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4

CHANNEL FOUR TELEVISION

## YOUR OMPUTE DONOUS



Software Shortlist: page 39.



Win an Enterprise: page 51.



Landscapes: page 60.



Joe and the Alligators: page 64.

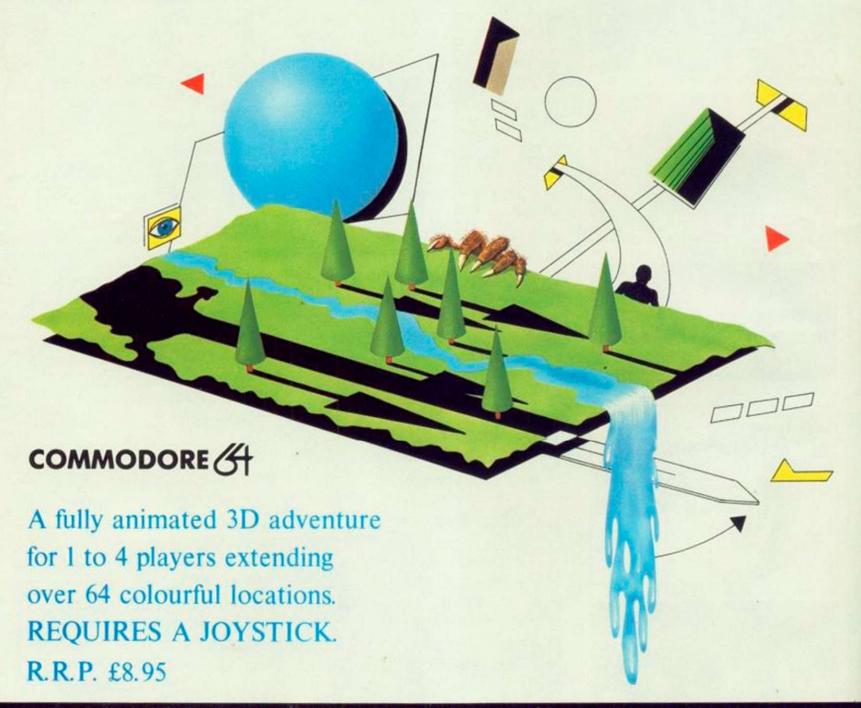


Cover: Crime and education features: pages 48 and 52.

- 20 NEWS: US Gold's projected airstrikes; tape cracker; hackers arrested.
- 25 LETTERS: Keep your old calculators; VDU viewing.
- **29** FIRST BYTES: We help you hack it in the micro jungle.
- **33** COMPUTER CLUB: A Scottish busman's holiday on the databuses.
- 35 HARDWARE HITLIST: Put your QL in touch with the big wide world, courtesy of OEL's QCom package; the Quick Disk alternative to floppy disc drives is tested.
- **39** SOFTWARE SHORTLIST: Dogfight with Mirrorsoft's Spitfire 40; Beyond's Shadow-fire with stunning icon graphics; Flyer Fox talking flight all the hits and more.
- **7** QUEST CORNER: Hugo North and the Heroes of Karn; casing Melboune House's latest criminal program Grand Larceny; and spoof Quest for the Holy Joystick.
- HOW COMPUTER CRIME REPORT: Trapdoors, Trojan horses, magic codes. Meirion Jones hacks his way through the mythology of computer crimes and capers.
- **51 COMPETITION:** Beat the system, win an Enterprise. What sort of a sneaky add-on would you like to have on your computer?
- GAN A MICRO HELP YOU PASS EXAMS? Our man at the chalk face, Pete Connor, dons his mortar board and stalks the groves of Academe, cane at the ready.
- MATHS MASTER: Colin Carruthers puts two and two together.
- LANDSCAPES: Brian Jones opens
- 64 CBM-64 JOE AND THE ALLIGATORS: Fryin' up a mess o' catfish, goin' down to the store and buy some gingham for Emmy Lou. A peek and poke salad from F Tout.
- 66 BBC TANKS: Nick Sheard puts something nasty in your briar patch. An armoured division. Time to get the old Sherman out of the garage. Tanks for the memory.
- VIC-20 TANKS: Serge Simon makes tracks for new territory. The native tanks aren't friendly. The game that took the Rom out of Rommel.
- 72XX SPECTRUM SNAKES ALIVE: A 100 percent machine-code game for any Spectrum. Kahn the snake has to collect nine eggs. 48 locations and joystick option.
- 8 ZX-81 SURVIVOR: Adrian Spriddell's condensed version of the ZX-81 graphic adventure game Survivor. Contains 10 of the original levels.
- 83 AMSTRAD JUMPER: An arcade quality game for the Amstrad CPC-64 in which you guide a little man called Jumper to the top of the screen. By Jason Charlesworth.
- **86** TELSOFT: This month we extend the Telsoft service to Commodore 64 owners. On Telsoft this month are Toolkit, Compiler and Space Junk.
- ZX SPECTRUM TOOLKIT: User-friendly Dave Spagnol brings you a really useful toolkit which avoids single key entry and default values.
- BBC COMPILER: Suitable for use on the Electron as well, describes a compiler which 4 enables programs to run five times faster.
- 99QL ZOOM: Software-based magnifying glass by Carsten Greave.
- **02** QL PLOTLINE: Mark Jones draws a better box.
- CONSUMERS' GUIDE TO DATABASES: John Dawson accesses some useful sources of information on his BBC.
- **9** COMMODORE CBM-64 REPEAT UNTIL: M C Hart shows you how to nest loops to a theoretical limit of 22 deep.
- COMMODORE CBM-64 TRAX DISC EDITOR: Keith Suddick shows you how to avoid the trauma of your 1541 disc drive turning work into garbage.
- CBM-64 SPACE JUNK: Nalin Sharma is lost in space.
- 19 RESPONSE FRAME: Tim Hartnell advises confused users.
- SOFTWARE FILE: Ten pages packed with programs.
- 6 DATABASE: Paul Bond rounds. up forthcoming micro events.

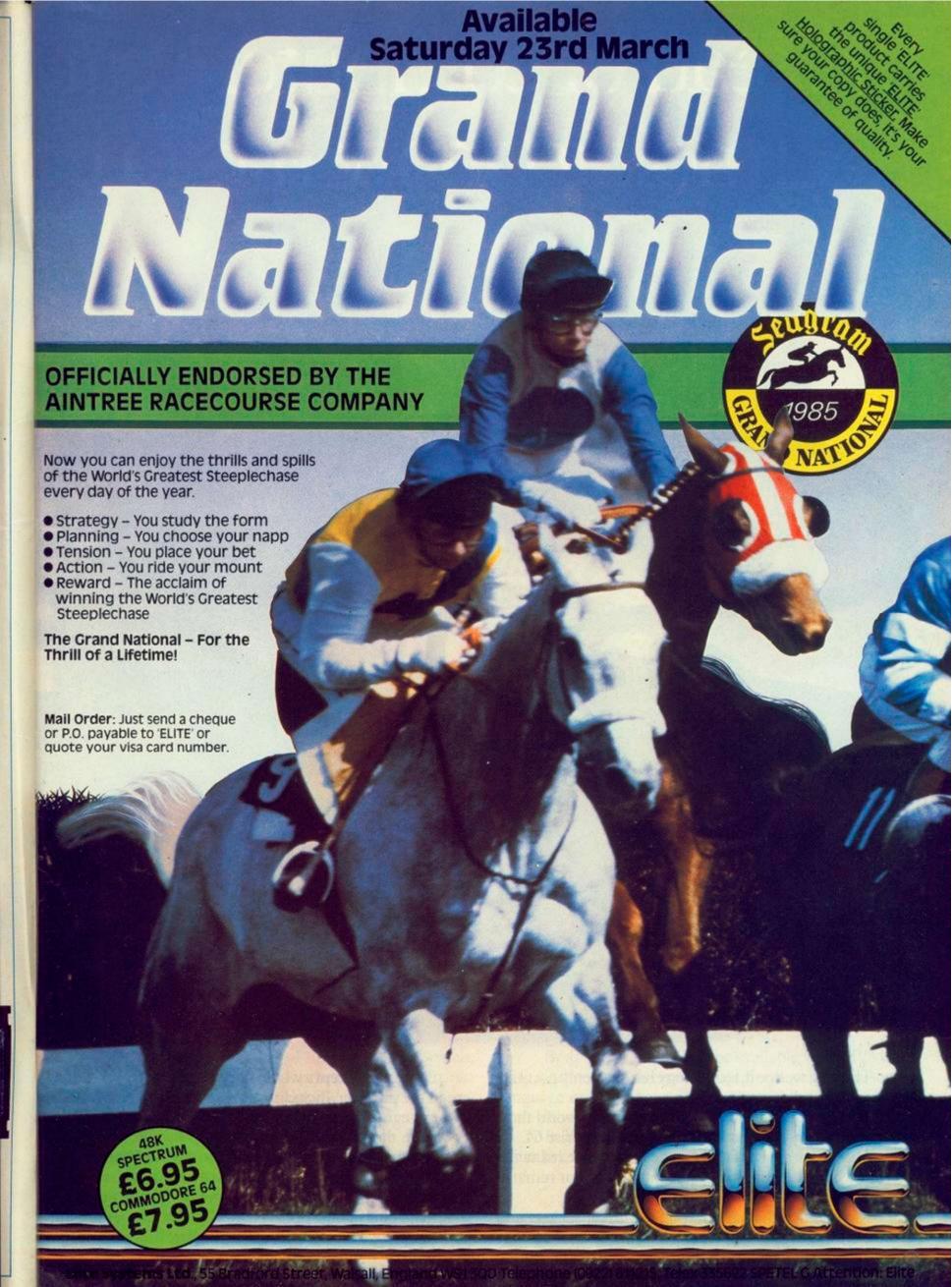


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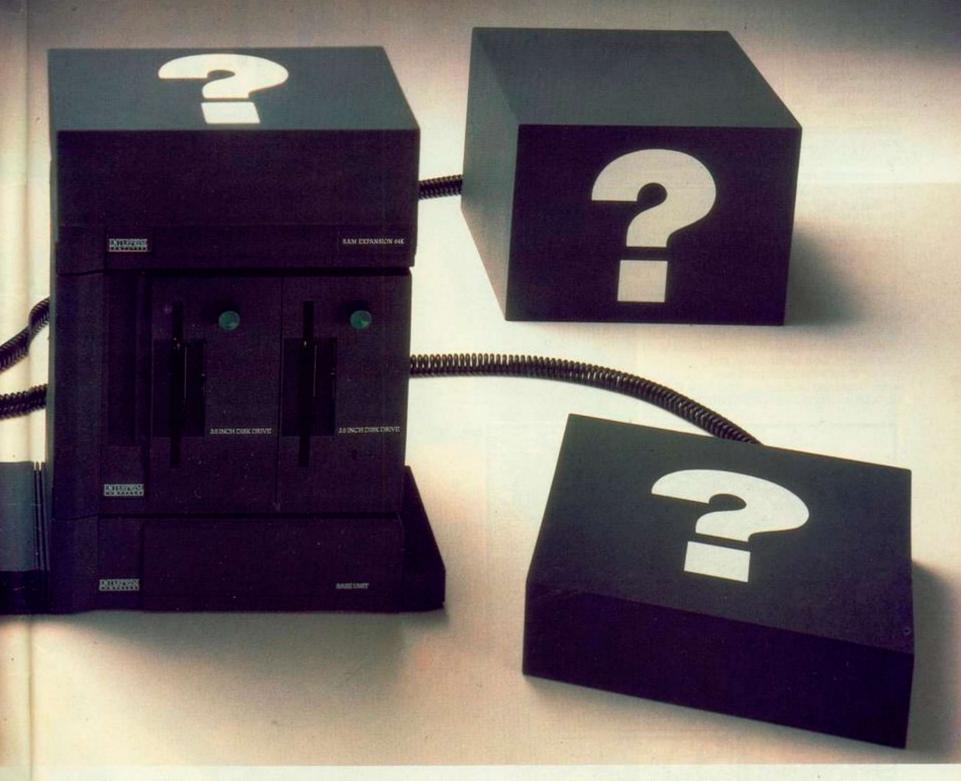
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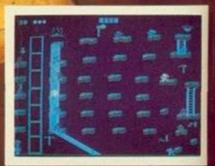
Bounty Bob returns in this new and exciting follow-up adventure to Miner 2049er. This time around it's even tougher than before and Bob needs your help more than ever to guide him through the mines. The mutant organisms have multiplied and over-run the mine entirely, making it extremely difficult to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

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## his is what they said about Miner 2049

Miner 2049er emerged as the unequalled

Miner 2049er emerged as the unequalled popular choice among Arkie (like Oscars) voters. Going strictly by the popular vote it would have, or come close to, copping no fewer than three 'Game of the Year' Arcade Awards.

The Arcade Awards Judging Committee having heard the voice of the gaming nation, recommended that a new award be created this year and given to Miner 2049er. It therefore gives us great pleasure to announce the institution of the 1984 Grand Arcade Award for the Best Electronic Game of the Year.

Editors of Electronic Games

this delightful multi-screen climbing and Jumping game has ascended the next rung on the ladder of fame in the same high style by coasting to a triumph in the Hall of Fame significance as well as intrinsic value. It was the first electronic game designed for the home market which could be played on almost every videogame and computer system. The multipublisher licensing made Miner the first home game to acquire a hobby-wide reputation on a par with leading games found in the family amusement centres. Bounty Peb Lives:

Electronic Games Hall of Fame

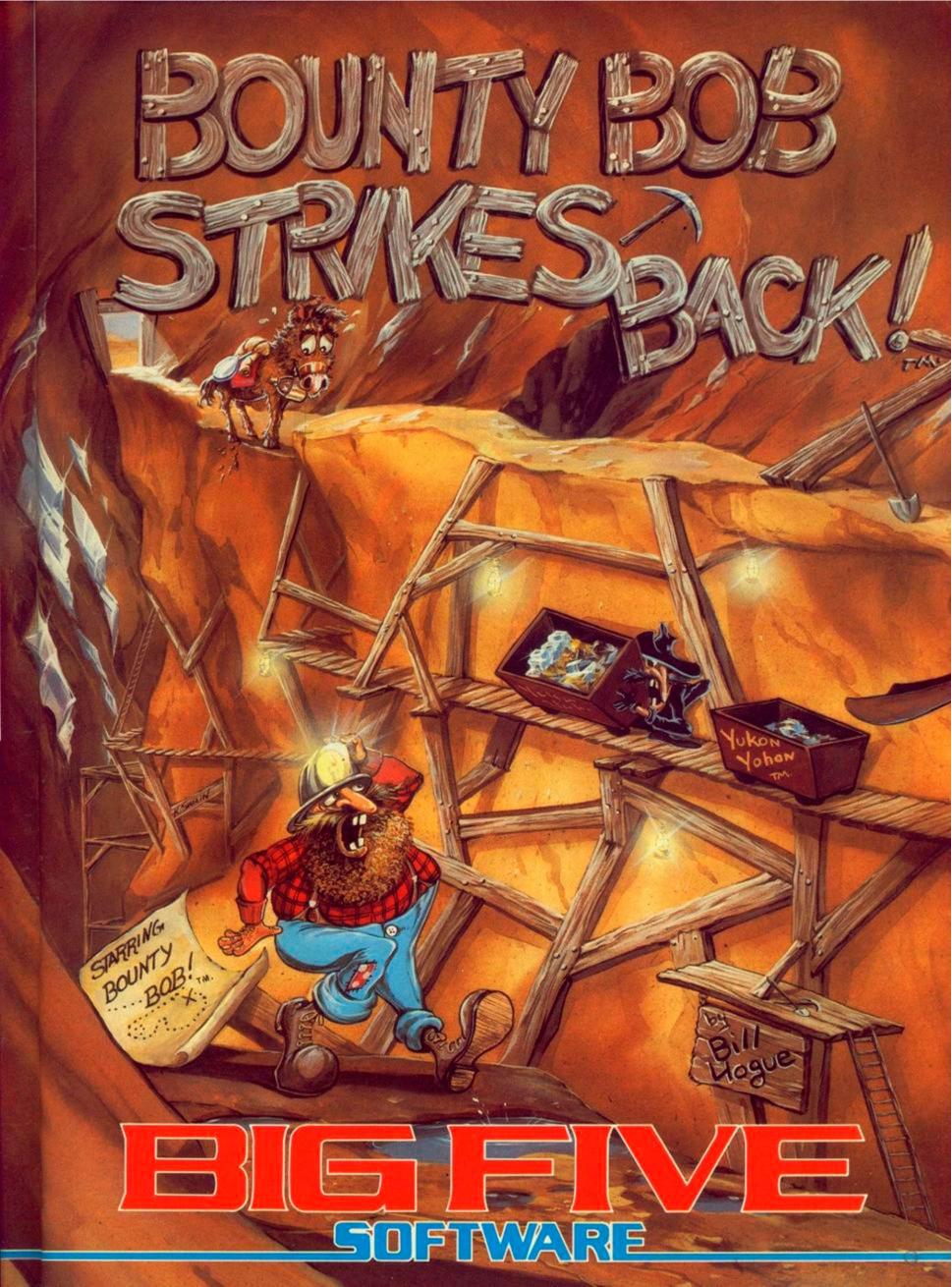
## Bounty Bob will leave them speechless!

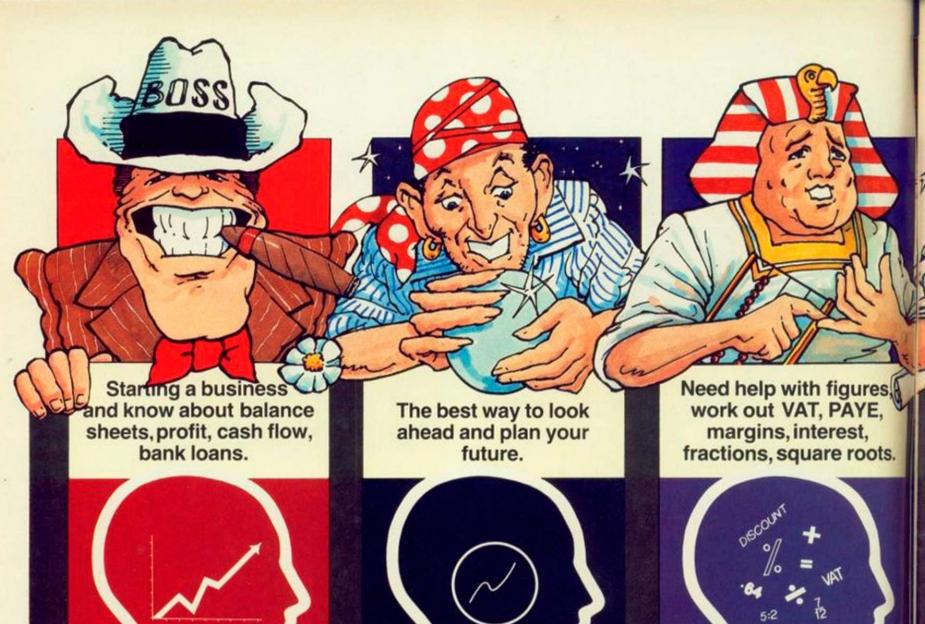


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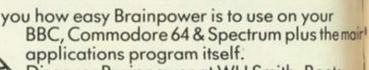
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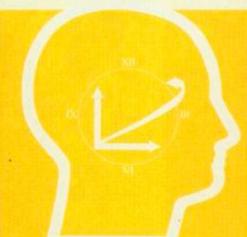
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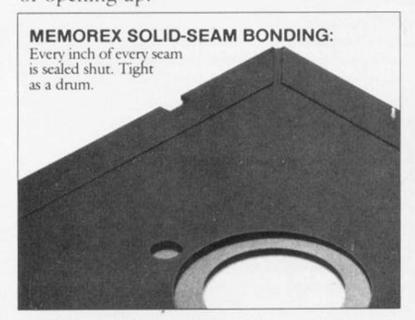
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Quasi knows a secret! Quasi knows where the jewels have been hidden in the castle and only Quasi can climb there.

They better leave Quasi alone, 'cause Quasi is getting mad. Quasi better hurry and find the jewels. Not much time. Quasi sees lots of soldiers. Quasi has lots of rocks.

Now the noise has stirred up the bats in the belfry. The bats are mean, they make Quasi fall down. Quasi better jump away from those bats.

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## SILICON BOBBIES FLEX THEIR KNEES

As TV SETS BLARE out the British Telecom "It's for you-hoo" ad slogan, hackers quite clearly only get interested when it isn't.

Breaking into unauthorised pages or parts of computers is their idea of having a good time. And although these electronic trespassers might agree that what they do is wrong, they would argue that it's really only good clean fun.

Comparisons with the early, illegal days of CB radio may seem inevitable — doing something you shouldn't — but with little risk of being caught. Yet whereas citizens' band eventually became legal, there is little chance of hacking becoming so. On the contrary, recent events show that the authorities are clamping down. The arrest of two hackers in London may be a taste of what is to come.

Armed with only a home computer, modem and telephone, hackers see their hobby as a test of ingenuity: the authorities see it as a challenge to security.

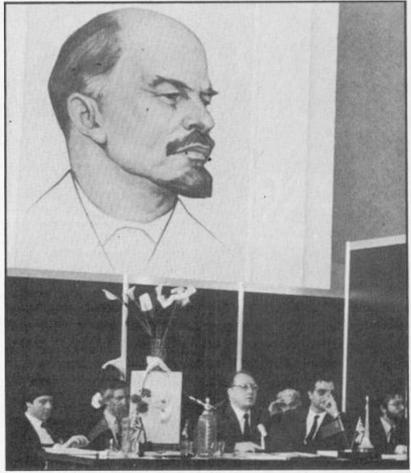
The current flood of hacking stories may be seen as bad publicity for the likes of Prestel but surely they could equally be welcomed for pointing out glaring deficiencies in system security.

After all, because networks like Prestel offer some subscribers a promise of confidentiality and are under obligation to make their system secure, it must be better that if security is to be breached it is done by people for fun rather than by vandals or criminals for financial gain.

Some claim that it is not unknown for a new network to release passwords to the hacking fraternity to test out its ability to react to breaches in safeguards. Hackers aren't interested in making use of information once they have gained access to it. They might occasionally leave a calling card by, for example, changing a letter in an unimportant word just to say they have visited.

Perhaps the recent spate of publicity surrounding hacking could actually help telecomms in general by encouraging home computer owners to buy modems. There are plenty of legitimate applications around such as *Your Computer's* Telsoft service, Prestel and Micronet 800. It seems sad that at a time when interest in modems is increasing, one of Britain's main home computer modem manufacturers, OEL, has gone into receivership. The good news is that you can still pick up one of its modems for around £40.

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Memotech negotiates in Moscow.

# KREMLIN'N CHIPS

RUSSIA needs one million micros in its schools to fulfil the next Five Year Plan and British companies are queueing up to offer their products.

Surprise front runner at the moment is Memotech backed by the Spectrum Group USSR Consortium headed by Dudley Langmead. Memotech has already produced a full Cyrillic keyboard and Rom for its MTX range but since Gorbachev came to power the pace has quickened and last

month Langmead, together with Branton and Tupper from Memotech, met Soviet officials in Moscow.

The USSR might import the first 50,000 computers readybuilt then switch to components and eventually self-production in a deal worth £100 million a year.

But Acorn and Sinclair are not out of the hunt — with Sinclair claiming that 100,000 Spectrums have already been unofficially exported to Eastern Europe.

## Wrist micro

SEIKO'S new computer terminal in a wristwatch is the ultimate gimmick. Just plug it in to your Commodore 64 and it can receive 2K of data which can then be displayed over 80 "pages" of its two-line 24-character LCD display.

If you must use the £120 RC-1000 as a mere wristwatch you can still plug it in to your CBM-64 and use the big TV screen to set up messages which can be timed to appear at any time



Ultimate gimmick

over the next year on your watch to remind you of birthdays and anniversaries.

## TIME FOR 128K How to fast load

## **Commodore sorts chaos**



Commodore going to any lengths to dispose of surplus stock.

AMSTRAD, Enterprise and [ Commodore are launching their new 128K computers into the middle of a price war caused by the low Christmas sales which have left half a million lower specification machines still clogging up the warehouses.

Amstrad's CPC-664 will

resemble the 464 except for the extra memory and built-in disc drive to replace the tape. Like the Commodore 128 it will be able to run CP/M programs although the CBM-128 "Shotgun" will also be CBM-64 compatible.

Its lack of compatibility with the C-16 and Plus-4 range prob- | things out.

ably means that the writing is on the wall for the two most recently introduced Commodores which are already being heavily dis-

No wonder Commodore U.K. is recruiting an IBM executive as General Manager to try to sort

## **BODY SYSTEMS AS** ENTERTAINMEN

"THE THING about computers is that they lack intentionality. Essentially, they don't want to do anything - they're happy to follow orders." After two years' break from theatrical work, it is clear that Dr Miller is bubbling with ideas generated by study at the University of Surrey concerning artificial intelligence, and is almost more keen on discussing this than Bodyworks - the computurised follow-up to his pop-up book The Human Body.

Dr Miller first rose to prominence as part of the 60s revue Beyond the Fringe which spawned such stars as Peter Cooke, Dudley Moore and playwright Alan Bennett. Apart from his work directing opera and stage plays, he more recently conducted a guided tour of the human body in BBC TV's The Body In Question.



Miller's body works

Together with the directors of the production company, Genesis, Jonathan Miller believes that there is a gap between serious business or educational software and games. Bodywork reviewed in this month's Software Shortlist is the first in a series of programs intended to fill this gap.

Genesis' future projects include a pop-up book and probably a computer game designed in co-operation with the Natural History Museum, London. And for Dr Miller? "I'd like to do a program devoted entirely to memory.

As a doctor how does he feel about the use of computers in hospitals? "Quite good in certain respects — diagnostic machines are less forgetful, but they have no intuition. Attempts to use them in psychoanalysis, as happened with Weizenbaum's Eliza program, are a reflection of the impoverishment of our lives "

## hits on a Spectrum

ALL THAT tedious messing about with assemblers is a thing of the past with the Transformer, a utility from Soft Machine, guaranteed a farm welcome from FAST - or possibly a writ.

This utility contains specific routines for copying 30 of the most recent blockbusters, including the chart-topping Alien 8 and Cycline. Adding insult to injury, it even copies. them to Microdrive, leaving out such space-wasters as loading screens. So legitimate back-ups can be made of your own

## Wafadrive speeds up

THIRTY SECONDS to load any program on a Commodore sounds too good to be true, but that's the claim for the new £99.95 Quick Data Drive. That compares well with cassettes which take anything up to a quarter of an hour, and even the 1541 disc drive's take two minutes.

The drive, from Dean Electronics for the CBM-64 or Vic, plugs into the cassette port. Once the system is booted up by pressing Shift/Run, you have the usual Load, Save, and data storage commands. There is also a System file which gives directory, formatting and copying commands. The drive uses the same technology as the Rotronics Wafadrive.

## on screen

WHILE gearbox problems halt production of the real C5 tricycle, Scorpio Gamesworld has cashed in with a C5 Clive Spectrum arcade game.

You have to keep picking up batteries if you want to keep going through 50 screens of hazards between the shop and your home.

Link to Giant Mainframes and network to thousands of Micro users via your 'phone with free Modems and Comms software in the British Telecom Modern competition.

British Telecom is offering 1000 free gift packs to plug direct into your home 'phone line.

## T'EL.ECOM

## **1000 FREE MODEMS**

500 for Spectrum/Spectrum + 350 for BBC Model B 150 for Commodore 64

And if you haven't got a squaretype BT phone socket, British Telecom will arrange to alter your installation at no charge!

HOW TO ENTER

(Monday 22nd April to Sunday 5th May 6pm to midnight)

For the 5 questions 'phone

01-627 3000 or 021-449 9944 or

031-225 8999 To get the Tiebreaker Sentence 'phone 01-627 1199 or

0532 455030 or

0632 324444

Complete the entry form using your skill and judgement, and send it off in the next post.

#### RULES OF THE BRITISH TELECOM MODEM COMPETITION

- 1) The dial-in is available from 6pm Monday 22nd April to midnight Sunday 5th May 1985, when the competition closes
- 2) Entries must be postmarked the next working day after the questions and tiebreaker were obtained.

- Entries can only be made on the official entry forms and become the property of British Telecommunications plc. 4) The competition is open only to residents of the United Kingdom over the age of 18 years. Employees of the Network Marketing Unit of British Telecommunications pic and PARKER REDMILE LTD, and their dependants are excluded. Only one winning entry perhausehold.
- Entries not reaching the competition address before midnight on Thursday 9th May 1985 will not be considered.
- A list of winners will be provided at the competition address. Please send an SAE if you wish to receive it.
- The winners will be picked as follows from entries received on time and properly completed The entries for each type of prize pack with all correct answers to the 5 questions and with the tielbreaker sentences judged most apt and humorous
- by the competition organisers will be chosen, subject to the stock of appropriate prize packs.
- 8) The decision of the competition organisers is final and no correspondence will be entered into. Winners will be notified automatically.

  9) British Telecommunications plc offers winners requesting BT phone socket
- conversion on entry forms to waive the charge normally made for such work Details of how to get on Prestel / Micronet 800 / Telecom Gold will be sent to winners. Subscriptions not included in prize.

OFFICIAL ENTRY FORM

A. Your answers:

Q1 ..

02

B. Tiebreaker Sentence complete (25 words or less in total):

If I win, I would like the prize pack for the ■ SPECTRUM/SPECTRUM +

☐ BBC MODEL B

(Tick Choice)

□ COMMODORE 64

D. My home telephone line (\* Delete as appropriate)

(a) already has a square-type BT 'phone socket \* or

(b) would need converting to square-type BT 'phone socket."

If (b), the person renting the line from British Telecom must fill in this declaration-If this is a winning entry, I agree to ask British Telecom to convert my line to square-type BT 'phone socket at a convenient date before 1st July 1985. My line is on Residential rental, is not a coinbox and is not shared service. Lunderstand British Telecom will not charge for doing the work

Telephone number

Signature ....

1985

E. I have read the rules of the British Telecom Modern competition and agree to abide by them. I am over 18 years old.

Signature of entrant

Date ..... . (Block Capitals) Name ..

Address

Postcode

POST IMMEDIATELY TO:-British Telecom Modern Competition PO BOX 73

MITCHAM SURREY CR42XU

(Postage stamp required)

WINNERS WILL BE NOTIFIED AUTOMATICALLY

British Telecommunications plc. Registered Office 81 Newgate Street LONDON EC1A 7AJ. Registered in England no. 1800000



## **Hacking** charges against Mouse

STEVE GOLD, otherwise known as Micronet's Micromouse, and Robert Schifreen, a freelance journalist, were arrested on Wednesday night, 27th March.

The two men were taken to Holborn Police Station, where they were charged the following morning with offences under the Forgery and Counterfeiting Act 1981. A Scotland Yard spokesman said that this was "the first ever police operation in this country into the alleged use of computers to interfere with other computers". He said, "Officers from the Computer Crime Unit of the Metropolitan and City Fraud Squad in an operation in the Edgware area of London and the Crosspool area of Sheffield arrested the two men.

The raids were made in cooperation with the British Telecom officials and South Yorkshire Constabulary, under a warrant issued under section 7 of the Forgery and Counterfeit Act of 1981. They follow a three month operation into the alleged interference with the Prestel system and warnings from police that publications such as The Hacker's Handbook might incite people to break the law.

Century, the Handbook's publishers, has denied that either of the men charged is connected with the Handbook and the police admit that the arrests had no connection with the Hacker's Handbook, but they are still investigating it.

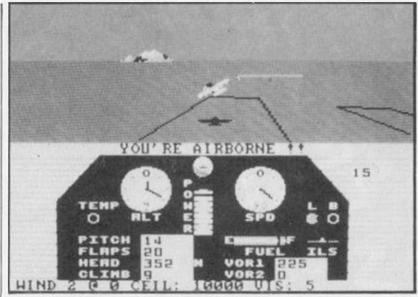
The charge the two men face is that they "forged an instrument, namely an electronic device, for recording information on the Prestel Gateway and the Kipling, Dickens and Keats Prestel computer, contrary to section 1 of the Counterfeit and Forgery Act

## RIGHT STUFF Pilot's Kennedy Approach

"I'M SELLING these games to men. If you haven't got the right stuff, I don't want to know." rasps Bill Stealey, president of MicroProse Software. Home of such hits as F-15 Strike Eagle, Nato Commander and Solo Flight, MicroProse programs are currently available in this country under the US Gold banner.

The next phase of ex-fighter pilot Bill's assault on the British software market via the US Gold beach-head has three main components: the Command series of Eastern Front style war games; a re-vamped version of Solo Flight and a remarkable air traffic control simulation called Kennedy Approach.

The Command series simulations allow you to play against the computer or against another player. The first two games available in the UK feature multiple scenarios ranging from single missions to in-depth campaigns. Crusade in Europe puts you in command of the Allied or German forces in Europe from D-Day to the Battle of the Bulge, and Decision in the Desert allows you to be either Monty or the Desert Fox in North Africa



Solo Flight needed a revamp.

from 1940 to 1942. Both games have a 10-screen scrolling map, strategic maps, game save and a flashback function.

Air traffic controllers are one of the sectors of the American public most prone to heart attacks. You can now expose yourself to this threat in the comfort of your own home with Kennedy Approach - students of American labour relations will be disappointed to know there is no strike option in the £14.95

game. But it features excellent synthesised speech - right down to the blast of static that you always hear in the movies when the pilot replies to the tower.

US Gold plans to market the Command series at £20 - a stiff price? "I'm not interested in the kind of guy who just wants a short thrill," says Bill Stealey." If you want to spend £6 on an arcade game that you're going to play for an hour, I don't want you buying my software."

## PSION EYES

PSION'S ORGANISER is now helping Marks and Spencer fight Chargecard frauds quickly and conveniently.

The Organiser enables assistants to validate a card on the spot without the usual time delay in getting telephone confirmation from the central office. The Eprom datapak is loaded with the latest list of invalid cards and distributed to the stores overnight, making stolen cards virtually worthless within 24 hours of being reported lost.

Other Organiser applications include the Wessex computerised on-site building estimates system, and a prescribed drug calculator, giving a dosage, precautions to be



Wessex hard hat

taken and side effects of 280 commonly used drugs. Entering the symptoms produces a list of recommended drugs.

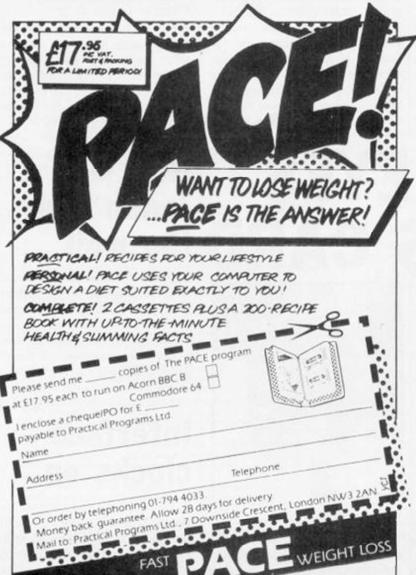
### New Gen Jonah and the wail

CLOSE YOUR eyes and you could be playing squash at the highest level - although you might miss the ball. New Generation's talking squash for the Spectrum uses a synthesised version of Jonah Barrington's voice to read out the

#### Interface clocks on

IF YOU HAVE an Electron with a Plus 1, Cumana's new disc interface plugs straight into the cartridge port. The interface contains a battery-backed real-time clock for date stamping.









MUSIC SYNTHESISER (Stereo) - 16 LINE CONTROL PORT

Play 3-part music, sound effects, drums etc. Full control of attack, decay and frequency Input Output lines provide control and monitor facility for Home Security. Robot Control. Model Railway etc. etc. Works with or without 16K RAM.

Full instructions software included Add keyboard to make a live performance polyphonic synthesiser!

Note: up to 3 units can be used simultaneously giving 9 music channels & 48 l 0 lines

NEW! VIBRATO CONTROL

AMAZING VALUE AT ONLY £19.50 (KIT) £25.50 (BUILT)

#### THE COMPOSER Synthesiser Music 0 Programme Enter & play 3 part harmony F Includes demonstrations (Spectrum ZX81)recommended £7 Т

TALKING HANGMAN For Chatterbox

The classic game claims its victims with a dry vocal accompaniment (Spectrum) £6

ZX ARP/DRUMSEQ Fascinating synthesiser demonstrations. Generates automatic sequences and plays from keyboard. Some weird effects (Spectrum) 63

## CHROMACODE??????

KIT £16

BUILT £22

Can you defuse the bomb by cracking the secret combination before time runs out? With Chatterbox voice output (Spectrum) 63

#### COLOUR MODULATOR

RGB in. PAL UHF out (not for ZX)

Please add VAT at 15% to prices Barclay/Access orders accepted by telephone

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All enquiries

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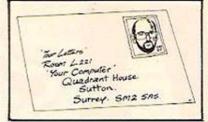
Quarley Down House Cholderton Nr Salisbury Wiltshire SP4 ODZ Tel 098 064 235

#### **TOP 20**

		Game	Company	Machine
	1	Booty	Firebird	Sp
	2	Everyones a Wally	Microgen	Sp
	3	Starstrike	Real Time	Sp
	4	Match Day	Ocean	Sp
	5	Atien 8	Ultimate	Sp
	6	Ghostbusters	Activision	Sp
	7	Wild Bunch	Firebird	Sp
٠	8	Monkey Magic	Solar	16
-	9	Broad Street	Argus	64
	10	Skool Daze	Micro- sphere	Sp
	11	Airwulf	Elite	Sp
	12	Blackbusters	Macsen	Sp
	13	Overdrive	Superior	ER
	14	Technician Ted	Hewson	Sp
	15	3D Time Trek	Anirog	16
	16	Go Go Ghost	Firebird	64
	17	Byte Bitten	Firebird	Sp
•	18	Dukes of Hazzard	Elite	Sp
	19	Mini Office	CDS	Sp
·	20	Bumper Bundle	Alligator	EI
EI DI AI	= = = = = = = = = = = = = = = = = = = =	Spectrum/Bc Electron/Vc = Dragon/64 = Amstrad/Or New release/—	Vic-20 CBM 64 = Oric/At = Same	= Atari
S	our	e: WH SMITH		

### TOP 3 BY

		MACH	HINE	
		Game	Company Ma	chine
	1	Vegas Jackpot	M, Tronic	Vc
-			Mr Micro	Vc
-	3	Duck Shoot	M. Tronic	Vc
	1		Beau Jolly	64
	2		M. Tronic	64
	3	BMX Racers	M. Tronic	64
	1	Bruce Lee	US Gold	Sp
	2	Raid over	US Gold	Sp
		Moscow		
	3	Wizards Lair	Bubble Bus	Sp
	1			Dr
	2		S. Projects	Dr
	3	Dragon Chess	Oasis	Dr
-	1	Snooker	Visions	Вс
	2	Mini Office	Database	Bc
			Pub.	
=	3	Castle Quest	Micropower	Вс
=	1	Compilation Tape 1	English	At
199	2	ANY TAKEN OF THE OWNER, WAS IN	English	At
	13	Chess		
	3	F15/Strike	Centresoft	At
		Eagle		
=	1	Williamsburg Adv.		16
	2	Roller Kong	Melbourne	16
			House	
-	3	Stellar War/ Bitz	CBM	16
	1	Classis	Melbourne	
		Adventure	House	EI
1	2	Mini Office	Database	EI
	3	Overdrive	Superior	EI
4	1			Am
	2		Virgin	Am
-	3	Mini Office	Database	Am
S	out	ce = Websters	Software	



#### CONGRATULATIONS

IT IS ONLY on a very few occasions can I recall seeing in your columns letters from readers who have felt compelled to tell us of retailers who have performed a "service beyond the call of duty". We are so used to reading of late deliveries, damaged goods and exaggerated descriptions that we are flabbergasted when we encounter that almost extinct species, the "caring" supplier.

It is with real pride, therefore, that I bring to the notice of Your Computer readers Dr. Andrew Wright of Betasoft whose software application for the 48K Spectrum, Beta Basic, adds 30 extra commands and a further 20 functions in just 11K of code.

I recently bought a Rotronics Wafadrive for my Spectrum and discovered that because of overwritten addresses the drive was not compatible with Beta Basic. I wrote to Betasoft for assistance and, to my utter amazement, almost by return of post I received a reply from Dr. Wright advising me that the necessary modification was in hand and, upon satisfactory trials, I would be sent a copy.

Now, only a few weeks later, I have up and running a Wafa-based version of Beta Basic which, incidentally, has been upgraded to take better advantage of the drive and printer output facilities.

Peter Marles, Leeds. West Yorkshire.

#### **NUKE LEAR**

Do you know Nuke Lear from CCS? It's the best buy on the market! Why?

- It costs only £2.99!
- It is the only game that can be enjoyed by beginners and experts alike! Levels 1 and 2 are for kids, levels 3-7 are hard enough for the best shoot-'em-up champions, levels 8 and 9 will never be finished evey by the best!
- You get a free compiler with it! Just load it by typing

CLEAR 39999: LOAD "W" CODE 59900,5636

Then type in or load your Basic program. Type Randomise USR 60000 to compile it, Randomise USR 40000 (= start-address) to run the compiled version.

It will run 20-100 times faster than the Basic version.

H. Schneider. Hamburg, West Germany.

#### **GOOD HACKERS**

I READ WITH interest your first bytes feature in the April 1985 issue of Your Computer. May I first make it quite clear that I am in agreement with everything you say about the



seem to delight in attempting to sabotage the efforts of serious DP users.

What I do not agree with is your statement about the origin of a hacker - that is someone who spent hours locked away with a home computer. Long before the advent of home computers the hacker had risen to an almost legendary status. The hacker was the person you sent for when you needed some catastrophic software failure - usually on a PDP-11 mini - fixed yesterday.

A good hacker - and by definition there were no bad ones - had, and indeed still has, the ability to fix anything, corrupted file, application program, system software or whatever, and fix it quickly. Naturally, some of these fixes were a little crude but such was the nature of the hacker own Prestel Mailbox. Our number is 01991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

that most tended to be rather elegant repairs that tended to become accepted as part of the software.

For such a fix the term "a neat hack" was coined.

> John Harper, Roker. Sunderland.

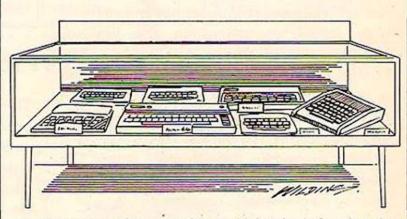
#### PRESTEL WARNING

I WISH TO issue a warning to future modem owners who are interested in subscribing to Prestel, the British Telecom Viewdata Service. The warning is watch out, you may be in an area which cannot get Prestel at local call

(continued on page 27)

#### "SAVE YOUR OLD COMPUTERS"

COMPUTER MUSEUM



I AM WRITING to ask your readers to think twice before throwing any old pieces of electrical equipment out, especially old calculators and computers.

The urge to collect in the human species is such that today's radios, calculators and especially computers will be tomorrow's collector's items - worth perhaps huge sums of money.

To prove my point, one only has to look at the prices old wirelesses fetch. In the days when such things were common, many people threw them away thinking that their ubiquity proved them worthless. And how wrong they were!

The reason I am making this appeal is so that posterity will be able to look at our present-day devices and marvel at their antiquity.

I am already beginning to build up a collection of old and obsolete microcomputers. They can be obtained for practically nothing, often in pristine condition.

So, think twice before you part with that old computer - it could be worth a fortune one day.

Robert Sedgwick, Grimsby, South Humberside.

# THE GAMES PLAYER

Our latest Interface for the Spectrum is the ultimate in games playing accessories. Not only is it a joystick-interface but also a games speed controller. This interface will enable you to become the master of any computer game.

#### Joystick Interface \_\_\_

When playing any game at normal speed the interface has all the features you would expect from a DK product. It is compatible with almost all games currently on the market and is fully Microdrive compatible. The port simulates in (31) command and will accept any joystick fitted with a 9 way D plug including the rapid fire types. (e.g. QuickshotII).

#### Freeze Feature

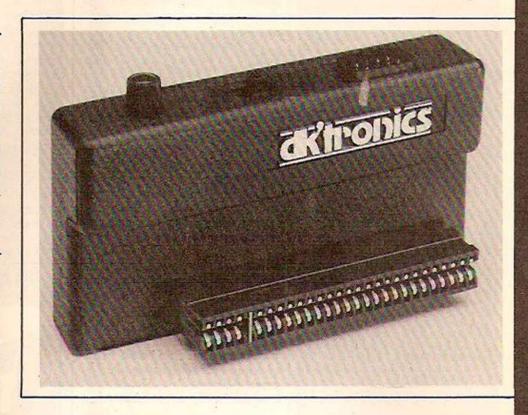
The secret of the interface is the "Freeze" control, after slotting the interface onto your Spectrum's expansion port you can adjust the speed of any game or program and even "freeze" frames simply by turning the speed control. The games controller has an extremely wide appeal; young children, the disabled, less experienced games enthusiasts, programmers and software developers will find individual benefits, you can slow games down to a complete stop and so improve your skills and high scores. You can also freeze individual screens to examine them in more detail. The freezer adds a new dimension to your games playing (or cheating).

#### Quickshot II Joystick

The perfect companion for your games controller, the Quickshot II offers the following features: Super positive response. 2 fire buttons. Stabilising suction grips. 4ft lead. Improved control grip. Trigger fire button. Rapid fire option. At only £11.95, it represents superb value for money.

## aktronics

Saffron Walden, Essex CB11 3AQ Tel: (0799) 26350 10 lines



#### How to Order \_\_

The Games Player Interface costs only £12.95 and like all our products is covered by a comprehensive guarantee. You can obtain your interface from any good computer store or by completing the order form below and returning it to:dk'Tronics Ltd, Shirehill, Saffron Walden, Essex. or by telephone, quoting your Access or Barclaycard number.

Orders normally despatched within 24 hours.

–Please rush me:—————	_	
Spectrum Games Controllers @	£12.9	95
Quickshot II Joysticks @	£11.	95
add postage and packing		£1.50
Total:		
I enclose cash/cheque/Postal Order, Pleas	e char	rge my
Access/Barclaycard No.	П	
Name:		
Address		
Tel:		
Signature		

## 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, doublespaced, 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 25)

It was only after I had subscribed that I found out that the whole country was not at Local Call Rate.

It looks as if I will have to sell my modem soon as our telephone bills are through the roof. If any other Prestel users who do not get the service at local call rate would like to contact me over Mailbox to exchange views on this, my Mailbox number is 082422531. I shall fight on.

Robert Evans, Ruthin, Clwyd.

#### SCREEN ERROR

THANK YOU for publishing my program Screen. However several errors have occured in the text which could lead to difficulty in using the program. The corrections are listed below Page 101, Column 2.

Line 16 "Pressing shift and graphics will alter the letter to an inverse G indicating that keys with graphic characters will have those as face value while the others are normal face value."

Line 28 "1 Indicates"

Line 31 "2 Will"

Line 34 "3 Then"

Line 38 "Editing of the screen may be carried out at any stage up to newline on 3".

Page 102 Column 2.

Line 11 "PEEK x+1" (No brackets) In addition the flash character may be altered by Poking 16772 with the code of the character required.

Mark Stenlake, Whitwick, Leicestershire.

#### **CREEPY BUGS**

IT HAS come to my notice that my program Creepy Castle — March — as it stands will not work on the Oric-1, only the Atmos. This is mainly due to bugs in the Oric-1's Rom but there is also a missing line from listing 1. There should be a line: 4525 POKE# 7800, # 4C:POKE

# 7803, # 4C:POKE # 7806, # 4C

When the Oric-1 loads in a block of memory, it decides to adjust the Basic program pointers resulting usually in "out of memory" errors. To get around this problem, insert the following lines in listing 1: 25 DOKE1024, DEEK (# 9C): DOKE1026, DEEK(# 9A)

DOKE1026, DEEK(# 9A)
32 DOKE # 9C, DEEK(1024): DOKE
# 9A, DEEK(1026): CLEAR

I believe that the Val function on the Oric-1 evaluates hex numbers — preceded by a hash — as zero resulting in the machine-code loader not working properly. This problem can be partially solved by making the following changes to listing 2:

10 INPUT "START ADDRESS (-1)

TO END)";A

20 IF A= -1 THEN END ELSE
C=0

35 INPUT B

40 IF B = -1 THEN 80 50 POKE A B

60 A = A + 1;C = C + B

Now -1 is entered to terminate a block instead of "S" and each number entered must be prefixed by a hash character.



Also, in the article the command for saving "castle3" should read, A6912 after "Castles" not ,A6192.

Myles Dunlop, Totnes, Devon.

#### **OPEN WINDOS**

THIS IS a modification to Ian Briscoe's Windos program which may be of interest to those without Microdrives — and maybe some, like me, with — who would like a VDU command to make the Windos system easier to operate. There is a bit of unused space between the program and the UDG area, and this is where this fits. Load Windos, then run the following program:

10 RESTORE: DATA 17, 118, 27, 225, 167, 237, 82, 32, 250, 213, 223, 254, 44, 192, 231, 205, 251, 36, 253, 203, 1, 118, 40, 6, 205, 213, 45, 215, 24, 236, 205, 54, 32, 24, 231

20 FOR n = 65282 TO 65316

30 READ a: POKE n,a

40 NEXT n 50 SAVE "WINDOS" CODE 60000.5317

Following the normal setting up for Windos — i.e., Rand USR 60000: Rand USR 60003 — insert the command Let VDU=65282. Now try the following Basic line: This is exactly the same as:

LPRINT CHR\$ 31; CHR\$ 22; CHR\$

10; CHR\$ 10; "HELLO"; CHR\$ 5;

CHR\$ 5; CHR\$ 6; CHR\$ 10; CHR\$ 5;

CHR\$ 5;

Dave Spagnol,

London E2.

#### CORRECTIONS

Statement 542 in April's QL Tutorial program was omitted. It is located at hex 458 and reads trap # 0. The hex code for this instruction is 4E40.

The hex loader for April's Amstrad Disassembler needs modifying before it can work. Change line 200 to read:

200 POKE address + y,a and insert

165 y=0

205 y=y+1

The character which precedes the command for enabling the disassembler should be a bar character — shifted @ — and not an exclamation mark as suggested in the text.

The error messages printed in inverse wideo in lines 6000 to 6040 of April's Spectrum Singlestep program are not clearly visible.

They read, in order: Number out of range Not a decimal number

Not a hex number Not a suitable flag value Interrupts disabled

Lines 595 and 610 in the listing for April's CBM Pikchachanja are not clearly printed. They should read: 595 GOSUB 800

610 X = X1: Y = Y1:etc

#### EYEING UP A VDU PROBLEM



ONE FACTOR seldom mentioned in connection with VDU problems is that of viewing distance. A comfortable reading distance for a typical Your Computer article is about 40 cm. At this distance a capital A subtends an angle of 17 minutes at the eye. The equivalent distance for a ZX computer on a 12 inch screen is 90 cm, or about three feet, a far cry from the common practice of standing the monitor on top of the computer.

When the screen is too close flicker is exacerbated since more of the screen falls in the area of periphal vision, and also the eye can only comprehend part of the screen at any time, leading to excessive eye movement. My suggestion to those suffering from eye strain is to move the screen further away if at all possible.

Phillip Bender, Sunderland.



## I could do that...

If the few examples on page 31 stimulate you into giving some thought to making more imaginative use of loops, maybe you'd like to try your hand at this month's First Bytes competition and a chance to win our £15 prize. To enter, simply write a short routine to achieve anything you like — but make sure it incorporates no more than five loops — at least one of which should be nested.

Your program should also include a dynamnic variable linked to the increasing or decreasing value of one loop, and a counter.

Send your entry to First Bytes, Your Computer, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

P Wilby, 34 Sheldon Close, Bransholme, Hull wins March's competition to write a program that modifies itself. His routine makes program lines which start with five colons invisible when listed.

By changing the first colon to a zero byte it fools the operating system into thinking it has reached the end of a line. To make the lines visible again change the 0 in line 10050 to 58. The program runs on the Vic-20, and the Commodores 16 and 64.

Anyone interested in the subject of self-modifying code might care to look at Scientific American's computer recreations feature. A recent issue introduced the fascinating idea of Core Wars — battles between two or more programs in memory at the same time. The aim of each program is to gain control of all available Ram space by replicating itself and attacking the others.

18 ... PRINT "THIS PROGRAM"
28 ... PRINT "PROTECTS LIMES"
30 ... PRINT "8 TO 9939"
48 ... PRINT "8 TO 9939"
48 ... PRINT "FROM"
50 ... PRINT "FROM"
50 ... PRINT "PRYIME EYES"
18888 A=PEEK(43)+PEEK(44)\*256
18818 THE PEEK(A+2)+PEEK(A+1)\*256
18828 LIME=PEEK(A+2)+PEEK(A+3)\*2
56
18838 IF ADDRESS=8 THEN END
18848 IF LIME=18888 THEN END
18858 POKE A+4,8

10040 A-ADDRESS 10070 5070 10010 BEGINERS

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## A bluffers' guide to micros

ADMIT IT. You're not really a computer expert. Okay, you know all about what's at the heart of every computer — a microprocessor, of course. You've probably figured out the oblique reply to the question "But what is a home computer for?" (The correct oblique reply is "What is a piece of paper for?").

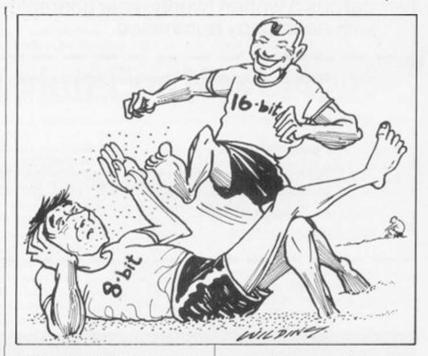
Maybe you even know enough not to get into a situation you can't handle — like trying to sing the praises of a CBM-64 to someone who owns an IBM PC. But at the end of the day there are still those bits of the conversation when names are dropped or antique machines referred to that make you feel like the man who hasn't been reading the FT. No comment.

Well, Your Computer is here to help you. Over the next few months we hope to develop, not just your knowledge, but more importantly, your techniques for defence. As with ju-jitsu, skilled micro-bluffing is all about turning aside remarks that threaten to expose your abysmal ignorance.

First, know your enemy. As with all social groups, there is a recognised pecking order among micro owners. A TI-99/4 owner, for example, is treated very often by the rest of the pack as a complete pariah. Why should this be? After all, as the distressed Texas owner often cries out whenever the pack starts circling him: "It is a 16-bit machine!".

Surely a 16-bit micro owner should be able to kick sand in the faces of mere eight-bit micro owners. But as we watch, we discover that for the Texas owner, at least, this is anything but the case.

The encounter is as horrifying in its way to the detached observer as watching a python swallow a lizard whole in a David Attenborough documentary. Nevertheless, it is instructive, since we are already deep in microbluff territory. What is the true meaning of the piteous cry of 16-bit, coming as it does in stark



contrast to the rhythmic tribal grunting of "Eight-bit, eight-bit"?

We all know what a bit is, of course. Defined elsewhere as "a boringly dichotomic entity which precludes rational discussion," the bit is more precisely a binary digit. Microbluffs and microbluffers alike all learned at mother's knee that each of the elements comprising the memory of any computer is a binary system — one state denotes 0, the other state denotes 1. But this cannot help our hapless Texas owner. He is the victim of two things: architecture, and history.

First, architecture. The term eightbit normally refers to the width of the data bus as opposed to the address bus. The job of the address bus is to access addresses in Rom or Ram. The instruction that the address refers to is sent back to the CPU via the data bus. The address bus is one way. The data bus is twoway — for example the instruction the address bus got hold of might require the transferrence of further data from Rom or Ram, or even to the input/output ports (I/O in microjargon).

Most home computers like the Spectrum, BBC, Commodore 64 etc are referred to as eight-bit micros. This refers to the width of the two-way data bus. And the width of the data bus determines how much information is processed in the CPU

in a standard amount of time.

Obviously a true 16-bit micro ought to be able to shove twice as much through the CPU in the same standard amount of time. Just like a six-lane highway can carry twice as much traffic as a three-laner. But—and this is crucial to the TI-99/4—big motorways can create parking problems in the city centre. For all its 16-bit architecture, only 32K of memory could be accessed by the 9900 chip deep in the heart of ever Texas.

And instead of having just an address bus, data bus and control bus, like the 6502, 6809 or Z-80 chips found in most home micros, it had a separate communications register unit I/O bus as well. So it needed an expensive 64K pin package to keep everything moving around. And instead of carrying on-chip registers like conventional processors, it had blocks of work-space registers in Ram memory.

All it had on the chip was a program counter flag register and the register pointing to the current workspace. So basically it's weird. It had its uses as a dedicated chip in military aircraft and so on, but proved to be too expensive and too strange to be bought by people in large volumes — which chips have to be if they are to be worth making. So much for architecture. Now for

(continued on page 31)

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(continued from page 29) history.

When the Texas came out over here, you could only but it with an NTSC colour monitor, so it could set you back £1,000. (Did you know, by the way, that NTSC stands for Not The Same Colour twice?) It spent a long time at £600 in the UK, went through a peculiar phase of being sold for £200, but you could get another £50 back if you sent off a voucher, and ended its days being sold for around £80. Finally, it was withdrawn from the market.

This is a vital piece of home computer mythology, symbolising the legendary price-cuts that reward the patient. It is also a severe lesson in bad marketing. As Commodore chronicler Mike Tomczyk says of TI in his gross book The Home Computer Wars, "I figured that if a giant semi-conductor company that

made its own chips charged that much money, they either didn't know how to control their manufacturing costs or were gouging profits at the consumer's expense.'

So, to summarise, what the pack is conveying to its victim is basically this: "You are a sucker. You bought something that turned out to be slightly less successful step in evolution that Neanderthal man. Worse, you (a) paid a hell of a lot of money for it, (b) bought it for next to nothing off a scrapheap, (c) were given it for Christmas by a loveable but eccentric uncle who thinks that Prestel is a Jewish delicacy"

The pack is demonstrating its irrational but natural fear of the alien. Nearly all of them are 6502 or Z-80 based. There may be a few Dragon owners who are glad it is not their turn to be picked on. There is little the victim can do to defend

4 rot byte clutching at straws - the unique TI

himself. "To the initiated, the 9900 chip is powerful and flexible," he may call out - this is a strange mantra he has gleaned from an old copy of Practical Computing.

He can point out that the mutant communications register unit I/O bus can address up to 4,096 individual bit I/O lines. But he is speech, synthesiser add-on has addressed him more often than he has used the computer to address anything else.

He must divert the attention of the pack. As the baying raises to its peak, he plays his trump card. He yells, "Well, I know for a fact that George over there has got a COMX-35 at home!" and runs like hell.

Paul Bond

#### using For/Next loops Elegant programming:

ELEGANT PROGRAMMING doesn't necessarily mean sitting at your micro wearing a pink carnation and spats - especially if you're female. It's more a question of rethinking those bad old hacking habits you've picked up, so that your self-written Basic routines don't look to others as though you found them at the bottom of a cardboard box.

Take as an example the ubiquitous For/Next loop. It's one of the most powerful Basic commands there is and probably also the most abused. Check through your own uses of it and you'll doubtless find that you have in all innocence introduced a couple of classic chip-charring catastrophes.

For/Next loops are versatile; use one as a counter set to the number of times you want a particular operation to be executed, to mimic a clock, or

to stuff your arrays full of data. They'll always work much better, though, if you observe a couple of golden rules.

First, don't skimp on labelling, especially if you're nesting - that is, introducing one loop or more inside another loop. This is sloppy:

10 FOR L = 1 to 10

20 PRINT L

30 FOR D = 1 TO 350

40 NEXT:NEXT

Now the proper order of execution might be clear in this simple example - but such routines aren't always so easy to decipher when you're checking over a listing of a program you wrote months before. So why not make the last line

40 NEXT DINEXT L

and remove all risk of confusion?

Next, it's wise always to close down a loop when you're finished with it, like this:

10 FOR L = 1 TO 10

20 IF L = 7 THEN PRINT "SEVEN":L = 10:GOTO 40

30 NEXT L

40 REM PROGRAM CONTINUES

There is an exception. You may sometimes want to use the "exhausted" value of L in a subsequent statement. If so, remember that it will usually total one more than the specified value. For example, if you Run the first demo again and then enter Print L in direct mode, you'll find the number printed in response is 11.

Of course, you can also weave in the changing loop value as a dynamic variable in a routine:

10 FOR L = 1 TO 10

20 PRINT "\*

30 FOR D = 1 TO (500°L)

#### 40 NEXT D:NEXT L disc system

ALTHOUGH CASSETTE tape is a perfectly adequate medium for those people who just want to dabble with computers, most serious users find it too hampering for real computing. It is awkward for handling program files and downright obstructive for manipulating data files of more than a handful of records. The remedy most sufferers of data headaches turn

to is the floppy disc.

Discs - Americans call them disks or diskettes - are flat, round platters of magnetic material encased in a plastic shell. They come in a variety of sizes; eight inch, five and a quarter inch, three and a half inch, and three inch. There are also a number of different formats, densities and single or double sidedness.

In order to use discs with a micro you need three elements; a disc drive, an interface and some controlling software. Normally, a disc drive will be sold with all three components included in the asking price, however that is not always the case. Most manufacturers market a disc package designed to work with their computer.

The notable exception to this rule is Sinclair Research, who has decided to plough a lonely furrow with the Microdrive. Yet Sinclair owners who desire the flexibility and convenience of floppy discs can turn to the third party disc manufacturers who also market units for other ranges of micros.

When buying a disc unit, it is worth taking a look at the "official" unit for your system first. This is usually the same as the most popular drive and is important because any disc-based software produced for your system is likely to be available in this format. Before purchasing, check that the drive you intend to buy is supported by the software houses

You will almost certainly want to transfer your library of software to your disc drive. This should be a trivial task as far as converting your own Basic programs is concerned but may be much more difficult for commercial software.

Depending on a number of factors, you should expect to part with around £200 for a single disc drive. A twin drive unit will often cost less than the sum of two singles as the power supply, controller and interface will be shared.

Remember that eight inch discs are a dying breed. Five and a quarter inch discs are still popular, though the drives can be more expensive to buy. Microfloppies - that is the Japanese three and three and a quarter inch discs - are becoming more and more popular all the time; however the discs are expensive to buy costing around £5 each.

Apart from the hardware, you will also be faced with a choice of operating systems. If there is a system specific to your micro, such as Commodore Dos or AMSDOS, you will have little choice. CP/M is a standardised operating system which will open your machine up to a wide range of software.

Bill Bennett

A loop can also be used to create a simple timer. Most micros have a real-time clock held in a reserved string - such as TI\$ - but you may want to keep this by for another part of your program. So use a loop instead:

10 FOR CD = 10 TO 1 STEP - 1

20 PRINT "COUNTDOWN" CD

30 FOR D = 1 TO 350

40 NEXT D:NEXT CD

You're probably familiar with the technique for filling one array or more using a For/Next loop equal to the total number of elements involved. However, don't forget that you can nearly always bypass an array provided there are 10 elements

or less. Try this:

10 FOR L = 1 TO 5 20 READ DS

30 PRINT D\$

40 IF D\$ = "ORANGES" THEN 60

50 NEXT L

60 PRINT "YOU'RE OUT OF FRUIT

70 END

80 DATA GRAPES, BANANAS, LEMONS, PINEAPPLES, **ORANGES** 

Finally, don't overlook the power that a For/Next loop can bring to all kinds of string-sorting chores. For example, some Basics - such as Commodore's - don't have an equivalent to the INSTR function available on the BBC which searches a string for a specified group of characters and returns its location. But this very useful facility can be emulated:

10 A\$ = "YOUR COMPUTER" 20 B\$ = "PUT"

30 FOR L = 1 TO LEN(A\$S) 40 IF MID\$(A\$,L,LEN(B\$)) = B\$ THEN GOTO 70

50 IF L>LEN(A\$) THE PRINT 'NO MATCH FOUND":GOTO 90

60 NEXT L 70 PRINT "POSITIVE MATCH FOUND"

80 PRINT "BEGINNING AT CHARACTER" L

90 END

After trying this version change B\$ to "OUR" and Run the program again; next, make B\$="NIL" John Ransley

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### Local news

#### Memotech

Memotech owners now have a magazine devoted just to them. It has articles on the machine, programs to type in and offers on commercial software. Contact the Memotech Owners Club, 23 Denmead Road, Harefield, Southampton...

#### Christian

A club has been formed "to promote the use of microcomputers in Church related activities" Christian computer users should contact the Secretary, P.A. Clark at the Christian Micro Users Association, 6 Wakely Street, Sheffield, S6 3RG.

