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AUGUST 1985

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Vol. 5 No. 8



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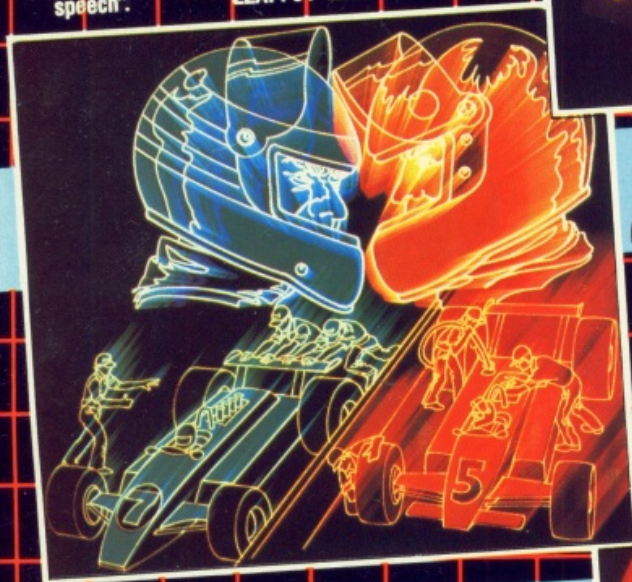
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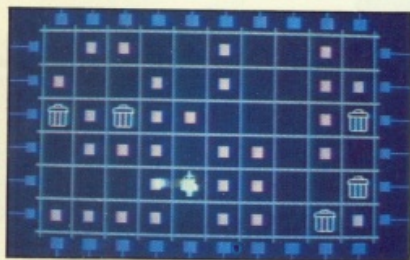


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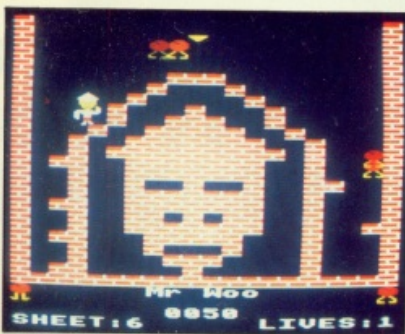
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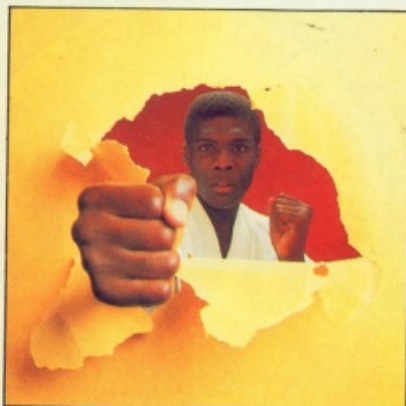
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- 46 THE QL REVISITED:** A quantum leap to nowhere? John Dawson boards the silent hulk floating in the depths of space to reassess the potential of the QL.
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- 52 SPECTRUM BIRDY:** Tough times for Jovian avians — this challenging machine-code game illustrates the problems of collecting diamonds on Jupiter.
- 58 COMMODORE 64 IMPULSE:** Floyd the Droid can't help acting on impulse — he has been miniaturised to track down chip defects in Keith Suddick's new game.
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- 66 AMSTRAD FRUITIE:** Hold, nudge and gamble with M K Mostowy's classy simulation of a penny arcade fruit machine. Penny arcade? Those were the days.
- 68 SPECTRUM CHORDATA:** Chuck away that cardboard Strat and get down to business. Dave Rogers' has a program that helps angst-ridden guitarists fret properly.
- 72 AMSTRAD SPLIT:** J G Fountain introduces you to split-screen techniques. Let's hope it does for the Amstrad what it did for Bette Davies.
- 74 SPECTRUM HATCHED FILL:** If you want to lower the tone of your graphics, or heighten the contrast, A J Renton fills you in on the details.
- 76 COMMODORE 64 SPRITES:** Master interrupts are one of the most important aspects of machine-code programming on the 64. Learn from the master, Nalin Sharma.
- 78 COMMODORE 64 STRINGS:** You get a number of sub-routines to manipulate strings with this educational article from Graham Barbour. All this and bubble sorts, too.
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- 106 DATABASE:** Paul Bond rounds up local, national and international micro events and supplies a list of essential phone numbers.

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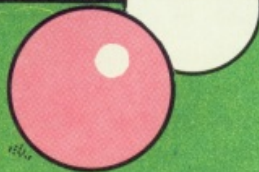
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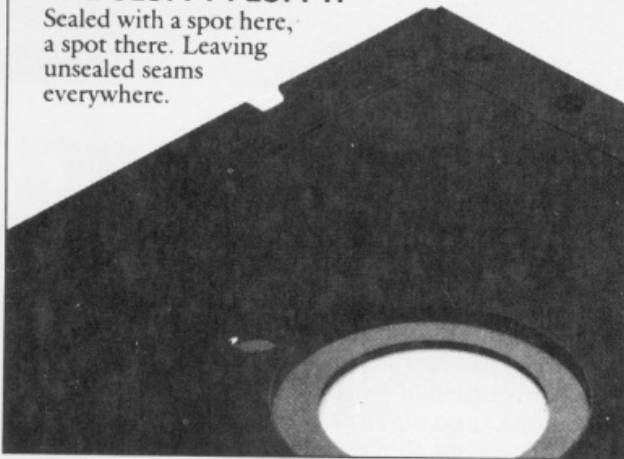
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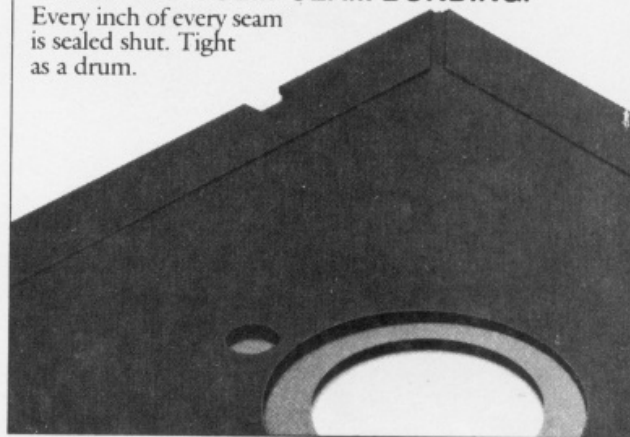
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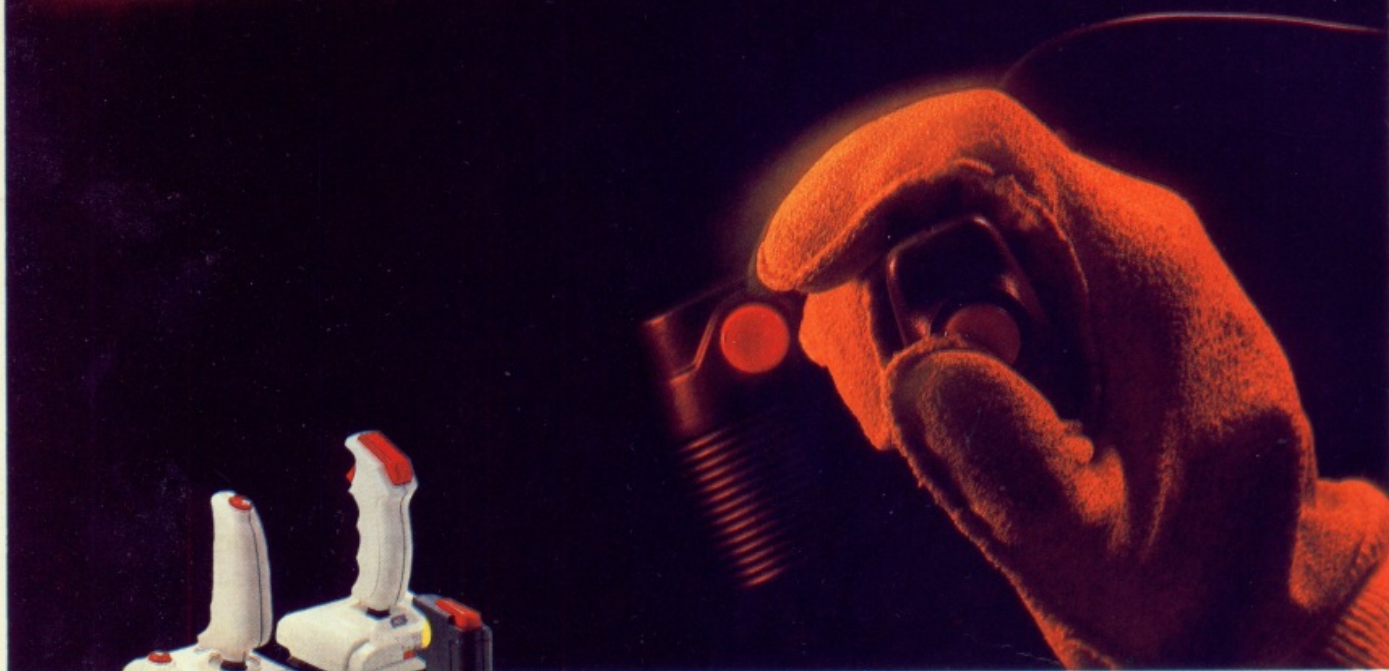


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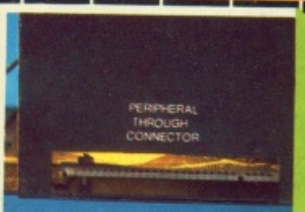
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CRASH JUNE 1984

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POPULAR COMPUTING WEEKLY NOVEMBER 1984

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... think Tasman

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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 TASPINT.

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.

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

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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.

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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 TASCOPY TWO. With TASWIDE you can double the information shown on the screen!

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CZECH MATE ON SINCLAIR'S BOARD

"I AM ABSOLUTELY DELIGHTED. Robert Maxwell is a really great bloke". That's Sir Clive's gushing reaction to the financial saviour of Sinclair Research. But just how the computing public will react to a Sinclair Research without Sinclair himself in charge and still pushing the buttons is another matter. After all, with Sir Clive only acting as a research and development consultant, how can the company ever be the same again?

The enthusiasm of Sinclair's creditors may also be qualified. They'll be pleased to see some money coming their way, but disappointed at the lack of new orders. As a result Timex has already laid off 400 workers from its Dundee production line where so many Spectrums have been built.

Sinclair Research must create new products if it is to have a long-term future. The fact that the company doesn't seem to be producing more of its existing computers is understandable. At the current rate of sales, the £34 million of warehouse stock that Maxwell has inherited should see the company into the autumn — and, pessimistically, even beyond that.

If the new Sinclair does try ploughing on into 1986 with old machines the company will cease to exist: Sinclair without innovation isn't Sinclair.

Worse, the whole industry without a steady flow of increasingly sophisticated computers will also flounder. This year for the first time it is the software houses and not the computer manufacturers who have been making all the running. They've been the ones to come up with the new ideas that keep the industry going.

But that can continue for only so long. Once they run up against the limits of machines which in most cases are several years old, there will be nothing to sustain the public's interest.

Clive Sinclair's outburst of delight at the Maxwell take-over shows his relief that the company he made great will continue to exist. Maxwell in turn must recognise the importance of Sinclair's continued participation in the firm's and the market's future.

Provided he capitalises on Sinclair's talents there may still be a British home-computing manufacturing industry for Acorn to return to when and if it staggers to its feet after its second knock-out in four months.



Was he leg before?

ROBOTS — HOWZAT?!

DICKY BIRD is not going to be replaced by a Dalek yet but micros could soon be helping umpires with tricky leg before wicket decisions. The Test and County Cricket Board is sponsoring research into using cameras linked to a computer to plot the probable course of the ball after it has hit someone's pads which would indicate to the umpire whether it was plumb or not.

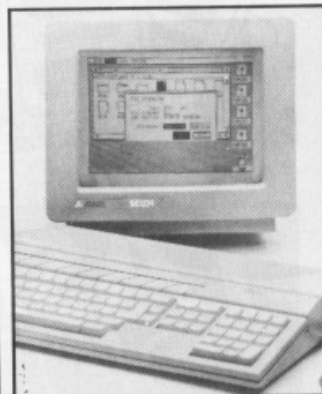
The idea comes from Jodrell

Bank Radio Astronomer and cricket fanatic Sir Bernard Lovell whose last idea for an electronic aid to show whether catches behind the wicket came off bat or pad is still at the prototype stage. This was a microphone in the bat itself — well Australian TV. puts a mike in the stumps — with headphones for the umpire. So far Sir Bernard's most successful electronic cricketing innovation is an improved light meter used at Old Trafford.

500,000,000K

LASER MEMORY could be in our homes before Christmas. By then Atari's Rob Harding expects to be selling a Compact Disc Rom Player for the ST with a capacity of half a Gigabyte per disc — that's 500 Megabytes, enough to swallow every telephone directory in Britain — and for a price of less than £500. The only catch is that the CD Rom is read only — the technology to write to laser discs is still prohibitively expensive.

At the Chicago Consumer Electronics Show Atari demonstrated the CDRP player with a disc containing an entire 15 volume encyclopaedia. The text only took up a third of a disc with pictures and a comprehensive index filling the rest. Arcade-style laser games will



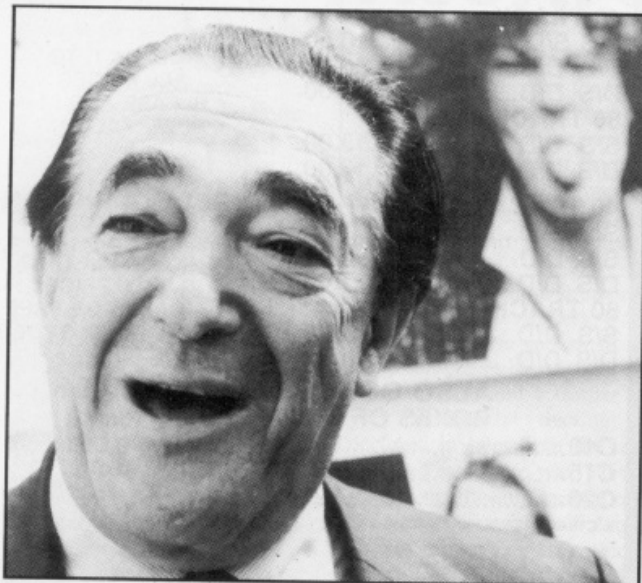
ST will have giga disk.

be possible and at the flick of a switch the machine doubles up as an ordinary compact disc music player.

Editor: TOBY WOLPE; **Assistant Editor:** MEIRION JONES; **Production Editor:** IAN VALLELY; **Software Editor:** SIMON BEESLEY; **Commercial Software Editor:** PAUL BOND; **Editorial Assistant:** LEE PADDON; **Editorial Secretary:** LYNN DAWSON. **Editorial:** 01-661 3144. **Advertisement Manager:** NICK RATNIEKS 01-661 3127; **Assistant Advertisement Manager:** KEN WALFORD 01-661 8548; **Senior Sales Executive:** JULIAN BIDLAKE 01-661 8458; **Advertisement Executive:** KAY FILBIN 01-661 8454; **Northern Office:** GEOFF PARKER 061 872 8861; **Advertisement Secretary:** MAXINE GILL; **Classified:** SUSAN PLATTIS 01-661 3036; **Publisher:** GAVIN HOWE; **Group Advertisement Manager:** SHOBHAN GAJJAR. Your Computer, Room L221, Quadrant House, The Quadrant, Sutton Surrey SM2 5AS. © Business Press International Ltd 1985. Printed in Great Britain for the proprietors Business Press International Ltd, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS. Tel: 01-661 3500, Telex/grams: 892084 BIPRESG ISSN 0263-0085. Printed by Riverside Press Ltd, Whitstable, Kent, and typeset by Instep Ltd, London EC1. Subscriptions: U.K. £14 for 12 issues. ABC 131, 769 July-December, 1984.

SINCLAIR COUP

Bob's your uncle, Clive



Ever popular Bob Maxwell — (live shows off the big wafer).

SIR CLIVE is back at the drawing board now that *Daily Mirror* owner Robert Maxwell is paying £12 million to take over Sinclair Research. Desperate financial trouble had led the Bank of England to try to organise a rescue, but Sinclair is still not safe.

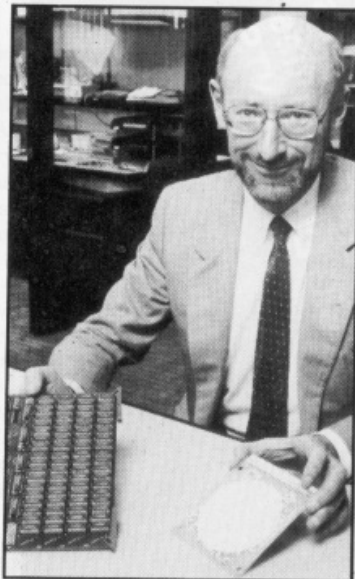
Timex has laid off 400 Spectrum Plus assembly workers because there are no more orders and the future of the pocket television looks

shaky, because Polaroid has stopped making the long life lithium batteries for it. When the stockpile runs out Sinclair will switch to short life Zinc Carbon batteries.

Maxwell is looking for a new chief executive now that Sir Clive, who admits he is "awful at managing established businesses", has left the board to concentrate on research. Paradoxically his Metalab

announced a breakthrough in wafer scale integration just days before the Maxwell deal.

The problem with conventional chip production is that on each wafer of silicon some chips are faulty so you cannot produce a complete computer on one slice. Metalab uses Ivor Catt's idea of configuration logic — a built-in circuit which checks and bypasses any faulty areas on the wafer.



Wally's paradise is a 64K Spectrum

MIKRO-GEN's latest box of tricks will turn software pirates into a bunch of wallies — and also give Mikro-Gen's own programmers almost 50 percent more memory to work with.

The Mikro-Plus Interface for the Spectrum is like Imagine's much talked about idea for Megagames. It's a hardware way of selling software. You pay £14.95 for a game on Mikro-Plus which overlays the Spectrum's Rom and includes a joystick port. The game itself won't be copiable because part of it is burnt into the Mikro-Plus's 16K's worth of Eproms. The rest of it comes supplied on cassette.

Shadow of the Unicorn, a role-playing adventure with 10 characters, will be the first program supplied on the cigarette-pack sized Mikro-Plus and will be out in mid-September. Mikro-Gen's new Wally game for the Christmas period, Three Weeks in Paradise, is not only a change in style but will also be appearing on Mikro-Plus Interface.

Booked — FBI pulls the Cracker

"I WAS a teenage hacker" confesses Bill Landreth, alias The Cracker, in *Out of the Inner Circle*, a newly released Penguin book he wrote while on probation after the FBI finally caught him after a lifetime of computer crime at the grand old age of 19 while tapping into Telemail which serves NASA, Coca Cola and General Motors.

Big Blue screen blur

SORE EYES? Nagging headaches? You could be another victim of VDU health hazards. The good news according to a comprehensive report on the subject put together by IBM is that extra metal shielding could cut out the problem. These shields are already a requirement in the States but not as yet in the U.K.

AMSTRAD PIRACY

DOUBLE-DECKER

SELLING A high-speed twin-cassette stereo deck which could be used to copy pre-recorded music or program cassettes was an inducement to infringe copyright according to Mr Justice Whitford in the High Court. The case is doubly embarrassing to Amstrad which makes the decks because it also supplies commercial software through its Amsoft operation.

Despite legal costs of £100,000 Amstrad intends to appeal against the ruling which was in favour of the British Phonographic Industry who are now seeking damages from Amstrad. According to BPI's legal adviser Patrick Isherwood high-speed twin cassette decks will only



Sugar "condemns piracy".

be allowed to be sold if "accompanied by adequate warning notices about the copyright infringement

— notices so explicit that they are likely to make the machines unattractive to the retailer".

If the ruling stands it could be used by organisations like the Guild of Software Houses and the Federation Against Software Theft to take action against companies like Evesham Micros which makes the Interface III program copier (Don't Touch, page 14, *Your Computer* July 1985). Roger Tuckett of FAST has called Justice Whitford's ruling "a welcome development".

Meanwhile the new copyright law has encouraged MicroPro — who wrote Wordstar — to look for a test case immediately.

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DIARY

RICHARD AUSTIN of Evesham Micros wants to thank GOSH and FAST "for their outburst against our product, Interface III, in July's *Your Computer*. He claims he is crying into his champagne as he celebrates the success of his product.

IT'S BEEN a bad few weeks for computers and robots. First there was the slight hitch with President Reagan's Star Wars extravaganza when the space shuttle insisted on looking for a 10,000 mile high mountain to make the laser test a little easier. Then an Edinburgh restaurant refused to pay for a Donic robot which it had bought second hand after it allegedly went berserk knocking over tables before its head fell off into a customer's lap. Now a Naughty Words Editor to stop people like the man who wrote the Amsdisk program — he sends his sincere apologies by the way — from filling up bulletin boards with obscenities has gone out of control. All messages including the word title are being censored.

ALAN SUGAR produced a bird watcher who makes recordings of wild life noises and copies them for friends, as an example of the typical tape-to-tape cassette user in the Amstrad double-decker piracy trial. The judge was not impressed.

SAD STORY from Brian Raine who went to Bournemouth Computer Club clutching his copy of *Your Computer* and complained that "piracy was the main activity". He was laughed at and the leader of one user group admitted that he asks his 8 year old daughter to make copies for him to avoid prosecution. Brian wants GOSH to guarantee that they will replace faulty tapes — in case software houses go bankrupt.

SOME TRANSPARENCIES from Datasoft disappeared before we saw them — Ah said Datasoft "that's because we put in a fake doubloon — somebody must have thought it was real". We are looking for a tall, one-legged man with a parrot on his shoulder . . .

Elsie Dee

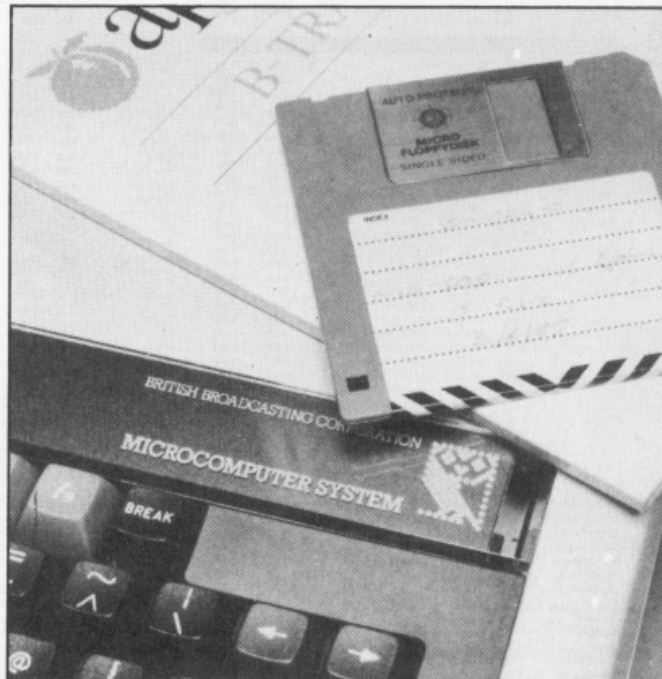
DOWN AGAIN

Acorn's second problem

ACORN'S CRISIS has deepened with the suspension for the second time of its shares, which had sunk to 11p on the Stock Exchange. At the same time Junior Industry Minister John Butcher wants an end to Acorn's exclusive and lucrative BBC contract to let companies like ACT in.

According to Close Brothers — Acorn's financial advisers — "the market for home and small personal computers has become even more difficult and a further and very substantial decline has occurred in sales from the levels predicted earlier this year. This has led to a significant deterioration in the financial position of Acorn". Two weeks earlier ACT, which is muscling into BBC country with its 16-bit FIE micro, announced it had made record £92 million sales and £10 million profit.

With home computer sales running at one third of last year's in some areas Acorn finds itself sitting on a stockpile of at least 70,000 Electrons while the BBC Plus is still not selling despite a panic £30 price cut. Olivetti, which bought 49.3 per cent of Acorn the last time it needed rescuing, could increase its stake to a majority and sell off



Will Acorn be submerged by ACT?

Acorn subsidiaries like Acornsoft.

One industry analyst points out that with sales of nearly £2 billion a year "Acorn is less than petty cash to them" but if high-flying ex IBM troubleshooter Alex Uboldi,

who has been put in as emergency Managing Director, cannot quickly find a new strategy for Acorn's survival then Olivetti may pull out. Acting Chairman Alex Reid may have had his spaghetti.

FREE MODEM WITH DRIVE

COMMODORE IS about to dump £20 million worth of kit on the market at half price but most of it seems to be business machines. Meanwhile general manager Nick "smile at the rain" Bessey claims he can maintain the price of the 64 and "break the seasonal stranglehold which has dogged the home computer industry".

Good offers on peripherals include 1541 disc drive, with disc software, plus modem and one year's Compunet subscription for £229.

Despite the launch of the CBM-128 in September Bessey says the 64 will continue through 1986. Certainly software and peripheral makers are sticking with the



Graphics Mouse expands 64.

Commodore 64.

Commodore's own Sound Studio and Sampler programs for the 64 come out at the same time as Activision's Music Studio, and Datex is showing the M/S 1 Graphics Mouse which purports to give the 64 Macintosh style graphics — at lower resolution but in colour.

If your name is MUD it's for you

BRITISH TELECOM turns dungeons and dragons into big business next month with the launch of its Multi-User Dungeon which will allow anyone with a modem and £20 to join "the largest interactive computer game in the world". MUD can accept over 100 simultaneous players and a permanent Arch Wizard will watch out for foul play.

MUD will operate from 6.00 pm to 8.00 am and all day at weekends. Originally written by Roy Trubshaw and Richard Bartle, MUD can still be played in the early hours on the Essex University Dec computer, but the BT version claims to be bigger and better.

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UPDATE

FIRST YOU RELEASE a good version of your game on say the CBM-64 to get rave reviews then you produce third rate conversions for other machines relying on lazy journalists not to even open the packaging before repeating what they wrote about the original. A monstrous libel on all concerned so here's an update on when you can expect to see other people's hits on your micro. Firebird has its **Gyron** team writing **Z-80 Elite** up in Edinburgh. Expect Spectrum **Elite** in September and Amstrad in October. Rumours abound that Firebird was so impressed with the shaver — sorry, Acornsoft that it wants to buy the company for a million pounds — but will they have enough credits left to buy a military laser? Meanwhile **Elite** — as in the software house not the game — hopes to produce Spec 'n Am versions of Commodore's **International Soccer/Basketball** soon. Beyond is stressing that its Spec version of **Spy vs Spy** "features identical graphics to the Commodore". End of August sees Mirrorsoft's **Boulderdash** on Am. A&F's **Chuckie Egg II**, originally Spec, is moving through CBM-64 and Am onto other micros. Another sequel, Task Set's **Super Pipeline II** is going Spec. CRL who proudly call themselves the Dream Makers have made it to the Amstrad with **Rocky Horror**.

RUSS ABBOTT has been seized by the BBC and the only way that Basilidon Bond and the rest of the Madhouse team can rescue him is by getting jokes right to unlock the doors in Probe Software's new View to a Kill lampoon . . . Rupert and the Toymakers' Party paves the way for Quicksilver to follow up with The Flintstones and Max Headroom . . . 666 Go to Hell now has a rival in Witchswift from English Software while Five Ways Software wants to unleash a plague of Rats . . . Monster Trivia tests you on 2,000 Trivial Pursuits type questions . . . Nick Faldo Golf from Mind Games is icon driven . . . Dinamic in Spain wanted to call its Frank Bruno Boxing rival Rocky but has had to settle for Rocco . . . System 3's Karate will join combat with Fist and U.S. Gold's Karateka.

ON YER BIKE

Activision's Tour de force

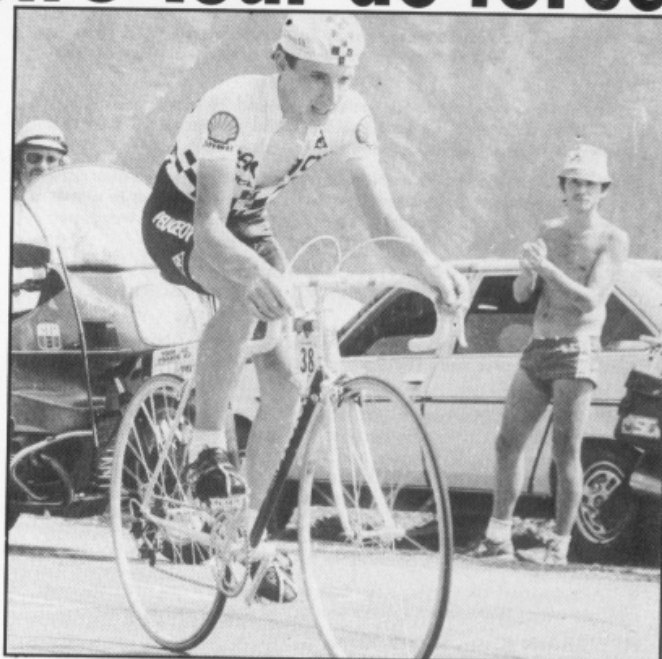
GREG FISCHBACH brought his family over from California to Britain for the Summer. They're still looking for it.

Greg, International President of Activision, is also looking for a new U.K. chief now that Geoff Heath has left for Melbourne House.

Greg's links in the entertainment industry — he has managed the Steve Miller Band amongst others — helped him snaffle the rights to Ghostbusters which contributed to Activision's \$27 million game sales last year.

Now he gets an early glance at movie scripts but he doesn't believe "that every motion picture is capable of being turned into home computer software. What a game needs is hooks."

His next release is Tour de France by Byron Turner, a cycling game endorsed by the Tour, Peugeot and king of the mountains Robert Miller. Flying Scot Bob might not be so happy if he knew Greg referred to him as "the English bicyclist".



Activision stays with racing but moves over to four wheels with the Great American Cross Country Race which starts on the 64 and

moves to the Atari. Moving the other way is the long-awaited CBM-64 version of Rescue on Fractalus — out August.

SON OF BLUE MAX MEETS GOONIES



Frankie's manager takes control.

SO BIG has the U.S. Gold/Ocean/Centresoft combine become that it seriously discussed taking over Sinclair when Sir Clive hit trouble. With over a quarter of the games sold in this country coming from the group already plans are in hand for a massive Autumn offensive to

take more of the market. U.S. Gold will be launching sequels to proven hits — Beachhead II, Blue Max 2001 and Solo Flight II in August and Pole Position II in October — all on the 64 to start with.

Goonies — based on the Spielberg film just released in America

and tipped as the next Ghostbusters — is also due in October, with Zorro due the month before. Raid Over Moscow on Amstrad paves the way for CPC versions of Dambusters and Bruce Lee later. Ocean is happy with the live audio track of Relax on its Frankie Goes to Hollywood program for the 64 and Spectrum and now plans Atari and Amstrad versions.

Ocean has also signed up Japanese computer game wizards Konami — who produced the original Scramble back in '81 — to sell Konami titles under the Imagine name.

The first of these is Hyper Sports — a suitable name for the original Imagine operation before it was resuscitated by the U.S. Gold/Ocean/Centresoft combine. Next Konami/Imagine launch will be Yie Ar-Kung Fu which will find itself competing with U.S. Gold's Karateka in the martial arts battle.

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● **'Practice Exercises'** gives Non-Timed accuracy oriented exercises and Timed speed/accuracy exercises. Your results are given in words per minute and percent accuracy. The target standard of 30 words per minute (and far beyond) is achieved with this module.

● **'Session Monitor'** overlays the whole program to hold your hand all the way through the course from first use of the program to that final, very useful result.

● To back up this Basic version you get documentation on how to approach the course and a record card to fill-in as you progress through the sessions.

● **'The Typing Master'** is not a toy. It is a professionally-written program which has as its sole purpose the teaching of typing/keyboard skills in a way that is friendly and fun. It was written by a typing instructor and it has been marketed world-wide on CP/M, MSDOS, PC DOS and other operating system-based machines over the past three years. It has also been available on Newbrain and BBC Micro (Model A or B) for over a year and is now being released for Amstrad CPC (mono or colour), Commodore 64 and Sinclair QL!

● TAPE formats of the Basic version are available from the following selected list of distributors (media and prices are shown in brackets).

NEWBRAIN (Cassette: £15.00 (no VAT)):

GFG Microsystems, 36 Armitage Way, King's Hedges, Cambridge, CB4 2UE. Tel. (0223) 315120.

BBC MICRO (model A or B) (Cassette, usable with disk: £15.00 + VAT)

AMSTRAD CPC (mono or colour) (Cassette: £15.00 + VAT).

E.C.H. Hobday, The Chestnuts, Rodmersham, Sittingbourne, Kent ME9 0PL. Tel. (0795) 24191.

COMMODORE 64 (Cassette: £15.00 + VAT).

SINCLAIR QL (Cartridge: £20.00 + VAT).

P. Ashpitel, 36 Athlone Avenue, Bury, Lancashire, BL9 5EE. Tel. (061-797) 5214.

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● DISK formats of the Basic program may be obtained from the following suppliers. They also supply a Business/Schools version which incorporates record keeping and many other facilities. Prices shown below are for the Basic version.

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Anglia Business Computers, 1 Milton Road, Cambridge, CB4 1UY. Tel. (0223) 315580.

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or,

Software Limited, No. 2 Alice Owen Technology Centre, 251 Goswell Road, London, EC1. Tel. (01-833) 1173.

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7	World Series Baseball	Imagine	Sp
8	Herberts Dummy Run	Microgen	Sp
9	Quackshot	Creative Sparks	Sp
10	Dambusters	US Gold	64
11	Starion	Melbourne House	Sp
12	Arnhem	CCS	Sp
13	Wild Bunch	Firebird	Sp
14	Star Strike	Realtime	Sp
15	Rocky Horror Show	CRL	Sp
16	Everyones a Wally	Microgen	Sp
17	Broadstreets	Argus	Sp
18	Dragontorc	Hewson	Sp
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20	Death Star Interceptor	System 3	Sp

Sp = Spectrum 64 = CBM 64.
Source = WH Smiths.

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1	Way of Exploding First	Melbourne House	64
2	Drop Zone	Centresoft	64
3	A View to Kill	Domark	64
1	A View to Kill	Domark	Sp
2	Dun Darach	Gargoyle	Sp
3	Action Biker	M. Tronic	Sp
1	Overdrive	Superior	El
2	Classic Adventure	Melbourne House	El
3	Football Manager	Addictive	El
1	Alien 8	Ultimate	Am
2	Ghostbusters	Activision	Am
3	Fighter Pilot	Digital Ing.	Am
1	Ghostbusters	Activision	Ms
2	Flight Path	Anirog	Ms
3	Chuckie Egg	A & F	Ms
1	Atik Atak	Ultimate	Bc
2	Revs	Acorn	Bc
3	Lode Runner	S. Projects	Bc
1	Quasimodo	C. Soft	At
2	Ghostbusters	Activision	At
3	Fort Apocalypse	US Gold	At
1	Dorks	Grenlin	16
2	Dark Tower	Melbourne House	16
3	BMX Racers	M. Tronics	16

Vc = Vic 20 64 = CBM 64
Sp = Spectrum Bc = BBC At = Atari
16 = CBM 16 El = Electron
Am = Amstrad Ms = MSX.
Source = Websters Software.

WHY NOT BACK—UP?

I FELT COMPELLED to write to you after reading your News item entitled "Don't touch — Software industry at risk" in the July '85 issue of *Your Computer*. This article referred in particular to Evesham Micro's Interface 3 which from what I can gather allows all commercially available Spectrum software to be transferred to Microdrive but it's implications were applicable to every back-up utility released for any micro.

I appreciate the concern felt within the software industry for the sort of organised software piracy rampant today but the opinions expressed in the article seemed to me to be just a touch one sided. Especially the comment by Mr. Langdell of the Guild of Software Houses who believes that there is no such thing as an "innocent" copy. Is he categorically stating that when I transfer my tape based programs to disc for more convenient use I am guilty of a crime? That's what it sounds like to me! I find his comments not only ill-informed, but also deeply offensive.

Cassette tape is an inefficient medium for storing computer data, it is slow and unreliable, and despite Mr. Langdell's protestations to the contrary, subject to deterioration with time. Unless you are prepared to fast-forward and rewind your tapes every few weeks as a matter of routine, print-through (caused by long-term proximity of data on the closely wound tape) may produce data corruption, thus rendering the tape useless.

I am not suggesting that this will happen inevitably, but it is a very real risk, particularly with so-called "fast loaders" where the frequency of bits is so much higher, and the computer is pushed just that little bit further to read the tape. It is perhaps lamentable that even in 1985, the vast majority of UK home computer users still rely on tape for software and data storage, and now that alternative storage media is beginning to gain wider usage in this country it seems that there are people wishing to prevent us from making full use of them, for until disc (and Microdrive) based commercial software becomes the norm it will still be necessary for the serious home user to back his/her tapes up on to disc.

You may well condemn the producers of back-up utilities but if I might just present an analogy: If I were to buy

YOUR Letters



Your Computer now has its own Prestel Mailbox. Our number is 019991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

NEW ROUTINES

SPECTRUM OWNERS may like to use some of my routines.

POKE 23659,0

Makes the Spectrum crash if anything is printed in bottom part of the screen. e.g. error messages or breaks. (To disable this routine use POKE 23659,2)

PRINT USR 0

Completely clears the memory. (New only clears the Basic) 9000 FOR f=1 to LEN a\$:PRINT A\$(f);BEEP .05,0;NEXT f:RETURN

Prints text newflash style. It is meant to be used as a sub routine. To activate use LET a\$="message to be printed.", then set the printing variables e.g.

PRINT AT xy; and GOSUB 9000

I have noticed that the Spectrum has a facility to convert binary numbers to decimal but it doesn't have anything to convert decimal numbers to binary, so I have written a routine to serve this purpose. Poke the decimal number that you want to convert into location 16384, then run this routine:

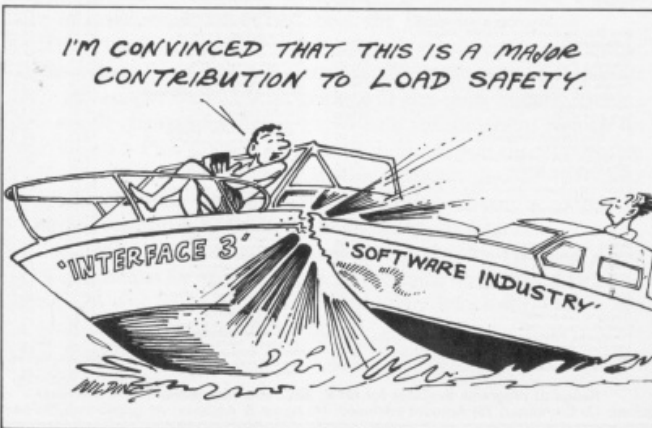
```
1 LET a$="" :FOR f=0 to 7:LET
a$=a$+STR$(POINT(f,175):NEXT
f:PRINT a$:STOP
```

Neil Braganza,
Nailsea,
Avon.

DISMON

IN THE June issue of *Your Computer* you published a program and accompanying article about my Dismon machine code monitor. Unfortunately, you accidentally left out quite a large section, describing the 'E', 'F' and 'G' commands.

E ssss: Allows you to Enter Ascii
(continued on page 21)



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Microvitec 1431 MS	£290	Microvitec 1431 MS	£290
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Microvitec 1451 AP MS4	£345	Microvitec 1451 AP MS4	£345
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Fidelity TV monitor	£210	Fidelity TV monitor	£210
Fidelity CM14	£199	Fidelity CM14	£199
Fidelity QL monitor (std res)	£199	Fidelity QL monitor (std res)	£199
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Memotech 1040, Memotech	£410	Memotech 1040, Memotech	£410
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CSX100 100K 40T	£109	CSX100 100K 40T	£109
CSX200 200K 40T DS	£129	CSX200 200K 40T DS	£129
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IN ★ TOUCH

How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+ + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

(continued from page 19)

text into memory from ssss onwards. Ascii text and control characters are entered from the keyboard — delete removes the last character, replacing it with a zero byte. This mode is terminated by pressing Stop in which case it displays the address of the next character that would have been entered, for use when appending.

F ssss eeee bb bb: This finds all occurrences of the one to seven bytes specified, within the given address range. Any byte can be ignored by typing ** in place of the byte value. The bytes may also be specified as the Ascii value of a character by preceding the character with an apostrophe.

F ssss eeee bb bb bb — bb bb bb: This form of the Find command allows you to search for the given sequence of bytes and replace every occurrence with the second sequence. As in the first form, a byte specified as ** will leave the original contents of the memory intact.

Note — The address of all matches found is printed out. If there are many occurrences then the find can be prematurely terminated by the Stop key. For example:

```
F 1000 17FF A9 'N 20 ** 18 —
    ** ** 4C ** 19
```

This finds all occurrences of loading the accumulator with the Ascii of N followed by a JSR to the \$18th page and replaces them with JMP's to the same relative position in the \$19th page.

G ssss: Start executing machine code at location ssss.

G: Start executing m/c at location specified by the program counter.

On entry, by any method, to Dismon it saves the IRQ vector, NMI vector, Program counter, Stack pointer,

YOUR Letters

Accumulator, X register, Y register and Status register. When Going to m/c it replaces all the above registers and starts execution at the specified location. Dismon automatically re-directs the NMIV to point to itself allowing you to break out of a program and re-enter Dismon by pressing Restore. If desired, this break function can be disabled by

GN ssss and GN: Both having the same function as above. On encountering a BRK instruction during execution of a machine code program, the computer returns control to Dismon therefore BRK instructions may be inserted within a routine you are checking to help with debugging.

John Twiddy,
Wallsend,
Tyne and Wear.

ENTERPRISING

AT THE BEGINNING of March I took delivery of an Enterprise. It had taken only 10 days from the date I sent the cheque, to the day it arrived by Securicor which I don't consider to be bad going.

Before I ordered it from Zappo Computers. I had read your review of

the machine which said the keyboard was poor. I had used a QL a few times and thought that the Enterprise's keyboard would be similar. It seems I was wrong, and I find it much better than the offering from Sinclair.

The graphics are superb — 640 x 512 — and although there are "only" pre-defined colours, one can define thousands using the RGB command which mixes the three primary colours.

The Basic is really outstanding, with no need to use the Poke statement. Many systems variables can be altered by using their names. For example the delay before any auto-repeat can be changed with the following.

SET KEY DELAY X — where
x is the delay

The arithmetic is very accurate, with 10 digits accuracy. Try this small program on any machine.

```
10 LET C=9.8
20 LET C=C+0.00001
30 PRINT C
40 IF C=10 THEN GOTO 60
50 GOTO 20
60 END.
```

Richard Hudson,
Keighley,
West Yorkshire.

TO THE TOP

THE SPECTRUM To The Top program published in the July issue of *Your Computer* will work on any Spectrum, not just the 48k Spectrum as stated.

The game should work as listed, but readers may obtain a copy of the program on cassette by sending a cheque/postal order for £2.50 to: Mr J.R.E. Wood, 22 Denver Hill, Downham Market, Norfolk PE38 9BE.

BITS 'N' BOBS

K.R. Laslett's *Amstrad Backup* only handles programs with a Basic header. To extend its range to cope with machine code only files change line 170 to read:

```
170 DATA &A8, &22, &F3, &03,
    &2A,
    &EC, &03, &ED
```

Although the *Backboogie* article in the July issue claims that listing 2 automatically saves the code in listing 3 once it is entered, in fact it does not do so. When you have finished entering the hex code from listing 3 you must save it yourself with:

SAVE "BOOGIE" CODE 60148,150

The Load and Save commands for Spectrum Multi-Font in the June issue need to be changed before the program will work. After running listing 2 save the code it creates with:

SAVE "M.F.T. Code" CODE
60928,2355

Now to load it back change the second statement in line 10, listing 1, to read

LOAD "" CODE 30464

'PLUS 4 HAS MANY PLUS POINTS'



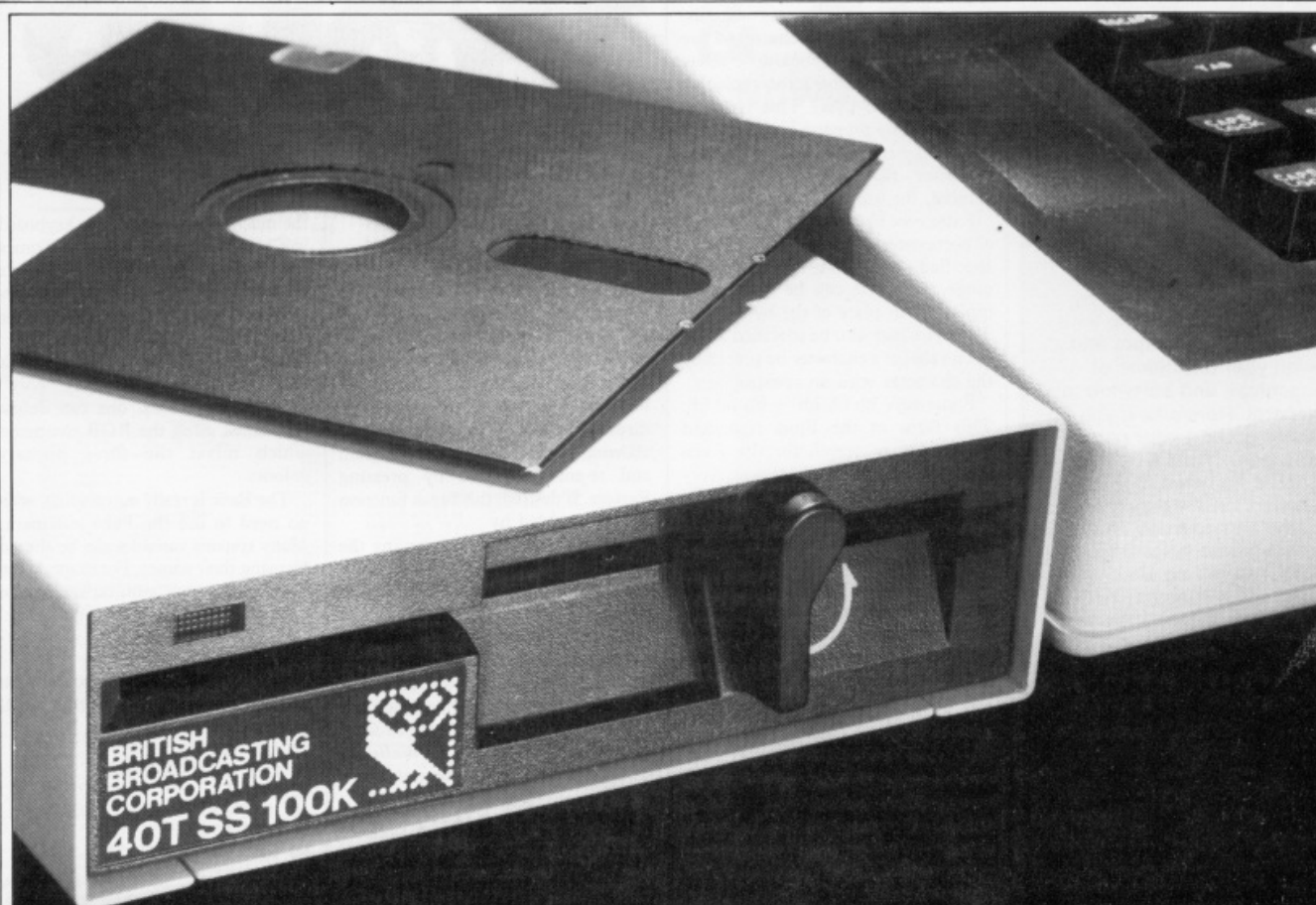
AFTER READING the review of the C128 in the June issue, I would like to make some comments about the Plus 4:

If the Plus 4 is not selling well the press is at least partly responsible. It has a good Basic which is a considerable improvement over Basic 2.0, yet straight Basic 2.0 programs will run quite happily, (with a few minor changes for colour etc.) I have run programs written for the Vic on a Plus 4, with a Screen Window to suit the Vic display.

Basic programs for the C64 run with no problems. The 1541 drive works satisfactorily with the Plus 4, transferring software is no trouble. The built-in software is adequate for many applications.

The sound and graphics commands are simple. The Plus 4 has a lot of potential for many users, including small businesses. Obviously the C128 will be an improvement but why knock the Plus 4, it's a good machine and available now.

D.E.F. Rolfe,
Byfleet,
Surrey.



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(YC8)

ADD-ON EXTRA

Prospect

Modem

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Interlekt Elec

A multi rate, multi standard modem, 1200/75 300 and 1200 answer or originate modes. Connects via a standard 25 pin RS232 connector. Five LEDs on the front show when the modem is powered up, on line, receiving or transmitting data. It has a loop back test mode.

Speech Synthesizer

Commodore

£24.95

Cheetah

Difficult as it may be to think of anything more irritating than a computer announcing in a loud voice that you've got it wrong, the Cheetah Sweet Talker plugs into the user port and a din plug goes into the video output socket. It has a vocabulary of 63 allaphones (speech building blocks) and various pause lengths.

Centronics interface

Commodore

£42.50

Zero Electronics

Yet another Centronics interface for the range of Commodore computers. A bit pricey, but it does plug into the serial port, and have its software in Rom, so it should be compatible with all Commodore software. Versions for most printers, screen dump software, optional 16k buffer at £14.95. Tel 0493 842023.

Control interface

Various

£100

Bowthorpe Microsystems

Do you feel inadequate whenever people say "very clever old boy, but what can you actually do with it"? Well now you can satisfy your craving to control the central heating, the burglar alarm and the cat flap all at once with this controller.

The board gives you 12 digital and eight analogue ins and 16 digital outs.

HARDWARE

Pace modem

■ BBC

■ Pace Electronics

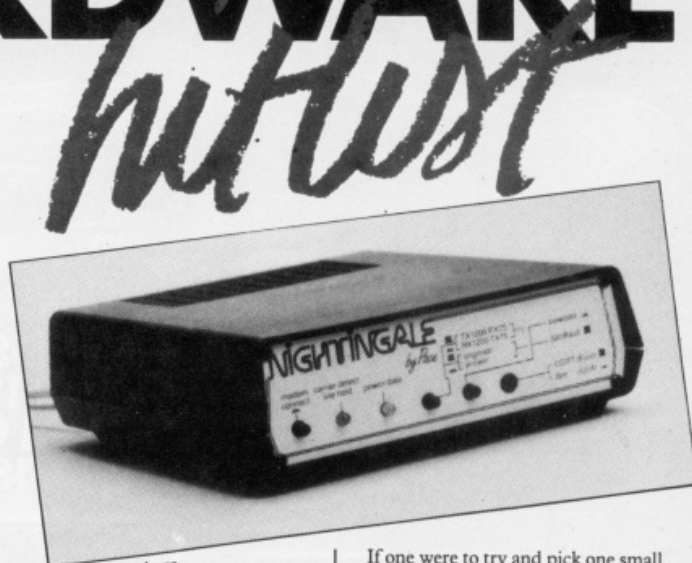
BUYING A MODEM is always a tricky task. You have to be confident that what you buy is going to be flexible enough to allow you to keep up in the ever-changing world of micro communications. Prestel, Bulletin Boards and of course Telsoft.

Pace might just have a product here which is just what you are looking for. The modem itself fits under the phone, which plugs into the back of the modem, and the modem is plugged in via a modular style BT socket. Two push buttons on the front select either 1200/75 or 300 baud originate or receive modes. An RS-423 lead plugs into the back of the Beeb and there are two indicator lights. One doubles as power indicator and data, the other shows line hold.

So far so good, not much to get excited about here. But the real strength of this package lies in the software. Commstar comes on Rom and is one of the best terminal packages around. It has two separate modes, a spooling dumb terminal mode, suitable for Bulletin boards and a page orientated mode for Prestel.

Using the terminal mode, the first thing to do is initialise the system to conform to the board's protocols you are trying to access.

You can also decide whether you want characters echoed to the screen, spooled to a buffer — memory or disc



Pace modem.

— output to the printer. If you are using a printer, it may be necessary to use XON/XOFF protocols to prevent jamming as the printer gets busy. There is a buffer output mode so that messages can be prepared off line.

The Prestel mode is a little more limited. There is no printer driver included, you can use various off the shelf printer drivers. To help cope with Prestel, you can tag as many pages as you want, and then retrieve them in the order you tagged them. All the usual options such as previous page, repeat page and download program are available from the function keys.

If one were to try and pick one small fault, it is that there is no Prestel message buffer, so mailboxes have to be typed in on line. Short phrases, such as password and ID can be programmed into the function keys, but this isn't really adequate for messages.

Apart from its reliability, it hasn't crashed on me yet, its very user friendly. From the menu page, you can enter any 'star' command you like, so you can mess around with disc files and printer format, and then return to Commstar. You can even stay on line while you do it!

Further enhancements to the Modem include an auto-answer board which should be available by now, and a bulletin board disc, using the SBBS format.

Voice Master

■ CBM-64

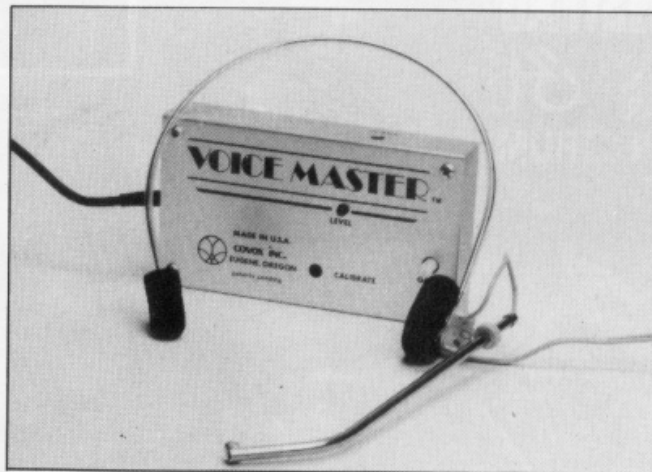
■ Anirog

■ £59.95

THE VOICEMASTER is a rather insubstantial lump of aluminium which converts your dulcet tones into a pattern of frequency against time. This it stores away inside the Commodore's memory. The box simply plugs into the joystick port. You can record a vocabulary of words which you can then incorporate into your programs.

