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▶ FEBRUARY 1986 VOL. 6 NO.2

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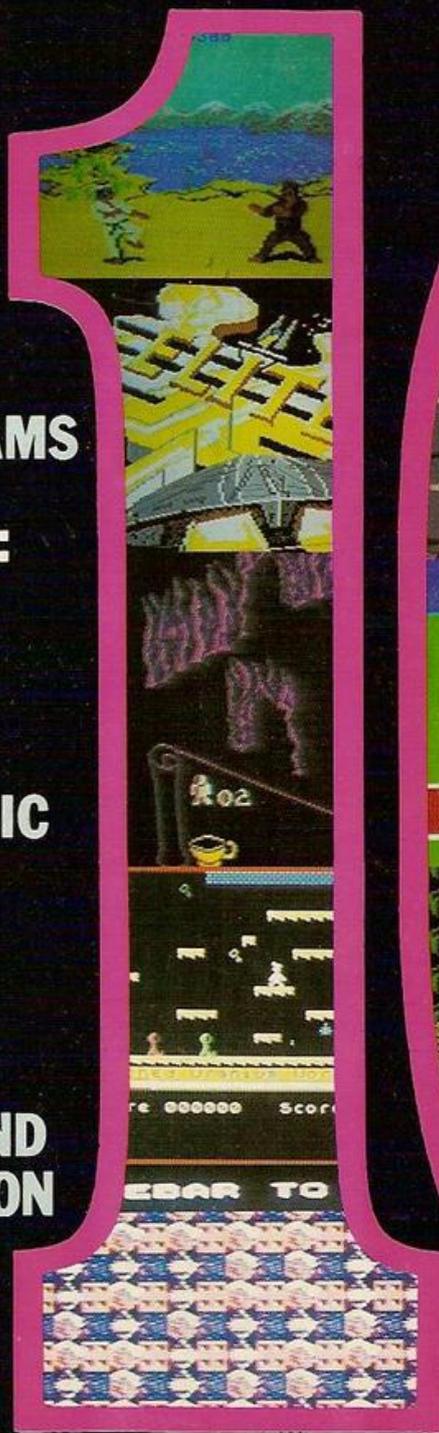
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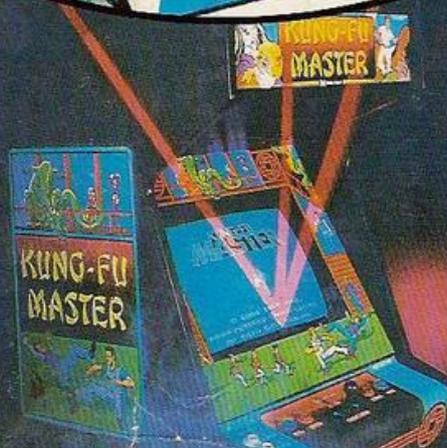
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**NEWS**

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**CHARTS PAGE**

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Free cinema tickets and copies of the game of the Spielberg blockbuster.



## 40

### ACTIVISION

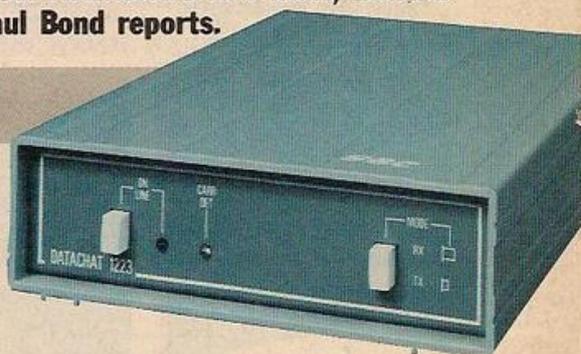
Another mouth-watering preview of goodies to come from Activision's new label, Electric Dreams. Paul Bond reports.



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### COMMUNICATIONS

Everything you need to know about communications, for beginners and hackers alike. A full list of bulletin boards and data bases.



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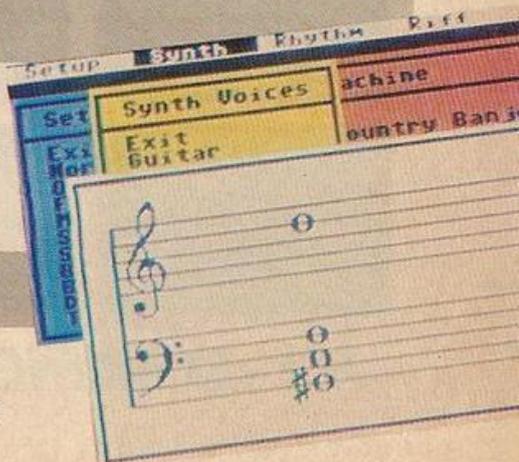
### SOUND EXPANDER

Scoop, in-depth review. At last, FM synthesis at a down to earth price. Tony Sacks gets more from his Commodore.

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### GENERATION GAME

Incentive Software's new adventure generator, GAC, casts its spell over Steve Cook.



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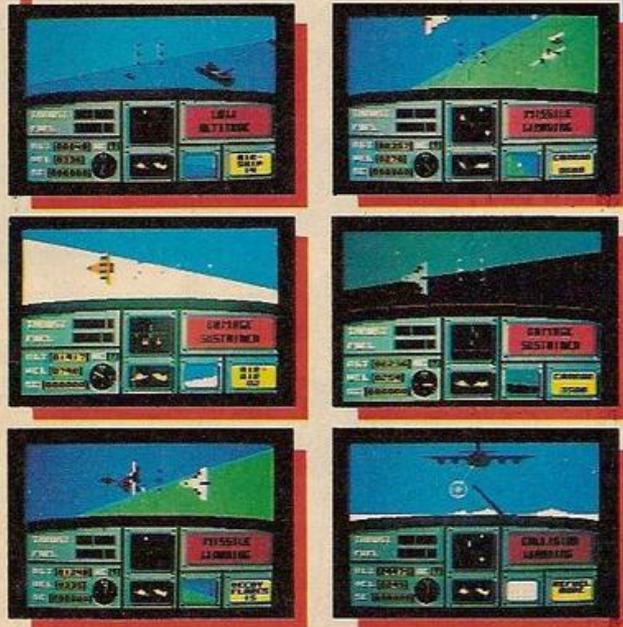
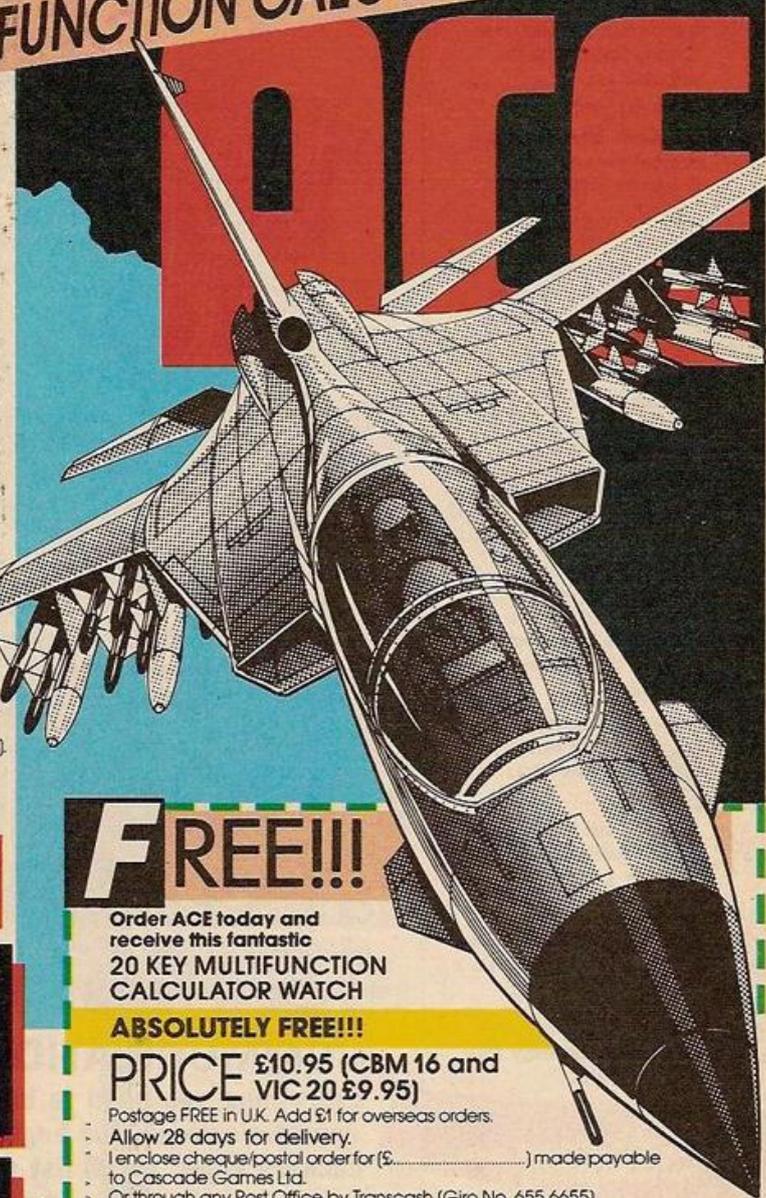
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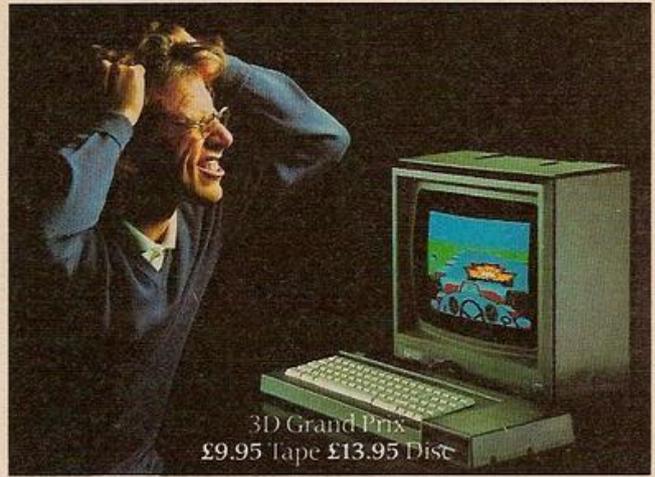
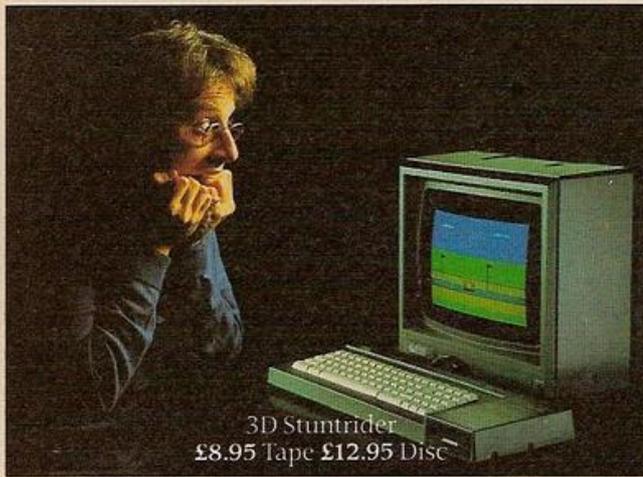
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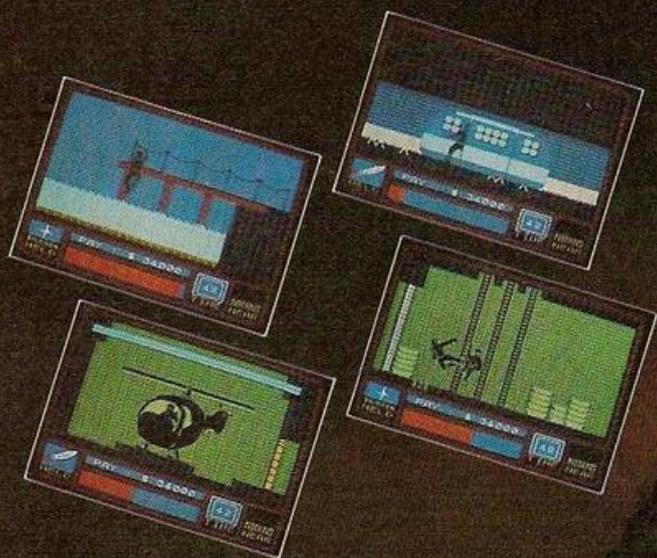
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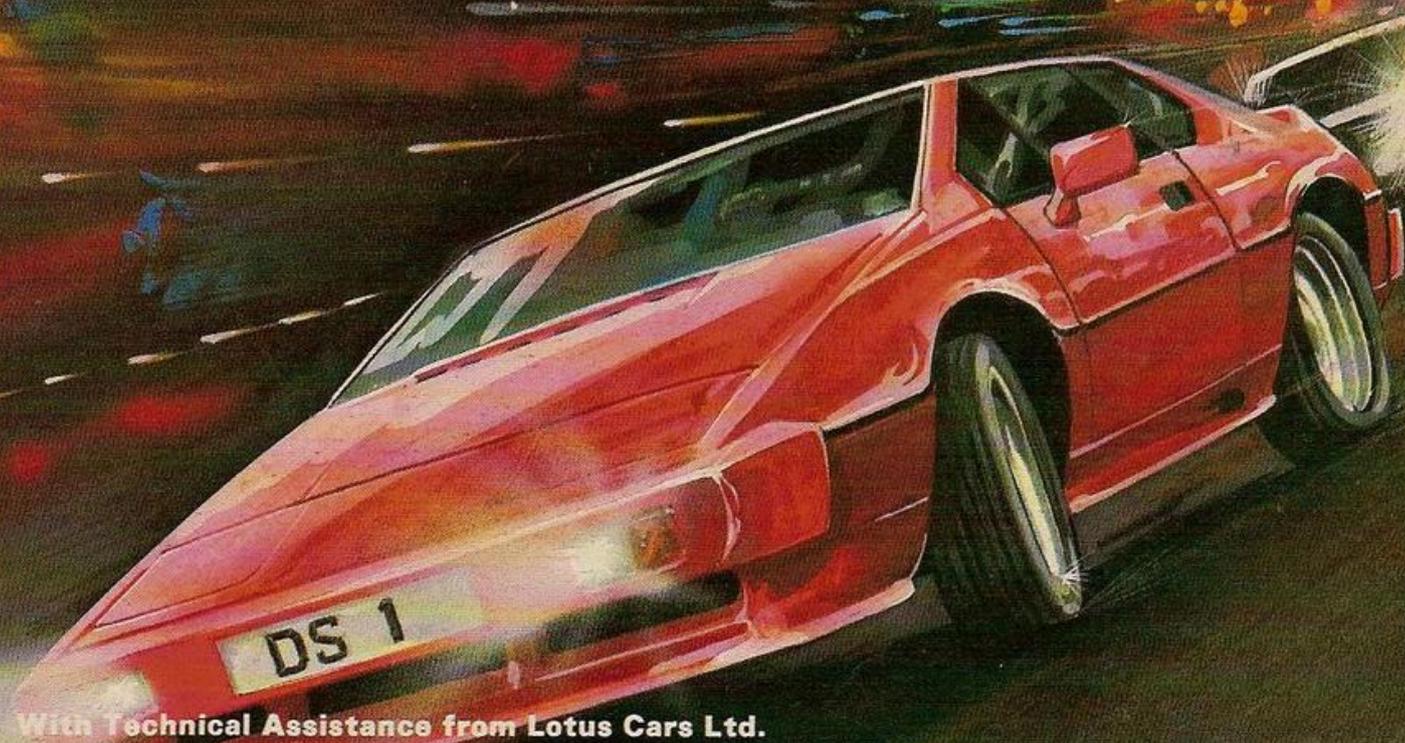
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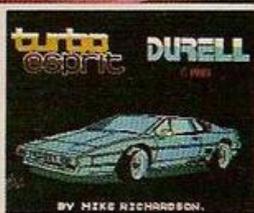
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Murom (rom)	Bebugsoft	£26.90
Paintbox	Bebugsoft	£10.80
Paintbox	Bebugsoft	£9.00
Seuth (rom)	Bebugsoft	£26.90
Spellcheck II (rom)	Bebugsoft	£27.50
Sprinkle Utilities	Bebugsoft	£3.00
Serie Utilities	Bebugsoft	£10.80
Star Pack	Bebugsoft	£11.70
Teletext Pack	Bebugsoft	£9.00
Teletext Pack (disk)	Bebugsoft	£9.00
Chequer (rom)	Comp Concept	£38.00
Disk Doctor (rom)	Comp Concept	£30.00
Graphics (rom)	Comp Concept	£30.00
Printmaster (rom)	Comp Concept	£30.00
Wordwise (rom)	Comp Concept	£40.00
Wordwise Plus (rom)	Comp Concept	£35
Beta-Base (disk)	Clares	£22.80
Cratfish (disk)	Clares	£5.00
Clares	Clares	£8.00
Replica III (disk)	Clares	£10.50
The Key (disk)	Clares	£5.90
Mini Office	Database	£5.35
Cashbook Accounts	Gemini	£50.00
Database	Gemini	£18.00
Final Accounts	Gemini	£50.00
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Invoice & Statements	Gemini	£18.00
Mailist	Gemini	£2.99
Stock Control	Gemini	£18.00
Printmaster	Gemini	£18.00
Island Logic	Island Logic	£11.65
Synthesizer Keyboard Library	Island Logic	£11.65
The Magic System (disc)	Island Logic	£17.95
Basic Ext (rom)	Micropower	£13.50
Machine Code Tutor	New Gen	£13.50
VJ-Calc	Pasion	£6.00
VJ-File	Pasion	£6.00
Ultrasac 2	BBC	£72

## SPECTRUM

Title	Company	Price
Beta Basic 3.0	Betasoft	£13.50
Masterfile	Campbell	£13.50
Masterfile & MF Print	Campbell	£18.00
Astronomer II	CP Software	£8.95
Floating Point Forth	CP Software	£9.95
Supercode II	CP Software	£8.95
Supercode III	CP Software	£11.95
Leonardo	Creative	£7.15
Database	Database	£5.35
Mini Office	Gilsoft	£13.50
The Illustrator	Gilsoft	£13.50
The Quill	Hisoft	£22.50
Dev Pac 3	Hisoft	£12.50
Pascal	Hisoft	£22.50
Utralis	Hisoft	£9.30
C Compiler	Kemp	£3
Purchase Ledger	Kemp	£3
Sales Ledger	Kemp	£3
Stack Control	Kemp	£13.50
Melbourne Draw	Microsphere	£13.50
Omeical 2	New Generation	£13.50
Machine Code Tutor	New Generation	£13.50
Lightmagic	New Generation	£13.50
Machine Lighting	Oasis	£17.95
Spec Mac Men	Oasis	£13.50
White Lightning	Oasis	£13.50
Address Manager Standard	OCF	£8.95
Address Manager Plus 80	OCF	£17.95
Editor Assembler	OCF	£11.65
Finance Manager Standard	OCF	£8.95
Finance Manager Plus 80	OCF	£17.95
Machine Code Test Tool	OCF	£8.95
Stock Manager Standard	OCF	£8.95
Stock Manager Plus 80	OCF	£17.95
VAT Manager Standard	OCF	£8.95
VAT Manager Plus 80	OCF	£17.95
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Trans Express (vid)	Romantic	£9.95
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Musical	Sinclair	£5
Small Business Accounts	Sinclair	£6.50
VU Calc	Sinclair	£4.50

VU 3D	£20
ZX Forth	£15
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Tasmerge	£12
Tasprint	£12
Tasworld	£19.95
Tasworld II	£29
The Artist	£14
Blast (Compiler)	£14

## AMSTRAD 464/6128

Title	Company	Price
Basic Tutorial 1	Amsoft	£17.95
Complete Firmware	Amsoft	£22.50
Complete OS	Amsoft	£22.50
Pascal 80	Hisoft	£35.95
Guide to Basic 1	Amsoft	£17.95
Guide to Basic 2	Amsoft	£17.95
Dev Pac 80	Hisoft	£31.50
Project Planner	Amsoft	£22.50
Screen Designer	Amsoft	£17.95
Star Watcher	Amsoft	£17.95
Masterfile CPC464	Campbell	£22.50
Masterfile CPC464	Campbell	£22.50
Artist & Sprite Designer	CP	£8.00
Mini Office	Database	£5.35
Masterfile 664 (D)	Campbell	£27.50
Hisoft	Hisoft	£22.50
Hisoft	Hisoft	£7.15
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Tascopy 464	Tasman	£17.95
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VATfile	Gemini	£23.00
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# Edit...

## A WOLF IN CHEAP CLOTHING

COMPUTER MANUFACTURERS are now offering the buying public new hardware that is difficult to fault on value for money grounds. The word new is important because there are plenty of older designs around that are being offered at prices that seem like a bargain — but only to the unwary. More experienced hands will realise that some of this bargain priced hardware is not supported by low cost software nor indeed much software at all. A computer, no matter how elegant its design, is just a collection of electronic components that will do very little of use.

In their efforts to make the best of bad marketing decisions in the past, some companies have dumped stocks onto the market at give away prices — better to have some cash in the bank rather than pile of computers that no one will buy at their original price. In these moves the manufacturers have found ready allies in some of the major High Street electrical chains.

While the reasons for these kinds of actions are perfectly understandable few would disagree that in the long term the industry as a whole is not well served by dumping. First time buyers of a machine that has no software support are not likely to maintain their interest in computing as a hobby, indeed their bad experience will give the world of micro computing a bad image.

To return to the more up-beat message of the opening sentence there are still plenty of good machines on the market today with many more in the pipeline. Your Computer will continue to monitor new developments in computing and will bring reviews of the latest hardware as soon as it becomes available. We'll also keep a close eye on the latest software developments for both the newest computers and those that add to the wide range of software available for some of the more 'mature' products. In preparing these reviews we will not be blinkered by any hype put out by the manufacturer nor by any technical gimmicks that are of little practical use. In short we will continue to bring you all the news and information that will help you get the most out of your computer.

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*The Master 128, still the same old Beeb?*

## Acorn unveils Master series

The long-awaited redesign of the BBC Micro finally saw the light of day in January with the launch of the BBC Master series micro from Acorn.

The Master series is not one, but five new variations on the BBC Micro — ranging from the Master 128 to the 32-bit Master Scientific.

The machine which is most likely to appeal, however, is the Master 128, which will sell for £499. Aside from the obvious 128K RAM, View, Viewsheet software and Advanced Disk Filing System (ADFS) — the Master 128 also includes the 65C12 processor running at 2 Mhz, BBC Basic Version 4.0, a program and text editor called Edit and two Acorn cartridge software sockets.

The other three BBC Master series models are:

- The Master 512 — A 512K MS-DOS version of the Master 128. Like all the machines in the Master range, the 512 is a co-processor upgrade of the 128 machine and can thus run all software written for the basic model. It includes everything you get in the Master 128 plus Digital Research's Macintosh-like Gem on disk,

- a mouse pointer device, the MS-DOS and CP/M 86 operating systems, 512K RAM and the Intel 80186 16-bit processor.

- The Master Turbo — This is another co-processor machine which places a high-speed CMOS-based 65C102 processor alongside the existing 128 cpu.

The two processors are linked by the Beeb's unique 'Tube' interface and a special version of BBC Basic known as 'HI-BASIC' is employed to optimise use of the memory and improve this processor's already impressive 4 Mhz speed. The upgrade from Master 128 to Turbo will cost £125.

- The Master Scientific — To take advantage of Acorn's longtime stake in the market for computers among the country's research and development community, the company has bolted a National Semiconductor 32016 32-bit processor on this version. The Scientific runs at a lightning-fast 8 Mhz and comes with half a Megabyte of RAM and its own 'Pandora' operating system. FORTRAN, Pascal and C software are also included with the system.

# Hard News

## FAT MACINTOSH

The original 128K Apple Macintosh is dead, long live the 512K 'Fat' Mac and the Macintosh Plus. This was the rallying cry at Apple's annual shareholder meeting in January as the company unveiled the new Macintosh which would take the company into the second half of the 1980s.

The new machine is fully compatible with the old (which can, in fact, be upgraded to the spec of the new machine), but includes a minimum RAM size of 1Mb (expandable up to 4Mb) a SCSI (pronounced 'suzzy') interface port, a new 128K ROM operating system, 800K disk drives and speed improvements up to five times those on the 'old' machine.

The Mac Plus is expected to sell for about £2300 in the UK — and thus will push down the price of the existing 512K Mac to about £1800 (and perhaps bring the price of the now-discounted 128K Mac to a mere £1000 or so). It — and upgrades for existing 128K and 512K machines — went on sale at the end of January.



*Fat Mac, Apple fights back on Amiga/ST front*

Pricing for the range isn't entirely clear, but it is evident that the machines won't be cheap. The cheapest machine is now the £399 Master ET (Econet Terminal) — a stripped-down version of the basic Master 128 machine

which removes the 6522 'sideways scrolling' chip and the 'bundled' word-processing, spreadsheet, terminal and disk filing software and adds network filing system software.

## Games tape comes "Off The Hook"

The British computer software industry has once again banded together under a charitable banner — this time to raise money for drug abuse rehabilitation.

The 'Off The Hook' campaign was launched at a January meeting of the Guild of International Software Houses and the International Society of Software Artists. It follows the highly successful Soft Aid tape, which last year raised £350,000 for famine relief.

The Off The Hook tape will feature software from Activision, US Gold, Ocean, Gremlin Graphics, Ultimate, Firebird, Melbourne House, Elite and Beyond. About £4.00 of the proceeds from sale of the £6.99 will go directly to the Princes Trust for Drug Abuse Rehabilitation — and the organisers are hoping to raise at least £100,000 in this way. The compilation tape will be offered for the BBC Micro, Spectrum, Commodore and Amstrad machines.

## Corby closes

Commodore UK started 1986 with a bang — the sound of doors slamming shut on 250 assembly jobs at the company's Corby plant.

The closure brings an effective end to the UK manufacturing of Commodore 64s and 128s. C16s and Plus-4 computers were also assembled at the Corby plant.

The move comes after months of disappointing financial results for Commodore — with the ironic exception of November and December, when pre-Christmas sales of all the company's products — in particular the Commodore 64 — were quite healthy. It also indicates a need for Commodore to get back to

doing what it does best — selling lots of computers at cheap prices — and that any further forays into the business market will have to be very carefully thought out.

The company's 1985 venture into the highly-competitive IBM PC market (with its PC10 and PC20 compatible computers) met with some success, but it's pinning much of this year's hopes on the Amiga super-micro. The Amiga, however, is a strange beast to pin down. It's got the best sound and graphics you're likely to see on a machine this side of £10,000, but it's priced to hit a market that is normally not used to needing synthesizers or paintbox software.

## No Gem on Atari ST

Atari has abandoned the Digital Research Gem Draw and Gem Write software for 'bundling' with its 520ST computer. In place of the DR products, Atari will now offer 1st Word by GST of Cambridge and DB Master One; a database from DB Master.

Atari has also thrown a couple of other software packages into the suite; an asteroids-style game called Megaroids and a less-comprehensive drawing program known as Doodle.

'We do not have copies of Gem Write and Gem Paint available for shipping and have decided to make alternative arrangements,' said Atari.

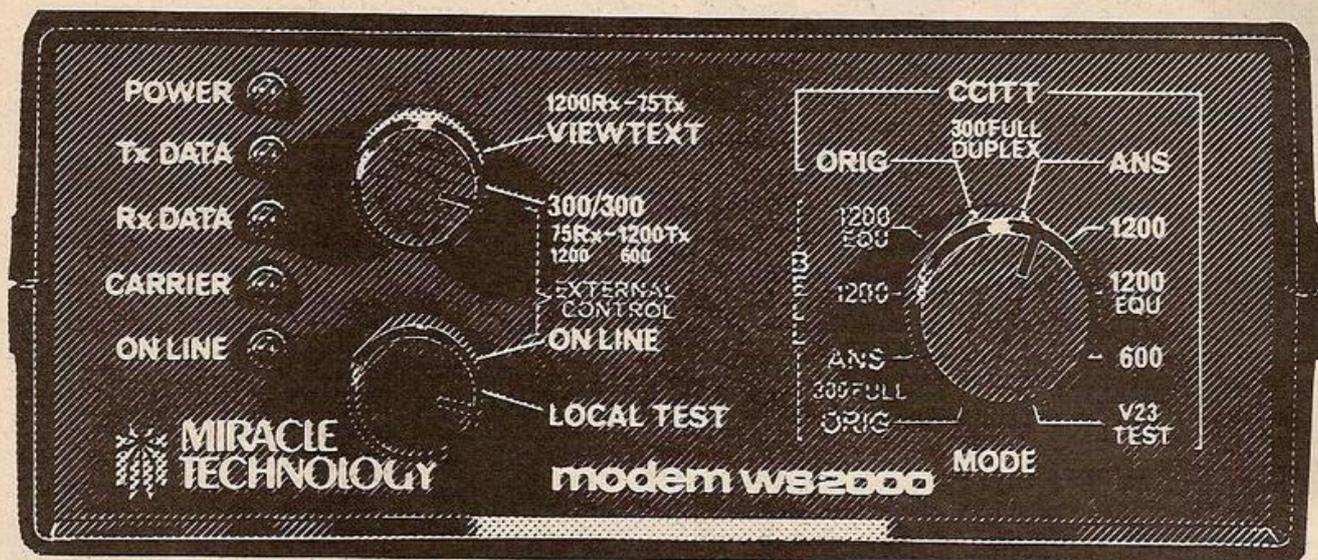
## Timex Portugal

Timex Portugal are shortly to announce a new disk system for the Sinclair Spectrum. In one box it has its own Z80 and two 3 inch disk drives (a la Amstrad). It comes with CP/M and has two printer ports.

What is really interesting is that a short while later they are releasing a professional keyboard. This connects into the disk system totally replacing the Spectrum. The combination is in effect a completely new computer.

The Liverpool software house mentioned last month as having a hit with their version of Underwulde have done it again. The ultimate game they have copied this time is Sabre Wulf, and a good job they've done of it too.

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# Soft News

(continued from page 13)

Industry rumour has it that Amstrad are in fact working on three new computers. In addition to the ST alike mentioned last month there is to be a PC compatible and the inevitable portable.

On a recent visit to Japan, Alan Sugar asked for production of 3 inch media to be increased. In return the Japanese asked for a commitment that his next machine would use this media. He couldn't make this promise because his next machine uses 5 1/4 inch media. It has to, in order to be IBM compatible. Rumoured price is in the £400 to £500 region.

Of course this switch to 5 1/4 inch disks won't help existing Amstrad owners. You are more likely to see Lord Lucan ride Shergar down Oxford Street than find a reliable source of the 3 inch media.

Just before Christmas Uncle Clive threw a party for the industry. The impressive venue was Magdalene College Cambridge. Most of the industries VIPs were there. Heads of software houses, distributors, large retailers and senior Sinclair staff. There was, however, one notable absence; Sir Clive himself. He missed his own party.

More facts are beginning to emerge about the Apple Carla, scheduled for September 1986 release. It will use the 68020 processor with a full 32 bit data bus. With this alone it would have enough power to obliterate the opposition. But there's more, it's going to run at double the clock speed as well. A bit like having one of the better minicomputers on your desk.

On the display front it will have double density graphics. There will also be a colour version and screens will be available in a variety of sizes.

Elsie Dee

## ULTIMATE TURN GOLD

Ultimate, producers of classic titles such as Knightlore and Alien 8 are to be marketed by U.S. Gold.

This move, predicted by Bruce Everiss in last month's issue, follows the pattern of Ariolasoft's link up with Lamasoft.

It is not entirely clear whether there has been a merger or if the two companies remain entirely separate. For the time being, Ultimate games will continue to appear with their usual logo and style. However, it will mean that Ultimate can take advantage of U.S. Gold's experience in marketing, manufacturing

and promotion, leaving Ultimate free to get on with developing their games.

This, combined with other labels under the Centresoft banner such as Gremlin Graphics, Ocean, and Imagine means that the company controls marketing and promotion of products which account for well over 50 per cent of the market. In another deal, after the collapse of Websters, the software distributors, Centresoft may well still further strengthen their hand by winning the contract to distribute to Boots, a large software retailer. The first of this year's releases from

Ultimate/U.S. Gold are scheduled for the end of January. They are Dragon Skulle for the CBM-64, Cyberrun and Petagram, both on the Spectrum.

Dragon Skulle is the completion of the Sir Arthur Pendragon trilogy. Your quest is set on a desert island where you must find the evil Skulle, and fight your way against the Skulle's evil minions. Cyberrun is an arcade adventure set out in space where you must make a fast buck carrying Cybernite around, which apparently makes you very popular with the local pirates with inevitable results.

## PAGEMAKER FROM AMS TO BATTLE UNCLE BOB

A newspaper war has broken out — but this time bingo cards and page three girls are not involved.

The combatants are a subsidiary of Robert Maxwell's giant Mirror Group Newspapers and a small firm of graphics specialists, AMS. AMS made a name for themselves with the AMX mouse on the BBC, they have since followed it up with a version for the Amstrad, and soon the Spectrum. Their new program, AMX pagemaker allows you to compose and print a newspaper page made up from text and digitised pictures. Whilst it might not be the sort of thing Eddie Sha or Rupert Murdoch might be in the market for, at £49.95 it would be well within the pocket of many smaller operations. The program, which is icon driven is controlled by either the

**Amx Times**  
WEDNESDAY JANUARY 1st 1986

**Creativity Unleashed!**  
Yes at last, AMX Pagemaker is available to everyone! Even if you do not have a mouse you can now start publishing your own newspaper or comic using THE most powerful text and artwork system ever launched for the BBC Micro. Pagemaker comes with two ROMs and two disks and requires NO extra hardware at all. It works with the AMX mouse or you can use either the keyboard or joystick. With a bit of imagination and very little time you can produce results like these. (Full details of a video picture digitizing service comes with Pagemaker.) Scenes below are excerpts from the first Pagemaker pictures with other graphics progs such as AMX comic strip:-

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Somewhere Far & Remote...  
The Evil DR. AMXIMUS X

AMX mouse, keyboard or joystick. It is too early to tell if either this, or the rival Mirrorsoft program Fleet Street Editor (with free robot Maxwell poster), will make a big splash, but AMS certainly appear confident they can

beat their more illustrious rival. Nick Pearson, managing director of AMS believes his product "can more than look after itself in the newspaper war. It's the first on sale, and its got a better specification."

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# Your letters

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## SQUITS IN

Your correspondent Peter Turner writes from Norway in the January issue to complain that Psion's Scrabble needs updating because it uses words like "squits" and "vision" that do not appear in his Chambers dictionary. My update ambition would be to have more words, not less.

Is it Scrabble that needs the update or Peter's spectacles? His complaint is a complete mystery because both of the words are long-standing inclusions in Chambers.

Words like "squits" and "vision" are part of the common armoury of the "good players" that Peter claims to represent and if he goes into battle with nothing better than a pocket dictionary and another extremely out-of-date one, then he's just the opponent I'd choose to play for cash! *Gordon West, Barton Dunterton, Devon.*

## IN TOUCH How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each

sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page —

that's as it appears in the magazine and includes illustrations.

## Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC and 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.

## Dear Ian Mac Naught Davis,

The home computer software industry in the UK has grown like Topsy in the last few years. It is now about a third the size of the record industry. Unfortunately it doesn't get a third the television time that the record industry does.

The programme you present, *Micro Live*, is one of the few examples of enlightened recognition of computing. For the millions of micro users it is a rare chance to find out more about their hobby from television. The Old Grey Whistle Test of computing. Your programme probably attracts more viewers than the combined readership of all the micro magazines. This is an enormous influence to wield. The difficulties involved make your programme easy to criticise — so that is what I am about to do.

The unfortunate relationship between BBC Enterprises and Acorn that produced the BBC Computer is reflected in *Micro Live*. In the real world the percentage of users of the BBC machine is minute, real people use Commodore 64's and Sinclair

Spectrums. If the BBC broadcast to the real world they should serve the interests of their viewers not the interests of BBC Enterprises. You are guilty of Microcomputer apartheid.

The largest single use of computers is games playing. This is irrefutable and absolute fact. Watching *Micro Live* a visiting Martian would think we use these machines principally as musical instruments. The paucity of games reviews on a microcomputer programme is amazing. The absence of the games charts unforgivable. As to the fetish about computer music, this is just throwing away valuable television air time.

One of the most powerful uses of television is the person to person interview. It has made people like Terry Wogan, Michael Parkinson and David Frost. It would seem an ideal mechanism for inclusion in *Micro Live*. Interview of the week, I am sure I am not alone in wanting this. Just think of all the potential victims. Mike Singleton, Uncle Clive, Alan Sugar, John Gibson, Mel Croucher and so on ad



nauseum. Much more interesting than computer music.

The final criticism regards news. This really is a fast moving, exciting industry. It must be to support two trade weeklies. Yet to watch *Micro Live* you would think it was as boring as the pot plant industry. Compared with the trade and consumer weeklies your superficial news section misses just about every story. Going out live you are in a position to produce a really good news section that would be of real interest to everyone. Why don't you?

The above comments are meant constructively and I hope they are taken as such. *Micro Live* is one of the very few true mass media events representing the Microcomputer industry. As such it is of critical importance.

*Bruce Evers*

## SNOWBOOTS BOTCH

My Snowbots program published in the January '86 volume of *YC* was a bit of a disaster. Apart from the Australian style screen shot — yes, it was upside down — not my fault I hasten to add.

The lack of the explanatory REMark statements causes

(continued on page 19)



# Your letters

more problems than might be imagined. Most CBM users will be able to cope with the control characters etc. but some important points are shown below.

Line 10:

The final set of quotes is — “< dot hm ins s/sp>” the shifted space is very important.

Line 7000 should read —  
sys36888:print“< clr gr2 >”11\$< s/★ 22cd <”: print “< cl ins s/★ hm cd >”chr\$(142)

Line 7200 & 7400 should read —

pokess,:< followed by the print statements as in line 7000 above >

Line 8000:

Control characters are “< clr c/n c/h wht >”

Line 16660:

The last data value is 150. Now for the bit that was my fault — while the unconventional method of starting the game does work, it appears that very occasionally it generates an apparent error at the very start of the game — there are two ways to deal with this. Firstly just ignore the error, clear the screen and enter either RUN (which will lose the high score) or GOTO8000 (which will). To get rid of the problem completely make the following modifications — In line 9130 change the value of KC to 36954 then enter the following lines:-

```
8060 td=0:poke198,0
```

```
8070 td=td+u:iftd>99then goto 8010
```

```
8080 getk$:ifk$ = “<f1>”then goto 10
```

```
8090 ifk$ = “<f3>”then 7000
```

```
8099 goto8070
```

This will get rid of the problem but will not allow the almost instant start of the previous method.

(All text enclosed in <...> should be interpreted as required — not typed literally.)

Keith Suddick,  
Jarrow,  
Tyne and Wear.

## YC POKES

I thought you might like to hear of some excellent pokes

for some excellent games which have appeared in *Your Computer* over the last few issues. They are as follows:

Terrapin

POKE 29525, no. of

bombs at start

POKE 29779, no. of

bombs you get when bonus

star collected (yellow)

Spraymania

POKE 27108, (time per

level)

POKE 27160, lives

Dangerous Gardens

POKE 28277, no. of lives

To The Top

POKE 29411, no. of lives

Mad Caverns

POKE 29332, no. of lives

All the above pokes for lives, etc can only be in the range (0-255).

C J Smith,  
Westbury,  
Wiltshire.

## KUNG FU OFFER

Due to overwhelming response to my Kung Fu free tape offer in November's issue, I cannot record any further tapes. But I am now in a position to copy the program for the minority of people whose tapes I returned unrecorded. I have received several tapes without S.A.E.s. To those whom it may concern please send an S.A.E. and you will receive your tape. I have also received an order from a Bedford reader for some additional tape but with no return address.

If he could contact me his tapes will be forwarded to him.

B Lewis,  
Bridgnorth,  
Shropshire.

