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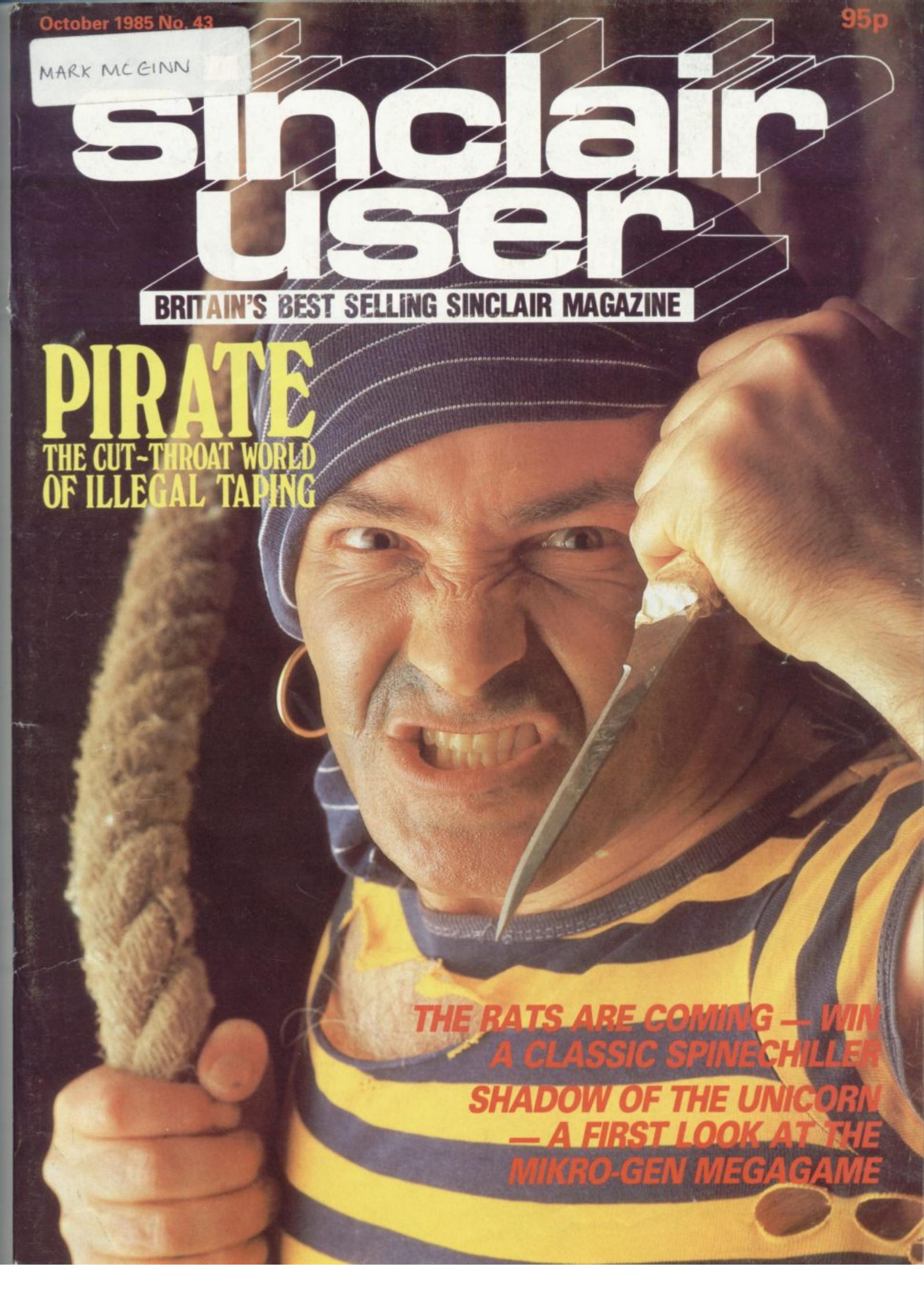
MARK MCGINN

Sinclair User

BRITAIN'S BEST SELLING SINCLAIR MAGAZINE

PIRATE
THE CUT-THROAT WORLD
OF ILLEGAL TAPING

**THE RATS ARE COMING — WIN
A CLASSIC SPINECHILLER
SHADOW OF THE UNICORN
— A FIRST LOOK AT THE
MIKRO-GEN MEGAGAME**



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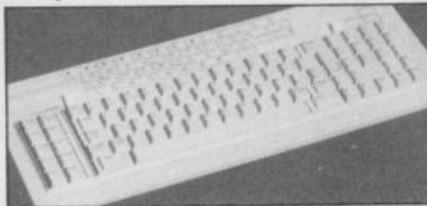


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If you would like to contribute to *Sinclair User* please send programs or articles to:
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 Original programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.

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Sinclair saved by creditors

SINCLAIR Research has been saved by its creditors and bankers, after Robert Maxwell decided to withdraw his support.

The creditors, including Thorn EMI, Timex and AB Electronics, together with bankers Barclays and Citibank, have decided to extend their loans so that the company can face the Christmas selling period with confidence. The agreement allows Sir Clive to remain as chairman and director of Sinclair Research with the new management team, headed by chief executive Bill Jeffrey.

Jeffrey, who was only recently appointed as chief executive, says: "Sinclair Research now has the support of its bankers and major suppliers and we look forward to building on the company's strong market leadership position, and continuing its outstanding achievement as a source of new ideas and products."

The banks with which Sir Clive is connected are also pleased that they have been able to bail out the company. Paul Borret, a divisional general manager of Barclays Bank and one of the signatories of the agreement, says: "We are delighted that we have been able to reach an agreement on continuing financial and manufacturing support for Sinclair Research. This agreement and the new



Uncle Clive and Cap'n Bob — a relationship in tatters?

management team, combined with Sir Clive's undoubted flair in the field of research and technology, enable us to share the company's hopes for a return to sound and profitable trading."

A week before the announcement Robert Maxwell withdrew from a plan to save Sinclair Research. The reason given was that the board of Maxwell's subsidiary company Hollis, having taken advice from their bankers and a specially commissioned report, decided that the rescue would not be advisable.

The collapse of the deal was hurriedly followed by a statement from Sir Clive claiming that not only did he

not need Maxwell's money but that his company was on the road to recovery, and that the Dixons deal made all the difference.

One of the main reasons for Sinclair's financial problems is the unpredictability of the home computer market. According to stock brokers Wood Mackenzie the market should be worth £430 million this year. Although Sinclair Research is likely to have a turnover of £100 million the company could make a loss of £5 million. As Sinclair Research has 40 per cent of the market share and the state of the company is shaky the situation does not bode well for the rest of the market.

Dixons gives kiss of life

DIXONS HAS made a deal with Sinclair Research which could head off some of the company's problems.

The deal, worth £10 million, means that Dixons has taken 160,000 Spectrum Plus computers and televisions.

They will go on sale in its 800 stores which include Currys outlets. Dixons are packaging the Spectrum Plus, cassette recorder, joystick and a ten-pack of Sinclair brand software for £139.99. A package which incorporates the computer, pocket television and five software titles is being sold at £199.99.

Sir Clive sees the deal as a turning point for Sinclair Research. "The deal with Dixons shows the light at the end of the tunnel. At this time I have no idea why Bob Maxwell pulled out, he may have other fish to fry. I don't think that we need anyone to rescue us."

more news on page 6

Hunt for 128K goes on

THE 128K Spectrum does exist but might not be available until well into 1986.

Despite attempts by Sinclair Research to play down rumours of the machine, whose existence was revealed in the July issue of *Sinclair User*, it is said to have a 128K RAM which is switched in 64K chunks,

two display modes, a joystick port and a sound chip which is similar to that used on the Amstrad computers.

The 128K could cost as little as £199.00 and that might be one reason why Sinclair will not yet release the machine — it would compete with the QL which is a 16-bit machine and

already has 128K RAM as standard.

If Sinclair does not launch the 128K computer before Christmas it will be the only company without such a machine on the market at the end of the year. Atari, Commodore and Amstrad all have computers with 128K RAM.

BT's express

WHATEVER happened to Program Express?

In July 1984 the company launched a revolutionary method of electronic software distribution. Retailers were to buy a terminal, linked to a central database, on which was stored thousands of software titles. Those titles could be downloaded onto tape or disc by the retailer and sold to the customer.

We were told that the system would do away with the usual retail problems such as choosing which titles to put on the shelves and overstocking. We were also informed that the device would be tested in branches of John Menzies and that Boots was also interested.

A year later nothing has happened — well, almost nothing. British Telecom has just become the major

shareholder in Program Express. The agreement means that BT will provide finance for the operation while the three Program Express directors, Gilmour Kennedy, Bruce Nevil and Grant Robertson will share responsibility for the running of the company.

It is still not clear, howev-



er, what Program Express has been done. A spokesman for BT says: "We are still considering the situation and our plans will be announced later."

Voyage round my modem

THE ROUND Britain Yacht Race has become available to users of Micronet 800, the telesoftware database, in the form of a multi-user game similar to MUD and Starnet.

It will cater for thousands of simultaneous players each week and employs the latest overlay frame technology to create a giant map of the

United Kingdom.

Players travel around the UK, searching for four secret locations. Clues are put onto the screen as the race progresses. Once the locations have been found they can be put into the Micronet mailbox. Winners of the race will be notified every fortnight and receive £100.

Ian Rock, marketing

manager of Micronet, says that the game "represents an exciting new direction in computer games and offers significant advantages over cassette based games."

"The interactivity of Micronet allows players to confer and discuss strategies, and the game's scenario changes every week adding a high degree of flexibility."



Children of the Lens

LENSLOK is a new security device which protects software from piracy while allowing back up copies to be produced.

It is a two-part system. The first part is a machine code routine which produces a code on screen

Stonechip goes bust

STONECHIP Electronics has gone into liquidation. The company was one of the first to manufacture an independent 16K RAM pack for the Spectrum. Since then it has been producing upgrades for the Spectrum, joystick interfaces and keyboard.

Bud Computers has also gone into liquidation. The company produced the Interstate 31 and Interstate-Pro joystick interfaces.

Jolly Roger in the dock

PIRACY does not pay and CP Software can prove it.

The company has successfully brought a prosecution against market trader Andre Bitton for selling counterfeit computer software. The case was tried before magistrates at Guildford, Surrey, where Bitton pleaded not guilty to 16 charges brought against him. Despite the plea the magistrates found him guilty of all charges and imposed one fine of £30 for a Copyright Act offence and 15 fines of £100 on offences under the Trades Descriptions Act.

Chris Whittington of CP Software says: "We think that the case will make people in the industry sit up and take notice.

"As you can see the fines are pretty hefty and this guy has had his fingers burned."

which must be typed in before the software can be used. The second part is a lens which arrives with the program.

When a lenslocked code appears on the screen, it can only be read by placing the appropriate lens above it and looking through the lens. Each code contains at least two characters — upper and lower case letters or numbers. Each time the game is loaded the code will be different, but it can read in the same way.

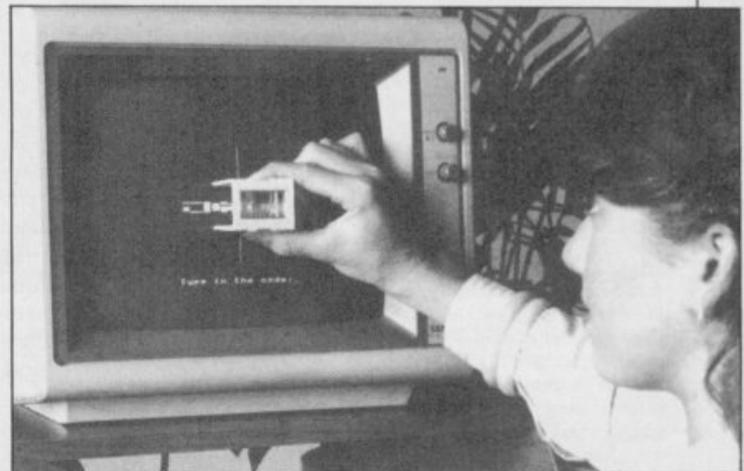
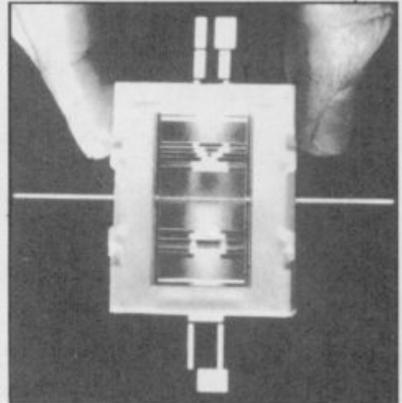
Each lenslocked product will arrive complete with its own lens. It cannot be used with another game, even with one produced by the same company.

The first game to feature the new system will be the Spectrum version of *Elite* from Firebird. ASAP Developments, the manufacturers of Lenslok, expect to see a large number of other games including the system on the Christmas market.

Unlike previous protective dongles, the Lenslok is cheap to manufacture and not unnecessarily bulky. Manufacturers can protect themselves against piracy

without incurring high costs, which would be passed on to the purchaser.

The only way for pirates to break into the system appears to be the coding system buried in the software. ASAP admits that, like any protection device, it is not 100 per cent secure, but stresses that even the



most experienced hackers will have problems breaking this system.

The major problem for users seems to be the possibility of losing or damaging a lens. Back-up copies of software will prove useless if the appropriate lens is not available.

In the long run, it is the user who stands to gain from the elimination of piracy. Software theft costs manufacturers money, and the only way they can recoup that money is in the price of games. If the Lenslok code prove secure it could benefit all software users.

Getting bored of the rings at last

BORED OF THE RINGS, awarded a *Sinclair User* classic in July, is now to be marketed by Silversoft.

The game is a cheerful spoof of Tolkien's trilogy, put together with the help of Gilsoft's *Quill* and *Illustra-*

tor programs, and written by software house Delta 4. It stars Fordo the Boggit who lives in the Shire with his uncle Bimbo. His great quest brings him into contact with such dubious characters as Legoland the Elf

and Giblett the Dwarf.

Silversoft was first involved when a distributor which wished to sell the game contacted its sister company, CRL. With a heavy load of new releases on their plate, CRL suggested that Silversoft take on the game, which was previously available by mail order only.

The game has been extended slightly for Silversoft. It contains more pictures and locations in a longer version of the adventure. Look out for it in the shops.

more news on page 8



Winners do it in style

THE WINNERS of the Saga graphics utility competition in the August issue of *Sinclair User* are: Roger Bateman of Bracknell, Berkshire; David Pegg, Cheshunt, Hertfordshire; N Fear, Westbury-sub-Mendip, Somerset; and A Richards, Sheerness, Kent. All four will receive a Saga graphics tablet and Style interface.

The 10 runners-up, who each win Style on its own, are: K H D Bailey, Hastings, Sussex; M J Sharp, Thurlaston, Leicester; Phil Morse, Welwyn Garden City, Hertfordshire; Peter Stokes, Trowbridge, Wiltshire; L Boulton, Bradford; A T Fowler, West Ewell, Surrey; Jonathan Walters, Bangor, County Down, Northern Ireland; D S Sims, Plymton, Plymouth; R J Bending, Farnborough, Hampshire; J Skinner, Peckham, London SE15.

All winners correctly identified the alien message as 'Do it in Style' and its planet of origin as Venus.

All entrants will receive a £2.00 voucher redeemable on Style, and a £5.00 voucher redeemable on the graphics tablet, if bought direct from Saga Systems.

Going back to schools

AN INITIATIVE aimed at reviving the ailing educational software market has been launched by eight software companies.

The British Educational Software Associates, or BESA, are looking to establish an initial network of 200 retail outlets - specialist dealers who will stock a core of 40 educational titles and offer customers advice.

The emphasis is on service, with a catalogue of some 250 programs and an ordering system available to parents and teachers. "Educational software is not an impulse purchase," says Roy Davey, marketing director of Hill MacGibbon and Collins. "Customers want to know where they can find a good stock and see it demonstrated."

Martin Neild of MacMillan says the market has

grown since the days when the home computer was expected to revolutionise learning overnight. "Software publishers have learned from their mistakes and are now publishing top quality imaginative software. Now it's a question of regaining the confidence of the retailer and the end-user.

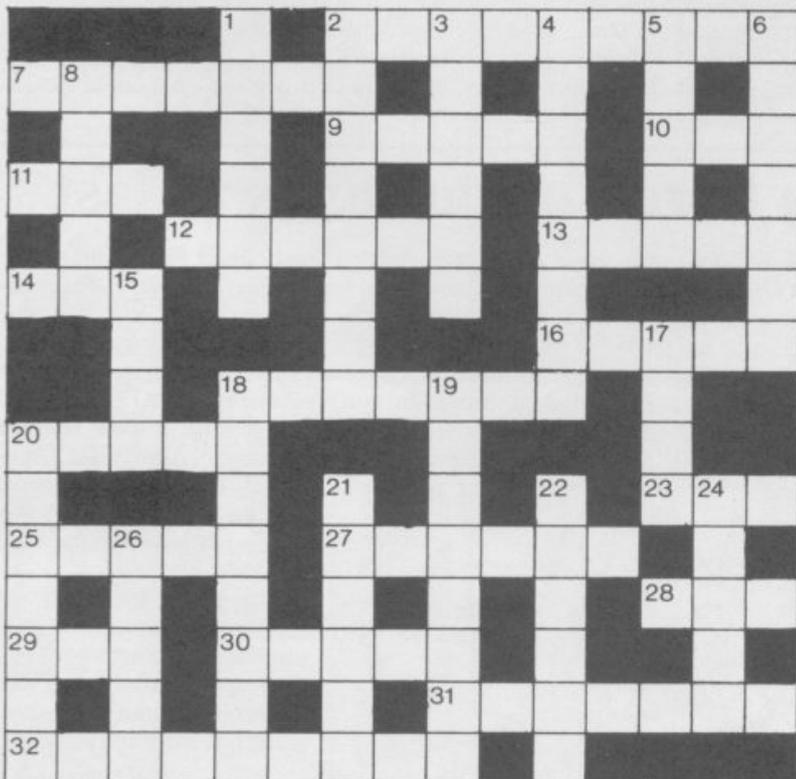
There are hopes of expanding the Association's

activities next year. The founding companies - ASK, Calpac, Collins, Bourne Educational, Widgeit, Hill MacGibbon, Griffin and MacMillan - hope to be joined by more producers next year.

Further information is available from Barbara Warren of Calpac, on 048-67 2584, or Martin Neild of MacMillan on 01-836 6633.



ZXWORD by Henry Howarth



solution on page 124

Across

2. The driving force behind the C5 (9)
7. Headroom fit to buy up Sinclair Research? (7)
9. A poem with an electric attraction, in a negative sort of way (5)
10. Equality in Part (3)
11. Origins of direct data entry (3)
12. Metal associated with cadmium in 2 across (6)
13. Complete sum (5)
14. Partly amended the Basic statement (3)
16. Writer in the operating system prepares file for access (5)
18. Hex EF OR Hex 10? (7)
20. Spectrum assembled UAMGT (5)
23. Trig ratio of some standing (3)
25. Dappled microcomputer (5)
27. Dieter changed to change again (2-4)
28. Truncated Basic statement? (3)
29. Joint found in the chips (3)
30. Computer aided management or alternative set of instructions (5)
31. Variable holding memory address - it's a dog! (7)
32. Tragic! - red ruined the little storage device (9)

Down

1. Erasable manual data recorder! (6)
2. Pandora's melanic data recorder? (5-3)
3. Fishes for adventure game heavies (6)
4. Choose Reagan, perhaps, to name Acorn product (8)
5. Introduce run, it appears (5)
6. Screens up the Dead Sea documents (7)
8. An odd peripheral? (3-2)
15. This Plotter gets some stick! (4)
17. Routine way out! (4)
18. Hard-disk tape unit with a shocking cold (8)
19. Surround note with carrier wave (8)
20. Diagrammatic sort of chip rag (7)
21. Carted around and checked at run time (6)
22. Like a high-tech limb in embryonic form (6)
24. A quaint angle? (5)
26. Spectrum keyword from Fleet Street (5)

New releases

THE BLOODY war veteran *Rambo* is set to explode onto your computer in October in **Rambo's Blood Part II**, from Ocean, costing £7.95.

Also in October, Ocean is releasing **Transformer**, based on the latest toy craze of robots. It will cost £7.95. **Cosmic War Toads** is the working title for the next Ocean game.

Lothlorien has just released **Arena**, an arcade game with futuristic tank battles priced at £9.99, while Mind Games is releasing **Evil Crown**, set in feudal times. It is icon driven and costs £7.99.

Schizophrenia is about to escape from Quicksilva. As Alfonse, cleaner at a laboratory, you must regain your alter ego. Price £7.99.

As threatened, Global Software is publishing a series of Golden Turkey Games. **Attack of the Mushroom People** is out in October. The games will cost £6.95.

Fun 'n' Games is the new label from New Generation. **Custard Kid** is set in a custard pie factory. **Cliff Hanger** relies heavily on the humour found in cartoons such as *Road Runner*. Both games cost £4.95 each.

A new game from Melbourne House is set in Egypt. **Fighting Warrior** is the working title, the price £6.95, and it should be out at the end of September.

Activision enters the ring with **Barry McGuigan's World Championship Boxing**. Price and release date still being considered. Imagine that you have entered a major business computer. That is the start of **Hacker**, from Activision. The game is scheduled for September.

Be the scourge of the high seas. **Seas of Blood** is on the Fighting Fantasy label and costs £9.95.

International Karate, by System 3, is due out soon and costs £6.50. **Revenge of The Last Ninja**, will be released in October.

Gilbert Gumphrey is the store detective known as **Grumpy Gumphrey**. The game by Gremlin Graphics, comes out in November, priced at £7.95.

Saving the people of New York from evil is the plot of **Superman**, from Beyond, due out in October at £9.95.

Electric Dreams Software has two games due out. **Riddlers Den**, a strategy/arcade program, priced at £7.95, and **I of the Mask** based around a masked robot character. Price is set at £9.95.

Orpheus is releasing **The Young Ones** in October, based on the unpleasant TV comedy series. It is icon driven and will cost £7.95.

Chartwatch

LAST MONTH we bemoaned the absence of **Frank Bruno's Boxing** from the charts. Now it's gone straight to number one with a bullet, while **Rocco's** on a downward spiral and Alligata's abysmal **Knockout** is out for the count.

Other new entries include Mirrorsoft's excellent **Dynamite Dan**, the classic **Frankie**, Vortex's **Highway Encounter** and Level 9's **Red Moon**. **Pole Position**, **Dam Busters**, **Nick Faldo's Open**, **Nonterraqueous**, **BMX Racers** and **Monopoly** are also new to the hit list.

Some lunatics out there are still buying Mastertronic's **Action Biker**, and Daley Thompson's **Decathlon**, over a year old, continues to sell well.

There's still no sign of the **Fourth Protocol**, and Melbourne's **Way of the Exploding Fist** has yet to make the same devastating impact that it had on the Commodore charts.

TOP GALLUP 30

This chart is compiled by Gallup by sampling sales at 250 retail outlets, including high street chain stores and independent home computer shops

MONTH ENDING AUGUST 23

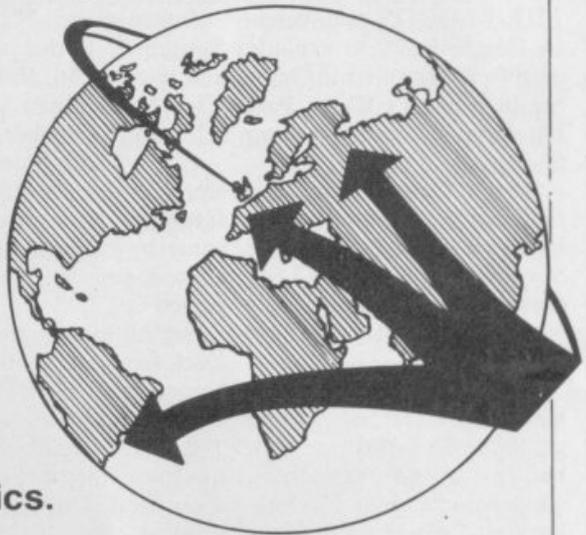
1	➤ FRANK BRUNO'S BOXING	ELITE
2	HYPERSPORTS	IMAGINE
3	◊ SOFT AID	VARIOUS
4	➤ DYNAMITE DAN	MIRRORSOFT
5	➤ SPY VS SPY	BEYOND
6	◊ JET SET WILLY 2	SOFTWARE PROJECTS
7	➤ ACTION BIKER	MASTERTRONIC
8	◊ SPY HUNTER	US GOLD
9	◊ ROCCO	GREMLIN GRAPHICS
10	➤ NODES OF YESOD	ODIN
11	➤ FRANKIE GOES TO HOLLYWOOD	OCEAN
12	◊ CAULDRON	PALACE
13	➤ POLE POSITION	US GOLD
14	BRUCE LEE	US GOLD
15	◊ DUN DARACH	GARGOYLE
16	➤ GLASS	QUICKSILVA
17	➤ HIGHWAY ENCOUNTER	VORTEX
18	◊ WORLD SERIES BASEBALL	IMAGINE
19	➤ DAM BUSTERS	US GOLD
20	◊ EMPIRE FIGHTS BACK	MASTERTRONIC
21	◊ A VIEW TO KILL	DOMARK
22	➤ NICK FALDO'S OPEN	ARGUS
23	◊ TAPPER	US GOLD
24	➤ NONTERRAQUEOUS	MASTERTRONIC
25	➤ BMX RACERS	MASTERTRONIC
26	◊ SHADOWFIRE	BEYOND
27	➤ RED MOON	LEVEL 9
28	◊ DALEY THOMPSON'S DECATHLON	OCEAN
29	◊ FINDERS KEEPERS	MASTERTRONIC
30	➤ MONOPOLY	LEISURE GENIUS

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Contact: **Phil Godsell**,
Software Manager
Micronet 800
8 Herbal Hill,
London EC1R 5EJ.

QL prices plummet

THE PRICE of the QL has been slashed in half, making it the only 16-bit micro-computer for less than £200.00.

The move comes at the start of what Sinclair Research claims to be an aggressive Christmas marketing campaign and should make potential customers think twice before buying machines such as the ST and Amiga.

Jane Boothroyd, UK sales

and marketing manager for Sinclair Research says: "We have reduced the price of the QL to consumers in line with reduced manufacturing costs. We will achieve major savings from a substantial increase in manufacturing volume. If the QL price drop is successful in attracting new customers it will bring down the price of software and should entice more software houses into the QL market."

Veronica Colin, of Talent Software, sums up the mood of software houses. "We anticipated that the QL would come down in price and the market should expand. Software prices have not gone down, even with the drop in price of micro-drive cartridges, because duplication costs increased by 20 per cent.

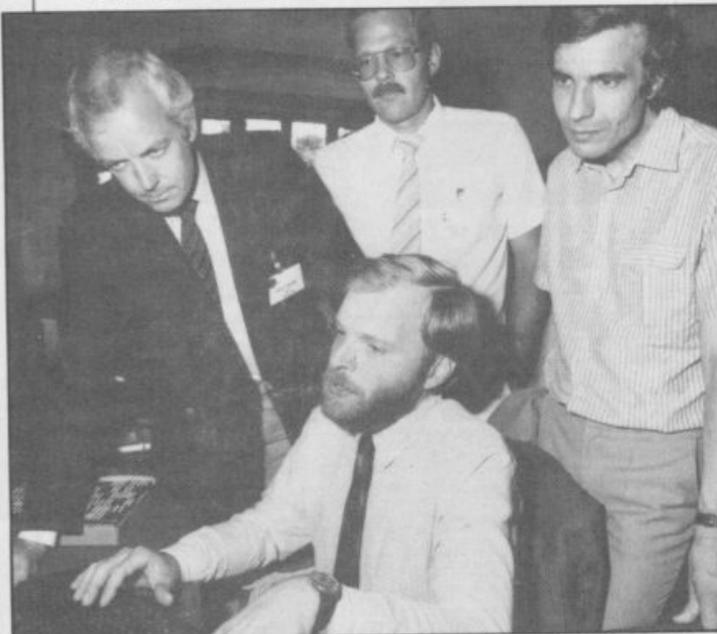
"The drop in price of the QL should do us good but hardware companies may have problems as some peripherals now cost more than the QL."

Hardware companies, however, are not too pessimistic. A spokesman for CST, manufacturers of disc drives and interfaces, says: "Anything which boosts the



sales of the QL should be seen as a good thing. I would defend the prices of our products as they are selling at the market price.

"The only thing which we are worried about is the effect of the price drop on the QL. It could push the QL down market into the range of the Spectrum Plus. Games manufacturers would have a good time but it would take a while before the children have their fill of it and parents think about serious uses which would require our products."



DELEGATES from the International Banking Summer School look on as Chris Clifton tries to demonstrate a Home Banking Facility on the QL. The facility, tied into the Nottingham Building Society, will allow you to move money from one account to another, check standing orders, order cheque books and pay bills.

Lattice C now available

A FULL implementation of Lattice C — the Kerninghan and Richie C standard — is available from Metacomco.

It is the first full version of the medium level system development language for the QL and, at £99.95, it is one of the most inexpensive for any computer.

The package includes a detailed user manual, three microdrive cartridges and a ROM which contains part of the operating system and also ensures that the pack-

age is virtually pirate proof. The language will compile to true 68000 code and is compatible with Lattice compilers on the IBM PC. It has a library of Unix, QDOS and utility functions.

The only product to which it could be compared is Prospero C, from Computaware. That company promises a full Kerninghan and Richie implementation but it will not be available until later this year and a price has not been fixed.

Accountancy packages

THE HOME Accounts Manager is the most competitively priced package in a new accounting program range from Dialog Software.

The first part of the package includes a budget routine into which all day-to-day expenses and standing orders set for banks, buildings societies or other organisations can be placed. The bank account part of the program deals with all cheque transactions and cash dispensers and produces a bank balance.

Transact is the first full book-keeping system for the QL. It can deal with nomin-

al ledger transactions, VAT payments, and profit and loss figures.

The Dialog Sales Ledger and Invoice Processor provides an open item accounting system. It can be used to create invoices from your product tables, take a stock of your products and implement trade discounts on certain lines.

The Transact book-keeping system and Sales Ledger are priced at £34.95 each while Home Accounts Manager costs £19.95. More information about the range of products can be obtained on 01-502 4328.

QL plus disc?

A NEW VERSION of the QL may be on the way, according to sources close to Sinclair Research.

The machine, based on QL technology, is likely to have ½ megabyte of RAM, and may offer one inbuilt disc drive instead of the two microdrives. Full versions

of the four Psion exchange packages may also be available in ROM on board the computer.

As yet there is no hint of a possible price, but if the machine is launched, the recent QL price cut leaves an obviously attractive niche at the £400 level.

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- * Through connector for other peripherals.
- * "Poke" facility or infinite lives etc.
- * Also saves to cassette.

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John Lambert — Sinclair User

"... an essential buy for the Spectrum owner who has converted to microdrive..."

Ian Sinclair — Author

"I much preferred the Microdriver for speed and ease of use."

Iolo Davidson — Your Spectrum

"I preferred the Microdriver because of its ease of use."

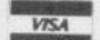
Andrew Pennell — Popular Computing Weekly

Note: This unit is intended for software owners to transfer programs onto microdrive cartridges for speed and ease of access. Programs saved using the Mirage Microdriver are unreadable unless the Microdriver is present.

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Pitfall II	Activision	8.10	DK Tronics	2.50	Hunchback II	Ocean	6.20	Learn to Read 2	Sinclair	5.00	PRINTER (Centronics)	£199
Space Road	Activision	8.95	DK Tronics	3.99	Kong Strikes Back	Ocean	6.20	Learn to Read 3	Sinclair	5.00	SHINWA CP80 PRINTER (Centronics)	£195
Space Shuttle	Activision	8.95	Mindar	8.95	Return to Eden	Ocean	8.99	Learn to Read 4	Sinclair	5.00	SHINWA CP480 PRINTER	£285
Football Manager	Addictive	6.25	DK Tronics	8.95	Snowball	Ocean	8.99	Learn to Read 5	Sinclair	5.00	MICROVTEC M21431 (SPECTRUM)	£245
Incredible Hulk	Adventure	8.95	DK Tronics	8.95	Flight from the Dark	Lothlorien	7.15	Learn to Read 6	Sinclair	5.00	MICROVTEC DG1451 (DL)	£280
Spiderman	Adventure	8.95	DK Tronics	8.95	Confrontation	Lothlorien	5.35	Learn to Read 7	Sinclair	5.00	MONITOR	£245
Archon	AmigaSoft	9.90	DK Tronics	8.95	Confrontation Scen 2	Lothlorien	5.35	Make a Chip	Sinclair	5.00	MICROVTEC DQ1451 (DL)	£280
Hard Hat Mack	AmigaSoft	8.05	DK Tronics	8.95	Confrontation Scen 3	Lothlorien	5.35	Match Point	Sinclair	7.15	PHILIPS GREENSCREEN MONITOR	£82
One and One	AmigaSoft	8.05	DK Tronics	8.95	Confrontation Scen 4	Lothlorien	5.35	Musikmaster	Sinclair	7.15	3 CHANNEL SOUND	£28
Son of Blagger	AmigaSoft	8.05	DK Tronics	8.95	Confrontation Scen 5	Lothlorien	5.35	Planet of Death	Sinclair	3.50	CURRAH MICRO SPEECH	£33
Chess II	Artic	5.00	DK Tronics	8.95	Confrontation Scen 6	Lothlorien	5.35	Plus 80	OCF	17.95	VOR BOX	£33
Chess Tutor	Artic	3.50	DK Tronics	8.95	Confrontation Scen 7	Lothlorien	5.35	Casino Royal	OCF	9.25	VTX 5000 MODEM	£85
Eye of Bam	Artic	3.50	DK Tronics	8.95	Confrontation Scen 8	Lothlorien	5.35	Editor Assembler	OCF	11.85	DK TRONICS DUAL PORT INTERFACE	£12
Gatansans	Artic	3.00	DK Tronics	8.95	Confrontation Scen 9	Lothlorien	5.35	Finance Manager	OCF	8.05	BUDG INTERFACE (+ reset switch)	£12
Golden Apple	Artic	3.50	DK Tronics	8.95	Confrontation Scen 10	Lothlorien	5.35	Finance Manager Plus	OCF	17.95	DATAL ELECTRONICS INTERFACE	£9
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Laundry	Artic	3.00	DK Tronics	8.95	Confrontation Scen 13	Lothlorien	5.35	Stock Manager	OCF	8.05	DK TRONICS PROGRAMMABLE	£29
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Snooker	Artic	3.00	DK Tronics	8.95	Confrontation Scen 15	Lothlorien	5.35	Stock Manager	OCF	8.05	INTERFACED II JOYSTICK	£11
World Cup Soccer	AVS	8.95	DK Tronics	8.95	Confrontation Scen 16	Lothlorien	5.35	Stock Manager	OCF	8.05	FORMULA 1 JOYSTICK	£12
System 15000	AVS	8.95	DK Tronics	8.95	Confrontation Scen 17	Lothlorien	5.35	Stock Manager	OCF	8.05	SURE SHOT JOYSTICK	£2
Chuckie Egg 2	A+F	6.20	DK Tronics	8.95	Confrontation Scen 18	Lothlorien	5.35	Stock Manager	OCF	8.05	SPECTRUM PLUS PVC COVER	£3
Beta Basic 3.0	B&B	13.50	DK Tronics	8.95	Confrontation Scen 19	Lothlorien	5.35	Stock Manager	OCF	8.05	SAGA EMPEROR PVC COVER	£4
Doonards Revenge	Beyond	8.95	DK Tronics	8.95	Confrontation Scen 20	Lothlorien	5.35	Stock Manager	OCF	8.05	CURRAH MICROSOFT	£7
Lords of Midnight	Beyond	8.95	DK Tronics	8.95	Confrontation Scen 21	Lothlorien	5.35	Stock Manager	OCF	8.05	EXTENSION TO KEYWAY (Ribbon)	£11
Playton	Beyond	7.15	DK Tronics	8.95	Confrontation Scen 22	Lothlorien	5.35	Stock Manager	OCF	8.05	MICRODRIVE INTERFACE LEAD	£8
Shadowline	Beyond	8.95	DK Tronics	8.95	Confrontation Scen 23	Lothlorien	5.35	Stock Manager	OCF	8.05	GAMES BOARD	£14
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Antman	CCS	8.05	DK Tronics	8.95	Confrontation Scen 29	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
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Advanced	CP Software	5.35	DK Tronics	8.95	Confrontation Scen 35	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Bridge Tutor Beginner	CP Software	5.35	DK Tronics	8.95	Confrontation Scen 36	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Draughts	CP Software	5.35	DK Tronics	8.95	Confrontation Scen 37	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Extended Basic	CP Software	8.95	DK Tronics	8.95	Confrontation Scen 38	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Floating Point Fort	CP Software	9.95	DK Tronics	8.95	Confrontation Scen 39	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Pinball Wizard	CP Software	5.35	DK Tronics	8.95	Confrontation Scen 40	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Superchess 3.3	CP Software	8.95	DK Tronics	8.95	Confrontation Scen 41	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Supercode II	CP Software	6.95	DK Tronics	8.95	Confrontation Scen 42	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Supercode III	CP Software	11.95	DK Tronics	8.95	Confrontation Scen 43	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Z3 Reversi	CP Software	5.35	DK Tronics	8.95	Confrontation Scen 44	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Leonardo	Creative	7.15	DK Tronics	8.95	Confrontation Scen 45	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Monkey Manager	Creative	6.25	DK Tronics	8.95	Confrontation Scen 46	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Derby Day	CRL	3.00	DK Tronics	8.95	Confrontation Scen 47	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Formula One	CRL	7.15	DK Tronics	8.95	Confrontation Scen 48	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Highway Code	CRL	5.35	DK Tronics	8.95	Confrontation Scen 49	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Magic Roundabout	CRL	8.05	DK Tronics	8.95	Confrontation Scen 50	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Rocky Horror Show	CRL	5.35	DK Tronics	8.95	Confrontation Scen 51	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Stargazer Secrets	CRL	3.00	DK Tronics	8.95	Confrontation Scen 52	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Terraviva	CRL	5.35	DK Tronics	8.95	Confrontation Scen 53	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
War of the Worlds	CRL	7.15	DK Tronics	8.95	Confrontation Scen 54	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Dungeon Master	Crystal	3.50	DK Tronics	8.95	Confrontation Scen 55	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Halls of Thengs	Crystal	3.50	DK Tronics	8.95	Confrontation Scen 56	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Rummets Revenge	Crystal	3.50	DK Tronics	8.95	Confrontation Scen 57	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Highway Code	Dalek	6.25	DK Tronics	8.95	Confrontation Scen 58	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Mini Office	Dalek	5.25	DK Tronics	8.95	Confrontation Scen 59	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
Red Arrows	Database	8.05	DK Tronics	8.95	Confrontation Scen 60	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
			DK Tronics	8.95	Confrontation Scen 61	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
			DK Tronics	8.95	Confrontation Scen 62	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
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			DK Tronics	8.95	Confrontation Scen 65	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
			DK Tronics	8.95	Confrontation Scen 66	Lothlorien	5.35	Stock Manager	OCF	8.05	ZX EXPANSION SYSTEM (Includes Microdrive/Interface 1/1astwood)	£190
			DK Tronics	8.95	Confrontation Scen 67	Lothlorien	5.35	Stock Manager				

Horror over red propaganda

THANK YOU for your perversion of the innocent game *Shopkeeper* in your August issue.

It is quite obvious that you are anti-Conservative and anti all other good things. I refer to the picture on pages 78 and 79 of a Mrs Snatcher — looking uncannily like our Maggie — snatching an old lady's cash. It is despicable and disturbing anti-Conservative propaganda.

What will we see next? How about games supporting the Labour party — **Dustman Kinnock**, or what about **Uprise and Overthrow the Government and join the Labour party?**

What worries me is that impressionable young people are subjected to this drossy propaganda and are thus influenced by your advertisements for the left. Where will it all lead? Perhaps to the greatness of Communism and the myth that all are equal — ho hum!

**Anthony Smith,
Hoddesdon,
Hertfordshire**

PS. I don't expect to see this letter published as freedom of speech is not allowed in Communist magazines.

● *Wrong again, you capitalist running dog! Long live the revolution! You'll be first against the wall when (that's enough. Ed).*

Piracy — the growing trend?

YOUR NEWS story — Spanish Connection, August — attracted my attention.

I don't pretend to defend piracy and by no means support companies like Inforpress, who know they are



Thatcher — unrepentant

in a market which can't stand the large numbers of imported games at standard prices.

However, while games like **Underwurld** and **Knight Lore** cost 3,000 pesetas, who can resist the temptation of buying a program from a friend at only 150 pesetas?

I am aware of the danger piracy represents to the software industry, but I think software houses should consider the possibility of reducing their prices — and not just complaining.

**Fernando Cortés
Cabanillas,
Madrid, Spain**

Mesmerised by a load of . . .

THERE ARE plenty of rubbishy rip-offs on the market and your magazine's to blame, encouraging garbage as you do with reviews of games you say are good, but which I think are awful.

One such game is

Shadowfire, which Clare gave classic status — I can only think Clare was mesmerised by the pretty graphics! For a start, if a group of *Shadowfire* characters are attacked, they stand like dummies, with their life-blood seeping away until you instruct them to defend themselves.

The game also supplies a bewildering array of weapons, but doesn't tell us which are the most powerful and whether they have an adjacent location range.

**Mick Godwin,
Leicester**

● *You weren't mesmerised, were you, Clare? Clare? Clare! C'mon, wake up. Snap out of it.*

Mixing politics and computers

I HAVE just read an article by M J King in Letters — August issue — and I am glad the Ed sorted him out.

However, in this day and age, people are supposed to be allowed to express themselves freely. And if others don't like it, then that's tough.

So my final advice to Michael King is to vote for the *Sinclair User Party* — and leave politics to the politicians.

**M Sellars,
BFPO 16**

● *The Sinclair User party. Now there's an idea . . .*

No music to relax to

IN YOUR REVIEW of *Frankie Goes to Hollywood* — July — you state that there is a 15 minute live version of *Relax* on one side

of a separate tape, and on the other side, playing tips by Patrick Allen.

I have bought the game and that is not true —

Ocean says there is only five minutes of *Relax*

on each side. I was very disappointed when I received the game.

**N Couley,
Nr Ormskirk,
Lancashire**

● *The version we reviewed was, as stated, pre-release, and Ocean assured us at the time that a live Relax would be included. Slapped wrists all round. Still, the game's not bad, is it?*

Disgust over Manx review

I WAS amazed when I read Mike Wright's review of *Manx Tapes' Classic Book-keeping System* — August.

As a purchaser of the system I must point out some of the inaccuracies and inadequacies of the review.

The most obvious inaccuracy concerns the price of the system. The reviewer states this as £69.95. On page 62 of the same issue, is an advertisement which shows the price of the larger of the two systems to be £69.00. The smaller system costs £46.00.

True, the system requires five further cartridges for storage of data. How else does the reviewer imagine that the large amounts of data which are processed are to be stored?

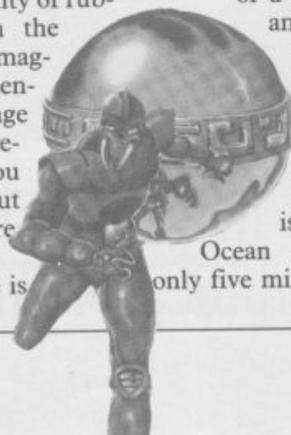
The system is far from complex. The user is instructed at every stage and each routine follows a logical path.

If you do not have the time or a sufficient understanding of accounting to enable you to carry out a proper review of such programs, then it would be fairer, not only to the authors but also to your readers, if you declined to perform the task at all.

**P M Mountjoy,
Gloucester**

● *Mike Wright reviewed an earlier version which has since been improved. A review of the new system appears on page 80 of this issue.*

more letters on page 14



Same old story

I AM writing to complain about the review given to **Jet Set Willy II**. Why did it receive a three star rating? It is very good value for money and has excellent graphics, sound, and an additional 42 new rooms. I would recommend this game to all Jet Setters. Apart from the reviews, I enjoy your magazine. Keep up the good work and bring back the Gilbert Factor.

David Little,
Chislehurst,
Kent

● How much is Gilbert paying you?

High scores on trashy games

WHEN PEOPLE claim to score millions of points on their fourth or fifth go at a game, it just shows how rubbishy and easy those

games really are.

Surely, if manufacturers made harder games, the consumer would be more satisfied and more likely to buy the next game brought out by that company. What ever happened to programs like **The Hobbit** or **Project Future** where there is a challenge each time you play the game?

Andrew Grant,
East Budleigh,
Devon

Surgery for dead micros

I RECENTLY reversed the polarity on the power supply to my Spectrum.

Referring to an article — August issue — on where to get poorly Spectrums fixed, I noted your enthusiasm for a company called Mancomp.

I arrived at Mancomp

with my dead Spectrum and walked out 25 minutes later with a fully repaired and tested machine.

I can recommend Mancomp unreservedly to all Spectrum users.

Gary Woolley,
Redditch, Worcester

Anonymous programmer

I WAS glad that you published my program in your August issue, however you did not include my name. I would be grateful if you would acknowledge my writing of **Isotopes** for the 48K Spectrum.

John Pitcher,
Cults, Aberdeen

Jolly good service

TOP MARKS for Beau-Jolly! I bought their Value Pack only to find there were no instructions included and **Pedro** refused to load.

Beau-Jolly quickly replaced it with a fresh pack — checked before despatch — with the all important instructions. First class!

Ian Nelson,
Insch, Aberdeen

Penpals wanted

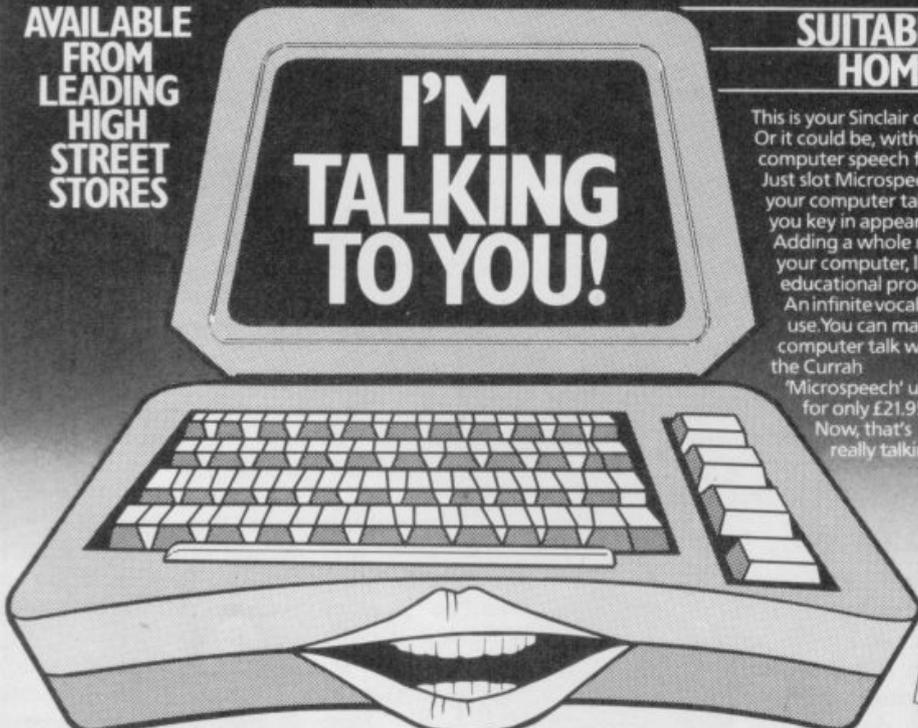
I AM 13 years old and would like to communicate with anybody who owns a Spectrum. I am interested in programming and playing games, and would be happy to swap programs, tips and POKEs.

Daniel Heuston,
63 Recreation Avenue,
Harold Wood,
Romford, Essex

I AM 10 years old and own a 48K ZX Spectrum. I am looking for a male pen friend between the ages of nine and 11 to exchange tips for games.

Ian Cook,
82 Arrendene Road,
Haverhill, Suffolk

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RRP £21.95

EASY TO ADD, EASY TO USE

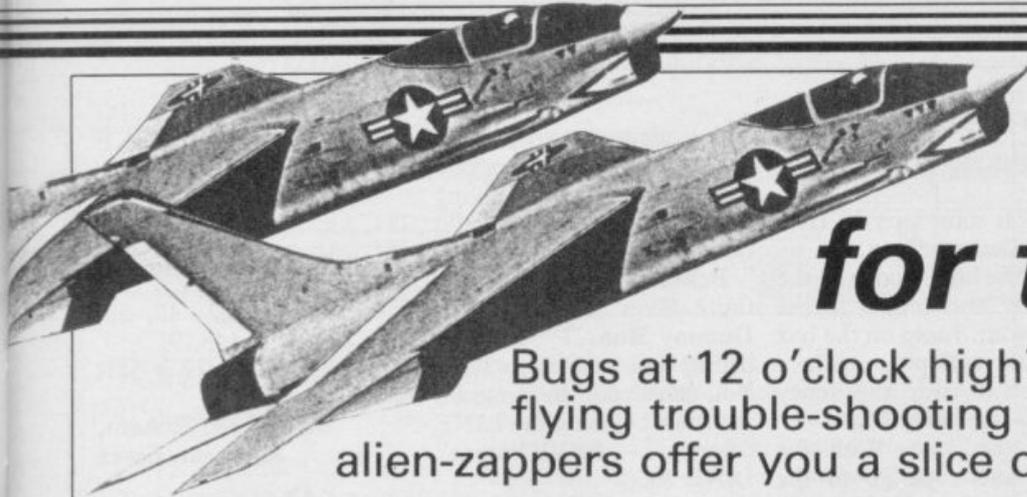
READ ALL ABOUT IT - MICRONET PAGE 60043712

CURRAH MICROSPEECH

We can make Commodores speak too

MAKES YOUR COMPUTER SPEAK!

Another great product from 



Reach for the sky

Bugs at 12 o'clock high? Need some high-flying trouble-shooting arcade action? Ace alien-zappers offer you a slice of the right stuff...

Fighter Pilot

I HAVE just finished **Fighter Pilot** after shooting down 12 enemy aircraft on level Ace.

Has anyone landed the F15 with the flaps and undercarriage destroyed? If not, here is how to do it.

First of all, get your air-speed to around 130 to 140 knots, but be careful of going below 130 as you will stall without flaps. Next get your VSI to -5 or -7 with about half a mile to go, the altitude at that stage depends entirely on you — mine is around 100 to 120. Then sit back and enjoy the landing.

This must surely be a bug.

Mark Testrow,
Allerton,
Liverpool

Frank Bruno's Boxing

IS ANYONE having trouble reaching Peter Perfect in **Frank Bruno's Boxing**?