You can train your Commodore to recognise a vocabulary of 32 words, or, if you hum it, the Voicemaster will play it, even correcting it if your singing is, shall we say, less than perfect. The quality of speech depends on the sampling rate. The faster the rate, the better the quality, but the greater the memory required.

Generally, the words will be recognisable, but from the Donald Duck school of diction. The speed of playback can be varied, and the Voicemaster need not be connected during playback, it uses the SID chip. After a couple of training sessions, the recognition program will achieve a hit rate around



Anirog voice master.

80 per cent, once you're used to it. Voice control of games might be tricky, as trying to retain measured tones in a crisis might be difficult, but it might make computers more accessible to the beginner.

The hum-along program is amusing. It records a single melody line which you hum into the mike. This is displayed on a musical stave which can then be easily edited, printed out, saved and played back in any of the 10 preset voices available. It is a pity only one

melody line can be recorded.

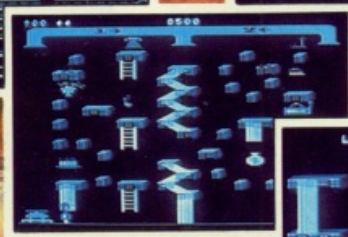
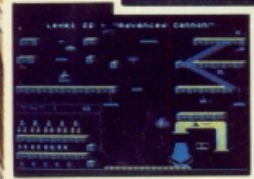
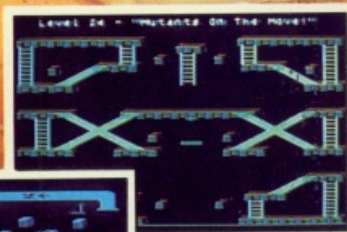
This is a fascinating add-on which will give hours of fun. A serious use for it might be harder to come by. It is a cheap method of incorporating speech into games. For someone interested in computer music, a true digital sampler with more specialist software is necessary.

That said, it brings into the province of the home user a field of interest formerly reserved to those with a few thousand pounds to play with.

BOUNTY BOB STRIKES BACK!

**THE MOST
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PLATFORM GAME
YET DEvised**

**Twenty-five all-new levels
Multi-channel music
Automatic Demo Mode
Level 'Warp' ability**



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STARRING
BOUNTY BOB!



Yukon Yohan

by
Bill Wague

Bounty Bob™ returns in this new and exciting follow-up adventure to Miner 2049er.® This time around it's even tougher than before and Bob needs your help more than ever to guide him through the mine. The mutant organisms have multiplied and over-run the mine entirely, making it extremely difficult to survive the hazards of the underground passageways. Using the high-powered special equipment in the twenty-five new caverns is Bob's only hope of achieving his objective of securing the mine and defeating the plans of the evil Yukon Yohan!™

CASSETTE £9.95

DISK £14.95



HEAVY WARNING: BOUNTY BOB CAN SERIOUSLY DAMAGE YOUR SANITY!

Star★ chart

KEY

- ★★★★★ Best of its type
- ★★★★ Very good
- ★★★ Good
- ★★ Average
- ★ Below par

Bobby Charlton Soccer

BBC
DACC
Football simulation
£11.95

★★

It's a great idea — match-action graphics teamed up with football strategy. Unfortunately, the graphics in the DACC game aren't as good as Commodore International Soccer's or Ocean's Match Day's, and the strategy aspect isn't as compulsive as Football Manager.

First you pick the team formation and then distribute 99 skill, accuracy and stamina points to the players. You can also hand out instructions on positional play to individual team members.

Tim Love's Cricket

CBM-64
Peaksoft
Cricket Simulation
£8.95

★★

Every winter cricket fans cluster around radios like Ovaltine kids, listening to crackly broadcasts from the furthest corners of the Empire ... sorry, Commonwealth. England are nearly always in dire trouble, and prayers are offered to the great umpire in the sky, for a great summer of revenge back in the old country. Summer comes and with it rain. Still not to worry, now you can play cricket in the comfort of your living room.

Tim Love's Cricket may become to cricket buffs what Football Manager is to soccer fans. It takes about as long to play, and has many similar elements. However, where Football Manager is primarily a strategic "think'em-up", this is more an arcade game.

"Flawed but fun" sums up this game perfectly.

SOFTWARE

Way of the Exploding Fist

■ CBM 64
■ Melbourne House
■ Arcade
■ £9.95

★★★★★

THUCK! A high punch renders my opponent senseless. GRUNCH! Just as I square back up to him his roundhouse kick catches me unawares sending me sprawling. Melbourne House's *Fist* is the most realistic and enjoyable computer combat game yet. Even the tired and cynical hacks of the *Your Computer* office were queuing up to play it.

You have a choice of 18 different blows, jumps, blocks and kicks all controlled from the joystick — it sounds complicated yet the movements seem surprisingly natural and easily learnt. Against the computer-controlled karate kid waiting for it to strike then pulling its legs away with a forward sweep will take you a long way. But the game really comes into its own played between two human players.

There you need the full range of punches and kicks. A perfectly executed flying kick will bring you 1,000 points signalled by a Yin and Yang symbol awarded by the fan-toting judge but leaves you vulnerable to a whole range of counters. The sweeps along the ground which prove so effective against the computer can be smashed with a well-timed short jab kick.

Each blow that strikes home is signalled with a grunt of pain breaking in to the tinkling oriental music sound track as the victim doubles up. As you improve you need to use the forward and back somersaults to keep out of trouble and take your opponent by surprise. Each fight is played out in front of four background screens, a pagoda, lake and mountains, in a



Way of the Exploding Fist.

gymnasium and in front of a Buddha. Against the computer you have to twice defeat a novice at the pagoda, a 1st Dan at the lake and mountains, and progressively more difficult opponents at each location.

Between the 3rd and 4th, and 7th and 8th

Dans the program springs a surprise on you, which you can deal with by remembering the name of the game.

If this all sounds a little violent to you — at least everyone lives to fight another day and the only real hazard is flailing elbows as you and your opponent wrestle with the joysticks.

High punch Low punch Jab kick Forward



Mid kick



Block



Back sweep



Fly kick



... BEHIND THE SCREENS ... BEHIND THE SCREENS ...

KARATE was the "only arcade game I played that I thought would be ideal on a home computer" says programmer Gregg Barnett. He put the idea to Melbourne House chief Fred Milgrom this January and "Fred jumped at the idea". Together with two other programmers and musician Greg Holland, Gregg Barnett has been slaving away in the software house's Melbourne bunker ever since. First he designed graphics handling routines to control the tall 72-pixel high figures on screen. Each player is made up of nine sprites which allowing for all the different shapes generated by 18 different moves makes a memory-sapping sprite count of 740. *Fist* was developed on BBCs with fast disc access linked to Commodore 64s. On the

Commodore says Gregg "it can take up to three hours assembly time if you make a mistake compared with five minutes on the BBC." "Making the computer play an intelligent game" was the most difficult part of Gregg's job so he had to look for volunteers to take



Fist writer Gregg Barnett.

it on. "But this time there were too many takers. That's when we knew it was going to work." With sound and backgrounds as well cramming everything into the 64's memory was difficult. Holland's music alone took up 3K and the interrupt-driven sound effects — grunts, shouts, moans and a primal scream based on digitised real sounds, extracted at who knows what price from the Melbourne House staff — another 3K. Gregg worked on Commodore versions of *Horace*, *The Hobbit* and *Sherlock Holmes* so he knows how development teams can become bored with a program. "Normally when the game's out everyone's sick of it" but this time they carried on playing *Fist*.

Meirion Jones

FIVE A SIDE FOOTBALL



Penalty shoot out feature



Fast moving characters leave competition standing.

Ideal family entertainment.

Voice Master generated speech.

Exciting simulation for **one** or **two** players.

Amazingly realistic animation.

Speed and skill the essence of the game.

Ingenious method of settling arguments.

Demanding challenge at all three skill levels.

Enormous fun from start to finish.



CBM 64
64 Cassette £5.95
64 Disk £8.95

ANIROG

Star★ chart

Dork's Dilemma

C-16

Gremlin Graphics

Maze game

£6.95

★★★

Slightly unusual in that the aliens try to trap you rather than kill you, though if you bump into them at any speed you've had your chips.

The graphics are all you would expect of the C-16 and the game is tactically interesting as you plant a time bomb and must be able to escape. Once you've killed all the aliens a piece of your craft is transferred out of the force field in the screen centre.

Saimazoom

QL and
Spectrum

Silversoft

Maze game

£7.95

★★★

Ultimate Play The Game have really spoilt software reviewers. I might have raved about this game once. As it is, it goes down as competent and enjoyable.

You steer your figure, Indiana Smith, around the jungle collecting items which permit you to ford rivers, shoot hostiles and carve through rockpiles and you must collect water bottles.

Pipeline

Spectrum
Viper

Archetypal

£7.95

★★★★

The ideal game for paranoid DIY players in an excellent implementation by Simon Ffinch — with acknowledgements to Taskset.

The pipes in this game have a good solid Victorian quality about them, and the plumber and his mate have a tough time fighting off the saboteur and the aggressive ladybirds.

Eight screens and you can choose your own keys, or use a variety of joysticks. And with another game — SOS — on the flipside, it's really good value for money.

(continued from page 25)

Kennedy Approach

■ CBM-64
■ US Gold
■ Simulator
■ £14.95

★★★★

"AMERICAN ZERO zero five, turn left to bearing two seven zero, descend to two thousand feet", a crackle of static, and then "Roger" as the pilot acknowledges the order. No, this isn't the script from another turgid airport drama, but instead the new air traffic control simulator from Microprose. This game is not headed for disaster.

The speech, which is clear and understandable even down to the mid-western accent and the crackle of the radio, is all from the Commodore's own hardware. Just try that on a Sinclair!

Putting the voice synthesis to one side for the moment, how does the game play? Previous efforts at this sort of thing have suffered from a lack of playability. But, here, all the information is easy to get at and entering instructions to the pilot is simplicity itself. You move a cursor over the plane to be controlled, press the fire button and then give orders on direction and height. If you forget the orders you gave a plane, ask the pilot.

The graphics are rather primitive, showing blobs on sticks moving around a grid. But it gets the information across, which is the main thing. Five

Jump Jet

■ CBM-64
■ Anirog
■ Flight Emulator
■ £9.95

★★★★

YOUR CHANCE to slip the surly bonds of earth with a V/STOL Sea Harrier — you don't need a ramp to get off because this program's plane has been specially modified to carry only 5,000 lbs of fuel and four missiles. Little details like this add credence to the program, if being written by ex-jump-jet pilot Vaughan Dow didn't already give it enough. (Some killjoys usually take this opportunity to point out that some really bad flight simulators have been written by pilots.)

With speech synthesis and introductory music this program has enough of the polish needed for it to be able to hold its head up in today's software market. But I don't think flight simulator aficionados and purists will rave about it — it's more of an advanced shoot'em-up than a pure simulator. Nevertheless, the instruments are visible throughout the program action, faithfully reproducing what's going on.

On the first screen, the top half shows an overhead view of the aircraft carrier with the instrument panel shown in the bottom half.

To take off you must hit the F key to select flaps down, switch on the vertical thrust — key 3 — and increase the power to maximum by pressing the

SOFTWARE

Shortlist



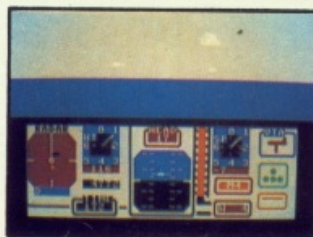
Kennedy Approach.

locations are available, from sleepy Atlanta to hectic Kennedy. There are three different aircraft types, Cessnas, jets and Concorde, which all go at different speeds, important when working out where various planes are going to be in a few minutes time.

During a really busy shift, you have

to keep an eye on more than a dozen planes at once, landing, taking off and flying to various destinations. If this still sounds too easy, then the computer will throw a few storms and emergencies your way as well.

After your fifth mid-air collision over New York in the rush hour, you'll be glad you weren't flying in to America shortly after Reagan did the big shift change with his Air Traffic Controllers. Lee Paddon.



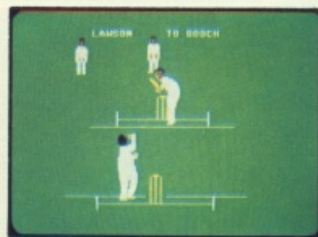
Jump Jet.

+ key. By selecting thrust at 45 degrees the aircraft can be boosted to normal flying speed. Don't forget to raise the undercarriage and flaps before exceeding 300 knots otherwise the computer will get panicky and shout at you. If the jump-jet is flown higher than 200 feet or out of range of the split screen display, the display shows the sea and the sky and the relative positions of the carrier and enemy aircraft are shown on the radar.

You achieve promotion by keeping the number of warnings down to the minimum permitted for your rank. So a Group Captain can only get away with three computer admonishments, whereas a Flight Lieutenant is allowed nine. A reverse example of what is meant by rank having its privileges. When the enemy aircraft attack you select M to activate the aiming sight and arm the missiles.

The higher you fly, the more difficult it gets — as you progress through the ranks, variable and deteriorating weather conditions make life more difficult.

Paul Bond.



Graham Gooch's Test Cricket.

Graham Gooch's Test Cricket

■ CBM-64
■ Audiogenic
■ Simulation
■ £9.95

★★

REMEMBER the Great Egg Race, all that hype and in the end all you did was sit back and look at it? Well, here we go again. Once the game has loaded, apart from changing the bowlers every now and then, you are free to get on with those other important tasks in life like making coffee and putting the cat out.

The screen gives a Ritchie Benaud eye view of the crease, as the bowler moves up to the wicket and bowls. The ball moves as realistically as the chunky graphics will allow, and the batsman takes a swipe at it. If he connects, you switch to another graphics screen of a

(continued on page 29)

JUMP JET

JUMP JET AVAILABLE FOR

	DISK	CASSETTE
BBC MODEL B/ELECTRON	£11.95	£9.95
AMSTRAD	£13.95	£9.95
CBM 64	£11.95	£9.95
VIC 20 16K		£7.95
C16		£7.95

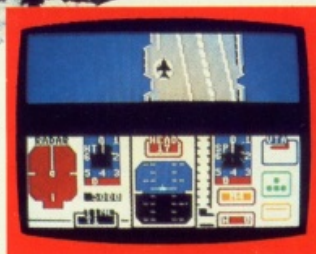
Every pilot has the dream of flying one of these unique and complex fighting machines. Here is your chance to do what few pilots have the privilege to try.

Depending on your skill, confidence and courage, you have the choice of remaining near the landing pad, learning to hover and land, or venturing higher to practise your approaches. When you think you have mastered these, then accelerate the Jump Jet into an attack fighter. Use the radar and range finder to seek and destroy the enemy, by launching heat-seeking air-to-air missiles. Beware! His radar and missile systems are as good as yours. Reckless pursuit is ill-advised: you must maintain a fuel level that will enable you to relocate and return to the aircraft carrier, executing the skills you have learned to achieve a successful landing.

You are now ready to proceed to the next skill level to face additional hazards, such as unpredictable swell and treacherous cross-winds.

Be warned, this program is not a toy or game. You will need to co-ordinate your hands, eyes and mind to successfully complete each mission. Do not hope to achieve in a short time that which took the author three years to learn as a Jump Jet pilot, and over a year to record on this computer program.

Written by
Vaughan Dow
Jump Jet Pilot



ANIROG

Star★ chart

Ancient Quests

QL and
Spectrum
Mirrorsoft
Maze game
£7.95

★ ★

Two games for the price of one is the growing trend for sensibly-priced good value software. I'm not wild about this example from the normally sound Mirrorsoft label, however.

The games run perilously close to passing off arcade games as educational software, in my opinion.

In King Tut you wander round a sub-Ultimate maze matching shapes with names and so on until you find the hidden treasure.

The other game, The Count, is set in a Dracula scenario and deals surprisingly enough with counting.

EVA

QL
Westway
Arcade adventure
£10.95

★ ★ ★

EVA, far from being the new au pair, stands for Extra-Vehicular Activity as any child of the space age will tell you. Game has overtones of Jet-Pac, and consists of 26 different screens.

You must construct a teleport device to change screen. Naturally you are under relentless attack from aliens.

Anyone bringing out software, let alone games software, for the QL should be applauded, but when all's said and done, there are games just as good on the Spectrum.

Buggy Blast

Spectrum
Firebird
Shoot'em-up
£5.95

★ ★ ★

Graphically pleasing little number from the BT software house, which has inexplicably missed being reviewed in *Your Computer*. Fly down corridors shooting at assorted robots, orbs and flying saucers.

(continued from page 27)

few fielders running about. If you feel like getting involved, there are two ways. In simulation mode, the bowler can attack off middle or leg and the batsman can decide to play more or less aggressively.

One or two players are catered for. Arcade mode is a solo effort, the bowler is controlled decathlon style, and you have to hit the batsman's fire button when you want him to play. Before loading the main game, you can define your own teams. You enter their names, bowling and batting averages, and bowler type.

For this sort of game to succeed, it must either appeal to the cricketing buff or be just another arcade game. It lacks the sort of detail the buff would want to see, and for the arcade addict, it's just too dull.

Lee Paddon.

Dun Darach

■ Spectrum
■ Gargoyle Games
■ Graphic Adventure
■ £9.95

★ ★ ★ ★ ★

JUST WHEN you think that it would be impossible to squeeze any more out of the Spectrum, along comes a game which makes you wonder where it will all end. Gargoyle Games produce graphic adventures. But that is only half the tale, because Gargoyle graphic adventures are one of the jewels in the crown of British software.

Unlike most computer adventures, which are Tolkienesque or Gothic, Dun Darach, like the earlier Tir Na Nog, is Celtic. From the unpronounceable names, to the unspeakable horrors, Dun Darach is poetically atmospheric. In our dreams we've all been to Dun Darach.

The graphics and action are exceptional. Especially wonderful is the movement of the characters. Like a number of other graphic adventures, this one uses the movie camera approach. That is you do not see out of the eyes of puppet in the computer world. Instead you view him through a camera. He can be made to walk, grab, drop, fight and offer objects to others through the keyboard — the same medium is used to control the direction which the camera is pointing in.

Cuchulainn is the name of the hero of the game. Tir Na Noggars will remember him, and his task is to free his pal, Loeg the charioteer, from the city of Dun Darach. He and the other inhabitants of the city look like rock musicians, with long flowing hair, bare arms and boots — the girls have longer hair and mini-skirts.

The city is realised wonderfully in this computer game, it is easy to get the impression that you are actually there. Taking the time to draw a map can be dangerous as the inhabitants are a bunch of thieves and pickpockets, but if you do you will be impressed by the size of it, and the attention to detail.

As graphic adventures go, Dun Darach is not easy. But it is highly original, superbly crafted and will give pleasure for hour after hour.

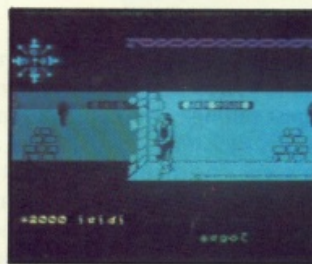
Bill Bennett.

SOFTWARE

Shortlist



Herbert's Dummy Run.



Dun Darach.

Nodes of Yesod

■ Spectrum 48K
■ Odin Computer Graphics
■ Arcade adventure
■ £9.95

★ ★ ★ ★

THIS EVOCATIVELY named game features a home computer breakthrough — the first-ever Spectrum speech with Liverpoolian accent. But don't worry, it's only the introduction.

It bears certain similarities to Ultimate's Underwurlde, not least in the quality of production. You play a spaceman who must descend into the depths of the moon, collect eight alchims — coloured shapes — and then get to the Monolith. All this to save the universe from some horrendous evil.

One of the game's nicest touches is that you're not alone in your quest. Before you disappear down a lunar pot-hole you need to catch a mole from its hole. When needed, the little critter can be activated to chew through walls to new caverns, or to destroy the many creepy crawlies in the moon's depths.

The subterranean playing area has many platforms which you hop around on. Progress is made in a series of athletic somersaults which will often land you at the very bottom of a cave — minus a life.

Peter Connor.

Herbert's Dummy Run

■ Spectrum
■ Mikro-Gen
■ Arcade Adventure
■ £9.95

★ ★ ★ ★

MIKRO-GEN'S ARCADE adventures are witty in an Ealing comedy way, as opposed to the Raiders of the Lost Ark fun of Ultimate's games. Both software ranges use impressive graphics, undisclosed maps, and take time to master. Both software ranges are more expensive than the average Spectrum fodder, but as Rolls Royce will tell you nobody begrudges paying extra for quality providing they have the money.

Herbert's Dummy Run is a compendium computer game. A number of the rooms within the arcade adventure are mini arcade games in their own right. So for your money you get a lot of different games — a kind of Star Wars On 45. You have to find items that let you do things, like the tennis racquet which is used to hit the bouncing tennis ball. In this respect the game is adventuresque, but go-north, eat-food, bang-headers will turn their noses up at Herbert's babyish actions.

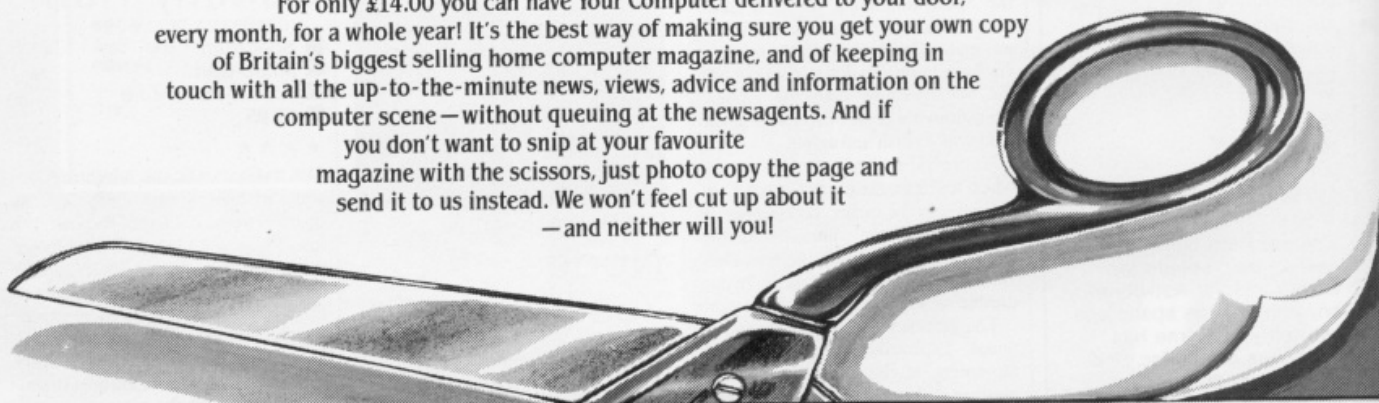
In fact, Herbert is a baby. Just to prove it, the game loads and starts playing "Baby Face" — if you can amplify your Spectrum's sound output it is worth doing so. He comes from a good family, being the child of Wilma and Wally Week, who you may remember from the previous Mikro-Gen games. Wally looks like a Tetley Tea man, but reminds me of Norman Wisdom.

The game is set in a department store; somehow Herbert has been separated from his mum and dad. His adventures on the way to the lost and found department are like a surrealist's nightmare, maybe he just drank too much gripe water.

Bill Bennett.

It's a snip.

For only £14.00 you can have Your Computer delivered to your door, every month, for a whole year! It's the best way of making sure you get your own copy of Britain's biggest selling home computer magazine, and of keeping in touch with all the up-to-the-minute news, views, advice and information on the computer scene — without queuing at the newsagents. And if you don't want to snip at your favourite magazine with the scissors, just photo copy the page and send it to us instead. We won't feel cut up about it — and neither will you!



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Perrymount Road, HAYWARDS HEATH, Sussex RH16 3DH.

YOUR COMPUTER

Star★ chart

Five-a-side Football

CBM-64
Anirog
Soccer game
£5.95 — disc £8.95

★★★
If this indoor football game has much of the excitement of ice hockey — and many of the same rules — you shouldn't be surprised. It was co-produced by Advantage, the same Canadian software house that brought Anirog's Slap Shot ice hockey game to the small screen. Not only do the players glide around the pitch as if they were on skates, they can also body-check each other with impunity on or off the ball. This escalation of soccer violence to the computer's screen adds a new and unexpectedly enjoyable dimension to the game. Your view of the action moves smoothly from end to end following the play, and the crowd gives a squelchy under-water roar as the ball hits the back of the net. The play switches to a penalty sequence whenever you cannon one player too many into a wall. Playing options include three levels against the computer, a penalty game plus the normal two-player.

Timeslip

C-16
English Software
Triple Scramble
£6.95

★★★
The game gives you three Scramble-type games for the price of one featuring a screen split horizontally three ways. At the top of the screen you fly a rocket over the landscape, in the centre you control a little man with a jet pack and on the bottom screen it's a submarine.

What are you trying to destroy, apart from the usual clutter of tanks, fuel dumps and civilian housing that tend to clutter up these sort of games? Well, there are 36 time orbs placed within the three time zones. Your job is to destroy all the orbs and synchronise time in the three zones to zero hours.

Sky Fox

■ CBM-64
■ Ariolasoft
■ Shoot'em-up
■ £9.95 — disc £12.95

★★★★
NOT SO MUCH a flight simulator as a combat simulator, Skyfox features both air and ground attack, plus a variety of scenarios. The three-dimensional graphics are very impressive, especially in the airborne scenario. But the hordes of tanks rolling across the green terrain of the charted colony are just as deadly.

You have to defend your home base and installations against attacks launched from a vast alien mothership. You can develop your skills through various training levels through to small invasions, full invasions, or would a massive onslaught be more to your taste, sir? Likewise you get promoted through five ranks from cadet to ace of the base. It is possible to start high (against planes) or low (against tanks), in a combined scenario.

The screen display shows the view from Skyfox's cockpit. There is a central radar display as well as the actual view from the cockpit and by pressing f1 you can choose an overhead or a forward view. If there is no activity in your area, you can just hit A and the autopilot will take you where the action is. As Ariolasoft's Clive Brown put it: "You don't want to be hunting all of the time — there are plenty of other programs that do that".

But, you can hunt if you want to. Alternatively you can call up your on-board computer which gives an overhead display of alien incursions and by moving your cursor on the map and pressing A you can go to the most strategically important area, rather than just the nearest.

The prices certainly make Ariolasoft competitive with other quality US imports and this is a new game released within two months of its American debut. "My hope is that we will get prices down to the same level as cassette prices", says managing director Frank Brunger.

Other nice features in the game include afterburners — hit the space bar to blast yourself out of a sticky situation or to zoom in on the enemy. You can select a limited number of guided or heat-seeking missiles which wipe out your target as long as you keep it in the middle sector of your cockpit window. You can land at home base to refuel, which you'll need to do if you use the afterburners much.

There is also a set of five multiple mothership invasion scenarios, Halo, Alamo, Advancing Wall, Chess and Cornered which necessitate different kinds of threat analysis on your part.
Paul Bond.



International Tennis.

SOFTWARE

Shortlist



Sky Fox.

International Tennis

■ CBM-64
■ Commodore
■ Tennis simulation.
■ £5.95

★★★
Soggy strawberries, and tennis tantrums; such are the dubious pleasures of another washed out English summer, and one of its great institutions, Wimbledon. Thanks to Commodore, the sight of the rain tipping down on the centre court need no longer be a signal for tennis fans to despair, just plug-in your trusty Commodore, and get stuck in to this latest offering in Commodore's "International" series.

You get an umpire's eye view of the court, with a token bunch of blobs in the background "representing" the crowd. One or two player options are available, and four levels of computer opponent are provided. Control is via joysticks, moving the player around the court and playing the stroke.

The way you move the joystick as you hit the ball determines the sort of shot played, in a fairly logical manner, i.e., pushing the joystick in the direction of your opponent plays a long straight ball, pulling the joystick toward you will produce a moderate length cross court ball.

Most shots are there — ground strokes, volleys, baseline play — but smashes and lobs are out.

Playing the game takes some getting used to. The side-on view is harder to judge than the more usual down-the-court style.

Looking at other offerings, there seems little to recommend this game over Activision's On Court Tennis.

Lee Paddon.

The Fourth Protocol

■ Spectrum
■ Hutchinson Computer
Publishing
■ Adventure
■ £12.95

★★★★

SO YOU made it at last, Johnny. Congratulations, Bertie. This is the first phone call you take when as John Preston you take up your post as the new head of section CI(A), part of MI5 responsible for the security of government buildings. But you'd better not rest on your laurels too long.

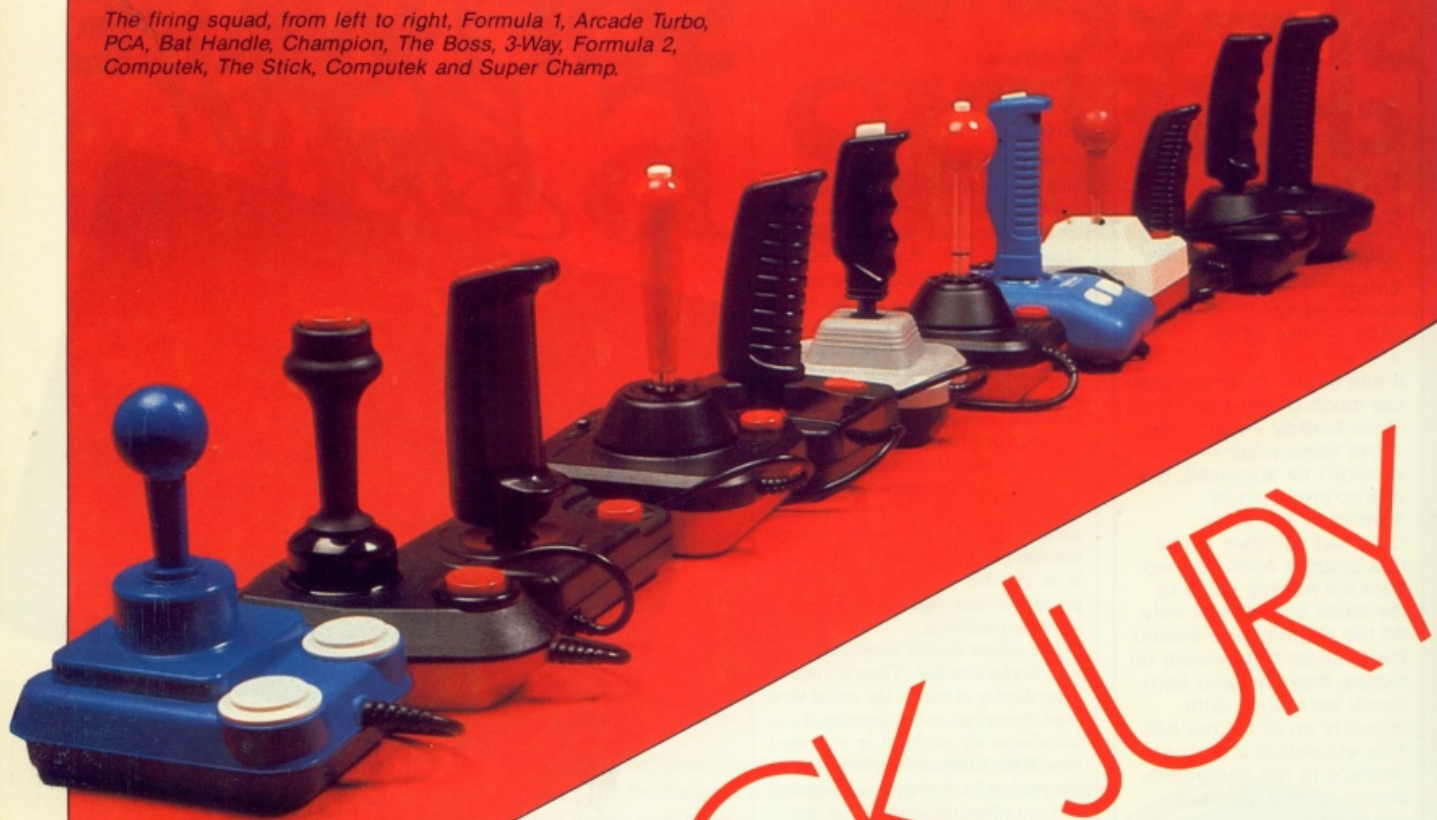
A burglar steals some diamonds from a flat somewhere in England, but posts back to the MOD some NATO documents that he lifts by accident at the same time. Where's the leak? You'd better find out fast, or you'll end up being posted to the Falklands. Worse, a nuclear bomb may go off somewhere in the UK.

The game is divided into three sections: The Nato Documents, the Bomb and the SAS assault. You must solve the first part to get the password for the second part and so on. The game is a high resolution, predominantly monochrome icon-driven adventure. On the first screen you have representations of three VDUs, a filing cabinet, a VCR camera, a cassette (this is for utilities related to saving the game for continuation at a further date), a graph, and a date pad which can be used to advance time in the game.

You just move a pointing hand around the screen to select what you want to do. If you go through the VDU displaying memos a subset of icons is overlaid on the screen enabling you to read, file or bin documents. A dustbin icon is used for the latter function, as on the Macintosh computer.

Paul Bond.

The firing squad, from left to right, *Formula 1*, *Arcade Turbo*, *PCA*, *Bat Handle*, *Champion*, *The Boss*, *3-Way*, *Formula 2*, *CompuTek*, *The Stick*, *CompuTek* and *Super Champ*.



JOYSTICK JURY

OF THE MAKING of many joysticks there is no end. A few years ago you took what you could get; now you're faced with a bewildering number of conflicting designs. Somehow you have to solve a complex equation involving such variables as strength, comfort, responsiveness, manufacturers' claims and, finally, the price. One of the factors affecting the last variable — price — seems to be the use of leaf switches or micro switches, the latter being more expensive as well as more responsive. Kempston's latest joysticks exemplify this difference.

In keeping with their new image as sponsors of motor sport, Kempston's sticks are now called the *Formula 1* and *2*. They've changed the previous black for a vibrant light blue. I think it's a disgusting colour, but *de gustibus...*

The **Formula 2** is the cheaper stick. It has two fire-buttons on the base — presumably to avoid accusations of right-handedism — and one on top of the shaft, which is quite tall and comfortably grasped. The trouble with this stick

is that you have to move the shaft a long way to get the response you want. It could cost lives.

More expensive is the **Formula 1**, doubtless because it's micro switched. This makes it much more sensitive. The construction also seems to be more solid. But I found it rather uncomfortable to use. It has a very short shaft with a bulbous end. The two fire-buttons are both on the base. If you don't want to put the stick on a surface, it means wrapping your hand around the base and firing with the same hand. This caused me considerable pain in the region of the thumb.

Another company with a selection of sticks is Wico. **The Boss** is a pretty nifty stick, with a solid plastic base into which the shaft fits snugly. The single fire-button is at the top of the shaft, a location which can lead to a certain amount of fatigue. The *Boss* is, otherwise, very comfortable and also very responsive. Perhaps just a little too much so; at times there doesn't seem to be enough resistance and you go much further than you wanted to.

Wico's **Command Control** is a very superior joystick; solid, smooth and attractive. There's a snazzy red and black base with a steel shaft. The grip is smooth, but this didn't cause any problems. This is a very responsive joystick and should last a long time. But it's also pretty

expensive.

Not quite as costly, though, is Wico's **3 Way Command Control**, which is the previous stick with knobs on. As well as the smooth grip, you get a moulded one and a large knob. Very useful if you treat your games like a round of golf. The extra grip means, naturally, extra price.

Much cheaper is the **Gunshot 1**, from Vulcan. Smartly turned out in grey and cream, the *Gunshot* has a big chunky handle that gives you a firm hold on things. Fire buttons are on the base and top of the shaft. It gives a quick enough response and, while not being the sturdiest stick



Goodness gracious, great balls of fire, from left to right, Micropride's Atari trackerball, Marconi's, the AMX mouse, Micropride's BBC trackerball, and Voltmace's data input pad.

around, seems pretty durable. At the lower end of the price range it's a good buy.

The Champion is another lower-priced stick but it has an auto-fire option as well as buttons on shaft and base. The black plastic grip is comfortable and you get a reasonable response from it. The whole thing is very light — perhaps too light for those who like to bash their sticks around. More restrained players should have no problems.

The **Arcade Turbo** disturbed me by the noisy clicking as I moved the handle. But it didn't seem to affect performance, which was tolerably responsive. The Turbo has buttons on base and shaft and is very solid; it should stand up to quite a lot of punishment.

But not quite as much as the **Super Champ**, which is a fearsomely large construction of heavy black plastic. The long and thick handle with fire buttons on top and in trigger position is secured in the massive circular base by means of a plastic collar that gives strength and the right amount of resistance without sacrificing sensitivity.

The Super Champ's cable rewinds into the base, and provides the occasion for some of the strangest instructions I've seen in a long time: "Rewinding the cable should be always clockwise. If sometimes reverse the direction which may cause extangled to the cable". So now you know.

The **Nidd Valley** brings a welcome change of atmosphere from all these brutal, boasting, macho names. It's like those old Dragon or BBC joysticks, built to be held in one hand and controlled by the other. Unfortunately, the stick you twiddle is rather too small — you can't really get more than two fingers round it. I suspect most people aren't satisfied with a joystick unless they can grab it in a fist and wrench it around.

If you can manage without chunky handles, then the Nidd Valley will do you very nicely. It's micro switched, and so pretty accurate and sensitive. It's also one of the cheaper sticks on the market.

The **Joy Card**, from Hudson Soft, is a funny little thing and is definitely not for the histrionic games player. It's a small, slim rectangular "card" with four direction pads and two fire buttons.

Shake rattle and roll, Pete Connor, our man with his finger on the button, gets to grips with the latest hits and misses.

Shooting from the hip with, from left to right, Gun Shot, Quick Stick, Delta 3b, Delta 14b, Delta 3d, Delta 3s, Delta 3b (BBC)

SURVEY

After using a joystick for a long time the Joy Card presents problems of adjustment. You most certainly cannot bash it about.

However, once you've got the hang of it it turns out to be sensitive and comfortable. It won't do for all games, and you won't like it if you don't want to use four fingers at the same time, but

it's worth having a look at.

The Stick is almost as strange. It looks pretty much like a joystick except . . . Great Scott! What's this? . . . The base is missing!

It doesn't need one. It works by means of "eight-point mercury switches". You get the movement you want by tilting the stick in the required direction. Obviously, this takes some practice since there's no resistance to movement. The Stick, though, proves to be very sensitive and less tiring to use than conventional joysticks.

Of course, it won't do for every game. The distributors say "it is particularly good with race games and flight simulators", and I would endorse that; it performed well on Pole Position but didn't do much for my chance in the Karate game Way of the Exploding Fist. At £12.99 it can't be considered expensive, so it may be worth investigating.

BBC owners used to have a rough time when it came to finding a joystick other than the official Acorn ones which were widely acknowledged to be unsatisfactory, to say the least.

But times have changed. If they want a stick that looks much like everybody else's the **PCA** is just the ticket. It plugs into the analogue port

(continued on next page)



(continued from previous page)

at the back of the Beeb and is made of that old black plastic again, with the red buttons we all know and love. The shaft has depressions to fit your fingers ever so snugly, and is set to one side of the base. Fire-buttons are on top of the stick and on the base.

Control is pretty good with the PCA. My only reservation is that the thing is so light I wonder how much of a bashing it can take.

Voltmace's Delta for the BBC is another analogue joystick. It looks like a TV remote controller, with the small stick set in it at the top. Below that are three buttons; so you must have two hands to use it.

It's a self-centring stick with control that matches others. But the same reservations apply to this as to the Nidd Valley. There's not a lot to grip, and if you get over-excited I wouldn't like to be responsible for the Delta's safety.

Looking a little farther afield, Micropride import a range of joysticks from Taiwan. At the lowest end of the range comes the **Quickstick**, which bears more than a passing resemblance to the Amstrad joystick, without the extra socket. It is small, and rather frail looking, but the grip fits snugly in the hand, and there are three fire buttons, on the top and front of the grip, and on the base. The action seems rather loose, but positive, and seems good value for money.

The **Computek** Atari-style stick gets the award for sheer bulk. In traditional black and red, it dwarfs a standard joystick, standing nearly 20cm. high. Made for the avid decathlete, or



someone who likes to put everything they've got into a game, this one looks as though it would last for ever, certainly long after your Spectrum is an exhibit in the Science Museum.

The Computek stick for BBC computers is of similarly good construction. It is self-centring, with two fire buttons on its large base, and a metal shaft with a bulbous knob on top. It is quite sensitive, and has just the right amount of spring to centre the joystick without making accurate positioning difficult.

I think it was Snaglepuss who used to say "I hate those meeces to pieces"; but he'd probably change his mind if he had a BBC and got hold of the **AMX Mouse**.

The AMX Mouse is so impressive because it comes with an excellent drawing program, **ART**.

As with the Macintosh MacPaint program, on which it is modelled, this allows you to pull down icons with your mouse instead of having to type in text or otherwise enter commands.

Available options are arranged around three sides of the screen. Move your mouse over the desk until the pointer is on the required option, press one of the buttons and, hey presto!, you're ready to go. For instance, you might want to start with a little graffiti. So you just select the Spray Can icon and off you go. Instant subway art.

It doesn't take long before you're able to do quite sophisticated drawings. Mistakes don't matter because all you do is pull down the eraser and rub them out. Although the program is monochrome there is a choice of 32 different patterns so a wide variety of effects can be obtained.

Other software available for use with the AMX Mouse includes a Utilities disc with icon designer and Desk, a program containing diary, memo pad, etc.

The first thing you have to do with **Connexions' Magic Mouse** for the Commodore 64 is assemble it — ball and carriage are separately packed for safety. The software includes a Hi-Res Graphic Designer — in other words, a drawing program. It's similar to the AMX one, with the major difference that the menu of icons is not constantly displayed.

You have a choice of nine brushes giving a good variety of width and stroke. As with the AMX you can draw circles and boxes, fill in backgrounds and dump to a printer. This mouse, though, seemed a little inaccurate; it circles came out rather less perfectly than one might have expected.

Also included in the Connexions package are a Sprite Designer, an Icon Designer and a Mouse Controller which enables you to write your own software for the wee creature.

It's been said that a mouse is really just an inverted tracker ball. But it would be a foolish man who tried to use **Marconi's Tracker Ball** for the BBC upside down. It's a hefty piece of peripheral, with a large brown ball set in the solid base. Marconi supply some software with it, including a painting program. This is not as sophisticated as AMX Art, but it does show just how accurate and sensitive the tracker ball can be.

The Tracker Ball can also be used with some — but by no means all — joystick-compatible programs. But how many games, Missile Command apart, would you want to use a tracker ball with? Not many, I'll wager.

Micropride also import two trackerballs, one for the BBC, and the other Atari style. The usual problems apply, at £19.95, they are expensive and don't seem to offer great advantages over the conventional joystick. This is not the fault of the trackerball, merely the fact that almost all software is designed to be controlled by joystick.

As far as the Atari version goes, the box is 15cms. square, and even during the most vigorous spinning will stay rooted to the spot. The ball moves quite freely and there are fire buttons to the left and right of the ball. One advantage over joysticks is the speed with which you can stop and change direction.

The BBC version obviously has more potential as, here, the position of the ball can be directly related to a position on the screen, but again, not really designed for use with most commercial software.

Name	Price	Company	Address
Formula 1	£16.95	Kempston	Unit 30, Singer Way, Woburn Road Industrial Estate, Kempston, Bedford. 0234-856633.
Formula 2	£11.95	Kempston	
The Boss	£15.99	Computer Games	CGL House, Goldings Hill, Loughton, Essex IG10 2RR. 01-508 5600.
The Champion	£11.99	Computer Games	
Bat Handle	£27.99	Computer Games	
3 Way	£32.99	Computer Games	
Gunshot 1	£8.95	Vulcan Electronics	200 Brent Street, Hendon, London. 01-203 6366.
Arcade Turbo	£22.95	New Horizon	1 Goodall Street, Walsall WS1 1QG. 0922-24821.
Joy Card	£8.95	New Horizon or Orpheus Ltd.	The Smithy, Unit 1, Church Farm Estate, Hatley St George, Nr Sandy, Beds. 0767-51481.
The Stick	£12.95	Lightwave Leisure	2 Maldwyn Road, Liscard, Wirral, Merseyside L44 1AL. 051-639 5050.
Delta 3b	£12.00	Voltmace Ltd.	Park Drive, Baldock, Herts SG7 6EW. 0462-894410.
Datapad	£34.95	Voltmace Ltd.	
Delta 14b	£29.95	Voltmace Ltd.	
Delta 3d	£10.00	Voltmace Ltd.	
Delta 3s	£10.00	Voltmace Ltd.	
AMX Mouse	£89.95	Advanced Memory Systems	Woodside Technology Centre, Green Lane, Appleton, Warrington. 0925-62907.
Magic Mouse	£59.95	SMC Supplies	11 Western Parade, Great North Road, Barnet, Herts. EN5 1AD. 01-441 1282.
Trackerball	£60.00	Marconi Electronic Devices	Doddington Road, Lincoln. 0522-688121.
Quick-stick	£7.50	Micropride Ltd	Unit 16, Shipyard Industrial Estate, Brightlingsea, Essex. 0206-364957.
Computek	£9.95		
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ENTERPRISE

Competition

IN MAY'S COMPETITION to win an Enterprise 128 plus a printer you were asked to come up with an idea either for cheating in an exam, or for pulling off a computer scam. To our surprise this sparked off a minor scandal.

Teachers and headmasters accused us of trying to subvert the exam system: copies of *Your Computer* were withdrawn from school libraries, school kids protested, and questions were asked in the House. In our defence we protest that the competition was intended as a light-hearted jape; and to our detractors we reply: Come off it Chalky! Where's your sense of humour?

Needless to say most of the entries took the competition less seriously. C. Holland suggested a way of using the ZX-81 to hack open the computer-controlled security door of a bank: place the ZX-81 near the security lock then, using its advanced wedge shape design, hit it with a mallet

so forcing the door open.

J. Andeh's idea was to program a computer to control a robot arms on wheels. During the exam the robot is to approach the supervisor and yank down his trousers. In the ensuing confusion you can take out a pre-prepared crib sheet and start cheating. This entry was nicely illustrated by a cartoon in the style of the Beano's Bash Street kids.

H. Kay revealed his three-part plan for making sure that he won the competition. First, break into the computer-held record of competition entries and delete all other entries. Second, hold *Your Computer's* memory banks to ransom. Third, alter BPI's records "to show that I am editor of *Your Computer*, whose decision is final". Just as well that the entries are not stored on a computer but in a cardboard box.

RESULTS

As you might expect many people hit on the idea of using hidden radio transmitters to communicate with computers during an exam. Seiko wrist micros were also popular, as was the technique of projecting answers on to spectacle lenses.

The best entries along these would-be practical lines were from R. Buckley with his comprehensive Cheat-O-Matic system, and C. Riddington with The Perfect Exam Cheat Implement.

All those mentioned above receive the runners-up prize — copies of the Hackers Handbook and Computer Crimes and Capers.

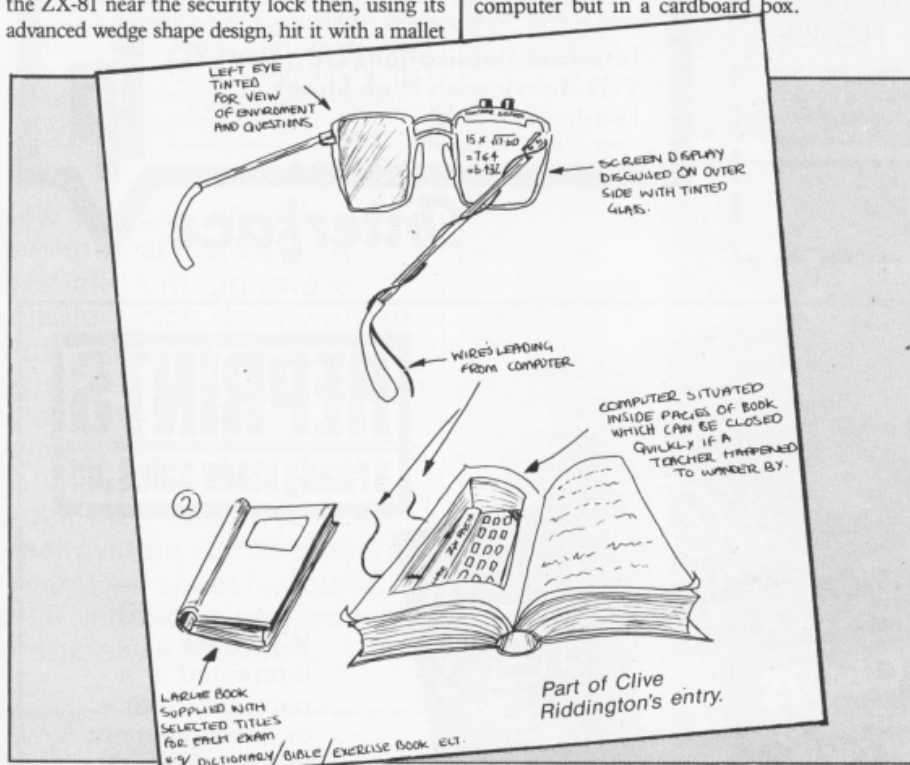
We awarded the first prize to one of the most entertaining entries submitted in a long time, which came from Manolo Abd-El-Baki, 21 Rue Daniele Casanova, 91330 Yerres, France. This amounted to a definitive study of cheating, or cheatology as the author calls it.

Cheating philosophy

At the start Abd-El-Baki discusses the philosophy of cheating. He argues that "cheating is a basic need for virtually all students" and cites the Greek philosopher Aesopius, who said "cheating is the mother of all wisdom".

Following this he takes a look at the history of cheating and makes the bold claim that "the search for the perfect method of cheating has been man's greatest preoccupation since the dawn of civilisation".

Finally he gives the specifications of his new model, the SOGE — Standard Operational Cheating Equipment — accompanying them with diagrams and formulae. A team of *Your Computer* scientists is now carrying out a feasibility study on the system, and its full details cannot be disclosed here. Suffice it to say that SOGE involves a pair of glasses, a contact lens, and a strip of microfilm.



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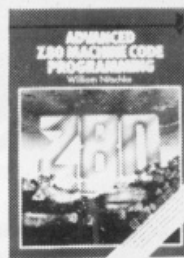
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- Each person may enter the competition only once.
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Address _____

Idea (written or drawn, use extra space if necessary). _____

FIRST FIST, THEN

FIRST FIST — THEN, Mordon's Quest, Terrormolinas, and Lord of the Rings plus conversions of Starion and Fist for other machines — not to

mention future projects like a Whitbread Round the World Yacht Race game and enhanced versions of current hits for new machines like the Commodore 128.

Everything seems to be coming up roses for Melbourne House since Geoff Heath became British boss a few months back but he would be the first to admit that the seeds of success had already been sown. The current wave of strong software was all under development long before Geoff took control, but when he arrived the company had faded out of the public view with Starion waiting to be launched.

Although Fred Milgrom, the international head of Melbourne House, admitted to *Your Computer* that the likes of Ultimate were producing arcade games that "were technically far superior to what we were coming up with" and promised to do something about it, that was over a year ago and there was still no sign of action. Melbourne was a leading adventure house but had no chance of catching up with the arcade specialists.

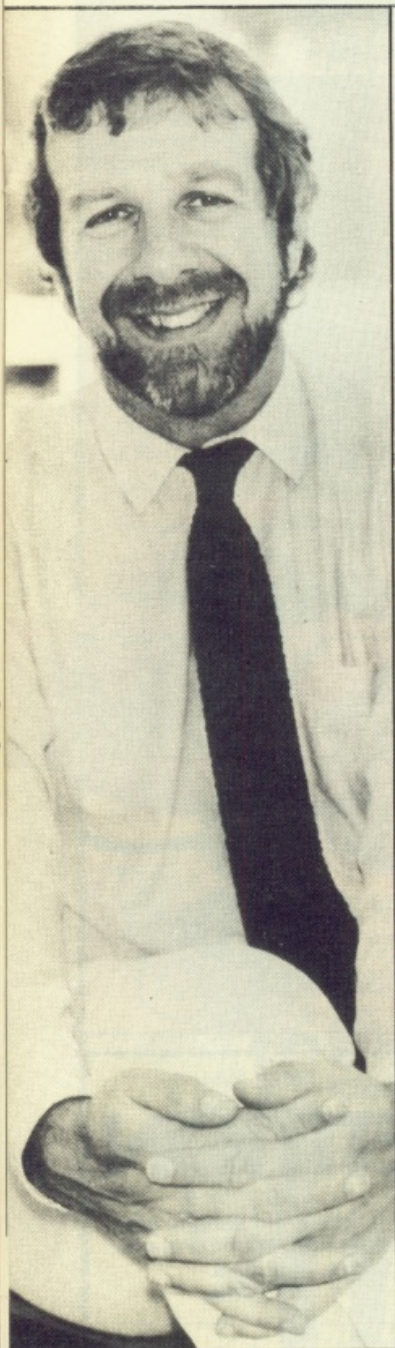
Geoff decided to scrap the expensive video-style packaging planned for Starion and go for a simple cassette case in the belief that a good Spectrum shoot-em-up just needed to be seen on as many shelves as possible.