## ENDZONE

Thanks for publishing my Amstrad program “ENDZONE” in YC, Jan. '86. Unfortunately I missed out the last byte, so the score mechanism does not work. The last line of DATA should be:-

```
4970 DATA EB,C1,CB,2A,  
CB,1B,C9,9999
```

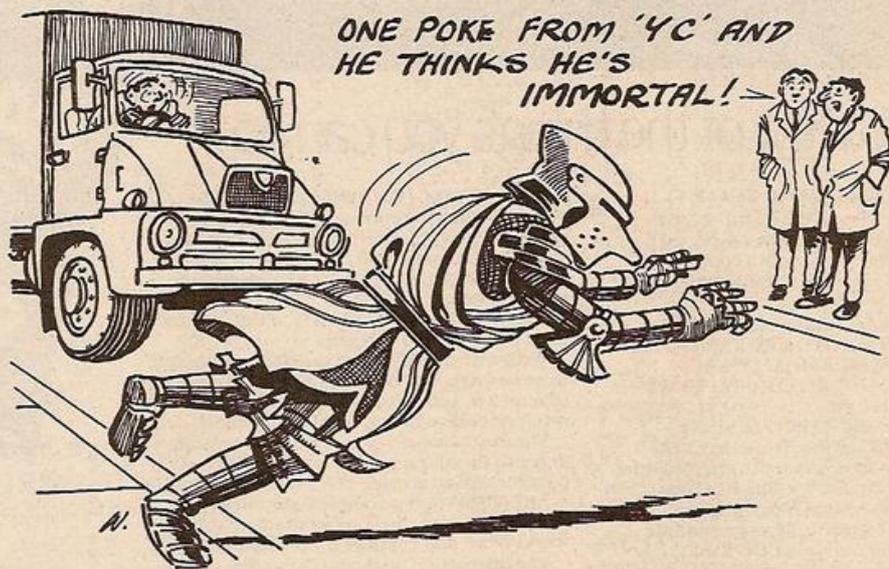
the 0 should have been C9.

Also to save the game, it should have been

```
SAVE “ENDZONE”:  
SAVE “EZCODE”,B,  
35000,4876
```

The “save” published was 1 byte less than it should have been. My apologies for any disappointed readers.

S Cartwright,  
Gabalfa,  
Cardiff.



## UNFAIR TO CLIVE

The title of the article in last month's *Your Computer*, “Knight Clubbing” was accurate even though the text left a lot to be desired in a supposedly serious article.

Clive Sinclair's claim to fame lies with his ability to provide cheap usable computing power via the ZX80, ZX81 and Spectrum. The idiosyncracies of each machine should not be allowed to mar his true place in the progress of home computing.

Prior to Clive, the market did not exist. His machines

indicated then confirmed that such a market existed. The comments about mail order tactics are petty: those about pre-product releases are correct but regretfully are commonplace in the computer industry. Other manufacturers including IBM have had similar problems so why pillory Clive alone?

There appears to be something wrong with making a profit. This totally ignores the fact that the machines were significantly cheaper than anything else available at the time. I see no criticism of Acorn or others for their price structure

initially or even now!

Why the total abhorrence of single keystroke Basic especially when my IBM PCs have 10 function keys designed to imitate this feature in a broader context.

Clive is not a magical culture figure who is never wrong. Many of the detailed criticisms are correct but then hindsight is the perfect science. As a result of his activities a new industry exists including *Your Computer* and the employees thereof.

B Jacobs,  
Hull,  
Humberside.

# NOW YOU CAN EXPLOIT SPECTRUM GRAPHICS TO THE ULTIMATE.

## With the Graphics Suite from Print 'n' Plotter.

If you're interested in producing great graphics with your Spectrum, then these programs are designed with *you* in mind.

And you *don't* have to be an expert. Even with no programming knowledge the programs will enable you to produce fantastic graphics to use in every piece of software you write.

Or you can use them just for the fun of producing computer art.

Each of the programs are inter-active and together they form the most accomplished graphics toolkit you will find on the market today.

But you can also use each of them separately, as each are self-contained and cover a specific area of graphics programming.

With Print 'n' Plotter's 'GRAPHICS SUITE', everything is made so simple you won't believe it.

## Just a few of the things you can do...

### PAINTPLUS (GRAPHICS SUITE 1)

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Facilities include: DRAW, PLOT, ARC, CIRCLE, FILL IN SOLID OR PATTERNS, FILL IN OVER MODE, DRAW RADially, ARC RADially, ENLARGE TO EDIT, PAPER WASH, BOX DRAW and so on...

As well as drawing, PAINTPLUS has a tremendous UDG section. It also has UDG "grabbing" from screen as well as full facilities for defining, saving and loading UDG sets.

The Organiser section of the program enables you to automatically store multiple screen graphics or multiple UDG banks.

PAINTPLUS comes with a demo of screens, animation and alternative character sets, plus a copy of Print 'n' Plotter PICTURE BOOK - 100 pages of instructions, hints, tips, listings and related graphics information.

### SCREEN MACHINE (GRAPHICS SUITE 2)

SCREEN MACHINE is *the* graphics manipulator.

Use it when you want to take your graphics and turn them into professional machine coded data for use in BASIC or M/Code programs.

For instance:

SCREEN MACHINE will compress the memory consumption of your graphics to cram even more into the computer's memory -

As well as memory compression, SCREEN MACHINE allows you to put your graphics through a series of highly-sophisticated graphics manipulations.

These include ENLARGE, REDUCE, RELOCATE TO OTHER PARTS OF THE SCREEN, STEP AND REPEAT, BLEND SCREENS TOGETHER, RECOLOUR SELECTIVELY OR GLOBALLY, FLIP SCREEN, etc.

And SCREEN MACHINE also has a dedicated Text Compiler - ideal for anyone who uses lots of text for instructions or menus on screen.

SCREEN MACHINE also comes with a copy of PICTURE BOOK and a demo that's so good you can't believe it.

### ART-O-MATIC (GRAPHICS SUITE 3)

Ever wanted to produce screen graphics for Adventure Games, Educational, Training, or Scientific programs and run out of memory because the graphics handling consumed too much memory?

If so, you need ART-O-MATIC, Print 'n' Plotter's great new graphics compiler.

With ART-O-MATIC you can draw, define and store an incredible number of screens or parts of screen in your programs as compiled instant machine code which is usable from BASIC or M/C.

The exact amount of compression possible depends on your graphics, but up to 99% is possible and an average of 85%-90% is usual.

ART-O-MATIC is a complete graphics drawing program, so you can produce your works of art and compile at the same time.

The instruction book and demo that comes with the program show you *everything* you need to know about cramming great graphics into your Spectrum.

### SPRITE MACHINE (GRAPHICS SUITE 4)

There have been a number of programs called Sprite Generators. Most of these are self-contained and not a great deal of use to people who want to use Sprites in their own programs.

SPRITE MACHINE is different. This program was written with *you* in mind - whether you are a professional, amateur or beginner.

There's never been a simpler Sprite program to use. All you have to do is draw your Sprite and then choose from a fantastic range of options to get it doing what *you* want.

You can: animate your Sprites, choose any direction and starting position, adjust speed, adjust height, choose running time, decide on edge actions such as bounce, wraparound, reflect or stop, make intelligent decisions like strike and collision actions, colour your Sprites or take colour from the screen, trace or non-trace, etc.

The program comes complete with a cursor-operated Sprite drawing board and catalogue/store function.

Instruction booklet and demo are included with the program.

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# The charts

## TOP 30 OVERALL CHART

1	COMMANDO	ELITE	15	LITTLE COMPUTER PEOPLE	ACTIVISION
2	YIE AR KUNG FU	IMAGINE	16	ARCADE HALL OF FAME	US GOLD
3	RAMBO	OCEAN	17	TOMAHAWK	DIGITAL INTEGRATION
4	THEY SOLD A MILLION	HIT SQUAD	18	BACK TO SKOOL	MICROSPHERE
5	WAY OF THE EXPLODING FIST	MELBOURNE HOUSE	19	SABOTEUR	DURELL
6	WINTER GAMES	EPYX/US GOLD	20	BMX RACERS	MASTERTRONIC
7	ELITE	ACORNSOFT	21	LORD OF THE RINGS	MELBOURNE HOUSE
8	COMPUTER HITS (10)	BEAU JOLLY	22	NOW GAMES 2	VIRGIN
9	FORMULA ONE SIMULATOR	MASTERTRONIC	23	SPELLBOUND	MASTERTRONIC
10	TRANSFORMERS	OCEAN	24	BEACH HEAD 2	ACCESS/US GOLD
11	MERCENARY	NOVAGEN	25	GOONIES	DATASOFT/US GOLD
12	ACTION BIKER	MASTERTRONIC	26	STEVE DAVIS SNOOKER	CDS
13	FINDERS KEEPERS	MASTERTRONIC	27	ROBIN OF THE WOOD	ODIN
14	GYROSCOPE	MELBOURNE HOUSE	28	MONTY ON THE RUN	GREMLIN GRAPHICS
			29	BEACH HEAD	ACCESS/US GOLD
			30	ROCKMAN	MASTERTRONIC

## BUBBLING UNDER

1	ZORRO	US GOLD	6	MASTER OF MAGIC	MASTERTRONIC
2	WINTER SPORTS	ELECTRIC DREAMS	7	BIG MAC	MASTERTRONIC
3	GUNFRIGHT	ULTIMATE	8	ARC OF YESOD	ODIN
4	KANE	MASTERTRONIC	9	DEATHWAKE	QUICKSILVA
5	ENIGMA FORCE	MONOLITH	10	GOLD RUN	MACSEN

This chart is based on the MicroScope chart as compiled by Gallup.

**MicroScope GALLUP**

MicroScope is the weekly trade paper of the microcomputer industry. If your computer store doesn't display the latest MicroScope chart, ask the manager to call Mark Salmon on 01-631 1433 - we'll send a copy every week.

## COMMODORE SALES

THIS	LAST	MTHS	TITLE	PUBLISHER
01	02	02	COMMANDO	ELITE
02	03	02	RAMBO	OCEAN
03	01	03	WINTER GAMES	EPYX/US GOLD
04	05	02	LITTLE COMPUTER PEOPLE	ACTIVISION
05	NE	01	MERCENARY	NOVAGEN
06	04	02	LAST V8	MASTERTRONIC
07	08	02	THEY SOLD A MILLION	HIT SQUAD
08	06	02	FIGHT NIGHT	US GOLD
09	NE	01	ARCADE HALL OF FAME	US GOLD
10	NE	01	TRANSFORMERS	OCEAN

## AMSTRAD SALES

THIS	LAST	MTHS	TITLE	PUBLISHER
01	01	02	THEY SOLD A MILLION	HIT SQUAD
02	06	02	YIE AR KUNG FU	IMAGINE
03	02	03	GRAND PRIX 3D	SOFTWARE INVASION
04	03	03	FORMULA ONE SIMULATOR	MASTERTRONIC
05	05	03	SOUL OF A ROBOT	MASTERTRONIC
06	04	03	FINDERS KEEPERS	MASTERTRONIC
07	NE	01	COMPUTER HITS (10)	BEAU JOLLY
08	NE	01	CAVES OF DOOM	MASTERTRONIC
09	07	03	NONTERRAQEUS	MASTERTRONIC
10	NE	01	SCRABBLE	LEISURE GENIUS

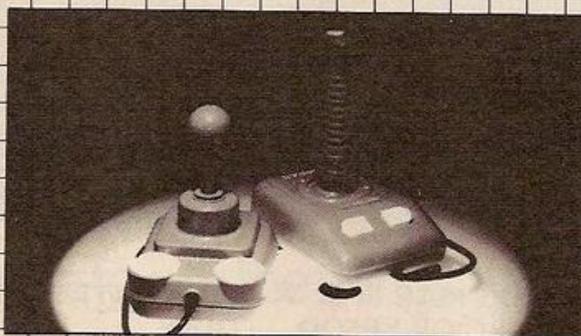
## SPECTRUM SALES

THIS	LAST	MTHS	TITLE	PUBLISHER
01	02	02	COMMANDO	ELITE
02	NE	01	YIE AR KUNG FU	IMAGINE
03	NE	01	RAMBO	OCEAN
04	01	02	ELITE	FIREBIRD
05	07	02	TOMAHAWK	DIGITAL INTEGRATION
06	03	02	BACK TO SKOOL	MICROSPHERE
07	06	02	SABOTEUR	DURELL
08	NE	01	LORD OF THE RINGS	MELBOURNE HOUSE
09	NE	01	SPELLBOUND	MASTERTRONIC
10	NE	01	WINTER GAMES	EPYX/US GOLD

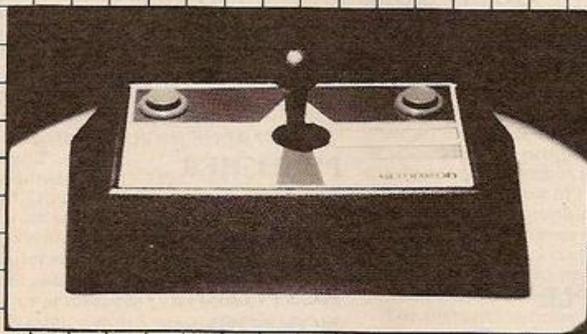
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The computer game  
with all the right  
questions



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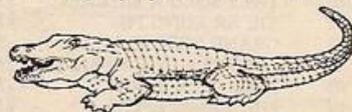
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## MERCENARY

◆ CBM64 & Atari • Novagen • Arcade Adventure • £9.95 cass, £12.95 disc • Lee Paddon

**GRAPHICS**  
● ● ● ● ●  
**SOUND**  
● ● ● ● ●  
**PLAYABILITY**  
● ● ● ● ●  
**VALUE FOR MONEY**  
● ● ● ● ●  
**OVERALL RATING**  
● ● ● ● ●

First, the bad news, you have crashed on an alien planet with only 9000 credits and a computer called Benson to your name. Second, the even worse news, you've landed slap bang in the middle of a war torn city called Targ. You have two modes, either zipping around at high speed in any of the various ships and vehicles hanging around the place, or trudging around corridors banging into walls on Shanks' Pony.

This first game in the planned series is called "Escape from Targ". Easier said than done. You've got to get a space ship. 9000 credits won't even make a down payment, so you've got to make some money. Fortunately, although there's not much call for computer journalists, you can make a crust by becoming a soldier of fortune. The two warring factions are the Palyars and Mechanoids. You can run

little errands for them, and eventually discover how to get off the planet.

There are other more direct methods, like nicking the nearest interplanetary type ship, or if this seems too dull, you can have fun blowing up Mechanoid installations. Naturally the mechanoids take a dim view of this, and try to stop you. However, if you manage to destroy all 120 enemy installations, the Palyars are suitably grateful. Possibly they give you a ship just to be shot of an obviously homicidal maniac. However, the trouble here is identifying which installation belongs to whom.

Being a world simulator, things are on a truly global scale. There are 200 structures scattered around the city, 170 rooms in subterranean complexes, and loads of objects, 30 of which are vital to progress. There's no limit to the amount Benson can carry — which allows you to unleash your kleptomaniac instincts, ripping off everything that isn't nailed down.

One little job you may take on will take you to the Palyar command ship, orbiting high above the planets surface. Once inside, be careful, as one wrong turn could give you a very rapid aerial view of the city, with no way of getting back up again. Arcade freaks will enjoy the vector graphics, except for the rather disconcerting way you can fly through things. This is a minor quibble on what is otherwise an excellent game on a truly

epic scale.

Novagen can consider themselves forgiven for keeping everyone waiting all this time — in the end they have brought out a bug-free, well thought out and absorbing product.

In an industry full of larger than life, over hyped self publicists, Paul Wokes stands out from the crowd. Retiring to the point of being a recluse, he lets his products do the talking for him.

About as close as you'll ever get to him is Bruce Jorden, the marketing man of Novagen, the two man outfit set up by Paul in 1985 to market his first game "Encounter".

Like any run of the mill teenage prodigy, Paul built his first computer way back in 1972 when LSI was still a twinkle in Ferranti's eye and you could fry an egg on the power supply. Then off to Leicester Poly to spend some more time building computers and then Lucas Electronics for a five year stint, whiling away his lunch hours playing around with 3D graphics. This soon evolved into the game Encounter.

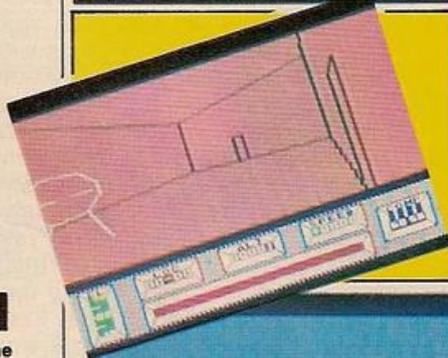
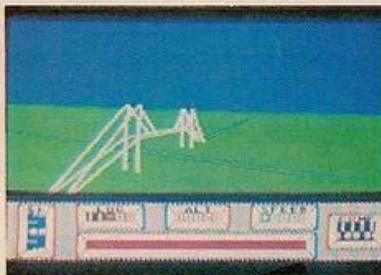
Mercenary had similar strange origins. It started life as a flight simulator, but Paul wrote such a fast routine for moving over landscapes that it seemed a shame to bog it down with too much performance detail. The adventure side comes from Paul's penchant for text adventures.

What actually pays the bills though is Novaload, the tape loading system developed by Paul for Encounter. It is used on around 70 per cent of all games. Whilst at 31, you could hardly describe Paul as a whizz kid millionaire, the sort of five figure sums Novaload has netted are not to be sneezed at.

Mercenary II? Well, the conversions come next, and at the moment it's very much in the design stage, but it will probably be carrying on where Mercenary left off, out in space, with more depth and solid objects.

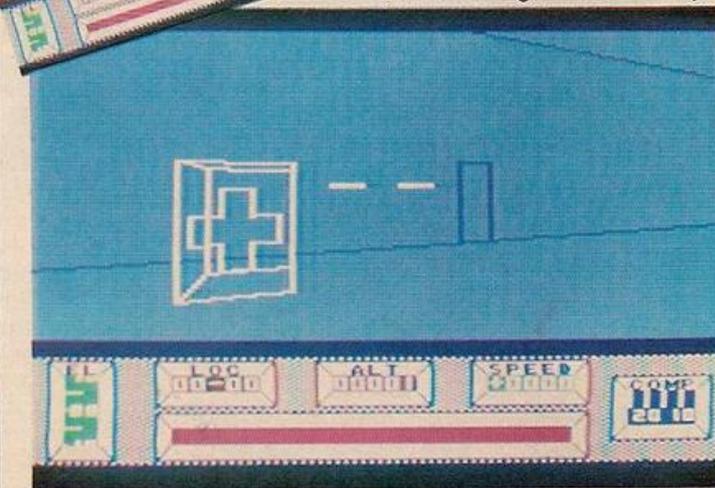
### SCREENS

● The underground complexes, take anything that isn't nailed down



### SCREENS

● Skimming over the surface of Targ.







# THE HOST IN THE MACHINE



## M.U.D

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# SOFTWARE SHORTLIST

## T TRANSFORMERS

► CBM-64 • Ocean • Arcade Adventure • Lee Paddon • £9.95

### VALUE FOR MONEY

● ● ● ● ●

### GRAPHICS

● ● ● ● ●

### PLAYABILITY

● ● ● ● ●

### SOUND

● ● ● ● ●

### OVERALL RATING

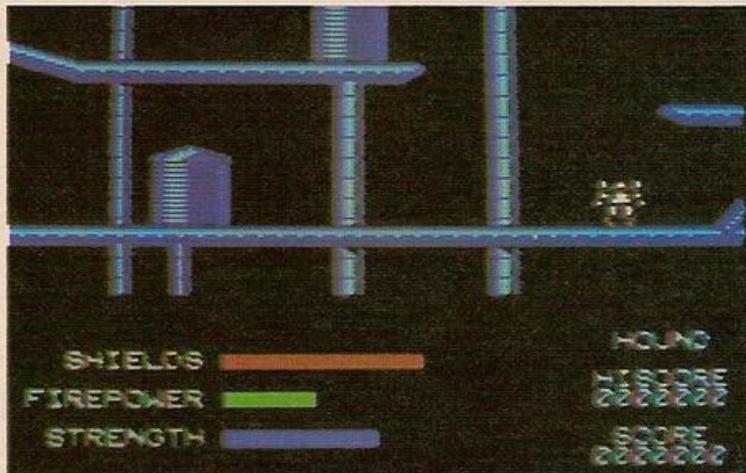
● ● ● ● ●

Yes, its TV tie in time again, with Denton Designs producing the game of the toy of the series.

All your old favourites from the small screen are here. Jazz, Mirage, Bumblebee, Hound, and of course, the local heavy, Optimus. In case you are one of the many millions who has never tuned in to TVam, Transformers is a cartoon strip in which our brave mechanical chums save the world from all sorts of evil threats.

In the game, I'm afraid, there are no worlds to save. The bad guys have done nothing more terrible than nick your logo and scattered it all over a superb multi-level maze. Your job is to use your robots to gather up and reassemble the four pieces of the logo, with a bonus based on speed.

What the game lacks in story line, it makes up for in presentation. The sound track



is well up to the standards we expect from Denton after their "Frankies" game. You could almost forgive the Commodore its slow loading if every game had loading music like this.

The maze consists of a series of platforms with ramps between them. The opposition consists of aggressive dogs, birds and

other Transformers. The action is fast, smooth and addictive. You can walk or fly, but whilst flying, collision with any part of the maze is fatal. You can also transform into a vehicle. You can't fire, but you can move fast.

This is a simple, stylish game, obviously aimed at the same sort of people who are fans of the toys and TV show.

### SCREENS

● A simple, stylish game for fans of the TV show.

## D DEATH WAKE

► Spectrum 48K • Quicksilver • Shoot-'em-up • Lee Paddon • £7.95

### GRAPHICS

● ● ● ● ●

### SOUND

● ● ● ● ●

### PLAYABILITY

● ● ● ● ●

### VALUE FOR MONEY

● ● ● ● ●

### OVERALL RATING

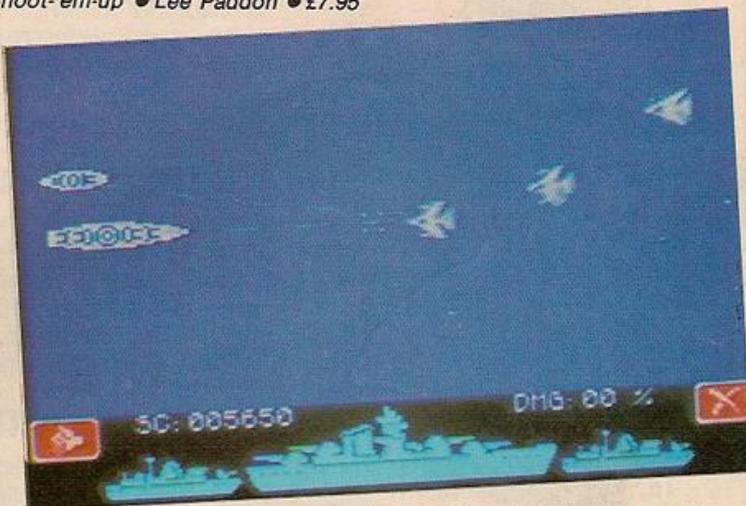
● ● ● ● ●

This is probably the game that Beachhead should have been. Beneath the surface of Beachhead was a series of fairly crude arcade games, but this game has far more detail, and possibly more staying power.

The plot is similar. You have to penetrate a well defended enemy base, being attacked by a variety of threats. Torpedo bombers, torpedo boats, bombers, destroyers, mines and so on. There is also a strategic screen which shows your progress toward your objective, the enemy bunker. On this map you also direct your air support which attempts to suppress the enemy air and sea bases.

Your sole weapon is "The Undaunted", a battleship, plus its two escorting destroyers. Your ships come equipped with flak guns plus heavy armament for shore bombardment.

After successfully completing each arcade sequence, it's back to the strategic map and allocating the air units. In the arcade



sequences, it pays to be defensive, as the targets are extremely elusive and deadly.

The graphics in the arcade sequences are very nicely done, with simple controls. Particularly nice is the way the torpedo bombers swing their wings back after finishing their attack run — if you haven't splashed them of course.

Needless to say, the fate of the nation is in your hands. Failure means that the enemy can build their

atom bomb in peace and lay waste to your cities. Presumably this gives it some kind of historical context, with you attempting to force your way up a Norwegian fjord, but this is not clear. Or perhaps it is a bit of gun boat diplomacy being applied to some dastardly third world chieftain holding the civilised world to freedom. A good, competent game, with plenty of variety. So damn the torpedoes and full speed ahead.

### SCREENS

● Takes up where Beach head left off

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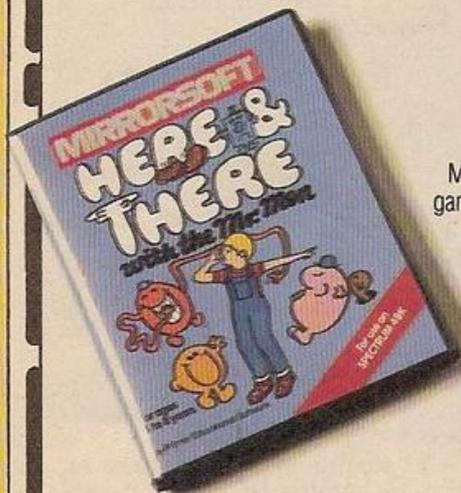
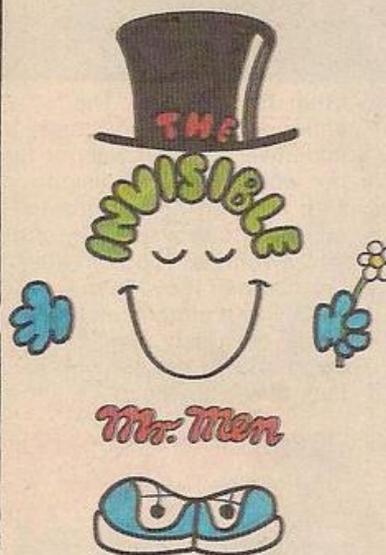
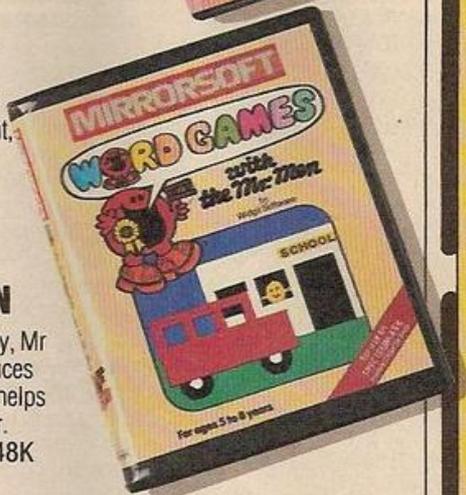
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# SOFTWARE SHORTLIST

## HI RISE

► Amstrad • Bubble Bus • Pacmanesque • £8.95 disc £12.95 tape • Lee Paddon

### VALUE FOR MONEY

●●●●●  
GRAPHICS

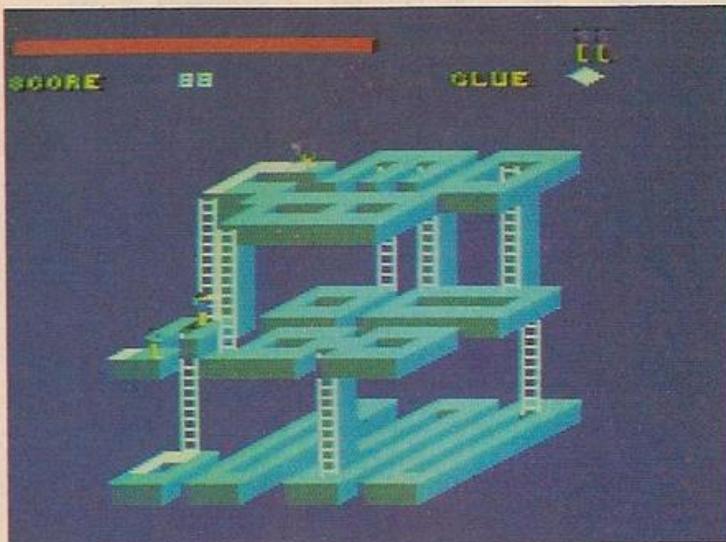
●●●●●  
PLAYABILITY

●●●●●  
SOUND

●●●●●  
OVERALL RATING

It seems nothing can stop Bubble Bus now. After years in the wilderness, they follow the excellent Starquake with this elegant offering. While a great game, it has the sort of plot that any right thinking games player would balk at. You play Builder Bob, a nasty piece of work. You are a scab labourer on a building site who is determined to carry on painting despite the picket line. Not unnaturally incensed by this, your workmates decide to beat you up, if they can catch you.

The practical upshot of all this is that we have a sort of 3D version of Pac man. Instead of power pills, you have two tubes of superglue which you can dump on the scaffolding at strategic points. The glue only lasts for a few seconds, but will stick any striker to it, and also allows you to walk through it without getting any of the GBH you richly deserve. Another way to escape retribution is by



jumping off the girders, but be careful there is another girder directly under you. The striker's behaviour varies, some go straight for you, others try to trap you. There are 99 screens of varying complexity. Trying to work out what is going on when your man is behind a pillar is very tricky and you've got to

be pretty quick with the glue. Well, I suppose it's a logical step from this to games featuring police versus pickets, phone tapping and locking out workers. But apart from the story line, this is a fast, addictive game, and 99 screens should keep even the most dedicated dauber happy.

### SCREENS

● Hi rise. Nice game shame about the plot.

## SCALEXTRIC

► CBM-64 • Leisure Genius • Race game • £9.95 • Lee Paddon

### VALUE FOR MONEY

●●●●●  
GRAPHICS

●●●●●  
PLAYABILITY

●●●●●  
SOUND

●●●●●  
OVERALL RATING

Pole Position, Talledega, Revs, names for the leather-hat-and-goggles brigade to conjure with. And now another name will have to be added to his hall of fame, Scalextric.

Very reminiscent of Ariolasoft's racing construction set, this game allows two players to race against one another on a track of their own design, or choose from a library of

international circuits. However, where this scores is the controls. The over rear wheel perspective will be familiar to all. The over the rear wheel perspective view is clear and effective, the controls consist of steer, accelerate and brake, the gearbox is automatic. If you take a corner too fast, your car will move toward the outside of the track, if you end up on the grass, your

speed is curtailed drastically. This makes for a very exciting game, brake too early, your opponent gets away, brake too late, and you won't see him for dust.

When you design your own track, all the standard elements are there, skid chicanes, corners varying from double inners to banked high speed curves. The competitive element is high. If the cars collide, the rear-most car explodes. The cars can try to push one another off the track if level. A neat, simple idea, well implemented. Perhaps a little lacking in variety, and perhaps some more graphic detail might have been nice, or a few computer controlled cars, but still a good addictive game. But some how I miss the important elements of Scalextric, like scrambling around the floor trying to put your car back on the track, or searching for it under the sideboard, ah, memories.



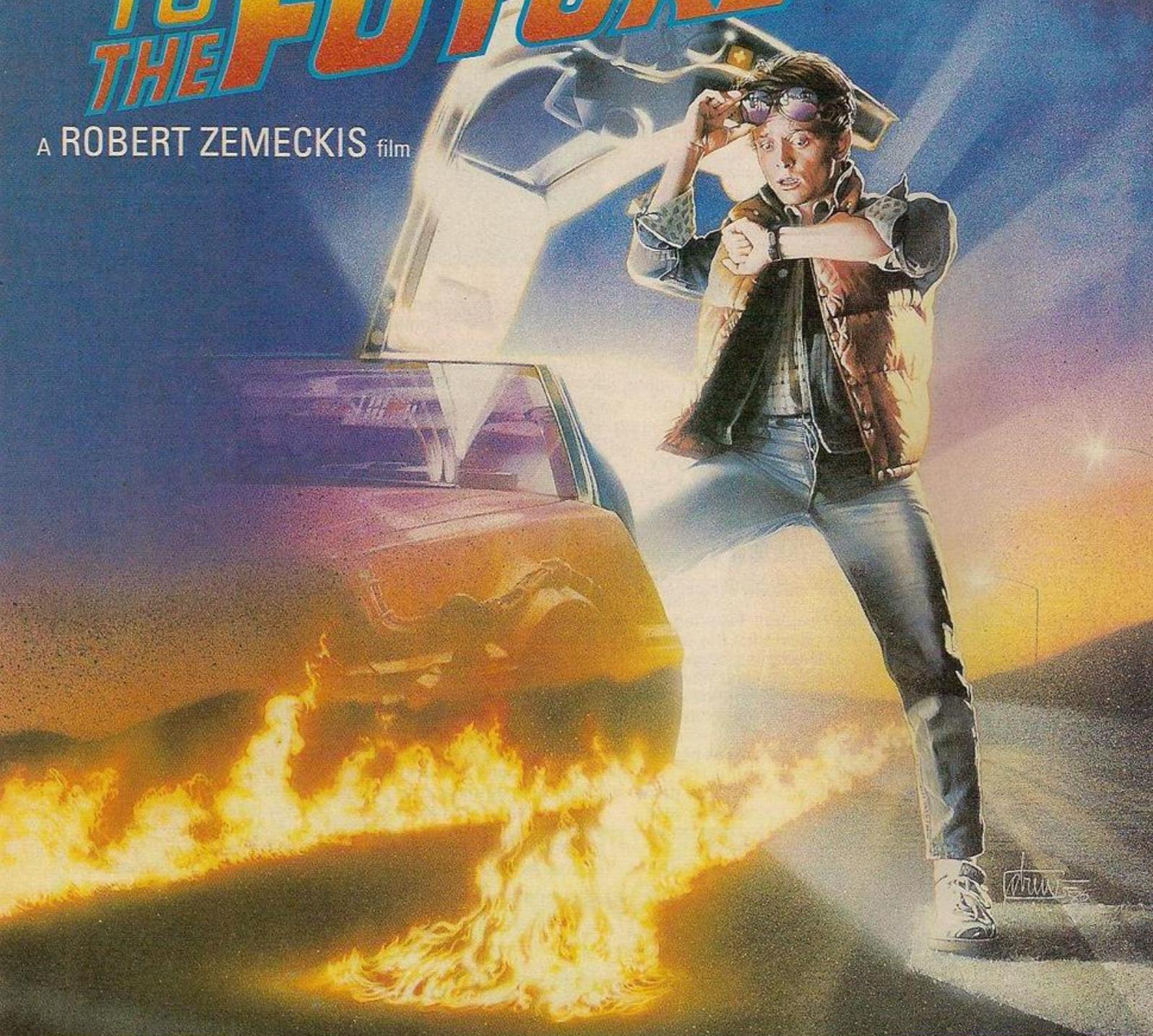
### SCREENS

● Scalextric, from the living room carpet to the small screen.

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SOFTWARE

# SOFTWARE SHORTLIST

## C

► Spectrum • Ocean • Spoof-'em-up • £7.95 • Simon Beesley

- GRAPHICS  
● ● ● ● ●
- SOUND  
● ● ● ● ●
- PLAYABILITY  
● ● ● ● ●
- VALUE FOR MONEY  
● ● ● ● ●
- OVERALL RATING  
● ● ● ● ●

The whacky title gives the game away. Cosmic Wartoad is clearly intended as a spoof, or perhaps as a grotesque parody of the Star Raiders type game. You start off on the Time Grid, Wartoad's version of a Star Map or Elite's Galactic Chart. Here you select an adjacent Time node for your next port.

Then instead of going on to do gallant combat amid the stars, you end up in a room, facing a Slime Master, or a Sludge Slug, or Frenzied Flies. Somewhat lacking in finesse, these nasties usually come straight for you, and also reproduce once hit. So it is a matter of firing away until such time as the program has judged that you are ready to return to the Time Grid. In other words, this stage of the game presents the simplest sort of shoot-'em-up.

The general idea is to work



across the Grid to the Slime King's lair, picking up eight vital items along the way. On the cassette inlay the game is dressed up as a space-time romp, involving Time Paradoxes, Time Vacuums, and the like. However, the major part of the action is shooting nasties.

Wartoad features highly imaginative graphics. The creature you control, a green toad, is a superbly animated eight by eight character supersprite. Windows open up on different game stages; and in between you get a tantalising glimpse of the Slime King's lair.

● Denton Designs go on the toad.

## GUN FRIGHT

► Spectrum • Ultimate • Shoot'em-up/adventure • £9.95 • Bill Bennet

- GRAPHICS  
● ● ● ● ●
- SOUND  
● ● ● ● ●
- PLAYABILITY  
● ● ● ● ●
- VALUE FOR MONEY  
● ● ● ● ●
- OVERALL RATING  
● ● ● ● ●

In the movie world, 1986 has been hailed as the year of the western. While Pale Rider and Silverado are wowing them on the big screen, Ultimate's Gun Fright is destined for similar success on the computer screen.

As usual in an Ultimate game, the graphics are excellent. Most of the time, the screen is split into a

number of areas, to the left of the screen is a colourful "wanted" poster showing a picture of the baddie you have to bring to justice, along with the reward. Beneath that is a display of hats showing how many lives you have left — you start with three.

At the bottom, your score is shown as the amount of dollars bounty earned. Next to this is a graphic display of

the number of bullets left in the Sheriff's gun. To the right a telegram window shows the high score, together with the current prices of bullets, horses and fines.

The action window occupies about 40% of the screen.

As Sheriff Quickdraw makes his way around Black Rock, he must avoid bumping into any of the townsfolk, as this results in losing a life, and paying a fine from his score. The score is initialised in a Fast Draw mode screen where shooting at moneybags results in earning money. Quickdraw is also likely to breathe his last if he walks into a cactus.

Quickdraw can speed his travel by riding a pantomime horse, at a cost, but his aim is to hunt out the villain. Once found the screen changes to Fast Draw mode where you see through the sheriff's eyes.

Gun Fright is a witty and welcome change to the wizard-dungeon type of arcade adventure. Yup partners even Clint Eastwood would approve.



# People's Choice

**H**ow do you put together a list of the best games of all time? One way would be to select the games which hit the top of the software charts published in magazines every week.

There are several reasons why this approach is flawed. For a start, the charts only started a year or so ago. Second, some charts are misleading because they are compiled by distributors who do not stock the entire range of new releases. Budget software, for example, is often sold outside the normal retail outlets, and, in the past, has not fared as well in the charts as it should have.

There's also the hype factor — one which only really came into its own in 1985. Never before has so much hype been heaped on so many mediocre games.

Instead, *Your Computer* decided to let the games playing public have its say. We hoped that compiling a chart of all-time favourites would weed out the games that hadn't stood the test of time. And in the main, it did

— although there were a few raised eyebrows over *Ghostbusters*' number three position. Around these parts the view was that *Ghostbusters* has a tremendous soundtrack but is not otherwise very playable.

Our chart can claim to be one of the most authoritative ever published. It is based on nearly 10,000 nominations received from readers. Almost a thousand readers sent in entries, each with 10 nominations for the best games. We typed them all into our BBC Micro and then asked the computer to sort them according to the number of votes received.

As a second measure of popularity the computer assigned each game a score of one to 10 per nomination depending on where it was placed in a reader's entry. In other words, a first place vote earned 10 points and a tenth place, one point.

By and large the two measures agreed: if we had adopted the second method of judging a game's popularity, the final order would only have been slightly

different. *Knightlore* would have come equal first with *Way of the Exploding Fist*, *Elite* would have swapped places with *Ghostbusters*, and several titles would have dropped off the bottom to be replaced by Frank Bruno's *Boxing*, *Jump Jet* or *Blue Max*.

Our final list held over 300 different titles. Other games that just missed making the Top Fifty included — in no special order — *Cauldron*, *Frankie Goes to Hollywood*, *Sorcery*, *Falcon Patrol*, *Frak*, *Dragonatorc*, *Nodes of Yesod*, *Solo Flight*, *Combat Lynx*, *Castle Quest*, *Entombed*, and *Staff of Karnath*.

As far as the first 20 games in the list were concerned, there was an impressive amount of agreement. The same titles came up over and over again. *The Way of the Exploding Fist* was clear winner, while the Top Twenty accounted for 44 per cent of the total votes. In fact the Top Fifty took 69 per cent of the votes. All of which suggests that even if we had received twice as many entries, the chart would not look very different.

**We give a rundown of all-time hits and misses and take a sample of expert opinion about the lucky games that made the grade.**

Nor does it reveal any bias towards particular machines. Most of the games are available on the Spectrum, Commodore 64, Amstrad, Atari and BBC.