Atari owners in the Watford area might like to join this likely bunch of WAG's (Watford Atari Group). Yet another offshot of the ever prolific Infomania group, they plan to cover a wide range of Atari related activities. WAG promise a software library and newsletter as well as regular meetings at Infomania HQ. Membership is £15 per year. Interested Atarists should contact Chris Bone (Garston 672235), or write to him for more details at 10 Garston Drive, Garston, Watford Herts WD2 6LB.

#### Elbug

The publishers of BEEBUG for the BBC have produced a cut-down offshoot for a cut down computer, the Electron. For £9.90 you get 10 issues of ELBUG, and the club provides other facilities such as local user groups, a discount schenie with a number of retailers and a software library. It's available from ELBUG, PO Box 109, High Wycombe, Bucks HP11 2TD.

## COMPUTER Patrick McDermott takes

the high road to Glasgow and discovers omnibuses as well as databuses at the S.P.T.E. club.

THERE ARE five, perhaps six, computer clubs around Glasgow. There might be over 100. The difficulty in knowing arises from the fact that they do not make themselves known, particularly to each other. By far the largest and best known is the S.P.T.E. Club organised by John Reid.

When I visited the club for one of the Sunday evening sessions, John was putting on a performance like one of the stall-holders at the famous Glasgow "Barras" market. With a CBM-64, disc drive and monitor, he enthusiastically demonstrated the wonders of computer programming to a gathering of 30 or 40. Not that it seemed necessary to sell them the idea, most listened attentively and stopped him in full flow if he had gone on too quickly.

Elsewhere in the large room, four or five small groups were working on their own, maybe they were playing games; but if they were, then they were silent ones, for games playing is not encouraged until the final hour of each meeting.

The tutorial that was taking place was the easy part of what is a very impressive programming course that forms the main part of the club's activity. This was the second of 12 fortnightly meetings that begin by assuming that the participants have no previous knowledge and end 24 weeks, three test papers and a programming project later.

On completion each member will have a full working knowledge of Basic and a complete set of detailed course notes and exercises for future reference. The course is not as stern as it may sound; the test papers indicate to John and his assistants where extra emphasis is required or

if any private tuition is necessary. Just now courses in Sinclair and Commodore Basics are run with an Amstrad course a possibility for the

If the whole business seems more like hard work than fun, then that is far from the truth. The membership of 192 is made up mostly from Strathclyde Passenger Transport Executive - S.P.T.E. bus crews and their families, although anyone can join, children with their parents approval only. The meetings take place in the staff function suite at one of the depots, a venue that comfortably provides all the necessary facilities and allows the nightly fee to be kept to 20p for adults and 10p for children.

As with most public computer clubs, there is a span of age groups and while I saw no-one under ten or over fifty, there was a variety of all inbetween working together. Unlike a lot of clubs there was a reasonable representation of female members.

I was surprised to see that there were relatively few computers at the club. Not, I found out, because members didn't have one; but that the organisers preferred people to work together. The theory seemed to work. Spread around the room there were people working on databases, music programs, writing adventure games, helping each other come to terms with machine code as well as Basic. A variety of machines were in use; Commodore 64s, 16s, Vic-20s, BBCs, Amstrads and Spectrums. There were also a variety of monitors, VVS, disc drives and cassettes that seemed freely available.

When younger members found

that their joysticks were going down faster than Mary Decker when they played Daley Thomson's Decathlon, John Reid designed and built a more durable customed joystick from the broken one and some extra parts. For more serious breakdowns of computers or peripheries, members can have repairs made via the club which has an arrangement with a local workshop.

Arrangements with other businesses provide discount discettes, discounted software and Activision, and has enabled the club to form its own library. A local book distributor allows the club to review books and then to purchase their choices at a discount. Businesses benefit from greater trade and the club by being able to offer more facilities to its members. Other businesses seeking similar benefits would be made most welcome.

Travelling has never presented any problem to the S.P.T.E. computer club. Free busses are one of the perks of the job and there is no shortage of drivers, a facility that the club intend to make the most of. A full list of outings to computer shows, commercial installations, and some of the computer manufacturers that abound in the area is planned. It is a facility that the club is willing to share with any other local club who dares make themselves known. Other clubs could benefit from both the visits and opportunity to witness an active, well organised and resourceful club at close hand.

The S.P.T.E. Club will welcome any inquiries from business or prospective members and details can be had from the organiser: John Reid, 3 Meadow Road, Partick,







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What it does is hack the Spectrum's memory up into two 32K pages. It also allows you to add up to 128 external pages, each up to 32K, onto your machine.

Each page of Ram can have a program running in it, and have a separate screen window dedicated to messages generated by that program.

One major problem is that most of the more complex games such as Alien 8 and Lords of Midnight won't run on an XK Spectrum, and being a soldered-in modification, you can't quickly change back.

#### Maxam

Amstrad CPC-464 Arnor Ltd. £59.90

Arnor have come to the serious CPC-464 owner's aid with a comprehensive. piece of hardware containing an assembler/disassembler/editor.

The small board plugs into the Amstrad so that most of the circuit board disappears inside the computer under the existing PCB. It provides an expansion bus extension and a slot for further Rom boards. You also get a 50-page manual which explains the use of the Rom-based assembler and the commands available.

Calling the assembler is done from Basic using extended commands.

Arithmetic operators and labels are supported and parameters can be passed from Basic to the code and back

The RST command is mentioned only rather briefly in the provisional manual provided. As this controls breakpoints. This could have done with more explanation and examples. Aside from this rather minor quibble, this looks like a product no serious Amstrad user can afford to be without.

- **■** Triton
- £129

THE QUICK Disk is designed as a cheap alternative to floppy disc drives, with only a slight reduction in performance.

There are three versions, Spectrum, Commodore 64 and MSX available, each priced at £129 with 100K 3in discs available at £1.99. The hardware consists of the disc drive and an interface box which plugs into the rear expansion socket of the computer. The performance of the drives is only marginally slower than normal disc drives.

A file takes a minimum of one sector and there are 20 by 2558 byte sectors per side, providing a maximum of 20 files/programs per side. Data files may be transferred between the three types of computers using the discs.

The drive repositions itself at its start position after every operation; this adds a further three to four seconds before the next disc access can be made, but does leave the head out of harms way and the data safe.

The quick disks overall are slightly quicker than the Spectrum Microdrives and appear to be reliable. Command format is simpler than Microdrive, but only just. As the quick disk built in software does not take up any additional space in memory, most software can be converted to run on the quick disk very easily using the conversion program provided in the manual.

There are a few problems with the Spectrum version - the only printer that can plug in directly is the obsolete ZX Printer, the Alphacom 32 does not work from the rear of interface. Interface 1 cannot be connected which loses the RS-232 port and modem facilities although a standard Centronics adaptor does work.

The MSX and Commodore versions do not have to sell against competitively priced products and appear to be good value for money, the Spectrum version needs tidying up to produce a viable alternative to Microdrives and stringy floppies.

#### QCOM

- QL
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- OEL
- £200

BLOODIED BUT unbowed by the demise of Prism and Oric, OEL once again sally forth into the world of microcommunications. Once again they have teamed up with Scicon to produce a formidable product for a Sinclair machine. The hardware



Triton Quick Disk.

consists of three units: QCON, QCALL and QMOD. All three units come in QL livery and styling and stack one upon the other.

The unfortunately named QCON is the guts of the system. It plugs into serial Interface 2. It uses the TI 7000 single chip micro and controls protocols, baud rates, receiving and sending data. This can be plugged into a standard modem with an RS-232 interface, or another QCON on another QL to provide shortdistance communications.

This, bought separately, would cost you £75.95 and comes with all the Scicon software. QMOD is an autodial, autoanswer unit which, at £79.95, might seem an expensive luxury to the hobbiest, but will make a big impact with the business user.

QCALL is a standard OEL V21 modem at a standard OEL price of £49.95. The hardware is only half the story. What makes this product worth a second look is the software. You get some idea when they tell you they only have room for one Prestel frame at a time in memory, the rest is filled up by the software!

The computer can be used as either a Viewdata terminal or as a VT100 terminal emulator, even down to simulating the numeric keypad. These models can either be accessed via a series of menus or the confident can just use command

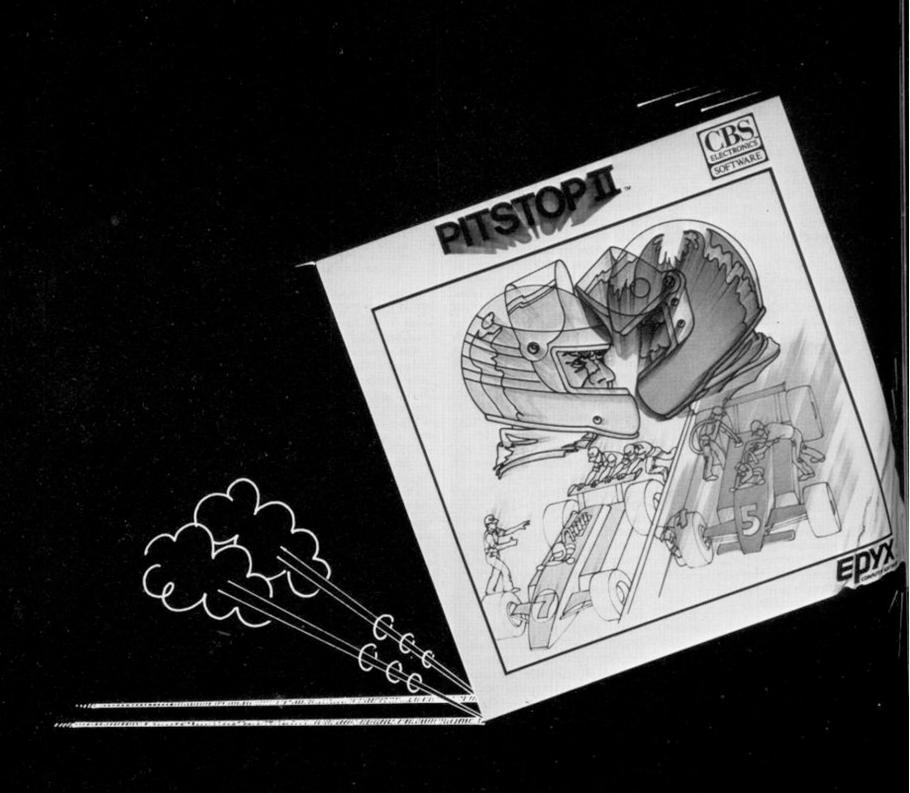
Using Prestel is simple in as far as using Prestel is ever simple. The # and \* commands use the Enter and / keys. While on line, frames can be saved, loaded, printed either in text only - i.e., fast - or a full graphics screendump with shading is available which takes a few minutes. The phone book you load on booting the software can contain up to 50 named pages. Each entry on a page is given its own number and prompt string, so once you're through, logging-on is automatic.

The filing commands, again available when on line are very comprehensive, indeed they represent a major improvement on QDOS, with the sort of facilities you would associate with a proper DFS. Data on Microdrive can be encrypted and, if necessary, this encrypted version can be transmitted, with the encryption code sent by some other means.

A command sequence can also be saved on Microdrive. This allows the user to, for instance, write a message for a Telecom Gold mailbox, run his mailbox program and then walk away and let the computer get on with it, even using delayed send to send it while he's asleep!

User-to-User comms works very smoothly. Although 1200 half duplex, time sharing between both ends means it appears full duplex. Both message and file transfer is possible, with checksums sent and echoed in the latter case. Of course, this unique protocol means a OCOM user won't be able to talk to anyone else, even should they wish to converse with such mere mortals in the Spectrum and BBC world.

For the business user, the simple menus and the ruggedness of the software won't leave him with a crashed program and a big phone bill. The hobbiest will revel in the numerous clever facilities, and it might even find a market as a cheap alternative to buying a VT100 terminal for mainframe users.



# FOU DRIVE FAST AND THINK FAST, YOU'LL LAP UP 'PITSTOP II.'

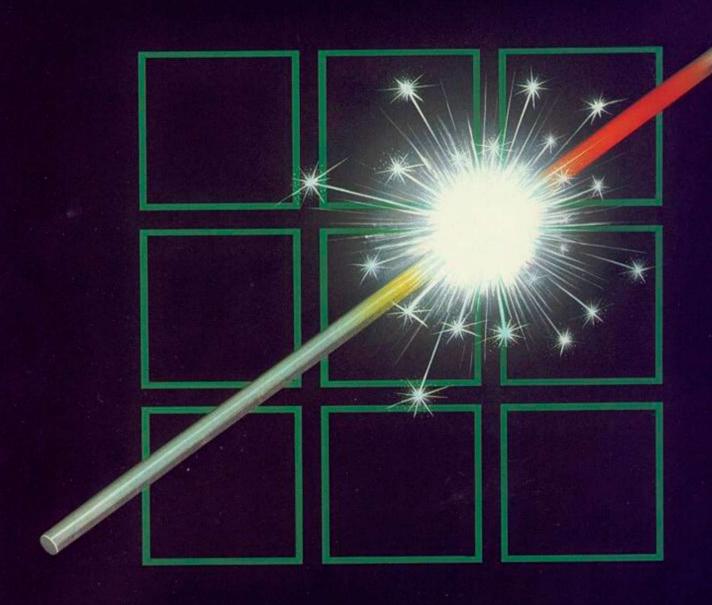
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# Stark SOFT

#### KEY

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

## Moon Cresta

ZX Spectrum £6.95 Shoot'em-up Incentive

\* \* \*

The Nichibitsu arcade classic, with an opportunity to win your own dedicated Moon Cresta machine, You blast away and score bonus points by docking successfully with the mother ship.

# Stay Kool

ZX Spectrum £6.95 Arcade adventure Bug-Byte

Everyone raved about Manic Miner but what Bug-Byte seem to have forgotten is you must put some oomph into the graphics if you want to get away with this sort of thing. Silly jokes about police boxes and doctors are not enough.

# Caveman Capers

\* \*

BBC Micro £7.95 Moon buggy derivative Icon

Nice to see some games for the BBC Micro after all this time. Your caveman rides on the back of a perambulating platypus. You must jump holes in the ground but avoid doing this when a low-flying bird is around.

# Pole Position

**CBM 64** £9 95 Road Race US Gold

The archetypal road-race game for your 64. It's all here, practice round, qualifying round, racing against other vehicles. Only carp is the under-use of CBM-64 sound facilities.

# Formula One

ZX Spectrum

- Management game
- CRL
- £7.95

\*

FOOTBALL MANAGER with racing cars. Fabri, De Angelis, De Cesaris, Piquet - you can hire them all provided they haven't already been bought up by your Spectrum. You can load up previous games, enabling you to continue a tournament over a long period of time, you can use a Kempston joystick and from one to six people can play at a time. There are five levels of play depending on whether you are a novice, junior, average, good or expert manager.

The six teams the players can manage include Brabham, Ferrari, Lotus, Williams, McLaren and Renault. You can also choose to be a driver - the ability to add new games in is a good one: stops the game getting out of date. After this you can select a sponsor, Saudia or Denim or whatever.

Now down to the nitty gritty choosing your driver and then outfitting the car. Allotted a sum depending on your sponsors - usually around £630,000, you can improve the driver, chassis, engine and pit crew. The more money you spend on your pit crew the faster they move in the pits. This is crucial, because although the race itself is randomly generated by the micro in the style of Addictive Games' Football Manager, you control tyre changes and adjustments by steering your man around the screen.

The graphics are functional rather than brilliant - but the heads of the crowd turn to watch the cars and the Goodyear airship moves majestically across the screen. After the race you are shown who won and how they're doing in the championship stakes. Other interactive elements of the game include deciding what sort of tyres to use, dependent on weather conditions, and when to go into the pits. Simple, enjoyable, no doubt socially divisive with six people fighting to get at the controls of one Spectrum. Paul Bond

Sam Stoat Safebreaker

# Formula One Sam Stoat Safebreaker

- Spectrum 48K
- Arcade adventure Gremlin Graphics
- £6.95 +

THE LATEST character to emerge from the warren of the Gremlin Gang, Sam Stoat would appear to be as guilty as Monty was innocent. Intent on stealing a very valuable diamond he braves bouncing bedsprings, runaway pool balls, nasty green bottles, pogo gnomes and deadly gnomemobiles in his quest.

Rather like Statesoft's Icicle Works, you get four main scenarios to choose from. Sam prowls about in the dark below four houses ranging from easy to hard. Press the fire button and pop goes the stoat you're in the house of your choice.

The basic scheme of the game is to locate the explosive bomb and match - then you can blow the safe. Having grabbed the diamond and whatever other jewellery may be lying around in the house, you can then move on. Each house contains 20 screens including the vital bottle of stoat elixir that boosts Sam's blood level - shown graphically in the form of a syringe at the bottom left hand side of the screen. At the top is shown high-score and how much money you personally have gained ill-gottenly.

The maximum score attainable is, we are assured, £64,384. This is not a game that I personally would go wild over. When all's said and done, it has to be remembered that the four houses with 20 screens are just the

same house with different levels of difficulty. Some nice graphical possibilities are hinted at, but Gremlin have a little way to go yet if they want to mutate into something bigger and meaner. Keep trying though, lads.

Paul Bond



Icicle Works

# Icicle Works

- Spectrum 48K
- Boulderdash clone
- Statesoft
- £6.95

DID THE ELECTRO-WIMP band name themselves after the game or vice versa? We may never know. Nevertheless, Icicle Works is a taxing and exciting game which bears many hereditary traits of Statesoft's earlier big hit, Boulderdash, for the Commodore 64.

The similarity lies in the snowballs. You dash around the screen, clearing paths and collecting parts of objects. If a bunch of snowballs falls on your head, you lose a life.

There are four main screens apart from the entry screen. This last is quite simple. You just saunter down from the top of the screen, grab a two-part key and decide which set of stairs you are going to go down.

In the first set you assemble a jet fighter and release a stream of water.

(continued on page 41)



# Star\*

# Mama Llama

**CBM 64** £7.50 Arcade adventure Llamasoft

\* \*

Ingenious 10 by 10 rotating grid enables you to select from five scenarios in which you protect Mama Llama and her two babes voyaging through the cosmos. You can place retrogenesis and antigenesis devices into areas of the game to block attacks for you. This is an irritating game to play games for purists are all

very well but we at YC feel Jeff's getting too involved

# Frankie 2000

BBC Micro £7.95 Fantastic voyage Icon

in his own head.

Right-hand side shows Xray view of human body, indicating where your minisub is in the bloodstream. Left-hand side is the arcade action as you journey through the trachea, etc., shooting germs. In the left lung you encounter cigarette ends!

#### Berks

Commodore C-16 and Plus 4 £6.95 Robotronesque CRL

More genocide. Tool around shooting at pathetic robot Berks edging their way round a total of 32 randomly generated maze screens. Paralyse the flashing diamonds that threaten to crush you. And serve you right.

# Major Blink

Commodore 16 & Plus 4 £6.95 Painter CRL

Major Blink is the creator of the Berks. He is harassed by "bears" and drones who try to stop him painting the blocks on the screen. A competent implementation of this old favourite.

(continued from page 39)

On the second set you build a railway engine while moving around a maze; in the third you attempt to destroy volatile puffins by dropping snowballs on them; on the fourth you assemble a ghetto blaster.

The modus operandi on the last screen is the most ingenious of all. The screen displays a central line of mystery boxes. You knock snowballs down on to them. When you clear a path underneath segments of the ghetto blaster fall from the boxes. You then sweep back and collect the parts. As with the engine and the jet what you are building is gradually displayed on the right-hand side of the screen. Once you have built the radio you start collecting bonus points - but only if you collect the individual letters B-O-N-U-S in the correct order.

Each of the four main screens has exit doors which you use to pass through into ever more mind-boggling levels. You have to get through each part of the game in a certain time - too little time! - this one should appeal to the Chinese puzzle mentality.

Paul Bond

# **Bug-eyes**

III Icon

Arcade adventure

Spectrum 48K £6.95

XXABANEANS RULE OK. Well, of course it's not OK since they intend to wipe out all intelligent life and have the universe to themselves. The dummies have invaded earth in a giant starship disguised as a meteorite. Your job is to penetrate down through the 10 levels of the ship and destroy its power generator.

Well-implemented graphics and a sense of humour make this game worthy of comparison with games in the style of Manic Miner. The big-nosed gliding ogre, the terrible twisting thingies, the wigglers and Big Jake all combine to despatch you with a desparing little squeak - all the more pathetic because of the Spectrum's not-wonderful sound capacity.

On the first screen you encounter the stamping stompers, a fiendish arrangement of ascending and descending plungers which make it a little like trying to walk through an internal combustion engine. Your little spaceman can only walk forwards or back, no jetpacking. Timing is of the essence. On most screens it is worth finding a place to ponder on how to scramble through the next set of obstacles.

When you fall through into the second screen you face the blinking bouncers. You also have a problem with disappearing bridges. The combinations of problems seem to grow increasingly more complex as you approach the base of each screen. You might miss the bouncers just to find yourself plummetting onto SOFTWARE spondence chess - cheat! - etc. Bug-eyes The graphics are legible without

needle sharp rocks from a nonexistent bridge.

Lazer phazer blazers, the third screen, is really two screens in one. There are three layers of ray guns then you have to work through a cavern of spiders casually reeling and unreeling from the roof on their grisly gossamer threads.

Icon may not be a prominent name now, but with quality like this they soon will be.

Paul Bond

# Colossus Chess 3.0

Atari

Chess game

■ English Software

£9.95

Is THIS THE greatest chess program on a micro? According to the handbook, Martin Bryant's Atari conversion of his Commodore 2.0 original thrashed 21 other programs mostly by 16-0. That includes Odesta's Chess 7.0 - Apple/Atari based on a former World Champion program. White Knight II - BBC it beat 13-3, Sargon III 10-6, and the excellent Parker Bros Chess - Atari, IBM PC - written by David Levy's Intelligent Software (Cyrus IS) - by 12-4. The list does not, however, include Psion's 3-D Chess on the Sinclair QL.

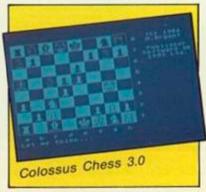
I tested it against the Parker cartridge and it confirmed its form, When it plays in Tournament mode - one of the six available - it claims an ELO rating of 1800 and gives moderate club players like me a challenging game. There are easier modes for beginners, plus Infinite and Problem modes for corre-

being showy. Move entry is simple, by either typing them in (e2-e4) or using the cursor keys. Pressing the space-bar toggles between the game board and a separate screen which lists the moves, shows the time on each player's clock, position and material rating and the program's latest thoughts.

Colossus also offers most of the other features you might want, including back-step, save and load game, and replay. You can even adjust the weight according to which positions are assessed, as like most programs Colossus will swap a small amount of material for a large positional inferiority.

The only major flaw is the handbook, which is almost illegible - black dot-matrix type on red paper and has a cover of almost unsurpassed embarrassingness.

Atari chess enthusiasts have a number of options — Sargon, Chess 7.0, David Kittinger's 3-D Mychess, Parker Bros Chess - but except for the awful Atari Chess cartridge, they are all at American prices, i.e., very expensive. The fact that this is British, probably better and third to a fifth of the price makes it a best buy on either tape or disc. Highly recommended. Jack Schofield



(continued on page 43)

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# Start

Android 1 **CPC 464** Vortex Shoot-em-up £7.95

Vortex made a name for themselves with TLL and Cyclone. They might have done better to bring out conversions of those games rather than this rather tedious game. Primitive graphics combined with naff sound effects and unoriginal material make this possibly their worst release to date. You have to get to the reactor core before it blows up. To do this, you shoot your way through walls, go through mazes, sideways scrolling and plan views. Naturally there are mutants to blast out of the way.

## Don Juan

Oric/Atmos No Man's Land Adventure £8.50

Perhaps it was inevitable that sooner or later this French software house would turn to the national obsession - l'amour. Given a choice of a number of young ladies to attempt to seduce, of varying coyness, you must seek to entice them into your little love nest by entering the right keyword at the right time. Some nice humourous touches; might provide some entertainment when inebriated.

## Rocketball

C64 IJK Sport Simulation £6.95

'This was never meant to be a game" in case you hadn't guessed this is Rollerball, hailed at the time as a grotesquely violent film IJK have removed all the blood and gore, and discover underneath a pretty trivial sort of game. Not bad as sport simulation goes, but I don't think International Football will be knocked off its perch by this one.

(continued from page 41)

# Banjax

■ BBC

Robico Software

Arcade Adventure

£9.95

BANJAX IS one of those games that is enjoyable to play even though you do not get very far with it. Despite having been given some tips by Robico this reviewer was only able to explore less than a quarter of the game's 240 locations, but liked what he saw: pleasant landscapes, smooth animation, and just enough threats from spiders, blobs and suchlike to keep you on your toes.

It also boasts some of the best graphics in a BBC game since Frak. Like Frak is uses Mode 1 but varies the pallette to give a different four colours in each screen.

Although challenging enough for those who seek challenge, the game has a pleasingly relaxed quality. As the character you control - a bear wearing a baseball cap - is unarmed you must avoid hostile creatures in your path. But if you do not feel up to dodging them you can leave the room. And when you return they are usually gone.

Some rooms, however, are blocked by gargoyles and guards. To gain access more energetic adventures will need to collect an assortment of objects. They will also have to map the territory thoroughly if they are to achieve the goal of the game and reach the Inner Sanctum of the Golden Temple. Simon Beesley



Tempest

# **Tempest**

■ BBC

Superior Software

Arcade Classic

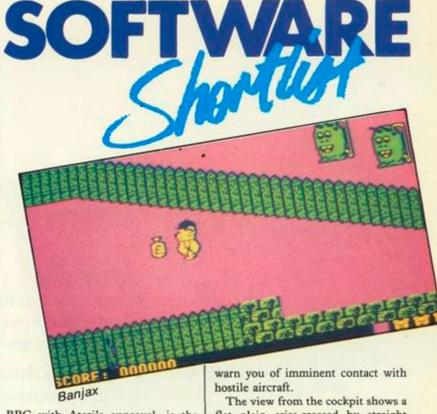
£9.95

\*

In HIS excellent survey of the arcades, Invasion of the Space Invaders Martin Amis calls Tempest the most abstract of all arcade games. The player is in charge of a claw which patrols the rim of a grid, a cobweb-like shape with lanes converging on a hub.

Out of the hub come a variety of what can only be described as animated geometrical figures spikes, diamonds, stars, and so on. The player's task is to contain them with the aid of a blaster or, as a last resort, a super zapper.

This version, translated to the



BBC with Atari's approval, is the first to appear on a home computer. In its arcade form the use of sharp vector graphics creates a spectacular display as the various shapes cartwheel outwards and then flip along the rim. But much of the game's impact is lost with pixel graphics: lines look too jagged at this resolution.

Nonetheless Tempest is a sufficiently original game to be worth playing however it is implemented. As far as possible Superior Software have recreated its features faithfully, with nine different grids, 255 levels, and, although rather fuzzy, fast-moving graphics.

Simon Beesley

# Flyer Fox

Commodore 64 Flight emulator

Tymac

\*

£9.95

A NICE SIMPLE stick and string air combat emulator, spoilt somewhat by the premise that Mig fighters feel the need to shoot down civilian airliners in international airspace. They only do it in Soviet airspace. You are piloting a fighter in escort of a passenger jet. The screen display gives you radar on the left, compass on the right, artificial horizon in the centre plus showing altitude, fuel and score. Messages are also flashed up on the altitude reading to inform you when you are at the same altitude as the jetliner and also to



Flyer Fox

flat plain criss-crossed by straight lines to form a geometrical grid. This stretches away convincingly to mountains in the distance. When the game starts you are automatically elevated to the same height as the airliner you are defending.

You can't get any higher than the airliner. It always flies at your service

Just before the attack the computer speaks - no add-ons required - and says "Mayday". It says other things at other times, all of them unintelligible.

All in all, good graphics, gripping combat action, garbled speech synthesis, all combine to make a tense and enthralling game.

Paul Bond



Dragon Torc

# **Dragon Torc**

■ Spectrum 48K

Arcade adventure Hewson Consultants

£7.95

\*

MAROC IS back. So what? Well, this is the entity who vanquished the Lord of Chaos and banished him from his earthly realm - a neat thing to mention in job applications. Afficionados of Hewson's Avalon will remember him; more importantly, they will have experienced the lateral thinking necessary to get things done in this program. Hardly anyone does anything for themselves; Maroc kicks off by projecting his soul - not one of the more manoeuvrable souls I may (continued on page 45)

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# Star

# A Day in the Life

Micromega Spectrum £6.95

One of those twee games featuring you-know-who (snigger, snigger) a bloke with bald head and glasses who is (tee-hee) quite important in the (ha-ha) U.K. computer industry.

Oh no, oh no it's no good I can't hold back, it's Sir Clive and the game has really primitive graphics.

# Dukes of Hazzard

Elite Spectrum £6.95

Them good ol' boys can now just roll along your Spectrum. The screen display is excellent and the game is rather more playable than some of Elite's previous offerings.

Up to now the company's main achievement has been the holographic label on the outside of the cassette.

The Duke boys have to make it to the start line of the road race but helicopters, Hell's Angels, and of course, Boss Hog. all conspire against them.

They drive along the motorway changing lanes and chucking bombs at oncoming vehicles. More fun than a traffic jam.

#### Pacmania

C-16 Pacmanesque Mr Chips Software £5.99

The old arcade classic revisited on the Commodore 16. Afficianados of Acorn Snapper or other more traditional implementations of the Atari original will probably find themselves shocked and stunned by this version.

The ghosts are completely anarchic, they hold to no known norm of civilised behaviour, recovering almost instantaneously.

(continued from page 43)

say - but quite a lot of Maroc's soul's work is done for him by a servant creature.

To move, you get the arrow pointing to move. Press the fire button once and the scroll changes to show the move you have selected and how many more uses of it you have left. "Project they soul" hints the scroll. In the style of Gargoyle's Tir Na Nog, you have to move around on pathways.

To access the servant, you scroll as before and press the fire button twice. A small will-o'-the-wisp appears which you control with the joystick instead of Maroc.

The graphics are rough scrolling, sacrificing smoothness for colour, so sometimes irritating to the eyes. But I am sure that the actual mechanics of the game will prove an irresistible addictive factor to adventure fanatics. Paul Bond

**Body Works** 

- Spectrum
- Genesis Productions
- Educational
- £14.95

\*

Is THERE a doctor in the software house? Yes, there is, and it's Dr Jonathan Miller, star of stage, screen and operating theatre. If you don't remember Beyond the Fringe you may remember the mammoth documentary called The Body in Ouestion.

The program in question is based on the pop-up book The Human Body, also published by Genesis Productions, a new company specialising in books and computer software. Consultant physician David Jefferys also worked on the project and one suspects a lot of the real slog was done by Five Ways Software's Andrew Rutherford (graphics), and Roger Moffat (code).

The program takes you on a trip round your body, dealing with cells, digestion, respiration, circulation, nerves, and muscles culminating in a marathon run simulation.

Interaction is the name of the game. Apart from pushing the space bar to animate each function, you can key in your own data. So you can choose between fats, proteins and carbohydrates in the digestion program.

It's not a biology revision program - it doesn't claim to be.

What it is, is an informative and interesting way of putting ideas together for yourself.

The final program in the suite, Marathon, is like a flight simular for the human body. Running eight times faster than real time, the simulation allows you to enter a course from 5-26 miles.

The body monitors displayed on the screen in the form of black graphs include heart rate and output, stroke volume, temperature and lactate. Paul Bond

Body Works Shadowfire

SOFTWA

- **CBM/Spectrum**
- Beyond
- Adventure
- £9.95

\* \* \*

IN THIS ADVENTURE your quest is to transport your crack and deadly why can't they be bungling and harmless for a change - team onto the enemy spaceship. Once there, you have to fight your way through the corridors to rescue Ambassador

All this in 100 minutes of real time before the Ambassador cracks under interogation and tells the bad guys Prince Phillip's Prestel mailbox number. There are six members of your party, each of which have particular strengths and weaknesses. There are various characters around to fight off, doors to open and things like the self destruction mechanism of the ship left lying around.

Lee Paddon

# Super Huey

- Spectrum
- Cosmi/U.S. Gold
- Simulator
- £11.95

THE GAME goes out of its way to take you gradually through each learning stage till you gain mastery of your "flying gearbox". There's plenty of clear instruction in the manual, including a step-by-step guide on how to get into the air, no mean feat! Once up there your friendly computer will provide you with

handy hints on how to stay there. Once you think you've got the controls sussed, you're ready to proceed onward.

Lee Paddon





Super Huey



Spitfire 40

# Spitfire 40

- Commodore 64
- **■** Mirrorsoft
- Simulator £9.95

THERE ARE three display's - the

traditional out-of-cockpit, the obligatory map, and a superb reproduction of the Spitfire instrument panel which takes Commodore graphics to new heights. Not combining the instruments with the forward view has two advantages, better instruments and a better view from the cockpit.

Three game modes are included: practice, combat practice and combat.

Lee Paddon

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STRINGER is an arcade adventure game in which you are a press photographer for the "Daily Blurb" set the task of snatching a shot of a Film Star, Polly Platinum in an hotel. To hinder your attempts your camera, flashbulb, press pass and the key to the lady's room have been hidden in the hotel and these items have to be recovered before the all important shot can be taken. To add to your troubles the hotel staff are bent on catching you before you reach your goal and your Editor has set you a strict deadline for the completion of the task.

The game has 5 skill levels and 10 screens of increasing difficulty. It is tantalisingly playable graphically excellent and, of course — Addictive! Available . . . Commodore 64 £6.95

#### ALSO AVAILABLE



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Software Star
"It carries the Kevin Toms hallmarks of attention to detail and carefully funed difficulty Popular Computing Weekly, February 1885.
"The game can be incredibly subtle: Pick of the Week, Popular Computing Weekly, February 1985 Available: Spectrum 48K 59 59.

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# NEWS oaeo rssu tttt

# The crystal ball

There's some exciting news from those adventure writing geniuses at Level 9. Later this year, they plan to release the first in a series of mega-adventures which they say will be as large, complex and detailed as those published by Infocom. And don't worry if you haven't got a disc drive — they'll also be available on cassette. Cost is likely to be around £15.00.

Enterprise owners have not been overlooked — Level 9 adventures can now be obtained for this machine.

Other imminent new releases from Level 9 include Red Moon — £6.95 — and The Worm In Paradise — £9.95.

Amstrad and MSX owners can now try Melbourne House's famous Hobbit adventure - £14.95 - for themselves. In addition, a reworked version of The Hobbit, on disc only and for Commdore 64, Apple and IBM PC owners, is available in the UK. The new version includes extra problems, additional text. larger vocabulary, enhanced graphics and, for the Commodore 64, complex music throughout the game.

# A helping hand

Here's a trio of tips for Spider-Man devotes:
Sandman proving a gritty problem?
ROGN EHT G NILI ECOG Not getting far up the elevator shaft?
PU OG NEHT UP HS UP Madam Web a mystery to you?
OTRE HKSA UOYF IUOY ROFS GNIH TNAC SLLI WEHS
Yours in adversity and adventure,
HUGO NORTH.

# Our man with the

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.

# Heroes of Karn

Spectrum 48K

£6.50

■ Interceptor Micros

HEROES OF KARN is a text and graphics adventure that first appeared for the Commodore 64. It proved to be very popular and has now been translated for the Spectrum.

Although the plot and puzzles are identical to the 64 version, the Spectrum program wins hands down in the graphics department, has a small edge in the text input contest but, naturally enough, loses by a mile in the music stakes.

Unlike, the 64 version, not every location is depicted graphically but those that are included are magnificent. Credit for the superb computer artwork goes to Terry Greer, as credited by the cassette inlay. The pictures appear instantaneously and are beautifully drawn using colourful high-resolution graphics.

The Spectrum's lack of sound capability means that the impressive music of the 64 version has had to be foresworn. However, the input parser has been tidied up making the acceptance of more complex commands much easier to use.

The plot involves you searching a fantasy land for not one but four lost heroes. The adventure has a host of puzzles, most of which involve hitting on what object to use with what item. The heroes themselves have different capabilities and in certain situations can do things that you could not do by yourself. It is therefore essential that you locate at least one of the lost heroes quite quickly. Finding the first lost hero, Beren, turns out to be quite easy, fortunately.

A thoroughly enjoyable adventure with some of the best graphics on the market.



Commodore 64

£7.95

Melbourne House

THIS IS THE second of what Melbourne House call their "joystick adventures". If you've played Zim Sala Bim, their first one of the series, then you'll know precisely what they mean. The adventure is a combination of traditional text and scrolling graphics.

The plot involves your recovering some secret plans which are about to be smuggled out of the country. If the enemy agents believe you are on to them, they will stop at nothing to escape.

You start the adventure outside a large hotel, your first problem being to get inside. The rest of the action takes place inside the hotel which you can explore by riding in the lift or nipping up the fire escape.

The cassette inlay describes the game as having "smooth, arcade style graphics" and "every location brilliantly displayed in 3-D". What you actually get is a minimally animated figure walking in front of some quite uninspiring and very two-dimensional backdrops.

The figure ambles to the left or right in response to the movement of your joystick — or by pressing the "less than" and "greater than" signs on your keyboard. The background scrolls in the appropriate direction.

The graphics mostly consist of hotel rooms and are simplistic stylised representations. Some fairly nondescript music plays throughout the game — better to turn the volume down.

The bottom part of the display is reserved for text input and output. When your character is stationary, you can type in the usual sort of two word command e.g., get knife. The program only recognises the first two letters of each word so abbreviated commands are acceptable. Response to your input is instantaneous but terse.

There seems to be a non-fatal bug in the program. When you move to the extreme left of a floor above ground level and type Look, the description given is not of that location but relates to a location on the floor above.

I found Grand Larceny to be quite tedious, lacking in interesting puzzles and totally devoid of atmosphere. However, if you enjoyed Zim Sala Bim, chances are you might like this one.

# Quest for the Holy Joystick

Spectrum 48K

£4.95

■ Delta 4 Software

THIS QUILLED text adventure is a zany spoof set around the ZX Microfair. You'll encounter many well known characters and companies who bear more than just a passing resemblance to famous names from the world of computer games and adventures.

 The is also a sequel — Return of The Joystick — which has graphics and includes some extremely funny pastiche title screens.

The games are available by mail order (04893 5800) and are sure to provide you with many a belly laugh.

Meirion Jones investigates a potentially explosive new crime wave instigated by that master of the keyboards the hacker.

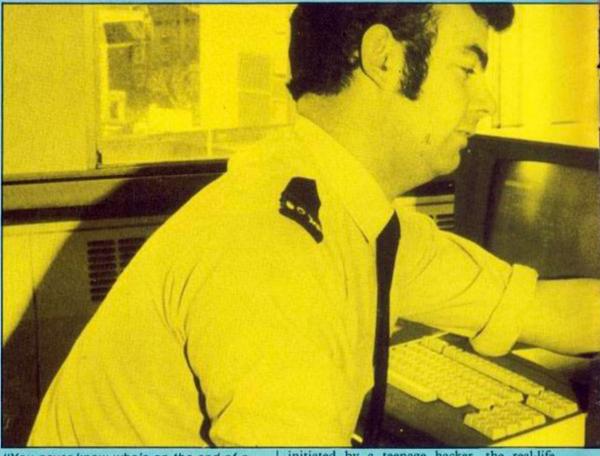
COMPUTER CRIMINALS will steal at least £1 billion in Britain this year - that's a Great Train Robbery every day in 1985. But unlike the train robbers, most of the electronic thieves will get away with it and even if they are caught, financial institutions are unwilling to prosecute because public confidence in them might collapse if people knew how easy it had been to breach their security.

In America the problem is worse still. Computer fraudsters range from high-ranking company officials who have invented whole communities on magnetic tape to make business look as if it's booming - as in the multi-million dollar Equity Life insurance scandal - to individuals who have resuscitated thousands of dead clients in order to pay the pensions into their own accounts.

Interfering with delivery and accounts programs has also produced spectacular results, in one case the disappearance of 200 rerouted freight wagons, in another the collection of a million dollar's worth of components without payment.

And in the unlikely event of the fraudster ending up in jail, white collar criminals don't need to dirty their shirts digging tunnels to escape, they can always follow the example of the Ohio prisoner, who having access as a trustee to a terminal in the library simply used it to bring forward his release date on the

These are just some of the cases that have been discovered and as Brandt Allen, an American researcher who helped to publicise the problem of computer crime in the early 1970s writes, "the first time I assembled a set of computer fraud cases, I was struck by the incompetence of most of the embezzlers who had been discovered. Since the computer



"You never know who's on the end of a hacked line. Watch out, there's a computer cop about."

provided such a high degree of fraud potential, I wrote at the time, "I can't help wondering what the really clever people are doing" with the computer. I think the biggest computer frauds are still to be revealed.'

All this pales into insignificance with the fears of Mr X, a British computer consultant who does not wish to be named. So far, most computer crime has been the work of professional criminals or employees who have taken advantage of their privileged use of a computer.

The amateur hackers - equipped with nothing more than a home computer, modem and a quick brain have been more of a nuisance than a threat to the big companies. Despite the fantasies of films like War Games where global thermonuclear war is almost initiated by a teenage hacker, the real-life exploits have been more usually of the order of the diversions of Pepsi-Cola shipments across Canada, which the pupils of Dalton School, Manhattan, reportedly perpetrated, or again in New York crashing a TV network.

But Mr X believes that all this will change in the next couple of years as modems become as common as data recorders and 16 and 32 bit chips give home micros the capabilities of the minicomputers that run companies today. Six vears ago a powerful VAX 750 mini cost £80,000 for a machine with 500K Ram and a 15 Megabyte hard disc drive. Atari plans to offer similar kit for less than £2,000 this year and companies like Commodore and Sinclair will not be far behind.

Armed with that power, the hackers may take some stopping. Mr X believes that if something like the mining dispute was to happen again organised team of hackers could cause power cuts, "you don't need pickets,

Early computer crimes were unsophisticated but effective. One simple trick, first used in New York was to remove the blank deposit slips on the counters of banks and replace them with apparently blank slips encoded with the fraudster's account number.

When customers filled the slips as they

deposited money the fraudster's account was credited - and with a carefully timed withdrawal from the account the fraudster could be away before anyone noticed that their accounts were awry. Programmers with criminal tendencies who found themselves writing financial software opted for more subtle tricks -

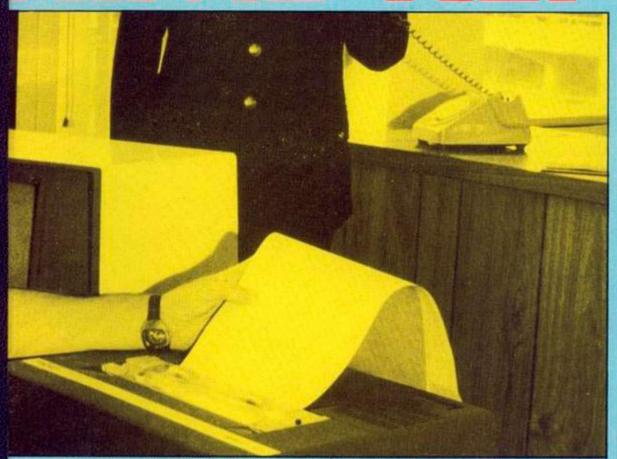
the so-called Trojan Horse, a fragment of code buried in a program which looked secure from the outside but which could trigger an unscripted diversion of funds.

These became known as Time Bombs if they were triggered by the central processor clock and Logic Bombs if they were set off by a par-

ticular event which might large number of be triggered to suit the programmer. Rather than these one-off raids some villains incorporated subtle routines which stole almost imperceptibly small amounts of money at a time rounding up cheques by a penny or a cent for instance and sending the difference to their accounts - but on a

transactions.

This Salami technique can be very effective in large organisations one service transfers £27,000,000,000 a day across the Atlantic. You would only need to divert one part in a million to make yourself a millionaire in a matter of weeks.



you could damage our grid capability - they could have brought the country down". He also suggests that groups that are opposed to deploying nuclear weapons, like the Greenham women, might be able to disrupt Ministry of Defence Systems - although Sabine Kurjo, who organises anti-war computer users in a Peace Network, has never heard of any such attempts, "none of us would dream of hacking into military computers".

Government cuts which affect scientists' jobs could also be dangerous says Mr X. "Ministry of Defence people are working on systems which can break any computer on earth. The government is paying them to do it put a few of them out of work ....'

Government spying agencies not only break their way into private computers, they sometimes deliberately make the job easier by reducing the security of commercial codes.

In America the National Security Agency which runs most of the spy satellites and surveillance interfered with the choice of the National Bureau of Standards Data Encryption Standard to make sure it was set at a level, 56-bit key with 64-bit cryptogram, that the NSA could break. Mr X thinks that the threat posed to major companies by hackers is not just the loss of few percent of turnover as with shoplifting but the complete destruction of their whole

not the petty pilfering, or even the major pilfering that worries them now. If you want to bring down a major company, even IBM, all you have to do is modify profit margins.'

Mr X sees a total and unavoidable collapse of companies as the hackers are let loose.

Faced with such apocalyptic predictions it is no wonder that Scotland Yard's computer crime chief Detective Inspector John Austen is calling for a ban on books like the recently published Hacker's Handbook which tells you how to set about breaking and entering other people's mainframes down your phone line.

But the book's author, who goes by the name Hugo Cornwall on the title page, believes that hacking is harmless so long as the participants follow a sort of countryside code: "Don't manipulate files unless you are sure a back-up exists; don't crash operating systems; don't lock legitimate users out from access; watch who you give information to; if you really discover something confidential, keep it to yourself." Cornwall also believes that "most hackers are not interested in perpetrating massive frauds. Modifying their personal banking, taxation and employee records, or inducing one world super power into inadvertently commencing Armageddon in the mistaken belief that another super power is about to attack it."

Cornwall prefers to think of hackers as the pranksters who raided Prince Philip's Prestel mailbox and bedevilled every public demonstration of Telecom Gold. Despite assurance from Telecom that the system was secure, Radio @'s Chip Shop presenter Barry Norman found his Gold mailbox raided on a number of occasions and the first demonstration of Telecom Gold on live TV was also disrupted by the appearance of a hacker's message.

# organisations. "It's the PIN numbers for at a would-be villain a

Police fear that the current publicity will give away the "secrets" of hacking and so open up the possibility of computer crime. But once a hacker has the necessary equipment - micro, phone line and modems capable of transmitting and receiving at any baud rate in any protocol and data format which the target computer might use — much of the necessary information such as passwords for breaking into systems is

easily available. Bulletin boards - the electronic noticeboards accessible with a passwords.

modem, or their more prosaic counterparts, the tatty pieces of paper passed around at computer clubs, often carry a few interesting numbers for enthusiasts to try. For a professional criminal many passwords are easy to find. At exhibitions an access number may be taped to the side of a machine in full view of the public, or typed in while people are watching. A single repeated symbol from the keyboard may trigger a test number and many people use their initials or birthdays as

Increasing the number of passwords needed to access a system can also cause problems. Clive Blatchford - in charge of ICL's computer security - told a computer crime conference last month that almost no-one who has to remember more than two Personal Identification Numbers trusts their own memories enough not to carry them around in a diary or on a slip of paper. Blatchford told his audience - mainly people in charge of computer security that if he picked their pockets he would expect to find out

least one in three of them.

If the hacker has most of the digits of a number, an autodialler can run through the remaining possibilities - although most systems now cut off a modern after two or three false attempts. The professional criminal might buy specialist equipment which can analyse a stream of data and tell you what protocols and formats are being used. Even closed computer networks can be cracked if you can get close enough. £200 would buy

measure the variations in electromagnetic pulse put out by a computer. According to Blatchford an unscreened terminal puts out 150 microvolts 30 feet away - while the device can pick up fluctuations as low as one microvolt. By listening in to the beginning of each transmission the bug could capture the passwords and identification codes. No wonder that some companies now spend up to £500,000 to screen a room which is going to take a £50,000 computer.

49

# the things that dreams are made of...





# VVIN AN ENTERPRISE



Win £600 of prizes from Enterprise for the best idea how to cheat in an exam or pull off a scam using a computer. Five runners will each get two great books on hacking and computer crime.

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- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or clever idea for a computer cheat or scam.
- The name of the winner will be printed in the August issue of Your Computer.
- All entries must arrive at the Your Computer offices by the last working day in May 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
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# COMPUTER CRIMES

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MARTIN H. GREENBERG AND
CHARLES G. WAUGH



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# REVISIONSOF

EVERY YEAR the nation is swept by an epidemic of exam fever. It begins around Easter and reaches its climax in May and June. Most of the victims suffer no lasting damage, although some do have a relapse known as "retakes". Usually, the trouble passes as quickly and strangely as it has started.

There is no known cure for the complaint; time is the great healer. The only thing the victim can do to alleviate the condition is to take large preventive doses of revision, beginning in mid-winter. In the right doses, revision lessens mental tension and ensures that there will be no need for the misery of retakes.

Many potential sufferers from exam fever will be owners of home computers. Many of the large publishing companies are now producing revision software for a wide range of subjects and machines. Can they help?

In some cases, almost certainly. Penguin Study Software has come up with a series of programs on Shakespeare's plays which shows just how much good educational software can achieve.

The programs run on a database containing three sections: people, themes and acts. So the student can search through each act, or the whole play, searching for references to particular characters or themes. But much more interesting, and useful, is the ability to combine a particular character with a theme in the search.

In Julius Caesar, for instance, the program lists 17 themes ranging from Alchemy to Weeping. Let's say you choose Ambition, combining it with the character of Caeser, and search through the whole play. The screen will display line references — to the Penguin edition, of course — and a comment, e.g.

# Pete Connor studies revision programs.

"Look at Act 1 Scene 1 Line 72. Flavius expresses fear, later developed by Cassius, that Caeser's ambition might plunge Rome into dictatorship." Sometimes another reference will be given, or a question for the user or a suggestion that another theme will be worth exploring.

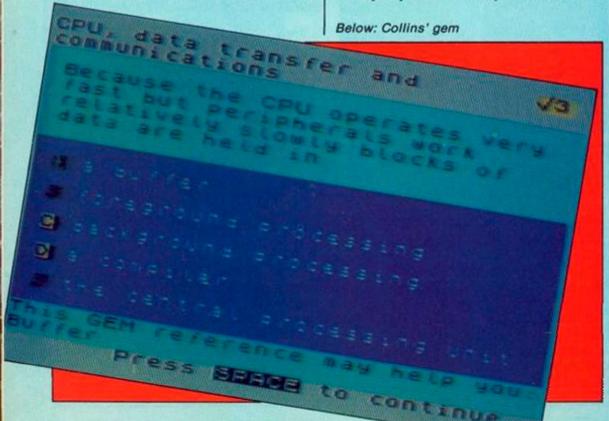
Thus the program constantly makes the user think for himself as well as providing information. It's the kind of service a good teacher would like to give, but never has the time — or perhaps the database — for.

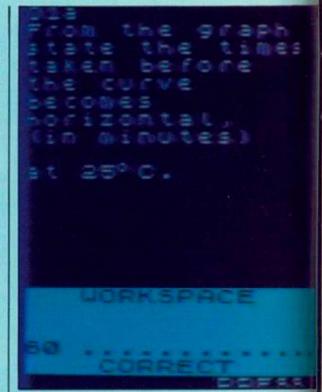
English Literature lends itself readily to this kind of stylish treatment. Other subjects are more traditionally presented and are much heavier going. French, for instance. You're obviously not going to get much guidance on your accent from a computer. And, sadly you won't get an awful lot of guidance on anything else of great value.

In the Hill MacGibbon/Pan Study Aids Software series you get two tapes and the Pan Study Aid book in a hefty £14.95 package. The program starts off with Diagnostic Test in which you have to choose the answers from an accompanying booklet. On completion you get a report showing how you've done.

The rest of the program is taken up with sections on grammer and areas of vocabulary. It's pretty simply presented, and will certainly ram home all those rules about the agreement of past participles etc., but it doesn't really seem to provide anything to merit the time taken to load it up.

With the Longman French program on the Spectrum you get only one tape. It contains five programs. Two of these — Lexis 1 and 2 — are pretty dull vocabulary tests. The others





Above: Pan biology

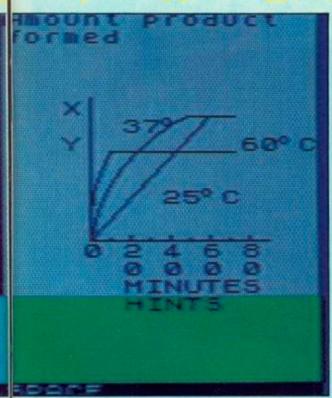


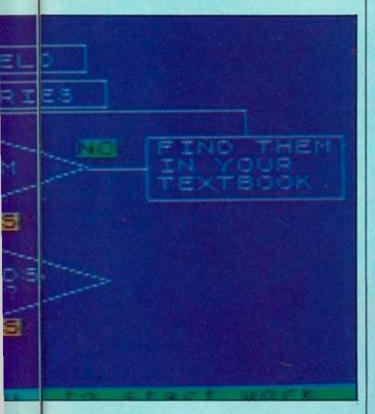
Above: Longman's biology

test knowledge of verbs and of the geography of France.

The most interesting seemed to be a Comprehension program. Here you get a choice of six passages which you are then asked questions on. But, in fact, this was little more than a memory test like those games where you must remember the objects on a tray. Instead of asking questions and expecting grammatical answers, the student is merely required to reproduce exactly each sentence in the passage. All this is accompanied by atrocious "drawings" designed to jog the memory.

# WARE REVIEW





The trouble with language programs is that computers just don't understand what they're talking about and so can only give a very limited number of mechanical and not very useful tests. French is one subject where you're better off with a book, your notes and a teacher.

Biology at least allows you to use diagrams and Longman, Hill MacGibbon, Collins and Scisoft programs all rely heavily on them. Word games are the other favoured means of learning. The Longman package has five programs on the one tape. Of these, Skeleton is the most fun. It's a word game based on

hangman in which each correct answer adds another bone with its name.

It's not a terribly original idea, and it hasn't really got much to do with the scientific method, as the blurb claims. But it is quite enjoyable, reinforces the knowledge and covers seven topics. The other programs cover heredity, food and kingdoms.

The Pan/Hill MacGibbon offering is similar to the French package, beginning with "diagnostic tests" and then going on to learning modules covering most of the topics on an 'O' Level syllabus. Since it has two tapes it covers rather more ground than the Longman program. The diagrams are all very clear and the program will be useful to the student —but not that much more useful than his or her own notes. If he or she has got any.

Collins Revision Software is another tape/book package: one tape and the Collins Basic Facts on Biology. The first of the four programs, Tester, asks you to give the answer to definitions from a mixture of topics. Get it wrong once and you're given the first letter, twice and you're referred to the Basic Facts, a third time and you're given the answer.

The other three programs are all diagrambased. The first one, for example, offers the structure of the flower, structure of the eye, kidney tubule, section through a leaf and the human digestive system. The exercises consist of labelling the parts, with plenty of help available if you need it. Again, most of the syllabus is covered and the program will be useful to the student. A pity, though, that the diagrams weren't just a little clearer or quicker on the draw.

Scisoft's Biology is the weakest package under review, even though it does proclaim on the cover "Approved by teachers". Which ones? Where?

Most of it is multiple choice questions on

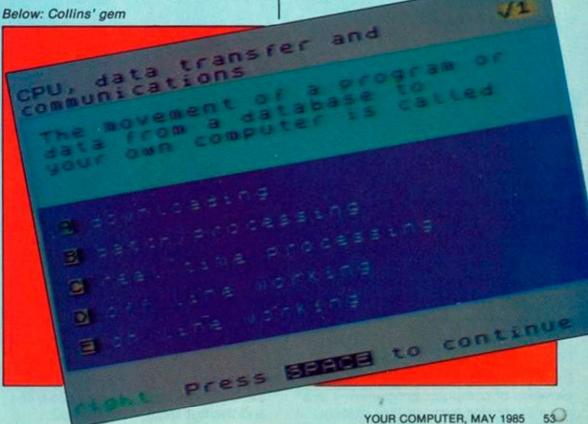
various topics. But each section contains only 20-32 questions, which doesn't really seem enough. There is also a diagram program. The package doesn't really have enough to offer the student in terms of variety or fun. Both Longman and Collins offer Computer Studies revision software, the Collins once more coming in a pack with a Gem Basic Facts

Longman's tape contains four programs covering most of the syllabus. Topics include Basic routines, file-handling, logic and low-level language. This latter is dealt with in the program Visicode, which gives you 15 commands in a low level language and allows you to write your own programs. This is a particularly useful sction; explanation is clear, graphics are good and it's easy to get any help you might need.

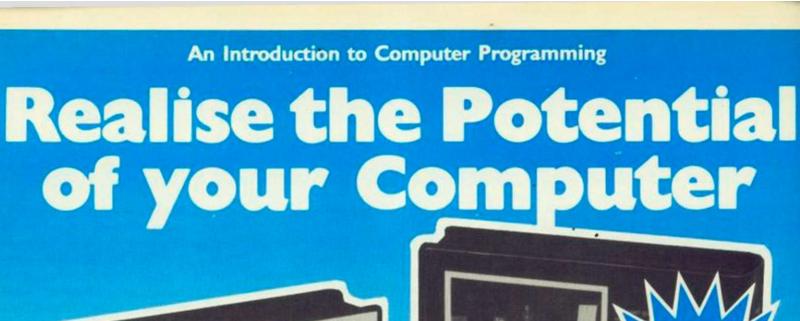
Collins's Computer Studies has the same format as their Biology; three programs in which you must label diagrams and two with multiple choice questions. The program covers much the same ground as Longman's, but is less well organised and therefore not quite so useful. It also contains a truly awful "game", based around darts. It's supposed to be fun, but it isn't.

Longman's do a Physics program as well, and it's pretty good. The four main programs are Formulae, Circuits, Light and Machine. Circuits contains two sections on Ohm's Law, the first of which is a graphich demonstration of the way that diodes and transistors work. It's very clear in its explanations, although the diagrams are constructed rather slowly. The rest of the package is of a similarly high standard.

But it's put in its place by the Physics program in the Penguin Study Software (continued on



page 55)







# THE BBC & ACORN **ELECTRON** First Steps in BASIC

The user guides which are supplied with the BBC Computer and the Acom Electron are excellent reference books.

There are also lots of very worthy books on sale which attempt to teach people how to program in BBC BASIC

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(continued from page 53)

series. This really is a very superior product, almost meriting the blurb's claim that it's "the next best thing to having your own private teacher."

There are two tapes with four programs: Mechanics and Units; Heat and Sound; Electricity and Magnetism; Light, Atomic and Nuclear Physics. Each is presented in a multiple-choice format with a help facility. So, if you're stuck on a question, you can first get a hint, then a detailed explanation with the answer.

The program has a very sophisticated randomising facility. If you want another question on a topic just covered you'll get something similar, but definitely not the same. And the questions are not easy - the

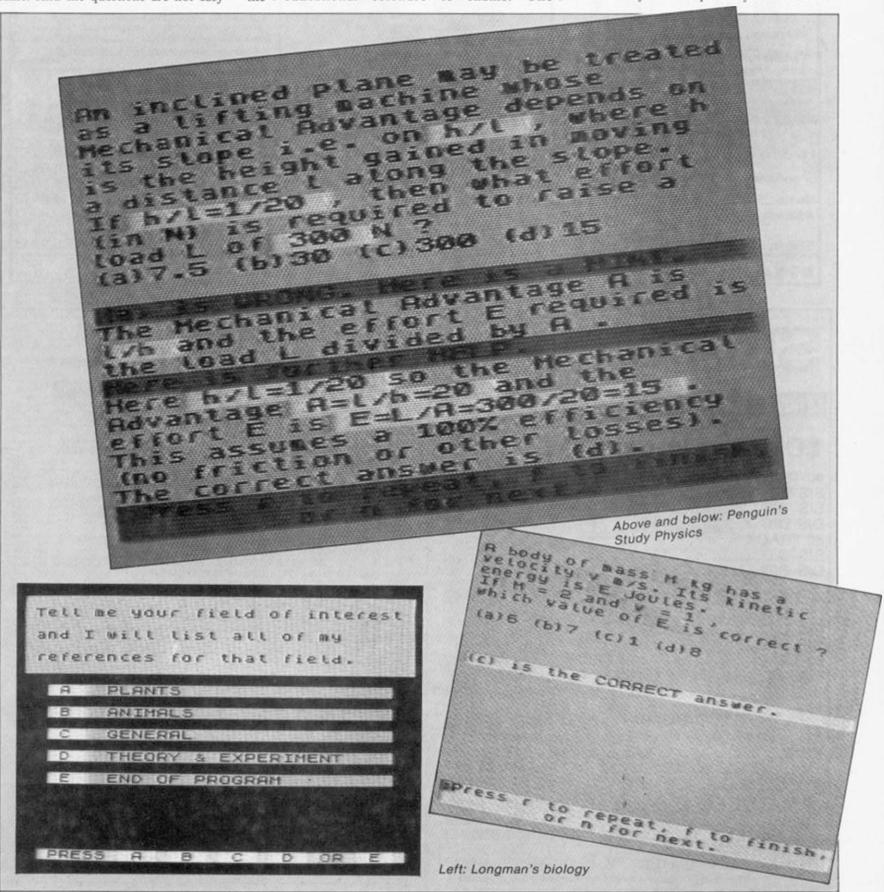
program will be useless unless you really have done the work. Which is as it should be in a revision program. Not only is this program more academically useful than others considered here, it is also much classier. It just looks better, with more colour and clearer and faster diagrams.

Perhaps this is because the Penguin software has more machine code routines it's certainly more attractive and much quicker than any of the others. Indeed, too little thought has been given to visual impact in nearly all the programs mentioned here. If someone has a computer the chances are that he or she will have seen countless games of one kind or another, games whose graphics, speed and general presentation put most educational software to shame. The

experienced games player is not going to stand for the sort of pathetic "game" presented on Collins's Computer Studies program.

Educationally, none of the programs is without merit. But too many of them do not give the student enough to do and are just not hard enough. And too many of them do not provide anything substantially different from what you would get from a decent set of notes - and if you haven't got those it's unlikely you're going to pass your exams, computer revision or not.

Top of the class, then, comes Penguin for both presentation and content. The other publishers need to pull their fingers out, pull their socks up and get their noses to the grindstone if they want to pass any future exams.



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# **SPECTRUM** Colin Carruthers and a

Spectrum teach you a thing or two about quadratic equations.

ARE YOU BORED solving systems of equations with five unknowns? Want a hand to invert a couple of matrices? Shouldn't you check that difficult integration problem you've just spent four hours doing?

Well, the computer's ability to plough through tedious calculations at high speed is used in this program to provide a useful maths package.

The program will run on both the 16K and 48K Spectrums, but since it is written entirely in Basic it should be quite a simple task to implement the package on other micros.

As far as possible, each part of the program has been made self-contained enabling the individual to just type in the routines he or she requires. However, the Matrix Operations section demands that the System of Equations routines be present - this is due to the fact that matrix inversion and solving systems of equations can be done by similar techniques and therefore have common program blocks. In any case, the program must have the menu, input a number and hit any key routines - see

Figure 1 Program breakdown.

500- 580: Input a number routine.

Extensive use is made of this routine, so it is placed near the beginning to speed execution.

1000-1180 : Menu.

2000-2970: System of Equations.

3000-3500: Quadratic Equation.

4000-4500: Equation of third degree. 6000-6650: Matrix Determinant and

Inverse.

7000-7500 : Simpson's Rule.

9000-9030: Hit any Key to Return.

figure 1.

There now follows a brief description of each part of the program and examples of the kind of mathematical problem they solve. These examples can be used to check that the routines have been typed in correctly.

System of Equations: Solved using Gaussian Elimination, each problem can have a maximum of five equations and five unknowns. The coefficients are held within a two-dimensional array - called "a". The user is prompted for each coefficient of x in turn, with the whole array of values shown on the screen at all times to enable checking.