Timing was also important — with thousands of Spectrum owners looking for something like Elite to come out on their machine. But when Starion hit the shelves the quality of David Webb's vector graphics on screen and the idea that Melbourne House could produce a successful program that was neither an adventure nor written by an Australian were both major surprises.

But if Starion was a cracking good variation on an old theme, Way of the Exploding Fist was something else — one of those programs which sets standards by which others will be judged. Timing again was nice — out in good time for the World Games at Crystal Palace on July 27 where non-Olympic sports like Karate will have their world championships.

Jeff Thompson, World Heavyweight Karate Champion from 1982-84 and Team Champion now, who is competing there, believes that Fist has enough of the feel of the real thing to attract computer gamers into abandoning the screens and taking up Karate. Jeff urges caution though "I want to see the sport develop — and safely. If they wish to take it up go to a local karate club but be careful". If anyone plays the game then wants advice on taking up the sport they can write to him for advice at Pursuit of Excellence, PO Box 699, Fulham, London SW6.

Geoff first tried Fist at the Commodore show "it looked very authentic, movements, drop sweeps — the mood, music and atmosphere" but he couldn't take it seriously — until he had suffered the indignity of being repeatedly laid out by kids of half his age, "I got really competitive". With three hours a day training for the championships — "it's a combat form of chess, you never really master it" — Geoff has not had



TERRORMOLINAS

Knuckle wrestler Geoff Heath, Melbourne's new U.K. chief, still plans to go ahead with the launch of Terrormolinas — a holiday disaster spoof adventure by the team who wrote Hampstead — despite the trail of real life disasters facing tourists this summer, from hijackings and bombings in mid air and on Spanish beaches to alerts in British resorts.



much time to improve his game on screen but he uses it as a break from training. He'd like to see a sport version where you take on teams from other countries.

After Starion and Fist, which were the May and June blows in Melbourne's Summer offensive, July drops into lower gear with Mordon's Quest. Geoff Heath was born in Morden, and if my supposedly efficient Croydon-based hire-purchase company claims to operate from Croydon on its headed notepaper, I suppose these Aussies can get away with a mis-spelt tribute to the head of the British office.

But no, Mordon's Quest turns out to be just the next text only stage in the Classic Adventure. Mordon is apparently the most important person in the history of the universe so I suppose he need not worry about being mistaken for a grey south London suburb stranded between

EN...



Like karate champ Jeoff Thompson, Melbourne House is exploding into action. Meirion Jones asks what next after the Fist?

Mitcham and Cheam.

About the only significant feature of the Quest is that it will be ready simultaneously in Spectrum, CBM-64 and Amstrad versions whereas Starion and Fist will gradually migrate to other machines over the next couple of months.

Summer migrants to Spain are the targets of Terrormolinas, an adventure aimed at people who do not usually buy adventures by the team who wrote the snobby social climbing computer game Hampstead — Peter Jones and Trevor Lever. Peter works in public relations and he says that Hampstead went down well although "Your Computer" were fairly scathing about it. It was tongue in cheek which perhaps you didn't realise". At least that well known micro mag The Listener made it their computer game of the year.

This time Peter and Trevor are taking more

LORD OF THE RINGS



Good news for Frodo fanciers. Fellowship of the Ring, first part of Tolkien's Ring and eagerly awaited sequel to the program which established Melbourne's reputation — The Hobbit — will appear in late September. Philip Mitchell, left, who programmed The Hobbit and Sherlock Holmes is team leader for Lord of the Rings and is seen here back at base with Lyn and Russel Comte and Fred Milgrom, right, who is the international head of Melbourne House.

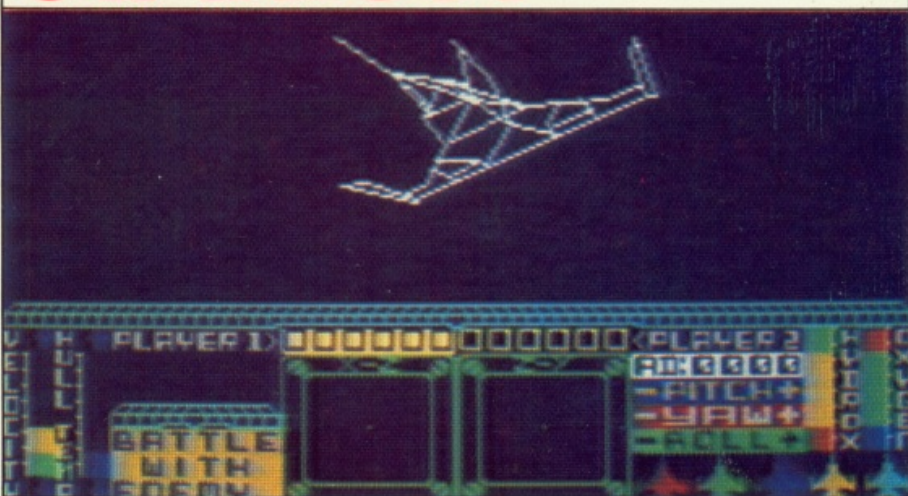
of a chance. Terror is based on the idea of collecting snapshots — unlike its predecessor this game has graphics — during a Spanish holiday in which everything that could go wrong does go wrong — from tummy bugs to bombs. Despite the risk of accusations of bad taste if tourists are hurt on the Costa Brava this year, Peter says it's "less risky than actually going to Spain". He's also not worried that the Spanish government may be offended — "we haven't written it for

the Spanish tourist industry. I hope it does offend some people".

No wonder Fred Milgrom asked them to "be nicer to the Spaniards" when he saw an early version. Fred's other contribution was the name Terrormolinas which he suggested as an alternative to the working title which was Holiday in the Sun — after the Sex Pistols song.

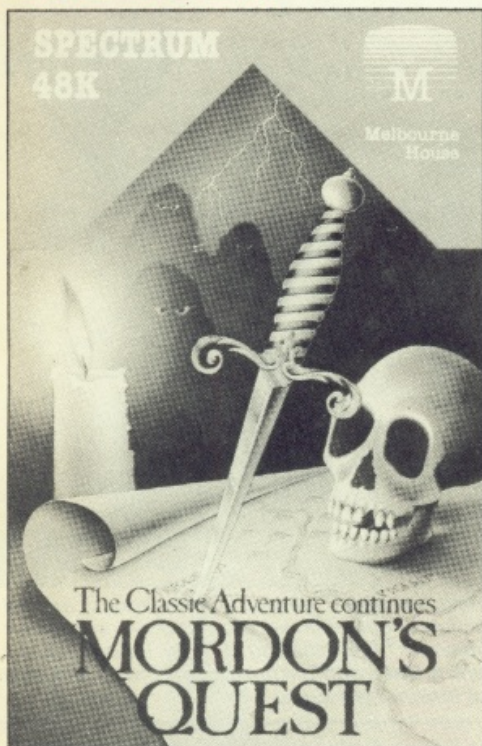
A global conspiracy game is what Trev and
(continued on next page)

STARION



Commodore 64 and Amstrad versions of Starion are on the launch pad now that the Spectrum shoot'em-up is hurtling up the charts to prove that Melbourne House can produce arcade games as well as adventures.

MORDEN'S QUEST



Morden's Quest takes up where Classic Adventure left off. It's a 150 location text adventure and Morden is the ancient one who asks you to find all the components of his immortality machine — if you fail the universe will be destroyed.

(continued from previous page)

Pete are working on next — sounds a little closer to the “plain of Tharg and the misty mountains of Blimp” which are the traditional settings for adventures and which they find “almost incredibly narrow”.

Lord of the Rings

Meanwhile back at the Victoria branch of the Melbourne House global conspiracy Philip Mitchell is leading the team working in the ultimate misty mountains adventure — The Lord of the Rings. After the Hobbit — which was also programmed by Philip — expectations are high so there will be no attempt to cram the whole thing into one game. He and his team, which includes “Fred’s creche” — a bunch of University of Melbourne computing students moonlighting in the vacations — are putting together The Fellowship of the Ring, the first part of the Tolkien Ring trilogy which again like the Hobbit will be a book plus game set to be released in late September. Then the other parts — the Two Towers and the Return of the King will be released at six month intervals. Before the Two Towers appears the Whitbread Round the World Yacht Race, which will run from this September to next March, should have made it to Australia and back again. Appropriately Milgrom plans a simulator game based on the race where you have to use radar and satellite navigation as well as

fighting off the hazards of the sea.

Now that Melbourne House has a British boss — below Fred but at least every decision does not have to make the passage to Australia and back — the company seems to find it easier to hold to its intended course over here.

Geoff Heath does not think that the problems of Acorn, Sinclair and the like are a real threat to the software industry. “Even if Sinclair is having problems right now I don’t believe the consumer is worried by that. People have still got money to spend”. Piracy is not such a problem either “if you produce a good product at a good price” and the “new copyright act will help”.

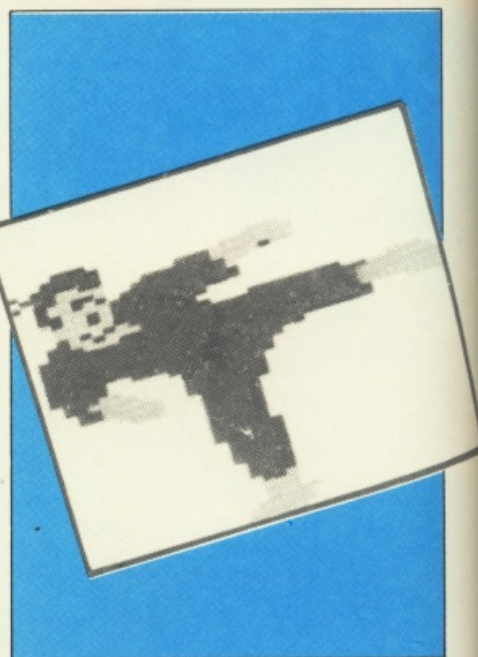
He believes that most of the small software houses that have folded were bound to go anyhow. “The days of starting up in a garage and running off a few hundred are over. The big software houses — under 10 companies count — are run as businesses. Soon there will be six or seven companies with others under their wings”.

Looking forward to more Ram

New machines mean it takes more programming time to create games that will take advantage of increased Ram — which again favours companies with big resources, but programs like Fist use every last byte of the 64’s memory and Melbourne’s teams are already looking forward to the luxury of 128K Ram and beyond. “More memory has never been enough for the programmers” as Geoff points out. At first they will produce enhanced versions of existing games for machines like the CBM-128.

Melbourne will still carry on producing books, for people who have just bought a micro “to tell them there are other buttons on it than shift and run” or who want to go on to machine code — “the helicopter head stuff”.

Before joining the Milgrom organisation Geoff was Mr Activision in this country so he’s seen it all but he is still enthusiastic about computer games. After all “there’s no other business where you can go home at night and be a karate expert”.



EXPLODING FIST



Gregg Barnett, who converted the Hobbit and Sherlock to the Commodore before making his mark with Way of the Exploding Fist, is now converting Fist to the Amstrad and Spectrum and — memory permitting — the BBC, in other words if the Plus ever takes off.

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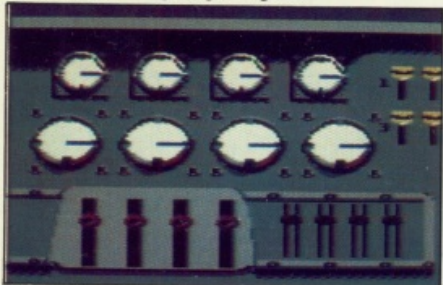
Just name your top 10 games and win a Commodore 64, a CPM machine and 128K of Ram all rolled into one — in other words the Commodore 128. Sounds easy — but as Ellie Dee, Elsie's elder sister, finds out you can be spoilt for choice.

ALTHOUGH PURISTS tell you there's no difference between the early jerky monochrome space invader clones and today's games like Skyfox and Raid Over Moscow, or that adventures have not advanced since Crowther and Woods Classic Adventure, the qualitative jump between chasing white blobs around the screen and playing arcade quality games in your own home came with the launch of popular colour computers — the

Gridrunner — the Vic-20 classic.



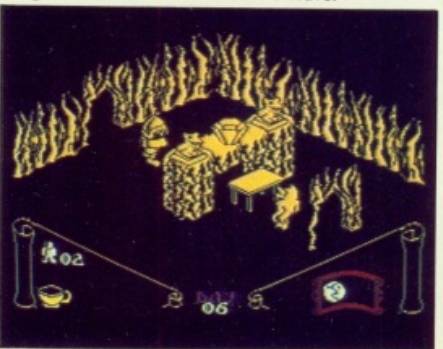
Dambusters — going for gold.



Tir Na Nog — real graphic venture.



Knight Lore — 3D arcade venture.



Vic-20 in Summer '81 and Spectrum in Spring '82.

Games like Jeff Minter's Gridrunner made good droid-zapping use of the Vic with enough colour and buzz-saw sound to keep you mesmerized. It had that magic addictive ingredient which puts it in my all time top ten — unlike Minter's later efforts which were technically more proficient, colourful, tuneful and complex but less fun to play.

Meanwhile in America Atari waded in with a whole series of cartridge games that were to set the standard for the home arcade. Missile Command, Defender, Star Raiders and Pole Position all used the Atari 400 and 800's superior graphics and sound capabilities while the quirky Oric went another way, even if the price of machines and software kept them out of the hands of all but a few British Atari fanatics.

Pole Position was unchallenged as a racetrack game until the likes of Talladega on the Commodore 64 and Revs on the BBC. Star Raiders was only upstaged by the slower and more thoughtful Elite this year. Buck Rogers-type games passed me by although Zaxxon still has its champions. Frogger spawned hundreds of copies, elaborations and even simplifications like Jumpin' Jack which has a charm of its own; snake games slithered out of all the software houses and every self-respecting micro had to have its own version of Galaxians.

But nothing compared with the Pac-Man madness that swept two continents and slides into my 10 toppers. If Pac-Man had arrived a couple of years later it would probably have been called Ghostbusters. Pity it didn't play as good as it sounded on the 64.

In Britain in 1983 Manic Miner singlehandedly raised expectations of what the humble Spectrum might achieve and platform games became the rage. At the same time strategy struggles like Eastern Front, or on a less serious level Football Manager, developed. The Commodore 64 allowed more realistic sports games on screen — like International Soccer which set new standards for realism.

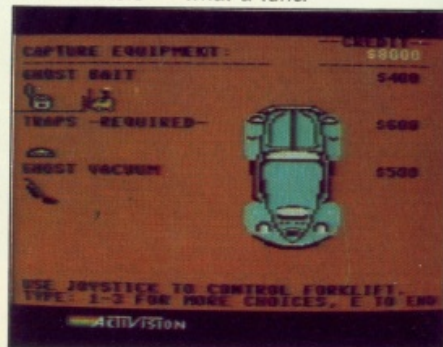
The bigger memory of machines like the 48K Spectrum 64 allowed adventure writers to go for epics like the Hobbit. Tir Na Nog might make my ten. Knight Lore definitely does — I love the 3D crossword style of arcade adventures with those Filmation graphics. You need little reminding of the outstanding programs of the last year, some of the strongest yet. From Fighter Pilot and Boulderdash to Daley Thompson's Decathlon and Solo Flight, David's Midnight Magic and Lords of Midnight or the current wave of block busters — Dambusters and co.



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Ghostbusters — what a tune.



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THE SINCLAIR QL-



In the wake of Clive Sinclair's financial trouble John Dawson reassesses potentially his biggest money-spinner — the QL.

THE LAUNCH of the Spectrum's successor, the 16 bit QL with its 68008 central processor unit, exceeded anything that had gone before in terms of advance publicity. It was unfortunate that, once again, the manufacturer's marketing advisers took precedence over wiser judgment that the QL machine wasn't ready either in terms of the quality of the software or the factory's capacity to deliver.

The operating system software and Basic interpreter contained numerous errors and a series of new Roms have been issued in the course of the first year. That's a depressingly familiar story but it occurs across the board in microcomputerland; remember the early Eproms in the BBC Micro and the problems with the Oric. Writing original software is very difficult, particularly at the low level of an operating system. The new Apple software for the Lisa — a comparatively unsuccessful launch, but for different reasons — and the Macintosh, took more than 100 man-years to write at the cost of a king's ransom.

But, admire Sir Clive Sinclair's entrepreneurial spirit as you may, if you take delivery, several months after placing your order, of a machine which doesn't work properly, you are likely to discount your role in the British computer industry's success story and demand a better product.

Now leave all these aside, for if you buy a Sinclair QL microcomputer today they are past history, how good is the QL as a general pur-

pose microcomputer now, and what sort of value does the machine represent for the money you are spending?

Hardware is less important than software at the level of complexity represented by the Sinclair QL. Nevertheless, it is the hardware that provided the basis for the name "QL". A quantum is the smallest quantity of some physical property, such as energy, that a system can possess according to the Quantum Theory.

The QL is 48 cms — 19in. — long, 14 cms — 5in. — deep, 5.5 cms — 2in. — high and weighs 1.5 kilograms. In that space is the main printed circuit board, two Microdrive tape units and the keyboard. Compare these measurements with the BBC Micro's 16 by 14 by 2.5in. and

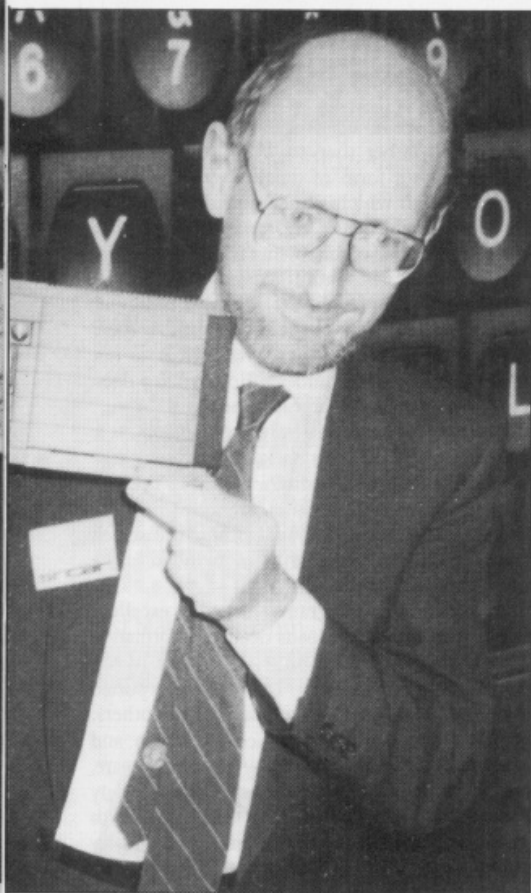
you will appreciate that the QL is comparatively portable.

Unlike the BBC Micro, the QL has a separate power supply which weighs about one kilogram; but the BBC requires a separate tape recorder or floppy disc drive for mass storage of programs or data.

Communication with peripheral devices is an important part of the design of a successful microcomputer. Compatibility and standardisation are effected at several levels, from the design of the plugs and sockets at the lowest level, through to software protocols that will control the transmission and interpretation of information at the highest. There are 11 sockets on the QL:



— IS IT MATURING?



- 1 64 pin bus from the 68008 CPU
- 2 Rom cartridge socket for plug in software cartridges
- 3 Two control socket for joysticks
- 4 Two non-standard RS-232 sockets — leading to one RS-232 interface
- 5 UHF output providing modulated RF for a TV
- 6 Video outputs
 - RGB + synchronisation
 - Monochrome + composite synchronisation
 - Composite PAL video
- 7 Power — Power supply unit delivers 5 volts at 1.8 amps and 15 volts AC at 0.2 amps
- 8 Two 3.5 mm sockets for linking up to 63 QL computers into a type of Local Area Network

There is no parallel port which would be compatible with a Centronics interface on a printer. The control sockets for games joysticks are inputs which are switched on or off rather than the accurate, if slow, analogue to digital converters on the BBC computer.

On the other hand, the inputs in each QL control socket have been arranged to correspond to two different, and very useful, sets of keys on the keyboard. If you wanted to write a program, for example, that would allow a disabled person to use a wordprocessor program, this arrangement would give you a good start. By most standards the QL is reasonably well equipped in terms of the input/output hardware.

The QL keyboard consists of two plastic membranes which have opposed metallised pads underneath the hard plastic keys. When a key is depressed the two pads are squeezed together and an electrical contact is made. The keys travel a reasonable distance down and up when they are pressed but there is no definite point at which you can be sure that an entry has been accepted by the machine.

Visual display unit manufacturers like Tele-video make computer terminals that will stand up to continuous use for many hours each day and they use orthodox keyboards which feel like an electric typewriter.

One of the best keyboards that I have come across was on the original Nascom. That used semiconductor Hall effect switches which operated when a tiny magnet was moved by the operator's finger pressing on the key. There were no mechanical contacts in the Nascom keyboard and no "bounce" or multiple character entry.

After the Nascom there was a steady tendency to downgrade the quality of the keyboard in new machines, presumably because the economics of competition have intruded more and more into domestic microcomputer design.

However, the QL keyboard feels much better than the Spectrum or the first Oric and the improvement is probably due to the influence of the BBC microcomputer keyboard which is acceptable to both secretaries and scientists.

Two Microdrive cartridges provide built-in mass storage of programs and data on the QL. Each cartridge will hold a maximum of 100 Kbytes and the continuous loop of tape com-

pletes one traverse in seven seconds. The BBC machine requires either an external tape recorder or floppy disc drives before it will store anything.

Data transfer using cassette tape is comparatively slow — 120 characters per second — but the BBC interface is robust, if primitive. Like other aspects of the computer, the QL design is theoretically attractive; the hard questions are to do with practical reliability and the Microdrive's cost effectiveness.

I think I would still hesitate to trust information that affected my livelihood to the QL Microdrives without the most careful backup procedures. Floppy disc manufacturers quote the expected error rates for storage and retrieval of information and the uncorrected false read/write data rates are better than one bit in 10 gigabits and the floppy and hard disc interfaces now on the market for the Sinclair QL will make the computer more attractive.

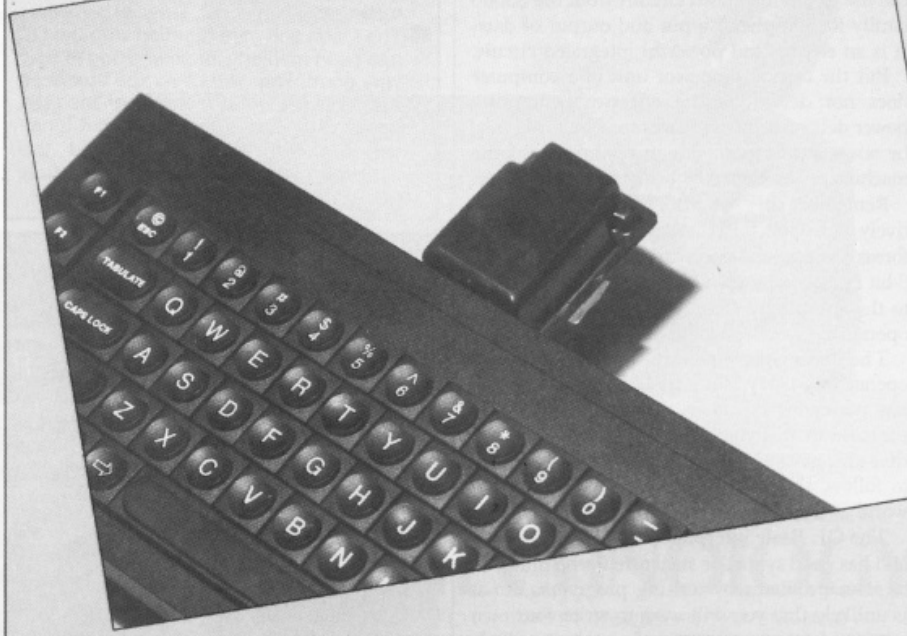
However, the additional cost will bring the QL close to the Apricot F1 purchase price and starts to whittle away at the BBC price differential.

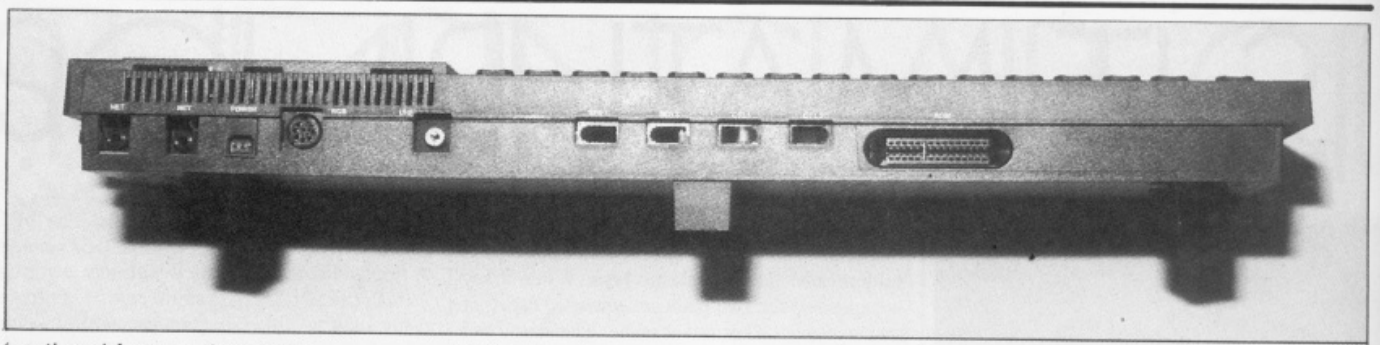
The QL screen display on a monochrome monitor is very good. The image is stable and lower case letters such as q, y, g and j have descenders which are two rows deep — the BBC characters are one row deep — and are easy to read. The spacing between lines is good. The operating system adjusts the screen format between 80 and 64 characters for display on a monitor or a television.

The graphics resolution may be set to either 255 by 255 pixels with eight colours, or 512 by

(continued on next page)

Early QLs need a "dongle" on the back but now Sinclair has fitted the operating system inside.





(continued from previous page)

255 pixels and four colours. However, it is possible to produce stippled or mixed colours which increase the complexity of the graphics effects considerably.

The QL is lighter than the BBC Micro and this can be attributed, in part, to the use of more recent, and more sophisticated integrated circuits. The memory chips in the QL are 4164 ICs — 64 Kilobits — set against the 4816 ICs — 16 Kilobits — in the BBC. Similarly, the QL uses two microprocessors and a number of ULAs — Uncommitted Logic Arrays.

The weight of the chips themselves is immaterial; it is the clustering of more functions into a single chip that matters. Reducing the "chip count", with consequent effects on the size of the printed circuit board, the number of associated components, and the smaller case, is the factor that contributes to the lighter, but more powerful, machine.

"More powerful" is a statement that needs careful examination. The Motorola 68000 central processor unit is an extremely powerful integrated circuit that is used now in some very expensive commercial computers. UNIX, the suite of programs that looks to have a good chance of becoming the next standard commercial operating system, runs happily on the 68000 series of microprocessors.

The CPU itself can address directly 16 megabytes of random access memory, has a rich set of addressing and indexing modes, has 17 internal registers, can handle data as 8, 16 or 32 bit words, has multiply and divide instructions built into the chip's machine-code repertoire and can use cheap integrated circuits from the 68000 family for peripheral input and output of data. It is an elegant and powerful integrated circuit.

But the central processor unit of a computer does not determine the effective computing power delivered by the machine. The CPU may be strangled by poor design of the rest of the machine or smothered by badly written software.

Remember that the BBC Micro uses the relatively old 6502 CPU and yet BBC Basic performs calculations faster than almost any other 8 bit microcomputer. The BBC's success is owed to the stunningly clever design of the machine operating system and the Basic interpreter.

The Basic interpreter in the QL does not operate as quickly as the BBC Micro despite the raw power locked up in the 68008 CPU. It is the software that you buy or write for a computer that unleashes the power. Without instructions to follow, the most powerful computer in the world is a useless, dead thing.

The QL Basic interpreter is well thought out and has good syntax or structure for helping you to solve problems by writing programs. But it is unlikely that you will want to write your own communications program, adventure or arcade

style games, home accounts programs and so on. The range of software for the QL is still quite sparse and this, I think, is the most serious criticism of the computer taken as a whole.

Four programs are supplied with the QL. The first versions operated slowly but these have been replaced with a new issue 2.0. Sinclair has operated an exchange scheme for the earlier programs.

Quill is a powerful wordprocessor with very sophisticated on-screen formatting, good file handling and good control over the printer. Its search and replace facility is fairly basic but overall Quill is an effective and friendly piece of software. Two other programs — Abacus, a spreadsheet and Archive, a database — complete the three most used pieces of software in office work.

Abacus has all the usual facilities that are regarded as essential in a good spreadsheet program and, in addition, you can use labels to identify rows, columns or single cells. It is far easier to build a model when you can refer to "December.Materials" or "Temperature.5 Gal-

lons/hour" rather than to "A24" or "V17".

Archive is a form of database programming language with which you can create procedures to enter, manipulate and print information according to your requirements. The manual says that it is possible to build relational files as well as the simpler card indexes. Archive is similar to dBase II in terms of the commands — there are 65 instructions — and although it is not possible to create a number of indexes to a database, Archive has a large potential.

Easel, the fourth program from Psion, is a clever business graphics package which will take data and present it in different ways. You can display pie charts, bar and line graphs on the screen and the program will dump the screen image to one of several printers included in the printer driver.

All the Psion programs have an excellent "Help" facility which loads detailed information from the program cartridge about any of the functions in the program. Data can be exported from any of the programs to any of the others. These two features, assistance on screen and integration of the data used by all the software, would make the Psion software outstandingly good value if you had to buy it. Given away with the machine, it is clearly the main reason why many people buy the QL.

But if you want to play games or demonstrate some scientific theory such as the reflection of sound waves from a concave surface, it's a different story. It is almost impossible to buy programs for the QL from W H Smiths and similar high street chain stores and even the pages of specialist magazines offer very little apart from a terrific chess program.

While the QL is well supplied with languages — APL, BCPL, Forth, Assembler, C, Lisp, Pascal, Fortran are all available from one company or another — it has not attracted the huge programming effort that went into its predecessor.

Below: The QL keyboard — "better than the Spectrum".

CONCLUSIONS

- It's the software that controls how useful or entertaining a microcomputer will be for you. I am never impressed by the fuss and bother that surrounds 16 bit micros. Software for eight bit machines is still only beginning to scratch the surface of the profitable and/or socially valuable uses to which microcomputers can be put.
- Most computer systems mature during their lifetimes in terms of the range and quality of software that will run on the machine.
- The Psion software bundled with the QL has been markedly improved and is now very good. That will cover the business needs of the great majority of the QL's users. But there is a virgin market for all the fun programs that helped the Spectrum to take off, provided that they can be delivered quickly.



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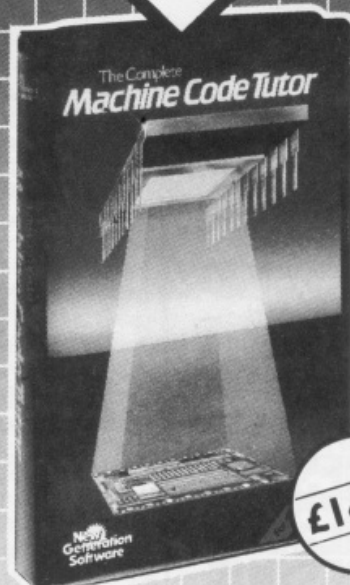
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YC/8

NEWS

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The crystal ball

Radar Games of Dudley have released Confidential, a graphics and text adventure where you step into the world of a private investigator. Available now for the Spectrum and soon for the 64 and Amstrad, Confidential will be reviewed next issue.

A helping hand

Keith Foreman of Rugby has almost completed Colossal Cave but wants answers to the following:

1. What should I do with the magazine "Spelunker Today"?
 2. Where is the Pirate's chest?
 3. Are the carpet and curtains in the Soft Room significant?
- SUNO BARO FDNES TTIW
TATI EVAE L
a) NMUL OCEG NARO
RAEN SEGA SSAP "EMA
S" OF EZAM NI
b) UOYB ORET ARIP EHTT
ELTS RIFU OYLI TNUT
IDNI FT'N OWUO Y
TIGN IKAE RBTU OHTI
WNOE SAVE HTGN IPPO
RDRO FYLN O

For the first time in any home computer magazine, here's some hints for owners of Infocom's new and utterly brilliant Hitch Hiker's Guide to the Galaxy:-

- Robot grabbing the Babel Fish?
- LENA PFOT NORF NILE
- HCTA STUP
- Bugblatter Beast spotting you?
- LEWO TEHT HTIW DAEH
- RUOY REVO C
- Problems with the Vogan Captain's poetry recital?
- YRTE OPYO HNE: NOIT
- AICE RPPA RUOY WOHS
- TSUM UOY
- Yours in dungeons and danger,
- Hugo North.

QUEST

Corner

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Tracer Sanction

- Commodore 64
- Activision
- £9.95 Disc only

YOU'RE THE highest ranking agent of the Stellar Intelligence Agency (SIA) and have been assigned to capture the Wing, the most notorious criminal in the galaxy.

You begin in SIA HQ on the planet Mongo facing a sinister gent in sunglasses. Trying to take his shades away only results in getting slapped. And that's one of the good things about this adventure — you can examine and experiment with many of the objects and still get a sensible response.

Your spaceship is nearby — you'll need to buy fuel and a map of the galaxy. On the planet Sonex, a long line of people waiting at the Tourist Information Centre might snooker you. Waiting politely in line gets you nowhere fast — the queue moves slowly and people keep barging in.

Puzzles abound. A bartender is in a daze and having trouble remembering anything — a clear-cut case of amnesia. A ragged hermit gets hot under the collar if he catches you swiping a solar battery from his shack. Stalactites are none too secure — one false move and you're in danger of becoming a kebab.

Further into the puzzle, a neat "sword in the stone" puzzle may baffle you and an unsociable chap will try to shake you off a suspension bridge. In a park, an old gentleman feeding the pigeons tells you to "Get off my turf, crumb." Old age pensioners aren't what they used to be. If you're not careful, he'll whip out a magnum .45 and say "Go ahead — make my day." Of all the pensioners in the parks in all the galaxy, you have to pick on Dirty Harry's grandad!

The graphics are particularly good, a hi-res picture for every location. Some are animated — the rolling eyes of an angry hermit, a soaring fount-



The Tracer Sanction

ain, and a flowing river for example. There's a wide vocabulary and response time is fast.

The Tracer Sanction is an enjoyable, medium-complexity adventure with several original wrinkles.

Bored of the Rings

- Spectrum
- Delta 4
- £4.95 cassette, £6.95 Microdrive

A MITE WEARY of Middle Earth look-alike adventures? Browned off with Baggins doppelgangers? Then this large (three-part Quilled game's the perfect antidote; it blows a gust of irreverent air right through the Shires.

Bored of the Rings is a delicious send-up of you-know-what. The author, Fergus McNeil, has done a superb job. Text is presented in an impressive character set, using green, blue, grey and white to splendid effect. There are some graphics but it's in the prose where the adventure excels.

Fag End, your uncle Bimbo Faggins house, bears a startling resemblance to a certain location in another adventure — does a round green door ring a bell? As you enter, you'll hear Grandalf in conversation with Bimbo: "... and so we'll need to get some dense lemming to take it and dump it where old eye-ball can't get it." "But what stupid individual can we get for a suicidal folly such as this..."

As Fordo, a boggit, it won't be long before you're joined by a large company. Do these names sound vaguely familiar: Spam, Pimpily, Murky, Legoland, Aragont, Borrower and Giblet? Later, there's a delightful sideswipe at the famous vending machine that appears in the classic Crowther and Woods adventure.

Eating some magic beans has a strange side effect: Fordo sees a squadron of pink elephants flying past, pursued by brightly glowing traffic wardens., "Coroner's verdict: overdose".

This is an extremely funny adventure. If you like a good laugh then get this at once. It's only available by mail order (048 93 5800) and deserves to be a massive success. Excellent.

Assassin

- BBC B
- Robico Software
- £9.95 tape, £11.95 disc

JUST ROOM for a brief mention of Assassin, a machine code text adventure. It has a fairly sophisticated command parser that allows input of a more complex nature than the usual verb plus noun.

Using text compression techniques, the game offers over 220 locations to explore, many characters to meet and a host of puzzles to solve. The game comes attractively packaged and includes an adventurer's notebook and card entitling you to help should you get stuck.

WELCOME TO Birdy, a challenging Spectrum machine-code game for anyone — though it's no longer than 6.5K, it runs on 48K models only.

You are the humble but brave little Birdy — a Birdy being a rare breed of penguin, very fond of ice, but you won't find him being friends with an Uglie.

Birdy likes adventure. And that's the reason why you'll find him collecting diamonds on the frozen wastes of the Jupiterian Southpole.

There is only one slight problem: the extremely high gravitation on this planet. Normally it would be impossible for Birdy to take the enormous diamonds with him, but the gravitation is eliminated by a levitation power that arises from a combination of three of these precious stones in a row.

That's why he must push the diamonds over the icefields in order to join three of them.

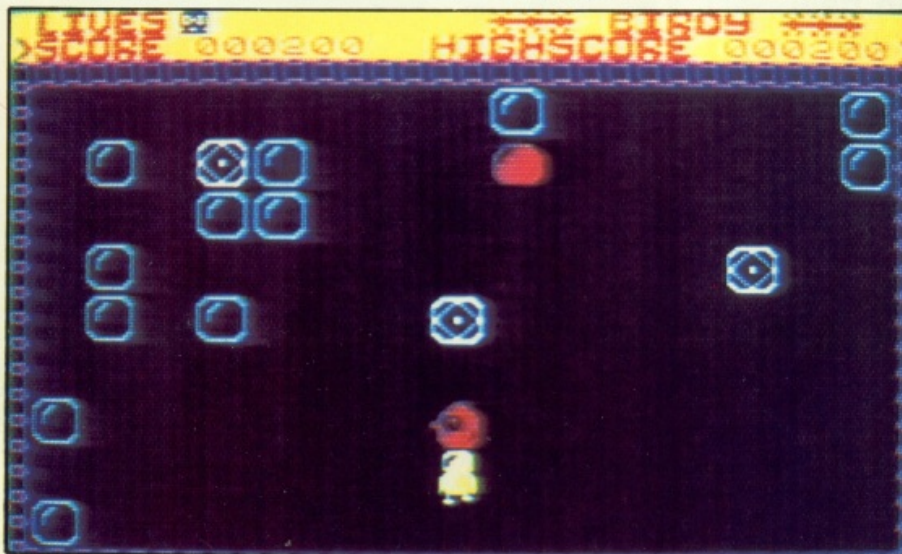
This would be simple if there weren't any Ugliers in the neighbourhood . . . These nasty tomato-like creatures don't like Birdy taking away their diamonds, so beware those fellows!! Lucky for our hero, they are not too intelligent.

To help the Ugliers to The Other World Birdy can squeeze them with one of the numerous blocks of ice lying around in the screens.

Sometimes Birdy can, for a while, make an Uglie dizzy by activating the electric fence — that means punching it — when such a nasty creature is wobbling along it.

If an iceblock is pressed by Birdy but it can't move, then it will fall to dust. Note that an Uglie cannot be killed by a sliding diamond.

Points are scored for squeezing the Ugliers and



This article available on

BIRDY

Listing 2.

```
10 GO TO 540
20 INK 7: PAPER 1: BORDER 3: C
LS : SAVE "BIRDY-CODE"CODE 49536
,6528
30 PRINT "*** VERIFY (YES/NO)?"
40 IF INKEY$="N" THEN RETURN
50 IF INKEY$<>"Y" THEN GO TO 4
0
60 PRINT "FLASH 1:*** PLEASE
PLAY THE TAPE"
70 VERIFY "BIRDY-CODE"CODE 495
36,6528: PRINT "VERY WELL!!":
PAUSE 25: RETURN
80 INK 4: PAPER 0: BORDER 1: C
LS
90 PRINT "FLASH 1:*** START
YOUR RECORDER.."
100 LOAD "BIRDY-CODE"CODE 49536
,6528
110 PRINT "GOOD OLD QUALIT
Y!": PAUSE 25: RETURN
120 INK 0: PAPER 7: BORDER 4: C
LS
130 LET a=10: LET b=11: LET c=1
2: LET d=13: LET e=14: LET f=15
140 PRINT "*** Type number of FI
RST block to enter ": INPUT b
eg: PRINT beg: IF beg<>INT beg 0
R beg<0 OR beg>101 THEN GO TO 14
0
150 PRINT "*** Enter number of
LAST block to enter ": INPUT
end: PRINT end: IF end<>INT end
OR end<beg OR end>101 THEN GO TO
150
160 PRINT "You want to enter b
lock ":beg: IF beg<end THEN PRI
NT "to "end
170 PAUSE 50: CLS
180 RESTORE : FOR n=1 TO beg: R
EAD sum: NEXT n
```

```
190 FOR n=beg TO end: READ sum
200 PRINT "TYPE IN: BLOCK ";n:
PRINT
210 INPUT LINE b#
220 PRINT b#
230 IF b#="QUIT" THEN RETURN
240 IF LEN b#=128 THEN GO TO 26
0
250 PRINT : PRINT FLASH 1:"* YO
U MADE A MISTAKE, TRY AGAIN!":
GO TO 200
260 FOR g=1 TO 128: LET k=CODE
b#(g): IF ((k)=48) AND (k<=57))
OR ((k)=65) AND (k<=70)) THEN NE
XT g: GO TO 280
270 GO TO 250
280 BEEP .1,12: BEEP .1,-12: LE
T t=0
290 FOR G=0 TO 63
300 LET v=16*VAL b#(2*g+1)+VAL
b#(2*g+2): POKE 49536+n*64+g,v
310 LET t=t+v
320 NEXT g
330 IF t<>sum THEN PRINT "FLAS
H 1:*** CHECKSUM ERROR, TRY AGAIN
!!!": PRINT : GO TO 200
340 PRINT "O.K. "
350 NEXT n
360 RETURN
370 INK 0: PAPER 6: BORDER 2: C
LS
380 PRINT AT 3,11:"* MENU *"
390 PRINT AT 8,3:"1 - ENTER
HEX-CODE":AT 10,3:"2 - SAVE B
YTES":AT 12,3:"3 - LOAD BYTES
"
400 PRINT AT 20,2: FLASH 1: BRI
GHT 1: INK 4: PAPER 7:"* PLEASE
MAKE YOUR CHOICE *"
410 LET K=CODE INKEY$-49
```

```
420 IF NOT K THEN GO SUB 120: G
O TO 370
430 IF K=1 THEN GO SUB 20: GO T
O 370
440 IF K=2 THEN GO SUB 80: GO T
O 370
450 GO TO 410
460 REM * DATALINES'-CHECK *
470 LET T=0
480 RESTORE
490 FOR N=0 TO 101
500 READ D: LET T=T+D
510 NEXT N
520 IF T=621249 THEN RETURN
530 BEEP .7,24: BEEP .7,0: BEEP
1.5,-48: PRINT FLASH 1: BRIGHT
1: INK 4: PAPER 0:"* ERROR IN DA
TALINES. AAARG!!": STOP
540 CLEAR 49535: POKE 23658,8:
GO SUB 460: GO TO 370
550 DATA 2509,2526,5528,3573,73
51,5984,5935,1947,7339,7193
560 DATA 7634,6688,5529,6769,69
09,8803,8058,7959,7481,7880
570 DATA 7171,6493,7114,6137,72
92,7783,8658,7779,7341,7759
580 DATA 6018,6977,5997,5910,75
26,7706,6708,7023,5986,7426
590 DATA 7113,8351,7609,8180,82
33,5474,6377,9340,7924,7699
600 DATA 8183,7802,5787,5561,75
79,6809,7375,7380,7423,7116
610 DATA 7191,6743,7454,6950,68
23,6976,7089,6405,8721,7477
620 DATA 5615,5692,5032,5491,59
56,2785,549,2722,3068,2643
630 DATA 1324,3320,3673,3742,36
71,2434,3318,3491,4198,4049
640 DATA 1394,584,6161,4344,411
9,6814,7896,7325,7115,6672
650 DATA 5938,6571
```


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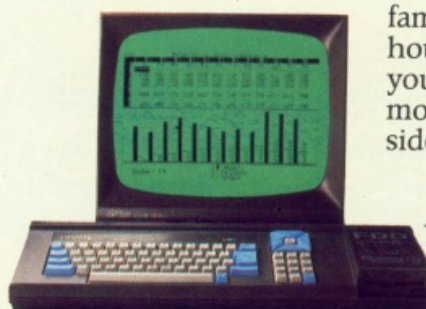


Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).



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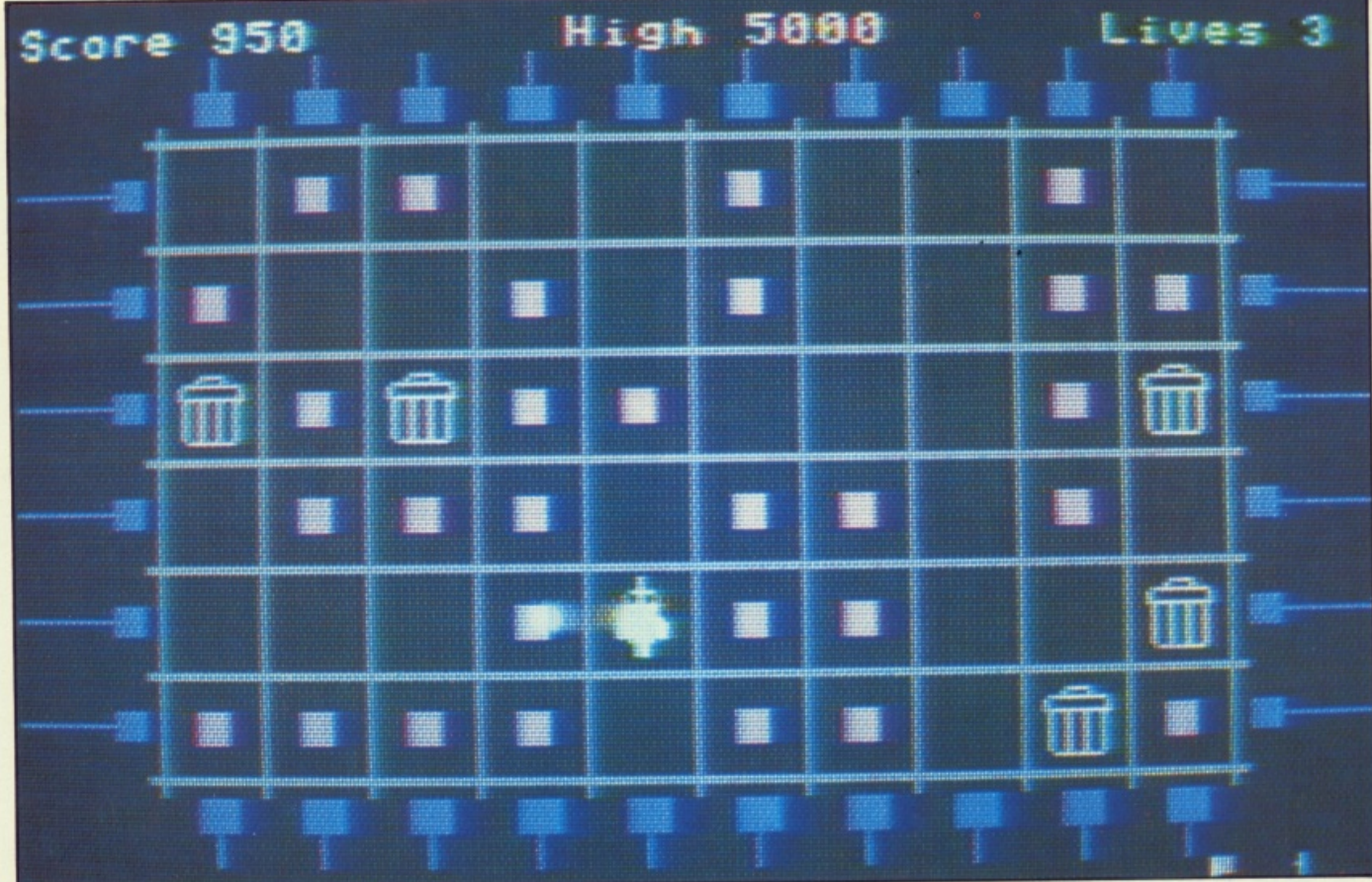
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IMPULSE

Keith Suddick finds something fishy at the chip factory and gets his CBM-64 to help.

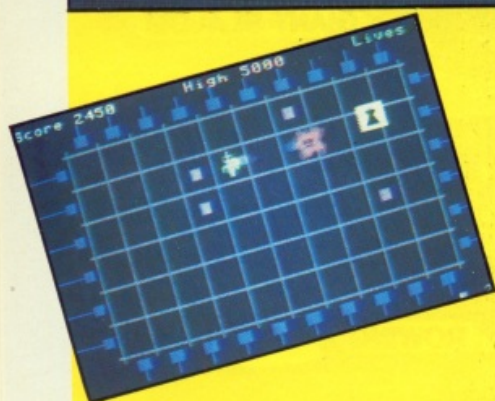
SOMETHING HAS gone very wrong down at the chip factory — silicon chips that is, not fish and . . . — All of the memory circuits have started forgetting the data that they are supposed to be remembering!

In a desperate attempt to find out what has gone wrong and hopefully put it right, Floyd the droid has been miniaturised and put onto the surface of one of the faulty chips. The problem soon becomes obvious as the circuit is invaded by program bugs and data locks which roam across the chip, both trying to turn any data they find into garbage. As if the bugs and locks weren't enough, worse still are the sparks which shoot across the chip from the contacts on either side.

Floyd can destroy bugs

Luckily Floyd can destroy the bugs and the locks by firing packets of random data at them but nothing has any effect on the sparks. Add to this the fact that if Floyd is caught by any of his adversaries then his own circuits will be scrambled, and you can see that he might need some help!

At the start of each screen Floyd will appear in the top left hand corner of the chip, a joystick in port number 2 will control his movements and the fire button will fire a packet of random data.



This program is available on Telsoft.



You start the game with three droids, scoring 50 points for each bug you destroy and 100 points for each lock, remembering that you cannot destroy sparks! Each screen is completed when the memory chip is full, including garbage, then you will score 10 points for every unharmed data packet retrieved from the chip.

Should you save 75 per cent or more of the data — 45 cells or more — then there is a bonus of 100 points per valid data packet. 10,000 points or more will earn you an extra droid.

At its most difficult level the game uses all

It is, as always, the case that Commodore control characters such as cursor movements and colour codes, do not lend themselves to dot matrix printers followed by photographic reduction and although anyone who has used Commodore machines for any length of time, will probably have gotten used to them, I have tried to make things easier by including details of

These remarks should not be typed — they will at best slow the program down slightly and at worst cause an out of memory error because I have placed the video chip data directly after the program area.

Table 1 describes the abbreviations I have used to explain the control codes. As usual, if you type the program then be sure to make a copy of it before you run it, if you would rather not type it then I can supply cassette copies for £2.50. Please write to: Keith Suddick, 6 Ravel Court, Jarrow, Tyne & Wear, NE32 3BW.

5000-5010 Adds points onto current score, updates high score if needed and prints new

data for other machine code routines.

repetitions:
e.g. 4s/* means 4 shifted asterisks.
15cd means 15 cursor down.

[illegible]

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(continued from previous page)

[illegible]

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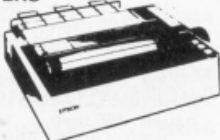
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CHARLIE CHAN VISITS THE WOK FACTORY

IMAGINE THE situation, there you are with your hot steaming rice in lotus leaf ready to tuck into your favourite meal of the day when you realise that there are no woks to cook your repas in and what's more, number one son is no where in sight so it looks like you'll have to get those woks yourself.

Untold nasties lurking

The only way you can get a wok at such short notice is to go to the old wok factory once owned by Mr Woo. However, this is not as easy as it seems because there are untold nasties lurking in the shadows of each of the factory's rooms. In all there are 15 screens and 15 woks to collect, but if you find any screen too hard simply press the Return key and you will go onto the next screen. Of course, you will gain no points for your efforts if you do this.

There are five different nasties — listed in the instructions — all of which are animated and all of which you have to avoid because the

FACTORY

Brian Lewis with an oriental orgy of violence on the BBC.

slightest touch can kill, and you can also die from falling too far.

Each of the listings should be typed in and checked and then saved one after the other on the same tape, but make sure you have a copy of listings 2 and 3 before you run them as they contain machine code and a mistake could cause a bad program ruining all your hard work typing in the game. If the listings appear quite long remember that the game has to store data for 15 screens which, even after massive compressing, is still quite lengthy.

As with all such games the controls are a

simple left, right and jump type which may take a small amount of time to get used to because the longer a directional key is pressed the farther the jump goes in the appointed direction. This technique must be mastered to clear certain sheets.

If BBC users wish to type in and play Charlie Chan Visits the Wok Factory they merely have to increase the values of the X and Y registers in line 320 of the second listing, their exact value will have to be found through experiment. I would like to apologise here and now for the sequence that occurs after all the lives are lost.

