nog* — there's also a robust sense of morality stated rather, they can be defeated by shooting at them with some kind of weapon. If Cavan loses a fight, he doesn't die on first he's dead already! But all his possessions are dropped and he goes back to the starting position — so it's essential to save the game straight away — when you start, if you don't want all the time and pieces littered all over the shop!

*Tir Na Nog* is a mammoth undertaking which will take a very long time to complete and, nevertheless, offers excellent value for money for "real money". Add to that the superb graphics and you have a game which deserves to go down as a classic!



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# SPOT THE DIFFERENCE COMPETITION

Here's a great competition to kick off the new year! Hewson Consultants and Saga Systems, in conjunction with Your Spectrum, are giving away £600 worth of software and hardware. Plus there's a quiz off Avalon — see page 14!



This competition's ideal for all those of you who are always writing in to tell us when we've made a teeny-weeny error in the magazine (I bet you like! Ed.). If you take a good look at the two cartoons below — based on Hewson Consultants' Avalon game — you may notice that they're not quite identical.

What we want you to do is ring each difference on the coupon cartoon and, once you've completed the rest of the form, write the number of differences you found on the back of the envelope and send it off to Avalon Competition, Your Spectrum, 14 Rathbone Place, London W1P 1JQ.

#### FIRST UP!

Winner of this competition will be the first correct coupon to be plucked out of the Editor's hat at random — and if that's you, you're due to receive £60 worth of hardware from Saga Systems, including its Emperor I keyboard, and the complete range of software from Hewson Consultants. There'll also be 20 runners-up and each will receive a copy of ZAP — the machine code development system worth £20!



#### AVALON RULES OK!

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# THE ULTIMATE ADVENTURE-UNDERWURLDE

Sabre Man's back... and this time he's hell-bent on involving himself in all kinds of unholy goings-on. Ross Holman enters the diabolic universe of Underworld to find out whether playing games of this nature is good for the soul

Sabre Man is turning out to be Ultimate's answer to Indiana Jones — and in much the same way as his movie counterpart, Sabre Man looks set to be a standard character in many an Ultimate graphic adventure to come.

In Underworld, the sequel to Sabre Wolf, Sabre Man's in all sorts of untold danger in a labyrinth of rooms, caves and passageways. And if you're worrying that Underworld's going to be a rip-off of *Ark II*, don't — Ultimate's latest offering is really different and really compelling.

## WHERE'S THE SABRE?

Once the game's started, you see the familiar, if somewhat diminished, figure of Sabre Man... but set in very unfamiliar surroundings. The on-screen scene reveals that Sabre Man begins his adventures in a palace called Underworld, and his mission is to escape alive! Sounds pretty simple... The action takes up most of the screen, except for the top two lines that are used to show the score, the number of lives left, your 'game power', the number of weapons collected, and how deep into Underworld you've penetrated.

Perhaps the most notable omission in Underworld is Sabre Man's trusty

sword. In fact, our hero starts off without a weapon to his name... but there just happens to be a catapult lying on the floor of the first room and with it, an infinite number of stones. The other three weapons, a bow, a fist/band and a knife, lie further afield, but you can holdal four at once.

A few Sabre Man's stood around for a while admiring the graphics, the 'music' will have come out of the woodwork to annoy him. Note that the larger sprites don't actually kill your character — they just annoy you to the point that you make some silly mistake. Of course, on the other hand, Sabre Man can be made to kill a few of the 'muskie' — a course of action I can thoroughly recommend.

## GIVE 'EM ENOUGH HOPE...

After a while, I was wondering if Sabre Man could possibly die, in most Ultimate adventures I don't usually have time to think about this particular problem! Movement of your character left and right is possible — but since his jungle escapades, Sabre Man has acquired some gymnastic skills and he's now capable of jumping across vertical shafts. Ultimate has also programmed Sabre Man with a useful sense of self-preservation: every time he comes across a huge drop, he'll

## ROOM FOR MANOEUVRES

These images

show a typical

example of the kind

of many that

appear

Underworld. They

are certainly not

new — they have

got in your eye and

because you always

know what you

have to do you

make little

mistakes.

When you're in the 'big' room, a lot of weapons seem to come out over the screen. However, see Sabre Man firing off a shot of swords at the attacking line of gobs. Roman shot, isn't it? ...



Underworld is 2D perspective, but it's on the leading edge of being a fully 3D game.

## LOOKING FOR TROUBLE?



How wide — another adventure? I reckon the best bet is to go out and buy that catapult, especially as I've heard it comes with an infinite number of rocks! I see I think most of the furniture is new — I'd just had to be a Sabre Wolf fan! In talking to some other Ultimate fan, I've discovered that he's going to be the first in Scotland to buy a...

## A BIRD'S EYE VIEW...



Watch, what do I do next? Stick on the bloody looking picture frame, if only a couple of time before those pesky birds come looking for me. I've got the option of going up to the world — which I like especially given jumping around on the picture frame — or I could hold a lower level. I know which I want...

## FOR MY NEXT ROPE TRICK!



Just how do I manage to get in situations like this? I can either swing myself to the left or right that point or extend the rope downwards until I can jump safely to the ground. Otherwise, in the interests of computer science, I could always hang around and see which 'rope' is going to break me for us...

automatically jump rather than fall.

Getting back to dying... my first experience came when I tried to jump Sabre Man on to a nearby ledge. Of course, I misjudged it, and dropped through to the room below and ended up, legs in the air, nose-cold dead. And what do you know — everything looks different, underneath the castle, the caves are rock-strewn and you'll come across a number of building craters. Having decided to jump across one of the craters, Sabre Man was found to float on the bubbles and land off to the room above. It seems a successful method of getting to the top of the maze, but most of my attempts were thwarted by a squid-like creature that seemed not to be sympathetic to the fact that I was poorly experienced at using the volcanic elevators.

Since you've collected weapons, it's included here, in this case, the sword which catapult has been found. Unfortunately, although Sabre Man can carry various weapons, he can only use one at a time!



The Underworld palace is heavily decorated with 19th Century furniture — isn't it a pity that there isn't any pretty? Sabre Man is going to be a little bit more than a simple royal over the top and perhaps improve the game a touch...

Since Sabre Man has made an attempt at jumping, it's included here, in this case, the sword which catapult has been found. Unfortunately, although Sabre Man can carry various weapons, he can only use one at a time!

Now you have Sabre Man — look how his adventures in Sabre Man are going to have had a bit of weight though — perhaps he needs a little bit more!

Discovering the ropes was also more of an accident than a planned operation. Approaching the edge of a precipice, I allowed Sabre Man to throw himself into theinky blackness and, to my surprise and Sabre Man's relief, the cave ceiling seemed to hold the graphic figure there as if it was smeared with superglue! Closer inspection revealed Sabre Man clinging to a rope, which could be extended by pulling back on the joystick until... yes, you've guessed it, he gets snubbed by another of those tentacle worms. By this time, you're feeling quite relieved that you've given six lives to complete the adventure!

Once you get the hang of the ropes, they're simplicity itself. As you've gathered from my first experience of using the ropes, though, that's not the problem — it's what you do once you're on the rope. It's essential to move downwards as quickly as possible and keep going, by prepared at any time to slow-down or pause movement on the ropes, just in case of collisions. You also have to keep one eye out for stalactites — these can fall (at random, as far as I could say) when Sabre man jumps for the ropes. Needless to say, stalactites are not the most user-friendly objects in Underworld.

Once you've lowered the rope to a level that you can jump off to the ground, you can always use it to climb up — you just have to remember where you left it. Of course, jumping off the rope once Sabre Man's reached the top is not the easiest of tasks but practice makes perfect.

After a few games I found that I could manoeuvre Sabre Man onto the bubbles on the rock pools, and this really was a much better technique for moving up to higher levels. In fact, I found it quite easy to jump from bubble to bubble to avoid the 'waters', but I wouldn't advocate that technique until you've got a few hours of Underworld under your belt.

The only other thing about registering deaths that's probably worth knowing is that if you jump Sabre Man on to a gem, he'll build up the amount of energy that's indicated in the top left of the screen

panel. This figure is a measure of the time Sabre Man can spend falling, without dying. So, collect those gems... it's worth it in the long run!

## WHAT THE DEVIL?

Underworld is split into three regions and each is watched over by a guardian. These comprise of large purple graphics striding under ominous stalactites. And you should by now have guessed the connection between the fact that you've to find three weapons (after the catapult) and three guardians to kill; each guardian requires a specific weapon to be used at it before it'll succumb to its chips.

Once you've managed to kill a guardian, though, you'll be allowed through to the next section. Doubtless it's worth also understanding the eagles; these winged graphics will swoop down and carry Sabre Man off in their claws — sometimes they take you somewhere useful, but more often than not they don't. If an eagle does scoop you up and start flying off, you do have the ability to struggle which, even if it doesn't lead to you being dropped quickly, will certainly impede the eagle's flight.

Last, but certainly not least, you'll come across the third guardian which just happens to resemble the devil on the front of the cassette box. When I first came across this evil little graphic, I found I couldn't get past him at all — everything I fired at him was useless. Luckily, hairy hacker Dave Nicholls came to my rescue with the tip that the guardian could be jumped past. The trick is to get as close as you can to the guardian and wait... eventually, a 'swoosh' will come up behind you and knock you past the guardian. Not only does this mean you don't have to spend hours searching for weapons, but if you don't kill the guardian, the eagles don't appear — which certainly makes the game that much quicker!

## JUMPING AHEAD

Once you've got the hang of manoeuvring Sabre Man through some of the trickiest situations in Underworld, you'll

## UNDER ATTACK ...



Small! My first chance to kill a guardian and my subsequent work, then, I remember seeing a small guardian... perhaps it's up and get that I'll be able to make some headway. Of course, I could always get real close to the gem, and hope that one of the 'waters' will bounce me through. Well, it worked for Dave Nicholls...

## UP, UP AND AWAY!



Now, I'm at the 10th level — and there's nowhere to go up! Luckily, there are volcanic elevators and, as long as the 'waters' are away from enough, there's a chance the bubble could get me out of here. I can move about on the bubble, but I get too near to the edge for some imaginative reason I get the rope to jump off...

## WHERE EAGLES DARE



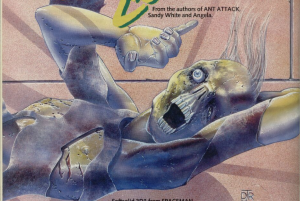
Having killed my first guardian, I'll get far to reward in a flock of eagles on my tail. At least the variety of 'eagles' doesn't become too great the screen like a jolly young girl — they just try and grab you! These jokers use an up arrow key and I think it's going to stop me in the next... or not! Aaaaah!

A prophecy is about to be fulfilled. The Dead will rise again to eat the flesh of the living...

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# HACKER'S GUIDE

After a routine quest through Underworld's maze, hacker Dave Mitchell finds that it's not only the best character you've seen before...

Those of you who, like me, have been playing around with micros for longer than you care to remember, will recall fondly the days when software production meant breaking the little tab at the back of the cassette. Nowadays, of course, things are rather different — although, strangely, Ultimate's games usually incorporate only the most rudimentary protection, in fact, its protection methods caused more trouble for the hacker than the game!

With the release of Underworld, this situation has changed — it's protected by an anti-MERGE device, a fast loading system and various other little tricks just to make life awkward, but the word 'impossible' never quite made it into the Hacker's Dictionary, and I soon found myself peering around inside Underworld's code to see if there was anything interesting. Ultimate has never really encouraged innovative coding — its programmers have simply gone to the trouble of loading exactly what a Z80 is capable of and there writes games using features that many other programmers miss.