If you are, enter your name as BOB with an EVBA membership code of NG8INI394. I have managed to knock the champion out in 18.04 seconds, has anyone beaten this?

Robert Dunning,
Middlesbrough,
Cleveland

Booty

WHILE PLAYING **Booty** I fell into a bug. I was on a platform when I missed a lift, and fell to the floor. The computer then locked. My

final score was 14 with 3 lives left.

Matthew Sharples,
Great Melton,
Norfolk

Spy Hunter

IN **Spy Hunter** from US Gold I have noticed a bug. If you follow the truck from the start, being careful not to run it off the road or shoot it, then no enemy agents' cars will appear on the screen.

Andrew Billimore,
Inverclyde,
Scotland

Hypersports

I HAVE just beaten Stephen France's highest score on **Hypersports** — September issue. My highest score is 226872 and my best individual scores are:

- Swimming — 25.88 seconds;
- Skeet shoot — 9200 points;
- Long horse — 9.56 marks;
- Archery — 4000 points (wind 5);
- Triple jump — 17.02 metres;
- Weightlifting — 195 kg.

I have also finished **Alien 8** and **Knight Lore** and I beat the computer on level 5 of **Spy vs Spy**.

Jon Goodheart,
Witham, Essex

Highway Encounter

ON August 13, I passed Zone Zero of **Highway En-**

counter from **Vortex**.

Block the path of your Vortons at Z29, go on, using blocks to block the paths of aliens, then go back and collect them.

Martin Hewes,
Woking, Surrey

Fantastic Voyage

USING THE Pokes for **Fantastic Voyage** in the August issue, the first section of the sub is in the mouth; the second — intestines; the third — liver; the fourth — gall bladder; the fifth — pancreas; the sixth — duodenum; the seventh — stomach and the eighth is in the colon.

If you are worried about the time limit —

the clock restarts at 60 minutes. The escape route is through the optic nerve in the brain to the eye.

Chris McGrail,
Sheffield

Mugsy

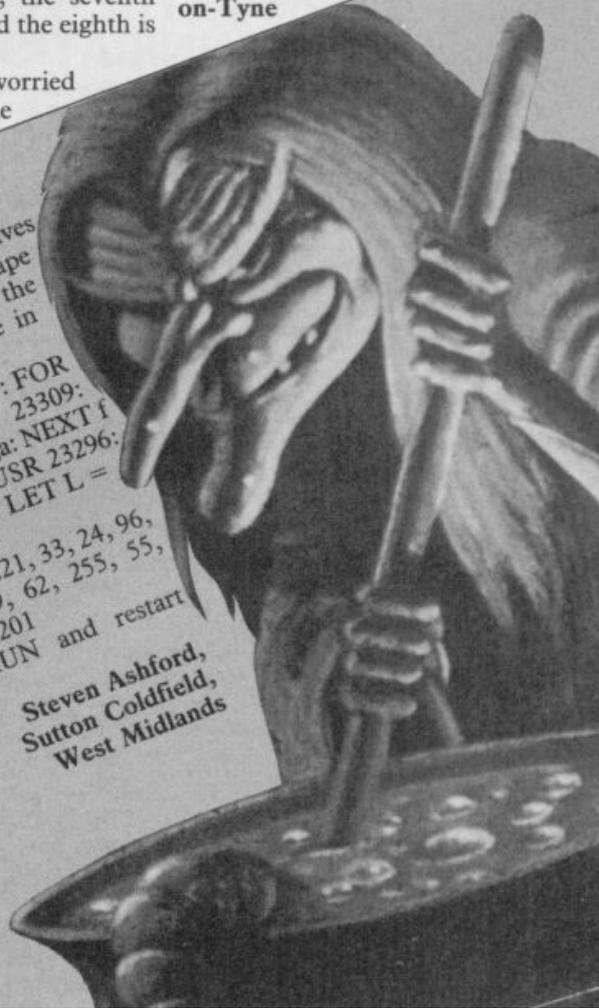
IF YOU need more cash in **Mugsy**, type 999999999 and you will get millions of dollars. Type that in when you are asked how much you wish to spend on artillery and ammo. But be warned, type it in again and the game freezes.

D A Scott,
Killingworth,
Newcastle-on-Tyne

Cauldron

TO OBTAIN infinite lives in **Cauldron**, wind the tape forward to just past the title screen, and type in this program.
10 CLEAR 24599: FOR f = 23296 TO 23309: READ a: POKE f, a: NEXT f
20 LET L = USR 23296: POKE 40060, 0: LET L = USR 24600.
30 DATA 221, 33, 24, 96, 17, 232, 159, 62, 255, 55, 205, 86, 5, 201
Type RUN and restart the tape.

Steven Ashford,
Sutton Coldfield,
West Midlands





Monty is Innocent

I HAVE got to be the only person to have completed **Monty is Innocent** in a record time of 56 seconds.

To complete it you don't have to collect a gun, just collect the bottom key on the left and enter the middle cell on the left, if Monty is there. Take him through the underground tunnels checking all the rooms, left and right, for potion.

Does anyone know how to get into the coal train in **Wanted: Monty Mole**. Also would anyone like to be my penfriend to exchange hints, tips and programs?

**Tim Stollery, (13 years),
31 Musquash Way,
Hounslow, Middlesex
TW4 7PH**

Herbert's Dummy Run

I HAVE some tips on **Herbert's Dummy Run**.

Get the honey pot and the box key and return to the start room. Jump on the box and that will put you in a position to swap the honey pot for the teddy bear.

Get the rope. With the teddy and rope go to the dalek screen. Teddy will open the right-hand side door, slowly. Go into that room and jump at the rope — it should expand.

Now go to the swimming pool screen. You can now collect the rubber duck.

Load the pop gun with the cork and go to the fort. Exchange the pop gun for the flag. With the flag and rubber duck, go to the sea-side screen.

Exchange the flag for some pebbles and load the catapult. Combine the torch and bulb to fix the torch.

With the working torch

and loaded catapult, go to the dark room and shoot all the ducks, except the flying duck. The toy caps should fall down.

Below is a routine for infinite lives on **Herbert's Dummy Run**. Type in the listing and save it to tape. You can make the program autostart by using the LINE command — SAVE "name" LINE 10.

```

10 CLEAR 65535
20 FOR F = 23296 TO 23321: READ B: POKE F,B: NEXT F
30 DATA 221, 33, 0, 0, 17, 17, 0, 175, 55, 205, 86, 5, 221, 33, 224
40 DATA 252, 17, 63, 2, 62, 255, 55, 205, 86, 5, 201
50 PRINT AT 0,0; "INSERT TAPE NOW FROM START"
60 RANDOMIZE USR 23296
70 POKE 65093, 243: POKE 65100, 190
    
```

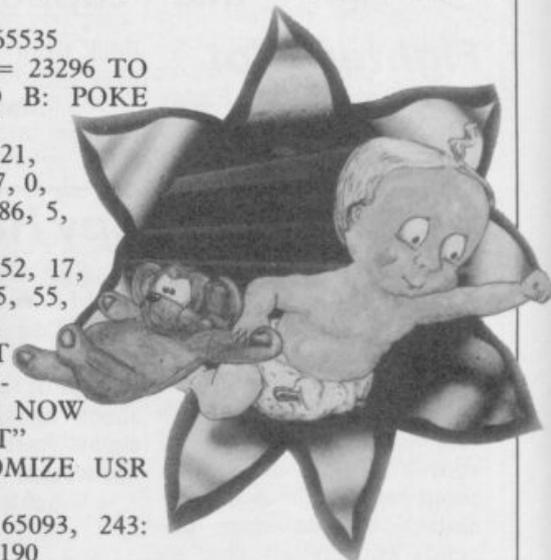
80 FOR F = 65271 TO 65299: READ B: POKE F,B: NEXT F

90 DATA 17, 128, 91, 33, 254, 83, 26, 174, 203, 164, 174, 203, 228, 18, 43

100 DATA 19, 123, 254, 154, 32, 241, 62, 48, 50, 213, 202, 195, 148, 91

110 RANDOMIZE USR 65093.

**Neil Zammit,
Rainham, Essex**



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**Acute add-on allergy?
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Sinclair Surgery

RS232 versus Centronics

I WISH to attach an Epson-type printer to my Spectrum Plus. I know that I will need a piece of hardware — an interface — but I am confused on which to buy.

I have sought advice from two sources; the first of which informed me that I would need a Sinclair Interface 1, and the other informed me that I would need only a printer lead.

**Gary Wells,
High Wycombe,
Buckinghamshire**

● To use any full-sized printer with the Spectrum you will need an interface.

There are two ways to drive a printer, Centronics or RS232; it does not matter which type you use provided the interface is of the same type as the printer. Centronics printers tend to be cheaper than RS232 and there are more Centronics interfaces available for the Spectrum. If, however, you intend eventually to buy a QL, which has a built-in RS232 port, it might be worth getting that type of printer.

Also, you should consider what you want to do with the printer. If you want to COPY the screen, check that the interface has suitable software; with Interface 1, which has an RS232 port, you will have to write your own.

The sound of silence

I RECENTLY attached the Currah Microspeech unit to my Spectrum Plus. I decided to try the device by putting the game sound of my recent turbo hyperload

software through the TV. That is where things went wrong.

Every time the loader reached the hyper-click a flashing 'K' cursor appeared and the game stopped loading. Is Microspeech incompatible with turbo-loads? Is there a POKE to solve the problem?

**Keith Groat,
South Queensferry,
Clwyd**

● The Currah Microspeech reserves a buffer at the top of memory and it is possibly that which is causing problems. Try entering PRINT USR 0, to reset the machine, or CLEAR 65535 to move RAMTOP before loading the game. If that does not work you will have to either get your soldering iron out or contact the manufacturer.

New look for old Spectrum

IS IT possible to fit the Spectrum Plus upgrade kit to a 16K Spectrum?

**David Jarratt,
Abingdon,
Oxfordshire**

● Yes. Any add-on keyboard will work with both 16K and 48K Spectrums.

Better points of the Fox

I WISH to purchase a Fox programmable interface and understand that it can be used as a pseudo-ROM.

Can you explain how that works and what advantage this interface has over the others you have reviewed?

**Ann Burns,
Norwich,
Norfolk**

● The Fox programmable

joystick interface contains a 2K static RAM chip and a rechargeable battery. When the unit is plugged into the Spectrum the battery is kept topped up from the Spectrum power supply. When you switch off, the battery retains the contents of the chip.

Although normally the chip contains routines to set up the joystick you can put anything you like in it. It can then be loaded into the Spectrum memory at the flick of a switch.

Contact Fox Electronics Ltd, Fox House, 35 Martham Road, Hemsby, Great Yarmouth, Norfolk NR29 4NQ. Tel: 0493 732420.

Incompatible Tasprint

IS Tasman's Tasprint compatible with the Alfacom 32 printer and Interface 1, and if so what are the printer control codes?

**G A Davies,
Doncaster,
South Yorkshire**

● Tasprint will only work with Epson compatible printers, and that excludes the Alphacom 32.

Ceefax gets dumped?

I POSSESS a Sanyo television which has a DIN 5-pin socket for earphones. Also coupled is a video recorder.

For my 48K Spectrum I use an Epson FX80 printer. Is it possible to connect the Epson to the television in order to get a print of Ceefax?

**L R Flacke,
Cardiff**

● The only way to copy a Ceefax screen is via the

TTX2000 teletext adapter from Modem House. It has a screen dump to a Sinclair printer facility built-in, but copying to an Epson is a little more complex. Contact them at Iolanthe Drive, Exeter, Devon EX4 9EA. Tel: 0392 69295.

Flexible connections

WHERE can I obtain an extender board for the rear of my ZX Printer interface, to allow me to connect my dead-ended Protek joystick interface at the same time as the printer.

**Nicholas Morrow,
Kirkton Manor,
Peebles**

● Contact CLPS, Shire Hall, The Sands, Appleby, Cumbria CA16 6XN. Tel: 0930 52204. They sell a flexible three-way connector for £12.50.

Dead flesh falls apart

I BOUGHT a Spectrum 48K at Christmas and noticed that the keyboard covering was loose. Does that affect the performance of the Spectrum in any way?

My real problem is that for about a month the Spectrum has failed to load any original tapes including Horizons.

**Jason McClurg,
Newtown Abbey,
County Antrim**

● The keyboard cover simply needs sticking down again. The loading problems could, unfortunately, be caused by a multitude of things. As the computer is still under guarantee it is best to send it back for repair, and get the keyboard fixed for free at the same time.

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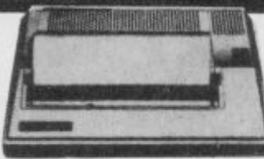
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SINCLAIR USER Classics are programs which, in our biased and eccentric opinion, set new standards in software. They are the programs by which the others should be measured. If you buy no

other software, buy these. No self-respecting Sinclair user should be without them.

Software reviews carry a star rating, the basis of which will be value for money. Programming, graphics, speed, presentation, addictive qualities and the rest are taken into account.

Guide to ratings

- ★★★★★ 24 carat. Buy it
- ★★★★ Value for money
- ★★★ Nothing special
- ★★ Over-priced
- ★ A rip-off

The Rats

MAN'S WORST FEAR waits eagerly in the darkness. The scent of human blood is overwhelming and the taste of cool, moist, rubbery flesh is still remembered and savoured. The time is near for the invasion of **The Rats**.

The game, from Hodder and Stoughton which publishes the book of the same name, is an experience as well as being a menu-driven adventure with a touch of strategy. It loads in sections, the first being a demo program with a nice line in cellar graphics. The sound is not too hot, but the excellent and superbly fast animation sequence, in which a torch scans a watery cellar to reveal hundreds of the plague carriers, is one of the best I have seen.

Once the demo is over, or if you break out of it, the main game is loaded from random routines on the first side of the tape. Loading is confusing as the main operating system of the game chooses the sections to be included within the program at random. Therefore, some of the code on the tape does not load and, if you are a first time user, you may think that the tape is faulty. It is not an error, the tape is loading in the random encounters for the game.

Once the game is running you had better be prepared for some fast action. There are two levels of play, over which the computer has total control. The first level involves a number of scenarios which deal with minor characters. As in James Herbert's book, those people are expendable and can

be sacrificed for information about the mutant rats.

Those scenarios are heralded by a warning siren. The screen then splits into three windows, the largest of which displays the action as text. The



long window on the left provides command options and the one at the bottom of the screen is your command window. Making your character act is simple — just construct a command sentence at the bottom of the screen using the options provided. The effect creates a feeling of tension as you do not know what options are available until a specific menu is displayed.

If you are unlucky enough to meet a rat, it can kill you in a number of ways. First it might rip through the screen and bite you or, alternatively, it could try to rip through the text with its claws. Once an attack is made, a human face, full of terror, is shown falling from the rip in the page.

It is possible to escape your fate as one of the minor characters. For instance, the little girl doing her paper round would be better off if she did not go into the house across the road, but then you would not discover the rats' secrets.

The major characters, including Harris and Foskins, are just as vulnerable to attack as the minor characters. In some situations, Harris must be mercenary and let the rats kill friends in order to gain information about their habits. For example, when he goes to capture a rat he must make sure that his companion leads the way

— the leader becomes a rat victim.

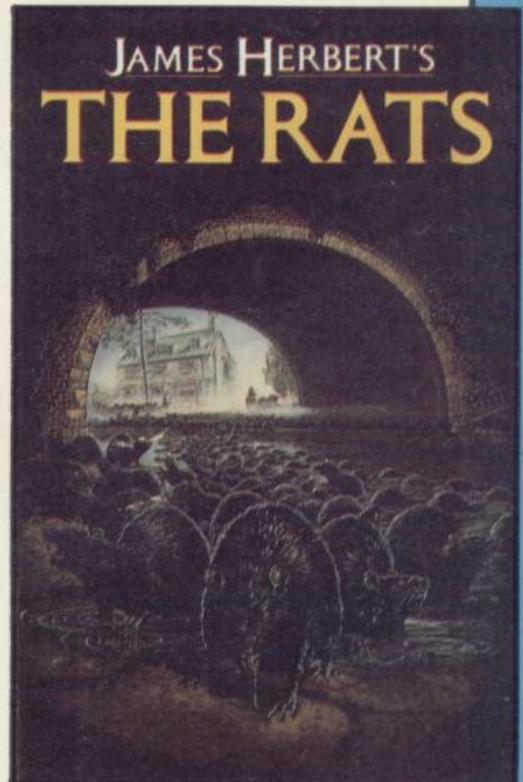
The other part of the game is a contest between the rats and Government forces. You are in charge and must allocate resources on a giant map which shows the spread of the rats through London. If they go over the boundaries you have lost the game, just as you have lost if one of the major characters is killed.

You use icon menus to allocate forces and resources. Those go into action on the part of the map which you have indicated with your cursor. At the same time you must specify the research into the rats' behaviour.

The Rats is a complex and brilliant game with above average graphics — if minimal sound. I can recommend it without reservation to those with strong stomachs.

John Gilbert

Publisher Hodder and Stoughton
Price £7.95 Memory 48K
Joystick Kempston, programmable
★★★★★



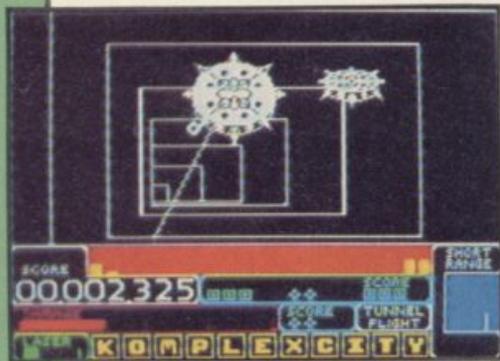
more software on page 22

Komplex City

PRETTY CLEVER aliens, the lot in **Komplex** — they've built a vast maze of a city to test our resources. Naturally you're unable to resist the challenge, so it's into the mazes of **Komplex City** for another bash at convincing the aliens of humanity's superiority.

Legend's series of shoot-'em-ups got off to a shaky start with **Komplex**, but the sequel more than redeems earlier disappointments. **Komplex City** is fast, long, and, as its name suggests, complicated.

The maze of tunnels has over 65,000 intersections, and there are several trillion possible mazes — you can change them by typing in a name



for the maze at the beginning. Then, every time you use the same name you will get the same maze.

To help you there are a number of on-screen scanners and the like. The long and short range scans show how far away from the targets you are — there are 11 to collect.

Another display shows what lies just ahead in the tunnels. At each intersection you can choose your direction, or whether to go into hyperdrive. You may also get an opportunity to increase your score, make a short jump or restore your shields — with the exception of jump, those involve maximising the size of bar graphs or the amount of green on the screen. It is what lies ahead in terms of shields, score bonuses or jumps that is shown on the display, and you will have to plan carefully to make the best use of those options.

Hyperdrive is great fun. The screen suddenly bursts into colour and various mushroom-like baddies come at you. Some are animated, with ports opening and guns extending to blast you. Hyperdrive is costly on the shields, but vital for completion of the game in less than a month.

The tunnels themselves are done in wireframe graphics, with aliens coming at you at some speed. While there is little new about the graphics style it



is extremely effective, and the flashes and various stuttering sounds indicating gunfire or damage are not so obtrusive as to hurt the eyes — a boon to reviewers at the end of a long week of zapping. You can switch off the sound or the flashes anyway.

One particularly good feature is the autopilot, which actually plays the game for you and can be cut in at any time. It's not a very skilled autopilot, and you will have little trouble in doing better yourself, but it does provide a good way of learning how the game is played.

Legend has clearly put a lot more care into **Komplex City** than into recent products, and that attention to detail has paid off. You probably won't want another shoot-'em-up this side of Christmas.

Chris Bourne

Publisher Legend Price £9.95
Memory 48K Joystick Sinclair, Cursor,
Kempston, AGF

Nightshade

HERE COMES Ultimate once more with the continuing saga of Sabre Man.

Nightshade is, as you might have begun to suspect, more of the same — the brilliant 3D graphics system of **Knight Lore** and **Alien 8** juiced up and improved to simulate a mediaeval village. Somehow the programmers have managed to get colour into the screens.

In order to see your little hero in the narrow village lanes one or two walls drop out of the picture, remaining as white lines on the screen. That system does, however, allow for some won-



derfully detailed views of inns, barns and the like.

As usual with Ultimate there is little information on what you are supposed to do. The village is said to have been possessed by a great evil, which turned the inhabitants into werewolves and other hideous creatures. Those monsters are some of the best yet, coming in a tremendous variety of shapes.

Your weapons lie in the village rooms and you collect various missiles to stock up your ammunition. Some will not do you much good — there are monsters which transmute into others if hit, or split into two, and it's going to take you some time to establish which does what to whom.

Meanwhile, there are four hyper-nasties — a mad monk, a skeleton, a ghost, and Mr Grimreaper, death himself. They are scattered about the village, and must, we suppose, be sought out and destroyed, presumably with four special objects, the eggtimer, Bible, Hammer and Cross.

The game is well-paced — very

much an arcade-style production compared to the logic puzzles of the two earlier Filmmation games

On the other hand, there is a sense of *déjà vu* creeping into Ultimate games. It's now well over a year since Sabre Man first appeared, and the concept is wearing a little thin.

Nightshade looks a lot different from **Knight Lore** and **Alien 8**, but not so different as to stifle doubts that Ultimate may be running out of steam. Or dare we hope for something really special this side of Christmas?

Chris Bourne

Publisher Ultimate Price £9.95
Memory 48K Joystick Kempston,
Sinclair, cursor



PREVIEW

Shadow of the Unicorn

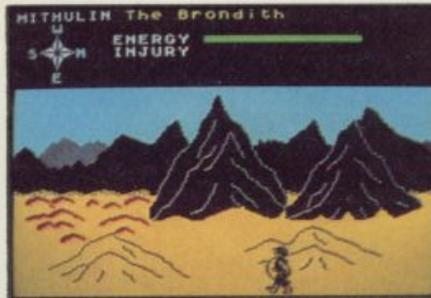
Buried somewhere in a mythical land — strongly reminiscent of Tolkein's Middle Earth — lies a book, which is the root of all evil. One horrific day, a young innocent stumbles across that weighty tome, and opens it — the evil spews forth to desecrate the land.

The main object in *Shadow of the Unicorn* is to retrieve that book from whoever holds it, seal it and hide it away. However, there are a number of sub-plots revolving around the 10 central characters which must be completed. For instance, the Queen Kielmath has been overtaken by evil. You must persuade her to join your side as she plays a vital role in the game.



You control all 10 characters, each of which have separate abilities, ranging from magical to healing powers. Some, like the dwarfs, work well with their hands, others, like the woodmen, have a great affinity to all living and growing things.

There are three main characters —



Avarath, chief wizard; Mithulin, King of one kingdom and Kielmath, Queen of the other. The game ends if the energy levels of any of those three run down. Happily, that is restored by eating the berries off a magical bush which grows in some profusion. It does not matter if one or two of the remaining characters die, although without them your quest will be harder to complete.

The game comprises vast panoramic views — rather like *Lords of Midnight* — with bright colours and detailed graphics. There are 2,816 screens and over 11,000 views.

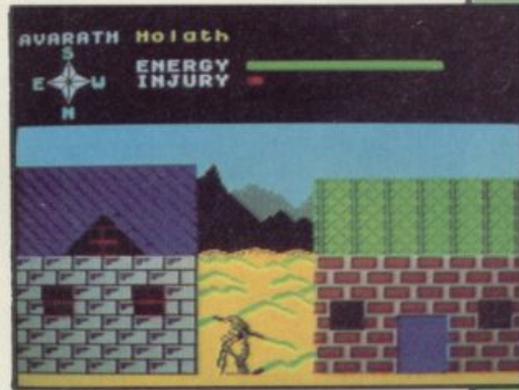
You can travel only to the east or west but not north to reach the forests, buildings and mountains in the background. Mikro-Gen has come up with a neat solution. If you want to travel forwards, revolve the scenery by fac-

ing another direction. That brings the place you want to investigate on an easterly or westerly line.

The graphics are marvellous — and should be even better once the game is completed. We saw a pre-production copy which was impressive, although some final touches had to be added. There are battle sequences, spells to cast and objects with magical properties to pick up as you venture deeper into the land. The characters interact with each other and, unlike the Wally games, while you are controlling one, the others remain static — they do not wander off to do their own thing behind the scenes.

Shadow of the Unicorn should keep you occupied for hours as there is so much to do and see. It costs £14.95 and is the first game to use the Mikro-Plus — Mikro-Gen's little black box of tricks which increases the Spectrum memory to 64K. An illustrated book provides the background, and a number of clues lie within those pages.

Clare Edgeley



Popeye

HELP POPEYE save Olive! Olive Oyl stands at her window waiting for her man to bring her hearts. Meanwhile the massive frame of Bluto thunders across the screen as he lies in wait for Popeye.

The essence of *Popeye* is to find all the hearts and return them to Olive before her lovemeter runs out. He

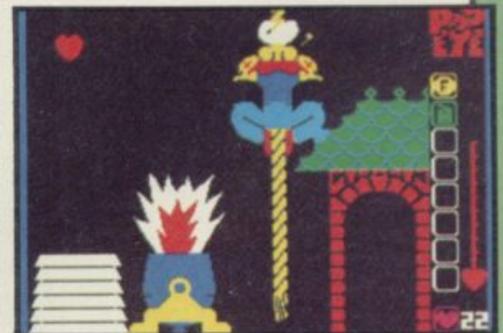


must also collect spinach cans, keys and an assortment of objects to aid him during his journey.

Spinach is the only way to revive Popeye following a blow from Bluto, vultures, witches on broomsticks and so on. Keys are needed to gain access to the chambers and rooms where more objects and obstacles lie.

To reach the various objects Popeye can jump, climb up and down ropes and hitch lifts. Be bold and adventurous and you will be rewarded with even more locations to explore.

At first the game is tedious. Popeye is so slow in response to your commands that he is mowed down even as he is recovering from a blow. Once you have adjusted to the slightly slow reactions and cracked the correct sequence to avoid Bluto, you can really start getting into the game.



The graphics are excellent and very large. Popeye, Olive Oyl and Bluto are all perfect reproductions of the famous cartoon characters.

Colette McDermott

Publisher DK Tronics Price £6.95
Memory 48K Joystick Any
★★★★

more software on page 26

I, OF THE MASK



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S O F T W A R E



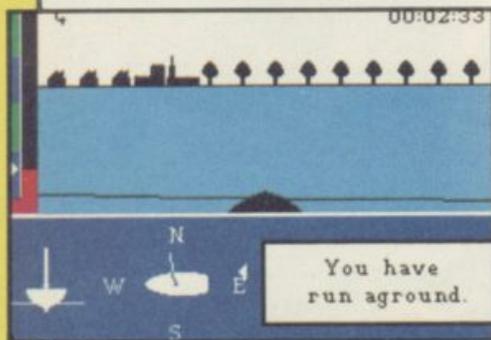
Steinar

Spectrum Software Scene

Yacht Race

THE HOLIDAYS are over, and the summer? — well that never began. But why not spend your autumn evenings learning the skill of yachting made easy with **Yacht Race**.

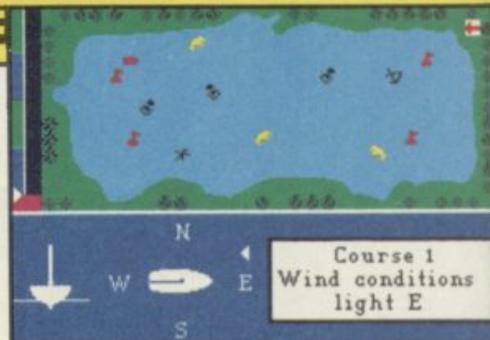
Even Simon Le Bon could handle



this one and he does not need to have insurance either. Impress your friends with your knowledge, and make up stories about sailing stormy seas and how you almost won the Americas Cup last year.

Carefully planned levels allow you to build up your skills step by step. In the first three levels you learn the basic skills of steering, trimming the sails and balance. Having mastered those you can pit your knowledge against the computer boat. Finally you compete against Black Streak, where the pedalo mob is weeded out from the true sailors.

The main screen can be toggled to a map which plots out the water, showing your present position and the dangers — buoys and sand banks — which surround you. You never actually see your yacht — only the



bows — but if you change direction or lose balance you will enjoy a simulated drowning!

Yacht Race is great fun and gives a real insight into the world of sailing. A booklet is also enclosed, giving tips and clear, easy-to-read, instructions.

Colette McDermott

Publisher Five Ways Software
Price £6.95 **Memory** 48K
Joystick Kempston, Sinclair
★★★★

Red Arrows

FLY WITH the Red Arrows and keep your stomach intact as you perform the amazing Manhattan Loop, the Pyramid Roll and the famous fly past.

The game is a flight simulator with a difference. You are accompanied in the air by your team mates, and you must perform aerobatics to the best of your ability in order to score points.

Don't look so worried. You are not left to your own devices in the air. A training routine has been included within the program which displays your instructions as you make a fly past. Failure to heed instructions usually results in a crash.

The instruction routine does not, however, help with the 16 different

key combinations which you need to control your Hawk aircraft. Out of desperation I just used the thrust and roll keys which seem to achieve good scores, and only the occasional crash.

Graphics may not be the game's strong point but the simulation is accurate to the degree of seeing the aircraft of your team mates fly past.

The flight instruction and aid does not end with the instruction routine.



Your team leader will give you instructions if you are going off course. The amount of instruction given to you during flights may seem unrealistic, but open communication must be available between pilots so that wing tips do not touch and you don't drive your aircraft into the ground. Your team mates will look after your safety just as you watch theirs.

Red Arrows turns the dull area of flight simulation into fast and furious fun. Database Software has also arranged a competition in which you could win a weekend to visit the real Red Arrows.

John Gilbert

Publisher Database Publications
Price £8.95 **Memory** 48K
Joystick Kempston, Sinclair,
programmable
★★★★

Tinderbox

GREMLIN GRAPHICS is not a company noted for its adventures.

Tinderbox is a fairy tale, in which you play the part of Tom, a common foot-soldier, who has to defeat the wicked witch and evil king to gain the hand of the fair Rowella.

As an adventure, it's a disgrace. It is written entirely in Basic, and contains large numbers of boring locations where little or nothing happens.

The computer does not understand even a simple, standard adventure

command such as Look. As Tom happily wades through a lake without so much as getting his feet wet, he may well ponder his bad luck in not signing up as a mercenary with Pete Austin or Brian Howarth.

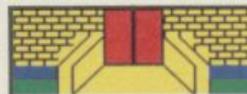
The B side of the cassette contains a long fairy story printed up screen by screen. It is the story of Tom, the common foot, and you've guessed the rest already.

All profits go to the Soft-Aid appeal for Ethiopia. It's very fine of Gremlin Graphics to do that, but they might have chosen a halfway decent program to flog for charity. If you care about Ethiopia — and you should — then

send a fiver to Bob Geldof. There's no point bothering with **Tinderbox** — it lights nobody's fire.

Chris Bourne

Publisher Gremlin Graphics
Price £4.99 **Memory** 48K
★



You are in a meadow. The King's cows stand happily chewing the grass. A small bridge leading to the north gate of the palace crosses the moat to the south.

The north gate is before you, it is seldom used and massive wood bolts hold it tightly closed. It is in plain sight of a group of soldiers in the courtyard.

Way of the Exploding Fist

UTTERING a bloodcurdling ki-ai, the black-robed ninja hurled his muscled body against the evil sensei of Mel-Bon ryu. A series of percussive kites was countered by the feared 'attack of the astral Ho-Bits'.

Reeling from the force, the ninja leaped instantly into the air and brought his calloused feet, like twin axes, down on his opponent's joystick. In a wail of agony the sensei, Spectrum, Ferguson 12" and all went down in a mess of black wires, crushed cartilage and broken Quickshot II.

Melbourne House has gotten all bloodthirsty for its latest, a simulation of karate which offers 16 different moves and an extremely tough series of opponents.

Everything is joystick controlled, and you'll find a stick essential for any chance of success. The moves allowed are split into two sets. The normal eight joystick positions translate into

movement backwards and forwards, two punches, crouching, jumping and somersaults, forward and back.

With the fire button held down, the eight positions become more aggressive. Three kicks, high, low and mid, form the basic arsenal, with a spectacular flying kick thrown in. You can also sweep from the crouching position forwards and back, or produce the well-known roundhouse kick, which involves spinning round and

SINCLAIR USER CLASSIC



catching the enemy on the jaw with the back of the heel. There's also a straight back-kick.

The key to the game's addictive playability is the intelligent way those actions are planned, so that once you are familiar with the controls, the movements are logical and instinctive.

Graphics are pleasing too. The animation of the two fighters is near perfect, with a satisfying crunch as foot connects with bone. It's sufficiently sophisticated for you to be able to hit your opponent while he's in mid-execution of a move, allowing for



feinting tactics. Virtually all the moves can be aborted halfway through and turned into something else; in short, the variety of strategy possible is remarkable for an apparently simple arcade game.

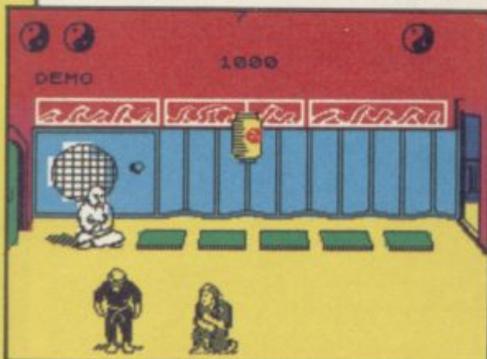
The backdrop of each round is suitably Japanese in flavour. A short, balding instructor looks on as you fight under the cherry blossom, or across the tatami mats.

You start as a novice and must win two rounds to progress to first Dan, and so through to tenth. The first round is relatively easy, and provides good practice, but life gets tougher, and you need all your cunning to survive for long at higher levels. Each round is scored, and has a time limit. You must get two full points to win, symbolized by yin-yang circles on the screen. To score a full point you need to be perfect in your attack.

As a sports simulation, this is one of the finest and most realistic we have seen. As an arcade game, it's addictive and pacy. As a product, it's clearly destined for the top.

Chris Bourne

Publisher Melbourne House
Price £8.95 Memory 48K
Joystick Sinclair, Kempston
★★★★



Talos

TALOS stomps across the pleasant pastures of rural England to recover the Crown of Eternity, and restore balance to nature or some such nonsense. All the little furry squirrels and chirpy grasshoppers are going bananas, and the old battle robot is the last chance of stopping the rot.

Trouble is, Talos has been dismembered and lies scattered in seven pieces. You start with just the great metal hand, and must find the other bits to reassemble yourself before finally getting the crown.

The screen shows fields surrounded by fences, and the occasional stretch of road — there are over 200 such

screens, fairly spacious, in which the rabid creatures appear. Your main problem is running out of energy, which can be restored by collecting coins, candles, and parts of your body.

You get a magnet which you can drop and which activates the compass, bottom right of the screen. It is a useful marker if you find part of your body but, alas, not one which will link up with what you have already.

Talos is a highly competent maze game, though not exactly original. The monsters are not much of a problem, and you can usually ignore them if you move swiftly enough. More important and difficult is the business of finding all the various bits and pieces. Some only appear after others have been found.

What is fun is the way the robot

changes each time a new part is added. It provides a good incentive to find the next piece, and we expect you will be clamouring for infinite lives POKES before very long.

Chris Bourne

Publisher Silversoft Price £7.95
Memory 48K Joystick Sinclair,
Kempston
★★★★

more software on page 28



EXCLUSIVE

Art Studio

LAST MONTH I reviewed *The Artist*, from Softechnics, and said there was nothing which could beat it.

I was proved wrong. *Art Studio*, from OCP, outclasses it in speed and style. Once loaded from disc or tape, the program display is set to white with a blue double-decked bar menu across the top of the screen. Near that is an arrow cursor which can be manipulated using the keyboard, joystick, or Kempston mouse.

To select an option on the menu, the cursor must be moved over it and the fire button pushed.

As well as being able to draw single lines, by placing two points on the screen with the cursor, you can extend lines to create shapes such as triangles and elastic banded lines. Elastic banding starts from a specified point. The

potential line is then dragged across the screen by the cursor and set in position by pressing the fire key.

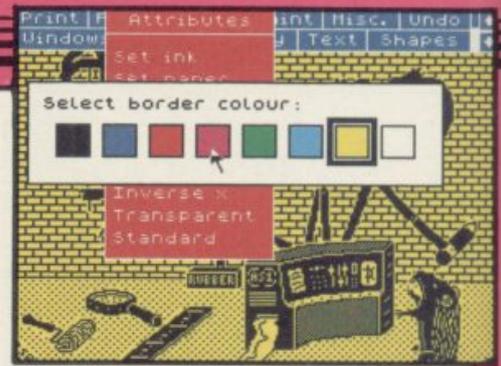
Once you have produced your drawing you can start to fill it in with solid colour or one of the textures provided on the FILL menu. Those include roof slates, brick structures, lines and dots.

To produce a fill effect, all you have to do is put the cursor inside the shape, and press the fire button. The



shape is first filled with a backdrop of colour and the texture is then dropped in.

The most impressive part of the package is its ability to cut and paste parts of screen pictures. That process is accomplished using windows. You must first put a window around the shape which is to be transferred to another part of the screen. Then choose one of two options. The first allows you to do a straight copy of a shape, the original remaining on the screen. The second performs nearly



the same operation but the original is cut out and a hole left on the screen.

While the cut and paste up operation is taking place it is possible to change the scale of the shape along the X and Y axes. To do that, open a window using the cursor, set it to the position in which you want the new shape to appear and make that window larger or smaller.

The only problem when using windows to achieve those results is that a rectangular patch is left in place of the shape. The screen then has to be retouched with the package's pen.

Apart from that one flaw, the package out-performs *The Artist* in almost every way. It has superior speed to the Softechnics package and the menus are easier to use. It can be used with disc, tape or microdrive and contains a printer driver which handles most compatible Spectrum printers. It is an extremely powerful utility which should be of use to professional artists and designers as well as the home user.

John Gilbert

Publisher OCP

Price £12.95 (cassette version, Opus disc/microdrive); £19.95 (cassette/disc version) **Memory 48K**

★★★★

Operation Caretaker

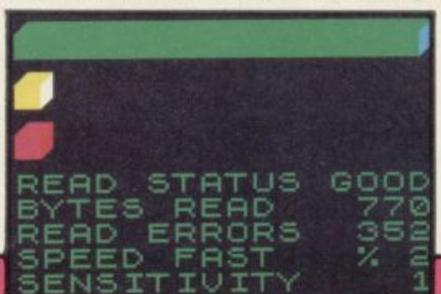
IT IS OFTEN impossible to know what to do if a program crashes, or won't load. How many times can you face taking a duff tape back to the shop and asking for a new one?

What many people forget is it could easily be the tape recorder causing the problem. Tape is grotty stuff. The oxides rub off on the heads and make a mess - it's like sandpaper. Also, the heads come adrift and change position. The alignment of the heads is called the azimuth, and Global has produced a piece of software to cure all ills.

Operation Caretaker contains two

cassettes and a screw driver. One cassette is a tape cleaner, a strip of fibrous material which rubs against the heads and collects the filth.

The second cassette is a program which sends out a steady stream of data and then interprets it. The data is sent through at a high speed to make it difficult to read, and a display shows you how many bytes were accurately read. You then stick the screwdriver into the azimuth screw on the tape deck and twiddle it until the readings



are as good as you can get.

They tend to be a little different on each side of the tape, which is confusing, but there should be a narrow area where both are at their best. That's the point you want. As far as we could test it, the program seemed to work.

Of course, the program is fairly useless if you haven't got a cassette recorder with a little hole in it for adjusting the tape heads.

The package will remove a great deal of aggravation with tapes which won't load. Next time you go down to the shops to complain, you'll know you're in the right.

Chris Bourne

Publisher Global Price £9.95

Memory 48K

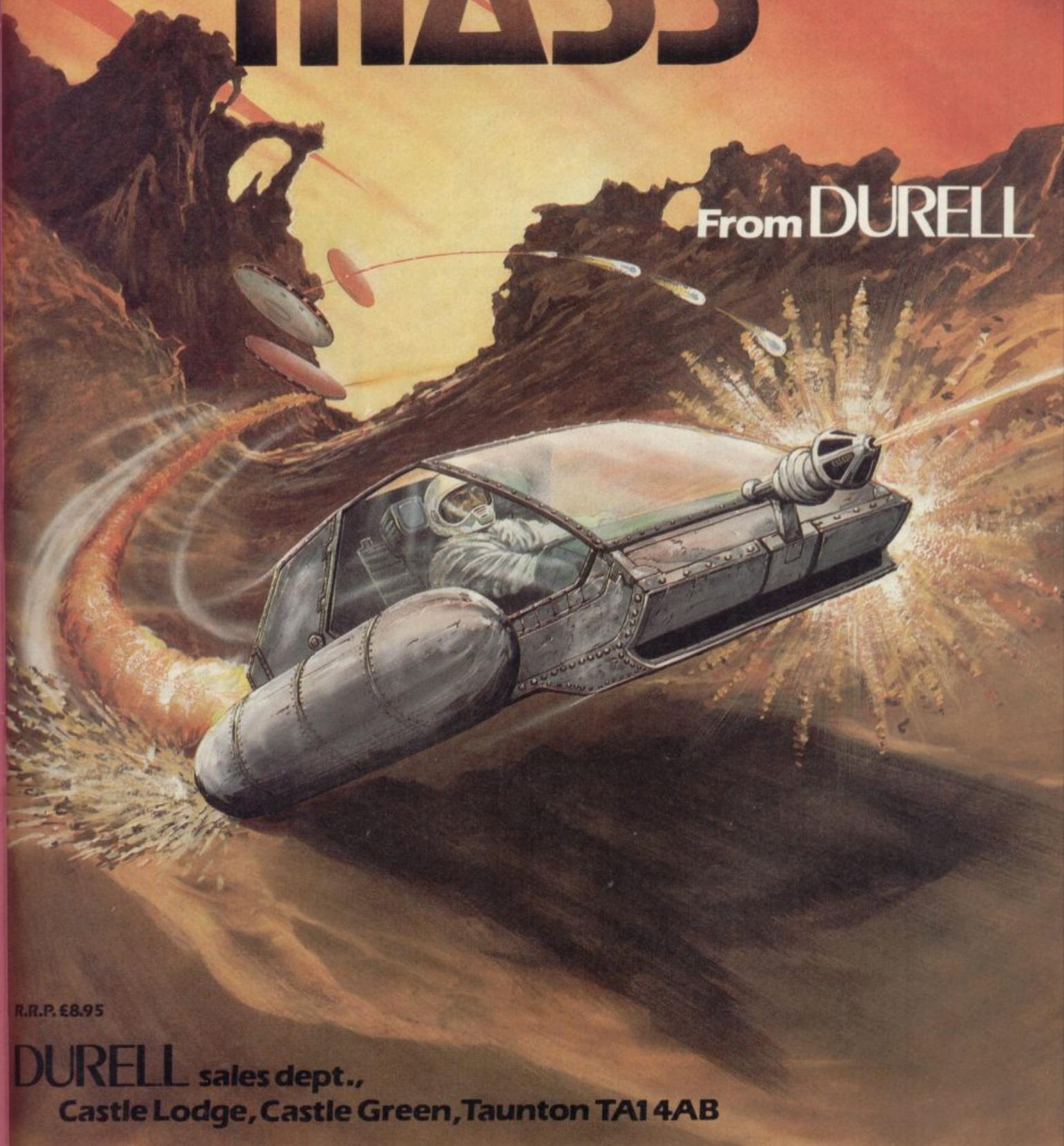
★★★

more software on page 30

THE COUNTDOWN HAS BEGUN

CRITICAL MASS

From DURELL



R.R.P. £8.95

DURELL sales dept.,
Castle Lodge, Castle Green, Taunton TA1 4AB

Dam Busters

YOUR TARGET is Germany's dam system, the object is to blow them out of the water. The result is the destruction of the military and industrial infrastructure of the German war machine.

Dam Busters is not just another flight simulation with added special effects. During the game you have to play the part of the pilot, front and rear gunners, bomb aimer, navigator and engineer. You must do all that while flying through enemy territory, continually lit by searchlights while being buffeted by flak.

You must guide the aircraft off the ground and head towards France and Germany. You will have to liaise with your engineer to make sure that the engine thrust is not too great. If it is the engines will catch fire.

As navigator you must use the maps to pinpoint your position and get the

pilot to alter course if necessary. It may appear to be a simple job but you will also have to pilot the aircraft while



looking for cities, industrial complexes or dams.

The front and tail gunners have similar jobs. When you get to an enemy complex you must take on their roles and fire at searchlights, balloons and enemy fighters. The pilot should be wary of flying too near towns even if your natural inclination as a gunner is to blow everything to bits.

If you do not keep a keen eye on your instruments you could stall, overheat, fly through enemy soil or end up swimming back to England.

Each crew member has a screen full of instruments which can be controlled by joystick or keyboard. You must look through all of them at regular intervals. The game is not, however, as impossible as it seems. The controls are touch sensitive and the aircraft is

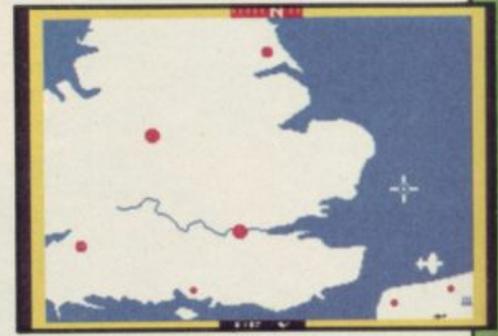
easy to fly. Attacks from enemy guns and the glare of the searchlights can be handled quickly if you even have only a few flying hours' experience.

When you have found a dam your approach should be carefully timed. You must have developed the ability to be at 232 mph, have an altitude of 60 feet and be exactly 800 yards from the dam when you drop the bomb. The practice approach available should increase your skill.

Dam Busters is excellent three-in-one entertainment which can be recommended to anyone. Arcade, strategy and simulation addicts will find all they require is just the push of a fire button away.

If you don't want to risk your luck in the air you could always go for the Lancaster kit offer from Airfix, included with the package. *John Gilbert*

Publisher US Gold Price £9.95
Memory 48K Joystick Kempston,
Sinclair, programmable
★★★★



Monty on the Run

INNOCENT or not, Monty has escaped from gaol and plans to flee the country aboard a waiting ship in **Monty on the Run**. From the safe house he must get through the maze of tunnels and sewers, picking up cash and objects en route.

He needs cash for his new life and objects to help him through the dangers that lurk in the maze of platformed areas. Not all objects will help



him — some are extremely dangerous to Monty and some completely useless.

Cash lies about the place — heavily guarded by nasty teapots — together with bouncing grandmother clocks, Hush Puppy dog lookalikes, machines which will flatten Monty and low flying insects. As he goes through each section the nasties become more bizarre.

Climbing up ropes, jumping across lakes and somersaulting onto platforms, are all within Monty's capabili-

ties. Each of his skills are constantly tested throughout the game as the nasties stamp about after Monty.

The animated graphics are a great improvement on the early Monty games. No doubt the quality of this new game will ensure that we will see a mole lot more of Monty games.

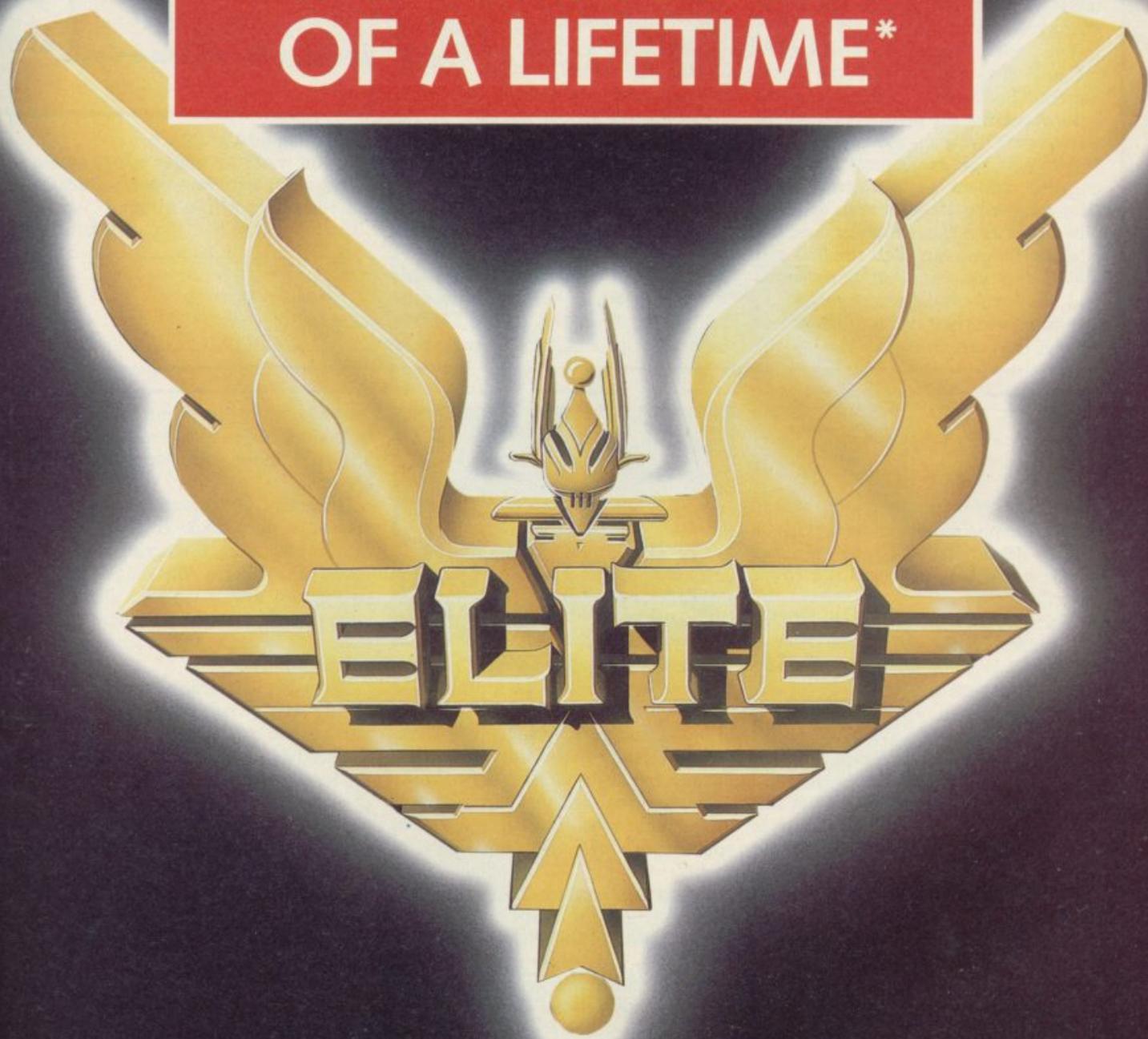
Colette McDermott

Publisher Gremlin Graphics
Price £7.95
Memory 48K Joystick Kempston,
Sinclair
★★★★

more software on page 32



THE GAME OF A LIFETIME*



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**Gold
Edition**

Run for Gold

SUPERB, life like, graphics have been used in **Run for Gold**, the latest offering for armchair athletes.