Listing 2.

```
10ENVELOPE11,1,2,1,2,1,1,0,126,0,0,-126,126,126
20DATA40,20,40,10,40,10,52,10,48,10,40,10,48,20,32,
10,20,40
30DATA88,10,88,20,88,20,88,10,88,10,100,10,96,10,88
10,96,20,88,10,68,30
40DATA40,20,40,10,40,10,52,10,48,10,40,10,48,20,32,
10,20,40,88,10,88,20,88,20,88,10,88,10,100,10,96,10,88
10,96,20,60,10,68,30
50DATA52,40,48,40,40,15,32,20,32,10,52,40,48,40,40,
15,32,40
60DATA1,0,11,255,40,0,15,0
70RESTORE20:FOR=0T097:READD:T?4000=D:NEXT
```

```
80RESTORE60:FOR=0T07:READD:T?4062=D:NEXT
9075:950=20:75:951=0
100FORT=0T02STEP2:P?=&406A:[OPTT
110DEC:950:LDA#950:BNEsound:..a LDA#21:LDX#5:JSR&FF
F4
120INC:951:INC:951:LDX#951:LDA#4000,X:STA#4066:LDA#4
001,X:STA#950:LDA#7:LDX#862:LDY#840:JSR&FFF1:LDA#951:C
MP#96:BEQend
130.nosound RTS
140.end LDA#254:STA#951:JMPa
1501
160NEXT
170CHAIN"
```

Listing 1.

```
1MODE4
2REM IMPORTANT:: CHECK BEFORE RUNNING !
310VDU23,128,254,254,254,0,239,239,239,0,23,129,0,0,
0,0,255,126,60,24
20VDU23,130,60,94,239,255,255,255,126,60,23,131,36,
36,36,165,102,0,0,0
30VDU23,132,60,126,255,0,72,149,106,165,23,133,0,12
6,255,126,0,255,126,60
40VDU23,134,36,60,36,60,36,126,195,90,23,135,90,195
126,36,60,36,60,36
50VDU23,136,255,129,145,185,147,133,181,181,23,137,
181,181,133,147,185,145,129,255
60VDU23,138,16,56,124,120,124,120,124,120,23,139,12
4,60,24,126,255,255,66,231
70VDU23,145,60,94,239,255,255,255,126,60,23,146,36,
66,129,129,231,0,0,0
80VDU23,147,0,0,0,60,126,255,72,149,23,148,106,165,
126,255,126,255,126,60
90VDU23,149,60,36,60,36,60,126,66,219,23,150,219,66
126,60,36,60,36,60
100VDU23,151,255,129,169,145,171,133,181,181,23,152,
181,181,133,171,145,169,129,255
110VDU23,153,4,14,31,30,31,30,31,30,23,154,31,15,6,1
26,255,255,231,0
120ENVELOPE1,1,1,-5,2,10,1,10,126,0,0,-126,126,126
130ENVELOPE2,1,20,30,100,1,2,1,126,0,0,-126,126,126
140DATA0,0,0,0,17,0,0,0,17,51,119,255,255,240,176,20
8,0,136,204,238,255,224,160,96,0,0,0,0,0,0,0,0,0,0
0,17,51,51,240,112,64,48,17,255,255,119,224,192,80,14
5,17,221,255,255,0,0,0,136,136,136,0,51,51,51,16,0
0,0,0,51,51,3,3,3,35,34,102
150DATA136,136,8,8,8,136,204,0,0,0,0,0,0,0,0,0,0
160DATA0,0,0,0,0,0,0,0,0,17,51,119,255,112,80,96,136
204,238,255,255,240,208,176,0,0,0,0,136,0,0,0,0,0,16
51,51,51,51,17,112,48,32,16,17,119,255,255,240,224,32
192,0,255,255,221,0,0,0,0,0,136,136,0,0,0,0,0,0,0,0
51,51,3,3,3,35,102,0,153,153
```

```
170DATA25,24,8,136,136,204,136,136,136,0,0,0,0,0
180DATA&11,0,1,0,2,0,5,0,&11,0,2,0,9,0,1,0
190J?=&5200
200RESTORE140:FOR?=&0T0207:READD:T?J?&D:NEXT:sou=J?
+192:sOu2=sou+8:M?=&Ou2+8:FOR=0T02STEP2:P?&M?:[OPTT
210LDA#&90:STA#70:LDA#&73:STA#71:LDA#0:STA#72:STA#76
:STA#77:STA#79:STA#7C:STA#9C:LDA#2:STA#73:LDA#J? MOD25
6:STA#74:LDA#J? DIV256:STA#75:LDA#&80:STA#&9D:LDA#&7B:S
TA#9E
220JSRdis:.start LDA#7C:CMF#4:BMIj1:JMFnoleft:.j1
230JSRChri:CPX#&FF:BEQnright:LDA#&81:LDX#&8D:LDY#&F
F:JSR&FFF4:CPY#&FF:BNEoright:JSRdis:CLC:LDA#70:ADC#8:
STA#70:LDA#71:ADC#0:STA#71:INC#72:JSRani:JSRdis:JSRsu2
2
240.noright JSRchle:CPX#&FF:BEQnoleft:LDA#&81:LDX#&9
E:LDY#&FF:JSR&FFF4:CPY#&FF:BNEoright:JSRdis:SEC:LDA#70
:SBC#8:STA#70:LDA#71:SBC#0:STA#71:DEC#72:JSRani:JSRdis
:JSRSU2
250.noleft JSRcheck:CPX#&FF:BEQnojump:LDA#77:CMF#1:B
EQnojump:LDA#&81:LDX#&FF:LDY#&FF:JSR&FFF4:CPY#&FF:BNE
ojump:JSRjump
260.nojump LDA#77:CMF#0:BEQns:JSRJUMP
270.ns LDA#&81:LDY#&FF:LDA#&86:JSR&FFF4:CPY#&FF:BNEH
S:RTS:.HS JSRcheck:CPX#&FF:BNEe1:JSRHOLE
280.e1 LDA#72:CMF#34:BNEg1:JSRscore:JSRscore:JSRscor
e:JSRscore:RTS:.g1 LDA#7C:CMF#&FF:BNEh1:LDA#10:STA#79:
RTS:.h1 LDX#0:JSRenemy:CPX#&FF:BNEu2:STX#79:RTS:.u2
JSRdelay:JMFstart
290.dis LDY#0:.A LDA(&70),Y:EOR(&74),Y:STA(&70),Y:IN
Y:CPY#32:BNEA:CLC:LDA#70:ADC#&20:STA#4D:LDA#71:ADC#1:S
TA#4E:.B LDA(&4D),Y:EOR(&74),Y:STA(&4D),Y:INY:CPY#64:B
NEB:CLC:LDA#4D:ADC#&20:STA#4D:LDA#4E:ADC#1:STA#4E:.C L
DA(&4D),Y:EOR(&74),Y
300STA(&4D),Y:INY:CPY#96:BNEC:RTS
310.ani LDA#76:CMF#1:BEQsc:CLC:LDA#74:ADC#96:STA#74:
LDA#75:ADC#0:STA#75:LDA#1:STA#76:RTS:.sc SEC:LDA#74:SBC
C#96:STA#74:LDA#75:SBC#0:STA#76:LDA#0:STA#76:RTS
320.delay LDX#100:.D LDY#150:.E DEY:BNEE:DEX:BNED:RT
S
```




This program is available on Telsoft.

Listing 3 is on the next page.

```

330. check LDX#0: LDA#77: CMP#1: BEQF: CLC: LDA#70: ADC#&C0
: STA#4D: LDA#71: ADC#3: STA#4E: LDY#0: .E LDA(&4D), Y: AND#15
: BEDH: INX: .H INY: CPY#24: BNEE: CPX#0: BEQdrop: .F LDX#0: LD
A#7C: CMP#8: BMI: LDA#&FF: STA#7C: RTS: .i1 STX#7C: RTS
340. drop INC#7C: DEC#73: JSRdis: JSRani: CLC: LDA#70: ADC#
&40: STA#70: LDA#71: ADC#1: STA#71: JSRdis: LDX#&FF: RTS
350. jump LDA#1: STA#77: LDA#0: STA#78: JMPsou
360. JUMP LDA#73: CMP#23: BPLend: INC#78: LDA#78: CMP#5: BP
Ldown: INC#73
370 JSRdis: SEC: LDA#70: SBC#&40: STA#70: LDA#71: SBC#1: STA
&71: JMPdis
380. down LDA#78: CMP#6: BEQend: RTS: .end LDA#0: STA#77: R
TS
390. sou LDA#953: CMP#&FF: BEQz Z2: LDA#7: LDX#sou MOD256:
LDY#sou DIV 256: JSR&FFF1: .z Z2 RTS
400. Chri CLC: LDA#70: ADC#32: STA#4D: LDA#71: ADC#0: STA#4
E: LDY#0: .a1 LDA(&4D), Y: AND#15: BNEhit: INY: CPY#8: BNEa1: L
DX#0: RTS: .hit LDX#&FF: RTS
410. chLE SEC: LDA#70: SBC#8: STA#4D: LDA#71: SBC#0: STA#4E
: LDY#0: .b1 LDA(&4D), Y: AND#15: BNEhit: INY: CPY#8: BNEb1: LD
X#0: RTS
420. sou2 LDA#953: CMP#&FF: BEQz Z2: LDA#7: LDX#sou2 MOD25
6: LDY#sou2 DIV 256: JMP&FFF1
430. check LDA#70: STA#4D: LDA#71: STA#4E: LDY#0: .c1 LDA(
&70), Y: EOR(&74), Y: BNEsee2: .d1 INY: CPY#24: BNEc1: LDX#0: R
TS
440. see2 AND#15: BNEd1: LDX#&FF: RTS
450. HOLE LDY#21: .f1 LDA#31: JSR&FFEE: LDA#19: JSR&FFEE:
TYA: JSR&FFEE: LDA#32: JSR&FFEE: INY: CPY#25: BNEf1: JSRdis: L
DA#31: JSR&FFEE: LDA#7B: JSR&FFEE: LDA#7D: JSR&FFEE: LDA#32:
JSR&FFEE: JSRdis: JMPscore
460. enemy LDY#0: .k1 LDA#D60, Y: STA#A60, Y: INY: CPY#7: BN
E: JSR&ENE: JSRdis: LDY#0: .l1 LDA#A60, Y: STA#D60, Y: INY: C
PY#7: BNEl1
470 LDY#0: .m1 LDA#D70, Y: STA#A60, Y: INY: CPY#7: BNEm1: JSR
&ENE: JSRdis: LDY#0: .n1 LDA#A60, Y: STA#D70, Y: INY: CPY#7: BN
E: n1: RTS
480. ENE JSRread
490 LDY#0: TYA: .s1 STA(&4D), Y: INY: CPY#16: BNEs1: CLC: LDA

```

```

&4D: ADC#&40: STA#4D: LDA#4E: ADC#1: STA#4E: .t1 LDY#0: TYA: .
u1 STA(&4D), Y: INY: CPY#16: BNEu1
500 LDA#A66: CMP#1: BEQlef: CMP#2: BEQrig: CMP#4: BEQup: CMP
#8: BEQdown: RTS
510. lef DEC#A60: LDA#A60: CMP#A64: BEQrev: RTS: .rig INC#
A60: LDA#A60: CMP#A62: BEQrev: RTS: .up DEC#A61: LDA#A61: CMP
&A65: BEQrev: RTS: .down INC#A61: LDA#A61: CMP#A63: BEQrev: RT
S
520. rev LDA#A66: CMP#1: BEQlef: CMP#2: BEQrig: CMP#4: BEQU
P: CMP#8: BEQdown: .lef LDA#2: JMPDO: .rig LDA#1: JMPDO: .up L
DA#8: JMPDO: .down LDA#4: .do STA#A66: RTS
530. read LDA#0: STA#4D: LDA#&58: STA#4E: LDY#A60: .o1 CPY
#0: BEQp1: CLC: LDA#4D: ADC#16: STA#4D: LDA#4E: ADC#0: STA#4E:
DEY: JMPo1: .p1 LDY#A61: .q1 CPY#0: BEQr1: CLC: LDA#4D: ADC#&
40: STA#4D: LDA#4E: ADC#1: STA#4E: DEY: JMPq1: .r1 RTS
540. HIT LDX#&FF: RTS
550. DIS2 JSRread: LDY#0: .aa1 LDA(&4D), Y: BNEHIT: INY: CP
Y#16: BNEaa1: CLC: LDA#4D: ADC#&40: STA#4D: LDA#4E: ADC#1: STA
&4E: LDY#0: .bb1 LDA(&4D), Y: BNEHIT: INY: CPY#16: BNEbb1
560 SEC: LDA#4D: SBC#&40: STA#4D: LDA#4E: SBC#1: STA#4E: LDY
#0: .cc1 LDA(&9D), Y: STA(&4D), Y: INY: CPY#16: BNEcc1: CLC: LD
A#4D: ADC#&40: STA#4D: LDA#4E: ADC#1: STA#4E: CLC: LDA#9D: AD
C#&40: STA#9D: LDA#9E: ADC#1: STA#9E: LDY#0: .dd1 LDA(&9D),
Y: STA(&4D), Y: INY: CPY#16
570 BNEdd1: SEC: LDA#9D: SBC#&40: STA#9D: LDA#9E: SBC#1: STA
&9E: INC#9C: LDA#9C: CMP#10: BNEx1: LDA#0: STA#9C: LDA#9D: CMP
#&B0: BEQy1: LDA#&B0: STA#9D: LDA#&79: STA#9E: RTS: .y1 LDA#&
B0: STA#9D: LDA#&78: STA#9E: .x1 RTS
571. score INC#B1: LDA#B1: CMP#10: BNEshow: LDA#0: STA#B1:
INC#B2: LDA#B2: CMP#10: BNEshow: LDA#0: STA#B2: INC#B3: LDA#B
3: CMP#10: BNEshow: LDA#0: STA#B3: INC#B4: LDA#B4: CMP#10: BNE
show: LDA#0: STA#B4: INC#B5
572. show LDA#31: JSR&FFEE: LDA#8: JSR&FFEE: LDA#28: JSR&F
FEE: LDY#3: .zz2 CLC: LDA#B0, Y: ADC#48: JSR&FFEE: DEY: CPY#&F
F: BNEzz2: RTS
580: NEXT
581 PRINTTAB(0, 15): "Well you'll just have to do witho
ut the title page won't you"
590 PRINT ".....: CHAIN"

```


(continued from previous page)

Listing 3.

```
1VDU23,142,84,84,131,128,128,135,136,240,23,143,0,
0,128,126,1,1,129,126,23,144,84,84,84,84,84,84,84
2ENVELOPE7,1,1,-1,-1,1,2,1,126,0,0,-126,126,126
10DATA192,0,240,0,48,0,0,0,0,2,192,0,48,0,12,0,
19,143,192,0,0,0,76,0,3,64,0,192,1,48,124,0,0,0,4,
200,0,48,0,76,0,3,0,0,209,1,52,64,13,16
20DATA0,0,0,0,0,0,0,0,63,255,192,0,0,0,0,1,0,0,
63,255,192,0,0,0,128,0,0,0,3,255,252,0,0,0,0,16,
0,3,255,252,0,0,0,0,8,0,0,0,0
30DATA0,0,0,0,0,0,0,255,255,0,0,64,0,0,0,0,122,
35,96,0,0,0,0,0,218,0,0,64,0,11,176,0,0,0,0,16,0,
0,46,250,16,0,8,0,0,0,0,0
40DATA0,0,0,0,0,0,0,3,0,0,28,62,0,0,0,0,4,0,0,0,0,
0,127,12,64,64,16,16,12,6,1,1,0,96,64,48,20,4,4,1,65,
32,192,64,16,17,4,132,1,1,1,66,64
50DATA0,0,0,0,0,0,0,0,29,238,192,0,0,0,4,0,0,0,0,
55,123,128,0,2,0,0,0,0,13,222,224,0,0,0,0,0,16,0,
0,238,236,18,162,4,228,193,40,160,202,236
60DATA0,0,0,0,0,0,0,0,0,112,0,34,0,16,64,8,13
6,2,114,1,62,64,159,200,47,250,25,252,130,127,32,146,7
6,39,242,25,252,130,107,32,159,201,99,226,8,136,130,28
,33,130,8
70DATA0,0,0,0,10,68,184,0,0,0,64,0,15,204,240,0,0,
0,0,0,120,0,63,0,25,224,14,124,1,255,0,31,224,1,248,0,
62,0,31,128,0,31,224,1,244,15,252,1,254,2,63,0,7,128
80DATA0,0,0,0,0,0,0,0,0,64,1,0,0,1,73,64,7,0,3,224,
1,248,0,127,0,22,192,4,144,1,36,1,127,64,95,208,23,244
,13,253,130,127,32,159,200,39,243,17,84,68,85,0,0,0
90DATA0,0,0,0,0,0,0,0,128,10,32,7,248,0,170,0,2,128
0,128,7,255,1,132,64,80,144,18,20,4,67,129,8,64,97,16
,20,39,4,133,1,16,192,66,16,31,252,193,4,0,65,0,56,224
100DATA0,0,0,0,4,0,0,0,0,6,128,0,45,128,0,0,0,10,0,0,
0,0,13,202,104,0,0,0,0,0,16,0,0,255,252,31,254,3,25
5,0,127,128,15,195,195,240,0,0,2,0,0,0,0
110DATA0,16,0,4,0,1,0,192,64,0,16,0,4,0,1,0,224,64,6
,16,0,4,0,1,2,3,64,0,16,0,4,1,153,0,0,0,192,0,0,0,0,0,
0,0,0,57,254,0,127,128,31,224,7,248
120DATA0,0,0,0,0,0,0,0,0,63,192,0,3,128,0,128,0,
32,32,8,0,2,112,255,128,0,32,64,8,0,2,0,1,134,0,32,0,9
,143,242,0,0,128,0,32,0,14,8,2,0,128
130DATA0,0,0,0,0,0,0,0,63,255,192,0,0,0,0,0,224,
0,64,0,16,0,0,0,3,254,0,0,0,0,64,0,0,0,0,4,0,32,
128,16,16,8,4,2,0,129,0,63,192
140DATA127,255,159,255,231,255,248,255,252,31,254,3,
255,0,0,0,0,0,0,0,0,0,0,0,0,0,63,255,144,0,0,0,1
,0,0,0,0,0,0,255,255,0,0,8,0,0,0,0,0,0
150DATA0,0,29,221,133,84,65,84,152,85,20,21,221,128,
0,0,0,1,0,0,192,0,240,0,124,0,63,0,31,192,15,240,7,252
,3,255,3,255,193,255,240,255,156,127,195,0,0,16,0,0,0,
0,0,0
160DATAEntrance,The Steps!,Mess,The Safe,HIS Name,Mr
Woo,Gobble Gobble,Ghosty,Sales Rooms,THE GREAT WOOCK,D
ivide,Blob,Empty Wock,The Press,ROUISE
170DATA&11,0,1,0,10,0,10,0
180DATA&11,0,2,0,2,0,1,0
190MODE4:DIMA$(15):RESTORE160:FORTX=1TO15:READA$(TX)
:NEXT:CLS:PRINT""SPC(2):"WOULD YOU LIKE INSTRUCTIONS
(Y/N)?"
191A$=GET$:IF A$<>"Y" AND A$<>"N" THEN 191 ELSE IF A
$="Y" THEN 620
200DEFPROCWALL:COLOUR131:COLOUR1:FORTX=1TO24:PRINTT
A(0,TX):CHR#128:TAB(19,TX):CHR#128:NEXT:PRINTTAB(0,TX
):STRING$(20,CHR#128):ENDPROC
210FORT=0TO5:T?&B0=0:NEXT:A=0:lives%=3:T?&79=A:MODE5:
VDU23,1,0,0,0,0;
230*FX15,1
240PROCWALL:COLOUR128:COLOUR3:PRINTTAB(0,30)"PRESS S
PACE TO START";
250A$=GET$:IF A$<>" " THEN 250
251T?&953=0:PRINTTAB(2,26)"KRAFTWERK (Y/N)?"A$=GET$:
IF A$<>"N" AND A$<>"Y" THEN 251 ELSE IF A$="N" THEN 25
4
252T?&953=&FF:T?&950=20:T?&951=0:T?&220=&6A:T?&221=&40:SO
UND1,-15,40,15
253*FX14,4
254PRINTTAB(2,26):SPC(16)
260PRINTTAB(0,30):SPC(20):COLOUR1:COLOUR131:PROCREA
S
270PROCEN:COLOURE:PRINTTAB(0,26):CHR$(AS)TAB(19,26):
CHR$(AS+15):COLOURE:PRINTTAB(0,27):CHR$(BS)TAB(19,27):
CHR$(BS+15);
280B=(A/10):COLOUR128:COLOUR3:PRINTTAB(0,29):"SHEET:
";B:TAB((20-(LEN$(B)))/2,26):A$(B):TAB(13,29):"LIVES:
";lives%
300B=430+A:RESTOREB:FORT=0TO6:READD:T?&D60=D:NEXT:FO
RT=0TO6:READD:T?&D70=D:NEXT
310COLOUR128:CALLM$:PRINTTAB(0,26):SPC(20)TAB(0,27):
SPC(20)
320IF T?&79>8 THEN PROCDEAD
330IF lives%=-1 THEN 370
340COLOUR131:COLOUR1:FORTX=21TO24:PRINTTAB(19,TX):CH
R#128:NEXT:VDU28,1,24,18,1,17,128:FORTX=1TO25:PRINTT
A(0,0):CHR#11:NEXT:VDU26
341GOTO260
350DEFPROCDEAD:FORT=0TO200STEP10:FORG=0TO50:NEXT:VDU
19,0,1,0;:FORG=0TO50:NEXT:VDU19,0,0,0;:SOUND&11,1,255-
T,3:NEXT
360lives%=lives%-1:ENDPROC
370*FX15,1
371*FX13,4
372*FX21,5
379PROCRIPOFF
380GOTO210
390DEFPROCCEAS:IF T?&79<6 A=A+10:IF A=160 A=10
400RESTOREA:X%=1:Y%=1:FORTX=0TO53:AX=128:READD:FORHX
=0TO7:IF (D AND AX)=A% THEN PRINTTAB(X,Y):CHR#128;
410X%=X%+1:IF X%=19 X%=1:Y%=Y%+1
420AX=(AX/2):NEXT:B=(A/10):COLOUR2:COLOUR128:RESTOR
E430:FORT=1TOB:READX,Y:NEXT:PRINTTAB(X,Y):CHR#129:T?&7B
=X:T?&7D=Y:ENDPROC
430DATA8,3,4,1,4,1,10,22,6,1,9,2,9,4,9,3,15,11,1,7,3
,1,2,2,3,1,1,10,18,4
440DATA1,10,17,10,2,10,2,10,16,17,16,2,16,2
450DATA5,6,17,6,4,6,2,1,16,14,16,2,16,2
460DATA6,5,6,21,6,6,8,10,10,10,21,10,6,8
470DATA11,15,11,22,11,15,8,18,12,18,22,18,13,8
480DATA6,8,16,8,7,8,2,10,17,16,17,3,17,2
490DATA1,3,17,3,2,3,2,18,5,18,17,18,6,8
500DATA1,5,16,5,2,5,2,18,9,18,17,18,10,8
510DATA4,4,14,4,4,4,2,17,10,17,12,17,11,8
520DATA2,10,2,22,2,11,8,18,10,18,18,11,8
530DATA3,8,13,8,4,8,2,1,13,15,13,2,13,2
540DATA13,15,13,19,13,13,8,18,12,18,22,18,13,8
550DATA1,14,10,14,1,14,2,9,10,9,2,9,2
560DATA1,10,14,10,2,10,2,9,14,9,22,9,15,8
570DATA1,11,14,11,2,11,2,3,15,14,15,4,15,2
580DATA7,7,15,7,8,8,4,23,16,23,5,23,2
590DEFPROCEN:B=(A/10):IF (B MOD 5)=1 E=1:F=2:AS=130:
BS=131 ELSE IF (B MOD 5)=2 E=2:F=2:AS=132:BS=133 ELSE
IF (B MOD 5)=3 E=3:F=3:AS=134:BS=135 ELSE IF (B MOD 5)
=4 E=3:F=3:AS=136:BS=137
600IF (B MOD 5)=0 E=1:F=1:AS=138:BS=139
610ENDPROC
620MODE4:VDU23,1,0,0,0,0;A$="CHARLIE CHAN":B$="VISI
TS":C$="THE WOOCK FACTORY":DIMB$(5):RESTORE790:FORT=1TO
5:B$(T)=":.....":READG$:B$(T)=B$(T)+G$:NEXT
630FORTX=1TOLENA$:G=ASC(MID$(A$,TX,1)):PROCDL(G):PR
INTTAB(TX+13,10):CHR#140TAB(TX+13,11):CHR#141:NEXT
640FORTX=1TOLENB$:G=ASC(MID$(B$,TX,1)):PROCDL(G):PR
INTTAB(TX+16,13):CHR#140TAB(TX+16,14):CHR#141:NEXT
650FORTX=1TOLENC$:G=ASC(MID$(C$,TX,1)):PROCDL(G):PR
INTTAB(TX+11,16):CHR#140TAB(TX+11,17):CHR#141:NEXT
660VDU19,0,1,0;:FORG=0TO500:NEXT:VDU19,1,0,0;:FORTX=
0TO8:PRINTAB(19,31):SOUND&11,2,TX*25,4:FORG=0TO30:NEX
T.:PRINTTAB(0,10):STING$(40,"")
670PRINTTAB(12,13):"Do Battle With:--"
680PRINTTAB(1,15):CHR#130TAB(1,16):CHR#131TAB(1,18):
CHR#132TAB(1,19):CHR#133TAB(1,21):CHR#134TAB(1,22):CHR#
135TAB(1,24):CHR#136TAB(1,25):CHR#137TAB(1,27):CHR#138
TAB(1,28):CHR#139
690GGX=1:FORTX=16TO28STEP3:FORG=1TOLENB$(GGX):PRINT
TAB(GX+3,TX):MID$(B$(GGX),GX,1):PROCSOUND:FORG=0TO60:
NEXT,GGX=GGX+1:FORG=0TO100:NEXT,
700FORT=0TO5000:NEXT:VDU17,129,28,0,31,39,11,12,26,1
7,0
710PRINTTAB(0,12):"You (Charlie Chan) must go around
the deserted woock factory to collect some woocks to
o cook your tea with. However the prementioned nasties
hinder you progressas much as they can."
720PRINT""On each of the 15 screens there will be a
woock to collect and the exit will not be opened until
you have collected it. You have three lives and looe
e one if you drop too far or get hit."
730PRINT""THE KEYS ARE:--""Z - LEFT
X - RIGHT"
740PRINT" shift - JUMP"
750FORT=0TO15000:NEXT:VDU19,0,0,0;:19,1,6,0;:PRINTTAB
(4,30):"BE VELY PLEASED IF HONORABLE SIR":TAB(12,31):"
PLESS SPACE BAR!";
760A$=GET$:IF A$<>" " THEN 760
770CLS:GOTO210
780DEFPROCDBL(G):T?&70=G:AX=10:X%=&70:Y%=0:CALL&FFF1:
VDU23,140,7&71,7&71,7&72,7&72,7&73,7&73,7&74,7&74,23,1
41,7&75,7&75,7&76,7&76,7&77,7&77,7&78,7&78:ENDPROC
790DATACONAN THE BALL BEARING,Hammy Burger,WALLY WAT
CH,Henry Head Cleaner,KEVIN QUICKSHOT
800DEFPROCRIPOFF:FORT=1TO3:VDU19,T,0,0;:NEXT:CLS:COL
OUR131:COLOUR1:FORTX=20TO30:PRINTTAB(8,TX):CHR#128:CHR#
128:CHR#128:CHR#128:NEXT
810FORTX=0TO2:FORGX=0TO31:GX?(&6DD0+(TX*320))=GX?(J%
+(32*T%))>NEXT,
820COLOUR128:COLOUR3:A$=" "+CHR#144+" "+CHR#8+CHR#8+
CHR#8+CHR#10+" "+CHR#142+CHR#143+" "
821VDU19,1,1,0;:19,2,3,0;:19,3,7,0;
830FORTX=0TO18:PRINTTAB(8,TX):A$;
840SOUND&11,7,255-(TX*14),2:FORG=0TO60:NEXT,
870FORT=0TO1000:NEXT:CLS:ENDPROC
999END
1020DEFPROCsound:SOUND&11,1,T*25,1:FORG=0TO50:NEXT:EN
DPROC
1080DEFPROCsound:SOUND&11,1,255,1:ENDPROC
```


ATARI ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3 1/2 inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system GEM from Digital Research. GEM stands for Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3 1/2 inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1) TOS - Tramiel Operating System based on CPM 86K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3 1/2 inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £651.30 + £97.70 VAT = £749.00 This price includes:
*** 512K RAM** *** B/W MONITOR**
*** MOUSE** *** 500K 3.5" DISK DRIVE**
*** GEM** *** KEYBOARD (95 KEYS)**

£49

SILICA SHOP LTD, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX
SEND FOR FREE ATARI ST LITERATURE

To: Silica Shop Ltd, Dept YC 0885, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

PLEASE SEND ME FREE LITERATURE
ON THE NEW ATARI 520ST COMPUTER

Mr/Mrs/Ms: Initials: Surname:

Address:

Postcode:

Do you already own a computer

If so, which one do you own?

ATARI 520ST SPECIFICATION

MEMORY
 512K RAM (524,288 bytes)
 18K ROM expandable to 320K
 Port for add-in 128K plug-in ROM cartridges
 200K TOS operating system

GRAPHICS
 Individually addressable 32K bit-mapped screen with 3 screen graphics modes:
 320x200 pixels in 16 colours (low resolution)
 640x200 pixels in 4 colours (medium resolution)
 640x400 pixels in monochrome (high res)
 16 shades of grey in low res mode
 512 colours available in low/medium res
 8 levels of each in red, green and blue

ARCHITECTURE
 4 custom designed chips
 68000 Chip - MMU Memory Management Unit
 DMA Controller - Graphics Processing Unit
 16/32 bit Motorola 68000 processor at 8MHz
 8pin 32 bit data registers
 8pin 32 bit address registers
 16 bit data bus/24 bit address bus
 7 levels of interrupts/56 instructions
 14 addressing modes/5 data types

DATA STORAGE
 High speed hard disk interface
 Direct memory access 1.33 Mbytes per second
 CD (Compact Disc) interface
 Built in cartridge access
 Dedicated floppy disk controller

DISK DRIVE
 300K (unformatted) 5 1/4 inch 3 1/2" floppy drive
 349K (formatted) storage capacity

SOUND AND MUSIC
 Sound Generator
 Frequency control from 30Hz to above audible
 3 voices (channels) in wave shaping sound in
 addition to a noise generator
 Separate frequency and volume controls
 Dynamic envelope controls
 ADNR (Attack, Decay, Sustain, Release)
 Noise generator
 MIDI interface for external music synthesizers

KEYBOARD
 Separate keyboard microprocessor
 Standard QWERTY typewriter styling
 Ergonomic angle and height
 95 keys including 10 function keys
 Numeric keypad - 18 keys including ENTER
 One touch cursor control keypad

MONITOR
 12" screen - high res monochrome monitor
 640x400 monochrome resolution
 Note: Some of the above specifications are pre-release and may therefore be subject to change

VIDEO PORTS

Display - Low Resolution - 40 columns
 Medium-High Res - 40/80 plus cols
 Monitor res RGB (Red/Green/Blue) output
 High resolution monochrome (Black & White)

COMMUNICATIONS
 Bidirectional centronics parallel interface for
 printers, or modems capable of input/output
 RS232C serial modem printer interface
 V722 Terminal Emulation Software
 Maximum baud rate up to 19,200
 High speed hard disk interface
 Floppy disk controller (Western Digital)
 2 joystick ports (one for 2 button mouse)
 MIDI interface for external music synthesizers

GEM WIMP ENVIRONMENT
 WIMP - Window Icon Mouse Pop-down menus
 Two button mouse controller
 Icons/Pull down menus/Windows
 GEM VDI - Virtual Device Interface
 GEM AES - Application Environment Services
 GEM BBT - Bit Block Transfer
 Real time clock & calendar

SOFTWARE
 GEM environment
 WIMP - Window Icon Mouse Pop-down menus
 TOS - Tramiel Operating System
 Atari's own system based on CPM 86K with
 hierarchical directory & file structure plus a
 host of MS DOS & UNIX command structures
 BOS - Business Operating System
 To run any standard BOS business programs
 GEM desktop
 with GEM PAINT graphics paint system
 and GEM WRITE word processor
 Personal BASIC and DR Logo
 originally written by Digital Research (DR)
 Very much like those on other machines
 except for the extensive use of pull down
 menus, mouse control and windows

VARIOUS
 Dimensions: 470mmx240mmx100mm
 Replaceable external power supplies
 Extension: 3 1/2" floppy disk drive 500K/1,000K
 (two drives can be connected)
 3 1/2" 15MB hard disk
 CD (compact disc) drive
 Dot matrix & daisywheel printers (black)
 Thermal dot matrix (colour)
 RGB & monochrome monitors

LANGUAGES
 BASIC & LOGO supplied
 Many others will soon be available, including
 Assembler, C, C++, Pascal, Fortran, Basic
 Lisp, Modula-2 and Prolog.

MACINTOSH v F16 v 520ST

Imagine a Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price.

June 1985 - Jack Schofield - PRACTICAL COMPUTING

FEATURES OF BASIC SYSTEM	APPLE	APRICOT	F16	ATARI
Price includes B/W Monitor	YES	NO - extra £200	YES	YES
Keyboard size mm (LxWxH)	330x147x50	450x167x28	470x240x60	
Keyboard size mm (LxWxH)	13x25x2	17 1/2x6 1/2x1	18 1/2x8 1/2x2 1/2	
3 1/2" D/Drive (Formatted)	500K	500K	500K	500K
3 1/2" D/Drive (Formatted)	399K	315K	349K	
WIMP (Window, Icon, Mouse)	Apple	ACT - Activity	GEM	
Real-time Clock	YES	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES	YES
RS232 Serial Port	YES	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES	YES
Hard Disk DMA Interface	NO	YES	YES	YES
Full stroke keyboard	YES	YES	YES	YES
Number of keys on keyboard	59	52	95	95
Numeric Keypad	NO	YES (16 Keys)	YES (16 Keys)	YES (16 Keys)
Cursor Control Keypad	NO	YES	YES	YES
Function keys	NO	10	10	10
16-bit processor	68000	Intel 8086	68000	
Processor running speed	8MHz	4.77MHz	8MHz	
RAM size	512K	256K	512K	
Number of graphics modes	1	4	3	
Number of colours	1	16	512	
Max Screen Resolution (pixels)	512 x 342	840 x 256	840 x 400	
Mouse included	Single Button	NO - extra £95	Two Button	
Replaceable External Power Pack	NO	NO	YES	
Cartridge Socket	NO	NO	YES	
Joystick Ports	NO	NO	YES (two)	
MIDI Synthesiser Interface	NO	NO	YES	
Monitor Size	9"	9"	extra £200	12"
RGB Video Output	NO	YES	YES	

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive	APPLE	APRICOT	ATARI
Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£652+VAT
Mouse	Included	GR-VAT	Included
Monochrome Monitor	Included	£200+VAT	Included
Expansion to 512K RAM	Included	£295+VAT	Included
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	£652+VAT

PRICE rounded down including VAT **£2,984 £1,362 £749**

PRESS COMMENT

"The electronics in the machine are a work of art... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip... when the machine appears in the shops, it'll be at the front end of the queue to buy one."

Peter Bright, June 1985 **PERSONAL COMPUTER WORLD**
 "This machine is significantly more powerful than an IBM PC... if it's possible to design a sure-fire winning machine, this is it."

May 11th 1985 **PERSONAL COMPUTER NEWS**
 "... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."

May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying - easy-to-use computing power without the price."

March 1985 **ANALOG COMPUTING**
 "It (the ST) uses the most modern technology that is affordable, in a package that gives a professional impression."

May 2nd 1985 **POPULAR COMPUTING WEEKLY**
 "The Atari ST is one of the most elegant designs I have seen... Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market... in any price bracket... The dollar question is would I go out and spend money for one? To which the only answer is 'Try and stop me!'"

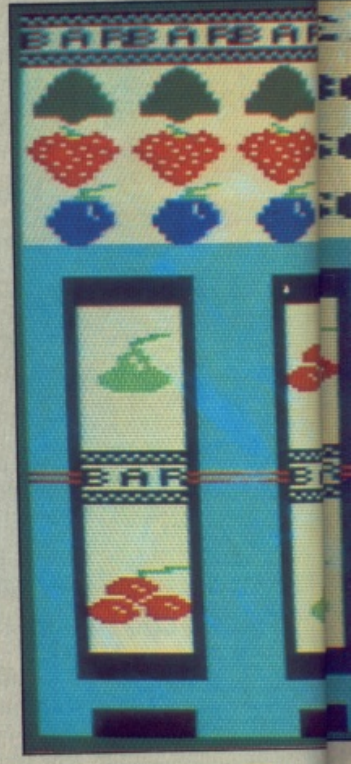
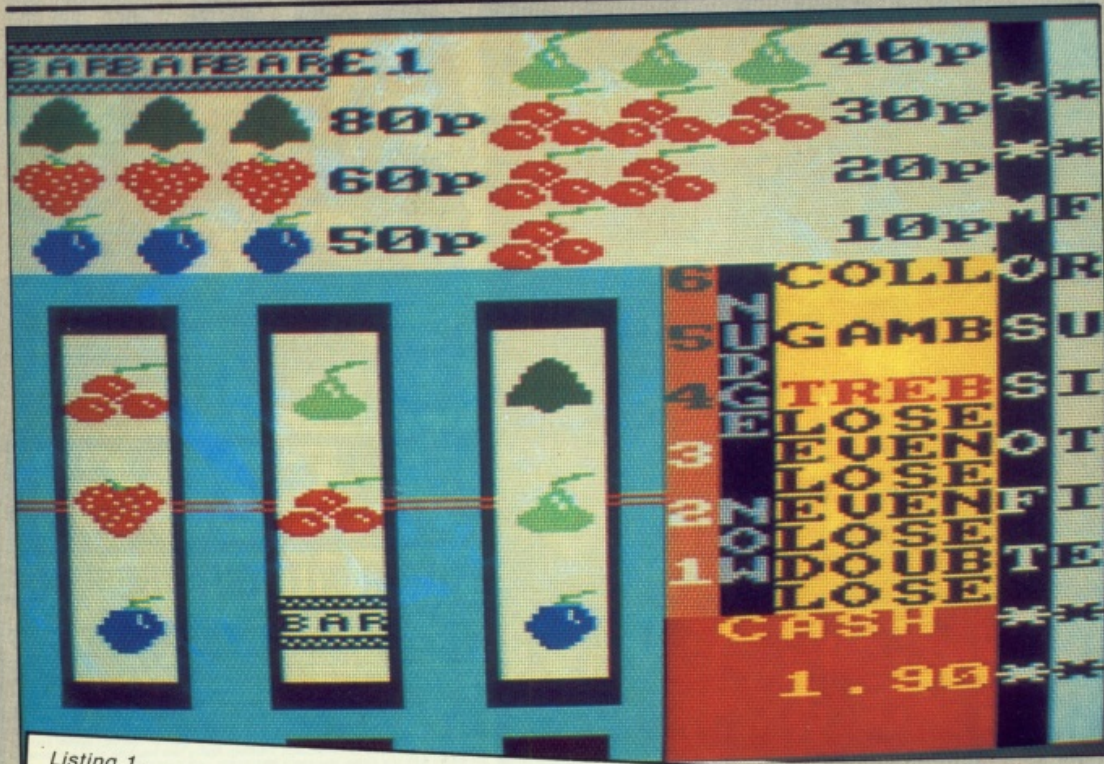
John Lambert, July 1985 **ELECTRONICS & COMPUTING**
 "The 520ST is technically excellent... The 520ST hardware is the new standard by which others will be judged."

July 1985 **YOUR COMPUTER**

SILICA SHOP
ATARI WE ARE THE UK'S No1 ATARI SPECIALISTS
 At Silica we have been successfully dedicated to Atari ever since their products first appeared on the UK market. We can attribute our success largely to the Atari specialisation which we practice and to the user back-up we provide. Rest assured that when you buy a piece of Atari hardware at Silica you will be fully supported. Our mailings giving news of software releases and developments will keep you up to date with the Atari market and our technical support team and sales staff are at the end of the telephone line to deal with your problems and supply your every need. With our specialist bias, we aim to keep stocks of all the available Atari hardware, software, peripherals and accessories. We also stock a wide range of Atari dedicated books and through us, the owners on our list can subscribe to several American Atari dedicated magazines. We can provide a full service to all Atari owners and are now firmly established as the UK's NUMBER ONE Atari specialists. Here are just some of the things we can offer to our customers:

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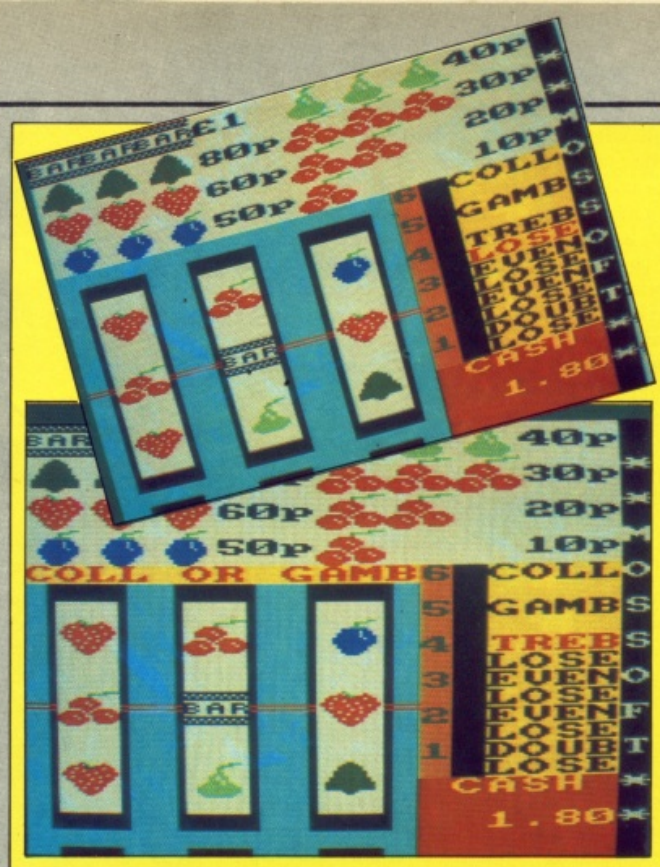


Listing 1.

```

10 MEMORY 29223
20 CLS:PRINT"PLEASE WAIT.  LOADING BYTES!"
30 LOAD"1"
40 LOAD"1"
50 RANDOMIZE TIME
60 ON ERROR GOTO 1600
70 ENV 1:1,15,1,14,-1,5,0,1
80 DIM G$(8):G$(1)="TREB":G$(2)="LOSE":G$(3)="EVEN":G$(4)=G$(2):G$(5)=G$(3):G$(6)=G$(2):G$(7)="DOUB":G$(8)=G$(2)
90 R1=RND*32768:R2=RND*32768:R3=RND*32768
100 R2=RND*32768:R3=RND*32768
110 R3=RND*32768
120 T=CHR$(209)+CHR$(143)+CHR$(143)+CHR$(211)+CHR$(209)+CHR$(143)+CHR$(143)+CHR$(211)+CHR$(209)+CHR$(143)+CHR$(143)+CHR$(211)
130 R1=R1:R2=R2:R3=R3:FLAG=0:V=0:W=0
140 GOSUB 990
150 *** MAIN LOOP ***
160 FOR F1=1 TO 3:FOR F2=1 TO 3:FOR F3=1 TO 3
170 IF SC=0 THEN GOTO 1510
180 FOR V=1 TO 3:FOR W=1 TO 3:FOR U=1 TO 3:FOR T=1 TO 3
190 IF H=1 THEN GOSUB 790:GOTO 220
200 WHILE INKEY="" GOTO 210
210 WHILE INKEY="" GOTO 210
220 SC=SC+1:LOCATE#6,1,3:PRINT#6,USING"###.##",SC/100
230 IF F1=1 THEN A=INT(RND*10)+5 ELSE A=0
240 IF F2=1 THEN B=INT(RND*10)+10 ELSE B=0
250 IF F3=1 THEN C=INT(RND*10)+20 ELSE C=0
260 GOSUB 990
270 H=0
280 IF RND>0.7 AND PO=0 THEN GOSUB 620
290 IF RND>0.3 THEN H=1:GOTO 1,30,0,0,1
300 GOTO 160
310 *** PAYOUT ***
320 LOCATE 1,1
330 FOR R1=1 TO 3:FOR R2=1 TO 3:FOR R3=1 TO 3:FOR R4=1 TO 3
340 IF PO="EEE" THEN S=80:GOTO 430
350 IF PO="CCC" THEN S=30:GOTO 430
360 IF PO="AAA" THEN S=100:GOTO 430
370 IF PO="SSS" THEN S=60:GOTO 430
380 IF PO="LLL" THEN S=50:GOTO 430
390 IF PO="PPP" THEN S=40:GOTO 430
400 IF LEFT$(PO,2)="CC" THEN S=20:GOTO 430
410 IF LEFT$(PO,1)="C" THEN S=10:GOTO 430
420 RETURN
430 LOCATE#4,1,1:PEN#4,7:PRINT#4,"6 5 4 3 2 1":CLS#5
440 LOCATE 1,9:PEN 3:PAPER 1:PRINT"COLL OR GAMB"
450 WHILE INKEY="" GOTO 460
460 IF INKEY(52)<1 THEN LOCATE 1,9:PAPER 2:PRINT"
470 IF INKEY(62)<1 THEN LOCATE 1,9:PAPER 2:PRINT"
480 GOTO 430
490 WHILE INKEY(18)<1 GOTO 500
500 WHILE INKEY(18)<1 GOTO 500
510 V2=(V2+1) MOD(8):W2=(W2+1) MOD(8)
520 LOCATE#7,1,V2+1:PEN#7,15:PRINT#7,G$(V2+1)
530 LOCATE#7,1,W2+1:PEN#7,3:PRINT#7,G$(W2+1)
540 SOUND 1,234-(V2*10),2
550 MEND
560 IF W2=1 OR W2=4 OR W2=6 OR W2=8 THEN S=0
570 IF W2=7 THEN S=S*2
580 IF W2=1 THEN S=S*3
590 SC=SC+S
600 PO=1:LOCATE#6,1,3:PRINT#6,USING"###.##",SC/100:RETURN
610 *** NUDGE ***
620 PO=0:NU=INT(RND*6)+1
630 FOR V=1 TO NU:LOCATE#4,1,13-(V*2):PRINT#4,USING"###.##",V:NEXT V:PEN#4,7
640 PRINT#5,"  NUDGE  NOW!"
650 WHILE NU>0 AND PO=0
660 WHILE INKEY="" GOTO 670
670 IF INKEY(64)<1 THEN A=1:B=0:C=0:GOTO 710
680 IF INKEY(65)<1 THEN A=0:B=1:C=0:GOTO 710
690 IF INKEY(67)<1 THEN A=0:B=0:C=1:GOTO 710
700 GOTO 660
710 SOUND 1,30,5:GOSUB 990
720 IF NU=0 THEN LOCATE#4,1,13-(NU*2):PRINT#4,USING"###.##",NU
730 NU=NU-1
740 MEND
750 LOCATE#4,1,1:PEN#4,7:PRINT#4,"6 5 4 3 2 1"
760 CLS#5
770 RETURN
780 *** HOLD ***
790 FOR V=1 TO 3:FOR W=1 TO 3:FOR U=1 TO 3:FOR T=1 TO 3
800 LOCATE 1,9:PEN 3:PAPER 1:PRINT"  HOLD  "
810 F1=1:F2=1:F3=1
820 WHILE INKEY="" GOTO 830
830 IF INKEY(64)<1 THEN F1=F1:PRINT#1,CHR$(24):CLS#1
840 IF INKEY(65)<1 THEN F2=F2:PRINT#2,CHR$(24):CLS#2
850 IF INKEY(67)<1 THEN F3=F3:PRINT#3,CHR$(24):CLS#3
860 WHILE INKEY="" GOTO 870
870 LOCATE 1,9:PAPER 2:PRINT"
880 GOTO 830
890 *** SPIN REELS ***
900 R1=(R1+1) MOD(10)
910 R2=(R2+1) MOD(10)
920 R3=(R3+1) MOD(10)
930 CALL &SC52,&R1,&R2,&R3
940 GOSUB 320
950 RETURN
960 *** RESET GAMBLE ***
970 PEN#7,15:LOCATE#7,1,1:PRINT#7,"TREBLOSEEVENLOSEEVENLOSEDOUBLOSE":LOCATE#7,1,1:PEN#7,3:PRINT#7,"TREB"
980 RETURN
990 *** PRINT SCREEN ***
1000 FOR V=0 TO 15:INK V,0:NEXT BORDER 0
1010 MODE 0
1020 WINDOW#1,1,4,11,22
1030 WINDOW#2,5,8,11,22
1040 WINDOW#3,9,12,11,22
1050 WINDOW#4,1,12,9,25:PAPER#4,2:PEN#4,5:CLS#4
1060 WINDOW#5,1,18,1,8:PAPER#5,4:CLS#5
1070 WINDOW#6,19,19,1,25:PAPER#6,5:PEN#6,4:CLS#6
1080 WINDOW#7,20,20,1,25:PAPER#7,4:PEN#7,5:CLS#7
1090 PRINT#6,"  ** W O S S O F **"
1100 PRINT#7,"  ** F R U I T I E **"
1110 FOR V=1 TO 3
1120 PEN#V,5:PAPER#V,2
1130 FOR W=1 TO 12
1140 PRINT#V,CHR$(209),"  ",CHR$(211)
1150 NEXT W
1160 LOCATE#4,1,2:PRINT#4,T$
1170 LOCATE#4,1,15:PRINT#4,U$
1180 MOVE 0,142:DRAW 352,0,3:MOVE 0,146:DRAW 382,0
1190 IF FLAG=0 THEN CALL &SC52,1,1,1:FLAG=1 ELSE CALL &SC52,0,0,0:R1=R1+1:R2=R2+1:R3=R3+1
1200 CALL &BB4E
1210 SC=200
1220 WINDOW#1,2,3,25,25
1230 WINDOW#2,6,7,25,25
1240 WINDOW#3,10,11,25,25
1250 WINDOW#4,13,13,9,20:PAPER#4,11:PEN#4,7
1260 WINDOW#5,14,14,9,20:PEN#5,14:PAPER#5,5:CLS#5
1270 WINDOW#6,13,18,21,25:PEN#6,1:PAPER#6,3:CLS#6
1280 WINDOW#7,15,18,9,20:PAPER#7,1:PEN#7,15:CLS#7:PRINT#7,"COLL  GAMB"
1290 PRINT#4,"6 5 4 3 2 1"
1300 PRINT#5,"  CASH"
1310 LOCATE#6,1,3:PRINT#6,USING"###.##",SC/100
1320 RESTORE 1460
1330 FOR V=1 TO 21
1340 READ T,S
1350 CALL &SC6A,T,S+64
1360 NEXT
1370 ORIGIN 0,0,500,502,350,348:CLG 4
1380 ORIGIN 0,0,0,640,400,0
1390 PLOT 194,390,5:TAG:PRINT#1,"
1400 FOR V=1 TO 3:READ W,MOVER,-96,-32:PRINT W,NEXT
1410 PLOT 482,390:PRINT#400"
1420 FOR V=1 TO 3:READ W,MOVER,-96,-32:PRINT W,NEXT
1430 TAGOFF
1440 FOR W=0 TO 13:READ A:INK V,A:NEXT:INK 14,0,20:INK 15,3: BORDER 10
1450 RETURN
1460 DATA &C000,30256,&C008,30256,&C010,30256,&C0A0,30768,&C0A8,30768,&C0B0,30768
1470 DATA &C100,29744,&C108,29744,&C1F0,29744,&C024,30000,&C02C,30000,&C034,30000
1480 DATA &C164,29232,&C16C,29232,&C204,29232
1490 DATA 889,609,509,309,209,109
1500 DATA 9,24,20,6,26,0,2,13,10,12,14,16,18,22
1510 *** END ***
1520 CALL &BC02:CALL &BB4E:MODE 1
1530 LOCATE 7,5:PRINT"YOU'VE LOST ALL YOUR MONEY!!"
1540 PEN 3:LOCATE 13,9:PRINT"PRESS ANY KEY TO"
1550 PEN 2:LOCATE 16,11:PRINT"TRY AGAIN."
1560 WHILE INKEY="" GOTO 1570
1570 CALL &BB18
1580 GOTO 140
1590 *** ERROR TRAP ***
1600 CALL &BC02:CALL &BB4E:MODE 1:PRINT"ERROR ",ERR," IN LINE ",ERR:END

```

FRUITIE

M K Mostowyj and his Amstrad turn you into a slaving degenerate gambler with a colourful print machine simulation.

Table 1.

Keys	Use
1:2:3	These are used to control holds and nudges for the three reels. When used for holds the keys work on a toggle on/off basis, so if you accidentally hold the wrong reel, press the same key and it will be released.
Space	This starts the reels spinning — assuming you still have money.
C:G	Used to choose either Collect or Gamble when you have a winning line.
Large Enter	If gamble is chosen this key is used to stop the flashing symbols on either Even, Doub, Treb or Lose. Your winnings are then adjusted accordingly.

FRUITIE IS A simulation of a penny arcade fruit machine. It includes all the usual features such as hold, nudge, gamble etc. The program is in two parts. Listing 1 is the Basic program that controls the above features plus pay-outs etc. Listing 2 is slightly over 2K in length but in fact pokes over 10K of data into memory. This data includes 9.9K for the reel graphics — 3.3K for each reel — and 353 bytes of machine code that are used to spin the reels and print the payout lines at the top of the screen.

Although listing 2 is discarded once it has poked the relevant data, it would be wise to save it on a separate tape in case of any mistakes you may make when entering the data lines. To get the program running is very simple, first of all enter listing 1 and save it to tape.