Taking Underworld as a classic example of good programming, there are one

or two techniques well worth adapting for use in your own programs.

## COPY CATS!

To kick off, the code in Underworld is very well structured. The central loop of most Ultimate games consists of a series of calls to subroutines which is only varied at the end of the game; this means that each routine can be tested on its own. Of course, since you'd written a good subroutine, there's no reason why it should be used just the once, wanting through Underworld's routines. I noticed code from Sabre Wulf and others!

Secondly, Ultimate's programmers made great use of the 'JP (HL), immediate' instruction; this is the machine code equivalent of the computed GO TO. To see the advantage of this, you have to realize that in most games there are many tasks the computer has to carry out, such as reading the keyboard and moving the sprites. But there are also a number of 'specialised' routines (to handle the obstacles in each room for example) that you can access via the indirect jump instruction. As each room type requires different connections, there'll be a separate routine for each room type called by an indirect jump; this means that time won't be wasted 'looking' for objects that

aren't there. Basic programmers may recognize this technique when constructing menu selections — instead of having a key pressed and a lot of IF...GOTO statements, you could use an array of line numbers accessed by a simple GOTO line number!

Finally, for the statisticians out there, the percentage score are calculated from a maximum of 576 rooms, although I've been reliably informed there are 605 rooms altogether. The weapons can appear in any of four different combinations of rooms — so, once you've found one, if you know the trick, you know where the others are. Underworld's code and data take up about 34K, with a further 3-4K being used as temporary storage while the game is running.

## THIS IS YOUR LIFE

And now, the moment you've all been waiting for — the POKEs. Well, grab yourself a blank tape and your original copy of Underworld and get ready. First off, type in the special loader given, RUN it and SAVE it to the blank tape (following the instructions provided on-screen). Once done, re-wind the tape and clear your Spectrum using the command **RAMDISK:15800**. Now type **LOAD:AS 25000**, press Enter, type **LOAD** and

start up your tape. When the loader's loaded, take out your tape and replace it with the Underworld master. Remove the lead from your cassette machine and listen to the tape, pausing it just after the program header (this is the short section that's heard first on the tape). Now re-connect the lead and start the tape up again. When the 'OK' message appears, pause the tape again and type in the following commands:

```
POKE 26791,2517000
14978,202
RAMDISK:AS 24740
```

You should now get a garbage message on-screen — press in type 'MAY', press Enter and type in the following listing:

```
000 READ 0
700 FOR 0=00000 TO 00000-1
000 READ 7:POKE 0,7
000 NEXT 0
140 RAMDISK:AS 00000
```

The final stage is to select one of the following data files and add it to the above program. Each line does something different, but only one can be used at a time! For infinite lives:

```
150 DATA 11,02,0,58,140,211,
80,204,121,195,242,90
```

To say 'invented after finding a gem:

```
160 DATA 17,00,0,0,0,100,140,
50,154,140,195,242,90
```

To make the weapons appear in the same places each game:

```
180 DATA 0,0,0,0,0,0,190,200,
195,242,90
```

All you have to do now is type 'RUN', press Enter and re-visit the tape. Good luck, and thanks to Chris Wood (without whose inspiration we would have been typing in about 500 bytes of machine code instead.



The special loader you'll need to use if you stand any chance of extending your time in Underworld.

## THE ULTIMATE ADVENTURE UNDERWORLD

ready to start mapping out the rooms. This isn't that difficult as the screens are paged rather than scrolled. However, there are 603 rooms... so the task is just a little daunting!

Perhaps the first and most important thing to master is control of Sabre Man. You'll have to be able to judge distances down to the last pixel if you're going to survive through to the end. Also, in a similar way to other Ultimate games, there's a slight delay between your entry

to a room and the 'master' appearing — so, if you can move freely from screen to screen you can avoid many pointless confrontations. You also have to be careful not to rush blindly into one room from another — if you don't know the terrain that well, you'll be well advised to check out the next rooms carefully... just in case there's a huge drop as soon as you enter, so you can take the appropriate jumping action.

## THE RETURN OF THE SEQUEL

Part of the appeal of Underworld must be the way the 'master' buffer is constructed from room to room like on a pinball machine... without actually killing you. Although there are also three different breeds of 'mazy', all behave in a completely different way. On the whole, I'd advise you to eradicate them as soon as they appear — but then I walked around

for whole game with my programmable joystick set to fire continuously.

Those who managed to defeat Sabre Man's last bid's going to give you a feeling of déjà vu. Once you're baffled your way through all three sections and manoeuvred out from past the devil, all that's left to explore is a really interesting area that leads up to ground level and your final escape. And then you get the message of congratulations and news of the next adventures. Watch this space in a few months' time and maybe you'll be hearing all about Pentagram and Mirror Maze... who knows?

Personally, I think Underworld's a wonderful game combining luck and skill with a very interesting backdrop of fantasy and, of course, Ultimate's usual high standard of graphics. If one can't wait for Pentagram... or Mirror Maze... or whatever it's going to be called! ☺



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# JOYSTICK JURY

All the latest software from around the houses! Passing judgement this month are Dave Nicholls, Ross Holman and Roger Willis.

Our regular crew of software reviewers are in fine form this month, bringing the spirit of Christmas with us: Dave Nicholls, the hairy backer; JST champion Ross Holman; and our two-wheeled terror, Roger Willis.

Just in case you find our scoring system too confusing, here's what it's all about. The score out of five at the end of each person's review is based on their own experience of the game. But that's pretty subjective — so, they also use the HIT and MISS system to indicate its potential as a commercial success.



ROSS HOLMAN



ROGER WILLIS



DAVE NICHOLLS



## FLIP FLAP

Software Supernova/£2.99

One Touch play has been quite well

entered for on the Spectrum with at least two pinball games already available, including one marketed by Sinclair Research itself. This is probably why Software Projects chose to put *Flip Flap* in its Software Supernova range of cheap software.

In fact, *Flip Flap* is just about the best all-round version that I've seen. If it had been released earlier, I reckon it would have sold quite well — even at full price! The game includes all the features of the real thing, such as bumpers, traps, bonus scores and tilts and there's also moving targets to hit and a gamble option to give you extra points and balls. Add to this the fact that there are no less than 25 tables to

play, each new table being offered after you've beaten the target score on the previous one, and you've quite a good game.

The only real minus in the game is that the ball does tend to behave a bit like a croquet ball with spins on it. It's only £2.99, so who's complaining anyway? **HIT**

**News** Despite an appalling lack of instructions, a good game of pinball with different tables to give it interest. **MISS**

**Roger** Being a bit of a pinball wizard, this one earned right up my sleeve... and I was a disappointed winner! **HIT**



## ALL OR NOTHING

Atari/£9.99

Save This is something of an oddity in that

it doesn't really fit into any one particular category of game. It's basically an arcade game, but there's also some strategy and adventure aspects.

Visually it resembles *Aut & Aut*, in that the enemy camp you've purchased lets it down in isometric perspective which can be viewed from different sides — but there's far more to it than that! Your mission is to locate the secret files hidden in the camp's warehouses but first, you must find the office safe containing a gun and the key to one of the warehouses. Each warehouse contains the key to the next one along with some other useful items like bullets and explosives.

All the time you're playing, the camp's

being patrolled by guards who shoot at you, and dogs which just get in the way. Once you've found some money it's possible to bribe the guards to leave you alone for a while, but you can always tempt them to move away with a few carefully placed explosives.

All in all, this is quite a good game. I've a few reservations as to its lasting appeal, but I would

recommend it. **HIT**

**News** Isometric full-screen graphics aren't such a thrill these days, but they are used well. **MISS**

**Roger** Get ready for this death-dealing program — it's quick with all the way! **HIT**



## DARK STAR

Design Design/£3.50

Save Design Design has taken vector graphics to a stage where the speed of the game is limited by players' ability rather than hardware restrictions.

The game itself is basically a derivative of the *Star Wars* arcade game, with the touch-screen aiming. Your task is to rid the universe of action by firing your spacecraft, called the Liar, through the galaxy and down on to occupied planets where you have to destroy the enemy bases, these consist of delicate rings of towers that must be shot or dodged.

Planets can have more than one base; in fact, some planets also have spacecraft and energy that go on them. Spaceports don't have to be destroyed, but the energy drains replenish your energy supplies and become vital after a while as there are 250 sectors to clear!

*Dark Star* has a very versatile menu system allowing the game to be customised. For example, the speed and accuracy of the alien weapons (as well as

the keys used to control the Liar) can all be changed to suit your own requirements.

Unfortunately, after the novelty of the blindingly fast graphics has worn off, the game becomes rather repetitive and loses most of its appeal. Hopefully Design Design's next offering will be a game instead of a programming exercise. **HIT**

**News** An incredibly fast *Star Wars* variant, with the emphasis on arcade action. Setting the game controls to 'demonstrating' and turning off all the alien's missiles makes the game much more fun. **MISS**

**Roger** Unpleasantly slow stuff for the touch-and-trigger-happy. A positive gamemaster will be able to hone their reaction times to perfection. **HIT**

# JOYSTICK JURY



## CHINESE JUGGLER

Commodore/MS-DOS

**Notes:** To be honest, my lack of infatuation



## DANGER MOUSE IN DOUBLE TROUBLE

Creative Sparks/MS-DOS

**Notes:** There's Greenback in it all again — not satisfied with his campaign of TV, he's decided to take over the VDU as well!



## KUNG FU

Top Byte/MS-DOS

**Notes:** Characteristically oriental graphics frame well-animated Bruce Lee clones trying to



## FRED'S FAN FACTORY

Software Supervisors/MS-DOS

**Notes:** If ever there was an agreement in favour of computer-controlled robots replacing human wage slavery in factories,

with this oriental variety act is probably connected to personal taste. Legendary immutability, or objectivity, or something, must be maintained however.

Players are required to rush around with plates of various colours. The purpose is to try to serve up ones 1 to 4 and a 23 with extra sweet-and-sour sauce, though, it's all about opening 'em up top of sticks and keeping one's past successes going while doing it.

Other juggling tricks can be performed so as to change the colour of plates and increase score. Success with all eight plates spinning apparently leads to more difficult scores and less valuable dishes of a darker hue can be dropped off the track of the

Luckily, Danger Mouse and his trusty sidekick Penfold have got wind of his plan and have kept him out.

Your first objective is to fly Danger Mouse's ancestor from his hideout in Malaysia to the Baron's lair in the jungle. Aah, but the Baron knows they're coming and he's sent a flock of Kwag who do his dirty deeds. These robots can be repelled by a blast from DM's joystick, but a different song is needed for each type of robot, and lower levels the selection is not remote, but here are the players meant. Animals which you can use. Once in the jungle, DM and Penfold proceed on foot, jumping over crocodiles and mowing off snakes, until they reach the Baron's HQ. The final enemy involves DM waving off a number of yellow lights on a grid. If the fails, an animated Danger Mouse is released on an

knock each other senseless in this superb example of an Spectrum violence. Sleeping, rather than getting stopped, means advance as well as retreat, and there's a choice of four classic moves in the authentic 'punch-chop-kick' martial arts tradition. Your invulnerable opponent will attempt to block all your attacks and smash you to the grid. An action replay facility allows you to study the sequence leading to each comically successful knock-out smash-down delivery.

Acquisition of 49K Black belt status eventually leads to another screen with different background and figures — but the action stays nice or less the same. This is one of few action games where course control can be extremely accurate, simply

this appalling excuse for a 'game' is it... So mindless is Fred's daily toil that management — which is *supposedly* the job enough to have taught the program — only demands that he dutifully shuffle from left to right, switching fans on and off.