We also took a straw poll on software reviewers' favourite games. You might doubt whether their opinions are more astute than anyone else's. But presumably after looking at hundreds of games on a range of different machines, something must have rubbed off on them. Some reviewers even claim that they have developed a nose for quality

*(Continued on page 34)*



## READERS' TOP FIFTY

1	WAY OF THE EXPLODING FIST	MELBOURNE HOUSE	25	FIGHTER PILOT	DIGITAL INTEGRATION
2	KNIGHTLORE	ULTIMATE	26	FOOTBALL MANAGER	ADDICTIVE GAMES
3	GHOSTBUSTERS	ACTIVISION	27	PACMAN	ATARI
4	ELITE	ACORNSOFT/ FIREBIRD	28	SPY VS SPY	BEYOND
5	HOBBIT	MELBOURNE HOUSE	29	JETPAC	ULTIMATE
6	IMPOSSIBLE MISSION	US GOLD	30	MATCH DAY	OCEAN
7	DALEY THOMPSON'S DECATHLON	OCEAN	31	DUN DARACH	GARLOYLE
8	RAID	US GOLD	32	LORDS OF MIDNIGHT	BEYOND
9	DAMBUSTERS	US GOLD	33	SABREWOLF	ULTIMATE
10	PITSTOP 2	CBS	34	BEACHHEAD	US GOLD
11	MANIC MINER	SOFTWARE PROJECTS	35	ATIC ATAC	ULTIMATE
12	BRUCE LEE	US GOLD	36	STARION	MELBOURNE HOUSE
13	JET SET WILLY	SOFTWARE PROJECTS	37	REVS	ACORNSOFT
14	ALIEN 8	ULTIMATE	38	SKY FOX	ARIOLASOFT
15	SPY HUNTER	US GOLD	39	VIEW TO A KILL	DOMARK
16	INTERNATIONAL SOCCER	COMMODORE	40	AIRWOLF	ELITE
17	HYPER SPORTS	IMAGINE	41	HUNCHBACK	OCEAN
18	SHADOWFIRE	BEYOND	42	EVERYONE'S A WALLY	MICROGEN
19	BOULDERDASH	STATESOFT	43	MATCHPOINT	PSION
20	UNDERWURLDE	ULTIMATE	44	GREMLINS	ADVENTURE INTERNATIONAL
21	POLE POSITION	ATARI	45	DROPZONE	US GOLD
22	TIR NA NOG	GARGOYLE	46	SUMMER GAMES 2	ACTIVISION
23	SUMMER GAMES 1	ACTIVISION	47	CHUCKIE EGG	A&F
24	ZAXXON	US GOLD	48	TAPPER	US GOLD
			49	GRIDRUNNER	LLAMASOFT
			50	SPITFIRE	MIRRORSOFT

## REVIEWERS' TOP TWENTY

1	WAY OF THE EXPLODING FIST	MELBOURNE HOUSE	10	ZALAGA	ACORNSOFT
2	BOULDERDASH	STATESOFT	11	SCRABBLE	PSION
3	DAVID'S MIDNIGHT MAGIC	ARIOLASOFT	12	LORDS OF MIDNIGHT	BEYOND
4	ALIEN 8	ULTIMATE	13	EASTERN FRONT	ATARI
5	HIGHWAY ENCOUNTER	VORTEX	14	TOMAHAWK	DIGITAL INTEGRATION
6	PARADROID	HEWSON CONSULTANTS	15	SORCERY PLUS	AMSOFT
7	GRIDRUNNER	LLAMASOFT	16	QL CHESS	PSION
8	ELITE	ACORNSOFT/ FIREBIRD	17	REVS	ACORNSOFT
9	SNAPPER	ACORNSOFT	18	SPEED KING	DIGITAL INTEGRATION
			19	MARS PORT	GARGOYLE
			20	MISSILE COMMAND	ATARI

## DIRTY DOZEN

1	THE GREAT SPACE RACE	7	MAD MARTHA
2	PEDRO	8	HAMPSTEAD
3	ALCATRAZ HARRY	9	JCB DIGGER
4	FLIGHT PATH 737	10	SCHIZOIDS
5	BLUE THUNDER	11	ZIP ZAP
6	JOHNNY REB	12	BRIDGE-IT

# People's Choice

(Continued from page 32)

software, which tells them within a few minutes of play whether a game is any good or not.

On the panel were the *Your Computer* team plus Bob Wade and ex-*Your Computer* reviewer Pete Connor. After almost three years solidly reviewing software Bob Wade could probably claim that he's the U.K.'s most experienced games player. The reviewers' Top Twenty, however, undoubtedly shows a strong bias towards games that went down well in the *Your Computer* office. All of them are production stoppers, capable of bringing work to a halt for several days at a time.

Looking at the readers' chart, there are several features that stand out. The first is that only a handful of the top games are straight shoot'em-ups. Evidently the legacy of *Space Invaders* is now forgotten, alas; aliens are fairly scarce these days. This feature may be some comfort to the author of a recent letter to *Your Computer*.

In the November letters page Harry Seldon — doesn't he figure in Isaac Asimov's *Foundation Trilogy*? — expressed concern "at the ever increasing popularity of . . . shoot'em-ups". His worry was that we might be upsetting the extraterrestrials who could even now be monitoring us. As our chart shows, his fears are groundless.

Another striking feature of the Top Fifty is that most of the titles are fairly recent, which raises the

question whether games software is improving all the time. Obviously the machines are improving as are programming techniques. It takes time to learn how to exploit a machine's potential to the full. For example, there is no comparison between most of today's Spectrum games and those written in 1983.

On the other hand, a game can be eminently playable even if it doesn't have amazing graphics, supersmooth scrolling, and 256 screens. Although *Gridrunner* was written in 1982, it can still hold its own against most new releases, and the best version of this classic game runs on the Vic-20.

To take a more extreme example, two of our reviewers' panel nominated *Snake* from Computer Concepts. Also dating from 1982, it was a very superior snake game written in BBC Basic.

Possibly the main difference between old and new software is that today's chart-topper is likely to have been written by a team of programmers, graphic designers and someone to compose the soundtrack. Formerly it just took a single programmer. Yes, they were giants in those days. But more on this subject later.

It is also noticeable that nearly half the Top Twenty titles were written in the U.S. In fact U.S. Gold takes the prize for the company with most titles, closely followed by Ultimate. This should please the former editor of *Practical Computing*, Jack Schofield.



In the introduction to his list of all-time winners, in January 1985, he had a go at Spectrum owners for being insular: "Most Spectrum games players are protected by a happy ignorance of all that has gone before. They missed out on the five years of continuous and intense development that preceded the launch of their machine. Hence they are able to greet each improved game as a breakthrough, mindless of the fact that it has nearly all been done before."

Ouch! But is it fair? It is true the Americans had a head start. The British — and with Melbourne House, Australian — software industry didn't get off the ground until the Spectrum arrived in late 1983. But there are some areas where the home-grown products reign supreme, particularly graphic adventures, platform games and arcade adventures.

*Knightlore*, *Lords of Midnight* and *Manic Miner* are good examples. Their graphics are more imaginative and the ideas behind them are original. Don't let anyone tell you that *Manic Miner* is merely a development of *Miner 2049er*.

If you turn to the reviewers' Top Twenty you will see their choices differ substantially from the readers' list. *Ghostbusters* is conspicuously absent; *Paradroid* and *Highway Encounter* were released after we held our survey, and would almost certainly figure in the Top Twenty now;

David's *Midnight Magic* probably never got the right exposure in Britain, although it went to the top of the charts in the States.

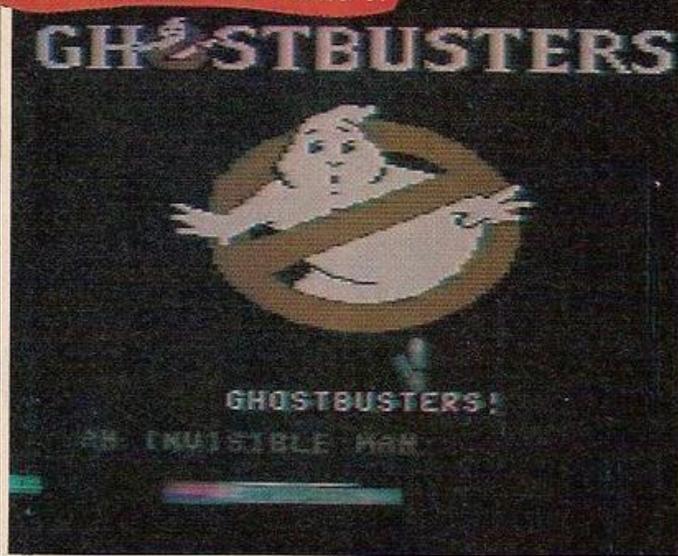
*Boulderdash* which just scraped into the readers' Top Twenty is the critics' choice for number two. It has been called a programmer's program — programmers, at least, are said to admire it. You could describe it as a game for connoisseurs.

But how are we to explain *Gridrunner*, *Zalaga* and *Snapper*, vintage software dating as far back as 1982? Perhaps as an attempt by veteran reviewers to recover their first flush of enthusiasm. These are men who cut their teeth on bat'n'ball games and *ZX-81 Hangman*. A games reviewer's career is necessarily a short one. The reflexes go after a few years, and the best an old reviewer can hope for is a batch of educational software. So we should see the inclusion of these titles as an exercise in nostalgia.

Unless, of course, some of the early games were just as good as the recent ones. There are quite a few people who think that the best game of all time is Atari's *Star Raiders* — among them, Jeff Minter and Jack Schofield. Amazingly, it was first written in 8K for an Atari games console in 1979.

Since the home micro version fully exploits the power of the Atari's graphics chip, *Antic*, *Star Raiders* has never been successfully translated to other machines. Yet you can see its

Look who's bustin' in at Number 3!



influence in dozens of later games such as Time Gate, Code-name MAT and Elite. And it is arguable that of its type it has never been bettered.

Of course trying to agree on the best game of all time is bound to fail, just as the similar attempt to define the ingredients of an addictive game is usually fruitless. One theory has it that a successful game should have a "learning curve" in the form of a parabola.

In other words, it should be easy to play at first, and then become increasingly more difficult, thus providing a challenge. Or you can reverse the theory

and claim that a game needs to be frustratingly difficult up to the point where you master the right technique — like blowing up a balloon.

Either way, the theory collapses in the face of numerous counter-examples. You can't always explain what makes a game playable — its grab factor — although it is obviously the most important feature. A game may have pretty graphics, and a great sound track, but if it doesn't force you to say "just one more go" when someone else approaches the keyboard, then it is probably just not worth playing. ●



# The Dirty Dozen

In June 1985 as part of a competition, we invited *Your Computer* readers to name the five worst programs they had ever paid money for. Our idea was that we would be able to draw up a definitive list of the great software disasters of our time.

As it turned out, there was almost no agreement on what was good and what was bad. No two entries shared more than one title. Some people even nominated such chart-toppers as *Ghostbusters*, *Harrier Attack*, and Jeff Minter's *Gridrunner* — in our book one of the all-time greats.

When you think about it, this lack of consensus makes sense. A good piece of games software is usually recognisable as such within half an hour's play and as a result gains a reputation. But a software disaster sinks without a trace. Only the few unfortunates who have been suckered into buying it get to know just how bad it is.

The worst game, of course, is the one that is so bugged it doesn't even run properly. But up to that point there is almost no limit to the different ways a game can fail. How about a version of *Breakout* where the bat moves too slowly to catch up with the ball? Or a *Pontoon* program that doesn't recognise *pontoon*? These two were part of Neme Software's *Games Package* for

the Vic-20 back in June 1982. Our reviewer felt so strongly about the package, he thought it ought to carry the warning "Keep Clear".

Just as bad was *Specman*, a Basic version of *Pacman* for the Spectrum, put out by Jega Software in early 1983. Our reviewer said that it was dismally slow, and added: "Sometimes the ghosts seem to be stricken with paralysis and unwilling to take up the chase." Still, it can't have been as dire as the version of *Space Invaders* we received from a reader. Accurately titled *Space Invader* it only managed to field one solitary alien.

What these games had in common is that they were produced when the Vic and Spectrum were in their infancy. At that time you could get away with selling any old rubbish. Today's software is generally far superior.

The Dirty Dozen list given here should be taken with a pinch of salt. Some of the games are victims of a backlash against hype: people are often unduly severe on a game if it has been hyped up and then falls short of expectations. This is probably the reason why readers have awarded Legend's *The Great Space Race* the title of worst-ever game.

For a start, Legend's previous game, *Valhalla*, was grossly overrated. The British Micro-

computing Awards sponsored by the *Sunday Times* even made it game of the year. But what can you expect from a body that later made the QL machine of the year?

Then Legend foolishly announced *The Great Space Race* months in advance, with the claim that it would represent the next stage in games software. A prolonged advertising campaign followed. When the game finally arrived, it turned out to be about as novel as a wet autumn. To add insult to injury it was partly written in Basic and overpriced at £14. The punters were understandably enraged.

On a smaller scale Acornsoft's *JCB Digger* suffered the same fate. BBC owners had been led to expect something special particularly since the program's author had previously written *Snapper*, possibly the best version of *Pacman* on a home micro. In fact, *JCB Digger* is not spectacularly bad, just not very playable.

*Hampstead* is rather different in that it won glowing reviews from magazine critics when it should have been panned. The game is about working your way up the social scale from a council flat in South London to the good life in *Hampstead*. Ill-informed writers in *Sunday* colour supplements tended to recommend it as an example of a whacky and sophisticated

adventure game. But in truth it is patronising and unfunny.

You may be surprised to learn that two other titles in the list, *Schizoids* and *Zip Zap*, came from Imagine, a company responsible for some of the best games of 1983/84. However, they date from the period when Imagine's production line was churning out programs at a rate of almost one a week.

As for the rest, there are some — it must be admitted — that are truly bad. To quote another *Your Computer* review, you can say of them that they weren't so much released as allowed to escape.

We shall refrain from identifying them by name. Their authors know who they are.

All the Dirty Dozen won at least three but not more than 10 votes each. A further 200 or so games received one or two nominations. Some of them may be familiar to you: *Airwolf*, *Arcadia*, *Everest Ascent*, *Transylvanian Towers*, *Roland on the Run*, *3D Tunnel*, *Android 1*, *Graham Gooch's Cricket*, *Micro Olympics*, *Dukes of Hazard*.

Strangely enough, *Airwolf* along with *Blue Thunder*, and the chart-toppers mentioned earlier, also appeared in the readers' top 100. The moral here seems to be that, as far as these games are concerned, one man's meat is another man's poison. ●

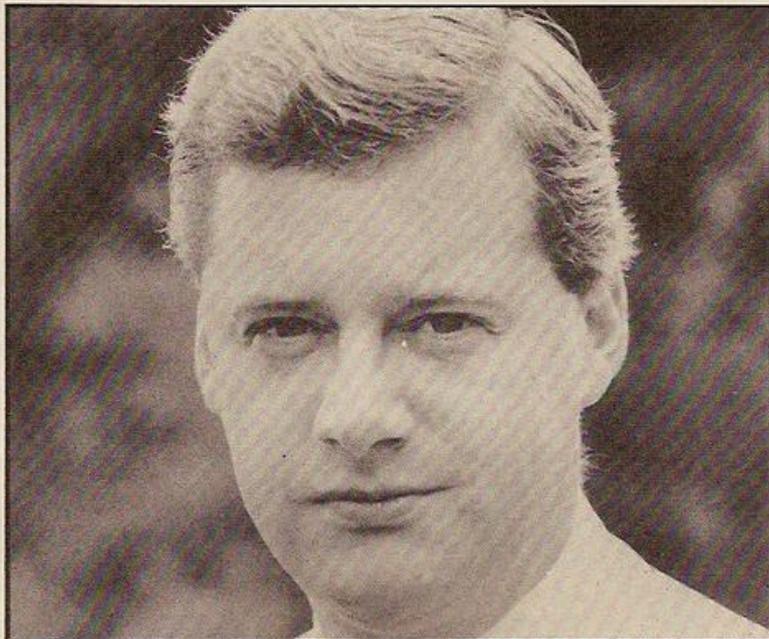
# Voices' choices

## **B**RUCE EVERISS

When Bruce Everiss was one of the big boys at Imagine the company had a reputation for large sales and even larger hype for very average products. So it's no surprise that he says "if you go for bestsellers you come up with a load of junk". But have the courage of your convictions — name names.

"Ghostbusters is a joke," draws the Everiss in his dry Liverpudlian way. "All you've got to do now to get in the charts is release some sort of sports simulator." Alone among all the pundits, readers and computer journalists we consulted Bruce was the only one to suggest that any of the original Imagine programs deserved to be in a chart — well, except Schizoids which won a few votes in the worst-ever poll.

But even he did not have the audacity to put Wetzone from Bruce Everiss Software (no relation) in his top ten. U.S. Gold's products don't impress Bruce either. "This



American stuff — you can stuff it." Although he didn't rate them a chart mention he reckons Odin "out Ultimate Ultimate" and he believes that unless the hermits from Ashby de la Zouche leave their cave soon the world will pass them by.

For sheer quality Beyond impresses him most, both with Mike Singleton games like Lords of Midnight and productions like Shadowfire and The Tuner from Denton Design, now the home of another Imagine refugee, programmer John Gibson.

## **B**ILL STEELEY

When you strip the tacky U.S. Gold label off simulators like F-15, Strike Eagle and Solo Flight you'll find the Microprose logo. Peel off the logo and you just might see the mouth of Bill Steeley — Microprose's gung-ho chief. His company is based in Maryland but if he catches you whistling the State anthem he'll probably have you shot for being some kinda commie.

He is amicable, over-bearing and positively sweats self-confidence. He doesn't so much talk to you as surround and then bombard you. Ten minutes on the telephone to Microprose is like going ten rounds with a Sumo wrestler in a bowl of warm treacle. Even having the temerity to suggest that he might put programs from other software houses in his top ten takes nerve.

In the end Bill hands over to Sid Mier, his top programmer who wrote F-15, after explaining that he set up Microprose because no-one else was producing good enough programs. Sid proves to be far more generous to his fellow programmers. Of course Kennedy Approach, Solo Flight and F-15 are in there — deservedly — but so are Electronic Arts' version of Hammurabi — Mule, Chris Crawford's Eastern Front and, just to prove Sid isn't obsessed by simulations, Pole Position and Galaxians. Also in there is Silent Service, a submarine simulator from Microprose that sold 40,000 copies in the first month Stateside but hasn't crossed the Atlantic yet. The company is also about to produce Conflict in Vietnam which sounds like another Rambo style attempt

to rewrite history so that the Yanks won, but at least there is an option to be the Vietcong.

Microprose is excited by the new wave of machines — Amiga, Mac and Atari ST — and Bill expects to produce simulators that are "another order of magnitude" better than existing titles. But Sid is not rushing to produce "the very first Pacman" on the Amiga. It will take time to develop proper software and in the meantime the Commodore 64 has plenty more life. Microprose will renew its battle with Digital Integration which led to F-15 dogfighting it out with Fighter Pilot. Bill Steeley hopes to launch Gunship — a helicopter simulator based on the Apache — next April, by which time DI should have the Commodore 64 version of Tomahawk flying.

## JEFF MINTER

Jeff Minter describes himself as "just an old-fashioned blaster" and he is confident that the day of the shoot 'em-up will return. He instances examples from the arcades — like Taito's *Invaders Return* where improved graphics and a few little surprises can re-invigorate the old favourites.

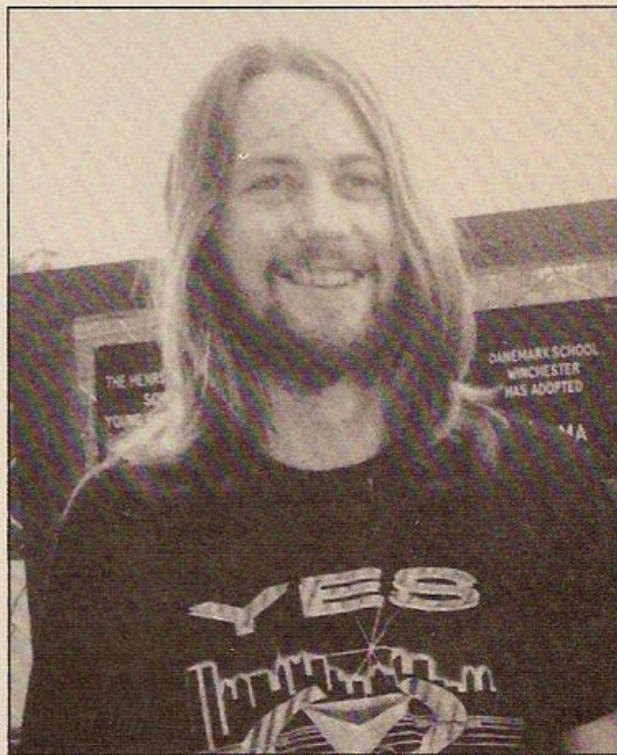
At the same time his love of the moment is the Atari 520 ST for which he has produced *Psychodelia* and *Colour Space*. Every evening he and his would-be hippy mates sit around playing with shapes and colours on the screen. "It's very difficult to describe in legal terms," says Jeff, playing up to his long-haired image. "It really does damage people's brains."

Trying to confine the Minter to a list of ten eligible computer games is almost impossible. How about *Invaders Return*? he wants to know. "You can't have it because it is only in the arcades," we explain. *Psychodelia* and *Colour Space*? "Yes." On the ST? "No, you haven't released it yet." *Millipede*? "O.K." On the Atari VCS? "Certainly not." But it's sheer megablast. "The answer's still No." And so it goes on...

Reluctantly Minter starts his list: *Batalyx*, *Fractalus*, *Star Raiders*, *Sheep in Space*

— "I'm still deeply attached to *Sheep*", *Master of the Lamps* — "It's so psychedelic", *Revenge of the Mutant Camels*, *Dropzone*, *Who Dares Wins* — "Shooting up little men is distasteful" so Minter would rather they were amorphous blobs, *Hitchhikers Guide* — "I'm still trying to get to the end of that", *Encounter*. But Minter is unhappy that he has not mentioned enough golden oldies.

Minter starts enthusing about *Missile Command* at the drop of a hat — well, missile maybe — but, unlike some of the gung-ho American games writers, he doesn't confuse fact and fantasy. Knocking spots off the screen is fun but knocking holes in real people is right out of order. "It's a shame that games like that have gone out of fashion," he mourns when he thinks of his earlier games. You won't find him still playing his ZX-80/81 originals but he stands by the programs he wrote for the Vic-20 as good by any standards — and he says that with an Atari ST sitting on his desk. "I did like *Gridrunner* on the Vic-20", (despite the superior graphics of the 64 he prefers the raunchy feel of the 3.5K version) "and the sound effects I did for *Laserzone* on that machine are still my



favourite — I miss the Vic in many ways." Like many other programmers Minter admires *Ultimate* for their technical expertise but thinks that the finished games lack a little something. "They're always extremely pretty and well programmed but there's not much humanity in them." "Is there much humanity in *Revenge of the Mutant Camels*," we venture. Minter is offended. "There's a lot of me in that."

## DAVE MARSHALL

When you hear the guys from the air industry's magazine *Flight* enthusing about the latest helicopter simulator they have tried you can be sure they are talking about a multi-million dollar mainframe-controlled unit somewhere in Seattle. But listen carefully — at the moment it is Digital Integration's *Tomahawk* simulator for the Spectrum based on the Apache attack helicopter that has won their respect.

No wonder, because DI's

Dave Marshall, already famous for his *Fighter Pilot F-15* flight simulator, spent 18 months working with Apache makers Hughes/McDonnell Douglas to get it right. "Modesty apart," says Dave, "other flight simulators are definitely inferior."

So why are *Tomahawk* and *Fighter Pilot* not in Digital's all-time top 10? "You can read other people's top tens and they always put their own programs at the top — we thought 'what the hell'." DI's "democratic" chart is

compiled from the individual lists of in-house programmers Nick, Colin, Tim and Rod Swift who showed self-interest by putting his *Speed King* top. Now Rod is working on another bike game — the long promised *TT Racer* which "will be more of a race simulator based on Suzuki's Project 500 — the whole screen banks as you go round a corner as if you mounted a camera on the fairing — than just another *Pole Position*".

# Hot Shots

## **B**BC POKES

**Frak** \*LOAD "FRAK2"?&305B=&FF then CALL&468A

**Mr E** \*LOAD "MAIN PROGRAM" 1900 then enter &IECB=&EA then use CALL &4300 to start game.

**Zalaga** \*LOAD "ZALAGA 3",Then ?&301B=&FF and CALL &4522.

**Rocket Raid** Enter CHAIN"" to load game. Lose your first two men then when the third appears press Break. Enter MODE 2 followed by CALL TOP to continue.

## **A**MSTRAD POKES

**Roland in Time** Enter MEMORY 4999: LOAD "ROUTINE",5000 After program has loaded type POKE 5859,67 for Green screen for colour type also POKE 5001,0. To start game type call 5000

**Electro Freddy** Type in then run program  
10 MEMORY 10000  
20 LOAD "A1"  
30 LOAD "A2"  
40 LOAD "A3"  
50 LOAD "A4"  
60 LOAD "A5"  
70 POKE 39356,255  
80 CALL 39323,255 is the number of lives

**Punchy** Type in then run program  
10 MEMORY &1FFF  
20 LOAD "CODE"  
30 POKE &20A9,255  
40 CALL &2000

**Roland on the Ropes** Type in then run program  
10 MEMORY 4800  
20 LOAD "ROLAND.D"  
30 LOAD "ROLAND.C"  
35 INK 0,1: INK 1,24: INK 2,20:  
INK 3,6  
40 POKE 25804,0:  
POKE 25562,0  
50 CALL 41100

## **C**BM-64 POKES

**Attack of the  
Mutant Camels  
China Miner**

On slow loader side insert LINE 0  
POKE 11639,255 in the header

1. Type Verify to get an error message
2. ENTER LOAD "",1,1 to load first part
3. Repeat this to load second part
4. ENTER SYS 64738 POKE 32776,0:  
POKE 33320, (No 0-29) Depending on which screen you wish to start.
5. Start game by typing SYS 33127

**Frak** For inf/lives \*Load Frak 2  
?&305B=&FF  
CALL&468A

To Boot into different screens using escape key \*LOAD Frak 2  
?&304D=1  
CALL&468A

**Motor Mania**

TYPE in "VERIFY"  
(Ret);LOAD"",1,1 (Ret and Play)  
Poke 8646,255 (Ret); SYS 8000 (Ret)

**Blogger**

POKE 3560,8

**Fort Apocalypse**

POKE 36339,153

**Frogger**

POKE 22341,173

**Hard Hat Mach**

POKE 16877,173

**Hunchback**

POKE 9521,234: POKE 9522,234:

**Moon Buggy**

POKE 9523,234

**Neptune's Daughters**

POKE 24151,173

**Pooyan**

POKE 7870,255

**Snokie**

POKE 20634,173

**Zaxxon**

POKE 33242,55

Type in "Red" at the start of Program to enter the Cheat Mode and become immortal.

**Frank Bruno**

Boxer 1: NO CODE

CANADIAN CRUSHER: He is very easy to beat. Just throw in body blows until his guard is down and then give him lots of blows to the head for as long as you can. Watch out for the bearhug when he gets back up.

Boxer 2: Code — OC71008A7 Name used — EDD

FLING LONG CHOP: Watch out for his speciality — the fly kick.

Whenever he bends down on his knees duck. To beat him just give him head blows and body blows.

Boxer 3: Code — C6B1006N5 Name used — EDD

ANDRA PUNCHEREDOV: His speciality is the head butt. This must be one of the most difficult moves to overcome. Do left and right head blows and then duck. When he dodges left do a left head blow and when he dodges right do a right head blow.

Boxer 4: Code — IA5INFEN5 Name used — EDD

TRIBAL TROUBLE: His speciality is the double fist punch. The only warning you get for this is when he stands still with his guard up. Give him a body blow to get his guard down and then give him as many head blows as possible.

Boxer 5: Code — 049INCCN5 Name used — EDD

FRENCHIE: His speciality is a spinning fist punch. When his fist starts spinning stop whatever you are doing. When it stops spinning duck. Lure Frenchie's guard down by giving him a right body blow and following it with head punches. Repeat this until you get him down three times.

Boxer 6: Code — C7CILFALA Name used — EDD

RAVIOLI MAFIOSI: Ravioli is really tough. The best tactics are to punch left to the head and then dodge, punch right to the head and then dodge and so on. When he does his speciality dodge and then try to get a right head blow in.

# COMPETITION **Back to the Future**



## COMPETITION RULES

- The winners of the competition will be the people who, in the view of the editor, come up with the correct answers to the questions and the most interesting or amusing tiebreaker.
- The names of the winners will be printed in the April issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in February 1986.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Focus Investments or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Focus Investments assumes no responsibility or liability for any complaints arising from this competition.

**WIN a £100 worth of cinema ticket vouchers as first prize, plus a copy of *Electric Dreams*' game. Back to the future.**

**There are a further 50 copies of the game for the runners up.**

**To be in the running for one of the prizes, first answer the following five questions:**

- 1 Who directed the film *Back to the Future*?**
- 2. What speed did the car have to reach before you could travel back in time?**
- 3. What was the name of Marty's girlfriend?**
- 4. What date does Marty travel back in**

**time to?**

- 5. What is the name of the band which performs at the school dance?**

**Now, for the tiebreaker, tell us: Which famous historical person would you like to visit, and what single question would you put to them? Be sure to enclose the coupon with your entry.**

## BACK TO THE FUTURE COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your entry to Back to the Future Competition, *Your Computer*, Suite 4, 20-22 York Way, London N1.

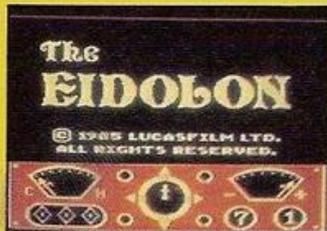
Name \_\_\_\_\_

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# Stand by fo

In which P

Left to right: Allison Hale, Hugh Rees-Parnall and Clare Hirsch spearhead Activision's European operations.



The Eidolon is a strange device invented by Dr Agon.



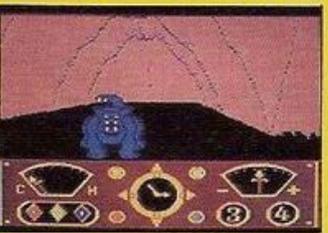
It takes you into the human id peopled by stone dragons.



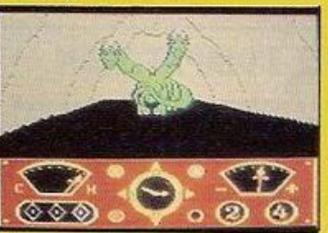
These come to life when you energise them with fireballs



A Grep aghast. The right mix of fireballs will kill monsters



The Maloc, or hell-hound. Not a pedigree chum.



Two heads are better than one. Some of them have seven.

In the beginning, was VCS, and Activision UK wasn't even a twinkle in the eyes of the four Atari renegades who founded American Activision in October 1979. But you can't run Europe from California, so the UK company was formed in December 1982. What's the difference between the UK and the Californian gamer — apart from about eight hours?

"In the US it's very techie-orientated; flight simulators, fantasy role-playing games, text adventures, Zargon chess — Hacker is a very successful game in the States," says Activision's American chief Greg Fischbach. "The UK market seems to be characterised by things like Rambo, Commando, Ballblazer — the two markets are very dissimilar."

Nevertheless, Activision's Ghostbusters clocked up over half-a-million sales in the UK alone; with the release of the video version of the movie the computer game is getting a new lease of life. But are Activision UK one-hit wonders? This Christmas's releases, Hacker and Little Computer People Discovery Kit, don't have as high a profile as Ghostbusters.

"Little Computer People is probably the highest selling entertainment disc" protests Hugh Rees-Parnall, managing director Activision UK. But one feels that the LCP disc is a uniquely American product and a real example of the divergence of US and Anglo tastes.

Activision are now keen to encourage contributions from the natives. Countdown to Meltdown was a brilliant three-dimensional game of British origin and the company hope to encourage more of the same via the foundation of their Electric Dreams label (not to be con-

fused with US Gold's label of the same name).

Both Rees-Parnall and ex-Quicksilva supremo Rod Cousens are keen to promote Electric Dreams as an umbrella for beleaguered independents.

"Activision can provide worldwide market support, even in the States," enthuses Rod Cousens; "no other software house can provide that. Electric Dreams is not going to be just another software house producing platform game after platform game. Programmers will be able to express their talent without fear of dilution."

Back To The Future seems a good example of the approach. Activision's good fortune with Ghostbusters meant that Universal Pictures looked kindly on their application for the game rights to the movie. And Mark Eyles, another Quicksilva refugee, has taken care to develop a strong game in its own right.

Eye of the Mask by Sandy White of the Ant Attack fame is to Electric Dreams a measurement of what you can get out of the Spectrum when everyone says it's reached its limits. "That to me is the thrill of the industry" beams Rod Cousens. Rod Cousens is keen to emphasise that the ex-Quicksilva people come to him, rather than the other way about. When Argus Press Group took over Quicksilva, I don't think they appreciated that a software house is not just a name, it's a

team. Also we had plans for creating Software Studios — this would have been a development house using sophisticated equipment to produce new standards of software. I think Argus shelved that. I see Electric Dreams as taking all the strengths of the old Quicksilva and, well, just carrying on."

Naturally cagey about future projects, Rod Cousens promises "real-life simulations" and about three licensed games based on TV, film or pop sources every year. How about a computer soap? "It's a possibility, but I can't be too specific."

Back in the hell-hole Andrew Wright and a couple of play-testers are getting to grips with the next Activision beast to be unleashed on the UK market — The Eidolon.

"I call it the hell-hole, people will sit down here and play a game non-stop for 12 hours sometimes," says Andrew who first got involved with Activision as a Video Cartridge System (VCS) demonstrator at Hamleys. "Because I knew the cartridge versions of the games back to front, I could check out the cassette versions for different home computers." Currently at the dizzy height (and rising) of Product Review Coordinator (Europe) it's his job to look for acquisitions and organise the play-testing.

The Eidolon is a strange machine invented by Dr Agon in the 1890's. It allows you to explore the murky depths of the human id, peopled by strange creatures: Rotoflies, trolls, Biter Birds, Greps, Dragons and the

# or Activision

ul Bond examines his id and dreams *Electric Dreams*

ferocious Maloc or hell-hound. "That gave us a bit of a shock when we first saw it. It wasn't mentioned in the notes from Activision, and you can imagine late at night when you've got really into the game and suddenly things start appearing that to all intents and purposes aren't supposed to be there — it can be a bit scary."

"Ever seen the alien in *Fractalus*?" asks one of the two budding programmers, Martyn Bysh and John Davy — they are on a work placement scheme from Walthamstow ITEC — "It comes as a bit of a shock if you aren't ready for it."

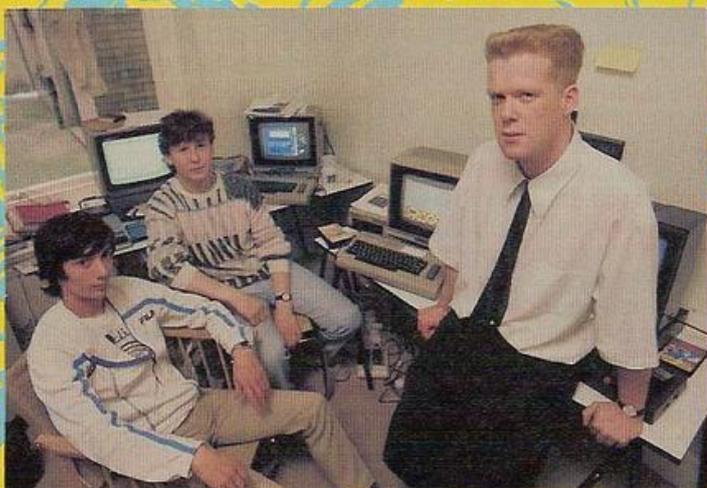
As you move through the caverns you need to fire different amounts of fireballs in different combinations to destroy or mutate the attacking creatures. "As well as being an adventure, it's a massive logic problem". Quite apart from the traumas of being chased down a network of tunnels by a Maloc late at night.

With the acquisition of Creativity Software in the States Activision show signs of diversifying from dragons and sports into utility software — not as dull as it may sound.

Gamemaker is an ingenious game designer for the Commodore 64. Comprising a Scene Maker, a Sprite Maker, a Sound Maker, and a Music Maker, it can provide all the nice touches you need to design your own arcade games.

Written by Gary Kitchen, who did EDC's Designer's

Left to right: John Davy, Martyn Bysh and product co-ordinator Andrew Wright spearhead Activision's play-testing.

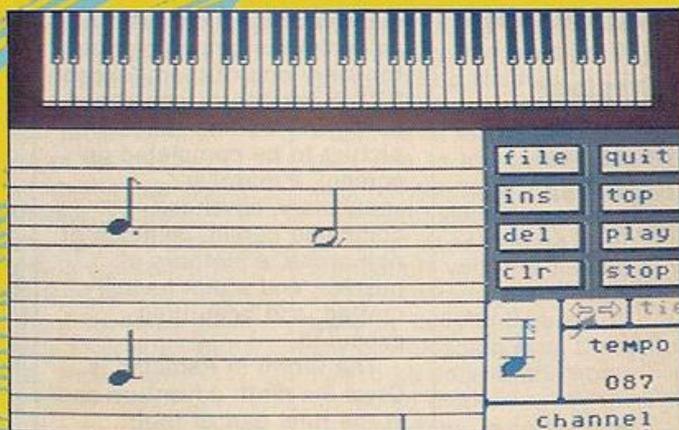


Pencil, it features pull-down menus and all those Macintosh-style touches that every computer owner envies. And if that doesn't whet your appetite, several games designed using the Gamemaker, including *Chopper* by John van Ryzin, are thrown in.

The long-awaited release of *Fractalus* and *Ballblazer*, both Lucasfilm games, will be followed up by more — the *Eidolon* and *Koronis Rift* (reviewed in this month's Software Shortlist) are the latest.

Apart from *Ballblazer*, all the games use fractals — a special branch of mathematics. David Fox, a three-year member of the team set up by the film company that brought you *Star Wars* and *Raiders of the Lost Ark* defines fractals thus: "It's the smallest portion you can break something up into — where all the component parts look alike." Huh? "Well, it's like when you look at the night sky. You magnify portions of it until you have small bunches of stars that look alike. Then you could use them to build different patterns. Fractals aren't significant, really. They're just a random breaking of the lines in the graphics, instead of straight lines which would be sterile."

Rescue on *Fractalus* and *Ballblazer* were developed originally as a kind of jam session for the new team, to get the feel of how they could approach game design and work together as a



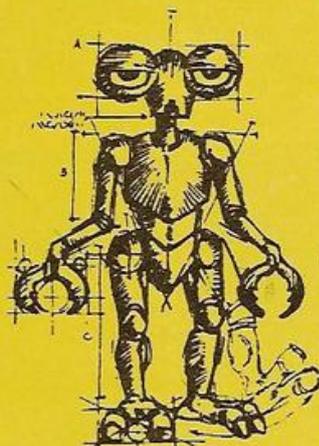
As above so below: Activision's new Gamemaker utility enables you to create background sound and background trees.



team. "Then we realised the games were good enough for release. Lucasfilm had a deal with Atari at that time, but when Jack Tramiel took over Atari, everything got delayed. Eventually the games were picked up for distribution by Epyx in the States and Activision in the UK". And US Gold are still smarting.

Lucasfilm saw the computer games division as a way into interactive entertainment. Several different areas are under exploration — laser discs, mass-storage CD Roms, and broad-based game situations with many players playing at the same time. "At some point, as the technology becomes more advanced, it will become more and more interactive with the film industry." And Lucasfilm are preparing for the millennium.

Activision's strength up to now has been their world-wide presence, even selling MSX material into Japan, as well as the Netherlands and the rest of



Europe. Their weakness in Europe has been reliance on US disc-related product. The reluctance of the average British punter to go out and spend money on fast-access storage means tiresome conversion of disc games for cassette which can drastically change the character of a program. Now with the new input from *Electric Dreams*, it looks like Activision finally mean to take the stage in Europe.

## THE WORM IN PARADISE

**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.**

► Various • £9.95 • Level 9

This latest text and graphics masterpiece has all the splendid qualities we've come to expect of Level 9 — masses of locations with a colourful fast-drawn picture for every one of them (except BBC B versions), type-ahead ability (no waiting for text or picture to be completed on screen), a massive vocabulary, advanced command parser, lashings of rich prose, a plethora of puzzles, and a plot lovingly crafted, and beautifully executed.

The Worm in Paradise is Level 9's ninth adventure and is the final part of their Silicon Dream trilogy (the other two parts are Snowball and Return to Eden but you don't have to have played them to enjoy this one). You play a citizen of Enoch

megapolis on the planet Eden, a century on from the time of Snowball and Return to Eden. When the game starts, that's all you can remember. The quest? Reach the Seat of Power.

"Wot, no delectable Kim Kimberley?" the aficionados cry. "Oh yes there is," comes the retort — seek and ye may find. To further whet your appetite, this engrossing and challenging adventure features such diversities and diversions as a Jobcentre Droid, a Socialist (Enoch is very right-wing usually), Wiggly Roots, a non-fattening pizza, the Fabulous Riverboat, a flying saucer, the Dream Palace (a high-tech amusement arcade based on dreaming), and the Worm (you'll possibly never eat another apple again!).