Do not run it at this stage as the machine code

calls within it may cause the computer to crash. Secondly, enter listing 2 and, after saving it on a separate tape in case of mistakes, run it. If all is well, after a short delay the reel symbols should start appearing one by one in the top left corner of the screen.

After 39 of these have appeared and have been poked into memory, the data for the machine code is poked in, the screen will then clear and the save message will appear. The two sections of memory that are about to be saved should be saved directly after listing 1, so make sure the tape is wound to the correct position before inserting it and proceeding to save the bytes.

Once this is completed reset the computer, rewind the tape and run it. If all is well listing 1 should auto load the other two parts.

Listing 2.

[illegible]

THE CHORD symbol system, along with the rest of music notation, has archaic origins, and has evolved to its present day state. The result is a system that, although reasonably consistent, is cluttered, widely misinterpreted and full of conventions, i.e., rules having little logical basis and so only learnable by experience.

However, like the English language — and Basic? — at least it has the advantage of having settled down into an established standard, agreed on by almost all; even a 1930's jazz musician could follow most of what's printed on a modern Casiotones chord buttons! This program boils chord structure for guitarists down into a very *easy to use* expert system.

It accepts any chord name typed in simply as read from sheet music, and takes into account all recognised variants by which chords are known — but if you type in rubbish don't blame me for the results! Unlike chord books or simple chord programs, which store a few standard chord shapes, Chordata scratch builds each chord you ask it.

This makes it extremely flexible and able to work out virtually *any* chord, of any type, whether old, contemporary or yet to be fashionable, in any key, at any fret position, and also for any tuning of any stringed instrument; a total of many thousands of chords. Although it works from theory it also weeds out what experience tells me are impractical combinations of notes e.g., an eleventh chord *technically* includes a third as well as a fourth, but the third is omitted in practice.

Eventually — well, six seconds — you are given a simple display of the guitar neck, showing finger positions as you would see them if playing your guitar in front of a mirror. Some people prefer the more conventional — but illogical — view with treble strings uppermost, so I have included a control to flip between



```
0>REM CHORDATA:J.Dave.Rogers/
  Walton.Liverpool/1984
5 RUN 2000
9 REM
```

```
NEW CHORD
10 BORDER 0: PAPER 0: INK 1: B
RIGHT 0: CLS: PRINT #;#0; FLAS
H 1:"Press any key"
20 BRIGHT 1: INK RND+5: LET X=
INT (RND+5)+7: LET Y=1+INT (RND+
5)+4: PRINT AT Y,X;"GHU":AT Y+1
X;"KL"
30 IF INKEY$="" THEN GO TO 20
40 BORDER 1
50 POKE 23617,253: POKE 23609,
22: POKE 23658,0
60 INPUT "FRESH 1, PAPER RND+
7: INK 9:"
70 LET C$="": LINE C$
80 LET P=4: GO SUB 1000: LET
root=v: IF root=0 THEN GO TO 10
90 LET B$="R...3..5....": LET
bass=0
99 REM
```

```
FIRST SEARCH
100 FOR P=5 TO LEN C$: LET P$
=C$(P): LET X$=C$(P TO P+1)
110 IF X$="11" THEN LET B$=
"r..9..4..f..7.."
120 IF X$="13" THEN LET B$=
"r..n..3..5..67.."
130 IF X$="5" OR X$="b5" OR X$
="b7" THEN LET B$(7 TO 8)="5.."
140 IF X$="d1" OR (P$="0" AND
C$(P-1)="7") THEN LET B$=
"r..3..5..7.."
150 LET X$=C$(P TO P+2)
160 IF X$="aug" OR P$="+" OR X$
(TO 2)="#5" OR X$="(5#" THEN LE
T B$(8 TO 9)="5.."
170 IF X$="no3" THEN LET B$(4
TO 5)=".."
180 IF X$="no5" THEN LET B$(7
TO 8)=".."
190 IF C$(P+1 TO P+3)="ass" THE
N LET C$(P)="b": LET P=P-1-(C$(P
-2)="a" AND C$(P-2)="g"): GO S
UB 1000: LET bass=v: LET P=P+4
200 NEXT P
205 REM
210 LET a$=b$: IF B$(5)="3" THE
N LET B$(5)="t"
```

```
220 REM SECOND SEARCH
230 FOR P=5 TO LEN C$: LET X$
=C$(P TO P+1): LET P$=C$(P)
240 IF P$="7" THEN IF X$(2)>="a
" AND X$(3)<="d" AND X$(2)<="g"
THEN LET P=P+1: GO SUB 1000: LET
bass=v
250 IF P$="m" AND X$(TO 3)<="m
a" THEN LET B$(4 TO 5)="t": LE
T a$(4 TO 5)="3.."
260 IF P$="6" OR X$(TO 2)="13"
THEN LET B$(10)="s": LET a$(10)
="6": IF a$(8)="5" THEN LET
a$(8)="7"
270 IF P$="7" THEN IF a$(12)<="
7" AND a$(10)<="7" THEN LET a$(1
1)="7": LET a$(11)="r": LET B$
(11)="s"
280 IF X$(TO 3)="sus" OR P$="4
" THEN LET a$(5 TO 6)="4": LET
B$(5 TO 6)="u"
290 IF X$(TO 3)="-10" THEN LET
a$(4)="9"
300 IF X$(TO 4)="maj7" OR X$(
TO 4)="maj9" THEN: LET a$(12)="
7": LET a$(11)="r": LET B$(12)="s
305 IF X$(TO 2)="11" THEN LET
B$(11)="r": LET B$(13)="n"
310 REM -----NINTHS-----
320 IF P$<="9" THEN GO TO 390
325 LET X$=C$(P-1): LET n=(X$="
#")-(X$="b" OR X$="-") IF n THE
N LET a$(3+n)="9": LET a$(3)=
"": LET B$(3)="": GO TO 390
330 LET a$(3)="9": LET B$(3)="n
": LET a$(11)="r": IF a$(5)="3"
THEN LET a$(5)="t"
340 IF P>5+2+shf THEN GO TO 390
350 PRINT #0; FLASH 1:"Jazz or
added ninth ?"
360 LET K$=INKEY$: BEEP RND/4,
RND+22
370 IF K$="" THEN GO TO 360
380 IF K$="j" THEN LET a$(11)="
7": LET B$(11)="s": IF B$(5)="t"
THEN LET B$(5)="3"
390 NEXT P
391 REM -----
395 INPUT "": PRINT #0; FLASH
1:"Working out "C$
400 REM
```

ADJUSTMENTS

```
410 IF a$(10 TO 11)="67" THEN L
ET a$(10 TO 11)="6s": LET B$(10
TO 11)="s7": LET B$(11)="s"
415 FOR n=3 TO 4: IF a$(n TO n+
1)="93" THEN LET a$(n TO n+1)=
"9t": LET B$(n TO n+1)="n3"
420 NEXT n
430 LET a$=a$(14-root TO )+a$
440 LET B$=B$(14-root TO )+B$
450 IF bass THEN LET root=bass
s: FOR n=bass-2 TO bass+2: LET P
=n+12-(n(1)-(n(12)): LET B$(P)=
("N" AND B$(P))>B$+P: NEXT
n
460 LET B$(bass)=B$
470 LET s$="FFFFFFFFFFFF"
480 FOR n=1 TO LEN a$
490 IF a$(n)="" THEN LET a$(n)
="0": GO TO 510
500 LET s$(n)="MN"(1+(a$(n)>"a
"))
510 IF B$(n)="" THEN LET B$(n)
="R": GO TO 530
520 LET s$(n)="MN"(1+(B$(n)>"s
"))
530 NEXT n
540 LET s$(root)=""
550 REM ---FILL-PLAY-ARRAY---
560 DIM p(48): LET p=1: LET P(
1)=root-13: LET s$=s$+a$
570 FOR n=1 TO LEN s$
580 IF s$(n)<0 OR n>128 THEN LET
p=p+1: LET P(p)=n-1
590 NEXT n
600 REM
610 FOR s=1 TO 8
620 LET g$(s)=0$ AND s(4)+v$
630 LET g$(s+8)=g$(s)
640 IF s>3 THEN LET B$=a$: LET
J$=s
650 BEEP .01+2+J$
660 FOR f=1 TO 16: LET g$(s,f+4)
=B$(n(s,f)): LET g$(s+8,f+4)=
J$(n(s,f)): NEXT f
670 IF g$(s,4)=g$(s,5) THEN
7 LET g$(s+8,2)="0"
680 NEXT s
690 REM ---PRINT-OUT---
700 BORDER VAL "7775017310"(1+
671 INK 9: PAPER 7:(col=2+INT
col(2)): BRIGHT col=6 OR col=7
720 CLS:PRINT:PRINT
```


Table 1.
Spectrum-specified Pokes etc.

0	A zero line is obtained by the direct command: Poke 23756,0.
10	h\$ is a screen-sized string used as a 'backdrop'.
50	The first Poke changes the Input-cursor character, the second Poke makes the Spectrum's key-beep more audible and the third Poke switches Caps-shift off.
60	'Line' allows string input without the quotes being shown.
395	Performs a CLS on the bottom two lines only, #0 Prints to the bottom of the screen.
450	use of boolean logic with b\$ allows a 'complete algorithm within a line'. Use of 'If's would have caused the rest of the line to be ignored if a condition was false.
560	Sinclair arrays can be re-

dimensioned even when already set up.	3070	Checksum for UDG data.
500/520 The first or the second of the characters in quotes is sliced out depending on whether b\$(n) is an upper-case or lower-case character.	9997	Reads character bit-patterns from the Rom and Pokes them into the UDG's, but by adding 128 a 'stripe' is added down one side to highlight the UDGs in the listing. Adding 129 would give a stripe on the other side as well.
710 Border colours are sliced directly out of a string using 'Val'.		
720 Using one big string takes less memory and prints faster than if using lots of separate 'Print At's.		
840 If 'view' equals one then the second version of the For-Next loop is set up and the one that was first set up is ignored. <i>Not</i> recommended on non-Sinclair machines!		
915 Pokes the attributes file to flash random <i>INK</i> colours only. The bits that are significant for Paper/Flash/Bright are masked off by the function 8* INT (Peek/8).		
2150 Checksum for strings.		

R r	Root note of chord
B	Bass (if altered root)
3 t	Third (minor or major)
5 f	Fifth (flattened, perfect or augmented)
7 s	Seventh (diminished, dominant or major)
6 s	Sixth
9 n	Ninth (flattened, dominant or sharpened)
4 u	Fourth (suspended or eleventh)
If a main note.	If an optional note.

(continued from previous page)

working program but one that spouts a load of misleading rubbish. I made up the (rather unlikely) 'test chord' in line 4080 to test as many parts of the search algorithm as possible.

If you do not get *exactly* what's shown in figure 1 then there is an error somewhere. When a Run gives the correct result you can erase line 4080, then make final copies using Save "chordata" line 1.

User-definable characters — to be entered in Graphics mode — are highlighted in the listing as capital letters *with a stripe*. To return them to this form, for checking, you must Run 9000 — this copies character bit-patterns from the Rom. It is also most important to notice where capital or small letters are used in the listing, because this is used as a note-priority marker.

For this reason check all lines in the search loops even more carefully than usual. Note that some lines in the listing have been padded out with spaces to clarify their appearance. Lines 540, 780 and 2050 use graphic shifted eight (*not* inverse video space).

In use, the 'sharp' sign can be found on key 3. For flats, as on all music, a small b is used. If you come across a natural sign — then type maj instead. It is *not* necessary to put capitals or spaces when typing in a chord, these will be inserted later by the program itself where needed for clarity e.g. Type in abbbass and see how the four b's get sorted out into Ab/Bb Bass.

Figure 1.

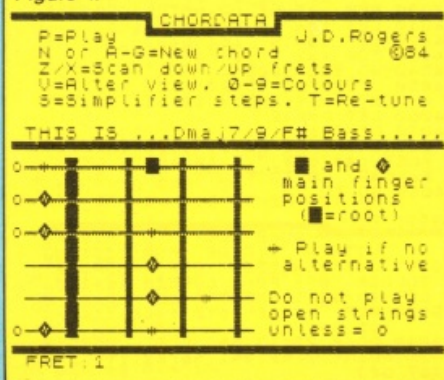


Table 2. Main Variables.

C\$	Chord name, inputted by user.
B\$	'Allowed notes' for given chord (separate sets for bass/treble strings).
A\$	Extracted items from C\$
X\$	Pointer for search through C\$
P	Value returned from note-to-number subroutine.
root	Root note of chord.
bass	New root note if 'altered bass'
i\$/j\$	Simplified versions of b\$/a\$.

g\$(s)	Guitar 'strings', literally.
e\$	Empty string, used to keep the guitar strings spaced-out.
N(s,f)	Notes reference array (string, fret)
col	Colour/options for display
T\$	Tuning for open guitar strings
Simp	Simplifier, on/off
view	View, up/down 'flags', 0 = off
play	Play notes, on/off
Shf	Sharps and flats
p (pa)	Play-array

For 9th chords you are prompted to choose jazz or added, the former includes a seventh, the latter doesn't and sounds more contemporary — used extensively by The Police. Any chord +7 means augmented fifth and dominant seventh, *not* a sharpened seventh. A 13th chord includes the sixth and seventh, usually an octave apart, sometimes the ninth, optionally the fourth and theoretically the root, third and fifth.

If the program is typed in error-free (!) then at least 99.9 per cent of chords typed-in off sheet music will be worked out correctly. Don't believe those who tell you "that's not how I play" whatever, many guitarists have their own somewhat loose idea of chord names.

Even sheet music is not infallible and can contain chord shapes or names that are unsuitable or just plain wrong e.g. G eleventh (G11) is used sometimes to mean F/G but sometimes to indicate G7 sus 4.

Structure-wise (horribobble word) the program flows straight through from line 10 to 900. The main variables to try and follow are a\$, b\$, c\$, p and x\$. Both searches through the inputted chord name (c\$) use a pointer (p) to keep track of everything. P is incremented for example to accommodate "sharps and flats" in the routine at 1000. Allowed notes for the chord in question are built up in a\$ — for the three treble strings — and in b\$ — for the three bass strings. B\$ gets started off containing a major triad in line 60.

The filling of the actual guitar-strings array (G\$) is all done in line 660 as follows: For each guitar-string/fret position (S, F) the fixed reference array N is sliced to find the note-value at that S, F. The resulting number — range 1 to

Table 3. Some chords to try, from simple to complex, showing just some of the types that may be found on sheet music.

E7	D	Dm7	Fmin	Am
Am(maj 7)	Am7	Bb6	C7-9	
F	F6/4	Esus	Eaug	D/E
C(Bb	Am/F	B7-10	Em(add 9)	
Cm7/9	A7(b9)	Abmaj7		
B9	A6/4/GBass	Dmaj7		
Bbm7	C11	F#dim		
F#m7(5b)	G	A13	D(9)	

12 — is used to slice out a character from a\$/b\$ — allowed notes data — which is then put into G\$ at the current string/fret.

This character could be a symbol or just a bit of guitar string — to fill the gap — depending on whether the note was an allowed one for the current chord or not.

Since the Spectrum Beep is monophonic — not to mention barely audible — the only way to give at least an impression of a chord is to play the notes of the chord rapidly in succession. This is done by storing the notes of the chord into a play array, P — sound better through a proper amp.

Note that throughout this program I use 1 to represent C, 2 for C sharp, 3 for D and so on. The Spectrum's Beep uses the same system but one lower (0=C) hence the need for 'n-1' in line 580.

I can supply a ready-taped version of Chordata which includes extra text screens. Send £2.50 to 11 Carnarvon Road, Walton, Liverpool, L9 1EB. Note that I refuse to have anything to do with fans of Wham! ■

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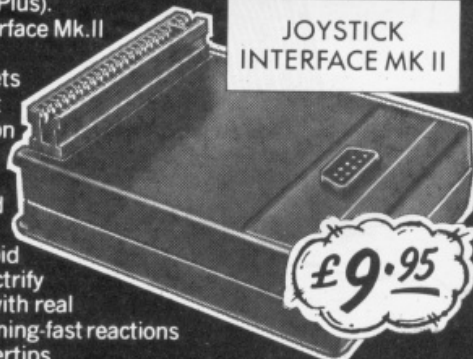
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SP

J G Fountain
gives your
Amstrad a
schizoid
screen.

THE PROGRAM Split uses the built in interrupt facilities on the Amstrad to split the display into separate areas and provide them with separate colour palettes, thus allowing the machine to have more colours on screen than normal. The program actually splits the screen into two sections, the upper retaining the normal screen palette and hence responding to the normal Basic commands for controlling the ink colours.

The lower area however is given a completely new palette and hence new commands have to be provided to control the inks though the

colours available are the same 27 hardware colours.

The new commands are provided using Resident System Extensions, which have been well described in various publications and are fully documented in the *Complete CPC 464 Operating System Firmware Specification Soft 158*. Basically an RSX command is a user defined extensions to the Basic language and provides a method for calling machine code routines by name rather than address.

For the control of the lower area of the screen 4 RSX commands are provided:-

:SPLIT,p,n — splits the screen at position p where p is in the range of 0 to 4, 0 being the bottom of the screen and 4 being the top. n inks are associated with the new palette ie. if n=0 none of the inks are changed in the lower area of the screen, if n=16 then all of them are changed the border always being split.

:SPLITOFF — returns the display area to its normal format.

:LOINK,i,c — sets ink i to colour c in the lower area of the screen.

:LOBORDER,c — sets the border to colour c in the lower area of the screen.

These RSX's have to be initialised by the Basic instruction

CALL 34000

though this address can be changed by changing the two ORG definitions in the assembly pro-

RSX INITIALISATION ROUTINE
This routine is called from basic and initialises the RSX commands.

```
RINIT: ORG 34000
LD BC,RCHDDB ; Address of command table
LD HL,RWRKSP ; Address of work space
CALL &BCD1 ; HL LOD EXT
RET ; Return to Basic
```

SPLIT SCREEN COMMAND ROUTINE
This routine is called when the RSX command SPLIT,n,m is found by the Basic Interpreter. It splits the screen at position 'n', providing a new palette for the first 'm' inks. If there are no parameters it defaults to SPLIT,1. If there are too many parameters it exits via the Error routine.

```
SPLIT: CP 0 ; Check for parameters
JR NZ,SPRAM ; If at least one jump to handle it
LD A,4 ; Else default to SPLIT,1
LD (POSTN),A ;
LD A,46 ;
LD (DELAY),A ; Set loop counter
JR SPIN ; then jump to initialise Ticker blocks
SPRAM: CP 1 ; Check if there is 1 parameter
JP 2,SP2 ; Jump to handle it
CP 2 ; Check if there are 2 parameters
JP NZ,PCERR ; Jump to error routine if not
```

SET NO OF INKS TO BE CHANGED
LD A,(IX) ; Get 10 byte of P2
CP 17 ; Limit the parameter
JR C,SP4 ; to between 0 and 16
LD A,16 ;
LD (LINIK),A ; Point parameter stack pointer at the first parameter on the line
INC IX ;

SET SPLIT POSITION
SP2: LD A,(IX) ; Get parameter
ADD A,3 ; Limit the parameter value
AND 7 ; to between 3 and 7
LD E,A ; Save the split position parameter for later
SUB A,3 ; Bring back to range 0 to 4
LD BC,LOOPTAB ; Get the loop table start address
ADD A,C ; Add offset (ADD BC,A)
LD C,A ;
JR NZ,SP1 ;
LD A,(BC) ; Get the loop driver value from table
LD (DELAY),A ; Load loop driver temp. store
LD A,E ; Get the split position parameter again
LD (POSTN),A ; Set split position variable

INITIALISE FRAME FLYBACK
SPIN: LD HL,FBLK ; Address of Frame Flyback Event block
LD B,&B1 ; Class of interrupt, Asynchronous Event
LD C,&FF ; with a routine in RAM
LD DE,FFRTN ; Address of routine
CALL &BCD7 ; KL NEW FRAME FLY

INITIALISE FAST TICKER BLOCK

```
LD HL,FBLK ; Address of Fast Ticker Event block
LD B,&C1 ; Class of interrupt, Asynchronous Express Event
LD C,&FF ; with a routine in RAM
LD DE,FTRTN ; Address of routine
CALL &BCE0 ; KL NEW FAST TICKER
RET ; Return to Basic
```

FAST TICKER ROUTINE
This routine is called every 3.33 ms. It checks where the screen scan has got to and if this matches the split position then the ink colours are changed.

```
FTRTN: LD A,(PCOUNT) ; Get the frame position counter
LD HL,POSTN ; Get position at which to split the screen
CP (HL) ; Check if they are equal
JR NC,FTPASS ; If they are not the same, do not change the palette
```

LOAD IN THE NEW PALETTE
LD A,(DELAY) ; Get delay time length
LD B,A ; Move it into B
FTLOOP: DJNZ FTLOOP ; Delay loop to get change of colours at character line boundary
LD B,&7F ; Load Gate array address into B
LD A,(LINIK) ; Address Bus During the OUT (C) instructions
CP 2 ; Check No. of inks to be changed
JR C,FTFEW ; If A < 2 change colours the slow way
LD HL,INKTAB ; Else do the border and the first two inks as fast as possible
PUSH AF ; Save limit of inks to be changed
LD D,L ; Load the spare registers with the ink numbers and colours of the first two inks to be changed and the border which is also changed at this point
LD C,&10 ;
INC HL ; Save ink table pointer
LD H,(HL) ;
OUT (C),D ; Output the ink Nos. and colours
OUT (C),E ;
OUT (C),C ; Border No.
OUT (C),A ; Border colour
OUT (C),L ;
OUT (C),H ;
POP HL ; Get the ink table pointer
INC HL ; Increment it to 2
POP AF ; Get the limit of inks
JR Z,FTPASS ; If there were exactly 2 inks to change
JR FTOUT ; Else continue outputting inks

```
FTFEW: LD L,&10 ; Entered if 1 or no inks to change
OUT (C),L ; Get Gate address
LD A,(BORCOL) ; Get the border colour
OUT (C),A ; Send it to Gate Array
LD HL,INKTAB ; Get the start of ink the table
LD A,(LINIK) ; Get the number of inks to set
CP 0 ; Check if no inks to change
JR Z,FTPASS ; ie only the border
DEC A ; Decrement the limit as L starts at 0
```

```
FTOUT: OUT (C),L ; Set Gate Array for ink (L)
OUT ; Set its hardware colour
INC B ; Reset B
```


The mechanism by which the screen is split uses two of the interrupt queues, the Frame Fly-back Queue and the Fast Ticker Queue. These

The Frame Flyback interrupts occur as the name suggests every Frame Flyback i.e., 50 Hz in the UK, 60 Hz in various other countries. The Fast Ticker interrupts occur at 300 Hz and so 6 — or 5 if Flyback is at 60 Hz — of these will happen during the period between frame

To use the interrupt queues each routine to be called has to have an event block which is an area of memory reserved by the user which is kicked by the interrupt and in turn calls the routine. These blocks are initialised, put on the queues, deleted from the queues, etc using various jump blocks.

```

10 REM version 1.1
20 REM Basic loader for SPLIT.
30 REM keep the line numbers as listed
40 REM and then when you make a mistake
50 REM in the data statements the
60 REM program will tell you what line
70 REM it is in.
85 PRINT "To load the code from 34000 onwards":PRINT "
press Enter when the INPUT prompts appear"
90 IF INPUT "Start of Machine code program"=startp
90 IF startp = 0 THEN startp = 34000
90 IF startp = 0 THEN startp = startp + 65536
100 INPUT "Start of Variable Area"=startvd
110 IF startvd = 0 THEN startvd = 34529
120 IF startvd = 0 THEN startvd = startvd + 65536
130 IF startp-INT ( startp / 256 ) + 256 <= 255 THEN GO TO 100
140 IF startp>startvd AND startp < HIREM THEN MEMORY at
startp ELSE IF startp>startvd AND startp>HIREM THEN MEM
ORY-startp+1
150 address = startp
160 limit = startp + 329
170 datastart = 1000
180 GOSUB 600
190 address = startp
200 limit = startp + 157
210 datastart = 2000
220 address = startp + 231
240 limit = startp + 240
250 datastart = 3000
260 GOSUB 600
270 FOR n = 1 TO 32
280 READ address : READ value
290 address = address + 31536 : startp = value + va
lu + startp
300 GOSUB 600
310 NEXT
320 FOR n = 1 TO 10
330 READ address : READ value
340 address = address + 51836 : startp = value + va
lu + startp
350 GOSUB 600
360 NEXT
370 FOR n = 1 TO 4
380 READ address : READ value
390 address = address - 86619 : startp = value + va
lu + startp
400 GOSUB 600
410 NEXT
420 CALL startp
430 SPLIT.1
440 STOP
450 REM code to new address values

```

```

010 F0R address=INT( value/256 ) * 256
020 F0R address = 1, INT( value/256 )
030 RETURN
040 REM read data subroutine
050 startaddr = address
060 check = 0
070
080 FOR n = 0 TO 7
090 READ v:IF address= startaddr,
100 check = check + v
110 NEXT
120 READ checksum
130 IF check <> checksum THEN GOTO 940
140 address = address + 8
150 IF Iaddress = Ithen THEN GOTO 020
160 RETURN
170 REM save n/c version
180 SAVE"split-e",v:74000,585
190 REM check sum error
200 linenumber = INT( (address - startaddr) / 8 ) + 1
210
220
230
240 PRINT data error in line :
250 PRINT linenumber
260 STOP
270
280 REM program data
290 DATA 1,142,134,33,01,174,205,209,8036b
300 DATA 188,201,254,08,32,12,62,4,502F1
310 DATA 50,59,134,62,46,50,134,64255
320 DATA 24,32,1,1,1,82,14,133,254,68790
330 DATA 3,194,251,133,221,136,0,254,88494
340 DATA 37,56,2,62,16,50,50,134,68198
350 DATA 221,35,221,35,221,136,0,190,80421
360 DATA 3,238,7,95,14,1,5,82,68756
370 DATA 174,8,1,1,1,1,1,1,50,68167
380 DATA 68,134,123,58,195,134,33,71,6029E
390 DATA 104,6,129,14,255,17,168,133,68750
400 DATA 205,215,188,35,01,134,6,193,68480
410 DATA 14,237,17,57,133,205,209,8036b
420 DATA 201,58,77,134,33,194,136,58562
430 DATA 46,77,58,68,134,71,16,254,682CE
440 DATA 6,127,58,134,254,2,56,5027B
450 DATA 37,33,8,135,245,95,94,58,68248
460 DATA 16,35,14,4,25,134,105,1237,60218
470 DATA 81,237,89,237,75,237,11,237,80528
480 DATA 105,237,97,225,35,241,40,74,807F3
490 DATA 34,20,16,237,105,134,6,5036b
500 DATA 135,237,121,33,8,135,58,68269
510 DATA 174,25,0,40,16,61,237,105,60749
520 DATA 237,163,4,189,210,134,133,56,60468
530 DATA 57,134,61,32,2,62,6,50,68194
540 DATA 57,134,62,0,50,65,134,201,8026E
550 DATA 205,168,205,56,108,62,4,602C9
560 DATA 50,57,134,62,0,50,75,134,6072E
570 DATA 201,35,61,134,205,238,103,3,60430
580 DATA 71,134,205,221,188,201,24,5,604F4
590 DATA 32,57,141,129,3,8,135,58,68269
600 DATA 254,74,56,0,75,95,88104

```

```

1730 DATA 221,126,0,254,20,110,4,154,68D1
1740 DATA 137,126,0,131,95,48,1,28,68D107
1750 DATA 26,119,201,254,1,194,251,137,68D98
1760 DATA 123,254,20,126,1,174,17,125,68D99
1770 DATA 173,131,95,40,1,194,119,119
1780 DATA 16,135,201,37,85,134,6,20,68E76
1790 DATA 205,11,134,201,33,115,134,68E47
1799 DATA 29,285,11,134,201,126,25,197,68E5
1800 DATA 47,167,1,134,201,126,25,197,68E6
1810 DATA 201,0,0,0,0,0,0,0,68E05
1820 DATA 0,0,0,0,0,0,0,0,68E05
1830 DATA 0,0,0,0,0,0,0,0,68E06
1840 DATA 0,0,0,0,0,0,0,0,68E06
1850 DATA 0,0,0,0,0,0,0,0,68E06
1860 DATA 0,0,0,0,0,0,0,0,68E06
1870 DATA 0,0,0,0,0,0,0,0,68E06
1880 DATA 77,86,70,87,94,64,70,87,80E28
1890 DATA 71,74,62,66,93,90,69,91,68E28
1900 DATA 6,6,2,69,0,0,0,0,68E05
1910 DATA 74,67,75,118,46,110,46,237,68E2D
1920 DATA 0,0,0,0,0,0,0,0,68E05
1930 DATA 0,0,0,0,0,0,0,0,68E06
1940 DATA 0,0,0,0,0,0,0,0,68E06
1950 DATA 0,0,0,0,0,0,0,0,68E06
1960 DATA 85,78,84,32,69,82,82,79,68E4F
1970 DATA 82,35,75,78,32,82,82,88,68E24
1980 DATA 50,65,82,65,79,69,84,69,68E4F
1990 DATA 72,78,69,84,32,69,82,82,79,68E4F
1999 DATA 32,82,65,78,71,69,32,72,78E06
2000 DATA 78,32,82,82,68,156,134,95,68E58
2010 DATA 219,152,195,177,153,195,190,153,88E5D
2020 DATA 195,227,133,82,58,76,71,21,68E47
2030 DATA 74,67,75,84,32,69,82,82,79,68E4F
2040 DATA 78,75,78,78,75,78,75,68E2D
2050 DATA 79,82,68,69,210,0,0,0,68E1F
2060 DATA 74,67,75,84,32,69,82,82,79,68E4F
2070 DATA 74,67,75,84,32,69,82,82,79,68E4F
2080 DATA 74,67,75,84,32,69,82,82,79,68E4F
2090 DATA 74,67,75,84,32,69,82,82,79,68E4F
2100 DATA 74,67,75,84,32,69,82,82,79,68E4F
2110 DATA 74,67,75,84,32,69,82,82,79,68E4F
2120 DATA 74,67,75,84,32,69,82,82,79,68E4F
2130 DATA 74,67,75,84,32,69,82,82,79,68E4F
2140 DATA 74,67,75,84,32,69,82,82,79,68E4F
2150 DATA 74,67,75,84,32,69,82,82,79,68E4F
2160 DATA 74,67,75,84,32,69,82,82,79,68E4F
2170 DATA 74,67,75,84,32,69,82,82,79,68E4F
2180 DATA 74,67,75,84,32,69,82,82,79,68E4F
2190 DATA 74,67,75,84,32,69,82,82,79,68E4F
2200 DATA 74,67,75,84,32,69,82,82,79,68E4F
2210 DATA 74,67,75,84,32,69,82,82,79,68E4F
2220 DATA 74,67,75,84,32,69,82,82,79,68E4F
2230 DATA 74,67,75,84,32,69,82,82,79,68E4F
2240 DATA 74,67,75,84,32,69,82,82,79,68E4F
2250 DATA 74,67,75,84,32,69,82,82,79,68E4F
2260 DATA 74,67,75,84,32,69,82,82,79,68E4F
2270 DATA 74,67,75,84,32,69,82,82,79,68E4F
2280 DATA 74,67,75,84,32,69,82,82,79,68E4F
2290 DATA 74,67,75,84,32,69,82,82,79,68E4F
2300 DATA 74,67,75,84,32,69,82,82,79,68E4F
2310 DATA 74,67,75,84,32,69,82,82,79,68E4F
2320 DATA 74,67,75,84,32,69,82,82,79,68E4F
2330 DATA 74,67,75,84,32,69,82,82,79,68E4F
2340 DATA 74,67,75,84,32,69,82,82,79,68E4F
2350 DATA 74,67,75,84,32,69,82,82,79,68E4F
2360 DATA 74,67,75,84,32,69,82,82,79,68E4F
2370 DATA 74,67,75,84,32,69,82,82,79,68E4F
2380 DATA 74,67,75,84,32,69,82,82,79,68E4F
2390 DATA 74,67,75,84,32,69,82,82,79,68E4F
2400 DATA 74,67,75,84,32,69,82,82,79,68E4F
2410 DATA 74,67,75,84,32,69,82,82,79,68E4F
2420 DATA 74,67,75,84,32,69,82,82,79,68E4F
2430 DATA 74,67,75,84,32,69,82,82,79,68E4F
2440 DATA 74,67,75,84,32,69,82,82,79,68E4F
2450 DATA 74,67,75,84,32,69,82,82,79,68E4F
2460 DATA 74,67,75,84,32,69,82,82,79,68E4F
2470 DATA 74,67,75,84,32,69,82,82,79,68E4F
2480 DATA 74,67,75,84,32,69,82,82,79,68E4F
2490 DATA 74,67,75,84,32,69,82,82,79,68E4F
2500 DATA 74,67,75,84,32,69,82,82,79,68E4F
2510 DATA 74,67,75,84,32,69,82,82,79,68E4F
2520 DATA 74,67,75,84,32,69,82,82,79,68E4F
2530 DATA 74,67,75,84,32,69,82,82,79,68E4F
2540 DATA 74,67,75,84,32,69,82,82,79,68E4F
2550 DATA 74,67,75,84,32,69,82,82,79,68E4F
2560 DATA 74,67,75,84,32,69,82,82,79,68E4F
2570 DATA 74,67,75,84,32,69,82,82,79,68E4F
2580 DATA 74,67,75,84,32,69,82,82,79,68E4F
2590 DATA 74,67,75,84,32,69,82,82,79,68E4F
2600 DATA 74,67,75,84,32,69,82,82,79,68E4F
2610 DATA 74,67,75,84,32,69,82,82,79,68E4F
2620 DATA 74,67,75,84,32,69,82,82,79,68E4F
2630 DATA 74,67,75,84,32,69,82,82,79,68E4F
2640 DATA 74,67,75,84,32,69,82,82,79,68E4F
2650 DATA 74,67,75,84,32,69,82,82,79,68E4F
2660 DATA 74,67,75,84,32,69,82,82,79,68E4F
2670 DATA 74,67,75,84,32,69,82,82,79,68E4F
2680 DATA 74,67,75,84,32,69,82,82,79,68E4F
2690 DATA 74,67,75,84,32,69,82,82,79,68E4F
2700 DATA 74,67,75,84,32,69,82,82,79,68E4F
2710 DATA 74,67,75,84,32,69,82,82,79,68E4F
2720 DATA 74,67,75,84,32,69,82,82,79,68E4F
2730 DATA 74,67,75,84,32,69,82,82,79,68E4F
2740 DATA 74,67,75,84,32,69,82,82,79,68E4F
2750 DATA 74,67,75,84,32,69,82,82,79,68E4F
2760 DATA 74,67,75,84,32,69,82,82,79,68E4F
2770 DATA 74,67,75,84,32,69,82,82,79,68E4F
2780 DATA 74,67,75,84,32,69,82,82,79,68E4F
2790 DATA 74,67,75,84,32,69,82,82,79,68E4F
2
```

```

CP L      : Check if this is the last ink to be set
JP NC,FTOUT : If not continue outputting
:
:
FTPASS: LD A,(PCOUNT) : Get the position counter
DEC A      : And decrement it
JR NZ,FTNST : If it decrements to zero
LD A,d     : Reset it to d
FNTNST: LD (PCOUNT),A : And store it again
LD A,0     : Reset the Fast Ticker block counter
LD (FTBLK+4),A
RET        : Return to BASIC

:
: FRAME FLYBACK ROUTINE
: ~~~~~
: This routine is called every 20 ms. It synchronises the Split position with
: the Frame Flyback. It also resets the palette at the frame top
FFRTN: CALL &BC5B : Get border colour
CALL &BC5B : Set border colour
LD A,d     : Reset position counter
LD (PCOUNT),A : Reset the Frame Flyback block counter
LD A,0     : Reset the Frame Fly
LD (FFBLK+4),A
RET        : Return to basic

:
: SPLITOFF COMMAND ROUTINE
: ~~~~~
: This routine is called when the RSX command SPLITOFF is found. It resets t
: screen to the normal format. The Fast Ticker and Frame Flyback blocks are
: removed from their respective queues.
OFF:
LD HL,FTBLK : Remove fast ticker block
CALL &BC6A : KL DEL FAST TICKER
LD HL,FFBLK : Remove Frame Flyback block
CALL &BCDD : KL DEL FRAME FLY
RET        : Return to basic

:
: LOINK COMMAND ROUTINE
: ~~~~~
: This routine is called when the RSX command LOINK,n,m is found. It changes
: colour associated with ink number 'n' to colour 'm'. It requires two
: parameters, and if the correct number of parameters are not passed then it
: exits via the error routine.
LOINK: CP 2 : Check for two parameters
JR NZ,PCERR :
LD A,(IX+2) : Get the Ink number
LD HL,&INKTAB : Get the Ink table start
CP 1d : Check that the ink number is
JR NC,PRERR : in range 0 - 15
LD B,0 :
LD C,A :
ADD HL,&C :
LD A,(IX) : Get the Ink colour
CP 2B : Check if it is in range
JR NC,PRERR :
LD DE,&COLTABL : Get the start of the Hardware colour table
ADD A,&E : Add the colour offset (ADD DE,A)
LD E,A :
LD A,E :
JR NC,LOI :
INC D :
LD A,(DE) : Get Hardware colour number

```

```

LD (HL),A          ; Load into ink table
LOEND: RET          ; Return to basic

;-----
; BORDER COLOUR COMMAND ROUTINE
;-----
; This routine is called when the BSK command LOBORDER,m is found. It changes
; the colour of the lower border area to colour 'm'. It requires one parameter,
; and if more or less than one parameter is past then it exits via the Error
; routine.

BORDER:
  CP 1              ; Check there is only one Parameter
  JP NZ,PCERR       ; If not jump to error
  LD A,E            ; Get the Low Byte of the parameter
  CP 20             ; Check that the colour is in range
  JP NC,PRERR       ;
  LD DE,COLTABL     ; Get the start of the colour lookup table
  ADD A,E           ; And add the parameter as an offset
  LD E,A            ; ( ADD DE,A )
  JR NC,B01         ;
  INC D             ;
B01: LD A,(DE)       ; Get Hardware colour number from the table
      LD (BORCOL),A ; Load into ink colour into variable
      RET           ; Return to Basic

;-----
; PARAMETER COUNT ERROR ROUTINE
;-----
; This routine is entered if the parameter count was incorrect.
;
PCERR: LD HL,PCMES   ; Point HL at the start of message
      LD B,20        ; Load B with its length
      CALL PRINTMES  ; Call message printing routine
      RET           ; ( use the current window )

;-----
; PARAMETER RANGE ERROR ROUTINE
;-----
; This routine is entered if the parameter was out of range.
;
PRERR: LD HL,PRMES   ; Point HL at the start of message
      LD B,29        ; Load B with its length
      CALL PRINTMES  ; Call message printing routine
      RET           ; ( use the current window )

EXIT: RET            ; Return to basic

;-----
; PRINT MESSAGE SUBROUTINE
;-----
; This routine should be entered with the address of the start of the string
; in HL and the Length of it in B. ZIT prints the string, printing not obeying
; control codes in the current window.

PRINTMES: LD A,(HL)  ; Get a character
          INC HL     ; Point at the next
          PUSH BC    ; Save counter
          PUSH HL    ; Save pointer
          CALL $B9BD ; GET WR CHAR
          POP HL     ; Recover pointer
          POP BC     ; Recover counter
          DJNZ PRINTMES ; Are there any more to print
          BE         ;

```


Listing 2.

```

1 DEF FN i(h$)=CODE h$-48-7*(h
  $>"9")
2 DEF FN h(b$)=16*FN i(b$(1))+
  FN i(b$(2))
3 RESTORE 100
4 LET LI=110
5 READ ADD
6 LET C=0: READ A$,CH
7 IF a$(1)="Z" THEN PRINT "POK
  ING COMPLETE. SAVE CODE NOW!": GO
  TO 20000
8 IF LEN A$<>16 THEN PRINT "LI
  NE LENGHT WRONG: ";LI: STOP
9 FOR K=0 TO 7
10 LET B$=A$( TO 2)
11 LET A$=A$(3 TO )
12 LET B=FN H(B$)
13 POKE ADD,B
14 LET C=C+PEEK ADD
15 LET ADD=ADD+1
16 NEXT K
17 IF C<>CH THEN PRINT "CHECKSU
  M ERROR: ";LI: STOP

```

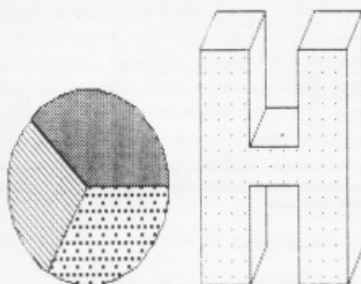
18 GO TO 6

```

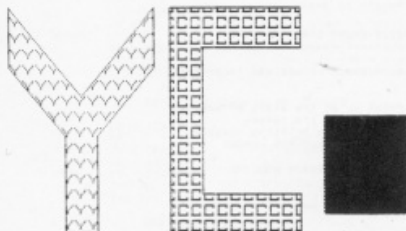
97 REM *****
  * PLACE START ADDRESS *
  * AT LINE 100 FOLLOWED*
  * BY DATA ENDING WITH *
  * DATA "Z",0 *
  *****
100 DATA 64800
110 DATA "F3C3CAF0D03E500C5",1322
120 DATA "3EAF9030043E01C1",689
130 DATA "C9E5CDCE22CDA22D",1287
140 DATA "E179C1C9C53EAF90",1318
150 DATA "30043E00C1C94759",668
160 DATA "480600CB21CB10CB",736
170 DATA "21CB10CB21CB10CB",910
180 DATA "21CB10CB21CB107B",830
190 DATA "CB3BCB3BCB3B1600",808
200 DATA "2A24FD1909CB23CB",806
210 DATA "23CB23C17993C601",933
220 DATA "C9477ECB2710FC38",964
230 DATA "033E00C93E01C947",601
240 DATA "3E00371F10FDB677",718
250 DATA "C9C5E5D5CD3CFDFE",1612
260 DATA "002004D1E1C1C9CD",1069

```

The routine is useful for pie charts and other graphs, or even for 3D shading effects.



Or just to emphasize a point. Or you can simply change your wallpaper



THESE TWO machine-code routines provide your 48K Spectrum with a way of filling in the screen without all the problems of attributes, i.e. colours overlapping. This is achieved by filling in the required area with a set pixel pattern, set up by the user in the first user-defined graphic.

The main dollop of machine code is in fact a common garden fill routine, this particular one by N. Dore — *Your Computer* October 1983. The program first fills in the required area in the usual way, then hatches it.

To type in the machine code, first type in listing 1. Type Run and the computer will check the data for any errors. After correcting any of these errors, save the program to tape or Micro-drive with:

SAVE "HATCH DATA"

or

SAVE "m";1;"HATCH DATA"

Now save the code with

SAVE "HATCH" CODE 58000,70

or

SAVE "m";1;"HATCH" CODE 58000,70

It is probably best to save the code on a different tape from the data programs. Next comes the fill routine. Type

CLEAR 57999

then type in listing 2 and Run it, correcting any errors. Then save it with

SAVE "FILL DATA"

or

SAVE "m";1;"FILL DATA"

The reason for saving the data programs as well as the code is that checksums do not detect all

HATCH

errors. Now save the actual code using
SAVE "FILL" CODE 64800,500

or

SAVE "m";1;"FILL" CODE 64800,500

Now the code is ready to run. Listing 3 demonstrates some of the possibilities of this routine. How to use this routine is probably best learned by studying this program but here is an example of step by step hatching.

1. Create shape to be filled on screen, making sure there are no gaps along the edges.

2. Define the first UDG (see listing 4 or manual).

3. Choose any point inside the shape and type
PLOT INVERSE 1;x,y

where x,y is the chosen point.

4. Type

RANDOMIZE USR 64800

and the area will fill with ink.

5. Type

RANDOMIZE USR 58000

and the area filled will become hatched.

6. If you don't like the pattern, then type
RANDOMIZE USR 58000

redefine the UDG and retype

RANDOMIZE USR 58000

Listing 1.

```

1 DEF FN i(h$)=CODE h$-48-7*(h
  $>"9")
2 DEF FN h(b$)=16*FN i(b$(1))+
  FN i(b$(2))
3 RESTORE 100
4 LET LI=110
5 READ ADD
6 LET C=0: READ A$,CH
7 IF a$(1)="Z" THEN PRINT "POK
  ING COMPLETE. SAVE CODE NOW!": GO
  TO 20000
8 IF LEN A$<>16 THEN PRINT "LI
  NE LENGHT WRONG: ";LI: STOP

```

```

9 FOR K=0 TO 7
10 LET B$=A$( TO 2)
11 LET A$=A$(3 TO )
12 LET B=FN H(B$)
13 POKE ADD,B
14 LET C=C+PEEK ADD
15 LET ADD=ADD+1
16 NEXT K
17 IF C<>CH THEN PRINT "CHECKSU
  M ERROR: ";LI: STOP
18 GO TO 6
97 REM *****
  * PLACE START ADDRESS *
  * AT LINE 100 FOLLOWED*

```

```

  * BY DATA ENDING WITH *
  * DATA "Z",0 *
  *****
100 DATA 58000
110 DATA "06AF1103E52A7B5C",687
120 DATA "78E607EE07C54F06",884
130 DATA "0009C1CDABE210ED",1054
140 DATA "0E00CDB5E21379C6",964
150 DATA "084F30F6C9D5E5C5",1221
160 DATA "E5CDA221A46ABE1",1127
170 DATA "4F7E471AA0B157C1",919
180 DATA "C5CDA2272C1E1D1",1347
190 DATA "C900000000000000",201
200 DATA "Z",0

```



```

270 DATA "79FDD1E1C1C9C5E5",1628
280 DATA "D5CD3CFDFE002004",1021
290 DATA "D1E1C1C9CD87FDD1",1630
300 DATA "E1C1C9C5F53EAF90",1442
310 DATA "3805E5CDDF22E1F1",1218
320 DATA "C1C92A24FD010016",748
330 DATA "3600230B78B1FE00",651
340 DATA "20F62A7D5CE5444D",911
350 DATA "0CCD27FDFE00200A",805
360 DATA "CDBBFDCDA6FD18F0",1533
370 DATA "0000E1444D0DCD27",627
380 DATA "FDFE002008CDBBFD",1192
390 DATA "CDA6FD18F03E0032",1000
400 DATA "815C2A24FD0100AF",728
410 DATA "7EFE00C479FE2379",1107
420 DATA "C608FE002001054F",577
430 DATA "3EFFB8287A18E9CD",1125
440 DATA "91FDFE00C804CD27",1100
450 DATA "FDFE00CC8DFE050C",1123
460 DATA "CD27FDFE00CC8DFE",1350
470 DATA "0D05CD27FDFE00CC",973
480 DATA "8DFE040DCD27FDFE",1163
490 DATA "00CC8DFE0CC9E511",1058
500 DATA "2000237ECB7FE1C8",948

```

```

510 DATA "E52B7ECB47E1C8E5",1326
520 DATA "197EFEFFFE1C0E5A7",1473
530 DATA "ED527EFEFFFE1C0D1",1580
540 DATA "C9CD56FEC51E00D5",1186
550 DATA "CD27FED10C1C3E08",817
560 DATA "BB20F4C1C9CD91FD",1460
570 DATA "FE01C8CDA6FDCDBB",1471
580 DATA "FD3E0132815CC93A",846
590 DATA "815CFE00CAECFE3E",1229
600 DATA "0032815C2A24FD11",619
610 DATA "FF151901FF007EFE",937
620 DATA "00C4CDFE2B79D608",1041
630 DATA "FEFF2001044F3EB0",863
640 DATA "B8281618E9CD56FE",1048
650 DATA "C51E00D5CD27FED1",1147
660 DATA "0D1C3E08BB20F4C1",767
670 DATA "C93A815CFE00CAEC",1172
680 DATA "FEC305FE2A24FD11",1056
690 DATA "00000100167EC506",352
700 DATA "08CB2730011310F9",583
710 DATA "C10B2378B1FE0020",822
720 DATA "EC424BFBC9000000",829
730 DATA "0000000000000000",0
740 DATA "Z",0

```

FILLED

A J Renton makes it easy to fill the Spectrum screen with patterns.

7. If you wish to remove all of the filled area, using

```
RANDOMIZE USR 58000
```

revert the hatch pattern to its original all filled in position, define the UDG as totally blank and type

```
RANDOMIZE USR 58000
```

Hey presto! the filled area disappears.

A final warning: before loading the fill routine, always type

```
CLEAR 57999
```

or the computer is likely to crash.

Listing 4.

```

10 REM UDG data poke
program
20
30 RESTORE 100
40 FOR k=USR "a" TO
USR "a"+7
50 READ byte
60 POKE k,byte
70 NEXT k

```

```
80 PRINT "A": REM Graphics A
```

```

100 DATA BIN 10001000
101 DATA BIN 01000100
102 DATA BIN 00100010
103 DATA BIN 00010001
104 DATA BIN 10001000
105 DATA BIN 01000100
106 DATA BIN 00100010
107 DATA BIN 00010001

```

Listing 3.

```

10 REM Hatch demo
15
20 REM by A.Renton 1985
25
30 LET poke=9000
40 LET fill=64000
50 LET hatch=50000
60 PAPER 7: INK 0: BRIGHT 0: FLASH 0:
OVER 0: INVERSE 0: CLS
70 BORDER 7
80 PRINT "The routine is useful for pi
charts and other graphs."
90 CIRCLE 50,50,50
100 PLOT 50,50: DRAW 50,0
110 PLOT 50,50: DRAW -35,35
120 PLOT 50,50: DRAW -25,-43
130 PLOT INVERSE 1:60,60: RANDOMIZE USR
fill
140 DATA 170,85,170,85,170,85,170,85: G
O SUB poke
150 RANDOMIZE USR hatch
160 PLOT INVERSE 1:40,40: RANDOMIZE USR
fill
170 DATA BIN 10001000,BIN 1000100,BIN 1
00010,BIN 10001,BIN 10001000,BIN 1000100
,BIN 100010,BIN 10001: GO SUB poke
180 RANDOMIZE USR hatch
190 PLOT INVERSE 1:60,40: RANDOMIZE USR
fill
200 DATA BIN 0,BIN 01100110,BIN 0110011
0,BIN 0,BIN 0,BIN 11000,BIN 11000,BIN 0
210 GO SUB poke: RANDOMIZE USR hatch
220 PRINT "Or even for 3D shading effec
ts."

```

```

230 PLOT 150,0: DRAW 0,50: DRAW 30,0: D
RAW 0,-50: DRAW 30,0: DRAW 0,120: DRAW -
30,0: DRAW 0,-50: DRAW -30,0: DRAW 0,50:
DRAW -30,0: DRAW 0,-120: DRAW 30,0
240 DRAW 10,20: DRAW 0,20: DRAW 0,10
250 PLOT 150,70: DRAW 10,20: DRAW 20,0:
PLOT 160,90: DRAW 0,50: DRAW -30,0: DRA
W -10,-20: DRAW 30,0: DRAW 10,20
260 PLOT 210,0: DRAW 10,20: DRAW 0,120:
DRAW -10,-20: DRAW -30,0: DRAW 10,20: D
RAW 30,0
270 PLOT INVERSE 1:131,1: RANDOMIZE USR
fill
280 DATA 0,0,0,16,0,0,0,0: GO SUB poke:
RANDOMIZE USR hatch
290 PLOT INVERSE 1:130,122: RANDOMIZE U
SR fill
300 DATA 0,255,0,255,0,255,0,255
310 GO SUB poke: RANDOMIZE USR hatch
320 PLOT INVERSE 1:190,122: RANDOMIZE U
SR fill: RANDOMIZE USR hatch
325 PLOT INVERSE 1:160,80: RANDOMIZE US
R fill: RANDOMIZE USR hatch
330 PLOT INVERSE 1:152,20: RANDOMIZE US
R fill
340 DATA BIN 11011101,BIN 1101110,BIN
110111,BIN 10111011,BIN 11011101,BIN 11
10110,BIN 110111,BIN 10111011
350 GO SUB poke: RANDOMIZE USR hatch
360 PLOT INVERSE 1:212,20: RANDOMIZE US
R fill: RANDOMIZE USR hatch
370 PLOT INVERSE 1:152,90: RANDOMIZE US
R fill: RANDOMIZE USR hatch
380 PAUSE 20: PAPER 0: INK 6: BRIGHT 1:
CLS

```

```

390 PRINT "Or just to emphasize a point
."
400 PLOT 35,0: DRAW 0,50: DRAW -35,35:
DRAW 0,30: DRAW 45,-45: DRAW 45,45: DRAW
0,-30: DRAW -35,-35: DRAW 0,-50: DRAW -
20,0
410 PLOT INVERSE 1:40,1: RANDOMIZE USR
fill
420 DATA 0,BIN 1000001,BIN 100010,BIN 1
0100,BIN 1000,BIN 1000,0,0
430 GO SUB poke: RANDOMIZE USR hatch
440 PLOT 100,0: DRAW 0,115: DRAW 80,0:
DRAW 0,-20: DRAW -60,0: DRAW 0,-75: DRAW
60,0: DRAW 0,-20: DRAW -80,0
450 PLOT 179,1: INK 4: RANDOMIZE USR fi
ll
460 DATA 0,126,66,64,64,66,126,0
470 GO SUB poke: RANDOMIZE USR hatch
480 PRINT "Or you can simply change you
r wallpaper"
490 PLOT 195,10: DRAW 50,0: DRAW 0,50:
DRAW -50,0: DRAW 0,-50
500 PLOT INVERSE 1:220,20: PAPER 5: INK
0: BRIGHT 1: RANDOMIZE USR fill
510 POKE 23676,62: FOR a=1 TO 26: POKE
23675,a*8: RANDOMIZE USR hatch: PAUSE 1:
RANDOMIZE USR hatch: IF CODE INKEY$ THE
N GO TO 520
515 NEXT a: GO TO 510
520 POKE 23676,255: POKE 23675,88
8999 STOP
9000 FOR k=USR "a" TO USR "a"+7: READ a:
POKE k,a: NEXT k
9010 RETURN

```


CBM-64 SPRITES

Nalin Sharma
with a routine
for special
effects.