The simple value from his labour is created by blowing 'balloon men' along the various factory floors, knocking off point-scoring objects and rising inexorably towards an exit at the top of a single screen. Chop it may be, but graphics are crude and keyboard control unacceptably imprecise. Each game-cycle, filled in minutes of available 'balloon men' and their related 'fans', is pathetically short. Given 49K of potentially creative programming space, the whole thing's

stagnant...

With all the ingredients of success, Chinese Juggler/robots' really make it, however you look at it. It requires skill and tactical planning, sure enough — but I found the final, pure and aggression of good accents to be missing. It doesn't even possess the saving grace of being weird. 2/3

**MISS**

**Notes:** This is one of those games that make great when you first start playing them, but don't hold you

**MISS**

**Notes:** A fairly incoherent game that seemed to have a lot to offer with smashing plots! The point of it all? Don't ask me, ask Confucius! 2/3

**MISS**

unimpressive world and the game is over. To suggest the game the graphics are superb and there are lots of nice touches that mark this as a very well thought out game.

Danger Mouse & Double Trouble will probably appeal most to the youngest player at it's slightly too easy for the hardened arcade fiend, but the graphics are good enough for anybody. 4/5

**HIT**

**Notes:** The automatic self-play facility that cuts in if you're not doing too well saves all the tedious business of actually pressing keys yourself. I thought it looked terrific. 2/3

**MISS**

**Notes:** 'Oh Heck' wins the on-screen Penfold, an DM gets it wrong again. Creative Sparks' team I get anything wrong... 4/5

**HIT**

because of being too fighting's formalised movements. Although it initially appears simplistic, the various combinations of attack, defence and surprise can be very entertaining and it's certainly safer than the real thing! For enthusiasts of the real thing, it'll provide a chance to keep in trim while their smothered bodies heal. 3/5

**HIT**

**Notes:** Kung Fu is quite a good martial arts simulation, but I'd have liked a few more possible 'moves' and a bit less testosterone. 2/3

**MISS**

**Notes:** A delightful program combining humour, skill, good graphics and violence. The thrill of subduing an your opponent and knocking him down with one swift blow is fun. 3/5

**HIT**

nothing short of an insult!

Unfortunately, Fred seemed absolutely no sign of understanding his concrete working class conditions or historical role — he failed to go out on strike. So I pulled the plug and made him *robotically* invent. Machine code like this could easily change someone's hobby from computing to knitting! 0/5

**MISS**

**Notes:** It might have been more fun if the instructions had explained what I was meant to be trying to do — but I doubt it! 0/5

**MISS**

**Notes:** When I first caught a glimpse of this game, I thought the idea of it was quite novel... but after a few days I realised that, unfortunately, it's a dull, dull, dull! Moving around on-screen proves most frustrating. 2/3

**MISS**

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# JOYSTICK JURY



## ICICLE KID JUMP CHALLENGE

Macintosh/TK-99

**Rating:** Yes, I can tell you from personal experience that leaping back or forward can certainly affect your stability while

jumping a motorcycle. It can also tell you that, just as in this program, getting it wrong has spectacular consequences.

Wow, though, Icicle always gets up and waves to the crowd! — I usually stay alone, screaming with pain ...

Approach distance appears irrelevant, so long as the biker has climbed theough its five jumps and achieved speed is at its maximum when taking off from the ramp. All you really have to do is control the bike in the air and that, presumably, governs the number of cars successfully jumped. Sounds like, despite it? Well, it isn't ...

Challenging graphics only serve to underline the fact that Icicle Kid has attached his name to a fairly pedestrian arcade game that gets boring quicker than

players will get good at it. The intro — or practice — screen demands you jump a particular car overhead, possible if, you make a perfect jump every time! Oh, yes, jumps beyond a certain limit produce an offer to SAVE on to blank cassette for comparison entry purposes, but I can't imagine anyone

buying 2.75

**MISS**

**Hint:** The BMX section gets annoying — it's so easy you can do it with your eyes closed! Jumping with cars is much more difficult and more

**HIT**

**Hint:** You can control Icicle quite well, but even after practice I found it difficult to make any successful jumps over a dozen distance. The "jumping" ones? **MISS** It helps a lot. 2/3



## ZOMBIE ZOMBI

Macintosh/TK-99

**Rating:** OK, not Antares has been invaded by zombies — daily ground units that run red with rage and attack whenever you get

too close.

To help you, rd the city of this infelix of Ocean Games has, you're equipped with a helicopter which you can use to fly around in safety. But you have to know it where you're destroying the zombies — a feat accomplished by raising into them from behind. Once hit they turn all shakily and can be led up onto any convenient wall where they will happily jump to their death to the tune of *Zoo Games*. If you're not too confident of controlling the zombies this way, you can always fire your "puffs" at them which'll make them run away to a safe distance.

Any additions and those will also be glad to hear that your helicopter is capable of carrying a large number of bombs around, so the city can be re-defined to suit

yourself, you can also have some fun with your own brand of "Soft Solid" graffiti!

Basically this is *Am-4* with all over again and as much it will appeal to *Am-4* devotees everywhere — but if you found *Am-4* such a tedious experience then don't bother with *Zombie Zombi*. For those of you who've never noticed *Zombi* is probably the best of the two. 2/3

**HIT**

**Hint:** This is just too similar to *Am-4* to offer anything very exciting. The games are OK and the ability to write obscenities on the bricks should keep you amused. 1/3

**MISS**

**Hint:** Ticking up the undead can be annoying, even though I'm told it's a painless short on originality. Probably a lot. 4/3

**HIT**



## NOAH

Macintosh/TK-99

**Rating:** Considering the fate of the whole animal Kingdom in its story book ... but in Noah,

that's your lot! You've got three days to collect all 33 pairs of animals and return them to the Ark. And there are 126 scores to explore, so landing down all the animals is a fairly daunting task.

*Noah* is played by a large five-by-three graphic, the vector movement makes everything look a bit jumpy, but it's perfectly adequate for a game of this type. On each screen you a number of land gas plants (such as grass, water, fence or lake) all of which you have to manoeuvre around; the insipid-looking flood has undeniably made Noah rather boring of water! There's also a hump of land which need be eaten before you can move on to the next screen. Watch out for the lamp and key, as you'll need these to

explore the caves and the area behind the Great Wall. And if you get lost, you can access a map of the whole playing area with your position marked on it.

The game features some very nice large graphics of animals, but overall I found the whole thing just a bit too repetitive and slow. 2/3

**MISS**

**Hint:** I wish software houses would test their programs properly. In this case, the keyboard routine is built to treat so that to go left you push right and vice versa. Not bad for keyboard players though ... 2/3

**MISS**

**Hint:** It's so slow that even the most devoted gamers nowadays will be praying for a miracle to speed things up! 1/3

**MISS**



## TURMOIL

Seg-Byte/TK-99

**Rating:** Picture a garage, one man with a spanner Mick the Mechanic, and a plague

of marauding Arabs — and you've got *Turmoil*. The idea of the game is to guide Mick up and down ladders and along platforms to fill his oil can with the precious black stuff. First manoeuvre: Mick sees a girl in the floor and drops the oil; this makes a car appear on the computer bank. If you manage to complete this first a second time, you get to move on to the next screen to build another machine.

Turmoil starts out from other ladders and levels' games currently flooding the market because it makes use of 'spring' power. Mick himself has no natural jumping ability, so to get him leaping on to the necessary platforms, you have to guide him over a spring ... he'll then be flung up in the air in proportion to the 'springiness'

of the spring. The Arabs, who seem to be very intelligent, also use the springs and ladders in their efforts to thwart your plans. You can kill an Arab by spilling some oil in his path, but they're so soon replaced so it hardly seems worth it.

Well, it may be just another 'platform' clone, but it's certainly different to be successful ...

I liked it. 3/3

**HIT**

**Hint:** It may change from the usual selection of platform games. The springs are a great idea and the bouncing Arabs are enough to give you a case of the Shingles! 3/3

**HIT**

**Rating:** It's a tried and tested formula ... with a few dirty tricks

**HIT**

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Add to this the ability to alter the pitch tone and shape of the sound you have produced and it's flexibility is unlimited. In simple terms, imagine the note you have produced as a calm sea, by altering the pitch and shape you can produce waves, the top of the wave corresponds with the maximum volume and pitch of the note, which like the wave itself rises and falls.

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## CLUB SUCCESS

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# JOYSTICK JURY



## FREE

**Software Supremacy '92 '99**

**How?** Yours is an Amstrad/Commodore

with some 60 different stages. The display's split into two parts with a status panel (showing the score, lives left, and position in the game) on the left, and the playing area on the right. You control a gun ship which sits at the bottom of the screen with controls to move it left, right, up or down and, of course, fire. The ship can only go about half-way up the screen, but this is good enough to escape from most tricky situations.

The aliens usually descend in groups of three or four and exhibit some very bizarre behaviour; some are easy to kill and some are not. After ten waves of attack, you move on to the next phase and get a credit life; here you have a whole new batch of

aliens... and this lot shoot back!

On landing, you can choose to see a demonstration game; what you're not told, however, is that the demo takes in about 50 minutes in all!

It's good to see a company like Software Supremacy supporting our brilliant, but unassailable, pieces of software. Hopefully, it'll encourage the authors

to produce better games. **2/3 MISS**

**How?** Not another Space Invaders clone! Well, it's a cheap and cheerful variation on a theme — a Scrooge

special, maybe? **1/3 MISS**

**How?** A throw-back to the happy

fringe days of computing doesn't this. **3/3 MISS**



## SIR LANCELOT

**Microgame House '92 '95**

**How?** This is a simplified Mario-like type

game that packs an incredible 24 screens into a 16k Spectrum. The idea behind the game is fairly conceptual — collect the floating objects on each screen to make an exit, only those that's used to get us to the next level — but the actual implementation is quite nice. Your little Lancelot figure runs around at a fairly hectic pace, and all the space Lancelots march in unison on and fire across the bottom of the screen. (King my help, pet?)

The aim of the game is to progress through all the rooms of the castle in search of the Holy Grail. A manager's of various pairs of the various key points, although many don't matter (number their number). Lancelot jumps, gaps, moves left

or right (even when falling) and has no problems surviving upon the longest of hills.

The graphics appear to move in four pixel stages, which means that it's slightly less precise than I would have liked — but the characters and objects have been carefully placed to give

maximum problems. **3/3 HIT**

**How?** Lancelot is one of the best platform games I've seen for a Micro. Well, it's a standard 50k career. Microgame House has done

well to fit it all in, but the sprites have a lot to be desired. **3/3 HIT**

**How?** Hunting the Holy Grail is good, it's simple, open, but it's a different concept

with a fervent imagination like mine in just 16K! **3/3 HIT**



## BATTLEZONE

**Quadravex '92 '95**

**How?** This is the Atari approved version

and in such, is a very competent copy of the original. Quadravex must be so it knows there's nothing's still so common, but who's really for the 'official' Battlezone, but after all the copies there've been, there isn't the misery!

The game itself contains all the features you'd expect, including some very clever features. You get to control a tank, travelling across a flat plain that's occasionally littered with large rocks and pyramids. A radar at the top of the screen shows the position of approaching enemy vehicles, and messages pop up on the left to let you know when an enemy is in range (although they'll probably send you an explosive reminder).