## THE ODYSSEY

► Commodore 64 • £9.95 • Duckworth

The Gerrard brothers, Peter and Mike, co-authors of this new text adventure, come with worthy credentials. As well as having played and reviewed many adventures for a variety of home computer magazines, they have also published books on writing and playing adventures.

Homer's epic, The Odyssey, a blend of fable and history, is one of the earliest adventures ever

written. Now a mere 3,000 years later, the Gerrards have taken the story of Odysseus's trials and tribulations for us to relive in this 80K, two-part adventure.

Odysseus is about to return to Ithaca, the 10-year siege of Troy having just ended. As Odysseus, you must gather a crew and supplies and take the danger-fraught trip back to your kingdom across the waters.

Among the many mythological malefactors you'll have to face are giants, Sirens, Cyclops, Lotus eaters, Scylla (and her sextet of heads) and Charybdis (a rather nasty whirlpool). If that's not enough to be getting on with, why not take the scenic route across the River Styx to the underworld, thence through the City of Perpetual Mists for a jolly tête à tête with the lost souls of the dead.

Commands are given by the accepted verb/noun input and the location descriptions are well detailed. Presentation is a shade on the dull side, being standard Commodore upper and lower case lettering (with an asterisk as a prompt) against a changing coloured background. Should you get

killed off, there's some reloading of data necessary before you can start again — fortunately, this doesn't take long.

The adventure is divided into two parts over two cassettes and uses a fast loading system. This is a big, interesting and well-planned adventure which should ensure you get your money's worth.

### A HELPING HAND

Terrormolinos, although fairly easy, is causing some head scratching:

Keep getting heatstroke and sunstroke?

SKNU RTDN ANOI TOLN  
ATNU SYKN AHRA EWDN  
AYKN AHTO NK

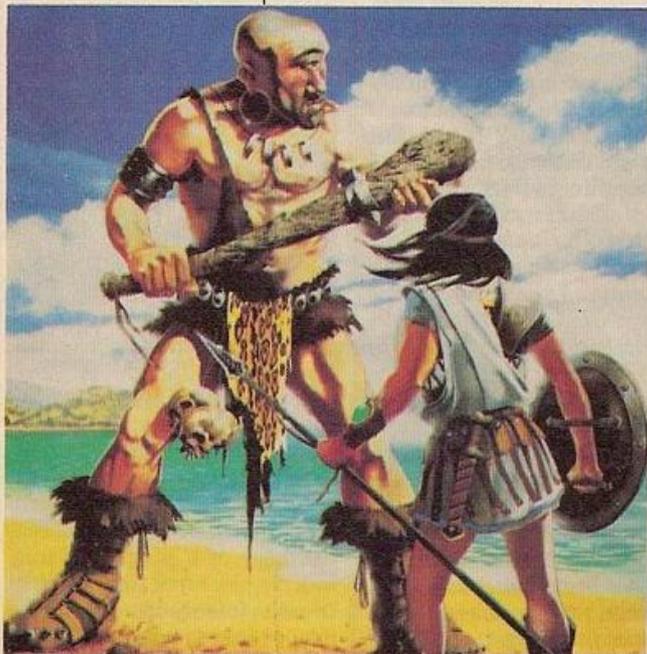
Problem in the bull ring?  
POHS ANIHC OT LLUB DAEL  
NEHT YKNAH DETTONKNU  
EVAW

Quite a few adventurers are still struggling with Gremlins.

Being followed everywhere:  
RABM ORFA REMA CNOH  
SALF ESU

Run over by snowplough?

a) RETI NGID NAEL TTOB  
HCRO TTEG  
b) HGUO LPWO NSDL EWNE  
HTHC ROTE TING IEVL  
AVNE PO



# HARDWARE HITLIST

## **D**ATACHAT 1223

► GEC Comms • Modem • £89.95 and £99.95 with BBC software

The modem which reduces your 'phone bill hasn't been invented yet. But at least GEC's Datachat can help with electricity costs. It's powered solely by the telephone line and has no mains connection at all.

It offers just one signalling standard, V.23 1200/75, but it can act as either Prestel terminal or viewdata host.

Overall, the modem is rather smaller than it looks from photographs, and seems very solidly made — the box is metal, not plastic. And it carries the green BABT approval sticker.

Controls are very basic — just an on-line/off-line button and another for transmit/receive (puzzlingly, the markings are topsy-turvy compared to other modems: when you originate a call, you must switch to receive). On the back there's an extension telephone socket and a five-pin DIN data connection.

The data interface is RS232C-compatible, so you could use the Datachat with almost any computer with a serial port and with all sorts of communications software.

But for the BBC Micro, GEC have developed a package of their own. Available on disc or in eprom, it's suitable for both Prestel and Telecom Gold (the screen can be switched to 40 or 80 columns). In addition, it provides a special 1200bit/s user-to-user mode which makes use of the modem's ability to turn the line round under software control.

With this software running, the modem is controlled by the computer's function-keys and the many facilities make for a crowded key-strip. But on the disc there's an extensive help-file to shepherd the new user through the uncertainties of logging-on for the first time.

The package includes some clever tricks, though the best ones work only when there's a Datachat set-up at the other end too. For example, the distant operator can enter the name of a file on your disc and make your computer send it automatically, without your touching the keyboard. And to ensure perfect transmission, he can invoke a special error-correcting protocol.

Exchanging files by this

method turned out to be quick and easy. But if something happened to go wrong anywhere (through a disc error at the remote end, for instance) the system could end up waiting helplessly for a block that would never arrive, giving no guidance as to what the user ought to do next.

Unfortunately, the protocol does not appear to be compatible with the Xmodem (or CPM) arrangement widely used by bulletin boards, so any downloading from these has to be done in the non-corrected mode.

This brings us to the one glaring omission in the viewdata department: there's no downloading capacity for Prestel telesoftware. GEC tells us they are thinking of putting this right; and indeed they should lose no time in doing so, since it's the prospect of free software that tempts many Micronet users to sign up in the first place.

However, there are also one or two lesser problems with the Datachat software. It isn't

*(continued on next page)*

● GEC's Datachat — powered solely by the telephone line.



## DATACHAT 1223

(continued from previous page)

possible to send operating system 'star' commands from the main menu: you have to wait until you're on-line and receiving a carrier from the other end before you can do that. So if you want to catalogue your files or switch drives, or whatever, you must either do so in public or else exit from Datachat and begin again.

Furthermore, the first issue of the disc version was so

well protected against copying that it appeared to run only on the standard model B with Acorn DFS. If you have anything else or are planning to upgrade, make sure you get a later issue.

The Datachat modem on its own is very recommendable. But with the price-gap steadily closing between V.23-only modems like this one and the multi-standard variety such as the Pace Nightingale or Miracle WS2000, you would be wise to consider whether it is

worth paying the little extra to have a 300bit/s mode plus the possibility for expansion options such as an autodialler or auto-answer board. After all, you might want to run your own bulletin board some day.

But the software, though cheap, is not up to scratch. And you would be unable to make the most of it unless your friends were using it too. So for the moment, Beeb users are better off with the likes of Commstar and Databeeb.

## MAGIC MODEM

► Datastar • £79.99 • Companion software for Amstrad or BBC Micro • £20

Does the ghost of the late Demon (or Unicom) modem still stalk the computing world? It's hard to avoid comparing the new Magic Modem with the Demon, since they have a common ancestry. At any rate, the distributors have the same address.

And besides, there is the same combination of feature-packed specification and alluringly low price. Both are direct-connect modems for various permutations of the V.21 and V.23 standards. Yet the Magic Modem seems to succeed where the earlier design created difficulties.

For example, instead of attempting to tackle all the rather complex switching in software, the designer has given us a traditional-style six-way rotary mode-switch (it includes an off-line test position) plus a row of status lamps. So there's no doubt about what mode you're in, or whether you're on-line.

However, it's the software which can make or break a communications package, and in this case the Companion Rom certainly makes it.

The Demon CommZromm did everything by star-commands, which meant you could incorporate communications features in your own programs. So you could write your own bulletin-board software in a few lines of Basic. Companion takes the more conventional approach of control by function-keys; rather more restricting, you might think,

but much easier to use.

However, when it comes to features, comprehensive is hardly the word. The viewdata section includes an effortless telesoftware downloader, extensive page-tagging facilities and — unusually for an eprom package — an off-line mailbox editor which allows the use of colour and graphics.

Sending mailbox messages is one of the hardest Prestel skills for the newcomer to master, so an editor and uploader as good as this one deserve a welcome.

In viewdata mode, the Magic Modem can be operated with the data rates reversed; so with the optional auto-answer board you could choose to run it as a viewdata host.

The other department, which gives a scrolling text terminal (300bit/s as well as 1200/75), is just as interesting. Xon/Xoff flow control and Xemodem (CP/M) protocols for file transfer are both provided, and incoming text can be spooled to disc or sent to the printer. Those functions which involve files worked faultlessly even with my highly non-Acorn double-density DFS, so compatibility problems with other systems should be most unlikely.

Decorative features such as foreground and background colours and screen mode are all alterable by the user. So are many internal settings such as text window size, parity checking, data block size, echo action and timing.

Sensible defaults are provided, but the configuration commands are arbitrary and difficult to remember, so the reference list in the manual is essential when anything unexpected crops up.

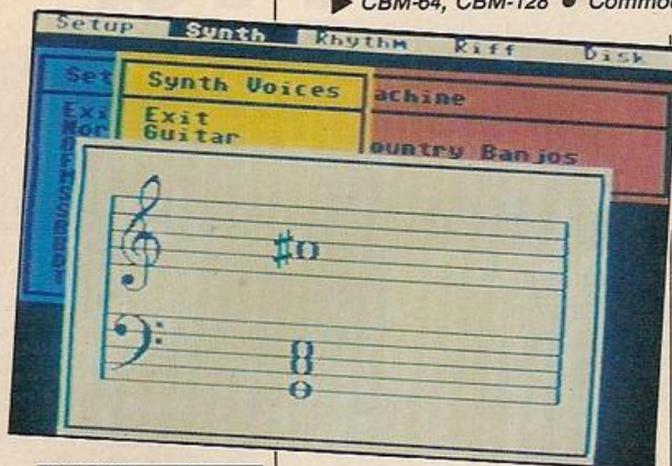
Fortunately, the manual is very detailed and it includes a useful problem-solving section at the end of each part. But the text itself, from a non-NLQ dot-matrix printer in condensed mode, is hard to find your way around in an emergency. However, you can call up an on-screen help list for a quick reminder of which key does what, and it doesn't destroy the data behind it.

Apart from intermittent minor problems with the autodialler and in getting the software set up for 1200bit/s user-to-user working, the combination performed exactly as billed and was very enjoyable to use.

But one niggle is that, like the Demon, the Magic Modem has no telephone socket on the back. It's highly desirable to have a means of eavesdropping on your line, especially if the modem has an autodialler. How else can you tell why a call has failed? And how can you stage-manage a file-swapping session without switching to voice now and then? A certain amount of discussion is surely unavoidable! Of course, you can always go out and spend another fiver on a two-way telephone adapter, but why should you have to?

# SOUND EXPANDER

► CBM-64, CBM-128 • Commodore/Music Sales • Music Synthesiser add-on • £99.99 • Tony Sacks



## SCREENS

• The FM sounds are great, but the Sound Expander's Cosmic Wow soon wears thin.

The precise, life-like tones of FM — frequency modulation — sound synthesis dominate the professional music synthesiser field and punctuate almost every hit record. Now for under £100 you can add eight channels of FM sound to a CBM-64 or 128 using Commodore's Sound Expander.

It snuggles into the computer's cartridge port and can be played using either a £69.99 full-size, four-octave keyboard or the Music Maker QWERTY keyboard overlay.

Sound output is through a television or hi-fi speaker.

A trapdoor in the top of the expander will take a MIDI interface which Commodore plans to market soon at the commendably low price of £24.99. This will allow you to link your expander to electronic instruments such as synthesisers and drum machines.

On start-up of the disc version you are presented with a musical staff display and a choice of five drop-down menus: Set-up, Synth, Rhythm, Riff and Disk.

Set-up allows you to choose between playing with eight notes of one sound across the whole keyboard or "splitting" the keyboard so that there are different sounds above and below the split point. In the split mode you can play full chords by pressing just one bottom-half note — or a key on the lower two rows of the QWERTY keyboard.

If you are using an external keyboard, another function allows you to play a chord which will be memorised and can then be played as a

single-note elsewhere on the keyboard.

Synth lets you choose the sounds for the whole keyboard or for each half when in the split mode. A dozen pre-programmed voices are available on start-up with an alternative 12 on the disc-based version of the expander. The sounds have the sparkling clarity typical of FM sounds. There are some powerful synthesiser-type voices and a delightful percussive glockenspiel. On the debit side, the piano sounds are unconvincing, and you tire quickly of gimmicks such as "cosmic wow" and "alien".

The only control that you have over a sound is to make it brighter or more mellow. You cannot change its fundamental character. More adventurous tampering with the potential of FM will have to wait until Commodore releases a sound editor program later this year.

In the meantime you can thicken up the sounds by turning on an "ensemble" function which doubles up the voices, giving added depth and vibrancy to some sounds, but halves the number of notes you can play simultaneously.

Rhythm provides a choice of 12 rhythmic accompaniments in an assortment of styles including rock 'n' roll, bossanova and two variants of disco. You can have just a percussion section or by pressing the single finger chord buttons/keys you can add a pre-programmed

musical accompaniment, supposedly in the style of the selected rhythm.

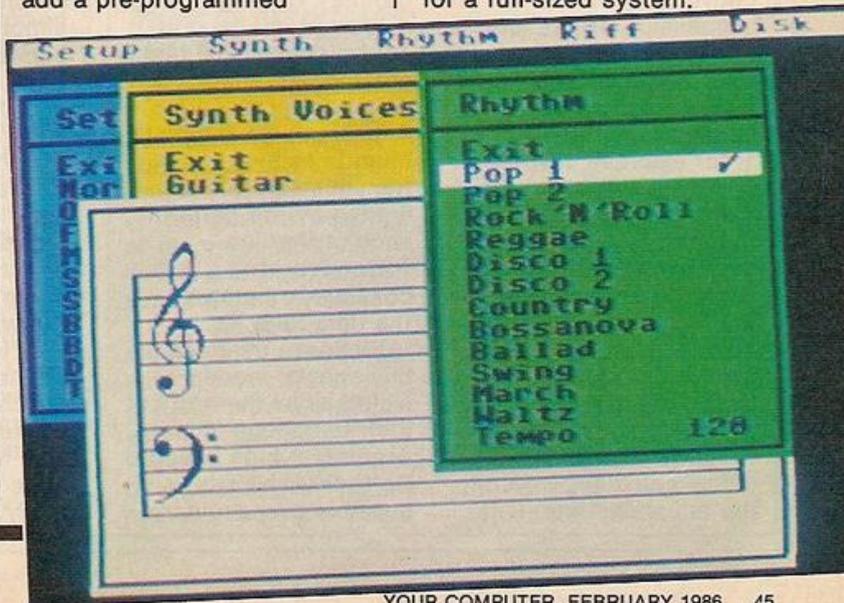
Riff and Disk are used together. With the Disk option you can load further voices for the synthesiser or demonstration tunes and "riffs". The riffs are snatches of backing pattern, a few bars long, in styles such as "big band" and "country banjos". For each style there are 12 different riffs which can be chained together in any order to form a "song".

The riffs and demonstration tunes are handy for impressing your friends but seem to have little lasting value.

The basic Sound Expander package turns your computer into something like a home organ with high-quality preset sounds. It does not allow you to program new voices or record what you are playing, but the next expander software package, due soon, will provide the system with a real-time and step-time recorder.

The only direct competitor for the expander is Siel's Sound Buggy, also for the 64/128. The two products are similarly priced and perform similar functions, but Commodore's expander wins through on the quality of its FM sounds.

If you don't own a Commodore computer then the competition offered by Yamaha's CX-5M computer-synthesiser is tougher. It has recently come down in price to under £300 for a mini-keyboard system and £350 for a full-sized system.



## SCREENS

• Thumbs up for the drop-down menus, and a raspberry for the "reggae" rhythms which would cause a few sniggers in Jamaica.

# Modem World

Richard Lambley on how to get in touch.

**V**argon: there's probably more of it surrounding communications than any other aspect of computing. But don't let it unnerve you — you'll easily get the hang of it. Modems can give you a great deal of innocent entertainment and they're cheaper than almost any peripheral except joysticks. If your interest in computing extends anywhere beyond arcade games, you'll find the whole business irresistible.

With a modem, you can — in theory — connect your computer to any other computer on earth. You can send and receive electronic mail through message-forwarding systems such as Telecom Gold, Comet, One-to-One or Easylink. You can swap messages and gossip through a worldwide network of computer bulletin boards run by fellow enthusiasts. You can search multi-megabyte databases such as Knowledge Index or play multi-user adventure games against unseen rivals. You can attend to your financial affairs with telebanking on Prestel, send a Telex, treat yourself to a bit of teleshopping and finish up by downloading some software. You can fire off a letter to *Your Computer*. And you can swap files with your friends by dialling them direct.

Sounds expensive? Well, some commercial electronic mail and information retrieval

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The Gnome at Home      8.0066f
The Junior Gnome Ranger Club
UNCLE JIM
Uncle Jim And The Curfew      19 Nov
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## UNCLE JIM'S JUNIOR GNOME RANGER CLUB CLUB INFORMATION

Uncle Jim's Junior Gnome Ranger Club is an expanding third world country with an oil-based economic recovery plan. Until 1982, only one home in ten had electricity. Now nobody has electricity because the military junta has cut off the supply in order to enforce a curfew.

Of all wading birds, the curfew is one of the most difficult to enforce because of its long, curved beak and its plaintive cry of "Cour-lee, cour-lee" which can be heard echoing around the oil refineries and desalination plants of our coasts.

Our airforce consists of fifty Sea Harrier operating manuals and a radio-controlled 1/24 scale model of a Spitfire.

Independence day celebrations are held every Thursday, by order.

# More...  
98 Goblination & Later News 9 Index

systems undoubtedly are. They're intended mainly for businesses which can afford them; although lately, Telecom Gold has become available to the small user in digestible form as Microlink. But bulletinboards cost nothing at all beyond the price of the 'phone call. And with a suitable set-up, you can even run your own and watch other people pay!

*There's far more to Prestel than Miconet 800: one of the most active sections is Timefame 818, above, with something to interest almost everyone. Right, the Tandata package for the QL and, far right, Educational stuff for the little ones from the Gnome and his cronies.*

## Bits and bauds

Each byte to be conveyed on a telephone line has to be converted into a succession of bits, so that the modem can turn them one at a time into the appropriate audible tone; high for a 1, for example, low for a 0. With suitable 'packaging' bits to mark the start and finish of each byte (and maybe a parity bit as a check that it gets received correctly), you end up with ten or eleven beeps per byte.

The rate of warble — which is to say, the actual signalling rate on the telephone line — is

expressed in baud, in honour of the French telegraphy pioneer Baudot. So with an ordinary viewdata modem, 1200 baud is equivalent to 1200 bits per second: one bit of data per burst of tone. And of course the maximum possible transmission rate is limited by the performance of the line.

However it is possible to bump up the data rate.

Business users can buy special modems which allow them to cut their telephone bills by sending at high speeds. Up to 9600 bit/s is possible over ordinary

'phone lines, still more on private wires, though the modems come expensive. The data rate (in bit/s) is normally a simple multiple of the signalling rate (in baud).

To achieve such speeds, the modems at each end transmit *synchronously*; that is, they are locked together by a clock signal. When there is no data to send, the line must be padded out with null characters. This is in contrast with ordinary low-speed, *synchronous* modems, where each end can wait for the next byte more or less indefinitely.

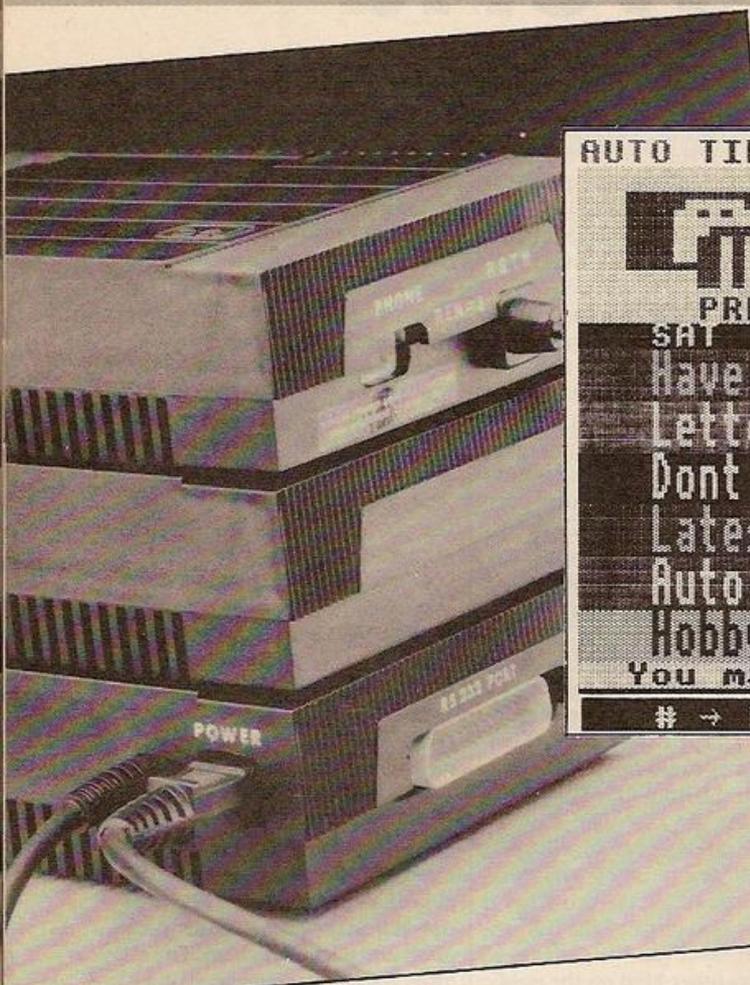
But of the commercial databases, two especially are popular with the home user. One is Compunet, which is exclusively for Commodore owners.

It costs £79, but when you buy Commodore's own modem pack, you get your first quarter's membership thrown in for nothing.

Bigger and better-known is British Telecom's Prestel, which can be accessed from practically any home micro. Prestel is very reasonably priced for the private user. The basic charge is £6.50 for three months, which gives you access to the majority of information-providers listed in Prestel's 90-page directory-cum-magazine, plus the use of the Mailbox messaging service.

On top of this you can pay £10 for admission to Miconet 800 and its rival Viewfax 258. These are special areas of Prestel dedicated to the home computer user, with up-to-the-minute news, interactive games, technical information and much more. Provided you avoid calling Prestel during business





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AUTO TIMEFAME INTERNAT 818114a Op
MICRO BOARD
PRESENTED FREE BY TIMEFAME 818
SAT updates start at 818114n
Have a micro problem? - ask here
Letterbox - press 9
Dont advertise other databases
Latest news .. provided by users
Auto Ads for a quick sale Tips
Hobby Time - press 8
You may read/write even when Auto off
# -> Forward 2 -< Start 0 -> Prizes

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hours and you keep off pages for which there is a charge, you need pay nothing further. Usually, your 'phone call will be at the local off-peak rate, so it can work out quite a bit cheaper than going to the pictures.

To get at these services, you need a modem, software to make your computer drive it, and a telephone socket (if you haven't got one, contact your local telephone area office).

I've assumed here that you want a direct-connect, plug-in modem: you can buy acoustically-coupled modems, which have rubber cups to push the telephone handset into, but they're more temperamental to use. However, if you expect to do a lot of modeming from telephone kiosks they may suit you perfectly.

The word modem is short for "modulator-demodulator". It simply means a box which translates the digital ones and zeros of your computer into audible tones which can be sent down a 'phone line — and vice versa. Conversion is necessary because ordinary telephone lines can't handle bits directly: you

have to turn the bits into voice-frequency sounds. So if you eavesdrop on the line, what you'll hear is rather like the twitter of a games cassette.

Each byte must be unpacked into a series of eight bits before transmission, then reassembled at the other end. If your computer has a serial port it can already do this trick, and you can pick and choose from the multitude of general-purpose modems now on the market. If you haven't a serial port and can't get one as an add-on, you'll have to resort to a plug-in modem pack designed especially for your computer — which could be a little more expensive.

The commonest serial interface standard for modems is RS232. This calls for a rather expensive 25-pin connector, of which only four or five pins are generally needed. Most home modems therefore have a cut-down version — a bit like the RS423 port on the BBC Micro. So make sure the modem you buy comes with the right connecting lead for your computer.

Audio connectors are normally what you'll find; and a new arrangement to look out

for is the S5/8 interface, which is based on a cheap eight-pin DIN connector and is expected soon to receive official blessing as a British Standard. For most purposes, S5/8 users can get away with ordinary five-pin audio plugs. One of the first modems to adopt S5/8 is the M1 cellular radio modem from Transam, for communicators on the move.

Perhaps the biggest decision you need to make in choosing a modem is which signalling standards you want. And that depends on what you want them for.

The earliest dial-up modems sent data at a rate of 300 bits per second, which corresponds to a maximum of 30 characters per second. Most bulletin-boards

and dial-up information services still use this system. But recently the faster viewdata standard of Prestel has gained popularity: using a different combination of tones, it sends 1200 bit/s to the subscriber and accepts 75 bit/s back (which is still a good deal faster than most of us can type). With the advent of software such as the Communitel view-data package and Pace's low-cost colour-capable OBBS for the BBC Micro, more and more business and private systems are adopting 1200/75.

These modes are called full-duplex, which means you can send in both directions at once. Certain other modes, called half-duplex, allow only one end

*(continued on next page)*

### Modem standards: the V series

The technical details of modem signalling are defined by the CCITT, a committee of the United Nations.

The CCITT's V series of recommendations covers every aspect of sending data by telephone. As far as modems are concerned, among them are V.21 (the 300 bit/s system) and V.23 (which includes viewdata and other 600 or 1200 bit/s modes): you'll see these

terms used on manufacturers' hand-outs. Some V recommendations relate to high-speed modem standards (such as V.22, which provides simultaneous two-way working at 1200 bit/s). But there's also V.25, which defines a protocol for intelligent modems — ones which can auto-dial, auto-answer and so on under software control. And there's V.24, which is the same as the RS232 serial interface.

# Modem World

(continued from previous page)

to send at a time.

But a modem designed for just one set of tones won't recognise any other kind. So unless you're certain that you don't want Prestel, or don't want 300 bit/s systems, it makes sense to buy a multi-standard modem which can handle both. Some dual standard modems now cost less than £100, so the relatively small extra cost should be well worth while.

It is possible to buy modems giving still faster speeds, but at present there is little opportunity for amateurs to use them, other than on the commercial electronic mail systems.

To use a modem, you need software of some sort. Characters coming in from the 'phone line must be routed to your screen, while those you type at the key board must be sent out to the line.

The more sophisticated packages have lots of extra features: examples are storage of incoming data in a memory buffer and on disc or tape; off-line editing for electronic mail; an echo facility (so that you can see what you're typing, even when the other and doesn't return your input); software flow-

control (which means that the computer at one end can make the other one wait if it gets too busy); error-free file transfer for swapping software; auto-dialling and auto-answering (for use with modems which have suitable hardware features); an on-screen clock, for keeping track of your telephone bill; and options to change the make-up of the data word, for dealing with unusual systems.

For viewdata, your communications program may have to work even harder. When you press Return or Enter, the character that should be sent is not a carriage-return but the Ascii underline character; and to confuse you further, Prestel represents it on the screen as £.

Besides coping with such bizarre contortions, the program may also need to re-jig your screen. With the BBC Micro, things are very straightforward, because the teletext mode (mode 7) is already just what's wanted for viewdata. But with many other micros, the 40 by 23 display format, the colour and control characters all have to be cooked up in software.

There are packages also which allow you to run your

computer in reverse, as a "host" system. With these you can operate your own bulletin board or mini-Prestel service, with news pages, special interest areas, messages and software to download. To do so, you'll need a suitable auto-answering modem plus the willingness to allow total strangers to hog your telephone line at all hours.

Incidentally, it's worth observing that data communication doesn't necessarily mean using the 'phone. A novel software package for BBC-owning amateur radio buffs gives extensive radio-modem facilities, yet calls for no modem hardware at all. Amprom, from CTP software (£18 in Eprom, £9 for the sideways Ram version), does it by reprogramming the cassette port; and it offers such possibilities as radio-teletype chat and automatic file transfer over the air.

One modem should work just as well as any other which has the same facilities, provided it carries the green BAPT approval label (and it's illegal to use any other kind on the public telephone network). So you may as well choose largely on price.

But what do you get by buy-

ing an expensive modem? Well, some of the more exotic business modems operate at higher speeds, have built-in diagnostic features, may include error-correction or data scramblers and can often do tricks like dialling up a stand-by line when the regular one goes wrong. They have built-in data buffering to cope with problems such as getting into Prestel with a computer which can't send and receive at different rates. And they may be able to select the correct control settings automatically.

But even on the low-cost, low-speed modems we're mainly interested in, we're starting to see features such as software control. For the manufacturer, the switches on the front panel may be among the most expensive components in his design, and it can often be cheaper to junk them in favour of a little more complexity in the electronics: a dedicated microprocessor, perhaps. Having decided on this, the designer can often add tricks which until now have only been seen on units costing many hundreds of pounds.

Modems with tricks are known as intelligent (or, in

## General purpose

DaCom DSLV21 Buzzbox: V.21, battery or mains-powered, very small, £80. Auto-answer option. Range includes V.21/V.23 professional models.

Disolve ChipChat, V.21/V.23, auto-answer, £219. Bell mode and autodial options.

DCE-Interlekt Prospect, V.21/V.23, £144; Portman (auto-answer), £199.

GEC Datachat 1223: viewdata terminal/host, £90. With software for BBC (including user-to-user features), £100. No mains unit: power provided by the telephone line.

Miracle Technology: WS2000 V21/23, £155 with introductory subscription to Micronet 800 and Microlink. Dial, answer and software control cards available. Databeeb software for BBC, £30. WS3000 series with professional features, from £340.

Micro Technology: Inter-Mover range, V.21/V.22/V.23, from £113; M4000 microprocessor driven V.21/V.23, from £215; acoustic couplers for V.21 and viewdata, from £98. Also Minimodem range of acoustic couplers, from £98.

Prism Modem 1000: receive-only viewdata plus 1200 bit/s user-to-

user. Available with software and leads for a variety of micros; from Modem House, £80 upwards.

Pace Nightingale, V.21/V.23, £136, including vouchers for Micronet 800 and Microlink. With serial interface and eprom software for Amstrad 464, 664 and 6128, £150. With Commstar eprom for BBC, £165; autodial/answer options, £68; OBBS colour bulletin board software for BBC, £24.

Miracle Technology: WS2000 V21/23, £155 with introductory subscription to Micronet 800 and Microlink. Dial, answer and software control cards available. Databeeb software for BBC, £30. WS3000 series with professional features, from £340.

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Tandata Tm110, intelligent viewdata modem with auto-dial and storage for eight numbers and passwords, £114. Tm220 has V.21, viewdata host mode and 1200bit/s user-to-user modes also, £199. Two further models with professional features, from £339.

Vicom, V.21/V.23/Bell, £110. Software for BBC, £39; Poseidon viewdata host software for BBC, £170.

Some bargain-price ex-BT modems are available from Display Electronics: prices begin at £35.

## Addresses

Amstrad, P.O. Box 462, Brentwood, Essex CM12 4EF. Computer Source, Brahmstraat 129, 2625 BV Delft, The Netherlands.

CTP Software, 107A Shacklewel Lane, London E8 2EB.

DaCom Systems Ltd, Sunrise Parkway, Linford Wood, Milton

Keynes MK14 6LU.

Datastar Systems, Unicom House, 182 Royal College Street, London NW1 9NN.

DCE-Interlekt Ltd, 24 Portman Road, Reading RG3 1LU.

Display Electronics, 32 Biggin Way, London SE19 3XF.

Disolve, Aire and Calder Works, Cinder Lane, Castleford, West Yorkshire WF10 1LU.

GEC Telecommunications Ltd, P.O. Box 53, Coventry CV3 1HJ.

Microlink: Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Micronet 800: 8 Herbal Hill, London EC1R 5EJ.

Miracle Technology (UK) Ltd, St Peter's Street, Ipswich IX1 1XB.

Modem House (D.T.M.C. Ltd), 70 Longbrook Street, Exeter EX4 6AP.

Modular Technology Ltd, Zygal House, Telford Road, Bicester, Oxfordshire OX6 0XB.

One-to-One, Scorpio House, 102 Sydney Street, London SW3 6NL.

Pace Micro Technology Ltd, Juniper View, Allerton Road, Bradford BD15 7AG.

Skywave Software, 73 Curzon Road, Bournemouth BH1 4PW.

Tandata Marketing Ltd, Albert Road North, Malvern, Worcestershire WR14 2TL.

America, "smart") modems. The kind of things you can expect are auto-selection of the right data rate and the ability to log-on automatically simply by sending the telephone number and passwords to the modem as a character string.

A few designs, such as the Datarstar Magic Modem (£99.95) and the earlier Demon (formerly Unicom) modem for the BBC Micro, simulate intelligent control at low cost by borrowing the power of the attached computer.

For a full description of the Magic Modem see the review in this month's Hitlist. When it's beefed up by the Commpanion software, in eeprom for the BBC and Amstrad, it is a highly attractive package, which scores by being exceptionally comprehensive.

## Communications modules and software

### Amstrad

Amstrad RS232 interface, £50. Modem House micropack, including modem, Skycom rom software and leads, £180; choice of other modems at prices from £130 inclusive. Also Skywave bulletin board software, £50. Pace communications package with Nightingale modem and software, £150.

### Atari

Miracle Technology Datari serial interface and communications software, V.21, V.23, £60. Modem House serial interface for 600XL, 800XL and 130XE, £50; allows use of general-purpose modem.

### BBC

Datarstar Magic Modem with Commpanion software V.21,

V.23, £100.

Acorn Prestel Adapter, built-in autodialler, with software £139.

Demon Modem: V.21/V.23 with many automatic features, from Walkbry Consultants at £96.39 including software.

Le Modem, V.21/V.23/Bell modes, many features, £102 including software and cables from Watford Electronics.

### Commodore

Miracle Technology 64 Multimodem module, V.21, V.23, Bell 103, built-in software, £116.75.

Vicommodem, V.21, V.23, Bell modes, £79; CBM64 cable, £8; dial/answer card, £35. Viewdata software, £25; Datatel viewdata host software, £75.

### Electron

Interface card (viewdata is monochrome), Nightingale modem and software, from Pace.

### QL

Q-Connect RS232 interface, Q-Com V.23 modem, Q-Call dial-answer unit. Modules are available from Tandata Marketing separately or as a package. Price for all three is £199.99.

### Spectrum

Miracle Technology Data-spectrum interface and software, V.21, V.23, £45.94.

Prism VTX 5000 viewdata modem, from Modem House, £70; user-to-user software, £4; Ascii software, £7.

Vicommodem, V.21, V.23, Bell modes, £79; interface card, cable and viewdata software, £20.

From Modem House: micropacks with modem, software and leads for BBC (£90); Commodore 64, £100; Dragon 32 and 64, £80; Einstein, £100; Tandy models I and III, £100; and many other home and business machines.

# Databases

To give a list of all the services you can dial up up would be impossible, new ones are starting up all the time. Bulletin Boards especially are booming.

These services fall into two main categories, databases and electronic mail services. This distinction is becoming somewhat blurred as Telecom Gold has lots of information and Prestel has a message service.

The most common use of a modem in this country is for accessing Prestel. The major attraction for the home computer user is Micronet, and its rival service Viewfax. Micronet is the more established service and offers software for the most popular machines, some of which are free. It also features the infamous chatline where some celebrity sits waiting patiently for questions to come through while the system goes down.

Other features are a micro-news service including the inimitable Steve Gold as the Micromouse. There is a "jungle" section which allows people to upload queries, advice and general chat onto the system.

Viewfax is a new rival to Micronet and appears to duplicate many of its features. It



also has a new downloading system for Amstrad users.

Prestel's main problem is it is very hard to get any useful information out of. You can either get to a page by entering a specific page number, or by going from one page to another. There is no index in the old fashioned sense, and it is impossible to ask for a page on, say, Commodore music programs.

There is also very little information on routing, ie what the next page is about. But, for all its faults, it probably has more pages of interest to most micro users than any other system.

For the games player, apart from downloading software, Prestel offers two possibilities. Diplomacy, a well known pro-

proprietary board game is played on the Pan-Am information area, and Starnet has finally got off the ground.

Starnet is based on a game played by post called Starlord. Started in the late seventies, players would post in their orders which would be processed on a PET, and the outcome of the moves would be printed out and sent to the players. The author, Miss Singleton, of Lords of Midnight fame, has converted the game to run on Prestel. Moves occur every day or so and cost 25p. Your object is to become Emperor of the Galaxy (and stay that way). The catch is that 499 other players are trying to do exactly the same thing. Naturally this opens up all sorts

of possibilities for Machiavellian tactics and skullduggery.

CompuNet is a rival network to Prestel. It is dedicated to Commodore owners, although there are plans to open up some sections to other computer users. To use it, you must have the Commodore modem. This has a built-in 10 which helps prevent hacking. The system is a little more complex to use than Prestel, but once you get the hang of it, relatively straightforward.

There is certainly far more on the system of interest to the Commodore user than Prestel. The software you can buy includes most of the current best sellers — the packaging can if necessary be sent through the post. The system is capable of handling both text and graphics. Its major advantage over Prestel is the method of routing. Once again, you can either use page numbers, or use routing pages, but more information is given on the potential pages you can access, so you are more likely to get to a page you are actually interested in.

CompuNet encourages participation by their subscribers

(continued on page 52)



# THE 520ST OVER QUAL

AVON BRISTOL  
Computer Exchange.  
AVON BRISTOL  
Laskys.  
AVON BRISTOL  
Radford Hi Fi.  
BEDS BEDFORD  
Bedford Computers.  
BEDS LUTON  
Hobbyte Ltd.  
BEDS LUTON  
Laskys.  
BELFAST  
CEM Micro-Computer Services Ltd.  
BELFAST  
Computer All Ltd.  
BELFAST  
Education Company Ltd.  
BELFAST  
Ideal Radio.  
BELFAST  
N.P.O.  
BERKS READING  
HMV Micro Shop.  
BERKS READING  
Laskys.  
BERKS SLOUGH  
Laskys.  
BERKS SLOUGH  
Silicon Chip.  
CAMBS CAMBRIDGE  
Cambridge Computer Store.  
CAMBS CAMBRIDGE  
Laskys.  
CAMBS PETERBOROUGH  
Laskys.  
CENTRAL FALKIRK  
Microplus.

CHESHIRE CHESTER  
Laskys.  
CHESHIRE CREWE  
Woottons TV.  
CHESHIRE WARRINGTON  
Warrington All Computers.  
CHESHIRE WILMSLOW  
Fairhurst Instruments Ltd.  
CLWYD WREXHAM  
Micro Computer World.  
CLWYD WREXHAM  
Micro Computer Centre.  
CO.DERRY  
Donaghy Brothers.  
CO. DOWN WARREN POINT  
Visions Video.  
CO. DURHAM  
DARLINGTON  
Darlington Computer Shop.  
DERBYSHIRE  
CHESTERFIELD  
E.A.W. Electronics.  
DEVON EXETER  
Laskys.  
DEVON PLYMOUTH  
Laskys.  
DEVON PLYMOUTH  
Syntax Ltd.  
DORSET BOURNEMOUTH  
Lansdowne Computer Centres.  
DORSET POOLE  
Lansdowne Computer Centres.  
ESSEX COLCHESTER  
Colchester Computer Centre.  
ESSEX COLCHESTER  
Capricorn Computers.  
ESSEX COLCHESTER  
Laskys.

ESSEX HARLOW  
Achter Instruments Ltd.  
ESSEX HARLOW  
Laskys.  
ESSEX ROMFORD  
Laskys.  
ESSEX SOUTHEND  
Laskys.  
ESSEX SOUTHEND  
Batusary Computers.  
ESSEX WESTCLIFF-ON-SEA  
Sterling Resources.  
FIFE GLENROTHES  
Computer Services (Scotland) Ltd.  
GLOUS CHELTENHAM  
Laskys.  
GLOUS GLOUCESTER  
Laskys.  
GRAMPIAN ABERDEEN  
Laskys.  
GRAMPIAN ABERDEEN  
Microhack.  
GT. MANCHESTER BOLTON  
Computer Annex.  
GT. MANCHESTER  
FAIRWOODFIELD  
Mighty Micros.  
GT. MANCHESTER  
MANCHESTER M4  
Laskys.  
GT. MANCHESTER  
MANCHESTER M1  
Laskys.  
GT. MANCHESTER  
MANCHESTER  
Lewis Ltd (Sound & Vision).  
GT. MANCHESTER  
MANCHESTER  
NSC Computershops.