Ex(n=3) $x_1 + 3x_2 - 4x_3 = -11$ 

 $2x_1 - x_2 + 3x_3 = 10$ 

 $4x_1 + x_2 - 2x_3 =$ 

(continued on next page)

```
108 GO TO 1800
508 LET as="": LET dps=0
505 LET nteger THEN LET dps=1
518 PRINT AT ", y_as; INK 4;"
515 IF INKEYS** THEN GO TO 515
520 LET z=1NKEYS; IF z=-" THEN GO TO 528
525 BEEP .02, 34.4: IF LEN as>=length THEN GO TO 566
536 IF z="." AND NOT dps THEN LET as=as=zs; LET dps=
1; GO TO 510
548 IF z=="-" GO As="" THEN LET as=as=zs; LET dps=
1548 IF z=="-" GO As="" THEN LET as=as=zs; GO TO 510
538 1F z8="-" AND AS" THEN LET AS"28: 60 TO 518
558 1F z8="-" AND 28<"" THEN LET AS"28: 60 TO 518
558 1F z8="8" AND 28<""9" THEN LET AS"AS"28: 60 TO 5
ethod"
1835 PRINT AT 13,3;"8 Guit"
1848 PRINT AT 21,3;"Enter Number ->"
1858 LET **21: LET y=20: LET integer=1: LET length=1
1868 GO SUB 580: IF a*>"5" THEN BEEP .5,-10: GO TO 186
 1'8":1
2000 MEXT 1
2000 FOR 1=1 TO n
2072 LET upper=n=1: IF matrix THEN LET upper=n
2000 FOR 1=1 TO upper
2000 FOR 1=1 TO upper
2000 FOR 1=1 TO upper
 20%8 IF j(=n THEN PRINT AT 15+j,3;"a(";1;1;")
TO 2188
20%5 PRINT AT 15+j,3;" b";1;" = "
210% LET x=15+j: OD SUB 50%
210% LET x=(15+j): OD SUB 50%
210% LET x=(15+j): OD SUB 50%
210% FOR c=15 TO 21: PRINT AT c,0;"
";: MCXT c
2110 OD SUB 200% MEXT :
2120 IF neatrix THEN DO SUB 50%
2130 IF neatrix THEN DO SUB 50%
2200 FOR i=1 TO next in the sub 50%
220% FOR i=1 TO max
2216 LET piv=a(i,i)
2215 IF piv=8 THEN 60 TO 29%8
2226 LET a(i,j)=a(i,j)/piv
2240 NEXT j
```

```
2250 FOR k=i+1 TO n
2255 LET piv=a(k,i)
2260 FOR j=i TO max
2270 LET a(k,j)=a(k,j)-piv*a(i,j)
2270 NEXT j
2270 NEXT j
2270 NEXT j
2370 POR i=n-1 TO 1 ETEP -1
2370 FOR i=n-1 TO 1 ETEP -1
2370 FOR j=i+1 TO n
2370 LET piv=a(i,j)
2370 LET piv=a(i,j)
2370 LET a(i,i)=a(i,k)-piv*a(j,k)
2370 NEXT j
23
  2018 FDR k=1 TO upper: IF ABS a(i,k)<8.881 THEN LET a(i,k)=8
2028 LET n==STR8 a(i,k)=" ": LET n==n8 ( TO S): IF
n8(1)<2"-" THEN LET n8=" "+n8( TO A)
2038 FRINT AT 2*i+3,6*(k-1);n8: NEIT k: RETURN
2038 FR and 1 TO n
2020 IF a(p,i)<0 THEN GO TO 2048
2038 FR ap: 1 TO n
2020 IF a(p,i)<0 THEN LET new=p
2030 NEIT p
2040 IF new=8 THEN FRINT AT 16,3; "No Solution": GO TO
2030
2060 FDR a=1 TO n=1: LET temp=a(i,m): LET a(i,m)=a(new
in): LET a(new,n)=temp: NEXT n
2045 LET piv=a(i,i)
2070 SO TO 2228
3060 FDR quadratic
3018 CLS i PRINT AT i,3; "Quadratic Equation"; AT 5,3; "A
is + Si * C = 8"
3028 LET in=0 THEN SEEP .5,-18: GO TO 3028
3025 LET x=11: FRINT AT 13,3; "C = ": GO SUB 500: LET c
NAAL AS
3040 LET x=13: FRINT AT 13,3; "C = ": GO SUB 500: LET c
NAAL AS
3040 LET x=13: FRINT AT 13,3; "C = ": GO SUB 500: LET c
NAAL LET b=-b/2/a; LET d=b=b-c/a
3050 IF d=0 THEN GO TO 3200
3050 IF d=0 THEN GO TO 3200
3050 FRINT AT 17,3; "Real p art: "; b; AT 19,3; "Imaginary:
i-/-"; iy GO TO 3500
3100 PRINT AT 17,3; "Real prots: "; b
310 BO TO 3500
3200 PRINT AT 17,3; "Real: "; b+SOR d; AT 18,3; "Real: "; b
SOR 370 GD TO 9000
4000 GDT 37000
                 2018 FDR k=1 TO upper: IF ABS a(i,k)<0.001 THEN LET at
                 -BOR d
3588 GO TO 9888
4888 REM 3rd degree
4818 CLS : PRINT AT 1,3; "Equation of 3rd Degree";AT 5,
3; "Axxx = 8xx = Cx + D = 8"
4828 LET x=9: LET y=7: LET integer=8: LET length=6: PR
INT AT 9,3; "A = ": GO SUB 588: LET x=WA. x8: IF x=8 TH
EN BEEP .5,-18: SO TO 4628
4838 LET x=18: PRINT AT x,3; "B = ": GO SUB 588: LET b=
VAL x8
```

```
4150 LET c=c-b: LET d=d=b: LET i=i=b
4160 PRINT AT 16,3; "Real: ";c;AT 17,3; "Real: ";d;AT 10
,5; "Real: "i
4170 GO TO 4880
4280 LET h=SDR h: LET (=.5*(h-e): LET g=-.5*(h+e): LET
h=1/3
              h=1/3
4218 LET (=ABS f*h+SBN f
4218 LET g=ABS g*h+SBN g; LET h=8.5+SQR 3
4238 FRINT AT 15,3; "Real root; ";1+g=5
4248 PRINT AT 15,3; "Real prost; ";-5+(+g)=5
4258 PRINT AT 18,3; "Real prost; ";-5+(+g)=5
4258 PRINT AT 18,3; "Imaginary; */= ";h+ABS (f-g); GO T
0 9508
4308 IF ABS a<18*-8 THEN PRINT AT 16,3; "Triple: ";-5;
#250 PRINT AT 18.3; "Imaginary; */- "; h*#ABS (f-g); GO T 0 9808

#280 IF ABS acis"-0 THEN PRINT AT 16.3; "Triple: "; b; CO TO 9808

#210 LET **- ABS (.5**) (1/3)*50h #

#250 PRINT AT 12.3; "Febal; "1/2*f-b; (2/4*b)

#250 PRINT AT 12.3; "Febal; "1/4*b

#250 PRINT AT 12.3; "Febal; "1/4*b

#250 SO TO 9808

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#250 SO TO 9808
#250 SO TO 9808
#250 SO TO 9808
#250 SO TO 9
              6040 LET g-a(new_a+n)
6030 OT 00 6538
7808 REM stapson's
7818 CLS : PRINT AT 1,3;"Siapson's Method -";AT 3,3;"A
pprosimate integral"
7828 PRINT AT 18,3;"Enter a funtion in x ";AT 12,3;"e-
q y = 5ex=2"
7838 INFUT " y = "; LINE fs ";AT 12,3;"
7848 PRINT AT 18,3;" = ";fs ";AT 12,3;"
7858 PRINT AT 18,3;";y=";fs"
7858 PRINT AT 18,3;"jupper x = "; LET integer=8; LET x=
18; LET y=13; LET length=8; SO SUB 588; LET d=VML as
7868 PRINT AT 14,3;"samples = "; LET x=12; GO SUB 588;
LET z=VML as
7855 IF x="c" THEN BEEP .5,-18; GO TO 7848
7878 TRINT AT 14,3;"samples = "; LET x=14; GO SUB 588;
LET p=VML as
7898 LET he(x=0)/2/p
7188 LET x=0; LET x=0; LET y=VML fs
7138 LET x=0; LET x=0; LET x=x+h; LET y=VML fs
7138 LET x=x+y; LET x=x+h; LET y=VML fs
7138 LET x=x+y; LET x=x+h; LET y=VML fs
                         7128 LET a-4*y-a: LET x=x+h: LET y=VAL #8
7138 LET a-y+a: LET p=p-1
7148 IF pF>8 THEN SO TO 7118
                7:00 LET C=a+0/3
7:00 LET C=a+0/3
7:00 PRINT AT 17.2; Integral = "16
7:00 GO TO 9000
9000 LET a=="1 IF IMEEV$<>"" THEN 50 TO 9000
9000 LET a=="1 IF IMEEV$<>" THEN 50 TO 9000
9010 PRINT AT 21,3; INS 4; INVERSE 1; HIT ANY KEY TO R
                       9030 IF INSEYS-" THEN GO TO 9020
9030 BEEP .02,74.41 RETURN
```

(continued from previous page)

This has the solution  $x_1 = 2$ ,  $x_2 = -3$  and  $x_3$ 

Quadratic equation: The roots are found using the classic formula:

$$-b \pm b^2 - 4ac$$
  
 $x = 2a$ 

This routine allows for both real and imaginary roots.

Ex 1 
$$x^2 - 3x + 2 = 0$$
 gives  $x = \text{ or } 2$   
Ex 2  $x^2$  6x + 10 = 0 gives  $x = 3 + / -1$   
Ex 3  $x^2 - 6x + 9 = 0$  gives  $x = 3$   
(double root?

Roots of a polynominal

Equation of third degree: This routine gives the roots of a polynominal with a term in x3. Again, imaginary roots are catered for, giving four types of possible solution.

$$Ex1 x^3 - 6x^2 + 11x - 6 = 0$$

Ex2 
$$x^3 - 3x^2 - 3x - 1 = 0$$
  
gives  $x = 1,2,3$   
gives  $x = 1,1,1$ 

gives 
$$x = 1,1,1$$

$$Ex3 - x^3 - 9x^2 + 81x + 729 = 0$$

gives 
$$x = 9, -9, -9$$
  
 $Ex4 x^3 - 5x^2 + 7x + 13 = 0$ 

gives 
$$x = -1, 3 + /-2i$$

Matrix Operations: The determinant of the given square matrix is calculated and displayed. Assuming that this is non-zero, the inverse is computed using Gaussian Elimination. A matrix with zero determinant has no inverse. The main "invert" routine is the same as that for the System of Equations.

$$Ex$$
  $(n=3)$ 

has determinant 1 and inverse



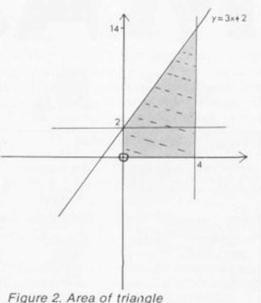


Figure 2. Area of triangle

$$= \frac{1}{2} \times 4 \times 10 + 2 \times 4$$

$$= 20 + 12$$

-2 0

Note that only real matrix elements are allowed.

Simpson's Rule: The function entered must be a valid expression in 'x', for example 'y = 3x+2' must be entered as:

$$y = 3 \star x + 2$$

Also, functions such as Sin, Tan or Ln must be entered as single-stroke key words. Any invalid expression typed in response to the prompt will result in an error at line 7100, statement 3. If this should happen, simply

GO TO 7000

and re-type the expression correctly.

$$Ex y = 3*x+2$$

$$lower x = 0$$

upper 
$$x = 4$$

samples = 10

# Value of the integral

As can be seen by looking at figure 2, the value of the integral - or shaded part of the graph - should be 32.

Type in the program as it is listed and check the operation of each segment using the given examples. They have been chosen to test all parts of the program and should make any typing errors apparent. When all is well, save the package by typing:

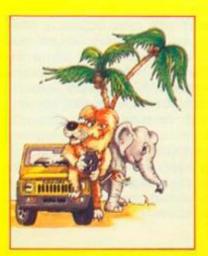
CLEAR: SAVE "Maths" LINE 100 This prevents any variables being dumped along with the program.





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# AMSTRAD AND SPICE AND SPICE AND SCIENCE AN

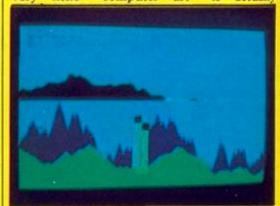
Fill in the background to that text-only adventure.
Artist Brian James puts pixel to phosphor.

```
Program 1.
10 '
        Fourier Synthesis
20 '
30 '
            AMSTRAD BASIC
40 '
50 '
         Brian James , March 1985
70 c$=CHR$(13)
90 KEY 135, "mode 1:ink 0,1:ink 1,24"+c$+" list "
100 KEY 137," edit ": KEY 128," goto "
120 SPEED KEY 12,2
130 SPEED WRITE 1
180 DIM a(250),b(250),c(250)
190 MODE 0
               for 16 colours
200 nn=6
                ' number of terms
               ' maximum amplitude
210 am=30
               ' blue sky
220 INK 0,11
230
240 FOR i = 1 TO 15
250 INK i,RND*26 'set colours
260 NEXT
280 FOR n= 1 TO nn ' Each wavelength
290 a(n)=RND*80/n 'amplitudes
300 b(n)=RND*2*PI
                   ' phases
310 c(n) = RND*15
                    ' colours
320 NEXT
325 PRINT: PRINT" Fourier Synthesis"
340 FOR x=0 TO 639 STEP 4
350 PLOT x,0,0
                ' at bottom
360 y=10
370 k=2*PI*x/640
390 FOR n= 1 TO nn 'incr. frequencies
400 y=y+a(n)*(1+SIN(n*k+b(n))) 'add waves
410 DRAW x,y,c(n) ' draw upwards
420 NEXT n
430
440 NEXT x
                     go right
460 FOR i= 1 TO 3000: NEXT 'pause
470 RUN
6000 WHILE 1: SAVE "": WEND
```

THE LANDSCAPE Creator is a program which creates detailed coloured landscape views, quickly and spontaneously. I developed this idea first on the Spectrum 48K, and now the program has been redesigned to fully exploit the beautiful graphics capability of the Amstrad CPC-464.

It is a simulation of "creativity": the computer makes all decisions relating to a wide range of parameters concerning the hills, trees, flowers, lakes, islands, and buildings. The number of variable parameters is such that the resulting scene gives endless, unexpected surprises with a wide range of possible colour schemes.

I developed this idea because, generally, very little "computer art" is actually



The scenic Spectrum.

generated by the computer. In nearly all cases the computer merely displays the picture, which is arranged by the programmer. We now have graphics packages which make it much easier for the operator to control the results on the screen. However, the result could just as well — or even better — be done with paint on canvas.

It is a much more interesting challenge to get the machine to create its own pictures, based on a "knowledge" of the subject to be portrayed. This involves intricate mathematical modelling, and really begins to unleash the power and the intelligence of the microchip and do things in a way only the computer can.

We have all seen some impressive colour graphics in computer games. In most cases these graphics make extensive use of user defined characters, which are rectangular elements — usually 8 by 8 pixels — used as building bricks. In contrast to this, the use of mathematical functions and probability theory allows us enormously improved flexibility, enabling the spontaneous creation of different scenes, giving endless surprises, even to the programmer!

It is easy enough to write a program to rearrange a number of graphic shapes — say to

# ECTRUM PES

select a building from a choice of five, choose a mountain from a choice of five, etc. etc. and put them together. But to simulate the idea of "creativity", we need to use a whole hierarchy of routines, building up the picture from the smallest elements, with freedom of choice at every stage in the process. User-defined characters are of limited use in this kind of exercise.

My objective in the Landscape Creator was to have the minimum of fixed quantities: to allow the greatest freedom for variations, without departing from some basic properties of landscapes. This same idea I used in Country Cottages, a fun game for two players where you buy cottages and try your skill in managing the awful tenants.

The cottages, the landscapes and the tenants are different every time you play the game. However, the Landscape Creator was designed from scratch, to produce greater variations, better colour schemes, better appearance of water and vegetation.

The number of calculations involved is quite horrendous. Just doing a single pixel involves over 50 machine-code instructions. Though Amstrad Basic is very comprehensive and quite fast, the Landscape Creator has so many calculations to do that machine code was essential.

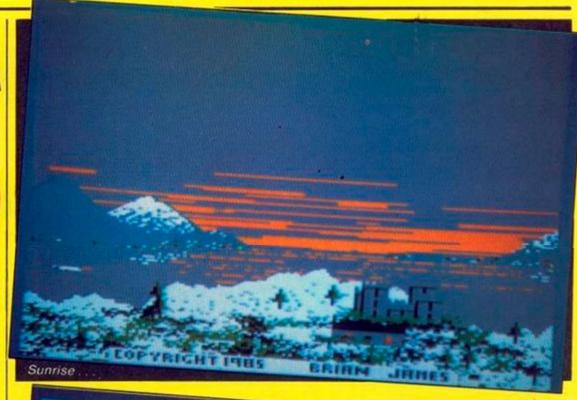
# Routines for plotting

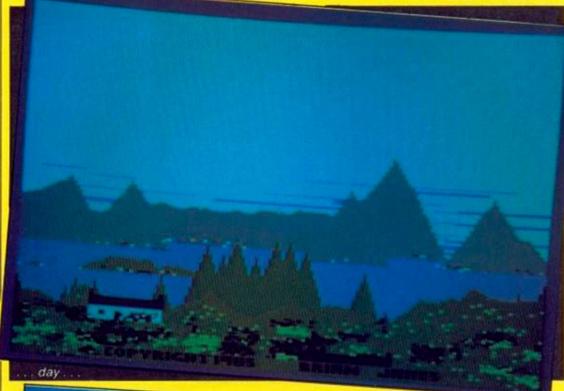
The Amstrad Firmware manual gives the addresses of inbuilt machine-code routines for plotting. These are easy to use and nicely crashproofed — but are therefore not as fast as would be desired. The Landscape Creator utilises its own extremely fast, compact plotting routines. Also the basic arithmetic routines were designed for the job.

In the Landscape Creator, the object was to have the maximum variety of pictures. Whether it is creating a rugged skyline, an island, a patch of buttercups, or a castle, a flexible routine is used which combines probability functions with appropriate mathematics.

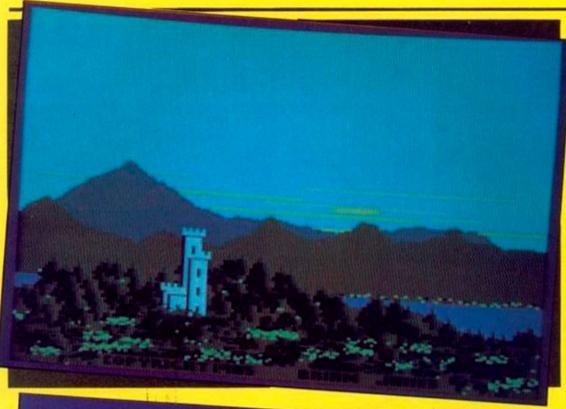
The program needs some "knowledge" about the structure of landscapes, so that the different features will have reasonable shapes and fit sensibly together. Trees and buildings must not hang in mid-air; hills must not have enormous holes through them; land must not be drawn when it is below water! Foreground objects may hide more distant objects — not the reverse — and so on. Distant hills could have a grey or bluish colour; whereas the foreground can have much brighter colours.

Lakes and sea can use a mixture of colours (continued on next page)

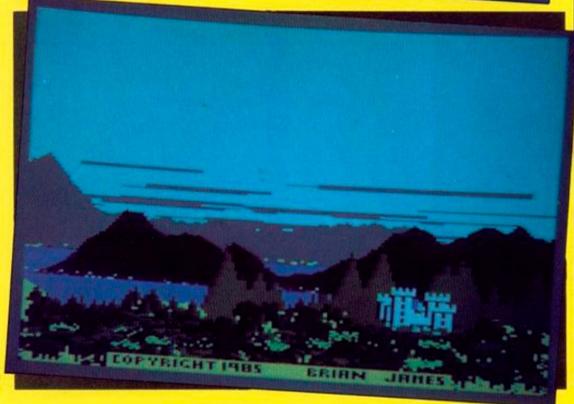












(continued from previous page)

reflecting the hills and sky beyond. The precise formulation of the fundamental properties of a landscape is a subjective process — and this is where the art comes in — and the inspiration for this task came from the Highlands of Scotland and also Cumbria.

The Amstrad version of the program displays several advances compared to the Spectrum version. A tremendous advantage of Amstrad graphics is that any pixel can be any colour. You can have 16 colours in Mode 0, with a resolution of 160 pixels horizontally by 200 vertically. For better resolution, Mode 1 gives you 320 horizontally, but only four colours. I chose Mode 0 with its much greater range of colours. If you want better resolution horizontally than vertically, then you could turn the monitor on its side, and swap your x and y axes.

# Pixels can be any colour

Whatever mode you select, any pixel can be any of the available colours. This gives enormous freedom compared to most home computers. Foreground features can be drawn with no effect at all on the background colours. The colours actually used on the screen can be chosen from a selection of 27.

Machine code is notoriously difficult to experiment with and so I am providing a simple program in Amstrad Basic for you to try out. It uses the RND function to generate



a recipe for a mixture of sine waves with different wavelengths and phrases. The sum of all the different waves is a complex curve which can have enormous variability. It is a well-known method called Fourier Synthesis.

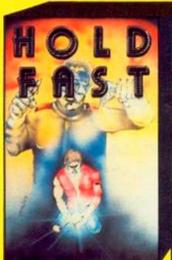
Each waveform here is drawn with a different colour and — Hey Presto! — the Fourier Series we learned in stuffy lecture theatres comes to life in brilliant colours.

The number of sine waves used in nn. You can try putting in a larger number, say nn = 20 or nn = 50. The curve becomes more and more complex — but very much slower. This method is very good for smooth curves, but becomes too cumbersome and slow for very rough crinkly lines.

Next month we will explore more possibilities with the RND function, and also peer into the fascinating world of "fractals", functions which are particularly suitable for describing the very rough mountain skylines we like to gaze upon.

I can supply the Landscape Creator doubly recorded on cassette, for the Amstrad or the Spectrum 48K. Send £5 for the Amstrad version, or £3 for the Spectrum version, to — Brian James, 21 Lamond Place, Aberdeen AB2 3UT.

# the only choice Control Cont



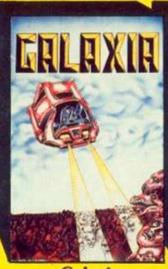
Holdfast



Gems of Stradus



Star Avengers



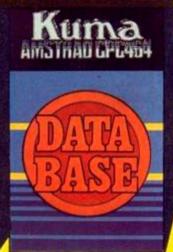
Galaxia



Music Composer



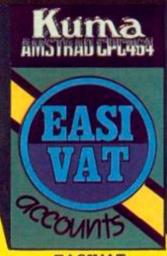
Logo



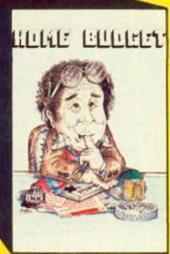
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# JOEAN

YOU ARE Joe, out for a quiet boat ride at your favourite beauty spot when you suddenly realise that someone with a warped sense of humour has sent loose a shoal of dangerous and ferocious aligators, intent on making you their snack of the day.

Guide Joe through four waves trying to steer clear of floating logs, other boats, rafts, floating weed and most of all watch those

When you reach the narrow exit you have to

guide Joe through the locks without hitting the walls or overhanging rocks.

There is also a hole in the boat and you must use the fire/button to bale out or the boat will sink.

Time limit and water level are shown at the bottom of the screen:

Time - WHITE Water level - BLUE

On the locks screen you can control Joe by:

Left - reduce speed of boat Right - increase speed of boat Up - increase level of water

F G Tout and his **CBM-64** are on the run.

# Variables.

V — 53248 sprites Q — sp locations

CO - colour of water level and time limit

TL - time limit

WL - water level

L - joystick port

S1, S2, S3 - sound

SYS 36864 = sound on SYS 37120 = sound off

LI - lives

LE - lake number

SC - score

```
En you reach the narrow exit you have

Listing 1.

Up — increase  

Listing 1.

Department of the process reach in the process reach in
```

```
.8
55888: DRTR174,8.8,182,8.8,252,8,15,252,8,15,252,8,4,12,8.8,12,8.4,15.8,48.6.8.8.
                        2
55899 DRTM8.8;1.8.8;18.8;6
55190 DRTM8.252.8;8;124.8;2;172.8;8;172.8;8;16.8;2;252.8;2;116.8;8;174.8;8;166.8
                       55100 DRTR0.232.0.0.124.0.2.172.0.0.172.0.0.11.204.0.43.15.0.40.15.120.160.3
55110 DRTR252.0.0.160.0.0.252.0.0.252.0.3.252.0.11.204.0.43.15.0.40.15.120.160.3
55120 DRTR160.0.0.160.0.0.32.0.0.160.0
55130 DRTR0.252.0.0.124.0.2.172.0.0.172.0.0.16.0.0.252.0.0.116.0.0.172.0.0.164.0
                     55130 DRTR0,252,0.0,124.0,2.172,0.0,172.0,0,152.0,0,252,0.0,116.0,0,172.0,0,164.0,0,55140 DRTR100,052,164.0,2.252,0.0,252,0.0,252.0,0.204.0,3.207.0,3.207.128,10,3
55150 DRTR160,0.160,40,0.32.160,0.160.0,55160 DRTR0,252.0,0.124.0,2.172.0,0.172.0,0.16.0,0.252.0,0.116.0,0.172.0,0.164.0,55170 DRTR0,0.180,0.2514.0,2.172.0,0.172.0,0.172.0,0.16.0,0.252.0,0.116.0,0.172.0,0.164.055170 DRTR0,0.120.120.10.0,120.0,0.120.0,0.120.0,0.252.0,0.204.0.3,206.120.3,206.120.55170 DRTR0,0.120.10.0,120.0,0.120.0,0.120.0,0.252.0,0.204.0.3,206.120.3,206.120.55170 DRTR0,0.120.10.0,120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.0,0.120.
```

```
10 - 200 Music interupt & data
                                                                                                                                                                                                                                                                                                                                                                                    29999-61000 Sprite data
                                                                                                                                                                                                                                                                                                                                                                                     62000-62030 Download W.D.Gs
                                                                                                                                                                                                                                                                                                                                                                                    62155-62235 Sprites for Title
                                                                                                                                                                                                                                                                                                                                                                                     62300-62570 Move sprites.
                                                                                                                                                                                                                                                                                                                                                                                      Gator: Listing 2.
                                                                                                                                                                                                                                                                                                                                                                                        0 - 50 Set variables
                                         100 - 135 Set sprites pos.
                                                                                                                                                                                                                                                                                                                                                                                         600 - 999 Set time and water level
                                                                                                                                                                                                                                                                                                                                                                                          1000- 1099 Main routine
                                                                                                                                                                                                                                                                                                                                                                                     10000-10199 Screen 1
                                                                                                                                                                                                                                                                                                                                                                                     11000-11099 Screen 2
                                                                                                                                                                                                                                                                                                                                                                                    11100-11199 Screen 3
                                                                                                                                                                                                                                                                                                                                                                                    11200-11288 Screen 4
                                                                                                                                                                                                                                                                                                                                                                                    22000-22040 Lives left
23000-23155 Game over
                                                                                                                                                                                                                                                                                                                                                                                    30000-30199 Locks screen
                                                                                                                                                                                                                                                                                                                                                                                    60000-60998 Title page
                                                                                                                                                                                                                                                                                                                                                                                    60999-61199 Music for title page
                                                                                                                                                                                                                                                                                                                  11230 DOTO11280
12550 PRINT'#F; PRINTTAS(34)SC; :PRINTTAS(74);LI
12555 PRINT'#F; PRINTTAS(34)SC; :PRINTTAS(74);LI
12555 PRINT'#GGG*; :PRINTTAS(34)SC; :PRINTTAS(74);LI
12555 PRINT'#GGG*; :PRINTTAS(34)SC; :PRINTTAS(74);LI
13250 POKE2040; 205 :PRINTTAS(34);LE :RETURN
13250 POKE2040; 205 :PRINT*BGG*; :PRINTTAS(34);LE :RETURN
22083 SYS36864+256
22083 SYS36864+256
22083 PDKESI, :16 :POKESI, :15 :FORJ=$TO25:R=R+1: IFR>8THEND=D+1:POKE2040; DIR=8
22085 POKESI, :16 :POKESI, :16 :POKESI, :17 :POK
                                                                                                                                                                                                                                                                                                          2003 PAPERCY 1. 129 POCK 1. 17 POCKS 2. 289 POCKS 3. 129 POCKS 1. 129 POCKS 1. 129 POCKS 1. 129 POCKS 2. 129 
     8 S1=54276 S2=54277 S3=54273 FORI=S1-4T0S1+28 POKEI.8 NEXT POKES1+28.15 00T06888
         1812 1FTL<19450RHL)2822THEN22888
```

Gator: Listing 1.



TANKS IS an arcade-style game for the BBC Micro with operating system OS 1.2. The program features machine-code, flicker-free, high-resolution graphics, with independent rotation of the tanks' turrets and chassis, music, animated lives and a high-resolution title page.

To get the program Saved on tape, first type in listing 1 and Save it as Tanks-1, then type in listing 2 and Save it as Tanks-2 on a different tape. Run Tanks-2 and a series of rotations of tank's chassis, turrets and trees will appear on the screen followed by the message "Record then return".

Start your tape recording straight after Tanks-1 and press Return. Finally, type in listing 3 and Save it as Tanks-3 after Tanks Data. To load the game

CHAIN "TANKS-1"

which will draw the title page and automatically load the other sections.

When the whole program has loaded, the instructions will be displayed. The object of the game is to destroy all enemy tanks - those with crosses on their turrets - by cleverly chasing and ambushing them. You score 100 points for each tank destroyed and 1,000 points for each screen completed.

After losing a life or on starting a new game your tank automatically drives from the barracks, at the top right of the screen, to the centre of the screen ready for action, during which the music plays. At the end of the game the last score and the highest score are

In writing the game the first problem was that, to obtain the necessary independence of rotation of a tank's chassis and turret, a total of 128 3-by-3 character matrices had to be defined, or 1,152 characters, or 9,216 numbers would have had to be typed in. This is obviously a massive waste of memory and would be very prone to error.

The alternative was to separate the turret and chassis into different characters and overlay one of the eight different rotations of each on to the other. This can be done using the Basic function Or, which affects the bits of two numbers when written in binary such

### 01010100 OR 00110101 = 01110101

It can be seen from this that if there is a 1 in any or both of the corresponding positions of the numbers then a 1 will appear in the corresponding position in the answer. Only where there is an 0 in both of the corresponding positions of the numbers does an 0 appear in a corresponding position in the answer. Thus:

8 OR 53 = 117

Unfortunately, using Or is too slow to produce flicker-free graphics and so I wrote a machine-code subroutine which appears at line 1940 in listing 3. ORA is the equivalent function to Or in assembly language and takes the form:

> LDA (first number): ORA (second number): STA (on screen)

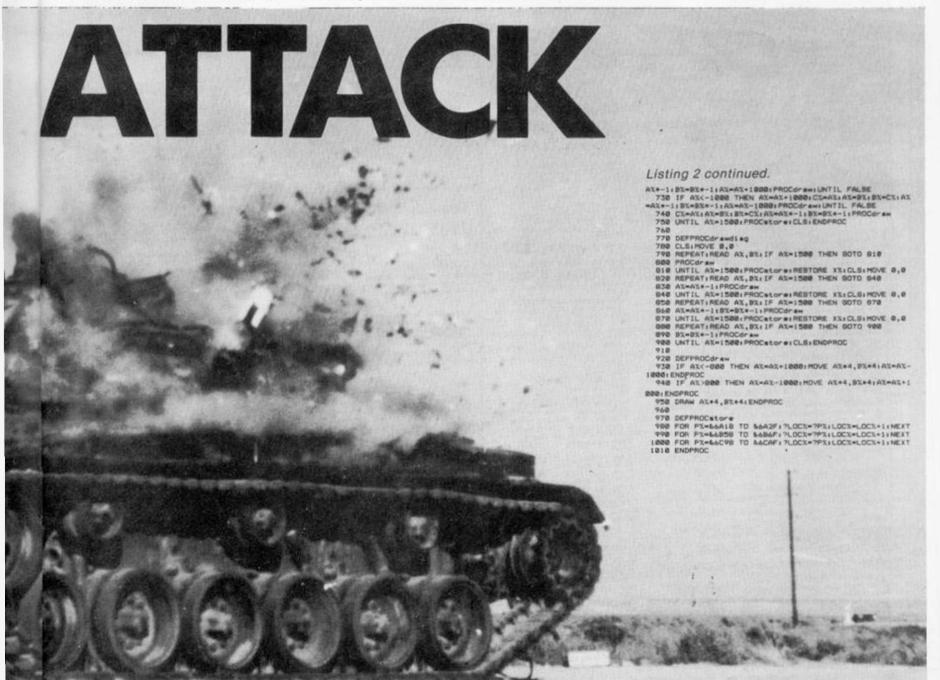
As you can see I have directly accessed the screen for ease and speed and so second processors must be disconnected before running the program.

With the program altered to accept this only 24 3-by-3 character matrices are required, that is 1,728 numbers to be typed in, which is still too prone to error. The solution was simple, use the BBC's processing power to rotate the shapes - from just two of the most important rotations of each shape entered from the keyboard - to create the remaining rotations and store them in the memory before the game begins. Listing 2 does this by reflecting the shapes in varying lines.

With this entered and working correctly only six of the 128 3-by-3 character matrices that will appear on the screen have to be defined.

If you wish to have a copy of the game, but do not have the time to type it in, it is available from N Sheard, 2 Ashbrook Drive, Prestbury, Cheshire SK10 4BY, on cassette for £4 including P&P.

(continued on next page)



#### (continued from previous page)

```
1188
1198 DEFPROCENSBYLANKS
1208 FOR ZX-65838 TO 6584F STEP 8
1218 ENXX=7(ZX+6):ENYX=7(ZX+7)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2318 LDA &7C:CLC:ADC e&Ce:SJA &72:LDA &7D:ADC &63:STA
&73:JSR check:JSR block:LDA &7E:STA &5282
2328 LDA &7C:CLC:ADC excists 472:LDA &70:ADC excists
&73:JSR check:JSR block:LDA &7E:STA &5261:ATS
                    Listing 3.
                                  10 SEM TANKS-3 BY N. S-EARD
20 ON ERROR ODTO 50
30 H1%-0
40 SCOPEX-0
50 MODE 7: VDU 23;8282;8;8;8;
40 PROCINSTRUCTION
70 MODE 4: VDU 23;8282;8;8;8;
80 VDU 19,1,8,8,8,8;VDU 19,8,3,8,8,8,8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2338
2348 .block
2358 LDA &78:8ED nought:LDA *&8:STA &7E:RTS
2368 .nought:LDA *&1:STA &7E:LDX &78:INX:STX &78:RTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1228 IF 7ZX-8 NEXT ZX; ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2378
2388 .movewheil
2398 LDV #11,DA(&78),Y1CMP #518MI right;LDV #21,DA(
478),Y18TA &73,DEC &73,LDA &73,8TA (&78),Y
2488 .right;LDV #11,DA(&78),Y1CMP #6418PL up;CPF #818
EQ up;LDV #21,DA(&78),Y1STA &73,1MC &73,LDA &73,8TA(&78)
                            100 PROCHACHINECOSE

110 RESTORE: PROCHAL

120 PROCHEW116

130 GOTO 160

140 RESTORE: PROCHAL

150 PROCHACTION

160 GX-28:HX-16

170 TURY-03: CHAGK-03: ROTX-1

100 DIRX-03: TRACKX-2: GUNX-4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           0),Y = 2418 .up:LDY #1:LDA($78),Y:CMP #2:BMI moveup:CMP #7:8
PL mdVeup:JMP down
2420 .moveup:LDY #3:LDA($78),Y:STA $73:DEC $73:LDA $7
3:BTA($78),Y = 2438 .down:LDY #1:LDA($78),Y:CMP #3:BMI end:CMP #6:BP
L md:LDY #3:LDA($78),Y:STA $73:INC $73:LDA $73:BTA($7
                              198 PROCQuite
198 PROCQuite
208 IF 765838-8 AND 765838-8 AND 765848-8 AND 765848
SCOREX-SCOREX-1888: RESTORE: PROCduta: CLE: GOTO: 48
218 GOTO 198
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     2468 .11ves
2478 LDA &74:ETA &7C:LDA &75:ETA &7C:LDA &76:ETA $7E:
LDA &77:ETA &7E
2488 LDA &468:ETA &7C:LDA &558:ETA &73:JER DIANKILDA
4568:ETA &72:LDA &568:ETA &73:JER DIANKILDA
4568:ETA &72:LDA &568:ETA &73:JER CONTROLLOA &7C:ETA
474:LDA &70:ETA &75:LDA &7E:ETA &73:JER &76:ETA &77:2498 LDA &588:CMP #2:EEG nolives:LDA #6:ETA &72:LDA #6
59:ETA &73:JER DIANKILDA #8:ETA &72:LDA #659:ETA &73:JE
SR control:RTE
2508 .nolives:RTE
2518 :
2528 NEXT
2538 ENDPROC
2548
2578 EDUND 8.-15,6::EUND 8.-15,5:15:EUND 8.-9,65
2508 FOR LOOPE:1 TO 2
2509 FOR LOOPE:1 TO 2
2509 FOR CIRCLEX-8 TO 508 ETEP 68
2608 NX-CIRCLEX-8 TO 508 ETEP 68
2608
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1398
1408 DEFPROCS#### 1418 7:21x-31 + 7:21x-21 + 9:00 3-8 AND (ENYX-1)
1418 7:21x-31 + 7:21x-21 + 9:00 3-8 AND (ENYX-1)
MOD 3-8 THEN PROCGIPACTION
1438 1F 7:21x-41) + 18 7:21x-21 + 7:21x-21 + 1:7:21x+3) + 7:21x-43 + 1:7:21x-43 + 7:21x-43 + 1:8
1488 1F 7:21x-43 - 7:21x-43 + 7:21x-33 + 7:21x-33 + 8:18 17:21x-33 + 7:21x-33 + 7:21x-
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            2468 .1;ves
2478 LDA 674:STA 670:LDA 675:STA 670:LDA 676:STA 676:
                            228 DEFFROCdram

248 Alm (Alm-72) + 64888; Blm (Blm-72) + 64888

258 Elm (Dlm-328) = (Clm-8) + 65888; 7872 = Elm (Dlm-328) = (Clm-8) + 65888; 7872 = Elm (Dlm-328) = 7872 = Elm (Dlm-328) + 7872 = Elm (Dlm-32
                              318
328 DEFPROCENECK
338 EX=(DX=328)+(CX=8)+65888
348 7872=EX MOD 256:7873=EX DIV 256
358 CALL check
368 ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1538 CX=ENXX:DX=ENYX;EX=(DX+528)+(CX+8)+&5888;7&7C=EX

MOD 254:7&7D=EX DIV 256

1548 CALL tankcheck;VARX=7&78

1558 IF VARX+8;ENDPROC

1568 IF VARX+8;ENDPROC

1568 IF VARX+1:DIRX=-1:REPEAT:DIRX=DIRX=1:IF DIRX=4

1578 IF VARX+1:DIRX=-1:REPEAT:DIRX=DIRX=1:IF DIRX=4

EN ENDPROC

1588UNTIL 7(DIRX+&5858)=1:PROChe#dir=ct:ENDPROC

1598UNTIL 7(DIRX+&5858)=1:PROChe#dir=ct:ENDPROC

1608 7(E5858+4X-2)=8

1618 AX=INT(RND(4))=&584F:IF 7(AX)=1 DIRX=(AX=&5858):

**ROChe#dir=ct:ENDPROC ELSE DOTO1618
                          370
                          378 DEFFROCEL#ar
398 EX=(DX=328)+(CX=8)+65888
408 7472=EX MDD 256:7673=EX DIV 256
418 CALL blank
428 ENDPROC
                      428 440 DEFFROCIATA 450 DATA 8,12,1,15,2,14,3,13 446 FOR IX-6500 TO 65007;READ XX:72X-XX:NEXT 470 DATA 16,20,17,23,10,22,19,21 460 FOR IX-65010 TO 65017;READ XX:72X-XX:NEXT 490 DATA 24,20,25,31,26,30,27,29 500 FOR IX-65020 TO 65027;READ XX:72X-XX:NEXT 510 DATA 8,134,162,99,166,144,12,86,200,0,102,736,96
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       2638 Energy 2648 2658 Energy 2648 2658 DEFPROCensenyshell 2658 DEFPROCensenyshell 2668 FOR 1X-65868 TO 65868 STEP 4 2678 IF 71X-8 NEXT+ENDPROC 2668 PRINTAB(7(ZX+Z),7(ZX+3))| = 2698 PROCenoveshell 2788 IF GX(=7(ZX+Z), AND GX+Z)=7(ZX+Z) AND HX(=7(ZX+Z),AND HX(=7(ZX+Z),AND
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1428
1438 DEFFROCOSHI(rect
1648 AX=?(IX+2)/2
1658 IF AX=01RX=2 OR DIRX-AX=2 ?(IX+4)=4:ENDPROC
1668 IF AX=3 AND DIRX=8 ?(IX+4)=182:ENDPROC
1668 IF AX=8 AND DIRX=8 ?(IX+4)=2:ENDPROC
1668 IF AX=01RX>8 ?(IX+4)=2:ENDPROC
1698 IF AX=DIRX>8 ?(IX+4)=182:ENDPROC
1788 ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         2700 IF GXC+7(12.72) Now No.+Nt/PROCexplosion:80TO 118
AND MX+2>+7(12.73) CX=0X; DX=HX; PROCexplosion:80TO 118
2710 CX=7(12.42); DX=7(12.43); PROCexhellcheck; IF 78.78=1 7
2X=8: NEXT; ENDPROC
2730 2730 NEXT; ENDPROC
2730 EX=(DX=320)+(CX=0)+45800; 74.72=EX MOD 256:74.73=EX
DIV 256: CALL shellcheck; ENDPROC
2740
                    528 MEMX-84288

538 FOR XX-1 TO 14:READ PX:AX-128

548 REPEAT:IF (AX AND PX) THEN THEMX-1 ELSE THEMX-8

558 AX-AX DIV 2:MEMX-MEMX-1:IUNTIL AX-8:NEXT XX

568 VDU 23,224,85,178,85,178,85,178,85,178

578 VDU 23,225,8,8,255,8,0,255,8,8
                    500 VDU 23,226,0,0,0,24,24,24,00,0
500 DDATA 1,1,0,0,10,2,2,25,1,1,4,4,10,2,2,5,1,1,0,0,
6,2,35,6,1,1,0,0,10,2,35,27
600 FDR TX-45030 TO 50049,READ XX172X-XX,NEXT
610 REPEAT:7(65030+(INT(RND(4))-1)+8)-0,UNTIL RND(1)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 1788 ENDPROC

1718 DEFFROCQuame

1738 TINE-8

1748 PROCSHell

1758 PROCSHell

1758 PROCHENS

1778 PROCHENS

1778 PROCHENS

1778 PROCHENS

1798 PROCHENS

1798 PROCHENS

1898 REPEAT (WILL TIME)

1818 PRINTTAB (5,2); "SCORE-1; SCOREX

1828 IF SCOREX-HIX HIX-SCORES

1838 PRINTTAB (5,1); "HI-SCORE-1; HIX

1848 ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2748 DEFFROCHOVERHEIT 2708 TATE TO THE TOTAL TOTAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2798 ENDPROC

2808
2818 DEFFROChemiife
2822 RESTORE 2848
2830 IF LIVESX-1 THEN PRINTTAB(15,16); "GAME OVER":TIM
5-04.REPEAT LWTIL TIME>300:00T050 ELSE CL8:PROCecreentL

IVESX-LIVESX-1
2848 DATA 5,29,13,6,29,13,6,28,13,6,27,13,6,26,13,5,2
6:13,4,26;14,4,26;15,4,26;16,5,26;16,6,26,16,7,28;16,8
2858 FOR DX-B TO 12:CX-29:AX-2:BX-18:PROCedram:TIME=8:
2858 FOR ZX-10 11:READ AX,CX,DX:BX-7(ES2:84-XX):AX-7:
2858 FOR ZX-10 11:READ AX,CX,DX:BX-7(ES2:84-XX):AX-7:
2858 FOR CX-26 FO 21 BTEP -1:DX-16:AX-3:BX-19:PROCedram:TIME-8:REPEAT:CALL Buffer:IF78-78-4
ND 7LOCX-10 GOUND 1,-15,7LOCX,7CLOCX-1):BOUND 1,-8,8;
21:LOCX-LOCX-2:LWTIL TIME>37:PROCelem:NEXT ELSE UNTIL
TIME>37:PROCelem:NEXT
2858 FOR CX-26 FO 21 BTEP -1:DX-16:AX-3:BX-19:PROCedram:TIME-8:REPEAT:CALL Buffer:IF78-78-4 AND 7LOCX-10 GOUND
1,-15,7LOCX,7(LOCX-1):BOUND 1,-8,8;2:LOCX-LOCX-2:UNTIL
TIME>48:PROCelem:NEXT ELSE UNTIL TIME>48:PROCelem:NEXT
2898 FOR IX-1 TO 2:READ AX,CX,DX:BX-7:858:8+AX):AX-71
2898 FOR IX-1 TO 2:READ AX,CX,DX:BX-7:858:8+AX):AX-71
228 FOR IX-65868 TO 6587F;7IX-8:NEXT
638 DATA 13,6;13,6;13,6;21;12;29,6,33,6;49,12,49,6,4
1,6;33,6,21;12,33,6;13,12;13,6;13,6;13,6,21;12,29,6,33
6,49;12,49,6,41,6,33,6,21;12,33,6,13,24,11
648 LOCX-65788:REPEAT;READ AX;8X:7LOCX-AX;7(LOCX-1)=
BX:LOCX-6CCX-2;UNTIL AX=1
## STALOCX=LOCX=2:UNTIL AX=1
## ADB ENDPROC
## ADB ENDPROC
## BEFFROCTION
## ADB TRACKX=TRACKX+4:IF TRACKX=14 TRACKX=2
## ADB TRACKX=TRACKX+4:IF TRACKX=14 TRACKX=2
## ADB TRACKX=TRACKX+4:IF TRACKX=14 TRACKX=2
## ADB IF ROTX=1 GUNX=GUNX-1 ELSE GUNX=GUNX+1
## ADB IF ROTX=1 GUNX=70 TAB
## ADB IF CONSTRUCTOR ADB IT TO THE TO LOCK ADB IT TO THE TO LOCK ADB IT TO THE TO LOCK ADB IT TO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1050
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1858 DEFPROCHACHINECODE
1878 FOR pass=8 TO 2 STEP 2
1898 PX=45188
1998 (
1998 OPT pass
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1998 (
1998 (
1908 OPT pass
1918 .move
1928 LDY #618
,loop
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   1938 .1000
1948 DEY;LDA(&78),Y:ORA(&72),Y:STA(&72),Y;CPY+0:BNE 1
00:RTS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          1958 1958 ...
1958 control
1968 .control
1978 LDA 574.5TA 575.LDA 575.5TA 571.JSR move:LDA 576.
1978 LDA 574.5TA 571.JSR move:LDA 574.CLC;ADC 85.8
15TA 574.LDA 577.STA 571.JSR move:LDA 574.CLC;ADC 85.8
15TA 574.LDA 577.ADC 858.STA 575.LDA 576.CLC;ADC 85.8
17A 572
1988 LDA 577.ADC 851.STA 575.
1998 LDA 574.STA 576.LDA 575.STA 571.JBR move:LDA 576.
15TA 574.LDA 577.ADC 858.STA 575.LDA 574.CLC;ADC 85.8
15TA 574.LDA 577.ADC 858.STA 575.LDA 574.CLC;ADC 85.8
15TA 574.LDA 577.ADC 858.STA 577.LDA 572.CLC;ADC 85.8
15TA 574.LDA 577.ADC 858.STA 577.LDA 572.CLC;ADC 85.8
17A 576.LDA 577.ADC 858.STA 577.LDA 572.CLC;ADC 85.7
17A 572.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       NEXT
2898 FOR IX=1 TO 2:READ AX,CX,DX:BX=7(558(5+AX):AX=7(5586+AX):PROCdram:TINE=8:REPEAT:CALL buffer:IF78/78)4
AND 7LOCX<1 SOUND 1.-15,7LOCX,7(LOCX=1):SOUND 1.8.8,2
:LOCX=LOCX=2:UNTIL TIME>48:PROCdimer:NEXT ELSE UNTIL TIME>48:PROCdimer:NEXT ELSE UNTIL TIME>48:PROCdimer:AX=8:8X=16:PROCdram:PROCscreen:ENDPROC79:8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2980 PROCelear; AX=8: BX=16: PROCdram: PROCecreen: ENDPROC
2910
2920 DEFPROCehell
2930 FOR ZX=45070 TO 45075 STEF 4: IF 7ZX=0 NEXT: ENDPR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   2000 LDA 673:ADC #61:STA 673:LDA 674:STA 670:LDA 675:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    STA $73:JSR nove:LDA $76:STA $78:LDA $77:STA $71:JSR

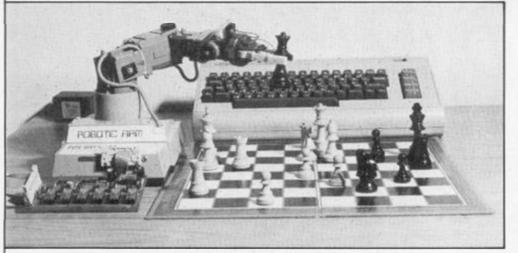
ove:RTS

20:0

2020, blank

2030 LDX #63
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2940 IF G%(*?(I%+2) AND G%+3>?(I%+2) AND H%(*?(I%+3)
ND H%+3>?(I%+3):GOTO 2950 ELSE PRINTTAB(?(I%+2),?(I%+
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2740 1.
2740 1.
2740 1.
2750 PROCROVESHELL
2750 PROCREMENT OF THE CAMPACH PROCREMENT LXHEXT ZX EL
BE NEXT LX
2770 CX-7(ZX-2):DX-7(ZX+3):PROCENELLCHECK:IF 7678=1 7
2770 CX-7(ZX-2):DX-7(ZX+3):PROCENELLCHECK:IF 7678=1 7
2770 PROCROVESHELL
2770 
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2030 LDX 963
2040 :COUNT
2030 LDY 9610
2050 LDY 9610
2070 DEYILDA 960:STA (672),Y:CPY 960:SNE b_loop:DEX:C
X 960:SED witilDA 673:CLC:ADC 9640:STA 672:LDA 673:A
C 961:STA 673:JMP COUNT
2000 .witiRTS
2090
                              PAG PROCEDIAM
PSG IF INKEY(-1) AND TURK MOD 2+8 THEN GOTD 968:ELSE
  950 IF INNEY(-1) AND TURN MOD 2+8 THEN SOTD 968:ELSE ENDPROC 968 FX=45878:IF 7FX=8 SOTO 988 978 FX=45874:IF 7FX=8 SOTO 988 ELSE ENDPROC 988 7FX=1:7 (FX+1) = TURN;7 (FX+2) = 9X=1:7 (FX+3) = HX+1: IX=FX:IFROCmoveshell:CX=7 (FX+2):DX=(FX+3):PROCehellcheck:SOUND 8;-15,4;2 998 IF 74:78=8 7FX=8 1888 ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ME NEXT LX 2202 2978 (Xx+2):DX=7(IX+3):PROCehellcheck:IF 7678=1 ? IX=8:NEXT:ENDPROC 2988 IF 72X=1 PRINTTAB(7(IX+2),7(IX+3)):CHR#(IZ6):NEXT:ENDPROC 2998 NEXT:ENDPROC
    1818
1828 DEFPROCACT ##0
1838 MENT=44288
1848 FOR YX=4 TO 28 STEP 3:FOR XX=2 TO 35 STEP 3:IF ?
MENX=1 AX=32:8X=33:CX=XX:DX=YX:PROCAT#
1858 MENX=MENX=1:NEXT XX:NEXT YX
1868 FOR YX=8 TO 28:PRINTTAB(YX,8):CHR*(224):NEXT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 2128 .c_count
2138 LDY #618
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    2130 LDY #818
2148 .c_loop
2150 DEY:LDA ($72),YIBNE found:DPY #80:BNE c_loop:DEX
1CPX #86:BED c_mxit:LDA &72:CLC:ADC #840:STA &72:LDA &
73:ADC #81:ETA &73:JMP c_count
2160 .c_mxit:LDA #86:ETA &70:RTB
2170 .found:LDA #81:ETA &70:RTB
    1878 FOR AX-8 TO 29:PRINTTAB(8,AX);CHR#(224);CHR#(224);PRINTTAB(38,AX);CHR#(224);MEXT
1808 FOR AX-8 TO 38:PRINTTAB(AX,3)CHR#(224):MEXT
1898 FOR AX-8/FBB TO 57FFF STEP 2(7AX-85)?(AX-1)=178:
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             2188
2198 .shellcheck
2208 LDY #48
2218 *_loop
2228 DEY:LDA (672),Y:BNE s_found:CPY #48:BNE s_loop:L
A #48:874 &78:RTS
2238 .s_found:LDA #61:STA &78:RTS
2248 .s_found:DA #61:STA &78:RTS
2248 .s_found:DA #61:STA &78:RTS
2248 .buffer
                1188 FOR AX=8 TO 2:PRINTTAB(26,AX);CHR#(224);CHR#(224
1188 FOR AX-8 TO 2:PRINTTAB(26,AX);CHR#(224);CHR#(224);PCH##(224);PCH##(224);CHR#(225);CHR#(225);CHR#(225);CHR#(225);CHR#(225);PRI NTTAB(8,38);CHR#(224);CHR#(224);1320 PRINTTAB(5,1);"HI-9CORE—;HIX
1130 IF LIVESX-4 SOTOLIS8
1148 CX-29:POR VARX-8 TO LIVESX-1:AX-2:SX-18:CX-29+VA RX-5;CX-8+PROCCIA+*NEXT
1150 IF LIVESX-1 ENDPROC
1148 CX-29:POR VARX-8 TO LIVESX-2:AX-2:SX-18:CX-29+VA RX-5;CX-89+VA RX-5;CX-89+VA RX-5;CX-89+VA RX-5;CX-89+VA RX-5;CX-89+VA RX-5;CX-89+VA RX-5;CX-89+PROCCIA+*NEXT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 J870 PRINTTAB(8,16); CHR#(134); "I'-ROTATE CHASSIS LEF
T. "PRINTTAB(8,17); CHR#(134); "I'-ROTATE CHASSIS RIGHT
"!PRINTTAB(8,17); CHR#(134); "I'-ROTATE TURRET LEFT.";
PRINTTAB(8,18); CHR#(134); "I'-ROTATE TURRET LEFT.";
J800 PRINTTAB(8,20); CHR#(134); "I'+ROLE TURRET RIGHT."
J800 PRINTTAB(8,20); CHR#(134); "I'+ROLE DATE."
J800 PRINTTAB(8,20); CHR#(134); "I'+ROLE DATE."
J800 PRINTTAB(8,20); CHR#(136); CHR#(131); CHR#(157); CHR#(131); CHR#(131); CHR#(157); CHR#(131); CHR#
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               2250 .buffer
2260 LDX #250:LDA #600:JBR &FFF4:STX &79:RTS
2270
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  2278 tankcheck
2298 LDA #8:STA 578:LDA $7C:BEC:BBC #$CB:BTA $72:LDA
$7D:BBC #$3:BTA $73:JBR check:JBR block:LDA $7E:BTA $5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2382 LDA &7C:SEC:SBC #4:8:STA &72:LDA &7D:SBC #68:STA 
&73:JBR check:JBR block:LDA &7E:STA $5853
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     3120 END
```

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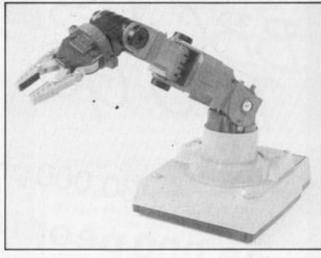
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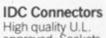
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luding Strain Rel	iet
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1	IDCP 20 way
of The same	IDCP 26 way
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	IDCP 40 way
	IDCP 50 way
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Each	+VAT		2000	

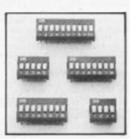
IDC 14 way	£1.16	£1.33	DIL Sw	itches	
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IDC 20 way	£1.65	€1.90			+VAT
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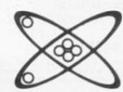
(Grey)

right ar	igie.		Perfoot	+VAT
Each	+VAT	10 way	£0.13	€0.15
£1.00	€1.15	14 way	20.18	£0.21
£1.04	£1.20	16 way	€0.21	€0.24
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£1.78	£2.05	40 way	€0.52	00.03
	£2.20	50 way	€0.65	€0.75
		60 way	€0.78	£0.90
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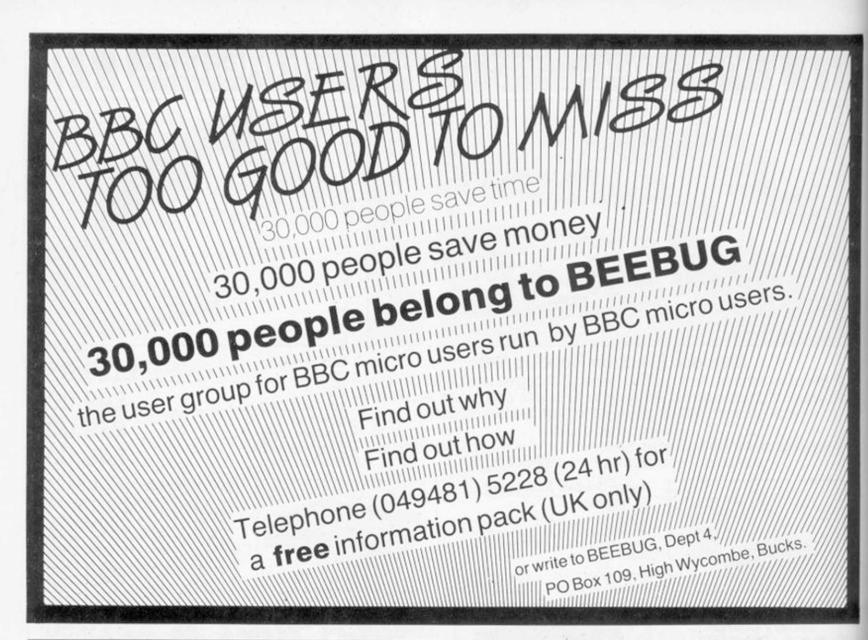
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er HR5 £162 (£146) £170. Shinwa CTI Brother HRS £162 (£146) £170. Shinwa CTI CPA80:— Centronics parallel version £237 (£248) £358. RS232 version £257 (£248) £378. Cannon PW1080A £382 (£344) £374. £pson RX80 £371 (£251) £282. Epson RX80F/T £314 (£286) £316. Epson FX80 £339 (£298) £328. Combined matrix printers and electric typewriters:—Brother £P22 £163 (£156) £176. Brother £P44 £258 (£235) £260. Interfaces to run the above printers from Vic and the Commodore 64 £45 (£41) £46.

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Interface



Program 1. 3 POKE52 28 POKE56,28 POKE36979 REM \*\*\*\*\*\*\*\*\*\*\* BATTLE \* \* SERGE SIMON PRINT COMMISSION BATTLESSES PRINT" PROTES - MADE BY SERGE SIM 18 PRINT"SDEED UDG S...PLEASE WAT C=0:FORI=7168T07679 READA IFA=-1THEN51 POKEI A C=C+A IFCC) 12528 THENPRINT TERROR IN FORT=7168+256T07168+256+8:POK POKE198 @ POKE198 1 POKE631 1 DATA8 8 8 8 8 8 8 8 8 8 DATA16,16,214,254,254,254,19

```
110 DATA25,50,124,253,191,30,12,
 20 DATA0, 252, 252, 56, 63, 56, 252, 2
138 DATA24 12,38 191,253 124 58
148 DATA198,198 254,254,254,214
    DATA24,48,128,253,191,62,76
    DATA63,63,28,252,28,63,63,8
DATA152,76 82,191,253,128,48
    REMEND OF TANKS***
DATA0,54,126,62,60,126,124,2
198 DATAS, 189 255 255 255 255 76
191 DATA60,126 255,255,255,255 1
192 DATA0,0,0,24,24,0,0,0
193 DATA129,90 36 90 90 36 90 12
194 DATA124 60 126 120.60 124 12
```

As REGULAR readers of Your Computer can see, machine code is used more and more for writing games. Such programs are much faster and more sophisticated than Basic programs, but are they better? Typing in those programs, mostly consisting of endless data lines is not a pleasant task, and for beginning computer enthusiasts it may be very discouraging. Also it seems as if people have forgotten that in Basic too, one can write good and reasonable fast games.

Therefore I have written this 100 per cent Basic program. It is Tank Battle, a two-player game for the unexpanded Vic-20. The program starts with displaying a title page, where you will be asked to enter the names of the two players.

If you have done this, and you have hit Return, you can see a sort of map on the screen, and two tanks.

The two players can move around the tanks and they can fire in the direction they move. The aim is - naturally - to destroy the other's tank and to score points. The keys to be used are:

For player one (black tank) forward, Ctrl; turn, Shift; and fire, CBM For player two (blue tank) forward, £5; turn, £7; and fire, £3

The game itself is divided into two parts because of the limited memory of the standard Vic-20. First type in the program with the data statements for the user defined graphics. Then save it and type in the second part. Save this immediately after the first one. If you later load in the first program, the main program will be loaded automatically.

One last note: player one, who sits at the left side, may accidentally hit the Run-Stop key and thus break into the program. To prevent this add line:

2 POKE 45, 240: POKE 46, 26: POKE 788, 194

```
@ PRINT"L": V=36878 POKEV+1, 152
   FORT=1108: READR(T): NEXT: DATA-2

-21:1:23:22:21:-1:-23

PRINTCHR$(8) CHR$(142)

B REM TANKGEVECHT* *DOOR SE
RGE SIMON * *VLAANDEREN, BELGIE
 40 PRINT THE MANUETANK BATTLEMEN
      PRINT PRESENTE SERGE SIMON"
  45 PRINT" DOODPLAYER 1 CBM/SHFT/C
      PRINT GIVE NAME OF THE INPUT PLAYER 1" BS IFLEN (BS)
  50 INPUT"PLAYER 1" | B$ | IFLEN(B$)
>6THENBS=LEFTS(B$,6)
60 INPUT"MPLAYER 2" | A$ | IFLEN(A$)
>6 (HENAS=LEFTS(A$,6)
   65 PRINT"L"
69 REM SETUP SCREEN***
   78 POKE36869.255
       FORT=44T0484 POKE38488+T.8 NE
   75 PRINT BOOKSJKJJJJJKJJJJJJJKJ
    76 FORT=1T028 PRINT"N"SPC(28)"N"
    NEXT

77 PRINT"KJJJJKJJJKJJJJJKJJK",

PRINTCHR$(157) CHR$(148)"J";

88 FORT=$1028 P=RND(1)*484+22 PO

KE38400+P.5 POKE7680+P.11 NEXT

85 PRINT"ENDOCOMO"SPC(4)"JKM12
    HI CONTROLLEM I CONTROLLEM JE
         PRINT"SONO DO POR "SPC(15)"KJIMI
      THE PART OF THE PART OF THE PARTY.
     87 PRINT"S D"B$ 8 "E"A$ 8
89 REM END SCREEN****
98 PB=7680+3+242 PA=7680+17+242
POKEPB 3 POKEPA 7 RA=7 RB=3 POKE
```

```
PB+30720,0
91 POKEPA+30728.6
95 KL=152 POKEV 10 TIS="000000"
96 MS=30 REM NUMBER OF BULLETS F.
OR EACH PLAYER
99 REM TANK 1********
180 A=PEEK(197)
101 IFA=63THEN60T0110
 102 IFA=55THEN120
102 IFH=55 (MEN120
103 IFA=47ANDASCMSTHEN130
104 POKEV-3,0:30T0199
110 RA=RA+1:IFRA=9THENRA=1
 111 POKEPA, RA: POKE30720+PA, 6 GOT
0199
 120 POKEV-3, 255 POKEPA, 32 PA=PA+
 P(RA) IFPEEK(PA (>32THENPA=PA-P)
 122 POKEPA, RA FOKEPA+30720, 6:001
  280 B=PEEK (653
201 1FB=1THEN210
202 1FB=4THEN220
  203 IFB=2ANDBSCMSTHEN230
204 POKEV-4.0 GOTO299
210 RB=RB+1: IFRB=9THENRB=1
   211 POKEPB, RE POKE30720+PB, 0:30T
        POKEY-4,255 POKEPB,32 PB=PB+
   R(RB) IFPEEK(PB) (>32THENPB=PB-R(
   222 POKEPB, RB: POKE30720+PB, 0: GOT
   230 BS=BS+1 C=6 S=200 PK=PB R=RB
```

```
Q=RA:GOSUB500 GOTO300
299 FORT=0TO25 NEXT
300 IFTI$ ("000148" THEN 100
310 KL=-(KL=152) *168-(KL=168) *15
2 POKE36879, KL
315 IFTI$<"000150"THEN100
316 PRINT"L" POKE36869, 248 POKEV
 +1,152
319 POKEV-1,0 POKEV-4,0 POKEV-3
                                       SCORE
 328 PRINT"CHNOCOPPERING
 321 PRINT" MENDERO (1) "B$ ,BB
322 PRINT" MENDERO (2) "A$ ,AA
323 PRINT" MENDERO PRESS KEY £"
 330 GETAS IFASC>"£"THEN330
  399 REM FIRE *******
  500 POKEV-1, 200 POKEV-4, 180
510 FORT=1T015
520 P=PK+T*R(R) IFPEEK(P) <>32THE
  738 POKEP 12 POKEV-1 3-1*4+10 PO
KEV-4 3-1*4 POKEP 32
540 NEXT
  545 POKEV-1, 0 POKEV-4, 0 POKEV, 10 RETURN
   550 IFPEEK (P >8THEN545
   560 POKEP, 13 POKEV-1, 140 POKEV-4
10 FORT=15TO0STEP-, 2 POKEV, T. POK
   E307204P 2-(RND(1)>.5) +2
   563 NEXT :
578 IFBA=PTHENBB=BB+1 RA=FA+3 PA
   =PA+(RA>8) +8 POKEP RA
580 IFPB=PTHENAA=AA+1:RB=RB+3 RB
```

113 POKE 23693 7: BORDER 0: CLE 23999: LOAD "CODE : LOAD USR PRINT "HIT ANY KEY.."; USR Loader. 13339555 ODE 30059 The nex loader.