The controls take a little getting used to; they simulate the two-level controls as used by the arcade game, rather than the standard joystick format. The line-drawing of the graphics is, as Quadravex claims, flat — and that is probably the best version I've played on the

Spectrum. **Home! 3/3 MISS**

**How?** Well, if you haven't already got a copy of this game, this is the one to get. Not only is it the 'official' Atari version...

but it's as good as any I've seen! **2 1/2 HIT**

**How?** Quite a reasonable training aid for both Panzer crews and London's taxi drivers. Definitely **HIT**



## JASPER

**Microgame '92 '95**

**How?** Forget the conventional story line — "mystery rat warning young Jasper about how dangerous the jungle becomes after the 'Great A' Wangled" — because this superb offering is obviously intended as a

serious training aid to Central American guerrillas. Twenty-two screens of herbal shrubbery, wildlife and obstacles have to be negotiated successfully, to recover the key and get safely back to base... to continue one's studies of 'The Durrell's Coloured World in France, no doubt!

Everything kills with pure certainty, but a mean rat can defeat all sorts of useful tools along the way. Facilities will delight Jasper's inability to slaughter wild river crocodiles, spiders, vipers, slugs, bees, scorpions, frogs and monkeys (and to mention the odd 'Y' insect) clanking against and the various helicopter (including those some flames, blasting away at our Jeep). Avoidance and survival skills are the name of this game.

Amazul's course simulation is a strong feature with water in situ to avoid oil and other things lying about in handy coils for later use. Picking flowers helps jumping ability,

food can be picked up for extra and sometimes, antibodies stored for still almost and the occasional spruce spray used for dodgy weed disposal. Acquisition of Mopac Patrons treatment lives, too. If you can handle attractive cartoon graphics, excellent attack tactics and (occasional) advanced strategy, then an awful lot of practice with Jasper could get you a decent job as a full-time

parrot! **3/3 HIT**

**How?** Jasper has a lot of very pretty graphics, but technically the game's a bit odd. Swinging on the ropes makes the pace slow down and the atmosphere

problems are awful. **2/3 MISS**

**How?** Another 'jumping' platform game where you utilize various objects to aid your progress. Jasper's ability to crawl, see ropes and perform extra long jumps adds to the thrill, but not enough to keep me interested. **2 1/2 MISS**

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# EVERY PICTURE TELLS A STORY

Anyone can be an artist on the Spectrum — it's just a matter of co-ordination. Let Chris Somerville tell you where to draw the line.

Everyone must remember using a pantograph at one time or another — but for those who don't, it's a mechanical instrument used to transfer a copy of a drawing to any scale. It may be cheating to use a pantograph but if, like me, you don't have the artistic flair of Rembrandt then it's a worthwhile principle to keep in mind.

## ALTERNATIVE ART

Now there are many excellent programs that allow you to create screen graphics by manipulating the cursor on-screen. Unfortunately, not everyone's endowed with the necessary artistic talent that's needed to draw directly to the screen — whether you're using a keyboard, joystick or light pen to control the cursor.

There's another method of transferring an original drawing to the screen, and that's to trace the picture on to a piece of transparent plastic material and tape it on the screen as a drawing

guide. Trouble is, the original drawing can't be bigger than your TV screen, and the distortion caused by the thickness of the screen precludes accurate work.

There are, of course, mechanical/electronic graph pads and digit-trackers, ranging in price from £50 to over £100. These, however, consist of pads with large steel drawings; certainly, a pop-poster or large wall map would be way beyond them.

## SQUARING UP

The program included in this article allows you to transfer any drawing — a map, a book illustration, or whatever — in scaled outline, regardless of size. The only restriction on size is that the graphics you wish to enter must fit in the same proportions as the computer screen; this means that any picture, or part of the same, that you intend transferring must be roughly in the proportions three units wide to two units high.

Having chosen your subject, you now need to overlay it with a grid of squares; or something like a map; these are already there — providing the necessary grid references. In most cases, though, you'll need to draw a pattern of squares in pencil over the original illustration. A more flexible system, and one that I use for my drawings from being covered with squares, is to draw the grid on an acetate sheet (obtained from any good stationer or art shop — just ask for a few pieces of overhead projector film). This can then be placed over the drawing; you should use a fine line marker pen to square up the acetate sheet — I'd suggest the Staedtler Lumocolor 343 Permanent.

The grid should be numbered from the bottom left-hand corner, both vertically (Y-axis) and horizontally (X-axis). Normally, it's best to number the co-ordinates of the bottom left-hand corner as X=0, Y=0 (or simply 0,0), if you have a grid numbered in some other fashion — a map for example — or if you're using only a portion of a larger grid, it doesn't matter as the program adjusts the co-ordinates and scales the square to match the screen.

## YOU GET THE PICTURE

Once you've run the program you'll be asked whether you require a printout of the final plot and draw positions of your creation; you may need these for inclusion in another program. (It's worth noting that these are not the co-ordinates as you enter them, but rather their posi-

## SPECTRUM PANTOGRAPH

Once you're typed in the heading and BEEP it, there's a look through the menu system available with the plotter; the various options are tabulated on the lead page of this article.

```

0 CLEAR SCREEN
10 BEEP
20 GOTO 100
30 PRINT "PLOT OR COPY?"
40 INPUT "PLOT OR COPY?"
50 IF A$="P" THEN GOTO 100
60 IF A$="C" THEN GOTO 200
70 GOTO 100

```

**Lines 5-20** Clear memory for the program and POKE the data required for the user-defined plots.

```

100 GET TITLE SCREEN
200 GET COORDINATE "X"
300 GET X2 "X2"

```

**Lines 21-30** Get the variable 'Y' and copy to the start routine.

```

400 PRINT "DRAWING TO BE PLOTTED IS:"
500 PRINT "DRAWING FILE NAME:"
600 PRINT "DRAWING FILE NAME:"
700 PRINT "DRAWING FILE NAME:"
800 PRINT "DRAWING FILE NAME:"
900 PRINT "DRAWING FILE NAME:"
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1600 PRINT "DRAWING FILE NAME:"
1700 PRINT "DRAWING FILE NAME:"
1800 PRINT "DRAWING FILE NAME:"
1900 PRINT "DRAWING FILE NAME:"
2000 PRINT "DRAWING FILE NAME:"

```

**Lines 31-38** Set up the printer routine.

```

210 GET DRAWING FILE NAME
220 GET DRAWING FILE NAME
230 GET DRAWING FILE NAME
240 GET DRAWING FILE NAME
250 GET DRAWING FILE NAME
260 GET DRAWING FILE NAME
270 GET DRAWING FILE NAME
280 GET DRAWING FILE NAME
290 GET DRAWING FILE NAME
300 GET DRAWING FILE NAME

```

**Lines 39-50** Set up the plot variables and the grid toggle variable.

```

310 GET X1
320 GET X2
330 GET Y1
340 GET Y2
350 GET X3
360 GET X4
370 GET X5
380 GET X6
390 GET X7
400 GET X8
410 GET X9
420 GET X0
430 GET X1
440 GET X2
450 GET X3
460 GET X4
470 GET X5
480 GET X6
490 GET X7
500 GET X8
510 GET X9
520 GET X0

```

**Lines 51-58** Printing some brief instructions on-screen.

```

530 GET X1
540 GET X2
550 GET X3
560 GET X4
570 GET X5
580 GET X6
590 GET X7
600 GET X8
610 GET X9
620 GET X0
630 GET X1
640 GET X2
650 GET X3
660 GET X4
670 GET X5
680 GET X6
690 GET X7
700 GET X8
710 GET X9
720 GET X0

```

**Lines 69-78** Request the final set of X and Y co-ordinates.

```

730 GET X1
740 GET X2
750 GET X3
760 GET X4
770 GET X5
780 GET X6
790 GET X7
800 GET X8
810 GET X9
820 GET X0
830 GET X1
840 GET X2
850 GET X3
860 GET X4
870 GET X5
880 GET X6
890 GET X7
900 GET X8
910 GET X9
920 GET X0

```

**Lines 79-100** Request the second set of X and Y co-ordinates.

```

930 GET X1
940 GET X2
950 GET X3
960 GET X4
970 GET X5
980 GET X6
990 GET X7
1000 GET X8
1010 GET X9
1020 GET X0
1030 GET X1
1040 GET X2
1050 GET X3
1060 GET X4
1070 GET X5
1080 GET X6
1090 GET X7
1100 GET X8
1110 GET X9
1120 GET X0

```

**Lines 101-120** Printing graphics and asking the user if suitable for the illustration you wish to copy to the plot.

```

1130 GET X1
1140 GET X2
1150 GET X3
1160 GET X4
1170 GET X5
1180 GET X6
1190 GET X7
1200 GET X8
1210 GET X9
1220 GET X0
1230 GET X1
1240 GET X2
1250 GET X3
1260 GET X4
1270 GET X5
1280 GET X6
1290 GET X7
1300 GET X8
1310 GET X9
1320 GET X0

```

**Lines 121-130** Evaluate and print the screen number.

```

1330 GET X1
1340 GET X2
1350 GET X3
1360 GET X4
1370 GET X5
1380 GET X6
1390 GET X7
1400 GET X8
1410 GET X9
1420 GET X0
1430 GET X1
1440 GET X2
1450 GET X3
1460 GET X4
1470 GET X5
1480 GET X6
1490 GET X7
1500 GET X8
1510 GET X9
1520 GET X0

```

(once after translation.) If you answer 'Yes' to this option, you'll need to have your printer (ZS Printer, AlphaScan 32, or any other printer that recognizes LPT/IP/S/1) connected.

You'll then be asked to enter the X and Y co-ordinates of the bottom left and bottom right of the X-axis. The program will then work out the scale, and tell you how many squares high it can allow the picture to be (so that the whole of the picture can be fitted to scale on the TV's screen). If the maximum height of the picture area fits in with your scaled drawing, then you can continue; if it doesn't, you'll have to start again, juggling the X-axis to suit (increasing the number of squares in the X-axis proportionally increases the number of squares in the Y-axis).

Now you've decided on the correct scale, you'll be given a number to remember — this acts as an escape number bringing you back to the menu at any time. Normally, this number allocated to this will be '999' (just like the police emergency number), but if '999' is a number that you could tap in as a co-ordinate, the program will assign you a different escape number. If you have trouble with numbers, write it down so you won't forget it at a vital moment in your artistic creation.

### THE FINAL TOUCHES

I'd suggest that once you've scaled your picture, you save it to tape. You could then re-load it into one of the many graf-

phic packages (Avalanche Draw, for instance) and play around with colours, fill in the outlines, and so on.