GT. MANCHESTER STOCKPORT  
New Mills Micro Centre.  
MERSEYSIDE LIVERPOOL  
Lewis Ltd (Sound & Vision).  
GWENT EBBVALE  
Computability.  
HANTS PORTSMOUTH  
Microchoice.  
HANTS SOUTHAMPTON  
AMS Systems Limited.  
HANTS SOUTHAMPTON  
Laskys.  
HERTS ST ALBANS  
Hobbyte Ltd.  
HERTS WATFORD  
Laskys.  
HIGHLAND INVERNESS  
Nova Computers.  
HUMBERSIDE HULL  
Golding Computer Services.  
HUMBERSIDE HULL  
Tomorrows World.  
KENT BECKENHAM  
Transform Ltd.  
KENT BEXLEY HEATH  
Laskys.  
KENT BROMLEY  
Laskys.  
KENT MAIDSTONE  
Kent Microcomputers.  
KENT MAIDSTONE  
Laskys.  
KENT ORPINGTON  
Lever Computers.  
KENT SEVENOAKS  
Chalk Hill Computers &  
Office Supplies.  
KENT SWANLEY  
Swanley Electronics.

KENT SIDCUP  
Silica Shop.  
KENT WELLING  
K.E.C.M. Computers.  
LANCS ACCRINGTON  
PV Micros.  
LANCS BLACKPOOL  
Lewis Ltd (Sound & Vision).  
LANCS BOLTON  
Computer World.  
LANCS BURNLEY  
Bytes And Pieces.  
LANCS DARWEN  
Grahams Micro Shop.  
LANCS LANCASTER  
Castle Computers.  
LANCS LANCASTER  
Online Computer Services.  
LANCS OLDHAM  
Home & Business Computers.  
LANCS PRESTON  
Laskys.  
LEICS HINCKLEY  
Leigh Computer Systems.  
LEICS LEICESTER  
Dimension Computers.  
LEICS LEICESTER  
May's Hi Fi Ltd.  
LEICS LEICESTER  
Lewis Ltd (Sound & Vision).  
LEICS LEICESTER  
Laskys.  
LEICS LEICESTER  
Data Nest.  
LINCS GRANTHAM  
OakLeaf.  
LONDON BROCKLEY  
Homeview Video.

LONDON NW4 Laskys.  
LONDON NW5 Zoomsoft.  
LONDON SW13 LEWISHAM  
Laskys.  
LONDON W5 EALING  
Laskys.  
LONDON W9 MAIDA VALE  
Micro Monde Ltd.  
LONDON W1 Compuface Ltd.  
LONDON W1 Laskys.  
LONDON W1 Laskys.  
LONDON W1 Micro Anvika.  
LONDON W1 Silica Shop.  
LONDON W1 Selfridges.  
LONDON W1  
Computers of Wignore St.  
LOTHIAN EDINBURGH  
Laskys.  
LOTHIAN EDINBURGH  
Silicon Centre.  
LOTHIAN EDINBURGH  
The Games Master Ltd.  
MERSEYSIDE LIVERPOOL L1  
Laskys.  
MERSEYSIDE LIVERPOOL L2  
Laskys.  
MERSEYSIDE SOUTHPORT  
Central Studios.  
MERSEYSIDE ST HELENS  
Microman Computers.  
MIDDLESEX ENFIELD  
Jennings Stores Ltd.  
MIDDLESEX ENFIELD  
Laskys.  
MIDDLESEX NORTHWOOD  
Screens.



**THE ATARI 520ST**  
 Personal Computer  
 has a list of qualifications as long as your arm. With a powerful 16 bit processor and 512k of memory linked to high resolution graphics and 512 colours its work is fast, clear and sharp on your screen, no matter how demanding the task.

Controlling the 520ST is easy through its mouse and unique operating system incorporating GEM desk top manager, whilst its eleven peripheral connectors including MIDI interface enables it to mix and communicate easily with other computer products.

The ST which presents itself in smart modern styling comes with powerful BASIC

# IFIED AND UNDERPAID.

MIDDLESEX PINNER  
 P & H Micro.  
 MIDDLESEX RUISLIP MANOR  
 Intech Software Ltd.  
 NORFOLK GT. YARMOUTH  
 The Micro Shop.  
 NORFOLK NORWICH  
 Tetranite (Spectrum).  
 N. YORKSHIRE YORKS  
 Laskys.  
 N. YORKSHIRE YORK  
 Microbridge.  
 N. YORKSHIRE YORKS  
 York Computer Centre.  
 N. YORKSHIRE RIPON  
 Arthur Yates Ltd.  
 NOTTS HUCKNALL  
 S P Electronics.  
 NOTTS MANSFIELD  
 Mansfield Computers.  
 NOTTS NOTTINGHAM  
 Intoto.  
 NOTTS NOTTINGHAM  
 Laskys.  
 NORTHANTS NORTHAMPTON  
 Laskys.  
 NORTHANTS NORTHAMPTON  
 Northampton Home Computers.  
 NOTTS REDDINGTON  
 GA Computers.  
 OKON HEADINGTON  
 Maddison Computers.  
 OKON OXFORD  
 Laskys.  
 OKON OXFORD  
 Selfridges.  
 ORKNEY STROMNESS  
 Get Taped.

PERTSHIRE BLACKFORD.  
 Silicon Glen Ltd.  
 SHETLAND LERWICK  
 Tomorrows World.  
 S. GLAMORGAN CARDIFF  
 Cardiff Micro Computers.  
 S. GLAMORGAN CARDIFF  
 Laskys.  
 S. GLAMORGAN CARDIFF  
 South World Computers.  
 S. YORKSHIRE DONCASTER  
 Danum Computer Systems.  
 S. YORKSHIRE ROTHERHAM  
 Rotherham Computer Centre.  
 S. YORKSHIRE SHEFFIELD  
 Just Micro.  
 S. YORKSHIRE SHEFFIELD  
 Laskys.  
 STAFFS. STOKE-ON-TRENT  
 Lewis Ltd (Sound & Vision).  
 STAFFS. STOKE-ON-TRENT  
 Town Computers.  
 STRATHCLYDE GLASGOW  
 Laskys.  
 STRATHCLYDE GLASGOW  
 Lewis Ltd (Sound & Vision).  
 STATHCLYDE GLASGOW  
 Unitsoft.  
 SUFFOLK SUDBURY  
 Sudbury Microsystems.  
 SURREY CROYDON  
 Laskys.  
 SURREY FARNHAM  
 Farnham Computers.  
 SURREY GUILDFORD  
 Laskys.  
 SURREY KINGSTON  
 Laskys.

SURREY LEATHERHEAD  
 Evergreen Ltd.  
 SUSSEX BRIGHTON  
 Brighton Computer Exchange.  
 SUSSEX BRIGHTON  
 Brighton Computer Centre.  
 SUSSEX BRIGHTON  
 Laskys.  
 SUSSEX CRAWLEY  
 Laskys.  
 SUSSEX WORTHING  
 Data Direct.  
 TAYSIDE DUNDEE  
 Cursor Keys.  
 TAYSIDE DUNDEE  
 Micromania.  
 TAYSIDE PERTH  
 VICS.  
 TYNE AND WEAR GATESHEAD  
 Currie & Maughn.  
 TYNE AND WEAR  
 NEWCASTLE UPON TYNE  
 Laskys.  
 WARWICKS LEAMINGTON SPA  
 Spa Computer Centre.  
 WARWICKS NUNEATON  
 Micro City.  
 WARWICKS NUNEATON  
 Warwick Computers.  
 W. MIDLANDS BIRMINGHAM  
 Lewis Ltd (Sound & Vision).  
 W. MIDLANDS BIRMINGHAM  
 Software Express.  
 W. MIDLANDS BIRMINGHAM  
 Laskys.  
 W. MIDLANDS BIRMINGHAM  
 Lee Computers.  
 W. MIDLANDS COVENTRY  
 Coventry Micro Centre.

W. MIDLANDS COVENTRY  
 Laskys.  
 W. MIDLANDS DUDLEY  
 Central Computers.  
 W. MIDLANDS  
 WOLVERHAMPTON  
 Laskys.  
 W. MIDLANDS  
 WOLVERHAMPTON  
 Micro Business Centre.  
 WORCS KIDDERMINSTER  
 Central Computers.  
 WORCS REDDITCH  
 Ampower Video and Computers.  
 W. GLAMORGAN SWANSEA  
 Bacon Ltd.  
 WEST LOTHIAN  
 LIVINGSTONE  
 Computer Centre.  
 W. YORKSHIRE BRADFORD  
 CNA Computing.  
 W. YORKSHIRE HALIFAX  
 Abacus Computers.  
 W. YORKSHIRE  
 HECKMONDWIKE  
 Thought & Crossea.  
 W. YORKSHIRE  
 HUDDERSFIELD  
 Microworld.  
 W. YORKSHIRE LEEDS 12  
 Farnells.  
 W. YORKSHIRE LEEDS 6  
 Interface Engineering Ltd.  
 W. YORKSHIRE LEEDS  
 Lewis Ltd (Sound & Vision).  
 W. YORKSHIRE LEEDS  
 Laskys.  
 W. YORKSHIRE LEEDS  
 Micropower.

plus Logo programming languages, a word processor and drawing programme, yet costs only £652\* including disc drive and black and white monitor.

Why? Because at Atari we bring up our products to work hard for their living.



\*This price is exclusive of VAT.  
 GEM® is a registered trademark of Digital Research.

# Databases

(continued from page 49)

with a large "jungle" area, as well as a mailbox service. The Commodore modem has quite advanced software such as off-line editors, and simple load, save and print routines.

Possibly Compunet's major fault is speed. It uses a complex error checking system which ensures that a transmitted page is fully error checked. However, this all takes time, and a page takes roughly three times as long to be received as Prestel. A major attraction for software retailers is that downloaded software is essentially "dongled" ie it will only run on a computer with the same modem in place.

## Computer shopping

Another section of Compunet is Comp-U-Store on line. This is the computerised branch of a discount shopping scheme Comp-U-Card, which has rented space on the Compunet system. Apart from trying to offer the lowest prices to its customers, Comp-U-card's idea is to offer unbiased advice to its members in order to help them with potential purchases. Comp-U-Store works in much the same fashion, but instead of speaking to a salesman, you simply interrogate a database. You key in the features you would like for a particular product, and the system comes up with a list of models which satisfy the criteria, then if you

are happy, you can go ahead and order.

This database contains information on 22,000 products. Membership is £20 a year (over and above the Compunet membership) but the company believes that most people will save this amount of money on purchases, plus the added convenience of free delivery. There are plans to make Comp-U-Store available on Prestel in the near future.

## Jungle chess

As far as the games player is concerned, there is the Compunet MUD (Multi User Dungeon) game, plus several games like chess carried on in the jungle and message areas.

MUD has also recently become available on its own from BT and MUSE (Multi User Entertainments). It now seems that at last MUD II as it is known has overcome its teething trouble. MUDD II was described recently in YC October 85. Principally, the difference between the MUD offered on Compunet and by MUSE is that MUD II from MUSE is far larger, with a larger number of spells, objects and monsters. However, it will only be available outside office hours, whereas Compunet MUD is available at all times.

MUD II's teething problems were caused when it was found that MUDL, the language MUD is written in, did not get

on well with the new version of the operating system running on the Vax machines at one of BT's brand new computing centres. If these have at last been overcome, this should be well worth investigation.

There is a large number of companies offering electronic mail. The major advantage of sending a letter by electronic mail rather than a Prestel mailbox is, firstly, the message is not chopped up into a series of frames, and also there are more ways to manipulate passages than the first in, first out method of Prestel.

## Telex gateway

Most services offer more than just straight electronic mail, where you send a message to another subscriber on the system and they read it when they next log on. Most offer a telex gateway, including acknowledging successful transmission. Some offer ordinary mail services — more useful for business men sending circulars, and others run a courier service.

Telecom Gold has expanded rapidly recently to the point where the differences with Prestel seem small. It hosts databases, usergroups and noticeboards. There were problems when this system started. For instance, entries to the index were not checked well, so most people ended up under "M" for mister.

Another problem was caused

when it was realised that BT could be liable for any obscene content of messages placed on public noticeboards. The dirty word checker was not, however, the most advanced piece of software ever written, so perfectly harmless treatises on the demise of the wild bluetit suffered terribly at its hands.

Bulletin boards are a new growth area. They have been called the CB of the eighties, and like CB, most of the boards you can access have little of interest, and you can spend a lot of minutes on-line finding this out. Covering every subject from blue jokes to red politics you may find something to your taste. Some use a ringback system. You ring the number once, let it ring once and then put the phone down. You then ring up again and the computer should answer.

## Speak to the sysop

If you let the number keep ringing the first time, you'll probably get through to the sysop. This system, while irritating, avoids tying up a phone line just for the board.

There is certainly no shortage of information you can dial up. Just remember your phone bill. Most common software will allow you to store Prestel frames or record entire calls to bulletin boards. Use this facility to the full to get in and out quickly and absorb the information later at your leisure.

SERVICES	MONODATA	COMET	EASYLINK	ONE-TO-ONE	TELECOM GOLD	PRESTEL	COMPUNET
Telex-send	Yes	Yes	Yes	Yes	Yes	Yes	No
Receive	Yes	Yes	Yes	Yes	Yes	Yes	No
E-Mail	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Letter	No	Yes	No	Yes	No	No	Yes
Database	No	No	No	Yes	Yes	Yes	Yes
Notice board	No	Yes	No	Yes	Yes	Yes	Yes
Radio paging	Yes	No	No	Yes	Yes	No	No
<b>CHARGES</b>							
Telex send (characters)	35p/400	14p/400	25P/400	20p/400	22p/400	40p/400	N/A
Telex reply	45p	Nil	Nil	Nil	50p	N/A	N/A
Instant Mail							
No. of free messages	No limit	500	50	No limit	No limit	No limit	N/A
Connect Time	Free	Free	10p/min	10p/min	3.5p/min off peak 10.5p/min peak	free off peak 6p/min peak	free off peak 6p/min peak
Registration	£40.00	Nil	£30.00	£50.00	Club £40	Club £26	£30 beginner
+ £10.00/mbx		+ £10.00 1stMbx		Corp £300	Corp £76	£40 Standard	
Mbx Rental	£60 1st Mbs £30 thereafter	£360.00	£155.40	Nil	£120.00	Nil	Nil
Minimum monthly invoice	N/A	£30.00	£12.00	£5.00	£10.00	N/A	N/A
Contact No.	01-404 5014	0527 28515	01-633 9577	01-730 1155	01-403 6777	Freefone 2296	01-965 8866

# ATARI ST

## 520ST

### POWER WITHOUT THE PRICE

#### THE NEW ATARI 520ST

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

#### USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

#### FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1) TOS - Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3 1/2 inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disc (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

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

# £749



## ATARI 520ST SPECIFICATION

**MEMORY**  
 512K RAM (256,288 bytes)  
 16K ROM expandable to 320K  
 Port for add-on 128K plug-in ROM cartridges  
 200K TOS operating system

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

**ARCHITECTURE**  
 4 custom designed chips  
 CPU: Chip - MMU Memory Mngmt Unit  
 DMA Controller - Graphics Processing Unit  
 16-32 bit Motorola 68000 processor at 8MHz  
 eight 32 bit data registers  
 eight 32 bit address registers  
 16 bit data bus/24 bit address bus  
 3 levels of interrupt/56 instructions  
 14 addressing modes/5 data types

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

**DISK DRIVE**  
 500K (unformatted) 5 1/4" floppy drive  
 349K (formatted) storage capacity

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

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

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

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

**COMMUNICATIONS**  
 Bidirectional electronics parallel interface for printers, or modems capable of input/output  
 RS232C serial modem/printer interface  
 VT52 Terminal Emulation Software  
 Maximum Baud Rate up to 19,200  
 High speed hard disk interface  
 Floppy disk controller (Western Digital)  
 2 joystick ports (one for 2 button mouse)  
 MIDI interface for external music synthesizers

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

**SOFTWARE**  
 GEM environment with user friendly Macintosh style operation  
 TOS - Tramiel Operating System  
 Atari's own system based on CPM 68K with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures  
 BOS - Business Operating System  
 to run any standard BOS business programs  
 GEM desktop with GEM PAINT graphics mgmt system and GEM WRITE word processor  
 Personal BASIC and DR Logo originally written by Digital Research (DR)  
 Very much like those on other machines except for the extensive use of pull down menus, mouse control and windows

**VARIOUS**  
 Dimensions - 470mm x 240mm x 60mm  
 Replaceable external power supplies  
 Expansion 3 1/2" floppy disk drives 300K/1,000K  
 3 1/2" drives can be connected  
 3 1/2" 15Mb hard disk  
 CD (compact laser disc)  
 Dot matrix & daisywheel printers (black)  
 Thermal dot matrix (colour)  
 RGB & monochrome monitors

**LANGUAGES**  
 BASIC & LOGO supplied  
 Many others will soon be available, including: Assembly, BASIC, C, C++, Compiled Basic, Lisp, Modula-2 and Pascal

## MACINTOSH v F16 v 520ST

"Imagine a Fat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."  
 June 1985 - Jack Schofield - PRACTICAL COMPUTING

FEATURES OF BASIC SYSTEM	MACINTOSH	F16	520ST
Price Includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x167x28	470x240x60
Keyboard size ins (LxDxH)	13x5 9/16 x 2	17 1/8 x 6 1/2 x 1	18 1/8 x 9 1/2 x 2 1/2
3 1/2" D/Drive (Unformatted)	500K	500K	500K
WIMP (Window, Icon, Mouse...)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	GEM
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	62	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	312
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive	Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£652+VAT
+ Mouse	Included	£95+VAT	Included	
+ Monochrome Monitor	Included	£295+VAT	Included	
+ Expansion to 512K RAM	Included	£295+VAT	Included	
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	£652+VAT	

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

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr. Tramiel established the maxim that 'Business is war'."  
 August 21st 1984 **FINANCIAL TIMES**

"This is the only personal computer I know of that comes with a MIDI interface as standard."  
 Peter Bright March 1985 **PERSONAL COMPUTER WORLD**

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing."  
 April 8th 1985 **PERSONAL COMPUTER NEWS**

"It would seem that GEM offers the ideal operating system."  
 March 7th 1985 **POPULAR COMPUTING WEEKLY**

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."  
 Peter Bright Feb 1985 **PERSONAL COMPUTER WORLD**

**PRESS COMMENT**

"The electronics in the machine are a work of art... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip... when the machine appears in the shops, it'll be at the front end of the queue to buy one."  
 Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

"This machine is significantly more powerful than an IBM PC... If it's possible to design a pure-fire winning machine, this is it."  
 May 11th 1985 **PERSONAL COMPUTER NEWS**

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."  
 May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying - easy-to-use computing power without the price."  
 March 1985 **ANALOG COMPUTING**

"It (the ST) uses the most modern technology that is affordable, in a package that gives a professional impression."  
 May 23rd 1985 **POPULAR COMPUTING WEEKLY**

"The Atari ST is one of the most elegant designs I have seen. Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket... The \$4k dollar question is would I go out and spend money for one? To which the only answer is: Try and stop me!"  
 John Lambert July 1985 **ELECTRONICS & COMPUTING**

"The 520ST is technically excellent... The 520ST hardware is the new standard by which others will be judged."  
 July 1985 **YOUR COMPUTER**

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✂

# The Generation



A quick peek at one of the screens from *Ransom*, a demo game that comes on the GAC disc. If you've got inky fingers, this program will really let you make your mark!

**A**dventures have been with us since the very earliest days of computer gaming and have fluctuated in popularity over the last few years. But in the last few months four quite separate

## WHY THE BIG BOYS USE GENERATORS

Just in case you think it's cheating to write an adventure using a generator program rather than coding it from scratch, just consider that Level 9, Scott Adams, Adventure International, Firebird, and Infocom have *all* produced games using generators. Of course most of these houses have designed their own generator software, but the principle of using a generator is widely accepted.

In fact, the nature of the games produced by software houses is dictated almost entirely by the generating software they have developed over the years for producing their games.

Each system has its own hallmarks. Infocom, for example, write their games in a specially adapted language derived from Lisp. This language is much used in artificial intelligence work, so it comes as no surprise to learn that Infocom games are particularly well known for the way in which they can understand complex inputs.

Level 9's system is hot on text-compression — the programs use huge dictionaries of words that allow the parser to find any word used by the game, even if it's only in a location description.

Adventure International's system is carefully designed to allow easy translation from one language to another so that they can sell their games in non-English speaking countries.

Melbourne House is the odd one out here, although both Hampstead and Terrormolinos were written using the Quill. It's to the credit of programmer Philip Mitchell that he has attempted to update his program system with each release, from the *Hobbit* through *Sherlock* to *Lord of the Rings*. That explains why he doesn't produce so many games, but it also guarantees that each one will be unique, introducing new game-play features and not just different stories using the same programming framework.

events have taken place that are bound to have an enormous effect on adventuring for anyone who's ever bested a Balrog or combed the hair between their toes.

The first event was Level 9's release of *Worm in Paradise*. This game is the first written using Level 9's new adventure programming system and raises the art of the cassette-based game to new heights, offering an unbeaten 1,000-word vocabulary and a very clever parser.

## New standards

Then came *Lord of the Rings* from Melbourne House. Although the Spectrum version is rather slow, this program still sets new standards for cassette adventures in terms of the interactive characters in the program. Philip Mitchell, chief programmer on the Rings project, was the programmer of the *Hobbit*, which must take a great deal of credit for the ensuing growth in popularity of adventures. LOR is a tremendously ambitious piece of programming that will give plenty of other software houses something to keep up with.

The third event, not quite so apparent as the other two, was the release of Infocom games for the Amstrad CPC computers. Up until now British software developers have been

hampered by the punters' reliance on cassette loading, but now Amstrad look like being the first eight-bit home micros to establish a decent disc standard for their machines.

The Infocom games run under CP/M, but at under £20 they're going to start making themselves felt in the marketplace, and it won't be long before other British software houses begin to take discs more seriously and move on to bigger and, hopefully, better games.

The fourth event, however, is possibly the most explosive of all. Again, it's gone quite unnoticed amongst owners of machines other than Amstrads, since at the moment the program in question runs on these machines only. However, Spectrum, Commodore, and hopefully BBC versions are planned for the spring... and then, all hell will break loose!

The program is called *Graphics Adventure Creator*; it's from Incentive Software, and it offers the unskilled programmer the chance of producing a really professional game.

## Room for adverbs

GAC offers the following options to the user — multiple entry commands; whole sentence input — rather than just verb/noun; a theoretical maximum of 2,000 locations; text-compression, so you can fit more in; multi-colour graphics with a merge facility; room for over 758 vocabulary entries, which can consist of verbs, nouns, *and* adverbs.

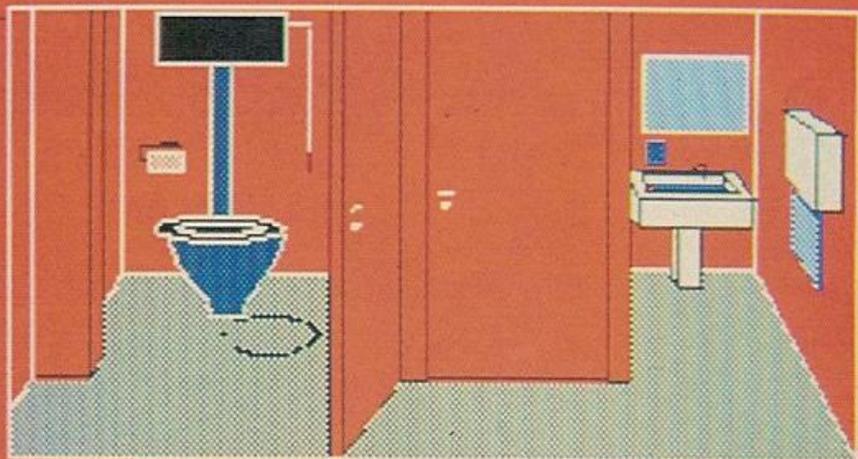
In other words, it looks as if it can offer the sort of facilities that should make writing a professional looking game a piece of cake — provided, of course, that you can supply the ideas.

The program is menu-driven, and you can see the main menu in the screen-shot on the right. Selecting the graphics option throws you into a stand-alone graphics utility that offers some very attractive features. Not only do you get "rubber-banding" — that means dragging a line around prior to fixing it in place — but you also get elipse and box drawing together with a stippled fill command. Another very important feature

# Game

Steve Cooke looks at an extraordinary new adventure generator program that leaves the Quill stuck in the ink-pot.

Other adventure houses are already jumping on the GAC bandwagon. This is a scene from *The Beer Hunter* from Global Software written using the Incentive program.



the outside gents. Graffiti is plastered all over the walls, some of it rather obscene! There is a horrible smell wafting towards you. You can't. Exits are: North What now?...

```
MAIN M
adverbs
Begin where?
Conditions ( LOCAL )
Graphics
High priority condit
Low priority conditi
Messages
Nouns
Objects
Printer menu
Room descriptions
Save adventure
T-Load adventure
Verbs
X-Erase adventure data
ENTER-enter adventure
```

Select one of the above please...■

This is the main menu for GAC. The program is easy to use and comes with very readable documentation — a boon for novice adventure programmers.

is the ability to Merge pictures, so that in theory you can build up a number of different scenes from a range of pre-defined shapes or objects.

The graphics utility is fun to play with, and as you can see from the picture on the left it can be used to produce some

very attractive looking displays indeed. However, what really sets GAC apart from the rest is the way it allows you to define the bare bones of your adventure — the commands and actions that go to build up the story.

Writing an adventure basic-

ally involves setting up three tables. A vocabulary table, which includes all those words that you want the program to understand; a message table, which specifies what strings are to be printed to the screen; and an action table, which includes the various routines for up-

dating variables, selecting messages, and so on.

Linking these three tables together is the parser, a sub-program that accepts inputs from the player and encodes them in such a way as to allow the program to select an appropriate action from the action table and kick the whole shebang into activity. Generally, an adventure stands or falls by its plot and its parser, and providing you can supply the plot, GAC can give you one hell of a parser.

## Parts of speech

Not only will GAC accept the verbs and nouns, but it will also allow you to set up a special "adverb" table. In fact, the table isn't strictly speaking for adverbs alone, but can also be used for prepositions like "in" or "on".

This means that GAC will allow you to cater for inputs like

Put the can on the table and even allow you to follow that with something like

"Open it" since the program allows the use of "it" to refer to a previously mentioned noun.

Sorting out inputs is obviously not a problem with GAC. However, the program also scores well on the amount of space left for the actions and room-descriptions that will be

## HOW IT WORKS . . .

Here's a quick glimpse at how GAC works. Suppose you wanted to test to see whether a player had typed "Look" and if so print a description of the current location. This would need to be entered as:

```
IF (VERB 7) LOOK WAIT END
```

This example is typical of a GAC construction, in that it consists of an If statement, which checks a condition and then performs some actions. Special words are used for conditions and actions — Verb n, for example, tests to see if a specific verb has been entered.

In the above example, verb 7 would have previously been defined as Look, and perhaps also Redescribe, or even Search — you can assign a number of synonyms to each verb number, thereby saving yourself the trouble of checking for different entries that mean the same thing.

Look and Wait in the above example are special GAC action commands, the first describes the

room and the second awaits a new description. Complex conditions can be built up using different condition key-words, such as Noun n, Carr n is object n being carried At n which returns true if At a specific location.

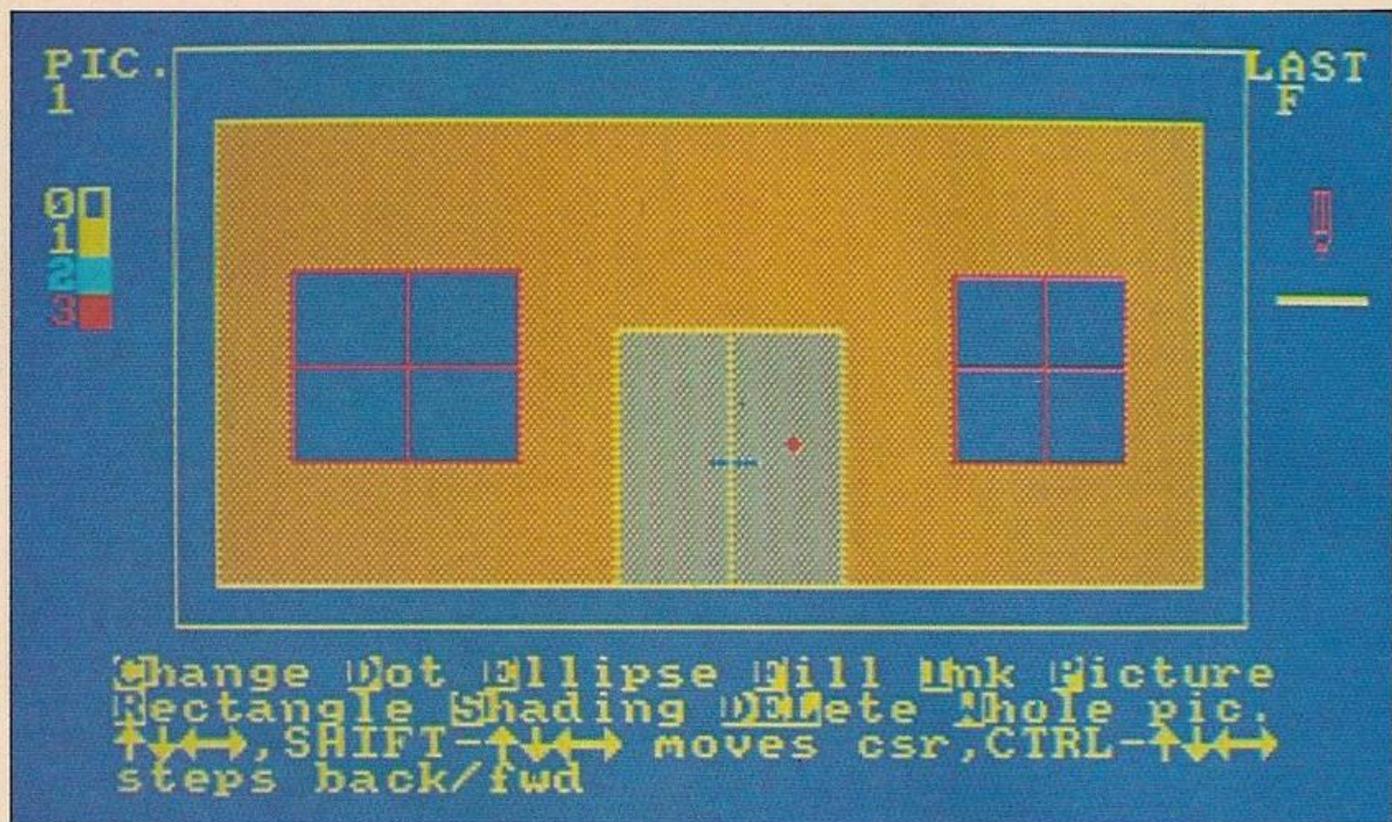
Similarly, complex actions can be performed by linking together action key-words such as Look and Wait above, or Goto n — move to location n — Find n — locate object n and go to it — and OBJ — describe object n.

There are approximately 38 different conditional structures and slightly more action key-words in GAC. However, many of these allow you to manipulate counters and flags, the purposes of which are defined by the user, so there is considerable flexibility here.

Furthermore, the key-word system makes GAC very easy to use, even if you're not very familiar with programming techniques. This is quite an advantage over the Quill which, although flexible in use, requires considerable study of the rather complex manual to get the most out of it.

(continued on next page)

# The Generation Game



(continued from previous page)

called up by the player. First, you can have up to 238 messages together with 250 objects to collect. The number of messages is perhaps the only side of GAC that could have been expanded.

Although you can have "up to 2,000" locations, memory obviously imposes limitations and I for one would rather have seen, say, a 255 limit to locations but a more generous message allowance. That said, however, you can cheat here by defining messages as locations in their own right, but it would have been nice to see a bit more

provision for text messages.

I've mentioned memory limitations, but really this is one area where GAC leaves all the other adventure generator programs standing. The program compresses all your text and can achieve compression rates approaching 45 per cent. This is really quite remarkable for a compact program such as this one and makes an enormous difference to the games programmer.

One of the big bugbears of the Quill was the Ram squeeze that ensued when you tried to go over about 80 locations,

unless the descriptions were kept very short. GAC on the Amstrad, however, gives you 25K of free space, and allowing for compression that amounts to about 50K of text space.

If you don't believe me, just meditate on this a while — Incentive has just finished converting Mountains of Ket from the Spectrum to the Amstrad. They obviously have confidence in their product, since they used GAC to make the conversion and — wait for it — the 38K-plus Spectrum program came out at just over 15K under the GAC system, a

compression rate of over 50 per cent.

So, if you've been lying awake at nights wondering whether to tackle machine code so that you can etch your fantasies onto silicon, forget it. Nearly all the successful adventure houses used adventure generator programs, and now there's one just round the corner for your machine that could set your imagination free!

Global's adventures — Magician's Ball, The Beer Hunter and Old Scores — have received considerable acclaim, so if an established software house like them uses GAC, you can be pretty sure it's good enough for you.

## QUILL PLUS ILLUSTRATOR

The Quill plus Illustrator is difficult to compare directly with GAC. For a start, it's already available on most machines — the Beeb version is available very soon now — and secondly, Gilsoft has a policy of constantly updating its products, so Quill today isn't necessarily Quill tomorrow.

For example, Tim Gilbert has a text-compression program in the offing that will be compatible with existing Quills and should go a long way towards solving the age-old problem of Quiller's cRAMP! There's even a "super Quill" in the pipeline, but don't expect that to arrive on

your doorstep for some time.

However, the Quill, despite its revisions and improvements, still suffers from its origins back in the days when text-input meant verb-noun and nowt else. It's true that you can still manage to do remarkable things with the Quill's parser if you persevere, but perseverance is the name of the game and the program demands a lot of work if you're going to create a game that will compete — in terms of complex input — with something written on GAC.

The best thing about the Quill, however, is undoubtedly the Illustrator. This program has a number of very powerful features, the most significant of which is

the ability to create individual picture elements and then merge them together using different scales.

That means that a pre-defined tree could be looming large in the foreground in one picture, but shrinking away into the distance in another. This "scaled merge" facility is very powerful, not least in saving you memory as well as development time.

Once GAC appears on other machines, it's going to give the Quill a run for its money. Of that, there's no doubt. GAC is easier to use, combines text and graphics in one package, and is far cheaper and — most important of all — gives you more space.

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\* Note due to memory limitations ACE on the C16 and VIC20 (+8K Ram) do not have any ground objects.

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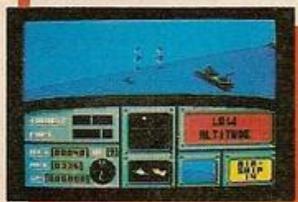
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Screen shots are for CBM 64 version. Other versions may vary.

# Tapeworm

## Listing 2.

```

10 PAPER 0: INK 7: BORDER 0: C
LEAR 29938
20 PRINT AT 7.5;" TAPEWORM IS
LOADING ";AT 10.9;"PLEASE WAIT"
30 FOR F=1 TO 5: BEEP .1,F
35 NEXT F
40 INK 0: LOAD ""CODE
50 POKE 23675,168
60 POKE 23676,233
70 RANDOMIZE USR 6E4: STOP
80
100 SAVE "TAPEWORM" LINE 10
110 SAVE "TAPEWORM CODE" CODE 5
9670,3200
120 VERIFY "": VERIFY ""CODE
130 STOP
    
```

## Listing 1.

```

10 DEF FN h(h$)=16
*FN i(h$(1))+FN i(h$(2)): DEF FN
i(i$)=CODE i$-48-39*(i$>"9")
15 CLEAR 59000
20 LET x=59670: PRINT "poking
data, please wait"
30 FOR a=1000 TO 1630 STEP 10:
PRINT "line ":a: READ a$.t: IF
LEN a$>10 THEN PRINT " lengt
h error": STOP
40 FOR b=0 TO 49
50 LET z=FN h(a$): LET t=t-z:
LET a$=a$(3 TO ): POKE x,z: LET
x=x+1: NEXT b
60 IF t THEN PRINT " checksum
error": STOP
70 PRINT " OK": NEXT a: PRINT
"finished, no errors"
996 STOP
1000 DATA "05a205a605aa0aac05a20
aac00001986198606861986198c068a1
98a06861986078432860000aa005920
a9205a005a405a0".3731
1010 DATA "059c0aa005920a9205a00
5a405a0059c0aa60aa405aa0aa605920
a92000005aa05aa05aa05aa60aa40aa00
a9c0a9c149c0000".3858
1020 DATA "0c880c960c880c960c960
69a069e06a00c960c960ca00c960c960
c9006920690068c06880c8c0c8c00000
00000000e314199".3417
1030 DATA "9941310e7e8181995a422
4181824425a9981817e708c829999828
c703c24e78181e7243c183c7effdb993
c7e24997e3cfff3c".5482
1040 DATA "3c0b24997e18c31824c30
30408387c7c7c38071961f2f66f0f060
00081c3ff7e3c0040e2e7e7e747221c0
0010363910b669e".4716
1050 DATA "080e0e1e6385081000804
2c488d1667810707679c0b0080400014
223118b661e080e6e9e030d10200080c
0c689d066791070".3984
1060 DATA "7078c6a1100800030f1f3
E3f7f7f00ffffffffff00c0f0f8f
cfcfefe0c32f23e0132a8f43216f421a
4582289f43e0232".6673
1070 DATA "a7f4c3eef4cd17eff3cdd
    
```

**T**apeworm is a game for the 48K Spectrum, featuring colour and lots of sound. You are a hungry snake on the search for food, but only the red fruit is edible — the green mushrooms are poisonous!

Furthermore you also have to avoid bumping into the wall or into the dreadful spider that roams around the screen. Once your worm gets moving you can't stop it. The more you eat, the more difficult the game becomes, because your length increases.

When you're down to the last five pieces of fruit you'll see a door open at the top of the screen. Once you've chomped through the first screen you can move on to the second where there is even more to eat but also even more to avoid bumping into. The game can be con-

trolled through the keyboard or with a Kempston joystick. There are three keys which perform a special function during the game:

- Caps shift — pauses the game
- Symbol shift — turns the background noise on/off
- Space — aborts the game.

Entering the game is not very difficult, but it's a lot of work and one single error could crash the computer. First, you have to enter listing 1. This is the machine code in hex data statements. Although every line is checksummed for security a checksum is not fool-proof so type with care.