RASTER INTERRUPTS are one of the most important aspects of machine-code programming on the Commodore 64. They allow such things as smooth scrolling and split screen effects, both of which I have used in previous *Your Computer* programs.

However, one of the most striking illustrations of raster interrupts is to have more than

eight sprites on the screen at once. This was hinted at in the programmers' reference guide, but there was no full explanation, and so here is a program which will display 64 sprites on your CBM-64.

The screen display of the CBM-64 is made up of 200 horizontal lines and is updated roughly every 1/60th of a second. The screen

Listing 1.

```
1 REM*****BASIC LOADER FOR 64 SPRITES*****
2 REM*****COPYRIGHT 1985 NALIN SHARMA*****
3 CM=34068:SM=5119:SUMCD=0:SPRCD=0
10 FORK=49152:TO49445
20 READB:POKEK,B:SUMCD=SUMCD+B
30 NEXT
40 IF SUMCD<>CHTHENPRINT"DATA ERROR":STOP
50 FORK=8192:TO8384
60 READA:POKEK,A:SPRCD=SPRCD+A
70 NEXT
80 IF SPRCD<>SMTHENPRINT"DATA ERROR":STOP
100 SYS49152
200 PRINT"TAB(30)"#64 SPRITES"
210 PRINTTAB(30)"(C) NALIN"
220 PRINTTAB(30)" SHARMA"
1000 DATA 169, 192, 32, 210, 255, 32
1010 DATA 199, 192, 32, 12, 192, 96
1020 DATA 120, 169, 58, 141, 20, 3
1030 DATA 169, 192, 141, 21, 3, 169
1040 DATA 0, 141, 64, 3, 169, 1
1050 DATA 141, 26, 208, 173, 17, 208
1060 DATA 41, 127, 141, 17, 208, 169
1070 DATA 49, 141, 18, 208, 169, 255
1080 DATA 141, 25, 208, 169, 0, 141
1090 DATA 14, 220, 88, 96, 174, 64
1100 DATA 3, 160, 1, 189, 1, 193
1110 DATA 153, 0, 208, 200, 200, 192
1120 DATA 17, 208, 247, 169, 129, 141
1130 DATA 25, 208, 173, 17, 208, 41
1140 DATA 127, 141, 17, 208, 238, 64
1150 DATA 3, 174, 64, 3, 224, 8
1160 DATA 208, 5, 162, 0, 142, 64
1170 DATA 3, 189, 9, 193, 141, 18
1180 DATA 208, 224, 0, 208, 88, 238
1190 DATA 65, 3, 173, 65, 3, 201
1200 DATA 7, 208, 49, 169, 0, 141
```

Listing 2.

```
10 **C0000 MULTIPLEXED SPRITES COPYRIGHT 1985 NALIN SHARMA
50 VIC = 53248
51 HRAST = VIC+17
52 RAST = VIC+18
53 IRST = VIC+25
54 ERST = VIC+26
55 XSCL = VIC+22
880 VB = 830
890 HIND = VB+1
900 RASNUM = VB+2
905 SPD = VB+3
906 SPIND = VB+4
907 SPRITESON = VIC+21
908 MSBX = VIC+16
910 BORDER = 53280
915 BACKGR = 53281
1000 !
1010 !
1020 !
1070 START LDA #147
1080 JSR #FFD2
1085 JSR SETSPRITES
1090 JSR NEWINT
1190 RTS
1216 NEWINT SET
1220 LDA #CONSTINT
1230 STA #0314
1232 LDA #CONSTINT
1234 STA #0315
1258 LDA #0
1260 STA RASNUM
1262 LDA #1
ASTER STA ERST
1263 LDA HRAST
1264 AND #127
1265 STA HRAST
1267 LDA #49
1268 STA RAST
1269 LDA #255
1270 STA IRST
1272 LDA #0
1274 STA 56334
1277 CLI
!CLEAR SCREEN
!SET UP VIC CHIP
!SET NEW INTERRUPTS
!RETURN TO BASIC
!LOW BYTE INTERRUPT POINTER
!HIGH BYTE
!NUMBER OF INTERRUPT
!ALLOW INTERRUPTS TO BE CAUSED BY R
!HIGH BIT RASTER LINE
!LOW BYTE RASTER LINE
!CLEAR RASTER LATCH
!CBM INTERRUPTS OFF
!READY TO BEGIN
```

(continued on opposite page)



```
1210 DATA 65, 3, 238, 66, 3, 173
1220 DATA 66, 3, 41, 3, 141, 66
1230 DATA 3, 174, 66, 3, 189, 33
1240 DATA 193, 141, 248, 7, 141, 249
1250 DATA 7, 141, 250, 7, 141, 251
1260 DATA 7, 141, 252, 7, 141, 253
1270 DATA 7, 141, 254, 7, 141, 255
1280 DATA 7, 32, 175, 192, 76, 49
1290 DATA 234, 162, 0, 222, 0, 208
1300 DATA 222, 0, 208, 222, 0, 208
1310 DATA 232, 232, 224, 16, 208, 241
1320 DATA 96, 184, 168, 184, 170, 184
1330 DATA 64, 169, 255, 141, 21, 208
1340 DATA 169, 0, 141, 63, 3, 141
1350 DATA 66, 3, 141, 65, 3, 141
1360 DATA 16, 208, 162, 0, 160, 0
1370 DATA 189, 17, 193, 153, 0, 208
1380 DATA 169, 128, 157, 248, 7, 189
1390 DATA 25, 193, 157, 39, 208, 200
1400 DATA 200, 232, 224, 0, 208, 232
1410 DATA 169, 1, 141, 33, 208, 169
1420 DATA 6, 141, 32, 208, 96, 51
1430 DATA 75, 53, 123, 147, 171, 195
1440 DATA 219, 40, 71, 95, 119, 143
1450 DATA 167, 191, 215, 30, 60, 90
1460 DATA 120, 150, 180, 210, 240, 0
1470 DATA 2, 4, 5, 6, 11, 9
1480 DATA 14, 130, 129, 128, 129, 0
4000 DATA 0, 24, 0, 0, 60, 0
4010 DATA 0, 60, 0, 0, 24, 0
4020 DATA 2, 15, 128, 3, 31, 224
4030 DATA 1, 190, 48, 0, 254, 96
4040 DATA 0, 14, 64, 0, 14, 0
4050 DATA 0, 14, 0, 0, 29, 0
4060 DATA 0, 59, 128, 0, 97, 128
4070 DATA 0, 96, 192, 0, 192, 124
4080 DATA 0, 192, 4, 0, 64, 0
4090 DATA 0, 64, 0, 0, 192, 0
4100 DATA 0, 0, 0, 0, 24, 0
4110 DATA 0, 0, 60, 0, 0, 60
4120 DATA 0, 0, 24, 0, 0, 12
4130 DATA 0, 0, 31, 0, 0, 31
4140 DATA 128, 0, 62, 128, 1, 238
4150 DATA 128, 0, 207, 0, 0, 14
4160 DATA 0, 0, 30, 0, 0, 30
4170 DATA 0, 0, 30, 0, 0, 51
4180 DATA 0, 0, 49, 192, 0, 48
4190 DATA 32, 0, 16, 96, 0, 16
4200 DATA 0, 0, 32, 0, 0, 0
4210 DATA 0, 0, 0, 24, 0, 0
4220 DATA 60, 0, 0, 60, 0, 0
4230 DATA 24, 0, 0, 12, 0, 0
4240 DATA 30, 0, 0, 26, 0, 0
4250 DATA 26, 0, 0, 26, 0, 0
4260 DATA 26, 0, 0, 26, 0, 0
4270 DATA 22, 0, 0, 14, 0, 0
4280 DATA 30, 0, 0, 12, 0, 0
4290 DATA 12, 0, 0, 12, 0, 0
4300 DATA 12, 0, 0, 28, 0, 0
4310 DATA 12, 0, 0, 28, 0, 0
4320 DATA 0, 24, 0, 0, 60, 0
```




is updated by an "invisible" horizontal line called a raster which runs from top to bottom of the video display.

So say, for example, you had all eight sprites at the top of the screen, you could interrupt the raster once it had drawn all eight sprites. Then you could change the Y position of all eight sprites to the bottom of the screen, so that when the raster reaches the bottom part of the screen it will draw all eight sprites again, thinking it hasn't drawn any sprites yet — see figure 1.

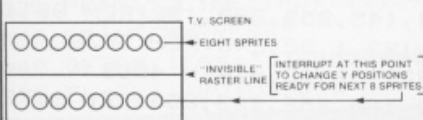
The process I have just described can be tightened up to interrupt at eight different parts of the screen, each time changing the Y position of the sprites — thereby giving 64 sprites.

Listing 1 is the Basic loader for the machine code program which shows 64 men running from right to left. Make sure you save the program before running it.

Listing 2 is the fully assembly listing of the program which is actually quite short. The complete program takes up less than 500 bytes, and that includes data for three sprites. Also, it shouldn't take much trouble to extend the program to a very simple Space Invaders program which shouldn't take up more than about 2K.

One last point is that since the program operates under interrupt control you have all the features of Basic at your disposal. It does make a very strange spectacle watching your program list upwards while 64 men are running across the screen.

Figure 1.



(listing 2 continued from opposite page)

```

1290          RTS
1300 !
1310 !
1320 !
1500 STINT    LDX RASNUM          !START INTERRUPTS
1510          LDY #1
1520          LDA SPRITEVERT,X    !SPRITE-Y-POSITION
1530 PLACEY   STA VIC,Y
1532          INY
1534          INY
1540          CPY #17
1550          BNE PLACEY
1600          LDA #129
1610          STA IRST           !CLEAR LATCH
1620          LDA HRAST
1630          AND #127
1640          STA HRAST
1641          INC RASNUM          !SET UP FOR NEXT INTERRUPT
1642          LDX RASNUM
1644          CPX #8
1646          BNE NMLN
1647          LDX #0             !RESET EVERY EIGHTH INTERRUPT
1648          STX RASNUM
1650 NMLN     LDA RASLINE,X      !NEXT RASTER LINE
1660          STA RAST
1664          CPX #0
1670          BNE RETFROMINT
1680          INC SPD            !DO ANIMATION OF ALL 64 MEN
1682          LDA SPD
1684          CMP #7
1686          BNE GOBACK
1690          LDA #0
1692          STA SPD
1700          INC SPIND
1704          LDA SPIND
1706          AND #3
1708          STA SPIND
1710          LDX SPIND
1740          LDA SPRPT,X
1750          STA 2040
1760          STA 2041
1770          STA 2042
1780          STA 2043
1790          STA 2044
1800          STA 2045
1810          STA 2046
1820          STA 2047
1822          JSR LEFT
1830 GOBACK   JMP #EA31         !SERVICE CBM INTERRUPTS EVERY EIGHTH
INTERRUPT
1870 LEFT    LDX #0
1872 LOOPLEFT DEC VIC,X
1873          DEC VIC,X
1874          DEC VIC,X
1876          INX
1877          INX
1878          CPX #16
1879          BNE LOOPLEFT
1880          RTS
2070 RETFROMINT PLA             !PROCEDURE FOR RETURNING FROM THE 0
THER 7 INTERRUPTS
2080          TAY
2090          PLA
2100          TAX
2110          PLA
2120          RTI
3000 !
3010 !
3020 !
5000 SETSPRITES LDA #255
5010          STA SPRITESON
5020          LDA #0
5022          STA HIND
5024          STA SPIND          !RESET SPEED & SPRITE INDEX OF MAN
5026          STA SPD
5030          STA MSRX
5040          LDX #0
5045          LDY #0
5050 PLACEX   LDA SPRITEHORZ,X
5060          STA VIC,Y          !SPRITE-X-POSITION
5062          LDA #128
5064          STA 2040,X          !SPRITE POINTERS
5066          LDA SPRITECOL,X
5068          STA 53287,X        !SPRITE COLOURS
5070          INY
5080          INY
5090          INX
5100          CPX #8
5110          BNE PLACEX
5200          LDA #1
5210          STA BACKGR        !WHITE SCREEN
5220          LDA #6
5230          STA BORDER       !BLUE BORDER
5500          RTS
9000 SPRITEVERT BYT 51,75,99,123,147,171,195,219
9010 RASLINE    BYT 40,71,95,119,143,167,191,215
9020 SPRITEHORZ BYT 30,60,90,120,150,180,210,240
9030 SPRITECOL  BYT 0,2,4,5,6,11,9,14
9090 SPRPT      BYT 130,129,128,129

```


ONE OF THE features that most people miss when programming in machine code is strings. This program provides the machine-code programmer with a number of sub-routines to manipulate strings. It will then be possible to write educational programs, quizzes, etc. in machine-code with very little difficulty.

Up to 64 strings are available, numbered in hex from 00 to 3F. These are stored in the area of memory under the Basic Rom — \$A000-\$BFFF. The sub-routines are situated in memory between \$C000 & \$C300. They are in a form very similar to the kernal sub-routines and are used in the way way.

The new sub-routines are:

INPUT. Address \$C1FA: This sub-routine receives information from the keyboard and stores it in the string specified by the accumulator. For example,

```
LDA # $09
JSR $C1FA
```

The information will be stored in string number 9.

PRINT. Address \$C1FD: This sub-routine will display on the screen, at the current cursor position, the contents of the string specified by the accumulator. For example,

```
LDA # $05
JSR $C1FD
```

This will print string number 5.

CLEAR. Address \$C200: This sub-routine will clear all characters from the string specified by the accumulator. For example,

```
LDA # $20
JSR $C200
```

This will clear string 32 (Hex 20).

CLEARALL. Address \$C203: This clears all 64 strings and requires no registers to be set. This sub-routine should be called before using the strings to make sure that they are ready for use. For example,

```
JSR $C203
```

MEM→STRING. Address \$C206: This sub-routine transfers information from the address specified in the X and Y registers to the string specified by the accumulator. The X register contains the least significant byte and the Y register the most significant byte. For example,

```
LDA # $01
LDX # $50
LDY # $80
JSR $C206
```

The above example transfers information from the address \$8050 to string number 1. The first 125 bytes of information are transferred unless a 0 (Zero) is encountered which indicates the end of a string.

STRING→MEM. Address \$C209: This performs the exact opposite function of the previous routine. This transfers the information in the string indicated by the accumulator to the address specified by the X and Y registers. The X register contains the LSB and the Y register the MSB. For example,

```
LDA # $01
```

```
LDX # $50
```

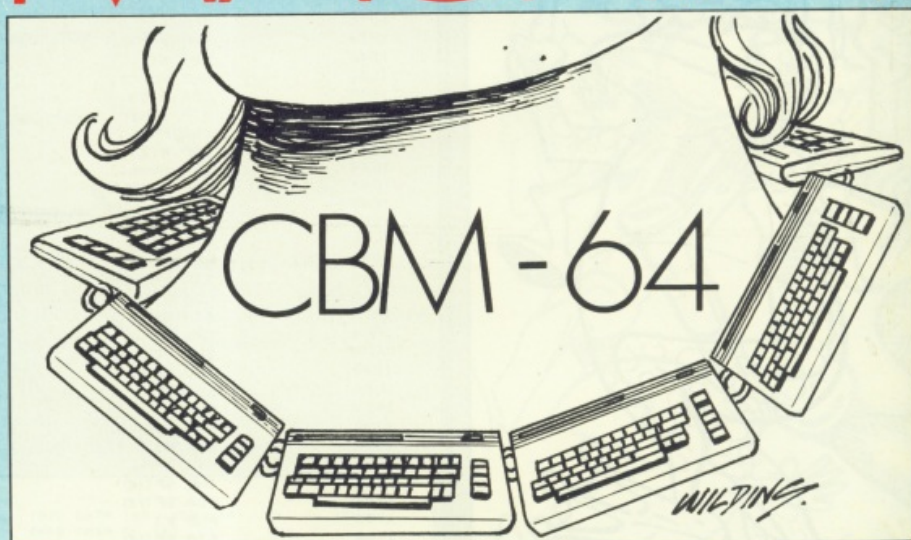
```
LDY # $80
```

```
JSR $C209
```

This transfers the information in string number 1 to address \$8050.

SWAP. Address \$C20C: This sub-routine

MACHINE



```
0 REM *****
1 REM *RUN TO TRANSFER SUB'S TO MEM*
2 REM *
3 REM * RUN50000 TO CHECK DATA *
4 REM *****
10 AD=49152
20 READA: IFA=-1 THEN END
30 POKEAD, A: AD=AD+1: GO TO 20
200 DATA 72, 169, 0, 133, 251, 169, 160, 133, 252: REM 7663
201 DATA 104, 168, 192, 0, 240, 17, 24, 165, 251: REM 6065
202 DATA 105, 128, 133, 251, 165, 252, 105, 0, 133: REM 6033
203 DATA 252, 136, 76, 11, 192, 96, 32, 227, 193: REM 6109
204 DATA 32, 0, 192, 160, 0, 32, 207, 255, 201: REM 6738
205 DATA 13, 240, 6, 145, 251, 200, 76, 41, 192: REM 6134
206 DATA 169, 0, 145, 251, 169, 13, 32, 210, 255: REM 6730
207 DATA 32, 240, 193, 96, 32, 227, 193, 32, 0: REM 4604
208 DATA 192, 169, 54, 133, 1, 160, 0, 177, 251: REM 5864
209 DATA 32, 210, 255, 200, 201, 0, 208, 246, 169: REM 7967
210 DATA 55, 133, 1, 32, 240, 193, 96, 32, 227: REM 5781
211 DATA 193, 32, 0, 192, 160, 0, 169, 0, 145: REM 4313
212 DATA 251, 200, 192, 127, 208, 249, 32, 240, 193: REM 8150
213 DATA 96, 32, 227, 193, 169, 0, 72, 32, 97: REM 4091
214 DATA 192, 104, 168, 200, 152, 201, 64, 208, 244: REM 7978
215 DATA 32, 240, 193, 96, 32, 227, 193, 134, 253: REM 7697
216 DATA 132, 254, 32, 0, 192, 160, 0, 177, 253: REM 6349
217 DATA 145, 251, 201, 0, 240, 5, 200, 192, 127: REM 6559
218 DATA 208, 243, 32, 240, 193, 96, 32, 227, 193: REM 7068
219 DATA 134, 253, 132, 254, 32, 0, 192, 160, 0: REM 4836
220 DATA 169, 54, 133, 1, 177, 251, 145, 253, 201: REM 7919
221 DATA 0, 240, 5, 200, 192, 127, 208, 243, 169: REM 7938
222 DATA 55, 133, 1, 32, 240, 193, 96, 32, 227: REM 5781
223 DATA 193, 72, 138, 32, 0, 192, 165, 251, 133: REM 6391
224 DATA 253, 165, 252, 133, 254, 104, 32, 0, 192: REM 5717
225 DATA 160, 0, 169, 54, 133, 1, 177, 251, 72: REM 5449
226 DATA 177, 253, 145, 251, 104, 145, 253, 200, 192: REM 8611
227 DATA 127, 208, 241, 169, 55, 133, 1, 32, 240: REM 5438
228 DATA 193, 96, 32, 227, 193, 72, 138, 32, 0: REM 4008
229 DATA 192, 165, 251, 133, 253, 165, 252, 133, 254: REM 9176
230 DATA 104, 32, 0, 192, 169, 54, 133, 1, 160: REM 4484
```


CODE STRINGS

Graham Barbour helps you to write educational and quiz programs.

swaps two strings around. The first string is specified by the accumulator and the second by the register. For example,

```
LDA # $08
LDX # $05
JSR $C20C
```

String number 8 will now contain the information previously stored in string number 5 and vice versa.

COMPARE. Address \$C20F: This sub-routine compares the string specified by the accumulator — we will call this A — with the

string specified by the X register — we will call this B. The result of the comparison will be returned in the accumulator. The possible results are:

\$FF this occurs if A is alphabetically less than B or if A and B are alphabetically the same but A is shorter than B.

\$01 this occurs if A is alphabetically more than B or if A and B are alphabetically the same but A is longer than B.

\$00 this occurs if the two strings are ex-

actly the same. For example,

```
LDA # $01
LDX # $09
JSR $C20F
```

This compares strings 1 and 9. The result may now be used for a branch.

SORT. Address \$C212: This sub-routine performs a bubble sort on all the strings from the string specified in the accumulator to the string specified by the X register. They are sorted into alphabetical order in a fraction of a second. For example,

```
LDA # $05
LDX # $3F
JSR $C212
```

This will sort strings 5 to 63 (Hex 3F) into alphabetical order.

SETNAM. Address \$FFBD: This is a kernel sub-routine but is needed to define the file name for the next two routines which load and save strings. The accumulator must hold the length of the name. The X and Y registers must hold the address of where the name is stored in the usual way — the X register containing the least significant byte and the Y register the most significant byte. For example,

```
LDA # 05
LDX # 00
LDY # 80
JSR $FFBD
```

This will set a five character file name starting at address \$8000.

SAVE. Address \$C215: This routine saves strings to tape or disc, and must be used in conjunction with the Setnam routine. It saves from the string indicated in the accumulator up to and including the string in the X register. The Y register must contain the device number i.e. 8 for disc and 1 for tape.

For example,

```
LDA # 10
LDX # 20
LDY # 08
JSR $C215
```

The above saves strings 16 to 32 — Hex 10 to 20 — onto disc.

LOAD. Address \$C218: This routine loads strings and is used in conjunction with the Setnam routine. The Y register must contain the device number. For example,

```
LDY # 01
JSR $C218
```

This will load the previously saved strings from tape.

When these routines are called, the registers are not destroyed except where a value is returned e.g. Compare.

Program 1 is merely the loader program which transfers the sub-routines from Data lines to memory. If you have a machine-code monitor, you can save the actual sub-routine by saving from \$C000 to \$C250. The resulting program will be much shorter than program 1.

To enter program 1, type it leaving out the Rem statements and the numbers following them. Then, to test that all has been correctly entered, Run line 50000. Line 200 will appear followed by a number. Check that this number is the same as the number following the Rem statement for the corresponding line. If correct, press any key and the next line will appear. If incorrect, press Run Stop, list the suspect line and check it. Then Run 50000 again.

```
231 DATA0,177,251,209,253,240,22,144,10:REM 6044
232 DATA169,55,133,1,32,240,193,169,1:REM 4994
233 DATA96,169,55,133,1,32,240,193,169:REM 6073
234 DATA255,96,200,201,0,208,223,169,55:REM 6507
235 DATA133,1,32,240,193,169,0,96,0:REM 3938
236 DATA0,0,0,0,0,32,227,193,141:REM 4594
237 DATA67,193,142,68,193,169,0,141,72:REM 4906
238 DATA193,173,67,193,141,69,193,170,232:REM 7430
239 DATA32,254,192,201,1,240,13,174,69:REM 5469
240 DATA193,232,138,205,68,193,208,234,76:REM 7401
241 DATA131,193,173,69,193,170,232,32,205:REM 7022
242 DATA192,169,1,141,72,193,76,102,193:REM 5700
243 DATA173,72,193,201,1,240,200,32,240:REM 6961
244 DATA193,96,32,227,193,141,69,193,169:REM 6748
245 DATA54,133,1,232,142,71,193,152,170:REM 6484
246 DATA169,1,160,1,32,186,255,173,71:REM 5739
247 DATA193,32,0,192,165,251,141,67,193:REM 6616
248 DATA165,252,141,68,193,173,69,193,32:REM 5682
249 DATA0,192,169,251,174,67,193,172,68:REM 6506
250 DATA193,32,216,255,169,55,133,1,32:REM 4327
251 DATA240,193,96,32,227,193,152,170,169:REM 7280
252 DATA1,160,1,32,186,255,169,0,32:REM 4383
253 DATA213,255,32,240,193,96,141,237,193:REM 7940
254 DATA140,239,193,142,238,193,96,0,0:REM 4785
255 DATA0,173,237,193,172,239,193,174,238:REM 9008
256 DATA193,96,76,33,192,76,67,192,76:REM 4850
257 DATA97,192,76,118,192,76,139,192,76:REM 5790
258 DATA168,192,76,205,192,76,254,192,76:REM 7014
259 DATA73,193,76,142,193,76,206,193,0:REM 5662
260 DATA0,0,0,0,0,0,0,0,0:REM 0
270 DATA-1
50000 FL=200
50010 CO=1:AV=0:FOR I=0 TO 8:READ A:IFA=-1
      THENPRINT "OK":END
50015 AV=AV+(CO*A):CO=CO+1:NEXT
50020 PRINT "LINE";FL;"...":AV
50030 PRINT "PRESS"
50040 GETA$:IFA$="" THEN50040
50060 FL=FL+1:GOTO50010
```


IF YOU typed in last month's music editor, you will have produced data files of your favourite tunes, waiting to install them into the operating system of your BBC. Once installed two entry points are available from calling programs. An activation address will cause the tune to start playing, a call to the deactivation address will stop the tune after the sound buffer has processed at most two notes.

The most obvious application for this is to accompany games. The routine is very well behaved. As it is interrupt driven the tune will proceed without interference from the game program written in Basic or machine code.

Any memory locations used outside its own defined area are preserved across the period of time the tune system is active. This allows machine code programmers not to be concerned with page zero locations reserved for this routine.

As is usual with machine-code routines an area of memory will have to be declared for it and the machine code itself assembled for this area. The amount of memory needed for the routine will depend on the length of the tune. In general, the routine itself will need in the order of 300 bytes and each note will add two bytes to the length of the code.

Once the file produced by this system has been loaded into the machine it has to be protected. Any interference with the event vector in page two has to be legitimate. The int'tune system uses this vector correctly, finishing with a jump to the original destination after the routine has completed.

Any other routines chained onto the vectors should do the same else the int'tune system will be bypassed. Likewise, the contents of the registers should be preserved over any other use of the vector. In Basic and other systems the value of Page or other system variables should be moved to protect the code once it has been installed.

For example, with disc users where Page normally resides at address Hex 1900 and the tune system is two pages long, Page should be moved to Hex 1B00 before the tune is loaded and the code assembled from 1900 onwards.

Having decided on the address where the routine is to be installed and the data file is available, the program can be run to produce the

interrupt driven routine. The system will require you to input the assembly address and the data file name. This is then followed by the sound and envelope number which the tune is to use.

The users' programs should avoid using the selected sound channel. The last input requested

is the gap between the end of the tune and the restart of the tune. This is in intervals of 1/25th of a second, and should be in the range 1 to 255.

After these values have been confirmed the code will be assembled. This will require the data file to be read in, tape users should watch the



```
10 REM INT'TUNE2
20 REM FINTAN CULWIN
30 REM APRIL 1984
40 MODE 7
50 PROC_inputs
110 FOR opt = 0 TO 2 STEP 2
120 P$=location
130 PROC_interrupt
140 PROC_checks
150 PROC_delay
160 PROC_main
170 NEXT opt
180 PROC_done
190 END
200 DEF PROC_inputs
210 REPEAT
220 OK = TRUE
230 CLS
240 FOR ytab=0 TO 1
250 PRINTTAB(12,ytab);CHR$(143);"INT'TUNE2"
260 PRINTTAB(12,ytab+2);CHR$(143);"*****"
270 NEXT ytab
280 PRINTTAB(2,6);"Assembly address"
290 PRINTTAB(2,8);"Input filename"
300 PRINTTAB(2,10);"Envelope number"
310 PRINTTAB(2,12);"Channel number"
320 PRINTTAB(2,14);"Delay (0.04 s)"
330 INPUT TAB(2,6);location$
340 location = EVAL("A"+location$)
350 INPUT TAB(2,8);filename$
360 REPEAT
370 PRINTTAB(2,10);SPC(15);
380 INPUT TAB(2,10);envelope
390 IF envelope < 0 OR envelope > 16 THEN PROC_hally
400 UNTIL envelope >= 1 AND envelope < 17
410 REPEAT
420 PRINTTAB(2,12);SPC(15);
430 INPUT TAB(2,12);channel
440 IF channel < 1 OR channel > 3 THEN PROC_hally
450 UNTIL channel >= 0 AND channel < 4
460 INPUT TAB(2,14);delay$
470 PRINTTAB(2,23);"CONFIRM (Y/N)";
480 REPEAT
490 response = GET AND 255
500 UNTIL response = 78 OR response = 89
510 IF response = 78 THEN OK = FALSE
```

```
520 UNTIL OK
530 OSBYTE = &FFF4
540 OSWORD = &FFFF
550 DIM pitches(1),durations(7)
560 FOR pitch = 0 TO 11
570 READ pitches(pitch)
580 NEXT pitch
590 FOR duration = 0 TO 7
600 READ durations(duration)
610 NEXT duration
620 ENDPROC
700 DEF PROC_done
710 PRINTTAB(2,16);"Activation address"TAB(24,16);"a
ctivate
720 PRINTTAB(2,18);"Deactivation address"TAB(24,18);
"deactivate
730 PRINTTAB(2,20);"Highest location"TAB(24,20);"lo
c
740 PRINTTAB(8,23);SPC(18);TAB(0,22)
750 CALL activate
760 ENDPROC
900 DEF PROC_hally
910 VDU?
920 IFX 15,0
930 PRINTTAB(8,22);CHR$(134);"OUT OF RANGE !!!"
940 PRINT TAB(9,23);"PRESS ANY KEY."
950 response=GET
960 PRINTTAB(2,22);SPC(20);SPC(22);
970 ENDPROC
1000 DEF PROC_interrupt
1010 I OPT opt
1020 .activate
1030LDA #220
1040STA revc
1050LDA #221
1060STA revc+1
1070LDA #main MOD 256
1080STA #220
1090LDA #main DIV 256
1100STA #221
1110JSR reset
1120JSR envdet
1130LDA #&FF
1140STA #flag
1150LDA #&DE
1160LX #4
```

```
1170JSR OSBYTE \ #FX 14,4 enable interrupts
1180RTS \ from activation routine
1190.deactivate
1200LDA revc
1210STA #220
1220LDA revc+1
1230STA #221
1240RTS \ restore original vector
\ from deactivation routine
1250
1260
1260 ENDPROC
1300 DEF PROC_main
1310 I OPT opt
1320 .main
1330
1340 PROC_checks
1350 PROC_delay
1360 PROC_soundit
1370 PROC_utility
1380 PROC_data
1390 ENDPROC
2000 DEF PROC_checks
2010 I OPT opt
2020STA sbuf+4 \ preserve A register
2030PHA
2040TVA
2050PHA
2060TVA
2070PHA
2080LDA #&70 \ stack registers
2090PHA
2100LDA #&71
2110PHA \ stack page zero locations
2120LDA sbuf+4
2130CMP #4
2140BNE exit \ test A register for interr
upt #4
2150LDA #flag
2160BNE no_delay \ branch if delay not active
2170JMP delay \ service delay
2180.no_delay
2190LDA #&80
2200LX #1251 - channel
2210JSR OSBYTE \ examine chosen sound buffe
r
2220CPX #14
2230BCC exit \ branch if sounds being pro
```




"cassette motor" led on the keyboard and start the tape with the data file when it lights up. When the code has been assembled it will demonstrate itself, and provide its activation, deactivation and high water addresses. A copy of the file can be saved with the command:

BEERSKI BEAT

Fintan Culwin
with the second
part of his music
program for the Beeb.

*SAVE filename assembly address highest point (activation address) <RETURN>

If the activation address is included in the command then the routine will self activate when it is loaded.

The routine uses the screen refresh event to time the system. When screen interrupts have been enabled, every 1/25th of a second the operating system jumps to the address contained in &220/1 with the accumulator containing the event code 4.

In order to install this system the contents of the vector have to be preserved and the address of the main part of the routine installed into the vector and screen refresh interrupts enabled. This is accomplished within the listing within PROC_install labelled activate.

In addition the envelope is defined with a call to a routine labelled envdef and the pointers set to the start of the tune with reset. The deactivation routine within the same procedure removes the sound driver by restoring the original vector. A tidier deactivation can be accomplished by disabling the interrupts with a

*FX 13.4

This may be a bad idea as other routines could be using these interrupts. Additionally the sound channel buffer could be cleared by using a

*FX 21

command.

The routine labelled main is pointed to by the new vector. It consists of three major parts.

Setting up for interrupt, testing certain conditions and leaving the interrupt in an orderly manner. To set up for interrupt the A register is first preserved in Ram, then it, all other registers and two page zero locations are stacked.

The exit routine has to tidy the stack, restoring all values to the correct locations, and passing control to the address of the original vector. This is the only exit point from the routine.

The middle part first tests the Ram copy of the A register to determine if the interrupt was a screen refresh; with a fast exit if it isn't. A branch to the delay routine takes place if the delay is currently active, this is signalled by a flag. The state of the sound channel is then sampled.

If there are less than two notes waiting to be processed the program jumps to the soundit routine to place another note in the buffer else the program exits.

In order to enter a note into the sound buffer the routine has to have some way of knowing which is the next note to be played. This is provided by a 16 bit location called counter. The contents of this location are transferred to page zero. The two values pointed to by this are then put into the sound buffer definition area, and a sound osword command executed.

The counter is then incremented by two and a check made to see if the end of tune has been reached. When the end of tune is met the counter is reset and the delay flag enabled.

```

cessed
2240JMP soundit      \ put one note in buffer
2250EXIT
2260PLA
2270STA &71
2280PLA
2290STA &70
2300PLA
2310TAY
2320PLA
2330TAX
2340PLA
2350JMP (revect)
2360J
2370ENDP
2380DEF PROC_delay
2390OPT opt
2400INC deicount
2410LDA deicount
2420CMP deitarget
2430BNE dundel
2440J
2450LDA &FF
2460STA flag
2470JMP reset
2480J
2490JMP exit
2500J
2510ENDP
2520DEF PROC_soundit
2530OPT opt
2540LDA counter
2550STA &70
2560LDA counter+1
2570STA &71
2580LDA &0
2590STA &701,Y
2600STA sbuff+4
2610J
2620LDA &701,Y
2630STA sbuff+8
2640J
2650LDA &701,Y
2660STA sbuff+8
2670J
2680LDA &701,Y
2690STA sbuff+8
2700J
2710LDA &701,Y
2720STA sbuff+8
2730J
2740LDA &701,Y
2750STA sbuff+8
2760J
2770LDA &701,Y
2780STA sbuff+8
2790J
2800LDA &701,Y
2810STA sbuff+8
2820J
2830LDA &701,Y
2840STA sbuff+8
2850J
2860LDA &701,Y
2870STA sbuff+8
2880J
2890LDA &701,Y
2900STA sbuff+8
2910J
2920LDA &701,Y
2930STA sbuff+8
2940J
2950LDA &701,Y
2960STA sbuff+8
2970J
2980LDA &701,Y
2990STA sbuff+8
3000J
3010LDA &701,Y
3020STA sbuff+8
3030J
3040LDA &701,Y
3050STA sbuff+8
3060J
3070LDA &701,Y
3080STA sbuff+8
3090J
3100LDA &701,Y
3110STA sbuff+8
3120J
3130LDA &701,Y
3140STA sbuff+8
3150J
3160LDA &701,Y
3170STA sbuff+8
3180J
3190LDA &701,Y
3200STA sbuff+8
3210J
3220LDA &701,Y
3230STA sbuff+8
3240J
3250LDA &701,Y
3260STA sbuff+8
3270J
3280LDA &701,Y
3290STA sbuff+8
3300J
3310LDA &701,Y
3320STA sbuff+8
3330J
3340LDA &701,Y
3350STA sbuff+8
3360J
3370LDA &701,Y
3380STA sbuff+8
3390J
3400LDA &701,Y
3410STA sbuff+8
3420J
3430LDA &701,Y
3440STA sbuff+8
3450J
3460LDA &701,Y
3470STA sbuff+8
3480J
3490LDA &701,Y
3500STA sbuff+8
3510J
3520LDA &701,Y
3530STA sbuff+8
3540J
3550LDA &701,Y
3560STA sbuff+8
3570J
3580LDA &701,Y
3590STA sbuff+8
3600J
3610LDA &701,Y
3620STA sbuff+8
3630J
3640LDA &701,Y
3650STA sbuff+8
3660J
3670LDA &701,Y
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"These are even crazier than I am, Folks!"



**This month's n
MicroGamer n
zany program r**

"My two bijoux choice-ettes"

1. Frankie goes to Hollywood
by Ocean.

A fab game featuring the intergalactic mega hunks themselves.

2. Mad Doctor
by Creative Sparks.
Fiendishly clever!
A game crammed with gunk and gore (and other naughty bits).

"My pick of the Arcade and Adventure:"

The way of the
exploding fist

by Melbourne House
Martial arts for two combatants, involving 18 manoeuvres such as kicks, feints, and blocks. By outwitting opponents, and gaining complete control over your body, you can change from a cuddly kitten into a Tenth Dan.
Spectrum 48K, Amstrad, Commodore 64.

£9.95

THORN EMI Computer Software

International Micro Software Division

REPTON

by Superior Software

The object is to retrieve diamonds from an underground cave system, using maps and passwords. But look out! Ferocious reptiles are lurking just around the corner. (Yuk!)

BBC Electron.

£9.95



by Virgin

The player, alias Rockin' Rodney delivers demos to his record company. But first he must test their danceability by blasting the people of Funky Town to their feet. Stupendously fab soundtrack includes Baker Street and Electric Avenue.

Commodore 64

£8.95

**mystery
er
m
makes his own
review...**

QUACKSHOT

by Creative Sparks

A mad survival chase game, with the player as night watchman in a toy factory, pursued by crazed clockwork ducks. (I know the feeling).

Spectrum 48K

£2.50

DESERT BURNER

by Creative Sparks

Desert Burner is a powerful road bike capable of megasonic speeds. The rider has to deliver crucial weapon plans, but there are enemies attacking and traps to evade. Skilful, huh?

Spectrum 48K

£2.50

A VIEW TO A KILL

by Domark

The name is Bond, James Bond. The game is to tear through the 3D streets of Paris, escape from a raging inferno, then save the world from a ghastly time bomb (and the Duran Duran soundtrack!)

Commodore 64

Spectrum 48K

£10.99

MAD DOCTOR

by Creative Sparks

As Mad Doctor, in this blood-curdlingly evil game, the player must create new life out of freshly killed body parts. If he arouses the villagers' suspicions, they'll kill him. A light touch on the scalpel is required.

Commodore 64

£8.95

SHADOW/FIRE

by Beyond

The player has a 100 minutes of real time to rescue Ambassador Kryxix held captive by the horrible General Zoff. All commands are issued through picture symbols to enable the game to be played at a truly intergalactic pace.

Commodore 64

Spectrum 48K

£9.95



THE ADVENTURE by Tynesoft

A whacky chase game based on the popular TV pensioner. Put on your kilt and your lavender water, wave your walking stick and zap the evil Scunner Campbell before he blames the world to bits.

Commodore 64 Commodore 16

Spectrum 48K

£9.95



by Gargoyle

Cuchulainn, the hero, is trying to free a companion imprisoned in the corrupt city of Dun Daragh. But first he must take part in hundreds of minor adventures. A game for brilliant warped minds.

Spectrum 48K

£9.95

FRANKIE

by Ocean

A perilous journey to the centre of the pleasuredome with those whacky Frankie boys. Plus a unique live recording of Relax.

Commodore 64

Spectrum 48K

£9.95

*Something for
zappers everywhere:*

JUMP JET



by Anirog

A sophisticated combat and flight simulator, requiring a strong nerve, and a head free of blancmange. The mission – to seek and destroy in ever-deteriorating weather.

Commodore 64

£9.95

*"Things for sporty
hunks to play:"*

Graham Gooch's

TEST CRICKET

from Audiogenic

Superb sports simulation, with lots of

googlies, maidens, and silly mid-offs. It's just like real cricket, except that, with you in control, England may even win the Ashes!

Commodore 64

£9.95

*"Something to
de-scramble
your brain with:"*



by Database

Comprising a word processor – for writing letters and reports, a database – for storing addresses, and a spreadsheet – for storing complicated numbers. Pretty clever stuff, huh?

BBC Micro

£5.95

*"A bonus for all
you 'Stuff' fans:"*

DON'T BUY THIS

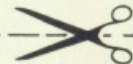
by Firebird

A cringe-along compilation containing the five most forgettable games of all times – about as exciting as watching grass grow. (Recommended for insomniacs).

Spectrum 48K

£2.50

Win



**UNMASK THIS MONTH'S
MYSTERY MICROGAMER
AND WIN A 2-PACK
PROGRAM PRIZE – TEN
PRIZES MUST BE WON.**



If you know the answer, send this coupon in to us, not later than 30 July 1985. The first ten correct entries drawn will each receive FRANKIE GOES TO HOLLYWOOD and MAD DOCTOR.

I say the Mystery Microgamer is:

Send me your latest full list of software programs.

Name

Machine

Address

Postcode

SEND TO: Thorn EMI Computer Software, Mystery Microgamer Competition, Thomson House, 296 Farnborough Road, Farnborough, Hants. GU14 7NU

YC1

All games featured above are available from Laskys, WH Smith and other good software stores.

COMMODORE 64, BBC AND SPECTRUM

Figure 1. CBM-64.

```

5 REM HEX LOADER FOR CBM 64 FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT I:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA":T=6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS":A
120 IF (ACSA) OR (ADLA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT"PRINT ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA:INPUTD#
160 IF D#="END" THEN GOTO 900
170 IF LEN(D#)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B#MID$(D#,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280

```

```

210 POKE A+B,D:T=T+D:NEXT
220 B#MID$(D#,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+B:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B,D)C#""
290 B=B+NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B#)
310 C#MID$(B#,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C#)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H#="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A:" ":T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT": "
550 V=INT(T/256):PRINT MID$(H#,V+1,1)
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H#,INT(X/16)+1,1)
610 PRINT MID$(H#,1+(XAND15),1):RETURN

```

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

```

800 SYS 680:C#CHR$(34)
810 PRINT"PRINT" TO RELOAD CODE : "
815 PRINT"PRINT" LOAD"C#DOWNLOAD":
820 PRINTC#,1,1 (RETURN)
825 PRINT"PRINT" THEN TYPE NEW":
830 PRINT (RETURN)
835 PRINT"PRINT"TO RUN THE PROGRAM":
840 PRINT" SYS 51000 (RETURN)"
900 PRINT"PRINT"PRINT"1 ENTER DATA"
910 PRINT"PRINT"2 PRINT DATA"
920 PRINT"PRINT"3 SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800

```

Figure 2. CBM-64.

```

51000 ? A9068D21D08D20D0=3E2
51008 ? A90F8D8602A90E20=2E4
51016 ? D2FFA9008D150A9=4D0
51024 ? FF8D8A02B8E92CE=510
51032 ? 20C8C920C7B20F8=4D5
51040 ? CADD80CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C58C7A914=410
51064 ? 20D2FF202FCBD0D8=52E
51072 ? 203FC8A920202D2F=461
51080 ? 4C9C94C4AC82063=411
51088 ? CC2022CDA95B85F=4F1
51096 ? A9C83FE2028CDA9=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90885BA20=4B9
51136 ? 20D2FFA90885BA20=4B9
51144 ? B085FAD9C8D85FA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC9848A0048C83=44C
51168 ? CE20D8C968A82025=40C
51176 ? CD2095CC9848A006=4C5
51184 ? 8083CE20D8C9ADA7=5E3
51192 ? CE85FAD9C8D85FA0=6A0
51200 ? 68A82060CBA90185=38A
51208 ? B885B998A293A0CE=539
51216 ? 20B0DFFA9C9EAC8A=567
51224 ? CEEB0D01C2025CD=479
51232 ? A9F820D0FF20F1C8=597
51240 ? 6020D9CC90D000B=3FE
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20202FF60A9=4E7
51264 ? 0D2029C8A90D20D2=30F
51272 ? FF602063CC8A000A9=43F
51280 ? FF993CEC8D0FA20=5FB
51288 ? D2C8B90F2020CB80=5D0
51296 ? FB8D72CEA0008C7C=4E0
51304 ? CE8C7DCE202CCAD4D4
51312 ? 72CE29F0C980D0E4=506
51320 ? 20D2CB00DA9973CE=599
51328 ? C8202ECC0009D0F0=4EB
51336 ? A000AD76CE2980D0=492
51344 ? 0FA52B85F018A52C=3D8
51352 ? 6D75CE85FC4C8AC8=507
51360 ? AD78CE85FAD79CE=607
51368 ? 85FC20202FFC820D=607
51376 ? D9CC20202FFC820D=607
51384 ? A9202ECC010D0EA=528
51392 ? 202ECC010D0EA=528
51400 ? 202ECC010D0EA=528
51408 ? CD7CECF00B89520=503
51416 ? D2FF2030C84C57C8=52C
51424 ? 20D2CB00DA9973CE=599
51432 ? D0EAD75CE8D7DCE=65D
51440 ? CED00E20C80A991=4EE
51448 ? 20D2FF47CE94C57=51F
51456 ? C8A0008C70CE8C7D=447
51464 ? CE20D2CB00DA9973CE=599
51472 ? 202ECC010D0EA=528
51480 ? F020D2CB00DA9973CE=599
51488 ? CEF008A95820D2FF=4D8
51496 ? 4C57C820D2CB00CE=40E
51504 ? CD7DCECF0034C23C9=473
51512 ? 20ACC82030C8AD75=409
51520 ? CEA8A9009993CEAD=506
51528 ? 84CE9C82D02520BC=436
51536 ? CBA9C820F3CBA955=568
51544 ? 2016CD9A95020F3C=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C58C7A9552016CD=3D0
51576 ? 20F1C84C63C9AC77=4EF
51584 ? CE20D2CB00DA9973CE=599
51592 ? D2C820D2CB00DA9973CE=599
51600 ? 4C5CC8A52B85FBA5=4F5
51608 ? 2C85FCA00081FB99=52A
51616 ? 2020C8B1FB8523F0=4C6
51624 ? 0BA52285FBA52385=447
51632 ? FC4C9BC918A5F869=57D
51640 ? 0285D2852F8531A5=37B
51648 ? FC6900852F8531A5=37B
51656 ? 32602063CC8A000A9=43F
51664 ? 84CEA9008D02D0E4=506
51672 ? 8E81CE8C82CE20C0=533
51680 ? A9098DCDCE202FC8=47A
51688 ? C914F016C9D0F051=4E2
51696 ? C924D01920D2FF60=544
51704 ? 3CECE84CE5C9E000=64B
51712 ? D0E3E000F0D20D2=554
51720 ? FFC4C9BC918A5F86=57D
51728 ? D4C93A901548AD03=454
51736 ? CEC924F00468A4C7=480
51744 ? C968C94190BFC947=48A
51752 ? C968C94190BFC947=48A
51760 ? B0B820D2FF38E930=4D5
51768 ? F0A89D02E907E005=36A
51776 ? C9E000F0A0E001D0=52A
51784 ? 07ADC3CE924F095=4FF
51792 ? A92020D2FFA90320=3A6
51800 ? C3CEA2008ECFC8E=544
51808 ? D0CE8ED1CE8ED2CE=659
51816 ? ADC3CE924F095=4FF
51824 ? 0F8DCDCE8BDC3CE=552
51832 ? C9FFF01D20C8A0A0=58D
51840 ? 34188DC3CE6DC8A0A=58D
51848 ? 8D0CFCEA9008D0CE=524
51856 ? 8D0CFCEA9008D0CE=524
51864 ? CADDCEFC8C8C99=660
51872 ? A3CE8ADD0C99A3=660
51880 ? CEC8188C83CE8C82=561
51888 ? CEAE81CE602025CD=4E0
51896 ? A200B041CE921F0=500
51904 ? 0720D2FF684C8A=570
51912 ? 4CDECC9ADCCE8DCE=65E
51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFC8DCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B008CECECE8DD0CE=625
51960 ? 2063CC9A0F8D0602=414
51968 ? A95185FAD9C8D85F=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3D0
51992 ? CC2022CD20A9CC20=3A6
52000 ? 95CC2022CD20A9CC20=3A6
52008 ? 202FCB20D2FF608E=421
52016 ? 81CE8C82CE2069CC=4B0
52024 ? 202FCB20D2FF608E=421
52032 ? 20ECC2020A9CC20=3A6
52040 ? D00D20FDC0CC931F0=4F0
52048 ? 062001CC4C35C8D0=314
52056 ? 80CEAE81CEAC82CE=597
52064 ? 2022CD9A95020F3C=432
52072 ? CE85FAD9C8D85F=575
52080 ? 2025CD9A95020F3C=432
52088 ? 93CE88D0FAD93CE=619
52096 ? 202FCB20D2FF608E=421
52104 ? 00F0F520D2FF608E=421
52112 ? 209993CE4C80CB9C=50A
52120 ? 0D0F00B20D2FF608E=421
52128 ? CECB0C01D0D0A920=579
52136 ? 20D2FF60A92020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A92020D2=4B4
52160 ? DE9A128D000E60A9=4CD
52168 ? 338D00DEA9528D00=40E
52176 ? DE60A996188D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? C20ECC0C82CE2004=4D4
52200 ? 02386020FDCB80EE=509
52208 ? 60A9F8A8C82CEA820=597
52216 ? 04CC88D0FAC82CE=616
52224 ? 602004CC8A2A8CA=3EE
52232 ? D0FDA02069CC6020=454
52240 ? 25CDA90220A8CC20=364
52248 ? 95CCAD8ECC20D2FF=573
52256 ? A92020D2FFA90320=3A6
52264 ? ABCC20D8C9604D7D=48A
52272 ? CE8D7DCEA208AD7D=4A4
52280 ? CE2A9010AD7DCE49=411
52288 ? 088D7DCEAD7DCE49=411
52296 ? 108D7DCEAD7DCE49=411
52304 ? 7DCEAD7DCE20CE=3D5
52312 ? A9009900D4C8C018=40E
52320 ? 60F68A99320D2FF=5B3
52328 ? 6048A9A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? A5A9A44C80CC9A20=42B
52352 ? 20D2FFA9008D0A9=51C
52360 ? 9D20D2FF688D468=53F
52368 ? 6020D2FFC8B1FD9=620
52376 ? 21D0F6C8602025CD=4B9
52384 ? A90C20A8CC2095CC=46D
52392 ? 60A9058E81CEAA9=4E5
52400 ? 2020D2FFC8D0FA8E=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9190=5C4
52432 ? 07C9D8B00338E960=4AF
52440 ? 60C941900EC95B80=494
52448 ? 08C9619006C97B80=49C
52456 ? 02492060488A4808=2D5
52464 ? 20E1FFD0034C59C8=533
52472 ? 2868A86860AD00DE=485
52480 ? A9016A900A90060=250
52488 ? A9016A900A90060=250
52496 ? 49026A86A680200C=223
52504 ? CD80F8D01DE20EC=508
52512 ? CC602025CD2028CD=373
52520 ? A90C20A8CC2095CC=46D
52528 ? F06A86A6A680200C=223
52536 ? 3A300318690720D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 3004318690720D2=21F
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D45E4552131=203
52576 ? 2020D254552131=203
52584 ? 5645213520454545=1FE
52592 ? 58495420544F2042=28A
52600 ? 4153494321362020=22F
52608 ? 205341564524259=28A
52616 ? 544553212820553=285
52624 ? 452012205345455=20C
52632 ? 209220544F20545=20C
52640 ? 5455524E20544F20=2CC
52648 ? D45455220544F20=2CC
52656 ? 4E54455220544F20=2CC
52664 ? 42455220544F20=2CC
52672 ? 41444524553320=2E6
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=500
52696 ? 9D9D9D9D9D9D9D9D=500
52704 ? 9D9D9D9D9D9D9D9D=500
52712 ? 2421535441525420=2E3
52720 ? 41444524553320=2E3
52728 ? 464F522041524541=220
52736 ? 202146494E414C20=1D3
52744 ? 41444524553320=2E3
52752 ? 464F522041524541=220
52760 ? 202150524F75241=22C
52768 ? 4D205449544C4520=23E
52776 ? 284D415820313620=1E5
52784 ? 43484152275320=219
52792 ? 21124E4F54205641=21B
52800 ? 4C494422C205452=2A5
52808 ? 3A20214449534320=216
52816 ? 4F52205441504520=26B
52824 ? 2820442F54202920=1E0
52832 ? 3F21000000000000=0D0

```


TELSoft



A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemund 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR

60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select

Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HMEM=64000
20 CLS:PRINT
30 INPUT "START ADDRESS (Hex) :";A$
40 A=VAL("&"+A$)
50 IF A<64000 THEN 200
60 IF A<24000 OR A>64000 THEN 200
```

Figure 2. BBC.

```
6000 1A9C80FAE20120F4,4C6
6001 1FF20616C284B6DC9,38A
6002 131F00C934F8E9C9,4CB
6003 135F00A4C0C6A4C47,208
6004 16A99C20E3FFA9E8,4FD
6005 1A00A2F220F4FFA9,4FD
6006 10A220F4FFA9E8,4CB
6007 10A220F4FFA9E8,4CB
6008 10A220F4FFA9E8,4CB
6009 10A220F4FFA9E8,4CB
6010 10A220F4FFA9E8,4CB
6011 10A220F4FFA9E8,4CB
6012 10A220F4FFA9E8,4CB
6013 10A220F4FFA9E8,4CB
6014 10A220F4FFA9E8,4CB
6015 10A220F4FFA9E8,4CB
6016 10A220F4FFA9E8,4CB
6017 10A220F4FFA9E8,4CB
6018 10A220F4FFA9E8,4CB
6019 10A220F4FFA9E8,4CB
6020 10A220F4FFA9E8,4CB
```

```
70 PRINT "A" "1"
80 INPUT "B";B$;C$
90 IF LEN(B$)<16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X= MID$(B$,2*N+1,1); GOSUB 300
130 IF E=1 THEN 260
140 X= MID$(B$,2*N+2,1); GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+MID$(B$,2*N+1,2))
170 "A=B+A+1";T=T+B
180 NEXT
190 FOR M=1 TO LEN(C$)
200 X=MID$(C$,M,1);GOSUB 300
210 IF E=1 THEN A=A-1; GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR!"
250 A=A-B;GOTO 50
260 PRINT "TYPING ERROR!"
270 A=B+(A DIV B);GOTO 50
280 A=B*(A MOD B);GOTO 50
290 SAVE "DOWNLOAD" &A$ &B$
295 END
300 E=0;IF ASC(X)<48 THEN E=1;RETURN
310 IF ASC(X)<58 THEN E=1;RETURN
320 IF ASC(X)<65 THEN E=1;RETURN
330 IF ASC(X)>71 THEN E=1
340 RETURN
```

```
6000 109C80FAE20120F4,4C6
6001 1FF20616C284B6DC9,38A
6002 131F00C934F8E9C9,4CB
6003 135F00A4C0C6A4C47,208
6004 16A99C20E3FFA9E8,4FD
6005 1A00A2F220F4FFA9,4FD
6006 10A220F4FFA9E8,4CB
6007 10A220F4FFA9E8,4CB
6008 10A220F4FFA9E8,4CB
6009 10A220F4FFA9E8,4CB
6010 10A220F4FFA9E8,4CB
6011 10A220F4FFA9E8,4CB
6012 10A220F4FFA9E8,4CB
6013 10A220F4FFA9E8,4CB
6014 10A220F4FFA9E8,4CB
6015 10A220F4FFA9E8,4CB
6016 10A220F4FFA9E8,4CB
6017 10A220F4FFA9E8,4CB
6018 10A220F4FFA9E8,4CB
6019 10A220F4FFA9E8,4CB
6020 10A220F4FFA9E8,4CB
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k
10 REM HEX CODE LOADER
15 CLEAR 50000
20 POKE 23450,8: CLS:PRINT
30 INPUT "Start Address :";A$
40 IF A<1135 THEN GO TO 200
50 IF A<60000 THEN GO TO 200
60 PRINT "A"
```

Figure 2. Spectrum.

```
60000 1CD15EDC387ECCD15,4C7
60001 150CD346CCD66DCD,38A
60002 150CD346CCD66DCD,38A
60003 150CD346CCD66DCD,38A
60004 150CD346CCD66DCD,38A
60005 150CD346CCD66DCD,38A
60006 150CD346CCD66DCD,38A
60007 150CD346CCD66DCD,38A
60008 150CD346CCD66DCD,38A
60009 150CD346CCD66DCD,38A
60010 150CD346CCD66DCD,38A
```

```
80 INPUT "B";B$;C$
85 IF B$="END" THEN GO TO 200
90 IF LEN(B$)<16 THEN GO TO 200
100 LET T=256*INT (A/256)
110 FOR N=0 TO 7
120 LET X=MID$(B$,2*N+1,1)
130 GOSUB 300
140 LET X=MID$(B$,2*N+2,1)
150 GOSUB 300
160 LET B= EVAL("&"+MID$(B$,2*N+1,2))
170 "A=B+A+1";T=T+B
180 NEXT
190 FOR M=1 TO LEN(C$)
200 LET X=MID$(C$,M,1)
210 GOSUB 300
220 IF E=1 THEN A=A-1; GOTO 260
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR!"
250 A=A-B;GOTO 50
260 PRINT "TYPING ERROR!"
270 A=B+(A DIV B);GOTO 50
280 A=B*(A MOD B);GOTO 50
290 SAVE "DOWNLOAD" &A$ &B$
295 END
300 E=0;IF ASC(X)<48 THEN E=1;RETURN
310 IF ASC(X)<58 THEN E=1;RETURN
320 IF ASC(X)<65 THEN E=1;RETURN
330 IF ASC(X)>71 THEN E=1
340 RETURN
```

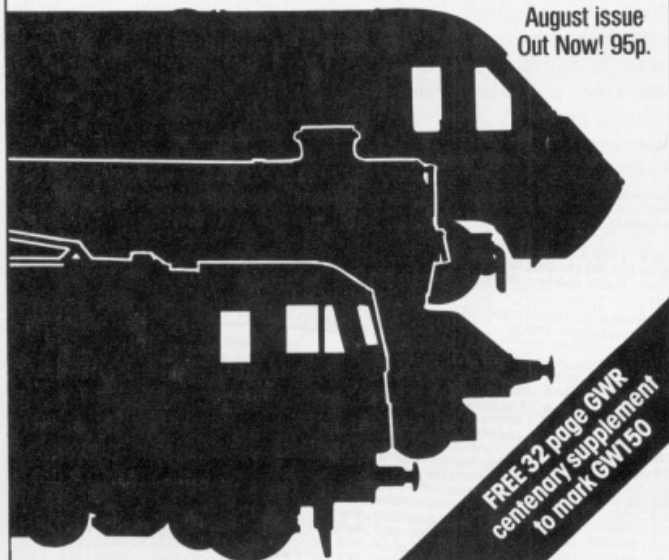
```
60000 1CD15EDC387ECCD15,4C7
60001 150CD346CCD66DCD,38A
60002 150CD346CCD66DCD,38A
60003 150CD346CCD66DCD,38A
60004 150CD346CCD66DCD,38A
60005 150CD346CCD66DCD,38A
60006 150CD346CCD66DCD,38A
60007 150CD346CCD66DCD,38A
60008 150CD346CCD66DCD,38A
60009 150CD346CCD66DCD,38A
60010 150CD346CCD66DCD,38A
```


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The book also includes a fully annotated, complete arcade game listing.