You must compete in the 400 meters, 800 meters and the 1500 meters. Qualify first in the local races before entering the main events which lead to the Olympics and gold medals.

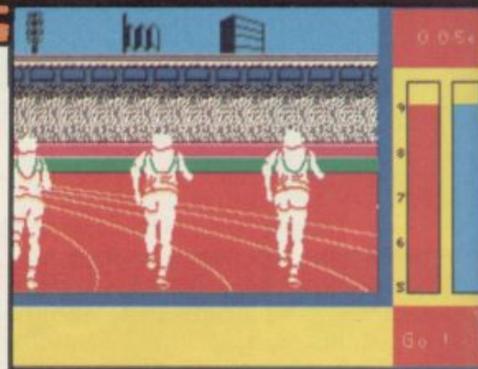
Although you can control the speed of your athlete as you guide him through the bends and straights, you will do better if the computer does the steering for you. In both the 400 and 800 meters you start off on a bend, and your wobbly-legged hero has no intention of staying on the track unless you let the computer play too.

Other athletes are a problem — they all look like your boy, and when they all stand together waiting for the starting orders, panic grips you. Which one is mine?

Legs rise and fall, calf muscles ripple and the race is on. Using the joystick, speed is produced by pushing full forward — but wait, he does not seem to be moving any faster.

The answer lies at the side of the screen in two box scales — one for energy level, the other for speed. It is only from those boxes that you have visual evidence that his energy and speed are indeed increasing or decreasing.

Even when the scales tell you that he has run out of both resources he still glides along the track! What a shame after producing such truly gold



medal standard graphics.

If you want the finger aching action found in **Daley Thompson's Decathlon** you will not find it here.

Colette McDermott

Publisher Five Ways Software
Price £7.95 **Memory** 48K
Joystick Sinclair, Kempston
★★★

Pole Position

OH NO! Not another racing car game! Despite **Pole Position** being a direct descendent of the famous arcade game it is still hard not to be cynical.

The game begins with a qualifying lap to determine which one of the eight grid positions you take for the race. Score, time left, speed, gears and laps completed, are displayed throughout the trial and race.

You have a view of the race from the rear of your car and control the steering, gears and brakes. What about speed? That increases at a set pace only as long as you remain on the track.

Racing through the straights and chicanes, you must qualify within a set time. Your car will be replaced following each crash until your time runs out.



It always seems that you reach a respectable speed — 200 mph plus — when approaching a bend. Attempting to brake and pass a car usually sends you careering off the track towards a lurking roadsign. Crash! Ugh! Fun?

Having qualified you now compete in the main race. The same obstacles appear, although there are more of them.

Points are scored in both events for remaining on the track and passing rival cars. Upon successful completion of the race you are awarded extended play. To make the game more chal-

lenging, your time limit drops each time you finish a race, your car speeds up and more cars and roadsigns appear.

Generally the graphics are good; your car does look like a formula racing machine. Flickering red and white lines mark the edge of the circuit and give a realistic illusion of movement to the game. There again, that also makes for uncomfortable viewing.

What lets the graphics down is the untidy sequence following a crash. On impact, the car explodes and is slowly replaced by a new one. Vital seconds are lost.

Be warned. If you like to play games where 10 fingers are never enough you won't enjoy this one. So steer clear.

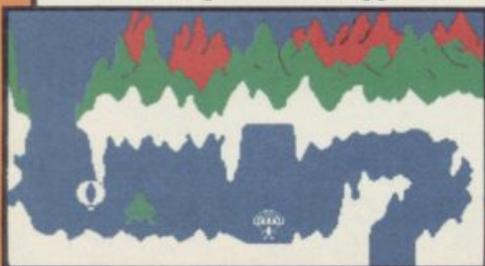
Colette McDermott

Publisher Datasoft **Memory** 48K
Price £7.95 **Joystick** Sinclair,
Kempston, Cursor
★★★

Valley of the Dead

COULD the title refer to your mental state if you actually buy this game?

"Three explorers are trapped at the



bottom of deep caves", reads the inlay card. "Armed with luck and a hot air balloon you must descend into the caverns to save them."

Set in a graphically sparse mountainous landscape, the game involves manoeuvring your balloon through the tunnel. Barring your way, through stage one, is a boring old alien and a parachute. Those must be avoided as well as the jagged edges of the cavern.

At the start of each new game you can select to play any one of the three levels of difficulty. Each level features

an increased number of obstacles.

Okay, so the game is cheap. You might, nevertheless, be wiser to type in one of the listings in *Sinclair User*.

Central Solutions proudly announces on the inlay card that a C15 blank cassette is yours upon writing to them. Is that a form of compensation?

Colette McDermott

Publisher Central Solutions
Price £0.99 **Memory** 48K
★★

more software on page 34

TAKE A TRIP
INTO THE
PLEASURE GAME



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**YOUR
COMPUTER**

CRASH

CLASSIC



... innovative mix of ideas and excellent graphics ...

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... a beautiful program, an adventure of great imagination, with some superb programming techniques ...

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Codename MAT II

THE MYONS are back again, after a year or so of inactivity, with **Codename MAT II**, another epic saga of alien-zapping from the mind of Derek Brewster.

This time it's a grid of satellites you are defending from the rotten galactic sprites, which power the Karillium mines of Vesta, without which substance millions will never . . . well, stuff the scenario. It's the zapping that counts.

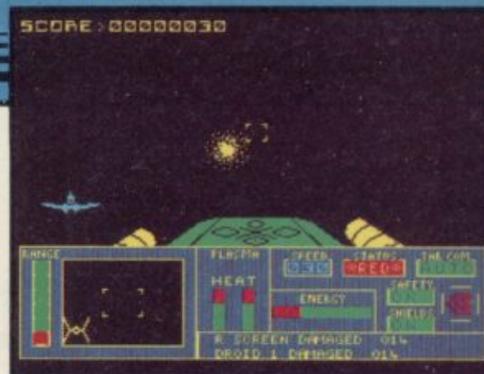
The game has a terminal case of the beam-me-ups. Your spaceship has lots and lots of gadgets like ion engines, plasma guns, two scanners, and so on. All good solid stuff bought cheap off an old episode of *Star Trek*. They need

a lot of keys to operate.

The screen shows the standard cockpit view, and an array of instruments. A smaller screen in the corner can be set to show the whole grid, or sector scans, or a detailed account of the status of your ship. Damage can be repaired by two droids which operate while you play.

Death comes when your shields are penetrated, or your lasers overheat, or something equally vile such as drifting about with no engines left. At the end of each wave — there are eight, repeated with more nasties for a total of 256 — you can repair satellites, your ship, or move satellites around to try and maintain the most efficient grid.

Despite its creaky concept, the game is mightily addictive. Later waves of aliens become both cunning and ferocious, spreading themselves thinly to attack as many satellites as



they can, or grouping in force and homing in on you. Touches like that, plus damage reports and the need to make tactical decisions about the repair droids or where to warp to next, certainly increase the illusion of being a middle-aged actor with a spreading waist and an abiding love of ultra-rational Vulcans.

Chris Bourne

Publisher Domark Price £8.95
Memory 48K Joystick Sinclair,
Kempston, cursor

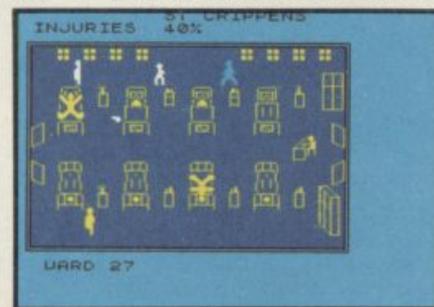
St Crippens

HOSPITALS have never been popular places and with its boast, 'Worst hospital in the world,' St Crippens won't change that. Patients never recover and often disappear for ever.

Guiding your patient around you explore the rooms searching for clothes — essential to your escape. Hospital staff will pursue you. There are bedpans lying about the ward floors, mutants in the Genetic Engineering Department and mould on

the kitchen floor. All must be avoided.

Detailed graphics are limited and barely adequate. There are patients strung up in beds wearing body plasters or playing darts in the games



room; the matrons have buns in their hair. It is difficult to pick out your patient amongst the swarm after him, as all characters tend to look alike.

Controlling the patient is tiresome. He refuses to react immediately and often gets caught.

It is sold at the cheaper end of the market, but it could do with a shot in the arm or a medical examination before release.

Colette McDermott

Publisher Creative Sparks
Price £2.50 Memory 48K
Joystick Kempston, Sinclair

Bryan Robson's Super League

THE FIRST thing you'll notice about **Super League** is the price; £19.95 is steep for any game. This time it is a computer-moderated board game, and we suppose the price has something to



do with all the bits of cardboard and money and dice.

What you do is manage a team, through a league season. The computer handles the league tables, random events, and fixes the gate money.

There are two stages. First you are shown the week's draw of matches on the computer. Teams travel from wherever they were last time around, and if a home team arrives at its own ground with a move in hand over its opponent, it gets to buy a player, which increases the points value of the team.

The second stage is the match. Again the dice are thrown and referred to a table which translates the score into points. After that, teams can play Match Cards — if they have them — to nobble the opposition.

It is a likeable game, not really very

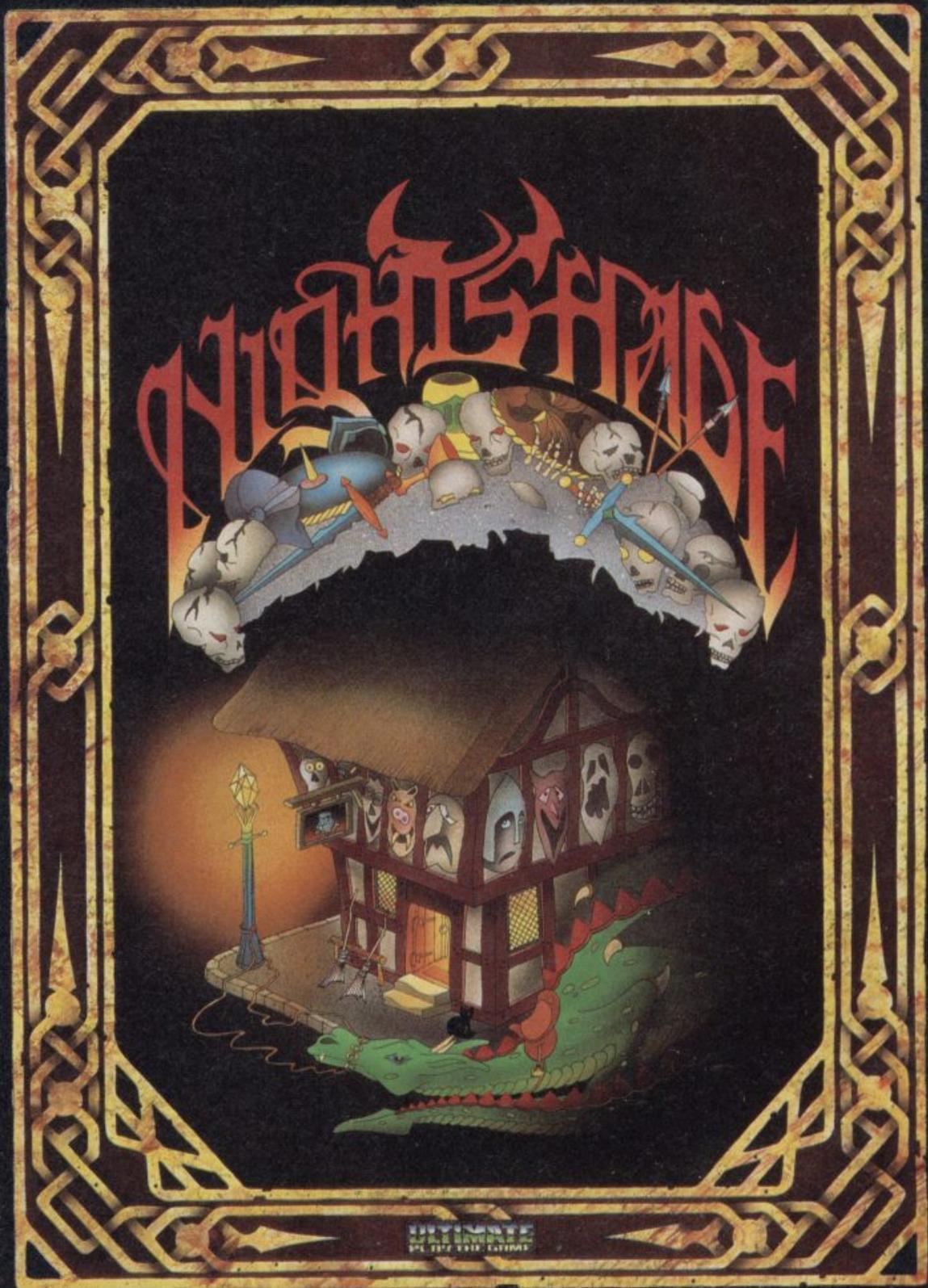
faithful to football and not really requiring a computer, most of whose functions could easily be carried out by the players. We tried hard to like it more, but there are some niggles. The instructions on the box lid are ambiguous in places, particularly regarding movement and in what order players should move.

Those flaws serve to irritate. For the price one expects everything to be done perfectly, and our rating reflects that. If you don't mind clarifying the rules yourself and have plenty of dough then you can get a lot of fun out of **Super League**. Perhaps that's why it was launched in Harrods.

Chris Bourne

Publisher Paul Lamond Price £19.95
Memory 48K
**

48K SINCLAIR ZX SPECTRUM



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(P&P are included) Tel: 0530 411485

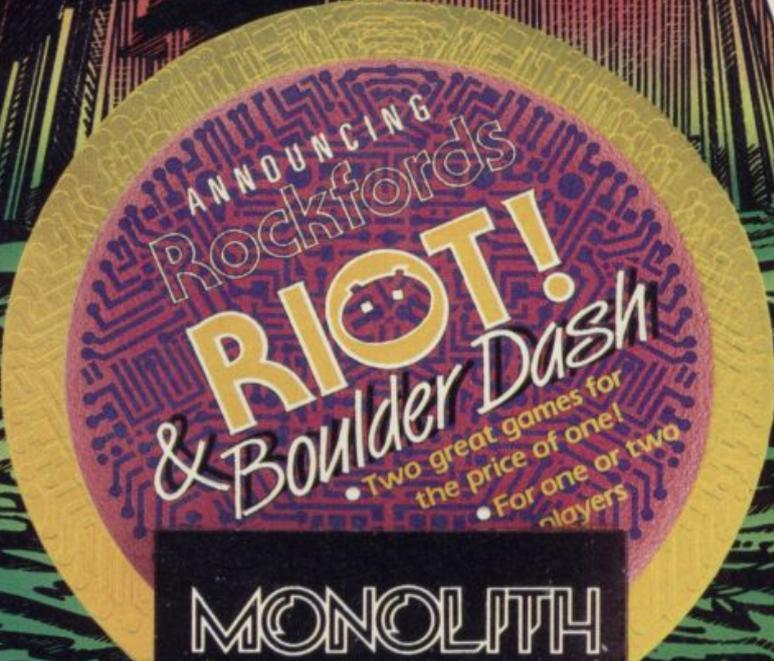
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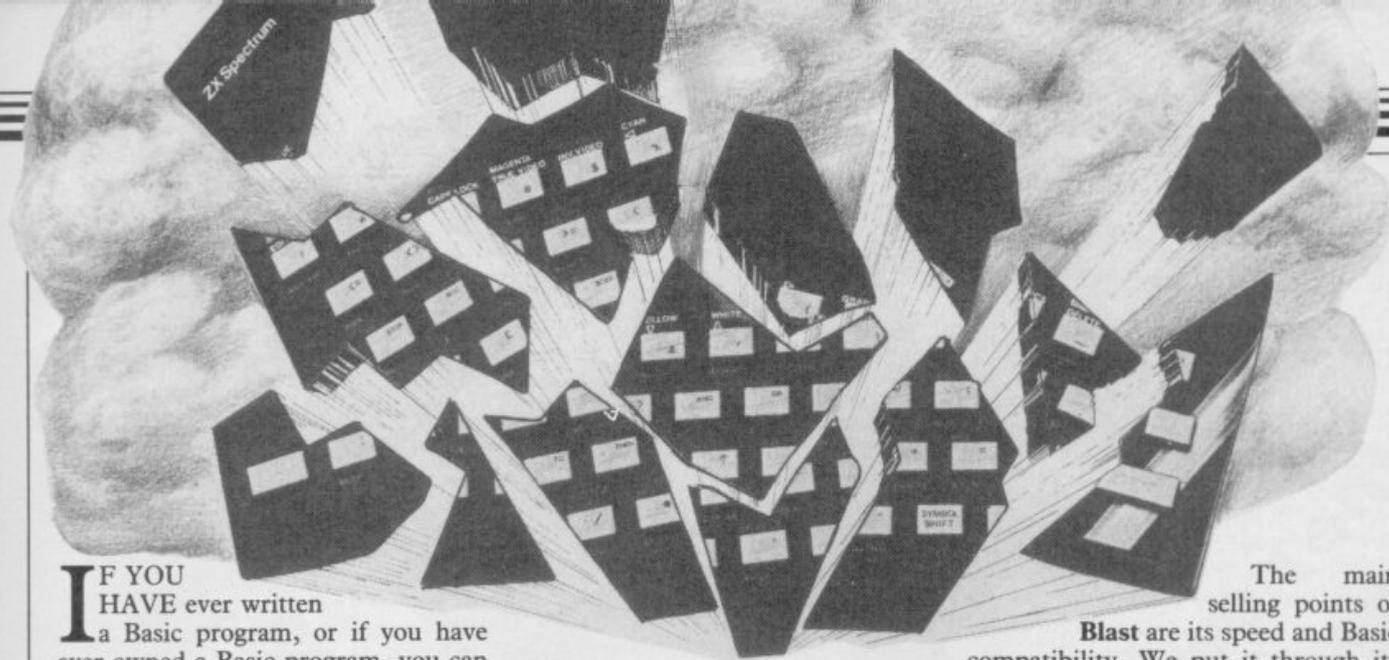
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CBM 64



IF YOU HAVE ever written a Basic program, or if you have ever owned a Basic program, you can probably find a use for the **Blast** compiler.

When you run a Basic program it is interpreted by the Spectrum, one line at a time. The advantage of compiling the code is that the entire Basic program is converted into machine code before it is run, giving a much faster execution time.

Blast arrives on cassette with a 30-page user manual. You can also backup **Blast** onto microdrive. Now to speed up those sluggish programs, though you are not likely to be able to do a lot with less than 3K of memory available!

Unfortunately, in order to create such a sophisticated compiler, the programmers have used nearly all of the available memory. So, if you want to compile a program of any reasonable size, you will have to compile from tape-to-tape — or microdrive.

Exploding into code

Marcus Jeffrey
turns the heat on
the Blast compiler

Compiling on the Spectrum can be very prolonged, especially using tapes. In that case, you first have to load in the toolkit and make a special copy of the program to be compiled onto tape. You then start compilation, and the computer constantly prompts you to change the tapes over.

The main selling points of **Blast** are its speed and Basic compatibility. We put it through its paces. Programs can be compiled into either pure machine code or the more compact 'p-code'. OCS claims a speed increase of up to a factor of 40. Try as we might we could not get even close to that, whatever instructions we included. Nevertheless, you can expect a minimum speed increase of between five and 10 times for most situations.

Blast is said to be able to compile all Basic programs. That includes those which call user-written machine code routines, and even those using Basic extensions.

We tried out a number of programs, and all but one worked correctly. We have still no idea why that one program posed problems. The assumption must be that **Blast** is pretty clever and will compile most, but not quite all, programs.

Blast was initially to have included a number of highly optimised Basic extensions, such as **WHILE . . . WEND**, **REPEAT . . . UNTIL**, **IF . . . THEN . . . ELSE** and multi-line recursive functions. Unfortunately due to space restrictions those were not included — a great loss. Instead, supposedly as compensation, Oxford Computer Systems has programmed a couple of extra — and in comparison useless — additions to the toolkit, included on the reverse of the cassette. These are shown in figure one.

Blast does have its drawbacks, but its flexibility for such a wide range of programming applications makes it a must for the serious programmer.

Marcus Jeffery

Figure 1. Toolkit Commands

*E n1	— Edit line n1.
*J n1	— Joins line n1 to the subsequent line.
*C n1,n2	— Copy line n1 to n2.
*C <range>,n	— Copy the range of lines to n onwards.
*D n1	— Delete line n1.
*D <range>	— Delete the line range.
*M n1 n2	— Move line n1 to n2.
*M <range>,n	— Move the range of lines to n onwards.
*R <range>,n1,n2	— Renumber the line range, starting at n1 with step n2.
*F <range>,string	— Find and string in the line range.
*S <range>,s1,s2	— Find and replace string s1 with s2 in the line range.
*G	— Turn on Global find and search.
*A	— Turn on Accept find and search (prompts user at each match).
*V	— Lists a number of useful system variables.
*L	— Lists all currently defined BASIC variables, including their values.
*T	— Start BASIC trace. <Space slows execution. <Enter> halts execution.
*U	— Stop BASIC trace.
*K	— Kill REM statements (other than the special command REMS).
*W <range>,<file>	— SAVE the range of lines to cassette.
*B <file>	— SAVE the current program to cassette in a form suitable for Blast compilation (tape-to-tape).
*Q	— Quit the toolkit.

Note: The toolkit requires approximately 2K of memory, and cannot be used at the same time as Blast.

Publisher Oxford Computer Systems,
Hensington Road,
Woodstock, Oxford
OX7 1JR.
Tel: 0993 812700
Price £24.95
Memory 48K

**NEWS
FLASH**

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QL Match Point

WIMBLEDON MAY be over, the players gone, and strawberries out of season, but **QL Match Point** from Psion should take you through the winter months.

The game is a conversion from the Spectrum but the authors have used the full power of the QL to make it faster, brighter, and a brilliant follow-up to **QL Chess**.

Centre Court at Wimbledon is shown in all its 3D glory. The crowds might not move their heads as rallies are played but the ball boys, line judges and umpire all move when necessary.

At the start of the game you can decide whether you want to play in the quarter finals, semi-finals or finals. The speed of the action increases as you move through the championship league table. You must also decide whether you want to play with a friend

or do battle against the computer. The computer generated player is



almost infallible — even in quarter final matches — and has all the ability of Boris Becker. It can knock a ball across the court which, even at full run, you will not be able to return. As a beginner, I found it difficult to win one game against the computer, let alone a set.

A joystick is a necessity when playing the game. You have to use the cursor keys to move in four directions and the space bar to swing the racket. I was all fingers and thumbs. It is impossible to respond to the swiftness of the computer generated player using the keyboard.

Psion has another QL winner. The quality of the game is superb, and the authors have handled the limitations and sophistication of the machine's graphics with professional skill.

John Gilbert

Publisher Psion
Price £14.95
Joystick
★★★★

SuperBasic Extensions

JOB CONTROL, memory management and file handling are just a few of the tasks which can be handled with Adam Denning's new EPROM cartridge.

Extensions to SuperBasic include commands to activate jobs, invoke QDOS traps, program the function keys and reset the machine, without pressing the usual button at the side of the QL.

The games player and graphics designer have not been left out either. High score tables can be set up using a

routine which produces a table of results in memory and commands have been included which provide information about the screen and windows which are active on it. Denning has also implemented routines which will copy the screen to a device such as a microdrive or compatible printer.

Many of the extensions, however, are rather esoteric for a Basic programmer and of little use to a machine code programmer who would no doubt use an assembler and monitor anyway. Such commands include rotating 32-bit integers, setting logical operations and copying words to and from specific addresses.

The pros of the package, however, outweigh the cons, and if machine code

programmers want to alter machine code from the SuperBasic environment then that is up to them.

For those who want an alternative to Tony Tebby's **QL Toolkit**, produced by Sinclair Research, Denning's extensions are ideal. The former utility has to be loaded in from microdrive, and that can take up to a minute. All you have to do with the extensions is to slot the supplied EPROM into the ROM socket and all the commands are available when the machine is powered up.

John Gilbert

Publisher Hi Soft
Price £34.95
★★★★

Expresso Coppee

ALTHOUGH MOST companies include a back-up routine for their particular programs, few general purpose utilities are available.

Expresso Coppee not only provides a back-up utility but also copies most files in under one minute. To put it to the test we made it copy itself. It comprised 123 microdrive sectors and took 47 seconds to complete the copy.

We also tried **Expresso** with **Abacus**. It was 198 sectors in length and the Psion copy routine took three minutes to do its work. **Expresso** did the job in 56 seconds.

If an error occurs during operation the utility can cope with it. The file will be read until the fault is located. The program has a retry option, which will try to copy a program a specified number of times.

Software houses need not fear that the utility will be a boon to pirates. **Expresso Coppee** will not operate on security protected files of any descrip-

tion. It will, however, read 99 per cent of other files.

The routine is overpriced at £9.00, when you consider that a similar utility is included in the Sinclair Research **QL Toolkit**, which offers much more and costs £25.00

John Gilbert

Publisher Total Computability,
45 Ewart Street, Brighton BN2 2UP
Price £9.00
★★★

more QL software on page 40

QL Monitor

IF YOU HAVE the **QL Assembler** from Sinclair Research you will find the **QL Monitor**, by Tony Tebby, a useful addition to your software library.

QL Monitor and the assembler are not compatible and cannot be run side by side, although they both use the same system of mnemonics.

The package provides disassembly, breakpoint setting and machine code trace facilities together with a simple line assembler. It is invoked with the command **QMON** at which point it will start running in the window at the bottom of the screen. You can make it run on any channel by adding the usual channel suffix to the basic command. As a result, it is possible to have several versions of the monitor running in different windows.

Disassembly is just a matter of typing the instruction **D** followed by the start and end addresses of a block of memory. The display format, shown when the command is invoked, is composed of a decimal representation

of the instruction address, followed by the code for that instruction.

The Trace facility takes advantage of the trace flag within the 68008 processor. When the flag is set, each time an instruction is performed, **QDOS** calls **QL Monitor** and a check is made for errors.

There are two trace modes. The normal mode writes every instruction to the trace window as it is executed. The second mode is called Quick Trace. It monitors the program code in the same way as the first, but no record is made in the trace window of the instruction being executed.

Normally the trace facility is used to look at user application programs which operate in the **QDOS User Mode**. It can, however, be used to monitor the execution of privileged code in **Supervisor Mode**.

If an error occurs within a machine code program it is possible to make a correction to the code using the **Modify instruction**, which allows you to alter one instruction line at a time. As well as being able to modify the contents of **RAM** you can also change the values stored in the data and address registers. The **Status Register**,

Program Counter and **Stack Pointer** can be altered in order to set up programs with test data.

The booklet which accompanies the package is above average for a Sinclair Research publication, even though it provides barely adequate descriptions of the monitor instruction set. However, it does show how to extend **SuperBasic** using machine code sub-routines. As Sinclair Research seems to make a habit of not including examples in its utility manuals, the booklet is certainly a step forward.

If you are shopping around for a monitor to go with your assembler then **QL Monitor** is worth bearing in mind. Its power and flexibility in dealing with straightforward machine code or **QDOS** traps and jobs puts it above almost all other monitors and disassemblers on the market. The only product which comes close to it is the **Hi-Soft MON QL**. Both packages are remarkably similar in performance and display.

John Gilbert

Publisher Sinclair Research
Price £24.95
★★★★

Touch 'n' Go

TOUCH TYPING is a real bind on any Sinclair computer but Sinclair Research is trying to make the process easier with the release of **Touch 'n' Go**.

The package contains two programs. One is a tutorial covering all the basic keystrokes and the other is an analysis routine which calculates the results of the 62 lessons through which you, as a beginner, must progress.

Each lesson has a short introduction which gives the lowdown on the keystrokes you will encounter. You must press the **ENTER** key at the start and end of each line of the test. As you also need to keep your fingers on the central key positions you need at least six fingers on the right hand.

Each test sequence must be completed with 100 per cent accuracy and at a speed of 30 words per minute. If the boundaries of time or accuracy are exceeded you must repeat the exercise.

The program marks the tests with question and exclamation marks. Question marks mean you have made

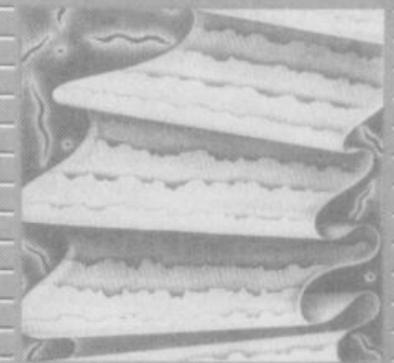
a keying error while exclamation marks show the parts of a test you have not completed. The more marks displayed on a test screen, the less accurate you have been.

Having completed the simple finger exercises you can move onto the real tests of skill and accuracy, typing in sentences and paragraphs. However, if you have learned your lessons well and are a reasonably fast typist, the speed at which the screen displays your input will soon fall behind the keying in of the tests. As a result, mistakes may not be picked up until it is too late and you will have to re-key the whole exercise.

The results analysis program, which is updated while you do the exercises, is confusing. Each entry shows the **Achieved Accuracy**, and **Achieved Speed** against **Required Accuracy** and **Required Speed**. Those headings are shown at the top of the screen as initials, such as **RA** and **RS**. Viewed with the massive block of results data, the initials make the display seem even more confusing.

On other micros **Touch 'n' Go** may be a boon to budding secretaries, but on the **QL** it is little more than a toy. Although the package multi-tasks dur-

QL-Touch 'n' Go



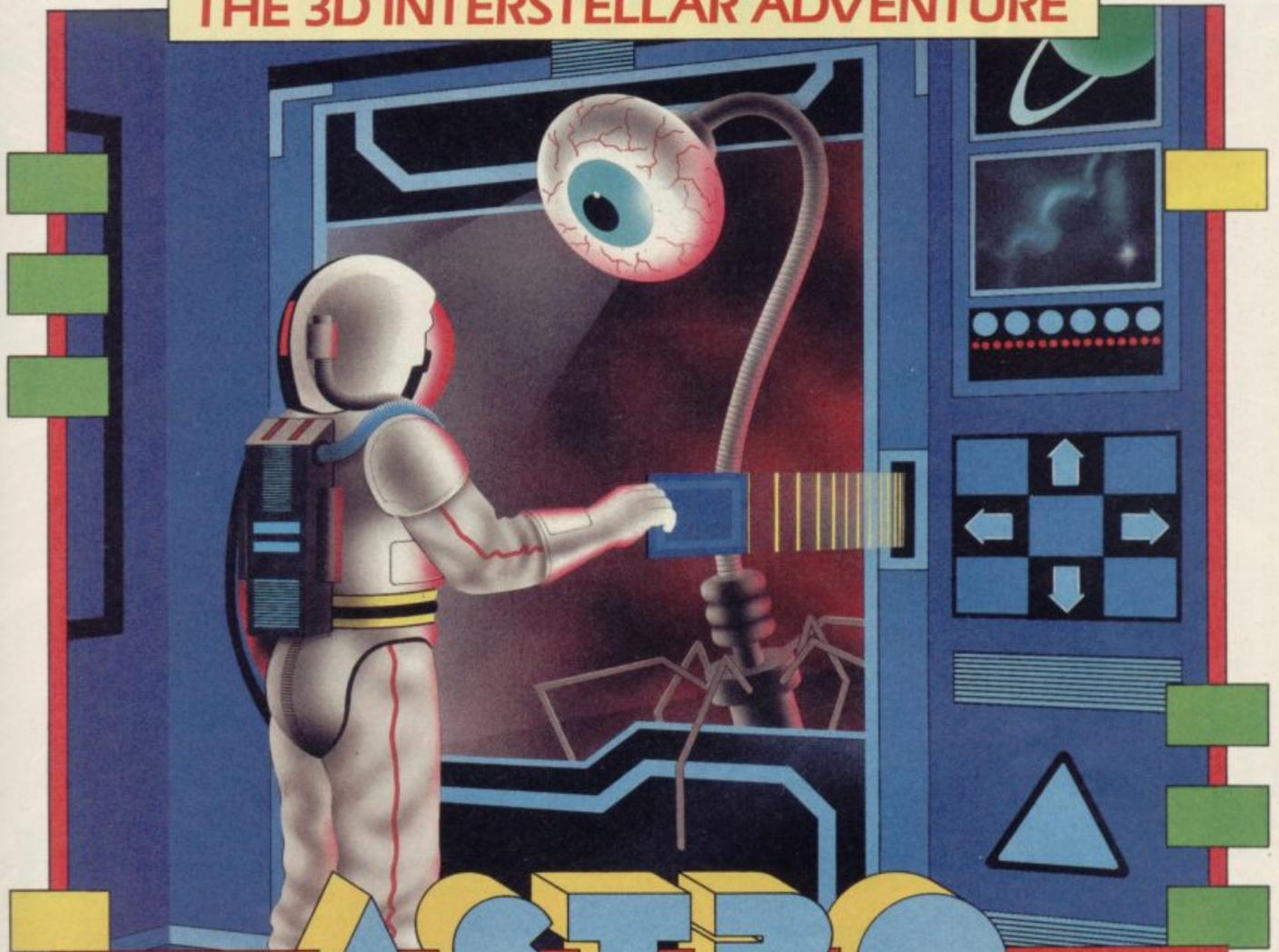
Software by
Harcourt Systems

ing the tests, the inability of the **QL** display to keep up with input makes an ordinary typewriter a better proposition for speed tests. Having said that, the package offers a viable alternative — though not a replacement — to typewriter tutorials.

John Gilbert

Publisher Sinclair Research
Price £24.95
★★

THE 3D INTERSTELLAR ADVENTURE



Those devious Seiddabs are mustering for another attack! Venture through a recently discovered series of stargates guarded by Seiddab fighters, and you'll find a system of named planetoids, each a part of the Seiddab war machine.

Your mission, in this totally original 3D adventure, is to explore these stargates and planetoids and rid them of the Seiddab menace, using an armada of fighters crewed by Astro Clones. In addition, a series of garbled messages tells you that a deadly Graviton Bomb lies hidden amongst the planetoids. Using all your skill and judgement, you must travel through the stargates to find its components and smash the master consul, closing the stargates forever. After a desperate

journey through space, beam your clones down to cripple each planetoid by destroying its launch system.

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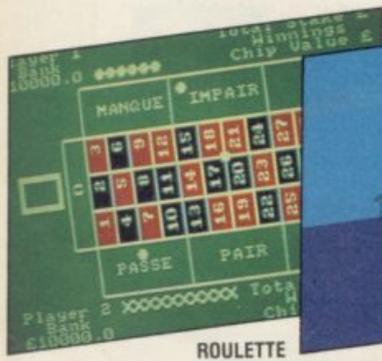
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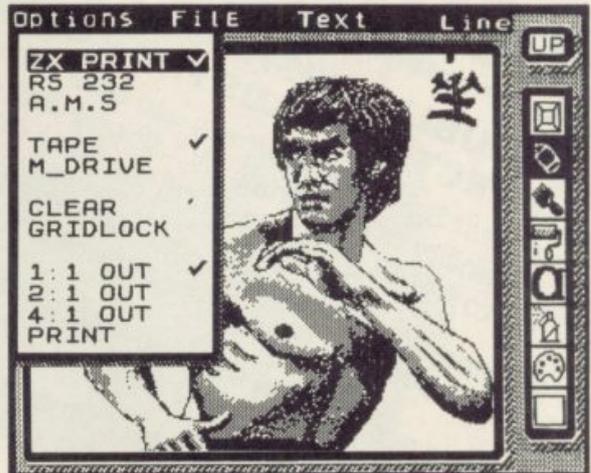
Finalist for Peripheral of the Year 1985... that's how successful the AMX MOUSE has been! A tried and tested product that now makes the keyboard positively old-fashioned. And offers a whole NEW approach to working with computers. Now this advanced opto-mechanical device can be used with YOUR SPECTRUM 48K MICRO!

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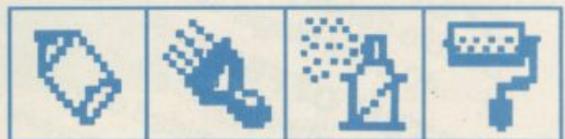
AMX COLOUR PALETTE lets you fill in with colour any pictures you've made with AMX ART. Now you can bring your drawings to life with rich, vibrant colours - and with a palette of 8 foreground + 8 background colours, to create full colour professional screen \$, you certainly won't be short of inspiration!

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Keyboard for the Elite

FEW KEYBOARDS have impressed me as much as the new Saga 3 Elite, from Hardware International. It transforms the humble Spectrum into an expensive-looking micro.

Looks, of course, are only skin deep, but the Elite offers a staggering 88 keys, of which 27 are single key functions.

A perennial problem with add-on keyboards is the need to cram all possible combinations of modes onto the key caps. The Elite sidesteps that by printing only the letter, and having a plastic card, angled for better viewing, at the top of the keyboard.

That means that if you are new to the Spectrum you will still have difficulty locating the correct key, although the three-colour card means that this is no more difficult than using the old rubber Spectrum.

Where the keyboard comes into its own is when using programs such as **Tasword Two** or **Beta Basic**. With **Tasword** you do not use any keywords and the single key functions could have been designed for it; with **Beta Basic**, where it is

possible to type in keywords in full, the lack of clutter makes life much easier.

Every silver lining has a cloud and with Elite the size of the keyboard means that if you have an Interface 1 you will find that the lead to the microdrive is not long enough. The microdrive can either be angled out at the back to compensate, or Hardware International can supply a longer lead.

With many full-sized keyboards users have encountered problems when adding hardware to the back. That has been eased with the advent of the Spectrum Plus, as it too suffered problems, and manufacturers redesigned their cases accordingly. The Elite seems to be better than most in that respect and an old style, upright, Kempston E printer interface can be fitted easily.

The keyboard is arranged as two banks of keys. On the left are 10 keys: True and Inv, Video — single key functions — plus Load, Save, Clear, Copy, Cont, Pause, List and Run.

Those are not single key functions, merely j, s, x, z, c, m, d, and r keys for ease of use.

The main body of keys, the remaining 78, are in one large block. To the left of the QWERTY section are Edit, G Mode, Caps Lock, E Mode and Symbol and Caps Shifts — which are duplicated on the right. The top row has both the numbers and the Symbol Shifted legends printed on them.

To the right are another eleven single key functions (?£"=;\$.,) plus Break (Caps Shift Space) and Stop (Symbol Shift A). On the far right is a numeric pad, with a double-sized zero key, surrounded by the four maths functions (/ * - +), four shifted cursor keys, an extra comma and full stop and a Delete key.

All those keys and functions are not without price — £79.95 inc. That is very high for an add-on keyboard. Only the new Transform keyboard comes close to matching it in terms of performance, and that

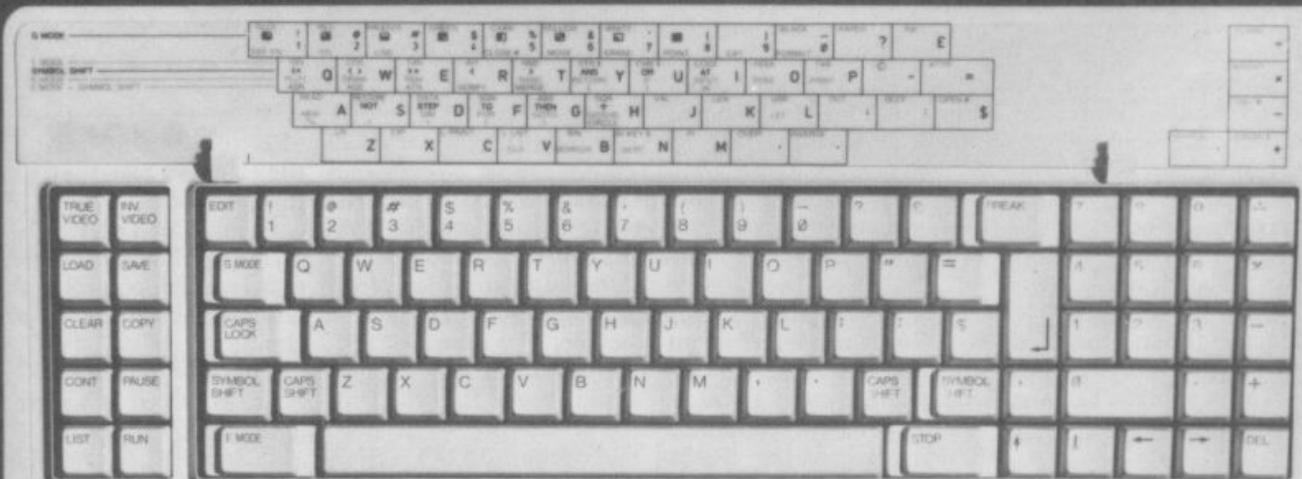
costs as much.

With the Saga 3 Elite, Hardware International is also launching the Saga 2 Profile. That is the discontinued AMS Lo»Profile keyboard in a new colour scheme. Just before AMS stopped manufacturing, it redesigned the back of the keyboard to resemble the rear of the old rubber Spectrum to make fitting add-ons easier. The base was changed to solid, as opposed to flimsy plastic, and the position of the Spectrum inside the keyboard was moved so that Interface 1 users could put the microdrive alongside. Those improvements are included in the Saga 2. Hardware International has retained the old price, £49.95 inc.

It has 53 keys, 41 in the main block with a full-sized space bar and an extra, unshifted, key marked Caps Shift. On the right is a numeric pad with an extra Caps Shift key and one, unshifted, marked with a full stop.

Hardware International, 2 Eve Road, Woking, Surrey GU21 4JT. Tel: 04862-22977

more hardware on page 46



Much Beta

TECHNOLOGY Research has upgraded its Beta disc interface for the Spectrum, and it is now probably the best stand-alone disc interface for that micro. TR has put all the commands in ROM, added sequential and random access files, provided auto-boot and made it possible to transfer any program to disc.

The new Beta, called Beta Plus, uses a system similar to the Mirage Microdriver. A tape-based program is loaded as normal and then at any point a 'Magic Button' on the interface can be pressed, which transfers the entire 48K to disc. When that is loaded back, the program continues from the point at which it was saved.

The system has some limitations in that it always saves that file under the same name in the same place on the disc, but once saved the file can be renamed and moved around. Unlike the Microdriver, which sometimes has problems fitting two programs on a cartridge, the increased capacity of a disc, 156K with a 40-track drive and up to 636K for an 80-track, double-sided drive, means that you can transfer your entire library to disc.

As well as the 'Magic Button', the Plus now has a reset button. When that is pressed, and on power up, the interface looks for a Basic program, 'boot', on drive one — up to four drives can be used. It also checks to see what sort of drive is connected, 40 or 80-track, single or double-sided, and the stepping rate. When another drive is used that check is made again so you can mix different types of drives.

In addition to the existing commands, LOAD and SAVE of Basic, Code and

Data, MERGE, CAT, ERASE, NEW (Rename), MOVE (Compact), and PEEK and POKE (sector read/write), the ROM has been changed so that the Break key can interrupt an operation. The Password is no longer required — old discs can still be read — and FORMAT and COPY are included, plus the new filing commands.

The main additions are the sequential and random access files. A sequential file is opened using the usual OPEN # command, followed by the file name and then either a W, for write or an R for read. Information can be PRINTed to and INPUT from the file.

A random access file is opened in a similar way except that the file name is followed by the keyword RND and a number denot-



ing the record length, up to 254 bytes. Records can be PRINTed to and INPUT from the file at any position.

Technology Research still includes a disc with the interface including a number of utility programs. Those include an enhanced CAT which gives details of file size and start address, FORMAT for old style drives, and a rudimentary tape to disc copier which copies all normally saved files, including Data, to disc.

For a stand-alone inter-

face — one to which you can add your own drives — it is well priced at £109.25 including VAT, plus £2.00 p&p. Existing owners of the Beta can upgrade for £19.95 plus £4.00 p&p.

With the 'Magic Button', Technology Research deserves to have a winner with the Beta Plus; it could be the start of a new era.

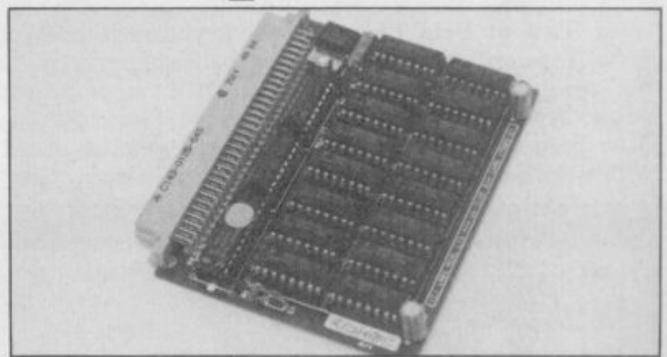
Technology Research Ltd, Unit 18, Central Trading Estate, Staines, Middlesex TW18 4XE. Tel. Staines 63547.

New ROM leaps onboard

WHEN I first reviewed the PCML 512K RAM expansion card for the QL, I commented that it might degrade the display on some QLs.

PCML has now redesigned it to work perfectly, with no noise and a crystal-clear display. The price is still £310.50.

PCML has also just released its 256K RAM board with an onboard ROM. The ROM contains extras from the Tony Tebby Toolkit plus commands for RAM discs and to spool a file. Up to eight RAM discs can be used, with the names RAM10, RAM20 and so on, and each can use all the available memory. In addition there is the command RAM_USE, as in 'RAM_USE mdv' enabling any command using MDV to automatically use the RAM



disc as a default.

The spool commands SPL and SPL_USE operate as a multitasking job. SPL_USE sets up the default destination device for SPL which is used to send the file. For example 'SPL_USE ser1:SPL file_name' would send the file 'file_name' to the serial port. The command DATA_USE is used to set the default source file; so 'DATA_USE mdv1_test:SPL_USE ser1:

SPL file1' would send the file 'mdv1_test_file1' to the serial port.

From the Toolkit there is the JOBS set of commands which control multitasking jobs from Super-Basic.

The 256K RAM/ROM board is priced at a reasonable £195.50.

PCML Ltd, Royal Mills, Esher, Surrey KT10 8AS. Tel: 0372-67282/68631

more hardware on page 48

The Rotronics Wafadrive 'Peripheral of the Year'

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the Spectrum storage system

Rise of the Bright Star

THE LONG AWAITED Commpak Data modem, Bright Star, marketed by Modem House, is available for the QL. Initially just the standard modem, at £179.95, will be available. Plans are, however, underway for an auto-dial/auto-answer model which, it is rumoured, will cost little more than £200.

Like the recently launched — re-launched? — QL-Connect the Bright Star is software driven — no switches to play with on the front of the box — which means that you have complete control from the keyboard. As a by-product of that freedom of control the modem is not computer dependent. If you have the right software you can use the modem on any computer with a serial port.

The modem is the usual black box, with LEDs on the front to show what is happening, and a collection of sockets on the back. Your 'phone plugs into one of those sockets which then goes back to the wall socket — when the modem is not in use you can still use the 'phone. Another lead plugs into the mains, and is supplied with a moulded, fused, plug. Of the two other sockets, one connects to the SER2 port on the QL — using the standard Sinclair cable — and the other is a parallel output to a Centronics printer.

As to the software supplied with the modem, I do not claim to be any great shakes in the Comms department but it looks good. If I can use it any idiot can.

There are two main areas of software, Prestel and Terminal Emulation. The Prestel software gives you access to systems such as Prestel and Micronet, while the terminal software allows you to access everything else.

When Prestel is up and running the QL looks just like any other computer — apart from the appearance of a useful clock which shows how long you have been on the 'phone. There are facilities to dump a screen to a drive or the printer — which were temperamental on the preliminary software I was using — send Prestel codes or refresh the screen. The modem had problems with some of the really fancy graphics produced by Micronet. The people of Commpak, to their credit, told me about that when they gave me the modem and that they are working on it.

The modem comes into its own when running the

Terminal software. You can preset it to the Baud rate used by the Bulletin Board, or set it to auto-scan and let it do the work for you. Auto-scan hiccuped a few times when the Bulletin Board was also trying to do it but if that occurs all you have to do is set a rate.

One feature I found useful was the ability to send the incoming information and my replies to a file as well as to the screen. If you have a disc drive connected you can save information and review it at your leisure.

The 1200/1200 rate is a special packet system for user to user — QL to QL — communications. It includes, and I quote — “carrier sense

collision”. I do not know what it does either but acquaintances who are into modems tend to get excited at the mention of the term.

The Bright Star potentially has the edge over the other QL modems in terms of cost, once it gets its software straightened out. Admittedly I was using an early version but it should be finalised by the time you read this article. It has some good features, particularly the auto-scan. The ability to use the modem on other computers will bring it many buyers.

Modem House Ltd, Iolanthe Drive, Exeter, Devon. EX4 9EA. Tel: 0392-69295.

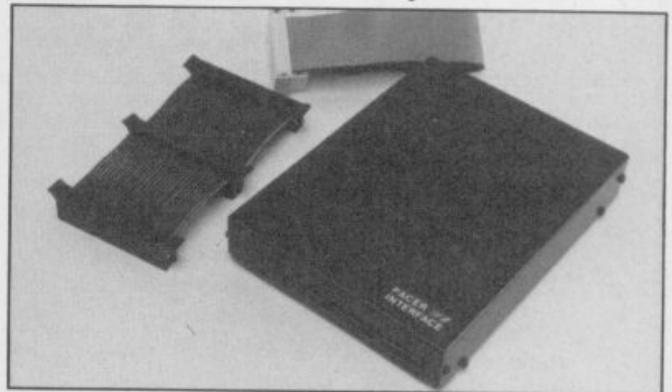
Pacer inspires déjà vu

THE NEW PACER disc interface from Omnitronix for the Spectrum evokes strange feelings of *déjà vu*. It is instantly recognisable by users of the Primordial Peripherals and Statacom systems.

The Pacer, and Omnitronix would be the first to admit it, is a budget interface for the Spectrum, and at only £79.95 for the interface plus £2.50 p&p, or £119.95 plus £5.00 p&p for the interface and a 100K drive, it fits the bill admirably. It is simple in operation but it can LOAD and SAVE Basic, Code and Data, which is all many people would want to do.

Omnitronix has redesigned the printed circuit board so it should be a little more reliable than the two previous systems. The system currently only works on 40 track, single-sided drives.

The interface is housed in a metal case which connects to the Spectrum via a flexible three-way connector.



The drive plugs into the back of the interface with a choice of either a Shugart or a BBC-style connector.

When the system is powered up, or the reset button pressed, the operating system is copied into the top 8K of the Spectrum memory. That means few commercial programs can be used with the system without major reorganisation.

The system is relatively easy to use; the variable f\$ is used to hold the file name plus any parameters and then a RAND USR call is made using a variable, such as 'b1' for Basic Load, 'bs'

for Basic Save and so on.