10 DEF FN h (h\$) =16\*(CODE h\$(1)

-48-(7 AND h\$(1))"9"))+CODE h\$(2)

10 JEF FN h (h\$) =16\*(CODE h\$(2)

10 JEF FN h (h\$) =16\*(CODE h\$(2)

10 JEF FN h (h\$) =16\*(CODE h\$(1)

11 JEF FN h (h\$) =16\*(CODE h\$(1)

12 JEF FN h (h\$) =16\*(CODE h\$(1)

13 JEF FN h (h\$) =16\*(CODE h\$(1)

14 JEF FN h (h\$) =16\*(CODE h\$(1)

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17 JEF FN h (h\$) =16\*(CODE h\$(1)

18 JEF FN h (h\$) =16\*(CODE h\$(1)

19 JEF FN h (h\$) =16\*(CODE h\$(1)

10 JEF FN h (h\$) =16\*( 95 23392 23400 33400 4164 233442 2334440 2334440 2334440 234456 tot=tot 100 POKE N+X,Z 110 LET h\$=h\$(3 TO ): LET X=X+1 120 NEXT b 130 PRINT " = ";: INPUT t: PRIN 23464 23472 23480 100 0 155 23488 4954 23504 235528 235528 235528 235544 3488 140 IF totest THEN PRINT "ing error - try again": GO TO 50 150 NEXT n 160 REM enter STOP to stop "input 341 839 470 23295: 2815012404012509 = 151 23304: 0325111010001E00 = 156 Listing 1.

SNAKES ALIVE is a 100 per cent machine-code game for any Spectrum which just fills all the memory available to the 16K machine. It

- ■48 locations, which you are free to move between and around, and each of which is named.
- ■Choice of control by Kempston-type joystick, cursor type, Interface II or redefinable keyboard.
- Title screen with music, scrolling instructions and display of
- High-score table.
- Annoying addictiveness that makes you unable to stop playing!

The object of the game is to guide Kahn the snake around a house and its grounds to find and collect nine eggs which he has lost. It is

totally non-violent - your poor snake is absolutely defenceless - which doesn't matter as there is nothing else about. The worst thing that can happen to Kahn is either bumping into an object, which results, in a nasty headache, or tying himself in knots. Despite Kahn being the only character that moves, the game is still frustratingly difficult.

On a blank cassette, save the loader program. This will load in the final code:

### SAVE "SNAKES II"LINE I

Type in the hex loader carefully. Save this on the other cassette, in case you don't type in all the hex in one go, or need to check it later.

Now Run the hexloader, type in the code from listing 1, and save the resultant code on the cassette with the loader, using:

#### SAVE "PRBF" CODE 23296,256

Run the hex loader again, and this time enter data from listing 2. Once finished, type: SAVE "CODE II" CODE 28384,4384

This code should not be saved on the final cassette.

Repeat this exactly, except type in code from listing 3. It may be saved temporarily with the same save instruction as before. When you have typed in this code, type:

CLEAR 23833: NEW and then CLEAR 23999: LOAD""CODE 2400

Load in the code from listing 2. Save the whole code on the finished cassette of the game, after the PRBF file, with:

#### SAVE "TOTAL" CODE 24000,8768

Summon up enough courage to try out the game - type Load"" and cross your fingers. If the game does not work perfectly first time, the most likely mistake that could have been made is that of entering one or more lines of hex data twice, or missing out others. The checksum is likely to stop other possible errors, but may not have. The only solution, short of starting again from scratch, is to list the program from the hexloader, by loading in relevant sections of code. As a guideline - if the program when tested crashes straight away, the error is likely to be within the code typed in from listing 2.

If it is during the game that an error becomes apparent, then look at the hex from listing 3. If, however, it is some mistake with the sound effects, or egg positioning, then check the code from listing 1.

Once the game has loaded, and works successfully, after pressing a key you will be shown the title screen to the game and some quite lengthy, but good, music will play. If this ends or is interrupted by a key press, the scrolling instructions will move slowly along the bottom line. Pressing S or O now will start or take you to the control options screen, respectively. On the control option screen, scrolling instructions again tell you which keys to press: 1 is keyboard, 2 — cursor joystick, 3 — Interface II joystick and 4 — Kempston-type joystick. The current choice is highlighted in white — the others in cyan.

I can supply tapes of the game, with both a turbo load — yes, in 16K! — and a normal load version of the game on, for only £2.75 inc. from: Snakes Alive, 16 Viking Way, Pilgrims Hatch, Brentwood, Essex, CM15 9HX. If you would also like a copy of my other game, Aliquid Simplex, published in Your Computer in November of last year, which includes sprites, two-channel music, etc., then I will put this on the same tape for you for another £1. Europe please add £1, overseas an extra £2.



David Aspinall presents a totally non-violent but, nevertheless exciting, game for the Spectrum featuring Kahn the snake.

# AKES ALIVE

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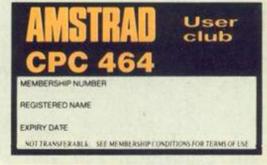
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| Case | (continued from page 73) 32712 32720 32720 32736 32744 32752 32760 Listing 3. 

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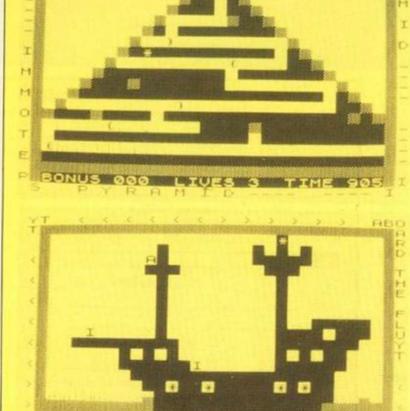
THIS IS A ZX-81 graphic adventure game called Survivor containing 10 levels each with its own different screen display and running in under 5K of machine code including all data. And before you reach for a calculator, I know that it takes 7K to store 10 screens. The discrepancy is due to the effects of Bistromatics, the original program having been written on the back of an old restaurant menu.

You are a lonely little blue person with short spindly arms having next to no strength so you cannot hang from anything. You are, however, possessed of a pretty good pair of legs — good that is for running and jumping. Unfortunately, the standard ZX-81 graphics set is somewhat limited and most little blue people end up looking suspiciously like a capital A, and on most televisions, worse still a black and white capital A.

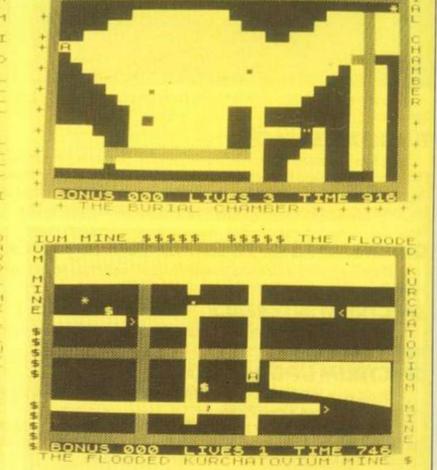
You have absolutely no defences or protection. Almost anything in your environment is hostile. In fact, about the only thing that will

# SURV

Ádrian Spriddell survives.



BONUS 000 LIVES 3 TIME 876



```
7.0000004400440000
7.7.004000000044500
4.0044000000044500
0.0040000000044500
                                                                       1505512656946
150551267556
```

(listing continued on next page).

not harm you is stepping on the cracks in the pavement.

Apart from flying bricks, arrows, boulders and anti-matter bombs being hurled at you, mummies, ghosts and horrid guards with sharp spears - OK then, dollar signs - arerunning around and will kill you if they get half a chance.

Not even the ground is safe entirely. Black blocks are OK and may be walked on or through with impunity but anything else black should not be trusted. There are grey seams of old Windscale waste around. These are impenetrable and although not immediately fatal, should you step on one, you will lose 50 health credits and have to start again. Bridges and elevators are there to help you - usually. Keys are: P - left; O right; Shift - jump.

The object of your endeavours is to reach the inverse star which is the key to the exit. Once this has been achieved you will be awarded 100 points and the exit itself will appear as another inverse star. This is your way through to the next level. Any time points then remaining will be added to your bonus. If you fail to collect a key or reach an exit before the time count reaches zero you will lose a life but will be able to carry on assuming that was not your last life - where you left off by pressing any key.

Keys Y, H or B will suspend the game while you grab asprin and a coffee. Pressing any other key will restart play.

Type in any 160 characters as line 1. Edit line 1 and change it to line 2. Edit this and change to line 3, etc. until you have lines 1 to 35. Type

# POKE 22317,180

and line 35 should end in an inverse letter O. If it does not, a mistake has been made. Now enter as direct commands:

POKE 16510.0 POKE 16511,179 POKE 16512,22

This joins lines 1 to 35 together.

Enter a new line 1:

1 REM \*\*\* DO NOT DELETE \*\*\* Make sure that you do not delete it.

Type in the Basic loader/checker from listing 1. Run, enter 16514 as the start address and enter the code from the hex dump one row at a time. Do not attempt to enter the equals sign or the following number. This is a checksum which should tally with what the computer is holding. It will be displayed on pressing N/L after entering every eight bytes. If the two totals are not the same, you have made an error in that line. Enter S to reRun the loader entering the start address of that line in answer to the prompt.

To test the game enter the lines of Basic from listing 2 and Run. If it crashes, reLoad from tape and Run 400 to check the code. When all is well, delete lines 20 onwards and add line 2:

# 2 SAVE "YC SURVIVOR"

The game contains a number of variables initialy set to nominal values but which may be Poked to effect changes as shown in table 1.

```
Listing 1.
    20 CLS
20 PRINT AT 21.0 INPUT START
                  FUT A
          PRINT A: "->"
INPUT AS
IF AS="S THEN RUN 30
IF AS="SAUE" THEN GOTO 260
IF LEN AS: 16 THEN GOTO 220
PRINT AS: ""
LET TT=0
FOR F=1 TO 15 STEP 2
LET BS=AS:F TO F=1
LET P=16+CODE BS+CODE BS:2)
230 PRINT INCORRECT LENGTH PLE
ASE RE-ENTER
```

250	PAUSE 4E4 90T0 60 PRINT RT 81.0: PRESS
250 290 400	FAUSE 4E4 SAUE, "YO SURVIVOR" RUN 20 CLS PRINT AT 21 0 HNDU SUCE
420 420 430 440 450 450 470 480 490	INPUT A CLSINT A LET TT=0 FOR F=1 TO 8 LET P*PEER A LET B*INT P*15) LET C*P-8*18 LPRINT CHRS (B*28) CMRS (C-
520 520 520 550	LET A=A+1 LET TTT.P NEXT F LPRINT = :TT

Table 1. Address	Nominal value	Parameters	Function/notes
16674	204	see note	Wait key. Change to 202 for Break key
18863	61	see note	Change to 0 for infinite lives
17021	3	2 to 5	Speed. Increase to slow play
17287	0	0 to 9	Level.
19050	50	0 to 250	Grey block penalty points

LIS	040	POKE PRINT	1728 JSR AT	7.70	735			
	94.	PRINT				ANOT	HER	GAM
E 7	8	PRINT	AT	12	8;"			
	901	INPUT IF AS: STOP		TH	HEN	эото	3	

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10 MEMORY HIMEM-10

start=HIMEM+1

30 |ASSEMBLE, start

70 'CP 10:SCF:RET Z

'RST 1,&87F2 'ORG &BD2B 100'JP start 110'END

'get start 50 'limit &FFFF 60 'ORG start

40

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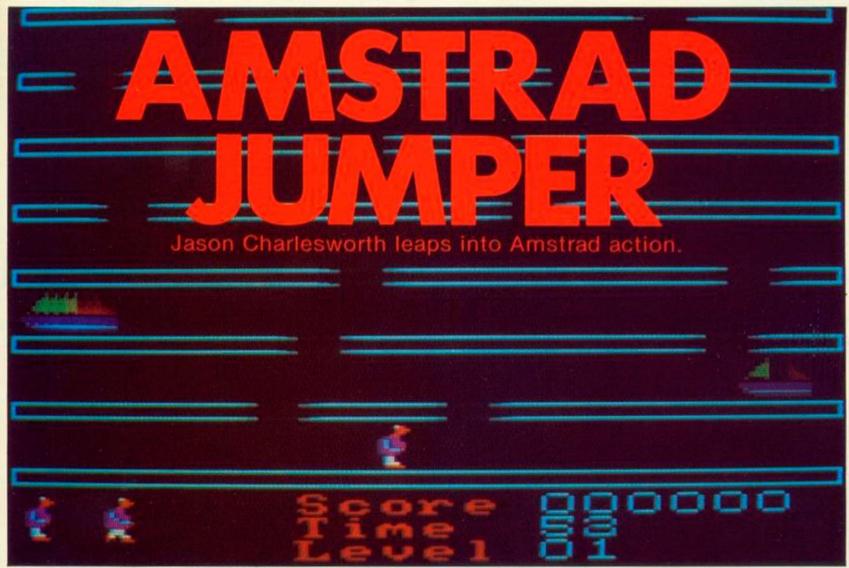
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JUMPER IS an arcade-quality game for the Amstrad CPC-464 computer in which you must guide a little man called Jumper to the top of the screen.

To get to the top of the screen, Jumper must jump through the moving holes in the platforms but if he falls through a hole he will be stunned and so will be unable to move for a while. However, all the time the nasties are advancing and Jumper, being a nice sort of chap, does not want to kill them so he must run away from them. To help him do this, the screen is wrap round i.e. if he runs off the left-

hand side of the screen he will appear on the right-hand side and vice versa.

The scoring in the game is based on how many times you jump up. The more times you jump up, the more points you get and the amount of points you get per jump increases every other round. If your score is high enough at the end of the game, the program will ask for your name.

The game has 15 screens featuring different combinations of the nasties - yachts, teapots, telephones and tanks - and on each screen continuous music plays - translated by Robert Rhodes.

The game also features a joystick option and a hard or easy game option. To set up the game type in listing 1 and save it with

# SAVE "JUMPER"

Next type in listing 2 and run it. If it finds an error in the code, correct it then rerun the program and when it gives the "Finished, no errors" message, save the code with

# SAVE "CODE", b, 35900, 3700

The game may now be played by rewinding the cassette and typing Run"".

Listing 2 is on the next page.

100 e=0: j=1:DEF FN x(n)=10\*INT(PEEK(n)/16)+PEEK(n)-16\*

INT (PEEK (n) /16)

110 INK 1,24:INK 14,26,0:INK 15,0,26:INK 5,0:INK 8,15: INK 9,3:INK 13,4:INK 10,3

120 GOSUB 130:GOTO 360

130 REM SETUP

140 MEMORY 32767:BORDER 0:INK 0,0:MODE 0:PRINT"Please wait":LOAD "!":e=0:j=1

150 ENV 1,5,2,1,5,1,1,1,0,8,5,-1,1,5,-2,3 160 DIM a\$(5),a(5):FOR a=1 TO S:READ a\$(a),a(a):NEXT a 170 DATA Super Ted,50,Shaggy the Yak,40,81ack Adder,30

Doomdark, 20, Mangled Cassette, 10 180 RETURN

190 REM demo

200 BORDER 1: INK 0,1: MODE 0: CALL 35900 210 FOR a=0 TO 999: z = INKEY : NEXT a: BORDER 0: INK 1,0:R

FTURN 220 REM game

230 BORDER 1: INK 0,1: CALL 35946

240 FOR a=0 TO 1999:z\*=INKEY\*:NEXT a:BORDER 0:INK 0,0 250 sc=10000\*FN x(37856)+100\*FN x(37855)+FN x(37854)

260 FOR a=1 TO 5: IF sc(a(a) THEN NEXT a: GOTO 290

270 IF a<>5 THEN FOR b=5 TO a+1 STEP -1:a\$(b)=a\$(b-1): a(b)=a(b-1):NEXT b

280 CLS:PEN 1:INK 1,24:INPUT "Name ",a\$(a):a(a)=sc

290 RETURN

300 REM High score table

310 BORDER 0:INK 0,0:MODE 0
320 PEN 2:PRINT" High Score Table":FOR a=1 TO 5:PEN a

330 LOCATE 1,2\*a+3:PRINT a\*(a):LOCATE 16,2\*a+3:PRINT a (a):NEXT a

340 LOCATE 3,24:PEN 2:PRINT"Press a key" 350 IF INKEY#="" THEN 350 ELSE RETURN

360 REM instructions

370 BORDER 0: INK 0,0: MODE 0: PRINT" Instructions"

380 RESTORE 360:FOR a=5 TO 11:READ z\$:LOCATE 1,2\*a-3:P EN a+1:PRINT z\$:NEXT a 390 LOCATE 1,24:PEN 1:PRINT" Press a key"

400 IF INKEY\$="" THEN 400

TA Z Left,\ Right,SHIFT Jump Halt,S Start,SPACE Music on/off 410 DATA Z Right, SHIFT Jump, 0 Abort Easy game, 4

420 DATA 1 Game,2 game,5 Joystick,6 430 MODE 0:PRINT" Demo,3 Keys OPTIONS"

440 FOR a=2 TO 7: READ z\*:LOCATE 4,2\*a+2: PEN a+4; PRINT

450 IF j=1 THÊN LOCATE 4,14:PEN 14:PRINT"5":PEN 1:PRINT
T:PRINT" 6" ELSE LOCATE 4 14:PRINT"5":PEN 1:PRIN

T:PRINT" 6 ELSE
RINT" 6":PEN 1
460 IF e=1 THEN LOCATE 4,10:PEN 14:PRINT"3":PEN 1:PRINT
T:PRINT" 4" ELSE LOCATE 4,10:PRINT"3":PRINT:PEN 14:P
RINT" 4":PEN 1
RINT" 4":PEN 1

=0

480 IF z\$="3" THEN e=1 ELSE IF z\$="4" THEN e=0
490 IF z\$<>"1" AND z\$<>"2" THEN 450
500 PEN 1:IF z\$="2" THEN GOSUB 190:GOSUB 300:PEN 1:INK 1,24:GOTO 360

510 IF Z\*<>"1" THEN 490 520 POKE 37853,e:IF j=1 THEN POKE 37562,74:POKE 37570, 75:POKE 36659,72 ELSE POKE 37562,71:POKE 37570,22:POKE 36659,21

530 GOSUB 220:PEN 1:GOSUB 300:PEN 1

540 GOTO 360

IB MEMORY 32767:MODE 2:PRINT\*Poking to progress,please Listing 2. H E(46):FOR A-B TO 46:READ E(AT:NEXT A THEN THEN t-8:FOR 5-8 TO 79:12-VAL ("6"-MIDS(46,5-2-1,2));t-t-

DAP33E333:1994C93A18997 DAP35E333:1994C93A18997 DBC02353332337EFEBBCDED48E59378FEBB DATA 1200-3E8131:1994C93E1895217594CDB893ED4BE593858 475579F13030208EACD8A923E843216943AE7933CE6FE1FCD787 3A1794FEBB288059732179 1.03A1794FEBE28059732179
4093EB13217943EB721F6938680F5C54E235E
200 DATA 790346FEB128021E81FE4729821EFF7328712323E5C5C
DF48DFC613A06073FEB1201C48235E79834FFEB120821E81FE47208
21EFF7328712325E5CDF40FE
101796C61847F13028840F99EEA786F2680295D
218 DATA 5479291916C859199554346C888623360810F823368C8
484687A648867753873986862334608028FA2336810F82336868

229 DATA 197ED1E1C9FBECA8741DBC47A5289A7B493B3787PBB338
FC2387AC621SEAFA99ACF11F44F9EEBADAE1DBESBB48C081173921F
A573A7BC48330772323SEFF77387BEA3FC485
239 DATA 773237BC06451SB973CB47F485F13B38C088C94A677357A
A673C973AEF9321SC9611SB973CB47F4867BB88C08C094A677357A
A673C973AEF9321SC9611SB973CB47F4867BC07911EA93CB4FF4E
A6921BC9711EC932CB57C4E69
240 DATA 773237BC0745CBC0C4721SB47BC451BC9711EA93CB4FF4E
A6921BC9711EC93CCB0CA92CCBCDC472E1BC487CA8B48B23868
246 DATA 2315K321BC986CCDCA92E1BC4A78CA1B47FEA838B23868
791F1001BCE872BF57SCBCCDF68B21B716227A
258 DATA 97321K7918A607ECDF49273BT71E2C73B9321B717227A9
258 DATA 9731K7918A607ECDF49273BT71E2C73B9321B717227A9
258 DATA 9731K7918A607ECDF49273BT71E2C73B9321B717227A9
258 DATA 9731K7918A607ECDF49273BT71E2C73B9321B717227A9
258 DATA 9731F84411SA6861188B007B5753CCP897SE10119C179C
A686FF13DAC6AFAF78CA38CDF49273BT712B71B72A572B53CDF897SE10119C179C
A686FF13DAC6AFAF8CA38CDF4927SBC011BBC07B35CCP897SE10119C179C
A686FF13DAC6AFAF8CA38CDF4927SBC011BBC07B35CCP89SEE111B088C55
A686FC131BCACC93A1894FE8BC08AB8117C83CDF498E111B088C55
A686FC131BCACC93A1894FE8BC08AB8117C83CDF498E111B088C55
A686FC131BCACC93A1894FE8BC08AF33A8321B9A84C53B38A84 

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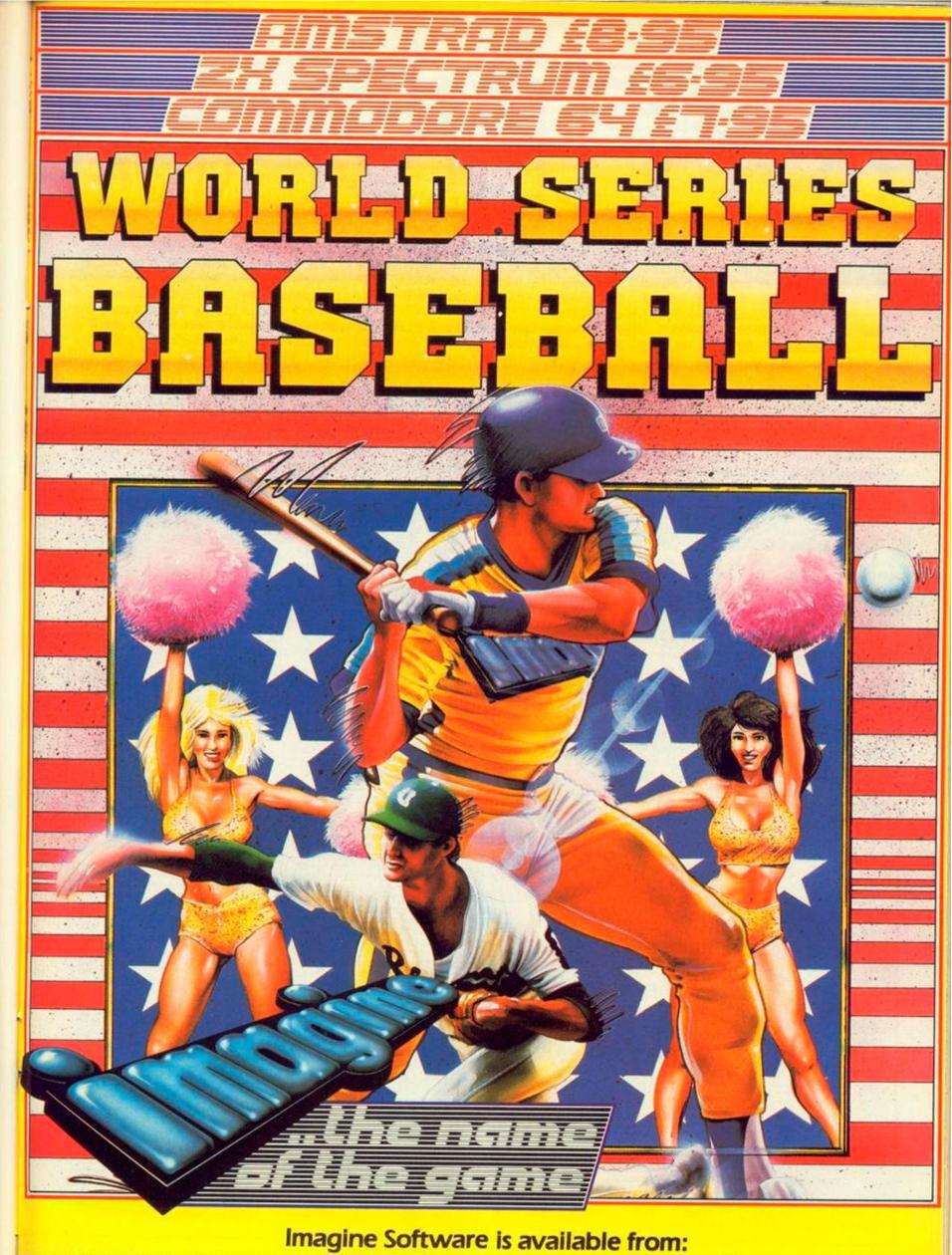
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# CBN-64

# The Telsoft service now extends to include the CBM-64.

THIS MONTH we are pleased to be able to announce the extension of the Telsoft service to Commodore 64 owners. It will be available initially to users who have the OEL Comms pack coupled with the Telemod 2 or similar modem.

Both the downloading program — which is listed with this article — and the full user-to-user communications program for the C-64 have slightly different menus to those produced for the BBC and Spectrum computers — see page 88.

The main difference is the addition of a machine-code Save routine which was considered essential since this is absent from the Commodore operating system. The full C-64 menu is: (1) Receive; (2) Transmit; (3) Chat; (4) Set Baud Rate; (5) Return to Basic; (6) Save Bytes — ie machine code sections. Brief details of the functions of these menu options are as follows:

Chat mode: This mode allows a real time conversation between the users with automatic changeover from one end to the other. Each time characters are entered from a different end a carriage return is generated automatically which ensures that the text sent by the two ends is not mixed up on the same line.

Transmit and Receive modes: These modes are used to transfer data between computers and if both users start off in the Chat mode

the procedure is semi automatic, as follows:

The user who is going to send the program presses his Stop key which reverts the computers at both ends to the menu. Menu option 2 is called to go to Transmit mode and the user will then be asked to enter details of the data that is to be transmitted to the distant end.

Both the transmitting and receiving ends get a visual display of the progress of the data or program transfer. The data is sent in 256 character blocks, each block being numbered in hex and finishing with an OK if the receiving end calculates that it has received the block without any errors.

If the block contains errors, the OK is

```
Figure 1.
  REM
          HEX LOADER FOR CBM 64
                                         FIG. 1
  REM
10 FOR I=680 TO 727: READA: POKEI, A: T=T+A
20
   NEXT: IF T=6716 THEN GOTO 100
PRINT"ERROR IN DATA ";T-6716:END
   DATA 169,1,133,186,169,1,133,184
40
   DATA 133,185,169,8,133,183,169,208
   DATA 133,187,169,2,133,188,169,56
60
   DATA 133,251,169,199,133,252,169,251
70
   DATA 162,231,160,206,32,216,255,96
80
   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$,2*B+1,2)
200 GOSUB 300: IF E=1 THEN GOTO 280
    POKE A+B, D: T=T+D: NEXT
220 B$=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 AKLA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+D)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
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 XC10 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"=";
```

```
560 Y=INT(T/256) PRINT MID$(H$,Y+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
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT" TO RELOAD CODE :"
815 PRINT:PRINT" LOAD"C$"DOWNLOAD";
     PRINTC$",1,1
                          (RETURN)"
                         THEN TYPE
825 PRINT PRINT"
                                            NEW";
     PRINT" (RETURN)"
830
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"
     INPUT Z: ON Z GOTO 100,500,800
     A9068D21D08D20D0=3E2
                              51312
51320
51328
                                      72CE29F0C980D0E4=5C6
20D2CBB0DA9973CE=599
C8202ECCC009D0F0=4EB
     FF8D8A02BA8E92CE=510
```

```
Figure 2.
51000 ?
                   20CAC920C7CB20F8=4D5
CAADS0CEC931F023=532
                                                                                                        A000AD76CE2980D0=492
0FA52B85FB18A52C=3D8
51848
                                                                                    51344
                  CANDSOCEC931F023=532

C935F014C936D006=43F

208EC74C5BC7R914=410

20D2FF202FCBD0DB=52E

203FC8R92020D2FF=461

4C93C94C4RC82063=411

CC2022CDR95B85FD=4F1

A9CE85EE2028CDR0=547
51048
51056
                                                                                                        6D75CE85FC4CAAC8=587
AD78CE85FBAD79CE=607
                                                                                                        85FC20D2CBB0A820=55E
D9CC20D2FFC820D9=607
51072
51080
51088
                                                                                                        202ECD20D2CBB067=4D7
CD7CCEF00BR95820=503
D2FF2030C84C57C8=52C
                    H9CE85FE2028CDH0=547

002095CC202FCBC9=404

44F00BC954D0ED20=4E1

D2FFA901D007A944=4EF

20D2FFA90885BA20=4B9
51104
51112
                                                                                    51416
51424
                                                                                                         20D2CBB0F8CD7DCE=65D
D0EBAD75CEA8B993=687
                    25CDA90820ABCCA9=4A3
BD85FDA9CD85FEA0=6A0
002095CC2025CD20=383
                                                                                                         CED00E2030C8R991=4EE
20D2FF4C7EC94C57=51F
C8R0008C7CCE8C7D=447
                                                                                    51456
                                                                                    51464
51472
                                                                                                         CE20D2CBB0F091FB=5BF
202ECCC8CC77CED0=4D3
                    CE20D8C968A82025=4C4
CD2095CC9848A996=4C5
8D83CE20D8C9ADA7=5E3
51168
                                                                                                        202ECCCSC077CEINS=418
F02012CBB0E0CD7C=59E
CEF088R9582012FF=418
4C57C82012CBB0CE=4CE
CD710CEF0034C23C9=473
                                                                                    51480
51488
                    CE85FBADA8CE85FC=6EA
                     68882060CBR90185=38R
                    20BDFFAEA9CEACAA=567
CEEBD001C82025CD=479
A9FB20D8FF20F1CB=597
                                                                                                         CEABR9009993CEAD=506
84CEC902D02520BC=436
CBA9C820F3CBA955=568
 51240
                     6020D9CCC90DD00B=3FE
                                                                                                         2016CDR95020F3CB=432
                    R9085C7A9202012=3E0
FFA9012012FF60A9=4E7
012029C8A9012012=306
FF602063CCA000A9=43F
                                                                                                         2007/CBRC730EC888=54F
B993CED02398D0F7=5D4
4C5BC7R9552016CD=3DF
20F1CB4C63C9RC77=4EF
                                                                                    51552
51560
51568
                                                                                    51576
51584
                     FF9993CEC8D0FR20=5FB
                                                                                                         CE2012CB8810F820=571
                    D2CB90FB20D2CBB0=5ED
FB8D72CER0008C7C=4D0
                                                                                                         D2CB20D2CB4C47C9=53E
4C5CC8A52B85FBA5=4F5
                                                                                    51600
```

omitted and the block is retransmitted by the sending end until it is received without error.

When data transfer is successfully completed Program loaded OK is printed at both ends and they then revert back to Chat mode.

Set baud rate: This gives the user the option to change baud rates to try out different methods of working; e.g., the Telemod 3 has the facilities for full duplex working at 1200/75 and 75/1200. However, the program was specifically written for 1200/1200 bit/s half duplex working - selection 4 from the baud rate menu.

Save bytes: As mentioned earlier this facility is built in to enable users to save any number of machine code sections to tape or disc after downloading. The start and finish memory addresses of the machine code can be entered using either decimal or hex numbering. Naturally, any Basic program located in its usual position in memory - i.e., 2048 upwards - should be saved using the machine's built-in Save to tape or disc facility.

Only the Download section of the machine code is given in this listing, not the Transmit and Chat routines.

When you have been returned to the menu, exit to Basic and list the first few lines of the program where we will give the instructions needed to Save the program to tape or disc.

The download program is approximately 1800 bytes in length and consists of a Basic hex loader program and a list of machine code. Type in the hex loader program listed in figure 1 and then Save to tape or disc before

you Run it. When the hex loader program is run the computer will give the prompt "Start address (hex)?" and you should enter 51000 and press Return.

The computer will print the start address of the line and a question mark - e.g., 51000? you then have to enter all the characters after the question mark from the relevant line in figure 2 and press Return at the end of the line. If all is well you will be prompted with the next address and so on. Each line comes with its own checksum so that you can correct any errors as you go.

If you want to enter the machine code in several sessions you can save part of the code - but to tape only - by entering End instead of the next line of data when you are prompted with a line number and question mark. When you want to continue typing in the machine code program it is reloaded with the Command.

When you have entered all the machinecode lines the hex loader program will automatically save this machine-code section with the title Download, so make sure that you have your tape recorder or disc ready to record, before starting to type in the machinecode section.

If you want to enter the machine code in several sessions you can save part of the code (but to tape only) by entering End instead of the next line of data when you are prompted with a line number and question mark. When you want to continue typing in the machine code program it is reloaded with the command.

LOAD "DOWNLOAD",1,1 then enter New and Load and Run the hex loader program.

When you have completed and saved the Download program it is reloaded with the command

LOAD "DOWNLOAD",1,1 or 8,1 for disc - followed by the New command. To Run the program, enter SYS 51000 (Return)

# Modem transmit speeds

Provided the machine code is correct you will be asked to select the modem transmit and receive speeds. For the OEL Telemod 2 modem simply select Option 4.

To receive software from Telsoft, the Your Computer downloading service, first dial up Colchester (0206) 8068 and check when software for your machine is being downloaded. This audio recorded information service will also advise you which telephone numbers to ring for the 300 and 1200 bit/s downloading services.

When a program you want to download is available, make sure your modem is correctly set up and dial up the telephone number appropriate to your modem's speed. When you hear the modem tones switch the modem to line and replace the receiver.

Select Option 1 from the menu - Receive. As each block of data is recieved the block number and the program title will be displayed, followed by "OK" if there were no errors. Note that the "OK" will be missing from any blocks in which errors are detected and that the downloading program will wait for these blocks to come round again in order to make a second attempt to load.

When all blocks have been loaded, the Program loaded OK message will appear and you will be returned to the menu or Chat mode after which select Option 5 to leave the Telsoft Menu and list the first few lines of the Basic program you have received to get the necessary Saving instructions.

? D0FDRR2069CC6020=454 ? 25CDR902208RCC20=264 CEADCFCESDD1CEAD=6C1 D0CESDD2CE18ADD1=639 CE6DCFCESDCFCEAD=6SF D2CE6DD0CESDD0CE=6BE 51920 ? 51928 ? 51936 ? 51944 ? 2C85FCA000B1FB99=52A 2200C8B1FB8523F0=4CE 0BA52285FBA52385=447 52232 52240 51616 52248 52256 95CCAD8ECE20D2FF=573 A92020D2FFA90320=3A6 60444F574E4C4F41=2C4 44204D454E552131=243 2020205245434549=228 5645213520202045=1FE FC4C9BC918R5FB69=57D 02852D852F8531R5=37B FC6900852E853085=412 ABCC20D8C9604D7D=48A CE8D7DCER208AD7D=4AA 2063CCA90F8D8602=414 51960 51648 2 A95185FDA9CD85FE=575 ? A968269DCC2025CD=343 ? 209DCC209DCC209D=3DF ? CC2022CD20A9CC20=3A8 51968 51976 58495420544F2042=28R 4153494321362020=22F 2053415645204259=28A 5445532128205553=285 84CER90B8D02DE60=4R3 52600 8E81CE8C82CEA200=533 A9098ICICE202FCB=414 C914F016C90DF051=4E2 C924D01920D2FF8D=544 51984 51992 52616 95CC2022CD2095CC=411 202FCB20D2FF608E=421 4520122053544F50=26I 209220544F205245=204 52008 60488582290FD01F=37E 52344 FFCH4CESC9C93090=554 D4C93R901548RDC3=444 CEC924F004684CE5=460 C968C94190BFC947=4BA B0BB20D2FF38E930=4D5 C90R9002E907E005=36A F0RB9DC3CEE84CE5=61A C9E000F0A0E001D0=52A 80CEAE81CEAC82CE=597 52064 52688 R90C20RBCC2095CC=46D 51769 52888 93CE88D0FR8D93CE=619 52400 20202FFCH06FH=505 81CE60C914F008C9=505 7FF00160A91460A9=456 7F6020E4FFC9C190=5C4 07C91BB00338E960=4AF 2421535441525420=2E3 4144445245535320=31E 52096 52104 PROCESEDICESEDZCE=503
RDC3CEC924D006A9=512
OFRICICEESBDC3CE=5DD
C9FFF01D20CBCAB0=5B2
3418BDC3CE5DCFCE=524 60C941900EC95B90=494 08C9619006C97BB0=49C 52144 9 SDCFCER9006DD0CE=566 8 SD0CEB020E84C75=534 CRADCFCEAC83CE99=642 A3CEC8ADD0CE99R3=660 286888686868D80DE=485 AD01DE6048AD00DE=307 488 ? R200BD41CEC921F0=500 ? 0720D2FFE84CBACA=570 F068686868930C9=3C8 3A300318690720D2=21F

# A reminder of how to use the Telsoft service.

88 INPUT " 1"156 85 IF 86-"END" THEN GO TO 288 98 IF LEN 56<>28 THEN GO TO 268

THE PROGRAMS given here will enable Spectrum and BBC owners to download via Your Computer's Telsoft service. First type the hexloader for your machine - figure 1 and then enter the machine code - figure 2. On the BBC you call the service by entering

CALL &6A00

while Spectrum owners must type

RANDOMIZE USR 60000

So far OE Ltd's Telemod 2 and VTX 5000

modems have been tested with the service, but it also works with a number of other makes.

To find out what is available on Telsoft 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 available, make sure your modem is set up and dial the number appropriate to your modem's

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 were 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.

248 PRINT "Checksum Error 258 LET a=a-8: 60 TO 58

```
258 A=A-8:GOTO 58
268 PRINT "TYPING ERROR !"
278 A=8*(A DIV 8):GOTO 58
                                                                                                                                                                                                    168 B= EVAL("&"+MID$(B$,2*N+1,2))
178 ?A=B:A=A+1:T=T+B
                                                                                                   78 PRINT "A" ";
88 INPUT ":" B#,C#
Figure 1. BBC.
                                                                                                                                                                                                 198 FOR M = 1 TO LEN (Cs)
288 XS=HIDS(Cs,M,1):SOSUB 388
218 IF E =1 THEN A=A-1: GOTO 268
                                                                                                    98 IF LEN(8#) <>16 THEN 58
  18 REM BBC HEX CODE LOADER
                                                                                                                                                                                                                                                                                                  288 *SAVE "DOWNLOAD" AARB AF87
 15 HIPEM-669FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>66F07 THEN 200
60 IF A<62A00 OR A>66F07 THEN 20
                                                                                                 118 FOR N=8 TO 7
                                                                                                                                                                                                                                                                                                  298 END
388 E-0:IF ASC(X#)<48 THEN E-1:RETURN
318 IF ASC(X#)<58 THEN RETURN
328 IF ASC(X#)<65 THEN E-1:RETURN
338 IF ASC(X#)>71 THEN E-1
                                                                                                128 XS= MIDS (BS, 2=N+1,1): BOSUB 388
138 IF E=1 THEN 268
148 XS= MIDS (BS, 2=N+2,1): BOSUB 388
158 IF E=1 THEN 268
                                                                                                                                                                                                  238 IF T= EVAL("&"+C#) THEN 58
248 PRINT "CHECKSUM ERROR !"
                                                                                                                                                                                                                                              6048 : A98C20E3FF28AB6D, 3EF
6D58 : A98728886EA99AB5, 386
6D58 : 82A96E8583A88828, 361
6D68 : F86D28AB6D28996D, 3C8
6D68 : 28996D28996D28AB, 317
6D78 : 6DA98A28886E28FB, 2C6
AD78 : AD78ABAD9822888, 278
                                                                                   6808 : 16C98F2917628D56D,477
6818 : C8C475D8F1288C6C,45A
6818 : 88E3C57AF88BA958,4CE
6828 : 28E3FF28E7FF4C67,48B
Figure 2. BBC.
                                                                                                                                                               6C28 1496CC68FD0023860,374
                                                                                                                                                                                                                                                                                                                               6E68 : 89C887D88568684C, 2C1
                                                                                                                                                                                                                                                                                                                                          1990897089368684C

1806A9370A67DA47E

168847E867DA996A2

18828F4FF982981F8

188A996A28928F4FF

19818988138A67DA4

17668444F574E4C4F

1414494E47284D45

14538D3128282852

1454345495458B034

12828895345542842
   AAR8 1A9CBA8FEA28128F4,4C6
                                                                                               16A288C6CB8CFC578,3C1
                                                                                              1676A2BC76B2BE7FF, 429
                                                                                                                                                                                                                                                            16D28AB6DA9822888,278
                                                                                                                                                                             I 68A9EBA888A2FF28
                                                                                   6848 1A573A8A98899856F,3F6
6848 1A58AC982D85828D7,419
                                                                                                                                                                                                                                               ADBB : AE28FBAD28ABAD28,34B
                                                                                                                                                                                                                                                           1E7FFA9D228E8FF48
                                                                                   6858 168A9C828556CA955,388
                                                                                                                                                               6C78
                                                                                                                                                                                                                                                                                                                                6EBØ
                                                                                               128386EA95828556C,298
1A915A28128F4FF28,394
                                                                                                                                                                                                                                               60°8 168A98828886E28F8,2B7
                                                                                                                                                                                                                                                                                                                                            12020205345542042
                                                                                                                                                                                                                                               COAR LADZRABADARZRABAD, 33A
                                                                                                                                                                                                                                                                                                                                6ECB
                                                                                                                                                                                                                                                                                                                                            :6175642052617465
:0D35202020455849
                                                                                              :F768A471C8888985,585
:6FD85198D8F7A98C,4A4
:28E3FF28A56DA95A,437
                                                                                                                                                                                                                                                            128AB6D28E7FF28E7
                                                                                                                                                                                                                                               ADB8 :FF684829F8AAAAAA,3FE
ADB8 :6A8938C93A388318,1F1
ADC8 :698728E3FF68298F,312
                115A20120F4FFA000,3EB
                                                                                   6878
                                                                                                                                                                             : 42FØ11C943FØ174C
                                                                                                                                                                                                                                                                                                                                6EDØ
                                                                                                                                                                                                                                              DC8 1698728E3FF68298F,312

DC8 18938C93A38831869,1F8

ADD8 18728E3FF68457885,3AE

ADD8 1728E3FF68457885,3AE

ADD8 1A5784988E378A278,398

ADE8 1A9188E37A267A2678,299

ADF8 1CAD8E86828E3FFC9,5AC

ADF8 18182C98DD8F6C868,4F7

AEB8 1867DAAA928228E3FF,478

AEB8 1CAD8FAA67D68C97F,55F

AE18 198F812A97FC92889,4FD

AE18 189F812A97FC92889,4FD
                                                                                               120006E20F86D20AB.2DB
                                                                                                                                                                             128F4FF4CB76CA988,433
                                                                                             120806.20F 96023041, 2DB
1 6DA99220806.6A99B, 2DA
1 20E3FF20F86DA9D2, 502
1 20E0FF4CBC6AA955, 3BF
2 20306.EA99620556C, 2D2
1 4C6A6BA475200C6C, 2D2
1 8BD0FA200C6C200C, 316
                :FBA0000477847884.416
                                                                                                                                                                            1A20420F4FFEABAS, 4CE
                :79847A8478857828.388
:D56DA57829F8C988.489
                                                                                                                                                                                                                                                                                                                              6F18 14E334D4954284261;24E
6F18 1756428526174658D,292
6F28 14128292837352842;16F
6F28 16175648D42282833,1FC
6F38 1383828426175648D,289
6F38 14328318238382842;188
6F48 16175648D53455428,253
6F48 15245434549564528,253
6F58 14261756428526174,203
6F58 14028284C4F414445;F2
6F68 14028284C4F414445;F2
6F68 14428286F688D5362,280
6F78 1485558528414E5928,213
6F78 1485558528414E5928,213
6F78 148455928464F5228,213
                1718@C828D56DC8@9.364
                                                                                                                                                               6CDB 1FBBBC942FB11C943,413
                                                                                                                                                                                                                                                                                                                                            14E534D4954284261
                DOF BAGGGA5742988 . 422
               1D009A51C857618A5,354
                                                                                                                                                               6CEB :8128F4FF4C896DA9,37F
                                                                                   6BC8 16C4C486B4C6C6AA9,336
6BCB 12020E3FFA96F20E3,43D
                                                                                                                                                               6CEB : 87A28328F4FF4C89,314
                                                                                 69C8 :2828E3FFA96F28E3,43D

68D8 :FFA96828E3FF68A9,51E

68D8 :9CA808068AE382D0,41E

68E8 :88A21329F4FFA212,387

68E8 :29F4FF68A29720F4,4C8

68F8 :FFA29629F4FF68A9,353

68F8 :PCA808A68AE382D0,41E

6C80 :EBA25328F4FFA252,4E7

6C80 :28F4FF6818A99685,44E

6C18 :8F847EA91A20828,36D

6C18 :F4FF8889C887D885,44B

6C28 :68684C8C6AA47E28,2D4
                                                                                                                                                               6CF8 : 6DA987A28428F4FF, 3D6
                                                                                                                                                                                                                                               6E18 :00F012A97FC920B0,3C3
                                                                                                                                                                                                                                               6E28 :8EC98AF88AC98DF8,3A1
6E28 :86C987F882A98868,2D1
               :5820E3FF20E7FF4C,4AC
:676AA573A8B9856F,43E
:D80E20E7FFA98B20,3B8
   6AFB :E3FF4CB36B4C676A,469
6BBB :ABBB847AB47B28BC,2C9
                                                                                                                                                                                                                                              6E68 1A991A28828F4FF88,49F
                                                                                                                                                                                                                                                                                                                               6F88 :4D454E558D282828,1A2
```

```
268 PRINT "Typing Error"
278 LET a=8*INT (a/8): 80 TO 58
288 SAVE "download"CODE 68888,1136
298 POKE 23658,8: STOP
                                                                                                 VB IF LEN b#<>20 THEN GO TO:
108 LET t=a-256+INT (a/256)
118 FOR n=0 TO 7
128 LET x#=b#(Z*n+1 TO 2*n+1)
125 GO SUB 388: LET y=x
138 IF e=1 THEN GO TO 268
148 LET x#=b#(Z*n+2 TO 2*n+2)
145 GO SUB 388: LET y=y*16+x
                                                                                                                                                                                        198 FOR a=1 TO 3
288 LET x8=b8(17+m TO 17+m)
            CLEAR 59888
POKE 23658,8: CLS : PRINT INPUT "Start Address ";a
IF a>61135 THEN GO TO 288
IF a<60800 THEN GO TO 28
PRINT a:
                                                                                                                                                                                        205 GO SUB 388: LET y=y+16+x
218 IF e=1 THEN LET e=a-1: GO TO 268
                                                                                                                                                                                                                                                                                                 388 LET e=8: LET x=CODE x$-48-7*(x$)*9*)
318 IF x<8 OR x>15 THEN LET e=1
                                                                                                                                                                                        228 NEXT m
238 IF t=y THEN PRINT ":"|b#: 80 TO 58
                                                                                                                                                                                                                                              60672 :EFEE10326FEF3721,305
60600 :6FEFCB1623CB1600,350
60600 :20E2C1E1C9110501,394
                                                                               60208 | E0EE12133E0012CD,340
                                                                                                                                                              60440 :31D3FF3E0F320F5C,305
  Figure 2. Spectrum.
                                                                                                                                                                                                                                                                                                                              60912 | C9FE87281CFEC828,4F3
60928 | 19FE8C2814FE8828,388
60928 | 18FE8D288CFE28FA,367
                                                                                              |D7ECCDA6ECC3AAEA,6B1
|CD1FEDDAAAEA2178,518
                                                                                                                                                                60456 ID3FE21915CCB9EFB,56B
 60000 :CD15EDC307ECCD15,4C7
60000 :EDCD36ECCD66EDCD,631
60016 :S0EDCD47EE30FBCD,5AF
60024 :BBEDFE31CA99EAFE,69A
                                                                                               :EFBE20E121E5EE3A,524
                                                                                                                                                                                                                                                60696 1216A00CDB503C93E,32F
60704 1963277EFCD47EDDA,529
                                                                                                                                                                                                                                                                                                                                             118FEBD280CFE28FA

18FEFEB8FA11EE3E

188C93E87C9CD488D

13E82CD81163E1832

1895CC93E121681CD

11122C93E121680CD

11122C9C5D3E53E82

1008114CD47EFSBER
                                                                                                                                                                                IEECD&6ED3EB1D3FE,556
                                                                                                                                                                               EECDAGED3E81D3FE, 556
2165EE3E88CD8FEC, 442
1CD84ECCDASECCDAG, 654
EC23CD77ECCD77EC, 58F
1CDA8ECCD84ECCDAG, 661
EC233E8DCD8FECCD, 4CF
84EC23CDA3EC3E83, 498
1CD8FECCD84ECCPCD, 688
A3EC2F87CD8FECCD, 688
                                                                                               13E86BE286BCDD7EC
                                                                                                                                                                                                                                                               : 2EEDF1C366EACDAC, 5C8
                                                                                               13E2132985CC3FFEB.482
                                                                                                                                                                                                                                               60728 | ED7BE601F602D3FE.548
                                                                               60264
                                                                                               13E88326FEF3278EF.3C7
                                                                                             13E09326FEF3278EF,3C7
ED58A9EF8E902D1F,40C
EDDAAAEA3273EFCD,634
EBEC3A68EFFE9029,506
1933A69EF6093A73,432
EF12130C3A6AFF9,3FC
128DCCD1FEDDAAAEA,5D9
                                                                                                                                                                                                                                                              1AF2177EF33200237,27C
1C9CD77ED38E8C9CD,5F0
147EED0FECBC837C9,5E6
1F5DBFF3A81EFFE00,5C7
120043E3610023E37,107
1D3FFDB7FF1C9F53A,675
                : 15ED3EFACDB4EDCD,5FD
                                                                               60272
 60040 | 15EDC9CD15EDC366,553
                                                                               AB288
                LEACDAGEDITESEEBA . 580
               18A5CBABED11EDEEBB, 38C

1803EFF121310FCCD, 45B

135E11CDEEBA173E, 3D2

120121310FCCD1FED, 3DA

130F8CD50EDCD1FED, 5BB

138F8C3245EF3E8032, 3E9
                                                                                                                                                                                                                                                                                                                                             *CDSCEEE1D1C1C93A
                                                                                                                                                                60536 | A3EC3E07CD0FECCD, 561
60544 | 84EC23C97EFE00C0, 520
                                                                                                                                                                                                                                                                                                                                             1385CCB6F288C3A88,28F
                                                                                                                                                                                                                                               60776 181EFFE0028043E36,376
60784 1D3FFCD50EDF1C93E,644
                                                                                                                                                                                                                                                                                                                              61000 | 5CF521305CCBAEF1
                                                                                                                                                                                                                                                                                                                              01806 | SCF021380CLBREF1, 47C937C9F5111808, 35E

01816 | A7C937C9F5111808, 35E

01824 | CD18EDF1C9444F57, 456

01832 | 42444F4144494E47, 216

01848 | 2840454455983128, 216

01848 | 2828524543454956, 276
                                                                               60320
                                                                                              1216FEFBEC22DEBCD, 584
                                                                                                                                                                               CDBBED23C384ECFE.651
                                                                                                                                                               60560 :00C0F53E20CD80ED,520
60560 :FISDC30FECCDA0EC,65D
60576 :CDA3ECCDA0EC3E0D,5A6
60564 :CD88ED3EFF328C5C,574
                                                                                                                                                                                                                                               60792 :00DBFFE68037C8DB,59.
60800 :FFE60237C8DBFFE6,626
60800 :302004DB7FA7C93A,3E0
                                                                               68328
                                                                                              : 1FEDDAAAEA2178EF . 5A2
                                                                                             | 1FEDDAMAEA2178EF, 5A2
| BEC22DE83E6F32E2,589
| EE3E6832E3E83E80,498
| 32E4EE3A685CFE21,581
| 2983CD15EECDD7EC,583
| CDA6EC21E3EE3A68,5C5
                16CEF326FEF3278EF,544
                                                                               60336
                13A65EFCDEBEC3A65,5A1
                IEFEAFREBB2BDEBE . 427
60120 | EFEAFGFE0020DE0E, 427

60126 | 9091165EFCD1FEDDA, 501

60136 | AAEA1312CDE0ECGD, 552

60144 | 20F23A49EFE60020, 51A

60152 | 8021485C3A60EF0E, 36C

60160 | 0047892260EF0000, 10A

60168 | 11CDEECD1FED309A, 47F

60176 | 12130CCDE0EC79FE, 45C
                                                                                                                                                                                                                                               60816 | 81EFFE0020043E37,397
60824 | 18023E36D3FFD07F,452
                                                                                                                                                                              :C9F513E6F@CB1FCB,6@C
                                                                                                                                                                                                                                                                                                                                             14500352020204578,217
                                                                                                                                                                               11FCB1FCB1FF630FE,4CF
                                                                                                                                                                                                                                                              #C9CD47ED3A73EFD8.5DE
                                                                                                                                                                                                                                              68832 | C9CD47ED3A73EFD8,5DE
68848 | F1C366EAF53ED23D,5EE
68848 | 28FDF1C9CDACED3D,62A
68856 | 28FAC9C5D5E5F5FE,78D
68864 | 7F2813CDF9EDFE8C,537
68872 | 298CFE8D29853E28,28A
68888 | D73E8DD718183E28,34F
68888 | D73E8BD73A885CFE,4E8
68896 | r2128833E8BD73E5F,2E6
                                                                                              1EF856F3E808C6736,422
18821E5EEED4866EF,561
                                                                               60384
                                                                                                                                                                                                                                                                                                                                             1652853796D626F6C
1285368696674282D
                                                                                               I OCTEFEBBC2BDEA23, 4FC
                                                                                               18D28F63EFACDB4ED.5B9
                                                                                                                                                                              CDEEESCOB4ECE186
                                                                                              : SEBIDSFECS&&EACD. SEB
                                                                                                                                                                              1173E20772310FC3E,339
10077C9E52170EFAE,538
                                                                               68416 | 1FED3@FBC3BDEAF3,594
68424 | 8683AFD3FF1@FB3E,3D8
68432 | 48D3FF3EFFD3FF3E,56F
                11828F83A68EFCD81,447
60200 | 6FEFBE28133E5811.326
```

158 IF ==1 THEN GO TO 268 178 POKE a,y: LET a=a+1 188 LET t=t+y: NEXT n: LET y=8

Figure 1. Spectrum.

REM SPECTRUM 48k REM Hex Code Loader

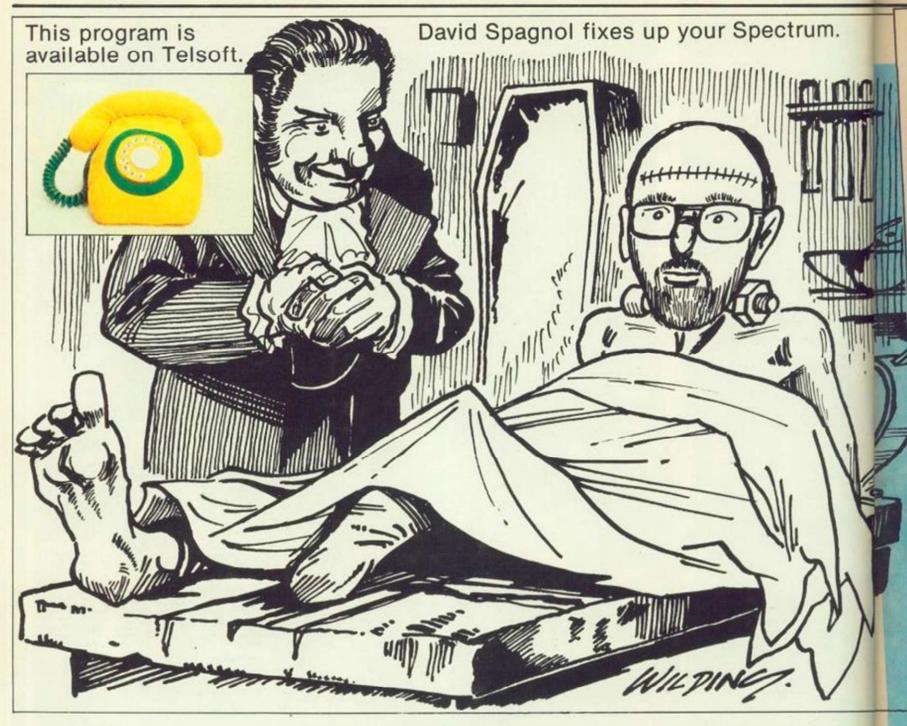
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THERE ARE a number of Basic Programmer's Toolkits on the market for the ZX Spectrum. They all seem to have one or two absolutely brilliant functions, which are only used because they are there. Meanwhile, the normal toolkit functions are pretty ordinary and often not at all user-friendly. I have tried to compile a number of Toolkit functions which operate the way I want them to. I also decided to write a user-friendly System to link them all up. A tidy Menu Page is included as is a method of returning to the menu any time Input is requested.

Single-key entry and default values have been avoided. It is too easy to make a mistake and ruin a program. Every parameter is prompted for on screen. Most errors that can occur are trapped. There are a number of error messages.

A feature that will please many people is that if Open #2, p or t is entered before calling the machine-code, the menu and prompts are still printed to the screen, but any Output - say, in Search and List, or List Variables — is sent to the selected channel.

The Editor: After much searching through Logan & O'Hara's book on the Spectrum Rom disassembly, I worked out how to call the internal Editor from machine-code. All

Input is treated like Input Line - i.e. Caps 6 will return to Basic and no syntax check is made. Two added features are that the calling routine has to specify a length limit for any string, and that the empty string causes a return to the Menu. If the length limit is exceeded then the input is rejected and the editor is called again.

The Collect Number Routine: This uses the Editor to allow input up to five bytes. If any non-numeric characters are included, or the number is over 65535, then input is rejected and the Editor called again. Only positive whole numbers are allowed. If the first character is a "#", then characters A-F or a-f are also allowed, and a hex number is evaluated.

The Parameter subroutine: This is a bit of code that when called, uses the bytes following the call as instructions. Compare the Spectrum Rom's floating-point calculator. It calls the editor for input, prints strings and

numbers on screen, as well as ordinary letters and messages from a table. It places input into buffers, and when all the prompts have been answered, tests to see if the values are valid. If all is well, it then asks if the routine should be executed. If you answer Y or y then the work is done. Some individual routines have further tests and error traps inside them.

The Renumber functions: Because of the way these programs correct Goto line numbers, they should not be used with programs that contain machine-code in Rem lines.

R - Renumber block of program: Renumbers a specified block — Start and first unaffected line numbers — with a new base — Destination - and Increment as specified by the user. It makes sure that line numbers will not overlap. It corrects purely integer, simple and up to four-figure numbers after Goto, Gosub, Llist, Run, Restore, and Line - as in Save a\$ Line 100 - throughout the entire program. It also removes leading zeros in Listing 1. 100 REM PUT MACHINE CODE 110 CLEAR 50000 120 LET a-10: LET b-11: LET c-12: LET d-13: LET e-14: LT f=15

To LET inne=1808
130 LET inne=1808
140 LET addres=56080\*(line=1800)\*6.4
150 RESTORE line
140 RESTORE line
150 LET byte=16\*VAL ss(1;\*VAL ss(2))
150 LET byte=16\*VAL ss(1;\*VAL ss(2))
150 LET bot=16\*VAL ss(1;\*VAL ss(2))
150 LET bot=16\*VAL ss(1;\*VAL ss(2))
150 RESTORE line
150 RESTORE line 

DDA78EE2190892201EE2A7800222E8EE7,3848

1580 DATA ~EBCAMOSEC29292919202020EC1032CD0FED0DD081D3D
4FEC18013[A14FCC20013]B14FE1805C780131C14FEE5EA87133D1
41516192ACFEC118C27A7ED530294EE7,7482

1510 DATA ~CD92EDFED9284F32A011801300802ACD6C23ED5BCBE
CAFEDSXED5B018C474F83E05238F84849CD60F53AD9ECESDF2A01EC
CFE44208FFE4072084CD44EF811113007,8289

1520 DATA ~2919108E2A01EC494427929232333333222D5EC2
ACFECCD6E192585C3EFFCD0116CD59C8CC3ACD5CA7ED52D8CD9DF

front of converted numbers. That is why it may appear a trifle slow.

M - Move block of program: This asks for the same four inputs as Renumber but instead of ensuring no overlap it checks the number of unused line numbers at the Destination. It renumbers your selected block as requested, then sorts the lines into the correct order. It therefore Moves the code and deals with all the Gotos etc.

C - Copy block of program: This asks for the same four inputs as Renumber. It copies the requested block at another point in the program and renumbers it. No Goto destinations in lines outside the new block are touched, but the new block is renumbered fully within itself. Any Gotos that point to before the original start of the copied block may be renumbered wrongly, but this is not a problem. Move the block you want copying to the front of the program, copy it, move it back, and all will be well.

R, M and C - Make sure there is enough memory: It is possible to get a Basic error report 4 Out of Memory and this can very rarely occur if the new line numbers after Gotos are longer - in terms of digits - than the old ones and there is no room to fit them 498
580 REM SAVE LOADER
510 SAVE "Tool Load"
520 VERIFY "Tool Load"
530 STOP
680 REM SAVE CODE
610 SAVE "Toolbytes"CODE 60000,5360
620 VERIFY "Toolbytes"CODE 60000,5360
630 STOP

For tape saving substitute these lines for lines 490-630 in listing 1.

in. This can only happen if the computer is near choc-a-bloc, but if it does, the program will be corrupted. Using function Y will leave something that can be worked with, unless copying when the system variables will have been corrupted - in which case, cry.

When copying it is more likely that there will be insufficient space for the actual copying of lines, in which case no damage will have been done at all. In Move, it is more likely that memory will be full when the lines are being rearranged. Deleting a line or so and using function Z will put things right. This is all theoretical. It has never yet happened to me in practise.

The "correct corruption" routines: Y -Restore line lengths; Z - Sort lines into correct order; USR 65240 - Renumber 1,1. These have more uses than outlined under the above routines. Occasionally a program won't load very well from tape. Any attempt to edit lines results in a large number of program lines disappearing - or the computer crashing - because the Invisible Length bytes have been corrupted. Use Y and editing is possible. It could, however, spoil programs with machine-code in Rem lines if CHR\$ 13 is contained in them.

Z sorts lines into their correct order. If line numbers are very badly corrupted, they may not be listed and will be rejected as program lines. Breaking back into Basic and calling USR 65240 will renumber the entire contents of the Program area from line 1, in steps of 1. No Gotos will be corrected. Because this can mess up a program it is made relatively hard

W - Disable New: This is the "Boss" routine for Diverted Interrupts. Functions N, Q and T are all routed through here, so that when they are on, the functions of W happen as well.