This program is not intended to compete with other graphics programs, but

it's hoped that it will prove a useful addition to the facilities they offer. The program will operate with both the 16K and 48K Spectrum 48K, even though like to elaborate their version with a 'Paint

### QUICK ON THE DRAW?



To the right, you'll see the author's attempt at reproducing the above illustration of Anas using his Paintgraph program. You can see the obvious stages of development and, yes, it did take a while to complete — but, with the help of a graphics package to add the finishing touches, the final picture almost looks better than the original!



```

1000: REM ***** 16000-16000 *****
1100: GO TO 200

```

Line 150-251 Try escape menu at the beginning of the main program

```

150: REM ***** 16100-16100 *****
1600: REM ***** 16100-16100 *****
1700: REM ***** 16100-16100 *****
1800: REM ***** 16100-16100 *****
1900: REM ***** 16100-16100 *****

```

Line 254 Checks to see if the status input is valid.

```

250: REM ***** 16200-16200 *****
260: REM ***** 16200-16200 *****
270: REM ***** 16200-16200 *****
280: REM ***** 16200-16200 *****
290: REM ***** 16200-16200 *****
300: REM ***** 16200-16200 *****
310: REM ***** 16200-16200 *****
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970: REM ***** 16200-16200 *****
980: REM ***** 16200-16200 *****
990: REM ***** 16200-16200 *****

```

Line 254-300 Copy the prog into the relevant subdirectory depending on which key you pressed.

```

990: REM ***** 16300-16300 *****
1000: REM ***** 16300-16300 *****
1010: REM ***** 16300-16300 *****
1020: REM ***** 16300-16300 *****
1030: REM ***** 16300-16300 *****
1040: REM ***** 16300-16300 *****
1050: REM ***** 16300-16300 *****
1060: REM ***** 16300-16300 *****
1070: REM ***** 16300-16300 *****
1080: REM ***** 16300-16300 *****
1090: REM ***** 16300-16300 *****
1100: REM ***** 16300-16300 *****
1110: REM ***** 16300-16300 *****
1120: REM ***** 16300-16300 *****
1130: REM ***** 16300-16300 *****
1140: REM ***** 16300-16300 *****
1150: REM ***** 16300-16300 *****
1160: REM ***** 16300-16300 *****
1170: REM ***** 16300-16300 *****
1180: REM ***** 16300-16300 *****
1190: REM ***** 16300-16300 *****
1200: REM ***** 16300-16300 *****
1210: REM ***** 16300-16300 *****
1220: REM ***** 16300-16300 *****
1230: REM ***** 16300-16300 *****
1240: REM ***** 16300-16300 *****
1250: REM ***** 16300-16300 *****
1260: REM ***** 16300-16300 *****
1270: REM ***** 16300-16300 *****
1280: REM ***** 16300-16300 *****
1290: REM ***** 16300-16300 *****
1300: REM ***** 16300-16300 *****
1310: REM ***** 16300-16300 *****
1320: REM ***** 16300-16300 *****
1330: REM ***** 16300-16300 *****
1340: REM ***** 16300-16300 *****
1350: REM ***** 16300-16300 *****
1360: REM ***** 16300-16300 *****
1370: REM ***** 16300-16300 *****
1380: REM ***** 16300-16300 *****
1390: REM ***** 16300-16300 *****
1400: REM ***** 16300-16300 *****
1410: REM ***** 16300-16300 *****
1420: REM ***** 16300-16300 *****
1430: REM ***** 16300-16300 *****
1440: REM ***** 16300-16300 *****
1450: REM ***** 16300-16300 *****
1460: REM ***** 16300-16300 *****
1470: REM ***** 16300-16300 *****
1480: REM ***** 16300-16300 *****
1490: REM ***** 16300-16300 *****
1500: REM ***** 16300-16300 *****

```

```

1510: REM ***** 16400-16400 *****
1520: REM ***** 16400-16400 *****
1530: REM ***** 16400-16400 *****
1540: REM ***** 16400-16400 *****
1550: REM ***** 16400-16400 *****
1560: REM ***** 16400-16400 *****
1570: REM ***** 16400-16400 *****
1580: REM ***** 16400-16400 *****
1590: REM ***** 16400-16400 *****
1600: REM ***** 16400-16400 *****
1610: REM ***** 16400-16400 *****
1620: REM ***** 16400-16400 *****
1630: REM ***** 16400-16400 *****
1640: REM ***** 16400-16400 *****
1650: REM ***** 16400-16400 *****
1660: REM ***** 16400-16400 *****
1670: REM ***** 16400-16400 *****
1680: REM ***** 16400-16400 *****
1690: REM ***** 16400-16400 *****
1700: REM ***** 16400-16400 *****
1710: REM ***** 16400-16400 *****
1720: REM ***** 16400-16400 *****
1730: REM ***** 16400-16400 *****
1740: REM ***** 16400-16400 *****
1750: REM ***** 16400-16400 *****
1760: REM ***** 16400-16400 *****
1770: REM ***** 16400-16400 *****
1780: REM ***** 16400-16400 *****
1790: REM ***** 16400-16400 *****
1800: REM ***** 16400-16400 *****

```

Line 300-350 Print up the menu table on cassette according to the option you selected.

Line 400-500 Contains the subroutines for all the menu options.

```

500: REM ***** 16500-16500 *****
510: REM ***** 16500-16500 *****
520: REM ***** 16500-16500 *****
530: REM ***** 16500-16500 *****
540: REM ***** 16500-16500 *****
550: REM ***** 16500-16500 *****
560: REM ***** 16500-16500 *****
570: REM ***** 16500-16500 *****
580: REM ***** 16500-16500 *****
590: REM ***** 16500-16500 *****
600: REM ***** 16500-16500 *****
610: REM ***** 16500-16500 *****
620: REM ***** 16500-16500 *****
630: REM ***** 16500-16500 *****
640: REM ***** 16500-16500 *****
650: REM ***** 16500-16500 *****
660: REM ***** 16500-16500 *****
670: REM ***** 16500-16500 *****
680: REM ***** 16500-16500 *****
690: REM ***** 16500-16500 *****
700: REM ***** 16500-16500 *****
710: REM ***** 16500-16500 *****
720: REM ***** 16500-16500 *****
730: REM ***** 16500-16500 *****
740: REM ***** 16500-16500 *****
750: REM ***** 16500-16500 *****
760: REM ***** 16500-16500 *****
770: REM ***** 16500-16500 *****
780: REM ***** 16500-16500 *****
790: REM ***** 16500-16500 *****
800: REM ***** 16500-16500 *****
810: REM ***** 16500-16500 *****
820: REM ***** 16500-16500 *****
830: REM ***** 16500-16500 *****
840: REM ***** 16500-16500 *****
850: REM ***** 16500-16500 *****
860: REM ***** 16500-16500 *****
870: REM ***** 16500-16500 *****
880: REM ***** 16500-16500 *****
890: REM ***** 16500-16500 *****
900: REM ***** 16500-16500 *****
910: REM ***** 16500-16500 *****
920: REM ***** 16500-16500 *****
930: REM ***** 16500-16500 *****
940: REM ***** 16500-16500 *****
950: REM ***** 16500-16500 *****
960: REM ***** 16500-16500 *****
970: REM ***** 16500-16500 *****
980: REM ***** 16500-16500 *****
990: REM ***** 16500-16500 *****

```

```

1600: REM ***** 16600-16600 *****
1610: REM ***** 16600-16600 *****
1620: REM ***** 16600-16600 *****
1630: REM ***** 16600-16600 *****
1640: REM ***** 16600-16600 *****
1650: REM ***** 16600-16600 *****
1660: REM ***** 16600-16600 *****
1670: REM ***** 16600-16600 *****
1680: REM ***** 16600-16600 *****
1690: REM ***** 16600-16600 *****
1700: REM ***** 16600-16600 *****
1710: REM ***** 16600-16600 *****
1720: REM ***** 16600-16600 *****
1730: REM ***** 16600-16600 *****
1740: REM ***** 16600-16600 *****
1750: REM ***** 16600-16600 *****
1760: REM ***** 16600-16600 *****
1770: REM ***** 16600-16600 *****
1780: REM ***** 16600-16600 *****
1790: REM ***** 16600-16600 *****
1800: REM ***** 16600-16600 *****
1810: REM ***** 16600-16600 *****
1820: REM ***** 16600-16600 *****
1830: REM ***** 16600-16600 *****
1840: REM ***** 16600-16600 *****
1850: REM ***** 16600-16600 *****
1860: REM ***** 16600-16600 *****
1870: REM ***** 16600-16600 *****
1880: REM ***** 16600-16600 *****
1890: REM ***** 16600-16600 *****
1900: REM ***** 16600-16600 *****
1910: REM ***** 16600-16600 *****
1920: REM ***** 16600-16600 *****
1930: REM ***** 16600-16600 *****
1940: REM ***** 16600-16600 *****
1950: REM ***** 16600-16600 *****
1960: REM ***** 16600-16600 *****
1970: REM ***** 16600-16600 *****
1980: REM ***** 16600-16600 *****
1990: REM ***** 16600-16600 *****

```

Line 550-600 Print up the menu table on cassette according to the option you selected.

Line 650-700 Contains the subroutines for all the menu options.

```

700: REM ***** 16700-16700 *****
710: REM ***** 16700-16700 *****
720: REM ***** 16700-16700 *****
730: REM ***** 16700-16700 *****
740: REM ***** 16700-16700 *****
750: REM ***** 16700-16700 *****
760: REM ***** 16700-16700 *****
770: REM ***** 16700-16700 *****
780: REM ***** 16700-16700 *****
790: REM ***** 16700-16700 *****
800: REM ***** 16700-16700 *****
810: REM ***** 16700-16700 *****
820: REM ***** 16700-16700 *****
830: REM ***** 16700-16700 *****
840: REM ***** 16700-16700 *****
850: REM ***** 16700-16700 *****
860: REM ***** 16700-16700 *****
870: REM ***** 16700-16700 *****
880: REM ***** 16700-16700 *****
890: REM ***** 16700-16700 *****
900: REM ***** 16700-16700 *****
910: REM ***** 16700-16700 *****
920: REM ***** 16700-16700 *****
930: REM ***** 16700-16700 *****
940: REM ***** 16700-16700 *****
950: REM ***** 16700-16700 *****
960: REM ***** 16700-16700 *****
970: REM ***** 16700-16700 *****
980: REM ***** 16700-16700 *****
990: REM ***** 16700-16700 *****

```

# EVERY PICTURE TELLS A STORY

BIT) option, or even a cursor-controlled 'touch-up' facility for correcting minor errors. Any additional routines would need to be entered as subroutines and called from lines 295 to 299. The menu, if, would also have to be altered (see lines 8000 to 8070) to incorporate additional command letters.

Geographical maps prove eminently suitable for display on-screen, but any artwork that can be seen as a series of outlines (rather than tones) can be treated effectively. Book covers, pop posters and comic book illustrations all offer possible material. Even photographs can be tackled after a fashion — just make sure you choose only those parts that have strong contrast, that is ones that have bold areas of black and white. The best way to approach a photo is to trace around the bold areas of contrast — tracing the photo to a sort of contour map showing the light and dark areas — and then square up and enter it as an ordinary outline drawing. The outlines can later be filled-in, using one of the commercial graphics packages, to give an 'impressionist' interpretation of the original photograph.

But by far the best way to tackle the program is to just waste it and start drawing. I'm an artist, but I'm well proud of some of my creations... ■

## MENU OPTIONS

KEY	COMMENT
C	Pressing 'C' (the 'CORRECTION' key) simply deletes the previous drawing position. Thus, if you make a mistake, you can return to the menu, press 'C' and continue where you left off.
D	Once you press 'D' (the 'DRAW' key) you'll be asked to provide the co-ordinates of the starting position, and of each subsequent position you want to draw a line to. It's rather like those 'join the dots' mystery pictures in children's books, only in this case you're specifying which each dot is to go and the Spectrum's connecting them together. It's unlikely that all the points you'll want to draw to will fall conveniently on your grid lines, but the program will happily accept positions like 8-1/22.5, 1-18.8. At this point, it's worth making a note that when you're planning the initial grid of squares, the first your grid the more detail you can include on the final on-screen drawing. On the other hand, if all you're after is a broad outline, then a relatively small number of large squares should suffice. Once you reach the end of a line and want to move on to a new starting position, simply type in the square number and return to the menu to start over. (Unlike the normal Spectrum (CPM) procedure, there's no calculation involved — you read off the co-ordinates for each point that's connected on the original drawing and it'll be reproduced to the scale you want.)
F	Press this key when you want to stop using the program.
JK	These two keys are used to activate (J) or cancel (K) the instruction to print out or to load to the printer.
L	This command loads back a previously saved picture. If you've planning to load back a partially finished picture, you'll have to enter the original co-ordinates applicable before you can continue drawing.
P	The 'P' key allows you to print the picture on-screen to the ZX Printer (or any other printer that accepts the CPY command).
R	This key is used to re-start the program, once you've finished with one drawing and want to start on another.
S	Making use of the SAVE (XCHG) function, the 'S' key saves the screen picture to cassette.
T	The 'T' key allows you to print a text label at any specified position on the screen. This function uses the standard screen 'PRINT' AT positions for line 0 to 21 and row 0 to 21.