When you have entered the whole listing you can run it. If you haven't made any errors, the program will just stop. Otherwise it will indicate at which line the error occurred so

```

0ee3e01c0db1ec3a9df43c329df4e6032
01ccdbbea3e7fdbf1fd2b2eb3efedbf
e1fd451ec79a7ca".8174
1080 DATA "b2ebfe0128d1cdd4f0300
5cd46ed18edcd10eb18caed4b7df4c5c
d7eeec66eeec1c5fe0420033a81f4328
1f4cd3feeed437d".7554
1090 DATA "f4cd13ed3a81f4ed4b7df
4114700cdf3efc11106003e04cdf3ef1
145003e202a82f44e2346cdf3efcd33e
e0e023a88f4a7c0".6334
1100 DATA "cdf1ec0e02c93aa7f45f3
e7fdbfee60232a7f4200bbb28083aa8f
4ee0132a8f43aa8f4a7caa9eb2aa0f42
b22a0f47cb53aa2".6962
1110 DATA "f4200c3ce60332a2f4219
00122a0f4a7282dfe01283bfe0228302
aa3f47d84cda2eb30057ced4467856f2
2a3f47d2f0707e6".5597
1120 DATA "03f6085f16002601c0b50
3f3c93aa3f4c61932a3f46f18e33aa3f
43d3d18f32aa5f47d846fcd2eb30047
ced44676f22a5f4".6166
1130 DATA "18c7fe0fd8fe03fc9217
8052b7cb520fbc9cd41ec361821f5f30
10108114f013e1ecd4df03e02c0b1ecf
bc8d8edc9219ef3".6435
1140 DATA "11b9f3010600edb021c4f
3060836202310fb21ccf3010108114f0
13e1ecd4df03e03c0db1ecfbc21eaf3010
90b1144013e0bcd".4769
1150 DATA "4df0fdbc30de21c4f3011
40b111f013e08cd4df0gd9aefdc01a
efdc0b16e28fa3a085cfd0dc8fe2038e
cfe8030e821c5f3".6612
1160 DATA "11c4f3010700edb01218c
9219ef311b9f30e061abec0231310f9c
9cd67ec3efdbfelf130f9afdbfe2fe61
f28f8cd67ecc921".6622
1170 DATA "0003110a00c5c2b503c1f
3c93a18f4a7280083ef7dbfe2fe607c05
e2356237ba7c8e5d5cd282d3e332d282
def0536f1cd282d".5757
1180 DATA "3e80cd282def03383e02c
d282def0538cdf803f3e118c32116e93
d28bdf57e2323a720faf118f3c5cdaaf
0c1ed4386f4fe14".6512
1190 DATA "3874fe173070e1c121dce
ce5c5c3dcaead4b86f43a81f411c700c
df3ef3e04c0db1ec0e01c9010f003e141
    
```

```

14000cdf3ef0110".6398
1200 DATA "003e15114000cdf3ef011
1003e16114000cdf3efc978a728aa3df
e163026793dfe1e3020cdaaf0feffc8f
e063816cd16eecd".5720
1210 DATA "c5ed2a82f42b2b2282f43
a88f43d3288f4c9e1c11804ed4b7df4c
de4edc0db2ed3a84f4010000a7c8cd75e
dcd96d3e010667".7016
1220 DATA "2119f4772310fc3e03328
1f4cd8ded010200c9dd218ff4dd36000
0dde5cd29f1dde1dd360001dd360100c
92100002b7cb520".5464
1230 DATA "fbc92a82f4117df4e5a7e
d52e1d04e234623e51145002c0df3e
fe118e73a84f43d3284f4c61b4f06001
e083e20c3f3ef06".6242
1240 DATA "0521a2f37e34fe3920053
6302b10f50107001108003e06219ef3c
d4df0c93e145f1600f5c53a81f43ce60
33281f485110800".4659
1250 DATA "edf3efd12110272b7cb52
0fbcd1deec1f1c60afe0a30d7110000c
d1deec9111fe0cd1deec93e00ee10d3f
e430520fd1d4f7a".6483
1260 DATA "bb7938f13e00d3fec9211
bf41119f4016400ed0b0c9fe0020010df
e01200104fe02200105fe0320010cfe0
4d83e00c90e00db".4796
1270 DATA "1fcb4fc00ccb57c00ccb5
fc00ccb47c00cc9fe04c83e0391473a8
1f4b879c03e04c93a16f4fe02280cc09
6ee79fe04c00db9".6312
1280 DATA "ee79c9cd59ee79c90e003
edf3efcb4fe80c3efdbfecb4fc80c3
efbdbfecb47c80c3edf3efdbfecb47c80cc
93ef70e00dbfec".6579
1290 DATA "47c80ccb57e80ccb5fc80
ccb4fc80cc93a17f4fe1e30013c3217f
4d6053288f43e0106672119f4772310f
c2173f42282f4cd".5575
1300 DATA "2cef3e033281f4cd16f1d
d218ff4dd360001dd360100dd360264d
d360364210101229bf4c93e093217f40
606219ef3363023".4827
1310 DATA "10fb3e043284f4c9eda9e
fcdcdfe0f7ef3a17f4473e05112400c
j53ef3a17f4473e06cd78f0c60611020
0cd53efc9e5f5d5".6438
1320 DATA "cd66efd1f1f5d5cdf3efd
    
```



# Quickdraw

**Geoff Hatto has come up with some further improvements to graphics on the CBM-64.**

Commodore Basic is notorious for its shortcomings. Perhaps the most grievous of them is the lack of any graphics commands. In the April issue of last year Geoff Hatto remedied this with a Quickplot routine which supplied an easy-to-use plotting command for the CBM-64's high-resolution screen.

Now he has followed it up with a Quickdraw program. For those who missed Quickplot the first time round, we have reprinted the listings and instructions.

To operate Quickdraw you must first load and initialise Quickplot. If you are starting from scratch, type in and save listings 1, 2 and 3. If you already have Quickplot on tape, just type in listing 3.

When you run listing 1, it loads in the main Quickplot program, listing 2. To initialise the high-res screen enter:

```
SYS 4096,ink,paper,gclear
```

where ink and paper are the colour values 0 to 15; a non-zero value for gclear clears the

screen, zero leaves it intact. Typing

```
SYS 4096
```

without any following parameters, takes the current screen colours and the value of 1 for gclear — as default.

Once Quickplot has been enabled, pressing F7 switches in out of the high-res screen — even if a Basic program is running. The Plot command takes the syntax

```
SYS 4318,x,y,p
```

where x and y are the pixel coordinates — 0 to 319 and 0 to 199 — and p is either zero, for unplot, or non-zero for plot.

When you have loaded and run listing 3, call the Draw routine with the command

```
SYS 4474,x1,y1,x2,y2,p
```

where x1,y1 and x2,y2 are the start and end points of the line, and p is either zero or non-zero, for plot or unplot.

Quickdraw uses a highly efficient line-drawing algorithm which cuts the "jaggies" down to a minimum. It also lives up to its name by being extremely fast — faster, in fact, than the Spectrum's built-in Draw routine. Try listing 4 for a demonstration of its speed.

The only restriction to the routine is that you cannot have more than two colours on the high-res screen. But as lines 150 to 200 in Listing 4 demonstrate you can change the colours instantly.

## Listing 1.

```
10 REM *****
20 REM ** C64 QUICKPLOT **
30 REM ** G.HATTO **
40 REM *****
50 :
60 :
70 POKE631,131:POKE198,1
80 POKE64*256,0:POKE44,64:NEW
```

READY.

## Listing 2.

```
10 REM *****
20 REM ** QUICKPLOT LOADER **
30 REM ** G.HATTO **
40 REM *****
50 :
60 :
70 MAXNUMBER = 48
80 DEF FN LINENUMBER(A) = PEEK(63)+PEEK(64)*256
90 :
100 READ ADDRESS
110 FOR COUNT=1 TO MAXNUMBER:GOSUB 230:READ CHECKSUM
120 IF SUM <> CHECKSUM THEN PRINT"CHECKSUM ERROR IN ":
FN LINENUMBER(0):END
130 L = FN LINENUMBER(0):PRINT L
140 IF ADDRESS <> L+8 THEN PRINT"LINE NUMBER":L;" NOT
IN ORDER":END
150 NEXT COUNT
160 :
170 PRINT:PRINT" HIRES ="
180 PRINT" SYS4096,[INK],[PAPER],[BCLEAR]"
190 PRINT:PRINT" PLOT ="
200 PRINT" SYS4318,[X],[Y],[PLOT/UNPLOT]"
210 END
220 :
230 SUM = 0
240 FOR I=1 TO 8:READ ENTRY$
250 GOSUB 310
260 POKE ADDRESS,ENTRY
270 ADDRESS = ADDRESS+1:SUM = SUM+ENRTY
280 NEXT I
290 RETURN
300 :
310 IF LEN(ENTRY$) <> 2 THEN 400
320 A$ = RIGHT$(ENTRY$,1):GOSUB 360:ENTRY = V
330 A$ = LEFT$(ENTRY$,1):GOSUB 360:ENTRY = ENTRY+V*16
340 RETURN
350 :
360 IF A$<"0" OR A$>"F" OR (A$>"9" AND A$<"A") THEN 400
```

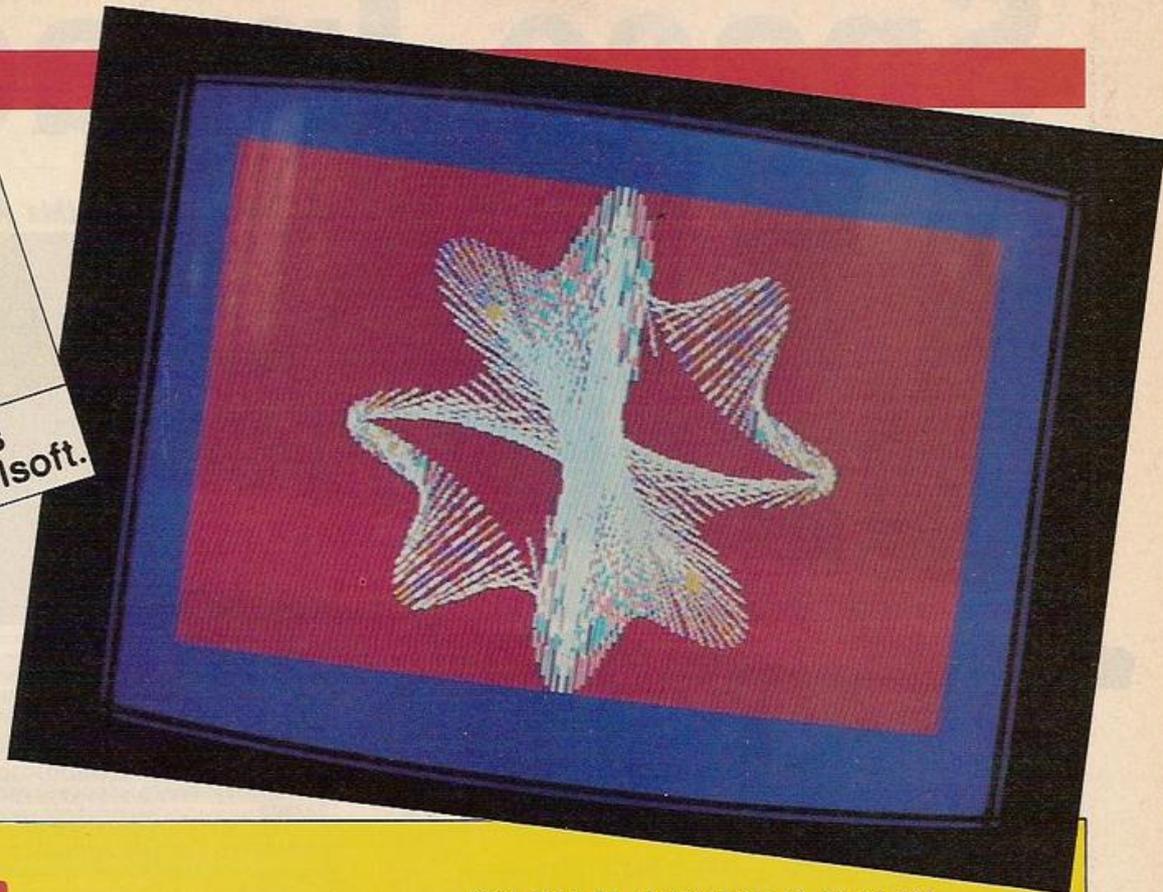
```
370 V = ASC(A$)-48+7*(A$>"9")
380 RETURN
390 :
400 PRINT"DATA ERROR IN ":FN LINENUMBER(0):END
410 :
420 DATA 4096
4096 DATA AD,86,02,85,9B,AD,21,D0,1011
4104 DATA 29,0F,85,9C,20,19,10,20,450
4112 DATA 62,10,20,9D,10,20,8A,10,505
4120 DATA 60,A0,00,A9,2C,D1,7A,D0,1008
4128 DATA 24,20,9B,B7,86,9B,A0,00,855
4136 DATA A9,2C,D1,7A,D0,17,20,9B,962
4144 DATA B7,8A,29,0F,85,9C,A0,00,826
4152 DATA A9,2C,D1,7A,D0,07,20,9B,946
4160 DATA B7,E0,00,F0,03,20,49,10,771
4168 DATA 60,A9,00,A0,20,85,4E,84,800
4176 DATA 4F,A9,00,AA,AB,91,4E,C8,1009
4184 DATA D0,FB,E6,4F,E8,E0,20,D0,1464
4192 DATA F4,60,A5,9B,0A,0A,0A,0A,700
4200 DATA 05,9C,A0,00,99,00,00,99,635
4208 DATA 00,09,99,00,0A,99,00,0B,336
4216 DATA CB,D0,F1,60,A9,14,8D,18,1099
4224 DATA D0,AD,11,D0,29,DF,8D,11,1028
4232 DATA D0,60,AD,18,D0,29,08,09,767
4240 DATA 28,8D,18,D0,AD,11,D0,09,820
4248 DATA 20,8D,11,D0,60,78,A9,D5,996
4256 DATA A0,10,8D,00,03,8C,01,03,464
4264 DATA A9,B4,A0,10,8D,14,03,8C,829
4272 DATA 15,03,58,60,20,BA,10,4C,518
4280 DATA 31,EA,A5,C5,C5,FE,85,FE,1483
4288 DATA F0,0E,C9,03,D0,0A,AD,11,866
4296 DATA D0,29,20,F0,04,20,7C,10,697
4304 DATA 60,20,8A,10,60,8A,30,03,567
4312 DATA 20,7C,10,4C,8B,E3,20,FD,899
4320 DATA AE,20,EB,B7,86,9B,20,F1,1186
4328 DATA B7,86,02,38,A9,C7,E5,9B,1127
4336 DATA B0,05,A2,0E,4C,D5,10,85,795
4344 DATA 9C,4A,4A,4A,AB,AS,15,4A,806
4352 DATA D0,F0,A5,14,90,06,2C,C2,1021
4360 DATA E1,D0,E7,18,29,FB,79,30,1154
4368 DATA 11,85,4E,AS,15,79,51,11,633
4376 DATA 85,4F,AS,9C,29,07,AB,AS,914
4384 DATA 14,29,07,AA,AS,02,F0,08,653
4392 DATA BD,6A,11,11,4E,91,4E,60,726
4400 DATA BD,72,11,31,4E,91,4E,60,766
4408 DATA 00,40,80,C0,00,40,80,C0,768
4416 DATA 00,40,80,C0,00,40,80,C0,768
4424 DATA 00,40,80,C0,00,40,80,C0,768
4432 DATA 00,20,21,22,23,25,26,27,248
4440 DATA 28,2A,2B,2C,2D,2F,30,31,358
4448 DATA 32,34,35,36,37,39,3A,3B,438
4456 DATA 3C,3E,80,40,20,10,08,04,374
4464 DATA 02,01,7F,BF,DF,EF,F7,FB,1281
4472 DATA FD,FE,00,00,00,00,00,00,507
```

READY.

READY.



This program is available on Telsoft.



Listing 3.

```

10 REM *****
20 REM ** QUICKDRAW LOADER **
30 REM ** G.HATTO **
40 REM *****
50 :
60 :
70 MAXNUMBER = 34
80 DEF FN LINENUMBER(A) = PEEK(63)+PEEK(64)*256
90 :
100 READ ADDRESS
110 FOR COUNT=1 TO MAXNUMBER:GOSUB 210:READ CHECKSUM
120 IF SUM <> CHECKSUM THEN PRINT"CHECKSUM ERROR IN ";
FN LINENUMBER(0):END
130 L = FN LINENUMBER(0):PRINT L
140 IF ADDRESS <> L+B THEN PRINT"LINE NUMBER";L;" NOT
IN ORDER":END
150 NEXT COUNT
160 :
170 PRINT:PRINT" DRAW ="
180 PRINT" SYS4474,X1,Y1,X2,Y2,PLOT/UNPLOT"
190 END
200 :
210 SUM = 0
220 FOR I=1 TO 8:READ ENTRY$
230 GOSUB 290
240 POKE ADDRESS,ENTRY
250 ADDRESS = ADDRESS+1:SUM = SUM+ENRTY
260 NEXT I
270 RETURN
280 :
290 IF LEN(ENTRY$) <> 2 THEN 300
300 A$ = RIGHT$(ENTRY$,1):GOSUB 340:ENTRY = V
310 A$ = LEFT$( ENTRY$,1):GOSUB 340:ENTRY = ENTRY+V*16
320 RETURN
330 :
340 IF A$<"0" OR A$>"F" OR (A$>"9" AND A$<"A") THEN 38
0
350 V = ASC(A$)-48+7*(A$>"9")
360 RETURN
370 :
380 PRINT"DATA ERROR IN ";FN LINENUMBER(0):END
390 :
400 DATA 4472
410 :
4472 DATA FD,FE,20,FD,AE,20,EB,B7,1416
4480 DATA 86,C3,A5,14,A6,15,85,C1,1027
4488 DATA 86,C2,20,FD,AE,20,EB,B7,1237
4496 DATA 86,9B,20,F1,B7,86,02,A9,1050
4504 DATA 00,85,B0,85,B1,85,62,85,983
4512 DATA 64,A9,80,85,61,85,63,38,915
4520 DATA A5,14,E5,C1,AA,A5,15,E5,1192
4528 DATA C2,A8,B0,0E,E6,B0,8A,49,1169
4536 DATA FF,69,01,AA,98,49,FF,69,1116

```

```

4544 DATA 00,A8,86,65,84,66,38,A5,858
4552 DATA 9B,E5,C3,B0,06,E6,B1,49,1241
4560 DATA FF,69,01,85,67,A2,FF,EB,1246
4568 DATA 46,66,66,65,66,69,66,6A,790
4576 DATA 46,67,66,6B,66,6C,A5,65,858
4584 DATA 05,67,D0,EB,BD,76,12,85,1009
4592 DATA 6D,BD,7F,12,85,6E,A5,C1,1044
4600 DATA A6,C2,A4,C3,85,14,86,15,1027
4608 DATA 84,9B,20,EB,10,20,1A,12,646
4616 DATA 20,4E,12,A6,6D,D0,02,C6,811
4624 DATA 6E,CA,86,6D,8A,05,6E,D0,1016
4632 DATA E9,60,A5,B0,D0,18,18,A5,1091
4640 DATA 62,65,6A,85,62,A5,61,65,899
4648 DATA 69,85,61,A5,14,69,00,85,758
4656 DATA 14,90,1A,E6,15,60,38,A5,758
4664 DATA 62,E5,6A,85,62,A5,61,E5,1155
4672 DATA 69,85,61,A5,14,E9,00,85,886
4680 DATA 14,B0,02,C6,15,60,A5,B1,855
4688 DATA D0,12,18,A5,64,65,6C,85,857
4696 DATA 64,A5,63,65,6B,85,63,90,948
4704 DATA 14,E6,9B,60,38,A5,64,E5,1051
4712 DATA 6C,85,64,A5,63,E5,6B,85,1074
4720 DATA 63,B0,02,C6,9B,60,03,05,734
4728 DATA 09,11,21,41,81,01,01,00,255
4736 DATA 00,00,00,00,00,00,01,02,3

```

READY.

Listing 4.

```

5 REM ** QUICKDRAW DEMO **
10 SYS 4096,1,2,1
20 PI=3.1412
30 XD=160:YD=100
40 GOSUB 100
50 END
100 FOR N=0 TO 2*PI STEP PI/100
120 S=SIN(N):C=COS(N)
122 S2=SIN(2*N):C2=COS(2*N)
124 X1=XD+C^3*100:Y1=YD+S^3*100
126 R=(C2^3+S2^3)*100
128 X2=XD+R*C:Y2=YD+R*S
130 SYS 4474,X1,Y1,X2,Y2,1
140 NEXT
150 FOR N=1 TO 50
160 C1=INT(RND(0)*15)+1
170 C2=INT(RND(0)*15)+1
175 IF C1=C2 THEN 150
180 SYS 4096,C1,C2,0
190 FOR T=1 TO 2000:NEXT
200 NEXT
210 RETURN

```

READY.





# Beyond

**John Dawson offers an introduction to the more practical applications of micros for when the novelty of game-playing wears off.**

You bought a computer just before Christmas. Perhaps it had some programs included in the price and you loaded those successfully and played some good games. About now, you might well be asking whether your machine can do anything else. Not because the games are boring, just that you've heard about computers running the air defences of North America, handling the banking transactions of Europe and controlling industrial robots that are building the wealth of Japan.

Your computer can do lots of things and this article looks at some of the ideas and applications, equipment and programs that you can get involved in, add on or build to extend your fun and enjoyment.

First of all, the very complicated integrated circuits in your computer add up to a machine that is good at doing simple repetitive tasks. Look at this tiny Basic program:

```
10 REMark — a very helpful program
```

```
20 VDU 2: REMark — this turns on a printer in BBC BASIC
30 FOR line = 0 TO 12
40 FOR column = 0 TO 12
50 PRINT " ";
60 NEXT column
70 PRINT: PRINT
80 NEXT line
90 END
```

It does something that I find useful because the job is tedious if I have to have to go on doing it for myself. More than that, the machine does it better than I can and it does it over and over again without complaint. The program prints 12 lines of dots, 12 dots wide in the right format for my children to play Boxes.

### Bad judgement

On the other hand the computer is very bad at tasks that require free-ranging thought, the initiation of new ideas, balancing emotions and rational thought to make judgements, appreciation of something that is "artistic" and all the other things that characterise us as humans.

In other words, a computer is good at the administration of an established process and bad at deciding how a process can be set up to fulfil a particular need.

Most people don't actually need a computer. On the other hand many people have found jobs that they want to do for which a computer is a valuable

tool. If you really want to use the computer to help you with some part of your life, you can do this successfully only if the machine fits in to your way of doing things and not if you are the component of the system that has to be changed.

You must identify the things that you want to do anyway that the machine can do more easily, more accurately, more profitably, with less tedium, and so on. The point of using the machine is to make life better and more enjoyable for you, not the other way round.

For example, you may find that there is real value in a program that will help to keep track of your stamp collection by preparing an indexed list of the various stamps, the date you bought them, the price you paid, the current price and other data relating to what may be either a hobby or a business.

If you are a photographer and you are making up a number of batches of chemicals for processing films or prints, it may be helpful for you to use a program that will remind you of the name and order in which chemicals have to be added to each solution and the weight of each of the components to be added.

You might also add a special input device that will measure automatically the weight of each substance and then print a label

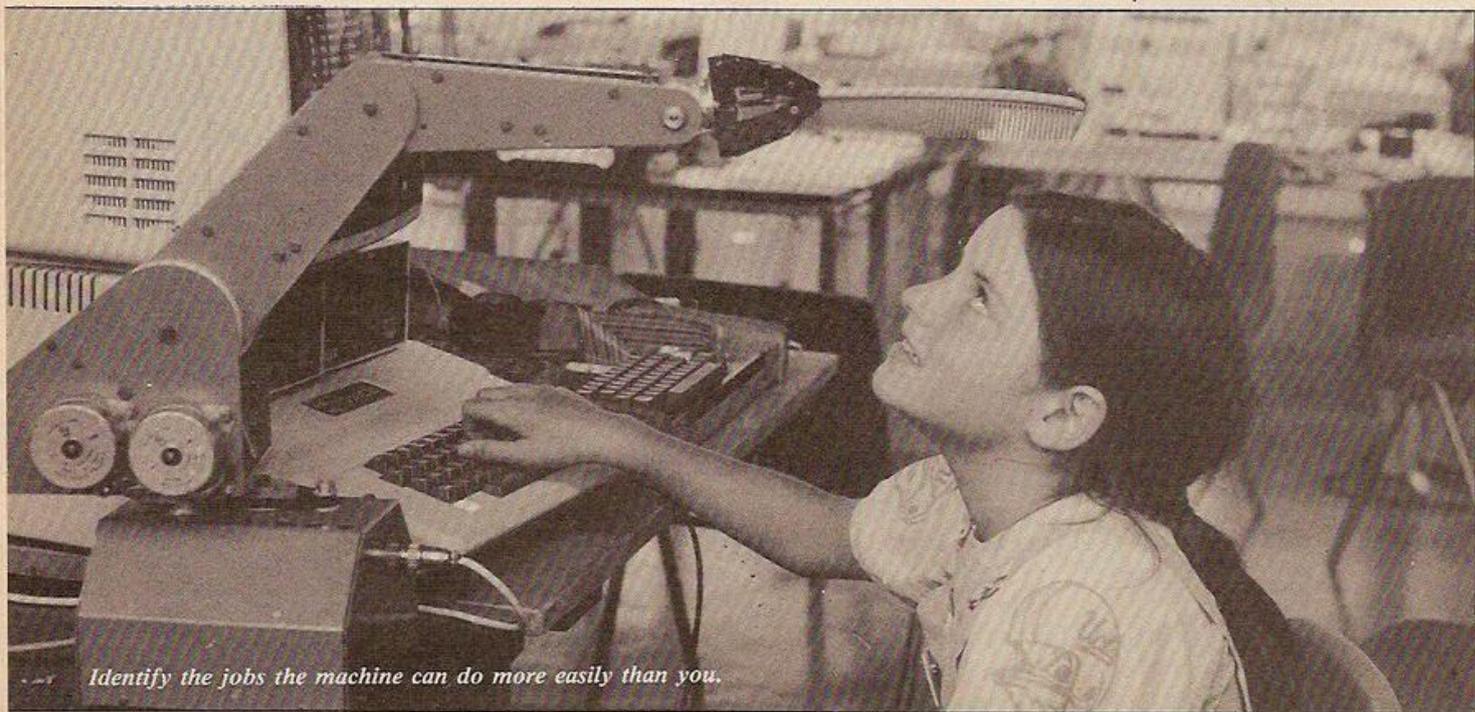
for the container at the end of the process. Using the built-in clock in many microcomputers, you could use almost the same program for beer or wine making, employing the machine to time the various stages as you go along.

### Practical value

The only consideration that will determine whether or not your application is successful is the practical value you get out of it. Far too many commercial programs expect people to fit into a straitjacket in order to comply with the program's requirements. Silly things like insisting that you fill in the number of copies you need when a document is printed when we know that on the vast majority of occasions the answer will be "one". Little irritations like this simply reduce the usefulness of a program.

Big design faults like collecting information that you will never use, or changing your routines by forcing you to get up 20 minutes early in the morning to record the temperature in the central heating system will lead to the machine being used as an expensive door stop.

If you buy a program to add up the amounts on your cheque book stubs you will soon run out of enthusiasm because the bank will generally do the job



Identify the jobs the machine can do more easily than you.

# Games

much better on your statement sheets. A pencil, paper and a pocket calculator are better tools in any case if you decide you must check some simple figures for yourself.

A home budget program can make a real contribution by allowing you to assign items from a bank statement or your cheque book into categories of expenditure. You can then analyse the change in each category from the last time you ran the program and plan how best to manage your money for the next accounting period. In other words, the machine is helping you to do a job which would otherwise be so tedious that you might not do it at all, and it is helping you to do it more accurately.

Microcomputers are being used for the control of many small pieces of machinery. Amateur astronomers have used a BBC computer to control the elevation and rotation of telescopes, many laboratories have used the BBC and other computers such as the Sinclair Spectrum to run experiments and control plotters, spectroscopes and other equipment. You can run the automatic watering system in a greenhouse with very little difficulty. Robot arms are another popular area for microcomputer control.

## Into the loop

In all of these applications the most important concept is the closed loop. Probably the simplest closed loop is an ordinary electric heater plugged into a thermostat. You set the temperature you want the system to achieve by turning the knob on the thermostat. This is the equivalent of programming a control process on a computer.

For example, you might instruct the computer to rotate a telescope at a rate that is just sufficient to compensate for the Earth's rotation while a long photographic exposure is made of a particular star cluster.

If the temperature in the room is too low, the switch in the thermostat closes and the heater is switched on which increases the temperature of the air in the room. When the temperature rises above the "programmed" temperature the

switch opens and the heater is switched off.

Provided that the temperature outside the room is lower than it is inside, heat will be lost to the surrounding environment, and when the temperature inside the room drops below the programmed setting, the heater will be switched on again.

The thermostat, the heater, the air inside the room, and the surrounding air combine to make a "closed loop" system. The purpose of the closed loop is to maintain the temperature inside the room but this can go wrong if one part of the system is faulty. Suppose that the out-

side temperature is higher than the interior temperature. The system has no way of cooling the air inside and the system may fail. If the heater is not powerful enough to replace the heat lost to the environment, the temperature inside may never reach the point at which the thermostat will switch off.

## Gaining experience

However, in terms of using your computer, it's possible to have a vast amount of fun and to get a lot of experience without having to worry too much about the error/fool-proofing that's necessary for a commercial process. One thing you will

discover quite early on when you start to write programs is that the core of the program, the part that actually carries out the process, often forms only a small part of the total set of instructions. The rest of the program is concerned with:

- 1 Presenting information on the screen in ways that are intelligible to the user.
  - 2 Taking information into the program while checking to ensure that false, and possibly dangerous, values are eliminated.
  - 3 Handling errors that may occur in the processing — division by zero is a classic problem — or in the program itself.
- The program below is

(continued on next page)

FIGURE 1

Number guessing game for the BBC and other microcomputers

```
10 REMARK - a very simple game
20
30 REPEAT
40   CLS
50   PRINT: PRINT: PRINT
60   PRINT "Try to beat the computer"
70   PRINT
80   PRINT "I know a number between 1 and 100"
90   PRINT
100  PRINT "Can you guess it? PRESS Y or N  ";
110  A$ = GET$
120  IF A$ = "Y" THEN GOSUB 170
130  IF A$ = "N" THEN CLS: PRINT "Bye, bye ": END
140  UNTIL A$ = "Q"
150 END
160
170 REMARK - number guessing subroutine
180 CLS
190 C=0: N=-999
200 R=RND(100)
210 REPEAT
220   PRINT: PRINT: PRINT
230   IF N=-999 THEN GOTO 300
240   PRINT "Your last try was "; N
250   PRINT
260   IF N <> INT(N) THEN PRINT "Whole numbers only
please ": GOTO 300
270   IF N < 1 OR N > 100 THEN PRINT "Enter a number
between 1 and 100": GOTO 300
280   IF N < R THEN PRINT "Too SMALL"
290   IF N > R THEN PRINT "Too LARGE"
300   C=C + 1
310   PRINT
320   PRINT "Guess number "; C; " ... ";
330   INPUT "" N
340   CLS
350   UNTIL N = R
360 PRINT "WELL DONE You took "; C; " attempts "
370 FOR DELAY = 0 TO 3000: NEXT DELAY
380 RETURN
```

# Beyond Games

(continued from previous page)

another very simple game. The BBC computer selects a number between 1 and 100. The number is a random number and the object of the game is to guess the number with the least tries. When the player enters a guess the program prints out a message saying "too high", "too low", or "well done, you took X attempts". This game is good fun for a short time but requires far more in the way of graphics and sound effects to exploit the idea fully.

Never be ashamed of writing a program in Basic. As you continue to read computer magazines, if you haven't heard already, you'll see criticism of Basic as being an inadequate language, slow, poorly structured and designed only for teaching people how to program. Pascal, Comal, Micro-Cobol, these are languages for real men, they say. Well, actually that's rubbish.

Computer languages are designed to do certain jobs better than others and there is no supreme general-purpose language. Basic comes closer to this definition than most others.

Forth, for example, is very good for controlling machinery, Fortran has many excellent scientific and statistical sub-routines written to make certain

tasks much easier, historical influences have made Cobol the standard commercial programming language, Pascal is well structured and widely taught in universities, BCPL and C are widely used for writing utility programs such as word processors and other languages — the BBC Basic interpreter was written in C.

An enormous number of commercially successful, sophisticated programs have been written in Basic and provided that you try to apply good programming habits there is no reason why you cannot use the Basic interpreter supplied with your machine to make it run many of the applications you may wish to develop.

What is important is knowing what a language will do and what areas are best avoided.

## In control

Many programs are written to control one or other of the range of peripheral equipment that is available for most microcomputers. The most common piece of add-on equipment to the domestic microcomputer must be a printer but there are many others that will switch 250V AC appliances on and off, communicate with remote com-



A computer club can help build up your knowledge.

puters (modems), draw graphs and pictures, or measure radio propagation paths, for example.

Various predictions suggest that printer prices are due to fall very sharply in the early part of 1986. A printer can be used for more than word processing and printing out or dumping the contents of the screen.

Most dot-matrix printers offer a condensed print mode which will print about 132 characters across the paper. That means that you can achieve a resolution of about 1 per cent (1 part in 100) for printing a graph simply by using the position of a condensed full stop as a point on a graph.

If you can vary the amount of paper that the printer moves when it carries out a line feed you may be able to make the dots touch so that a smooth line of good resolution can be obtained. Some people have mounted photocells on the printer head and scanned a photograph to input information about brightness levels into the computer rather than using the printer to output data.

Joysticks are used most often for playing games. However, they can be used also by people who are disabled for controlling ordinary programs such as a word processor. Many, but not all, joysticks contain two potentiometers or variable resistances which provide an analogue signal for the computer. If your machine will work with this type it is a simple matter to connect other variable resistances to the same port to measure other signals.

So, if your machine has an analogue to digital converter port (ADC or A-D converter) you can measure small electrical

voltages directly and this can be used, for example, to determine when the level of liquid in a container has reached a predetermined height.

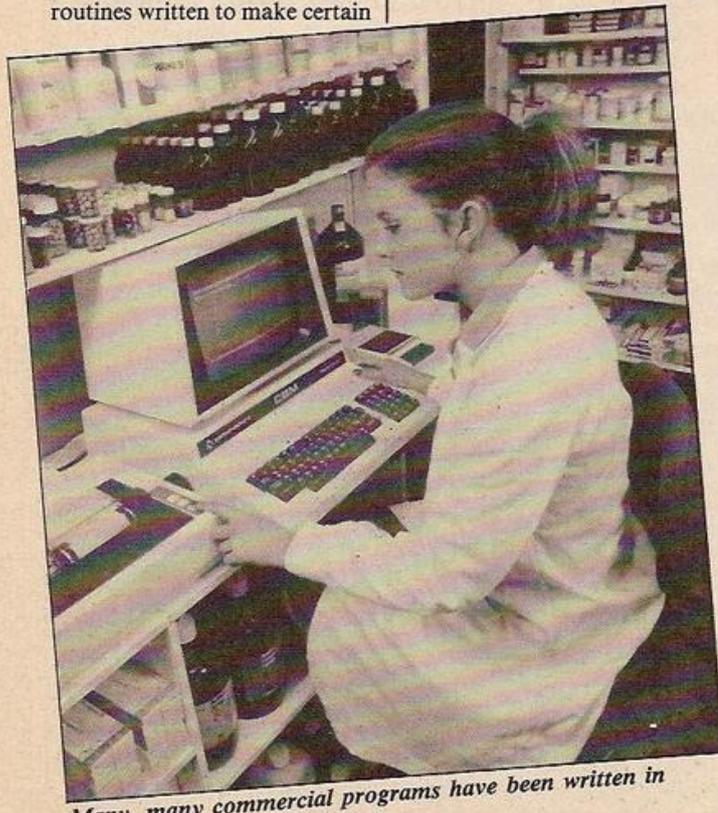
One fascinating aspect of the use of computers is the communication of skills and knowledge. I have touched on this already in this article when I said that a program could be written to help a photographer mix a particular photographic solution correctly.

The point of the program is not only to help the original user to achieve the right solution at the right temperature, but to communicate the skill so that anybody who loaded and ran the program could achieve the same results.

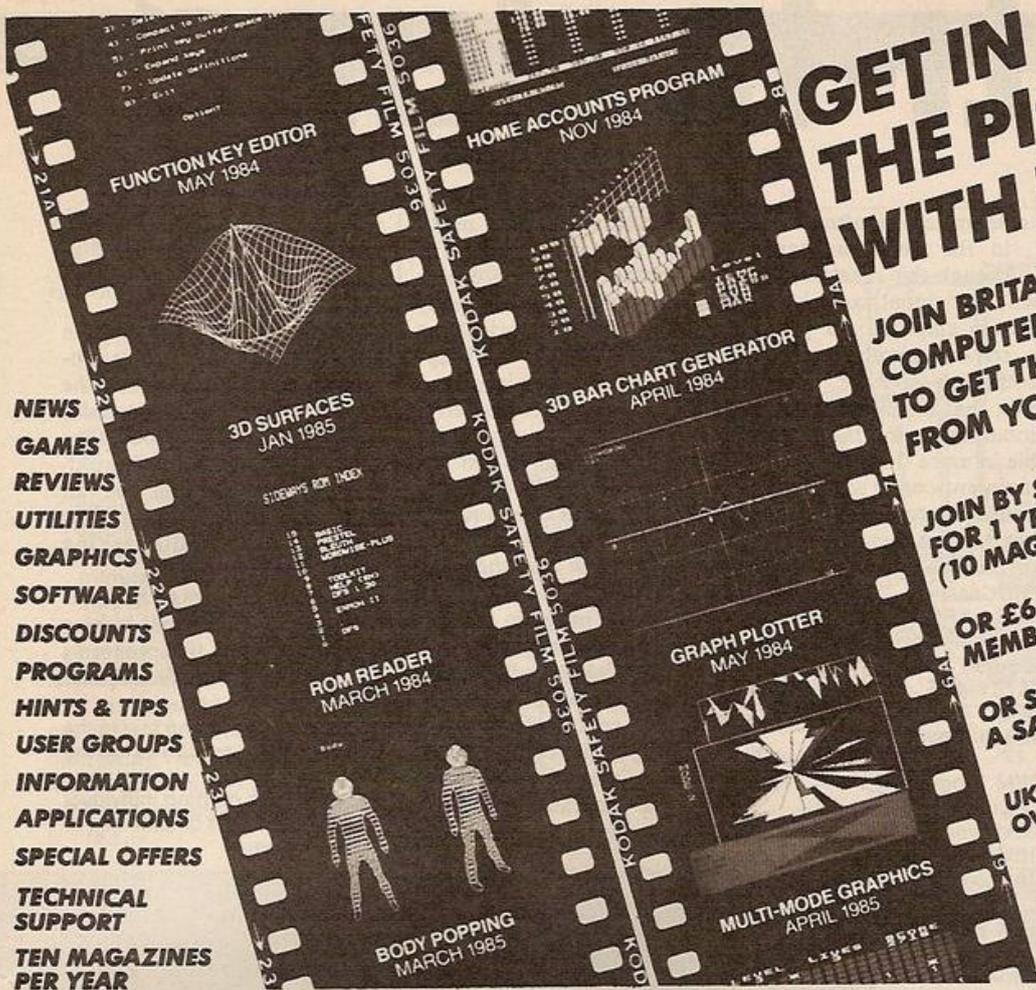
## Store of knowledge

You may have noticed that you can acquire a lot of knowledge and expertise about a subject that is lost if you don't put into practice for sometime what you have learned. You may have puzzled out the wiring diagram for an electro-mechanical timer on a washing machine and the traced through the various possibilities until you discovered the fault. Try to repeat the exercise in a year's time and you will have to start all over again. The computer can be used to store the results of all your labour.

There's no end to the use to which you can turn a micro-computer because it is the first general-purpose programmable tool we have possessed. More often than not the limitation on its use is in your mind. Don't try to force your own way of working to fit in with what the machine can do unless you can see a real gain.



Many, many commercial programs have been written in Basic.



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# Multi-tasking

**Here's how to have a dozen pairs of hands. Jeremy Hill presents the art of multi-tasking for the delectation of BBC users.**

**M**ulti-tasking is the running of several programs at the same time on the same computer. This program allows multi-tasking on the standard BBC computer in Basic, but will probably not work with the second-processor. Actually on most computers, certainly on microcomputers, true multi-tasking — programs really running at the same time — is impossible.

The method we use to get around this is to run each program for a short period of time — this is called a time-splice — and then go on to the next program until the last program is reached, then the first program is continued from when it left off, and so on.

To give the impression of all the programs running at the same time, the time each program is run for before it goes on to the next is usually quite short.

Because BBC Basic was not designed for multi-tasking there are certain restrictions imposed on the programmer. For instance this program cannot be switched within procedures without causing some rather undesirable consequences. Also you cannot switch tasks within Gosubs, For . . . Next and Repeat . . . Until loops.

To use this system is very simple, you simply type the listing — ignoring comments in the form Rem . . . , or : . . . if you wish to — and save it. When you wish to use it within a set of programs to run together you load in this program and type in before it the set of programs together with a 'description line' before the actual program — see later. Note that Break must be pressed before Procasse is used again.

Another restriction of this system is that all the programs

have to be written one after each other, in the same program area, although this means that you can use "global variables" in order to allow all the programs to communicate with each other. You must note, however, that all the variables are global and using the same variable in more than one program unintentionally will cause dire consequences. You have been warned! An example of how to use this system:

```
10 PROCasse
20 !&72=&FFFFFFF (time splice in hundredths of a second)
30 ?&76=&FF
40 GOTO 70 (first program line number)
50
60 REM Program 1
70 CALLdefine:GOTO 120 (next program line number)
80 REM Any program
90 CALLchk:GOTO 80
100
110 REM Program 2
120 CALLdefine:CALLstart (to signal last program)
130 REM Another program
140 CALLchk:GOTO 130
```

Lines 20 to 40, 70, 120 are description lines. These setup the tasks by telling the system where the tasks are within the program.

When an individual task is being performed the system has to be told when it can change the task being run. This is done by putting: Callchk at points in the tasks where switching can take place, eg FNs or Procedures. If the time-splice is over the program will be suspended until its time-splice comes around again otherwise the execution will continue after the Call.