If you press key A in K mode, instead of getting New you will get Stop. If you hold down Symbol Shift and A in L mode, nothing will appear to happen. But the next key

(continued on next page)

(continued from previous page)

depression will be taken as K mode. Symbol Shift A followed by just A will give Stop. This is useful in functions A and S, avoiding having to do Then keyword backspace Delete forwardspace.

N — Autoline Number: Prompts for Increment. When awaiting a Basic line to be entered, adds the Increment value to the existing current line and inserts that number in the Edit line. It only works if the last key pressed was Enter. It will very rarely append to a line after a syntax error — you'll just have to delete. Note that Q, T, W and X all turn this utility off.

Q — Constant memory: Gives a constant display of memory left. Is turned off by N, T, W and X.

T — Trace — Continuous display of current program line: This function prompts for speed. 100 is close to normal running speed. As the number is reduced, the program runs considerably slower. So if there is something wrong with your program you can get a rough idea why. When this function is in operation, you can skip through part of your program at normal speed by holding down Enter and K together. You can freeze the program by holding Enter and L together. Trace is turned off by N, Q, W and X.

X — Return interrupts to normal: Switches off N, Q, T and W. You can now New if you wish!

A — Search and replace: This prompts for Start and Finish line numbers. It then asks for Old and New strings. String in this sense means a string of characters from the program. They do not have to be the same length. There is also a List option (not advisable when there will be a large number of alterations). If the string to be altered contains floating point numbers, tell the program by preceding and following the number with three "&" signs. For example:

OLD STRING: "'m";&&&1&&&;" NEW STRING:"

would allow you to change Microdrive commands for tape. If "&&&" is part of a non-numeric string, this feature would not work further down the line. It also works in the New String. There is a maximum string length, including &'s, of 32 characters. To use the Bin character, place &&& before the Bin and after the bits. If the number is too large, a return to Basic is made with error 6. Error 4 is also possible but no damage will have been done.

B — Machine code to data: This prompts for start and finish addresses, a destination and number of bytes per line. Lines are formed incrementing by one. It gives the option of hex in the same form as line 1000 onwards in listing 1 or Decimal numbers. Only the hex form gives a checksum. A memory check is made before each line is started to ensure that the program is not corrupted by unfinished lines.

Error Reports. Error message May occur in Task completed Most routines: it means it's done as told B. C. M. N. R. T. U. Range error Increment > 100 ABCDJKLMPR -Numbers S. Start > Finish reversed Line > 9996, Non-Invalid line number existent line in 0. CMNRTU. Speaks Zero not allowed for itself. R. Check what you are Lines would overlap trying to do. No room at B C E M. Not enough destination unused line numbers. Zero block! C D. No actual lines from start to finish

A check is also made to ensure that there are enough unused line numbers at the destination. Of course, machine code occupying the same space as the Toolkit will have to be moved before the Toolkit is loaded but that is simple enough.

*U* − *UDGs* to data: This is the same as function "B" but is an easier way of working if you want to put any UDGs − perhaps produced by function G − into Data lines. It asks for the number of UDGs required − starting from A − so 4 gives graphic A, B, C and D − and the number of the first Data line. It puts eight bytes on each line.

D — Delete block of program: This is obvious. Enter first line and finish line as prompted. It is very quick indeed.

E — Create a Rem line: This can create a Rem line of 35,000 characters in less than a second. Useful for those without Interface I who enter their machine code that way. Prompts for Line Number, Length, and Symbol.

F — Delete Rem lines: Prompts for Start and Finish line numbers. Deletes Rem lines in specified range only, including :Rem further down a line. Does not deal with If a Then Rem but who is that daft?

G — UDG Designer: Prompts for a character to be used as a starting point. This is then amended by entering the co-ordinates of a point on an 8 by 8 grid — number first — followed by i for fill in and o for rub out. Mirror images, inversions and rotations can also be made. Finally, the UDG is entered into a specified letter.

H — Hex/Decimal conversions: Will print any number input in both hex and decimal. As all numbers 0-65535 can be entered in either hex or decimal — see above under Collect Number routine — this is useful. It

# Listing 2.

I PRM Lines 9997-9999 are referred to as LI Sing 2 in the tent. LISTing 3 is, of . course, the first program on this tage?

3 9997 STOP: ERASE "m";1;"Tools:t": ERASE "m";1;"Toolb:t": GAVE \*"m";1;"Toolb:t": GAVE \*"m";1;"Toolb:t\*: URRIFY \*"m";1;"Toolb:t\*: "Toolby:t\*:"COUR 60000,5768: VERIFY \*"m";1;"Toolby:t\*:"COUR 60000,5768: VERIFY \*"m";1;"Toolby:t\*:"COUR 60000,5768: VERIFY \*"m";1;"Toolby:t\*:"COUR 60000; STOP 9998 CLEAR 59999; LOAD \*"m";1;"Toolby:t\*s"COUR 60000; STOP 9999 RAMODMIZE USB 60000

Listing 3.

9997 STOP: SAVE "Toolkit" LINE 9998: SAVE "Toolbytes" CODE 60000,5368: VERIFY "Toolkit": VERIFY "Toolbytes"CODE: STOP

9998 CLEAR 59999: LOAD "Toolbytes"CODE 60000: STOP 9999 RANDOMIZE USR 60000

keeps prompting for more numbers. Return to menu using Empty String.

I — Status report: Gives a report of memory left, whether interrupts are normal or diverted, printout of UDGs provided channel s or p is in use, plus a few other bits. A command can be entered without returning to the menu.

J — Merge block of lines: Will merge together a specified block of lines as one line. Watch out for Goto destinations, Rem lines, and the fact that the Spectrum only allows 127 commands on a line.

K - Lower to upper case and L - upper to lower case: Will convert letters inside a program between two specified lines. Note that there is an option to include or exclude characters inside string quotes.

O — Token locate: This gives the address in both decimal and hex of the first symbol after the Line Number and Length Pointer in a specified line. Gives an error if the line does not exist.

P — Compact program: Does usual prompts for specified program block. Then deletes any unnecessary characters — i.e, spaces and colour controls outside quotes. It ignores lines that start with Rem but does affect messages after Rems if it is not the very first symbol on the line.

S — Search and List: This is the opposite to function A in how it deals with floating-point forms. It searches the lines and prints them in accordance with how they look when listed so you don't have to worry about hidden characters. It prompts for Start and Finish line numbers, and the string of characters to be searched for — maximum length 32.

V — List variables: Does what it says. All simple variables are given with their values, except that CHR\$ 0-31 in string variables are printed as "?". For-Next variables are printed in capitals with their values, and Dimensioned variables are printed with their dimensions but no values.

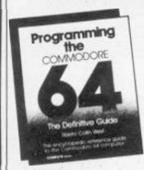
Warning — Line 9999: If at any time there is an attempt to append to the existing program — i.e., creating lines after the last one present — using functions B, C, E, M or U, then although the functions will appear to work, the new lines will be formed in the variables area, and the computer will not work properly until you Clear it. Also Renumber relies on the fact that Line 9999 is present to ensure that if doesn't form invalid line numbers. So always ensure that at least Line 9999 is present in a program before using the Toolkit.

All prompts requiring line numbers actually reject anything above 9996. I append two suggested ideas for lines 9997 to 9999 depending on whether you are a Microdrive owner or not. Note that it is unwise to use Autorun on the Microdrive version as you would be unable to Merge the control lines with your existing program.

Lines 1000 upwards of listing 1 were produced by the toolkit. Type in listing 1. Save it by Run 500. Run the program. If all is well you will end up with Report E. Once okay, save it by Run 490 and save the Code also?— Run 600. Rand USR 60000 should give you a nice title page. Use Caps 6 to return to Basic, then do a New then enter listing 2 or 3 as appropriate. Now Run 9997, then continue.

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0103 LB	DE, £1800	57. 2504	4068 FF 60 FF 60 F2 00 FF 60
0106 DR	A	TA 0000	doro ff to ff to ff 80 ff to
0107 SEC	HL, DE	11 0000	doff ff to Ff to FF 20 FF to
0109 LB	5P.HL	0000 HL 0000	0100)28<06 00 11 00 19 87 ED *7
0108 P15H	R.	0000 BE 0000	0108 52 FF E5 3A 04 00 SF 18 Ryet
0108 LB	A. (£0004)	0000 BC 0000	0110 00 0E 0E CD 05 00 11 BE M
010E LB	E.4	0000 AF 00FF	0118 01 0E OF CD 05 00 3C 20*
910F LD	3,500	.MR 0100	0120 19 21 00 01 7E 87 28 08 .11. 71
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0113 CALL	£1005	I SI H INC	
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0124 LB	A. (NL)		. 00   88   88   88   88   88   80 .
8125 GR	A		B124 00 , 00 , 00 , 00 , 00 , 11 .
0126 JR	MI*E0122		2800 03 0 03 0 03 0 03 0 03 0 00 .
6129 LB	E,4		FE7E 06 . 06 . 06 . 06 . 06 . 18 .
0129 LB	C.602		2040 AB ( AB ( AB ) AB ( AB ) B7 7

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THE AIM OF this and the next article is to describe the construction of a compiler system for BBC Basic that is suitable for use on the BBC and Electron computers. The limitations on the amount of memory available on these machines mean that it is not possible for the program to compile all of BBC Basic — instead only a subset is treated but this is more extensive than that handled by some commercially available compilers. This subset is shown in figure 1. I shall refer to it as TC — Tiny Compiled — Basic.

TC Basic consists of two programs; the compiler which is a large Basic program and the run time system — RTS — which is a hybrid machine code — Basic program. This article will describe the compiler while the subsequent one will contain a description of the assembly language program that generates the RTS: this is called the run time system generator — RTSG.

The aim of a compiler, is to convert a program written in a high-level language like BBC Basic into a much simpler one like machine code which will therefore run faster. A program compiled by the TC Basic compiler will run as fast as a Forth program—ie., four to five times faster than the usual interpreted BBC Basic.

The code version of a program is rather more compact than the original Basic program and, typically, at least 10K of code can be generated on a BBC micro — for the Electron 4K would be a reasonable estimate.

The compilers usually implemented on mainframe and minicomputers take the high-level program and convert it into machine code. However, for the BBC computer this approach has the disadvantage that the 6502 CPU chip does not have instructions to do many of the things one would like it to.

For instance, there are no instructions to add two 16 bit numbers or for multiplication. To get round this I have invented a "virtual machine". This is an idealised CPU which has instructions to do all the things required. It is implemented as a 6502 machine-code program. The compiler produces machine-code for this virtual machine; such code is usually called pseudo-code or more briefly, p-code.

The machine-code to interpret the p-code, is contained in the RTS and this is, of course, the main purpose of this program. The use of p-code has some advantages and some disadvantages. The chief advantage is that it makes the compiler and run time system a bit less complex. A further advantage is that compiled programs are very compact. The

chief disadvantage is that p-code executes about three times slower than machine code.

An alternative to p-code would be to compile the Basic program into 6502 machine-code statements. Every time some feature not in the 6502 instruction set was required we could jump to a subroutine in a run time support system. Simple functions like addition could be implemented as in line code. The major advantage of this approach is that programs run faster. However, there is the disadvantage that programs are very long; perhaps three to four times the length of an equivalent p-code program.

All the components of a p-code system are used by a true machine-code compiler. It is therefore worth starting with such a system if you want to learn how to make a compiler work.

The TC Basic compiler is shown in the listing. Obviously, if you want a TC Basic system, begin by typing in this listing. It should be Saved before you try Running it. In addition, before you can declare the compiler finished, it is necessary to enter in line 120 the value of the address in memory of the top of the RTS. This number, is provided by the RTSG program to be described in part 2.

The following is a description of the major components of the compiler. The main program runs between lines 150 and 300. Line 150 calls Procsetup — line 560. This initialises the values of various variables; in particular, it gives a large number of them the values of the Basic tokens which correspond to the keywords the compiler needs to know about. Procsetup also calls Proctok — lines 380 to 540 — which assembles a small machine-code program which is used to print out keywords from their tokens in the listings of programs. In addition, Procsetup prompts the user to specify the sizes of various things and reserves the appropriate quantities of memory.

Line 160 is a call of Procopen — lines 940 to 1020 — which opens the file containing the program to be compiled. Once the file is open, characters are always read from it by using FNCH — line 1020. Line 170 set things up so that compilation can start and in line 180, the call of Procprog actually initiates the compilation process. After the program has been compiled, execution of the main program continues at line 190. Lines 190 to 210 check if the storage allocations have been exceeded and print error messages if this is the case.

At line 220, a check is made to see if there have been any errors so far. If there have, the program branches to line 290: this is where

# COM

the compiler ends if there are errors; a message is printed out giving the number of errors

At this point, the compiler has constructed a p-code version of the Basic program. However, there are no actual addresses in this for either variables or for Goto — or in p-code jump — statements to branch to. To complete the p-code program it must be "fixed up". This is done by Procfix — lines 4050 to 4230 — and its associated routines in lines 3950 to 4280. This procedure allocates memory to variables and finds out the addresses in code to which Gotos, procedures and functions correspond. While the code is being fixed up, it is also relocated so that it will run at the address corresponding to the top of the RTS. Hence the reason why the value of this must

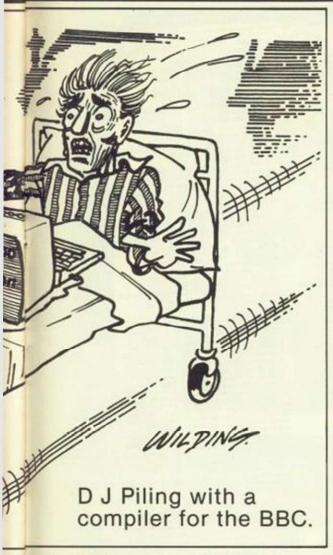
Figure 1. TC Basic Specification
Variables:
2 byte signed integers.
Variable names may contain up to 255
characters and may end with a %. The
variables A% to Z%, use the same
memory locations as the usual Basic
system variables thus allowing
programs to pass information, and
enabling parameter passing to the Call
statement.
Arrays:
Multiple dimension arrays of 2 byte
signed integers.
Arithmetic Operators: +, -, \*, /, DIV,

Logical Operators: AND, OR, EOR, NOT

Relational Operators: =, <, >, > =, < =, <Indirection Operator: ? (right hand side operand only) Statements: FOR TO STEP NEXT (no variable allowed after NEXT) REPEAT UNTIL PRINT"string" 'variable / expression, TAB(X,Y): IF THEN ELSE VDU , ; string (send string to OSCLI) GOTO line number SOUND ENVELOPE MODE GCOL COLOUR CLS CLG MOVE DRAW PLOT CALL END

DIM array / vairable System variables / functions: FALSE INKEY GET TRUE ADVAL TIME ABS SGN **VPOS** POINT SQR POS Procedures / functions: DEFPROC **ENDPROC** PROC DEFEN FN procedure and function arguments are not supported but procedures and functions can be used recursively. In addition, the following are supported: REM, () (brackets), = (asignment), : (for multi-statement lines), integer constants, + and -(unary sign operators), & (for hex constants).

MOD



be known

Finally, if no errors occur in the fix up process the compiler ends at line 260; this calls Procdump - lines 1040 to 1180 - to save the code produced.

Some other features of the compiler are worth describing. The procedures in lines 1230 to 1900 compose the lexical analyser.

Every time Proclx - lines 1230 to 1360 - is called, it reads the text token from the program and puts its type in the variable T%. Here "token" does not refer to the usual BBC Basic keyword token. Instead, it means the next significant piece of the program. Therefore, tokens can be variables and strings.

As was stated earlier, in a p-code system one constructs a virtual machine. In TC Basic the virtual machine is stack-based. This means that all operations take place either to or from the stack. For instance, there is an operation Add which takes a variable and adds it to the top element of the stack the result of the addition becoming the new top of stack element.

When the syntax analysis requires that a variable be added to the stack it calls Procadd. This writes the opcode for Add (2) into the code space and follows it with the address of the variable. In fact, until fix up instead of the variables address its number in the symbol table is used.

Other code generating subroutines, are supplied for all the operations the virtual machine is required to perform.

A typical scenario for the use of the compiler would be as follows: First, the program is developed as usual using the TC Basic subset to BBC Basic with the BBC Basic interpreter and Saved. Next, the compiler is Loaded and Run. It then asks for three pieces of information; the number of variables, the number of line numbers and the code space in bytes for the program to be compiled. Typically, answers of 100, 100 and 2000 would suffice for a small program. It is important to note that the number after a Goto counts as a variable as do the names of functions and procedures. Thus you must be careful when calculating how many variables to reserve space for.

Next, the compiler will ask you for the name of the program to be compiled. This will then be read in off the tape. This can in fact lead to a slight problem since, the compiler, is treating a program file as a data file. On a cassette-based system they are written to tape with different inter-block gaps.



# This article is available on the Telsoft service.

With some cassette recorders having the wrong gap will lead to filing system errors when the program is being read in. The solution to this problem; if it happens to you, is to define one of the function keys as follows: \*KEYO \*OPT,1 IIM INPUT " "FILE NAME "A\$:X% = OPENOUTA\$: FORI% = PAGE TO TOP-1: BPUT # X%, ?1%: NEXT: CLOSE # X%: \*OPT IIM

f0 is then used for saving programs to be compiled.

As the program is compiled, it will be listed out on the screen. If any errors are found there will be a break in the listing and an appropriate error message. If enough room has not been reserved for variables code or lines you will be informed of the amount of space needed for the.

Finally, if there are no errors in compilation, a copy of the code equivalent of the Basic program can be saved. This will automatically be given the name C.name-ofcompiled-program.

To execute the program, this new code file must be loaded into the RTS. The construction of this will be described in part 2. A C30 containing the listings from both articles, TC Basic systems set up for both tape and disc based computers and example programs and code files is available from D. J. Pilling, 12 Cherrywood Avenue, Anchorsholme, Blackpool. FY5 1SU. in return for a cheque for £2.99.

```
20REH
30REM TO BAGIO COMPILER
40REM D. J. Pilling
50REM (c) January 1985
   MARCH enter value for top of RTS in
BORREY line 128.
       toorts=7848
  268PROCHE : PROCOUMP
2786ND
310
320DEFFNL (B1X,82X,83X)
33885X+83X+264-8
3481F81XMD0418-8 83X-83X+16384181X+81X+4
3381F81XM644 81X-64 ELBEIF81X+54 81X-8 ELBEIF81X-6-6
81X-192 ELBEIF81X-6-74 81X-128
378
379
 448.DX TKA:CHP(%78);Y:BEG CX
458INC %78:BNE DX:INC %71
468LDA%71:CHP DXXIV256:BNE DX
478LDA%71:CHP DXHDD256:BNE DX:BEG FX
468.CX LDXCE
498.HX DEY:INX:LDA(%78);Y:CHPC:IX7:BCCHX
```

```
DBBINY: INY: DEX: DEX: TXA: CMPCY: BCS FX

518.EX LDA(478); Y: JSR &FFEE: INY: DEX: BME EX

528.FX RTB: :KX JSR &FFEE: RTB

538.LX LDACAS: JSR &FFEE: LDAC78: JSR &FFEE: LDACA8: JSR

FFEE: RTB: :I NEXT

548ENDPROC

559

568DEFFROCBETUP

578FROCTOK

598INPUT "ENTER MAX, NUMBER OF LINES" "NOT LESS THAN

69 >*MAX

488IFMLX(1880T0598

618INPUT "ENTER NUMBER OF VARIABLES" "BETWEEN 5 AND

56 \ YMX
```

```
948-CPT2.1
978PRINT''ENTER NAME OF PROBRAM TO"
9881NPUT'COMPILE >*F#
9982X-OPENUPF#
1888PRINT' "START OF COMPILATION"''
1818-DPT1.8
1828ENDPROC
1838
1848OEPROCOLMP
            1838
1848DEFFROCDUMP
1858IFLEN#$18 F#=LEFT#(F#,8)
1868F#="C"."+F#
1878FRINT' "READY TO SAVE CODE"|F#
1868FRINT' "READY CODE 7 Y/N "|
1878FRINT' SAVE CODE 7 Y/N "|
1878INT SAVE CODE 7 Y/N "|
                  128XF-OPENOUTP#
1389PHINTEXX,CX,PX,EX,F#
148FOR:IX-CX-6 TO EX:SPUTEXX,7IX:NEXT
158CLOBEEXT:
1680T01878
178+OPT
168PPHINT': ENDPROC
12180EFPROCALCALL TK: AX=FNCH: ENDPROC
1228
1238DEFPROCLX
1248IFELX TX=8: ENDPROC
1248IFTX=00: ENDPROC
1248IFTX=00: ENDPROC
1248IFTX=00: FROCNA
1278IFAX=0p: REPEAT PROCA: LNTILAX > opc
1298IFNOTFNAL (AX) 80T01328
1298PROCIS: IFAX=0c 88=88+*X*: PROCA
1388IFAX=1b TX=c 88=88+*X*: PROCA
1388IFAX>1b TX=c 88=88+*X*: PROCA
1388IFAX>PROCA: ENBPROC
1328IFAX>PROCA: IFNOTFNAL (AX) TX=8: ENDPROC
1338IF PROMAX) PROCONS ELSEIF AX=ap PROCA: PROCHOS ELSEIF AX=1
100 PROCLS ELSEPROCTS
1398EFPRAL (AX): PROCAS ELSEIF AX=dquote PROCSS ELSEIF AX=1
130 ERROPROCLS
13780EFPRAL (AX): PROCAS ELSEIF AX=1
               288DEFFNCHI -BGETEZE
218DEFFROCALCALL TKIAX-FNCHI ENOPROC
      13-BERDPROC
1378DEFFNAL(AX):=(AX)-646NDAX<91)DR(AX)-966NDAX<123)
138DEFFNDN(AX):=(AX)-47ANDAX<98)
1378DEFFNOLAX):=(AX)-47ANDAX<98)DR(AX)-64ANDAX<71)
148BDEFPROCLB
                                                                              (listing continued on next page)
```

```
27ABPROCetate
277BFTX=col:PROCLX:BOTO27AB
277BGPROCADR (LZX,PX)
279BGNOPROC
28BBNDFPROCFO:LOCAL STX:PROCLX
28BBPROCC(46):BTX=BNX:PROCLX
28BBPROCC(46):BTX=BNX:PROCLX
28BBPROCC(46):PROCADR (PX-3,8TX)
28ABPROCC(40):PROCADR (PX-3,8TX)
28ABPROCC(40):PROCLX:PROCASP
28BBPROCC(40):PROCLX:PROCASP
28BBPROCC(40):PROCLX:PROCASP
28BBPROCC(40):PROCX:PROCADR (PX-3,8TX)
297BIFTX=eop ORTX=ment BOTO2098
28BBPROCC(40+1):PROCLX:PROCADR (PX-3,8TX)
297BBPROC(40+1):PROCLX:PROCADR (PX-3,8TX)
297BBPROC(40+1):PROCLX:PROCADR (PX-3,8TX)
297BBPROC(40+1):PROCLX:PROCADR (PX-4,8TX):PROCADR (PX-4,8TX):PROCX:ENDPROC
298BDEFPROCED:STX:DOPACT
291BDEFPROCED:STX:DOPACT
291BDEFPROCED:STX:DOPACT
291BDEFPROCED:STX:DOPACT
294BBFTX=eop ORTO292B
294BFTX=eop ORTO292B
294BBFTX=eop ORTO29BBFTACCC(eop)PROCPRISBOTO292B
294BBFTX=eop ORTO29BBFTACCC(eop)PROCPRISBOTO293B
        (listing continued from previous page)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         3998DFFPACAFIX(EXX)
3998DFBT7(8XX+1)-8 PROCEH(9)
4988ST7(8XX+1)-PX DIV256:8X7(8XX+2)-PX HODZ56:PD
                                                           SEPROCE
SEPRINTINXI
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         ENDRACE BUYZDS(EXT(EXX)=PX H00256
4818DEFPROCPFIX(EXX):IFEX7(EXX+1)=B PROCEH(3)
4828ENDPROC
                                   4-SEEPPROCIS
4-FESS - 1 PEPEATI SE-SE+CHREAX PROCALUNTIL NOT (FNON (AX
SEFNAL (AX))
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                40180EFFROCPFIX(BXX):IFBX7(BXX+1)=8 PROCEM(3)
40280DEFPROCFIX(BXX):IFBX7(BXX+1)=8 PROCEM(3)
4048ENDPROC
40380EFFROCFIX
4048ENDPROCFIX
4048ERINT:''FIX UP STAGE*
40380EFFROCFIX(3+8NX)+11no:PROCUFIX(3+8NX)
40380EFFX7(3+8NX)+11no:PROCUFIX(3+8NX)
40381FBX7(3+8NX)+11d PROCIFIX(3+8NX)
41081FBX7(3+8NX)+11d PROCIFIX(3+8NX)
41081FBXT(3+8NX)+11D PROCIFIX(3+8NX)
41081FBXT(3+8NX)+1D PROCIFIX(3+8NX)
41081FBXT(3+8NX)+1D PROCIFIX(3+8NX)
41081FBXT(3+8NX)+1D PROCIFIX(3+8NX)
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                                      + SERVICTIONS
SESSION 
                             ISISTX-const
                                DEMERFRACIONS
SERNI-BIREPEAT NI-NI-16
SERNI-BIREPEAT NI-NI-16
SERIFFNON(AI) NI-NI-NI-AI-ABC-B'IPROCA ELSEIFFNON(AI) NI-NI-AI-ABC-B'IPROCA ELSEIFFNON(AI) NI-NI-AI-ABC-A'-18 PROCA
SEGENTILNOTFNON(AI)
SEGENDFROC
SEGENDFROC
                                                  PROCEPPROCES

BENEFFRO PROCES UNTILAX ** 60 In I TX ** AX I PROCE

18ENOPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                come):PROCLX:PROCVDU:PROCemp:PROCC(rb):PROCLX:PROCVDU
80T02798
2908:PFNEXP:Tix=id:PROCemp:PROCPRI:B0T02938
2908:PFNEXP:Excel PROCVDL(13):PROCVDL(18)
380880:PFNEXP:=TX=plue:ORTX=ninue:ORTX=id:ORTX=ib:ORTX
pling:ORTX=const:ORTX=inkey:ORTX=timer:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORTX=rb:ORT
                                      618ENDPROC

6280EFPROCSB

6280EFF**: PROCA

6480EFEAT: Se-08+CHRSAX; VDLAX; AX-FNCH; LNTIL AX-dquote

RAX-medin: IFAX-medin PROCEM(1) ELBE PROCA

630IFAX-edquote GOTO:648

660TX-extring

673ENDEROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   4198NX-PX7-2:PX7-1=SX7(NX+3+1):PX7-2
4288PMOCRL
4218UMT1L PX)=EX
4228PMINT: "FIX UP NOW COMPLETE"
42388PMOCP
42480EFPMOCRL
42388X-956-PX7-1-PX7-2
4268IFPXX-6E88 ENDPROC ELBENX-NX-RLX
4278FX7-1-RXD1V256:PX7-2-NXJN00256
42788-X-1-RXD1V256:PX7-2-NXJN00256
42788-X-1-RXD1V256
42788-X-1-RXD1V
                                         38381FLENS#=1 PROCVDL (ABCS#) ELSE PROCVDS
                                               TEBE-CHREAX
TERREPEAT: PROCA: SE-SE-CHREAX: UNTIL AX-edin: TX-AX: PRO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     3848ENDPROC
38580EFFROCENSIPROCITERS
38580EFFX-or PROCIXIPROCITERSIPROCORALBOTO3848 ELSEIFT
FROCEXIPROCITERSIPROCEORIBOTO3848
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       429BENDPROC
4278
439BOEFPROCADO: PROCPP (1, 2): ENDPROC
431BOEFPROCAUS: PROCPP (1, 4): ENDPROC
431BOEFPROCAUS: PROCPP (1, 6): ENDPROC
432BOEFPROCAUS: PROCPP (1, 18): ENDPROC
433BOEFPROCAUS: PROCPP (1, 18): ENDPROC
434BOEFPROCAUS: PROCPP (1, 12): ENDPROC
435BOEFPROCAUS: PROCPP (1, 12): ENDPROC
435BOEFPROCAUS: PROCPP (1, 18): ENDPROC
435BOEFPROCAUS: PROCPP (1, 22): ENDPROC
444BOEFPROCAUS: PROCPP (1, 22): ENDPROC
444BOEFPROCAUS: PROCPP (1, 23): ENDPROC
444BOEFPROCAUS: PROCPP (1, 32): ENDPROC
444BOEFPROCAUS: PROCPP (1, 32): ENDPROC
444BOEFPROCAUS: PROCPP (1, 33): ENDPROC
444BOEFPROCENIS: PROCPP (1, 34): ENDPROC
444BOEFPROCHOS: PROCPP (1, 34): ENDPROC
444BOEFPROCHOS: PROCPP (1, 34): ENDPROC
45BOEFPROCHOS: PROCPP (1, 34): ENDPROCPP (1, 34): END
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 Lesor PROCLX: PROCITER at PROCEON: BUTUJede

3878ENDPROCI
3878ENDPROCI
3898EPPROCIFECT
3898PROCIFECT
3188ETFX-and PROCLX: PROCIFECT: PROCAND: 80T03188
3118ETTX-and PROCLX: PROCIFECT: PROCESS
3138ETFX: And TAX-12 ANDTX: 
                                            738TX-AX:PROCA
748IFTX-Qt ANDAX-eq TX-qeq:PROCA
758IFTX-1t ANDAX-eq TX-1eq:PROCA
758IFTX-1t ANDAX-eq TX-neq:PROCA
778IFTX-col ANDAX-col REPEATPROCA:UNTIL(AX<>col)AND(
                                                        BBIFTX-col ANDAX-woln: TX-AX: PROCA
                       17881FTX=Col AMDAX=soln:TX=AX:PR
1798EMDPDCC
1888DFFPCCM.
18181FAX=sop:EMDPROC
1828L1X=AX=236+FMCH:LLX=FMCH:
18381FMLX:PRLX:EMX=EMX+1:80T01888
1848L37(MLX=4+1)=LIX=MD236
1858L37(MLX=4+1)=LIX=MD236
1858L37(MLX=4+2)=PXD1V236
1878L37(MLX=4+3)=PXD1V236
1878L37(MLX=4+3)=PXHOD256
1878L37(MLX=4+3)=PXHOD256
1978L37(MLX=4+3)=PXHOD256
1978L37(MLX=4-3)=PXHOD256
1978M1HT';LIX; TAB(4)::AX=32
1998EMDPROC
1918
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        SIGNIFITA-DILLE PROCLX: PROCLEM: BOTO3198 ELSEIF
TX-mainus PROCLX: PROCLX: PROCSUS: BOTO3198
3288ENDAROC
3218DEFPROCFACTOR: LOCAL STX: STX-SMX
3228IFTX-16 PROCLX: PROCLD: PROCADR (PX-3, STX): ENDPROC
3248IFTX-AP PROCQASI-PROCLD: PROCADR (PX-3, STX): ENDPROC
3248IFTX-AP PROCQASI-PROCLD: PROCADR (PX-3, STX): ENDPROC
3248IFTX-DING: PROCLX: PROCLD: FROM PROCLD: IS ENDPROC
3258IFTX-DING: PROCLX: PROCLD: SENDPROC
3258IFTX-DING: PROCLX: PROCLS: ENDPROC
3258IFTX-DING: PROCLX: PROCLS: PROCLD: ENDPROC
3258IFTX-MAY PROCLX: PROCLS: PROCLS: ENDPROC
3338IFTX-SMY PROCLX: PROCLS: PROCLM: ENDPROC
3348IFTX-SMY PROCLX: PROCLM: PROCAM: ENDPROC
3348IFTX-SMY PROCLX: PROCM: PROCLM: PROCEM: PROCLX: PROCEM: ENDPROC
3348IFTX-TM-PO-PROCLX: PROCPO: ENDPROC
3348IFTX-TM-PO-PROCLX: PROCPO: ENDPROC
3348IFTX-TM-PO-PROCLX: PROCPO: ENDPROC
3348IFTX-TM-PO-PROCLX: PROCPO: ENDPROC
3448IFTX-TM-PO-PROCLX: PROCPICE TM-PROCPICE ENDPROC
3448IFT
                                      918
9280EFFROCE
9381F NBX>MBX ENX=ENX+1:ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       7488NX=-1:REPEAT BNX=BNX+1
958UNTIL (88(BNX)=88 AND BX7(3+BNX)=TX) OR B8(BNX)=*
                          ZETRITIMEN PROCLX: 80T02128
28989FRTL**eop ORTX=endproc 90T02118
21989FRTL**eop ORTX=endproc 90T02118
2138PROCC(endproc): PROCLX: PROCRTS: ENDPROC
21389FRTL**eop ORTX=eq 80T02148
21389FRCCatate: FFTL**eol ORTX=eoln PROCLX: 90T02128
21389FRCCatate: FFTL**eol ORTX=eoln PROCRTS: ENDPROC
21580
21580
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                S
4748ENDPROC
4758DEFPROCVDS
4768IFFNC(2+LENS#) ?PX=98:PX?1=LENS#:#(PX+2)=$#:PX=PX
4768IFFNC(2+LENS#) ?PX=98:PX?1=LENS#:#(PX+2)=$#:PX=PX
213BPROCE tels:FTX=col ORTX=soin PROCLX:SOT02128
214BPROCC (eq):PROCLX:PROCexp:PROCRTF:ENDPROC
2158
214BPROCE tels
215BIFTX=soin ORTX=col ORTX=sis:SOT02458
215BIFTX=soin ORTX=col ORTX=sis:SOT02458
215BIFTX=soin ORTX=col ORTX=sis:SOT02458
215BIFTX=soin ORTX=sis:SOT02458
228BIFTX=rep:PROCEASIGN:SOT02458
228BIFTX=frep:PROCEASIGN:SOT02458
223BIFTX=frep:PROCEASIGN:SOT02458
223BIFTX=frep:PROCEASIGN:SOT02458
225BIFTX=frep:PROCEASIGN:SOT02458
225BIFTX=frep:PROCEASIGN:SOT02458
225BIFTX=frep:PROCEASIGN:SOT02458
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245BIFTX=sis:PROCEASIGN:SOT02458
245BIF
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    34980EFFROCESSES ELBE PROCFECTOR
3588EFFROCESSES ELBE PROCFECTOR
3518ENDPROC
3518ENDPROC
3518ENDPROC
3518ENDPROC
3518ENDPROC
3518ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                4778ENDPROC
4788DEFFROCCLI
4798IFFROC(2+LENS#) 7PX=921PX71=LENS#1#(PX=2)=S#1PX=PI
2-LENS#
488DEFDROCC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    4798IFFNC (2+LENS#) 7PX=Y21PX71=LENS#;
2+LENS# 
4880ENDFROC
48180EFPROCSBR:PROCPP(1,182):ENDPROC
48180EFPROCSBR:PROCPP(1,184):ENDPROC
48180EFPROCSBR:PROCPP(1,184):ENDPROC
48180EFPROCSBR:PROCPP(1,184):ENDPROC
4850EFPROCPO;PROCPP(1,118):ENDPROC
4850EFPROCPO;PROCPP(1,114):ENDPROC
4850EFPROCPO;PROCPP(1,114):ENDPROC
4850EFPROCPO;PROCPP(1,114):ENDPROC
4850EFPROCPO;PROCPP(1,114):ENDPROC
4960EFPROCOT:PROCPP(1,122):ENDPROC
4960EFPROCENT:PROCPP(1,122):ENDPROC
49180EFPROCENT:PROCPP(1,123):ENDPROC
49180EFPROCENT:PROCPP(1,123):ENDPROC
4930EFPROCENT:PROCPP(1,123):ENDPROC
4940EFFTOCADR:PX:42EX
ENDPROC
4940EFFTOCADR:PX:42EX
ENDPROC
4940EFFTOCADR:PX:42EX
ENDPROC
4940EFFTOCADR:PX:42EX
ENDPROC
4940EFFTOCADR:PX:42EX
ENDPROC
4940EFFTOCADR:PX:42EX
ENDPROC
4940EFTTOCADR:PX:42EX
ENDPROC
4940EFTTOCAD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 PROCFactor : PROCNES ELBE PROCFactor
35:18ENDPROC
35:38ENDEPPROCeound
35:38EROCLX: PROCeound
36:38EROCLX: PROCEOUN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        ROC
3458PROCqmaiPROCLOL(8X7(8TX+3+2)):PROCOMAiPROCADR(PX-3;8TX):8X7(8TX+3+1)=1:80T03488
3448IFTX:>id:ENDPROC
34788TX-SERX:PROCK:X:PROCemp:PROCOMM:PROCADR(PX-3;8TX)
3488IFTX=commai80T03438
3438IFTX=commai80T03438
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              4908ENDPROC
4998
3008DEFFNC(8X)
5018IFFX-8X)-EX ENX-ENX+1:EX-EX-BX:-FALSE ELSE:-TRUE
5018IFFX-8X)-EX ENX-ENX+1:EX-EX-BX:-FALSE ELSE:-TRUE
5028DEFFNCCENT:PRINT'-CRETURN) TO CONTINUE ";:REPEAT U
NTIL INCEY-74:PRINT'-INCENDPROC
5038DEFFX-ENX+:
5040EFFX-FRINT'-INCENDPROC
5040EFFX-FRINT'-INCENDPROC
5070EFFX-FRINT'-INCENDPROC
5070EFFX-FRINT'-INCENDP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          3708DEFPROCessiLOCAL 1X
3718PROCLX:PROCLX:1X+8X7(8TX+3+2):1F1X+8:1X+1:80T0374
     2468IF (TXC)eoln ANDTXC)col ANDTXC)else) PROCEM(7):PRO

ELF
2478ENDPROC
2488
2478DEFPROCend:PROCEND:PROCLX:ENDPROC
2588DEFPROCests on LOCALBTX:BTX=BKX
2518PROCLX:PROCC(eq):PROCLX:PROCesp
2528PROCETA:PROCADR(FX-3, BTX):ENDPROC
2538DEFPROCEres:gri_LOCALBTX:BTX=BKX
2548PROCess:pROCC(eq):PROCLX:PROCesp
2538PROCETA:PROCADR(FX-3, BTX):ENDPROC
2538PROCETA:PROCADR(FX-5, BTX):ENDPROC
2538DEFPROCEssign:PROCLX:PROCesp:PROCLX:PROCESP:PROCEX:PROCESP:PROCESP:PROCEX:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCESP:PROCES
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    3728REPEAT IX-IX-1:PROCewp:IFIX(>8 PROCC(comma):PROCL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 3738UNTILIX=8:PROCC(rb):PROCLX:ENDPROC
3748PROCesp:IFTX=comma:IX=IX+I:PROCLX:80703748 ELBEPR
30C(rb):PROCLX:8X7:83X9-9-1X;ENDPROC
3758DEFFROCeode:PROCLX:PROCesp:PROCVOL(22):PROCVOU:EN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              3768DEFPROCCOLOI PROCLIXI PROCESOI PROCVOL (17) I PROCVOLI EN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        OPROC 3778DEFPROCecal : PROCLX : PROCVDL (18) : PROCeca : PROCVDL : PROCEX : PROCVDL : PROCVDL : PROCCEX : PROCCEX : PROCVDL :
        2878DEFPROCE as Egni PROCEXI PROCE (aq) i PROCEXI PROCEXI PROCEXI PROCEXI PROCEXI PROCEZI PROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           2578DEFPROCENI PROCJERI PROCADR (PX-3, BNX) I PROCLX I ENDPRO
        2020PROCexp:IFTX=scol PROCVOD ELSEPROCVOU
2030FTX=comma 00T02618 ELSE:FTX=scol PROCLX:IFFNEXP
0T02628
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SZIGAX-TX: ENX-ENX+1: PRINT: TX-8: PROCERT: ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    5228DEFPROCELP

5238IFELX-FOLD OR ELX-FOD TX-ELX:ELX-FALSE:ENDPROC

5248ELX-FALSE:REPEAT PROCLX:UNTIL TX-FOLD ORTX-FOD

5248DEFPROCEE

5248DEFPROCEE

5248DEFPROCEE

5248DEFPROCEE

5248DEFPROCEE

5248DEFPROCEE

5248DEFPROCEE
     2648ENDPROC
2658DEFPROCIFILOCAL LIX,L2X
2668PROCLX
  2648PROCLE
2678PROCHEP
2678REGERP
2688LIX=PX:PROCJHC
2678LIX=PX:PROCHEP
2678LIX=PX:PROCHEP
2788PROCHER
27788PROCHER
2778SPROCHER
2778SP
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 3888IX=8:REPEAT
3898IPLIX=LX7(4+IX)+256+LX7(4+IX+1):8X7(8XX+1)=LX7(4+
X+2):8X7(8XX+2)=LX7(4+IX+3):IX=NLX
3988IX=IX+1
3918LNTIL IX>=NLX
3928IFIX=0.X
PROCEM(2)
3938ENDPROC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              SZBBENDPROC

SZBBERINT "COMPILATION COMPLETE"

SZBBERINT "COMPILATION COMPLETE"

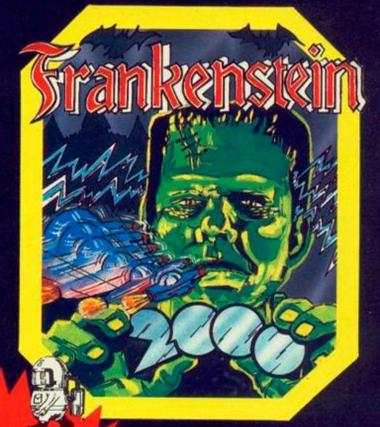
SZBBERPROCT

SZBBERPROCT

SZBBERINT SCOOR STANDER STA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        39480EFFROCIFIX(8XX)
39580EFFROCIFIX(8XX)
3968IFLENDS(8XX)=2:IFRIGHTS(88(8XX),1)="X";IX=ASCLEFT
6(88(8XX),1):IF(IX)64ANDIX(91):IX=(IX-65):44-6484;8X7(8
           2748PROCLX
2758IFTX=11nb PROCJMP:PROCADR(PX-3,8MX):PROCLX:80TD27
```

# MSX-AMSTRAD-SPECTRUM-ELECTRON-BBC





# CHRYSALIS.

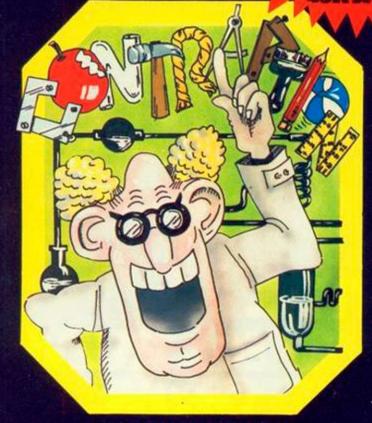
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# BUG-EYES

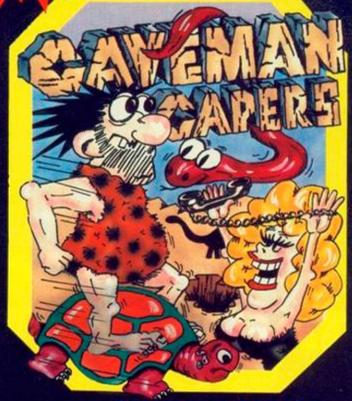
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Hex loader.	290 PRINT ds;	510 END IF
.cx rouse.	300 END FOR q	520 t=t+v+16"1
00 MODE 4	310 AT col,18	530 END FOR 1
10 BORDER 5,0,6:CLS	320 INPUT"?";b\$	540 END DEFine
20 PRINT Type in starting address (followed	330 IF bs="" THEN GO TO 390	550 DEFine PROCedure dec_hex(v,1)
by an 'h' if in hex)"	340 hex dec bs	560 LOCal c.as.b
30 INPUT as		570 b=vids=""
40 IF as(LEN(as) TO LEN(as))="h" THEN		
	360 AT col,18	580 at=b:at=at(1 TO 1)
50 a*=a*(1 TO LEN(a*)-1)	370 dec_hex t,4	590 b=ABS(b)
60 hex_dec as	380 UNDER 1:PRINT ds;:UNDER 0:PRINT" ";	600 REPeat work
70 ELSE	390 add=add+2	610 c=(b/16-INT(b/16))*16
80 t=a\$	400 END FOR col	620 IF c<=9 THEN
90 END IF	410 END REPeat loader	630 ds=CHRs(c+48)&ds
00 addmt	420 DEFine PROCedure hex_dec(h\$)	640 ELSE
10 REPeat loader	430 LOCal 1,as,v	650 ds=CHRs(c+55)&ds
20 CLS	440 v=0:t=0	660 END IF
30 FOR col=0 TO 18	450 FOR 1=0 TO LEN(hs)-1	670 b=INT(b/16)
40 AT col,0	460 as=hs(LEN(hs)-1 TO LEN(hs)-1)	680 IF b=0 THEN EXIT work
50 dec_hex add,5	470 IF CODE(a\$)>57 THEN	690 END REPeat work
60 PRINT d\$;" ";	480 v=CODE(a\$)-87	700 ds=FILLs("0",1-LEN(ds))&ds
70 FOR g=0 TO 1	490 ELSE	710 IF asm"-"THEN dsmas&ds
80 dec_hex PEEK(add+g),2	500 v=a\$	720 END DEFine

ZOOM IS a graphics utility for the QL which enlarges part of the screen in Mode 4 or Mode 8. It allows you to double one of the four screen quadrants simply by pressing a key. Once you have zoomed you can zoom again, and again . . . until the screen either fills up or becomes empty.

If you have an assembler you can enter the assembler code directly. You must remember that it has to produce an executive code - that is a position independent code.

If you have not got an assembler you can use the Basic hex-loader listed elsewhere or use your own program to enter the assembled code - this is much faster than using an assembler but errors arise more often.

If you use the Basic hex-loader type the program in and save it for later use. Make room in memory for the machine code by

# OP = RESPR (512)

See what starting address you have got for the code by typing

# PRINT OP

Run the hex-loader and type in the address. Remember that you must type in the code as words, so if the listing says:

0000' 223C 0000 2000 23 MOVE.L #HEAP\_ROOM,D1

(continued on page 101)

# Carsten Greve makes the QL screen bigger.

Explaining Zoom. QDOS Trap routines. 8 - 1518-24 Take 8192 bytes from the common heaproom. If not succeeded kill Zoom and return to Superbasic. 26-37 Open a console and set the cursor. If not succeeded kill Zoom and return to Superbasic. 38-44 Find out display mode and store it for later use. 46-62 Get a number from keyboard and jump to an Area. 64-101 Fill Heap\_Room with the right area of screen. 103-140 Take Heap\_Room and enlarge to the whole screen. 142-146 Kill Zoom and return to Superbasic. 148-182 Data definition for console and Bit Data

Assembl	y listing.				*****	nore	25	******	200 40
LOC	OBJECT	STMT	SOURCE	STATEMENT	0014	72FF	26 27	MOVEQ	#-1,D1
					0016	7602	27	MOVEQ	#2,D3
		1 * Z00M			00187	41FA 015A	28	LEA-L	DEVNAME, AO
		2 * A proce	dure to e	mlarge part of the screen	00101	7001	29	MOVEQ	#IO_OPEN,DO
		3 * By Cars			001E*	dE42	28 29 30 31	TRAP	62
				4th of December 1984	0020*	4A80		TST-L	DO
		5 • Finishe	d on the	22nd of December 1984	00227	6600 0144	32	BNE	JOB_END
				QL version JM	00261	76FF	33	MOVEQ	<b>*</b> −1,03
		7		2 to 10 to 1	00281	700E	34	MOVEQ	#SD_CURE,DO
=2000	0	8 HEAP_ROOM	EQU	8192	002A*	4E43	35	TRAP	#3
=0013		9 MT_ALCHP	EQU	24	002C*	4A80	32 33 34 35 36 37 38 39 40	TST-L	DO
=000		10 IO_OPEN	EQU	ī	002E1	6600 0138	37	BNE	JOB_END
=0001		11 SD CURE	EQU	14			38		
=000		12 IO_FBYTE	EQU	10	0032*	72FF	39	MOVEQ	#-1,D1
=00C		13 UT ERRO	EQU	202	00341	74FF	40	MOVEQ	#-1,D2
=000		14 MT FRJOB	EQU	5	0036	7010	41	MOVEQ	WMT_DMODE, DO
=001			EQU	16	0038*	4E41	42	TRAP	81
-001	,	15 MT_DMODE 16	EGO	10	003A1	£309	43	LSL.B	#1,D1
0003		17 START			00301	1801	44	MOVE - B	D1, D4
	C 0000 2000	18	HOVE - L	WHEAP_ROOM,D1			45		
006° 74FI		19	MOVEQ	9-1,D2	003E	284D	46 LOOP_0	MOVE-L	A5,A4
00087 7018			MOVEQ		00401	76FF	47	MOVEQ	#-1,D3
		20		MMT_ALCHP, DO	0042	7001	48	MOVEQ	#IO FBYTE.DO
00A1 4E4		21 22	TRAP	#1 DO	00441	4E43	49	TRAP	#3
000C1 4A8		22	TST-L		0046	4A80	50	TST-L	DO
	0 0158	23	BNE	JOB_END	3040	ando			
0012' 2A4	8	24	MOVE - L	AO, A5			(listing o	continued	d on page 10

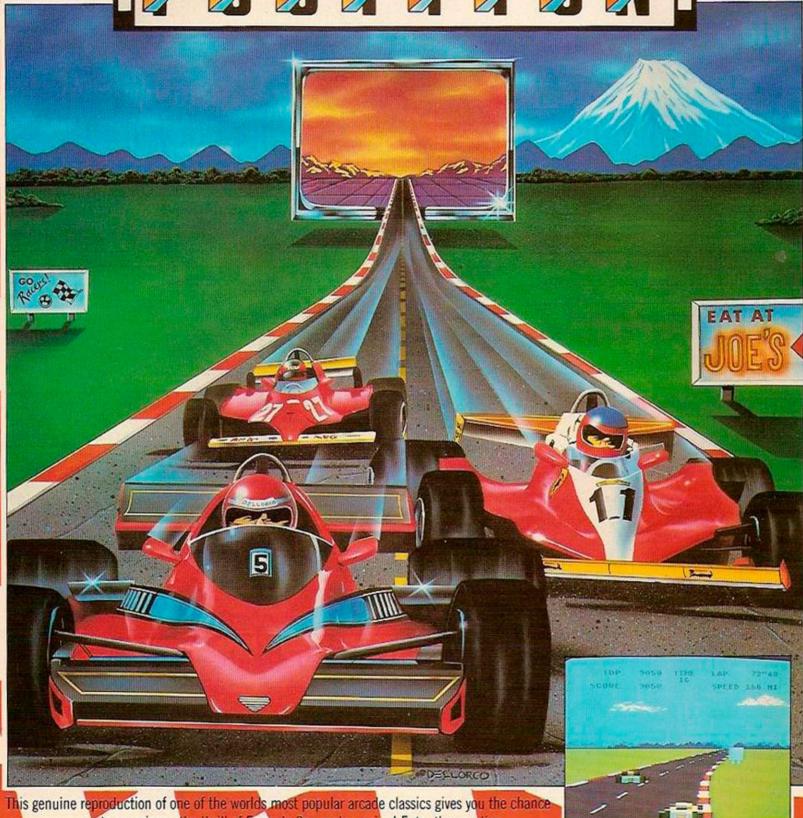
```
Program to dump a screen 
Using <ESC>"*"+5+n1+n2
By Carsten Greve
Started on the 29th of Da
          MOUEQ
                       #-1,01
          MOVEQ
                       #1,03
          LER.L
                       DEUNAMI
          MOVEQ
                       #1,D0
                       #2
          TRAP
          TST.L
                       00
          BNE.S
                       END_JOI
          MOVE . W
                       #3,02
                       #-1,D3
          MOUE . W
                       SETUP.
          LEA.L
```











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(listing	continued from	page 99)			01101	1342 0001	118	MOVE-B	D2,1(A1)
00481 66		51	BNE	JOB_END	0120	1214	119	MOVE - B	(A4),D1
	230 0031	52	CMP-B	#\$31,01	01221	E809	120	LSR-B	#4,D1
	710	53	BEQ-S	AREA_1	01241	C27C 000F	121	AND-W	#\$F,D1
	230 0032	54	CMP.B	#\$32,D1	0128	D204	122	ADD - B	D4,D1
	736	55	BEQ.S	AREA_2	01221	45FA 004E	123	LEA-L	BIT_DATA,A2
	23C 0033	56	CMP-B	#\$33,D1	v12E*	1432 1000	124	MOVE - B	O(A2,D1-W),D
	750	57	BEQ.S	AREA 3	0132	1342 0080	125	MOVE - B	D2,\$80(A1)
	23C 0034	58	CMP-B	#\$34,D1	01361	1282	126	MOVE - B	D2,(A1)
	76A	59	BEQ.S	AREA_4	01381	121C	127	MOVE - B	(A4)+,D1
	23C 000A	60	CMP-B	#\$OA,D1	013A*	C27C 000F	128	AND-W	msF,D1
	700 0104	61	BEQ	END_JOB	013E*	D204	129	ADD-B	D4,D1
	0D0	62	BRA-S	LOOP_O	01401	1432 1000	130	MOVE - B	O(A2,D1.W),D
0000 80	000	63	DUN-3	200F_0	0144	1342 0082	131	MOVE - B	D2,\$82(A1)
006E' 22	27C 0002 0000	64 AREA 1	MOVE-L	#\$20000,A1	01481	1342 0002	132	MOVE - B	D2,2(A1)
	8D9	65 LOOP_1	MOVE - L	(A1)+,(A4)+	01401	5689	133	ADDQ-L	#3,A1
	209	The second secon	MOVE-L	A1,D1	014E1	3209	134	MOVE - W	A1,D1
	801 0006	66 67			01501	0801 0007	135	BTST	#7,D1
			BTST	#6,D1	01541	679E	136	BEQ-S	LOOP FS
	7F6	68 69	BEQ.S	L00P_1	01561	D3FC 0000 0080	137	ADDA-L	#\$80,A1
	3FC 0000 0040	70	ADDA-L	#\$40,A1	0150	B3FC 0002 8000	138	CMPA-L	#\$28000,A1
	3FC 0002 4000	70	CMPA-L	#\$24000,A1	01621	6690	139	BNE-S	LOOP_FS
	6E8	71	BNE - S	L00P_1	01641	6000 FED8	140	BRA	LOOP_O
008C' 60	05E	72	BRA-S	FILL_SCR	0,00	0700 1200	141	2000	2001_5
00000	070 0000 0040	73 74 AREA_2	MOUE	##20040 At	01681	3478 00CA	142 JOB_END	MOVE-W	UT_ERRO,A2
	270 0002 0040		MOVE-L	#\$20040,A1	01601	4E92	143	JSR	(A2)
	809	75 LOOP_2	MOVE-L	(A1)+,(A4)+	016E'	7005	144 END_JOB	MOVEQ	#MT_FRJOB,DO
	209	76	MOVE-L	A1,D1	0170*	72FF	145	MOVEO	#-1,D1
	801 0006	77	BTST	#6,D1	0172*	4E41	146	TRAP	61
	6F6	78	BNE - S	L00P_2	0112	dear	147	I mate	**
	3FC 0000 0040	79	ADDA-L	#\$40,A1	0174	0004	148 DEVNAME	DC-W	4
	3FC 0002 4040	80	CMPA-L	#\$24040,A1	0176	434F 4E5F	149	DC-B	"CON_"
	6E8	81	BNE - S	L00P_2	0176	404F 4ESF	150		for MODE 4
00AC 7 60	03E	82	BRA-S	FILL_SCR	017A1	00	151 BIT_DATA		2000000000
		83			017B	03			
	27C 0002 4000	84 AREA_3	MOVE-L	#\$24000,A1			152	DC - B	200000011
	8D9	85 L00P_3	MOVE-L	(A1)+,(A4)+	01701	00	153	DC - B	200001100
	209	36	MOVE - L	A1,D1	017D1	0F 30	154	DC - B	200001111
	801 0006	87	BTST	#6,D1	017E1		155	DC - B	200110000
	7F6	88	BEQ.S	L00P_3		32	156	DC - B	200110011
	3FC 0000 0040	89	ADDA-L	#\$40,A1	01801	20	157	DC - B	200111100
	3FC 0002 8000	90	CMPA-L	#\$28000,A1	0181	3F	158	DC - B	200111111
	6E8	91	BNE . S	L00P_3	01821	CO	159	DC - B	211000000
00CC* 60	01E	92	BRA-S	FILL_SCR	01831	C3	160	DC-B	#11000011
		93			0184	CC	161	DC - B	211001100
	27C 0002 4040	94 AREA_4	MOVE-L	#\$24040,A1	0185	CF	162	DC - B	%11001111
00D4° 28	809	95 LOOP_4	MOVE-L	(A1)+,(A4)+	01861	F0	163	DC - B	X11110000
00D6' 22	209	96	MOVE-L	A1,D1	0187	£3	164	DC - B	211110011
	801 0006	97	BTST	#6,D1	0198*	FC	165	DC - B	%111111100
	6F6	98	BNE-S	L00P_4				These are	for MODE 8
	3FC 0000 0040	99	ADDA-L	#\$40,A1	01891	FF"	166	DC-B	211111111
	3FC 0002 8040	100	CMPA-L	#\$28040,A1	018A*		167	DC-B	200000000
00EA 66	6E8	101	BNE - S	L00P_4	018B1		168	DC-B	200000101
		102			01801	0A	169	DC-B	200001010
00EC* 28	84D	103 FILL_SCR	MOVE . L	A5,A4	018D1	OF	170	DC-B	200001111
	27C 0002 0000	104	MOVEA-L	#\$20000,A1	018E'	50	171	DC-B	201010000
	214	105 LOOP_FS	MOVE - B	(A4),D1	018F1	55	172	DC-B	201010101
	809	106	LSR-B	#4.D1	01901	5A	173	DC-B	201011010
	27C 000F	107	AND-W	#\$F,D1	0191	5F	174	DC+B	201011111
	204	108	ADD-B	D4,D1	01921	AO	175	DC-B	210100000
	5FA 007A	109	LEA-L	BIT DATA, A2	01931	A5	176	DC-B	210100101
	432 1000	110	MOVE - B	O(A2,D1-W),D2	01941	AA	177	DC-B	%10101010
	342 0080	111	MOVE - B	D2,\$80(A1)					
	202	112	MOVE - B	D2,(A1)+	01951	AF FO	178	DC - B	210101111
	21C	113	MOVE - B	(A4)+,D1	01961	FO	179	DC-B	X11110000
	27C 000F	114	AND-W	#\$F,D1	01971	F5	180	DC - B	211110101
	204	115	ADD-B	D4.D1	01981	FA	181	DC - B	211111010
					01991	117	182	DC-B	211111111
	432 1000	116	MOVE -B	O(A2,D1-W),D2			183	- Table	
ULIO 1	342 0081	117	MOVE - B	D2,\$81(A1)			184	END	

(continued from page 99)

you must type 223C and Enter, 0000 and Enter, 2000 and Enter.

If the listing says:

0190' 5A 173 DC.B %01011010 0191' 5F 174 DC.B %01011111

you must type 5A5F and Enter.

When you have finished typing in press Ctrl-space. To check the code you must Run the hex-loader again with the same starting address. If the code is correct just type Enter, and if the code is incorrect type the correct code in and continue.

If you have used an assembler, the



assembler should have produced an Executable code. If you have used the hex-loader you must type:

SEXEC mdv1\_ZOOM,OP,412,64

Therre are two different ways of running the Zoom-code and I will describe both here.

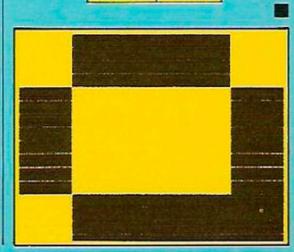
EXEC\_W MDV1\_ZOOM=With this command you run the code and you cn make as many Zoom's as you like, and when you have finished you type Enter to return to Superbasic.

EXECMDV1\_ZOOM = With this command you also run the code, but you stay in Superbasic. To make a Zoom you must



type Ctrl C to transfer control to the Zoomprocedure. Now you can again make as many Zoom's as you like, but to go back to Superbasic you just have to type Ctrl C. In this way you can use the Zoom-procedure on many screens.

The screen is organised in the following way and you just have to type one of the numbers to obtain a Zooming.



THE FOLLOWING machine-code routines for the QL were written as an exercise in 68008 programming. They demonstrate the difficulties involved in manipulating the screen memory and also show the ease with which data can be passed to machine code from Basic using the Call command.

To set up the code, run the Basic code creator program. Whenever you reset the computer you will need to reserve some memory for the routines by typing

BOX = RESPR (250)

Now load the code with

# LBYTES MDV1-CODE,BOX

The variable Box contains the address at which the code is stored. To plot a point Call ST, x co-ordinate, y co-ordinate, colour. To draw a box Call ST+2, x co-ordinate of bottom left corner, y co-ordinate of bottom left corner, width of box, depth, thickness of

For example, to draw a box at 100,000, width = 10, depth = 10, thickness 3, colour red - in mode 4:

CALL BOX + 2, 100,100,2,10,10,3

For further information see under Call in the OL manual.

The x and y co-ordinates are independent of channels and scale where x=0, y=0 is the top left corner of the screen, x=512 (26 if mode Mark Jones with a set of programs which show how difficult it is to manipulate screen memory and the ease of using the Call command.

8), y=256 is the bottom right corner. Colour codes for the routine are explained in the assembler listing.

Speeds achieved for the plot routine are faster than the QL's own plot routine and this speed advantage is particularly effective in machine code. Using a plot routine is not the fastest way to draw a box but again serves as a useful demonstration of 68008 machine code.