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---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

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QUANT SYSTEMS

# MACHINE CODE COMMANDS

## MC<sup>2</sup>

Being able to access Basic commands from machine code is not always as easy as it sounds, especially when dealing with Microdrives and the like. Join David Thornhill as he rummages around in the Spectrum's ROM.

There are many functions on the ZX Spectrum that are not easy to use from machine code. The simple LOAD, colour and AT functions are straightforward. Tape commands such as SAVE and LOAD are a little more difficult, but the interface 1 commands for Microdrive, KS132 and streams are almost impossible without a very detailed understanding of the ROM routines involved.

The technique to be described here isn't ingenious enough to allow the spectacular gains in speed you would normally expect from machine code. However, it is very simple to use and there's no advantage in speeding up the rate at which you get to the Microdrive routines when the drives themselves have an access time of several seconds.

The method is simple to build a customized version of the command to be executed in the Basic input line area (pointed to by the system variable E...

Line). The steps involved are as follows:

1. Clear out all the areas above the input area. This will also empty the workspace and floating point stack.
2. Make space for your command in the input buffer.
3. Build the command into the buffer — this will usually be just a question of copying into that area.
4. Manipulate the error stack pointer (ERR...SP) so that the machine will return to your routine whenever happens.
5. Call the ROM routine which executes a single line of Basic.
6. On return, clear work areas and test the error flag. If there was an error go back to Basic.

The assembler listing provided isn't that necessary; it's fairly short and all Basic commands can be operated on in the same way. The code is liberally commented, but a few more notes would undoubtedly be helpful.

The complicated manipulations of the stack pointers and error pointer (ERR...SP) is not necessary unless you plan to use interface 1 commands. If you don't follow this method then only the first use of this facility will work and the command may not return to your routine at all, even after successful execution.

The routine "BASE" has been written so that it's called with the HL register pair pointing to the formatted version of the command which you wish to have executed. This allows the routine to be used repeatedly, with different commands if necessary. In all cases, the last byte of the command must be that representing carriage return (13 decimal).

Most Spectrum users will be aware that numbers are stored in a rather odd way in Sinclair Basic. First, there are the ASCII characters making up the number, then the single byte 14 followed by the five byte binary representation of the number. The ASCII form is converted to binary form during syntax checking. If we want to avoid this checking, some way has to be found which doesn't entail so translating any numbers we use into binary. Fortunately there is a way, using the VALL function. Simply write numbers as VALL "number", for example, if we intend to include the number 500 in the code to be executed, we need only write VALL "500".

### FOR EXAMPLE ...

There are many uses for this routine, but for now I'll give just two examples. Say you wish to SAVE 8000 bytes of code starting at location 50000 into a cassette file called "fred". The normal Basic command would be:

```
SAVE "fred" CODE 5000,8000
```

To execute this from machine code we can insert:

```
SAVE "fred" CODE HL -50000,  
VALL "8000"
```

At label TEXT in the assembler listing, Note that the word "SAVE" is inserted with its token value (248), as are all the other keywords like CODE and VALL.

The second example is both more complicated and more useful. It's difficult to see the line editor on the Spectrum for sending a string of characters, but the following code inserted at TEXT will read in 85 and put it at location 50000 onwards — allowing you to access it from your machine code (the byte 'V' marks the end of the string):

```
INPUT at 50000=VALL "V" TO HL at E  
PUSH HL -50000+4 CODE at E: NEXT E  
PUSH E-HAL -50000, VALL "V"
```

The only restriction imposed is that the total length of the input line must be less than 128 characters. This can be increased very easily by making more space and copying more with the LDHR.

Finally there's no way back to Basic from here — because we've erased the input buffer, upset the Basic code pointer and destroyed the floating point stack. These are all reversible, but a RST E returns to Basic is safe and simple. ☺

CODE	ASSEMBLER	COMMENTS
	LD HL,TEXT CALL BASEC RST E END	Make HL point to the required Basic code Call the routine from your machine code Return to command mode with error 'V'
BASEC	PUSH HL CALL MAKE LD HL,(248)H LD BC,0H CALL 5717,INC HL RD DR HL POP HL LD BC,12H LD HL RST E,(SP+4) LD (7F4),255 LD (7F1),1 LD HL,(248)H PUSH HL LD HL,BACK PUSH HL LD (248)H,HL CALL 7050 POP HL	Use CALL routine to tidy up the buffers. Point HL at the system variable E...LINE. Make DR bytes of space in the input buffer. Make space routine in ROM. Convert, into DR to an LDHR. Point HL to our Basic code. Maximum length of text. Move text to the input buffer. Signal interruption. Clear any characters. Set the SPPC system variable to the end of statement. Keep the value of DR...SP correct each pushes the label again BACK is return address. Put HL on the stack in case of error return. Keep the stack pointer in DR...SP Call the translation routine If we return here then, should this value.
BACK	POP HL LD (248)H,HL CALL MAKE LD A,(248)H CP 255H JP NZ,MAKE RST	Maximum here if there is an error. Put DR...SP back open. Tidy the buffers. Was there an error? Look at DR...LINE. RST is OK. If not, jump back to Basic. Return to the calling routine.
TEXT		Your IDE gets return an assembler string.
SPB	TI	Terminates the string with carriage return.



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00014	ARCADE	4.95	5.75	00141	AVIC	4.95	5.75
00015	ARCADE	4.95	5.75	00151	AVIC	4.95	5.75
00016	ARCADE	4.95	5.75	00161	AVIC	4.95	5.75
00017	ARCADE	4.95	5.75	00171	AVIC	4.95	5.75
00018	ARCADE	4.95	5.75	00181	AVIC	4.95	5.75
00019	ARCADE	4.95	5.75	00191	AVIC	4.95	5.75
00020	ARCADE	4.95	5.75	00201	AVIC	4.95	5.75
00021	ARCADE	4.95	5.75	00211	AVIC	4.95	5.75
00022	ARCADE	4.95	5.75	00221	AVIC	4.95	5.75
00023	ARCADE	4.95	5.75	00231	AVIC	4.95	5.75
00024	ARCADE	4.95	5.75	00241	AVIC	4.95	5.75
00025	ARCADE	4.95	5.75	00251	AVIC	4.95	5.75
00026	ARCADE	4.95	5.75	00261	AVIC	4.95	5.75
00027	ARCADE	4.95	5.75	00271	AVIC	4.95	5.75
00028	ARCADE	4.95	5.75	00281	AVIC	4.95	5.75
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00030	ARCADE	4.95	5.75	00301	AVIC	4.95	5.75
00031	ARCADE	4.95	5.75	00311	AVIC	4.95	5.75
00032	ARCADE	4.95	5.75	00321	AVIC	4.95	5.75
00033	ARCADE	4.95	5.75	00331	AVIC	4.95	5.75
00034	ARCADE	4.95	5.75	00341	AVIC	4.95	5.75
00035	ARCADE	4.95	5.75	00351	AVIC	4.95	5.75
00036	ARCADE	4.95	5.75	00361	AVIC	4.95	5.75
00037	ARCADE	4.95	5.75	00371	AVIC	4.95	5.75
00038	ARCADE	4.95	5.75	00381	AVIC	4.95	5.75
00039	ARCADE	4.95	5.75	00391	AVIC	4.95	5.75
00040	ARCADE	4.95	5.75	00401	AVIC	4.95	5.75
00041	ARCADE	4.95	5.75	00411	AVIC	4.95	5.75
00042	ARCADE	4.95	5.75	00421	AVIC	4.95	5.75
00043	ARCADE	4.95	5.75	00431	AVIC	4.95	5.75
00044	ARCADE	4.95	5.75	00441	AVIC	4.95	5.75
00045	ARCADE	4.95	5.75	00451	AVIC	4.95	5.75
00046	ARCADE	4.95	5.75	00461	AVIC	4.95	5.75
00047	ARCADE	4.95	5.75	00471	AVIC	4.95	5.75
00048	ARCADE	4.95	5.75	00481	AVIC	4.95	5.75
00049	ARCADE	4.95	5.75	00491	AVIC	4.95	5.75
00050	ARCADE	4.95	5.75	00501	AVIC	4.95	5.75
00051	ARCADE	4.95	5.75	00511	AVIC	4.95	5.75
00052	ARCADE	4.95	5.75	00521	AVIC	4.95	5.75
00053	ARCADE	4.95	5.75	00531	AVIC	4.95	5.75
00054	ARCADE	4.95	5.75	00541	AVIC	4.95	5.75
00055	ARCADE	4.95	5.75	00551	AVIC	4.95	5.75
00056	ARCADE	4.95	5.75	00561	AVIC	4.95	5.75
00057	ARCADE	4.95	5.75	00571	AVIC	4.95	5.75
00058	ARCADE	4.95	5.75	00581	AVIC	4.95	5.75
00059	ARCADE	4.95	5.75	00591	AVIC	4.95	5.75
00060	ARCADE	4.95	5.75	00601	AVIC	4.95	5.75
00061	ARCADE	4.95	5.75	00611	AVIC	4.95	5.75
00062	ARCADE	4.95	5.75	00621	AVIC	4.95	5.75
00063	ARCADE	4.95	5.75	00631	AVIC	4.95	5.75
00064	ARCADE	4.95	5.75	00641	AVIC	4.95	5.75
00065	ARCADE	4.95	5.75	00651	AVIC	4.95	5.75
00066	ARCADE	4.95	5.75	00661	AVIC	4.95	5.75
00067	ARCADE	4.95	5.75	00671	AVIC	4.95	5.75
00068	ARCADE	4.95	5.75	00681	AVIC	4.95	5.75
00069	ARCADE	4.95	5.75	00691	AVIC	4.95	5.75
00070	ARCADE	4.95	5.75	00701	AVIC	4.95	5.75
00071	ARCADE	4.95	5.75	00711	AVIC	4.95	5.75
00072	ARCADE	4.95	5.75	00721	AVIC	4.95	5.75
00073	ARCADE	4.95	5.75	00731	AVIC	4.95	5.75
00074	ARCADE	4.95	5.75	00741	AVIC	4.95	5.75
00075	ARCADE	4.95	5.75	00751	AVIC	4.95	5.75
00076	ARCADE	4.95	5.75	00761	AVIC	4.95	5.75
00077	ARCADE	4.95	5.75	00771	AVIC	4.95	5.75
00078	ARCADE	4.95	5.75	00781	AVIC	4.95	5.75
00079	ARCADE	4.95	5.75	00791	AVIC	4.95	5.75
00080	ARCADE	4.95	5.75	00801	AVIC	4.95	5.75
00081	ARCADE	4.95	5.75	00811	AVIC	4.95	5.75
00082	ARCADE	4.95	5.75	00821	AVIC	4.95	5.75
00083	ARCADE	4.95	5.75	00831	AVIC	4.95	5.75
00084	ARCADE	4.95	5.75	00841	AVIC	4.95	5.75
00085	ARCADE	4.95	5.75	00851	AVIC	4.95	5.75
00086	ARCADE	4.95	5.75	00861	AVIC	4.95	5.75
00087	ARCADE	4.95	5.75	00871	AVIC	4.95	5.75
00088	ARCADE	4.95	5.75	00881	AVIC	4.95	5.75
00089	ARCADE	4.95	5.75	00891	AVIC	4.95	5.75
00090	ARCADE	4.95	5.75	00901	AVIC	4.95	5.75
00091	ARCADE	4.95	5.75	00911	AVIC	4.95	5.75
00092	ARCADE	4.95	5.75	00921	AVIC	4.95	5.75
00093	ARCADE	4.95	5.75	00931	AVIC	4.95	5.75
00094	ARCADE	4.95	5.75	00941	AVIC	4.95	5.75
00095	ARCADE	4.95	5.75	00951	AVIC	4.95	5.75
00096	ARCADE	4.95	5.75	00961	AVIC	4.95	5.75
00097	ARCADE	4.95	5.75	00971	AVIC	4.95	5.75
00098	ARCADE	4.95	5.75	00981	AVIC	4.95	5.75
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# PROGRAM POWER

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## MAGIC NUMBERS

BY M LOFTUS



In Magic Numbers, you're to choose five numbers from the 5x5 available. Trouble is, once you've chosen one, the program won't let you choose another number from the same row or column. Here you see the number 50 has been chosen.