It is important to remember that the task being run will not change until the time-splice is over and Callchk has been executed, so the program can use extra time if it needs to by not calling chk. If, on the other hand, the task being executed needs no more time for the moment it can force a switch by executing:

```
CALLNxt
```

This program works by making use of the interval timer built into the BBC.

This timer counts from the number you specify to 10991162703 by one every hundredth of a second. When

the counter reaches its maximum number it resets back to zero (giving you a range of a hundredth of a second to nearly three and a half centuries long time-splice!). When this happens the computer is informed of 'Interval timer crossing zero'.

This is when my multi-tasking routine comes in. When the computer detects this condition my routine takes over and sets a signal in the computer — a flag — to show that the time-splice is over.

When your program executes Callchk another routine in my program checks this flag to see whether the time-splice is over. If the time-splice is not yet over then the task continues as normal. Otherwise it stores where the program left off and restores the next program's

position. This is unless it has reached the last program, in which case it resets to the first program again.

Finally bytes &4F to &80 in zero-page are used by this program, and when you run the program after you have typed it (save it first!) you should then see a demonstration of multi-tasking. If you see this you can then adapt the program for your own multi-tasking application.

The program listed below is an example of the multi-tasking on the BBC with five programs running at the same time. These are:

- i) A program printing text in the top, left hand corner of the screen;
- ii) A program plotting individual random points on one area of the screen;

## Multi-tasking demo.

```
10 MODE0
20a$="Hello everybody this a demonstration of my multitasking program. At the moment there are five programs running at the same time."
30DIM st1% 256
40REM A multitasking program example
50PROCasse: !&82=&FFFFFFFE: ?&86=&FF
60
70REM Program one - print instructions
80CALLdefine:GOTO 170
90a%=1
100PRINT TAB(0,0);MID$(a$,a%,30)
110a%=a%+1
120IF a%+10<LEN(a$) CALLchk:GOTO 100
130PRINT TAB(0,0);"
"
140GOTO 90
150
160REM Program two - draw random graphics
170CALLdefine:GOTO 230
180PLT 69,RND(400)+200,RND(400)+200
190DRAW RND(400)+200,RND(400)+200
200CALLchk:GOTO 180
210
220REM Program three - draw more graphics
230CALLdefine:GOTO 280
240PLT 69,RND(400)+400,RND(400)+400
250CALLchk:GOTO 240
260
270REM Program four - check keyboard and enter command
280CALLdefine:GOTO 380
290p%=st1%:l%=0
300IF ADVAL(255)<1 CALLNxt:GOTO 300
310k%=GET:PRINT TAB(1%,5);CHR$(k%);:IF k%=127
p%=p%-1:ELSE IF k%>31 ?p%=k%:p%=p%+1
320l%=POS
330IF k%<>13 CALLNxt:GOTO 300
340?p%=13:($st1%)
350GOTO 290
360
370REM Program five - time
380PRINT "Time:"
390INPUT "Hours ?" h%:IF h%>23 GOTO 390
400INPUT "Minutes ?" m%:IF m%>59 GOTO 400
```

- iii) Another program drawing lines in random positions in another area of the screen;
- iv) Yet another program checking the keyboard and accepting Mos commands ("\*" commands), executing the line when Return is pressed. The line will be printed just below the text and Delete will work as usual;
- v) Lastly there is a program telling the time (not very accurately, but it serves as a demonstration) in hours and minutes at the top of the screen in the middle of the line.

The last part of the program is simply the m/c assembly of the multi-tasking code. This program creates quite an interesting visual effect, and is worth referring to in order to see how the multi-tasking utility is used.



```

410z%=0
420CLS
430CALLdefine:CALLstart
440
450PRINT TAB(40,0)h%:" ";m%
460z%=z%+1:IF z%<480 CALLnxt:GOTO 450:ELSE z%=
0
470
480s%=0:m%=m%+1:IF m%<59 CALLnxt:GOTO 450
490m%=0:h%=h%+1:IF h%<23 CALLnxt:GOTO 450
500h%=0:CALL nxt:GOTO 450
510
520DEFPROCassem
530flg=&B7:n_evnt=&B8
540DIM mc 200
550FOR a%=0 TO 2 STEP 2
560 P%=mc
570 lopt a%
580 .setup lda #13
590 idx #5
600 jsr &FFF4
610 lda #0
620 sta &B0
630 rts
640
650.define idx &B0
660 cpx #&31
670 bcs noroom
680 ldy &0A
690.nxtchk lda (&0B),Y
700 iny
710 cmp #13
720 bne nxtchk
730 dey
740 tya
750 clc
760 adc &0B
770 sta &4F,X
780 inx
790 lda &0C
800 adc #0
810 sta &4F,X
820 inx
830 stx &B0
840 rts
850.noroom brk
860 EQUUS "Too many programs"
870 BRK
880
890.start lda #14
900 idx #5
910 jsr &FFF4
920 jmp first
930
940.nxt lda #0
950 sta flg
960 ldx &B1
970 dec &0A
980 lda &0B
990 clc
1000 adc &0A
1010 sta &4F,X
1020 inx
1030 lda &0C
1040 adc #0
1050 sta &4F,X
1060 inx
1070 cpx &B0
1080 bcc nreset
1090.first ldx #0
1100.nreset lda &4F,X
1110 sta &0B
1120 lda &50,X
1130 sta &0C
1140 stx &B1
1150 lda #0
1160 sta &0A
1170 lda #4
1180 ldx #&B2
1190 ldy #0
1200 jmp &FFF1
1210
1220.chk lda flg
1230 bne nxt
1240 rts
1250
1260.event php
1270 cmp #5
1280 bne n_int
1290 sta flg
1300.n_int plp
1310 jmp (n_evnt)
1320 J
1330NEXT
1340
1350 ?n_evnt=?&220
1360 ?(n_evnt+1)=?&221
1370 ?&220=event MOD 256
1380 ?&221=event DIV 256
1390 CALLsetup
1400ENDPROC

```

# Desert

## Burkhard Meier goes through the desert on a CBM-64.

**D**esert Decision for the CBM-64 is a fast shoot-'em-up game with a strategic touch. It consists of 7K pure machine code, so fast action is ensured.

With your joystick plugged into port 2 you move your trigger-happy sheriff around the screen. His mission is to ensure law and order in his monster-safe town and in the surrounding desert. But this becomes difficult since the cacti growing in the desert produce strange alien monsters.

To fight a hard but successful battle against the monsters you have know a bit of basic botany. In the desert cacti and bushes grow. Bushes are harmless and fear your firepower, so they try to escape if you are able

to shoot them. One bush scores five points.

Unlike the bushes the cacti aren't able to move and you can't shoot them. A single cactus without any other cacti in its neighbourhood is harmless, but two neighbouring cacti from time to time produce an egg, which is dangerous because a monster will hatch from it.

You can't shoot these eggs — you can only shoot monsters and each one killed scores five points. If you shoot a monster it immediately turns into a cactus. But this is your chance: there can't be more than two cacti standing next to each other, because if you shoot a monster standing next to a pair of cacti the cacti will disappear.

One day is completed if there

are no cactus pairs and monsters in the playing area. If you manage this quickly you will get a bonus. At the beginning of every new day there are two cactus pairs more than at the beginning of the day before. The best 10 players enter the "Hall of Fame" and are saved to disc if a disc drive is connected. Finally some information about the title melody. It's the famous German march *Der Dessauer*, composed in 1740.

Before typing in or loading the hexloader, enter the following commands in direct mode: POKE 642,60:SYS 64760

When the hex loader is run, the computer asks you for the start address for typing in. When you begin entering the code type 2049. Type the 16 hex

digits followed by Return. Then enter the checksum, also followed by Return. If the program detects an error in the line just entered, you have to enter this line again. Repeat this procedure until the whole code is entered.

If you want to save the code earlier, you must type " " instead of the hex digits. Don't forget to load the uncompleted file before you load the hex-loader and continue typing in.

If you want to avoid those endless hex digits, copies can be ordered from me, Burkhard Meier, at Schinkelstr. 26, D-3340 Wolfenbüttel, West Germany. Please state whether you want the program on tape or on disc and enclose £2.50 with your letter.

### Listing 1.

```

0 REM *****
1 REM *
2 REM *           HEXLOADER FOR           *
3 REM *           "DESERT DECISION"       *
4 REM *
5 REM *****
6 :
10 IFPEEK(44)=60THEN100
20 PRINT{CLR}PLEASE TYPE THE FOLLOWING COM
MAND"
30 PRINT"BEFORE LOADING THE HEXLOADER:"
40 PRINT{DOWN}{RVS}POKE 642,60:SYS 64760"
50 END
100 INPUT{CLR}START ADDRESS " ;SA:PRINT
1000 FORA=SATO91738STEP8
1010 PRINTA;:INPUTH$;IFH$="*"THEN1090
1015 PRINT{UP}"TAB(25);:INPUT"CHECKSUM";CK
1020 C=0;FORB=0T07
1030 H$=MID$(H$,B*2+1,2)
1040 H=ASC(LEFT$(H$,1))+ASC(LEFT$(H$,1)
>57)*7-48
1050 L=ASC(RIGHT$(H$,1))+ASC(RIGHT$(H$,1
))>57)*7-48
1060 BY=L+16*H:C=C+BY:POKEA+B,BY:NEXT
1070 IFC<>CKTHENPRINT"ERROR - PLEASE INPUT
AGAIN":GOTO1010
1080 NEXT
1090 INPUT{DOWN}{DOWN}{DOWN}FILE NAME " ;P$
1100 INPUT{DOWN}DEVICE NUMBER (1=TAPE,8=DI
SK) " ;DV
1105 C=PEEK(646)
1110 POKE646,PEEK(53281):PRINT{CLR}POKE43,
1:POKE44,8:POKE45,225:POKE46,35"
1120 PRINT{DOWN}{DOWN}SAVE"CHR$(34)P$CHR$(
34)" ;"DV
1125 IFDV=8THENS$="S:"+P$:OPEN1,8,15,S$:CLO
SE1
1130 POKE631,19:POKE632,13:POKE633,13:POKE1
98,3:POKE646,C
READY.

```

### Listing 2.

```

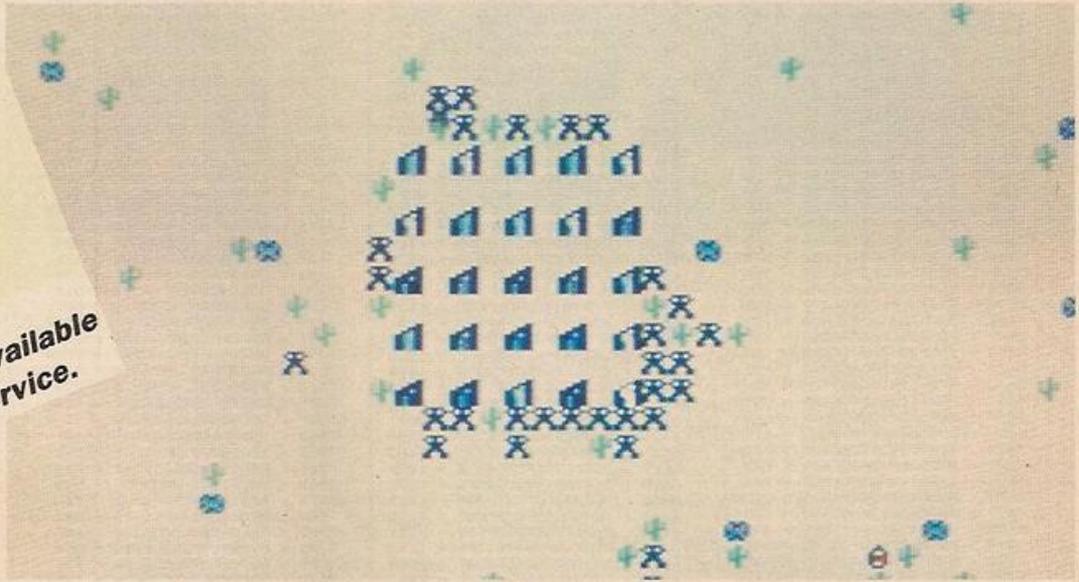
2049 : 0C08C1079E203230 = 588
2057 : 3632000000A200BD = 455
2065 : 39089D00C4E8E0C0 = 1068
2073 : D0F5A200BDFB009D = 1220
2081 : 00C8CAD0F7BDFB09 = 1306
2089 : 9D00C9CAD0F7BDFB = 1455
2097 : 0A9D00CACAD0F74C = 1102
2105 : 330B0000003C0000 = 122
2113 : 3C0000000000FF00 = 504
2121 : 0000000000000000 = 0
2129 : 0000000000000000 = 0
2137 : 0000000000000000 = 0
2145 : 0000000000000000 = 0
2153 : 0000000000000000 = 0
2161 : 0000000000000000 = 0
2169 : 00C2000000000000 = 194
2177 : 0000000000000000 = 0
2185 : 0024000026000060 = 170
2193 : 0000000000000000 = 0
2201 : 0000000000000000 = 0
2209 : 0000000000000000 = 0
2217 : 0000000000000000 = 0
2225 : 0000000000000000 = 0
2233 : 00F2000000000000 = 242
2241 : 0000000000000000 = 0
2249 : 0024000064000006 = 142
2257 : 0000000000000000 = 0
2265 : 0000000000000000 = 0
2273 : 0000000000000000 = 0
2281 : 0000000000000000 = 0
2289 : 0000000000000000 = 0
2297 : 00D03C666EAE662 = 704
2305 : 3C007CC6C6FEC6C6 = 1230
2313 : C600FCC6C6FCC6C6 = 1494
2321 : FC007EC0C0C0C0C0 = 1338
2329 : 7E00FCC6C6C6C6C6 = 1368
2337 : FC007EC0C0C0C0C0 = 1394
2345 : 7E007EC0C0C0C0C0 = 1268
2353 : C0007EC0C0C0C0C0 = 1292
2361 : 7E00C6C6C6FEC6C6 = 1370
2369 : C600783030303030 = 558
2377 : 78000A0606060606 = 348
2385 : 7C00C6C6C6C6C6C6 = 1402
2393 : C600C0C0C0C0C0C0 = 1350
2401 : 7E00C6C6C6C6C6C6 = 1384
2409 : C600C6C6DEC6C6C6 = 1458
2417 : C6007CC6C6C6C6C6 = 1312
2425 : 7C00C6C6C6FCC6C6 = 1408
2433 : C0007CC6C6C6C6C6 = 1324
2441 : 6400FC0064FCC6C6 = 1088
2449 : C6007EC0C0C0C0C0 = 974
2457 : FC007E1B1B1B1B1B = 498
2465 : 1800C6C6C6C6C6C6 = 1212
2473 : 7E00C6C6C6C6C6C6 = 1224
2481 : 3800C6C6C6C6C6D6 = 1276
2489 : EC00C6C6C6C6C6C6 = 1102
2497 : C600C6C6C67E0606 = 938
2505 : 7C007C00C1B30000 = 434
2513 : 3E003C3830303030 = 362
2521 : 3C0038449AA2BA44 = 786
2529 : 38003C8C0C0C0C0C = 176
2537 : 3C0001051D797D6D = 450
2545 : 64D185A5A5E7818 = 660
2553 : 1800000000000000 = 24
2561 : 00001C3838380030 = 236
2569 : 3000666666000000 = 354
2577 : 00006CFE6C6CFE6C = 940
2585 : 00001BFED0FE1EFE = 1032
2593 : 180066660C183066 = 408
2601 : 0600FB0B0B760C0C = 1244
2609 : F600181B18000000 = 318
2617 : 00000C1830303018 = 204
2625 : 0C0030180C0C0C18 = 144
2633 : 3000006C38FE386C = 630
2641 : 00000018187E1818 = 222
2649 : 0000000000000038 = 112
2657 : 183800000007E000 = 332
2665 : 0000000000000038 = 112
2673 : 380000006C183066 = 242
2681 : C0007CC6CED6E6C6 = 1362
2689 : 7C00183870303030 = 444
2697 : 78007CC6067CC6C0 = 956
2705 : FE007CC6061C06C6 = 814
2713 : 7C0000CCCCCFE0C = 1814
2721 : 0C00FEC0C0C0C6C6 = 1106
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2737 : 7C00FE0C18303030 = 558
2745 : 30007CC6C67CC6C6 = 1088
2753 : 7C007CC6C67E06C6 = 974
2761 : 7C00003838000038 = 348
2769 : 0000003838000038 = 224
2777 : 18380C1838060318 = 332
2785 : 0C000007E007E000 = 264
2793 : 00006030180C1830 = 252
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2841 : 18187C927C386C6C = 884
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2865 : 3800A9082090FF4C = 732
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2881 : 4853333A44442E48 = 558
2889 : 4947A853A901A208 = 639
2897 : A00020B0A990A2 = 972
2905 : 3BA00B20B0FFA908 = 875
2913 : A23C00020D5FFA9 = 1864
2921 : 0120C3FF2081FF28 = 931
2929 : 84FFA210A9909D00 = 899
2937 : D4CA18FA98F08D18 = 1029
2945 : D42088084C8B0878 = 785
2953 : A900BD1A00A9318D = 983
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2969 : 000020D080D1D8A9 = 932
2977 : C88D16D858A9948D = 1117
2985 : 00D0A9328D18D8A9 = 982
2993 : C8D8B02A9808D91 = 1066
3001 : 026078A9D0A8D1483 = 763
3009 : A90F8D1583A9780D = 771
3017 : 05DCA908853A8538 = 777
3025 : 853CA96288378538 = 831
3033 : 853CA96885378538 = 869
3041 : 8539A92185408541 = 787
3049 : 8542A94C85498543 = 850
3057 : A910854C8546A9F4 = 1810
3065 : 854A854A91854D = 803
3073 : 8547A97885488545 = 983
3081 : A911854E854858A2 = 852
3089 : 08DD28C0740F00A = 1489
3097 : 28D2FFED08F3A9F3 = 1489
3105 : 85FBA98D85FCA987 = 1127
3113 : 8D862A280A0808A9 = 768
3121 : 0D20D2FF8A48A208 = 890
3129 : A91D20D2FFCAD0FA = 1355
3137 : 68A81FB28D2FFCB = 1399
3145 : C8180F618A5F869 = 1207

```

# Decision



This program is available  
on the Telsoft service.



3153	:	1005FBA5FC490085	=	1055
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3169	:	85FBA90D05FCA901	=	1121
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3185	:	A20CA0001820F0FF	=	005
3193	:	A000A208A48A0000	=	702
3201	:	A219A91D20D2FFCA	=	1084
3209	:	D0FA002B1FB44AA	=	1194
3217	:	4A4A0970320D2FFB1	=	879
3225	:	FB290F093020D2FF	=	061
3233	:	0B10E768AAA90D02	=	873
3241	:	D2FF18A5FB690385	=	1146
3249	:	FBA5FC690005FCCA	=	1360
3257	:	D0C2A2000D00E20	=	812
3265	:	D2FFEBE023D0F5AD	=	1582
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3297	:	5F209E4445534552	=	656
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3329	:	1D1D1D1D42592042	=	369
3337	:	555248041524420	=	561
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3369	:	1D1D1D1D0548414C	=	334
3377	:	4C204F4620464140	=	501
3385	:	450040504C454153	=	519
3393	:	452049474E4F5245	=	553
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3425	:	5345204954204953	=	529
3433	:	20534F53454E5345	=	576
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3473	:	53434F5245532E2E	=	555
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3497	:	2E2E2E50533A574F	=	525
3505	:	4C46454E42554554	=	597
3513	:	54454C4752554553	=	619
3521	:	53542044454E2052	=	528
3529	:	4553544445522057	=	574
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3569	:	0000000000000000	=	0
3577	:	0000000000000000	=	0
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3625	:	544F20504C415990	=	649
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3657	:	52205594F5552204E	=	559
3665	:	4140452021208008	=	455
3673	:	A200A9EC05FBA90D	=	1133
3681	:	05FCA0002B91A00D1	=	967
3689	:	F80F4A0079000808	=	966
3697	:	10F230034C0D0E18	=	564
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3737	:	38E9108562A90DE9	=	951
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3753	:	E9038566A90E8565	=	888
3761	:	E9008567A20AA00F	=	816
3769	:	B16291600810F9A0	=	1077
3777	:	02B16691648B10F9	=	927
3785	:	A562856038E91085	=	930
3793	:	62A5638561E90085	=	950
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3809	:	8566A5678565E900	=	970
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3841	:	10FBA2008D300E20	=	709
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3857	:	05A00C1820F0FFA9	=	897
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3873	:	00DCCA10FAA000A9	=	1002
3881	:	0085CC85CFA90385	=	982
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3897	:	68A8A502C90DF025	=	930
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3937	:	D2FF4C280FB402A9	=	899
3945	:	0185CA90185CF0C8	=	1040
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3961	:	9160C8C402D0F620	=	1125
3969	:	E4FFC900D0F9A90A	=	1320
3977	:	A243A00820BDFFA9	=	1045
3985	:	01A208A0F28BAFF	=	819
3993	:	28C0FFA90128C3FF	=	1131
4001	:	A901A208A00220BA	=	728
4009	:	FFA900A238A00B20	=	856
4017	:	B0FFA93C85FBA90D	=	1239
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4033	:	20D0FFA90120C3FF	=	1155
4041	:	A90D20D2FF4C0B08	=	953
4049	:	00070EA200854905	=	978
4057	:	50554C8551853A0D	=	978
4065	:	50A0008607BDD10F	=	794
4073	:	AB1509D01D4C896	=	1131
4081	:	00B1509D0004A607	=	807
4089	:	C8B150953AA608A4	=	1002
4097	:	078934009D05D489	=	803
4105	:	37009D06D4894000	=	679
4113	:	9D04D418A607B549	=	824
4121	:	69039549854C6900	=	692
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4177	:	0C1A140415ED001A	=	354
4185	:	140822CF0C1A1404	=	331
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4217	:	0000082B0B0C2712	=	339
4225	:	042B0B082E760834	=	498
4233	:	27102E76082B0B08	=	497
4241	:	27121027120C2712	=	199
4249	:	042712100000081A	=	111
4257	:	140827120C2B0804	=	363
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4305	:	12042B0B082E7608	=	464
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4321	:	082BDB1027121022	=	393
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4377	:	CF0C1A140415ED08	=	535
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4393	:	0815ED001A14101A	=	362
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4521	:	120022CF0820D010	=	542
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4537	:	1000001020D0B022	=	329
4545	:	CF0420D0801D4508	=	576
4553	:	1A14101A141020D8	=	375
4561	:	0C1D450420D08022	=	407
4569	:	CF0827121820D080	=	555
4577	:	22CF0C20D08422CF	=	749
4585	:	082712082BDB102E	=	397
4593	:	760827120822CF10	=	448
4601	:	20D1022CF100000	=	524
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4617	:	0D951DCA10F84C30	=	781
4625	:	1253434F52454849	=	543
4633	:	474B2053434F5245	=	555
4641	:	4C49564553984741	=	667
4649	:	4D45204F564552A9	=	663
4657	:	0185050831A90385	=	624
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4673	:	10FBA9038532A940	=	855
4681	:	0534A9018535A900	=	710
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4697	:	0FD4A9818D12D4A2	=	1058
4705	:	05A00856FB84FC98	=	1091
4713	:	0A10690D80A0A018	=	492
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4729	:	18D429078908086	=	579
4737	:	02A95E20D2FFA6F8	=	1179
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4753	:	D0D110A216A00020	=	817
4761	:	F0FFA9078D0602A2	=	1110
4769	:	008D121220D2FFEB	=	954
4777	:	E085D0F520D61318	=	971
4785	:	A216A01720F0FFA2	=	1056
4793	:	05B0D121220D2FFEB	=	959
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4817	:	0FB0D121220D2FFEB	=	969
4825	:	E014D0F5505041869	=	995
4833	:	308D05CF4C1014A9	=	890
4841	:	008507A200460590	=	529
4849	:	03186586A6607CA	=	551
4857	:	D0F385080A050109	=	863
4865	:	078501A9008D15D0	=	600
4873	:	2084FAD0ED0C9708	=	963
4881	:	8D0EDCA00DFDC297F	=	951
4889	:	8D0FDC9A008D0BDC	=	917
4897	:	8D0AD0809DC8D08	=	890
4905	:	DCA9008D20D0AD16	=	965
4913	:	D009108D16D0A900	=	773
4921	:	8D2D0A90E0B23D00	=	950
4929	:	A9CC00802A9038D	=	965
4937	:	8602A99320D2FFA9	=	1118
4945	:	948D00DA9328D18	=	894
4953	:	D078A988D1403A9	=	966
4961	:	138D15839E18D12	=	737
4969	:	D0AD110297F8D11	=	932
4977	:	D0A9818D1AD058A2	=	1131
4985	:	17A9809D00D4CA10	=	779
4993	:	FAA90F0D18D4A0AD	=	1000
5001	:	19D08D19D03807AD	=	835
5009	:	8D0C58AC1EAAD12	=	951
5017	:	D0C9E1908BA9008D	=	1899
5025	:	21D08D12D04C1EA	=	1047
5033	:	8D0C58AC1EAAD12	=	1893
5041	:	12D84C81EA0082B1	=	1004
5049	:	274AA4A4A166938	=	

# Desert Decision

(continued from previous page)

5441	: 68AAA5079DFCC2A5	= 1217	6345	: 41B5174CD318A900	= 701	7269	: A514850A9288506	= 671	8233	: A5F912F98186908	= 897
5449	: 08D909C3A5099D13	= 719	6353	: 8533A480D00CA519	= 771	7297	: 20E81218A5156507	= 600	8241	: A8A5FC912F983E9	= 1218
5457	: C3A50A9D1DC3A908	= 920	6361	: D005A52DD001604C	= 804	7305	: 8507A50869CC8508	= 763	8249	: 07AA68A86FE18A5	= 1122
5465	: 0D04D4CAF0034CBF	= 1069	6369	: 5F1CC60FF0034C5F	= 750	7313	: A000A9209107A516	= 700	8257	: FB490185FB8A5C9	= 1263
5473	: 14A20A80B0A9008D	= 647	6377	: 1CA50E8507BDF0F3	= 802	7321	: 2901D017C6141003	= 510	8265	: 0085FCASFD9C16F0	= 1266
5481	: 8602AD1BD4293FC9	= 853	6385	: 85FB85078DF0F485	= 1105	7329	: 4C901D30A80E9E28	= 750	8273	: 1E45FC9228F01898	= 1106
5489	: 1600F78509AD1BD4	= 999	6393	: FC8508BDF0585FD	= 1228	7337	: 8507A508E9008508	= 687	8281	: 48BA0A85BF912F98	= 1138
5497	: 293FC920B0F7850A	= 911	6401	: B0FF0685FEA9FF85	= 1394	7345	: 4C031DA5162902D0	= 546	8289	: 18690A80A5FC912F	= 914
5505	: A509C9069011C90F	= 758	6409	: FFA000A5FDC510F0	= 1286	7353	: 18E61A4514C916D0	= 893	8297	: 983E907AA6A808A	= 1028
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5521	: C91800034C68158A	= 746	6425	: FF3006A5FF29F85	= 1156	7369	: 288507A508A90085	= 591	8313	: 2FC80002F0034CD0	= 976
5529	: 48A60902886058A	= 718	6433	: FFA5FEC511F01090	= 1208	7377	: 084C31DA5162904	= 348	8321	: 1E490085FAA2000	= 909
5537	: 0620E21218A50765	= 585	6441	: 08A5FF29F885FFC0	= 1156	7385	: D017C61510034C90	= 689	8329	: 00894003D05803D0	= 764
5545	: 0A8507A50869CC85	= 765	6449	: 06A5FF29F785FFA5	= 1267	7393	: 1D38A507E9018507	= 631	8337	: 1C894003D05803D0	= 800
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5561	: 0568AA4C6B1518A6	= 673	6465	: FF29034903F01E45	= 810	7409	: 1D6E15A515C920D0	= 915	8353	: 9970830508399778	= 821
5569	: 09A40A20F0FFA900	= 879	6473	: 18D42901F009A5FF	= 950	7417	: 034C901DE607D002	= 699	8361	: 03E4FF48A8C8CC61	= 1261
5577	: 80D4D48D0504A950	= 964	6481	: 290385FF4C5E19A5	= 792	7425	: E608A908B080D480	= 912	8369	: 83D0D6EBCA6803D0	= 1200
5585	: 80D5D4A9018D04D4	= 1013	6489	: FF290385FF4C5E19	= 1157	7433	: 0C048D08D4A9F08D	= 1140	8377	: CEAC18D4CAF00F09	= 1493
5593	: A9018D01D4A9420	= 825	6497	: 01D00FC6FD30A5F8	= 1147	7441	: 00D4A9818D08D4A5	= 1052	8385	: 87908385F8850789	= 1009
5601	: D2FFA064A200CAD0	= 1297	6505	: E92885FB8A5CE900	= 1307	7449	: 180D000438E90285	= 809	8393	: 780385FC28E9CC0A	= 1161
5609	: FD88D06A8AAA50F7	= 1293	6513	: 85FC4A5F2902D00F	= 1071	7457	: 18A9028512B107C9	= 731	8401	: 28840828F01385FE	= 855
5617	: 9DF03A5089DF0F04	= 1004	6521	: E6FD18A5FB862885	= 1201	7465	: 20F07AC94D00620	= 909	8409	: A50685F0A5D5FC96	= 1182
5625	: A5099DF05A50A9D	= 923	6529	: FB8A5F900885FCAS	= 1323	7473	: 31A4C981DC945D0	= 814	8417	: 9024A5FDC90F01E	= 1020
5633	: FF06A9080D04D4CA	= 989	6537	: FF2904D00FC6FE38	= 1031	7481	: 56A2008D14C3C514	= 069	8425	: A5FC9F9018A5FE	= 1222
5641	: F0034C6B15A90A85	= 759	6545	: A5FBE90185FB8A5F	= 1451	7489	: D0078D1E3C3C51F0	= 1007	8433	: C9190083C9121A5	= 824
5649	: 0C850A900852D0A9	= 674	6553	: E90085FCASFF2908	= 1007	7497	: 05E8E42390D0A008	= 1041	8441	: FDC518D008A5FEC5	= 1299
5657	: 0C850E850FA9585	= 614	6561	: D00FC6FE18A5FB8A	= 1252	7505	: A92801078AA8C8B9	= 1044	8449	: 11D0834C9121A928	= 691
5665	: 2A49080D27D0A902	= 764	6569	: 0185FB8A5FC90885	= 1048	7513	: 00C39D08C3B90AC3	= 937	8457	: 8585A5FD05828E8	= 959
5673	: 8D28D0A9088510A9	= 887	6577	: FCASFD9069011C9	= 1239	7521	: 9D0AC3B914C39D14	= 939	8465	: 1218A5075FE8507	= 709
5681	: 138511A9038D15D0	= 711	6585	: 0FB00DA5FEC90F90	= 903	7529	: C3B91E3C9D1E3C38	= 1187	8473	: A58699C8508A000	= 783
5689	: A9080D18D0A908D	= 1020	6593	: 07C91880034C2C1A	= 557	7537	: E8C42390E2C623F8	= 1314	8481	: B187C928D86AA5FD	= 1149
5697	: 00D080D2D0A908D	= 1007	6601	: B1FBC91EFA04C91F	= 1209	7545	: 18A51A9069851A5A	= 649	8489	: C518D08A5FEC511	= 1060
5705	: 01D080D3D0A910A9	= 887	6609	: F04AC944F0A4C9A5	= 1163	7553	: 1B6900851BA51C69	= 598	8497	: F05E5A0878529A58	= 853
5713	: F8CFA9118DF0FA9	= 1407	6617	: F042C946F03EA920	= 1008	7561	: 00851CD820D613A9	= 811	8505	: 852A9018528A5FE	= 1189
5721	: 0085138533A28A0A	= 668	6625	: 9107A94491FBA5FB	= 1201	7569	: 00851C09BDD0D4	= 938	8513	: 852CA901852D9A92	= 824
5729	: 0080D0FDCAD0FAA6	= 1423	6633	: 9DF03A5F09DF0A4	= 1248	7577	: A983D08D04A9088D	= 971	8521	: 852E9A46918718A5	= 759
5737	: 0DCAB06D0034C0D3	= 892	6641	: 18A90C65FC85FC9A	= 1112	7585	: 80D4C851DA51791	= 842	8529	: 08E9C8508A908A	= 590
5745	: 10A50C850DA510B5	= 661	6649	: 0091FBA5FD9DF085	= 1231	7593	: 0718A508698C8508	= 462	8537	: 074C9121A62E0F03	= 748
5753	: 06A928850520E812	= 635	6657	: A5F9DF06A513F0	= 1261	7601	: A929107C624F003	= 800	8545	: 4C9121A608A000A5	= 756
5761	: A5071865118507A9	= 623	6665	: 13A5FDC514D08DA5	= 1048	7609	: 4C991EA90C8524A6	= 775	8553	: 299D0084A52A7D08	= 566
5769	: C650888508A00DC	= 847	6673	: FECS15D0878A4828	= 929	7617	: 23F085BD13C385F8	= 1307	8561	: 05A527E00086A52C	= 585
5777	: 8502A90029100803	= 563	6681	: D009A5FEC511D003	= 1061	7625	: B01DC385FC0008D	= 1147	8569	: 9D00876088A74491	= 787
5785	: 4C7E18A5022901D0	= 643	6689	: 4CAB17CAF0034CEA	= 1025	7633	: FFC228F0D009C385	= 1361	8577	: 29A52A186980852D	= 564
5793	: 1E38A507E9280507	= 671	6697	: 18AD2CA49A0A26	= 859	7641	: FEAFCC511D032A5	= 1306	8585	: A9009129A900052D	= 782
5801	: A508E9088508A510	= 728	6705	: CA4C5F1CF818A51A	= 844	7649	: FBC180818A5FB8A5	= 1317	8593	: A508F082D008A519	= 827
5809	: F00A0107C920F05A	= 997	6713	: 6625A90851A518A900	= 566	7657	: 5ECAF38A5FD920	= 1290	8601	: D007A52D00834C32	= 762
5817	: C944F0564CD318A5	= 1071	6721	: 851BA51C9A90851C	= 619	7665	: 85F0A5FEE90085FE	= 1425	8609	: 22A008D7D0CC91F	= 1031
5825	: 022902D081518A507	= 470	6729	: 20D613D8A9FB8D0D	= 1055	7673	: D0A45FBC915F0A7	= 1234	8617	: F00A4C2F297A68E	= 895
5833	: 62808507A5086908	= 563	6737	: D4A9038D08D4A908	= 1042	7681	: E6FB18A5FD92085	= 1201	8625	: C91F07A3C8508C08	= 1162
5841	: 8508A510C915F0E0A	= 1012	6745	: 8D08D4A9088513A2	= 847	7689	: F0A5FE9088508A50	= 1372	8633	: D0E9A92685FB9C0	= 1406
5849	: 0D08A5022904D013	= 863	6753	: 808D0806C514D007	= 627	7697	: 36A5FBC518D038A5	= 1104	8641	: 85FC4A20A00081FB	= 1139
5857	: 38A507E9018507A5	= 767	6761	: 808D0806C514D007	= 627	7705	: 26CFC119815A5FC0	= 1320	8649	: C91F07A3C8508C08	= 1136
5865	: 08E9088508A511F0	= 804	6769	: D00807C515F005E8	= 891	7713	: F0A5FE9088508A50	= 1196	8657	: C91F07A3C8508C08	= 1075
5873	: C8D08FA5022908F0	= 1058	6777	: E48D08D0A8C8B0D	= 1379	7721	: B5F0A5FEE90085FE	= 1425	8665	: 5085FBA5FC90085	= 1119
5881	: 034CD31818A58769	= 615	6785	: 008485FB8D080505	= 715	7729	: D015A5FC0927F00F	= 1141	8673	: FCCAD08E8510C906	= 1274
5889	: 018507A508690885	= 452	6793	: FC890806D08080A9	= 791	7737	: E6F18A5FD690185	= 1163	8681	: 904C99F0840A8511	= 850
5897	: 08A511C927D0A34C	= 877	6801	: 00079D0807B90004	= 360	7745	: F0A5FE90885FEB1	= 1341	8689	: C90F903AC918003A	= 873
5905	: 318A5022901D0805	= 657	6809	: 9D0084A900859D00	= 508	7753	: FDC920D845A5FBC9	= 1380	8697	: A28A0081820F0F	= 885
5913	: C6184C3C17A50E229	= 581	6817	: 08C8EBC408D08E2C	= 1308	7761	: 06908EC90F000A5	= 731	8705	: A9008D15D0A800	= 890
5921	: 82D085E610A0C3C17	= 620	6825	: 0B8080A91F915A5A	= 932	7769	: C909F08004C91898	= 1253	8713	: 16222D02FEE8019	= 1034
5929	: A5022904D005C611	= 640	6833	: FB8521A5FC925218	= 1025	7777	: 31A5FB9D13C3A5FC	= 1425	8721	: D0F0A5C41895894F	= 949
5937	: 4C3C17A50229088D	= 583	6841	: A5FC490C85FC9A95	= 1093	7785	: 9D1DC385FC285FB	= 1403	8729	: 5520A4F43A8A44	= 851
5945	: 02C611A9080D04D4	= 775	6849	: 91FB203818A520C9	= 789	7793	: B09FC85FC9A920B1	= 1124	8737	: 20594A55253454C	= 595
5953	: 8D85D4A91E0D01D4	= 911	6857	: 02F083801368E619	= 791	7801	: FBA94591F0A5FD9D	= 1462	8745	: 4628A94E28214C5E	= 488
5961	: A91808D8D4A9818D	= 902	6865	: A619A5FB0DF0F838	= 1266	7809	: FC2A5FE9089C318	= 1253	8753	: 1618A20A00820F0	= 653
5969	: 04D4ADFC9FA908D	= 1062	6873	: A5FC90C9DF0F0680	= 1362	7817	: A5FE90885FEA906	= 1098	8761	: FFA9008D15D0A208	= 956
5977	: 9FCFA508785FA058	= 1185	6881	: A200A008D00C0D9	= 920	7825	: 91FDCAF0034CC41	= 1144	8769	: 8D9F23C940F08620	= 926
5985	: 85FCAS188505A908	= 881	6889	: 00C2D0808D09C1D9	= 1012	7833	: A52DF0034C0D21A5	= 820	8777	: D2FE9830F318A82	= 1336
5993	: 850628E81218A507	= 617	6897	: 8BC2D0834C061E8C	= 725	7841	: 19D0034C9121A508	= 666	8785	: A00F2080FFA5314A	= 990
6001	: 69328D01D00083D0	= 857	6905	: 1990E1B01CA0A8C8	= 1124	7849	: C91E90834C9121A0	= 805	8793	: 4A4A40873622D2FF	= 776
6009	: A9080D18D0A511E5	= 849	6913	: 890C87D00C0B9008	= 911	7857	: 18D4C90A90034C91	= 818	8801	: A531290F93020D2	= 569
6017	: 05A9088508A20E812	= 603	6921	: C19D00C1C8E6A419	= 1228	7865	: 21A1E18D4E19B0F9	= 1124	8809	: FFE603F819A53169	= 1079
6025	: 18A50769188D080D	= 674	6929	: 90EEC619F0034CE1	= 1149	7873	: 8000C065218D00C1	= 929	8817	: 018531D8A204A00	= 738
6033	: 8D02D8A5086908F0	= 869	6937	: 1A0080A620D0FC1	= 1021	7881	: 852203818A000A9	= 611	8825	: 1B20F02A200D081	= 1079
6041	: 05A9083D1D0801F8	= 876	6945	: 85FB8A5C285FC9A9	= 1331	7889	: 40852FA983853089	= 782	8833	: 2320D2FFE800508	= 1201
6049	: C944D0834CAB174C	= 920	6953	: 2091FBCAD00E68A2							

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- **LISTING** with optional automatic indentation of loops, IF, procedures etc. Works on existing programs e.g. you can choose to list:
 

```
10 FOR n=1 TO 10: PRINT n: NEXT n
as: 10 FOR n=1 TO 10
    PRINT n
    NEXT n
```
- **KEYWORDS** can all be entered by typing them in full, or by the "single entry" method, or both in the same line; e.g. the line:
 

```
10print"hello";if x=1 THEN goto 100
```

 will be recognised and listed normally.
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# Megamon

**John Mullins' program takes you on a trip to the secret heart of the Spectrum**

**M**egamon is a sophisticated disassembler/monitor which works on the Sinclair Spectrum and Spectrum +. Among its many features are an intelligent move memory facility, read or write object code to tape, full memory dump to the printer and a disassembly that will even understand all of the 102 undocumented Z80 instructions. All of the controls are accessed through single key-presses so Megamon is easy to understand and simple to use.