# Demo program. 11 k=+:1F g;k==k 20 CALL box+2,j,k=h.+,10-+/10,10-+/10,1 21 j=j+1 30 NEXT 40 g\*1-0 50 NEXT # 60 FOR f=1 TO 512 STEP 51CALL box+2,f,h,f,10,10,4 70 NEXT h 90 FOR f=1 TO 321PAN #4,16

100 box=RESPR(240):LBYTES mdv1\_code,box:RUN 999 HODE 4:PRINT "Loading Basic Demonstration" 1000 MERGE mdv1 basic\_demo:GO TO 100

Code loader. 1 et-RESPR(500) 7,08,03,23,12,12,190,70,14,230,0,203,341,0
28 DATA 78,02,08,63,4,78,4,97,208,63,207,90,18,62,00,2
5,167,2,40,50,2,0,34,194,108,0,234,28,1,2,65,2,73,0,1
5,0,74,0,60,112,6,227,240,135,41,0,126
28 PRHAM\*
28 DATA 96,65,103,69,61,117,96,42,62,66,255,4,01,3,97,
270,126,06,102,1,126,0,2,65,228,7,2,3,226,65,102,65,82,252,23,34,0,1,12
35 RCMam\*
48 DATA 10,03,12,183,206,66,4,01,3,77,230,03,207,96,6,78,0,0,0,34,52,0,65,102,76,58,3,2,14,0,74,0,65,198,3,2
28,124,210,254,144,12,01,41,0,1,76,6 45 REMAY 58 DATA 97,66,181,6,255,135,82,287,96,38,62,65,255,4,8 1,17,68,255,82,124,17,81,18,255,823,825,825,825,826,6 1,14,8,194,218,1,227,208,8,3,96,205,226,3,25,6 1,14,8,194,218,1,227,208,8,3,141,159,78 51 DATA 11,28 88 tot-0 98 FOR G=8 TO 4 188 FOR f=8 TO 4 188 FOR f=8 TO 46 110 READ diFORE st+g+f+5,d 115 tot=tot-d 138 NEXT 0 148 READ diPOKE st+235,d 145 tot-tot-d 146 IF toto::EVG2 THEN FRINT "error" 147 PRINT "code stored ox from ":mt;" length 236 bytes

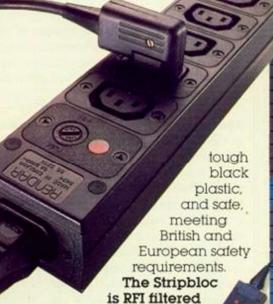
MODE	ECU	163892	
SCREEN	N EQU		
•			
O: TN	BRA.S PL	OT ENTER	HERE FROM BASIC TO PLOT ONLY
		LTI ENTER	HERE FROM BASIC TO DRAW BOX (PLIN +2)
			***************************************
<ul> <li>MUI</li> </ul>		SS BOX ROUTIN	
2			WIDTH AND DEPTH ARE EXTERNAL HEASUREMENTS IS AS FOR DOX ROUTINE
	OTHER E	THE PROPERTY	S AS FOR BUX ROOTINE
****	*******	**********	***************************************
LOOP	BSR.S	BOX	Charles to the second of the second
	ADDD	#1,D1	NEXT BOX LH CORNER IS X=X+1 Y=Y-1
	SUBC	#1,D2 #2,D4	WIDTH-WIDTH-2
	BEQ. S	EXIT	EXIT LOOP IF WIDTH-8
	BCS.S	EXIT	EXIT LOOP IF WIDTH(0
	SUBO	#2,D5	DEPTH=DEPTH-2
	BEG.S BCS.S	EXIT	EXIT LOOP IF DEPTH-0 EXIT LOOP IF DEPTH-0
MULTI	DBRA	D6,L00P	DRAW (D6) BOXES. ENTER ROUTINE HERE FROM BOX ENT
EXIT		50,1500	
			***************************************
* B(	DX ROUTINE	D1=X,	D2=Y, D3=COL, D4=WIDTH, D5=DEPTH
5	0.1	DEGLETEDE IN	CHANGED EXCEPT A1-ADDRESS OF LH CORNER, D71
	HLL	HEDISTERS ON	CHANGED EXCEPT AT-HOUNESS OF EN CONNEX, D7-1
· HODE	E 4 COLS	B-BLACK, 1=GRE	EN,2*RED,3*WHITE
		B=BLACK, Z=GRE	EN,4=BLUE,6=CYAN,8=RED,10=YELLOW,12=MAGENTA
			1 TO MODE 8 COLOUR FOR FLASH
RDX	CLR.L	<b>D</b> 7	
	BRA.S	BOXA	TOP OF BOX
DOXAA	ADDQ	#1,D1	
	Control of the control		
	DBRA	D7.BOXAA	
воха	DBRA	D7.BOXAA	
BOXA *	DBRA MDVE.W BRA.S	D7,BOXAA D5,D7 BOXB	
BOXA *	DBRA MOVE.W BRA.S SUBD	D7,80XAA D5,D7 BOXB #1,D2	RIGHTHAND SIDE
BOXA *	DBRA MOVE.W BRA.S SUBQ BSR.S	D7, BOXAA D5, D7 BOXB #1, D2 PLOT	RIGHTHAND SIDE
BOXA *	DBRA MOVE.W BRA.S SUBD	D7,80XAA D5,D7 BOXB #1,D2	RIGHTHAND SIDE
BOXA *	DBRA MOVE.W BRA.S SUBD BSR.S DBRA	D7,80XAA D5,D7 BOXB #1,D2 PLOT D7,BOXBB	RIGHTHAND SIDE
BOXA * BOXBB BOXB *	DBRA MOVE.W BRA.S SUBD BSR.S DBRA MOVE.W BRA.S	D7,80XAA D5,D7 B0XB #1,D2 PLOT D7,B0XBB D4,D7 B0XC	
BOXA * BOXBB BOXB *	DBRA MOVE.W BRA.S SUBO BSR.S DBRA MOVE.W BRA.S SUBO	D7,BOXAA D5,D7 BOXB #1,D2 PLOT D7,BOXBB D4,D7 BOXC #1,D1	RIGHTHAND SIDE
BOXA * BOXBB BOXB *	DBRA MOVE, W BRA.5 SUBD BSR.5 DBRA MOVE, W BRA.5 SUBD BSR.5	07,80X8A 05,07 80X8 #1,02 PLOT 07,80X8B 04,07 80XC #1,01 PLOT	
BOXA * BOXBB BOXB *	DBRA MOVE.W BRA.S SUBO BSR.S DBRA MOVE.W BRA.S SUBO	D7,BOXAA D5,D7 BOXB #1,D2 PLOT D7,BOXBB D4,D7 BOXC #1,D1	
BOXA * BOXBB BOXB *	DBRA MOVE, W BRA. C SUBQ BBR. S DBRA MOVE, W BRA. S SUBQ BBR. S DBRA	07,80XAA D5,07 B0XB #1,02 PLOT D7,80XBB D4,07 B0XC #1,01 PLOT D7,80XCC D5,07	
BOXA * BOXBB BOXB * BOXCC BOXC	DBRA MOVE, W BRA. G SUBG BSR. S DBRA MOVE, W BRA. S SUBG BSR. S DBRA MOVE, W BRA. S	D7, BOXAA  D5, D7  BOXB  #1, D2  PLOT  D7, BOXBB  D4, D7  BOXC  #1, D1  PLOT  D7, BOXCC  D5, D7  BOXD	SOTTOM OF BOX
BOXA * BOXBB BOXB * BOXCC BOXC	DBRA MOVE, W BRA. C SUBD BSR. S DBRA MOVE, W BRA. S SUBD BSR. S DBRA MOVE, W BRA. S ADDD	D7,80XAA  D5,D7 B0XB #1,02 PLOT D7,80XBB  D4,D7 B0XC #1,D1 PLOT D7,80XCC D5,D7 B0XD #1,D2	
BOXBB BOXBB BOXCC BOXCC BOXCC	DBRA MOVE, W BRA. C SUBC BSR. S DBRA MOVE, W BRA. S SUBO BSR. S DBRA HOVE, W BRA. S ABDD BSR. S DBRA	07,80XAA  D5,07  B0XB #1,02 PL07 D7,80XBB  D4,07 B0XC #1,01 PCD7 D7,80XCC  D5,07 B0XD #1,02 PL07	BOTTOM OF BOX  LEFTHAND SIDE
BOXBB BOXBB BOXCC BOXCC BOXCC	DBRA  MOVE, W BRA. G SUBG BSR. S DBRA  MOVE, W BRA. S SUBG BSR. S DBRA  HOVE, W BRA. S ADDD BSR. S DBRA  DBRA. S ADDD BSR. S DBRA	D7,80XAA  D5,D7 B0XB #1,02 PLOT D7,80XBB  D4,D7 B0XC #1,D1 PLOT D7,80XCC D5,D7 B0XD #1,D2	SOTTOM OF BOX
BOXB BOXBB BOXB BOXCC BOXC BOXD BOXD	DBRA MOVE, W BRA. C SUBD BSR. S DBRA MOVE, W BRA. S SUBD BSR. S DBRA MOVE, W BRA. S DBRA MOVE, W BRA. S DBRA MOVE, W BRA. S DBRA ROBERA MOVE, W BRA. S DBRA ROBERA	07,80XAA  D5,D7  B0XB  #1,02 PLOT D7,80XBB  D4,D7  B0XC #1,D1 PLOT D7,80XCC  D5,D7  B0XD #1,D2 PLOT D7,80XDO	BOTTOM OF BOX  LEFTHAND SIDE
BOXBB BOXBB BOXBB * BOXCC BOXC BOXD	DBRA MOVE, W BRA. C SUBC BSR. S DBRA MOVE, W BRA. S SUBC BSR. S DBRA MOVE, W BRA. S ADDD BSR. S DBRA RTS	D7,80XAA  D5,D7 B0XB #1,02 PLOT D7,80XBB  D4,D7 B0XC #1,D1 PLOT D7,80XCC D5,D7 B0XD #1,D2 PLOT D7,80XD0  D1=X D2=Y D	BOTTOM OF BOX  LEFTHAND SIDE  X1 AND X2 ARE NOW BACK TO ORIGINAL VALUES  32-COLOUR (0-15)
BOXBB BOXBB BOXBB * BOXCC BOXC BOXD	DBRA MOVE, W BRA. C SUBC BSR. S DBRA MOVE, W BRA. S SUBC BSR. S DBRA MOVE, W BRA. S ADDD BSR. S DBRA RTS	D7,80XAA  D5,D7 B0XB #1,02 PL01 D7,80XBB  D4,D7 B0XC #1,D1 PLD7 D7,80XCC D5,D7 B0XD #1,D2 PL07 D7,80XD0  D1=X D2=Y D SPEED=118 PL	BOTTOM OF BOX  LEFTHAND SIDE  X1 AND X2 ARE NOW BACK TO CRIGINAL VALUES  VS=COLOUR(0-15)  OTS/SEC FROM BASIC - 3000 PLOTS/SEC FROM M/C
BOXBB BOXBB BOXBB * BOXCC BOXC BOXD	DBRA MOVE, W BRA. C SUBC BSR. S DBRA MOVE, W BRA. B SUBO BSR. S DBRA HOVE, W BRA. S DBRA HOVE, W BRA. S ADDD BSR. S DBRA RTS T ROUTINE	D7,80XAA  D5,D7  B0XB #1,02 PL07 D7,80XBB  D4,D7 B0XC #1,D1 PLD7 D7,80XGC  D5,D7 B0XD #1,D2 PLD7 D7,80XDD  D1=X D2=Y D  DPED=118 PL B0 P0X	BOTTOM OF BOX  LEFTHAND SIDE  X1 AND X2 ARE NOW BACK TO CRIGINAL VALUES  X3-COLOUR (0-15)  .OTE/SEC FROM BASIC - 3000 PLOTS/SEC FROM M/C IT ROUTINE-40 PLOTS/SEC
BOXBB BOXBB BOXBB * BOXCC BOXC BOXD	DBRA MOVE, W BRA. C SUBC BSR. S DBRA MOVE, W BRA. B SUBO BSR. S DBRA HOVE, W BRA. S DBRA HOVE, W BRA. S ADDD BSR. S DBRA RTS T ROUTINE	D7,80XAA  D5,D7  B0XB #1,02 PL07 D7,80XBB  D4,D7 B0XC #1,D1 PLD7 D7,80XGC  D5,D7 B0XD #1,D2 PLD7 D7,80XDD  D1=X D2=Y D  DPED=118 PL B0 P0X	BOTTOM OF BOX  LEFTHAND SIDE  X1 AND X2 ARE NOW BACK TO CRIGINAL VALUES  VS=COLOUR(0-15)  OTS/SEC FROM BASIC - 3000 PLOTS/SEC FROM M/C
BOXB BOXB BOXC BOXC BOXC BOXD BOXD	DBRA MOVE, W BRA. C SUBC BSR. S DBRA MOVE, W BRA. S SUBC BSR. S DBRA MOVE, W BRA. S DBRA T ROUTINE ALL RE	D7,80XAA  D5,D7 B0XB #1,02 PL01 D7,80XBB  D4,D7 B0XC #1,D1 PLD7 D7,80XCC D5,D7 B0XD #1,D2 PL07 D7,80XD0  D1-X D2-Y I SPEED-118 PL GL P0IN ESISTERS UNCHE	BOTTOM OF BOX  LEFTHAND SIDE  X1 AND X2 ARE NOW BACK TO CRIGINAL VALUES  X3-COLOUR (0-15)  .OTE/SEC FROM BASIC - 3000 PLOTS/SEC FROM M/C IT ROUTINE-40 PLOTS/SEC

	MOVE. W	D2,D6	COPY Y
	AND1.H	#255.D2	CO. T. C.
	CMP.W	D2,D6	Y OUT OF RANGE 7
	BNE	RANGX	
	MOVE. W	D1,D4	COPY X
	MOVE.L	*MODE,A1	MODE STORAGE AREA
	CMPI.B	#8,0(A1)	MODE 8 ?
	DEQ.S	MODES	YES
*	ELTHER	MODE B OR MODE 4 ROUT	INE USED HERE
2			
7.00		-200	
MUDE 4	ANDI.W	*511,D1	8 <x<512< td=""></x<512<>
	CMP. N	D1.D4	X OUT OF RANGE 7
	BNE	RANGX	
	LSR. W	e2,D4	X2=X/4 USED FOR ADDRESS
	ANDI_W	#7,D1	X AND 7 * X3=X AND 7
	MOVE W	e234,D5	MASK-11111110
	ANDI-B	e3.03	COLOURS 0-3
	MOVE, B	03.06	COPY COLOUR
	ANDI-B	e1.D3	BOTTOM 1 BIT OF COLOUR BYTE 1
	1 CO D	#1.D6	TOP 1 BIT OF COLOUR BYTE 2
	E34-0		TOT I DIT OF COLUMN BITE A
	BRA.S	ALLOK	
MOREO	ANDI.W	#255.D1	8(X(256
HUDER			
	CMP.W	D1.D4	X OUT OF RANGE ?
	BNE.S	RANGX	
	LSR.W	#1,D4	X2=X/2 USED FOR ADDRESS
	ANDI.W	e3.D1	X AND 3 •
			X+2 + X3-2+(X AND 3)+1
	LSL.W	#1,D1	
	ADDO	#1,D1	X+1 •
	MOVE, B	#252.05	MASK=11111100
	AND. B	#15,D3	COLOURS 0-15
	MOVE.B	D3.D6	COPY COLOUR
			BOTTOM 2 BITS OF COLOUR BYTE!
	ANDI.B	#3,D3	
	LSR.B	#2,D6	TOP 2 BITS OF COLOUR BYTE2
	SCREEN	ADDRESS- Y*128 + (IF	MODES X/4 AND 510, IF MODE4 X/2 AND 510)
		AND MODE B ROUTINES I	
	10000	HILD HOUSE O HEGITATION	
	Carlo III	20.00	Control of the Contro
ALLOR	LSL. N	#7,D2	Y2=Y+128
	MOVE.L	WSCREEN, A1	GET START OF SCREEN
	ADDA. W	D2.A1	ADDR=ADDR+Y2
	ANDI-W	#510,D4	LOSE ANY ODD 1
			ADDR-ADDR+X2
	ADDA.W	D4,A1	ADDITEDUCTAX
	A STATE OF THE PARTY OF	The second second	
*	A1 NOW	CONTAINS CORRECT SCRE	EN ADDRESS
×			
	MOVEQ	e7,00	
	SUB. B	D1,00	7-X3 FIND WHICH BITS TO ALTER
	BRA.S	LPA	
LPA1	LSL.8	#1.D3	ROTATE 1ST COLOUR BYTE
Contract of the Contract of th	LSL.8	#1.Do	ROTATE 2ND COLOUR BYTE
			ROTATE MASK OVER E.G 11110011
	ROL.B	#1,D5	HOTHIE IMON OVER EIG TITIEGIT
	DDRA	DO,LPA1	
*	ACTUAL	PLOT IS DONE HERE	
		The second second	
*	AND. B	25 2(01)	MASK OF SCREEN (SET PLOT POS TO DO)
		D5,0(A1)	
	OR.D	D3,0(A1)	OR 1ST BYTE WITH SCREEN
	AND.B	D5,1(A1)	MASK OF SCREEN
	OR.B	D6.1(A1)	OR 2ND BYTE WITH SCREEN
DANGY	MOVEM. W	(A7)+,D1-D6	RETRIEVE REGISTERS
Chicany.			
	MOVED	+0,00	ENSURE NO ERROR ON RETURN TO BASIC
	RTS		The state of the s
	END		

# CONNECT PROTECT

Peripherals make using your computer more interesting and easier. But you may have more items of equipment than power outlets. The best way of tidying up the trailing wires and obtaining a 'clean' power supply is to use STRIPBLOC. It has five CEE 22 outlets, probably more than enough for connecting your add-ons to your power source. It's rugged, made from

Have you ever noticed interference when you are using your computer?



against spikes, 'dirty'
mains and 'unclean' power.
Once you've bought it you
don't need any extras,
it's supplied with five
standard right-angled
rewireable plugs, a 2m
fully-approved cable and
moulded 13A plug. Forget about risky

Stripbloc includes: ■ 1 five outlet mains unit with RFT filter
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connections. Be safe with STRIPBLOC.

caused by any number of things: a light switch, a fridge, a central heating motor starting, or even a thunderstorm. The power lines of your computer can pick up many forms of natural and manmade interference, which can be damaging to computers and peripherals. Rendar's SPIKEBLOC has been developed to give protection against transient over voltages and continuous high frequency interference on the mains supply. The unit is housed in a rugged metal case and gives good electrical screening from high frequency sources. This high level of protection was only possible previously using elaborate and expensive filter units. Now it isn't too expensive for you to protect your equipment.

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 Quantity
 Price
 Total

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 TOTAL

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Address		
		-
	Post Code	

I enclose cheque/postal order made payable to **Rendar Ltd.**,

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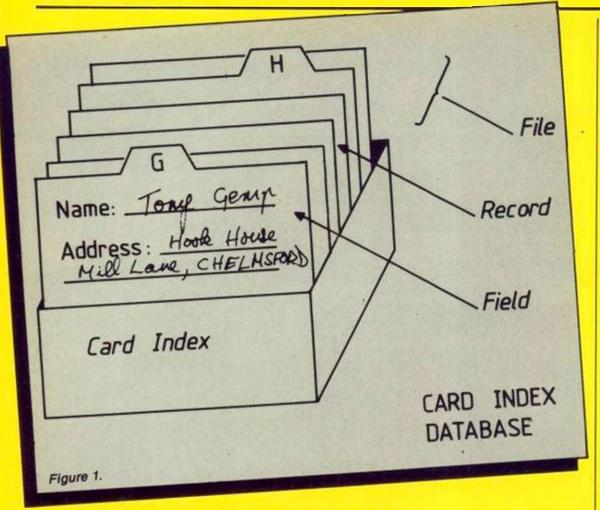
Access

VISA

Or debit my

Access





THIS SERIES of articles is about four database programs for the BBC microcomputer. It is impossible to review these sophisticated programs adequately in a single article and I hope that some of the ideas and the solutions to problems will help you if you are thinking of buying a database program for any microcomputer, not just the BBC machine.

A microcomputer is a general-purpose machine that can be made to look like any other machine by programming it to simulate the actions of the machine. In other words, a microcomputer can simulate a numerically controlled machine tool, model a central heating system or act as a central heating system controller, edit and format text or work as a complex pocket calculator.

A microcomputer can be used to store, manipulate and retrieve information and a spreadsheet program like Viewsheet or Ultracalc 2, for example, establishes a sort of database except that it is dedicated to displaying information in a particular way. Generalpurpose programs for database manipulation that will be held in the system and the ways in which it will be used for calculation and dis-

The best known, and most widely sold, database for microcomputers is dBase II which is marketed by Ashton Tate, California. dBase II is written in machine code for the Z-80 central processor unit and will not run directly on the BBC microcomputer's 6502 CPU. However, the program has been installed on the Z-80 second processor for the BBC machine and is now available.

# A difference with dBase II

dBase II is entirely different from all the other database programs that are on sale for the BBC micro because it is not a dedicated databuse program but a high level programming language. There are about 84 commands and functions in the dBase II language and these can be combined into command files that are interpreted by the central dBase II core.

A dBase II program can set up a database of

make fewer assumptions about the type of data information and can then sort, search, calculate Figure 2. NAME: Corton-Charlemagne MERCHANT: S H Jones TELEPHONE: 0295 11798 VINTAGE: 1980 DATE BOUGHT: 25/05/1983 QUANTITY: 8 bottles **CURRENT STOCK: 3** TASTING NOTES: ...

results and output the results in a huge variety of different ways.

The four databases that are included are:

Datagem Gemini Marketing Ltd., Exmouth.

0395 265165.

Merlin Computer Products.

Database Swansea.

Scribe

0792 467980.

Stardatabase GCC (Cambridge) Ltd.,

Cambridge. 0223 835330

Database Acornsoft Ltd.,

Cambridge. 0223 316039

All of these programs are dedicated in the sense that the structure of the information in the database is largely preordained. That seems to contradict some of the advertising claims made for Datagem and Stardatabase so let's see what's going on in more detail.

Figure 1 shows the card index architecture that is used by all four programs. A single file of information is held on a floppy disc and this can be accessed by the program to give you the results that you want. In these programs a file looks like a box holding a number of cards. You may have a number of boxes holding cards on different subjects; a stamp collection, a name and address list, recipes for your kitchen and so

Each file consists of a number of records which you can think of as the individual cards in the card-index box. Each card has information written on it. If the information is organised in a regular way then each piece of information is a field in the record.

So, there are several fields in each record and a number of records make up a file. Figure 2 shows the record format for a hypothetical wine cellar file. There are eight fields in each record and the information recorded about each wine is of various types. The date the wine was brought into the cellar is structured information in the form DD/MM/YYYY -Day/Month/Year — while the name of the wine is a string of alphanumeric characters of indeterminate length.

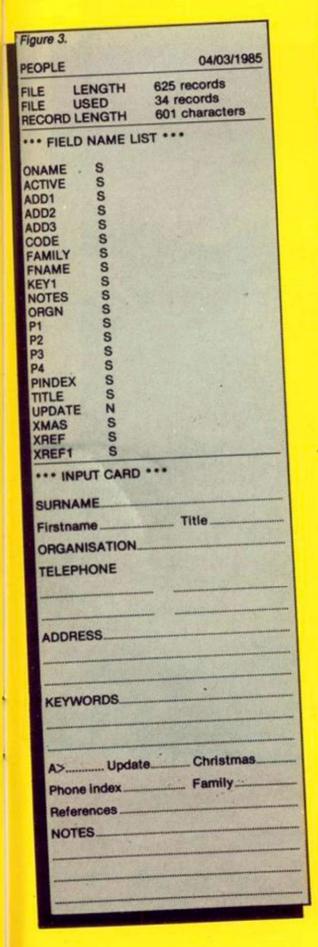
Note particularly that the tasting notes field is longer than the width of the paper or the VDU screen; long fields create special problems for printing out information in three of the databases when you try to use them in conjunction with View or Wordwise.

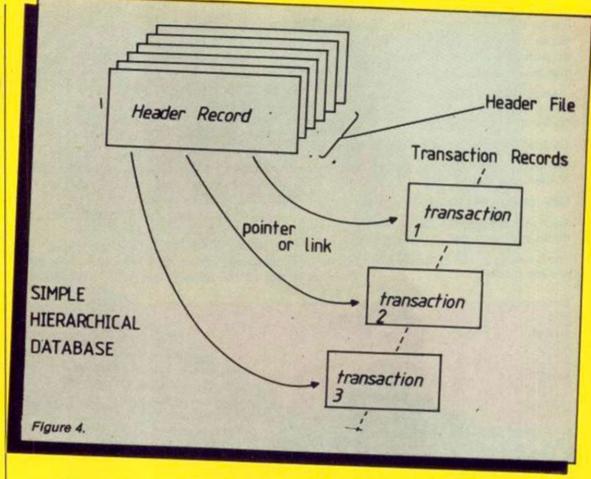
Figure 3 shows the record format of a real name and address file. This record layout and the fields it contains are more complex than the usual, trivial examples shown in the instruction manuals because "real" life is both complex

However, in both figure 2 and figure 3 you can see at once that the same information is recorded in the same place on each card. In other words, the program can look in the same place on each record and expect to find a name, or the date you bought a stamp, or how much you paid for a consignment of wine, or simply the town in which someone lives.

# BASES

In the first in a series of articles, John Dawson looks at databases in general and how they operate.





A card index architecture is simple, straightforward and can be very useful for many purposes. For example, all other factors being equal, you could use any of the four programs for the following purposes:

Software catalogue

Photograph and slide indexing

Christmas card lists

Name and address files

Mailshot personalised mailings

Price lists

Estate agents' housing lists

There are, however, other ways of structuring information that are better suited to many common tasks that you may want to carry out.

Figure 4 illustrates the architecture of a very simple hierarchical database. Suppose that you want to set up an invoicing system for sales of mugs, plates, casserole dishes, parsley pots and other items from your craft pottery. If none of your customers ever buys from you more than once then the card index architecture is quite adequate.

Presumably, though, you would like some of your customers to come back again for more of your goods. When this happens you have to reenter all the same details about the customer's name, invoice address, delivery address, telephone number each time you make a sale.

Apart from being very time consuming, the chances of errors occurring are large and if you make a mistake in entering the customer's name it becomes more and more difficult to relate one sale in June to another in October and two in the previous March. You can't run any sort of a credit system with the card index approach.

The database in figure 4 is different. When a customer first makes contact with your operation the name, addresses, telephone numbers and other information that you will need for the first, and subsequent orders, are typed into the database to form a header record. The goods that you supply, the cost per item, total price, Value Added Tax, discount and so on are entered into a separate transaction record

which is linked to the header record by a pointer.

The information in the transaction record is different to that in the header record — the second field, for example, may contain a telephone number in the header record and a description of a piece of furniture in the transaction record; so you need two files, but the files are linked automatically by the database program.

When the customer, impressed by your efficiency, returns for the third time you can search through the header file to find the original entry and immediately enter information into a new transaction record for the next sale. In a well designed system it should be possible to merge information from the header record with the transaction record to print an invoice and label for the envelope. The transaction should point to the header, just as the header must point to all the transactions.

dBase II has an exceptionally advanced feature that permits you to work in two separate active areas at the same time: Primary and Secondary. You can switch between the two areas by typing Select Secondary followed by Use 'newfilename'. Return to the primary database is achieved by typing Select Primary.

# Prefix the name of variable

Information can be transferred from one area to another by prefixing the name of a variable with either P. or S. This facility means that records in a second file can be found or manipulated by reference to records in the first file.

dBase II is an example of the third type of database which has been talked about greatly in the last few years. dBase II is a relational database. E.F. Codd published a fundamental paper titled 'A Relational Model of Data for Large Shared Databanks' in Communications ACM in June 1970.

Although the theory of relational databases (continued on next page)

(continued from previous page)

can be taken into quite high powered mathematics, the ideas underlying it all are simply to do with tables. As Kenneth Robinson says in Database Analysis and Design:

"tables are a very simple and natural way of regarding data . . . The tables conform to a set of rules . . .

Each box in a table contains one value

Within a column the box values are all of the same kind

Each column has a distinct name

Each row is unique — there are no duplicates

The ordering of the columns and rows is not significant"

Figure 5 illustrates part of a simple medical relational database. The information in the database is arranged in tables and each part of the information relates to other parts. The patient's name is put together with the address and a registration number.

By looking down — searching — the name and address file it's possible to find a name by reference to the registration number or the number in relation to a name. Similarly, the drug stock list file contains information about the cost of each drug and the quantity that should be held in stock.

The prescriptions file relates to both the patients and drugs file. A patient called M Hunter (No. 4914) was prescribed one Salbutamol inhaler on 5 November 1983. The cost of the inhaler was £4.75. The relations

between data in the tables could be much more complex.

For example, you may want to see the total cost of prescriptions which have been issued for Penicillin in the last year and to whom they were given — children are not charged. The prescriptions table must be searched for Penicillin between 1 January 1984 and 31 December 1984 and the registration numbers looked up. The age of the patient must be extracted from the patient file and the quantity prescribed costed for records matching the age criteria.

Next month I'll describe the four programs in detail, look at passwords, record and file sizes, and discuss how you can set about planning and building a database for your own purposes.

# **Patients**

name	address	no.
JAMES. A KYLE . J MARKS. B WEBB. E	25 MILL ROAD 25 MILL ROAD 135 WHEELER ST 2 NEW CROSS ST 101 RUTLAND RD. 4 UPPER LANE 271 WARWICK ST 11 ABBEY CLOSE	1772 5918 6664 3350 2218

# Drug Stocks

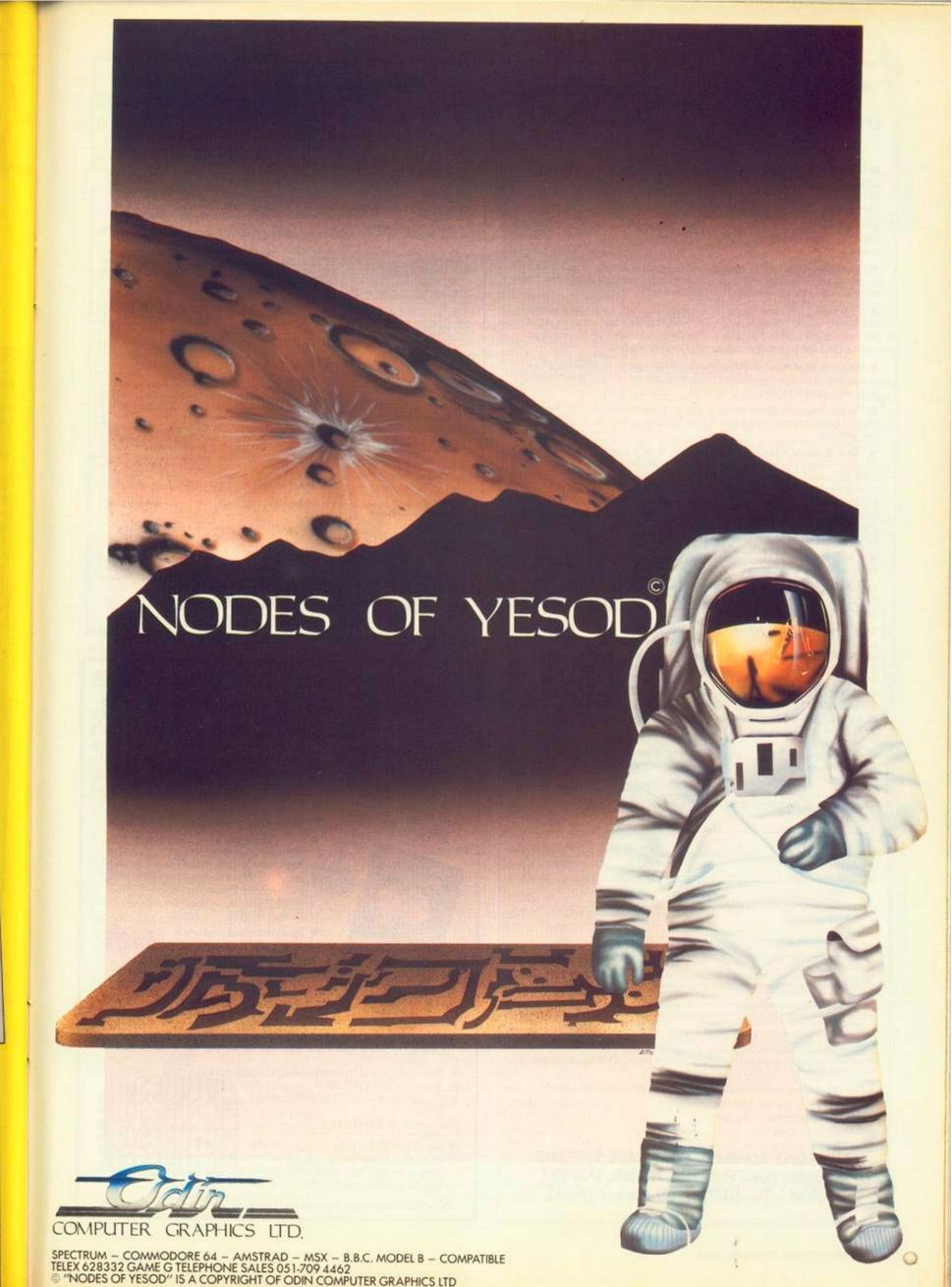
drug	stock	cost
SALBUTANEL PENICULIN AMPICILLIN TETRACICUM NITEAZERMY OXAZERAN PHENERGAN WARFARIN ASPIRIN	10 INHALERS 1000 TABS 1000 TABS 600 TABS 1000 TABS 1600 TABS 1600 TABS 1200 TABS 1200 TABS	4.78 10.70 25.35 17.50 19.10 27.80 11.15 38.60 4-85

# RELATIONAL DATABASE

# Prescriptions

no.	date	drug	dose
4914 3149 1772 6918	6/11/83 6/11/83 6/11/83	GALBUTAMOL PENICILLIN WARFARIN PENICILLIN NITRAZEPAN PHENERGAN	2 ×3(1) 2 × 4(48) 1 × 4(80) 2 × 4(48) 2 × 1(80) 1 ADI(20)

Figure 5.



# THE TYPING MASTER

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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, PCDOS 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:

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-

Please send me_ (Basic Version)		E TYPING MASTER
for the where shown). I	computer at £enclose cheque/postal c	per copy (+ VAT
4		
NAME:		
ADDRESS:		

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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.

supply a Business/schools version which incorporates record keeping and many other facilities. Prices shown below are for the Basic version.

APRICOT, SIRIUS & VICTOR (tailored versions). (Disk: £50.00 + VAT).

Anglia Business Computers, 1 Milton Road, Cambridge, C84 IUY, Tel. (0223) 315580.

CP/M80, CP/M86, MSDOS, PCDOS. (Disk: £50.00 + VAT).

Microcomputer Products International Limited, Central House, Cambridge Road, Barking, Essex, IG11 8NT, Tel. (01-591) 6511.

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

In case of difficulty contact

ANTHONY ASHPITEL SOFTWARE SYSTEMS 56 London Road, Harleston, Norfolk, IP20 9BZ, England. Tel. (0379) 852807 (answer phone).

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CLOCK digital clock
CLOCK digital clock
strings to have complex shapes
DELETE a black of lines
DO-AGOP senuture
DPOAK double pake
EDIT specified line
EDIT specified line
EDIT specified line

FRL Institutes or paper GET well for keypress JOIN two program lines KEYN a string KEYWORDS new keywords on/off LISTALIST line TO bee USED lused with GOTO, GOSUBI ON ERROR trap errors twith LINE, STAT and ERRORS PLOT a string Imay contain cursor P Basic's stack OC, DEF PROC, END PROC

# FUNCTIONS

HEX5 decimal to hexadecimal INSTRING string search MEM free memory MEMORY5 all of memory as a str

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### MC Hart gives your CBM-64 an extra command.

```
I REM **** REPEAT-UNTIL ****
 2 REM
  1 REM *** M. C. HART ***
 E REM SYNTAXIARICENP) .... &UICENP)
 8 FOR J=828 TO 968:READ XIPOKE J,XINEXTIEND
 18 DATA 281,58,176,234,76,95,3,162
 11 DATA 2,189,64,3,149,124,202,16
12 DATA 248,232,134,2,96,76,171,227
13 DATA 162,2,189,60,3,149,124,202
 14 DATA 16,248,96,201,39,208,238,32
15 DATA 115,0,201,85,240,37,201,82
16 DATA 208,227,165,2,10,10,170,165
17 DATA 123,157,167,2,165,122,157,168
18 DATA 2,165,58,157,169,2,165,57
19 DATA 2,165,58,157,169,2,165,57
19 DATA 157,179,2,230,2,32,115,0
20 DATA 76,174,167,32,115,0,32,115
21 DATA 0,32,159,173,165,97,240,5
22 DATA 189,2,76,64,169,166,2,262
23 DATA 139,10,10,170,189,167,2,133
24 DATA 123,169,166,2,133,122,189,169
25 DATA 2,133,59,189,170,2,133,57
26 DATA 104,104,76,229,167
27 :
100 REM *** DEMO REPEAT-UNTIL ***
126 SYS 835 IREM INITIALISE
 148 SRIA-A-11PRINT OUTER JAIREM OUTER
160 J=0 IREM NB ZERO BEFORE INNER LOOP
170 I
188 :: SR: J=J+1:PRINT J,:REM INDER
198 :: SU: J=4:PRINT: REM INTER
210 SU:A=10:REM OUTER
230 PRINT .-- END ---
       SYS 852 IREM RESTORE CHROOT
```

## REPEATUNTIL

THOSE WHO like structured programming or even those who are just interested in 6502/6510 programming for its own sake might be interested in this Repeat-Until.

The routine works by altering Chrgot to look for and process the & symbol followed by R - for Repeat - or U - for Until. Other characters will be passed to the interpreter where they will generate a syntax error.



Unlike For-Next loops in CBM Basic a variable which is used within a loop - such as J in the inner loop in the demo provided — is not initialised back to a starting value and it is the responsibility of the programmer to ensure that such variables are set to the correct value before the loop is entered.

Notice also that the loop will always execute at least once: if a Do-While loop is required which may require the entire loop being skipped if the initial conditions are met then this is best tested for before the Repeat-Until loop is entered. When the routine is in operation, the interpreter will not handle spaces - outside quotes - in excess of one hence the double colons in lines 180-190.

When Run the code will be read into the cassette buffer - if you totalise the X's in line 8 then they should provide you with a checksum of 15167. The routine is activated by a Sys 835 and restored to normal by a Sys 852. Run 100 runs the little demo routine.

Discoombly	035F C	9 26		CMP	##26	0392	20	73	00	JSR	\$0073
Disassembly.					\$0351		20	9E	AD	JSR	\$AD9E
B*	0361				\$0073	0398	A5	61		LDA	\$61
PC SR AC XR YR SP	0363 8				##55	039A		05		BEQ	\$03A1
.;0008 30 4F 4F 00 F6	0366					039C				DEC	
	Ø368 F					039E			99		\$A940
033C C9 3A CMP #\$3					##52				110		\$02
033E B0 EA BCS \$03					\$0351	03A1		96		DEX	402
0340 4C 5F 03 JMP \$03	5F . 036E f	95 08	2	LDA	\$02						
0343 A2 02 LDX ##0	2 0370 (	DA .		ASL		Ø3A4				TXA	
0345 BD 40 03 LDA \$03		an Ac		ASL		03A5				ASL	
0348 95 7C STA \$7C		AA		TAX		03A6				ASL	
Ø34A CA DEX	0373 6	45 7E	3	LDA	\$7B	03A7				TAX	
034B 10 F8 BPL \$03	45 0375	9D AT	20 7	STA	\$02A7,X	03A8	BD	A7	05		\$02A7,X
	0378		1	LDA	\$7A	Ø3AB	85	7B			\$7B
			8 02	STA	\$02A8,X	03AD	BD	8	05		\$02A8,X
	Ø37D (		9		\$3A	0380	85	78		STA	\$7A
0350 60 RTS					\$02A9,X	Ø3B2	BD	A9	92	LDA	\$02A9,X
0351 4C AB E3 JMP \$E3					\$39	03B5	85	38		STA	\$3A
0354 A2 02 LDX ##0			9 02		\$02AA,X	Ø3B7		AA	02	LDA	\$028A,X
9330 00 00 00		T-1			<b>\$02</b>	Ø3BA		39		STA	<b>\$</b> 39
Ø359 95 7C STA \$70					\$0073	03BC				PLA	
035B CA DEX		-	3 00		\$A7AE	03BD				PLA	
035C 10 F8 BPL \$03		4C A				03BE			A7		#A7E4
035E 60 RTS	Ø38F	20 7	3 00	JSR	\$0073	OODE	40	2.4		~	

032F PO	1/10
Location	Explanation
033C-035E	This is the initialisation.
035F-0361	See if & character and exit to CHRGOT in Rom if not found.
0363-036C	Get next character from the text and if it is a U then branch forward to \$038F — if it is not an R then branch back to Goto CHRGOT in Rom — where a syntax error will be generated.
036E-038C	Get the contents of the 'Loop counter' which has been initialised to zero in

lines \$034D-\$034E. Multiply by four to provide an offset and then put into the X register.

038F-039E

The characters & and then U have been identified so bump the text pointers by two (past U and :) and then access a Rom routine to input and evaluate the 'truth' of a condition. If the statement is 'true' then \$61 is non-zero so the loop counter is decremented and an exit made to Rom.

If "false" i.e. zero then a branch is mae to \$03A1. 03A1-03C0 Get the loop counter in A, decrement it and then multiply by four, putting it in an offset to restore the line number and text pointer bytes previously put on the temporary stack. Then pull two bytes off the normal stack and 'throw them away' before accessing a routine in Rom to execute a statement

within a line.

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ANY 64 OWNERS who use a 1541 disc drive may well have gone through the trauma of having it turn six weeks' worth of their latest masterpiece into the kind of garbage that makes random numbers look sensible.

Fear not — as many users may know, this is quite often caused by an error in only one of the many blocks that may be used by the disc drive to store the file. In many cases it is quite easy to fix these errors — if not quite so easy to trace them in the first place.

Consider the way in which the 1541 stores files on a disc, take the most common type - a program file. First of all, the file has to have an entry in the directory. This directory entry contains details of the name, type and length of the file and the track and sector numbers of the block on which the actual file starts.

Each block on the disc is 256 bytes long and the details of the formats are given in the user manual for the disc drive. Briefly, however, in each block the first two bytes, or links, point to the next block in the file and the following 254 bytes are data in the file itself. The last block in a file is marked by links that are invalid track and sector numbers.

When an error occurs on a disc it can corrupt a file in several ways. The error may occur in the data part of the file, changing a character or keyword in a program for example. Another type of error could occur if the links from one block become corrupted and point to an incorrect block as the next in the file.

In both cases the error needs to be found — this may involve careful examination of the file as stored on the disc. Once the error is identified, attempts can be made to correct it, in the case of corrupted links this may involve searching areas of the disc for pieces of the file

and then linking them back together. It is not always possible to recover the whole of a file but unless the error is compounded by extensive writing to the disc afte the error occurs, then perhaps only one or two blocks will be lost.

The details of detection and remedy of such errors on a disc is beyond this article and is more related to experience and even reasonable guess-work than a set of rules, but the manuals and reference guides provide all the information on how things are supposed to be stored on the disc and comparison with this should highlight the corruption.

Finding the error will probably mean careful inspection of the data on the disc and then some alterations to correct it. This is where the program Trax becomes useful.

Although the 1541 allows the use of random files, through which it is possible to access any block on the disc in any order, a program is needed to make use of this. While a simple program may suffice to deal with a particular situation, Trax is a more general program which allows easy reading, writing and alteration of disc blocks as well as allowing the use of the 1541's built in DOS commands.

When the program is running it will attempt to identify the disc that you want to work on. It does this by loading in the directory header and block allocation map from track 18, sector 0 and examining it — although the BAM is not used. During execution various things are displayed on the screen in several "windows".

The track and sector numbers of the block currently in the computer's memory are shown along with the track and sector numbers to which the current block is linked or points to. Along the bottom of the screen the disk name, ID and operating system version are shown and below this the error channel form the disc drive is shown.

The largest of the windows on the screen is used to display the actual contents of the block in memory. There is a choice of either hexadecimal or ASCII displays, although editing can only be done hexadecimal mode. Because of the size of a block — 256 bytes — only one half of the block is displayed at any one time, in the bottom right hand corner of the screen is an indicator showing whether the display is the top or bottom half of the block, the bytes are also numbered in groups of eight. Finally, the top lines of the screen are used for communications with the program — prompts will appear here along with any responses that you may type.

In the case of a hard copy version of the display, both the hexadecimal and ASCII data is printed along with the track, sector, name,

The commands provided by Trax are all invoked by single keys to make editing easier, although as a precaution commands that move data to and from the disc are obtained via the control key — Ctrl.

The commands may be summarised: Ctrl R: Read a specified block from the disc into memory.

Ctrl W:Write the data in memory to the specified block on the disc.

Crtl U: Update the current block on the disc with the data in memory.

Ctrl F: Follow the links from the current block and read the next block if possible.

Ctrl P: Print the current block contents on a printer.

Ctrl Q: Quit the program.

(continued on next page)

(continued from previous page)

- Switch between ASCII and hexadecimal display modes.
  - Switch page to display other half of block.
- @: Send following DOS command to disc drive. In addition the cursor keys and the Home key may be used to move around the block display to edit the

Note that all numbers are in hex including the track and sector numbers typed as responses to read and write commands although leading zeros may be omitted. The only exception to this is the error channel which shows numbers in decimal in line with the disc manual which gives more details on error conditions. DOS commands are sent to the disc drive exactly as typed, so the normal syntax applies. In addition, entering just return when asked for a track or sector number will substitute the current value and pressing the CLR key - Shift Home during a response will cancel the command.

The program is relatively straightforward to type in; the Commodore control codes are as usual. The only exception is line 50 where the reverse characters u,w,f,r,p and x inside the quotes are obtained by pressing Ctrl and the given letter key whilst in quotes mode.

Don't forget to save a copy of the program before trying to use it and I strongly recommend testing it out with a blank but formatted disc to ensure the program is correct.

For anyone who doesn't want to type the program in I can supply tape copies for £2.00, write to: Keith Suddick, 6 Ravel Court, Jarrow, Tyne and Wear, NE32 3BW.

Place the required disc in the drive and run the program. Pressing return when asked will result in the program reading in track 18 sector 0 - the directory header, and getting from this data the name, id and operating system version of the disc. The first page of the block will be displayed along with the links and error channel. When the command prompt appears at the top of the screen you can either enter one of the commands listed

above or use the cursor keys to move the "cursor" around the block.

If you want to change a byte in a block then simply put the cursor on that byte and type the new value - remember the values are shown in hexadecimal - you will see the byte change and although it will have been altered in memory the change is not sent to the disc until either an Update command is used to rewrite the current block or a Write command ius used to place the data in any block on the disc. Note that should you change either of the first two bytes in a block - the links, then the link display will change accordingly and any Follow commands will use the new values even if the block has not been written to the

The first directory block is linked to track 18 sector 1 which is the start of the file entries and you can follow this link from the directory header by using the Follow command. The first files in the directory will be in this block and if you switch the display to ASCII using \* you will be able to see the file names more easily although you must change back to hex to be able to edit the block.

Since only half of the block is displayed at any time you can see the other half by using the to change the display.

If you find the file you want in the directory then this entry will tell you where the actual file starts and you can then get the first block of the file using the Read command and then follow the rest of the file - note that Follow will not work from the directory entry as this will link to the next directory block.

```
hex/decimal.
Program breakdown.
                                            800-899: Read specified block from
  0-90: Initialisation.
                                                      the disc, update current
100-180: Main input loop. Edit block if
                                                      track and sector values and
          requested and check for
                                                      set links to next block.
          valid commands.
                                            900-999: Write current block data to
200-260: Get track and sector
                                                      specified block on disc.
          numbers for read and write
                                            1000-1020: Read and display error
          commands.
                                                      channel from disc drive.
300-360:
         Produce printed copy of
                                           2000-2150: Draw screen "windows"
          current block.
400-499:
         Move "cursor" around block -
                                           2200-2300: Attempted to identify disc -
                                                      read track 18 ($12) sector 0.
          display.
                                           2400-2550: Error messages for
500-590:
         Execute commands.
                                                      unreadable dics.
600-630:
         Display block on screen.
                                           3000-3070: Input a string subroutine.
700-760: Convert to and from
```

0 rem trax 1541 disk editor
1 rem k. suddick mar 1985
18 dimb(255):cle214
20 r\$=chr\$(13):d\$=chr\$(28):z\$=chr\$(8):hx\$="8123456789abcdef"
30 cls="8
40 cl\$=cl\$+"H"+mid\$(cl\$,2)+"3"
50 ok\$="#BEUGUNTERS has bl\$=" H"+bl\$:next
50 bl\$=c\*\*HB"forx=8008:bl\$=" H"+bl\$:next
60 bl\$=c\$+"BI"forx=8008:bl\$=" H"+bl\$:next
80 e\$(0)="ist"e\$(1)="2nd":n\$(0)="hexadecinal,":m\$(1)="fSC11."
90 90sub2000 90to180
100 9etk\$:ifk\$=""then100
110 k=ssc(k\$):ifk(48ork)78or(k)57andk(65)then160
120 PokecP,Peek(cP+u):PokecP+u,k+64\*(k)57)+b8
120 PokecP,Peek(cP+u):PokecP+u,k+64\*(k)57)+b8
121 ifx(2thenPrint"H"tab(150)"H\_inking":9osub850:Print"H";
140 ifx(2thenPrint"H"tab(150)"H\_inking":9osub850:Print"H";
150 9oto180
160 forweltolen(ck\$):ifk\$Comid\$(ok\$.x.i)thennext:9oto180 

```
### SUDFOUTINE.

638 next:Print:next:Poke1981.226-P#b8:Poto448

739 h$*mid$(hx$, d/xx*u.u)*hid$(hx$, (dandft)*u.u):return
759 d=*asc(right$(h$, u))-a8:d=d=d+c7*(d)c9)**ax

769 d=*asc(right$(h$, u))-a8:d=d=d+c7*(d)c9)**a, return

808 Print*B'sPc(150)** @Reading

818 Print*15, "u1 2.8 "tiss posub1000:iferthen080

820 bett s=ss:d=t:Posub700:t$*mid des:Posub700:s$*mid

820 bett s=ss:d=t:Posub700:t$*mid des:Posub700:s$*mid

820 print*15, "b-P, 2.0"

840 forx*0to255:0et#1, a$:b(x)=asc(a$+x$) next:P#

850 nt=b(0) ins=b(1) d=nt Posub700:nt$=is d=ns Posub700:ns$=mid

850 print*BisPc(150)**Biriting

960 Print*B'spc(150)**Biriting

970 Print*Biriting

9
```

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second moon lo. A moonbase established on lo is under constant attack by aliens from Jupiter. It is your mission to escort the men and their precious crystals safely from the surface of lo to the Dropzone where the landing pad is located. You are equipped with the latest pulse-laser back-pack system which will make you invisible and indestructible for short periods of time. You must succeed, the future of the human

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## SPACE JUNK

### Nalin Sharma continues his epic for the CBM-64.

HERE IS a reminder of the loading and game instructions for Space Junk.

Insert cassette, press Shift and Run/Stop and start your cassette recorder. Loading time is about two minutes. Put your joystick into Port 2.

Can you retrieve all 32 satellites by mastering control of your ship, which can move up, down, left and right and can also fire bullets?

However, beware of the four yellow junkies which patrol the skies. Unless you can work out how to destroy them you're in trouble! To help you there's a radar at the top of the screen which will pinpoint the junkies and any miscellaneous junk which appears from time to time and can be retrieved for bonus points.

After every two sheets you'll get an extra life and an attempt at the challenge stage. Here you have 99 units of time to turn the four junkies into stormer — if you succeed you'll get 8000 points! Below your score is shown the number of satellites left to collect, together with the number of lives left.