As much as 107.25K can be stored on a disc with up to 39 different files. The interface treats each track as a sector — of 2816 bytes — so even if you save only one byte you lose the other 2815. A file is automatically verified when it is saved and when a Basic program is saved the user defined graphics are saved with it.

The Pacer is not outstanding as a disc interface, but it is a good introduction to the world of disc storage.

Omnitronix Ltd, 13 Dartford Road, Leicester LE2 7PQ. Tel: 0533-839713.



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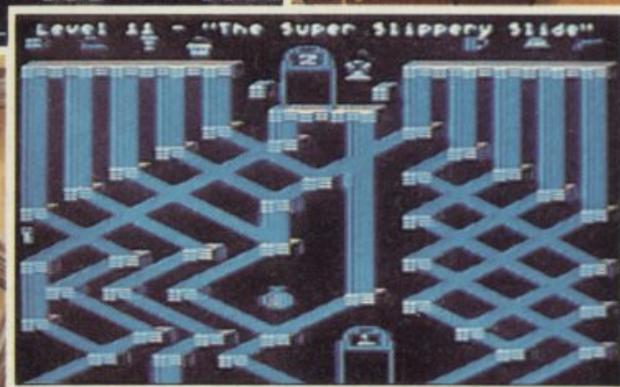
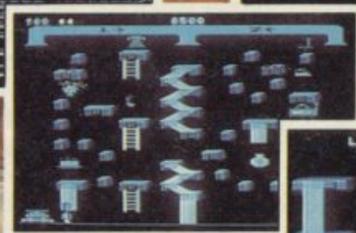
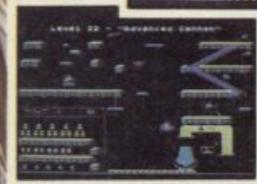
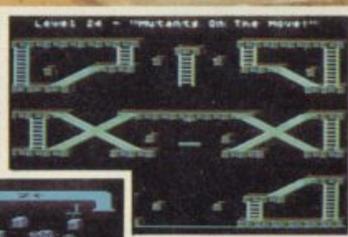
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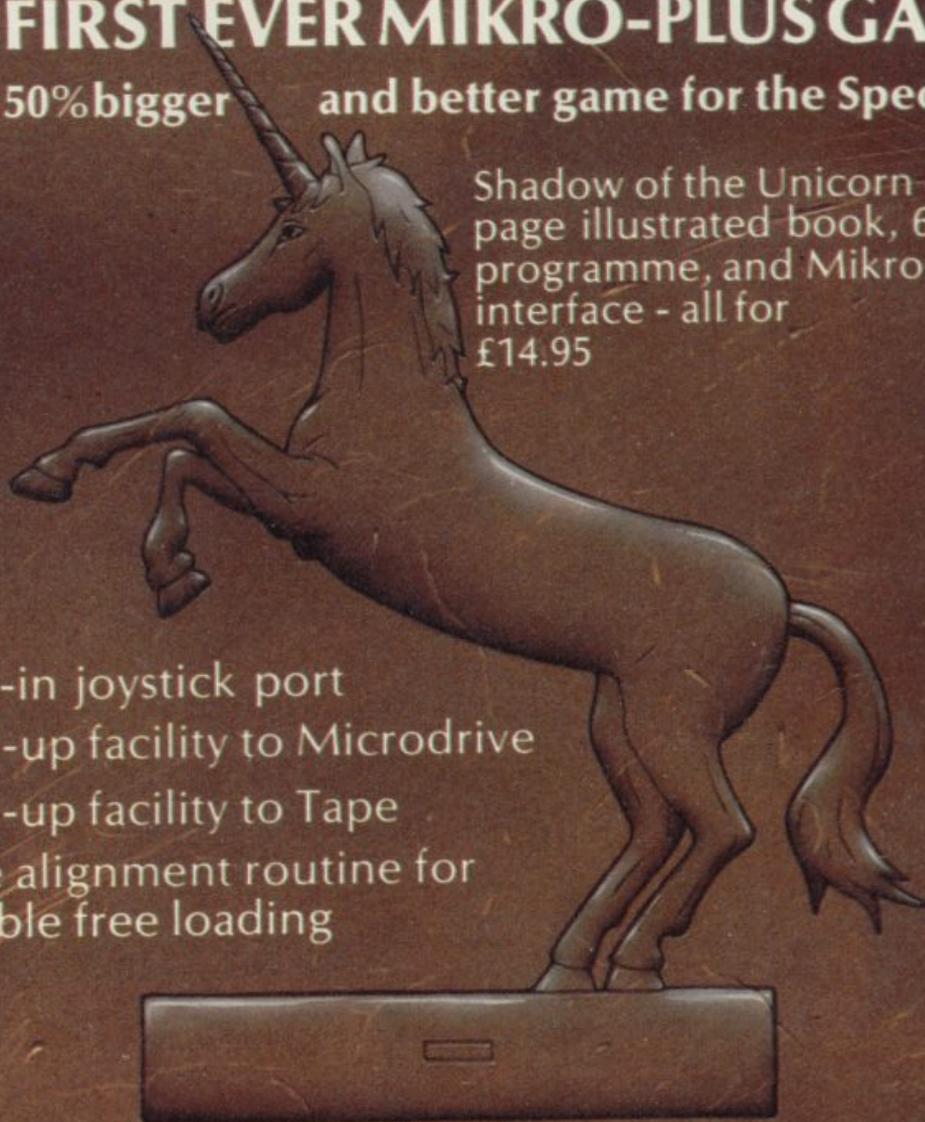


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THIS MONTH we are going to look at the more advanced arithmetic instructions available on the Z80, and employ them in a screen magnify and reduce utility. You could easily add this routine to the alternate screen and fill utilities from the last two months.

We have already seen how to add and subtract bytes, using the ADD and SUB instructions. If we want to add 16-bit numbers together, we have looked at the 'ADD HL, rp' instruction which will add a 16-bit register pair to the HL register pair.

What happens, however, if we want to add two 16-bit numbers without using the HL register pair, or even add 24-bit and 32-bit numbers together? Z80 handles that in much the same way as we perform calculations. Imagine that you were performing the following addition:

```

  987
+ 456
-----
1443

```

Figure 2.

	LD	D,0	: Make multiplicand 16-bits
	LD	HL,0	: Set result to zero
	LD	B,8	: Perform 8-bit multiplication
nextbit	ADD	HL,HL	: We use this to shift HL one bit left
	RLA		: Shift multiplier one bit left into the carry flag
	JR	NC,noadd	: If no carry, then no addition, else
	ADD	HL,DE	: add the multiplicand
noadd	DJNZ	nextbit	: Do remaining bits

Adding up bit by bit

Marcus Jeffery waves his binary wand and before you can say 'RST 28H' you have got a screen magnification utility

You first add the seven and six, giving 13, and then consider that as the digit three with a carry of one. That is then added to the eight and five, giving four with a carry of one, and so on.

We can do exactly the same thing when adding binary numbers together. The ADD instruction will correctly add the two bytes. If the addition of the two most significant

Figure 1.

next	LD	A,(DE)	: get byte from first number
	ADC	A,(HL)	: add (with carry) byte from second number
	LD	(HL),A	: place result in second number position
	INC	DE	: move to next byte of first number
	INC	HL	: move to next byte of second number
	DJNZ	next	: continue until addition complete

bits gives a carry — that can only be zero or one — then the carry bit in the Flag register is set.

If we convert the above calculation to binary we would get the following:

```

  987 = 0000 0011 and 1101 1011
+ 456 = 0000 0001 and 1100 1000

```

continued on page 54

Figure 3. RST 28H instruction

Operand	Operation	Description			
00h	Jump-True	Conditional jump based on value at top of stack	21h	Tangent	Replace top of stack with TAN of value
01h	Exchange	Swap the two values at the top of the stack	22h	Arcsine	Replace top of stack with ASN of value
02h	Delete	Delete the value at the top of the stack	23h	Arccosine	Replace top of stack with ACS of value
03h	Subtract	Delete two top values and stack subtraction result	24h	Arctantgnt	Replace top of stack with ATN of value
04h	Multiply	Delete two top values and stack multiplication result	25h	Logarithm	Replace top of stack with LN of value
05h	Division	Delete two top values and stack division result	26h	Exponent	Replace top of stack with EXP of value
06h	Power	Delete two top values and stack power result	27h	Integer	Replace top of stack with INT of value
07h	X-or-Y	Gives X if Y = 0 and one otherwise	28h	Sq-root	Replace top of stack with SQR of value
08h	X-and-Y	Gives X if Y < > 0 and one otherwise	29h	Sign	Replace top of stack with SGN of value
09h	X < = Y	Gives true if X < = Y else false	2Ah	Absolute	Replace top of stack with ABS of value
0Ah	X > = Y	Gives true if X > = Y else false	2Bh	Peek	Replace top of stack with PEEKing value
0Bh	X < > Y	Gives true if X < > Y else false	2Ch	In-port	Replace top of stack with IN value
0Ch	X > Y	Gives true if X > Y else false	2Dh	Usr	Replace top of stack with USR of value
0Dh	X < Y	Gives true if X < Y else false	2Eh	String\$	Replace top of stack with STR\$ of value
0Eh	X = Y	Gives true if X = Y else false	2Fh	Char\$	Replace top of stack with CHR\$ of value
0Fh	Addition	Delete two top values and stack addition result	30h	Not	Gives one if top of stack is zero and zero otherwise
10h	X\$ and Y	Gives X\$ if Y = 0 and "" otherwise	31h	Duplicate	Make duplicate of top of stack at top of stack
11h	X\$ < = Y\$	Gives true if X\$ < = Y\$ else false	32h	X mod Y	Replace two top values with INT(X/Y) and remainder
12h	X\$ > = Y\$	Gives true if X\$ > = Y\$ else false	33h	Jump	Unconditional jump based on top of stack
13h	X\$ < > Y\$	Gives true if X\$ < > Y\$ else false	34h	Stk-data	Stack list of literals following '34h' code
14h	X\$ > Y\$	Gives true if X\$ > Y\$ else false	35h	Dec-jr-nz	Perform DJNZ on BREG system variable
15h	X\$ < Y\$	Gives true if X\$ < Y\$ else false	36h	X < 0	Gives true if top of stack < 0 else false
16h	X\$ = Y\$	Gives true if X\$ = Y\$ else false	37h	X > 0	Gives true if top of stack > 0 else false
17h	X\$ + Y\$	Concatenate X\$ and Y\$	38h	End-calc	End the RST 28H calculations
18h	Value\$	Replace top of stack with VAL\$ of item	39h	Get-oper	This routine converts a function operand to a value
19h	Usr\$	Replace top of stack with USR of string item	3Ah	Truncate	Replace top of stack with truncation (towards zero)
1Ah	Read-in	Read (INKEY\$) from a channel	3Bh	Sgle-Calc	Perform single calculation (Code in B)
1Bh	Negate	Negate the value at the tip of the stack	3Ch	E-convert	Convert a number in the form 'numEm' to top of stack
1Ch	Code	Replace top of stack with CODE of string	3Dh	Rstack	Rstack number
1Dh	Value	Replace top of stack with VAL of string	3Eh	Series	Series generator for SIN, COS, LN, etc.
1Eh	Length	Replace top of stack with LEN of string	3Fh	Stk-lit	Stack a literal zero, one, half, half-Pi or ten
1Fh	Sine	Replace top of stack with SIN of value	40h	Store-mem	Store in memory 0 to 5 (codes C0h to C5h)
20h	Cosine	Replace top of stack with COS of value	41h	Get-mem	Get a memory 0 to 5 (codes E0h to E5h)

continued from page 53

We can now do that by ADDing the lowest two bytes to give:

(1) 1010 0011

and then ADC the top two bytes to give:

(0) 0000 0101

If we convert that to decimal, we get $256 \star 5 + 163 = 1443$.

Using that method, we could effectively add any number of bytes together. Suppose that we had two numbers, each being made up of a large number of bytes. We could hold the number of bytes in B, the location of the lowest byte of the first number in DE and the location of the first byte of the second number in HL. We could place the result into the locations presently used for the second number — HL onwards. The code would look something like figure one.

With this sort of routine you must ensure that you do not corrupt the carry flag between one ADC instruction and the next. We have made a couple of assumptions with this routine. Firstly, we would be in a mess if the carry flag was set before entering the routine, and would add an extra digit to the lowest byte.

An easy method of clearing the carry flag is to perform an ADD instruction which could not possibly set it; 'ADD A,0' — Add zero to the accumulator — works well.

The other assumption is that the most significant digits are higher in memory. We can compensate for that by changing the INC instructions to DEC, neither of which affect the carry flag. Figure seven shows all the ADC instructions, together with their equivalent SBC — SuBtract with Carry — instructions.

We have seen how to multiply a number by two, either by adding it to itself, or by shifting one bit to the left. Division by two is similarly performed by shifting one bit to the right.

A more general multiplication algorithm can be performed as a series of additions, in the same way as you would do long multiplication by hand. Imagine the calculation:

```

19
x 34
---
76
+57
---
646

```

Figure 4.

		ORG	60000		
		LOAD	60000		
EA60	CDA5EA	CALL	COPY1		:Copy to alternate screen
EA63	2143EB	LD	HL,XCOORD		:Get X-multiple and place
EA66	CD7EEA	CALL	DIVIDE		: into (DX)
EA69	ED434BEB	LD	(DX),BC		
EA6D	2147EB	LD	HL,YCOORD		:Get Y-multiple and place
EA70	CD7EEA	CALL	DIVIDE		: into (DY)
EA73	ED434DEB	LD	(DY),BC		
EA77	CDBEEA	CALL	MAG		:Perform magnify/reduce
EA7A	CDB2EA	CALL	COPY2		:Copy back to main screen
EA7D	C9	RET			:Exit to BASIC
EA7E	46	DIVIDE	LD	B,(HL)	:B = x1
EA7F	23	INC	HL		
EA80	7E	LD	A,(HL)		:A = x2
EA81	90	SUB	B		:A = x2 - x1
EA82	47	LD	B,A		:Transfer A to 16-bit BC
EA83	0E00	LD	C,0		
EA85	E5	PUSH	HL		
EA86	CD2B2D	CALL	2D2BH		:Stack BC
EA89	0601	LD	B,1		
EA8B	0E00	LD	C,0		
EA8D	CD2B2D	CALL	2D2BH		:Stack '1'
EA90	EF	RST	28H		:Calculation...
EA91	0F	DB	0FH		: Addition
EA92	38	DB	38H		: End calculation
EA93	E1	POP	HL		
EA94	23	INC	HL		
EA95	46	LD	B,(HL)		:B = x3
EA96	23	INC	HL		
EA97	7E	LD	A,(HL)		:A = x4
EA98	90	SUB	B		:A = x3 - x4
EA99	CD282D	CALL	2D28H		:Stack A
EA9D	EF	RST	28H		:Calculation...
EA9E	A1	DB	00A1H		: Stack '1'
EA9F	0F	DB	0FH		: Addition
EAA0	38	DB	05H		: Division
EAA1	CDA22D	CALL	38H		: End calculation
EAA4	C9	RET	2DA2H		:Unstack to BC (C=frac)
EAA5	210040	COPY1	LD	HL,16384	:Copy main screen to
EAA8	ED5BB05C	LD	DE,(23728)		: reserve screen
EAAE	010018	LD	BC,6144		
EAAF	EDB0	LDIR			
EAB1	C9	RET			
EAB2	2AB05C	COPY2	LD	HL,(23728)	:Copy reserve screen
EAB5	110040	LD	DE,16384		: to main screen
EAB8	010018	LD	BC,6144		
EABB	EDB0	LDIR			
EABD	C9	RET			
EABE	DD2143EB	MAG	LD	IX,XCOORD	:IX = start of coords
EAC2	DD5600	LD	D,(IX+0)		:D = x1 (xa)
EAC5	1E00	LD	E,0		:E = frac inc to x1
EAC7	DD6E02	LD	L,(IX+2)		:L = x3 (xb)
EACA	DD4604	XLOOP	LD	B,(IX+4)	:B = y1 (ya)
EACD	0E00	LD	C,0		:C = frac inc to y1
EACF	DD6606	LD	H,(IX+6)		:H = y3 (yb)
EAD2	E5	YLOOP	PUSH	HL	
EAD3	D5	PUSH	DE		
EAD4	C5	PUSH	BC		
EAD5	4A	LD	C,D		
EAD6	110040	LD	DE,16384		:Get screen coords for
EAD9	E5	PUSH	HL		: location (xa,ya)
EADA	CD13EB	CALL	FCOORD		: on main screen
EADD	C1	POP	BC		
EADE	ED5BB05C	LD	DE,(23728)		
EAE2	A6	AND	(HL)		
EAE3	2807	JR	Z,RESET		:Jump to reset pixel
EAE5	CD13EB	CALL	FCOORD		:Set screen coords for
EAE8	B6	OR	(HL)		: location (xb,yb)
EAE9	77	LD	(HL),A		: on reserve screen
EAEA	1B06	JR	NEXT		
EAEF	2F	RESET	CALL	FCOORD	:Reset screen coords for
EAF0	A6	AND	(HL)		: location (xb,yb)
EAF1	77	LD	(HL),A		: on reserve screen
EAF2	C1	NEXT	POP	BC	
EAF3	2A4DEB	LD	HL,(DY)		:Increment ya by DY
EAF6	09	ADD	HL,BC		
EAF7	44	LD	B,H		
EAF8	4D	LD	C,L		
EAF9	D1	POP	DE		
EAFB	E4	POP	HL		
EAFD	DD7E07	INC	H		:Increment yb by one
EAFF	94	SUB	A,(IX+7)		
EBO0	30D0	JR	NC,YLOOP		:Loop along y-axis
EBO2	E5	PUSH	HL		
EBO3	2A4BEB	LD	HL,(DX)		:Increment xa by DX
EBO6	19	ADD	HL,DE		
EBO7	54	LD	D,H		
EBO8	5D	LD	E,L		
EBO9	E1	POP	HL		
EBOA	2C	INC	L		:Increment xb by one
EBOB	C8	RET	Z		:RETURN if x-axis wraps
EBOC	DD7E03	LD	A,(IX+3)		
EBOF	95	SUB	L		
EB10	30B8	JR	NC,XLOOP		:Loop along x-axis
EB12	C9	RET			
EB13	D5	FCOORD	PUSH	DE	:Variation on previous
EB14	79	LD	A,C		: PBYTE routine.
EB15	E607	AND	7		: Returns HL screen
EB17	5F	LD	E,A		: location and A bit.
EB18	CB39	SRL	C		: for coords (C,B)
EB1A	CB39	SRL	C		: on screen starting
EB1C	CB39	SRL	C		: at location DE.
EB1E	3EAF	LD	A,175		
EB20	90	SUB	B		
EB21	47	LD	B,A		
EB22	E638	AND	56		
EB24	CB27	SLA	A		
EB26	CB27	SLA	A		
EB28	B1	OR	C		

Figure 4 cont.

```

EB29 6F      LD      L,A
EB2A 78      LD      A,B
EB2B E607    AND     7
EB2D 67      LD      H,A
EB2E 78      LD      A,B
EB2F E6C0    AND     192
EB31 CB3F    SRL     A
EB33 CB3F    SRL     A
EB35 CB3F    SRL     A
EB37 84      ADD     A,H
EB38 67      LD      H,A
EB39 43      LD      B,E
EB3A 04      INC     B
EB3B AF      XOR     A
EB3C 37      SCF
EB3D 1F      FLOOP  RRA
EB3E 1DFD    FLOOP  DJNZ  FLOOP
EB40 D1      POP     DE
EB41 19      ADD     HL,DE
EB42 C9      RET

EB43 01020304 XCOORD DB 1,2,3,4      :x1,x2,x3,x4
EB47 01020304 YCOORD DB 1,2,3,4      :y1,y2,y3,y4
EB4B 0000     DX      DB 0,0          :DX = frac.int
EB4D 0000     DY      DB 0,0          :DY = frac.int

END
    
```

Workarea - ACEA to AEA7
 ORG end - EB4F
 LOAD end - EB4F

You first multiply 19 by four to give 76. Moving to the next digit, you multiply 19 by three, placing the result, 57, one digit to the left. Adding those gives the final result of 646.

The same calculation is even easier in binary. At each stage, the digit in the multiplier (34) will be either zero or one, so we just add either zero or the multiplicand (19) respectively, remembering to shift the final product one bit left after each step in the calculation. So, in binary, that would look like:

```

      00010011 (19)
×     00100010 (34)
-----
+      00000000 [0]
+      00010011 [1]
+      00000000 [0]
+      00000000 [0]
+      00000000 [0]
+      00010011 [1]
+      00000000 [0]
+      00000000 [0]
-----
000001010000110 (646)
    
```

If you look at the digits in square brackets, you will see that, read from bottom to top, they exactly match the multiplier. Using that technique, we can develop a simple multiplication algorithm. That will multiply two eight-bit numbers into a 16-bit result. Assume that the E register contains the multiplicand and the A register contains the multiplier. We can then use the code in figure two to return the result in the HL register pair. Division is performed in a similar way, by a series of subtractions, just as you would perform long division.

You should be warned to avoid multiplication and division in programs wherever possible. Fortunately, few machine code programmers will

ever find a need for such complex calculations. After all, how often are we going to need multiplication and division algorithms for moving space invaders around at fantastic speed?!

If you do need to perform more complex calculations, Spectrum programmers have an extra advantage. Have you ever wondered how Basic can evaluate such expressions as 'INT(19 * SIN(5 * angle) ^ 2)' which includes all the operations integer, multiplication, sine, and power? Obviously, Sinclair must have written the code to perform all of those

functions into the Spectrum operating system, and it has been kind enough to make them all easily accessible to the distraught machine code programmer. They are all accessed using the RST 28H instruction.

We will examine that and similar instructions in a later article, so don't worry about exactly how it works just now, but meanwhile here is how to use it. The RST 28H instruction expects to be followed by a list of numbers, terminating with the number 38H. That list of numbers tells the processor which operations to perform on the numbers in the calculator stack. All those codes are shown in figure three.

If we want to multiply the two numbers at the top of the calculator stack, and then take the integer of the square root, we can write the code:

RST 28H : Start calculation
 DEFB 04H : Do multiplication
 DEFB 28H : Take square root
 DEFB 27H : Want an integer result
 DEFB 38H : End calculation

The only remaining problem is to place numbers onto the calculator stack and retrieve the result. That is done by calling the appropriate ROM routines:

2D28H — transfer integer A to

continued on page 56

Figure 5.

```

10 CLEAR 53759
20 POKE 23728,0: POKE 23729,21
0
30 GO SUB 1000
40 CLS : PRINT AT 1,1:"SINCLAIR"
R
50 PLOT 6,159: DRAW 67,0: DRAW 0,9: DRAW -67,0: DRAW 0,-9
60 LET x1=6: LET y1=159: LET x2=74: LET y2=168
70 LET x3=200*RND: LET y3=120*RND
80 LET x4=255*RND: IF x3>=x4 THEN GO TO 80
90 LET y4=158*RND: IF y3>=y4 THEN GO TO 90
100 POKE 60227,x1: POKE 60228,x2
110 POKE 60229,x3: POKE 60230,x4
120 POKE 60231,y1: POKE 60232,y2
130 POKE 60233,y3: POKE 60234,y4
140 RANDOMIZE USR 60000
150 GO TO 70
160 STOP
1000 REM HEX LOAD ROUTINE
1010 DEF FN p(x)=CODE h$(x)-48-7
*(CODE h$(x)>=65)
1020 LET byte=0
1025 LET chbyte=0
1030 RESTORE 2000
1040 READ start
1050 READ h$
1060 IF h$="" THEN GO TO 1160
1070 IF LEN h$<>2*INT (LEN h$/2) THEN PRINT "Odd number of hex digits in: "h$: STOP
1080 FOR i=1 TO LEN h$
1090 IF NOT ((h$(i)>="0" AND h$(i)<="9") OR (h$(i)>="A" AND h$(i)<="F")) THEN PRINT "Illegal hex digit: "h$(i): STOP
1100 NEXT i
1110 FOR i=1 TO LEN h$ STEP 2
1120 POKE start+byte,16*FN p(i)+FN p(i+1)
1125 LET chbyte=chbyte+PEEK (start+byte)
1130 LET byte=byte+1
1140 NEXT i
1150 GO TO 1050
1160 PRINT "Code entered"
1161 PRINT chbyte
1162 READ checksum
1164 IF checksum<>chbyte THEN PRINT "Wrong Checksum": STOP
1170 PAUSE 150
1180 RETURN
2000 DATA 60000,"CDA5EA"
2010 DATA "2143EB","CD7EEA"
2020 DATA "ED434BEB","2147EB"
2030 DATA "CD7EEA","ED434DEB"
2040 DATA "CDBEEA","CDB2EA","C9"
2050 DATA "46","23","7E","90"
2060 DATA "47","0E00","E5"
2070 DATA "CD2B2D","0601","0E00"
2080 DATA "CD2B2D","EF","0E"
2090 DATA "38","E1","23","46"
2100 DATA "23","7E","90"
2110 DATA "CD282D","EF","A1"
2120 DATA "0F","05","38"
2130 DATA "CDA22D","C9"
2140 DATA "210040","ED5BB05C"
2150 DATA "010018","EDB0","C9"
2160 DATA "2AB05C","110040"
2170 DATA "010018","EDB0","C9"
2180 DATA "DD2143EB","DD5600"
2190 DATA "1E00","DD6E02"
2200 DATA "DD4604","0E00"
2210 DATA "DD6606","E5","D5"
2220 DATA "C5","4A","110040"
2230 DATA "E5","CD13EB","C1"
2240 DATA "ED5BB05C","A6"
2250 DATA "2807","CD13EB","B6"
2260 DATA "77","1806","CD13EB"
2270 DATA "2F","A6","77","C1"
2280 DATA "2A4DEB","09","44"
2290 DATA "4D","D1","E1","24"
2300 DATA "DD7E07","94","30D0"
2310 DATA "E5","2A4BEB","19"
2320 DATA "54","5D","E1","2C"
2330 DATA "C8","DD7E03","95"
2340 DATA "30B8","C9"
2350 DATA "D5","79","E607","5F"
2360 DATA "CB39","CB39","CB39"
2370 DATA "3EAF","90","47"
2380 DATA "E638","CB27","CB27"
2390 DATA "B1","6F","78","E607"
2400 DATA "67","78","E6C0"
2410 DATA "CB3F","CB3F","CB3F"
2420 DATA "54","67","43","04"
2430 DATA "AF","37","1F","10FD"
2440 DATA "D1","19","C9"
2450 DATA "01020304","01020304"
2460 DATA "0000","0000","*"
2470 DATA 27156 : REM Checksum
    
```

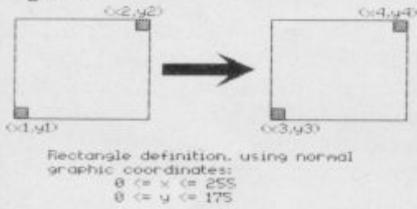
Machine Code

continued from page 55

calculator stack;
 2D2BH — transfer integer BC to
 calculator stack;
 2AB6H — transfer AEDCB to
 calculator stack;
 2DD5H — transfer top of stack to
 integer A;
 2DA2H — transfer top of stack to
 integer BC;
 2BF1H — transfer top of stack to
 AEDCB.

To see more clearly how this works, look at the routine DIVIDE in this month's program shown in figure four. As usual, we have included a Basic loader and application program in figure five. Due to the length of the program, there is an extra feature to the Hex Loader routine. That is a checksum, which adds up to the total value of all the bytes, and then checks that against the total at the end of the

Figure 6.



ADC	A,byte	— Add the value byte to the accumulator, including the carry.
ADC	A,reg	— Add the contents of the register to the accumulator with carry.
ADC	A,(HL)	— Add the contents of the location addressed by the HL register pair to the accumulator, with carry.
ADC	HL,rp	— Add the register pair (BC, DE or HL) to the HL register pair, with carry.
SBC	A,byte	— Subtract the value byte from the accumulator, with carry.
SBC	A,reg	— Subtract the contents of the register from the accumulator, with carry.
SBC	A,(HL)	— Subtract the contents of the location addressed by the HL register pair from the accumulator, with carry.
SBC	HL,rp	— Subtract the register pair (BC, DE or HL) from the HL register pair, with carry.
CCF		— Complement carry flag (0 to 1, 1 to 0).
SCF		— Set carry flag to one.
DAA		— Convert contents of the accumulator into binary-coded decimal form.

data. The lines to add are 1025, 1125, 1161, 1162 and 1164.

The routine will allow you to define a rectangle on the screen as (x1,y1) and (x2,y2). That will be magnified or reduced to a second rectangle (x3,y3) and (x4,y4), as shown in figure six. The new rectangle will replace the corresponding picture — if any — on the present screen, and the final merged version will be displayed. In order to magnify and reduce without corrupting the original data, the routine uses an alternate screen, the start location of which should be stored in the two locations 23728 and 23729 (line 20).

The routine works by stepping through every pixel in the second rectangle and checking the associated pixel in the first rectangle. The non-integer stepping factors for the first rectangle are held in DX and DY. Those values are sufficiently flexible for you to multiply one pixel to the complete screen, or vice versa, although that would not be particularly interesting.

Next month we will look at the powerful Z80 instructions which allow you to manipulate large sections of memory quickly and easily, and assess the potential they have for interesting graphics.

AN IMPORTANT ANNOUNCEMENT TO ALL QL OWNERS

bad or changed medium

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Fighting the pirates

**Wendie Pearson looks at the latest in
a long line of weaponry brought to bear
by the battle-weary software industry**

AS THE ARGUMENTS surrounding software piracy rage on and on, a new act has come into force which will deter serious, organised pirates from operating, even if it cannot be used to gobble up all the amateur pirates in towns the length and breadth of the country.

The law

The Copyright — Computer Software — Amendment Bill, passed in July, is supported by an array of people in the trade who really mean business. Members of the Guild of Software Houses — GOSH — and the Federation Against Software Theft — FAST — have supported the bill from its conception as a private members' bill, and helped to push it through parliament.

The bill ensures that computer software is covered by the 1956 Copyright Act, which means that the plaintiff will not incur any legal costs, thus making action possible where it might not have been before. Anyone selling, exhibiting or possessing pirated software will face a fine of up to £2,000 for each offence, or prison for up to two months. Making, distributing or importing such material will carry an unlimited fine, or up to two years in prison, or both.

The enforcement

The bill received royal assent on July 16. Nick Alexander of Virgin, who is also director of FAST, says he is very relieved to see that Robert Hay, a retired chief superintendent of the Metropolitan Police, has taken on the job of enforcement co-ordinator for FAST. Bob Hay's working history covers the Grunwick dispute, the Iranian seige and day-to-day duty in Southall, all of which is enough to make most people quake at the knees.

Software theft costs the industry over £150 million each year in lost sales. Hay's presence may prove reassuring, especially since the industry is going through exactly the same problems as the music industry has done, according to Alexander.

Hay is keen to point out that piracy should be seen in the same light as theft. "The Americans call piracy 'softlifting' and as far as I'm concerned, the public should take the same view of someone who lifts £500 of software as they would of someone who took £500 of goods from a shopkeeper," he says.

Hay emphasises how dishonest he thinks the practice is, and how it does

others out of an income. "Piracy inhibits investments and innovation and, ultimately, it will cost jobs which are there in an expanding industry. The public will suffer the effects, because loss of choice will result. Piracy means that companies don't get a return on their investment."

Hay's job will be to enforce the new law via FAST. "Unlike the music or video industries, the problems of the micro games industry are quite different," he says. "When we receive information that a company's software is being pirated at particular premises,

**"Ninety per cent
of software on the
market isn't worth
the asking price"
— Nick, pirate**

we can get in touch with the appropriate authorities who will take the matter further."

Hay will keep an eye on incidents of piracy, how and when those occur, and advise member companies of FAST on the amendment. He will also work on making the counterfeiting of products more difficult.

The history

So, what is piracy? Mark Tilsen, formerly production manager for Quicksilva, says there are three kinds: copying by the user so he can pass the stuff on to his mates, encouragement to copy by a retailer by way of renting out or lending software, and counterfeiting.

The latter is the kind used in organised crime whereby people make games which appear to be original copies but aren't. Many of those sell at markets and from street traders and often those vendors do not realise the seriousness of what they are doing, according to the Trading Standards Authority — TSA — and the Advertising Standards Authority — ASA.

Tilsen estimates that for every copy bought, seven copies are made by users for their friends. On the subject of renting or lending out software, Jeff Brown, managing director of US Gold, shares Tilsen's opinion: "This is a pure incentive to copy."

US Gold produced a court order in January this year, ordering a number of public libraries to return US Gold software at once, after the company

found out that their games had been lent out in the same way as books.

DEC's senior commercial lawyer, Roger Tuckett, confirms that you are allowed to make a backup copy of something if it has been negotiated with the manufacturer first. He points out that distribution of copied software is the most likely thing to get you into trouble.

Stories of piracy are legend. Philip Morris, managing director of English Software, phoned in response to a small ad in a magazine, only to be offered pirated copies of his own software. Much to his horror, he was asked to make out a cheque to the pirate's mother in payment.

Tim Langdell, managing director of The Edge and executive member of GOSH, quite often receives faulty tapes back from software shops, which are not originals.

Other horror stories abound, such as that of one software house employee who went to a computer club meeting to find all the members busy copying his software. And then there was the case of a certain London Borough which ordered only one program from a software house, rather than several.

Software houses have been busy chasing pirates from other shores, too, with most problems occurring in Europe, the far east and Australia. US Gold have had problems in Germany, Spain and Italy while the Quicksilva had their worst problems with Portugal. At one point, says Rod Cousens, formerly of Quicksilva, 23 companies there were copying his games and there was nothing he could do about it.

One particularly busy outfit in Germany operates as an international computer club and copies software from the US before sending it on and distributing it at reduced prices to members in the UK and Europe.

Generally speaking though, laws abroad are much clearer on software copyright and counterfeiting and hopefully the new law will bring Britain in line with other countries in this way.

The protection

Last summer, heads rolled when various software company personnel, including Richard Turner of Artic, Roger Gammon of Anirog and Jeff Brown of US Gold, staged dawn raids on four private homes along with police and solicitors — imagine wak-

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ing up to find that lot on your doorstep! Many other software houses including Mirrorsoft, A 'n' F, Software Projects and Virgin gave their support to the raids.

Other steps taken by software houses to protect their goodies have been less dramatic and involve everything from colour coding of tapes to turbo-loading.

In the case of a fast or turbo loading tape, copying is made difficult because the game is loaded at such a fast rate that the signals are scrambled, although that doesn't affect the original game when it is played.

Hewson Consultants' game *Avalon* has a security sheet printed in 'fugitive ink' so that it will not photocopy, and the company also uses a turbo load system. There are a number of other methods which Andrew Hewson, managing director, will not go into. "We've constructed our defence in a number of ways," he says.

Software Projects has used a colour coding system, so that when you have loaded a program, you have to type in a set of colours in a particular sequence. Those are given with the documentation.

Michael Fitzgerald, managing director of A 'n' F, has introduced holographic labels which make copying difficult, and has settled a few piracy situations out of court this year.

"I see the schoolkid syndrome as something we have to live with," he says. Fitzgerald's attitude is that if someone sees your game in the first place and they like it, they are more likely to buy your next one.

Jim Lamont, managing director of JLC Data in Barnsley, developed a software protection device last year, which was promptly confiscated by the Ministry of Defence. It was subsequently refused a patent.

Although the incident was shrouded in mystery, the MoD has shed some light on the affair. A spokeswoman says, "We can withdraw a product for a year if we think it could be useful to us, and withhold the patent on it. The device concerned stopped you copying anything which had been put onto magnetic media of any kind. The other thing the MoD looks at is whether a device is listed as 'sensitive' or could be useful to Warsaw Pact countries if exported.

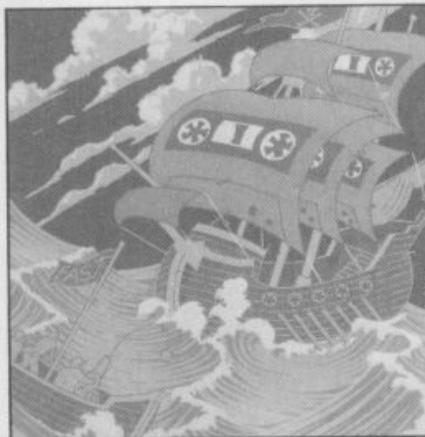
"A prohibition order was put on the patent in early 1984, but has since been lifted," she says, "as the device

wasn't found to be as sensitive as originally thought."

The prohibition order was lifted by the Patent Office after a question was raised on the matter in Parliament in April. Up in Barnsley, however, Lamont says he had been told not to talk about it.

The thin line

The argument concerning the small advertisements offering pirated copies in the backs of magazines is likely to continue, although Rod Cousens, now a consultant for Incentive Software, speaks for many when he says: "Anything which gives more protection is



helpful and I think it will place more pressure on magazines to scrutinise their adverts."

However, Charles Hendry, information communications adviser of FAST, confirms that it is not illegal to advertise something which is illegal — it is only illegal to use the service. In other words, anyone advertising devices which enable the copying of software is not breaking the law.

At the same time as the bill went through, computer and hi-fi company Amstrad ran into trouble with their twin deck cassette system, and two other companies, Mirage Computers and the Micro Centre, brought out copying devices.

How do the companies feel about the implications of the new law? Bob Hitchcock, director of Micro Centre which makes Interface 3 — a combined hardware/software package for tape and microdrive copying — says the piracy outcry is "a load of rubbish."

"It doesn't affect sales in any way," he says. "We've been selling products of this kind for two years and, if anything, it's increased software sales. It's all a fuss about nothing. Look at the record industry — they sell more

records now than they ever have done.

"Interface 3 doesn't encourage piracy. The piracy thing should be aimed at people who copy the inlay cards, and so on, too. After all, when people hear a record, they go out and buy it — hearing it encourages people to buy."

A similar device to Interface 3 is the Microdriver, brought out by Mirage. That serves the same function but also does tape to tape copying too. Both devices sell for £39.95.

Over at Mirage, the attitude to piracy is quite different. Director Gerry Bassingthwaite says: "Our unit copies the program and saves it in encoded form so that unless you have a microdriver plugged into your Spectrum, you can't reload the program. That means that if someone bought our device for piracy, he is wasting his time. He could make as many copies as he wanted, but if the people he sold them to don't have our device, they can't use the programs. You can do tape to tape copying on our device too, but in the same way, it can only be loaded using a Microdriver."

He says he understood why Amstrad had got into trouble over their device. "Their adverts encouraged people to rip off music and software. In all our promotions, we stress that it's for backups and we've taken lengths to ensure it can't be used for piracy. The problem is, lots of software houses don't let you make backup copies . . ."

Over to Amstrad, who are understandably sensitive on the matter. Marketing manager Malcolm Miller says "The British Phonographic Industry — BPI — took exception to the way Amstrad was advertising a high speed dubbing power system, which allows you to do tape to tape copying at twice the normal speed, and they wrote to our retailers about this."

Amstrad then hauled the BPI off to court. "We wanted to declare that what we were doing was lawful," says Miller. "We asked the courts for a declaration on what they thought was lawful, but the High Court said they couldn't declare that what we were doing was lawful. So Amstrad will appeal, and will be heard this autumn, in the Court of Appeal.

"We don't condone any infringement of copyright," he adds. "Remember that we ourselves produce copyrighted material, so it wouldn't make sense."

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Amstrad are continuing to sell the systems, which range from £159 to £199. "We haven't been placed under pressure to withdraw them from sale and we haven't been banned from doing anything," says Miller.

"It's all very well to talk about piracy. We regard our tape copier in much the same way as selling knives which kill people, cars which break the speed limit, videos which record TV and stereo units which record LPs."

The pirates

So, prohibition order aside, why have software houses failed so miserably in their attempts to deter pirates? The answer may be summed up in the words of one software house chief who said glumly: "The kids break into security devices as fast as they're invented."

Three schoolboys who pirate their games with the same regularity as most of us drink coffee gave us their views.

David, 18, believes piracy is justified because prices are too high. "I've never bought a piece of software in my life," he gushes. "I never have, or



will, buy software."

How does he do it? "I have a very expensive hi-fi deck which lets me do an excellent back-to-back copy. It's called high-speed dubbing. If I want discs copied, I use a disc-copying utility sold by a reputable company. Practically everyone I know pirates stuff."

On the new law, David feels it will be totally ineffective when it comes to individuals, but that companies should be caught. "Jobs are only lost in the industry through large-scale pirating operations. I think software houses themselves do a lot of pirating — they break into the code for a routine which they'll find useful for

their own programs. They will deny this, but it's an absolute fact."

James, also 18, says: "Tapes with turboloads are difficult to copy, so you have to break into those programs using certain techniques. You can put the game into memory, or you can break into it. You can also transfer your games onto disc, but that takes time."

Why does he do it? "By the time you've forked out money for disc drives and the micro itself, there's no cash left. It's not done to own a micro and not pirate." Summing up, James feels that if a game costs over £1.99 he may as well pirate it.

Nick, 16, believes that everything boils down to how good a game is. He reckons that if it is really good, people will pay for it, but if it is only average, they will copy it. "Ninety per cent of software on the market isn't worth the asking price," he says. "Anyway, I reckon most of the software houses pirate each other's stuff on the quiet."

On passwords, he says: "They don't always keep people out. If you write a program which asks for a password, the program must know that password. So if you look at the program carefully, you'll find it."

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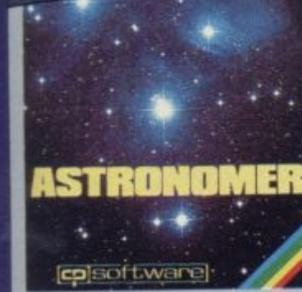
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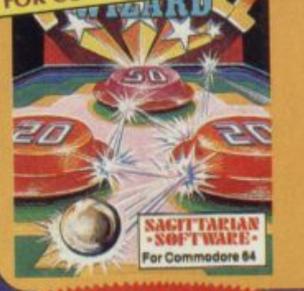
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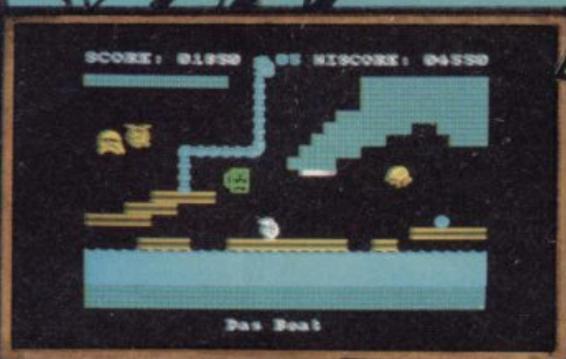
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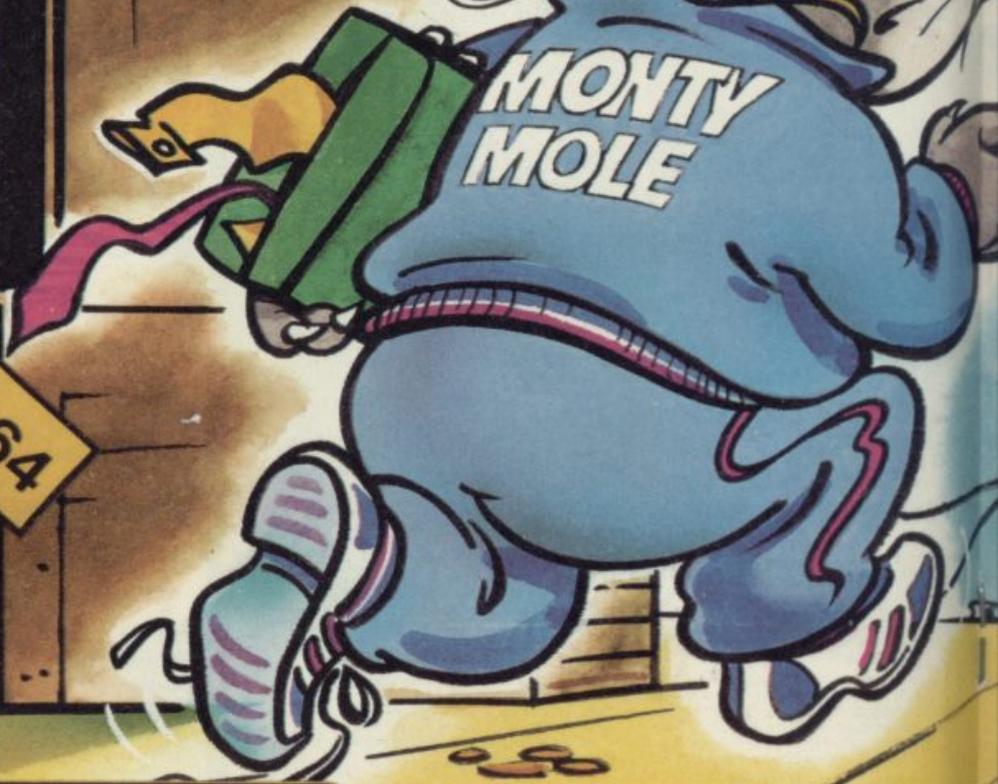
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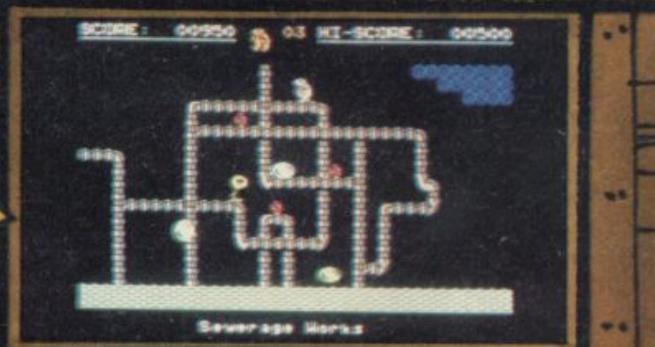


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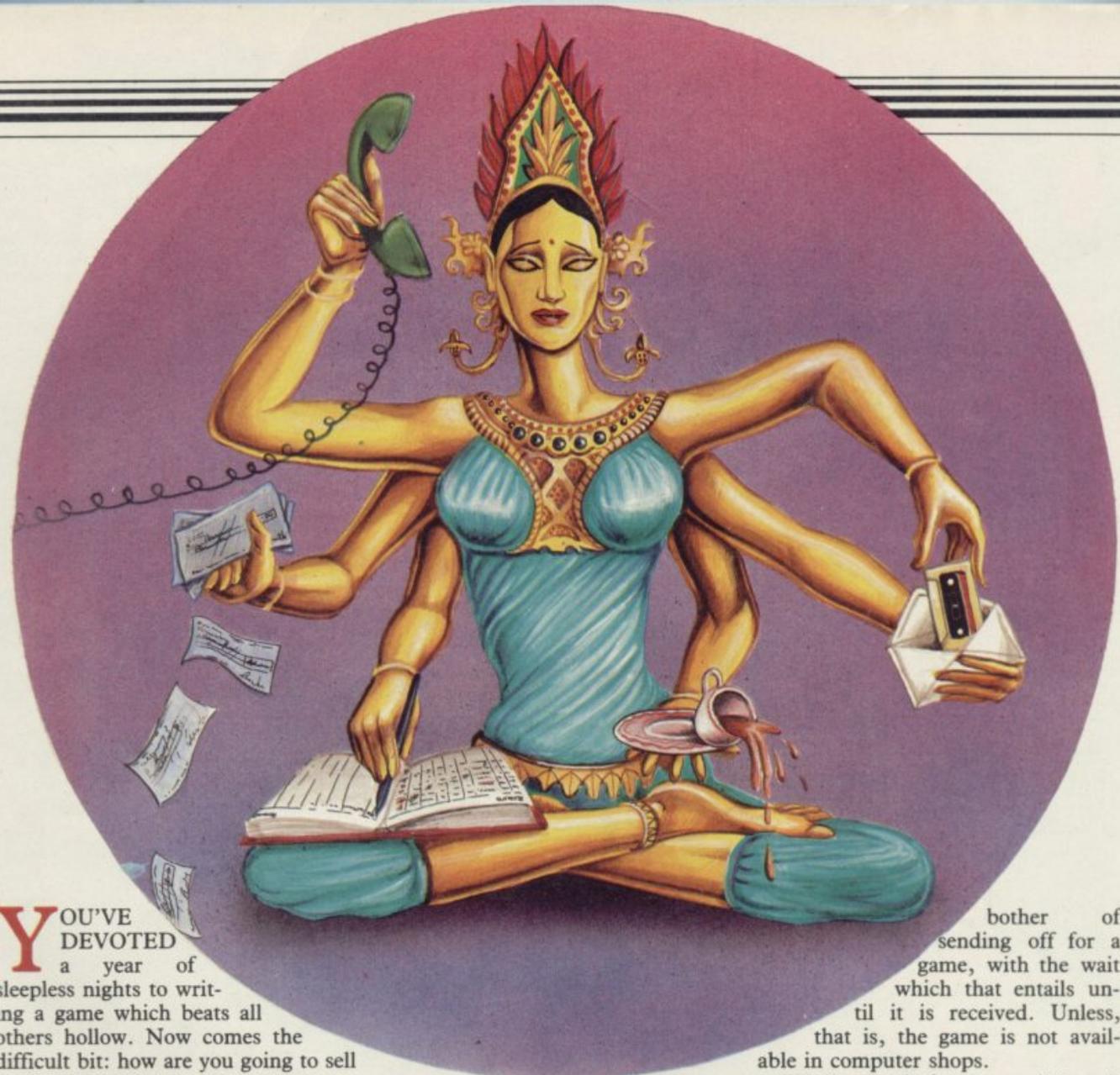


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to underground lair, Monty must select the correct five elements of his freedom kit from the many he's offered and not miss out on the hidden gold coins that will make him a mole of leisure.

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YOU'VE DEVOTED a year of sleepless nights to writing a game which beats all others hollow. Now comes the difficult bit: how are you going to sell it?

Your options are few. You can sell the game to a well-established software house. In the unlikely event of them liking it, they will pay an advance and royalties, and leave you to concentrate on your next blockbuster. We travelled down that well-trodden path in the August issue of *Sinclair User*.

Or you can decide to go it alone, and either sell the game by mail order or submit it to distributors who will then sell it into the high street.

This month we find out what it's like being a mail order minnow abroad in the predatory seas of the software industry.

Past and present

Five years ago, when the industry was in its infancy, mail order was the only way to sell games. The distributors had not yet muscled in to control the software scene. As the market grew and high street stores like W H Smith and Boots opened computer depart-

Going it alone

So you want to start your own software house? Clare Edgeley talks to the entrepreneurs

ments, distributors became necessary to control the flow of games into those stores and the increasing numbers of computer shops.

Selling games by mail order is not as simple nowadays. With the wealth of games available in the shops, there is no real call for anyone to go to the

bother of sending off for a game, with the wait which that entails until it is received. Unless, that is, the game is not available in computer shops.