This program demonstrates the magical mystery of the ZX Spectrum. You won't be able to conjure a rabbit out of a hat, but you should be able to dazzle your friends with a clever piece of number manipulation.

You're going to choose a number between 50 and 4200. Once you've typed in the magical number, the Spectrum generates a five by five grid of seemingly random numbers. You then have to choose five numbers, in each number's chosen, the row and column it comes from are crossed from the screen, decreasing the amount of numbers you have to choose from. When all the numbers have been chosen from the grid, the Spectrum adds them together and compares the result to the number you chose at the outset of the program to see if they're the same. And 'May Power' ... they are the same.

To say most of the program's inner workings would spoil all the fun. So if you can work it out for yourself ...

```
1 500 PRINT 1344
```

Line 1: 00 PRINTs the calculation that prints up the instructions for 500-512000.

```
100 INPUT "Type your chosen number 500-4200" : Y
110 IF Y < 50 OR Y > 4200 THEN GOTO 130
```

Line 100-110 Ask you to input any integer between 50 and 4200. Line 110 checks that your answer is valid.

```
120 GOSUB 1, 1300 PRINT AT Y, 0, "0" : GOTO 1, 1300
130 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
140 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
150 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
160 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
170 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
180 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
190 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
200 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
```

```
180 PRINT AT Y, 0, "0" : GOTO 1, 1300+1 AND 4
190 PRINT AT Y, 0, "0" : GOTO 1, 1300+1 AND 4
200 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
210 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
220 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
230 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
240 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
250 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
260 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
270 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
280 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
290 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
300 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
```

Line 120-300 Printing the grid numbers in rows.

```
310 PRINT AT 18, 0, "Choose a number by index"
320 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
330 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
340 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
350 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
360 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
370 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
380 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
390 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
400 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
410 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
420 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
430 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
440 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
450 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
460 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
470 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
480 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
490 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
500 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
```

Line 310-400 Ask you to select number by index. Line 310 is added to the total number of selected numbers, and the value of all the numbers in that row and column are changed.

```
510 PRINT AT 18, 0, "Transferring the last row"
520 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
530 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
540 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
550 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
560 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
570 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
580 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
590 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
600 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
610 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
620 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
630 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
640 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
650 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
660 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
670 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
680 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
690 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
700 GOTO 1, 1300+1 AND 4 AND GOTO 1, 1300+1 AND 4
```

Line 410-620 The random number the number left and total selected numbers. Finally enough, the total always comes out to



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7. LINE MODE  
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FULL GRAPHICS CAPABILITY  
NORMAL 33 CHARACTERS PER LINE

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(SEE BELOW)

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14. SPRINT MODES  
(SEE BELOW)

### 2. SPRINT MODES

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16. SPRINT MODES  
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NORMAL 33 CHARACTERS PER LINE

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TOTAL =

## PROGRAM POWER PROTECTOR

BY PATRICK DONNELLY



As Private in the Intergalactic Army, you're in control of the laser base in an effort to destroy all the aliens invading down from the top of the screen. The screen scrolling is indicated by the bar to the left of the playing area.

Here's a game for the more military-minded of you! As a Private in the Intergalactic Army, you're in charge of the laser base that's been ordered to defend the space station, Spacey 3. The invading alien hordes are knowing all the hardware they can at you, including K1 and K2 fighters, as well as the deadly XTC missiles. All you have to do is shoot them out of the sky before they explode against the walls of the space station.

Spacey 3 starts off with 15 shields to protect it, but one is lost each time an enemy fighter or missile breaks through the defences. You gain 50 points for each enemy craft you shoot down, but you'll lose 10 points for each one that explodes against the space station's walls. You'll be promoted through Corporal, Sergeant and Captain to General, depending on the score you're left with when the game's over.

On 8011 using the program, once you've read your way through five pages of on-screen instructions, the playing area is taken up with a panel indicating your current score, the amount of ammunition you've got left over the laser base, the number of shields the space station has left, and the overall 'high score'. At the foot of the playing area, you're allocated a single laser base, that you control using the 'Y' key to move left, the 'N' key to go right and the Space key to fire a laser bolt.

```

2 BORDER 0
2 SHIP 0
2 CLEAR 0
2 SCORE 0
2 SHIELD 15
40 SH 8000: REM CREATED USER DEFINED CH
40 SH 8000: REM PRINTS THE INSTRUCTIONS
40 SH 8000: REM A/T/T/ENTER DEF-LOCK
40 BORDER 0
  
```

Lines 2-6 Set the SCORE 0 and PAPER 0 variables, and set the subscreen. The first screen will create the user defined graphics. The second screen sets the SCORE 0 and PAPER 0 variables for play on the screen.

```

110 SH 8000: REM SCORE 0
120 SH 8000: REM PAPER 0
130 FOR I=1 TO 3: LET A(I)=INT(RND*500)+1000: NEXT I
140 SH 8000: REM INITIALISE HIGH SCORE TABLE
  
```

Lines 79-83 Set up the 'high score' table and fill it with the initial scores. Initial just happen to be 10 for 1 through 3. Of course, you could always give your own table of initial scores.

```

150 SH 8000: REM OTHER VARIABLES NEEDED FOR T
160 LET Y1=121: LET Y2=200: LET Y3=180: LET X2=0
170 LET Y3=180: LET X2=0
180 LET Y1=121: LET Y2=200: LET Y3=180: LET X2=0
190 LET Y1=121: LET Y2=200: LET Y3=180: LET X2=0
200 LET Y1=121: LET Y2=200: LET Y3=180: LET X2=0
210 SH 8000: REM CREATED GAME SCREEN
  
```

Lines 159-173 Set up the initial game variables. CO, FO, SH, Y1 and X2. Y1 are the positions of the first, second and third attacks. Y2 is a list of the order variables you should know about. Y3 — the position of the laser shot, X2 — the laser base position. SH — the shields. FO — the only enemy condition. Y1 — the logic points indicator. CO — the score, and SH — the items you start with.

# PROGRAM POWER

**400 PRINT PAPER 4; OVER 4; DR. STAT 20,187**  
**417 4; 15; 10; 20**  
**400 LET 43=4; LET Y2=141; PAPER 20; GO TO 9**  
**401**  
**400 LET T1=141; PAPER 4;**  
**400 LET 43=4; LET Y1=141; PAPER 20; GO TO 9**  
**401**  
**400 LET T1=141; PAPER 4;**  
**400 LET 43=4; LET Y2=141; PAPER 20; GO TO 9**  
**401**  
**400 PRINT PAPER 4; DR. STAT 43, Y1; T1; AT 43**  
**417 4; 15; 10; 20**

**Line 400-400** Set up the initial entry positions and get them up to speed.

**470 NEW CHECKS ON STATE OF BARE**  
**4810 IF 40=0 THEN PRINT BRIGHT 1; PAPER 2;**  
**480 T=87; T1=80; GO TO 4700**  
**4000 LET 40=1; PRINT PAPER 2; 140 T; BRIGHT**  
**4140 1; 10; 10**  
**4700 PRINT BRIGHT 1; PAPER 2; 140 T=87; T1=80;**  
**471 1; 10; 10; PAPER 4; GO TO 4700**  
**4720 PRINT BRIGHT 1; PAPER 2; 140 T=87; T1=80;**  
**473 1; 1; 1; IF 40=1 THEN PRINT PAPER 2; 140**  
**474 T; T1; PAPER 4; GO TO 4700**  
**4750 IF 40=1 THEN LET T=87+1; BEEP**  
**4760 LET 40=4**

**Line 470-470** Check the game status. If you want to get looking to change any of the program settings at this stage, take a look at lines 4140 and 4000. Each could do with some work...

**1190 NEW CHECKS TO SEE IF ANY IS PAPER'S**  
**1200 IF 140=4 THEN LET 43=4; GO 4300**  
**4300**  
**1200 IF 140=4 THEN GO 4300; PAPER 20; PAPER**  
**20; LEFT**  
**1200 IF 140=4 THEN GO 4300; PAPER 20; PAPER**  
**20; RIGHT**

**Line 1200-1400** Scan the keyboard and jump to the required subroutine depending on whether you pressed the left, right, or top key.

**1400 NEW CHECKS TO SEE IF ANY ATTACKERS HAVE**  
**1410 IF 410=1 OR 411=1 OR 412 OR 413; 414; 415; 416; 417**  
**418; 419; 420; 421**  
**410 IF 410=1 OR 411=1 OR 412 OR 413; 414; 415; 416; 417**  
**418; 419; 420; 421**  
**420 IF 410=1 OR 411=1 OR 412; 414; 415; 416; 417; 418; 419; 420**  
**421**

**Line 1400-1420** Check to see if an enemy fighter has been hit, and then jump to relevant subroutines.

**1500 NEW CHECKS TO SEE IF ANY ATTACKERS HAVE**  
**1510 PRINT PAPER 2; AT 41, 41; T=87; T1=80;**  
**1520 LET 40=1; IF 42=1 THEN PRINT PAPER**  
**2; 140; 40; 17; 20; 140; 18; 20; 140; 19; 20;**  
**1530 PRINT PAPER 2; AT 41, 41; T=87; T1=80;**  
**1540 LET 40=1; PRINT PAPER 2; 140**  
**1550 IF 41=1 THEN LET 40=1; GO TO 4000**  
**2000 LET 41=4; IF 41=1 THEN PRINT PAPER**  
**2; 140; 40; 17; 20; 140; 18; 20; 140; 19; 20;**  
**2010 PRINT PAPER 2; AT 41, 41; T=87; T1=80;**  
**2020 LET 41=1; LET 40=1; PRINT PAPER 4;**  
**2030 LET 41=1; LET 40=1; GO TO 4000**  
**2040 LET 42=1; IF 42=1 THEN PRINT PAPER**  
**2; 140; 40; 17; 20; 140; 18; 20; 140; 19; 20;**  
**2050 PRINT PAPER 2; AT 41, 41; T=87; T1=80;**  
**2060 LET 41=1; LET 40=1; PRINT PAPER 4;**  
**2070 LET 41=1; LET 40=1; GO TO 4000**  
**2080 LET 43=4; LET 40=1; GO TO 4000**  
**2090 PRINT PAPER 4; DR. STAT 43, Y1; T1; AT 43**  
**417 4; 15; 10; 20**  
**4000 GO TO 4000**

**Line 1500-2000** Check if any of the attackers have reached the bottom of the screen. If they have, your score and shield levels are reduced. If they have 'reached the bottom of the screen yet, each one of fighters is moved down by one row.