Pressing F7 will freeze the game and pressing the Space-Bar will restart it. Tape copies of the program are available for £3.25 from Nalin Sharma, 35 Kitchener Road, Walthamstow, London E17 4LJ.

```
note: enter letters as
                                      3888442493425632 356
                                                            3700
                                                                  20acaa3300cd3778 325
   capitals
                                                                                              b6457b6bbdb5dede 5bf 3aa8
                                                                                        3938
                                      5741564520425954 242
                                                                                                                          ffff03cfcfcfcftf 63c
                                                                  8c52545300dc377d 315
   34+0 b19a535441204849 2d4
                                                                                               efafb7faf9cdb6ff 6ca 3aa8
                                                                                        3938
                               3660
                                     2033332633332633 17
                                                                  8040445829534341 26b
                                                                                                                          ++++3333333393++ 3oc
         47484869aa35660a 279
                                                                                              0006330c63cc63cc 2a3
   34+8
                                                                                        3940
                                     332c333300353094 1be
                               3668
                                                                                                                    3ah@
                                                                                                                          ####3333333c+++ 498
                                                                  50455800ee37828c 320
         35668a4644412023 289
                                                                                              330403030303030 096
                               3670
                                     +25457534+554e44 326
                                                                                                                          ffff33333333334f 3oo
                                                                                                                    3ab8
                                                            37e9
                                                                  4a53522043404541 224
         36001b35bb8a5354 272
                                                                                        3959
                                                                                              0060cc30c633c633 34e 3ac0
                                     2042595420302c32 1bd
                                                                                                                          ++++3333c+3333++ 498
                                                            37e8
                                                                  5253415453004437 201
         41204849474848b9 282
                                                                                        3958
                                                                                              cc78c8c8c8c8c8b8dc 5c8
                                     3430203136203232 187
                                                                                                                    3ac8
                                                                                                                          ++++333383+383++ 45b
                                                                  8786464458205343 261
         aa36002635ca8a4c 2db
                                                            3740
   3518
                                                                                              0000000000181830 060 3ad0
                                                                                        3960
                                     3426333226323038 186
                               3688
                                                                                                                          ++++03+3c+3+03++ 504
                                                                  4150455800053889 1+4
   3520
         4441202335003525 167
                                                                                              0000007e00000000 07e 3ad8
                                     2034382031393220 180
                               3688
                                                                                                                          0103060c183+60++ 1cc
                                                           3888
                                                                 0303040434344444 240
        d48a535441205348 301
                                                                                              ffffffffffcfcftf 798
                                                                                        3979
                                     3634203137362038 198
                                                                                                                          0103070c183060c0 174
                                                           3888
  3530
        49454644004635e8 281
                                                                 0040406060703038 218 3ae8
                                                                                       3978
                                     3020313630203936 180
                                                                                                                         8000000103++00++ 282
                                                                 80a0e8eatatatete 6e2
                                                           3810
        8a4a535220534554 285
  3538
                                                                                       3988
                                                                                              10100+0703000000 053
                              36a8
                                     2031343426313132 185
                                                                                                                   3a+8
                                                                                                                          ff00ff0103060c1f 233
                                                           3818
                                                                 0000000000000a0a8aa 272
        5241444152005735 1+6
  3549
                                                                                             00000000000183000 296
                                    20313238007e309e 213
                              36b9
                                                                                                                         3+60c08000+e00++ 3dc
                                                                                                                   3948
                                                           3828
                                                                 aaaaeaeafafafafeto 716
  3548
        f48a5349c3434520 385
                                                                                       3990
                                     +2485950534+554+ 328
                                                                                             0000001818000000 030
                              3668
                                                                                                                   3b00
                                                                                                                         ff00ff80000102e4 365
                                                           3828
                                                                 30a0a030303000000 200
        4044582023300060 107
                                                                                             00000003dbab++db 453
                                    4420425954203020 10+
                                                                                       3998
                                                                                                                   3668
                                                                                                                         c912244890af40ff 3c5
                                                                 0000000000010205 008
  3558
                                                           3839
        35468a9c53494420 351
                                                                                       39.00
                                                                                             dipe7dib+fdibe7dib+f 738
                              3658
                                    3136203332203438 190
                                                                                                                   3b10
                                                                 ea12a548902040bf 398
                                                                                                                         999 50600000000000000
                                                           3838
        40444120534+554e 236
  3569
                                                                                       39a8
                                                                                             e7ffdloffffdloff7e 717
                              3600
                                    2036342638302639 184
                                                                                                                   3618
                                                                                                                         00000000000000++++ 1+e
                                                          3849
                                                                 7+000000001++00++ 27e
        442c58007d35+88 a 2+c
  3560
                                                                                       39b8
                                                                                             5555ffdbe7e75ac3 56f
                                    3620313132203132 185
                              3688
                                                                                                                         00000000ffff0000 1te
                                                                                                                   3h29
                                                                 ++00++00010306+c 304
                                                                                             e7e7ffff7e000000 44a 3b28
  3570
        5354412044555053 244
                                                                                       39h8
                                    3820313434203136 190
                                                                                                                         0000111100000000 1te
                                                          3859
                                                                 483060c080++00++ 4c6
        4944205800883549 207
                                                                                       3909
                                                                                             66664444c3bd9999 57c
                                    302c3137362c3139 190
                              36e8
                                                                                                                   3539
                                                                                                                         ffff0000000000000 1fe
                                                                ++00++0080000001 33+
       8840444120233000 100
                                                          3858
  3588
                                                                                            bdc3ffff7e000000 3+c
                                                                                       3968
                             3640
                                    3220323838203232 188
                                                                0103070604183048 160
                                                                                                                  3b38
                                                                                                                         999 99999999999 999
                                                          3868
       9935fa8a53544120 35a
                                                                                             ffff815e575f5780 46a
  3588
                                                                                      3940
                             3548
                                    342c32343000c730 led
                                                                                                                  Shap
                                                                                                                         03060c1830e0c080 27d
                                                                0018181818183030 040
 3598
       5748494348322058 229
                                                                                            ++++9177+d6++b44 5b1
                                                                                      3908
                                    a8f2524546534+55 36e
                             3799
                                                                                                                         ++06+c183060c080 3e9
                                                                                                                  3b48
                                                          3878
                                                                6666667e66c3++c3 49b
       00a1354b8a494e58 34a
                                                                                            +fff03f5dd79ed03 53c
                                                                                      3960
                                    4e44204259542032 1#3
                             3708
                                                                                                                  3650
                                                                                                                        0018185a3cdb7e18 237
                                                          3879
                                                                c37ec300++000000 303
 35a0
       00ad35+08a435058 353
                                                                                      3900
                                                                                            ffffff87ff87ff++ 708
                             3710
                                    3430203232342032 186
                                                                                                                  3b58
                                                                80c0e060f0180c1f 3b3
                                                                                                                        000000183c187e18 102
                                                          3889
       2023323500ba35+a 297
 35a8
                                                                                      39+0
                                                                                            ffc3abdfdfdbc3ff 648
                             3718
                                   30382c3139322c31 18d
                                                                                                                        00c0d8dbfb1b1+18 3c0
                                                                0000000000000000 003
                                                                                                                  3h68
 3580
       8a424e45209c5349 2b7
                                                                                      3948
                                                                                            ffc7bbf7efffefff 754
                                    37362c3136302c31 18d
                                                                                                                  3b68
                                                                                                                        000018781e180000 0c6
                                                               0f1f3f3d3f1f0f01 118
 35b8
       4400c235108b5254 27c
                                                                                      3,400
                                                                                            3728
                                   3434203132382031 180
                                                                                                                  3679
                                                                                                                        000000007ee7e37e 2o6
                                                               0000000000000+++++ 20d
      5388473574865241 2+1
                                                                                            ++++033303333++ 390
                                                                                      SAMR
                                   3132263936263838 192
                             3739
                                                                                                                  3b78
                                                                                                                        000000000001e391e 075
                                                         3848
                                                               bffbfffddfffffc 784
      53549a34204c4441 266
                                                                                      Saig
                                                                                            f#ff0733073307+f 378
                             3738
                                                                                                                  3b80
                                   2036342034382033 18d
                                                               000000017fffdfb 359
      20534154539100e2 2ce
                                                         3848
                                                                                                                        35d8
                                                                                            ++++0333343303++ 3a8
                                                                                      3a18
                                   322c31362c3000e1 202
                                                               ffddfff7ffffe000 6b0
                                                                                                                        000000003c000000 03c
                                                         3850
                                                                                                                  3b88
      357e8b434d502023 261
 35d8
                                                                                      3a29
                                                                                            ++++0733333307++ 3a4
                            3748
                                   30b2+29153432042 35d
                                                               000000+fffffddff 4d9
                                                                                                                  3698
                                                                                                                        0000000018000000 018
                                                         38b8
 3568
      3100+235888b424e 2+b
                                                                                      3a28
                                                                                            ffff033f073f03ff 388
                            3750
                                   5954203936203134 1od
                                                                                                                        1+7++08000c0+03c 3+a
                                                         3800
                                                                                                                  3b98
                                                               effffbbffffe0000 5a5
 35e8
      4520464946524153 228
                                                                                            ++++033+073+3+++ 304
                                                                                     3a39
                            3758
                                   3420363420313736 194
                                                                                                                 3ba@
                                                                                                                        +fc0000000000007+ 23e
                                                               0000000001340+060 432
                                                         3808
35+0
                                                                                           ++++033+333303++ 3#8
      3400033692864953 227
                                                                                     3a38
                                  00+23018+6802022 242
                                                                                                                 3ba8
                                                                                                                        c38381818187444c 2cb
                                                        3849
                                                               efffbetof8080008 498
      522042554040434# 233
3542
                                                                                           ++++3333033333++ 300
                                  535041434532222c lec
                                                                                                                 3bb0
                                                        3848
                                                                                                                        ffffc3c3c3c3ffff 708
                                                               1038386c7cbe6e7+ 313
      405300143697664a 255
3600
                                                                                     3a48
                                                                                           ####83c+o+c+03+# 570
                                  3800000050804445 1a9
                                                                                                                        ffffebebebebffff 7a8
                                                                                                                 3bb8
                                                        38e0
                                                               fff7bffeeefebata 759
      5352205348495043 23c
                                                                                     3a50
                                                                                           ffff03cfcfcf0fff 57c
                                  58008b375f8c4a53 2a2
                                                                                                                 3bc0
                                                                                                                        ++++d7d7d7d7d7++++ 758
3618
      4+4c530025369c8b 270
                                                        38e8
                                                              ebd3b83b6d+d++c+ 5ec
                                                                                           ++++3333073333++ 300,3bc8
                                                                                     3a58
                                  5220504044545341 245
                            3788
                                                                                                                        ff9999ffff9999ff 660
                                                        3840
     4a5352204d495343 23b
                                                              0000000101032377 094
                                                                                           ++++3+3+3+3393++ 3+0
                                  5453009337648652 263
                                                                                                                        ffe7e7ff9999ffff 6fc
                                                                                                                 3hd9
      48444c52003536a6 23b
                                                        3848
3629
                                                               7bfbfbd9fdeckidfe 5ee
                                                                                    3a68
                                                                                           ffff3303333334f 3cc
                                  545398ae37698c52 2d3
                                                                                                                 3bd8
                                                                                                                        3+++03030303++++ 648
     8646494e52415334 282
3628
                                                        3900
                                                              999 999999999999 999
                                                                                    3a70
                                                                                           ffff0333333334f 3oc
                                  4153549a32204c44 264
                                                                                                                       foffc3c3c3c3ff+f 705
                                                                                                                 3be8
                                                        3908
                                                              ddfd7dedfbf3f7ef 718
      202c3000d22f8df2 2fc
                                                                                           ++++0333333303++ 390
                                                                                    3a78
                                  4120534154539120 24d
                            37a8
                                                                                                                 3be8
                                                                                                                       0103070414347444 146
                                                        3918
                                                              000081c1c367e7ed 440
     5632524540204259 226
                                                                                    3a80
                                                                                           ffff0333033f3fff 3b4
                           37a8
                                 214c45465400b937 23c
                                                                                                                 3b+8
                                                                                                                       90c0e0f0f8fcfeff 701
                                                        3918
3648
     54203234382c3234 1a4
                                                              efe6+6b5db+b+677 6c3
                                                                                    3a88
                                                                                           ffff033303f3f3ff 51c
                           37b8
                                 6e8o434d50202331 24e
                                                                                                                       000000003c3c5555 122
                                                                                                                 3648
                                                              b7cadbe+66+7db++ 685
     3920323534203235 193
                                                        3920
                                                                                    3a98
                                                                                          ++++0733073333++ 3a4
                                 00c537738c424551 2d3
                                                                                                                       0103070+1+3+7+00 0+7
                                                                                                                 3000
                                                       3928
                                                              c0c0e4eeeb6++7+6 699
                                                                                          ++++033+03+303++ 438
                                                                                                                       ++99++99++99++++ 606
                                                                                                                 3088
```



```
7d37708583a888b1 2+d
                                                                                        4318
                                                                                                                      4598
                                                                                                                            978d9978a2668a28 266
                                                          4088
                                                                 85048510a9018511 269
                                                                                               020961d007ea2051,35e
                                                                                        4318
                                                                                                                      45a0
                                                                                                                            59468a48a28a28aa 2e6
                                                          4898
                                                                850d8d1ad0ad11d0 397
                                                                                               434c6c429d4+70bd 356
                                                                                                                             4668aacae062+80e 462
                                                                                        4328
                                                                                                                      45a8
                                                                 297#8d11d@a9518d 39d
                                                          4098
                                                                                               087029+e9d0870a9 35d
                                                                                                                            e88a205846caa00a 3a4
Available on Telsoft.
                                                          49 nB
                                                                 12d0a9++8d19d0a9 4a9
                                                                                        4338
                                                                                               019d2370e00e+016 325
                                                                                                                      45b8
                                                                                                                            20b9464c9e45a920 31
                                                                008d0edc20da4420 2d5
                                                           40a8
                                                                                               8a186907aa4c6c42 2h6
                                                                                                                            205846ad37030a0a 1b9
                                                                                        4338
                                                                                                                      45c8
                                                           4868
                                                                 ec452080434c+04a 39a
3c18: ##ebeb##ebeb#### 7a8
                             3428
                                                                                               a288648478948844 344
                                                                                                                            Ra49++848-78aa37 388
                                                                                        4348
                                                                                                                      45-8
3c18: ++c3c3++c3c3++++ 708
                                   +f+fddfffff32000 Sec
                                                          48b8
                                                                 a273a9009500e8e0 41b
                            3438
                                                                                                                      45d0
                                                                                        4240
                                                                                               e8e819d8#5684c31 483
                                                                                                                            03ad3703c919d00e 2aa
                                                                8bd0+9a99320d2++ 581
     3e38
                                  9999994+4bb+e18c 3a6
                                                          4868
                                                                                        4359
                                                                                               eaa9019d23709d26 387
                                                                                                                      4548
                                                                                                                            a9138d4841a9008d 308
                                   77+fffbbbf7f77f7 5do
                                                          4908
                                                                 a934854b854da985 498
      ++++99++99++++00 62d
                             3e48
                                                                                        4358
                                                                                               70a9009d2570a9++ 3+3
                                                                                                                            96798d9c7968297+ 282
                                                                                                                      45e8
                                                                85+ca9d985+ea011 537
      ++00++00++00++00 3+c
                             3e48
                                   ++247b774444d800 546
                                                          40d0
                                                                                               9d24709d3770bd28 35a
                                                                                        4360
                                                                                                                      4568
                                                                                                                            4646964528794428 278
                                   000000++++d++926 3+c
                                                          4988
                                                                 a247a917209546a0 344
      4455445544554455 550
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4818	8468284353498285		4530	8861052a91058861 337	4d28	d0688d00d0a20a20 361	4+b0	4aa20428bd4668aa 325	5238	53d4c8c9d32dc7c1 540
4828	04c61260a026a227		4898	052a910598186945 223	4d38	pd4668a.aad89d9c9 45b	44b8	e8e018d0e2a9888d 550	5240	odo52do9d32dc4o5 511
			4568	a8c081d0c960a000 482	4d38	d0d0d6a2a48a48a0 52e	44c0	02d0a9b88d04d0a9 43d	5248	0409030104050404 642
4828	b9+8069d+806b9+8 1		4ab8	18b1056a9105c8b1 347	4d40	d8201a49205249a2 2b8	4408	478d1dd0a9bca0cd 493	5258	c+2dd3o+odo5c+ce 5dd
4830	da9d+8dab920079d		4ac8	056a9105c8b1056a 2ed	4d48	1e20bd4668aacae0 3fd	4+d0	201a49205249a9bc 2a3		c52dc92dc+cec3c5 58d
4838	2887b926ab9d28ab	373	4ac8	9105a9006a489818 2a1	4d58	9cd0eaa20a20bd46 425			5258	
4840	6948079048076948	245					4+48	a8ce201a49205249 2ac	5260	2dcbcec5d7414e45 436
4848	db9d48dbu970079d -	468	4-ad8	693ea8682ab1056a 301	4d58	ee01d0ad01d0c9bb 4c1	4166	a2008a48a9cc2009 312	5268	45485300000000000 040
4850	7897kj978ab9d78db -		4ad8	9105c8b1056a9105 314	4d68	d0+1a90a8d2cd0a9 4a6	4468	49207c4aa9ce2009 2cf	5270	000000000caca0000 19c
4858	6998079d9807b998		4566	08b1056a91059939 34e	4d68	94a0d8a219201a49 34a	4448	4920b64aa20420bd 2ec	5278	0000040103013334 970
4860	ab9d98dbb9c8679a 5		4ae8	e93fa8c83fd0c968 4c8	4d70	203649a94985+b85 396	4448	4668aae8e88cd8e2 4de	5280	35362+3031323337 197
			4a/6	a90085648d20d08d 3a7	4d78	fda90685fca9da85 535	5000	a9a88d8cd8a9ee8d 4d6	5288	3839353539383733 1b6
4868	0007b900ab9a00ab 5		4818	21d828da44287944 38c	4d80	+ea907a261201b45 331	5008	0dd0a9078d2dd0a9 3o0	5298	68696a6b6c6d0000 274
4870	5988e00dd0b29412 4		4b98	a99320d2ffa9138d 476	4d88	a990a0ca201a4920 346	5010	bc8dfe87a9f98d15 492	5298	
4878	40004735040901d0		4b08	484120e94628a644 2e2	4d90	5249a21420bd46a9 31d	5018	d8ad6b52c981+883 3+7		
4880	84287547686982d8 2		4618	59958d87d88d89d8 48e					52a0	0841004100000008 142
4888	0320244868850586 1				4d98	c9200949207c4ace 2ef	5020	4ca150a2008a48fe 3af	5238	80070000000000044 844
4890	8984074901850685 2		4618	a9388d96d98d98d9 3a9	4030	00d0ce00d0ad00d0 3eb	5028	5107a21920bd4668 29e	52b0	4120233000c352ad 276
4898	88a2883826852686 1		4628	a9078d2ad08d2bd0.3b+	4da8	c9a0d0e6207e4620 423	5030	aabd5107c90dd0ed 452	52b8	6153544120534154 251
48a0	1826072608e6e003 2		4628	a9++8d15d8a994a8 4+7	4db8	7e46207e46207e46 28c	5038	8a48a200a90da03e 308	5200	539100d052b26153 366
4898	30+1a200a000x185 3		4630	d2a219201a492036 266	4db8	a908a268201b45a9 2e4	5040	20d34868aa48a93e 37c	5208	54412053aa333200 217
			4638	49a93985fb85fda9 4d6	4dc8	b8a0cb201a492052 318	5848	9d5107bd3952a03e 31b	52d8	dd52bc6153544128 354
48h0		99	4640	0685+ca9da85+ea9 536	4dc8	49a9b8a8ce281a49 39b	5050	a219208d4868aabd 37+	52d8	53aa333380+252c6 36d
4868	06058a48a60920ba 3		4648	938d0178a986a254 2a6	4dd0	205249a9078d28d0 2+0	5058	39529d5107e8e016 35e	52e0	614a535220434c45 244
4800	4668aaa886b187c8 3		4650	201b45a994a0d520 352	4dd8	8d29d8a96a8d83d8 3+9	5868	d8c3a2008a48fe79 47e	52e8	
4868	9107888860++00+5-5	20	4b58	1a49205249a20a20 lea	4de0	8d95d8a9298d02d8 38a		07a21920bd4668aa 2+7		4152535052495445 264
4888		da.	4b60	bd46ee09d8ad09d0 450			5068		52+0	5390++52cb614a53 36d
4885	8749018506650842 2	66			4de8	a9388d04d0a9048d 37c	5070	bd7907c90dd0ed5a 45a	5248	5220904153540000 202
48e0	0018260526061826 0	80	4be8	09bbd941a9bb8d91 537	4d+0	10d0a2008a48a9ob 3o8	5078	48a200a90da03e20 29e	5300	554e54312c58000f 1bb
4848	072608e8e003d0+1 3	01	4678	d08d03d0a9ff8d00 465	4d+8	200949203e4aa9ce 291	5888	d34868aa48a93e9d 349	5308	531ca75458410017 21a
4878	3886b18591879848 2	ce	4678	d0a992a0ca201a49 3#8	4e00	200949203e4aa207 1o3	5088	7907bd4f52a03ea2 35e	5310	5326a7434c430024 216
48+8	3589e898488328bd 3	5+	4b80	205249a90e8d27d0 2+6	4e68	20bd4668aae8e015 412	5898	19208d4868aabd4f 32c	5318	5330a74144432023 235
4988	4668a8c8c0008d0ea 4	Sec	4688	a2008a48a9c92009 30+	4010	d0e2a9b88d#9078d 52d	5098	529d7907e8e016d0 41d	5320	323136002c533aa7 149
4998	5895064900850518 2	36	4690	49207c4aa21420bd 2c2	4e18	+a07a20720bd46ee 3bb	50a0	c3a20a28bd46ce0c 36c	5328:	50484100345344a7 24b
4918	5505550513660666 1		4698	4668aae8e018d0ea 4+2	4e28	03d0ee05d020d150 3d7	58a8	d0ad0cd0c95ed0+1 541	5330	5441590041534ea7 277
4918	856858686898488 2		46.a8	a9e68d02d0a9048d 428	4428	ad83d9c9d7d8eba9 584	58b8:	a28a28bd46ee8cd8 399	5338	4c44412023313930 Ise
1297	a290860586071866 2		4ba8	28d8a297e09d+0+a 598	4e30	b68d+907a91a8d02 395	5868 :	ad0cd0c9e1d0+1a2 596	5348	4c70674c09594c1c 239
4928			4bb0	8a48a0cc201a4920 2e1	4e38	d0a20720bd46ee02 38c	50c0	8a28bd46ce8cd8ad 384	5348	594cea584cda584c 3b1
4928	0666051866086607 1		4bb8	5249ce82d8ce82d8 3db	4e40	d0ee05d020d150ad 481	5968	0cd0c9a0d0f14c52 4a4	5350	cd58a2ff9a20da44 49e
4938	e8e002d0f160a000 4		4bc0	ce00d0a20a20bd46 36d	4e48	05d0c9e1d0eba9ba 59d	50d0	53ad+90749018d+9 3d0	5358	
4938	3200b1059107e8c8 3		4bc8	68aae8ad82d8c94a 48c	4e58	8d+a07a93e8d04d0 3d6	50d8	07adfa0749018dfa 386		a980851328d75328 2ab
4948	+883380+698484689 4	38				[ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [			5368	0+5420a644206b53 24b
4948	28bd4668a8c83+d8 4	62	4bd0	d8daa288a9cb2889 3e9	4e58	a900850585068502 24a	50e0	07608a8b8e8f9192 3bc	5368	4cbc53a9b885+b85 4c1
4958	e760a00001059107 3	35	4bd8	49207c4a@8e018d0 3df	4460	a015a20098488a48 309	50e8	9596999a9d9e9+a0 4d8	5378	+da90585+ca9d985 533
4958	08083+d8+768a288 4	98	4be0	+3a2008a48a9d520 405	4668	a20520bd46ad02d0 349	50+0	8c8d902093949798 41+	5378	fea9078d0170ee9s 434
4968	a000b105950ae8c8 3	a5	4be8	0949205e49ce00d0 2b7	4070	186901900748a902 20c	50+8	9b9c20a1a2a3a4a8 489	5380:	46a24ba00ea91a28 2c4
4968	c003d0+6b1058888 4		4610	a20a20bd4668aaad 38e	4978	9a10d0688d02d0ad 3e1	5100	a9acadb0bla5a6a7 555	5388	9546207e46207e46 2a3
4978	689105c8c8c8c6c6 4		4b+8	00d0c94cd0e5a2a4 4e0	4e80	04d038e901b00748 2+5	5108	aaabaeafb2b34601 45e	5390	a9078d0170a00aa2 2+a
			4000	8a48a8d5281a4928 2ea	4e88	a9008d10d0688d04 30+	5110	203d204f4e452050 1cf	5398	00a923209546207e 265
4978	3+d0+1a200a03cb5 4		4008	5249s21e20bd4668 2e6	4e98	d020d150ad02d0c9 459	5118	4041594552204741 225	53a0	46207e46a00aa219 284
4980	0a9105c8e8e003d0 4	62	4018	aacae09cd0eaa200 54c	4e98	4ed804a9818506ad 384	5128	4d454603203d2054 lac	53a8	209846a00aa23220 29c
4988	4660s202a03eb105 3	oe.	4018	8848890920094920 2d6	4000	04d0c90cd004a901 327	5128	574+20504c415945 241	53b8	
4990	950aca68c03bo0+6 4		4028	3e4aa21420bd4668 2c9	4ea8	850768aa68a8ad10 36b	5130	522847414d454a55 22b		7e46207e46209846 2a6
4998	b105c8u8u8910588 4		4028	aae8e815d8eaa988 4+2	0.75				5368	ce9a4660a9008512 34e
49 a8	8888880 <del>011</del> d0+142 5	0 à			4eb8	d0c902d00aad02d0 3+4	5138	4e4b494554524#4# 26b	5300	209055a901851185 2ca
4938	00a000b50a9105e8 2	dd	4030	8d2bd08d2cd0a394 44e	4eh8	o93ed8834c894+e6 364	5140	504552535444524d 27c	5308	10a20120bd46a512 28d
4968	c8e003d0+668a800 4	71	4038	a0d5a219201a4920 2d3	4ec8	05a505c908d09ua9 396	5148	4552544845204a55 237	53d0	09++00+540+04882 565
4968	1801856a9185c8b1 3	4.	4040	3649207e46207e46 247	4ec8	008505a506c901d0 2c+	5150	4b45504c41594552 25d	53d8	008a951be8e008d0 3da
4958	856a910508b1056a 2		4048	207e46207e46a907-278	4ed8	16e016d007a90085 311	5158	2001504c41594552 1ee		49a90185238524a2 396
4908	9105a9006a888811 2	5-2-0	4058	a25a201b45a9388d 2ea	4ed8	064ce74ea90a9d51 328	5160	2002504041592054 100		00207061a901a220 25d
100000			4058	0ad0a9bb8d0bd0a9 44+	4ee0	07a9019d51dbe8a5 407	5168	48452047414d4520 1e7		207061a900852+a9 2+7
4900	8591858686868687 3		4068	94a0d8201a492052 301	4ee8	07c901+0034c644e 2c2	5170	4046464452284045 22a		00853385258526a9 2b6
49d8	d8de68a83e18b185 3	03		49a20a20bd46ee0a 310	4010	c0++d007a9008507 3cb	5178	56454c2dd0ccc1d9 44a		3285278528a90585 2be
49e0	2891058861052891 2	DF.	4070	d0ad0ad0c9b8d0+1 599	4e+8	4c644ea90a997907 2ca	5180	c5d210112d171819 22d		
4988	058861052a9105a9 2	ac ,	4c78	a20a20bd46ce0bd0 378	4400	a9019979db884c64 3c4	5188	1a1b1c1d1e1f2c21 0f8		29852a286b5568a9 2c1
4948	062ac8c811859185 2	55		ad0bd0c99bd0f18d 53a			5190	222324252627282d 130		9320d2++a90e8d23 3eb
4948	8888860#fd0de60 5	00	4088		4408	4ea9b88d+907a938 41d				d0a9098d22d0a900 3aa
4300	a003b10588888891 3	82 1	4038	01d08d03d0a9038d 36a	4+10	8d02d0a20a20bd46 32e	5198	d0ccc1d9c5d21213 4+2		85+685+da90485+c 530
4a08	05c8c8c8c8c03+d0 4	+4	4090	10d0a9208d000da9 3a+	4418	ce04d6ee03d020d1 454	51a0	2d47414d4520204+ 1d6		a9d885fea9078d01 442
4a18:	+1c8b10588888888 4	8+	4698	8a8d82d8a2888a48 2dd	4420	50ad04d0c91ad0eb 46+	51a8	5645524348414040 251	5438	70a299a001a90b20 320
4a18:	9105c8c8c8c8c8c8c8c8		4ca@	a9c920094920004a 24e	4428	a9b88d+a07a9208d 445	51b0	454e474520205354 206	5438	9546a01da2b5a927 3b4
4a28	43d8e+b105888888 4		4ca8:	a214206d4668aae8 3d3	4+30:	84d8a28728bd46ee 38e	51b8	4147454020010908 134	5448	209546a9098d0178 2ab
4928	3185c8c8o8c8c8c87+ 4	7.5		e015d0eaa2008a48 423	4+38	03d0ee05d020a150 3d7	5108	054e414c494e2053 lea		a00ba2a3a91u2095 36b
4438	d0+138a900910588 4		4cm8	a9cb20094920b64a 306	4440	ad83d8c9eed8eba9 59b	5108	4841524d41b4b5b6 388		-
4438	910588910560a07b 3		4008	a20+20bd4668aae8 3ce	4+48:	1a8d04d0a9b68d+a 461	51d0	b7b8b9babbbcbdba 5d4	Tot	ne continued.
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## oftware that's

### **TASWORD TWO**

### The Word Processor \*

"If you have been looking for a word processor, then look no further!

0 034

850

436 848

190

878 197

274

837

42

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76

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12

CRASH June 1984

"The number of on-screen prompts, together with the excellent manual, make it ideal – even for an absolute beginner.

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TASWORD TWO ZX 48K Spectrum £13.90

### TASWORD MSX

### The Word Processor

The Tasman Word Processor for MSX microcomputers

All the features of the Spectrum version.

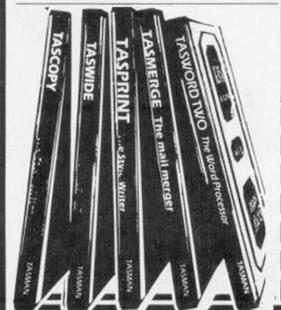
TASWORD MSX MSX Computers £13.90

### TASCOPY

### The Screen Copier

Screen copy software for Spectrum with Interface 1 and Amstrad CPC 464. Print high resolution screen copies (in a choice of sizes), and also large 'shaded' copies with different dot densities for the various screen colours. Tascopy supports all eight pin dot matrix printers with Epson type control codes, e.g. Epson RX-80 and FX-80, Shinwa CP-80, Mannesmann Tally MT-80, Star DMP 510/515, Brother HR5, and also Amstrad DMP 1 with the CPC 464.

TASCOPY ZX Spectrum £9.90 TASCOPY 464 Amstrad CP 464 £9.90



### **TASWORD 464**

### The Word Processor

The Amstrad implementation of Tasword Two plus many extra features.

TASWORD 464 Amstrad CPC 464 £19.95

### **TASMERGE**

### The Mail Merger

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

TASMERGE ZX 48K Spectrum

### £10.90

### **TASPRINT**

### The Style Writer

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. TASPRINT utilises the graphics capabilities of dotmatrix printers to form, with a double pass of the printhead, output in a range of five fonts varying from the futuristic DATARUN to the hand-writing style of PALACE SCRIPT. TASPRINT drives all dot-matrix printers with bit image graphics capabilities and can be

used to print TASWORD text files. TASPRINT gives your output originality and style!

TASPRINT ZX 48K Spectrum **TASPRINT** Amstrad CPC 464 £9.90 £9.90

### **TASWIDE**

### The Screen Stretcher

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

TASWIDE ZX 48K Spectrum

£5.50

### TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASWORD TWO. The cassette also contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Seikosha, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers. Compatible with microdrives and ZX Interface 1

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### MEMORY LOOK

To enable the contents of the memory holding a Basic program to be examined I have written the following utility which uses line numbers from 9000 onwards. This allows it to be added to the end of existing programs using Merge ' instead of Load ""

Once installed the direct command Go To 9000 should be used to execute the routine. The screen is filled with the memory locations, the corresponding contents in decimal and where applicable the ASCII character or keyword.

The "scroll?" prompt appears after each screen fill and allows you to stop by pressing key N.

Alan Pratt

9000 REM EXABINE MEMORY 9010 CLS LET 1=PEEX 23635+PEEX 23635256-1. 00 TO 9210 9020 LET P=PEEX 1 9020 LET P=PEEX 1 9030 LET P=13 THEN 00 TO 9200 9040 IF P=14 THEN 00 TO 9200 9050 IP P=18 THEN PEIX 1 9000 IF \$19 AND \$ (100 THEN PRINT 9070 IF \$199 THEN PRINT 1; \$ 2000 IF POST THEN PRINT PAPER 5. CMRS 0 P. (32 THEN PRINT 9000 IF P. (32 THEN PRINT 9100 LET 5:8:4: GO TO 9020 9200 FRINT: P. PAPER 1:250 PAPER 1:4:1 9220 PRINT: PAPER 6. Line NO. P. PAPER 6. Line NO. P. PAPER 6. Line NO. P. 1875 - 2 LET PAPER SAPEE \$230 LET \$15-2 LET PAPER SAPEE \$240 PRINTS PAPER S. NO. 

### HEX-DEC/DEC-HEX

This is a machine-code program which is for the CBM 64 and readily converts either hexadecimal to decimal or decimal to hexadecimal.

To do this you simply type the following: for dec/hex

SYS 49152,\*\*\*\* (decimal number)

for hex/dec SYS 49242,\$\*\*\*\* (hexadecimal number)

Gary Taylor

30000 REM HEX-DEC & DEC-HEX 30010 ADD-49152:C-0 30020 READ AIT A-0 THEN END 30030 FORE ADD+C,AIC=C+1:GOTO 30 920

#20 30040 DATA 32,253,174,32,138,173 ,32,247,165,170,152,72,72,138,72

30050 DATA 169,36,32,210,255,104,32,30,192,104,32,43,192,104,32, 30060 OATA 192,104,32,43,192,96, 24,106,106,186,186,41,15,24,105,

48
50070 DATA 201,50,144,2,105,6,32
,210,255,96,234,234,234,32,115,0
50000 DATA 201,50,41,15,144,2,10
5,8,96,32,61,192,10,10,10,10
30090 DATA 133,35,32,61,192,101,3
35,133,35,96,32,115,0,201,36,240

30100 DATA 3,76,8,175,32,73,192, 133,34,32,73,192,165,34,166,35 30110 DATA 32,205,189,76,116,164 ,234,234,-1

### BBC FILL-IN

RES Pe

I have owned my BBC Model B computer for over eight months and have not experienced any problems with it until now. I discovered the problem when I accidentally used a recently-obtained "fill" routine on a screen full of text. When the routine encounters the text, the computer locks up, and I have to resort to the Break key, or it produces a variety of very strange error messages, depending on which graphic mode it is used in. The "fill" routine uses the Point command and it is the lines which contact this command which produce the error messages. To start the routine, I used the command Procfill (500,500). I would be pleased if you could tell me if the fault is in the programming, if it is a universal fault in all PS 1.2's or if it is just my computer at fault. Here is the offending program:

10 DEFPROCFILL (X%, Y%)

20 CLEAR

30 X = X%:Y = Y%

40 IF POINT (X,Y) = 0 THEN PLOT 69,X%,Y%

50 IF POINT ((X + 4),Y) = 0 THEN PROCFILL ((X + 4),Y)

60 IF POINT (X,(Y + 4)) = 0 THEN PROCFILL (X,(Y+4)) 70 IF POINT ((X - 4), Y) = 0 THEN

PROCFILL ((X - 4),Y) 80 IF POINT (X,(Y - 4)) = 0 THEN PROCFILL (X,(Y-4))

Darren Powell,

Thorne, Doncaster.

THE PROBLEM lies in the program, not in the operating system or your computer. For a start, you should not use Clear within a procedure as this strips the return address for exiting the procedure from the stack, so it can return to almost anywhere in the program.

The BBC Micro generates meaningless random error messages under certain circumstances, so the content of the messages you have generated is irrelevant. Your routine, even without the Clear, is probably the least sophisticated "fill" routine possible. As it is recursive, it is also very, very memory-hungry.

It probably consumes around 60 bytes every time it calls itself. When you try to "fill" on a page of text, more than half the screen is blank, so the number of self-calls will be huge, giving rise to the problems you've experienced. I suggest you delete the Clear, and only use your routine for filling relatively small shapes.

### COLOURED MAN

I have an Amstrad computer and am presently writing a program in Mode 1. I want to

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?

include a figure of a man, made | up of five user-defined graphic shapes. However, I want to mix colours within particular defined graphics and cannot figure out how to do this. Can it be done? M Smith,

Stoke-on-Trent.

MODE 1, AS you know, gives four colours but there is no way in Basic which I can discover which will allow more than one colour to be used for a user-defined graphic. Although this would doubtless produce a program which ran more slowly, you could user Line and Draw to construct your figure as these do allow you to do colour changes.

### WHICH MODEM?

I am looking for help on the subject of modems for the Electron. I am interested in buying one, but am not sure which are available.

Richard Rennie, West Calder, West Lothian.

I HAVE BEEN unable to locate any modems made specifically for the Electron. If you get an RS-423 interface for your Electron, you will then be able to hook your computer to any modem made for the BBC. In fact, with this interface, you'll probably be able to use any standard 1200 baud modem.

### CBM-64 SOUND

In a recent edition of Your Computer magazine I saw an advertisement for a "digital sound sampler" for the ZX Spectrum. I own a Commodore 64, and wonder if there are similar products available for it? Stewart Sadler, Tollesbury.

WHILE I have not been able to track down a sound sampler as such, I've discovered that many of the music synthesiser programs available for

the 64 give you the capability of generating many non-musical sounds. The Commodore Music Maker, which you might have seen, includes a small keyboard which actually sits on the Commodore's keys, and comes with driver software. If you want to generate speech, the cassette program from an American company, Big-Mouth, is available. There is also the plug-in speech module from Commodore called Magic Voice.

### VIC DISC DRIVE

I am a Vic-20 owner, and after a couple of years' computing I now wish to invest in a disc drive. The obvious choice is the Commodore drive, but this is fairly expensive.

Andrew McFarlane,

THE EASIEST route to follow is to buy an RS-232 interface for your Vic-20, which will give you the ability to choose from a very wide range of disc drives - and, incidentally, other peripherals as well.

### AMSTRAD COLOUR

I am considering buying an Amstrad CPC-464. However, there is one thing I have not been able to find out from the articles which have been printed on it. If I buy a green-screen monitor version, can I plug the computer into a colour television? If I can, will it produce a colour picture, or is the "colour circuitry" only provided with the colour version?

Anthony Hodgson, Sunderland

THERE IS only one type of Amstrad machine, in terms of its ability to produce a colour picture. The only difference is in the monitor provided with the one you buy. You cannot connect the CPC-464 up directly to a colour television. However, Amstrad make a modulator, costing around £30, for this purpose.

### AT LAST A 16K RAM PACK FOR YOUR C16

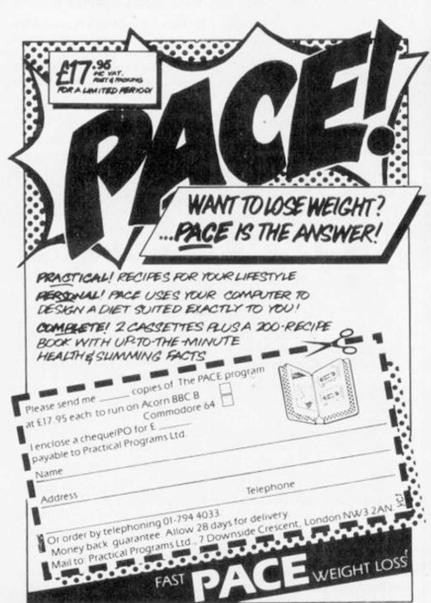
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MEMOTECH £12.75 EINSTEIN £12.75 IBM PCC £15.95 SPECTRUM interface 1 to RS 232 £9.75 SPECTRUM interface	1x2.5mm Jack plugs £2.20 6 Pin DIN Plug to 6 Pin DIN Plug £1.96 2x3.5mm Jack plugs to 2x3.5mm Jack plugs to £1.25	HOODS .95  #IBBON CABLE (Price per ft)  Grey Rainbow 9 way 13 24 10 way 15 28
1 to Centronics   E10.75	7 Pin DIN plug to 5 pin DIN plug £1.95 7 Pin DIN Plug to 3 pin DIN plug and 2 5mm Jack plug plug and 2 5mm Jack plug £2.25 7 Pin DIN plug to 7 Pin DIN plug to 2 Pin DIN plug £2.25	14 way 18 32 15 way 20 36 16 way 22 40 20 way 30 50 24 way 36 80 25 way 40 85 26 way 45 76
Pins 14 90p 16 £1.00 24 £1.40 28 £3.95	5 Pin Domino Piug to 5 pin Domino plug £1.95 Phono Plug to Coaxial TV Aerial plug 95p	34 way 80 80 37 way 85 85 50 way 70 90 50 way 95 61 25 60 way 61 10 61 40 64 way 61 15 61 50
40 £2.15  TELEPHONE CONNS  Surface master jack socket £3.75 Surface extn socket £2.50 Dual outlet adaptor £4.25	2x23 way (2x81)	BBC JOYSTICK DELUXE JOYSTICK for BBC MICRO. Fits directly
Line jack cord 3mtr E1.85 BT jack plug 48p 4 core cable per metre 15p All surface units shuttered BT approved.	Spectrum 28-way £1.50  MONITOR LEADS  BBC 6-pin to start plug £4.95 BNC plug to phone plug £2.95 OL to colour monitor £4.95	into BBC Micr analogue port
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Voted Peripheral of the Year the Microspeech, like the Speech 64, has an unlimited vocabulary programmed in BASIC or machine code. Many commercial games include speech output for these units and all sound is fed through your TV speaker.

Send your order without delay to AGF Hardware, Units G1 and G2, Ash Grove Industrial Park, Bognor Regis, West Sussex, stating whether for Spectrum or Commodore 64

Alternatively you can order by telephone using your ACCESS/VISA/DINERS CLUB card on 0243 823337 - ask for 'credit card' sales.

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Listing 1. 15 RESTORE 20: FOR a=USR "a" T USR "0"-1: READ b: PORE a,b. N 205 FOR #=500 TO 300 STEP -100
210 LET p=0: GO 5UB 1000: PRINT
#1; "SCORE: ";s; TAB 16; "HIGH: ";h
211 LET f=#: PRINT AT 7,23, "FUE
L";f,AT 12,23; "LIVES: "L!
212 PRINT AT 9,9; INK 2; "M", AT
213 LET d=8: LET l=5: LET l=5
214 RESTORE 60: LET reint (RNO.)
15): FOR a=1 TO 18: READ b,C: IF
b=50 THEN PAUSE C: GO TO 216
215 BEEP b,C+f
216 NEXT a: LET X=2: LET X=2: LET Y=2:
LET Y=X: LET X=12: LET Y=X: PAUSE
220 LET ch=152: LET X=X: LET Y
121 LET d=8: LET X=2: LET X=3:
LET y=X: LET X=12: LET X=12: LET Y
122 LET Ch=152: LET X=12: LET X=3
220 LET o=1: LET as = INKEY\$
230 IF y=9 AND y(12 THEN LET X=3
X(20 AND as = ") -2 (X) 12 AND as =
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IF Y(X) 1 AND Y(10 AND as = ")
IF Y(X) 1 AND Y(10 PRESS ANY KEY TO CONTINUE.

PRESS ANY KEY TO CONTINUE.

555 IF INKEY\$: "THEN GO TO 557

560 GO TO 205

560 GO TO 205

1000 BORDER 0: PAPER 0: CL5 : PR

INT USR 23760: INK 4

1015 PRINT INK 0; AT 10,0, ... PR

INT AT 0; 10; "——", AT 21, 10, "——", AT

10,0; "|"; AT 10,21; "|" ", "AT 1

1,21," "AT 10,21; "|" ", "AT 1

1030 FOR a=0 TO 10 STEP 2 PRINT

AT a,a; ", "AT a,21-a, ", "FOR b

=a+1 TO 9: PRINT AT a,21-a, ", "FOR b

=a+1 TO 9: PRINT AT a,21-b, "—", AT

1040 PRINT AT 21-a, a; ", "AT 21-a, ", "

", "NEXT b

1040 PRINT AT 21-a, a; ", ", AT 21-a, ", "

", "AT b,a; ", ", "AT b,21-a, ", "

", "AT b,a; ", ", "AT b,21-a, ", "

", "AT b,a; ", ", "AT b,21-a, ", "

", "AT b,a; ", ", "AT b,21-a, ", "

", "AT b,a; ", ", "AT b,21-a, ", "

", "AT b,a; ", ", "AT b,21-a, ", "

", "T b, ", ", "AT b,21-a, ", ", " NEXT

b. NEXT a

1045 INK 7: PRINT AT 2,23, "LEUEL

1050 RETURN

1100 PRINT AT 9, X; FLASH 1; BRIGH

HT 1; INK 2; PAPER 6; "#" IF USR

23807 THEN LET Li=1-1

1105 DATA 6,0,6,0,1,0,6,0,5

33.13.3,2,3,0,3,0,3,0,1,1,0

1110 IF LI THEN GO TO 210

1120 BORDER 2: PRINT INK 2; AT 9,

X; "\* "RESTORE 1105; FOR 3=1 TO

111: READ b,c: BEEP b,c+r: NEXT

11: READ b,c: BEEP B,c+r: NEXT

12: READ B,c: B,c-r: READ

13: READ B,c: B,c-r: READ

14: READ B,c: B,c-r: READ

15: READ B,c-r: READ

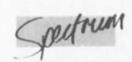
16: READ B,c-r: READ

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 to Your Computer exclusively.

### Dodgems

Julian Wood, Downham Market. Norfolk.



YOU CONTROL a white car running around a track of five lanes, trying to collect the yellow dots while avoiding the red computercontrolled car. Every so often the red car will drop a steering wheel - worth 50 points when collected. However, if you aren't quick enough, the red car will pick it up again. A dot is worth five points.

To make the game slightly more difficult, you have a limited amount of fuel. Once your fuel has run out, your car stops and it is only a matter of time before the red car crashes into you. When you crash you lose one of your three lives and when you have lost all your lives, a short tune is played, the game ends and you are invited to have another go. There is a high-score facility.

The amount of fuel changes from 500 to 400 to 300 units with each level completed. After three levels you receive a bonus number of points, the fuel returns to 500 units and the game becomes slightly harder. A level is completed when all the dots have been collected. At the beginning of each level, and also when you receive a bonus, the computer plays a short tune.

To enter Dodgems, first type in the Basic program in listing 1. Then enter a line 1 Rem followed by the letter "a" 384 times - or 12 lines' worth. This is used to hold the machine code. Then Run 9990 and carefully enter the decimal values in listing 2. In the left-hand column are the addresses and on the righthand side, in brackets, are the addresses and on the right-hand side, in brackets, are the checksum values. If you make a mistake, enter -1 and enter that line again.

After entering a line of five numbers, check the checksum value before entering the next line. When you have finished entering the machine code and are sure that everything is correct, delete lines 9990-9995 and save the program using

SAVE "DODGEMS" LINE 15

When the program is run, there is a short pause while the user-defined graphics are set up and then the game starts. I moves your car in a lane, O moves it out a lane. You can move in or out up to two lanes at once, as can the red car.

The program uses four machine code subroutines:

23760-prints a certain number of dots used in setting up the display

23807—the explosion sound-effects routine

23848-moves the white car, and also decreases and prints amount of fuel

24011-moves the red car

The routines use two Rom subroutines:

8141-executes a #2, thus allowing printing in the upper half of the screen #n can also be achieved by: LD A,n: CALL 8143

6683-prints a decimal number in the range 0-9999.

1135 IF INKEY\$ ... THEN GO TO 11 1137 IF INKEY :" THEN GO TO 113 7140 CLS : GO TO 200
9990 LET c=0: FOR 3=20760 TO 241
44 STEP S: LET P=C
9991 PRINT 3; --"; FOR b=0 TO 4
9992 INPUT d: IF d=-1 THEN LET C
=P: PRINT : LET 3=3-5\*NOT b: GO
TO 9991
9994 IF d:0 OR d:255 THEN BEEP .
5,-10: GO TO 9992
9995 POKE 3+b;d: LET c=c+d. PRI
NT TAB 6+b\*4;d: NEXT b: PRINT T
AB 25; "(";c;")": NEXT a

### Listing 2.

23790-215 62 32 215 23795-32 215 62 11 23800-12 62 21 135 23805-215 201 6 10 23815-35 124 254 64 23825-213 68 77 32 23830-0 17 32 0 23835-16 253 9 1	0 (455) 6 (816) 152 (816) 16 (1832) 26 (852) 10 (3144) 56 (3730) 215 (4579) 32 (4579) 32 (4579) 32 (5635) 32 (5144) 32 (7879) 9 (7470) 9 (7823)
---	---

23045-481135 645-481135 530450-7821135 530450-7821135 530450-7821135 530450-7821135 530450-7821135 530450-11545 530450-1	949978168881186518486786619111 8888	93	225	4 5 3 4 5 1 5 7 7 7 7 5 5 5 5 6 8 5 8 6 8 6 8 6 8 6 8 6 8 6 8	(11446) (111484) (111986) (11986) (11986) (11986) (11986) (11986) (11986) (11986) (11986) (11
23995-221	126	96	131	149	(24310)
23985-52	7 7	215	52	215	(55593)
23960-221	116 79 215	75 62 62	205	16 215 215	(19894) (20359) (21048)
23940-16 23945-56 23950-205	37 10 16	52 37 93	9 229 225	32	(18246)
23920-45 23925-1 23930-48	205 44 10	16 62 36	11 229	187	(16190) (16495)
23905-186	56 93	32	4.4	205	(15254)
23899-215	110	94	103	69	(13539)
23875-215	62	55	215	215	(12509)
23869-221	70	26	78 11 112	221	(10547)
23845-254	92	201	221	42	(9202)
	845-45 -758113 -758	23845-254 433855-2621 783855-2621 78538655-123 233876-215 223	20045-254 4 201 20145-254 92 121 20155-721 92 121 20255-721 92 222 20255-721 92 222 20255-721 92 222 20255-721 16 222 20255-721 16 222 20255-721 16 222 20255-721 16 222 20255-721 16 222 20255-721 16 222 20255-721 16 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-721 17 222 20255-722 202	25845-254 4 201 221 74 221 221 221 221 221 221 221 221 221 22	20845-254 20150-75 221 42 20150-75 221 78 22

### SOFTWARE File

### (continued from previous page)

24015-42 75 92 1 74 (26761) 24020-0 221 9 221 94 (27366) 24025-118 221 95 126 221 (26073) 24030-110 82 221 102 89 (26682) 24030-110 82 221 102 89 (26682) 24040-45 205 16 93 32 (29395) 24045-43 44 52 11 138 (29743) 24050-48 7 44 205 16 (30063) 24050-11 137 48 18 37 (30589) 24060-11 137 48 18 37 (30589) 24065-229 107 205 16 93 (31239)	24080-229 107 205 16 93 (32558) 24085-225 32 1 37 221 (33074) 24090-117 82 221 116 89 (32599) 24095-265 16 93 79 62 (34154) 24100-16 215 221 126 31 (34763) 24105-245 215 62 22 215 (35522) 24110-122 215 123 215 22 215 (36943) 24110-24 62 157 215 62 (37441) 24120-2 62 157 215 62 (37951) 24130-221 54 31 9 62 (36319) 24140-113 31 195 180 93 (39378)
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### Carnival Shootout

Tony Loton, Stoke-on-Trent, Staffordshire. Amstrad

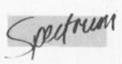
CARNIVAL SHOOTOUT is an arcade-style game for the Amstrad CPC-464. It is about 6K long and is written partly in Basic and partly in machine code. Typing the data in wrongly could cause the program to crash so it is best to save the program on tape before running

```
10 ENV 1,15,1,1:ENT 1,15,1,1:ENV 2,15,-1,1:RESTORE
20 REM CARNIVAL
30 FOR I=38500 TO 38546: READ A: POKE I, A: NEXT
40 DATA 221 , 126 , 0 , 38 , 0 , 61 , 111 ,205 , 26 , 188 , 6 , 8 , 125 , 50 , 44 , 151 , 124 , 50 , 45 , 15  
1 , 126 , 84 , 93 , 35 , 197 , 1 , 79 , 0 , 237 , 176 , 193 , 43 , 119 , 58 , 45 , 151 , 103 , 58 , 44 , 151 , 111 , 205 , 38 , 188 , 16,222,201  
50 FOR 1=38400 TO 38451:READ A:POKE I,A:NEXT
60 DATA 221,126,0,38,0,61,111,205,26,188,6,8,125,50,44
,151,124,50,45,151,17,79,0,237,90,126,84,93,43,197, 1
,79,0,237,184,193, 35,119,58,45,
151,103,58,44,151,111,205,38,188,1
70 FOR I=39000 TO 39073: READ A: POKE I, A: NEXT
70 FOR I=39000 TO 39073:READ A:POKE I,A:NEXT
B0 DATA 17 , 64 , 156 , 221 , 110 , 0 , 221 , 35 , 2
21 , 102 , 0 , 237 , 90 , 68 , 77 , 197 , 221 , 35
, 221 , 110 , 0 , 221 , 35 , 221 , 102 , 0 , 17 , 0
, 0 , 205 , 29 , 188 , 193 , 221 , 35 , 221
90 DATA 94 , 0 , 221 , 35 , 221 , 86 , 0 , 237 , 90 ,
89 , 80 , 6 , 4 , 14 , 16 , 26 , 119 , 19 , 35 , 16 ,
250 , 6 , 4 , 43 , 43 , 43 , 43 , 205 , 38 , 188 , 13
, 62 , 0 , 185 , 194 , 139 , 152 , 201
100 SYMBOL AFTER 97:SYMBOL 97,0,0,48,88,248,184,4,28:S
YMBOL 98,28,14,7,61,88,36,8:SYMBOL 99,0,0,0,0,0,0,5
6,96:SYMBOL 100,96,96,112,120,0,0,0
110 SYMBOL 101,0,0,12,26,31,29,32,56:SYMBOL 102,56,56,
112,224,188,26,36,16:SYMBOL 103,0,0,0,0,0,0,28,6:SYMBO
    104,6,6,14,30,0,0,0,0
120 SYMBOL 105,0,48,16,48,32,32,65,126:SYMBOL 106,127,126,127,126,60,0,0,0:SYMBOL 107,0,128,64,64,128,0,0,0:
SYMBOL 108,0,0,0,0,0,8,8,24
130 FOR I=40000 TO 40063:READ A:POKE I,A:NEXT
 140 DATA 0,48,0,0,0,16,0,0,0,16,0,0,0,16,0,0,0,16,0,0,
160,0,0,240,160,0,0,240,160,0,0,80,0,0,0,80,0,0,0,240
  160,0,0,240,160,0
 170 SC%=0:GOSUB 520
 180 MODE 0: PAPER 0: CLS: INK 0,3: BORDER 3: INK 1,0: INK 2,
26: INK 3,20: INK 4,2: INK 5,0: INK 6,1: INK 7,24: INK 15,18
 190 SHX=0:FOR i=41000 TO 41063:POKE i,0:NEXT
200 SL=38500:SR=38400:SPRITE=39000
210 PEN 1:PRINT:PRINT:PRINT "a a a a a a a a a b b b b b b b b b":PRINT CHR$(22)+CHR$(1):PEN 2:LOCATE 1,
3: PRINT"cccccccdddddddddd": PRINT
  CHR# (22) +CHR# (0)
220 PEN 6:PRINT:PRINT " e e e e e e e e e f
 f f f f f":PRINT CHR$(22)+CHR$(1):LOCATE 1,7:PEN 2:PRI
NT" g g g g g g g g g h h h h h h h h h h":PRINT CHR $(22) +CHR$(0)
230 FEN 7:PRINT "i i i i i i i i i
 230 FEN 7:PRINT "i i i i i i i i i j j j j j j j j j j":PRINT CHR#(22)+CHR#(1):PEN 2:LOCATE 1,11:PRINT"k
  k k k k k k k k l 1 1 1 1 1 1 1 1 1 1 1":PRINT CHR#(22)+C
240 LOCATE 1,25:PEN 3:PRINT" CARNIVAL SHOOTOUT";
250 X%=40:PEN 15:B%=35
260 CALL SL,3: CALL SL,4: CALL SR,7: CALL SR,8: CALL SL,11
: CALL SL.12
270 IF INKEY(71)=0 AND F=0 AND X%>0 THEN GOSUB 330:X%=
```

280 IF INKEY (63)=0 AND F=0 AND X%(72 THEN GOSUB 330:X% =X7.+2 290 IF INKEY(47)=0 AND F=0 THEN F=1:Y%=7:BX%=X%:SOUND 2,0,0,15,2,0,10:8%=8%-1:LOCATE 9,1:PRINT B%:IF 8%<0 TH EN 440 300 CALL SPRITE, X%, 23, 0 310 IF F>0 THEN GOSUB 350 320 GOTO 260 330 CALL SPRITE, X%, 23, 1000 340 RETURN 350 Y%=Y%+32:IF Y%>190 THEN F=0:CALL SPRITE, BX%, Y%-32. 1000: RETURN 360 IF Y%>39 THEN CALL SPRITE, BX%, Y%-32, 1000 ELSE CALL SPRITE, BX%, Y%-16, 1000 370 CALL SPRITE, BX%, Y%, 64 380 IF TEST(X%\*8+14,Y%\*2+10)<>0 THEN 400 390 RETURN 400 CALL SPRITE, BX%-2, Y%+16, 1000: CALL SPRITE, BX%+2, Y%+ 16,1000:SH%=SH%+1:SC%=SC%+RND\*10+10 410 SOUND 1,60,0,0,1,1:F=0:CALL SPRITE, X%, Y%, 1000 420 IF SH%=30 THEN 480 430 RETURN 440 CLS:PEN 1:PRINT "YOU RAN OUT OF BULLETS." 450 PRINT: PRINT"YOU SCORED: "; SC% 460 PRINT:PRINT" HIT ENTER TO PLAY" 470 IF INKEY(18)<>0 THEN 470 ELSE RUN 480 CLS:PEN 1:PRINT"YOU SHOT ALL THE TARGETS !WELL 490 PRINT:PRINT "YOU SCORED:";SC% 500 PRINT:PRINT "PRESS ENTER TO CARRY 510 IF INKEY(18)<>0 THEN 510 ELSE 60TO 180 CARRY ON. " 520 MODE 1: PAPER 0: CLS: INK 0,3: BORDER 3: INK 1,0: INK 2, 26: INK 3,18: ENV 5,30,0,2,1,-15,1 530 PEN 1: PRINT "a a a a a a a a 540 PEN 3: PRINT " 560 PRINT CHR\$(22)+CHR\$(0) 570 PEN 3: PRINT: PRINT" YOU HAVE TO SHOOT AS MANY OF THE MOVING TARGETS AS POSSIBLE. THERE ARE 30 TO HITAND YO HAVE 35 BULLETS SO AIM WITHCARE." 575 PRINT: PRINT "THE NUMBER OF BULLETS YOU HAVE LEFT I S SHOWN AT THE TOP OF THE SCREEN." 580 PEN 2: PRINT: PRINT "KEYS TO USE: -Z-LEFT X-RIGHT SPACE-SHOOT" 590 PAPER 1:PEN 0:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT" HIT ENTER TO START 600 SL=38500:SR=38400:RESTORE 640 610 CALL SL,1:CALL SL,2:CALL SR,4:CALL SR,5 620 READ N,D:IF N=-1 THEN RESTORE 640 ELSE SOUND 4,N,D INKEY(18)=0 THEN RESTORE: RETURN ELSE 610 640 DATA 95,4,106,4,119,4,106,4,95,8,106,2,119,2,127,2 ,142,4,159,4,142,4,127,8,142,2,159,2,179,2,190,4,159,4,119,4,127,4,106,4,80,4,95,16
650 DATA 95,4,106,4,119,4,106,4,95,8,106,2,119,2,127,2,142,4,159,4,142,4,127,8,142,2,159,2,179,2,190,4,159,4 ,119,4,127,4,106,4,80,4,119,16,-1,-1

### Colours

A D Grundy, Merton, London.



THE PROGRAM sets out to prove that the Spectrum can show more than the usual eight colours. It does this by picking up the letter to be displayed and subtracting it byte by byte from the sprite graphic.

```
5002 LET k$="1234567": LET i$="6 per ";paper 260066": LET p$="1702332": FOR m 7000 REM show line l$ =1 TO 7 5004 LET high=VAL k$(m TO m): LE 7010 CLS: INK ink PAPER paper Ink=VAL i$(m TO m): LET paper= LET l$=" Press Y to show with vAL p$(m TO m): LET paper= LET l$=" Press Y to show with vAL p$(m TO m) S006 LET z=0: GO SUB 9400: GO SU 7020 GO SUB 7200 B 9500 PRINT INK ink, PAPER pap 7030 IF INKEY$="Y" OR INKEY$="Y" er: AT high, i; "A"; "ink ":ink;" p THEN GO TO 7100 aper ":paper 7040 GO SUB 7300: GO TO 7030 F008 NEXT m 7050 REM **show pink text**

5008 NEXT m 7050 REM **show pink text**

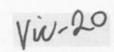
5000 INPUT "If Colour ok press Y" THEN 7100 FOR d=1 TO 30 LET z=8*(-3) LET ink=6: LET paper=1: GO TO 70 +CODE l$(d TO d)): GO SUB 9400 GO SUB 9500: GO SUB 9600 PRINT S010 INPUT "ink ";ink INPUT "pa AT 10,d;"A";AT 11,d;"B". NEXT d
```

### SOFTWARE File

TO 10: IN 9000 REM \*big\* GO TO 8800: REM show effect of filling in 7200 FOR d=1 TO 30 LET z=8+(-32 +CODE (\$(d TO d)); GO SUB 9400 GO SUB 9500: PRINT AT 10,d;"A";A T 11,d;"B"; NEXT d; RETURN; REM show line of print 7300 FOR (=2 TO 30: BEEP .25,((C ODE (\$(f TO f))/4): NEXT f: RETURN : REM make a noise 3800 REM ++ BIG LETTERS ++

### Dominoes

J Ireland. Canterbury. Kent.



DOMINOES NEEDS a minimum 8K expansion. There are three variations on the game against the computer. All instructions are included with the game.

There are three versions. Block, Draw and

Bergen. Each version has slightly different rules for scoring. In Block, or Draw you lose points for what is in your hand at the end. In Bergen you gain points for matching ends of

```
1838 00SUB1178 00SUB1288:SD=SD+1:HT=2:RETURN
1848 IFBY=8THENPRINTD1#D#"NO TILES IN YMRD.":FORI=1703888:NEXT:GOT0688
1858 IFG=3RNDBE=1THENPRINTD1#D#"YOU CRN CNLY DR9N ONCE":FORI=1703888:NEXT:GOT068
        10 PRINT"3" PORE36879.25
20 DIMMC(28.1) PK(20.1) CK(20.1) CPK(6)
38 DE="#M00000000" CLE="
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0
1068 IFG=ITHENPRINTDISDS*NO DRAW IN THIS GRME." FORI=1703000 NEXT GOTG600
1070 IFG=ZRWDBY=ZTHENPRINTDISDS*THE YARD IS FROZEN. "FORI=1703000 NEXT GOTG600
1080 BE=1 PT=PT+1 PX(PT.0)=RX(BY.0) PX(PT.1)=RX(BY.1) BY=BY-1
1090 KI=DL KZ=DR
1100 GOSUBIT70 GOSUBIZ00 GOTG600
1110 IF(G=ZRWDBY>2)OR(G=ZRWDBY>0FNDBE=0)THEN1130
" CIR-CLE+CLE+CLE+CLE+CLE BIE-DE+CL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             1100 GOSUBILTW GOSUBILZOG GOTDESG

1110 IF (G-ZPM-DBY)2)OR(G-3MMCDBY)ORNDBE=0)THEN1130

1120 GOTO1140

1130 FRINTDIDE*YOU MUST DRAW! "FORI=1TO3000 NEXT GOTDESG

1140 IFG-3PMCDBY)OTHEN1160

1150 FR-PRH-1 IFFR-ZTHEN2000

1150 FR-LL KZ-DR WIT=2 GOTDE70

1170 FRINT*900FCL# FRINT*9000FSPC(10)PT FRINT*8000FSPC(14)CT FRINT*8000FSPC(15)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       00T01328
1378 IL=-IL:PL=PL+IL-22:POKEPL:A+176:POKEPL+C0;CL:PL=PL+IL:POKEPL:B+176:POKEPL+C
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       1370 IL=-IL PL=PL+IL-22 POMEPL.A+176 POMEPL+CO,CL PL=PL+IL POMEPL-E+176 POMEPL-CO.CL  
1380 LL=0 GOTO1310  
1380 LL=0 GOTO1310  
1380 REM ##PUT TILE ON RIGHT OF, CHAIN®6  
1390 PAHO RD=0 IFAHSTHEIRED=1  
1400 IFRLTHEN1490  
1410 IFRETHEN1490  
1410 IFREEN (PR)=96THENFOMEPR+CO.CR IFA+STHENFOMEPR-22.B+176 FOMEPR-22+CO.CR GOTO1+50  
1430 IFFEEN (PR+IR)=96THENFOMEPR+22.B+176 FOMEPR+22+CO.CR FR=FR+44 RL=2 GOTO1460  
1440 PR+FR+IR POMEPR.B+176 FOMEPR+CO.CR  
1450 PR=PR+18 POMEPR.B+176 FOMEPR+CO.CR  
1470 PR= RETURN  
1480 PR+PR+22-IR  
1490 IFRL=3THEN1510  
1500 POMEPR A+176 FOMEPR+CO.CR POMEPR+22.B+176 FOMEPR+22+CO.CR PR=PR+44 PL=RL+1  
GOTO1460  
1410 PR= RETURN  
1450 PR+PR+22-IR  
1490 IFRL=3THEN1510  
1500 POMEPR A+176 FOMEPR+CO.CR POMEPR+22.B+176 FOMEPR+22+CO.CR PR=PR+44 PL=RL+1  
GOTO1460
     350 PRINT"YOU START" WT=1 00SUBE80 00SUB650 00SUE770 00T0670
360 PRINT"BERGEBBBBBT;
370 IFDD*SIDEARFINT"YOU START, "WT=1 GOSUB600 GOSUB650 00SUE770 GOTD670
380 PRINT"1 START, "WT=2 00SUB600 GOSUB650 00T01530
390 PRINT"1 THE(0) "WEBERGEN"
480 PRINT"1 THE(0) "WEBERGEN"
110 C=7 FOR1=1TOPT R=PX(I,0) B=PX(I,1)
120 IFR=SRIGRCTHENC=R P1=1
39 NEXT
48 D=7 FOR1=1TOCT R=CX(I,0) B=CX(I,1)
50 IFR=SRIGRCTHEND=R C1=1
60 NEXTI
   48 B=7 FOR1=1TOCT A=CX(1.0) B=CX(1.1)
50 IFA=BRHGHCDTHEND=A CI=1
160 NEXT
160 NEXT
170 IFC=7HHDD=7THENEPRINT*NO DOUBLE IN PLAY....ME*LL START BORIN*
480 IFC=7HHDD=7THENEPRINT*I HAVE NO DOUBLE OTTO520
500 IFD=7HHDN=FRINT*I HAVE NO DOUBLE— GOTO520
510 PRINT*NOU MAYE THE LOWEST DOUBLE— THE*PX(P1.0)**,*PX(P1.1)
520 PRINT*NOU MAYE THE LOWEST DOUBLE— THE*PX(P1.0)**,*PX(P1.1)
530 PRINT*NOU MAYE THE LOWEST DOUBLE— GOTO570
550 PRINT*NOU MAYE THE PX(P1.0)**,*PX(P1.1)
570 PRINT*NOU MAYE THE*PX(P1.0)**,*PX(P1.1)
570 PRINT*NOUNDOUBLE**
570 PRINT*NOUNDOU
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             GOTO1460
1510 IR=-IR FR=PR+IR-22 POKEPR.R+176 POKEPR+CO.CR PR+FR+IR POKEPR.1+176 FDECETTO
0.CR
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               0.CR
1520 PL=0 GOTD1450
1520 PEM ##CCPPUTER'S TURNE#
1530 PRINT"#" IFSETHENISTO
1540 J=0 FORF=ITOCT R=CX(F,0) B=CX(F,1)
1550 IFR:BJJTHENJ=A+B I=F
1550 IFR:BJJTHENJ=A+B I=F
1550 IEXT R=CX(I,0) B=CX(I,1) F=1 BL=H GOSUB2048 GOSUB1398 GOTD2000
1570 FORFI=0TOS CPX(I)=0 NEXT FORJ=ITOCT FORI=0TOS CPX(I)=CPX(I)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(CX(J,0)=1)-(
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      1560 NEXT NACX(1,0) B=CX(1,1) F=1 DL=H GGSUB2048 GGSUB1398 GDTI
1570 FORI=0TOS CPX(1)=0 NEXT FORJ=1TOCT FORI=0TOS CPX(1)=CPX(1)
1580 NEXT NEXT
1590 NEXT NEXT
1590 FOCOGRSDCSTHEN(689
1600 FORF=1TOCT A=CX(F,0) B=CX(F,1)
1610 IF(AC)DLOREC)DE/BRUCA-DEFORDED bloTHEN(680
1620 J=(AP=DLOREC)DE/BRUCA-DEFORDED bloTHEN(680
1630 IF,THENDNIJGOTO1878 1888,1890,1990
1640 IFR=DEFNDBEDTNEN(1870
1650 IFFA-DEFNDBEDTNEN(1870
1650 IFFA-DEFNDBEDTNEN(1870
1670 IFFA-DEFNDBEDTNEN(1870
1670 IFFA-DEFNDBEDTNEN(1870
1670 IFFA-DEFNDBEDTNEN(1870
1770 IFFA-DEFNDBEDTNEN(1870
1770 IFFA-DEFNDBEDTNEN(1870
1770 IFFA-DEFNDBEDEN(1870
1770 IFFA-DEF
        768 GOTGITE
770 FRINTDIBISTMENTCH DONLDT:
770 FRINTDIBISTMENTCH DONLDT:
780 GETHS IFRICTOTORAL)"6"THENTSE
798 PRINTH:
790 GETHS IFRICTOTORAL)"6"THENTSE
800 GETHS IFRICTOTORAL)"6"THENTSE
820 FORF-ITOPT COMIC, FOR DAMAGE, 1) IFRICANNOD-DORKC-BANDD-A-THENSSE
820 FORF-ITOPT COMIC, FOR DAMAGE, 1) IFRICANNOD-DORKC-BANDD-A-THENSSE
830 FESTIF FRINTDIBISTOUD DON'T HAVE IT!" FORI-ITOZOGO NEXT IFSD-OTHENF7E
840 KETURN
850 IFRIDAND-HONGSUBIZSE DRAM GOTGIBLE
850 IFRIDIBISTHAT MON'T MATCH!" FORI-ITOZOGO MEXT RETURN
870 PRINTDIBISTHAT MON'T MATCH!" FORI-ITOZOGO MEXT RETURN
870 IFRIB-DORG LEDRANDG-SAOPSD-THENSSE
890 IFRIB-SOKUL-EDRANDG-SAOPSD-THENSSE
890 IFRIB-SOKUL-EDRANDG-SAOPSD-THENSSE
890 IFRIB-SOKUL-EDRANDG-BRITHENSSE
       900 FYAM-DEPORTERNOVERSULHEDM-SKYTHERGEN
910 GOTO960
920 FRINTDIBUSTAT WHICH END (L OR R)?"
930 GETHS IFMAC "L"HEDMSC"R"THERGEN
940 IFMST"L"THERMST"R"THERGEN
950 FM-DK-C*(D-DL) -C*(D-DL) D*-D*(C-DL) -C*(D-DL) GOTO990
950 FM-DK-THERGEN
950 FM-DK-THERGEN
950 C=R R=E E=C IFM-DKTHEN1808
950 GOSUBIZED GOTO1818
1018 PT-PT-1 FORJ-FTOPT FX(J,8)-PX(J+1,8) PX(J,1)-PX(J+1,1) NEXTJ
1028 IFSD)08NDG=3RNDDL=DKTHENFS-PS+2 GOSUBZ858 IFLDORPDTHENPS*PS+1
```

(continued on next page)

# (Continued from previous page) 1950 PH-PH-1 ITPR-2THER2080 1950 PH-PH-1 ITPR-2THER208

### Sound experimenter

Edward Upsdell, Thonex, Switzerland.



THIS PROGRAM is for an Atari with at least 32K of memory. It aims to help in understanding sound on the Atari and experiment with the sound.

Type in the program and run it. You should see something like figure 1.

To use sound register 0 type 0, hit Return, type REG, and hit Return. The rest is basically the same. Type in the number, hit Return, command, Return. This is used for the REG, FRE, DIS, VOL commands. Next is the FRC command. It does not have to be preceded by a number. Its function is to produce a click from the TV. A value of one in this place means on and a zero signal that it is off. The first eight lines, B7 to B0, are the bits

in the AUDCTL register. To change bit seven to one, type B7, Return. To return it back to zero again, type B7, Return. These changes are technical and give no indication on what the sound will be like. It is best to experiment. Enough to say that using B0 through B4 turns on both sound channels associated with B7.

To hear the sound type in the register number, press Return, type in CH and hit Return again. It is possible is listen to all four channels at once. To turn off the sound type in Off and hit Return. The sound must be off to change one of the parameters. When you want to look at the sound statements to write them down for future reference, type in SDIS and hit Return. This will show the numbers for all four channels. When you use this sound in one of your own programs just type in the same numbers.

If any of the eight bits have a one beside them then in order to view the sound you must type in PDIS. This prints out the Poke statements for that sound. The SDIS command will not give you the full information. Again, when you went to use this sound, just copy the Poke statement into your program.

Figure 1.

**PDIS** 

AUDCTL (REG)ISTER 4

9 BIT POLY:(B7):0 clock Ch.0 w/l.79 MHz:(B6):0 clock Ch.2 w/l.79 MHz:(B5):0 clock Ch.1 w/Ch.0:(B4):0 clock Ch.3 w/Ch.2:(B3):0 clock Ch.0 w/Ch.2HiP:(B2):0 clock Ch.1 w/Ch.3HiP:(B1):0 15 kHz:(B0):0

SOUND (REG)ISTER: (DIS)TORTION: (FRE)QUENCY: (VOL)UME:

X: D: ? USABLE COMMANDS: REG DIS FRE FRC VOL OFF CH SDIS

```
1100 POSITION 2,10:7 "
1110 POSITION 2,11:7 "
10 REM INCLUDENCE STREET
                                                                                                         (DIS) TORTION: "
                                                                                                                                      OSITION 30,7:2 S(4,1):GOSUB CLD
                                                                                                                                      2067 IF IN%="BO" THEN S(4,0) = NOT (S(4,0)):P