"Mail order is for the small boys," says Domark's Dominic Wheatley. "With mail order you don't know when you'll get the product — it's a big turn off for the punter. If the game is faulty, it's much easier going into a shop to exchange it."

Domark has sold about two or three per cent of its total sales through mail order, catering for those who live abroad and for those whose local computer shops do not stock a full range of games.

Automata's Christian Penfold disagrees. "With mail order you've got the advantage of being able to sort out faults very quickly and to tell whether it is the tape or micro which is at fault. There is a definite need for mail order companies and I'm trying to make 1985 the year of the postage stamp. We work on the assumption that if you've made the effort to take your order to a post office, you deserve that order to go out the day we receive it." Automata started off as a mail order company, later sold through the distri-

butors and experienced such problems that it has reverted to mail order again.

Packaging

Many small software houses have to survive on mail order sales only, as distributors will not handle their products. George Clough, of Manx Tapes, runs a small one-man outfit through which he has tried to market his business program, **Classic Book-keeping**: "No distributor will look at my programs. Terry Blood Distribution likes it but won't take it on because it doesn't have fancy packaging and it won't fit onto the shop shelf. Packaging it professionally would be a silly waste of time and money. To have the manual for my program printed, I would have to order about a thousand copies and boxes to make it pay." However, it is unlikely that Clough will have as many as a thousand orders.

Laurie Sinnett, now working as a programmer for Sentient Software, ran into trouble when he tried to market his program **Dietmaster** two years ago from his company Delta 7. "I had a couple of really good reviews but it flopped. The distributors wouldn't take it on as the packaging was so poor."

Publicity

If you want to increase sales by getting your software into the high street, you must approach the distributors. That means you need a good quality product with good quality advertising and packaging. A review or two in the computer press also helps.

Delta 4 is a small software house run by Fergus MacNeill and three friends. They are 16, have just left school and are going to college. The company is run from home on a part time basis and is doing extremely well, considering it caters only for the lunatic fringe of the adventure market.

MacNeill depends heavily on reviews and has had great success with **Bored of the Rings** — a Sinclair User Classic — which he has recently sold to Silversoft. "Initially we did hardly any advertising and sent out no review copies, which is why we didn't get much publicity. From the **Quest of the Holy Joystick** onwards we relied heavily on reviews. If we get a good review, we receive more orders and sell up to 100 copies a week over all our games."

"We get large numbers of enquiries after a review", agrees Sentient's Laurie Sinnett. "If we do get to the stage where we advertise, it will depend on the review that game gets."

Advertising can be a costly business. Classified adverts are the best bet and it is essential to bring your product to the readers' attention. Even if it has been reviewed it is necessary to inform people where they can obtain it.

"You've got to create a convincing advert and you've got to make sure you get your money back," say Hewson Consultants' Andrew Hewson. "Do a survey of all the classified adverts in the different magazines, and if people are advertising consistently in the classified pages, they are earning money. See what type of advert they are placing, in which magazine and for what product."

Most adverts placed by small companies are about three centimetres deep and one column wide, costing between £20.00 and £45.00, depending on the magazine. A large magazine

"There is a need for mail order. I'm trying to make 1985 the year of the postage stamp"

charges more for advertisements but it is read by a greater number of people. You must decide how much you can afford and how many tapes need to be sold to pay for that advert, and still leave a profit.

"My father keeps the books", says Fergus MacNeill, "and our policy is that we will not get into debt. We only advertise if we've got the money — we don't buy things we can't pay for."

MacNeill explains why more money can be made by selling a game mail order. "We lose out a lot by not having our products on the shop shelves, but by selling mail order we make more pounds per copy. We don't pay the distributors 55 per cent discount. The real costs — after duplication, buying the tapes and printing the cassette inlays — are buying jiffy bags and stamps."

However, although more is made by Delta 4 per unit, compared to the volume sales created by huge advertising campaigns and impulse buys in the high streets, the small mail order company loses out.

Cautionary tales

Asvoguelle is one company which has fallen by the wayside. Peter Percy, 27, set it up in November 1984, to market his game **Mount Challenge**, with the help of a £1000 loan from his father and financial assistance from the Manpower Services Commission. Peter was away looking for a job when we tried to contact him, but his father gave us some details.

"Peter did a lot of work before November and wanted to launch **Mount Challenge** on April 16 of this year." He booked two adverts in the computer press and had one direct response for the game. In fact, he had to send that copy out twice as it got lost in the post the first time. He also sold four or five copies locally and had two enquiries — from France and Spain. **Mount Challenge** was reviewed once in *Crash*.

"Peter got everything ready before the launch date as he didn't know what the response would be," says Mr Percy. "I expected 40 or 50 enquiries." He has now got 900 tapes waiting to be sold — the packaging and printing were done professionally and he even bought all the jiffy bags.

"Peter closed Asvoguelle in mid-July. I hope he'll advertise again. He's very disheartened." Peter Percy was a sole trader, which means that he would have to pay any debts incurred. Fortunately, he paid for everything as he went along and does not owe any money.

Micromania's Dominic Wood is similarly disheartened. "My advice to anyone starting off in mail order is not to bother. If your game's good enough, one of the top five software houses will take it and you will be paid a royalty."

Two to three years ago, Micromania sold around 200 games a week and could afford to advertise in magazines. "Now it's more like two or three units a week, through mail order."

Micromania started by selling its games through mail order in 1982. Last year the distributors took on its games — **Kosmic Kanga** sold 10,000 copies — and a few months ago Micromania went bankrupt through problems with credit control. Even if the distributors do take on your game, it is not a guarantee of success.

"There's no room for small companies, and no chance of gaining a foothold unless you've got some

continued on page 71

The Risk Business

continued from page 69

marketing skill," says Wood. "You can't make a living dealing solely in mail order — I would be surprised if a new company, advertising its games, sold more than 12 units a month."

Hewson Consultants and Domark feel the same. Hewson reckons on less than a half a per cent of his total income comes from mail order sales and Domark's Wheatley thinks he earns two to three per cent. Hardly enough to keep a cat alive, let alone pay for wages and equipment.

Surviving

Sentient Software sells its adventure games through mail order, but that comprises only a very small slice of the business. According to Laurie Sinnett, the major bulk of the company's income is derived from contract work — doing conversions, and a lesser amount from distribution. Sentient is the sole distributor for Memotech software in the UK.

Sentient would not be thriving today if it had to rely on the income from its games. It needs the conversion work and distribution deal to keep the software side alive.

Even though Laurie Sinnett's first venture, Delta 7, failed, he does not regret the time spent trying to make it a success. His advice: "Try it. It was great fun and I learnt a lot from it even if I didn't make much money." Delta 7 was closed before it could run into debt.

George Clough of Manx Tapes is retired and became interested in the Spectrum as a business micro about two years ago. He wrote *Classic Book-keeping* and believes in adver-



tising to keep his products in the public eye, but doesn't need to rely totally on the income the program might make for him.

"What I've invested is two years of my time. I've been struggling since last August, when I advertised in ZX

Computing three months in succession — the sales from those ads didn't cover the cost of advertising, and I'm down quite a few hundred. I'm not interested in selling 10,000 copies a month, I'm interested in serious programs."

Taking the plunge

If you want to set up your own company you can either be a sole trader or form a limited company. Being a sole trader offers no security if the company is unsuccessful, as you will be liable for any debts incurred. On the other hand, you will not need to appoint shareholders, hold annual general meetings or have your accounts audited yearly as would be necessary if you set up a limited company.

A limited company does offer security. If you should go bankrupt, you will be liable only for the money you invested in shares. Limited companies can be bought off the shelf for about £115.00 — just contact any one of the Company Registration Agents listed in the Yellow Pages and they will sell you a ready-made company.

Setting up a limited company yourself involves more work but it is simple nevertheless. You can buy the Memorandum and Articles of Association from a law stationers plus the necessary forms —

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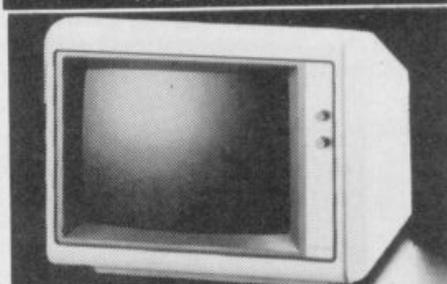
This program allows you to produce 3 sizes of screen copy using Interface 1.

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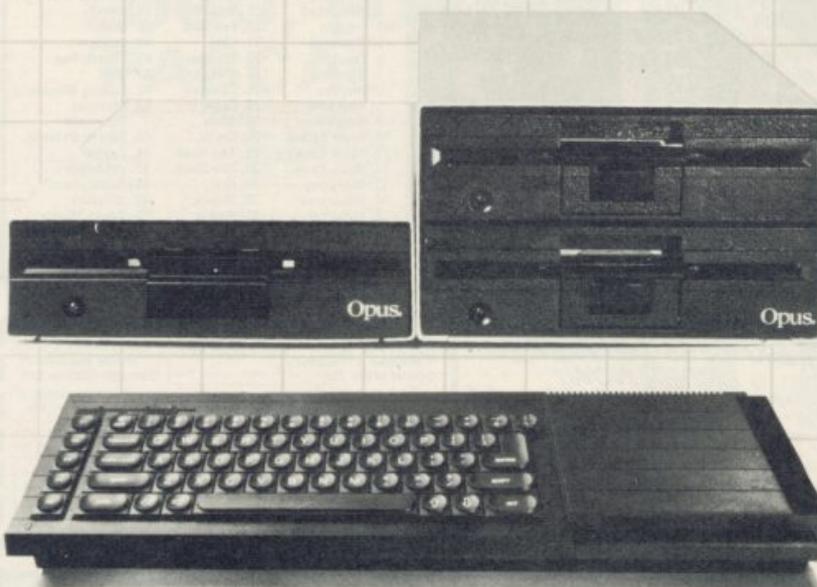
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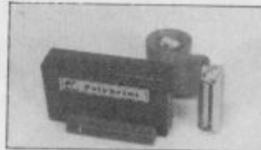
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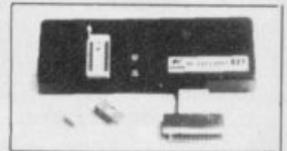
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```

STATUS  NO. OF SYSTEM  —HE8
          EPROM TYPE  —27128
          RAM START ADDR —4000
          EPROM ST' ADDR —8000
          JOB LENGTH  —4000
          TASK        —CHECK

WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO RAM
Y) BLOW AN EPROM WITH DATA FROM RAM
Z) VERIFY THAT EPROM DATA IS THE SAME AS IN RAM
Q TO QUIT          R TO RESTART
FAST CODES AVAILABLE
  D   H   POR   WXYZ
    
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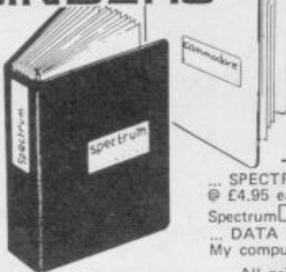
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- GRAPHICS - up to 128 WINDOWS, each with its own character size (giving 1-64 chars/line) and attributes. ROLL and SCROLL any part of the screen by any number of pixels in any direction. Use GET to store parts of the screen, then put them back anywhere at different magnifications. Fast FILL, ALTER attributes, PLOT strings, DRAW TO a point, change scale and origin.
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10 FOR n=1 TO 10: PRINT n: NEXT n
as: 10 FOR n=1 TO 10
PRINT n
NEXT n
- KEYWORDS can all be entered by typing them in full, or by the "single entry" method, or both in the same line; e.g. the line:
10print"hello"if x=1 THEN goto 100 will be recognised and listed normally.
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Letta-Head

BRADWAY Software, a small, new, software house, has released **Letta-Head** for the Spectrum and Epson-compatible dot matrix printer. It is designed to personalise your own stationery, but has a variety of uses, including labels, posters, order forms and invoices. A special option allows cassette labels to be designed without printing over the hole in the middle.

It is run from a series of menus and prompts in the bottom eight lines of the screen. Options are selected by single key entry. The only exceptions are the escape option which is CAPS SHIFT and 1, and where numbers greater than 9 can be entered. The top 16 lines are used for designing the two options of heading and label.

The design features allow text to be added in any one of six fonts, including user-defined graphics. You can vary the height and width of the characters independently, from one to nine character squares. Graphics can be added through the Art option which plots points, draws straight lines, arcs and circles. It also features a fill routine.

Another option allows you to draw

boxes with the border varying from one to nine pixels in thickness. The text graphics and boxes are all defined by moving a flashing cursor and using ENTER to mark the corners. Unfortunately, the cursor does not move particularly quickly and it would be nice to see it increase speed when the keys are held down.

If you decide that part of your design is in the wrong place, it can be independently scrolled using the cursor keys, by marking a box around it, to another part.

Plotting graphics is a long and tedious job. Not only must each pixel be plotted individually but CAPS SHIFT is still needed to use the cursor keys. To save time, designs — saved as a SCREEN\$ — from graphics packages or other sources can be loaded and altered. All or any part of the design can be erased, and again that is done using the cursor to mark a box round the offending area.

Two useful features are the ability to overlay a chequered grid, to aid design, and the reservation of an area of memory which will hold the design. A design held thus can be loaded back replacing the one on screen or merged with it. You can also exchange the two designs.

Before you design a label, you must

select its size. Four choices, three fixed and one user-definable, are offered for both the width and height of the label. In practice, despite a maximum set size of 5in×1¹⁵/₁₆in, I found that the printing never exceeded 4.25in×1.5in.

The printing options vary considerably. For labels the only variables are the number to be printed, the number across the paper and the horizontal and vertical separation. For headings the print height and width, the left hand margin and the sheet length can be set. Each sheet can include its own numbering system, starting from any given alphanumeric.

My initial reaction was that **Letta-Head** would make a useful program for the home but that it might be limited for office use. By the time I had explored it, however, I was prepared to look more favourably upon it. Nevertheless the quality of the printed large-size characters is not sufficient to make the correct impression in business. Using logos created on a graphics package could produce acceptable results.

Mike Wright

Publisher Bradway Software, 33
Conalan Avenue, Sheffield S17 4PG
Price £7.50 Memory 48K
★★★

Plumbers' Price

FOLLOWING **Building Price**, designed to calculate the cost of materials used in the construction of a building, author J Redman has turned his attention to plumbing.

Plumbers' Price and **Plumbers' Price (Drains)** are also used for costings but could be used at the planning stage to estimate the cost of different pipe runs.

A program synopsis is supplied but the main instructions are held as a program on one side of the cassette. The instructions are written in a kind of shorthand, making them difficult to understand. It is also likely that reference to them will be needed while the program is being used, and that is not possible when they are only on cassette.

Before reaching the main menu you enter the job name and date. The main menu allows plans to be drawn, materials listed, the file to be saved and the price to be calculated. The majority of



the work is likely to be spent on drawing the plans in 3D.

The draw option allows for any of three types and 10 sizes — four in the drains version — of pipe and for either type or size to be changed at any stage. There are extra categories for your own type and size. The pipe currently being used is shown in the top left

corner of the drawing, while the name given to the drawing is top centre and in the bottom right corner is a representation of the keys used to draw the diagram.

The choice of L(ef), R(ight), U(p) and D(own) is easy enough to understand but the choice of O, P, J and K

continued on page 80

Thinking software?

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CRASH JUNE 1984

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A sixty-four character per line display and the ability to hold over five hundred lines of text at any time are just some of the features of this, the most recent of the Taswords. Full interaction with the disc system — e.g. Tasword detects the presence of added drives and allows their use.

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TASWORD 464

"There is no better justification for buying a 464 than this program."
POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464* Amstrad CPC 464 & 664 cassette **£19.95**
disc **£22.95**

TASWORD 464-D

This is the new Tasword especially developed to utilise the capabilities of the CPC 464 and 664 disc drives. A major new feature is a powerful mail merge facility. Tasword 464-D will only run on, and is only supplied on, disc. ▶

TASWORD 464-D Amstrad CPC 464 & 664 disc **£24.95**

THE TASPRINT STYLE WRITERS

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. The Tasprints utilise the graphics capabilities of dot matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic Data-Run to the hand writing simulation of Palace Script. A TASPRINT gives your output originality and style! The TASPRINTS drive all Epson compatible eight pin dot-matrix printers, e.g.

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PALACE SCRIPT - a distinctive flowing font

Typical Tasprint output. Please note that different makes of printer produce different sized output.

TASPRINT (Spectrum)

Drives all the printer interfaces compatible with TASWORD TWO and can be used to print TASWORD TWO text files as well as output from your own Basic programs.

TASPRINT 48K Spectrum cassette **£9.90**
microdrive cartridge **£11.40**

TASPRINT EINSTEIN

Print TASWORD EINSTEIN text files in one or more of the TASPRINT fonts.

TASPRINT EINSTEIN disc **£14.95**

TASPRINT QL

TASPRINT QL includes a screen editor used to modify files created by other commercial software, such as QUILL, or by the user from BASIC. These modified files include TASPRINT control characters and may be printed, using TASPRINT, in one or more of the unique TASPRINT fonts.

TASPRINT QL Sinclair QL microdrive cartridge **£19.95**

TASPRINT 464

Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the **Amstrad DMP-1** in addition to the printers listed above.

TASPRINT 464 Amstrad CPC 464 & 664 cassette **£9.90**
disc **£12.90**

TASWORD UPGRADES

Tasword 464 and Amsword owners: send your original cassette or disc (not the packaging) as proof of purchase. Your original will be returned together with Tasword 464-D on disc. **£13.90**

... think Tasman

THE TASCOPY SCREEN COPIERS

The TASCOPY screen copiers print high resolution screen copies with different dot densities and patterns for the various screen colours. This gives the screen copies a shaded effect which presents on a monochrome scale the colours on the screen. With TASCOPY you can keep a permanent and impressive record of your screen pictures and diagrams. TASCOPY supports all the printers mentioned under TASPRIINT.

TASCOPY (Spectrum & Interface 1)

The Spectrum TASCOPY is for use with the RS232 output on ZX Interface 1. It produces monochrome copies (in a choice of two sizes) as well as copies with the shaded "grey scale" effect described above.

TASCOPY ZX Spectrum cassette **£9·90**
microdrive cartridge **£11·40**

TASCOPY QL

TASCOPY QL adds new commands to the QL Superbasic. Execute these commands to print a shaded copy of the screen contents. Print the entire screen or just a specified window. TASCOPY QL also produces large "poster size" screen copies on more than one sheet of paper which can then be cut and joined to make the poster, and high speed small copies.

TASCOPY QL Sinclair QL microdrive cartridge **£12·90**

TASCOPY 464

Adds two new commands to the 464 Basic to give both a standard shaded screen copy as well as a "poster size" copy which is printed onto two or four sheets which can be cut and joined to make the poster.

TASCOPY 464 Amstrad CPC 464 & 664 cassette **£9·90**
disc **£12·90**



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With this machine code utility you can write your own Basic programs that will, with normal PRINT statements, print onto the screen in the compact lettering used by TASWORD TWO. With TASWIDE you can double the information shown on the screen!

TASWIDE ZX 16K + 48K Spectrum **£5·50**

TASMERGE The Mail Merger

Transfer data from MASTERFILE to TASPWORD TWO! Letters and forms typed on TASPWORD TWO can be printed with addresses and data taken from MASTERFILE. The mail merge facility allows, for example, multiple copies of a letter to be printed, each containing a different name and address taken from your MASTERFILE data. To use TASMERGE you must have one or more microdrives as well as TASPWORD TWO and MASTERFILE by Campbell Systems (version 9 or later).

TASMERGE ZX 48K Spectrum **£10·90**

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Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASPWORD TWO. The cassette contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers. TASCOPY, shaded screen copy software for this interface (value £9·90 — see description on left) is included in this package.

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continued from page 77

for drawing diagonally makes the choice of keys seem strangely scattered around the keyboard; perhaps the use of 1-8 on a clock would seem easier. In addition to the direction markers, which flash to show the direction the last line was drawn in, double pipe runs and insulated piping can be drawn and those are denoted respectively, by a flashing 'X' in the centre and a flashing 'I' just below the 'U'.

At the bottom of the screen is the draw menu which allows any one of 16 user-defined graphics to be added for room fittings such as baths, sink and tanks. There are five fittings in the Drains program. Twenty two types of pipe fittings — 21 for Drains — can also be added. An extra category in each program is available for a user-defined fitting. The Fittings option is used to change the pipe size and add T-joints.

There are three further move op-

tions included in the draw menu. Those allow you to erase part or all of the last pipe run, return to any one of the first 20 T-joints to draw a different branch, and thirdly change the rate of drawing from Slow, one pixel at a time, to Fast, one character at a time. The length of the pipe run is shown in the top left corner under the pipe size. You can be set a new run at any stage by selecting option 0 which then prompts to see if an elbow joint is to be included.

Once the drawing is finished it can be printed out onto a ZX-type printer before returning to the main menu to either list the materials used or to go through the pricing section. The pricing calculator lists the amount and type of each item used and prompts for a unit price. The cost for that item and the total cost is calculated and displayed.

One feature of the Drains program unfortunately lacking in its partner is the ability to store a diagram in

memory at any stage and then to return to it later. That is the major problem with the program, apart from some poor error-trapping which may be necessary in order to fit the program into the Spectrum memory. The whole package would also benefit from a clearer manual or at the very least an option to print out each page from the program.

Mike Wright

Publisher J Redman, Stevelon House, Slade Lane, Tarnock, Axbridge, Somerset, BS26 2SH
Price n/a **Memory** 48K
★★★



Classic Bookkeeping

IN THE August issue we reviewed an accounting package from Manx Tapes. That package was an early pre-release version and should not have been reviewed. Many improvements have been made.

Classic Book-keeping (Series 250) is a complete double-entry accounting system, including general, sales and bought ledgers and journals, for the 48K Spectrum, one microdrive and an 80 column printer. Lists of customers and suppliers, statements of accounts and trial balances are also produced.

The size of the system is approximately 200K spread over 17 programs. It is provided on three microdrive cartridges, and three further cartridges are required for holding data. Another program, entitled Series 500 and priced £69.00, is also available. It requires a second microdrive but it can handle a greater number of transactions.

An extensive manual is included, with a sample printout showing the setting up and running of the system for one month for a small manufacturing company.

On loading you must press CAPS SHIFT and CAPS LOCK to enter Capitals Mode. As all the entries are

made in capitals a simple poke would have done that and given you one less item to think about. The system is run from a six-option main menu covering installing the system, making the prime entries, posting the ledgers, preparing statements, extending ledgers and annual closing entries.

The first option leads to a sub-menu to set up the control codes, the account headings, the opening balances, names and addresses and the opening aged balances. Having installed one part of the system you are returned to the main menu rather than the install menu, though a return to the install menu with an option to return to the main menu would make the system easier to use.

Data is entered as either cash received, bank payments, petty cash payments, sales journal, purchase journal and journal entries. Data for the cash received list consists of the date, a reference, customer's account, gross payment, discount, net amount and the general ledger code. Similar data is required for all other entries. All monetary entries are made in pence, avoiding the use of an awkwardly situated decimal point. An amount can also be attributed to more than one account.

The on-screen instructions refer to multiple coding being set to 10 cycles but no explanation is given there or in the manual, and you are left to find

out by trial and error if that is satisfactory. At the end of a run of entries an analysis summary is printed showing the breakdown of amounts between the general ledger account codes.

Once the data is entered it needs to be sorted before it is posted to the appropriate ledger. Each set of data must be sorted individually.

Data will usually be entered at the end of a month but can be entered in batches, and then you must be careful to mark the final batch. Failure to do so causes the program to crash later by trying to read a 'write' file.

Statements of your customers' accounts can be prepared using option 4 of the main menu. That allows you to enter your trading name, telephone number and address, along with any terms you may wish to include on the invoice, before statements are printed for all accounts. Those details must be entered every month.

This is an extremely complex and comprehensive package which will produce valuable records of your business, although, perhaps because of that complexity, it is not as user-friendly as it might have been.

Mike Wright

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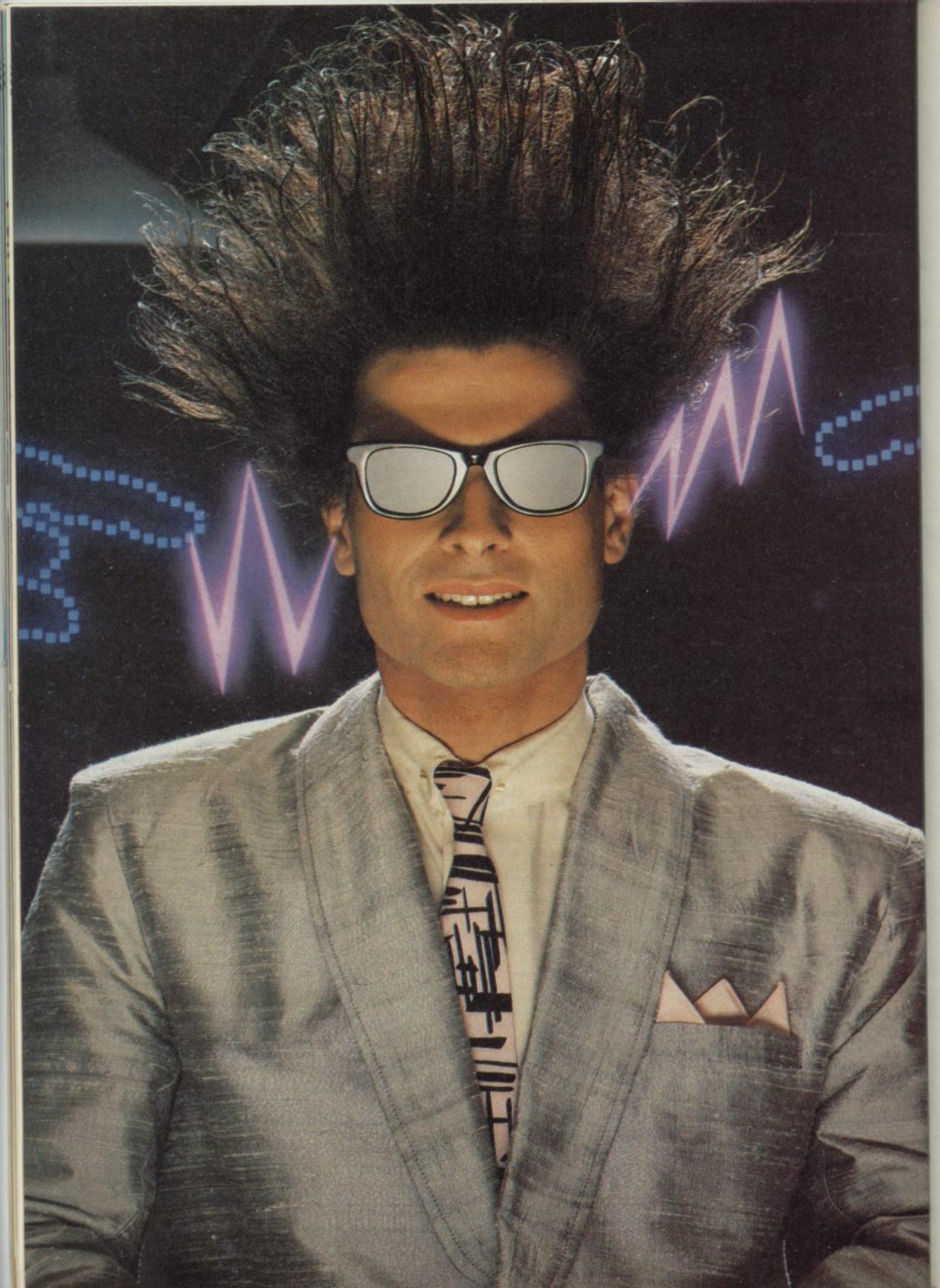
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The Golden Maggot



GRAPHICS INSTRUCTIONS

IN GENERAL, graphics abbreviations are enclosed in brackets, which should not be entered. A string of the same graphics character is represented in the form (3*A) which would be entered as AAA, where A is the graphics character. A space, where it is important to have the correct number of spaces, is indicated by (sp). Spaces in text will not normally be indicated. Where several graphics characters are used, they are separated by commas, which should not be entered. With Spectrum and QL listings the letter l has a flat top and the numeral 1 has a sloping top.

The above applies to all Sinclair machines. The following instructions are for specific machines.

ZX-81: ZX-81 listings are generally reproduced as they appear when you enter them, spaces and all. Where extensive graphics are used, REM statements will be inserted to provide a guide to the position of each character.

Spectrum: User-defined graphics are represented by underlined letters, without brackets. Type the appropriate letter while in graphics mode. The underline does not appear on the screen. Inverse characters have the letter i before them, e.g. iZ, iA, iP. Block graphic characters are indicated by g followed by the number of the appropriate key: g4 would mean the block graphics on key 4, ig4 the inverse of that graphic.

Control codes are indicated by cc before the character, and are obtained by pressing CAPS SHIFT while in extended mode. They do not appear on the screen but may change the colour of the cursor and will affect what is printed after them: cc3,i* would thus have the effect of printing an inverse asterisk in red.

QL: User-defined graphics on the QL are indicated by a description of the keys pressed to obtain them, underlined and in brackets. Thus (CTRL + 9) means press CTRL and 9 together. The same applies for unusual characters within the QL character set, which our printer is unable to reproduce.

WIN THE coveted golden maggot trophy in P Todhunter's fishing simulation. Choose bait and depth of hook according to weather, and then sit back and wait for a bite. Use key l to strike the fish, Q for a short cast and A for a long cast.

The Golden Maggot runs on a 48K Spectrum or Spectrum Plus, and experienced programmers should find it easy to include more details of baits and fish.

The program uses our special abbreviations for graphics characters, so please read the instructions above.

```

5 POKE 23658,58
10 REM *THE GOLDEN MAGGOT*
20 FOR N=USR "A" TO USR "U"+7:
READ A: POKE N,A: NEXT N
21 LET MATCH=1
22 BORDER 7: PAPER 7: BRIGHT 0
:CLS
25 PRINT AT 0,7:"THE GOLDEN MA
GGOT":AT 1,8:"FISHING CONTEST"
30 PRINT AT 3,4:"WRITTEN BY P.
TODHUNTER"
40 PRINT AT 6,7:"1)...INSTRUC
TIONS"
45 PRINT AT 8,7:"2)...START F
ISHING"
50 IF INKEY#="1" THEN LET CH=
0: GO SUB 8000
60 IF INKEY#="2" THEN GO TO 9
0
70 GO TO 25
90 BEEP .01,30: BEEP .01,40: B
EEP .01,30: BEEP .01,40: BEEP .0
1,30: BEEP .01,40: BEEP .05,50:
INPUT "ENTER NAME (MAX.12) ":N$:
IF LEN N#>12 OR LEN N#<0 THEN
GO TO 90
100 BORDER 7: PAPER 7: BRIGHT 0
:CLS
105 GO SUB INT (RND*3+5)*1000+(
cc5)
110 BORDER 0: PAPER 5: BRIGHT 1
:CLS
120 FOR Y=0 TO 31
130 INK 7: PRINT AT 0,Y:"(igB)"
:AT 1,Y:"(igB)":AT 2,Y:"(igB)":A
T 3,Y:"(igB)":AT 4,Y:"(igB)"
140 INK 4: PRINT AT 5,Y:"(igB)"
:AT 6,Y:"(igB)":AT 7,Y:"(igB)":A
T 8,Y:"(igB)":AT 9,Y:"(igB)"
150 PRINT AT 10,Y: INK 6:"(igB)

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"
155 NEXT Y
160 PRINT AT 9,2: INK 0: PAPER
4:"RE":AT 10,2: INK 0: PAPER 6:"
CD"
170 PRINT AT 9,6: INK 0: PAPER
4:"RE":AT 10,6: INK 0: PAPER 6:"
CD"
180 PRINT AT 9,16: INK 0: PAPER
4:"RE":AT 10,16: INK 0: PAPER 6
:"CD"
190 PRINT AT 9,21: INK 0: PAPER
4:"RE":AT 10,21: INK 0: PAPER 6
:"CD"
210 PRINT AT 9,30: INK 0: PAPER
4:"RE":AT 10,30: INK 0: PAPER 6
:"CD"
230 PRINT AT 11,4: INK 4: PAPER
5:"EEEE"
240 PRINT AT 12,5: INK 4: PAPER
5:"EEEE"
250 PRINT AT 13,3: INK 4: PAPER
5:"EE"
260 PRINT AT 11,13: INK 4: PAPE
R 5:"EE"
265 PRINT AT 12,15: INK 4: PAPE
R 5:"EE": INK 0: PAPER 5:"RE"
270 PRINT AT 13,16: INK 4: PAPE
R 5:"EE": INK 0: PAPER 5:"CD"
310 PRINT AT 14,18: INK 4: PAPE
R 5:"EE"
320 PRINT AT 12,20: INK 4: PAPE
R 5:"EE":AT 13,21:"EE":AT 12,23:
INK 0: PAPER 5:"RE":AT 13,23: I
NK 0: PAPER 5:"CD"
330 PRINT AT 11,27: INK 4: PAPE
R 5:"EEEE":AT 12,28:"EE"
350 LET FC=0
360 LET P=0
370 LET WT=0

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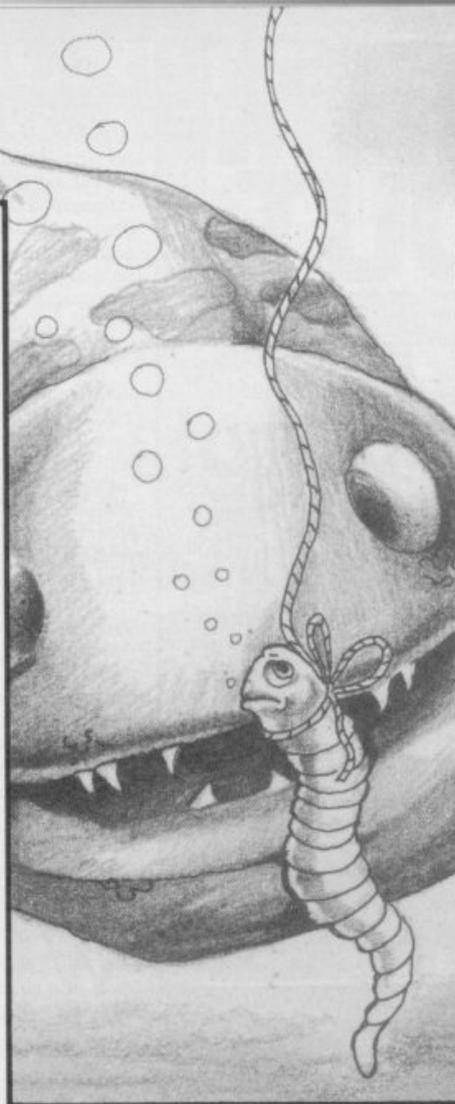
400 LET M=INT (RND*28)
430 FOR Q=1 TO 15
440 BEEP .01,10: BEEP .01,15
442 NEXT Q
443 INK 0
455 LET CAST=0
460 LET T=0
461 IF CAST=0 THEN PRINT AT 6,
M: PAPER 4:"QRJ":AT 7,M:"(sp)ST"
:AT 8,M:"(sp)OP"
500 PRINT AT 1,1: PAPER 7:"FISH
CAUGHT=":FC
510 PRINT AT 2,1: PAPER 7:"POIN
TS=":P
520 PRINT AT 3,1: PAPER 7:"MATC
H=":MATCH
525 PRINT AT 1,17: PAPER 7:"WEI
GHT OF":AT 2,17:"LAST FISH":AT 3
,19:WT:" LB"
530 IF INKEY#="Q" AND CAST=0 TH
EN PRINT AT 6,M: PAPER 4:"(sp)I
J":AT 7,M: PAPER 4:"KLM":AT 8,M:
PAPER 4:"NOE": PAUSE 10: PRINT
AT 15,M: INK 2: PAPER 5:"G": LET
CAST=15
535 IF INKEY#="A" AND CAST=0 TH
EN PRINT AT 6,M: PAPER 4:"(sp)I
J":AT 7,M: PAPER 4:"KLM":AT 8,M:
PAPER 4:"NOE": PAUSE 10: PRINT
AT 20,M: INK 2: PAPER 5:"G": LET
CAST=20
540 LET FISH=INT (RND*40-CH)
550 IF FISH=1 AND CAST=15 OR FI
SH=1 AND CAST=20 THEN LET T=T+1
: GO SUB 2000
560 IF INKEY#="1" AND FISH<>1 T
HEN PRINT AT 15,M: PAPER 5: INK
5:"(igB)": PRINT AT 20,M: PAPER
5: INK 5:"(igB)": LET CAST=0: L

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ET T=T+1: GO TO 461
570 LET T=T+1
572 IF T>600 THEN GO TO 575
574 IF T<600 THEN GO TO 461
578 FOR F=1 TO 10
580 BEEP .01,10: BEEP .01,15
585 NEXT F
587 GO SUB 3000
590 GO TO 100
2000 FOR B=1 TO INT (RND*8)
2005 PRINT AT CAST,M; INK 2; PAPER 5; "G"
2006 PAUSE INT (RND*30)+1: LET T=T+1
2007 PRINT AT CAST,M; INK 2; PAPER 5; "H"
2008 PAUSE INT (RND*30)+1
2009 NEXT B: PRINT AT 15,M; INK 5; PAPER 5; "(igB)"; AT 20,M; INK 5; "(igB)"
2010 IF INKEY#="" THEN PRINT AT 6,M; INK 0; PAPER 4; "(sp) I U"; AT 7,M; "KLM"; AT 8,M; "(sp) QP": LET CAST=0: LET T=T+1: GO TO 461
2020 FOR X=1 TO INT (RND*100)+50
2040 IF INKEY#="" THEN PRINT AT 6,M; INK 0; PAPER 4; "QRJ"; AT 7,M; INK 7; PAPER 4; "U"; INK 0; PAPER 4; "ST"; AT 8,M; "(sp) QP": BEEP .01,40: FOR R=1 TO 10: NEXT R: GO TO 2055
2050 NEXT X
2052 PRINT AT CAST,M; INK 2; PAPER 5; "G": LET T=T+1: GO TO 462
2055 LET FW=INT (RND*6): LET FC=FC+1: LET P=P+FW: LET WT=FW: LET CAST=0: LET T=T+1
2060 RETURN
3000 BORDER 7: PAPER 7: BRIGHT 0: CLS
3010 PRINT AT 1,9; "GOLDEN MAGGOT"; AT 2,8; "FISHING CONTEST"
3020 PRINT AT 3,10; "MATCH No. "; MATCH
3025 PLOT 60,170: DRAW 130,0: DRAW 0,-30: DRAW -130,0: DRAW 0,30
3030 PRINT AT 2,24; INK 4; "EF"; INK 0; "CD"; INK 4; "EF"; AT 3,25; "EEEE"; AT 4,24; INK 2; "G": PRINT AT 1,26; INK 0; "AB": PRINT AT 5,27; INK 4; "EF"
3040 PRINT AT 6,7; "(3*sp)NAME(7*sp)PTS."
3050 PLOT 50,129: DRAW 150,0: DRAW 0,-91: DRAW -150,0: DRAW 0,91
3055 FOR I=118 TO 35 STEP -16
3060 PLOT 50,I: DRAW 150,0
3065 NEXT I
3070 PLOT 165,129: DRAW 0,-91
3080 PRINT AT 8,7; "JOHN ROACH"; AT 10,7; "PAUL RUDD"; AT 12,7; "DAVID BREAM"; AT 14,7; "NIGEL PIKE"; AT 16,7; N#
3083 FOR L=8 TO 14 STEP 2
3084 LET K1=INT (RND*40)
3085 PRINT AT L,22; K1;
3086 NEXT L
3088 PRINT AT 16,22; P
3100 PAUSE 0: LET MATCH=MATCH+1: GO TO 22
5000 CLS: PRINT "WEATHER:-SUNNY"
5010 GO SUB 8500
5015 IF A<(DP/3) THEN LET CH=CH+0
5020 IF A>(DP/3) AND A<(DP/3*2) THEN LET CH=CH+1
5030 IF A>(DP/3*2) THEN LET CH=CH+2
5040 PRINT "WHAT SIZE HOOK?(S,M,L)"
5050 INPUT B#
5060 IF B#="S" THEN LET CH=CH+0
5065 IF B#="M" THEN LET CH=CH+1
5070 IF B#="L" THEN LET CH=CH+1
5075 PRINT "WHICH BAIT?-BREAD,MAGGOTS,WORMS"
5080 INPUT C#
5090 IF C#="BREAD" OR C#="B" THEN LET CH=CH+2
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5100 IF C#="MAGGOTS" OR C#="M" THEN LET CH=CH+0
5110 IF C#="WORMS" OR C#="W" THEN LET CH=CH+1
5120 PAUSE 100
5130 RETURN
6000 CLS: PRINT "WEATHER:-CLOUDY"
6010 GO SUB 8500
6020 IF A<(DP/3) THEN LET CH=CH+1
6030 IF A>(DP/3) AND A<(DP/3*2) THEN LET CH=CH+3
6040 IF A>(DP/3*2) THEN LET CH=CH+1
6050 PRINT "WHAT SIZE HOOK?(S,M,L)"
6060 INPUT B#
6070 IF B#="L" THEN LET CH=CH+1
6080 IF B#="M" THEN LET CH=CH+1
6090 IF B#="S" THEN LET CH=CH+2
6100 PRINT "WHICH BAIT?-BREAD,MAGGOTS,WORMS"
6110 INPUT C#
6120 IF C#="BREAD" OR C#="B" THEN LET CH=CH+1
6130 IF C#="MAGGOTS" OR C#="M" THEN LET CH=CH+2
6140 IF C#="WORMS" OR C#="W" THEN LET CH=CH+1
6150 PAUSE 100
6160 RETURN
7000 PRINT "WEATHER:-RAINING"
7010 GO SUB 8500
7020 IF A<(DP/3) THEN LET CH=CH+0
7030 IF A>(DP/3) AND A<(DP/3*2) THEN LET CH=CH+1
7040 IF A>(DP/3*2) THEN LET CH=CH+1
7050 PRINT "WHAT SIZE HOOK?(S,M,L)"
7060 INPUT B#
7070 IF B#="L" THEN LET CH=CH+3
7080 IF B#="M" THEN LET CH=CH+1
7090 IF B#="S" THEN LET CH=CH+1
7100 PRINT "WHICH BAIT?-BREAD,MAGGOTS,WORMS"
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GGOTS,WORMS"
7110 INPUT C#
7120 IF C#="BREAD" OR C#="B" THEN LET CH=CH+1
7130 IF C#="MAGGOTS" OR C#="M" THEN LET CH=CH+1
7140 IF C#="WORMS" OR C#="W" THEN LET CH=CH+3
7150 PAUSE 100
7160 RETURN
8000 BORDER 7: PAPER 7: BRIGHT 0: CLS: PRINT AT 1,9; "INSTRUCTIONS"
8050 PRINT: PRINT "YOU HAVE ENTERED IN A FISHING CONTEST.": PRINT "YOU GET MORE POINTS FOR THE HEAVIER THE FISH eg/ A 5LB FISH 5 POINTS.": PRINT "YOU ONLY HAVE A CERTAIN TIME IN EACH MATCH SO CHOOSE THE RIGHT DEPTH, HOOK SIZE AND BAIT FOR THE DIFFERENT CONDITIONS.": PRINT "YOU HAVE AN OPPORTUNITY FROM OTHER FISHERMEN SO TRY YOUR BEST"
8060 PRINT AT 21,8; "PRESS ANY KEY"
8070 PAUSE 0: BEEP .01,40: CLS
8090 PRINT: PRINT "WHEN YOU HAVE A BITE YOUR FLOAT WILL BOB. BUT DO NOT STRIKE TOO SOON OR YOU WILL LOOSE THE FISH. WAIT UNTIL THE FLOAT IS FULLY SUBMERGED. YOU HAVE TO CAST BACK OUT AFTER EVERY STRIKE SO DON'T FORGET!"
8100 PRINT: PRINT "STRIKE CAST CAUGHT ": PRINT AT 10,23; "A FISH"
8110 PRINT: PRINT: PRINT "(4*sp)QRJ(8*sp)IJ(8*sp)QRJ": PRINT "(5*sp)ST(7*sp)KLM(8*sp)UST": PRINT "(5*sp)QP(7*sp)NQP(9*sp)QP"
8115 PRINT AT 21,8; "PRESS ANY KEY"
8120 PAUSE 0
8130 BEEP .01,40: CLS: RETURN
8500 LET DP=INT (RND*10)+5
8510 PRINT "THE WATER IS "; DP; " FEET DEEP"
8520 PRINT "WHAT DEPTH ARE YOU SETTING YOUR FLOAT?"
8525 INPUT A
8530 IF A<0 OR A>DP THEN GO TO 8520
8540 PRINT "YOU HAVE SET YOUR FLOAT AT "; A; " FT"
8550 PRINT "IS THIS CORRECT?(Y/N)"
8560 INPUT A#
8570 IF A#="N" THEN GO TO 8510
8575 LET CH=0
8580 RETURN
9000 DATA 4,4,66,66,34,33,33,33
9010 DATA 0,8,20,20,17,17,34,34
9020 DATA 33,145,149,149,85,80,66,2
9030 DATA 34,40,68,68,84,80,16,16
9040 DATA 0,0,3,31,62,62,31,12
9050 DATA 0,0,224,240,254,252,112,0
9060 DATA 8,8,8,28,28,0,0,0
9070 DATA 0,8,8,8,28,0,0,0
9080 DATA 0,0,1,0,0,1,1,3
9090 DATA 248,248,232,168,136,254,4,14,7
9100 DATA 0,0,0,0,0,0,0,3
9110 DATA 3,3,4,11,14,51,196,8
9120 DATA 15,55,207,62,252,212,68,206
9130 DATA 12,48,192,0,0,0,0,0
9140 DATA 17,34,58,59,59,123,247,15
9150 DATA 26,50,116,212,204,202,145,16
9160 DATA 0,0,0,0,0,0,126,129
9170 DATA 0,0,1,0,0,1,1,131
9180 DATA 99,27,6,7,7,3,4,8
9190 DATA 7,7,127,254,228,92,68,206
9200 DATA 0,0,64,224,224,224,64,224
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DEVIL'S DISKS

PLAY THE DEVIL for your soul in **Devil's Disks** by D Cunningham of Rhyl in Clwyd. The two-player strategy game uses an unusual method of movement. You must get your four disks across the board by moving into coloured squares, but you can only move onto a square of the same colour as the three in front of your opponent's pieces. Each move you make alters the possibilities for the other player, so great care and skill is required to win.

Devil's Disks runs on a 48K Spectrum or Spectrum Plus, and with a randomly coloured board every game is different.

The program uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the listing.