**2090 NEW MOVES UNDER TO LEFT**  
**2100 PRINT PAPER 4; AT 20, Y1+20; T=87; T1=80;**  
**2110**  
**2090 LET 20=19; GO 21; LET Y1=0**

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```

0010 PRINT PAPER 0:047 5.0,"WELCOME SOLIDER"
0020 PRINT PAPER 0:047 6.0,"YOUR MISSION IS 1"
0030 PRINT PAPER 0:047 10.0,"BASE SPEECS FOR"
0040 PRINT PAPER 0:047 12.0,"POSSIBLE WOULD 2"
0050 PRINT PAPER 0:047 14.0,"OF ALL ESSENTIAL"
0060 PRINT PAPER 0:047 16.0,"REQUIREMENT TARDIS"
0070 GO SUB BRAD

```

Line 0010-0040 The first screen of instructions are printed on screen.

```

0010 PRINT PAPER 0:047 5.0,"THE CONTROLS YOU"
0020 PRINT PAPER 0:047 7.0,"TO USE WILL BE -"
0030 PRINT PAPER 0:047 10.0,"O" - TO MOVE R"
0040 PRINT PAPER 0:047 12.0,"A" - TO MOVE L"
0050 PRINT PAPER 0:047 15.0,"BRIEF/SPACE" -"
0060 PRINT PAPER 0:047 17.0,"TO FIRE"

```

Line 0050-0060 The second screen of instructions are printed on screen.

```

0010 GO SUB BRAD
0020 PRINT PAPER 0:047 4.0,"BASE SPEECS IS"
0030 PRINT PAPER 0:047 6.0,"FROM THE ENERGY"
0040 PRINT PAPER 0:047 8.0,"TYPE POSITION -"
0050 PRINT PAPER 0:047 10.0,"OF"
0060 PRINT PAPER 0:047 12.0,"AS WELL AS FROM"
0070 PRINT PAPER 0:047 14.0,"THE LATEST YTC-"
0080 PRINT PAPER 0:047 16.0,"POSSIBLE"
0090 PRINT PAPER 0:047 18.0,"ING"
0100 PRINT PAPER 0:047 20.0,"NOTE CAREFULLY 3"
0110 PRINT PAPER 0:047 22.0,"THEY"
0120 PRINT PAPER 0:047 24.0,"FROM ONE SHOT 4"
0130 PRINT PAPER 0:047 26.0,"TO DESTROY THE 5"
0140 PRINT PAPER 0:047 28.0,""

```

Line 0040-0140 The third screen of instructions are printed on screen.

```

0140 GO SUB BRAD
0150 PRINT PAPER 0:047 3.0,"YOUR JOB IS TO H"
0160 PRINT PAPER 0:047 5.0,"LUNATE YOUR SHIL"
0170 PRINT PAPER 0:047 7.0,"POSSIBLE-OUT ON 2"
0180 PRINT PAPER 0:047 10.0,"TAKEN OUT OF APPA"
0190 PRINT PAPER 0:047 12.0,"AFTER WHICH TIM"
0200 PRINT PAPER 0:047 14.0,"IS REFERENCED"
0210 PRINT PAPER 0:047 16.0,"OVER-RUN BY THE"
0220 PRINT PAPER 0:047 18.0,""
0230 DATA 207, 199, 192, 156, 248, 240, 204, 128

```

Line 0090-0095 The fourth screen of instructions are printed on screen.

```

0090 GO SUB BRAD
0100 PRINT PAPER 0:047 5.0,"BY THE WAY 1 ALL"
0110 PRINT PAPER 0:047 7.0,"TO TELL YOU THAT"
0120 PRINT PAPER 0:047 9.0,"PROXION CHANCE"
0130 PRINT PAPER 0:047 11.0,"FOR YOUR SUCCESS"
0140 PRINT PAPER 0:047 13.0,"OUT AGAINST THE"
0150 PRINT PAPER 0:047 15.0,"BUT SORCULAR AN"
0160 GO SUB BRAD

```

Line 0090-0095 The fifth screen of instructions are printed on screen.

## 0090 GO TO 0090

Line 0090 Jump past the wait subroutine.

```

0090 LET I=1
0100 LET B=INT (RND*(255/4)+1)
0110 IF I=0 GO AND LET B=INT (RND*(255/4)+1)
0120 FOR J=1 TO 200 PRINT PAPER 0:047 I,""
0130 NEXT J

```

Line 0090-0095 The wait routine plays a few musical notes while the screen is being read. Instead of the fast pace for the routine in line 0090-covers the program in using sleep and a better pace might be another line 0090.

```

0090 FOR I=1 TO 100: NEXT I
0090 RETURN

```

Line 0090-0095 Contains the wait loop.

```

0090 FOR I=1 TO 100: NEXT I
0090 RETURN

```

Line 0090-0095 Setup the user-defined graphics.

```

0090 DATA 40,40,70,20,20,40,20,0
0090 DATA 0,200,0,200,0,0,0,0
0090 DATA 200,20,100,20,0,0,0,0
0090 DATA 115,234,115,234,115,234,115,234
0090 DATA 120,240,120,240,200,200,200,200
0090 DATA 0,0,0,0,0,0,0,0
0090 DATA 40,60,100,100,100,100,100,100
0090 DATA 0,20,40,60,80,80,80,80
0090 DATA 10,20,20,10,10,10,10,10
0090 DATA 100,90,140,110,10,10,100,40
0090 DATA 0,0,0
0090 DATA 0,0,0

```

Line 0090-0095 Contains the data for the user-defined graphics.

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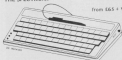
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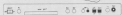
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128K 5 1/4" MICRODRIVE - 128K 5 1/4" MICRODRIVE

## FLOYD 40

Due to an error the advertised price in the December issue was incorrect. This has now been corrected and we apologise for any inconvenience this error may have caused.

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# CIRCE

What could possibly turn a Civil Servant into a successful exhibitionist? Sue Denham meets the man behind the ZX Microfair ... Mike Johnston.

ZX Microfairs have become almost as much a part of the Sinclair Research success story as has the Spectrum itself. But these micro exhibitions aren't the product of a large company hoping to cash in on users' enthusiasm, they're more of a tribute to one man's dedication to his hobby...

It's just 24 hours away from the Christmas Microfair and the organizer Mike Johnston can be found right in the thick of the action, directing exhibitors to their respective stands in much the same way as a hotel welcome party to a family get-together. But then, after four years of putting on shows, what else would you expect?

Keeping one eye out for any crisis that might arise in the hall, Mike talked of how he first became involved in exhibition work. "Well, I suppose it all began after I'd joined up as a member of the National ZX81-88 Users' Club. I was always enjoying Tim Harrell to arrange a meeting between members... and eventually he did. Expecting about half a dozen people to turn up, he suggested that everyone meet in a West London pub — and to our surprise, over 70 members turned up. It was great, everyone was chatting about which RAM pack was the best value and so on.

"After our first meet, I suggested Tim Harrell to arrange another, but he was too involved with book publishing by this time to offer me anything other than moral support and the suggestion that I do it myself. Eventually, I got in touch with a few people like David Hodges, Miles Lord and Nick Lambert and invited their opinions on exhibiting in a small stall — and it was good! I secured a room for a hall and, after a brief period of contemplating a hall in Camden Town, I settled for Central Hall in Westminster."

What are your memories of the first show — did everything go wrong? "Hah! Did anything go right, you mean. I'd only booked half the hall, so I wasn't



## ALL THE FUN OF THE FAIR

overbooked that we'd have more than a couple of hundred people to run the show at most. There'd been no mention in the press coverage for a small place in F10 — advertising was out of the question with the financing the whole thing. I can remember opening the doors and a flood of people pushing into the hall!

"Anyway, there we were watching thousands of people running into the hall and it was a daunting point! It was only just over an hour wondering what to do next. I fumbled out of the hall and grabbed the nearest policeman. He stood on a chair and asked everyone to file out again — of course,

human nature being what it is, no-one moved — they didn't want to leave their place in the queue. A few people started laughing and that was it — pretty soon the whole place was just falling about with tears rolling down their cheeks. In all, we had around 5,000 people at that first show — it was amazing."

Although Mike Johnston spends a lot of time organizing the fairs, is 'real life' to a Civil Servant. How the Microfair brought him fame and success? "I don't know about fame. I do have a lot of people I've never seen before come up and say 'Hello, Mike', but it's not quite as if I

imagined it. Success is a funny sort of word. I do make some money out of the fairs, but this is not the point. I'd never be able to put the next one on if the Microfairs have the cheapest admission around for this sort of show, and we do try to keep the admission low just so that we attract everyone."

Now that the market has expanded and the retail outlets include shops like WH Smiths and Woolies, do you think there's a future for a show like this? "Yes, the market's a bit flat at the moment — the number of new products here this year will be less than at this time last year, but that's no reason why the ZX Microfair won't carry on. We're still attracting a few of people over the two-day period, and they're keen exhibitors. When you buy a product in a shop, you take it home and that's it. But here, you can meet the people behind the product and chat to them. It's so much more friendly than your average chain store — and these people are experts in computing, which is a lot more than can be said for the high street shops."

"As long as the printers are interested, I'll be putting on shows. I've thought of organizing shows for other types of computers, but I like Sinclair Research computers best... I think they give the best value. Sir Clive's innovative and takes risks — there's a lot of investment in doing that. A lot of professionals have moved into the market now, but it's still innovative. As long as something's new and different, you'll find a number of users at the ZX Microfair."

Any regrets about having to organize all these shows on your own? "My one regret is that I don't have the time to fiddle about with computers any more. Of course, I own at least one of each of Sinclair Research's computers, and who knows how many add-ons. But I can't spend much of my time with spreadsheets and databases on all sorts of computers planning for the next fair... But I'm still one of Sir Clive's biggest fans!"

Editor Roger Hargrave, Art Editor David Dunnington, Deputy Editor Tim Bayles, Technical Editor Peter Stone, SA Assistant Terry Broadhurst, Editorial Consultant Andrew Powell, Subscriptions Consultant Gwyneth Jones, Contributors Terry Smith, Dr David Thornhill, Tony Jackson, Ian Hancock, John Gardner, Chris Southwell, John Gault, Steve Gillard, Alan Watkins, Roger Wilby, Ross Wilson, Henry Woodgate, Sue Denton, Monica Gurney, Paul Pinner, David Kelly, M Luffkin, George Advertising Manager Ian Hutton, Advertising Controller David Smith, Group Art Director Terry Hordley, Publisher Stephen Ingham, Published by Hutchinson Newsprint Press Ltd, 14 Ranelagh Place, London W8 7EH. Telephone 01-275 6100. Telex 940000000. Fax 01-275 6101. Typesetters Colophon, London. Reproduction Copyright John Deane, Printed by Chase Court Offset, St. Annals, Cornwall. Distribution: Seymour Press, 25A Bedford Row, London WC1R 4EJ. Telephone 01-733-2444. Advertisement in This Magazine © 1987 Feline Productions, and may not be reproduced in whole or part without the written consent of the publishers. Four pence per month subscription.

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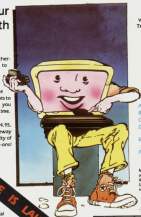
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