OSITION 30,8:7 S(4,0):GOSUB CLD

2070 IF IN%="PDIS" THEN GOSUB PDIS

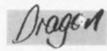
2072 IF IN%="SDIS" THEN GOSUB SDIS
20 REM #SOUND EXPERIMENTER#
                                                                                                           (FRE) QUENCY:
25 REM 1 BY 1
30 REM 1 EDWARD UPSDELL 1
                                                                   1120 POSITION 2,12:2 "
                                                                                                         FORCE OUTPUT:"
                                                                  1126 POSITION 2,13:7 " (VOL)UME:"
1128 POSITION 2,14:7 "X:"
1130 POSITION 2,15:7 "D:"
1140 POSITION 2,16:7 "USABLE COMMANDS:":POSI
40 REM #
50 REM # COPYRIGHT(C)1984 #
                                                                                                                                       2980 IF FAIL=1 THEN GOSUB BUZZ
2989 FAIL=0
80 DIM S(5,8), IN$(50), SP$(35)
                                                                   TION 2,17:? "REG DIS FRE FRC VOL OFF CH PDIS
                                                                                                                                       2990 NEXT 727
85 SP$="
                                                                    SDIS"
                                                                                                                                       5000 REM REG
 REM 35 SPACES
                                                                   1500 GOSUB START
                                                                                                                                      5010 IF A<0 OR A>3 THEN FAIL=1:G0T0 5088
5020 IF A>0 OR A<4 THEN POSITION 21,9:7 A
                                                                   2000 REM JUMP TABLE
2008 FOR ZZZ=1 TO 2 STEP 0
90 FOR 1=0 TO 8:FOR J=0 TO 5:S(J,1)=0:NEXT J
                                                                                                                                      5030 C=A
                                                                   2010 POSITION 5,15:POKE 752,0:INPUT IN$:POKE
100 REG=5000:DIS=5100:FRE=5200:FRC=5300:OFF=
                                                                                                                                       5040 GOSUB REGDIS
5400
                                                                    752.1
                                                                                                                                       5088 GOSUB CLD: GOSUB CLX
                                                                   2020 TRAP 2040; A=VAL (IN$); TRAP 40000
102 CLD=5900:CLX=6000:VDL=6100:PDKAUD=6200:C
                                                                                                                                      5090 RETURN
                                                                   2030 POSITION 5,14:7 A:GOSUB CLD
2040 IF IN%="REG" THEN GOSUB REG
2042 IF IN%="DIS" THEN GOSUB DIS
H=6300:START=6400:REGDIS=6500:BUZZ=6600
104 PDIS=6700:SDIS=6800:EDIS=6900
1002 GRAPHICS 0:PDKE 752,1
                                                                                                                                      5110 IF A<0 OR A>14 THEN FAIL=1:60T0 5180
5112 IF INT(A/2)-A/2<>0 THEN FAIL=1:60T0 518
1008 POSITION 2,0:7 "AUDCTL (REG)ISTER 4"
1010 POSITION 2,1:7 " 9 BIT POLY:
                                                                   2044 IF IN$="FRE" THEN GOSUB FRE
                                                                  2044 IF IN$="FRE" THEN GOSUB FRE
2046 IF IN$="FRC" THEN GOSUB FRC
2048 IF IN$="OFF" THEN GOSUB OFF
2049 IF IN$="CH" THEN GOSUB CH
2058 IF IN$="VOL" THEN GOSUB VOL
2060 IF IN$="B7" THEN S(4,7) = NOT (S(4,7)):F
                                            9 BIT POLY: (
                                                                                                                                      5120 IF A=0 THEN D1=0.
                                                                                                                                      5121 IF A=2 THEN D1=32
1020 POSITION 2,2:7 "clock Ch.0 w/1.79 MHz: (
                                                                                                                                       5123 IF A=6 THEN D1=96
1030 POSITION 2,3:? "clock Ch.2 w/1,79 MHz:(
                                                                  OSITION 30,1:? 5(4,7):GOSUB CLD
                                                                                                                                      5125 IF A=10 THEN D1=160
5126 IF A=12 THEN D1=192
1040 POSITION 2,4:7 "
                                                                         IF INS="86" THEN S(4,6) = NOT (S(4,6)):P
                                 clock Ch.1 w/Ch.0:(
                                                                  OSITION 30,2:7 S(4,6):GOSUB CLD
2062 IF INS="BS" THEN S(4,5) = NOT (S(4,5)):P
                                                                                                                                      5127 IF A=14 THEN D1=224
5130 POSITION 21,10:? A
1050 POSITION 2,5:2 "
                                 clock Ch. 3 w/Ch. 2: (
                                                                  OSITION 30,3:? S(4,5):GOSUB CLD
2063 IF IN$="B4" THEN S(4,4)= NOT (S(4,4)):P
                                                                                                                                       5140 S(C,1)=D1:S(C,5)=A
1060 POSITION 2.617 "clock Ch.O w/Ch.2 HiP: (
                                                                                                                                      5170 S(C.8)=A
                                                                  OSITION 30,4:7 S(4,4):GOSUB CLD
2064 IF IN$="83" THEN S(4,3)= NOT (S(4,3)):P
                                                                                                                                       5180 GOSUB CLD:GOSUB CLX
1070 POSITION 2.7:? "clock Ch.1 w/Ch.3 HiP: (
                                                                                                                                      5190 RETURN
                                                                  OSITION 30,5:7 5(4,3):60SUB CLD
                                                                                                                                       5200 REM
1080 POSITION 2.8:2 "
                                                                   2065 IF IN4="82" THEN S(4,2)= NOT (S(4,2)):P
OSITION 30,6:? S(4,2):GOSUB CLD
                                                                                                                                      5210 IF A<0 DR A>255 THEN FAIL=1
                                                                                                                                       5218 POSITION 21,11:2
1090 POSITION 2,9: " SOUND (REG) ISTER: "
                                                                   2066 IF INS="B1" THEN S(4,1)= NOT (S(4,1)):P
                                                                                                                                      5220 POSITION 21,11:7 A
```

### SOFTWARE File

5230 S(C,2)=A	6290 RETURN	6705 GDSUB EDIS
5280 GOSUB CLD: GOSUB CLX	6300 REM CH	6710 POSITION 2,22:7 "POKE 53768, ";SUM
5290 RETURN	6310 GOSUB POKAUD	6720 POSITION 20,18:7 "POKE 53761, ";S(0,1
5300 REM	6320 IF A=0 THEN POKE 53761,S(0,1)+S(0,4):PD	S(0,4):POSITION 2,18:7 "POKE 53760, ";S(0,)
5310 IF A=0 THEN S(0,3)= NOT S(0,3)	KE 53760,S(0,2)	6730 POSITION 20,19:7 "POKE 53763, "18(1,1)
5320 IF A=1 THEN S(1,3)= NOT S(1,3)	6322 IF A=1 THEN POKE 53763, S(1,1)+S(1,4):P0	S(1,4):POSITION 2,19:7 "POKE 53762, ";S(1,2
\$330 IF A=2 THEN \$(2,3) = NOT \$(2,3) \$340 IF A=3 THEN \$(3,3) = NOT \$(3,3)	KE 53762,S(1,2)	6740 POSITION 20,20:? "POKE 53765, ":S(2,1)
5340 IF A=3 THEN S(3,3) = NOT S(3,3)	6324 IF A=2 THEN POKE 53765, S(2,1)+S(2,4):PO	S(2,4):POSITION 2,20:? "POKE 53764, "1S(2,2
5350 POSITION 21,12:? S(C,3)	KE 53764, S(2,2)	* 6750 POSITION 20,21:? "POKE 53767, ";S(3,1)
5380 GOSUB CLD	6326 IF A=3 THEN POKE 53767, S(3,1)+S(3,4):PO	
5390 RETURN	VE 57744 677 21	6780 GDSUB CLD
5400 POKE 53761.0:POKE 53763.0:POKE 53765.0:	6380 GOSUB CLX:GOSUB CLD:GOSUB REGDIS	6790 RETURN
POKE 53767.0	6390 RETURN	6800 REM SDIS
5480 GOSCIR CLD	ALOU REN START	5905 GOSUB EDIS
5370 RETURN 5370 RETURN 5400 POKE 53761,0:PDKE 53763,0:PDKE 53765,0: POKE 53767,0 5400 GDSUR CLD 5900 REM 5910 POSITION 5,15:7 SP\$(1,20) 5990 RETURN 6000 REM	6410 FOR INS TO BEPOSITION 30, IT? "O"INEXT I	5810 POSITION 2,19:? "SOUND 0, ":S(0,2):".
5910 POSITION 5,15:7 SP\$(1,20)	6490 RETURN	;S(0,8);", ";S(0,4)
5990 RETURN	6490 RETURN 6500 REM REGDIS 6505 POSITION 21,12:7 " "	6820 POSITION 2,20:7 "SOUND 1, ";S(1,2);",
6000 REM	6505 POSITION 21,12:7 " "	;S(1,8);", ";S(1,4)
6010 POSITION 5,14:? SP\$(1,21):A=0	6506 POSITION 21,12:7 S(C,3)	6830 POSITION 2,21:7 "SOUND 2, ";S(2,2);",
6090 RETURN	6507 POSITION 21,11:7 " "	;S(2,8);", ";S(2,4)
6100 REM	6508 POSITION 21,11:? 5(C,2)	6840 POSITION 2,22:7 "SOUND 3, ";S(3,2);",
6110 IF A(0 OR A)15 THEN FAIL=1:60TO 6180	6520 POSITION 21.10:2 " "	15(3,8):", "15(3,4)
6120 POSITION 21,13:? " "	6521 POSITION 21,10	6880 GOSUB CLD
6122 POSITION 21,13:7 A	6522 IF S(C.1)=224 THEN 7 "14"	6890 RETURN
6122 POSITION 21,13:7 A 6130 S(C,4)=A	6523 IF S(C,1)=192 THEN 2 "12"	6900 POSITION 2,18:7 SP\$
6180 GOSUB CLD: GOSUB CLX	6524 IF S(C,1)=160 THEN 7 "10"	6910 POSITION 2,19:7 SP\$
6190 RETURN	6525 IF S(C,1)=128 THEN ? "8"	6920 POSITION 2,20:? SP\$
6200 REM	6526 IF S(C.1)=96 THEN 2 "6"	6930 POSITION 2,21:7 SP\$
6208 SUM=0	6521 POSITION 21,10 6522 IF S(C,1)=224 THEN ? "14" 6523 IF S(C,1)=192 THEN ? "12" 6524 IF S(C,1)=160 THEN ? "10" 6525 IF S(C,1)=128 THEN ? "8" 6526 IF S(C,1)=96 THEN ? "6" 6527 IF S(C,1)=64 THEN ? "4"	694 POSITION 2,22:7 SP\$
6210 IF S(4,0)=1 THEN SUM=SUM+1	6528 IF S(C,1)=32 THEN 2 "2"	6950 RETURN
6211 IF S(4,1)=1 THEN SUM=SUM+2	6529 IF S(C,1)=0 THEN 7 "0"	9000 POSITION 2,18:7 SP\$
6212 IF S(4,2)=1 THEN SUM=SUM+4	6530 POSITION 21.13:2 " "	9010 POSITION 2,19:7 SP\$
6213 IF S(4,3)=1 THEN SUM=SUM+8	6531 POSITION 21,13:2 S(C,4)	9020 POSITION 2,20:? SP\$
6213 IF S(4,3)=1 THEN SUM=SUM+8 6214 IF S(4,4)=1 THEN SUM=SUM+16 6215 IF S(4,5)=1 THEN SUM=SUM+32 6216 IF S(4,6)=1 THEN SUM=SUM+64	6528 IF S(C,1)=32 THEN 7 "2" 6528 IF S(C,1)=0 THEN 7 "0" 6530 POSITION 21,13:7 " 6531 POSITION 21,13:7 S(C,4) 6590 RETURN 6600 REM BUZZ	9030 POSITION 2,21:7 SP\$
6215 IF S(4,5)=1 THEN SUM=SUM+32	6600 REM BUZZ	9040 POSITION 2,22:7 SP\$
6216 IF S(4,6)=1 THEN SUM=SUM+64	6610 7 CHR\$(125):REM CLEAR SCREEN	9050 RETURN
6217 IF S(4,7)=1 THEN SUM=SUM+128	6690 RETURN	10000 END
6220 POKE 53768, SUM	6700 REM PDIS	

### Speedy commands

Brian Allan. Scuntfield. County Down.



HERE ARE two routines for the Dragon. One of them lets you enter 52 commands by pressing two keys. The second one lets you change the speed of printing. First, I will show you how to use the single-key entry routine. Enter the listing. Save this then run

The routines are now activated. To use the single key entry option press the down arrow. The black cursor will change to a graphic character. To get a command press any letter - experiment for yourselves. 52 commands are available by using Shift. To enter the

### EDIT

press E. Edit should appear on the screen.

You can put a line number after it. To enter a command like Point press P then the down arrow then J-Point will appear on the creen.

The print speed is held in locations 1022 and 1023. After the hex loader has finished

### POKE 1022,20: LIST

You will see the program list slowly. The higher the value in 1022 and 1023 the slower the print speed. To switch off both routines enter

**EXEC 32252** 

```
10 REM ************
20 REM ** ONE KEY ENTRY **
30 REM ** & PRINT SPEED **
40 REM ** M/C. ROUTINE. **
50 REM ************
60 REM **BY BRIAN ALLAN. **
70 REM ************
80 CLEAR 200,32224
100 PRINTTAB(9): "KEYWORD & PRINT"
110 PRINTTAB(9); "************
120 PRINT"please wait...LOADING THE HEX."
                                                          420
130 PRINT: PRINT"LOCATIONS. "
140 PRINT: PRINT" 'EXEC 32225'
                             - ROUTINES ON. ": PRINT "'E
           - ROUTINES OFF."
XEC 32252
150 PRINT: PRINT "PEEK (1022) *256+PEEK (1023) IS THEPRINT
DELAY.
160 PRINT: PRINT "FOR KEYWORD - PRESS THE DOWN
                                                  ARROW
 THEN A (SHIFT-LETTER) OR
                           (LETTER).52 COMMANDS AVAILA
BLE."
170 FOR AD=32225 TO 32767 STEP 10
180 CS=0
190 FOR Z=AD TO AD+9
200 READ H$: H=VAL ("&H"+H$)
210 CS=CS+H
220 POKE Z.H
230 IF Z=32767 THEN 270
240 NEXT 2
250 READ CS$:SS=VAL("&H"+CS$)
260 IF SSCORS THEN PRINT: PRINT "THERE IS AN ERROR IN L
INE"; PEEK (49) *256+PEEK (50) : END
270 NEXT AD
280 PRINT: PRINT: PRINT"ALL LOADED AND BOTH ROUTINES
ACTIVATED.
290 PRINT: PRINT
300 EXEC 32225
```

310 END 320 REM DATA FOR ROUTINES. 330 DATA 86,7E,87,1,6A,87,1,67,8E,7E,451 340 DATA 15,8F,1,6B,8E,7E,5,8F,1,68,379 350 DATA 8E,0,0,8F,3,FE,39,86,39,87,3FD 360 DATA 1,67,87,1,6A,39,BF,3,FC,BE,43F 370 DATA 3,FE,30,1,30,1F,26,FC,BE,3,364 380 DATA FC,39,81,A,26,E2,C1,E6,22,DE,56F 390 DATA BF,3,F2,10,BF,3,F4,FD,3,F6,570 400 DATA 86,C9,10,9E,88,A7,A4,7F,1,19,499 410 DATA BD, B5, D, 73, 1, 49, 81, 41, 10, 25, 333 DATA 0,8A,81,7A,10,22,0,84,81,5B,317 430 DATA 25,6,81,60,22,2,20,7A,81,5B,2A6 440 DATA 25,2,80,6,80,40,8E,7E,D2,5F,3AA 450 DATA B7,3,F8,5C,F1,3,F8,27,8,A6,4CF 460 DATA 60,81,0,26,FA,20,F2,BF,3,F9,4EE 470 DATA 10, BE, 3, F2, A6, 80, 81, 0, 27, 7, 398 480 DATA A7,A0,7C,3,F7,20,F3,10,BF,3,4A2 490 DATA F2,BE,3,F9,10,9E,88,A6,80,81,589 500 DATA 0,27,36,81,40,22,2,88,40,A7,284 510 DATA A0,10,8C,5,FF,22,2,20,EA,10,37E 520 DATA BF,3,FB,10,8E,4,0,E6,A8,20,40D 530 DATA E7,A0,10,8C,5,E0,25,F5,C6,60,548 DATA E7, A0, 10, 80, 6, 0, 25, F8, 10, BE, 414 550 DATA 3,FB,31,A8,E0,20,C4,10,9F,88,4D2 560 DATA BE,3,F2,10,BE,3,F4,FC,3,F6,56D 570 DATA 39,41,55,44,49,4F,0,44,49,4D,285 580 DATA 0,43,40,45,41,52,0,52,45,41,23F DATA 44,0,45,58,45,43,0,46,4F,52,250 600 DATA 0,47,4F,54,4F,0,50,52,49,4E,272 610 DATA 54,0,49,4E,50,55,54,0,4A,4F,27D 620 DATA 59,53,54,48,28,0,43,49,52,43,294 630 DATA 4C,45,28,0,4C,49,53,54,0,53,248 640 DATA 4F,55,4E,44,0,54,48,45,4E,0,265

(continued on next page)

### SOFTWARE file

					-
(cont	inued fr	om previous page)			4B,45,59,24,0,50,4F,49,4E,54,297
			770	DATA	28,0,50,41,49,4E,54,28,0,4C,218
650	DATA	4F,50,45,4E,0,50,4D,4F,44,45,2A7	780	DATA	49,4E,45,0,41,4E,44,0,54,41,244
660	DATA	0,44,52,41,57,0,52,45,54,55,26E			42,28,0,43,4C,4F,53,45,0,50,230
670	DATA	52,4E,0,53,43,52,45,45,4E,0,260	800	DATA	43,4F,50,59,0,43,48,52,24,28,264
680	DATA	43,4C,4F,41,44,0,43,4C,53,0,245	810	DATA	0,52,45,53,54,4F,52,45,0,53,277
690	DATA	53,45,54,28,0,53,54,45,50,0,250			54,52,49,4E,47,24,28,0,43,53,266
700	DATA	4C,45,46,54,24,28,0,52,55,4E,26C	830	DATA	41,56,45,0,53,48,49,50,46,0,259
710	DATA	0,50,4F,4B,45,0,4D,4F,54,4F,26E	840	DATA	52,45,53,45,54,28,0,52,49,47,280
720	DATA	52,0,52,45,4D,0,43,4F,4C,4F,263	850	DATA	48,54,24,28,0,4D,49,44,24,28,20E
730	DATA	52,0,44,41,54,41,0,45,44,49,23E	860	DATA	0,52,45,4E,55,4D,0,50,45,45,261
740	DATA	54,0,4E,45,58,54,0,47,4F,53,27C	870	DATA	48,28,0,73
750	DATA	55,42,0,45,4C,53,45,0,49,4E,257	880	END	

### Sideways dump

M K Mostowyj, Bretton Estate, Peterborough.



THIS PROGRAM will produce a hard copy of any screen in any mode as long as the graphics origin is set to its default (0,0). The final printout is two tone only and assumes that the background colour is Paper 0.

The program is written in machine code. It is 202 bytes long and is located at &AAB3. Rather than having to use the Call statement to run the program, a new command is implemented via the resident system extention capability of the Amstrad.

To enter the program type in the basic listing and run it. If all is well you will be given the chance to save the code to tape. To reload the code type:

MEMORY &AAB2:LOAD"",&AAB3 and press Return. Once loaded CALL &AAB3

to log on the new command. If you are using a Paper other than 0 you may inform the routine with

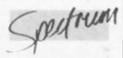
POKE &AAF8,n

where n= the Paper being used. Please take note that it is Paper and not Ink.

### Listing 1. Listing 2. 10 MODE 1 20 MEMORY & AAB2 AAB3 01 C1 AA 21 BD AA CD D1 30 SUM=0:RESTORE 170 AABB BC 09 00 00 99 00 C6 AA 40 FOR N=%AAB3 TO %AB70 55 AAC3 D1 AA 44 4D DØ 00 50 READ X\$ AACB 00 00 CD ЙØ 99 00 00 06 60 POKE N, VAL( "%"+X#) 21 22 CB 22 AAD3 00 00 AA SUM=SUM+VAL( "%"+X#) AADB CD AA 01 00 C5 3E 00 80 NEXT 00 90 IF SUM(>%5FA8 THEN SOUND 1,254,10 PRINT CLS PRINT" DØ. 32 CF AAE3 AA 30 DATA WRONG PLEASE CHECK": END AAEB 05 5B CB AA 100 CLS PRINT"DATA LOADED CORRECTLY" AAF3 00 AA CD DF BD FE 28 110 PRINT PRINT "PLEASE INSERT TAPE FOR BYTES" AAFB 3A CF 3A D0 AA 47 AA 80 120 PRINT: PRINT"THEN PRESS ANY KEY" **AB03** 32 DØ AA 3A CF AA A7 CB 130 IF INKEY\$="" THEN 130 2A CB AB0B 17 32 AA AA 140 CLS PRINT"SAVING DUMP, B. &AAB3, &CA" **AB13** CB C1 10 D3 3E 1B 150 SAVE "DUMP", B, & AAB3, & CA AB1B CD 73 AB 4B 160 END **AB23** 00 CD 73 AB 3E 01 CD 170 DATA 01,c1,aa,21,bd,aa,cd,d1,bc,c9,00,00,00,00,c6,aa AB2B AB 38 CD 180 DATA c3,d1,aa,44,55,4d,d0,00,00,00,00,00,00,00,cd,06 DØ AA AB 190 DATA 69,21,00,00,22,cb,ss,22,cd,ss,01,00,00,c5,3e,00 **AB33** 28 CB AA 07 00 ED 11 200 DATA 32, d0, aa, 3c, 32, cf, aa, 06, 07, c5, ed, 5b, cb, aa, 2a, cd AB3B CB AA C1 03 210 DATA aa.cd.df.bd.fe.00.28.0b.3a.cf.aa.47.3a.d0.aa.80 **AB43** 20 79 FE 21 32, d0, aa, 3a, cf, aa, a7, cb, 17, 32, cf, aa, 2a, cb, aa, 23 220 DATA AB4B 3E 0A CD AB 2A CB 230 DATA 22.cb.aa.c1.10.d3.3e.1b.cd.73.ab.3e.4b.cd.73.ab 19 **AB53** 07 22 11 99 CB AA 240 DATA 3e.00.cd,73.ab.3e.01.cd,73.ab.3a.d0.aa.cd,73.ab AB5B FE 02 C2 DD AA 70 FE 84 2a,cb,aa,11,07,00,a7,ed,52,22,cb,aa,c1,03,78,fe **AB63** 02 DD AA 3E 0F 73 AB CD 260 DATA 01,20,26,79,fe,91,20,21,3e,0a,cd,73,ab,2a,cb,aa 43 CD AA C3 AB6B 09 ED EØ AA 270 DATA 11.07,00,19,22,cb,aa,7c,fe,02,c2,dd,aa,7d,fe,84 280 DATA c2.dd.aa.3e.0f.cd.73.ab.c9.ed.43.cd.aa.c3.e0.aa **AB73** 47 CD 2B BD 30 290 DATA c5,47,cd,2b,bd,78,30,fa,c1,c9 AB7B 09

### Wild West

Anszar Zerfass, Lehrberg, West Germany.



THIS GAME uses the excellent Sprite routine by Robert Newman — Your Computer January, 1984, page 106 — to create smooth animated graphics in different colours. The programs will work on the 48K machine only. However, it may be changed for a 16K Spectrum by changing the Clear statement in line 10 to

### **CLEAR 31199**

and by changing all Peek and Poke addresses except line 10. The new values for Peek, Poke and Rand USR statements can be calculated from the information in Newman's article.

### The main program.

3 REM LINE 20 LOADS MACHINE CODE SPRITE ROUTINE BY R.NEUMAN - YOUR COMPU-TER 1 84 PAGE 106

 SOFTWARE file

0 40+(120 AND (CHI=3 OR HI=3))
66 GO TO 50
E 65239,0 IF PEEK 65230(62 AND
E 65230)120 THEN FOR E 65268,0 E LET
UAG=0 LET CY=15 LET CY TO ST
EP = 11 (PRINT AT CY, CY, INK 2+("EFT
CY, CY, " "AT CY, AT CY, INK 2+("EFT
CY, CY, " "AT CY, AT CY, INK
EP = 10 (PEEK 6526)

FOR CY, " "AT CY, AT CY, "AT CY
EP = 11 (PRINT AT CY, AT CY, "AT CY
EP = 12 (PEEK 6526)

FOR CY, " "AT CY, AT CY, "AT CY
EP = 14 (PRINT AT CY, AT CY, "AT CY
EP = 15 (PEEK 6526)

FOR CY, " "AT CY, AT CY, "AT CY
EP = 16 (PRINT AT CY, AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, " "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, " "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, " "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
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FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY, "AT CY, "AT CY, "AT CY, "AT CY
EP = 17 (PEEK 65245)

FOR CY, "AT CY 180 IF HI=3 THEN LET CW=CW+1: LET S\$=" --- YOU HAVE BEEN KILLE 200 RANDOMIZE USR 65155, PRINT RT 4,0; BRIGHT 1; PAPER 5; INK 3\$ 10 LET 3\$=" SCORE: SLIM JOEY " +STR\$ CU+" - YOU "+STR\$ PU 220 IF LEN 3\$<32 THEN LET 3\$=3\$ +" " GO TO 220 • 230 PRINT AT 20,0; PAPER 7; INK 230 PRINT HT 20,0) PAPER 7; INK 1,5\$ 240 INPUT "" PRINT #0, INK 0;" Another game (Press Y or N) 7 BEEP .5,-12 250 IF INKEY\$="9" THEN CLS GO TO 870 260 IF INKEY\$="N" THEN GO TO 99 TO 870
260 IF INKEY\$="N" THEN GO TO 99
99
270 GO TO 250
500 RANDOMIZE USR 65155
505 BORDER 6: PAPER 6: INK 0: C
L5: GO 3UB 150
510 FOR F=65208 TO 65313 STEP 1
5: POKE F.0: NEXT F
515 RANDOMIZE RESTORE 520 FOR
F.G NEXT F
520 DATA 200, INT (RND+140) +25, 0
0.LEU, 2, 0, 0, 1, 0, 0, 250, 0, 11, 15
530 DATA 50, INT (RND+140) +25, 0, 0, 1, 2, 2, 0, 0, 1, 0, 32, 250, 0, 11, 15
530 DATA 50, INT (RND+140) +25, 0, 0, 2, 2, 0, 0, 1, 0, 32, 250, 0, 11, 15
540 DATA 60, 0, 1, 0, 0, 254, 0, 0, 64, 250, 0, 3, 1
550 DATA 62, 0, 4, 0, 1, 0, 0, 254, 0, 0, 64, 250, 0, 3, 1
550 DATA 62, 0, 0, 1, 4, 2, 0, 255, 0, 0, 96, 250, 0, 12, 16
570 LET 50=0 LET 5P=0: LET UAG
=0
580 PANDOMIZE FOR F=1 TO 4: F =0 580 RANDOMIZE : FOR F=1 TO 4: F OR G=1 TO INT (RND+6)+6 PRINT A T INT (RND+22) INT (RND+4)+(1 AN D F=1)+(9 AND F=2)+(18 AND F=3)+ (27 AND F=4) : INK 4: CHR\$ (144+(R ND).5)) . NEXT G NEXT F 590 FOR F=0 TO 21 PRINT AT F.6 . INK 2; ..., AT F.25; INK 1; ... 590 FOR F=0 TO 21 PRINT AT F.6 INK 2; AT F.25; INK 1; S NEXT F 800 RETURN 800 BORDER 1 PAPER 5 INK 1 B RIGHT 1: CL3 810 PRINT AT 1 7 BRIGHT 0; PAPER 7: -- WILD WEST -- B20 PRINT AT 3 0; Here you are again - a lone comboy facing death under the hot sun burning down on the wide desert. B30 PRINT '" No one there to he p you - you're on your own

The game Wild West allows one player to take part in a deadly gunfight. Full instructions are included in the program. It is you against Slim Joey, who is controlled by the computer. Joey will be able to move faster than you - especially on the higher levels so he's a really tough opponent. Some extra features are cacti spread all over the scenario - a desert - and a covered wagon which will appear at random and will explode if hit by a bullet.

Type in the program carefully and save it on tape with

### SAVE "wild west" LINE 1

Load the 48K Sprite routine and save it immediately behind the main program with

SAVE "spmov48k" CODE 64551,611

Verify the recordings and try to run the program. Check all Peek/Poke/Rand USR statements and the sprite data hold in lines 520-560 and 1050-1070 - graphics - if the game does not work properly.

A lot of work may be saved by editing similar lines and changing the small differences - e.g. 70-72 and 75-77.

Program	structure.
1-25	Set-up
50-66	Main loop
70-72	Subroutine: Player's bullet hit
75-77	Subroutine: Joey's bullet hit
100-110	Subroutine: Player/Joey hit
150	Subroutine: Print score table
160-270	End of game
500-600	Subroutine: Set up screen and Poke initial values for sprites
800-900	Instructions and selection of skill level
1000-1070	Subroutines: Set up user- defined graphics (1000-1030)

and sprite graphics (1040-1070)

The machine code. against ame is blim Joey, whose n feared throughout the west."
835 PRINT "
13 bullet is
UCK, boy!"
840 PRINT " He moves faster, h faster - so good L You will only surv And you cannot mov has been hit, his hit you in the mea s40 PRINT TOO WITT ONLY SULVE 2 hits. And you cannot move once Joey has been hit, his bullet may hit you in the meantime. S50 GO SUB 1000 PRINT #0: PAPE R 5: INK 0: PRESS ANY KEY! BEEP 1,-10 PAUSE 0 CLS 860 PRINT red waggons onus points. "The cacti and cove s will gain you no b s. It is just him or 1109910000000744 you."
.870 PRINT '" Move by pressing keys P or L (Up/down) and put the trigger by pressing key 0 880 PRINT AT 19,0; "Press key 1 -5 to select game level (1-5; 6=hard): "BEEP 1,-12 890 LET I\$=INKEY\$: IF I\$<"1" OR I\$>"5" THEN GO TO 890 900 LET LEU=UAL I\$: BRIGHT 0: G 0 TO 30 1000 RESTORE 1000: FOR F=USR "A" TO USR "F"+7: READ G: POKE F.G. NEXT F 1010 DATE 15,144, 145,145,042 1010 DATA 16,144,146,146,242,18, 30,16,16,16,18,13,146,146,158,240,1 53051 1205 944 1075 1150 995 04403775500546090450 0440377500546090460 0440507000440004400 04400004400090440 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 h; "; 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 hs=hs(3 TO): LET x=x+1 120 NEXT b 130 PRINT " = ";: INPUT t: PRIN 140 IF tot()t THEN PRINT "input error - try again": GO TO 50 150 NEXT n 150 REM enter STOP to stop

### SOFTWARE file.

### Graphics 7 Paintbox

Christopher Jones, Herne Bay, Kent.



THIS PROGRAM allows the user to draw a picture on a Graphics screen. These pictures may be stored on cassette for retrieval at a later time, so that finished pictures may be viewed again and again or unfinished pictures completed. A number of paint programs are now on the Atari market, but my program allows the user to sample the possibilities of this type of program without parting with any cash!

One of the main considerations while writing this program was to keep it as user-friendly as possible. There are on-screen prompts at all times, and all options are performed in a similar way. In addition to the joystick only the number keys are used to carry out instructions. Although the Atari computer has a vast range of colours to display, I have deliberately kept the choice down to a simple minimum.

The colours are also named — rather than using a combination of hue and luminance — which means that children of reading age should be able to use the program. If anyone is not satisfied with my choice of colours they are easily changed: lines 3000-5000 contain the relevant routines.

When you have typed in the program save it on a cassette and then run it. The screen will show a menu of options:

SCREEN - First select the screen colour of your choice.

PALETTE — Next select three colours with which you wish to draw your picture.

COLOUR — This command allows you to choose a working colour from your palette. This colour will then be used when you select draw, circle, etc.

DRAW — A cursor will appear in the centre of the screen in the colour you have chosen. Move the cursor by pushing the joystick in the required direction. If you wish to draw then keep the joystick button depressed and move the joystick in the required direction. To plot a point — useful for stars — simply fire the button once and move on.

DRAWTO — A cursor will appear in the centre of the screen. Move the cursor to one end of the line you wish to draw and hit any key. Then move the cursor to the other end and hit any key. A line will be drawn between the two points.

ERASE — When the cursor appears move it to the area you wish to erase. Hold the joystick button down and move over the points and lines you wish to erase.

CIRCLE — Move the cursor to the point where you wish the circle's centre to be and hit any key. Then move the cursor left or right to establish the radius of the circle and hit any key.

FILL — Move the cursor to the area you wish to fill and hit any key. The area must be enclosed and must be filled with the same colour with which it was drawn. Awkward shapes may need more than one fill.

SAVE — Put a blank tape in the casette unit. When you hear two beeps press play and record, then hit return.

LOAD — Put the tape on which you saved the picture in the cassette unit. When you hear a beep press play, then hit return.

Choose your screen colour carefully. It need not be merely a background, but an integral part of the picture e.g. a grey screen colour could be used for the surface of the moon.

If you wish to erase part of a filled in area select a working colour which will show up against that area and then select erase. When the picture is finished try putting a frame around it by using draw or drawto.

Screen colours and palette colours can be changed at any time, often with interesting results. Experimentation is the best approach in this respect, so don't be shy!

If the program should stop for any reason — such as a misuse of Fill — then type Goto 1000 and you will be able to continue work on that picture.

The circle routine in my program is based on the one in Ian Sinclair's Boots Guide to the Atari 600XL. I have adapted it to plot a continuous line as the circumference of the circle, because any gaps would interfere with the smooth running of the fill routine. In my version it is also possible to have semicircles and arcs at the edges of the screen.

The display list interrupt routine which protects the colours in the text window is based on the one in Peter Budgell's article on Graphics 10/7 in Analog 14. I have altered it to fit in with the colour requirement of my program.

```
1 REM GRAPHICS 7 PAINTBOX
2 REM CHRISTOPHER P. JONES
3 REM APRIL 1984
9 REM INITIALISE
10 DPEN #1,4,0,"K:"
20 GRAPHICS 7
25 DIM A$(10),C1$(10),C2$(10),C3$(10),R(
35 R(1,1)=0:R(1,2)=0:R(2,1)=0:R(2,2)=0:R
(3,1)=9:R(3,2)=14
36 GOSUB 11000
37 POKE 752,1
38 SETCOLOR 4,8,8:POKE 54286,192
40 GOTO 1000
199 REM MAIN LOOP
200 X=80; Y=40
205 X1=X:Y1=Y:COLOR C:PLOT X,Y
250 GOSUB 800
255 IF PEEK (764) < 255 THEN 2500
265 IF S=15 AND FLAG=0 THEN 350
270 IF FLAG=0 THEN 350
280 COLOR B
290 PLOT X1.Y1
295 LOCATE X,Y,B
305 GOTO 205
350 IF ERASE=1 THEN COLOR 0:PLOT X1.Y1
360 GOTO 295
399 REM FILL
400 Y2=Y: X2=X: COLOR C
405 Y2=Y2-1:LOCATE X2,Y2,C1
410 IF C1<>C THEN 405
415 Y3=Y
420 Y3=Y3+1:LOCATE X2,Y3,C1
425 IF C1<>C THEN 420
450 K=Y3-Y2
460 FOR L=1 TO K: X2=X
465 LOCATE X2, Y2+L, C1
470 IF C1=C THEN 500
480 PLOT X2. Y2+L
485 X2=X2-1
490 GOTO 465
500 X2=X+1
505 LOCATE X2.Y2+L.C1
510 IF C1=C THEN 530
```

```
515 PLOT X2, Y2+L: X2=X2+1
520 GOTO 505
530 NEXT L
535 POKE 764,255
550 GOTO 1000
599 REM CIRCLE
600 IF Q=1 THEN 610
601 Q=1:D=B:COLOR C:PLOT X,Y:X2=X:Y2=Y:P
OKE 764,255:60TO 295
610 Q=0
620 R=X-X2: COLOR C
640 FDR N=0 TO 360
645 Z=X2+R#SIN(N)
646 IF Z<0 DR Z>159 THEN 660
647 0=Y2+R*COS(N)
648 IF 0<0 OR 0>79 THEN 660
650 PLOT Z.O
660 NEXT N
665 COLOR D: PLOT X2. Y2
680 GOTO 1000
800 REM JOYSTICK INPUT
810 S=STICK(0)
815 T=STRIG(0):FLAG=SGN(T)
825 IF S=10 OR S=11 OR S=9 THEN X=X-1
830 IF S=6 OR S=7 OR S=5 THEN X=X+1
835 IF S=10 OR S=14 OR S=6 THEN Y=Y-1
840 IF S=13 OR S=5 OR S=9 THEN Y=Y+1
845 IF X<0 THEN X=0
850 IF Y<0 THEN Y=0
855 IF X>159 THEN X=159
860 IF Y>79 THEN Y=79
895 RETURN
899 REM DRAWTO
900 IF Q=1 THEN 910
901 COLOR C:PLOT X,Y
905 Q=1
906 X2=X:Y2=Y
907 POKE 764,255:60TO 295
910 X3=X: Y3=Y
911 COLOR C
915 PLOT X3, Y3: DRAWTO X2, Y2
920 POKE 764,255:Q=0:GOTO 1000
999 REM MAIN MENU
1000 7 "3"
```

1001 FOR K=1 TO 3: SETCOLOR K-1,R(K,1),R(
K,2):NEXT K
1005 POKE 764,255
1010 7 "DRAW(1), DRAWTD(2), ERASE(3), CIRCL
E(4), FILL(5), SCREEN(6), COLOUR(7), PALETT
E(8)SAVE(9),LOAD(0)?";
1015 ERASE=0:LOCATE B0,40,B
1018 FILL=0:DRAW=0
1019 DRTD=0: CIRCLE=0
1020 GET #1,A
1025 IF A<48 THEN 1020
1030 IF A>57 THEN 1020
1040 IF A=49 THEN DRAW=1:GOTO 2000
1050 IF A=53 THEN FILL=1:GOTO 2200
1055 IF A=51 THEN ERASE=1:GOTO 2100
1060 IF A=52 THEN CIRCLE=1:GOTD 2150
1065 IF A=50 THEN DRTD=1:G0T0 2050
1070 IF A=54 THEN 3000
1075 IF A=55 THEN 3500 1080 IF A=56 THEN 4000
1085 IF A=57 THEN 10000
1090 IF A=48 THEN 10500
2000 ? ")"
2005 ? "PRESS BUTTON TO PLOT, HOLD BUTTON TO DRAW, HIT ANY KEY TO RETURN"
2010 GOTO 200
2050 ? ")"
2055 ? "HIT ANY KEY TO ESTABLISH POINTS"
2060 GDTO 200
2100 ? ">"
2105 ? "HOLD BUTTON TO ERASE, HIT ANY KEY TO RETURN"
2110 GOTO 200
2150 ? ")"
2155 ? "HIT ANY KEY TO ESTABLISH CENTRE
AND RADIUS (LEFT-RIGHT)"
2160 GQTO ,200
2200 ? ")"
2205 ? "HIT ANY KEY TO FILL AN ENCLOSED SPACE"
2210 GOTO 200
2500 IF ERASE=1 THEN COLOR B:PLOT X,Y:GO
TO 1000
2505 IF DRAW=1 THEN COLOR B:PLOT X,Y:60T

### SOFTWARE file

0 1000 2510 IF FILL=1 THEN COLOR 0:PLOT X,Y:GOT 0 400 2515 IF DRTO=1 THEN 900 2520 IF CIRCLE=1 THEN 600 2999 REM SCREEN COLOURS 3005 ? "GREY(0), BLUE(1), DRANGE(2), GREEN( PINK(4), PURPLE(5)?"; 3010 GET #1, SET 3011 IF SET<48 THEN 3010 3012 IF SET>53 THEN 3010 3015 IF SET=49 THEN SET=8 3020 IF SET=51 THEN SET=13 3030 SETCOLOR 4,SET,8 3035 GOTO 1000 3499 REM PLOT COLOUR 3500 7 ") 3505 ? C1\$;"(1),";C2\$;"(2),";C3\$;"(3)?" 3525 GET #1,A:C=A-48 3530 IF C<1 OR C>3 THEN 3525 3535 GOTO 1000 3999 REM PALETTE COLOURS 4000 ? ")" 4005 ? "WHITE(0),BLACK(1),BLUE(2),GREEN( 3), YELL PICK 3"; YELLOW(4), RED(5), DRANGE(6), BROWN(7 4015 FOR K=1 TO 3 4020 GET #1,A:A=A-48 4025 IF A(0 DR A)7 THEN 4020 4030 IF A=0 THEN A\$="WHITE":R(K,1)=9:R(K .2) = 14

4035 IF A=1 THEN A\$="BLACK":R(K,1)=0:R(K 2)=0 4040 IF A=2 THEN A\$="BLUE":R(K,1)=7:R(K, 2)=4 4045 TE A=3 THEN A4="GREEN":R(K.1)=13:R( K.2)=104050 IF A=4 THEN A\$="YELLOW":R(K,1)=15:R (K, 2) = 124055 IF A=5 THEN A\$="RED":R(K,1)=3:R(K,2 4060 IF A=6 THEN A\$="DRANGE":R(K,1)=2:R( 4065 IF A=7 THEN A\$="BROWN":R(K,1)=2:R(K .21=2 4071 ON K GOSUB 4600, 4700, 4800 4075 NEXT K 4080 GOTO 1000 4600 C1\$=A\$: RETURN 4700 C2\$=0\$+RETURN 4800 C3\$=A\$: RETURN 9999 REM SAVE ROLITINE 10000 ? ")":? "PREPARE CASSETTE FOR SAVE 10005 SCREEN=PEEK (88) +256\*PEEK (89) 10010 OPEN #2,8,0,"C: 10015 FOR T=0 TO 3199 10020 PUT #2, PEEK (SCREEN+T) 10025 NEXT T 10030 PUT #2, SET 10035 FOR T=1 TO 3 10040 PUT #2,R(T,1):PUT #2,R(T,2)

10050 CLOSE #2 10055 GOTO 1000 10499 REM LOAD ROUTINE 10500 ? ")":2 "PREPARE CASSETTE FOR LOAD 10505 SCREEN=PEEK (88) +25A\*PEEK (89) 10510 OPEN #2,4,0,"C:" 10515 FOR T=0 TO 3199 10520 GET #2, A: POKE SCREEN+T, A 10525 NEXT T 10530 GET #2, SET 10535 FOR T=1 TO 3 10540 GET #2,A:R(T,1)=A:GET #2,A:R(T,2)= 10545 NEXT T 10550 CLOSE #2 10551 SETCOLOR 4.SET.6 10555 BOTO 1000 10999 REM PROTECT TEXT WINDOW 11000 DIM DLI\$(29) 11010 RESTORE 11050:FOR X=0 TO 28:READ I : POKE ADR (DL I\$) +X, I: NEXT X 11020 POKE PEEK (560) +256 \*PEEK (561) +84,14 11030 POKE 513, INT (ADR (DLI\$) /256) : POKE 5 12, ADR (DLI\$) -PEEK (513) \$256 11040 RETURN 11050 DATA 72,169,0,141,10,212,141,27,20 B,169,144,69,79,37 11060 DATA 78,141,24,208,169,10,69,79,37 ,78,141,23,208,104,64

### McConverter

Ed Corteen, Westbury, Wiltshire. Spectrum

THIS PROGRAM is designed to convert machine code into data statements which are then ready for publication. I have used the method used by Ian Briscoe in his Windos program.

To use the program simply type it into your Spectrum altering the program to suite. The addition of the interface 1 and Microdrives alters the base address of Basic so use Let Poke =23761 for non-Microdrive users and LET Poke =23819 if the Microdrives are fitted.

The program as listed is self-explanatory. Run the program and you will be presented with the Menu. If your program is a long one it is probably best if you use option 3 first to ensure you don't run out of memory when using Edit to enter copies of line 1000.

10045 NEXT T

Once the program has been run always use Goto g to run. Now use option 1 to initialise the variables. Use Edit to enter copies of line 1000. Use a line interval of 10.

Next use option 2 to check that you have entered enough copies.

Now we come to the interesting part. If you look in the manual page 166, you will see how the lines of Basic are organised. We know the address and length of each line — 119 bytes. Option 4 will read the machine code, convert it to Hex notation and Poke the code into each line. At the same time it calculates the checksum and this is Poked in at the end of the line. Using Edit to enter copies of line 1000

reserves space at the correct address for your machine code.

This process is quite slow being Basic. It takes about 40 seconds per line. Clever machine-code programmers can convert this.

Once the code has been Poked into each line it can be checked with option 5. To publish your masterpiece simply send off the data lines with the loader program (lines 7200 to 7630) plus any extra Basic lines required. And there you have it — all the hours spent coverting and checking your code have been overcome.

The data lines once "decompiled" can now be anywhere in your completed program. But remember they must be at the beginning of your program while they are being converted. If they aren't you will end up with some very strange looking lines or more likely a crash!

1000 DATA "0000000000000000000000 00000000000000000",1234 1020 REM use 100 characters per line, with 4 characters for chec 1030 REM use line interval of 10 for data statements 6000 REM AUTOLINE 6010 REM ED CORTEEN 6020 REM January 1985 6990 REM after running program use 60 TO g to run 7000 LET g=7000: CLS : PRINT "En 7010 PRINT "1:To initialise" 7020 PRINT "2: To check number of DATA lines" 7030 PRINT "3: To load m/c code" 7040 PRINT "4:To Decompile progr 7045 PRINT "5: To compile program 7050 IF INKEY\$="" THEN GO TO 70

7060 IF INKEY#="1" THEN 60 TO 8 7070 IF INKEY#="2" THEN 60 TO 8 055 7080 IF INKEY#="3" THEN GO TO B 500 7090 IF INKEY#="4" THEN 60 TO 8 100 7100 IF INKEY = "5" THEN GO TO 7 200 7110 GD TO 7050 7195 REM \*\*hex loader\*\* 7197 REM change address as neede 7200 CLEAR 58999 7210 LET address=59000 7220 LET line=1000: RESTORE line 7230 FOR a=1 TO line: REM \*\*number of DATA lines\*\* 7240 GO SUB 7500 7245 PRINT line;" OK."; 7250 LET line=line+10 7260 NEXT a 7270 CLS : PRINT "Code in memory 7280 INPUT "name of code? ";z\$: INPUT "length of code? ";length 7290 SAVE \*"m";1;z#CODE address, length 7300 PRINT "Verifying..": VERIFY

\*"m":1:z#E0DE 7310 PRINT "Finished saving ";z# 7320 GO TO 7000 7500 READ at , checksom 7510 LET total=0 7520 FOR L=1 TO LEN at STEP 2 7530 LET high=CODE at(i)-48 7540 LET low=CODE as(i+1)-48 7550 LET high-high-39\*(high)9) 7560 LET low=low-39\*(low>9) 7570 LET byte=(16\*high)+low 7580 LET total=total+byte 7590 POKE address, byte 7600 LET address-address+1 7610 NEXT 1 7620 IE total Cohectsum THEN PR INT "Error in line ";line;".""c heck and re-run": STOP 7630 RETURN 7990 REM \*\*initialise\*\* 8000 CLS: PRINT "enter lenth of m/c CODE ": PRINT "this must be rounded UP to the nearest 50": INPUT I 8005 LET := INT (1/50): REM numbe r of lines required 8010 PRINT "use EDIT to create " of line 1000" is:" copies

(continued on next page)

### SOFTWARE File

### (continued from previous page)

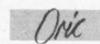
8015 PRINT#0; "press any key to LIST program": PAUSE Ø 8020 CLS : LIST 1000 8040 REM \*\*check number of data linesex 8050 REM \*detects the quote mark after each data statement\*\* 8053 REM if no microdrive fitted LET poke=23761 8055 LET poke=23819: LET line=0 8065 FOR p=poke TO poke+(x+1)\*11 9 STEP 119: IF PEEK (p-1) <>34 TH EN GO TO 8080 8070 LET line=line+1: NEXT p 8080 PRINT AT 8,0; "you have ente red "; line ; " copies of line 100 8090 GO TO 7050 8095 REM \*\*decompiling routine\*\* 8100 LET poke=23819: INPUT "star

8110 LET linenumber=990 8115 FOR p=poke TO poke+((x-1)\*1 19) STEP 119 8120 LET linenumber=linenumber+1 0: PRINT AT 10,0; "decompiling li ne ";linenumber 8130 GD SUB 9000 8140 NEXT p 8150 PRINT AT 12,0; "FINISHED!" 8155 PRINT #0; "Hit any key to co ntinue": PAUSE Ø 8160 GO TO 7000 8490 REM \*\*loading routine\*\* 8500 IF poke=23819 THEN GO TO 8 8510 PRINT #0; "prepare cassette and hit any key": PAUSE 0 8520 LOAD ""CODE 8530 GD TO 7000 8550 CAT 1: INPUT "name of CODE ?":z\$ 8560 LOAD \*"m";1;z\$CODE 8570 GO TO 7000

9000 DIM a\$(2): LET checksum=0 9010 LET a=p 9030 FOR a=a TO a+99 STEP 2 9040 LET a#=FN h#(PEEK peek) 9050 LET checksum=checksum+PEEK neek 9060 LET peek=peek+1 . 9070 POKE a,CODE a\$(1) 9080 POKE a+1,CODE a\*(2) 9090 NEXT a 9100 DIM c#(4): LET c#=STR# chec ksum 9110 FOR f=2 TO 5: POKE a+f,CODE c\*(f-1): NEXT f 9120 RETURN 9960 REM \*\*\*dec-hex converter\*\*\* 9970 DEF FN k\$(x,y)="0123456789a bcdef"(INT (x/16^y)-16\*INT (x/16 (y+1))+1)9980 DEF FN h\$(x)=FN k\$(x,1)+FN k\$(x,0) 9998 ERASE "m";1; "autoline" 9999 SAVE \*"m";1; "autoline": VER IFY \*"M";1; "autoline"

### Hires and Gnasher

Swansea, West Glamorgan.



HIRES COPY provides a direct screen to printer dumping utility which handles text and graphics on all Oric computers except the 16K machine for which the addresses in lines 10020, 10050, 10060 and 11010 must be altered.

Oric Gnasher is a Pac-man style program following the usual rules and is designed for use on the Atmos although it should run on the Oric-I 48K.

Cursor keys are used to guide your man around the maze. However, points are lost if you retrace your steps which is also dangerous as the ghost follows in your footsteps and gets

closer towards the end of the game, the maze has been designed with this in mind.

Moving over the fruit enables you to kill the ghost before the screen returns to normal. The object is to eat all the dots and move onto the pyramid. More screens could be added by using more data after lines 2120 to 2180 with appropriate adjustments in the rest of the program.

### Hire copy.

10015 LPRINT CHR\$(18):LPRINT"I" 10020 A=£A000 10030 REPEAT 10050 UNTIL PEEK (A) >64 DR A=£BF3F 10060 IF A=EBF3F THEN LPRINT'M0,-400":PING:END 10070 X=PEEK(A)-64 10080 IF X/32>=1 THEN X=X-32:S=1:GOSUB 11000 10090 IF X/16>=1 THEN X=X-16:S=2:GOSUB 11000 10100 IF X/8>=1 THEN X=X-8:S=3:GOSUB 11000 10110 IF X/4>=1 THEN X=X-4:S=4:GOSUB 11000

10120 IF X/2>=1 THEN X=X-2:S=5:GOSUB 11000 10130 IF X/1>=1 THEN S=6:GOSUB 11000 10140 GOTO 10030 11000 REM \*PRINTER\* 11010 B=A-£A000 11020 CY=INT(B/40) 11030 CX=(((B-CY\*40)\*6)+S)\*2 11035 CY=CY+-2 11040 LPRINT"M";CX;",";CY:LPRINT"D";CX+1;",";CY 11050 LPRINT"M";CX;",";CY-1:LPRINT"D";CX+1;",";CY-1 11060 RETURN

Gnasher. f CLSIPAPER WITHK 1 | DIM MILEMEN .NYLMED):C#+"2500"15+3:H#+"Narl Williams 1/425000 PKINT CHRE(6), CHRE(28), CHRE(17) SOSUB 5000 DOSUB SOME

LS

OCSUB 1808

OCSUB 2808

SEMINATE TO SOME

SOME 2808

I X=711Y=0:D=11K=26

EXPLOSE

FOR K=LEV TO 1 STEP -1

2 Y=421=M=416V=461AH=175

SIP K/2=1NT(K/2) THEN %=41;M=42;AV=174;AM=47

A ADEX:1783

2 HIK1=1A (S) = Y1O=O-1

2 HIK1=1A (S) = Y1O=O-1

2 HIK1=1A (S) = Y1O=O-1

2 HIK1=1A (S) = Y1O=O-1 100 to (K-K/10)-11PLOT D\_E, 22PLOT M(U), K(U), K TWO REPTYTEOTO 4008
210 A-58510
210 A-58510
230 FF L-46 OR L-174 THEN FINA; P=F+250; PQ=PQ+1:Q=25:6
08UB 3800; QGTQ 135
250 FF (L-47 OK L-175 THEN 200
250 FF (L-47 OK L-47) THEN 200
250 FF (T X, V, V, PTR); FOR H-5800 TO 1 STEP-1: SQUND 1, H, 1
51NERT H; P=F+5800
255 FF-18H-1:QGTQ 140
278 PLOT R(K), N(K), 32; FOR H=1 TO 3801; SQUND 1, H, 0:PLAY
1,1,2,5; HEIT H
275 FF-200; S=G-1:QGTQ 150
200 FF 0:(597-FQ) THEN 290 ELSE 310
200 FF 0:(597-FQ) THEN 290 ELSE 310 ORE:"
2030 FOR C-1 TO 55
2040 IF C-32 THEN D-40 ELSE D-1
2000 IFC-32 THEN D-40 ELSE D-1
2000 FEAD E.F.
2000 FOR UHE-40040 TO F-40040 UTEP DIPOKE D.40:NEXT D 2070 FOR H-40162 TO 40999; IF PEEK (H) -32 THEN POKE H, 4 SENSE RETURN
4000 Whit DEBLOLSIPAPER BITM: 4
4005 FINS
4005 FINS
4005 FINS
4005 FINS
4006 FINS
4

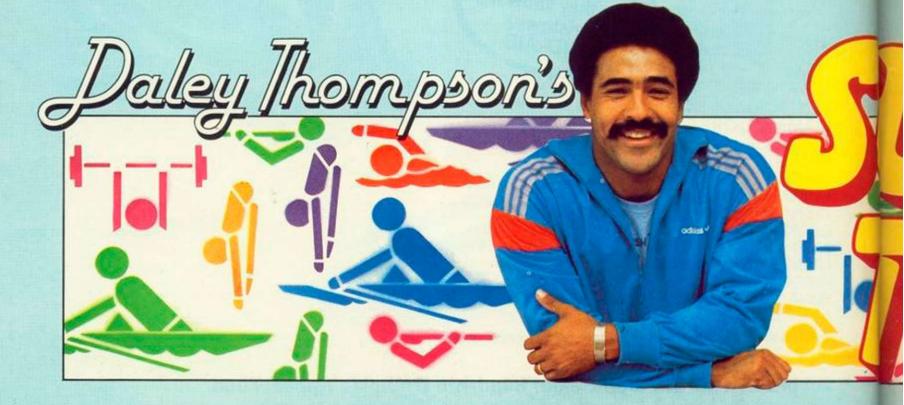
##DS PRINT(FRINT CHE)27)["0"]CHE(27)["F1]FC:SH(GE ##DS PRINTCHE;4) ##GS PRINT(FRINT LEVEL("]THE\10\10\HE\135)]AR ##78 PRINT(FRINT SWESTE KILLED:"(THE\10)[OHE\135)] 4800 PRINTIPRINT FRUIT ORTAINEDITATAD TRICORROTTEN (100 ) Think "points" (100 ) (H) THEN 4148 4130 PSIATE FEBRUARY (MS) ) (H) THEN 4148 4130 PSIATE FEBRUARY (MS) ) (H) THEN 4148 ) "You have beaten the previous HISCORE" (40); "of ";CE;" points by "4125 PRINT (MS) (135);(MS) (40); "of ";CE;" points by " jHB
4138 CE=STREIF):FRINT:INPUT" Your NAME>";HB:HI=P
4148 PRINT:FRINT=Again? Y or N":IEFEAT:GET XB:UNTIL X 4140 PRINTIPRINT AGAIN? V DE N°INSTEATIGET INIUNIL 2
10°7° OR 440°0"
4150 IF N° "THEN 4190
4150 IF N° "THEN 41 5848 PRINTIPRINT through the maze but beware of Bollu SESS PRINTIPRINT the Gaelic Ghost' He can only be " 5868 PRINT:PRINT destroyed in the short time after yo 5878 PRINTIPRINT have eaten the fruit found sceenberg DEDE PRINT:PRINT'in the mase." SERS PRINT:PRINT' Your final objective being to ge 5887 PRINT:PRINT to the flashing pyraeid after eating SEUD PRINT:PRINT"all the dots'":PRINT SEYS PRINT "GARGE:CHRE(133); "Enter level 1,2 or 3>";C Saye PRINT MAR(G); [CHR#(133); "Enter level 1;2 or 3-1-His(135);
Say2 FSPEAT; A\*\*EX\*\* SOUND1; RND(1) \*380\*; 12; WAIT28; UNTIL
VAL (ARI)\*\* AND VAL (ARI)\*\*
Say3 FRINT VAL ARI (LEV-(4-VAL (ARI)\*\*75\*A08
Say3 FRINT SPICHT CHR#(132); [CHR#(148); SPC(5); "FY\*\*48 F
SAY4 FRINT; SOUND 1; RND(1) \*380\*, 12; WAIT 15; UNTIL KEY\*\*
CHR#(13)
5118 FING: RETURN
6808 FOR D\*\* TO 24; PRINTE 1; D; CHR#(INT(RND(1)\*5)\*12Y)
6818 NEXT D LORO FOR D-4 TO 24:PRINTE 1,D;CHR#(INT(RNC LOID NEXT D 1020 FRINTE 2,0;CHR#(135):PRINT CHR#(135) LOSO RETURN

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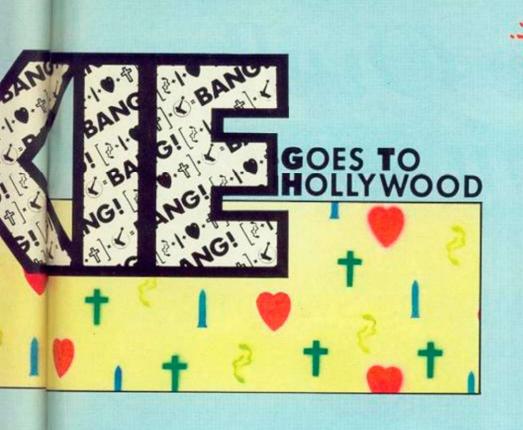




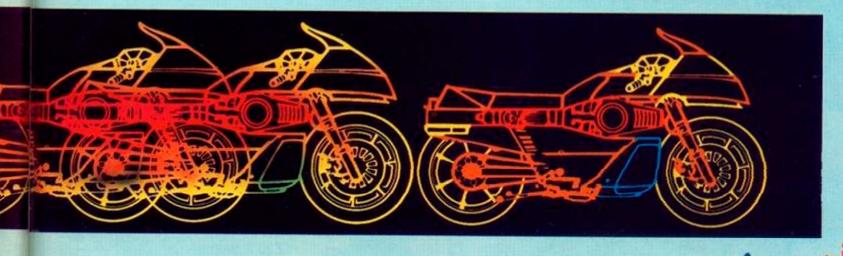
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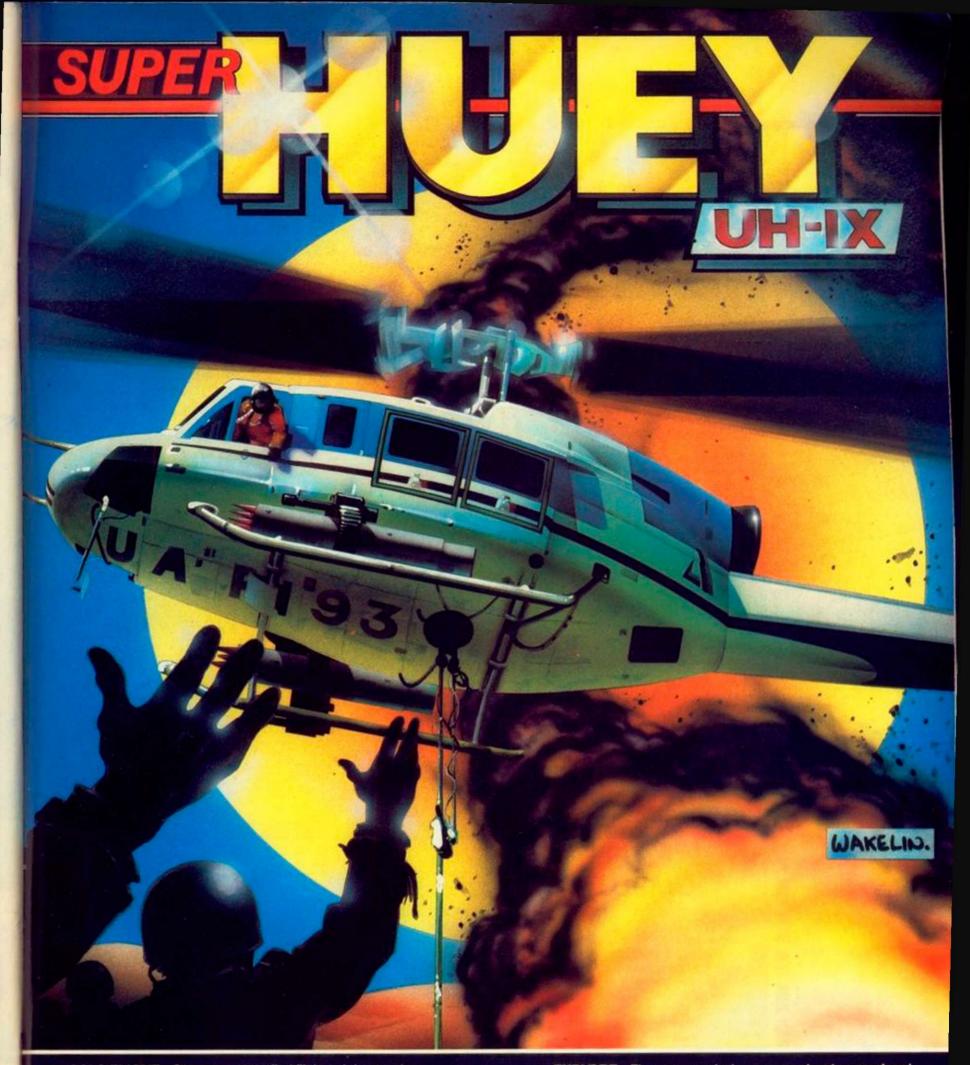
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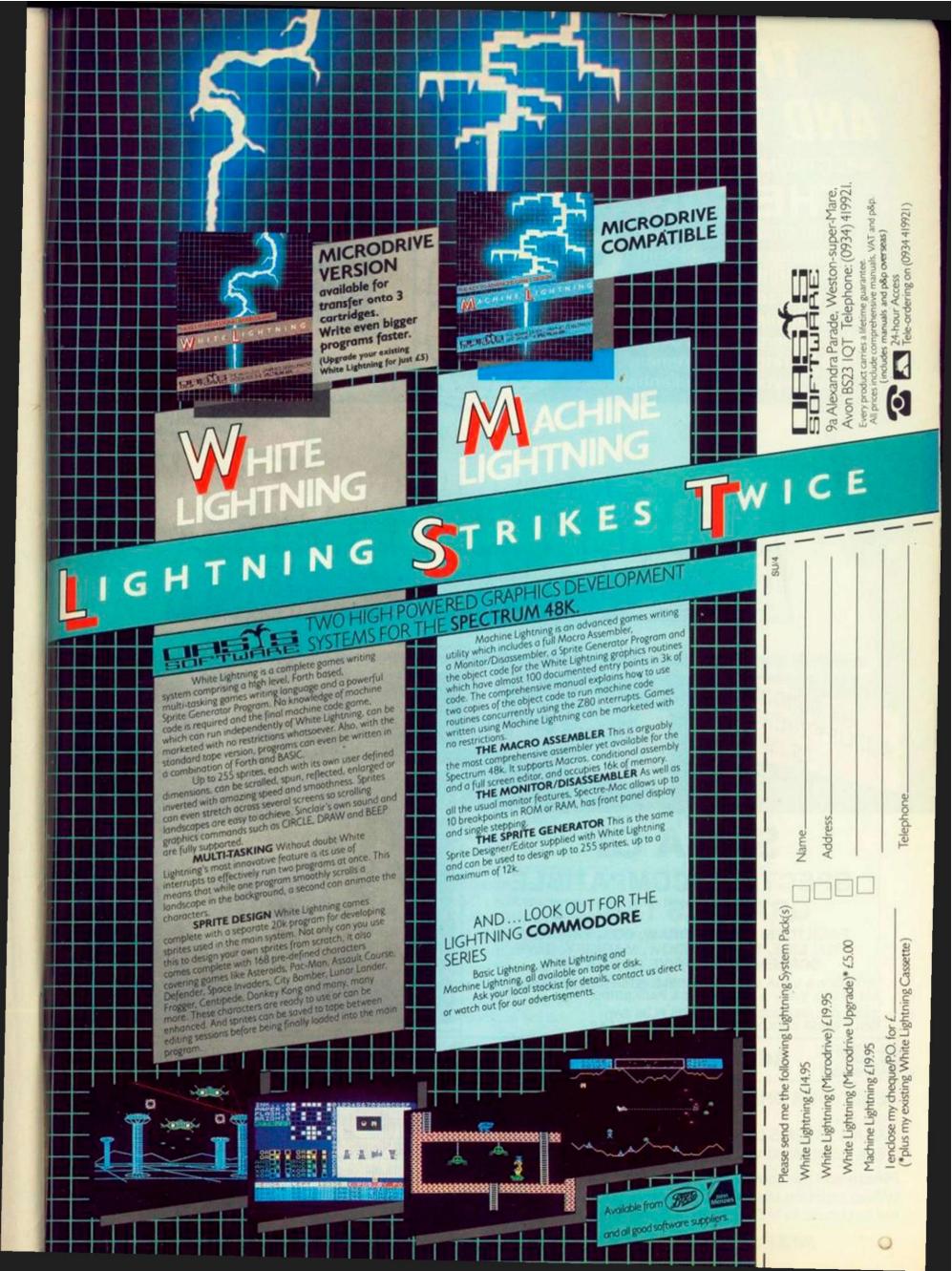
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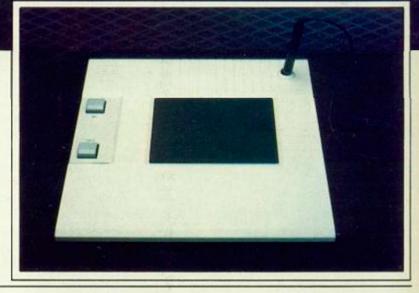
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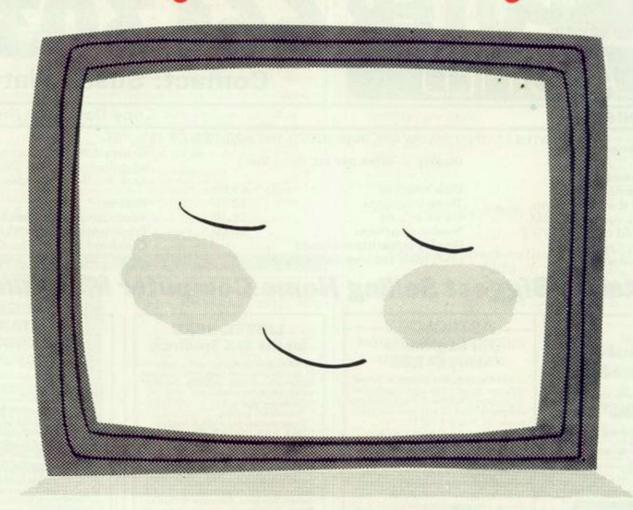
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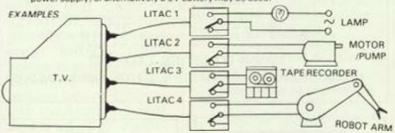
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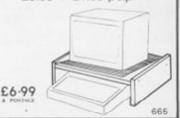
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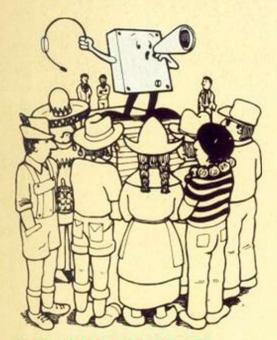
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