```

10 GO SUB 5000
20 GO SUB 6500
30 GO SUB 500
40 LET SCD1=0: LET SCD2=0
50 LET LIV1=0: LET LIV2=0
120 FOR x=2 TO 18 STEP 2
130 FOR y=1 TO 30 STEP 2
140 LET a=INT (RND*4)+2
150 PRINT AT x,y; BRIGHT 0; PAPER a; INK 0;"(2*sp)":AT x+1,y; PAPER a; INK 0;"(2*sp)": NEXT y: NEXT x
160 DIM c(8): FOR x=1 TO 8: LET c(x)=ATTR (h(x),p(x)): NEXT x
170 GO TO 1000
500 BRIGHT 1: PAPER 0: INK 0: BORDER 1: CLS
510 DIM p(8)
520 FOR x=1 TO 8:
530 LET p(x)=INT (RND*14)+2: LET p(x)=p(x)*2: IF p(x)=30 THEN GO TO 530
540 FOR y=1 TO x
550 IF p(x)=p(y) AND x<>y THEN GO TO 530
560 NEXT y: NEXT x
570 DIM h(8): FOR x=1 TO 4: LET h(x)=2: NEXT x: FOR x=5 TO 8: LET h(x)=19: NEXT x
580 RETURN
1000 BRIGHT 0: FOR x=1 TO 4: PRINT AT h(x),p(x)-1: PAPER (c(x)/8); INK 1;"EE":AT h(x)+1,p(x)-1: PAPER (c(x)/8); INK 1;"GH": NEXT x
1010 BRIGHT 0: FOR x=5 TO 8: PRINT AT h(x),p(x)-1: PAPER (c(x)/8); INK 7;"DD":AT h(x)-1,p(x)-1: PAPER (c(x)/8); INK 7;"EE": NEXT x
1020 LET a=10: LET b=11
1200 REM player 1's turn ↑
1210 PRINT INK 6; PAPER 1; BRIG
HT 0;AT 21,0;"PLAYER 1'S TURN(17
*sp)":AT 0,0;"(32*sp)"
1220 PRINT INK 5; PAPER 0;AT 20
,b;"LL":AT 1,b;"LL"
1230 PRINT INK 5; PAPER 0;AT a,
0;"L":AT a+1,0;"L":AT a,31;"O":A
T a+1,31;"E"
1235 LET q=a: LET w=b
1240 LET a=a+(2 AND INKEY#="6" A
ND a<18)-(2 AND INKEY#="7" AND a
>2)
1250 LET b=b+(2 AND INKEY#="8" A
ND b<28)-(2 AND INKEY#="5" AND b
>2)
1260 IF a<>q THEN PRINT INK 7;
PAPER 0;AT q,0;"(sp)":AT q+1,0;
"(sp)":AT q,31;"(sp)":AT q+1,31;
"(sp)": BEEP .005,35
1270 IF w<>b THEN PRINT INK 7;
PAPER 0;AT 20,w;"(2*sp)":AT 1,w;
"(2*sp)": BEEP .005,15
1275 IF INKEY#="1" THEN BEEP .1
,0: GO TO 1500
1277 IF INKEY#="Q" OR INKEY#="q"
THEN GO TO 4000
1280 IF INKEY#="0" AND (ATTR (a,
b)/8)<>INT (ATTR (a,b)/8) THEN
GO TO 1300
1290 GO TO 1220
1300 FOR x=5 TO 8: IF (a+1)=h(x)
AND (b+1)=p(x) THEN GO TO 1330
1310 NEXT x
1320 GO TO 1240
1330 LET DSK=X
1340 LET COL=ATTR (H(DSK)-2,P(DS
K))
1350 FOR X=1 TO 4
1360 IF ((ATTR (H(X)+2,P(X)-2)=C
OL) OR (ATTR (H(X)+2,P(X))=COL)
OR (ATTR (H(X)+2,P(X)+2)=COL)) A
ND H(X)>1 THEN GO TO 1390
1370 NEXT X
1380 PRINT INK 0; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"(2*sp)":
AT H(DSK)-1,P(DSK)-1;"(2*sp)"
1385 LET H(DSK)=19
1388 PRINT INK 7; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"DD";AT H
(DSK)-1,P(DSK)-1;"EE"
1389 FOR X=40 TO 1 STEP -2: BEEP
.01,X: NEXT X: GO TO 1500
1390 BEEP .01,55: BEEP .01,50: P
RINT INK 0; PAPER (C(DSK)/8);AT
H(DSK),P(DSK)-1;"(2*sp)":AT H(D
SK)-1,P(DSK)-1;"(2*sp)"
1400 LET C(DSK)=COL: LET SCD1=SC
D1+10
1410 LET H(DSK)=H(DSK)-2
1420 PRINT INK 7; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"DD";AT H
(DSK)-1,P(DSK)-1;"EE"
1430 IF H(DSK)<>3 THEN GO TO 14
40
1432 PRINT INK 0; PAPER (C(DSK)
/8);AT H(DSK),P(DSK)-1;"(2*sp)":
AT H(DSK)-1,P(DSK)-1;"(2*sp)": L
ET P(DSK)=0: LET H(DSK)=0: LET L

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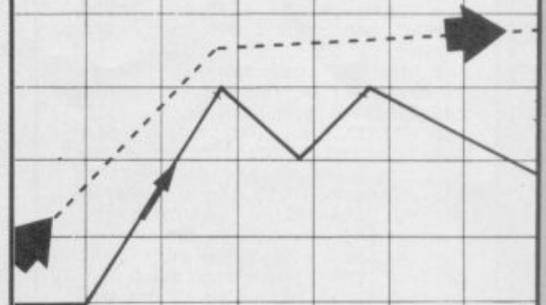
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IV1=LIV1+1: LET SCO1=SCO1+50: FO
R X=1 TO 20: BEEP .005,X*3: NEXT
X
1435 IF LIV1=4 THEN GO TO 4500:
REM ALL ROUND DISKS ACROSS
1440 IF RND>RND THEN GO TO 1500
1450 LET GND=INT (RND*8)+2: LET
GND=GND*2: LET LEV=INT (RND*14)+
1: LET LEV=LEV*2
1470 FOR X=1 TO 8: IF LEV+2=P(X)
THEN GO TO 1500
1480 NEXT X
1490 PRINT INK 7: BRIGHT 1: AT G
ND,LEV+1: "OS": AT GND+1,LEV+1: "RT
"
1500 REM PLAYER 2'S TURN
1510 PRINT INK 6: PAPER 1: BRIG
HT 0: AT 0,0: "PLAYER 2'S TURN(17*
sp)": AT 21,0: "(32*sp)"
1520 PRINT INK 5: PAPER 0: AT 20
,b: "L": AT 1,b: "RL"
1530 PRINT INK 5: PAPER 0: AT a,
0: "L": AT a+1,0: "H": AT a,31: "O": A
T a+1,31: "P"
1535 LET q=a: LET w=b
1540 LET a=a+(2 AND INKEY#="6" A
ND a<18)-(2 AND INKEY#="7" AND a
>2)
1550 LET b=b+(2 AND INKEY#="8" A
ND b<28)-(2 AND INKEY#="5" AND b
>2)
1560 IF a<>q THEN PRINT INK 7:
PAPER 0: AT q,0: "(sp)": AT q+1,0:
"(sp)": AT q,31: "(sp)": AT q+1,31:
"(sp)": BEEP .005,35
1570 IF w<>b THEN PRINT INK 7:
PAPER 0: AT 20,w: "(2*sp)": AT 1,w
: "(2*sp)": BEEP .005,15
1575 IF INKEY#="2" THEN BEEP .1
,0: GO TO 1200
1577 IF INKEY#="Q" OR INKEY#="q"
THEN GO TO 4000
1580 IF INKEY#="0" AND (ATTR (a,
b)/8)<>INT (ATTR (a,b)/8) THEN
GO TO 1600
1590 GO TO 1520
1600 FOR X=1 TO 4: IF a=h(x) AND
(b+1)=p(x) THEN GO TO 1630
1610 NEXT X
1620 GO TO 1520
1630 LET DSK=X
1640 LET COL=ATTR (H(DSK)+2,P(DS
K))
1650 FOR X=5 TO 8
1660 IF ((ATTR (H(X)-2,P(X)-2)=C
OL) OR (ATTR (H(X)-2,P(X))=COL)
OR (ATTR (H(X)-2,P(X)+2)=COL)) A
ND H(X)>1 THEN GO TO 1690
1670 NEXT X
1680 PRINT PAPER C(DSK)/8: AT H(
DSK)+1,P(DSK)-1: "(2*sp)": AT H(DS
K),P(DSK)-1: "(2*sp)"
1685 LET h(dsk)=2
1688 PRINT INK 1: PAPER C(DSK)/
8: AT H(DSK)+1,P(DSK)-1: "GH": AT H
(DSK),P(DSK)-1: "EF"
1689 FOR X=39 TO 0 STEP -2: BEEP
.01,X: NEXT X: GO TO 1200
1690 BEEP .01,40: BEEP .01,45: P
RINT PAPER C(DSK)/8: AT H(DSK)+1
,P(DSK)-1: "(2*sp)": AT H(DSK),P(D
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```
SK)-1: "(2*sp)"
1700 LET SCO2=SCO2+10: LET H(DSK
)=H(DSK)+2: LET C(DSK)=COL
1710 PRINT INK 1: PAPER C(DSK)/
8: AT H(DSK)+1,P(DSK)-1: "GH": AT H
(DSK),P(DSK)-1: "EF"
1720 IF H(DSK)<>18 THEN GO TO 1
730
1722 PRINT INK 0: PAPER (C(DSK)
/8): AT H(DSK),P(DSK)-1: "(2*sp)":
AT H(DSK)+1,P(DSK)-1: "(2*sp)": L
ET P(DSK)=0: LET H(DSK)=0: LET L
IV2=LIV2+1: LET SCO2=SCO2+50: FO
R X=1 TO 20: BEEP .005,X*3: NEXT
X
1725 IF LIV2=4 THEN GO TO 4750:
REM ALL SQUARE DISKS ACROSS
1730 IF RND>RND THEN GO TO 1200
1740 LET GND=INT (RND*8)+2: LET
GND=GND*2: LET LEV=INT (RND*14)+
1: LET LEV=LEV*2
1760 FOR X=1 TO 8: IF LEV+2=P(X)
THEN GO TO 1200
1770 NEXT X
1780 PRINT INK 7: BRIGHT 1: AT G
ND,LEV+1: "OS": AT GND+1,LEV+1: "RT
"
1790 GO TO 1200
4000 REM QUIT GAME
4010 FOR X=1 TO 30: BEEP .01,X*2
: BEEP .01,60-(X*2): NEXT X
4020 BRIGHT 1: PAPER 0: INK 7: B
ORDER 0: CLS
4030 PRINT FLASH 1: BRIGHT 0: AT
6,8: "GAME TERMINATED":
4040 PRINT AT 9,6: "SCORES: "
4050 PRINT AT 11,6: "PLAYER 1 = "
: SCO1: AT 13,6: "PLAYER 2 = ": SCO2
4060 PRINT AT 18,6: "ANOTHER GAME
?(Y/N)"
4070 IF INKEY#="N" OR INKEY#="n"
THEN STOP
4080 IF INKEY#="y" OR INKEY#="Y"
THEN RUN
4090 GO TO 4070
4500 REM ALL ROUND DISKS
4510 BRIGHT 0: PAPER 1: INK 7: C
LS
4520 PRINT FLASH 1: AT 6,8: "PLAY
ER 1 WINS": AT 8,5: "AFTER CROSSIN
G OVER": AT 10,10: "ALL DISKS": FO
R F=1 TO 6: FOR Y=1 TO 40 STEP 3
: BEEP .005,Y: NEXT Y: NEXT F
4530 GO TO 4060
4750 REM ALL SQUARE DISKS
4760 BRIGHT 0: PAPER 2: INK 7: C
LS
4780 PRINT FLASH 1: AT 6,8: "PLAY
ER 2 WINS": AT 8,5: "AFTER CROSSIN
G OVER": AT 10,10: "ALL DISKS": FO
R F=1 TO 6: FOR Y=1 TO 40 STEP 4
: BEEP .004,Y: BEEP .008,40-Y: N
EXT Y: NEXT F
4790 GO TO 4060
5000 LET Z#="ABCDEFGHIJKLMNOPS
TU"
5010 FOR Y=1 TO 20
5020 FOR X=0 TO 7
5030 READ A
5040 POKE USR Z*(Y)+X,A
5050 NEXT X: NEXT Y
5060 RETURN
6000 DATA 0,7,15,31,63,127,127,1
```

```
27,0,224,240,248,252,254,254,254
,127,127,127,63,31,15,7,0,254,25
4,254,252,248,240,224,0
6010 DATA 0,1,3,7,15,31,63,127,0
,128,192,224,240,248,252,254,127
,63,31,15,7,3,1,0,254,252,248,24
0,224,192,128,0
6020 DATA 1,3,7,15,31,31,31,31,1
28,192,224,240,248,248,248,248,3
1,31,31,31,15,7,3,1,248,248,248,
248,240,224,192,128
6030 DATA 255,254,252,248,240,0,
0,0,0,0,240,248,252,254,255,0,
0,0,15,31,63,127,255,255,127,63,
31,15,0,0,0
6040 DATA 128,64,32,16,15,8,8,8,
8,8,8,15,16,32,64,128,1,2,4,8,24
0,16,16,16,16,16,16,240,8,4,2,1
6500 PAPER 3: BRIGHT 1: INK 7: B
ORDER 4: CLS
6505 PRINT BRIGHT 1: AT 5,5: "AB"
: AT 6,5: "CD": AT 5,25: "EF": AT 6,
25: "GH"
6510 PRINT INK 1: FLASH 1: AT 5,
10: "THE DEVIL'S": AT 6,13: "DISKS"
6515 PRINT AT 10,3: "DO YOU WANT
INSTRUCTIONS?"
6520 INPUT "YES OR NO ": LINE A#
6530 IF A#="YES" OR A#="yes" THE
N GO TO 6600
6540 IF A#="NO" OR A#="no" THEN
RETURN
6550 GO TO 6520
6600 PAPER 5: INK 0: BRIGHT 0: B
ORDER 7: CLS
6610 PRINT AT 2,6: "MOVEMENT CONT
ROLS": OVER 1: AT 2,6: "-----"
6620 PRINT AT 5,1: "USE CURSOR CO
NTROLS TO LINE": AT 7,1: "UP THE A
ROWS TO THE DISK YOU": AT 9,1: "W
ANT TO MOVE."
6630 PRINT AT 12,1: "WHEN YOU HAV
E LINED UP YOUR": AT 14,1: "DISK,
THEN PRESS ""0"" TO MOVE."
6640 PRINT INK 1: AT 17,1: "THIS
APPLYS TO BOTH PLAYERS."
6700 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS
6710 PRINT AT 3,2: "WHAT IF YOU C
AN NOT MOVE?"
6720 PRINT OVER 1: AT 3,2: "-----"
6730 PRINT AT 6,5: "PLAYER 1 PRES
S ""1""": AT 8,12: "AND"
6740 PRINT AT 10,5: "PLAYER 2 FRE
SS ""2""":
6750 PRINT AT 13,4: "IF BOTH PLAY
ERS CAN NOT": AT 15,2: "MOVE THEN
PRESS ""0"" TO QUIT"
6760 PRINT AT 17,2: "THE WINNER I
S DECIDED BY ": AT 19,5: "EACH PLA
YERS SCORES."
6770 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS
6800 PRINT AT 3,4: "THE RULES TO
MOVEMENT !": OVER 1: AT 3,4: "-----"
6810 PRINT AT 6,3: "THE COLOUR IN
FRONT OF THE ": AT 8,3: "THE DISK
YOU WANT TO MOVE": AT 10,5: "MUST
MATCH ONE OF THE": AT 12,3: "COLOU
RS DIRECTLY INFRONT": AT 14,4: "OR
DIAGONALLY INFRONT OF": AT 16,5:
"YOUR OPPONENTS DISKS."
6900 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS
6910 PRINT BRIGHT 1: INK 7: PAP
ER 0: AT 3,15: "OS": AT 4,15: "RT"
6920 PRINT AT 6,2: "WHAT'S THIS
^"
6930 PRINT AT 9,2: "WELL THIS IS
A COLLAPSED ": AT 11,2: "COLOUR, T
HAT CAN NOT BE MOVED": AT 13,2: "O
N BY YOUR DISKS BECAUSE THEY"
6940 PRINT AT 15,2: "ARE NEVER IN
FRONT OF YOUR ": AT 17,2: "DISKS B
UT SOMETIMES THEY ARE": AT 19,2: "
ON THE LEFT OR ON THE RIGHT."
7000 FOR X=1 TO 50: NEXT X: PAUS
E 4E4: CLS : GO TO 6500
```

FUNCTION FIT enables you to predict accurately the values of points on a graph which are not already known. The program works by taking a known set of values and constructing a function to suit them all as closely as possible. Obviously the more points you have the better the fit, and you will have to experiment with known functions to find the appropriate number for the accuracy you require. As an example, 25 points on a sine wave from 0 to 2 should give you accuracy to about 5 decimal places.

The program was written by J M Kelly of Solihull, West Midlands, and should prove useful in situations where full Fourier analysis of the type possible with Abacus is not required.



FUNCTION FIT

```

100 WINDOW#0,512,30,0,210:WINDOW
512,202,0,0:WINDOW#2,512,202,0,
0:PAPER#2,2:PAPER 2:PAPER#0,6:IN
K 7:INK#0,0:BORDER 1,7:BORDER#2,
1,7:BORDER#0,1,5:MODE 4
110 get_mat:reduce MAT,size:bac
k MAT,size:SETUP_STRING:CLS:MATH
_PRINT 1,A#:CLS#0:A_FEW_NUMBERS:
CLS#0:STOP
120 :
130 DEFINE PROCEDURE SETUP_STRIN
G
140 r=size+1:A$=':'
150 REPEAT loop
160 r=r-1
170 IF r=0:EXIT loop
180 REPEAT test
190 IF MAT(0,r)=0:EXIT test
200 IF MAT(0,r)>0:A$=A$+'+'
210 IF MAT(0,r)<0:A$=A$+'-'
220 A$=A$&ABS(MAT(0,r))
230 IF r-1=1:A$=A$&"x "
240 IF r-1>1:A$=A$&"x^(r-1)&":
"
250 EXIT test
260 END REPEAT test
270 END REPEAT loop
280 END DEFINE SETUP_STRING
290 :
300 DEFINE PROCEDURE A_FEW_NUMBE
RS
310 REPEAT forever
320 INPUT#0,'Value for x = ',C$,
'Y = ',:kkk=0
330 IF C# INSTR 'quitQUITstopSTO
PendENDFINfinABORTabort':EXIT fo

```

```

rever
340 FOR r=0 TO size-1
350 kkk=kkk+MAT(0,r+1)*C#^r
360 END FOR r
370 PRINT#0,kkk
380 END REPEAT forever
390 END DEFINE A_FEW_NUMBERS
400 :
410 DEFINE PROCEDURE get_mat
420 LOCAL r,rr
430 INPUT 'Number of elements ';s
ize
440 DIM TEMP(size,1),spare(size,
size+1),MAT(size,size+1)
450 FOR r=1 TO size
460 INPUT 'X = ';TEMP(r,0);TO 10;
'Y = ';TEMP(r,1)
470 END FOR r
480 FOR rr=1 TO size
490 FOR r=0 TO size-1
500 MAT(rr,r+1)=TEMP(rr,0)^r
510 END FOR r
520 MAT(rr,r+2)=TEMP(rr,1)
530 END FOR rr
540 FOR r=1 TO size
550 FOR rr=1 TO size+1
560 spare(r,rr)=MAT(r,rr):END FO
R rr:END FOR r
570 pivot MAT,size,1
580 END DEFINE get_mat
590 :
600 DEFINE PROCEDURE reduce(TEMP
,B)
610 LOCAL C,d,E,F
620 FOR C=1 TO B-1
630 FOR d=C+1 TO B
640 pivot TEMP,B,d:F=TEMP(d,C)/T
EMP(C,C):FOR E=1 TO B+1:TEMP(d,E
)=TEMP(d,E)-TEMP(C,E)*F
650 END FOR d:END FOR C
660 END DEFINE reduce
670 :
680 DEFINE PROCEDURE swap(TEMP,A
,B,C)
690 LOCAL d
700 FOR d=1 TO C+1:TEMP(0,d)=TEM
P(A,d):TEMP(A,d)=TEMP(B,d):TEMP(
B,d)=TEMP(0,d)
710 END DEFINE swap
720 :
730 DEFINE PROCEDURE pivot(TEMP,
B,F)
740 LOCAL C,d
750 FOR C=F TO B-1
760 FOR d=C+1 TO B:IF TEMP(C,F)<
TEMP(d,F):swap TEMP,C,d,B

```

```

770 END FOR C
780 END DEFINE pivot
790 :
800 DEFINE PROCEDURE back(TEMP,A
)
810 LOCAL B,C,k
820 FOR B=1 TO A
830 k=2:FOR C=1 TO A
840 IF ABS(TEMP(B,C))>1E-8:k=0
850 END FOR C:END FOR B:alert k
860 FOR B=1 TO A
870 IF TEMP(B,B)=0:k=1
880 END FOR B:alert k
890 IF k=1 OR k=2: END DEFINE ba
ck
900 FOR B=0 TO A+1:TEMP(0,B)=0
910 FOR B=A TO 1 STEP -1
920 pp=0:FOR C=A TO B+1 STEP -1
930 pp=pp+TEMP(B,C)*TEMP(0,C)
940 END FOR C
950 TEMP(B,A+1)=TEMP(B,A+1)-pp
960 TEMP(0,B)=TEMP(B,A+1)/TEMP(B
,B)
970 END FOR B
980 END DEFINE back
990 :
1000 DEFINE PROCEDURE alert(A)
1010 IF A=1:PRINT'\No Solution a
vailable'
1020 IF A=2:PRINT'\There is an i
nfinite number of \'solutions'
1030 END DEFINE alert
1040 :
1050 DEFINE PROCEDURE MATH_PRINT
(s,P)
1060 FOR counter=s TO LEN(P)
1070 part$=P(counter TO counter)
1080 IF CODE(part$)=94:upper cou
nter,P
1090 IF CODE(part$)=124:standard
counter+1,P
1100 END FOR counter
1110 END DEFINE MATH_PRINT
1120 :
1130 DEFINE PROCEDURE upper(P,q)
1140 CSIZE 2,0
1150 FOR r=P+1 TO LEN(q)
1160 REPEAT test1
1170 IF CODE(q(r TO r))=124 OR C
ODE(q(r TO r))=2:r=LEN(q):EXIT t
est1
1180 PRINT q(r TO r);:x=r+1
1190 EXIT test1
1200 END REPEAT test1
1210 END FOR r
1220 MATH_PRINT x,q
1230 END DEFINE
1240 :
1250 DEFINE PROCEDURE standard(P
,q)
1260 CSIZE 2,1
1270 FOR r=P TO LEN(q)
1280 REPEAT test2
1290 IF CODE(q(r TO r))=94 OR CO
DE(q(r TO r))=124:r=LEN(q):EXIT
test2
1300 PRINT q(r TO r);:x=r+1
1310 EXIT test2
1320 END REPEAT test2
1330 END FOR r
1340 MATH_PRINT x,q
1350 END DEFINE

```

Listing One

```
10 BORDER 0: INK 0: PAPER 0: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS
```

```
15 CLEAR 31765: LET h=0: RANDO
MIZE : LOAD ""CODE USR "a": LOAD
""CODE
```

```
40 RESTORE 100: INK 4: PLOT 7,
72: DRAW 241,0: DRAW 0,-9: DRAW
-241,0: DRAW 0,8: INK 0
50 PRINT INK 6;AT 7,2;"EF";AT
8,2;"GH";AT 7,28;"EF";AT 8,28;"
GH"; INK 5;AT 16,14: FLASH 1;"KE
YS": FLASH 0;AT 18,12;"q...Left"
;AT 19,12;"e...Right";AT 20,12;"p
....Up";AT 21,12;"k...Down"
```

```
60 LET a$="(32*sp)Herbert must
collect the flowers on each scr
een to rescue Wilma. The pro
blem is that he must avoid the n
asties which roam the screen.
Press any key to begin."
```

```
70 READ p: IF p<0 THEN RESTOR
E 100: GO TO 70
```

```
80 PRINT INK 3;AT 13,1;a$( TO
30): LET a$=a$(2 TO )+a$(1): IF
INKEY$<>" " THEN GO TO 100
```

```
90 BEEP .1,p: GO TO 70
100 DATA 0,0,0,0,4,4,4,4,5,7,7,
7,7,7,9,11,12,12,7,7,7,9,7,5,4
,4,0,0,0,0,0
```

```
110 DATA 5,5,9,9,9,9,7,5,4,4,7,
7,7,7,7,2,2,5,5,5,5,4,2,4,4,7,
7,7,7,7,5,5,9,9,9,9,7,5
```

```
120 DATA 4,4,7,7,7,7,9,11,12,12
,7,7,7,9,7,5,4,4,0,0,0,0,0,0,-1
```

```
130 LET s=0: LET l=3: LET b=1
140 LET a$="(10*Q)": CLS : POKE
23560,0: IF l=0 THEN GO TO 20
```

```
145 IF b=14 THEN LET b=1
150 FOR n=1 TO 5: PRINT INK 2;
AT n+4,n+10;a$(n TO 11-n): NEXT
n
```

```
160 PRINT INK 5;AT 11,12;"KL";
AT 12,12;"MH"
```

```
170 PRINT INK 7;AT 11,18;"KL";
AT 12,18;"OP"
```

```
180 PRINT INK 6;AT 11,15;"EF";
AT 12,15;"GH"
```

```
190 PRINT INK 3;AT 14,1;"Can y
ou win the heart of Wilma";AT 15
,5;"on screen number: ";b;" ?"
```

```
200 RESTORE 210: FOR n=1 TO 30:
READ p: BEEP .1,p: NEXT n
210 DATA 0,-2,-3,-3,0,0,0,0,0,0
,2,2,0,0,0,0,-2,-2,-3,-3,0,0,5,5
,5,7,9,9,9,9,9
```

```
220 POKE 31804,4*b+14: POKE 318
97,4*b+14
```

```
230 LET a=32000: FOR f=1 TO b
240 LET x=INT (RND*3)-1: LET y=
INT (RND*3)-1: IF x=0 OR y=0 THE
N GO TO 240
```

```
250 FOR n=0 TO 30 STEP 10: POKE
a+n,144+(n/10): POKE a+1+n,2: P
OKE a+3+n,x: POKE a+7+n,y: NEXT
n
```

```
260 LET x=INT (RND*12)+3: LET y
=INT (RND*20)+3
```

```
270 FOR n=0 TO 10 STEP 10: POKE
a+2+n,x: POKE a+22+n,x+1: POKE
a+6+(n*2),y: POKE a+16+(n*2),y+1
280 POKE a+4+n,2: POKE a+24+n,3
: POKE a+5+n,16: POKE a+25+n,17
```

```
290 POKE a+8+(n*2),2: POKE a+18
+(n*2),3: POKE a+9+(n*2),23: POK
E a+19+(n*2),24: NEXT n
```

```
300 LET a=a+40: NEXT f: CLS
310 PRINT INK 6;AT 0,0;"EF";AT
1,0;"GH";AT 18,0;"EF";AT 19,0;"
GH";AT 0,25;"EF";AT 1,25;"GH";AT
18,25;"EF";AT 19,25;"GH"
```

```
320 FOR n=0 TO 18 STEP 3: PRINT
INK 4;AT n,28;"E";AT n+1,28;"E
": NEXT n: PRINT INK 4;AT 3,1;"
E";AT 4,1;"E";AT 15,1;"E";AT 16,
1;"E"
```

```
330 LET x=9: LET y=0: LET d=0:
LET f=0
```

```
340 LET ox=x: LET oy=y
350 PRINT AT 0,0: RANDOMIZE US
R 31766
```

```
360 LET k=PEEK 23560-101
370 LET x=x+(k=6 AND x<18)-(k=1
1 AND x>0)
```

```
380 LET y=y+(k=0 AND y<30)-(k=1
AND y>0)
```



WIN THE HEART of your loved one with a bunch of flowers. However, you must deal with monstrous spiders while picking the flowers.

Flower Power, written by I D Birdseye of Wallsend, Tyne and Wear, runs on any Spectrum. There are two listings. Type in the first and SAVE it. Then type in the second, which generates two machine code routines and automatically SAVES them after the main listing.

The game uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

```
2 AND y>0)
400 GO SUB 440: IF d=1 THEN GO
TO 140
410 PRINT AT ox,oy;"(2*sp)";AT
ox+1,oy;"(2*sp)"; INK 5;AT x,y;"
KL";AT x+1,y;"MN"
420 PRINT INK 6;AT 20,0;"SCORE
:";s;AT 20,25;"LIVES:";l;AT 20,1
3;"HIGH:";h
430 GO TO 340
440 IF (ATTR (x,y)=0 OR ATTR (x
,y)=5) AND (ATTR (x,y+1)=0 OR AT
TR (x,y+1)=5) AND (ATTR (x+1,y)=
0 OR ATTR (x+1,y)=5) AND (ATTR (
x+1,y+1)=0 OR ATTR (x+1,y+1)=5)
THEN RETURN
450 IF ATTR (x,y)=7 OR ATTR (x
,y+1)=7 OR ATTR (x+1,y)=7 OR ATTR
(x+1,y+1)=7 THEN GO TO 540
460 IF ATTR (x,y)=6 OR ATTR (x
,y+1)=6 OR ATTR (x+1,y)=6 OR ATTR
(x+1,y+1)=6 THEN GO TO 490
470 IF ATTR (x,y)<5 OR ATTR (x
,y+1)<5 OR ATTR (x+1,y)<5 OR ATTR
(x+1,y+1)<5 THEN GO TO 560
480 RETURN
```

```
490 LET u=(x>16)*18: LET i=(y>2
3)*25
500 FOR n=6 TO 0 STEP -1: PRINT
INK n;AT u,i;"EF";AT u+1,i;"GH
": BEEP .01,20-n: NEXT n
510 LET s=s+10: LET f=f+1: IF f
<4 THEN RETURN
520 PRINT AT 9,28;"(sp)";AT 10,
28;"(sp)": BEEP .1,-20: BEEP .01
,50
530 RETURN
540 FOR n=0 TO 20: BEEP .005,n:
NEXT n
550 LET s=s+100: LET b=b+1: GO
TO 140
560 PRINT AT ox,oy;"(2*sp)";AT
ox+1,oy;"(2*sp)"; INK 7;AT x,y;"
(ig2,ig1)";AT x+1,y;"(g5,ig5)"
570 BEEP .4,0: BEEP .4,0: BEEP
.2,0: BEEP .4,0: BEEP .4,2: BEEP
.2,1: BEEP .4,1: BEEP .2,0: BEE
P .4,0: BEEP .2,-1: BEEP .8,0
590 LET l=1-1: IF l>0 THEN LET
d=1: RETURN
600 IF s>h THEN LET h=s
610 LET d=1: RETURN
```

FLOWER

```

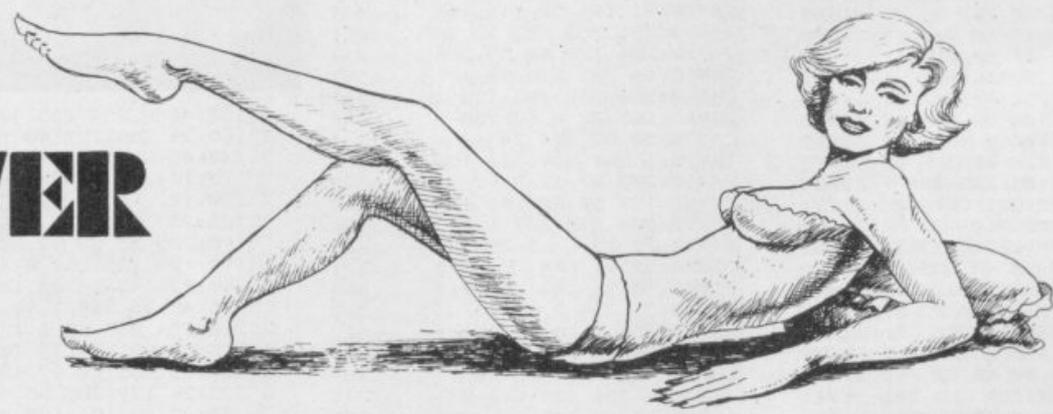
1 CLEAR 29999: BORDER 0: PAPER
R 0: INK 7: BRIGHT 1: CLS
10 FOR f=0 TO 113: READ a: POK
E (30000+f),a: NEXT f
20 FOR f=0 TO 77: READ a: POKE
(31000+f),a: NEXT f
25 PRINT AT 0,0: "PLAY MUSIC
INTO THE EAR PHONE ";AT 1,5;"AS
IF YOU ARE LOADING": PRINT AT 21
,0; FLASH 1: "PRESS ANY K
EY
LS
27 RANDOMIZE USR 31000
30 DATA 33,15,88,6,11,197,84,9
3,19,6,16,205,106,117,203,191,20
3,159,203,167,203,175
40 DATA 119,18,43,19,16,239,62
,48,35,61,32,252,193,16,224,1,96
,1,33,0,88,17
50 DATA 191,90,126,18,27,35,11
,120,177,254,0,32,245,201,14,0,2
19,254,203,119,40,4
60 DATA 203,193,24,2,203,129,2
19,254,203,119,40,4,203,201,24,2
,203,137,219,254,203,119
70 DATA 40,4,203,209,24,2,203,
145,219,254,203,119,40,4,203,119
,40,4,203,241,24,2,203,117,121,2
01
80 DATA 0,127,127,127,127,127,
127,0,17,88,255,33,24,121,1,8,0,
237,176,62,2,205
90 DATA 1,22,62,1,237,163,33,2
55,87,17,0,88,1,191,2,62,0,119,1
,192,2,62
100 DATA 144,215,11,120,177,194
,67,121,1,9,0,118,11,120,177,194
,79,121,58,8,92,254
110 DATA 32,202,100,121,205,48,
117,195,76,121,201,201

```

TURN YOUR Spectrum on to music with **Light Show** by Paul Munro of Salford. Load in the program and RUN it — you should see a completely black screen. With the tape leads arranged for loading a program, play a tape of music through your cassette recorder, and the screen will spring to life with colourful patterns to the beat.



POWER



Listing Two

```

10 BORDER 0: INK 7: PAPER 0: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS : CLEAR 31765
20 DEF FN h(a#)=16*(CODE a#(n)
-48-(39 AND a#(n))>"9")+CODE a#(
n+1)-48-(39 AND a#(n+1))>"9")
30 FOR l=80 TO 220 STEP 10: PR
INT "Line: ";l;: READ a,c,a#: LE
T t=0
40 FOR n=1 TO LEN a# STEP 2
50 POKE a,FN h(a#): LET t=t+FN
h(a#): LET a=a+1: NEXT n
60 IF c<>t THEN BEEP .1,50: P
RINT TAB 10;"ERROR: ";TAB 17;"Tot
al: ";t:TAB 17;"Check: ";c: STOP
70 PRINT : NEXT l
80 DATA USR "a",4164,"04242323
9389671f2024c4c4c991e6f8374f9dae
adaf2702ecf2b975b5f5e440"
90 DATA USR "e",3716,"03070707
3b7d7e7ec0e0e0e0dcbe7e7d3b0f17

```

```

27438000bedce0e0e0c00000"
100 DATA USR "k",1059,"070f1832
20242330e0f0184c0424c40c"
110 DATA USR "m",1758,"1f100908
0f7181fff8089010f08e81ff"
120 DATA USR "o",2028,"fff04908
0f31437dff0f9210f08cc2be"
130 DATA USR "q",533,"00367f7f7
f3elc08"
140 DATA USR "r",1863,"083c6bd6
6a57ea566b56ff817e42427e"
150 DATA USR "t",1373,"1c141c05
063c7eff382838a060387eff"
160 DATA 31803,6793,"060e21c47c
23233e10d73e00d73e16d77ed74f237e
814f237eb920052b3601180d237eb920
062b2b36ff18022b2b2b71232323237e
d74f3e20d7237e814f237eb920052b36
01180d237eb920062b2b36ff18022b2b
2b712323232310a8"
170 DATA 31896,3582,"060e21c47c
3e10d7237ed73e16d7237ed723232323
7ed72b2b2b2b2b2b7ed7232323232323
2323232310dac9"
180 DATA 31940,1372,"a303010000

```

```

0002010217a4030100000003010318a3
031200000017ff0217a4031200000018
ff0318"
190 DATA 32040,1376,"a303000001
0117ff0217a40300000010118ff0318a3
031300000002010217a4031300000003
010318"
200 DATA 31980,858,"9a070001001
21e0000009b07000100121f0000009e0
7010101131e0000009f07010101131f0
00000"
210 DATA 32020,428,"a3030201021
119000000a403020102111a000000"
220 DATA 31766,2164,"061921227c
7ed72310fb1819161508100511016279
2049414e20442e424952445345591100
"
230 PRINT ""-PRESS ANY KEY TO
SAVE THE CODE-"
240 IF INKEY#="" THEN GO TO 24
0
250 SAVE "FPgraph"CODE USR "a",
168
260 SAVE "FPcode"CODE 31766,314

```

Listing 1

```

1 INPUT "Start address: "; n: F
OR b=n TO 27000: PRINT b;";": L
ET tot=0: FOR j=1 TO 5: INPUT a:
PRINT a; " ";: POKE b,a: LET tot
=tot+a: LET b=b+1: NEXT j: LET b
=b-1: PRINT TAB 27;";": tot: NEXT
j: LET tot=0: FOR n=24575 TO 26
989: LET tot=tot+PEEK n: NEXT n:
PRINT "Final checksum: "; tot
2 BORDER 0: PAPER 0: INK 7: B
RIGHT 1: RANDOMIZE: CLEAR 24575
: PRINT AT 9,7;"ROCKS! IS LOADIN
G"; AT 13,10: FLASH 1;"PLEASE WAI
T": INK 0: LOAD ""CODE: INK 7:
RANDOMIZE USR 24576

```

Listing 2

```

24575:62 205 175 13 33 ;488
24580:7 6 34 113 104 ;264
24585:62 255 50 112 104 ;583
24590:195 130 102 243 62 ;732
24595:71 50 141 92 205 ;559
24600:175 13 1 0 0 ;189
24605:205 56 102 205 255 ;823
24610:96 83 67 79 82 ;407
24615:69 58 48 48 48 ;271
24620:48 48 48 255 1 ;400
24625:25 0 205 56 102 ;388
24630:205 255 96 76 73 ;705
24635:86 69 83 58 51 ;347
24640:255 1 0 1 205 ;462
24645:56 102 205 255 96 ;714
24650:84 73 77 69 32 ;335
24655:58 48 48 58 48 ;260
24660:48 58 48 48 255 ;457
24665:33 106 104 17 107 ;367
24670:104 1 5 0 54 ;164
24675:0 237 176 33 0 ;446
24680:88 54 71 17 1 ;231
24685:88 1 63 0 237 ;389
24690:176 33 15 20 34 ;278
24695:80 104 33 64 88 ;369
24700:54 68 17 65 88 ;292
24705:1 192 2 237 176 ;608
24710:33 85 104 54 0 ;276
24715:17 86 104 1 4 ;212
24720:0 237 176 62 3 ;478
24725:50 95 104 205 200 ;654
24730:101 175 211 254 50 ;791
24735:72 92 205 103 97 ;569
24740:205 67 98 205 176 ;751
24745:98 205 28 99 205 ;635
24750:9 97 205 223 101 ;635
24755:205 182 99 58 95 ;639
24760:104 254 0 40 23 ;421
24765:1 254 127 237 120 ;739
24770:203 71 40 14 58 ;386
24775:104 104 254 255 196 ;913
24780:236 96 175 50 104 ;661
24785:104 24 205 33 0 ;366
24790:88 17 1 88 1 ;195
24795:0 3 54 56 237 ;350
24800:176 62 56 50 72 ;416
24805:92 62 7 211 254 ;626
24810:251 201 17 2 0 ;471
24815:33 220 5 205 181 ;644
24820:3 243 1 32 3 ;282
24825:11 120 177 32 251 ;594
24830:201 225 126 35 229 ;816
24835:254 255 200 215 24 ;948
24840:246 58 105 104 254 ;767
24845:2 40 5 60 50 ;157
24850:105 104 201 175 50 ;635
24855:105 104 33 111 104 ;457
24860:126 60 254 10 56 ;506
24865:26 175 119 43 126 ;489
24870:60 254 6 56 17 ;393
24875:175 119 43 229 193 ;759
24880:17 106 104 167 237 ;631
24885:82 40 5 197 225 ;549
24890:24 224 119 1 6 ;374
24895:1 205 56 102 6 ;370
24900:3 33 106 104 197 ;443

```

THE GIGANTIC astral gibbon of Aldebaran 4 is throwing green rocks at you. He's been hired by the man-eating molluscs of Rigel to get you. They've also got heat-seeking missiles. Tough.

So - use keys B and N to dodge, and CAPS SHIFT to fire at the missiles and rocks. C Clarke of Oldham in Lancashire wrote **Rocks**, which runs on any Spectrum. It's in full machine-code and was written with the OCP Editor/Assembler.

To enter the code, first type in Listing One and RUN it. Enter the first start address - 24575 - and then the decimal numbers one by one. The number at the end of each line is a checksum, which you can check against the sum printed on the screen.

When you've done all that, a final checksum will be worked out, which should come to 237822. Delete line 1 from the Basic listing. Enter SAVE "ROCKS" LINE 1: SAVE "rockscod" CODE 24575, 2450, and VERIFY.

```

24905:229 126 198 48 215 ;816
24910:225 35 229 126 198 ;813
24915:48 215 62 58 215 ;598
24920:225 193 35 16 235 ;704
24925:1 14 1 205 56 ;277
24930:102 62 32 215 201 ;612
24935:175 50 82 104 50 ;461
24940:91 104 58 112 104 ;469
24945:254 255 202 12 98 ;821
24950:254 128 40 55 254 ;731
24955:64 202 228 97 1 ;592
24960:254 247 237 120 203 ;1061
24965:103 32 7 62 255 ;459
24970:50 82 104 24 14 ;274
24975:1 254 239 237 120 ;851
24980:203 87 32 5 62 ;389
24985:127 50 82 104 1 ;364
24990:254 239 237 120 203 ;1053
24995:71 32 6 62 255 ;426
25000:50 91 104 201 175 ;621
25005:50 91 104 201 219 ;665
25010:31 254 2 40 33 ;360
25015:254 1 40 23 254 ;572
25020:16 40 31 254 17 ;358
25025:40 5 254 18 40 ;357
25030:6 201 205 210 97 ;719
25035:24 17 205 216 97 ;559
25040:24 12 62 127 50 ;275
25045:82 104 201 62 255 ;704
25050:50 82 104 201 62 ;499
25055:255 50 91 104 201 ;701
25060:1 254 239 237 120 ;851
25065:245 203 103 40 16 ;607
25070:203 95 40 19 241 ;598
25075:203 71 194 172 97 ;737
25080:62 255 50 91 104 ;562
25085:201 62 255 50 82 ;650
25090:104 24 237 62 127 ;554
25095:50 82 104 24 230 ;490
25100:1 254 127 237 120 ;739
25105:203 103 40 26 203 ;575
25110:95 40 26 175 50 ;386
25115:82 104 1 254 254 ;695
25120:237 120 203 71 40 ;671
25125:5 175 50 91 104 ;425
25130:201 62 255 24 248 ;790
25135:62 255 24 231 62 ;634
25140:127 24 227 42 80 ;500
25145:104 17 13 105 14 ;253
25150:68 205 69 102 201 ;645
25155:58 82 104 254 0 ;498