Creating Arcade Games on the Commodore 64 by Robert Woolford (ISBN 0 907563 75 9) is £7.95, and is available at most book and computer stores, or directly from the publishers, post free:

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Interface

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I could do that...

"Poor is the pupil who does not surpass his master" Leonardo da Vinci is supposed to have said. Taking this principle to heart, for this month's £15 competition we would like you to outdo John Ransley by improving on the demonstration program he gives elsewhere in First Bytes.

In other words we want you to write your own Snake program making it — if possible — faster and more elaborate than John Ransley's, but not longer. It can be for any machine and can contain Peeks, Pokes, user defined graphics, print statements or whatever takes your fancy.

Despite the simplicity of the task we set for June's competition the response was disappointing. We were looking for an animation program based only on print statements and without any user-defined graphics.

From the few entries received we awarded the prize to Giorgio Berardi, Via Buonarroti 60, 47100 Forlì, Italy. His program runs on the Spectrum but could easily be converted for other machines.

```

5 LET a$="I COULD DO THAT"
10 LET x=10: LET y=(32-LEN a$)
20 LET b$=""
30 FOR n=30 TO y STEP -1
40 PRINT AT x,n;a$(p)+""
40 NEXT n
50 LET y=y+1: LET p=p+1
60 IF p<(LEN a$+1) THEN GO TO 30
70 PAUSE 50: LET y=(32-LEN a$)
80 FOR x=11 TO 20
90 PRINT AT x,y;a$(p)+""
100 NEXT x
110 PAUSE 50: LET p=p+1
120 FOR n=10 TO 1 STEP -1
130 PRINT AT n,y;a$(p):AT n+1,y
140 NEXT n
150 PRINT AT n+1,y;" "
160 LET y=y+1: LET p=p+1
170 IF p<(LEN a$+1) THEN GO TO 130
180 STOP

```

BEGINNERS

First bytes

Starting out in home computing? First Bytes is for you. Just write to

Your Computer with any hardware or software problems, no matter how small or simple.

A bluffers' guide to micros

"TIS PLEASANT, through the loopholes of retreat, to peep at such a world; to see the stir of the great Babel, and not feel the crowd". Whatever William Cowper was writing about in his 18th-century poem *The Task*, it might just as well have been computer languages, because this is something that micro users talk about a lot, but never actually do. It is thus an area wide open to bluffing.

Everybody uses Basic, which is supposed to stand for Basic All-purpose Symbolic Instruction Code. Worldly-wise micro cynics always grin and maintain they have it on personal authority from John Kemeny that he invented what the acronym stood for a long time after he invented the acronym — probably during some after dinner game played by academics at Dartmouth College, USA, back in 1960. Basic programs are just long lists of lines made up of two things: a line number and a series of statements.

Six sorts of statement go into Basic programs: assignment statements which set up a variable or manipulate it in some way, input/output statements which deal with the peripherals, like the screen or the printer, control structures like the famous Goto If or Gosub statements, plus statements related to graphics and sound, error detection — and, just in case I've forgotten something, miscellaneous. Languages which everybody talks about but never use include — Forth, Pascal, Lisp, Prolog, Logo. These are just the ones available in some form on microcomputers. More of this later, since the dedicated micro-bluffer must first be made aware of the dangers inherent in the break-out of a Basic skirmish, because this is the language everyone uses.

Just as God confounded the speech of men when they attempted to build the Tower of Babel to reach heaven, so Basic has been fractured into many dialects as a divine punishment for giving computing power to the little man instead of leaving it safely in the hands of big business, academic researchers and military intelligence.



Obedient to the principle of divide and rule, small knots of micro-hackers can be found arguing heatedly in their high-level human languages about the advantages of their Basic.

When Kemeny and Kurtz, the famous Dartmouth College double act, invented Basic routines, they revolutionised computer programming by doing away with having to assemble programs on punched cards, giving them to the machine and leaving it to extrapolate wildly from your initial error-strewn program until producing results of no use to anyone.

Now, instead of leaving the machine to single-handedly improvise from the original, or "batch program", you could join in and actually interfere with the program while it was going wrong. This is known as "real time" or "interactive" programming, and since the purpose of Basic was to allow non-programmers to program, you can imagine that the capacity for error must have been greatly enhanced.

There are several "standard" Basics. Computer languages spread rather like diseases, so that the dominant form is usually the most virulent, communicable or "portable" language, but not necessarily the most pleasant to experience. Microsoft Basic is thus generally regarded as a standard Basic because it is the most widely used, rather as engineers still end up using Fortran rather than Pascal, due to the company not wanting to spend any more money on systems development.

The American National Standards Institute spent 10 years developing a standard Basic, so it could carry out the natural function of such organisations, i.e., go around telling everyone that the standard universally adopted in the meantime was all wrong. It allows long

variable names and is very structured; like most extended Basics it starts to look like another language — in this case, Pascal, a very structured programming language developed by Swiss professor, Niklaus Wirth. About the only home computer you might encounter this admittedly powerful language on, is the Enterprise — its IS-Basic is closely related to the ANSI version.

Another Basic which owes a lot to Pascal is BBC Basic. BBC owners are quietly smug about the speed of their Basic. Detractors will point out that it is highly non-standard. The BBC owner will take this as a compliment. His language has powerful commands like Repeat-Until, which you don't find on your common or garden Spectrum. People who say that BBC Basic's VDU commands aren't very elegant had better make sure they aren't struggling with an overheated power pack, aerial and cassette leads, whilst frantically looking for a mains adaptor, when they say this. BBC owners are patriotic, cool. Not for them the troglodyte scabbling of the cheapskate Spectrum owner.

The gruff, bluff Commodore 64 owner is liable to be a little spiky if the topic of Basic comes up. The strength of his machine is hardware; its language is Neanderthal. It uses the raw, ungraded old PET Basic of Commodore's early machines. The sprite graphics are a considerable improvement on the Vic-20, but a real micro-snob will remember to sneer at the fact you have to access them with Poke statements.

An Atari user would make mincemeat out of him. Both of their languages are descended from Microsoft, MBasic for

(continued on page 89)

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(continued from page 87)

short. But until the C-16, graphics and sound commands were notably absent from Commodore Basic.

Having compared Basics, micro buffs can then bicker about the way they use it.

There is a fanatical hard core who insist that programs must be structured. Structuring a program is a way of making it less interesting. Instead of a fascinating tracery of Goto statements endlessly looping and recurring like

smoke trails at an air-display, the idea is to construct the program out of "modules".

This makes the program easy to edit and, worse, it makes it easily understandable to other programmers. If these people had their way, a bloody crusade would be waged against the Goto statement. They have misunderstood the true spirit of computing and are very dangerous men — not so much programmers as pogrommers.

Paul Bond.

Round the disc maze

SINGLE SIDED, double sided, double density, formatted, unformatted, 40 track, 80 track — these are just some of the terms used to describe discs and disc drives. Not surprisingly the newcomer often feels more than a little bewildered. So in this follow-up to May's introduction to discs we aim to set you straight on basic disc vocabulary. Most of the terms described here refer to 5¼in. discs, which are still the most popular size on home micros.

First, the drives themselves. Most of them can only handle a fixed number of disc tracks, so a 40 track drive cannot read an 80 track disc. They are also either single or double sided. Unlike the 3in. variety 5¼in. discs cannot be turned over but require a drive with two opposing read/write heads if both sides are to be used.

These considerations apart 5¼in. drives are generally not configured for specific disc operating systems and can often be interfaced to a variety of different machines. Thus Opus, Kempston and Cumana all supply interfaces which

allow BBC drives to be run on the Spectrum. You can also add a 5¼in. drive to the Amstrad disc system as a second drive.

As for the discs, most are suitable for any disc system despite the information given on their labels. Manufacturers commonly produce all 5¼in. discs as double sided and double density. The only difference between those discs which are sold for 80 track double density operation and those for single density 40 track is that the latter are subjected to less rigorous quality control.

For example discs are described as 96 TPI — tracks per inch — or 48 TPI. Although the latter are usually formatted to give 40 tracks they can generally also be used as 80 track discs.

In single density mode data is interspersed on the disc with synchronisation bits which serve to keep the timing of the disc head up to the mark. By dispensing with synchronisation bits double density systems manage to store twice as much data as single density.

BEGINNERS

first bytes



The quality of the disc itself and the sensitivity of the drive is therefore much more critical. But whether a disc system runs double or single density rests largely on the disc interface and not the drive mechanism.

Discs arrive from the manufacturer in a blank unformatted state. It is then up to the user to format the disc for a particular operating system. Formatting

determines how many tracks a disc has, how data is stored in sectors on each track, which tracks are allocated to the disc directory, and how many entries the directory can take.

The size of the directory limits the number of files — whether programs or data — that can be stored on the discs. Thus the BBC Disc Filing System gives 40 track discs a maximum of 32 files, while Commodore drives allow 144 files on 35 tracks.

Simon Beesley.

Pythonesque pokes — creating an arcade game

WHICHEVER MICRO you own and however much the makers may boast that its Basic runs faster than others, the fact is that you'll always be faced with something of a compromise when writing arcade-style games. Basic is a friendly language, but it's one that executes in a crawl.

Yet, as you can discover for yourself with a little experimentation, it is possible to shift individual characters and objects constructed from your micro's alphanumeric or graphic set around the screen with impressive speed — provided you use Print statements to do so.

Only problem is, games often require constant Peeking of different screen locations to suss out what's happening there, and combining active Print elements with frequent Peeks, and even the occasional Poke, can leave you with a program that runs slower than a Sinclair C5 on a dud torch battery.

Thankfully, though, there is a way of achieving acceptably fast screen movement using Pokes exclusively. It's just a matter of observing the golden rule of declaring as many fixed-value variables as you can right at the start of your program, so that subsequent sections of it can use this silicon shorthand as a short cut to faster execution.

If you'd like to refresh your memory as to the fundamentals of screen movement, animation and the use of Peek

and Poke, you'll find these explained in the June and July issues of *Your Computer*.

Rather than spend too much time theorising, let's get right down to keying in a program that makes good use of Peek and Poke: on the CBM-64 it's cloned from that arcade classic in which you control a centipede or snake which has to be moved around the screen gobbling objects while avoiding hazards — not least, it's own body.

```
10 PRINT "CLR SCREEN";
:P=-1:L=0:D=5
20 IF SC>HI THEN HI=SC
30 SC=0
40 S0=1601:S1=S0+1:S2=S1+1:
S3=S2+1:S4=S3+1
50 S5=S4+1:S6=S5+1:S7=S6+1:
S8=S7+1:S9=S8+1
60 PRINT "HI-SCORE"HI:FOR
D=1 TO 1500:NEXT
70 POKE S0,56:POKE S1,37:POKE
S2,37:POKE S3,37:POKE S4,37
80 POKE S5,37:POKE S6,37:POKE
S7,37:POKE S8,37:POKE S9,37
90 :
100 REM MAIN LOOP
110 PRINT "CLR SCREEN"
120 L=0
130 D=D+5
140 FOR I=1 TO D:X=INT(RND(1))
*900)+41
150 IF PEEK(1103+X)<>32 THEN
X=INT(RND(1)*900)+41:
GOTO 150
160 POKE 1103+X,90:NEXT
170 TI$="000000":GOTO 280
180 J=PEEK(56320)
```

```
190 IF J=126 THEN P=-40
200 IF J=125 THEN P=40
210 IF J=123 THEN P=-1
220 IF J=119 THEN P=1
230 S9=S8:S8=S7:S7=S6:S6=S5:
S5=S4:S4=S3:S3=S2:S2=S1:
S1=S0:S0=S0+P
240 REM CHECK COLLISION
250 IF PEEK(S0)=90 THEN SC=
SC+10:PRINT "SCORE"SC:
L=L+1:IF L=D THEN 120
260 IF PEEK(S0)=90 THEN
GOTO 280
270 IF PEEK(S0)<>32 THEN
GOTO 10
280 POKE S0,56:POKE S1,37:
POKE S9,32
290 REM SCORE/TIME UPDATE
300 PRINT "SCORE(24 SPACES)
TIME "TI$
310 IF TI$>"000060" THEN PRINT
"(CSR HOME)(8 SPACES) TIME
EXPIRED"SCORED"SC:STOP
320 GOTO 180
```

This listing will work as it is on the Commodore 64, and on other micros with just one or two changes. In line 40, the value 1601 awarded to S0 is the screen memory address that will place the snake's head — and the rest of his body will follow — near the centre of screen. The values 56 and 37 which crop up in lines 70 and 80 are the 64 screen codes for the figure 8 and percentage sign respectively.

In lines 140 and 150 you may use a different syntax to set the randomiser which peppers diamonds over the play-

field.

Lines 180 and 190 make the snake move up, down, left or right under the control of a joystick; alter as necessary. On the 64, if you don't have a joystick you can

PEEK(197)

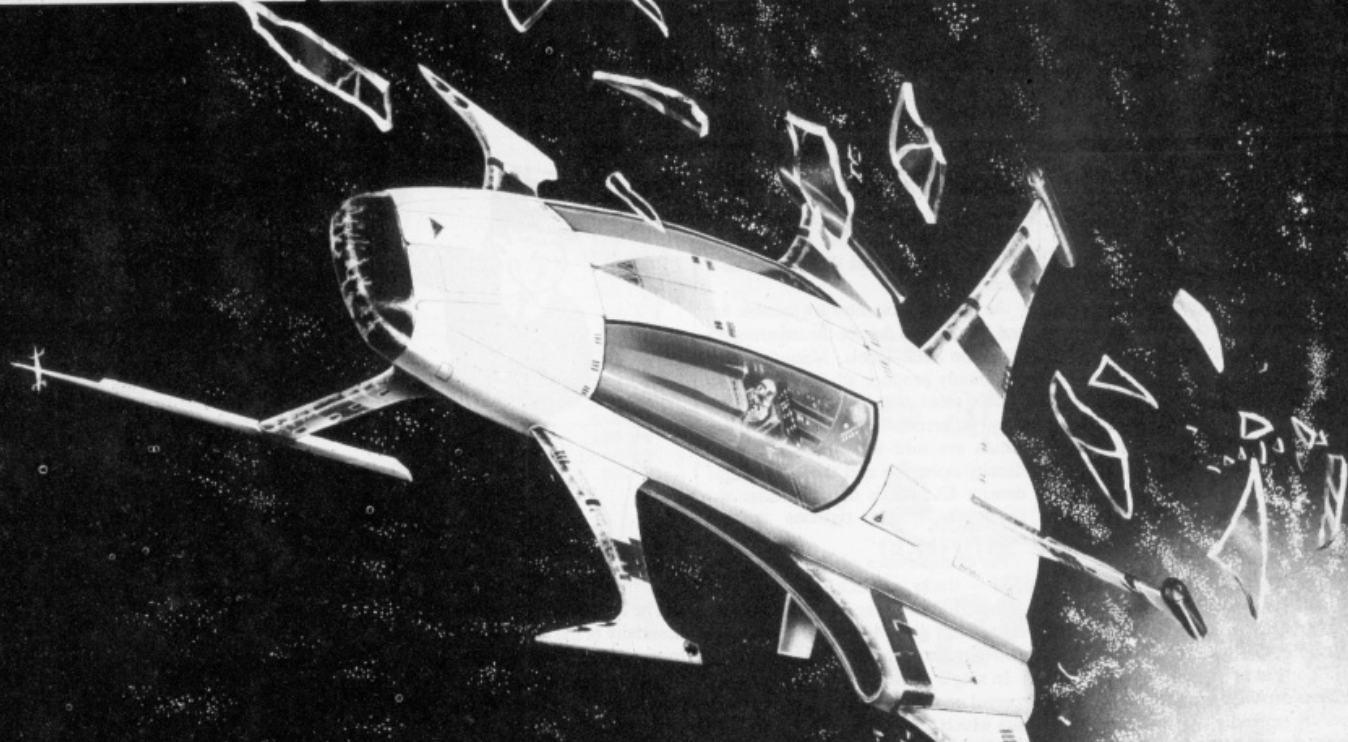
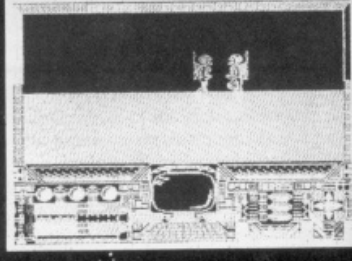
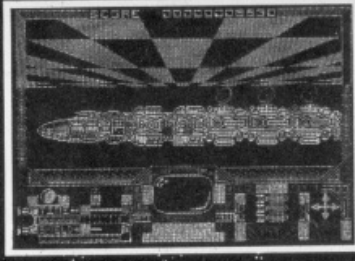
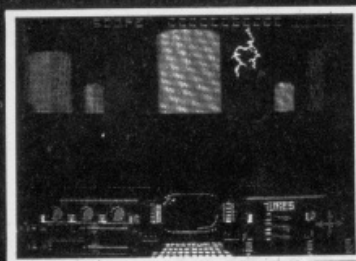
As you'll see when you play this simple demo, the "chaining" of Pokes in lines 70 and 80, and their updating in line 230, produces a surprisingly smooth — if not totally slinky — and automatically synchronised screen movement of no fewer than 10 different characters.

The snake wraps round — moving up or down a line depending on direction — the edges of the screen, but take him off the top, or try to have him double back on his body, and the game resets.

Line 310 gives you just 60 seconds to eat all the diamonds; beat the clock and the game resets with even more targets. The score feature gives you 10 points for every diamond taken and line 20 keeps a tally of your best effort.

This program has been kept to its bare essentials to make it easy for you to study its structure — especially the use of Peek and Poke. Once that's clear to you, you could add a few bells and whistles in the form of colour, sound effects, additional playfield obstacles, and perhaps user-defined characters to produce a more convincing snake!

John Ransley.



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TOP TIPS

BREAKTHROUGH

During the production and testing of machine-code programs I have often accidentally caused my Spectrum to stick itself in an infinite loop, against which the Basic Break command will prove quite useless.

This program for either the 16k or 48k Spectrum solves this problem. By running the program before you test a machine-code subroutine or program, it will put the Spectrum into interrupt mode two (IM2). In this mode the machine will not only perform an RST566 instruction each time an interrupt occurs, but will also execute the short machine code program which will check whether or not the Break key has been pressed. If the test should prove positive it will return the machine to interrupt mode one (IM1).

Once the program loader has been entered and run, it will automatically put the program above Ramtop and execute it. Once the Break key has been pressed however, the machine must be placed back into interrupt mode two by entering the line

```
RANDOMIZE USR 32377.
```

Edmund Ward.

SEARCHER

This is a simple machine code routine used to know what programs are loaded in a cassette, what kind of programs are, and the memory they employ. The routine runs on a CBM-64, and it's stored at C000 hex (49152 decimal). It uses some of the Rom and Kernel routines.

Once the program is typed, you must run it to store the data in memory.

When you want to know the content of a cassette, you must call this routine by typing SYS 49152.

Manuel Garcia Alvarez.

```
10 REM ***** SEARCHER *****
20 REM *** BY MANUEL GARCIA ALVAREZ ***
30 REM *****
40 REM *****
50 REM *****
60 REM *****
70 REM *****
80 REM *****
90 REM *****
100 REM *****
110 REM *****
120 REM *****
130 REM *****
140 REM *****
150 REM *****
160 REM *****
170 REM *****
180 REM *****
190 REM *****
200 REM *****
210 REM *****
220 REM *****
230 REM *****
240 REM *****
250 REM *****
260 REM *****
270 REM *****
280 REM *****
290 REM *****
300 REM *****
310 REM *****
320 REM *****
330 REM *****
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850 REM *****
860 REM *****
870 REM *****
880 REM *****
890 REM *****
900 REM *****
910 REM *****
920 REM *****
930 REM *****
940 REM *****
950 REM *****
960 REM *****
970 REM *****
980 REM *****
990 REM *****
1000 REM *****
```

RESPONSE

Frame

STOP REPEAT

I have a friend who owns a Commodore 64. Unfortunately, he is quite severely disabled as he suffers from *Freidrich's Ataxia*, which affects his co-ordination. He was hoping to be able to use his computer as a word processor in place of his electronic typewriter. Unfortunately, he has found that when he attempts to use the computer in this way, the keyboard is too sensitive, and he gets multiple responses from the keys. I would be interested to learn if there is anyway he might overcome this problem.

Albert Hunt,
Stafford.

I DO NOT know which word processing program you are using with the 64. However, if it allows you to do some modifications in Basic, it might be useful to put a small routine like the following at the point in the program which allows input from the keyboard. This routine simply ignores any duplicate key presses, so it will not give multiple responses.

If, however, more than one press of a similar key is needed at a time — as for double letters in words — a seldom-used key — I've chosen the %, but you may have one which is more suitable — needs to be struck between the key presses needed for the double letter.

The letter which is 'passed on' to the word processor is in the variable Q\$, while the routine also uses P\$.

```
10 P$=""
20 Q$=INKEY$
30 IF Q$="" THEN 20
40 IF Q$="%" THEN P$="":GOTO 20
50 IF Q$=P$ THEN 20
60 P$=Q$
70 REM NOW Q$ IS USED TO 'HAND ON'
80 REM KEY PRESS TO PROGRAM ITSELF
90 PRINT Q$;
100 GOTO 20
```

CLEAN SCREEN

I have written several games for the Spectrum, in which I load a complete picture (saved as Screen\$) into the computer, so it can sit there while the main program is loading. However, I don't want the loading message of the second program to obliterate part of the picture which is on the screen. I know I can overcome this, to some extent, by controlling the Ink and Paper colours of the loading message, but this puts some restriction on the original Screen\$ picture. Is there a better way?

Arnold Thrimble,
Cirencester.

STEVEN DEMPSTER of Littleworth, Stafford, has discovered a very good way of solving this problem. To stop the filename from obstructing your Screen\$, first Peek 23570. Note down the answer you get. Next, type in Poke 23570,16. After the Screen\$ has loaded, Poke 23570 with the original number.

ZX PRINTER OK?

I own a Spectrum and am thinking of buying a new, or second hand, ZX Printer. Some of my mates say that Sinclair aren't making it any more. If it is not being sold any more, will I be able to get extra paper for it?

Paul Taylor,
Sittingbourne,
Kent.

THE ZX Printer has been discontinued, although independent suppliers are still producing paper for it. The Alphacom 32 has almost totally supplanted the ZX Printer, and most Sinclair stockists also handle the Alphacom.

This produces blue or black (depending on the paper you buy) printing, and is far more consistent in its output than the ZX Printer ever was.

BENCHMARKS

When looking through magazines with reviews in them, including *Your Computer*, I quite often see a section showing 'Benchmarks, 1 to 8'. Could you please tell me what these mean, and how they are timed?

D Macroe,
Morpeth,
Northumberland.

BENCHMARKS ARE a set of standard tests which try out a function or functions of the computer under test, producing a measurable result which can be compared, to some extent, with the results of running the same tests on another computer.

The 'standard' eight benchmarks were introduced back in 1977 by the American magazine *Kilobaud*. While they are not particularly rigorous, they do offer a quick and simple solution to the problems of checking out how well the computer performs particular arithmetic functions.

The first bench mark simply runs an empty For Next loop from 1 to 1000, and times it. In the second test, a variable is set to zero, then incremented by one over and over again until it reaches 1000.

In the third test, a small bit of

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

arithmetic is added within the program, using variables. Test four does the same thing as test three, except numbers are substituted for the variables. A "dummy" subroutine call (that is a call just to the word Return) is added in test five.

As you can see, each test demands a little more of the computer, and gives results which can be compared with the results obtained from running the tests on other machines.

DATA TRANSFER

I have recently changed from a ZX Spectrum to an Amstrad, and am having trouble transferring some of my programs. On the Spectrum, all the current variables and arrays are saved when the program is saved. This meant that, on reloading, it was possible to set off again from the same point, adding information to the array and variable data loaded in from the cassette. — provided, of course, Goto was used rather than run. This does not work on the Amstrad using the standard Save and Load commands. Is there a way of saving and loading current variables and array information on the Amstrad?

Brian Paget,
Aberdeenshire.

UNFORTUNATELY, there is no way of doing this on the Amstrad which is as simple as that provided on the Spectrum. The best way to achieve this on the Amstrad is to open a cassette file, and save the data to that, load in the data from tape after the main program has loaded in.

The command Openout "filename" opens an output file onto cassette for use with the current program in the computer's memory (see page 8-31 of the Amstrad manual). The program creates the first block of data, in the file with the given name. Each block consists of up to 2048 bytes of data.

A New command will abandon any open file buffered, and any data will be lost. The "opposite" command is Openin, which opens an input file from the cassette which contains information for use in the current program in your Amstrad's memory.

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Listing 1.

```

50 INK 7: PAPER 0: BORDER 0: C
LEAR 31999
60 DATA 231,165,255,24,255,24,
102,231,36,24,60,a,a,24,a,a
70 DATA 24,164,0,a,a,24,36,0,
0,164,127,a,164,0,a
80 DATA 0,a,29,254,a,29,0,a,25
4,130,178,170,154,130,254,0
90 DATA 254,205,238,a,a,198,25
4,0,254,130,250,130,190,130,254,
0
100 DATA 254,130,250,130,250,13
0,254,0,254,174,a,130,238,a,254,
0
110 RESTORE : FOR n=USR "a" TO
USR "j": READ a: POKE n,a: NEX
T n
120 FOR n=USR "t" TO USR "u"+7:
POKE n,127+(127 AND n)=USR "u")
: NEXT n
130 LET a$="TOTAL WIPEOUTKill
bonus:"
140 FOR n=1 TO 25: POKE 34999+n
,CODE a$(n): NEXT n
150 REM Now you should set up
the UDG's by typing RUN
160 PRINT ""
T
170 PRINT " T UT UT UT UT
UT TU T UT UT T
UT T UT T UT T
UT TU T UT T
UT U T UT UT T T
UT UT U"
180 PRINT "TAB 14:"from"
190 PRINT " T UT UT UT
T UT T UT UT
T T UT UT UT
T UT UT UT UT
T UT UT UT UT
T UT UT UT UT
200 PRINT AT 16,0;" @'85
H:
ECH TI
210 PRINT AT 21,25;"(DG)"
220 REM The following REM lines
should not be typed in, but are
to help you with the graphics.
Enter the characters shown in
code with caps shift when needed
230 REM Line 170 reads:
T88UT88UT88UT88UT88UT88
T UT T UT T
etc.
240 REM Line 190 reads:
T888UT888UT888UT888UT888U
T8 T8 8UT8 8UT8 T8
etc.
250 REM Line 200 reads:
8 813832833355 55
8338 8 8 3854375 and so on
260 FOR n=1 TO 3: BEEP .1,0: BE
EP .1,7: NEXT n
270 INK 0: PRINT AT 14,0:
280 LOAD ""CODE : PRINT AT 14,0
: LOAD ""
290 REM
SAVE "carrots" LINE 0

```

Listing 2.

```

10 DEF FN h(h$)=16+(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2)
-48-(7 AND h$(2)>"9")
20 INPUT "Start "s
30 INPUT "Finish "f
40 FOR n=s TO f STEP 8
50 LET tot=0: PRINT n;" ";
60 INPUT h$: PRINT h$;
70 LET x=0
80 FOR b=1 TO LEN h$ STEP 2
90 LET z=FN h(h$): LET tot=tot
+z
100 POKE n+x,z
110 LET h$=h$(3 TO ): LET x=x+1
120 NEXT b
130 PRINT " = ": INPUT t: PRIN
T t
140 IF tot<t THEN PRINT "input
error - try again": GO TO 50
150 NEXT n
160 REM enter STOP to stop

```

Listing 3.

```

110 LET dif=1: LET sp=26
120 REM RAFTOP NT comp./no data
overlap/top interrupt level pat
ch=85EPH.Machine code=1293 bytes
130 GO SUB 370
140 INK 7: CLS: PRINT AT 1,1:
BRIGHT 1:"CARROTS FROM SPACE"
150 PRINT "Eliminate the de
adly carrots by placing time bo
mbs in their path."
160 PRINT " Keys: 7
5 8 and 0 to
drop bombs.
170 PRINT " Difficulty: ""
Easy Medium Hard"
180 PRINT AT 17,1:"Use 5 & 8 to
change difficulty Use 6 & 7 to
adjust speed, and
0 to play."
190 PRINT AT 13,dif*8+5: OVER 1

```

SOFTWARE

Programs for Software File should be fairly compact and sent on a cassette.

Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

File

Carrots from space

David Green,
Wye
Kent.

Spectrum

WHILE RECOVERING from the sheer boredom of typing in over 5K of machine code, I resolved to write a 48K Spectrum game that would be fast, fun to play, well-endowed with sound effects and that would contain less than 1.5K of machine code. Despite its unbelievably silly title, this is that program.

The game is based on the slightly improbable situation that entire battle fleets of alien telekinetic carrots, with world domination their intent, have been temporarily trapped in freak wormholes in the space/time continuum, and someone has to go in there to turn the evil vegetables into so much mangled cellulose. The only method known to science of destroying these extra-terrestrial tubers is that of skilfully placing time bombs in their path, but it is best to do this only when you are moving, as otherwise it is all too easy to blow yourself up.

Convincing your computer to take part in this wanton slaughter is relatively straightforward. The recommended procedure is as follows:

Type in listing 1 and save it. This bit sets up the graphics, the title page, and various other things of dubious artistic value.

Type in the hexloader in listing 2 or load a

suitable one from tape. No self-respecting Spectrum user should be without one. Enter.

CLEAR 31999

and then type in the machine code from listing 3 using the hexloader. Save it as:

SAVE "from" CODE 33000,1300

Type in the imaginatively-titled listing 4. This actually controls the game and plays the music. Save it when you've finished and then reload from the beginning when you want to play it.

The game should work first time, but if it doesn't, check the machine code in listing 3 and the Poke's and USR calls in listing 4.

Full instructions on how to select any particular game configuration are given in the program. It would be quite easy to add a high score table by adding a few short routines to listing 4, including one at around line 320 that would use the Screen\$ function to find out what the score was after every game, but that is up to you. Anyone with a disassembler might like to know what the first 200 bytes of code do, since this is not very obvious, and this is in fact a collection of subroutines which handle printing to the screen etc.

If you don't like using the cursor keys, the part of the code which deals with the bombs is from 33520 onwards, and the section which controls movement is from 33630 onwards. These articles usually end with a heartfelt plea to send cheques or postal orders to the author, but as this program has been made as short as possible, this should not be necessary.

```

200 PRINT AT 15,9:"Start speed:
",sp,
210 BEEP .008,0: PAUSE 0
220 IF INKEY$="0" THEN GO TO 27
0
230 LET sp=sp-2*(INKEY$="5" AND
sp>0)+2*(INKEY$="7" AND sp<50)
240 PRINT AT 13,dif*8+5: OVER 1
"
250 LET dif=dif+(INKEY$="8" AND
dif<2)-(INKEY$="5" AND dif<0)
260 GO TO 190
270 POKE 33309,(50-sp)+24: POKE
33384,16*(dif+1)-1
280 BORDER 2: INK 7: PAPER 0: C
LS : PRINT AT 21,0: PAPER 2:"Sc
ore:0000000 Wave:001 Lives:3<"
290 LET z=USR 33221
300 GO SUB 630
310 BORDER 0: INK 7: PAPER 0: P
RINT AT 10,11: INVERSE 1:"GAME 0
VER"
320 FOR n=1 TO 200: NEXT n
330 IF INKEY$="" THEN GO TO 33
0
340 IF INKEY$="" THEN GO TO 340
350 GO TO 140
360 REM tune @ d.green
370 DATA 0,12,2,11,4,9,5,7
380 DATA 0,12,2,11,4,9,5,7
390 DATA 12,0,11,2,9,4,7,5
400 DATA 0,12,2,11,4,9,5,7
410 DATA 0,12,11,2,9,4,7,5
420 DATA 0,12,11,9,2,7,4,5
430 DATA 0,12,11,9,7,2,5,4

```

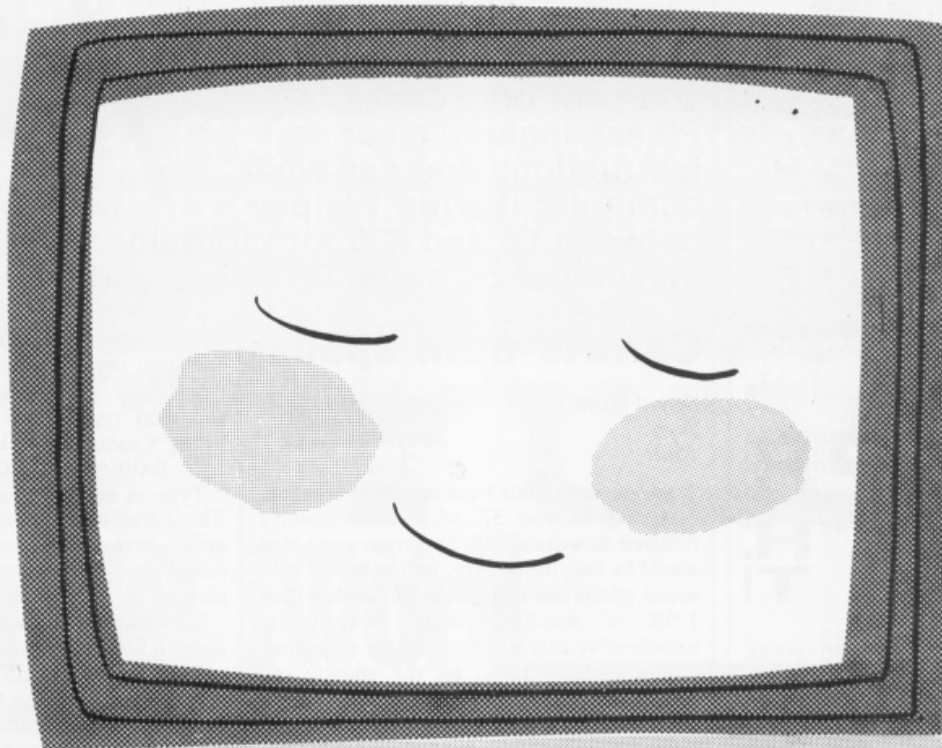
```

440 DATA 0,12,11,9,7,5,2,4
450 DATA 0,12,2,11,4,9,5,7
460 DATA 12,0,11,2,9,4,7,5
470 DATA 0,12,2,11,4,9,5,7
480 DATA 0,2,4,12,11,9,5,7
490 DATA 0,12,2,11,4,9,5,7
500 DATA 5,7,5,7,5,7,5,7
510 RESTORE 370: FOR n=1 TO 112
520 READ a
530 BEEP .1,a
540 BEEP .1,a-12
550 BEEP .1,a
560 BEEP .1,a-12
570 IF INKEY$="" THEN RETURN
580 NEXT n
590 BEEP 1,12
600 BEEP .2,0
610 PAUSE 0: RETURN
620 REM tune @ tom keir
630 DATA 19,14,19,21,14,21,22,1
4,21,19,14,19,18,14,16
640 RESTORE 630: FOR n=1 TO 15
650 READ a: BEEP .1,a-12: NEXT
n
660 BEEP .4,7: BEEP .05,7: BEEP
.1,7
670 RETURN
680 REM
690 REM
SAVE "space" LINE 0

```

(continued on page 95)

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Listing 4.

33000	00000000000000000000	=	130	33320
33001	00000000000000000000	=	885	33321
33016	030905C0298204C9	=	885	33322
33024	21004040578E3E18	=	890	33323
33033	64C79B2E1F6F78C6	=	112	33324
33038	27CB78E56FD1C1E9	=	116	33325
33048	00000000000000000000	=	116	33326
33056	C0D51600550608AF	=	705	33327
33061	E13CB2E12E92100	=	741	33328
33072	590349C10C2E05B5	=	981	33329
33080	55F0C0208138850E	=	981	33330
33088	77C0D08512E28100	=	803	33331
33099	00FE03802E2E5BC	=	747	33332
33104	000180020005F18	=	747	33333
33112	000603AFCB13CB12	=	627	33334
33120	10F193C106887E12	=	655	33335
33129	3141820000000000	=	1149	33336
33138	C05F521058070E18	=	422	33337
33144	FE0A2005530020E18	=	422	33338
33152	57F0606E0C2E105	=	440	33339
33160	00000000000000000000	=	953	33340
33168	8D5C07C0C0C05E15	=	953	33341
33176	C03681C0D2E10F0	=	895	33342
33184	32B050EC1D1C1E1F	=	135	33343
33192	E006038000000000	=	675	33344
33200	20027A78C7CE1C1F	=	675	33345
33208	072050507FEE1C18	=	850	33346
33216	78E3538F00000000	=	991	33347
33224	0600005F1A01	=	1616	33348
33232	00C0BC03110F31	=	888	33349
33240	00C8C0BF61C110E7	=	1165	33350
33248	1A0C440000000000	=	1403	33351
33256	C28D055011050C0D	=	989	33352
33264	B503E2113E0B5E5	=	1314	33353
33272	10500C0C80E1D1	=	845	33354
33280	EEB110E800000000	=	845	33355
33288	0636000210F5F03	=	457	33356

00000F0020009000C	= 608	33632	05DECCE48D0000C
0008002000322020B	= 318	33634	817FEF73A990000
002000370DA88110B	= 742	33648	36881C53EF70000
0000000000000000000	= 910	33650	672000000000000
75FE000000000000000	= 902	33652	000000000000000
0000000000000000000	= 637	33654	0105C8B6F700000
0000000000000000000	= 650	33656	000000000000000
0000000000000000000	= 340	33658	79F000000000000
0000000000000000000	= 885	33660	000000000000000
0000000000000000000	= 704	33662	000000000000000
0000000000000000000	= 403	33664	000000000000000
0000000000000000000	= 529	33666	000000000000000
0000000000000000000	= 403	33668	000000000000000
0000000000000000000	= 403	33670	000000000000000
0000000000000000000	= 964	33672	000000000000000
0000000000000000000	= 1399	33674	000000000000000
0000000000000000000	= 694	33676	000000000000000
0000000000000000000	= 871	33678	000000000000000
0000000000000000000	= 944	33680	000000000000000
0000000000000000000	= 853	33682	000000000000000
0000000000000000000	= 1000	33684	000000000000000
0000000000000000000	= 625	33686	000000000000000
0000000000000000000	= 625	33688	000000000000000
0000000000000000000	= 985	33690	000000000000000
0000000000000000000	= 1209	33692	000000000000000
0000000000000000000	= 1080	33694	000000000000000
0000000000000000000	= 518	33696	000000000000000
0000000000000000000	= 754	33698	000000000000000
0000000000000000000	= 754	33700	000000000000000
0000000000000000000	= 155	33702	000000000000000
0000000000000000000	= 140	33704	000000000000000
0000000000000000000	= 336	33706	000000000000000
0000000000000000000	= 558	33708	000000000000000
0000000000000000000	= 772	33710	000000000000000
0000000000000000000	= 772	33712	000000000000000
0000000000000000000	= 772	33714	000000000000000
0000000000000000000	= 772	33716	000000000000000
0000000000000000000	= 772	33718	000000000000000
0000000000000000000	= 772	33720	000000000000000
0000000000000000000	= 772	33722	000000000000000
0000000000000000000	= 772	33724	000000000000000
0000000000000000000	= 772	33726	000000000000000
0000000000000000000	= 772	33728	000000000000000
0000000000000000000	= 772	33730	000000000000000
0000000000000000000	= 772	33732	000000000000000
0000000000000000000	= 772	33734	000000000000000
0000000000000000000	= 772	33736	000000000000000
0000000000000000000	= 772	33738	000000000000000
0000000000000000000	= 772	33740	000000000000000
0000000000000000000	= 772	33742	000000000000000
0000000000000000000	= 772	33744	000000000000000
0000000000000000000	= 772	33746	000000000000000
0000000000000000000	= 772	33748	000000000000000
0000000000000000000	= 772	33750	000000000000000
0000000000000000000	= 772	33752	000000000000000
0000000000000000000	= 772	33754	000000000000000
0000000000000000000	= 772	33756	000000000000000
0000000000000000000	= 772	33758	000000000000000
0000000000000000000	= 772	33760	000000000000000
0000000000000000000	= 772	33762	000000000000000
000000000000			

978	33965	8205141CSE510022280	473
979	33976	C80501110022280	804
980	33984	81E1C1100FE1110	1235
981	33992	81E1C1732605C8A00	656
982	34000	80501000000000000	127
983	40003	C630F0C53651F17	1374
984	4016	C03262180A113200	396
985	40332	C8050032762218C	870
986	40340	8330000000000000	562
987	40404	C05007607C036810C	970
988	40486	C030C50E521180011	924
989	40539	1900300000000000	1034
990	40564	1520E0100A0A160C	339
991	4072	7E0C3F6800CA3C505	971
992	40850	3E00300111900C0E	769
993	40934	8E03000000000000	398
994	40936	81A380477C5D0885	975
995	41004	CCE507732050C011	602
996	41112	0A06000000000000	645
997	41200	C070311078A45E5	635
998	41268	C03C2485C063221	509
999	41336	000000C5E5110100C	700
1000	41360	8000000000000000	1098
1001	41522	2C0E585110100C0E	937
1002	41650	5E0C521310F311C	105
1003	41700	0000000000000000	57
1004	41776	1735050C1A08903C	450
1005	41834	2C0890011E35C630	484
1006	41858	C030580000000000	802
1007	41976	FE1E000000000000	602
1008	42018	053C3C0A05CF0A020	677
1009	4216	0000000000000000	43
1010	42244	0F00000000000000	604
1011	42322	0A00216405F5C0E	604
1012	42440	0000000000000000	953
1013	42518	C110512602210580	628
1014	42736	011F510000000000	605
1015	42864	812300C1507F5E17	559
1016	42772	2445C621000111C	405
1017	42880	3000000000000000	505
1018	42938	C803F0800C9C0000	507

Double height

M K Mostowyj
Bretton Estate,
Peterborough.

Amstred

THIS IS A utility program for the Amstrad CPC-464. It will give you access to a double height character set similar to that found on the BBC micro. The program provides Basic with two new commands by using the RSX capability of the Amstrad. The two new commands are Top and Bat. Anyone familiar with the BBC will know that to print in double height in Mode 7 two lines must be used, e.g.:
10 PRINTTAB(1,10);CHR\$(141),"This is an example"

20 PRINTTAB(1,11);CHR\$(141),"This is an example"

The second line is printed one line lower than the first and CHR\$(141) informs the BBC that double height is required. My version for the Amstrad works in a similar way. Any

string that already exists in your Basic program can be printed in double height. The syntax is as follows.

1TOP,@a\$ (This prints the top line as in
line 10 above)

1BOT,@a\$ (This prints the bottom line as
in line 20)

The words Top and Bot must be preceded with the 1 symbol, this is the shifted @ key. Both words must then be followed directly by a comma and the @ symbol then the string to be printed, a\$ is used in the example but in fact any string can be used as long as it exists. Also the top and bottom halves of the double height characters can have different Pen and Paper colours, e.g.:

10 X\$ = "QWERTY"

20 LOCATE 1,10:PAPER 1:PEN 2:

1TOP,@X\$

30 LOCATE 1,11:PAPER 2:PEN 3:

1BOT,@X\$

Any character from 32 to 126 can be printed using this utility and it can be used in any mode. The only restriction is that the string to

be printed must not exceed the screen width e.g. 80 characters in Mode 2, 40 in Mode 1 and 20 in Mode 0.

To enter the program simply type in listing 1 and run it. The data in line 250 is poked into memory first. This is not in fact part of the finished program but is a small machine code routine that transfers a copy of the original character set to a different part of memory thus saving you having to type in an extra 760 bits of data. Once this is completed the data containing the new character sets — one for the tops and one for the bottoms — and the machine code that supplies the two new commands is poked into memory. If all is well the new commands are logged on and a message is printed using the new facility.

To save the resulting code use

SAVE "D/H.BIN".B.38200.2371

To reload it either type as a direct command
or as the first line of your own program

SYMBOL AFTER 0:MEMORY
&9537:LOAD"1":CALL &9E20

[illegible]

```

340 DATA 00,3C,7E,66,60,60,7C,7E,00,7E,
7E,66,06,06,0C,18,00,3C,7E,66,66,66
350 DATA 7E,3C,00,3C,7E,66,66,66,66,66
00,00,00,00,00,18,18,00,00,00,00
360 DATA 00,00,00,00,00,00,00,00,00,0C,18
30,60,00,00,00,00,00,00,7E,7E,00,00
370 DATA 00,00,00,30,18,0C,06,00,3C,7E,66,
66,66,0C,18,00,00,3C,7E,42,5E,5E,5E
380 DATA 00,3C,7E,66,66,66,66,66,00,7C
7E,66,66,66,7E,7C,00,3C,7E,66,66,60
390 DATA 60,60,00,78,7C,6E,66,66,66,66
00,7E,7E,60,60,60,60,7C,00,7E,7E,60
400 DATA 60,60,60,7C,00,3C,7E,66,66,66,
60,60,00,66,66,66,66,66,66,7E,00,3C
410 DATA 3C,18,18,18,18,00,06,06,06,
06,06,06,06,00,66,66,66,66,6C,78,78
420 DATA 00,60,60,60,60,60,60,60,66,
FF,DB,DB,DB,DB,00,3C,7E,66,66,66,66
430 DATA 66,66,00,3C,7E,66,66,66,66,66
00,7C,7E,66,66,66,66,66,66,00,3C,7E,66
440 DATA 66,66,66,66,00,7C,7E,66,66,66,
66,66,00,3C,7E,66,66,66,00,7C,3E,00,7E
450 DATA 7E,18,18,18,18,18,00,66,66,66,
66,66,66,66,00,66,66,66,66,66,66,66
460 DATA 00,DB,DB,DB,DB,DB,DB,DB,00,66
66,66,66,66,7E,3C,00,66,66,66,66,66
470 DATA 7E,3C,00,7E,7E,06,06,0C,0C,18
00,3C,3C,00,30,30,30,30,00,00,00,00
480 DATA C0,60,30,18,00,3C,3C,0C,0C,0C,
0C,0C,00,18,3C,7E,5A,18,18,18,00,00
490 DATA 00,00,00,00,00,00,00,00,00,30,30,18
0C,00,00,00,00,00,00,00,00,00,00,78
500 DATA 00,00,00,00,E0,E0,60,60,7C,00,00
00,00,00,00,00,3C,00,00,00,1C,0C,0C
510 DATA 0C,7C,00,00,00,00,00,00,00,3C
00,00,1C,36,36,30,30,00,00,00,00
520 DATA 00,00,00,3E,00,00,00,E0,60,60
60,6C,00,00,00,00,18,00,38,00,00
530 DATA 00,00,00,06,00,0E,00,00,00,E0
60,60,60,66,00,00,00,38,18,18,18,18
540 DATA 00,00,00,00,00,00,00,6C,00,00
00,00,00,00,DC,00,00,00,00,00,00
550 DATA 00,3C,00,00,00,00,00,00,00,DC

```

```

00,00,00,00,00,00,00,00,76,00,00,00,00
560 DATA 00,00,00,00,6C,00,00,00,00,00,00,00
00,3C,00,00,00,30,30,30,7C,30,00,00
570 DATA 00,00,00,00,00,00,66,00,00,00,00
00,00,00,66,00,00,00,00,00,00,00,C6
580 DATA 00,00,00,00,00,00,00,00,C6,00,00
00,00,00,00,00,66,00,00,00,00,00,00
590 DATA 00,7E,00,0E,0E,18,18,18,18,70,
00,18,18,18,18,18,18,00,70,70,18
600 DATA 18,18,0E,00,76,76,0D,0D,00,
00,00,00,00,00,00,00,00,00,00,18
610 DATA 18,18,00,18,18,00,00,00,00,00
00,00,00,00,36,36,7F,7F,36,36,00,00
620 DATA 7E,0A,7E,7E,0B,0B,00,00,30,6E
,CA,0E,00,00,00,7B,FF,CC,CC,FF,7B
630 DATA 00,00,00,00,00,00,00,00,00,00
00,60,30,30,1B,0C,06,00,06,06,0C,0C
640 DATA 18,30,60,00,18,24,66,00,00,00
00,00,7E,18,18,18,00,00,00,00,00,00
650 DATA 18,18,18,30,60,7E,00,00,00
00,00,00,00,00,00,18,18,18,00,00
660 DATA 30,60,C0,00,00,00,00,00,76,76
,66,66,66,7E,BC,00,18,18,18,18,3C
670 DATA 3C,00,18,30,60,60,7E,7E,00,
1C,06,06,66,66,7E,3C,00,6C,6C,7E,7E
680 DATA 0C,0C,0C,00,06,06,66,66,66,7E
3C,00,66,66,66,66,66,7E,3C,00,18,18
690 DATA 18,18,18,18,00,00,7E,66,66,66
,66,7E,3C,00,7E,3E,06,06,66,7E,3C,00
700 DATA 00,00,00,18,18,18,00,18,00
,18,18,18,18,30,60,60,30,18,0C,00,00
710 DATA 00,00,00,7E,7E,00,00,00,00,00
00,06,0C,18,30,00,00,00,00,18,18,18
720 DATA 00,18,18,00,4E,40,40,40,7E
3C,00,7E,66,66,66,66,66,66,00,66,66
730 DATA 66,66,66,7E,7C,00,60,60,60,66
,66,7E,3C,00,66,66,66,66,66,7C,78,00
740 DATA 7C,60,60,60,60,7E,7E,00,7C,60
,60,60,60,60,60,6C,6E,66,66,66,7E
750 DATA 3C,00,7E,66,66,66,66,66,60
,18,18,18,18,3C,3C,00,06,06,06,66
760 DATA 66,7E,3C,00,7C,6E,66,66,66,66

```

(continued on next page)

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```

,66,00,60,60,60,60,60,7E,7E,00,DB,DB
770 DATA DB,DB,DB,DB,DB,00,66,66,66,66
,66,66,66,00,66,66,66,66,7E,3C,00
780 DATA 7E,7C,60,60,60,60,60,00,66,66
,66,6E,6E,7E,3F,03,7C,7E,66,66,66,66
790 DATA 66,00,06,06,06,06,66,66,7E,3C,00
,18,18,18,18,18,18,00,66,66,66,66
800 DATA 66,7E,3C,00,66,66,66,66,7E,3C
,18,00,DB,DB,DB,DB,FF,FF,66,00,3C,7E
810 DATA 66,66,66,66,66,00,18,18,18,18
,18,18,18,00,18,30,30,60,60,7E,7E,00
820 DATA 30,30,30,30,30,3C,3C,00,0C,06
,03,01,00,00,00,00,0C,0C,0C,0C,3C
830 DATA 3C,00,18,18,18,18,18,18,18,00

```

```

,00,00,00,00,00,00,00,FF,00,00,00,00
840 DATA 00,00,00,00,0C,7C,CC,CC,CC,CC
,76,00,66,66,66,66,66,66,6C,00,66,60
850 DATA 60,60,60,66,66,3C,00,CC,CC,CC,CC
,CC,CE,76,00,66,66,66,7E,60,60,3C,00
860 DATA 78,30,30,30,30,30,78,00,66,66
,66,66,66,3E,06,7C,76,66,66,66,66,66
870 DATA E6,00,18,18,18,18,18,18,3C,00
,06,06,06,06,66,66,66,3C,6C,6C,78,78
880 DATA 6C,6C,E6,00,18,18,18,18,18,18
,3C,00,FE,D6,D6,D6,D6,D6,00,66,66
890 DATA 66,66,66,66,66,00,66,66,66,66
,66,66,3C,00,66,66,66,66,66,7C,60,F0
900 DATA CC,CC,CC,CC,CC,7C,0C,1E,36,30
,30,30,30,30,78,00,00,60,60,06,06
910 DATA 7C,00,30,30,30,30,36,36,1C,00

```

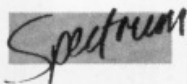
```

,66,66,66,66,66,66,3E,00,66,66,66,66
920 DATA 66,3C,18,00,D6,D6,D6,D6,FE
,6C,00,6C,6C,38,38,6C,6C,C6,00,66,66
930 DATA 66,66,66,3E,06,7C,0C,0C,18,18
,30,32,7E,00,70,18,18,18,18,0E,0E,00
940 DATA 18,18,18,18,18,18,00,0E,18
,18,18,18,70,70,00,00,00,00,00,00
950 DATA 00,00,01,2E,9E,21,2A,9E,CD,D1
,BC,C9,00,00,2E,9E,36,9E,C3,3D,9E,C3
960 DATA 42,9E,54,4F,D0,42,4F,D4,00,21
,30,98,18,03,21,28,98,11,00,A5,01,F8
970 DATA 02,ED,B0,DD,6E,00,DD,66,01,7E
,FE,00,28,17,47,23,5E,23,56,EB,7E,CD
980 DATA 5A,BB,23,10,F9,3E,0D,CD,5A,BB
,3E,0A,CD,5A,BB,21,38,95,11,00,A5,01
990 DATA F8,02,ED,B0,C9

```

Securdrive

Ansgar Zerpas,
Lehrberg,
West Germany.



THE SPECTRUM Microdrive manual tells you how to save a program or a code or data file in a way that the usual Cat command cannot register it: Save the program or file with a file name starting with CHR\$ 0.

This method will protect your programs on Microdrive cartridge from unauthorised access. On the other hand, you will have to learn the protected program names by heart — which will prove to be impossible — or you will have to keep a written list of the names along with your cartridges — which will make the whole protection senseless.

Securdrive is a utility which will store the file

names of your protected programs and which allows you to get rid of a written list. Securdrive will be saved on Microdrive cartridge with the autorun facility (... Line 1) which makes it unable to break into Securdrive during the loading process or to merge it in order to get hold of the stored program names.

The first operation of Securdrive after loading is the input of a password. A wrong password will cause the system to crash. The right password will cause a list of all protected programs to be shown and will give you the opportunity to load any of these programs by pressing just one key.

Spectrum users should be able to alter Securdrive to handle more than 10 protected file names or to handle protected data files from a commercial file program etc. without much difficulties.

You may use Securdrive with your existing cartridges by saving all existing files and pro-

grams with a new, protected name (starting with CHR\$ 0) and saving Securdrive on the same cartridge. You will have to initialise Securdrive by entering the protected file names and a password of your choice every time a new protected program has been saved on the cartridge.

Type in listing 1 and save it on any cartridge with

GO TO 9999

and

ENTER

Type in listing 2, the demo program, and enter

GO TO 100

to save this program on the same cartridge with three different names. Then new your computer and load Securdrive. Initialise the program by entering Init as password and entering the three protected demo program file names — DEMO ONE, DEMO TWO, DEMO XXX. Enter any new password and save Securdrive on the cartridge using option two.

Listing 1.

9000 REM

```

{ SECURDRIVE }
ENGLISH VERSION
ZX SPECTRUM & M-DRIVE
© 04.05.1985 by
Ansgar Zerpas,
Schlehenweg 10,
8802 Lehrberg,
West Germany.

```

```

9010 CLEAR # : BORDER 1 : PAPER 1 :
INK 7 : CLS
9020 PRINT PAPER 5 : INK 0 : "{ SEC
URDRIVE } © A.Zerpas 1985"
9030 INPUT PAPER 6 : INK 0 : "Enter
the password to access the prote
cted programs or enter INIT to en
ter a new list of protected progr
ams and a new password : " : LI
NE I$
9040 IF I$="INIT" THEN GO TO 950
0
9050 IF I$<>C$ THEN PRINT USR 0
9060 PRINT AT 4,6:"Choice of pro
grams : "
9070 FOR F=1 TO 10 : IF N$(F)="
" THEN GO TO 9090
9080 PRINT TAB 9;"("F-(10 AND F
=10);" " : N$(F) : NEXT F
9090 PRINT AT 18,0:"Press the co
rresponding key to load a progr
am or press (C) to copy the scr
een to your printer! : BEEP .1,1
9100 LET I=-1 : LET I$=INKEY$ : IF
I$="" THEN GO TO 9100
9110 IF I$<"9" AND I$>="0" THEN
LET I=VAL I$+(10 AND I$="0")
9120 IF I>0 THEN IF N$(I)="
" THEN LET I$="" : GO TO 9100
9130 IF I$="C" OR I$="c" THEN CO
PY : LPRINT : LPRINT : LPRINT :
LET I$="" : GO TO 9100

```

```

9140 IF I<1 THEN GO TO 9100
9150 PRINT #0;AT 1,6:"Loading "
:N$(I);""
9160 LOAD "*"M";1;CHR$ 0+N$(I) : R
UN
9200 STOP
9500 CLEAR # : DIM N$(10,9) : FOR
F=1 TO 10
9510 INPUT "ENTER THE PROGRAM NA
ME (Max. 9 letters; enter END i
f you have entered all programs
) : " : LINE M$ : IF M$=""
OR LEN M$>9 THEN GO TO 9510
9520 FOR G=1 TO F : IF N$(F, TO L
EN M$)=M$ THEN GO TO 9510
9530 NEXT G
9540 IF M$="END" THEN GO TO 9560
9550 LET N$(F)=M$ : NEXT F
9560 INPUT "PASSWORD : " : LINE
C$ : IF LEN C$>20 THEN GO TO 9560
9590 PRINT AT 3,0:"Press""(1)
to save SECURDRIVE on a
cartridge for the first time""
"(2) to save SECURDRIVE on a
cartridge after a"" mod
ification"
9600 IF INKEY$="1" THEN GO TO 96
30
9610 IF INKEY$="2" THEN ERASE "M
" : "SECURDRIVE" : GO TO 9630
9620 GO TO 9600
9630 SAVE "*"M";1;"SECURDRIVE" LI
NE 1 : VERIFY "*"M";1;"SECURDRIVE"
: CLS # : PRINT "SECURDRIVE saved
and verified."" : "Password : "
C$ : PAUSE 0 : PRINT USR 0
9999 CLEAR # : LET C$="INIT" : SAV
E "*"M";1;"SECURDRIVE" LINE 1

```

Listing 2. The demo program.

```

1 REM #####
DEMO PROGRAM FOR SECUR-
DRIVE / PRINTS CHAR-SET
#####

```



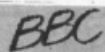
```

10 BORDER 0: PAPER 0: INK 6: C
LS : PRINT N$
20 FOR F=32 TO 255: PRINT CHR$
F: NEXT F
30 GO TO 9999
100 FOR F=1 TO 3: READ N$
110 SAVE "M":1)CHR$ 0+N$ LINE
120 NEXT F
130 DATA "DEMO ONE","DEMO TWO",
"DEMO XXX"

```

Fernando

David Cawthray,
Leeds.



YOU are Fernando the Flea hopping around a

dog when suddenly you leap into a human's hair by mistake. The hair is all tangled and you have to leap from strand to strand searching for some precious objects. There are four levels and it is loosely based around a platform game.

Type in program 1, Run it and correct any mistakes. Save it then press Break, and enter program 2, Run it and correct any mistakes. Save it under "flea" then the two programs are ready. Rewind the cassette and chain program.

Program 1.

```

110NERROR CLS:GOTO150
120REMTITLEPAGE
130PROCINIT
140MODE1:VDU23:8202:0:0:0:19,0,4:0:
150COLOUR1
160PROCENTER("D.C.SOFT Presents",2)
170COLOUR2
180PROCENTER("FERNANDO THE",5)
190PROCENTER("FLEA",7)
200PRINTTAB(12,9)"By D.J.Cawthray"
210PRINTTAB(4,13)"Graphics"
220PRINTTAB(7,14)"By"
230PRINTTAB(3,15)"P.Cawthray"
240PRINTTAB(27,13)"Music"
250PRINTTAB(29,14)"By"
260PRINTTAB(26,15)"S.Addy"
270PROCKEY
280PROCENTER("FERNANDO THE FLEA",2)
290PRINTTAB(2,5)"You play the part of
fernando flea"
300PRINT" Who is trapped in somebody's
hair."
310PRINT" Being a flea you can fall
any distance. But don't be too long on e
ach level or your BOUNUS will reach zer
o and you will lose a life."
320PRINT" To get the gems you must g
et past the monsters."
330PRINT" There are four levels each
has a different monster.You must
complete all the levels to get out
of the hair."
340FORI=1TO1000:NEXT
350PROCKEY
360NERROR CLS:GOTO370
370PROCENTER("FERNANDO THE FLEA",2)
380PRINTTAB(2,5)"Use the following key
s:-"
390PROCENTER("Z.....Left",7)
400PROCENTER("X.....Right",9)
410PROCENTER("Shift.....Jump",11)
420VDU28,10,22,30,20
430NERRORGOTO440
440CHAIN"FLEA"
450END
460DEFFPROCENTER(A$,Y)
470X=20-(LEN(A$)/2)
480PRINTTAB(X,Y)A$
490PRINTTAB(X,Y+1):STRING$(LEN(A$),"")
500ENDPROC
510DEFFPROCINIT
520VDU23,255,255,255,255,126,126,42,20
530VDU23,224,28,60,124,248,112,96,192,
224
540VDU23,225,56,60,62,31,14,6,3,7
550VDU23,226,42,85,16,16,28,16,24,60
560VDU23,227,42,85,8,56,8,24,60
570VDU23,228,24,60,126,255,255,126,60,
24
580VDU23,229,0,29,17,29,5,29,0,0
590VDU23,230,0,209,11,209,17,29,0,0
600VDU23,231,0,220,72,200,72,72,0,0
610VDU23,232,0,0,24,24,0,0,0
620VDU23,233,0,0,36,0,0,36,0
630VDU23,234,0,66,0,0,0,66,0
640VDU23,235,129,0,0,0,0,129
650VDU23,236,66,126,60,24,24,126,21
660VDU23,237,62,126,254,62,62,12,28
670VDU23,238,124,126,127,124,124,124,4
680VDU23,239,102,153,60,24,24,36,66,23
690VDU23,240,60,102,195,195,231,231,23
700VDU23,241,24,24,24,126,126,102,126,
126
710VDU23,242,0,255,231,195,195,231,255
720VDU23,243,255,66,255,255,126,60,24,
730ENVELOPE1,1,100,127,100,1,1,1,100,-
3,-2,-1,100,0
740ENVELOPE4,1,0,0,0,200,200,0,-1,
0,-80,80,0
750ENDPROC
760DEFFPROCKEY
770PROCENTER("PRESS SPACE BAR",28)
780REPEAT

```

```

790RESTORE880
800FORI=0TO39
810READNOX,DUX
820NOX=NOX-48
830DUX=DUX+3
840IF NOX=-48 THEN SOUND1,0,0,DUX:GOTO
880
850IF INKEY(-99) THEN CLS:ENDPROC
860SOUND1,4,NOX,DUX
870SOUND1,0,0,0
880NEXT
890UNTILFALSE
900DATA101,1,121,1,109,1,121,1,117,1,1
17,1,0,1
910DATA101,1,117,1,109,1,117,1,121,1,0
,2
920DATA101,1,121,1,109,1,121,1,117,1,1
17,1,0,1
930DATA101,1,117,1,109,1,117,1,121,1,0
,2
940DATA137,1,121,1,149,1,121,1,157,1,1
17,1,117,1
950DATA157,1,117,1,149,1,117,1,137,1,1
21,1,121,1

```

Program 2.

```

10*FX15
20MODE1
30PROCASS
40PROCALL
50LEVX=1:SCX=0:LIX=3
60PROCINIT
70VDU23:8202:0:0:0:
80NERRORGOTO50
90VDU19,1,2:0:
100PROCCHALLOFFAME
110CLS
120COLOUR1
130PROCINIT
140PROCSCREEN(LEVX)
150PROCINIT
160COLOUR2
170TIME=60
180TIX=300-INT(TIME/30)
190IF TIX<0 THEN PROCCAUGHT
200PROCMOVE:PROCMON:GOTO100
210DEFFFNCHAR(A$,B$)
220?71=A$:?72=B$
230CALLREC
240C=?75
250=CX
260DEFFPROCMOVE
270PRINTTAB(X,Y)" "
280PROCKEYS
290IFFNCHAR(X,Y)=130 OR FNCHAR(X,Y)
)=131 THEN PROCCAUGHT
300PROCCHECK
310IFFNCHAR(X,Y,X+1)>159 THEN Y=Y+1
:FAILZ=1:GOTO330
320FALLZ=0
330PRINTTAB(X,Y)CHR$(FLEAX)
340PROCSCORE
350FORIX=1TO50
360NEXTIX
370ENDPROC
380DEFFPROCJUMP
390IFINKEY(-99) THENPROCLEFT:ENDPROC
400IFINKEY(-67) THENPROCRIGHT:ENDPROC
410SOUND1,1,210,1
420YX=YX-2:ENDPROC
430DEFFPROCLEFT
440EX=0
450FLEAX=225
460RESTORE590
470SOUND1,1,210,1
480REPEAT
490EX=EX+1
500 IF EX MOD2=0 THEN PROCMON
510PRINTTAB(X,Y)" "
520READAX,BX
530IFFNCHAR(X+AX,Y+BX)=159THEN UNTIL
TRUE:ENDPROC
540IF X+AX<0THENAX=0:UNTILTRUE:PROCCLE
:ENDPROC
550X=X+AX:Y=Y+BX
560PRINTTAB(X,Y)CHR$(FLEAX)
570FORIX=1TO50:NEXTIX
580UNTILAX=-1 AND BX=1:PROCCLE:ENDPROC
590DATA-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,1
600DEFFPROCRIGHT
610EX=0
620FLEAX=224

```

```

630RESTORE760
640SOUND1,1,210,1
650REPEAT
660EX=EX+1
670 IF EX MOD2=0 THEN PROCMON
680PRINTTAB(X,Y)" "
690READAX,BX:IFAX=999 OR BX=999THEN750
700IFFNCHAR(X+AX,Y+BX)=159THEN UNTIL
TRUE:ENDPROC
710IFX+AX>39THENX=39:PROCCLE:UNTILTRU
E:ENDPROC
720X=X+AX:Y=Y+BX
730PRINTTAB(X,Y)CHR$(FLEAX)
740FORIX=1TO50:NEXTIX
750UNTILAX=999 OR BX=999:PROCCLE:ENDPRO
C
760DATA1,-1,1,-1,1,0,1,0,1,1,1,1,999,9
99
770DEFFPROCSCREEN(LLEVX)
780CLS
790COLOUR1
800IFLEVX=1 PRINTTAB(0,30)STRING$(40,C
HR$255):ELSE PRINTTAB(0,31)STRING$(40,C
HR$255):
810PROCBOJECT
820COLOUR1
830ON LLEVX GOTOB40,850,860,870
840RESTORE940:GOTO880
850RESTORE950:GOTO880
860RESTORE960:GOTO880
870RESTORE970
880FORIX=1TO25
890READX,Y,X
900PRINTTAB(X,Y):STRING$(LX,CHR$255)
910NEXTIX
920COLOUR2
930ENDPROC
940DATA31,3,7,37,5,1,5,7,21,29,7,4,37,
7,3,29,16,1,5,9,1,26,9,1,34,18,2,5,11,7,
14,11,2,17,12,7,26,14,1,10,16,10,29,18,2
,19,20,1,28,20,3,21,21,6,19,22,1,10,23,4
,19,24,1,10,25,1,14,25,3,18,26,2,7,27,6
950DATA0,5,23,23,7,13,15,9,7,32,9,4,38
,11,2,38,13,2,33,14,3,38,15,2,38,12,16
,19,5,20,19,3,38,19,2,12,21,4,36,20,1,24
,22,4,34,22,5,14,23,5,30,24,5,20,25,4,5
,27,3,12,27,12,0,28,3,6,15,3,3,23,1,35,26
,1
960DATA5,5,5,11,6,5,20,7,4,23,9,3,25,1
1,3,27,13,3,29,15,3,37,15,3,33,16,3,29,1
8,4,28,20,4,21,22,7,16,24,2,19,24,2,28,2
4,9,22,25,5,1,26,3,11,26,6,9,20,2,13,28,
2,16,28,5,10,16,1,16,16,1,35,3,1,30,28,1
970DATA3,4,4,12,4,4,21,4,4,30,4,4,38,4
,2,35,6,2,17,8,1,35,8,2,35,10,2,14,11,1,
3,12,3,29,12,8,23,14,4,24,16,2,17,18,7,1
4,19,2,8,28,3,31,20,3,13,22,6,17,24,17
,26,2,28,18,1,26,25,3,18,28,8,18,30,8
980DEFFPROCCLE:PRINTTAB(X,Y)" ":ENDPROC
C
990DEFFPROCMON
1000PRINTTAB(MONXX,MONYY)" "
1010PRINTTAB(MON2X,MON2Y)" "
1020MONXX=MONXX+DIRXX
1030MON2X=MON2X+DIR2X
1040IF MONXX>MMBZ THEN DIRXX=-DIRXX:MON
CX=MONCAZ
1050IF MON2X>MMBZ THEN DIR2X=-DIR2X
:MONCZ=MONCAZ
1060IF MONXX<MMAZ THEN DIRXX=-DIRXX:MON
CX=MONCBZ
1070IF MON2X<MMAZ THEN DIR2X=-DIR2X
:MONCZ=MONCBZ
1080IFFNCHAR(MONXX,MONYY)=128 OR FNCHAR
(MON2X,MON2Y)=129 THENPROCCAUGHT
1090IFFNCHAR(MON2X,MON2Y)=128 OR FNCH
AR(MON2X,MON2Y)=129 THENPROCCAUGHT
1100PRINTTAB(MONXX,MONYY)CHR$(MONCX)
1110PRINTTAB(MON2X,MON2Y)CHR$(MONCZ)
1120ENDPROC
1130DEFFPROCINIT
1140IFLEVX=1 THEN RESTORE1190
1150IFLEVX=2 THEN RESTORE1200
1160IFLEVX=3 THEN RESTORE1210
1170IFLEVX=4 THEN RESTORE1220
1180READX,Y,X,MONXX,MONYY,MMAZ,MMBZ,MON
2X,MON2Y,MMAZ,MMBZ,01X,01Y,0BX,MONC
AZ,MONCBZ
1190DATA1,28,11,15,11,26,31,2,32,36,31,
(continued on next page)

```



```

200 DATA 253,165,251,10,10,9,128,141,12,144,96
205 REM*** CHAR, DATA ***
210 DATA 0,0,255,255,0,0,0,0,56,16,252,252,12,12,0
220 DATA 90,90,60,24,24,84,34,2,90,90,60,24,24,40,68,72,90,90,60,24,24,20,34,18
230 DATA 90,90,60,24,24,42,68,64,0,0,16,32,64,32,95,78,0,0,66,66,66,126,0
240 DATA 0,2,134,0,71,119,0,0,90,90,60,24,24,36,36,36,16,16,56,124,124,56,16
250 DATA 66,66,126,66,66,66,126,66,0,238,238,0,119,119,0,0,255,255,126,126,126,12
6,60,60
260 DATA 8,8,137,74,42,44,28,8,8,4,4,4,8,107,156,0,0,32,80,200,200,8,28
270 DATA 0,0,0,0,0,24,44,0,0,0,28,34,42,34,28,0,0,0,24,44,36,24,0,0,0,0,0,0
,0
280 DATA 0,0,0,0,0,0,0,0
290 DATA 138,133,252,56,165,254,229,252,133,254,176,2,198,255,96
300 DATA 24,138,101,254,133,254,144,2,230,255,96
310 DATA 165,255,73,136,133,255,138,145,254,165,255,73,136,133,255,96
320 DATA 165,251,201,15,240,5,169,15,133,251,96,169,14,133,251,96
330 DATA 165,251,201,16,240,5,169,16,133,251,96,169,15,133,251,96
340 DATA 165,251,201,13,240,5,169,13,133,251,96,169,14,133,251,96
350 DATA 165,251,145,254,162,0,32,34,29,76,235,27
360 DATA 173,4,31,201,32,208,13,169,22,141,4,31,141,238,30,169,3,141,238,150
370 DATA 173,114,31,201,32,208,13,169,22,141,114,31,141,92,31,169,3,141,92,151
380 DATA 173,150,30,201,32,208,13,169,22,141,150,30,141,128,30,169,3,141,128,150
,173,202
390 DATA 31,201,32,208,13,169,22,141,202,31,141,224,31,169,3,141,202,151,96

```

READY.

Program 2.

```

READY.
10 H=0:P(0)=7810:P(1)=7920:P(2)=8030:P(3)=8140:PRINT"*****HIT A KEY":WAIT1
97,15
20 C=30720:N=36876:T=1000:S=0:L=3:G=1:D=8035:POKE7,255:POKE2,15:POKE3,25
30 PRINT"*****KILL" :POKE0,216:POKE2,216:POKE1,31:POKE3,151
40 FORI=8164TO8185:POKEI,23:POKEI+C,2:NEXT
50 FORI=8164TO8185:POKEI,23:POKEI+C,2:POKE7963+I,23:POKE7963+I+C,2
60 POKE8073+I,23:POKE8073+I+C,2:NEXT
70 FORI=7808TO8160STEP22:POKEI,22:POKEI+C,3:NEXT:POKE8152,20:POKE8152+C,0:POKE81
90,18
80 FORI=8164TO8185:POKEI,25:POKEI+C,5:POKEI+C,22,24:POKEI+C,22+C,0:POKEI+C-22
,29
90 POKEI+C-22,7:NEXT:POKE8167,19:POKE8130+C,6
100 J=INT(RND(2)*4):IFPEEK(P(J))=28ANDRND(2)<.06THEN190
110 IFRND(1)<.07ANDPEEK(P(J))>28THENPOKE(P(J)),PEEK(P(J))+1:POKE(P(J))-22,PEEK(P(J))
-22+1
120 PRINT"SC":S,"HI":"H","LEFT":"TTTT",L:SYS6913:FORI=1TO70:S/4:NEXT
130 IFPEEK(253)>0THEN S=S+5:POKE253,0:IFHCSTHENH=S
140 IFS=80THENHL=L+6:G=0
150 IFPEEK(D)>18THENPOKE2,32:D=D+22:IFD=8167THEN D=8035:POKE0,200
160 IFPEEK(D)>19THENPOKE6,1:POKE7316,126:POKE7317,126:D=8035:GOTO100
170 POKE2,21:POKE2+C,6
180 POKE0,0:GOTO100
190 FORI=1TO1000:NEXT:FORI=248TO128STEP-10:POKEI-1,I:FORJ=1TO70:NEXTJ,I
200 FORI=1TOT:NEXT:POKEI-1,0:L=L-1:IFLTHENFORI=1TOT:NEXT:I:GOTO30
210 PRINT"*****NOTHER GO(Y/N)":I=PEEK(197):IFI=28THENPOKE198,0:SYS212
220 IFI<11THEN210
230 FORI=1TO4*NEXT:POKE7316,66:POKE7317,66:POKE6,0:GOTO20

```

READY.

- Lines 30-90: Sets up the screen — ladder, floors, flowers. Also the man's starting position.
- Lines 100-110: Picks the number of the flower to be wilted — if any. If a flower has wilted too far then exit to line 200.
- Line 120: Prints "score", "high", "lives"; calls the machine code to move the man; delays depending on the score.
- Line 130: If Peek (253) had been set during the machine code then five points are added to the score and the high score checked for.
- Line 140: If the score is 80, then a bonus life is given.
- Lines 150-180: Moves the drop down the screen and "fills" the man's bucket if he catches it.
- Lines 190-200: Makes a noise, takes a life away. If there are enough lives left then program goes to line 30.
- Lines 210-230: Asks if user wants another go. If Yes then program moves to line 20. If No then SYS212, which resets the machine as if a RUN/STOP-RESTORE had been performed.

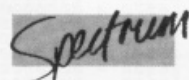
After typing in the second part it should be saved by typing

SAVE"";1

The first program will automatically run the second after it has loaded it.

Jon the Jany

N Billiland,
Grangemouth,
Stirlingshire.



Jon the Jany is a ladders and platform game. You play the part of Jon whose sole purpose in life is to switch off light bulbs. To do this you

must walk under them. Once you have switched off all the lights you get a different screen to complete and two extra lights to switch off. Sounds easy but as usual there are monsters that kill if they are touched.

Jon the Jany is written in Basic and machine code. The machine code controls the monsters and the rest is in Basic. The screens, bulbs and monsters are all printed up randomly and the cursors control Jon.

Do not break into the program when scrolling message appears at the bottom of the screen because

POKE 23659,0

is used to print the message on the 22nd line and the program will crash if attempting to do so. If you can't be bothered to type in this great program send a sae and £1.50 to N. Billiland, 22 Garry Place, Grangemouth, Stirlingshire.

```

10 CLEAR 33199: BORDER 0: PAPE
0: OVER 0: INK 6: INK 8: CLS
LET HI=0: GO SUB 5000: GO TO 45
00
30 GO SUB 1500
35 GO SUB 1000: GO SUB 2000: G
0 SUB 3500
100 REM MAIN ROUTINE
110 IF INKEY$="" THEN BEEP .00
120
115 LET X1=X: LET Y1=Y: IF ATTR
(Y+2,X+1)=2 THEN GO TO 130
120 IF ATTR(Y+2,X)=7 THEN GO TO
0 200
130 LET X=X+(INKEY$="8" AND X<3
1)-(INKEY$="5" AND X>0)
200 LET Y=Y+(INKEY$="6" AND ATT
R(Y+2,X)=7)-(INKEY$="7" AND ATT
R(Y,X)=7)
205 OVER 1: PRINT AT Y1,X1:AS(A
1):AT Y1+1,X1:AS(A,2): IF A=3 T
HEN LET A=2: GO TO 300
220 IF A=1 THEN LET A=2: GO TO
300
230 IF INKEY$="8" THEN LET A=3
240 IF INKEY$="5" THEN LET A=1
300 PRINT AT Y,X:AS(A,1):AT Y+1
,X:AS(A,2): OVER 0: IF ATTR(Y-1
,X)=71 THEN PRINT AT Y-1,X: INK
4:"J":BEEP .01:LET T=T+1:LE
T T=5+10:PRINT AT 0,6,5:IF T=N
THEN GO TO 3000
320 IF ATTR(Y+1,X)=4 OR ATTR
(Y+1,X+1)=4 OR ATTR(Y+1,X-1)=4 O
R ATTR(Y,X)=4 THEN GO SUB 4000
400 RANDOMIZE USR 33500: GO TO
110
1000 REM SCREEN
1010 PRINT AT 0,0: INK 7:"SCORE
,3:AT 0,12:"HI SCORE":HI:AT 0,
27:"HEN":LU:AT 21,0:"SCREEN":5
CR:FOR F=4 TO 20 STEP 4:PRINT
AT F,0: INK 2:"AAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAA":IF F=20 THEN G

```

```

O TO 1110
1050 FOR G=1 TO 3
1060 LET C=INT (RND*30)+1: IF AT
TR(A,C+1)=7 OR ATTR(F,C-1)=7 T
HEN GO TO 1050
1090 FOR H=1 TO 3: PRINT AT F+H
,C: INK 7;"B":NEXT H: NEXT G: N
EXT F
1110 IF ATTR(15,0)<7 AND ATTR
(15,2)<7 THEN FOR F=15 TO 19: P
RINT AT F,1: INK 7;"B":NEXT F:
RETURN
1500 REM VARIABLES
1510 DIM A$(3,2): LET A$(1,1)="H
":LET A$(1,2)="I":LET A$(2,1)="
E":LET A$(2,2)="F":LET A$(3,1)
="C":LET A$(3,2)="D"
1570 LET N=5: LET S=0: LET T=0
LET SCR=1: LET LU=4: LET B$="PRE
SS ANY KEY TO START....."
1650 LET X=0: LET Y=18: LET A=2
:PRINT AT Y,X:AS(A,1):AT Y+1,X,A
$(A,2):RETURN
2000 REM LIGHT BULBS
2010 FOR F=1 TO N
2020 LET Y1=(INT (RND*4)+1)*4+1:
LET X1=INT (RND*32): IF ATTR(Y
1,X1)<6 THEN GO TO 2020
2050 PRINT AT Y1,X1: INK 7: BRIG
HT 1:"J":NEXT F:RETURN
2500 REM SCROLLING MESSAGE
2510 POKE 23659,0: LET B$=B$(2 T
O)+B$(1):PRINT AT 22,0: INK 7:
BRIGHT 1:B$(1 TO 32): BEEP .001
:INT (RND*50)+10: IF INKEY$="" T
HEN GO TO 2500
2515 PRINT AT 22,0:"": POKE 2365
9,2
2520 RETURN
3000 REM COMPLETED SCREEN
3010 FOR F=1 TO 10: BEEP .01,40+
F: NEXT F:FOR F=10 TO -20 STEP
-7: BEEP .01,40+F: NEXT F: PRIN

```

```

T AT 21,0: POKE 23692,23: FOR F=
0 TO 21: PRINT : BEEP .005,10+(F
+2): NEXT F
3026 INK 7: PRINT AT 8,6:"YOU AC
TUALY CLEARED":AT 10,10: BRIGHT
1:"S C R E E N":AT 4,14: FLASH
1:"WOW":AT 6,12: INVERSE 1:"AMAZ
ING"
3032 PRINT AT 14,13: FLASH 1:SCR
:AT 14,17:SCR:AT 16,15:SCR:AT 12
,15:SCR:AT 14,15: INVERSE 1:SCR
3040 GO SUB 2500: PAPER 7:CLS
POKE P+3,4: LET P=P+4: NEXT F
3540 POKE P,255: POKE P+1,255: P
OKE 33827,1: RANDOMIZE USR 33500
POKE 33827,0: RETURN
4000 REM OVER 1: BEEP
4010 OVER 1: BRIGHT 8: PRINT AT
Y,X:AS(A,1):AT Y+1,X:AS(A,2): FO
R F=Y+2 TO 20 STEP 1: PRINT AT F
,X:"E":AT F+1,X:"F": BEEP .005 F
:PRINT AT F,X:"E":AT F+1,X:"F":
NEXT F
4110 OVER 0: GO SUB 1650: LET LU
=LU-1: IF LU<0 THEN PRINT AT 0,
31:LU: GO SUB 2500: RETURN
4120 BEEP 1,-20: IF S>HI THEN PR
INT AT 10,10: FLASH 1: INK 7:"NE
W HI SCORE": FOR F=-20 TO 20: BE
EP .01,F: NEXT F:PRINT AT 12,11
: INK 7:"WELL DONE": PAUSE 0: P
AUSE 100: LET HI=S
4130 FOR F=50 TO 0 STEP -2: BEEP
.01,F: NEXT F:CLS:PRINT AT 5

```

(continued on next page)

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```

4: INK 7: "YOUR FINAL SCORE WAS
5: PRINT AT 9,3: FLASH 1: INK
7: "DO YOU WANT ANOTHER GAME ?"
GO SUB 2500
4140 IF INKEY$="Y" OR INKEY$="y"
THEN CLS: GO TO 30
4150 IF INKEY$="N" OR INKEY$="n"
THEN GO TO 4500
4160 GO TO 4130
4500 REM OPENING SCREEN
4510 LET B$="
      "JOIN THE JANY" BY NG
      "GUIDE 40N' AROUND TH
      "E FACTORY (USING THE CURSORS) SW
      "ITCHING OFF ALL THE LIGHTS
      "BUT WATCH OUT FOR THE
      "FUNNY BLOBS THEY
      "ARE FATAL IF TOUCHED (press any
      "key to play)"
4520 CLS: PRINT AT 6,6: INK 5:
      BRIGHT 1: "J O N T H E J A N Y"
      AT 10,9: INK 7: "Written by N.G.
      F"
4530 GO SUB 2500: FOR F=0 TO 30:
      BEEP .01,F: NEXT F: PAPER 7: CL
      S: PAPER 0: CLS: GO TO 30
5000 REM DATA
5005 PRINT AT 10,6: INK 7: "PLEAS
      E WAIT A MINUTE"
5010 RESTORE 5080: FOR F=USR "A"
      TO USR "J": 7: READ A: POKE F,A:
      NEXT F
5020 RESTORE 9000: FOR F=33500 T

```

```

O 33829: READ A: POKE F,A: NEXT
F: RETURN
5100 DATA 255,24,24,255,255,129,
129,255
5100 DATA 129,129,129,255,255,12
9,129,129
5110 DATA 28,28,28,28,28,45,75,72
,72,20,148,84,32,33,8,23,42,42,42
5110 DATA 28,28,28,28,28,54
42,20,20,20,20,20,54
5120 DATA 60,126,60,90,126,102,1
02,50
5130 DATA 56,56,56,144,184,180,2
10,13,15,40,42,71,68,64,192
5140 DATA 24,24,60,60,60,24,0,0
5150 GO TO 4130
9000 DATA 17,36,132,26,254,255,4
0,5,205,241,130,24,246,19,26,254
,255,200,27,24
9010 DATA 243,26,111,19,26,103,1
9,205,143,131,205,108,131,19,229
,205,126,131,26,254
9020 DATA 4,32,6,62,7,119,225,58
,35,132,167,40,2,19,201,213,27,2
05,45,131
9030 DATA 27,124,18,27,125,18,20
,229,205,126,131,126,131,19,229
,205,108,131,19
9040 DATA 201,28,203,71,32,13,20
3,79,32,11,203,87,32,9,203,95,32
,26,201,43
9050 DATA 201,35,201,213,125,230
,224,40,8,167,17,32,0,237,82,209

```

```

201,17,32,7
9060 DATA 237,32,209,201,213,125
,230,224,254,24,40,6,17,32,0,25
,209,201,17,32
9070 DATA 7,28,209,201,229,213,1
7,136,255,6,8,78,26,169,119,36,1
9,16,246,209
9080 DATA 225,201,124,203,163,20
3,63,203,63,203,63,103,213,17,0,
68,25,209,201,125
9090 DATA 230,31,254,31,32,6,62,
0,203,199,18,201,167,32,6,62,0,2
03,207,18
9100 DATA 201,229,205,67,131,205
,131,126,254,6,225,32,17,229
,295,88,131,205,126
9110 DATA 131,126,254,2,225,40,4
205,223,131,201,229,205,67,131,
205,126,131,126,254
9120 DATA 5,225,200,229,205,88,1
31,205,126,131,126,254,2,225,192
,205,240,131,201,126
9130 DATA 17,132,230,3,40,249,25
4,1,32,23,62,0,203,223,18,201,20
5,17,132,230
9140 DATA 3,40,249,254,1,32,6,62,
0,203,215,18,201,254,2,32,6,62,
0,203
9150 DATA 199,18,201,62,0,203,20
7,18,201,229,42,33,132,35,126,71
,230,63,103,34
9160 DATA 33,132,120,225,201,0,0
,0,255,255

```

Outlaw

Chris Colley,
Cambridge,
Cambridgeshire.

ZX-81

THE IDEA is to get from your hideout at the bottom of the screen to the castle at the top, steal some gold and return with it to your hideout. In between, you have to negotiate the changing doorways in the outer walls and avoid the patrolling guard. You have to make the trip 12 times in all and each time the game gets slightly faster.

You may wait in a doorway for a passage to clear and in this time you may find the gap changes and a wall is built on top of you. You may use this to your advantage since, when you move, there will be two gaps in that wall until the next change. Be careful not to forget your position while you're hidden though.

To enter the program you will need a Rem of 1304 bytes.

Enter the code, delete the hexloader, enter the Basic from program 1 and run. And there it is. The machine code may be stopped at any time

by pressing shift with P, O, Newline or Space. If the game is too fast, the speed may be changed by Poking 17480. This is initially set at 16 and the delay is caused by the computer counting up to

(PEEK 17480 — SCORE) x 256

Therefore, a number lower than 16 makes the game virtually unplayable in the later stage, while a number higher than about 30 makes it tediously slow in the early stages. If you require a challenge, cut your number of lives by Poking 17435 with the number of lives you require.

The hex loader.

```

1 REM HEXLOADER FOR OUTLAW
10 PRINT "START ADDRESS"
20 INPUT S
30 PRINT "FINISH ADDRESS"
40 INPUT F
50 FOR N=3 TO F STEP 8
60 LET T=0
70 PRINT N: " "
80 INPUT A$
90 PRINT A$: " "
100 INPUT TOT
110 PRINT TOT
120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C= (CODE A$(K)-28)*16+CO
DE A$(K+1)-28
150 LET T=T+C
160 POKE N+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
210 GOTO 60
220 NEXT N

```

The Basic program.

```

1 LET HI=0
5 FAST
10 CLS
20 POKE 16418,0
30 PRINT "
40 PRINT "
50 PRINT "
60 PRINT "
70 PRINT "
80 LET Z=PEEK 16396+256*PEEK 1
6397
90 POKE Z+1,200
100 POKE Z+67,200
110 POKE Z+133,200
120 PRINT "
130 PRINT "
140 PRINT "
150 FOR A=9 TO 20
160 PRINT AT A,0: "|||": AT A,29:
"|||":
170 NEXT A
180 PRINT "PRESS A KE
190 PRINT "
200 PRINT "

```

```

210 GOSUB 250
220 PRINT AT 10,11: "1: INFO": A
T 13,11: "2: KEYS": AT 16,11: "3:
PLAY": AT 19,11: "4: QUIT"
225 SLOW
230 GOTO 230+70*(INKEY$="1")+17
0*(INKEY$="2")+270*(INKEY$="3")+
60*(INKEY$="4")
240 GOTO 230
250 FOR A=9 TO 20
260 PRINT AT A,3: "
270 NEXT A
280 RETURN
290 STOP
300 GOSUB 250
310 PRINT AT 10,4: "YOUR TASK IS
TO ROB THE TAB 11: TAB 4:
HERIFF'S GOLD AND TAKE TAB 5: TA
B 4: "IT TO YOUR HIDEOUT IN TAB
5: TAB 4: "THE WOODS. THE PACE HOTS
TAB 3: TAB 4: "UP EACH TIME YOU
SUCCEED."
320 IF INKEY$="" THEN GOTO 320
330 GOSUB 250
340 PRINT AT 10,4: "THE PASSAGES
ARE GUARDED": TAB 5: TAB 4:
"AY ON YOUR TOES. YOU": TAB 5: TAB 4
"HAVE 10 LIVES AND MUST": TAB 5:
TAB 4: "MAKE 12 TRIPS IN ALL": TA
B 5: TAB 4: "GOOD LUCK"
350 IF INKEY$="" THEN GOTO 350
360 GOTO 210
370 GOSUB 250
410 PRINT AT 10,15: "1": TAB 11:
"1234567890": TAB 9: TAB 8: "OWER
T: HUKLE": TAB 9: TAB 8: "ASDFG
HUKLE": AT 17,11: "ZXCVBNM.2"
TAB 14: "EOLN"
420 IF INKEY$="" THEN GOTO 420
430 GOTO 210
500 RAND
510 LET L=USR 17394
520 LET S=PEEK 16447
530 PRINT AT 23,10: "PRESS A KEY
": AT 23,10: "PRESS A KEY"
540 IF INKEY$="" THEN GOTO 530
550 POKE 16418,2
560 CLS
570 PRINT TAB 11: "GAME OVER": TA
B 11: "-----"
580 PRINT "SCORE=": S
590 IF HI>S THEN GOTO 620
600 PRINT "A NEW HI-SCORE."
"PLEASE INPUT YOUR NAME."
610 INPUT H$
615 LET HI=S
620 PRINT "HI-SCORE=": HI: "
BY: H$
630 PRINT AT 21,10: "PRESS A KE
640 IF INKEY$="" THEN GOTO 640
650 GOTO 5
700 SAVE "OUT"
710 RUN

```

The hex dump.

```

16514 - 0707070707070303 = 48
16522 - 0303030303030303 = 24
16530 - 0303030303030303 = 24
16538 - 0303848484848484 = 796
16546 - 7605353535353535 = 640
16554 - 00000000000028181 = 2650
16562 - 816223232010000000 = 520
16570 - 00000000000080805 = 733
16578 - 8576053535353535 = 123
16586 - 0000000000000033 = 640
16594 - 30803030800000000 = 384
16602 - 00000000000030805 = 778
16610 - 5585760535353535 = 1024
16618 - 80803030800000000 = 1076
16626 - 80803030800000000 = 1024
16634 - 80803030800000000 = 1024
16642 - 8085760535353535 = 778
16650 - 80803030800000000 = 1024
16658 - 80803030800000000 = 1076
16666 - 80803030800000000 = 1024
16674 - 8080353576053535 = 778
16682 - 80803030800000000 = 1024
16690 - 80803030800000000 = 1076
16698 - 80803030800000000 = 1024
16706 - 8080303085760500 = 645
16714 - 00000000000000000 = 0
16722 - 00000000000000000 = 0
16730 - 00000000000000000 = 0
16738 - 0000000000357605 = 256
16746 - 8A8A8A8A8A8A8A8A = 1104
16754 - 8A8A8A8A8A8A8A8A = 966
16762 - 8A8A8A8A8A8A8A8A = 1104
16770 - 8A8A8A8A8A8A8576 = 1079
16778 - 85000000000000000 = 5
16786 - 00000000000000000 = 0
16794 - 00000000000000000 = 0
16802 - 0000000000000035 = 133
16810 - 76058A8A8A8A8A8A = 951
16818 - 8A8A8A8A8A8A8A8A = 1104
16826 - 8A8A8A8A8A8A8A8A = 966
16834 - 8A8A8A8A8A8A8A8A = 1104
16842 - 8576050000000000 = 256
16850 - 00000000000000000 = 0
16858 - 00000000000000000 = 0
16866 - 00000000000000000 = 0
16874 - 003576058A8A8A8A = 808
16882 - 8A8A8A8A8A8A8A8A = 1104
16890 - 8A8A8A8A8A8A8A8A = 1104
16898 - 8A8A857605000000 = 532
16906 - 00000000000000000 = 0
16914 - 00000000000000000 = 0
16922 - 00000000000000000 = 0
16930 - 00000000000000000 = 0
16938 - 0000003576058A8A = 932
16946 - 8A8A8A8A8A8A8A8A = 1104
16954 - 8A8A8A8A8A8A8A8A = 966
16962 - 8A8A8A8A8A857605 = 808
16970 - 00000000000000000 = 0
16978 - 00000000000000000 = 0
16986 - 0000000000357605 = 256
17002 - 8A8A8A8A8A8A8A8A = 966

```


SOFTWARE *File*

(continued from previous page)

RANDOMIZE USR 40000
to set up the new commands. The routine must

not go into the printer buffer as it uses this itself.

The routine works with any printer that uses Epson-type control codes such as the cheap Brother range. Make sure that the "B" channel

has been opened before calling the code. It can take quite a while to print the screen at the lower baud rates but only takes about a minute at higher speeds.

The hex loader.

```
10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2)
)-48-(7 AND h$(2)>"9")
20 INPUT "Start ";s
30 INPUT "Finish ";f
40 FOR n=s TO f STEP 8
50 LET tot=0: PRINT n;": ";
60 INPUT h$: PRINT h$;
70 LET x=0
80 FOR b=1 TO LEN h$ STEP 2
90 LET z=FN h(h$): LET tot=tot
+z
100 POKE n+x,z
110 LET h$=h$(3 TO ): LET x=x+1
120 NEXT b
130 PRINT " = ";: INPUT t: PRIN
T t
140 IF tot<>t THEN PRINT "input
error - try again": GO TO 50
150 NEXT n
160 REM enter STOP to stop
```

Header program.

```
5 OPEN #3,"b": FORMAT "b",960
0
10 CLEAR 32767
20 LOAD ""CODE 32768
30 RANDOMIZE USR 32768
40 CLS
50 PRINT "" "COPY # and
COPY #"" are now avai
lable"
```

Hex dump.

```
32768: 210C00009E5CF31E1 = 764
32776: 22B75CC9FE31C2F0 = 1247
32784: 013E4B32505CD720 = 703
32792: 00FE23280AFE24C2 = 823
32800: F0013E4C32B05CD7 = 912
32808: 2000CDB7053E03D7 = 705
32816: 01163E1BD710003E = 405
32824: 41D710003E04D710 = 593
32832: 003E0DD710003E0A = 378
32840: D71000060000E0DD = 472
32848: 21005B79CB3F6F78 = 742
32856: E6300F6778E60E07 = 767
32864: 070707B56F78E601 = 664
32872: 0707B4F64067C506 = 810
32880: 08E516003E084E58 = 495
32888: CB391D20FBCB1224 = 829
32896: 3D20F37ADD7700DD = 1019
32904: 23E110E5C10C0C79 = 843
32912: FE4038BFC53E1BD7 = 1066
32920: 10003AB05CD71000 = 573
32928: AFD710003E01D710 = 700
32936: 0021005B06007ED7 = 471
32944: 10002310F93E0DD7 = 606
32952: 10003E0AD71000C1 = 512
32960: 040478FE3038863E = 682
32968: 1BD710003E32D710 = 601
32976: 00C3C10500000000 = 393
```

Key Helper

Colin Newcombe,
Sudbury,
Suffolk.

Amstrad

THIS PROGRAM defines most of the keys, A-Z, to print whole Basic keywords without affecting the numeric keypad. The program uses less than 1K of memory.

In the CPC-464 User Guide, there is a paragraph of key defining which tells you very briefly about the numeric keypad which can be used as function keys — this makes 12 function keys, key numbers from 128-139.

The other 20 function keys are not mentioned and are left out of the user guide. The program which I have written uses these 20 and leaves the numeric keypad alone so it can be used as normal because many people use the keypad for entering Data than using the normal top row number keys.

I have made it as easy as possible to remember which key prints which keyword. The keywords are called by pressing Control and a Key:

A = AFTER	L = LOCATE
B = BORDER	M = MODE
C = CHR\$(N = NEXT
D = DATA	P = PRINT
E = ELSE	R = RETURN
F = FOR	S = SYMBOL
G = GOSUB	T = THEN
H = HEX\$(U = UPERS
I = INKEY\$	V = VAL(
K = KEY	W = WHILE

As you can see, it is very easy to remember which keywords each key prints. If this sounds complicated then I suggest you sell your micro! I have tried to use the most commonly used

keywords. All of the keys can be reset to normal by:

CAL &BB00

Using this very short program you can speed up programming and make typing in listings easier and much quicker.

```
100 REM *****
110 REM *** Key Helper ***
120 REM * Colin Newcombe *
130 REM ***** 3-6-85 *****
140 REM * Software File. *
150 REM *****
160 REM
170 REM - Loop to define KEYS -
180 REM
190 FOR big.key%=140 TO 159
200 READ message$,letter$,key.number%
210 lower%=ASC(LOWER$(letter$))
220 upper%=ASC(UPPER$(letter$))
230 KEY DEF key.number%,1,lower%,upper%,big.key%
240 KEY big.key%,message$
250 NEXT big.key%
260 REM
270 REM - DATA for key defining -
280 REM
290 DATA "AFTER ",A,69,"BORDER ",B,54
300 DATA "CHR$( ",C,62,"DATA ",D,61
310 DATA "ELSE ",E,58,"FOR ",F,53
320 DATA "GOSUB ",G,52,"HEX$( ",H,44
330 DATA "INKEY$",I,35
340 DATA "KEY ",K,37,"LOCATE ",L,36
350 DATA "MODE ",M,38,"NEXT",N,46
360 DATA "PRINT ",P,27
370 DATA "RETURN",R,50,"SYMBOL ",S,60
380 DATA "THEN",T,51,"UPPER$",U,42
390 DATA "VAL(",V,55,"WHILE ",W,59
```


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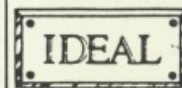
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DATABASE

Local, national and international micro events are updated here.

Making Music

Be warned, some days are trade only so check with the organisers before you wander in and check out all the new chip and computer-assisted ways of making music.

The event more properly known as the British Music Fair takes place from July 30-August 4 (first three days trade only) at Olympia 2. Organised by Philbeach Events, London. Telephone 01-385 1200.

Info North

The Information Technology and Office Automation Exhibition takes place at Belle Vue, Manchester from September 17 to September 19. Open to the general public, more details available from BED Exhibitions, 44 Wallington Square, Wallington, Surrey. Telephone 01-647 1001.



In line with defence cuts, Sinclair Spectrums (bought from the warehouses of old microcomputer distributors which have gone bust) are now controlling Britain's first-strike capability. Not entirely true, as the picture above shows Westland helicopters supreme Dr Jones demonstrating a special presentation version of Durell software's Combat Lynx to Major General Goodman of the Army Air Corps.

BBC Micro User Show

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hosts the BBC Micro User Show from September 27-29. £2 to get in if an adult, £1.50 for non-adults. Telephone Database Publications, Stockport for more details: 062 429 8080.

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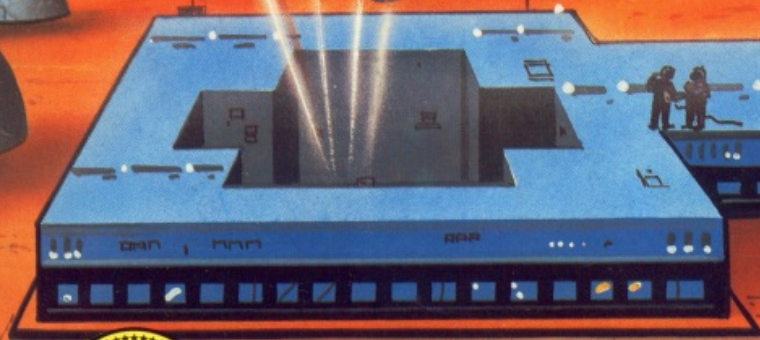
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