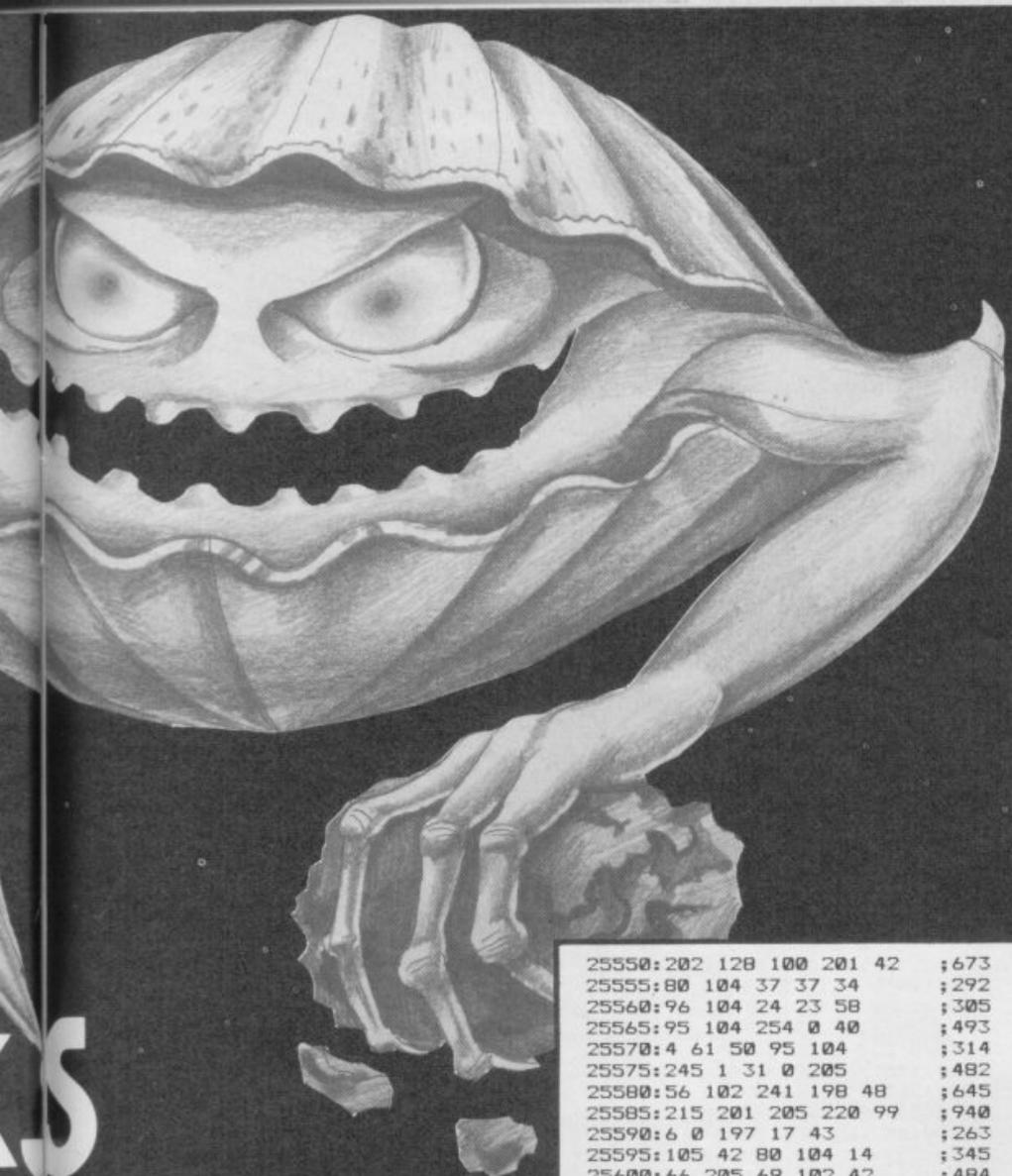
```

ROCKS

```

25160:40 8 254 255 40 ;597
25165:24 254 127 40 57 ;502
25170:42 80 104 17 209 ;452
25175:104 14 71 205 69 ;463
25180:102 58 91 104 254 ;609
25185:255 204 175 100 201 ;935
25190:205 55 98 42 80 ;480
25195:104 125 254 0 40 ;523
25200:225 45 34 80 104 ;488
25205:45 45 205 3 99 ;397
25210:254 255 40 6 175 ;730
25215:50 99 104 24 206 ;483
25220:62 255 50 99 104 ;570
25225:24 199 205 55 98 ;581
25230:42 80 104 125 254 ;605
25235:30 40 188 44 34 ;336
25240:80 104 44 44 205 ;477
25245:3 99 254 255 40 ;651
25250:6 175 50 98 104 ;433
25255:24 169 62 255 50 ;560
25260:98 104 24 162 6 ;394
25265:3 197 205 242 98 ;745
25270:254 30 48 249 38 ;619
25275:2 111 229 205 3 ;550
25280:99 225 254 255 40 ;873
25285:40 36 229 205 3 ;513
25290:99 225 254 255 40 ;873
25295:30 38 2 229 205 ;504
25300:242 98 203 79 40 ;662
25305:11 225 17 115 104 ;472
25310:14 68 205 69 102 ;458
25315:24 9 225 17 145 ;420
25320:104 14 68 205 69 ;460
25325:102 193 16 193 201 ;705
25330:42 118 92 84 93 ;429
25335:41 41 25 41 41 ;189
25340:41 25 34 118 92 ;310
25345:124 201 205 104 102 ;736
25350:6 8 126 254 0 ;394

```



25805:104 237 91 102 104 ;638
 25810:167 237 82 40 74 ;600
 25815:42 92 104 237 91 ;566
 25820:102 104 37 167 237 ;647
 25825:82 40 61 42 92 ;317
 25830:104 229 205 3 99 ;640
 25835:225 254 255 202 143 ;1079
 25840:101 37 205 3 99 ;445
 25845:254 255 202 143 101 ;955
 25850:42 92 104 17 177 ;432
 25855:104 14 70 205 69 ;462
 25860:102 42 92 104 17 ;357
 25865:13 105 14 68 205 ;405
 25870:69 102 42 92 104 ;409
 25875:37 37 34 92 104 ;304
 25880:193 16 168 62 255 ;694
 25885:50 104 104 201 193 ;652
 25890:58 101 104 254 70 ;587
 25895:40 32 254 65 40 ;431
 25900:12 254 67 40 16 ;389
 25905:62 70 50 101 104 ;387
 25910:195 252 101 62 67 ;677
 25915:50 101 104 195 252 ;702
 25920:101 62 66 50 101 ;380
 25925:104 195 252 101 6 ;658
 25930:20 197 42 102 104 ;465
 25935:17 43 105 229 213 ;607
 25940:14 66 205 69 102 ;456
 25945:209 225 14 70 205 ;723
 25950:69 102 33 100 0 ;304
 25955:17 1 0 205 181 ;404
 25960:3 243 193 16 222 ;677
 25965:42 102 104 17 13 ;278
 25970:105 14 68 205 69 ;461
 25975:102 6 4 33 88 ;233
 25980:104 126 60 119 254 ;663
 25985:10 56 5 175 119 ;365
 25990:43 16 244 205 156 ;664
 25995:100 195 175 99 193 ;762
 26000:6 5 197 42 92 ;342
 26005:104 37 17 43 105 ;306
 26010:14 70 205 69 102 ;460
 26015:42 92 104 37 17 ;292
 26020:75 105 14 66 205 ;465
 26025:69 102 33 50 0 ;254
 26030:17 1 0 205 181 ;404
 26035:3 243 193 16 218 ;673
 26040:42 92 104 37 17 ;292
 26045:13 105 14 68 205 ;405
 26050:69 102 205 139 100 ;615
 26055:201 205 242 98 254 ;1000
 26060:30 48 249 111 38 ;476
 26065:3 34 102 104 175 ;418
 26070:50 100 104 62 65 ;381
 26075:50 101 104 201 58 ;514
 26080:100 104 254 200 48 ;706
 26085:7 205 242 98 50 ;602
 26090:100 104 201 42 102 ;549
 26095:104 237 91 80 104 ;616
 26100:123 189 40 4 56 ;412
 26105:16 24 31 42 102 ;215
 26110:104 17 241 104 58 ;524
 26115:101 104 79 205 69 ;558
 26120:102 201 205 44 102 ;654
 26125:42 102 104 125 254 ;627
 26130:0 40 231 45 34 ;350
 26135:102 104 24 225 205 ;660
 26140:44 102 42 102 104 ;394
 26145:125 254 30 40 214 ;663
 26150:44 34 102 104 24 ;308
 26155:208 42 102 104 17 ;473
 26160:13 105 14 68 205 ;405
 26165:69 102 201 33 60 ;465
 26170:92 203 134 62 22 ;513
 26175:215 120 215 121 215 ;886
 26180:201 229 205 79 102 ;816
 26185:225 36 205 79 102 ;647
 26190:201 205 104 102 229 ;841
 26195:205 119 102 113 35 ;574
 26200:113 225 6 8 35 ;387
 26205:26 119 43 19 26 ;233
 26210:119 19 36 16 245 ;435
 26215:201 124 230 7 15 ;577
 26220:15 15 133 111 124 ;398
 26225:230 248 246 64 103 ;891
 26230:201 203 60 203 60 ;727

25550:202 128 100 201 42 ;673
 25555:80 104 37 37 34 ;292
 25560:96 104 24 23 58 ;305
 25565:95 104 254 0 40 ;493
 25570:4 61 50 95 104 ;314
 25575:245 1 31 0 205 ;482
 25580:56 102 241 198 48 ;645
 25585:215 201 205 220 99 ;940
 25590:6 0 197 17 43 ;263
 25595:105 42 80 104 14 ;345
 25600:66 205 69 102 42 ;484
 25605:96 104 17 75 105 ;397
 25610:14 70 205 69 102 ;460
 25615:17 75 105 42 80 ;319
 25620:104 14 70 205 69 ;462
 25625:102 42 96 104 17 ;361
 25630:43 105 14 66 205 ;433
 25635:69 102 33 50 0 ;254
 25640:17 1 0 205 181 ;404
 25645:3 243 193 16 198 ;653
 25650:58 100 104 254 200 ;716
 25655:56 30 42 80 104 ;312
 25660:237 91 102 104 37 ;571
 25665:37 167 237 82 40 ;563
 25670:13 42 80 104 237 ;476
 25675:91 102 104 37 167 ;501
 25680:237 82 32 3 205 ;559
 25685:200 101 42 80 104 ;527
 25690:17 13 105 14 68 ;217
 25695:205 69 102 42 96 ;514
 25700:104 17 13 105 14 ;253
 25705:68 205 69 102 175 ;619
 25710:50 98 104 50 99 ;401
 25715:104 201 42 80 104 ;531
 25720:44 44 34 96 104 ;322
 25725:195 243 99 42 80 ;659
 25730:104 45 45 34 96 ;324
 25735:104 195 243 99 33 ;674
 25740:89 104 6 5 126 ;330
 25745:60 119 254 10 56 ;499
 25750:5 175 119 43 16 ;358
 25755:244 1 6 0 205 ;456
 25760:56 102 6 6 33 ;203
 25765:85 104 126 198 48 ;561
 25770:215 35 16 249 201 ;716
 25775:42 80 104 37 37 ;300
 25780:34 92 104 33 10 ;273
 25785:0 17 1 0 205 ;223
 25790:181 3 243 6 8 ;441
 25795:197 58 100 104 254 ;713
 25800:200 56 25 42 92 ;415

25355:32 12 35 126 254 ;459
 25360:0 32 6 43 36 ;117
 25365:16 241 175 201 62 ;695
 25370:255 201 1 0 8 ;465
 25375:237 67 83 104 175 ;666
 25380:50 94 104 205 82 ;535
 25385:98 205 76 99 237 ;715
 25390:75 83 104 120 254 ;636
 25395:159 48 50 4 237 ;498
 25400:67 83 104 175 50 ;479
 25405:91 104 58 94 104 ;451
 25410:254 8 40 221 60 ;583
 25415:50 94 104 24 222 ;494
 25420:237 75 83 104 205 ;704
 25425:170 34 229 237 75 ;745
 25430:83 104 120 214 8 ;529
 25435:71 205 170 34 84 ;564
 25440:93 225 1 32 0 ;351
 25445:237 176 201 1 0 ;615
 25450:2 205 56 102 6 ;371
 25455:32 62 32 215 16 ;357
 25460:251 33 64 88 17 ;453
 25465:65 88 1 31 0 ;185
 25470:54 68 237 176 175 ;710
 25475:50 91 104 58 100 ;403
 25480:104 254 200 48 3 ;609
 25485:195 82 98 42 102 ;519
 25490:104 229 205 104 102 ;744
 25495:205 119 102 62 68 ;556
 25500:119 35 119 225 124 ;622
 25505:254 20 40 10 36 ;360
 25510:34 102 104 205 252 ;697
 25515:101 195 82 98 205 ;681
 25520:44 102 205 200 101 ;652
 25525:201 42 80 104 37 ;464
 25530:205 3 99 254 255 ;816
 25535:40 17 58 98 104 ;317
 25540:254 255 202 117 100 ;928
 25545:58 99 104 254 255 ;770

continued on page 94



continued from page 93

26235:203 60 203 244 203	;913	26490:1 7 6 237 67	;318	26745:240 3 152 7 236	;638
26240:228 201 175 211 254	;1069	26495:113 104 205 56 102	;580	26750:15 20 10 252 11	;308
26245:1 12 0 205 56	;274	26500:62 62 215 24 193	;556	26755:104 21 232 21 232	;610
26250:102 205 255 96 82	;740	26505:62 128 50 112 104	;456	26760:61 240 23 240 9	;573
26255:79 67 75 83 33	;337	26510:205 103 103 1 7	;419	26765:224 7 192 1 0	;424
26260:33 255 1 6 2	;297	26515:8 237 67 113 104	;529	26770:0 0 0 0 0	;0
26265:205 56 102 205 255	;823	26520:205 56 102 62 62	;487	26775:0 3 192 15 96	;306
26270:96 87 114 105 116	;518	26525:215 195 74 103 62	;649	26780:30 80 25 176 29	;340
26275:116 101 110 32 98	;457	26530:32 50 112 104 205	;503	26785:96 11 192 12 128	;439
26280:121 58 67 46 67	;359	26535:103 103 1 7 10	;224	26790:11 0 7 0 0	;18
26285:108 97 114 107 101	;527	26540:237 67 113 104 205	;726	26795:0 0 0 0 0	;0
26290:46 255 1 9 4	;315	26545:56 102 62 62 215	;497	26800:0 128 1 128 1	;258
26295:205 56 102 205 255	;823	26550:195 74 103 62 64	;498	26805:128 1 128 1 128	;386
26300:96 83 69 76 69	;393	26555:50 112 104 205 103	;574	26810:1 128 1 128 1	;259
26305:67 84 32 79 80	;342	26560:103 1 7 12 237	;360	26815:128 1 128 1 128	;386
26310:84 73 79 78 255	;569	26565:67 113 104 205 56	;545	26820:1 128 1 128 1	;259
26315:1 8 6 205 56	;276	26570:102 62 62 215 195	;636	26825:128 1 128 1 128	;386
26320:102 205 255 96 49	;707	26575:74 103 205 17 96	;495	26830:1 128 1 128 1	;259
26325:45 75 69 89 66	;344	26580:6 20 197 1 7	;231	26835:128 1 192 3 192	;516
26330:79 65 82 68 255	;549	26585:2 205 56 102 205	;570	26840:3 64 2 64 2	;135
26335:1 8 8 205 56	;278	26590:255 96 71 32 65	;519	26845:96 6 224 7 226	;559
26340:102 205 255 96 50	;708	26595:32 77 32 69 32	;242	26850:71 242 79 186 93	;671
26345:45 75 69 77 80	;346	26600:32 79 32 86 32	;261	26855:190 125 190 125 226	;856
26350:83 84 79 78 255	;579	26605:69 32 82 255 205	;643	26860:71 192 3 0 0	;266
26355:1 8 10 205 56	;280	26610:28 99 33 100 0	;260	26865:128 1 192 3 252	;576
26360:102 205 255 96 51	;709	26615:17 2 0 205 181	;405	26870:63 184 29 176 13	;465
26365:45 67 85 82 83	;362	26620:3 205 242 98 211	;759	26875:160 5 224 7 192	;588
26370:79 82 255 1 8	;425	26625:254 33 0 88 119	;494	26880:2 64 3 192 2	;263
26375:12 205 56 102 205	;580	26630:17 1 88 1 0	;107	26885:192 3 128 1 128	;452
26380:255 96 52 45 73	;521	26635:3 237 176 193 16	;625	26890:1 128 1 0 0	;130
26385:78 84 69 82 70	;383	26640:197 1 0 19 205	;422	26895:0 0 0 0 0	;0
26390:65 67 69 32 73	;306	26645:56 102 205 255 96	;714	26900:0 0 0 0 0	;0
26395:73 255 1 8 15	;352	26650:80 114 101 115 115	;525	26905:0 0 0 0 0	;0
26400:205 56 102 205 255	;823	26655:32 97 110 121 32	;392	26910:0 0 0 0 0	;0
26405:96 53 45 83 84	;361	26660:107 101 121 32 116	;477	26915:0 0 0 0 0	;0
26410:65 82 84 32 71	;334	26665:111 32 99 111 110	;463	26920:0 0 0 0 0	;0
26415:65 77 69 255 237	;703	26670:116 105 110 117 101	;549	26925:70 75 204 44 116	;509
26420:75 113 104 205 56	;553	26675:46 255 33 0 88	;422	26930:23 136 12 112 107	;390
26425:102 62 62 215 33	;474	26680:17 1 88 1 0	;107	26935:46 21 243 23 154	;487
26430:0 88 17 1 88	;194	26685:3 54 87 237 176	;557	26940:41 172 85 80 52	;430
26435:1 0 3 54 71	;129	26690:205 142 2 123 254	;726	26945:200 21 36 82 94	;433
26440:237 176 1 254 247	;915	26695:255 40 248 205 175	;923	26950:37 72 89 128 96	;422
26445:237 120 203 71 40	;671	26700:13 195 130 102 0	;440	26955:0 0 12 120 18	;150
26450:31 203 79 40 50	;403	26705:0 0 0 0 0	;0	26960:71 228 40 136 23	;498
26455:203 87 202 161 103	;756	26710:0 0 0 0 0	;0	26965:80 9 72 22 100	;283
26460:203 95 202 185 103	;788	26715:0 0 0 0 0	;0	26970:106 178 169 76 90	;619
26465:203 103 40 108 24	;478	26720:0 0 0 0 0	;0	26975:144 39 96 20 32	;331
26470:227 237 75 113 104	;756	26725:0 0 0 0 0	;0	26980:27 144 36 72 72	;351
26475:205 56 102 62 32	;457	26730:0 0 0 0 0	;0	26985:48 48 0 0 0	;96
26480:215 201 62 255 50	;783	26735:0 0 0 0 0	;0	26990:0 0 0 0 0	;0
26485:112 104 205 103 103	;627	26740:0 0 0 224 1	;225	26995:0 0 0 0 0	;0
				27000:0 0 0 0 0	;0

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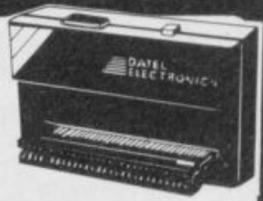


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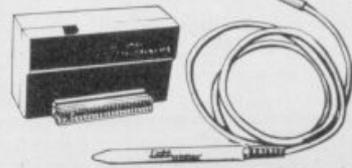
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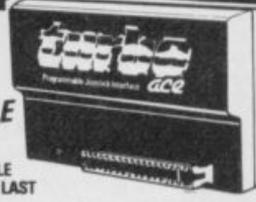


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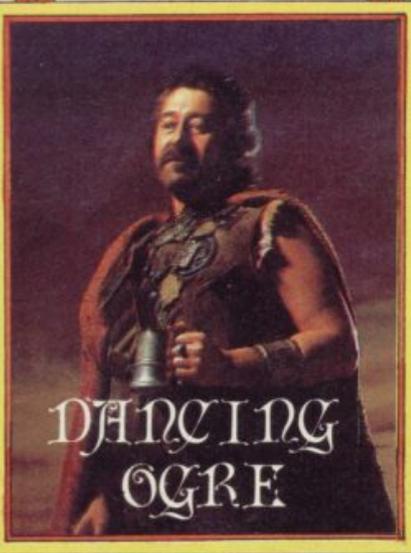
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OUR PARTY was forced to remain at the fort of Uusuun-An for two days because of the turmoil along the Great Road. Colonel Ishiru, the commander there, told me that the snake folk were greatly angered because some human had defiled the shrine of their python-god, Szasassa. One of the huge sapphire eyes of the cult image had been stolen and not yet recovered. When we reached that point in our talk Iubba, the snake men's captive, hurriedly excused himself. He has been complaining of the bellyache and swears something he ate disagreed with him. Hmm . . .

This Iubba claims the snake people took him for fresh meat — that is hard to credit for he is all skin and bone, and small with it. Either they like their men stringy or there is another side to the tale. He has asked to join us on our trek. Since the services of a locksmith are always handy I have agreed. He will fit in places I could not.

On the subject of bellies, you will be disturbed to hear that I have damaged my protuberance! In my sleep I rolled over and crushed the bottle that held the fiery Micro-Demon I bought from Zignash the Ectoplasmist. Before it expired from fright beneath my weight, it caused a distinct soreness and redness on my poor flesh. I shall be returning it to Zignash for replacement you may be sure.

More travellers arrived to shelter at the fort and there was little to do but talk and dice. Paul of Polesworth passed on news of his stay within the walls of **Dun Darach**. Here, there are many secret doors which may be found in the blank walls which carry torches.

"First," says Paul, "obtain a book from the shop in King Street. Give it to the Lady Mhor and she will give one in return. That will open the secret door in Myre Street. The shield found hidden here can be offered to the great Goddess Danu. Now, on Old Hill you may get a lyre. Dain, who dwells behind the ever-

open secret door in Park Row, will exchange that lyre of a shield sacred to Midir. Offer it to the god and you shall receive a key."

Much money may be made in this sorcerous place. "This is simple, O Large One. Take gold from the Assayers in West Way and sell it to the brokers in Cross Street. There are other means but that is easiest. But beware the thieves — they will always take the possession you have placed your star beside. Thus it is safer never to place your star on a valued object — leave it on your stock of Iridi which can be easily replaced."

Despite his knowledge, Paul seeks advice on other problems here. He wishes to know how to remove the Pearl from the Strong Room on the north wall, and he cannot find a way into the Inner Castle from the jail. Share your experience with him and receive help by writing to him at The Vicarage, Polesworth, Tamworth, Staffordshire.

Grimwood the Exciseman has wandered the paths of the Irish legends too, in **Tir Na Nog**. Though partially successful he could not find the egg to open the N door. To locate that he should go to

In the fort of Uusuun-An, Gordo dices with weary adventurers

Ruads Retreat carrying some sand. Nor could he leave the Row in the Plain of Lies — seek out a secret and invisible door for an exit.

Now this Grimwood has tried to read the second scroll he found in the library. He knows it to be written in Ogham, the ancient Celtic script, but his translation is meaningless. The McKenna of Croydon, a battle weary veteran, told us all that the script is corrupt and should read Crossroad Ten North. Perhaps that means ten paces north from a crossroads?

The McKenna has fulfilled the quests of both **Tir Na Nog** and **Dun Darach**. Help he offers if you write, courier prepaid, to 35, Havelock Road, Croydon, Surrey. As the night fell and the beer flowed the voices of those **Bored of The Rings** rose in argument. Dewi Ap Evan of Caerphilly, Hugh Boggit of Newtown Abbey and John the Taylor of Portstewart, all fell upon Thorne of Mansfield in a quarrel over the way to enter the Morona Gate. All know the clue which tells the traveller to use pepper but none could find the spice.

Prising them apart, I cautioned them to search carefully at Featherwop Beacon where there is a stone. Examine it, lift it if you will and then be sure to look before you leave. When you have the pepper drop it at the gate. So much discord for a little thing!

When he had recovered, Thorne of Mansfield came over to help me with Alex de Keresley of Coventry. This wanderer had entered Tylon's bedchamber in **Kentilla**. There stands a chest, inviting plunder but securely locked. Alex could find no key. "Simple", says Thorne, "examine the bedposts well. There's a key there. Before unlocking the chest, strengthen it by dipping it in a precious liquid. All will then be yours."

Richard the Black had found himself in deep water in the same quest. Way out on the perilous Serpent Sea he was, with a leaky boat. If you have a cup or silver chalice handy you can bail the water out and proceed in safety.

A problem of codes beset Gary 006 of Scunthorpe. In the **Fourth Protocol** he could find no way to decipher or understand the one-time pads. When your code is given to you early in the search write down the numbers. Take the first number and then count horizontally across the letter grids. Thus the first letter of the second line corresponds to 27. The second letter of that same line will be 28 and so on. Count the letters until you reach that which corresponds to the number you have. Now you have the first letter deciphered.

Five Best Shaw of Maidstone, dressed most sweatily in a tracksuit, complained to me that his search for status and wealth in **Hampstead** had failed. Penniless in Piccadilly he is, and can raise no cash. Before you travel to Waterloo take a well earned rest upon a bench on Hampstead Heath. Examining that spot well may give you access to a flexible friend.

After such an exhausting night sleep came easily to me, though as I dropped off I spied Iubba stealthily creeping behind a barrack block. Close behind him in the shadows were Zul and Zel, peering intently. I have some strange companions indeed. Farewell friends.

Greatbelly

Gordo Greatbelly, Landlord

If you have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, Priory Court, 30-32 Farringdon Lane, London EC1R 5BH.

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**QL MEGA GRAPHICS
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**HUGO CORNWALL
BLOWS THE LID
OFF HACKING**

MOST MONTHS the games sent in for review tend to be a mixed bag and usually only one or two stand out from the general run of average productions. This month is exceptional as all five programs reviewed are either excellent, value for money, break new ground or restate old values. Whatever the depth of your pocket you should find at least one that suits you or your wallet.

Mordon's Quest

The large scale text-only game has gone underground lately and graphics have come forward as the favoured element in adventures. **Mordon's Quest** bucks this trend and is a welcome return, with long flavour-some descriptions and a vast feeling of space.

The program is a sequel to Melbourne House's **Classic Adventure** and is written by the same author, John Jones-Steele. There are over 150 locations and, according to the blurb, more than 400 words in the vocabulary. The presentation is a restful white text on a black background with your inputs scrolling up in yellow.

The quest begins in a strange and sparsely furnished house set in the swirling mists of a time limbo. Logical exploration reveals little at first but, if you are curious enough, a fall from a height will leave you nauseous and predisposed to concussed visions. So appears Mordon the Ancient One, swathed in light. He asks you to take on the search for the lost pieces of an immortality device — your success will save the universe from assured destruction.

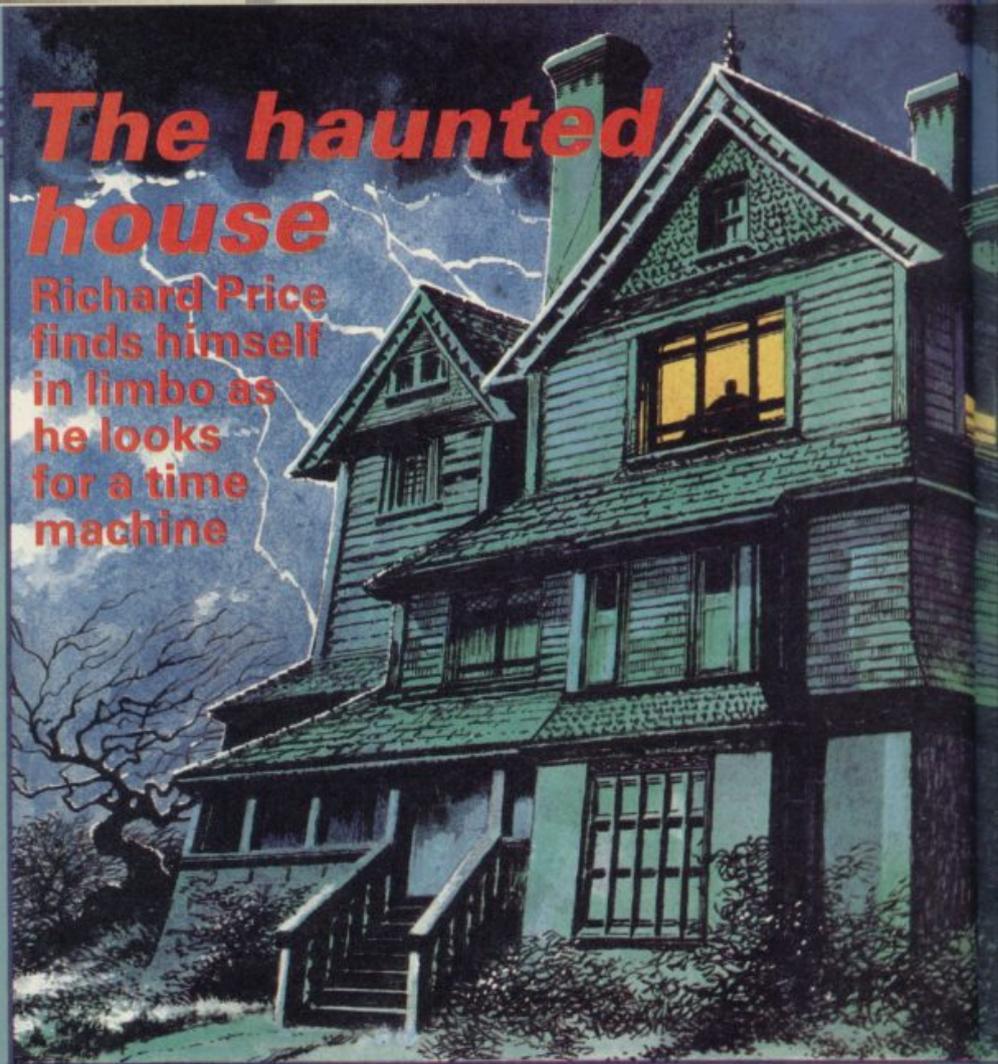
With the aid of a transporter unit and torch you set off into the mists. Sure enough you quickly enter a steaming jungle full of ancient ruins. After passing the mandatory patch of quicksand, you will run into a cannibal pygmy who can be disposed of by making a weapon from the bits and pieces found lying around in the jungle. Don't forget the pygmy as you journey — the carnivorous plants can be placated by a spot of judicious feeding!

The search now begins in earnest and, though you will discover some treasure and the first part of Mordon's machine quite quickly, you'll need to put in some serious thinking to progress into the other areas of the game.

The descriptions are excellent, full

The haunted house

Richard Price finds himself in limbo as he looks for a time machine



of atmosphere and needing no pictures to help them. When you arrive at the temple in the heart of the ruinous city you see a lake . . . "you walk to the lake and dive in. After swimming for several minutes you find yourself at a small outcrop of black rock. Looking around you, you see the perfect circle of the lake, surrounded by the ruined city and in turn the lush jungle. As you view the scenery you feel almost as if you are standing at the centre of a beautiful all-seeing eye."

This literate and evocative text is typical of the game as a whole and the detail encourages exploration and experiment. I have no doubt that many clues are hidden in this wealth of description. Don't think of the lack of graphics as a loss — just give three cheers for text compression and expect some good hunting!

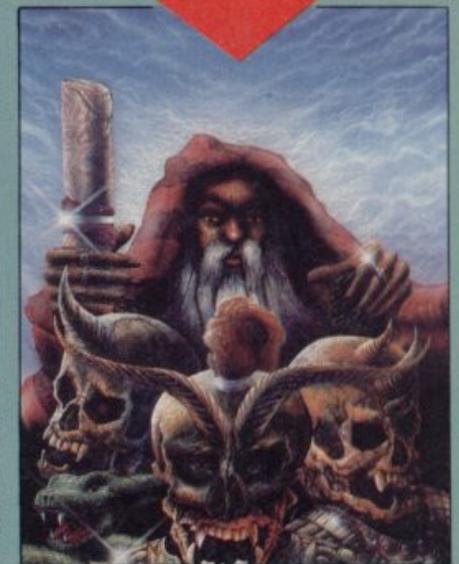
Sorderon's Shadow

Sorderon's Shadow — The Legend of Elindor is the most innovative of this month's selection. Beyond has consistently tried to push out the frontiers of games software and this latest program is no exception. In fact

the scope of the game is so wide that it would be difficult to explain all its facets in such a small space.

The setting is the land of Elindor, much troubled by the evil of the sorcerer Sorderon. That wicked magus has blighted the land by his spells and the country is wasted by his minions and creatures. Krillan zombie warriors terrorise the people and other

SINCLAIR USER
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half-human things haunt the landscape.

You are cast as the Un-named One, foretold in legend as the saviour of Elindor. To defeat Sorderon you must successfully accomplish nine major quests, all of which are subdivided into lesser tasks. Most of those tasks involve the enlisting of other characters, many of whom are hostile or indifferent to you. At other points you will need to reconstruct magical artifacts such as the Staff of Power, or trade items of power for others necessary to your purpose. The overthrow of Sorderon is no straightforward matter.

Your journey takes place in a landscape familiar to addicts of *Lords of Midnight* or *Doomdark's Revenge*. As you move from location to location the features shift in perspective and size on the screen. You can view the country from all eight major compass directions before deciding where you want to go. There are mountains, plains, lakes and forests. Within those you will discover tombs, huts, caves and other man-made places. Beyond claim over 4,000 locations and a staggering 33,000 screen views.

Commands are given in a variety of ways. By pressing Symbol Shift you can access a range of single key

instructions. With those you can move, get an inventory, count your money, identify other characters, and carry out a number of other functions like scoring, saving and so on. There is also a full text interpreter which allows you to play the game as a text adventure too. That takes the program beyond the systems used in *Lords of Midnight* and provides a wide variety of choice for your approach to the game.

The interpreter shows the results of your actions on a scroll above the landscape and informs you of any problems in your input with an error message buffer. The screen also displays your strength — you'll need to find food — and shows small graphics of the characters who are with you in the location.

There are many other inhabitants of Elindor living their own lives around you in real time. You can speak to them and get them to help or do your bidding. You may, of course, need to fight them so you will have to be quick on the uptake.

Before you begin you will need to familiarise yourself with the very complex game format. There is a vast wodge of documentation with the cassette and I advise you to spend a fair bit of time taking it all in. The quests and sub-quests are very involved.

The first quest is to follow your



companion Morrin to the cave where a magical urn is secreted. The inscription on it will provide more clues to your task and Morrin then vanishes — you're on your own. My own first priority was to get used to the landscape — it took me a while to realise that wandering unprepared and unarmed was perilous, and I found myself being slaughtered regularly. Make sure you Save a position early on as you cannot simply quit and begin again — you have to load in a prepared set of data.

My review copy was a pre-production version and I ran into a few glitches in the program. At one point I typed 'Wait' — everything

crashed and I couldn't get the game going again. The text interpreter kept telling me that my sentence lacked a verb when it clearly didn't. Fortunately, that did not affect the play much and it's worth remembering that there are very few other games which even possess that sort of error-trapping function.

Sorderon's Shadow is a heady blend of text adventure and strategy, and is a true successor to the realms of *Midnight*. I am sure that it will have a strong appeal to those who have clashed with *Doomdark*, and it should pull in many other text players who may have shied away from the military bias of those previous programs. In some ways it is experimental, but definitely shows the way forward for mixed format games. Good luck and don't talk to any strange lizards.

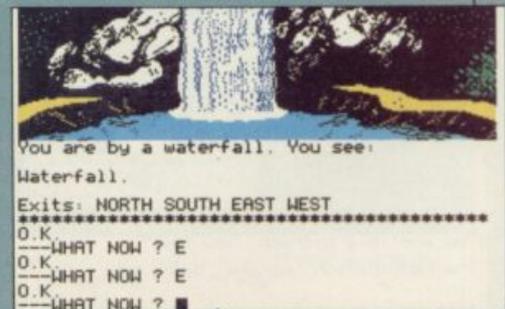
Robin of Sherwood

Sometime back in the Middle Ages the real Robin Hood began his career as the people's outlaw. Over the years he has undergone many transformations, and is nowadays portrayed as a freedom-fighter cum guerilla whose sole aim is to lift the yoke of Norman oppression from the Saxons' necks.

Robin of Sherwood from Adventure International is the computer spin-off from the TV series and portrays the new style Robin.

Like other Adventure International products, the game is mixed text and location graphics. A few of the pictures have some element of animation — such as the cascading waterfall — and are finely detailed, well drawn and very fast in appearing.

As in the TV series, you begin by finding yourself banged up in the sheriff's oubliette. To escape you will have to kill the guard and open the grating that pens you in. Adventure International feels that early achieve-



continued on page 102

continued from page 101

ment in an adventure helps to hook you into the game and the instruction sheet offers some useful coded help with that problem.

Once you've successfully broken out you should meet Herne the Hunter — Robin's godlike helper. He will



You are on the castle battlements. You see:

Door.

Exits: DOWN

-----WHAT NOW ? GO BATTLEMENTS
The portcullis is lowered. Your flight is blocked by soldiers. Much and Will escape.
-----WHAT NOW ? █

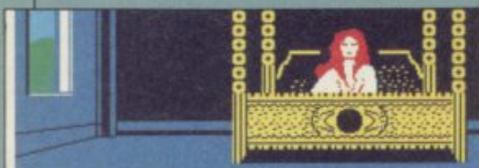
tell you to seek out the six Touchstones of Rhiannon. You will need to find your band and then explore the huge forest for clues and information.

Your adversaries include, naturally, the Sheriff of Nottingham and also Knights Templar, corrupt taxmen, venal Nuns and the extremely evil Simon De Belleme — the Crusader magician.

The problems rapidly become more complex and it seems that certain actions have to occur before others become possible. Until you have won the archery contest it's impossible to rescue Marion from the sorcerer, and it is very easy to be recaptured by the Sheriff if you make rash judgements.

Other characters will lay sub-quests on you — the Templars, for instance, will freely admit that they possess a stone but won't part with it until you have found their stolen Holy Crest. The Nuns offer to sell theirs for a lot of gold — all you have to do is go out and steal it. But where from?

I found the scenario compelling and the identification with Robin very easy given the fine graphics. It is good to see one of our own home-grown heroes in adventure action, and I thoroughly recommend **Robin of Sherwood** to all potential freedom-fighters. The game is a little pricey at £9.95 but it is worth saving up for.



You are in a bedroom. You see:

The Lady Marion. Window. Door. Bed.

-----WHAT NOW ? GO DOOR
-----WHAT NOW ? GO RIGHT
-----WHAT NOW ? █

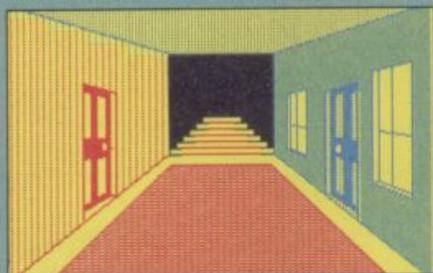
The Secret of St Bride's

Regular readers of this column will know that I have a distinct partiality for odd storylines and original plots.

The **Secret of St Bride's** falls smack dab into that category. St Bride's is a real school in Ireland but its set up is like a girls' boarding school fifty years ago. The, er, more mature lady may enjoy spending a week or so there to see what a private school was like in that remote era.

This Quilled adventure, with location graphics, is set in that abode of learning and begins as Trixie Trinian arrives there for her hols. Having donned your gymslip you start to wonder just what on earth this odd place is about, with its ancient wirelasses and copies of newspapers from the 1920s.

Your main task is to find out what the secret of the school is and then return it to present day normality. Built into the game is a search for a mysterious amulet — almost a game in itself. Anyone discovering the Secret



will be awarded a St Bride's Certificate of Merit by the Games Mistresses who direct this bizarre school. I kid you not . . . it really exists!

Play commences in the dorm where your chums Fiona and Cynthia join in your hunt. An exploration of the school shows that all exits are blocked. Only the Forbidden Door offers a way out. Escape from here can be managed through a special Use command built into the game which helps to get round the two word input system of the Quill. By using a pencil and then placing it in the keyhole you'll get the key . . . there's slightly more to it than that but I shan't spoil your fun — write to the Fat One next door if you're stuck.

The **Secret of St Bride's** is humorous, well written and full of odd connections. It is a tongue in cheek romp through the realms of Angela Brazil — if you like the sound

of it you should send your £6.95 to St Bride's School, Burtonport, County Donegal, Ireland. The Games Mistresses tell me they may have a distributor soon — keep an eye out for it.

Crystal Quest

Last, there's **Crystal Quest** from Pocket Money Software. This is a 100 location Quilled text adventure set in the world of *Star Trek*. The Earth is in serious danger and you must pilot your space craft where no man has gone before to find the three Crystals which will save the human race.

At the start you find yourself in the overheating engine room of the ship. The warp drive is due to malfunction so you have to race to the control room and warp out of Earth base, pronto. There are steering systems to be mastered — if you get your colour coding wrong you could be in dead trouble and end up in a completely wrong destination.

Once you have learned how to steer the ship, you will find a variety of planets to explore — some with hostile alien life and some with robotic systems to contend with. You can use a transporter beam to get down to those landfalls but remember to set the coordinates before you beam down.

Trekkies will like the game as will anyone who can only afford a small amount of cash to buy their software. At 99 pence the program is terrific value for money, and compares very favourably with a lot of games costing five times as much. Beam me up Scotty!

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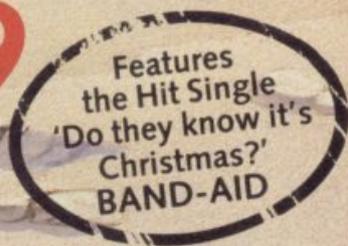
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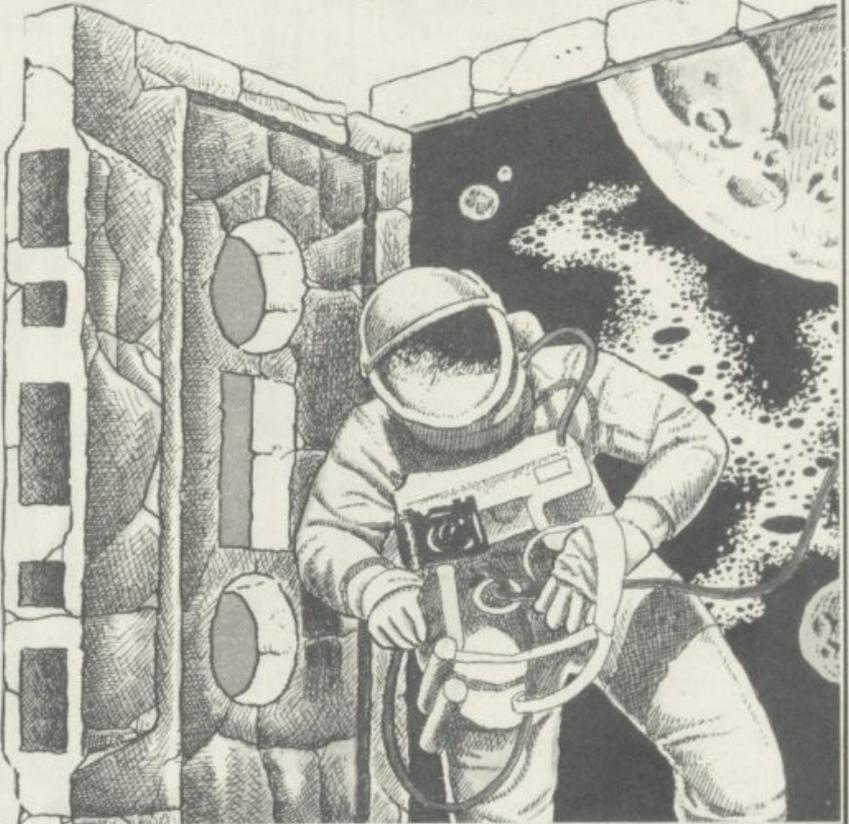
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FIVE YEARS is a long, long time in this business. Five years ago, the ZX-80 was hailed as a breakthrough at under £100. Five years ago, people were building Nascom computers from kits, and computer magazines, such as there were, printed listings of *Othello* for the UK101 or Acorn Atom.

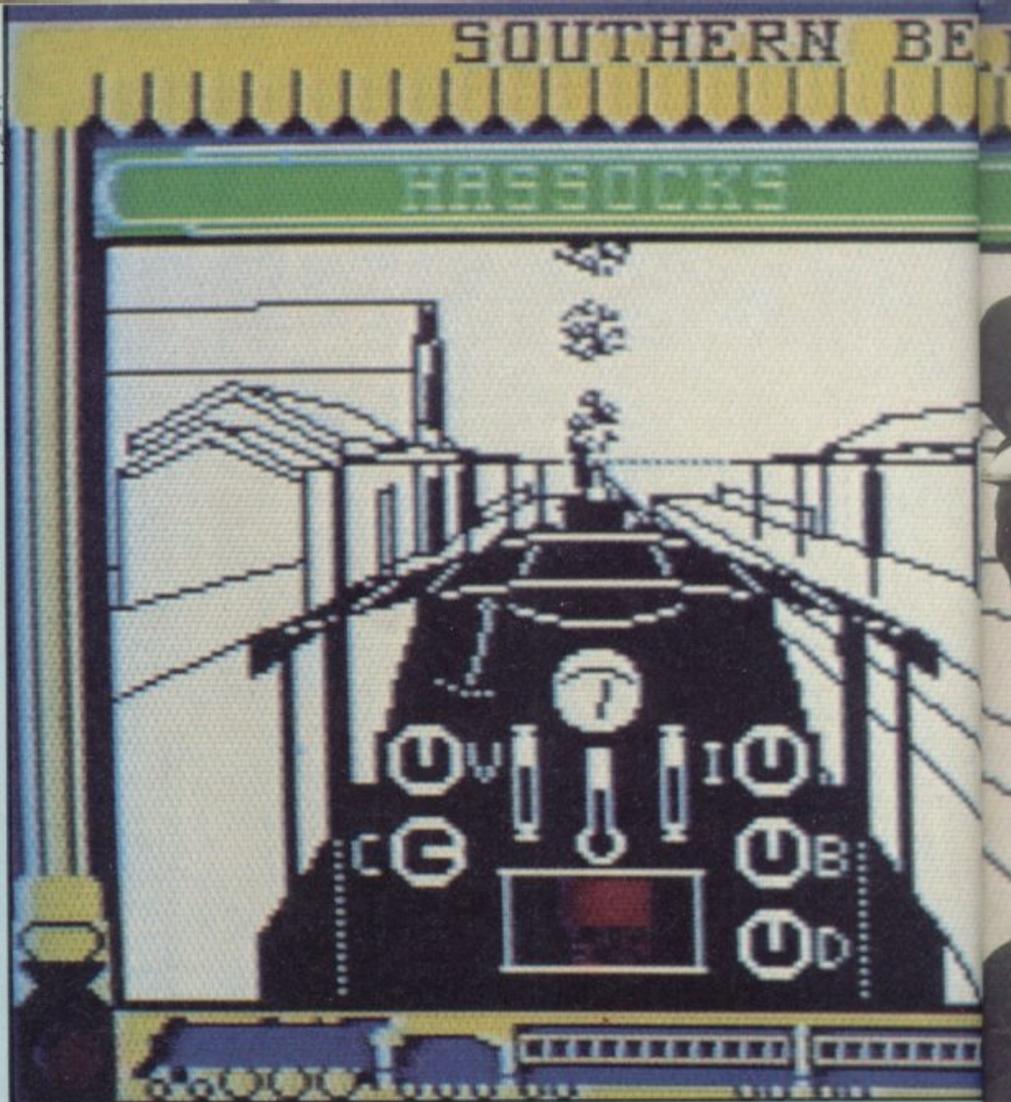
The prince of machines was the Commodore PET. There were no Amstrads. No Orics. No VIC 20s, BBCs, MSXs, C64s, Spectrums or QLs. And there were no games. Computers were not supposed to be about playing games, bought off the shelf. They were about writing your own, because it was an interesting way of learning how to program. It was all very earnest, the obsessive hobby of a tiny minority. And one of the few, the very few, software companies to have started back then, and still going today is Hewson Consultants, now celebrating its fifth birthday.

Andrew Hewson is well known to readers of *Sinclair User* through his Helpline column, which has been informing, and occasionally baffling, folks with revelations about machine code ever since the magazine began. But he's also the founder, and managing director, of Hewson Consultants, set up on a shoestring in 1980, and now an expanding business infiltrating the charts with programs such as *Dragontorc* and *Southern Belle*.

Andrew's a chemical physicist by education — he did a degree at Sussex University. In 1972 he started working at the British Museum assessing the age of objects by radio carbon dating.

"In 1973 the Museum got a computer," says Andrew. "It was a big step forward. Businesses used computers for things like insurance, and doing gas bills and so on. But in the last ten years or so it's made an enormous difference to science." The museum was one of the first organisations outside the big universities to acquire a computer for research work, rather than as a filing or accounting system.

Since nobody at the Museum could program it, an expert was brought in to run it, and Andrew learned how to program from him. "I learned good habits," says Andrew. "You have to take it slowly when you program. It was a 16-bit Hewlett Packard with a 64K memory. The memory was a set of ferrite rings which lived in a draw-



The Hewson Express

er. We had a couple of tape drives, a disc drive and a printer, and the operating system had to work frantically to keep it all going."

After seven years at the Brit, Andrew joined NERC, one of those much-derided quangoes. He moved to Oxfordshire and is still there.

"I'd been up to Manchester with my boss, and on the way home we stopped off at the Wimpy in Stratford-Upon-Avon for a cuppa. He started talking about the ZX-80 and how wonderful it was." Andrew was not impressed. "I said, 'you must be joking!' and started listing all the reasons why the machine was awful. He said, 'look at the price'. And the penny dropped."

Andrew leans back, puts his hands behind his head, and explains how, if you wanted a system with any equip-

ment — printers, discs or whatever — you needed about £2,000. "So I bought a ZX-80 and played around with it. You only get one life."

Right from the start it was business. Andrew was interested in making money, not acquiring a hobby. "I had a wife and two kids and a mortgage." He taps his head. "If I'm as clever as I think I am — no, that's not right. If you think 'I can do this', then there's an easy way to prove it."

What also made Andrew keen to set up his own business was an increasing dislike of the sort of organisation he was working for. "I learned that in fixed institutions, the job was never going to be more than it already was. Those places don't care if you spend ten years on some obscure project if it produces 'knowledge'. I got fed up



The unstoppable Hewson Consultants has been steaming ahead for half a decade. Chris Bourne talks to the man on the footplate

with it."

Andrew's one of those people who are concerned to analyse carefully what they do. "What isn't apparent to the public is the effect of government cutbacks and what it generates in the civil service. Look at the teachers — they're desperately anxious about the future of their profession. It was the same in government science departments.

"It's always difficult to look back on your own motives" he adds, cautiously.

So, Andrew hummed and hawed a bit and then got down to uncovering the innards of the ZX-80. "It was a breath of fresh air, the first computer I'd ever worked with where you could get at all of it. Usually you are given the ground rules — operating system,

language and so on." What he means is the way you can inspect the ROM of Sinclair machines easily, and write directly in machine code.

Andrew's first move was logical. All his moves are logical. Having discovered the ROM he wrote a book, *Hints and Tips for the ZX-80*. "People were interested in books. That book was why I'm now doing the *Sinclair User* column. It's about things like clearing a part of the display, or how variables are stored."

Hewson Consultants was thus formed on a mere £500 of capital. The consultant part was because Andrew also did some consultancy work. Logical, remember.

The book was a success, and became *Hints and Tips for the ZX-81* when that computer was released. By November of 1981, Andrew was working incredibly long hours, splitting his time between NERC and the new business, with help from his wife, Janet. It was then that his brother Gordon joined the business as Sales Director to take some of the administrative load off Andrew's shoulders.

Utilities were the thing in those days. The home computer market was supposed to be stuffed with would-be programmers — a real hobbyist's market. Andrew brought out *Programmer's Toolkit for the ZX-81*.

Virtually all companies receive bundles of unsolicited games from programmers, and that's how Mike Male got involved. He was an air traffic controller at Heathrow, and sent in a flight simulation called *Pilot*. It was very slow. John Hardman sent in *Puckman* "in just the same way. It sold quite nicely, thank you."

All the games were sold mail order and duplicated the hard way. On a cassette deck, by hand.

Nineteen eighty-two began as the year of the RAM pack and Andrew bought in a load of them to sell. It ended as the year of the Spectrum. By then Hewson Consultants had a proper office, a scruffy little place in Wallingford. Andrew, true to form, decided he was going to write a book about the Spectrum.

"People then were avid to know how things worked. Books can no longer carry them forward — but when people ask, 'what can I do with my computer?' they still go down to WH Smith."

Andrew worked night and day, he says, to complete *20 Best Programs for the Sinclair Spectrum*. "You know what

listings are like," says Andrew, sympathising with our own problems at *Sinclair User* in trying to help people type them in correctly. "We still get people phoning up about *Index File*."

Mike Male was now working on *Nightflite* and *Heathrow Air Traffic Control*, still beaver away at simulating flight one way or the other. The system at Hewson involves giving programmers their head. If the first game is successful, a new one is immediately discussed. According to Andrew, being good to your authors is one of the most important aspects of maintaining a sound business base.

"It's very easy to find people who'll write software. It's very difficult to find someone who can write good software. We've grown and prospered by keeping faith with our authors." That means if Mike wants to write simulations, Andrew won't try and force him to do arcade games.

At about the same time, Kim Topley was writing *Quest*, a text adventure with pictures. *Quest* is surely one of the most underrated of adventures — a role-playing game with spells, weapons, and extremely difficult problems. It's main failing is that it's slow — you have to wait for minutes to build up your energy if you get wounded, and there is no way of restarting a lost game. Kim followed up *Quest* with *Fantasia Diamond*, a wacky number with plenty of humour which probably went down better.

With such a wide range of products already out, most companies might have regarded themselves as home and dry. Ready for the Porsche, and the long summer break in the Bahamas. Not Andrew.

"It wasn't until 1983 that we seriously believed this hula-hoop craze was strong enough to build an entire business around. We decided to take it seriously. I left NERC in mid-83 and by the end of that year we were bursting out of Wallingford. Shipping out tapes for Christmas was exciting but also murder."

So the company moved to bigger premises on a Didcot industrial estate, and installed a duplicating plant which had been bought earlier. "We did it because we couldn't get guaranteed supplies of our software. I'd say it was the right decision for the future." Hewson is one of the very few software houses who do this — most use

continued on page 108





continued from page 107

commercial duplicating firms.

"From my experience in laboratories, I knew equipment was not a doddle. It never is. Our father is another chemist, and although he knew it wouldn't be easy, he was prepared to take it on. It works because of a combination of money, the right reason, and the key person to do it."

The plant starts with an ordinary, battered, cheap cassette deck. The program is loaded into the Spectrum



Programmers Mike Male and Bob Hillyer

from that, and then SAVED to a reel-to-reel ReVox tape deck. That master tape sends the program to the Binmaster machine, which sends cassette tape flying through a series of heads and rollers at high speed, duplicating the program. That tape settles in bins, and a 'wodge' is put on the tape to mark the end of each program. Another machine delivers blank cassettes containing nothing but transparent head tape, which it cuts, splices in the program tape, cuts at the 'wodge', splices again, and drops into a box. The final stage is to stick on the labels with a solvent and pack them up.

In August of 1983 Steve Turner arrived. He's the man behind **Avalon** and **Dragontorc**, and the masterly graphics system which leads Andrew to talk about computer movies with uncharacteristic enthusiasm. Usually he makes quietly deprecating comments such as 'we did all right with that' or 'it's a nice little program.'

Steve, by pure coincidence, went to the same school as Andrew. One feature of all Hewson's authors is their comparatively high age. "Whiz kids may be all the fashion," says Andrew,

"but Mike, Kim and Steve are all in their thirties. they don't give up until a program is 105 per cent complete. That's experience showing through."

Steve produced a series of 3D space games first — **Seiddab Attack**, **Space Wars** and **Lunattack**. Andrew admits now that as games, they were not overly successful or particularly good, but the programming was rather more sophisticated than met the eye. "Steve's series built a base, and a strategy, to carry him forward. **Avalon** and **Dragontorc** came out of the wireframe graphics system on the **Space Wars** series."

The entire history of Hewson Consultants, though without any of the spectacular failures of many companies, is like a microcosm of the software industry generally. Every produce has been precisely the sort of program, or book, which fitted the market as it existed. **Avalon** and **Dragontorc** are Hewson's response to the demand for arcade-adventure hybrids, still high and apparently unabated. But keeping up with the times is not the whole story. Andrew and Gordon both insist on the need for quality and atmosphere in games. "What happens in a book?" asks Andrew, getting all philosophical after

— a railway buff. While nothing has yet been decided, it seems likely that **Southern Belle** will spawn other, railway-related simulations in the future. Andrew's been pleasantly surprised by the response so far. He claims he's had a phone call from one customer who said he'd bought a Spectrum simply in order to play it.

That brings the lengthy saga up the present. Hewson now employs a team of four in-house programmers, working on conversions and such products as an assembler, **Zapp**, for the Amstrad. The main authors remain freelance. Programming is always done on the machine the game is for.

In future we can expect to see another Steve Turner game, **Astroc-lone**, "sort of Maroc in the 23rd Century." The idea is to take the graphics and game ideas of the **Avalon** series into a science fiction setting.

There's also **Sphinx**, about which Andrew is more reticent. He says it's going to be a "scrolling multi-character adventure with a recognisably different graphics system." That's being written by a new face at Hewson's, Mark Goodall.

There's a tremendous diversity in products at Hewson's, but the key is surely in the simple, unassuming professionalism of the entire outfit. "It's a



The Hewson team

his lunch. "You know it's good because of an image that stays in your mind. We can't produce Hollywood special effects, but the same things apply in different moods to other styles. And the authors are very important — we always promote them as themselves. The Hewson name is simply a guarantee of standard."

Southern Belle, the train simulation, had been at the back of Mike Male's mind for some time, and after he finished a new version of **Heathrow ATC** he teamed up with a friend of his

rather boring story," says Andrew, "I'm not sure if it's really what your readers want to hear."

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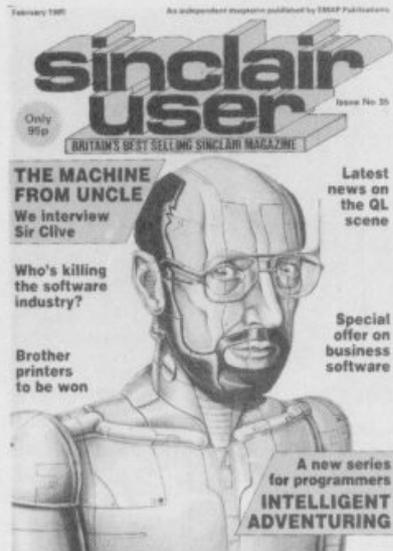
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The Rats has already won our *Sinclair User* Classic award, and is reviewed elsewhere in this issue. And now Hodder and Stoughton is giving away 100 copies of the game to the winners of our exclusive Rats competition.

All you have to do is solve a simple maze puzzle, explained opposite, and then prepare yourself for the slobbering, crunching, blood-spattered, plague-ridden squealing vileness of ...

The Rats.

Foskins is trapped

Down in the sewers the rats are stirring. Dare you face the menace in its lair?



in the tunnels under London's sewers, and you, as Harris, must rescue him from the rats. The two maps below show the network of sewers and the tunnels beneath them. There are two manholes by which you can enter the sewers, and four connections — A, B, C and D — between the sewers and the rat tunnels.

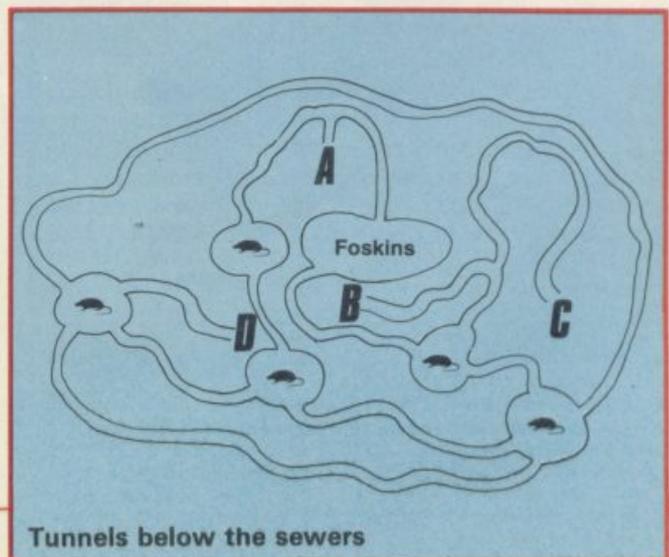
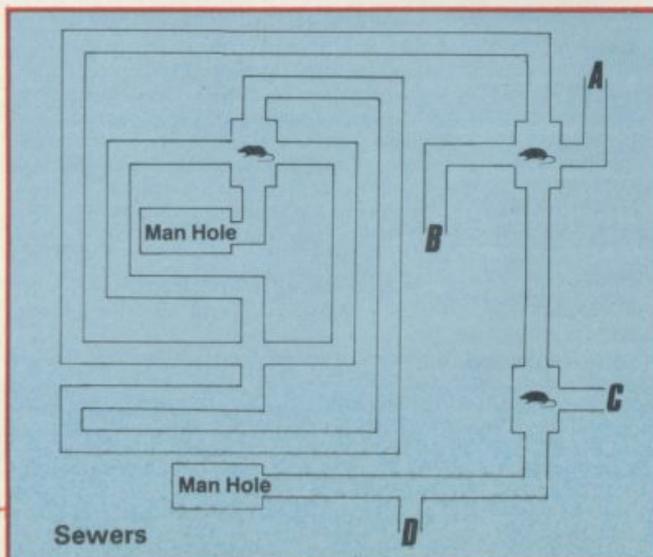
The problem is, the network is infested by the killer rats. You can sneak past them if you take them by surprise, but you'll never make it once they are alert.

So, what's the smallest number of rats you'll have to pass to get to Foskins, and then get back out of the complex into the open air again? Remember, you can't pass the same rat twice. You can enter by whichever manhole you choose.

The rats are stirring in their underground burrows, and time is running out for all of London.

When you've solved the puzzle, write the answer — the smallest number of rats you have to pass — on a postcard along with your name and address.

Send it to Rats Competition, *Sinclair User*, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU by Friday, October 18. Employees of EMAP or Hodder and Stoughton are not allowed to enter. Only one entry per person is permitted.



Sinclair spares and repairs

IF, LIKE MANY other Spectrum owners, you find one day that your computer has died, you will have a major problem on your hands. Phoning the Sinclair Research customer relations department in Camberley will not help very much either.

If your electronics knowledge is limited, then you will decide to send your Spectrum to one of the companies who specialise in repairing computers. If you have a good working knowledge of electronics then the addresses listed

below should enable you to obtain most replacement parts to repair your computer. Some of the simpler repairs, such as those involving keyboards can be undertaken by those with limited knowledge.

If your computer is under guarantee then it is important that you do not invalidate that guarantee. Talk to the customer service division at

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Suppliers of Sinclair parts:

Adaptors and Eliminators, 14 Thames Street, Louth, Lincolnshire. (050782) 8011. Spectrum and ZX-81 power supplies.
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CPC, 194-200 North Road, Preston, Lancashire. (0772) 555034. Supplies all parts for Spectrum, ZX-81, ZX printer, ZX RAM pack including all case parts, power supplies and keyboard parts. Probably the best place to get ULA, ROM, case parts and keyboard.
Ferranti Semiconductors, Computer Road, Hollinwood Avenue, Oldham, Lancashire. (061) 682 6844, (061) 624 0515/6661. Supplies Spectrum and ZX-81 ULA.
Maplin Electronics, Southend on Sea, Essex. (0702) 552961. Supplies general components and data and technical books.
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Sinclair Research Ltd, Camberley, Surrey. (0276) 685311.
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Component companies

SOME OF THE large companies mentioned above do not like dealing directly with the public. The following is a list of component companies which should be happy to deal with you. Most will have catalogues available and will supply data sheets for their products on demand.

These firms are only distributors and they do not make components. If you have a problem with a particular device contact the manufacturer as listed above because not many of the distributors can answer technical questions; RS Components, Farnell, Ambitt and Hawkes may do. Anyone needing NEC parts should phone them direct and ask for some distributors dealing with them.

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STC Electronics, Edinburgh Way, Harlow, Essex. (0279) 26777. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Computer parts

Z80A: Zilog, SGS, NEC (Spectrum/ZX-81).
ULA: Ferranti (Spectrum/ZX-81).
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RAM: 4116 type — NEC, National Semiconductors, Texas Instruments, ITT (Spectrum). 4532 type — Texas Instruments, OKI (Manhattan Skyline) (Spectrum). 2114 type — Motorola, NEC (ZX-81). 4118 type — Mostek (ZX-81). 2K type — Mostek, Toshiba, Motorola, Texas Instruments, NEC (ZX-81).
LM1889: IC14 — National Semiconductors (Spectrum).
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If you are a QL User or thinking of buying Sinclair's supermicro, then you can't miss the October issue of QL User.

Not only has it a striking white outer folder but it also features the first part of a specially commissioned supplement.

In the October, November and December issues, QL User will contain 16 extra pages as a pull out section making up each of the three parts of the QL User Owner's Manual.

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groups in mind — beginners, business users and those with some technical knowledge.

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Plus we review Digital Precisions "Superbasic Compiler" and CST's Winchester Hard Disk, and discover a way to connect your QL to a Spectrum.

October issue on sale 21st of September.

QL USER

Learning machine code? Andrew Hewson shows how the Z80 registers operate

THIS MONTH I am devoting the whole of this column to a discussion of the various Z80 registers, in response to a letter from Brian Sedgewick of Hartlepool: **I am told that registers are like variables in Basic. Can you explain how?**

A computer does not alter the contents of memory directly when it is executing a machine code program. It copies the contents of a location in memory into one of a number of special locations within the microprocessor, called registers, and then operates on the contents of the register. It is true that registers have a similar function in machine language to that of variables in Basic, in that they are used to store numbers and can be used to control a decision, but the comparison is by no means exact. They differ from Basic variables in that they are limited in number and they exist within the processor itself.

The Z80A is a powerful microprocessor because it has several registers and can hold several numbers at once, thereby reducing the need to make time-consuming transfers between the processor and memory.

The accumulator is the most important register because most of the arithmetic instructions, like addition and the logical instructions — logical OR — operate on the contents of that register.

Some of the instructions which refer to the accumulator use a second register, or a memory address as a source of data. For example, 'add a,b' instructs the processor to add the contents of the 'b' register to the 'a' register, leaving the result in 'a'.

Most of the registers occur in pairs in the sense that some instructions operate on two registers together. The 'f', or flag register, is paired with the 'a' register in that sense, although the link is rather tenuous as it is limited to the PUSH, POP and exchange.

The 'f' register is rather different from the others, because the eight individual bits in the register are used as so-called flags to record and control the sequence of program execution. Each flag is used to indicate that either



Registering a pair of numbers

one of two logically opposite events has occurred, for instance, the zero flag indicates whether the result of the last addition or subtraction was zero. Only four of the eight flags are of interest to most users. Their features are summarised in table one.

The sign flag is the simplest. By convention, if a byte is being used to represent a signed number then bit seven is used to hold that sign, being set when the number is negative and reset otherwise. The sign flag reflects the sign of the last result.

The zero flag is set if the result of the last operation is zero. It is also used by comparison instructions which are, in effect, subtraction instructions for which the result is discarded.

The carry flag records the overflow which occurs if the result of an addition is too large to record in the register and if a borrow occurs on subtraction. There are also some rotation instructions in which the bits in a register are rotated to the left or to the

right, with bits seven and zero being rotated to or from the carry flag.

The parity/overflow flag is really two flags in one. It is used as an overflow flag by arithmetic instructions to indicate if bit seven has been affected by a carry or a borrow generated by bit six. Logical instructions use the same flag to indicate the parity of the result. The parity of a binary number is the number of bits set to one — if the number is even the parity is said to be even, if it is odd, the parity is said to be odd.

The effect of some instructions depends on the current setting of particular flags. For example, the instruction:

```
jr z,d
```

causes the Z80A to jump over the next 'd' instructions if the zero flag is set. If the zero flag is not set, the processor executes the next instruction in sequence as usual. Thus the flag register is important because it allows the processor to make decisions and branch to

continued on page 116

continued from page 115

another part of the program.

The 'b' register, and to some extent the 'c' register with which it is paired, is available for a number of purposes but its most important use is as a counter. We have already seen how the flow of a program can be controlled by the use of the zero flag in the 'jr z,d' instruction. Another instruction:

```
djnz d
```

also uses the zero flag to allow loops to be constructed in machine code, using 'b' as a counter in an analogous fashion to FOR-NEXT loops in Basic.

When the instruction is encountered, the Z80A decrements the contents of the 'b' register — reduces the contents by one. If the result is zero then the next instruction in the sequence is executed. If the result is not zero the routine jumps 'd' instructions. If the programmer uses a negative value for 'd', the jump goes back earlier in the program and assuming there are no other branches, the processor will eventually encounter the same instruction again. Thus by loading the 'b' register with a suitable value initially, and setting the displacement — 'd' — appropriately, a section of code can be executed a given number of times.

The 'b' register holds one byte only, and so it can be set to any number between zero and a maximum of 255. Hence at most, 255 passes can be made through the same section of code using that mechanism.

There are no similar facilities for making more than 255 passes through a loop, but there are a limited number of powerful instructions which use all 16 bits of the 'bc' register pair as a counter up to 65535. An example is the instruction:

```
cpdr
```

When it is encountered, the Z80A decrements 'bc' by one, decrements the contents of 'hl' — hl is another register pair — and compares the contents of the accumulator, 'a', with the contents of the location in memory whose address is held in 'hl'.

The processor repeats those actions until either a match is found between 'a' and the memory contents or until $bc = 0$. Thus, that instruction can be used to search for an address containing a particular number.

The 'd' and 'e' registers do not have any individual function and are mostly used as temporary, rapidly accessible memory. They may also be used together, to hold the address of a

location in memory.

The main function of the 'h' and 'l' registers is to hold the address of a location in memory and we have already seen how the 'cpdr' instruction makes use of 'hl' for that purpose; 'h' stands for high byte and 'l' stands for low byte, and the address is held in the form:

$$\text{address} = 256 \star h + l$$

giving a maximum of 65536 unique addresses — 0 to 65535 inclusive.

The 'ix' and 'iy' registers are each 16-bit registers and can be used only as such, in contrast to the 'bc', 'de'

'sp'; copy the contents of 'h' to the location pointed to by 'sp'; decrement 'sp'; copy the contents of 'l' to the location pointed to by 'sp'.

The POP instruction is the exact reverse. In this manner the most recent pair of values pushed on to the stack are always the values which are POPped off again. Provided the register pairs are POPped in the reverse order to that in which they were originally PUSHed, no problems will arise.

The program counter, 'pc', is a very important 16-bit register because it

Flag	Mnemonic	Mnemonic Use when reset
Sign	M	P Set when the last result is negative.
Zero	Z	NZ Set when the last result is zero or a match occurred.
Carry	C	NC Set when the last result is too large to be fully recorded in one byte — or two bytes for operations on register pairs.
Parity/Overflow	PE	PO Parity — set when the last result has odd parity. Overflow — set when an operation changes bit seven as a result of an overflow from other bits.

Table 1. The four flags which control most of the operations of the Z80A

and 'hl' registers which can be used in pairs as 16-bit registers or individually as eight-bit registers; 'ix' and 'iy' are generally used in a similar fashion to the 'hl' register pair, although the instructions which drive them require one more byte of storage. For example:

```
add hl, bc
```

is a one byte instruction which causes the Z80A to add the contents of the 'hl' and 'bc' register pairs and leave the result in 'hl'. The same instruction using 'ix':

```
add ix, bc
```

is a two byte instruction.

The register pairs, 'ix' and 'iy', have one further property which is not available to 'hl', and that is that they can be used with a displacement, 'd'. That means an instruction which references 'ix + d' does not use the memory location whose address is held in 'ix'. Rather, 'd' is added to the value in 'ix' to give a new address and the instruction then uses the corresponding memory location.

The stack is an area at or near the top of RAM which is used for the temporary storage of the contents of register pairs. It is designed to grow down the RAM as it is filled and to shrink back up the RAM as it is emptied. The address of the current location of the top of the stack is held in the 'sp' register.

Transfers to and from the stack are made by means of PUSH and POP instructions. For example:

```
PUSH hl
```

causes the processor to: decrement

holds the address in memory of the next instruction to be executed.

The normal flow of events when an instruction is executed is as follows. Copy the contents of the location pointed to by 'pc' into a special register within the processor. If the instruction is held in several bytes, increment 'pc' and copy the contents of the next location into a second special register. Increment 'pc' so that it points to the next instruction to be executed. Execute the instruction which has just been copied in.

A jump instruction such as 'djnz d' or 'jr z,d' alters the normal flow of events by altering 'pc' during the last step. Note that that alteration occurs after 'pc' has been incremented, so the value of a displacement, 'd', should always be calculated relative to the position of the instruction following the one containing the displacement.

The Z80A possesses duplicates of each of the 'a', 'b', 'c', 'd', 'e', 'h' and 'l' registers. The duplicates are distinguished by the use of a prime — for example, 'a'' is the duplicate 'a' register. No instructions operate on those duplicates directly, but exchange instructions are available to swap two or more registers out of use and to bring their duplicates into use.

Exchange instructions are executed very rapidly. The contents are not physically copied from one register to the other. Rather a set of internal switches is changed, so that the prime register is used by subsequent instructions and the original register becomes dormant.

Shadowing the ROM

EXPLOITATION of Interface One has been minimal but Melbourne House hopes to put that right with its new book, *Spectrum Shadow ROM Disassembly* by Gianluca Carri.

The book opens with a brief introduction to the use of hook codes and a description of those which can easily be used from Basic. They include accepting a character from the keyboard, and a test for key depression.

Carri devotes a section of the book to his extensions of

Spectrum Basic. They allow you to POKE strings of characters into memory, add line numbers to the Basic EDIT command, speed up the microdrive CATalogue and produce pseudo-random file handling.

Each short routine is listed in assembly code format so you will need an assembler to enter it. The author has included a Basic loader program for those who do not want to enter the assembly code, which means that a long list of numbers has to

be entered — such a process is prone to error.

Although the author shows how each of his new commands operate, together with information about how the machine code extensions work, he does not explain how they are patched into the Basic Operating System. As a result, the book only provides ready to run listings and not much new information for readers who want to get to the heart of the Shadow ROM.

The third, and most important, section is devoted to a complete disassembly of the Interface One ROM. The assembly language listing is split into subroutines.

Each routine is explained in a short paragraph and descriptions of each line of code are given opposite the appropriate line of the routine. An appendix at the back lists all the ROM routines together with corresponding entry points.



Carri has also included appendices on system variables, labels and how to tell whether you have got a ROM1 or ROM2. The technicalities involved may easily put off a beginner, but the book could be regarded as a source of reference for machine code programmers.

John Gilbert

Spectrum Shadow ROM Disassembly
 Publisher Melbourne House
 Price £8.95 (paperback)
 ★★

Illustrating SuperBasic on the Sinclair QL
 Publisher Cambridge University Press
 Price £5.95 (paperback)
 ★★★

Learning with pictures

IF YOU ARE not the sort of person who likes being lectured, *Illustrating SuperBasic on the Sinclair QL*, by Donald Alcock, should please you.

The book looks as if it has been hand written and contains hundreds of pictures and diagrams.

Each major topic is given one section. The author starts with introductory examples, showing how the QL line editor works and finishes with a look at the direct entry of commands.

At the end, Alcock has included an appendix of funny smells: things that don't work as expected or contradict the user guide.

If the text had been printed in normal type and diagrams given more space,

the book would be ideal for beginners. As it is, you should think twice before purchasing it. John Gilbert

Keep it in the family

NOT ANOTHER general book about computers disguised as something which all the family can read!

According to the publisher, *The Family Computer Book* by Richard Graves and Andrew Thomson, is for the 99 per cent of home computer owners who buy their micros for educational and practical reasons.

The first chapter shows how to buy a computer. Only three computer manufacturers — Acorn, Sinclair and Commodore — are mentioned. Nine pages are then used up with information about where to place the machine, plugging in the television, and playing the introductory tape.

The section on the impact of a computer on family life is classic stuff. No review

would be complete without a quote from a poem included on those pages.

"Computer, Computer, how hateful that thing

One day in frustration I'll smash you right in."

How can you follow such a poem? The authors manage to introduce PRINTING, INPUT and arrays, but little else.

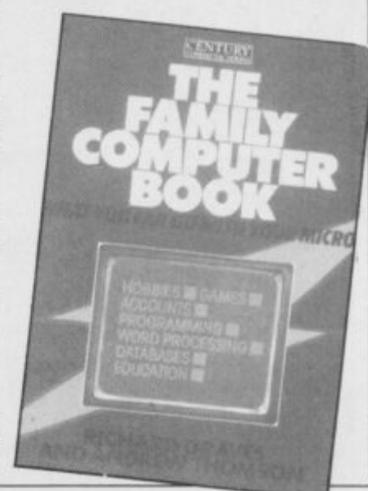
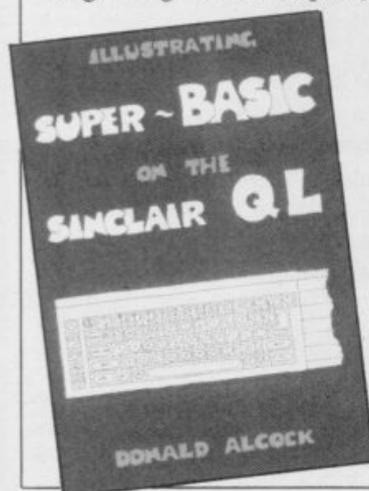
The other sections are similar to the section about buying a computer. They include advice on family accounts.

At the end of the book is a section about extending your system. Voice synthesisers, joysticks, and home robots are dealt with in too quick and concise a way.

A confusion arises because it is not clear whether *The Family Computer Book*

is based on what families can do with computers or a general computer book for all the family. John Gilbert

The Family Computer Book
 Publisher Century Communications
 Price £7.95
 ★★



BIGGER BOLDER BETTER



"Hi I'm Otiss.

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"We've been brought together by Tim (the esteemed editor of C&VG) and Jerry our maker, to save you from death, destruction and dodgy software.

"Meet Jackson T. KALLIBER... my boss, who makes Rambo look like Rupert Bear and MELISSA RAVENFLAME his boss... well she makes me go hot under the collar and I'm a robot!

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THE Gilbert Factor has been replaced by a star rating, the basis of which is value for money. Programming, graphics, speed, presentation and addictive qualities are taken into account.

Guide to ratings:

- ★★★★★24 carat. Buy it
- ★★★★Value for money
- ★★★Nothing special
- ★★Over-priced
- ★A rip-off

SPECTRUM 16K

Adventure

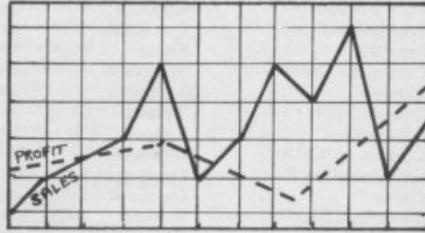
Planet of Death Artie 3★

Arcade

Arcadia	Beau Jolly	3★
Arcadian	JK Greye	3★
Black Hole	Quest	3★
Blind Alley	Sunshine	4★
Cosmic Guerilla	Crystal	4★
Crazy Cranes	Voyager	3★
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Earth Defence	Artie	3★
Escape	New Generation	4★
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Fruit Machine	DK'tronics	3★
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Business

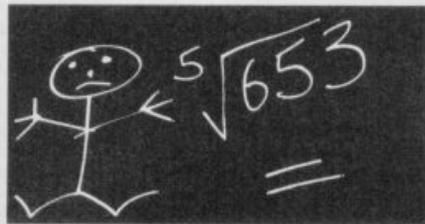
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Vu-File Sinclair 4★

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SPECTRUM 48K

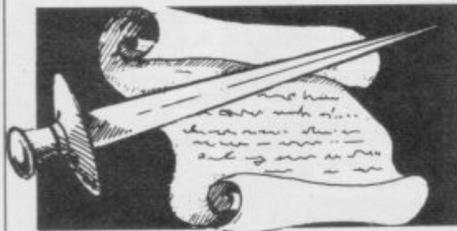
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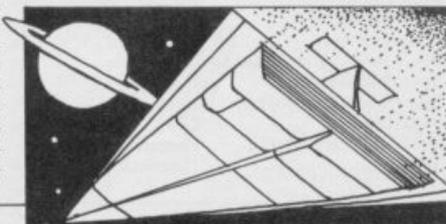
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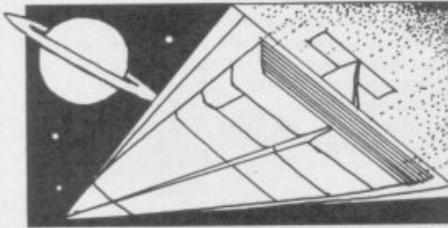
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Gilligan's Gold	Ocean	3*
Glass	Quicksilva	4*
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Helicopter	Firebird	2*
Hellfire	Melbourne House	4*
Herbert's Dummy Run	Mikro-Gen	4*
Hickstead	CCS	2*
High Noon	Work Force	5*
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Hunchback II	Ocean	3*
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Kokotoni Wilf	Elite	3*
Komplex	Legend	2*
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Lode Runner	Software Projects	3*
Loony Zoo	Phipps	3*
Lunar Jetman	Ultimate	5*
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Paws	Artic	4*
Pedro	Beau Jolly	4*
Penetrator	Melbourne House	5*
Pi-Balled	Automata	4*
Pi-Eyed	Automata	3*
Pitfall II	Activision	3*
Potty Pigeon	Gremlin Graphics	3*
Psi-Spy	Postern	3*
Psst	Ultimate	4*
Psytron	Beyond	5*
Pyjamarama	Mikro-Gen	4*
Pyramid	Fantasy	4*
Quackshot	Creative Sparks	3*
Rapscallion	Bug-Byte	3*
Reactor	Gemini	4*
Revenge of the K. Tomatoes	Visions	3*
Rider	Virgin	3*
River Rescue	Creative Sparks	2*
Robot Riot	Silversoft	3*
Rocco	Gremlin	3*
Rocky Horror Show	CRL	3*
Roland's Rat Race	Ocean	4*
Rommels Revenge	Crystal	5*
Sabre Wolf	Ultimate	5*
Saimazoom	Silversoft	3*
Shadowfire	Beyond	5*
Shadowfire Tuner	Beyond	4*
Skooldaze	Microsphere	5*
Scuba Dive	Durrell	5*
Select I	Computer Records	4*
Skull	Games Machine	3*
Sky Ranger	Microsphere	2*
Snapple Hopper	Macmillan	3*
Software Star	Addictive Games	2*
Sorcery	Virgin	4*
Space Station Zebra	Beyond	3*
Spectron	Virgin	3*
Spellbound	Beyond	4*
Splat	Incentive	4*
Sports Hero	Melbourne House	3*
Spy Hunter	US Gold	4*
Spy vs Spy	Beyond	5*
Stagecoach	Creative Sparks	4*
Starbike	The Edge	3*
Starion	Melbourne House	4*
Stop the Express	Sinclair	4*
Strangeloop	Virgin	5*
Submarine Strike	Pulsonic	3*
Super Pipeline II	Taskset	3*





Tachyon Command	Century Software	1*
Tank Trax	Mastertronic	2*
Tapper	US Gold	5*
Technician Ted	Hewson	4*
Terrahawks	CRL	3*
That's the Spirit	The Edge	4*
The Covenant	PSS	2*
The Guardian	PSS	3*
The Pyramid	Fantasy	4*
The Snowman	Quicksilva	4*
Therbo	Arcade Software	2*
3D Bat Attack	Cheetahsoft	3*
3D Lunattack	Hewson	3*
3D Seiddab Attack	Hewson	3*
3D Starstrike	Realtime software	4*
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Tribble Trouble	Software Projects	4*
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Turtle Timewarp	Softstone	2*
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Worse Things Happen at Sea	Silversoft	4*
Wrath of Magra	Mastervision	4*
Wriggler	Romantic Robot	4*
Xadom	Quicksilva	2*
Xavior	PSS Software	3*
Zenji	Activision	4*
Zig-Zag	DK'tronics	4*
Zombie Zombie	Quicksilva	4*

Business

Address Manager	OCP	4*
Banker	Andic Software	3*
Bank Account System	K Gouldstone	4*
Bizzicom	Merlin	1*
Cash Controller	Shepherd	4*
Collector's Pack	Sinclair	4*
Database	Microl	4*
Decision Maker	Collins	3*
Electric Office	Fisher Software	2*
Entrepreneur	Collins Soft	3*
Heathplanner	Heath Computing	4*
Home Budget	Kuma Computers	3*
Investment, Insurance, Information	Inform	3*
Invoicing/Accounting	Transform	4*
Keyfile	Keysoft	4*
Lifeline	William Stuart	2*
Masterfile	Campbell	5*
Micropen	Contrast	3*
Mini Office	Database Pubs	4*
Money Manager	Creative Sparks	3*
Multi-File	ISP	3*
Omnicalc	Microsphere	5*
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Personal Financ.	McGraw-Hill	3*
Profile 2	McGraw-Hill	4*
Projector 1	Hestacrest	4*
Sales Ledger	McGraw Hill	4*
Spectext	Microl	4*
Spreadsheet	OCP	4*
Stock Manager		

Superfile
Tasprint
Tasword
Tasword II
The Unitrust Program
UNISTAT
VaTrack
Word Processor

Education

Angle	Angle Turner	Antony and Cleopatra	Astro Maths	Biology	Blockbuster	Bodyworks	Castle	Castle of Dreams	Castle Spellerous	Chess Tutor 1	Clown	Cortes	Dinosaurs	Disease Dodgers	Dyslexia Beater	Eiffel Tower	Electronic Learner's Guide	French	French is Fun	Friend or Foe	Viking Raiders	German is Fun	Highway Code	Highwire	Hotline	Humpty Dumpty	Inkosi	Learn to Read 1-5	Light and Heat	Linkword	Look Sharp	Macman in the T. Caves	Macman's Magic Mirror	Mansfield Park	Maths	Mathskills II	MDA-PCSS	Merchant of Venice	Mr T's Measuring Games	Mr T Meets His Match	Musicmaster	Nineteenth C. England	Oil Strike	Paddington's Garden Game	Pathfinder	Physics	Physics	Pirate	Postman Pat's Trail Game	Riddle of the Sphinx	Run, Rabbit, Run	Sequences	Snaffle	Speech Marks	Spelling Bee	Startrucker	Stuart Period	SuperTed	Teacher Data	Tense French	Weathermaster	Weather Station	Words and Pictures	Wordsetter	Word Wizard	Worldwise	Zoo	Beta Basic	Forth	Forth	48/80 Forth	Hiscft C	Logo	Micro Prolog	Snail Logo	Spec. Forth	Spec. Forth	ZX Forth
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Transform Ltd 3*
Tasman Software 4*
Tasman 4*
Tasman 5*
Michael Slatford 3*
University Software 3*
Morley Davies 4*
Quicksilva 1*

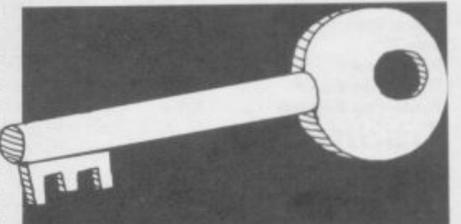
Chalksoft 3*	Arnold Wheaton 4*	Akadamas 4*	Scisoft 3*	Longman 4*	Compusound 4*	Genesis 2*	L'Ensouleiado 4*	Widget 4*	Sinclair 4*	Sinclair 4*	Engfield Software 2*	L'Ensouleiado 3*	Piper 3*	Sinclair Research 5*	Dunitz 4*	Chalksoft 3*	ETST 3*	Longman 4*	CDS 3*	Longman 3*	Firebird 3*	CDS 4*	Learning Systems 3*	Engfield Software 2*	Chalksoft 3*	Widget 4*	Chalksoft 3*	Sinclair 4*	Rose Software 4*	Silversoft 3*	Mirrorsoft 4*	Sinclair Research 3*	Sinclair Research 4*	Sussex 4*	GCE Tutoring 3*	Griffin 4*	MDA Assoc. 4*	Penguin Study 4*	Ebury 4*	Ebury Software 3*	Sinclair 3*	Sussex 4*	Sinclair Research 4*	Collins 4*	Widget 4*	Longman 4*	Scisoft 4*	Chalksoft 4*	Longman 4*	Longman 4*	Longman 4*	Chalksoft 3*	Longman 4*	Sinclair 4*	Image Systems 3*	Widget 4*	Akadamas 4*	Longman 3*	B Farris 4*	Sullis 4*	Sinclair/Macmillan 4*	Arnold Wheaton 4*	Chalksoft 3*	Sinclair/Macmillan 4*	Longman 3*	Conflict & Peace 5*	L'Ensouleiado 3*	Betasoft 5*	Melbourne House 5*	Sinclair 4*	ELR 4*	Hisoft 5*	Sinclair 5*	Sinclair 4*	CP 4*	Abersoft 4*	CP 4*	Artic 4*
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Practical

Astrocalc 3*	Astronomer 4*	Beamscan 5*	Simtron 1*	Computer Cookbook 3*	Cricket Averages 4*	Design your Garden 1*	Diet Master 3*	Dietician 2*	First Aid 2*	How Long have you got? 3*	I Ching 4*	Know Your Personality 3*	Love Oracle 3*	Microfitness 4*	Psychodelia 2*	Spacescan 4*	Star Gazer 4*	Statistics II 1*	The Guide to Medicine 2*	Vega-Table 4*	Astrocalc 3*	CP Software 4*	Beamscan 5*	Simtron 1*	Bug Byte 3*	Spartan CC 4*	Blandford Press 1*	Diet Master 3*	Keysoft 2*	Eastmead 2*	Eastmead 3*	Salamander 4*	Mirrorsoft 3*	Solar Publishing 3*	V0 ² 4*	Llamasoft 2*	Macmillan 2*	CRL 4*	Bridge 1*	Eastmead 2*	Vega 4*
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Puzzle

Arcturus 3*	Computaword 1*	Flix 4*	Hareaiser 2*	Mazecube 3*	Stuart Henry's Pop Quiz 4*	3D Strategy 4*	Visions 3*	Work Force 1*	Softricks 4*	Haresoft 2*	PAL 3*	Bellflower 4*	Quicksilva 4*
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Simulation/Strategy

Airline 4*	Alien 4*	American Football 4*	Angler 3*	Arnhem 5*	Ashes 4*	Atram 3*	Barrington's Squash 3*	Battle for Midway 3*	Battle 1917 4*	Brewery 4*	Caribbean Trader 4*	Combat Lynx 4*	Confrontation 4*	Confrontation Scenarios 4*	Conquest 3*	Cricket Captain 3*	Dix Mille 3*	Fall of Rome 3*	Fighter Pilot 4*	Flight Simulation 4*	Football Manager 4*	Formula One 4*	Full Throttle 4*	Frank Bruno's Boxing 4*	Galaxy Conflict 4*	Gangsters 4*	Gatecrasher 4*	Golf 4*	Grand National 4*	Grand Prix Manager 4*	Great Britain Ltd 4*	Gyron 4*	Heathrow Int ATC 4*	Howzat 4*	Hunter Killer 4*	It's Only Rock 'n' Roll 4*	Jack Charlton's Match 4*	Fishing 3*	Juggernaut 3*	Match Day 3*	Match Point 3*	Millionaire 3*	CCS 4*	Mind Games 4*	Mind Games 4*	Virgin 3*	CCS 5*	Pulsonic 4*	PD Visual 3*	Marketing 3*	New Generation 3*	PSS 4*	CCS 4*	CCS 4*	East Midland 4*	Durrell 4*	Lothlorien 4*	Lothlorien 4*	Cheetasoft 3*	Allanson 3*	CCS 3*	ASP 3*	Digital Integration 5*	Sinclair 4*	Addictive Games 4*	CRL 5*	Micromega 4*	Elite 4*	Martech 4*	CCS 4*	Quicksilva 4*	Virgin 4*	Elite 4*	Silicon Joy 1*	Hessel 4*	Firebird 5*	Hewson 4*	Wyvern 4*	Protek 5*	K-Tel 3*	Alligata 3*	CRL 3*	Ocean 3*	Sinclair 5*	Incentive 4*
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Software Directory

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Mugsy	Melbourne House	4★	Bullseye	Mastertronic	2★	Spectrosim	Shiva	2★
New Birkdale	Hornby	4★	Cluedo	Leisure Genius	3★	Spectrum Extended Basic	CP Software	4★
New Venture	Falcon	2★	Derby Day	CRL	3★	Spectrum Monitor	Picturesque	4★
Nick Faldo's Open 1984	Argus	3★	Do Not Pass Go	Work Force	3★	Spectrum Sprites	ISP	4★
Oligopoly	Incentive	4★	Double Dealer	MFM Software	3★	Spectrum Super Toolkit	Nectarine	4★
Olympics	CCS	4★	Draughts	CP Software	4★	Supercode II	CP Software	4★
Overlords	CRL	3★	Mind Games	Oasis	4★	The Comp. M. Code Tutor	New Generation	4★
Plunder	Lothlorien	5★	Monopoly	Leisure Genius	2★	The Illustrator	Gilsoft	5★
Red Weed	CCS	4★	Pontoon	Contrast	2★	Varitalk	ITS Software	3★
Regards to Broadway	Lothlorien	4★	Scrabble	Sinclair	5★	Vu3D	Sinclair	4★
Reichswald	Richard Shepherd	4★	Super Bridge	Buffer Micro	4★	White Lightning	Oasis	5★
Royal Birkdale	Argus	3★	Superchess II	CP Software	4★	Zeus Assembler	Sinclair	5★
Scatterbrain	MW Gamesworld	2★	Superchess III	CP Software	5★	QL		
747 Flight Simulator	Ocean	4★	The Turk	OCF	4★	Adder Assembler	Adder Publishing	4★
Ski Star 2000	Manor	2★	Voice Chess	Artic	5★	Area Radar Controller	Shadowsoft	1★
Southern Belle	DACC	2★	Yatzee	CP Software	3★	Assembler Dev. Package	Metacomco	5★
Special Operations	Richard Shepherd	2★	ZX Draughts	CP Software	4★	Blackjack	Quest	1★
Spectre	Hewson	4★	ZX Reversi	CP Software	4★	Cartridge Doctor	Talent	5★
Star Trader	Lothlorien	2★	Utility			EVA	Westway	2★
Steve Davis Snooker	Runesoft	3★	Allsort S-1	A Firminger	4★	GraphiQL	Talent	5★
Stonkers	Bug Byte	3★	Artist, The	Softek	5★	GST Assembler	Sinclair Research	4★
Strike Attack	CDS	4★	Assembler	Artic	3★	Hopper	Microdeal	1★
Super-League	Beau Jolly	5★	Assembler	Roybot	2★	Hyperdrive	English Software	3★
Super Soccer	Micromart	2★	Beyond Basic	Sinclair	3★	Land of Havoc	Microdeal	3★
Test Match	Cross	3★	Building Price	J Redman	3★	MicroAPL	MicroAPL	5★
The Biz	Winters	2★	Compiler	Softek	3★	MonQL	HiSoft	4★
The Bulge	Comp. Rentals	3★	Composer	Contrast	1★	Pascal	Computer One	4★
The Forest	Virgin	4★	FP Compiler	Softek	5★	Pascal	Metacomco	5★
The Troon	Lothlorien	4★	Games Designer	Quicksilva	4★	QL Agenda	Q-Soft	1★
United	Hipps	4★	HURG	Melbourne House	4★	QL Bank Accounts System	KJ Gouldstone	2★
Video Pool	Hornby	4★	Keyword Extension	Timedata	4★	QL Cash Trader	Sinclair	5★
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War 70	OCF	3★	Information Handling	McGraw Hill	2★	QL Chess	Psion	5★
Whodunnit	Firebird	3★	Make Music	Buffer Micro	4★	QL Compiler	GST	3★
Wilfred the Hairy	CCS	4★	Melbourne Draw	Melbourne House	4★	QL Gardener	Sinclair	2★
World Cup Football	CCS	4★	Monitor/Diss.	Sinclair	4★	QL Reversi	Softschool	1★
Traditional			Music Maker	Bellflower	2★	QL Toolkit	Sinclair	5★
Arcturus	Visions	4★	Paintbox	Print & Plotter	4★	QSpell	Eidersoft	4★
Backgammon	CP Software	4★	Print Utilities	Sinclair	4★	Quilmerge	Pitch Associates	3★
Brag	Turtle	4★	Quill	Gilsoft	5★	Super Backgammon	Digital Precision	2★
Bridge Master	CP Software	4★	Screen Machine	ISP	4★	Super Sprite Generator	Digital Precision	3★
Bridge Player	CP Software	4★	Softalk 1-2	CP Software	4★	Typing Tutor	Computer One	3★
			Spec. Compiler	Softek	4★	Zkul	Talent	4★
			Spectre Mac/Mon	Oasis	4★			

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- Activision**, 15 Harley House, Marylebone Road, London NW1
- Adder Publishing Ltd**, PO Box 148, Cambridge CB1 2EQ
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- Addictive Games**, 7a Richmond Hill, Bournemouth BH2 6HE
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- Atlantis Software**, 19 Prebend Street, London N1
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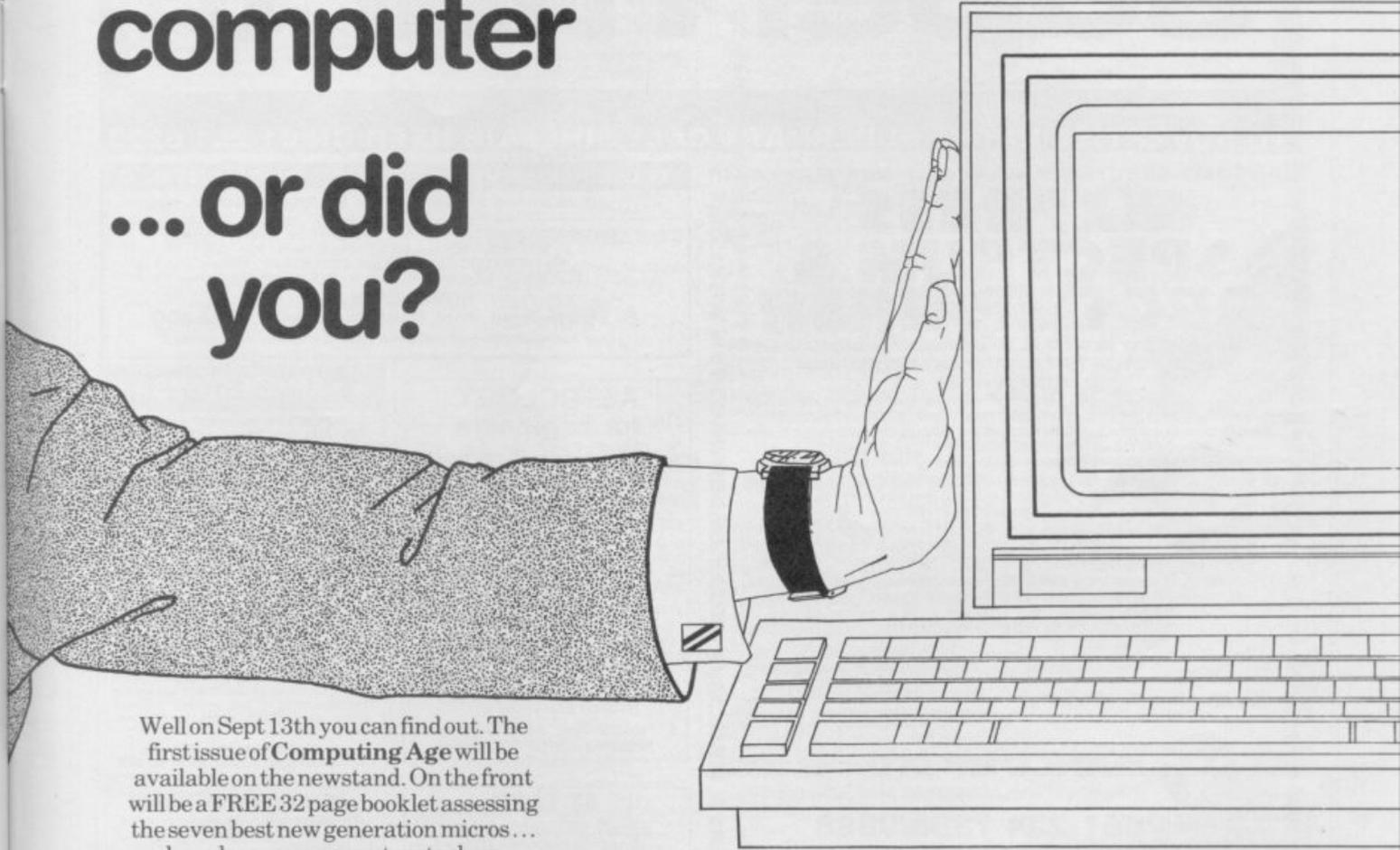
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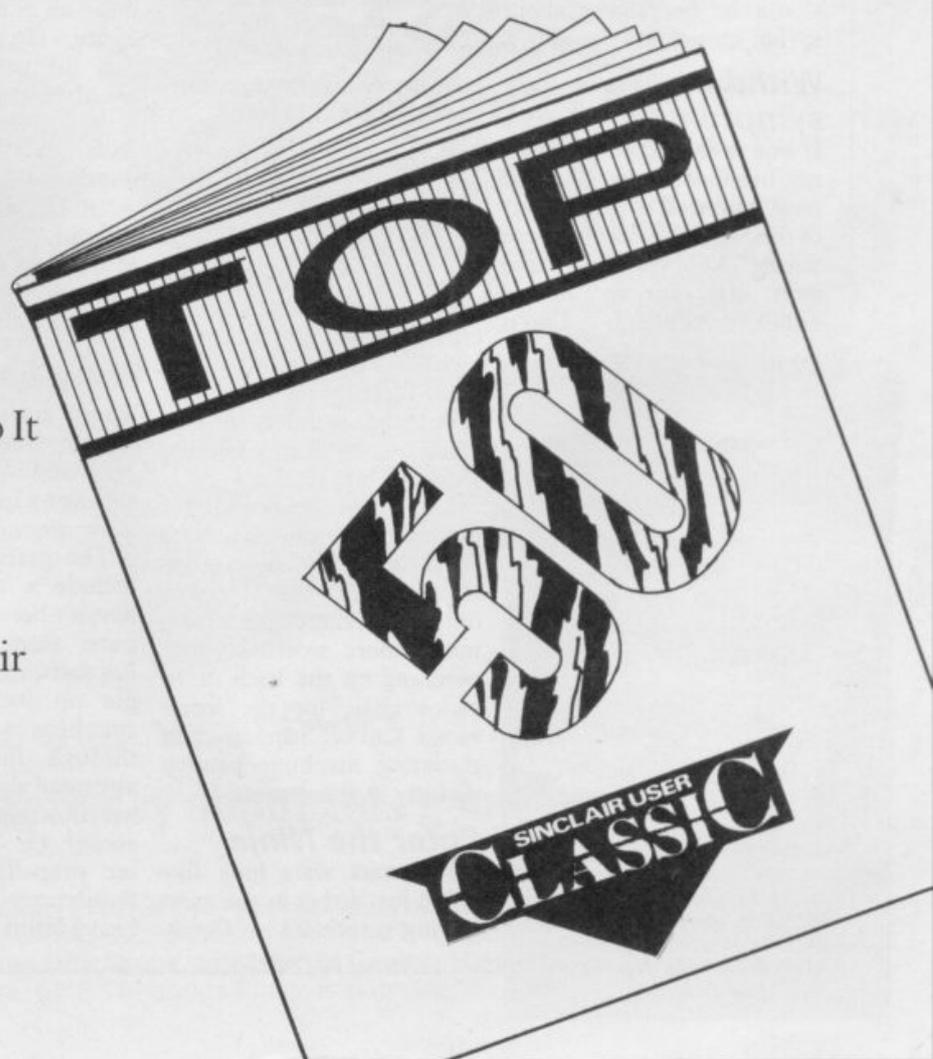
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ANSWER: The Sinclair
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(Some mistake here surely?
Editor).



GREMLIN, voice of the people, telephones **US Gold** to find out why it persists on putting Commodore screen shots on Spectrum cassette inserts. Spokesman **Tim Chaney** writhes impressively as he explains that Sega and other yank coin-op game merchants despise the Spectrum.

"Being Americans, they don't see why the game should go out with inferior screen shots to those which they can produce from the original coin-op or Commodore versions" he says.

Tim assures readers that US gold is not trying to con anybody — it clearly states where Commodore screen shots have been used. Anyway, many of the games, like **Dambusters**, look just as good on the Spectrum as on the Commodore.

That being the case, why pander to American prejudice? Tim mutters something about duplication of photography and printing. Could he be talking about saving money?

Withdrawal symptoms

If you were expecting banner headlines from Gremlin now **Maxwell's** pulled out of the **Sinclair** deal you were wrong. You wouldn't have seen any in the *Mirror* either. Although **Cap'n**

All that glitters

Bob's rag blazed away with 'Maxwell Saves Sinclair' at the time, the news that he went back on the deal only rated a few paragraphs on an inside page.

Staff at Sinclair Research may be relieved at the thought that Bob won't be calling in their chequebooks for all expense accounts after all . . .

Altered states

Meanwhile **Sir Clive** maintains a bold front of bullish optimism about Maxwell breaking off their engagement. No weeping virgin he. "Twenty-six thousand people in the US want to buy QLs," is one of the lines he's pushing.

Gremlin reckons it begs the question. If the yanks are so keen on the machine, why does **Sluggo** keep postponing the US launch? . . .

Weight of authority

While we're on the subject of QLs, *Sinclair User* has been moving in exalted circles recently. You may have spotted that maestro of the critical insult, **Chris 'lunch-breaks' Bourne** holding forth recently on *Newsnight* about the wonders of the black beast and why nobody wants to buy it.

Our **Chris**, whose ability to bore entire saloon bars to death is legend, droned on happily until the film ran out. Gremlin reckons he was much more worried about perching on the back of an office chair for the interview. This had the effect of thrusting his huge paunch directly at the camera . . .

Enter the Ninja

The karate wars look like being just as hot as the great boxing punch-up — **Grem-**

lin, **passim. Melbourne House**

is already riding high with **Way of the Prententious Fist**, while **System 3** has yet to bring out **International Karate**. It seems ninjas broke in and pinched a

whole load of gear, including some of the core routines. Hence the delayed launch.

Meanwhile, **Andy 'Cartier' Shafte**, the cool elegant production manager at System 3, wants to know why the magazine doesn't mention him as a major industry figure. He has some idea that his great talent helps entertain people — "which is what your magazine is about, so in effect I pay your wages."

"Andy needs his wrists slapped," says his boss, **Mark Cale**. "I'm more of an industry figure than he is, and I'm nobody . . ."

Reely heavy, man

Those ageing comics, **The Young Ones** — **Rik, Viv, Neil and Mike** — will be appearing in the game of the show around November.

The graphics are said to include 'a few things which haven't been tried on a computer game before'. What has software house **Orpheus** got up its sleeve? **Vivian** smashing cricket bats through the screen? The awesome sight of **Neil's** snot overflowing into your living-room? Or **SPG** the hamster propelled by his own flatulence after a really heavy lentil curry . . .?



PRACTICAL Uses for the C5 No. 73: Paul 'porn-king' Raymond finds that the C5 can be an excuse for publishing tacky pictures in dirty magazines. But which *SU* stalwart discovered the pic? Answer on a postcard please . . .

Top secret

Sluggo's been denying the existence of the **Spectrum 128K** for so long now that everybody must know it's on the way. Some machines have even been sent out to software houses, it seems, with letters about how secret it all is and how the computer must be carefully guarded.

So which software house is so blasé about its model that it's been left lying around the office for any old industrial spy to see . . .?

Cat splat

Brazen Backslappers of the Month Award goes to **Artic** for their sicko press release about a cat named **Selwyn**. **Artic** claims **Selwyn** was the beloved pet which inspired the game **Paws**. Gremlin thought the game was inspired by the idea of acquiring the rights to the musical **Cats**, but let it pass.

Sadly, **Selwyn** is dead, 'struck down in his prime while crossing the road'. What a great excuse for sending everybody a reminder of **Selwyn's** alleged game. Gremlin hopes **Artic** will now have the decency to send all profits accruing from the game to the **RSPCA** . . .



DAVID WHITE of Saga demonstrates his new bio-degradable keyboard. In conjunction with **Tasword II**, it allows you to do word-processing in the alimentary canal, thus ensuring a highly personalised end copy.

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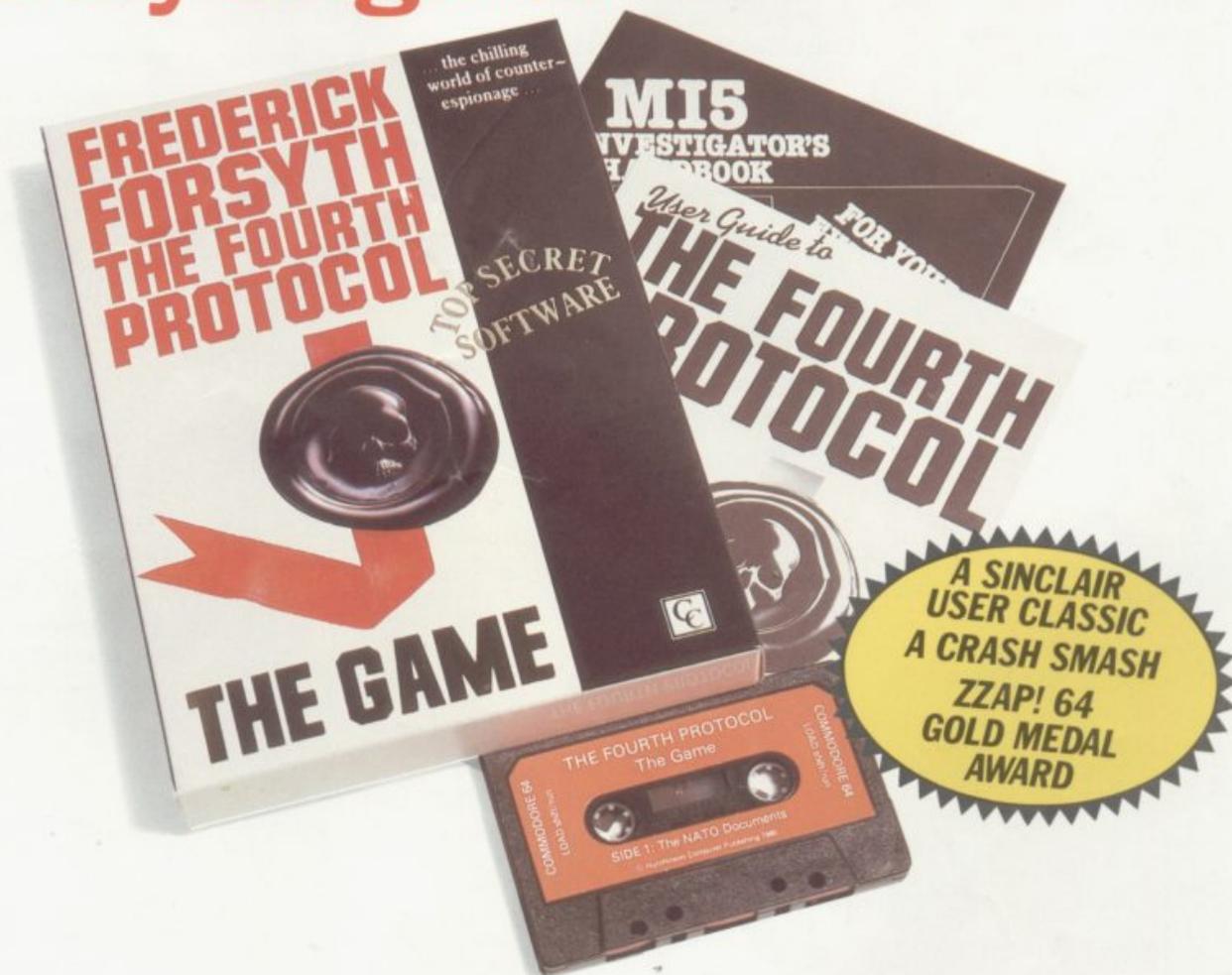
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ZZAP! 64

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