Listing 1 is the short loader program for Megamon. Type this in and save it as the first thing on your tape as "MEGAMON". Listing 2 is the standard hex-loader program. Simply type it in, save it, then run it. When all of the bytes have been successfully entered then the loader program will prompt you to hit any key when ready to save the code. Ensure your tape is positioned after the Megamon basic loader.

To run the program rewind the tape and type 'Load "MEGAMON"'. When the program has loaded the title screen will appear and you will be asked for an address at which to load Megamon. This can be any

address from 7000H up to E000H.

Once the address has been entered the object code for Megamon is loaded and you will be presented with Megamon's Front Panel screen display.

**Z80 Registers** — The top right of the screen shows the Z80 registers AF,BC,DE,HL,IX,IY together with the stack pointer (SP) and the program counter (PC). The register contents are shown (at start-up these are always zero) and then the contents of the memory location addressed by that register. There is also the register cursor (">"), which points to AF on start-up. Its use will be discussed shortly.

**Memory Display** — The memory display occupies the bottom of the screen and its purpose is to display the bytes around the memory pointer, indicated by ">". The bytes can be displayed either as hex or as Ascii.

**PC Instruction** — The instruction at the Program Counter is constantly displayed above and to the left of the Memory Display.

**List Display** — The left of the screen above the Memory Display is taken up by the List Display. At start-up this display will be blank, but if you are eager to see it in action then for the moment press 'L' followed by a full-stop. You will see the 14 instructions from address zero disassembled for your perusal.

Unfortunately space does not permit a detailed discussion of the undocumented instructions, needless to say their use is becoming much more frequent in many of today's top games. Disassemblers that can cope with them are rare and the format for displaying them varies. For example, look at the instruction: ADD A,AXL.

This means "add A to the low-byte of IX", the "L" tagged on to indicate the low-byte. Alternatively, you can use: ADD A,IXH.

This means "Add A to the high byte of IX", ie add A to I. Megamon would display the two instructions above as follows:

- (i) ADD A,iX
- (ii) ADD A,Ix

The letter in capitals indicates which byte of the register pair is being operated upon. The same applies to all undocumented instructions that use the IY register pair.

Here is a list of the Megamon keys and a full explanation of their usage.

**The Four Cursor Keys** (*Shift and 5,6,7, or 8*). The four cursor keys above the function pad are used to move the Memory Pointer ">" within the Memory Display in the appropriate direction, allowing you to step up or down through the memory in steps of one or eight bytes at a time.

**The Full Stop (Symbol Shift and "m")**: Pressing the full stop will advance the Register Cursor

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">" on to the next register pair in the Register Display.

**B — Return to Basic**: Pressing this key will produce the prompt "Are you sure?". In response to this press "Y" if you wish to leave Megamon and return to Basic. Any other key press will return you back to Megamon itself.

**C — Clear List Window**: The List Window can be cleared at any time by pressing the "C" key.

**D — Display Memory**: This allows you to change the address around which the Memory Display works. You will be asked for a new address

Listing 1.

```

1 REM *****
2 REM *           MEGAMON           *
3 REM *           THE MONITOR       *
4 REM *****
10 BORDER 1: INK 7: PAPER 1: C
LS
20 PRINT AT 1,6;"SPECTRUM MEGA
MON"
30 PRINT AT 2,5;"
"
40 PRINT AT 4,8;"© LAJ 1985"
50 INPUT "LOAD ADDRESS ? ";a
60 LET high=INT (a/256): LET l
ow=a-256*high
70 POKE 65535,high: POKE 65534
LOW
80 CLEAR a-1
85 PRINT AT 10,0;"PLEASE WAIT
- LOADING MEGAMON"
90 LET A=256*PEEK 65535+PEEK 6
5534
100 LOAD "MEGA"CODE A
9997 STOP
    
```

Listing 2.

```

200 CLEAR 54999
210 DEF FN H(H#)=16*(CODE H#(1)
-48-(7 AND H#(1))>"9")+CODE H#(2)
-48-(7 AND H#(2))>"9")
220 RESTORE 1000
225 LET address=55000: LET x=1
000
230 READ a$,check
233 IF a$="END" THEN GO TO 5
00
235 LET tot=0
240 FOR z=1 TO LEN a$ STEP 2
250 LET byte =FN H(a$): LET tot
= tot +byte
260 POKE address,byte
265 LET address=address+1
266 LET a$=a$(3 TO )
270 NEXT z
275 IF tot<>check THEN PRINT
"ERROR IN LINE 'ix': TRY AGAIN"
: STOP
278 LET x=x+10
280 GO TO 230
500 PRINT "DATA CORRECT"
510 SAVE "MEGA"CODE 55000,6670
1000 DATA "3EC9320040F3CD00403B3
BE11F7FF1911F015EB",2209
1010 DATA "195DDE1DD6E00DD66017
CB52B1823195FDE1FD",2744
1020 DATA "6E00FD660119FD7500FD7
401DD23DD231BDEFD21",2275
1030 DATA "3A5C3AD50B8332D50B32E
E0BC6A432F50B3EC312",1919
1040 DATA "215600220100ED733E173
1601BCD150EC0878CCD",1557
1050 DATA "B0ACD4A0ACD5F0ACDF01
4CD740010EC210E0001",2017
1060 DATA "1600FE13002D620EDB1C
0090705E2356D52A00",1700
1070 DATA "16C942430B0A00092E495
2504640444C53544750",1292
1080 DATA "40414F57F1120912D611A
0114E115B0E220F290F",1302
1090 DATA "D000C90C0B005C0D090D9
20D070DC00DC0D000",1699
1100 DATA "D00D30DE00DE90D30EFC
DA60B05DDE13007C00D",2514
1110 DATA "2A0A1610062004DD2A061
6AF3212163E00C0C307",1165
1120 DATA "CDC415060EDD220A16CDF
F0010F7C9DDE01DC056",2605
1130 DATA "0B3A12163D20273E17D73
E05D73E00D7DDE0C0C0",1952
1140 DATA "341141DD7E000D23CD030
B10F6A3E17D73E00D7AF",2112
1150 DATA "D7C1DDE110053E0032391
730E1321616C5AF321A",1600
1160 DATA "16DD7E00FDD2005C0000
41043FEFD200A0E132",1051
1170 DATA "1A16C00041035FECB200
5CD0006102CFEED2005",1779
1180 DATA "CD96051023FE403009F0B
0300ACDD5021016CDDC",2117
1190 DATA "021011F0C03000CDA5021
000E607110103CDE402",1639
1200 DATA "3A1316B72023CD7027BF
E202011C0B00179FE20",1946
1210 DATA "200932C2CD6A0279C00D0
13E0DCDA023E0ACD6A",1755
1220 DATA "02DD23C1C9FE513021FE5
92009C5ED4B1A1601C1",2339
1230 DATA "1010FE0020F3FE0B000C
    
```

for the Memory Pointer — this must be entered as a hex number terminated by Enter. If instead of a hex number you press the full stop key then the Memory Pointer will be set to whatever address the Program Counter currently holds.

The address is displayed along with its contents. You can either enter a new hex number for this location or press Symbol Shift and "z" (colon) to exit the memory change. When a new number is entered the memory pointer is advanced to the next location and your options are the same again. At any time during the input of a number you can press the colon keys to abort and leave the Memory Pointer unchanged.

**F — Fill Memory:** The prompt "Fill >" appears and the number entered here will be the "start" address for the program to use. You are then asked for the address at which the program will end its "fill" and finally the byte to fill the memory with. For example, if you enter 8000 in response to "Fill >", 8100 in response to "To >", and FF in response to "With >", the memory between 8000 hex and 8100 hex will be filled with FF (255 decimal).

**B — Go:** This allows you to execute the object code currently under examination with the use of "breakpoints", ie, places at which the object code is stopped in its tracks and control returned to the monitor for you to examine the registers etc. The address which you enter in response to "Go >" will be the address at which the monitor starts execution of the

object code. As usual with all prompts, if you press the colon keys then the operation will be aborted. You are then asked for an address "To >" at which control will be returned to Megamon, ie the address at which you wish your "breakpoint" to be inserted.

When you have entered this address Megamon will go off and execute the code. When the breakpoint has been reached, assuming that the code has not caused a fatal crash, a small line will be displayed on the screen and this means that Megamon is waiting for you to press any key before updating all of its displays.

**H — Search for String:** The prompt "Search For >" is displayed. You can now enter a sequence of up to 255 bytes which will form the string which Megamon will search for. Each number should be entered by pressing Enter and by pressing Enter on its own you will terminate the string.

At this stage, assuming the string can be found, Megamon will update the Memory Display and the Memory Pointer ">" will be pointing to the second byte of the input string. Also see the explanation of the next instruction, "A".

**A — Find Next Occurrence:** Pressing the "A" key will tell Megamon to find the next occurrence of a string you have searched for using "H".

**I — Toggle between Ascii and Hex:** By pressing the "I" key you can toggle the Memory Display Memory Display so that it shows either Hex or the Ascii equivalents.

**L — List:** You can enter a new address from which the disassembler will list its 14 instructions. But there are two other alternatives to entering a new address. If you press the full-stop key in response to "List >" the disassembly will begin from the address currently held in the Program Counter. Alternatively, you can press Enter in response to the prompt and the disassembly will continue from where it left off.

**M — Move a Block of Memory:** The prompt "Move >" will be displayed and the address you enter will be the start of the memory block you wish to move. The prompt "End >" asks you for the end address of the memory block and the prompt "To >" asks you for the destination address for this block.

The routine is "intelligent" so that if your destination address lies within the limits of the block you wish to move Megamon takes this into account and performs the move correctly.

**O — Read Object Code:** This reads a block of object code in from tape. You are prompted to enter a file name and then an address at which the code will be loaded. Obviously you should take care not to overwrite Megamon.

**P — Printer Disassembly:** With this option you can produce a disassembly of any length to your printer; you could even list the Spectrum Rom. The first address you enter, in response to "Print >", is the start address for the disassembly and the second

address is the end.

Assuming the printer is connected a disassembly will now appear on the printer which can be aborted at any time by pressing the Break key.

**R — Change Register:** By pressing the "R" key you can change the value of the register pair currently pointed to by the register cursor ">". The register pair will take on the value you enter at the keyboard.

**S — Single Step:** Megamon will execute the current instruction at the Program Counter when you press the "S" key, allowing you to examine the effects of the code upon the registers and memory. This function will also single-step through a Call instruction.

**T — Trace:** If you press the "T" key Megamon will execute the instruction at the Program counter in the same way as the "S" function above, except that using "T" allows you to execute a Call instruction automatically, as opposed to single-stepping through it.

**W — Write Object Code:** This writes a block of code to tape under a given filename. You are prompted to enter the filename and then the first and last (inclusive) addresses of the block you wish to write.

**X — Toggle Alternate Registers:** Pressing the "X" key will toggle the Register Display between AF,BC,DE,HL and the alternate registers AF',BC',DE',HL'.

Megamon is available on tape for £3.50, postage included, from John Mullins, 6 Haslewood Place, Eber Gardens, Leeds LS9 7PJ.

```
5ED491A16B181C1CD31",2344
1240 DATA "0EC9FE183006C61ECD310
EC928193A1616A72087",1689
1250 DATA "7BC638CD4A82C98E203E2
3CD6A027BCDB38C9FE",2264
1260 DATA "1928088E203E23CD6A02C
D560BC9FE1A28133E2B",1468
1270 DATA "CD6A823E23CD6A82CD560
B3E29CD6A82C9FE1B20",1955
1280 DATA "143E28CD6A823E23CD6A0
27BCDB38B3E29CD6A82",1731
1290 DATA "C9FE1C28283E28CD6A023
A1A16C59CD310E3E2B",1728
1300 DATA "02CD6A823E23CD6A027CCD8
38B3E29CD6A82C9FE53A",2114
1310 DATA "12163D286E1CD5F13A7C
9F1E8AC8D7C9E57DCD",2755
1320 DATA "310E3A12168728043E0F1
8143D280F7DFE372808",1891
1330 DATA "5E17D73E15D7AFD7E1C93
E06323917E1C9F8BF0F",2883
1340 DATA "E067C6396FDD7E08CDA98
7DD7E00FE9830848687",2141
1350 DATA "180DFE083086FE9830821
BF2410E28C9E60711F1",2842
1360 DATA "02CD6A82C9FE762E10012
02028052E11CDA987C9",1827
1370 DATA "876F2680197E23566FDD7
E00E98067E07210771",1742
1380 DATA "075807600764879D87BA0
38983C403480373231",1322
1390 DATA "03DB0F903C0805CE05DD8
5EC050606106238644",1496
1400 DATA "86C8F20C2E58CDB5877
BF0E800651C92E406",1870
1410 DATA "19DD5E11DD5602DD23DD2
3C9FCF320062E4D8619",2084
```

```
1420 DATA "1BEBFD328882E53861B8
E87188AFEDB280C2E54",1628
1430 DATA "86078E1BDD5E01DD23C9F
EE328072E55860F0E8A",1523
1440 DATA "C9FE82072E55860F0E8E
AC9012820FE32883E2",1743
1450 DATA "56C72E57C9CB5F208C2E5
0CDB50778FE0BC06651",2146
1460 DATA "C9FC981202820032E4CC
9FED20032E52C9FE9",2481
1470 DATA "280524D060CC92E11060
B0E0AC92E4CCD168778",1162
1480 DATA "C61847C924DCD16070E1
9DD5E01DD5602D023DD",1984
1490 DATA "2310E82E4E10E80F0F0E
607C4396F86870E18DD",1594
1500 DATA "5E01DD23FE3B2804410E2
0C9FE3DD8187FE6382E",2146
1510 DATA "4F3F06180E28090132161
6C9DD7E81FCB2828DD",1688
1520 DATA "7E03E687FE66DD23C2520
5DD23CD88063E868928",2851
1530 DATA "040E1C1802861CDD66FFC
9FE48D2F504DD23E687",2155
1540 DATA "CA5205FE07CA5205FE012
01ADD7E00CD7E073E8A",1989
1550 DATA "B9280882809DD28DD2BC
352850E598659CFE82",1933
1560 DATA "2823DD7E00FE222811061
AE592E11DD5E01DD56",1572
1570 DATA "02DD23DD23C9FE2AC2520
50E1A045918E9FE0328",1972
1580 DATA "17DD7E00FE2328072E128
6598E28C9FE2BC25285",1682
1590 DATA "2E1318F2FE0428D1CDD7E0
8CD580778FE04D8A585",1979
1600 DATA "FE07CA5205CD5D8578FE1
```

```
CC8DD668C9FE852808",2278
1610 DATA "DD7E88CD680718D8DD7E0
0FE26208C86582E110E",1758
1620 DATA "18DD5E01DD23C9FE2E208
4851C18EEFE3C625285",2862
1630 DATA "861CDD23DD668018E0FE8
03814DD7E01FE76DD23",2287
1640 DATA "CA5285CDD582CD5D05DD6
680C9FE0C8300DD23CD",2583
1650 DATA "A582CDD585DD6680C9DD2
3FEE120072E5806590E",2883
1660 DATA "28C9FE520042E5818F3F
EE920862E4D0668018E8",2162
1670 DATA "FEE320072E55860F0E59C
9FE920072E1106880E",1612
1680 DATA "59C92E5F812818DD28DD5
E08C9260079FE862805",1724
1690 DATA "DD238E1CC97FE8620050
61CDD23C978FE043809",1858
1700 DATA "FE863005C6574260179F
E043809FE063800C657",1758
1710 DATA "4F26817CA7C0E1C35285D
D23DD7E00FE8381321",2281
1720 DATA "8706811080ED89C252857
9C6626F812028C9FE48",1973
1730 DATA "4FC92E5F812818DD28DD5
2C92E54CDA9870E7278",1974
1740 DATA "748067279FE86CA5285",2146
1750 DATA "C92E3C85F2882E3ACDB
50748868AC92E11CD85",1882
1760 DATA "070E1ADD5E01DD5682DDC
8885EDD23DD23C07841",2079
1770 DATA "2FC92E74012828FE44C8C
35285812828FE452803",1734
1780 DATA "2E75C92E76FE4DC8C3528
5AF32161DD7E002E77",2122
```

```
1790 DATA "8128181E00FE46C81CFE5
6C81CFE5E83E813216",1898
1800 DATA "16C32852E18E07FE472
0038678C9FE4F208386",1449
1810 DATA "79C98687FE5728038E78C
9FE5F28838E79C98128",1799
1820 DATA "47FE6728032E7AC9FE6FC
252852E78C9A8A1A2A3",2455
1830 DATA "AGA9A8B801B28388B9B
ABBAF321616DD7E01FE",3081
1840 DATA "4830130F0F0FE687C6416
FD7E81CDA987418E28",1627
1850 DATA "18122E49FE838862CFEC
038012CDA987588618",1695
1860 DATA "DD23C9FE203819CD1607C
8978C61047DDE51DD",2786
1870 DATA "7E01CD06870E192E36DD2
3C9A728062E1D812028",1286
1880 DATA "C9FD0E20062E37012028C
9FE10200A238DD7E01",1630
1890 DATA "CD068718002E36DD7E01C
D06878619DD23C9C5E5",1838
1900 DATA "C6824F179F47DDE5109E
BE1C1C9F50F0F0FE687",2597
1910 DATA "47F18E28C9FE202E11381
4CDB58778C6A84DDCB00",2115
1920 DATA "5E280A470E07C94F0607C
98687FE3838028680E",1111
1930 DATA "18DD5E01DD5682DDC8805
ED23DD23CD78414FC9",2338
1940 DATA "2E12CDA9870E28C92E131
8F62E11CDA9870E18DD",1738
1950 DATA "5E01DD23C92E12C85F280
12CCDB5878E028C92E11",1782
1960 DATA "CB5F28092E14CDB587480
```

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# Megamon

(continued from previous page)

69AC9CDB5870E19DD5E", 1842  
1970 DATA "01DD5682DD23023C9F0F  
F0E607C6156F012020", 1700  
1980 DATA "C9F5E6074FF10F0F2FE60  
747C9F50F0F0FE6A3", 2095  
1990 DATA "C608470E20FC9B7875F1  
60821D0871911341701", 1529  
2000 DATA "04080ED0218181223817C  
908001C8D080F1C0F85", 870  
2010 DATA "112116081727171D02270  
91D08278D1D082789D", 418  
2020 DATA "08A0808080814628D0A4  
24328D08A444528D08A", 590  
2030 DATA "484C2808A446278D0A424  
3278D08A4445278D08A", 843  
2040 DATA "4C2780A958D08A49590D0  
A53508D08A58308A172", 994  
2050 DATA "452789F7528737572652  
83F08282828280852", 1298  
2060 DATA "456769737465728046696  
C080546F0857697468", 1753  
2070 DATA "79046764580845664084  
46973706C617904C69", 1593  
2080 DATA "7374808484C454084C448  
8494E43084445430841", 1159  
2090 DATA "444408524C41910852524  
34180524C418052524", 1174  
2100 DATA "884441108433584C08534  
34680434346804E4F58", 1482  
2110 DATA "8842804308418824508480  
84C8028484C2908418", 712  
2120 DATA "424308445808484C08535  
8082842432980284448", 972  
2130 DATA "290828484C29802853502  
9084E5A0850804E4508", 917  
2140 DATA "4308584F0858450850804  
8084A5208455820280", 941  
2150 DATA "202841462C41462708044  
A4E5808414444804144", 1061  
2160 DATA "43085354208534243084  
14E448084F52084F52", 1138  
2170 DATA "80435808524C430852524  
308524C08525208534", 1084  
2180 DATA "410853524108534C4085  
3524C084249548085245", 1145  
2190 DATA "530853455408524554084  
A508043414C4085253", 1157  
2200 DATA "5408584F50808414608455  
858084F555408494E08", 1102  
2210 DATA "45808044908045490805  
5534808495808495908", 1083  
2220 DATA "497808695808497908695  
908445464208284958", 1248  
2230 DATA "298028495929084C44498  
843584908494E49084F", 1024  
2240 DATA "555449804C44448043504  
480494E44804F555444", 1284  
2250 DATA "804C44445208435049520  
8494E4952084F544952", 1225  
2260 DATA "804C44445208435044520  
8494E4452084F544452", 1285  
2270 DATA "082843290846804E45470  
8524544E0828435444", 1057  
2280 DATA "80494D804908520852524  
408524C44084760854", 1029  
2290 DATA "6F085072696E740853656  
172636828666728054", 1677  
2300 DATA "6845E802083E084C6F616  
4085374617274085361", 1499  
2310 DATA "76652066726F08000466  
166458083E01CDD387C", 1747  
2320 DATA "082C3072101812238172  
6CD3781C9F5C85E53E", 2078  
2330 DATA "02DC30872101812238172  
A081611F0FF17ED6F8", 1769  
2340 DATA "1F0E6806CD568B3E3ACD6  
A02CD910A10F3CDA48A", 2091  
2350 DATA "E1D1C1F1C9F5C58083E2  
0CD6A821A13CD618018", 2386  
2360 DATA "F4C1F1C93A0816E6074F8  
781C686672E0323817", 2016  
2370 DATA "3E3EC6A02C9F5C5D5E53  
0813210163E04CD307", 2146  
2380 DATA "2181012238173A0F16C60  
3CD310E210581223817", 864  
2390 DATA "3E05CD310E21F8153A0F1  
6A7280321F015CD2A08", 1494  
2400 DATA "3E05321816210016CD2A0  
BCD038BE1D1C1F1C93A", 1814  
2410 DATA "0E163C6F26042238173E3  
ECD6A82C93E04CD307", 1473  
2420 DATA "3A0E16E073C6F2604223  
8173E20CD6A02C98604", 2075  
2430 DATA "E83A10166F2605223817E  
B5E235623D5C5D5808E", 1833  
2440 DATA "3A10166F3C321016260A2  
23817E0D11ACD618018", 1315  
2450 DATA "D7C9F57ACD8B97BCD838  
BF1C9F53A1116A7281A", 2617  
2460 DATA "F1F5C50E2FE283085FE7  
E30014F79CD6A023E20", 2126  
2470 DATA "CD6A02C1FC9F1F5E6F00  
F0F0FF0E0A3802C607", 2491  
2480 DATA "C630CD6A02F1F5E60FF0E  
A3802C607C630CD6A02", 2376  
2490 DATA "1C9F53E03CD307F1CD3  
10E3E81CD310E2A3817", 2248  
2500 DATA "228C16212028224108224  
308114108CDF014CD5D", 1234  
2510 DATA "0C28F8FE0C28087BFE412  
82F1B3E28121029FE0D", 1681  
2520 DATA "2832FE3A372664FFE2E2  
0877BFE4120618677B", 1955  
2530 DATA "FE4579280C21420811410

8EDAE8DA8EDA812132A", 1955  
2540 DATA "0C162238173E87CD310E1  
8833A4108FE28282E01", 1191  
2550 DATA "08082141087FE28282FD  
630FE0A3802D6871717", 1456  
2560 DATA "171717C81B1C1817C811C  
B1017C811C1817C811", 1675  
2570 DATA "CB102318D83FEFA737F5C  
5DC415C1F1C93FEFA", 3016  
2580 DATA "18F3A718F0E5C5FE3A208  
EFE613802D62821740C", 2314  
2590 DATA "0113808EDB1C1E1C93E313  
2333435363738394142", 1789  
2600 DATA "434445462E8C8E3E06CDD  
387210102238173A0F", 1041  
2610 DATA "16A73AF81528033AF8154  
F868021C30C56CB1138", 1573  
2620 DATA "02162878FE82811FE042  
80D7ACD6A02783CD83E", 1682  
2630 DATA "20CD6A022310E1535A485  
64E433E0ECD6A08C83E", 1883  
2640 DATA "84ED480816ED430816CD5  
F0A3E83CD307C0C415", 1804  
2650 DATA "ED580816CD568B3E28CD6  
A021ACD610B3E28CD6A", 1811  
2660 DATA "02CD85082A08163003C83  
801712322081618CE3E", 1283  
2670 DATA "0CCD6A08D8C83E08CDDA  
68B0A870DC8A870DC53E", 2439  
2680 DATA "0ACD6A08D1E1DBC8AF5E  
D5230079FE1E8A75E5D", 3272  
2690 DATA "52E3C4D08D380A8059C1E  
B09E803ED89C9E85059", 2548  
2700 DATA "C103ED89C9E5A7ED42E1D  
8E8E5A7ED42E1E83FC9", 3688  
2710 DATA "3E97CDA6808D8C83E08C  
DA680831C281AC53E08", 1948  
2720 DATA "CD6A0831288F79E1D11  
274ED52444D626813ED", 2175  
2730 DATA "80C9C1C1C93A0F16E0E13  
28F16C93E08CDA6808D", 2254  
2740 DATA "21F8153A0E16FE8438093  
A0F16A7280321F0153A", 1368  
2750 DATA "0E16875F160819712370C  
93A116E08132116C9", 1488  
2760 DATA "CD13803A0E163CE607320  
E16C923180C2B180911", 1077  
2770 DATA "F8FF18031180801922081  
6C93E08CDD387CDA1E", 1736  
2780 DATA "C93E38CDD3873E06CD318  
ECD8F14FE792808FE59", 2248  
2790 DATA "2884CD415C9CD3313215  
827D9ED563E3FE4A7FB", 2326  
2800 DATA "ED783E17C93E8F32A17C  
D331321F8151F15081", 1736  
2810 DATA "43813A08ED82A3E17228  
416C9F5C5D5E521F78", 2824  
2820 DATA "B7280A57A811FFFFEDB11  
520F8E7B7280CDA6A02", 2395  
2830 DATA "2318FAE1D1C1F17C9E1D  
1C1F1A7C9ED7358173E", 3182  
2840 DATA "7CCD6A083007C8ED48061  
618062004ED480616C5", 1784  
2850 DATA "3E7DCDA6803089C1C80C5E  
D48061618062004ED48", 1934  
2860 DATA "06166968E511481701030  
0ED80E136CD01D50E21", 1748  
2870 DATA "712370F3D9ED434617E05  
34417224217D908F5E1", 2346  
2880 DATA "22401708C1ED736A16C5E  
D73841631F015F1C1D1", 2236  
2890 DATA "E1D980F1C1D1E1DDE1FDE  
1ED780416F8C9E3C2B28", 3393  
2900 DATA "2B228616C5D5114817E08  
10380ED80D1C1E1F3ED", 2386  
2910 DATA "738416310416FDE5D5E5E  
5D5C5F5D9E5D5C5D908", 3113  
2920 DATA "F508ED7B58172A4017E5F  
1082A4217ED584417ED", 2118  
2930 DATA "48461709F83E5FCD6A02C  
DF814C93E8132191618", 1956  
2940 DATA "04AF321916C310FC9CDB3  
01E1D580616ED735817", 1827  
2950 DATA "21E50FE580436002318F  
8E9D10608ED80228616", 1797  
2960 DATA "DD21E50FDD7E90FE76CA0  
110210711010908EDB1", 1917  
2970 DATA "CAB618010908EDB1CA521  
0010908EDB1CA2D100", 1636  
2980 DATA "0680ED181C7A100180080E  
DB1CAD510FE9CA6918", 2426  
2990 DATA "FEDD2080D07E91FEE9CA6  
E18DD7E08FFED2080DD", 2799  
3000 DATA "7E81FEE9CA7310DD7E08F  
EED2821DD7E01FE4528", 2533  
3010 DATA "88D35680C9DD368108C32  
D18E4FD208D35680C9", 18649  
3020 DATA "D03368108C32D1310F15F  
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3030 DATA "DDE1FED1E7B8416C8080  
808083ED738416318A", 2235  
3040 DATA "16FDE5D5E5D5F5D9E  
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3060 DATA "10C3CF8F12A0616E52A4  
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3070 DATA "D4DD7E08FEC92810F6C2E  
6FA214418DD7780CDF8", 2988  
3080 DATA "10C3CF8F12A0616E1228  
616ED73841618AFCDF1", 2129  
3090 DATA "1822AC1721110CDF818C  
3CF8F2A4C1722861618", 1488  
3100 DATA "982A8F1518882A8016188  
32A8216220616C38108", 932  
3110 DATA "DD7E814F179F47A06168  
9224AC17D07E082AF815", 1558  
3120 DATA "E5FE10282CFE382810FE3  
02812FE282814FE2828", 1989  
3130 DATA "16E1C36110F138FAC3011

8F138F4C3810F128EE", 2578  
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BFA15F108F5E122F815", 2539  
3150 DATA "ED43FA1520D4C38110E2A8  
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3160 DATA "1621FE1041842310FD4EE  
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3170 DATA "DD6081C9DD7402D7581C  
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3180 DATA "FCD4AC4FE4ECCDAFAD  
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3230 DATA "DDE5E1ED422801D0ED435  
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3250 DATA "38F3E02CD8116AF32121  
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3270 DATA "08380838181428BF4DD23D  
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3290 DATA "EDB1C8C5E5DD211D163A1  
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3300 DATA "2808DD232310F5E1C1220  
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3310 DATA "811280C3E83CDA6808D3  
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3320 DATA "216C17DDE5AF3711100C  
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3370 DATA "CDC307CDD415F1C0D310E3  
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3380 DATA "57170189083620ED80E11  
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3390 DATA "8D2838FE8030F1FE0C201  
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3400 DATA "153E9C5D5F133E20CD5F1  
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3580 DATA "8989898989898989898989  
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3600 DATA "4114804442810101008F  
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3620 DATA "7987818747E68D687ED4  
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3630 DATA "8819D1FC9C3A3917473  
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3640 DATA "28823888CDD14CDD3141  
8873A39173C32917C1", 1484  
3650 DATA "C93A39173C32917C93E8  
1323917C93A391747", 1538  
3660 DATA "3A3517883D473A3717882  
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3670 DATA "180C323817C1CF9E0828D  
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3680 DATA "CDF61438F8C9C5D5E5FD2  
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3690 DATA "783C2838FE282837FE192  
832214C157A3C280A21", 1436  
3700 DATA "7415FE282803219C15168  
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3770 DATA "282328232833829", 839  
3780 DATA "482803A2828252F21202  
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3790 DATA "173A31617956F3A3717946  
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E28D5F13C97508A08", 1877  
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308F8126608608F080", 1898  
3820 DATA "F3127408A08A708A908A  
808A0808A081088308", 1726  
3830 DATA "8580870808808808080808  
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3850 DATA "028108011701280139013  
E01480153015601581", 527  
3860 DATA "1680178017A0183018A018  
01900196019E1A081", 1383  
3870 DATA "AC8181018601C701D081D  
1E01E081E081F01F81", 2158  
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022902330238023C02", 361  
3890 DATA "41028824E02582858285  
026102660268027F02", 935  
3900 DATA "8202783808C2E02D102E  
02F0202202F402F602", 1977  
3910 DATA "F882F82F02F02E0280038  
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3920 DATA "8C838310831083120314831  
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3930 DATA "81638A817FE043803D11  
10447056407C489904", 1102  
3940 DATA "A784A8482848584C784E  
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3950 DATA "1685F08478584858485848  
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3960 DATA "EE85862806248641067  
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3970 DATA "CE84F86FE0628705A076  
68788786878887898", 1486  
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3990 DATA "B88AC88AC88A8D8A8E8A  
18E8A8E8A8E8A8F8A", 2279  
4000 DATA "F88A88F88A88B88B88B88B8  
8888888288B88C888", 1108  
4010 DATA "4588888888888888888888  
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808C10C858C8D8C8C8", 1468  
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4070 DATA "C38D88D8D8D4213AC8AF  
808D10E1A8E178D10E", 1238  
4080 DATA "208E2A8E28E28E68A358E4  
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4090 DATA "7687E87E8E8E8E8E8E8E  
848E8A9E8E8E8E8E8E", 1668  
4100 DATA "888E8E8E8E8E8E8E8E8E  
C8E8E8E8E8E8E8E8E8E", 1663  
4110 DATA "180F148F180F240F2A0F2  
D8F310F380F39F380F", 555  
4120 DATA "4D8F510F598F58F648F6  
C8F748F7C8F8A8F89F", 1286  
4130 DATA "958FA8F8D8C8C8C8C8C8E  
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4140 DATA "8A18081010131016101  
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4150 DATA "38183E104110541049104  
105210551058105810", 988  
4160 DATA "5E186118641869186E187  
3187618791883188718", 1286  
4170 DATA "8D18618A818821888188  
E18C218C918CD18D218", 2081  
4180 DATA "D518D918DE18E118E18E  
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4190 DATA "58115A116211671175117  
A1186118D119C11A211", 1373  
4200 DATA "A81180118511891191C1911  
D11D311D611D811E111", 2156  
4210 DATA "E011ED1811280853808  
48458A388438843E80", 976  
4220 DATA "4280458A888188D938583  
E8A388A8888121212", 662  
4230 DATA "581312881288128812881  
58D8A88898C8E8C28D", 1632  
4240 DATA "E8888A12C887C8788A8  
18A888A888A888188", 1625  
4250 DATA "3388A888A888C8C3481A  
80828887282C128

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# Telsoft

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

tions program Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemod 2 or similar modem; later we hope to

adapt the service to work with Commodore's modem.

## Hexloader

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL

&6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

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

When a program you want to

Figure 1. CBM-64.

```
5 REM HEX LOADER FOR CBM 64 FIG.1
6 REM
10 FOR I=680 TO 727 READA:POKEI,A:T=T+A
20 NEXT I:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ".T-6716:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,169,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000 LA=52855
110 INPUT"START ADDRESS":A
120 IF (A<SA) OR (A>LA) 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:INPUT#
160 IF #="END" THEN GOTO 900
170 IF LEN(#)=20 THEN GOTO 190
```

```
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B#=MID$(#,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,DIT=1+D NEXT
220 B#=MID$(#,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+B:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B,D);C#"??"
290 B=8:NEXT GOTO 150
300 E=R: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+C#:NEXT RETURN
400 X=ASC(C#)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X*7:IF X<10 THEN E=1:RETURN
430 IF X<15 THEN E=1
440 RETURN
```

```
500 H#="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A:"? ".T=A-32768:AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"="
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$(H#,1+(XAND15),1):RETURN
800 SYS 600 (A=CHR$(34))
810 PRINT PRINT "TO RECORD CODE ."
815 PRINT PRINT "LOAD C# DOWNLOAD."
820 PRINT C#,"1,1":RETURN
825 PRINT PRINT "THEN TYPE NEW."
830 PRINT PRINT "RETURN."
835 PRINT PRINT "TO RUN THE PROGRAM."
840 PRINT SYS 51000 (RETURN)
900 PRINT PRINT PRINT "1. ENTER DATA"
910 PRINT PRINT "2. PRINT DATA"
920 PRINT PRINT "3. SAVE DATA"
930 INPUT 2 ON 2 GOTO 100,500,800
```

Figure 2. CBM-64.

```
51000 ? A9068021100802000=3E2
51008 ? A90F806602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF80A02BA9E920E=510
51032 ? 200AC92007CB20F8=4D5
51040 ? CADD30CE931F023=532
51048 ? C35F0140336D006=43F
51056 ? 208EC7405BC7A314=410
51064 ? 20D2FF202FCB0A0B=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C40C82063=411
51088 ? CC2022CD8A9585FD=4FF
51096 ? A9CE85FE2028CDA0=547
51104 ? 8020950C202FC0C9=404
51112 ? 44F00B9540ED209=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA90885BA20=4B9
51136 ? 25CD8A9020A0C0A9=43A
51144 ? B885F8A9C0D85F0A=6A0
51152 ? 0A20950C2025CDB3=383
51160 ? 95CC984890048C83=400
51168 ? CE20D8C968A82025=404
51176 ? CD20950C9848A906=404
51184 ? 8D83CE20D8C9ADA7=5E3
51192 ? CE85FBAD80CE85FC=6EA
51200 ? 68A82060CB90185=38A
51208 ? B885F8A9C0D85F0A=6A0
51216 ? 20D2FFA90885BA20=4B9
51224 ? CEE8D001C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6A20D9C00C90D009=4DD
51248 ? A90085C7A92020D2=3E0
51256 ? FFA90D20D2FF60A9=4E7
51264 ? 0D2029C8A90D20D2=306
51272 ? FF602063C0A000A9=43F
51280 ? FF9993CE0C8D0F20=5FB
51288 ? D2CB90FE20D2CB00=5E0
51296 ? FB0D72CEA000807C=4D0
51304 ? CE8C7D0E202ECCDD=4D4
51312 ? 72CE29F0C980D09E=506
51320 ? 20D2CBB0A9973CE=599
51328 ? C8202E00009D0F0=4EB
51336 ? A000AD75CE298D00=492
51344 ? 0FA52B85FB18A52C=3D8
51352 ? 6D75CE85FC40A9C8=587
51360 ? AD78CE85FBAD73CE=607
51368 ? 85FC20D2CBB0A997=55E
51376 ? D9CC20D2CFFC820D9=607
51384 ? CC202E00010D0EA=528
51392 ? A92020D2FFD705CE=56A
51400 ? 202ECD20D2CBB07E=4D7
51408 ? CD70CEFF0BA95820=503
51416 ? D2FF2030C84057C8=520
51424 ? 20D2CBB0F8CD7DCE=65D
51432 ? D0E8AD75CEA88393=687
51440 ? CED00E2030C8A991=4EE
51448 ? 20D2FF407FC94057=51F
```

```
51456 ? C8A0008070CE8C7D=447
51464 ? CE20D2CBB0F991FB=58F
51472 ? 202E00C80C77CE00=4D3
51480 ? F020D2CBB0E0CDD7=59E
51488 ? CEF00A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEFF034C23C9=473
51512 ? 20ACC82030C80AD7=5A9
51520 ? CE8A9009993CEAD=506
51528 ? 84CEC902D02520CB=436
51536 ? C8A9C820F30BA955=568
51544 ? 2016D8A95020F3CB=432
51552 ? 20C7C8A9730CE868=54F
51560 ? B933CE0D0239D0F7=5D4
51568 ? 4C5807A9552016CD=3DF
51576 ? 20F1C846C309A77=4EF
51584 ? CE20D2CBB0D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53E
51600 ? 4C50C8A52B85FA95=4F5
51608 ? 20C8F0A000B1FB95=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285FA852385=443
51632 ? FC4C98C918A5FB69=57D
51640 ? 02852D852F8531A5=37B
51648 ? FC6900852E853085=412
51656 ? 32602063C0A000A9=43A
51664 ? 84CEA908B0D2E6A0=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098D0CCE202FC0=4D4
51688 ? C914F016C90D0F05=4E2
51696 ? C924D01920D2FF8D=544
51704 ? C3CE84CE50C9E000=64E
51712 ? D0E3E0000DF20D2=554
51720 ? FFC84CE5C9C93090=554
51728 ? D4C93A901548A0C3=444
51736 ? CEC924F004684DC5=450
51744 ? C968C941908FC947=48A
51752 ? B0BB20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0A89DC3CE834CE5=61A
51776 ? C9E000FA00E001D0=52A
51784 ? 07D0C3CE924F095=4FF
51792 ? A92020D2FFA90920=54F
51800 ? C3CEA2008CE0CE8E=544
51808 ? D0CE8E1D1CE8ED0CE=659
51816 ? ADC30CE924D006A9=512
51824 ? 0F8D0CCE83DC3CE=5DD
51832 ? C9FFF01D20C80A9=582
51840 ? 34188DC3CE6D0CE=524
51848 ? 8D0CF0A9006DD0CE=566
51856 ? 8D0CE00820E84C75=534
51864 ? C8AD0CF0A9006DD0=564
51872 ? A3CE08AD0CE99A3=650
51880 ? CEC8188C830CE82=561
51888 ? CE8E81CE692025D=4ED
51896 ? A2008D41CE0921F=500
51904 ? 0720D2FF834C8A0A=570
51912 ? 4CDEC9AD0CE8DCE=65E
```

```
51920 ? C8AD0CF0A9006DD0=564
51928 ? D0CE8E1D1CE8ED0CE=659
51936 ? D2CE6D0CE8D0D0CE=6BE
51944 ? B005CE0CE0D0E660=625
51952 ? 2063C0A90F8D8602=474
51960 ? A95185FA90D85FE=515
51968 ? A000209D0C2025C0=343
51976 ? 209D0C209D0C209D=3DF
51984 ? CC2022CD20A90C20=386
51992 ? 95CC2022CD2095C0=411
52000 ? 202FC820D2FF608E=421
52008 ? 81CE8C820E20690C=480
52016 ? 20ECC200A0C900=48F
52024 ? D00D20FD0CC931F0=4F0
52032 ? 062001C4C35C88D=314
52040 ? 80CEA81CEA0820CE=597
52048 ? 60AE92CE9A4C5BC7=4CE
52056 ? 2022CD8A92285F0A=465
52064 ? CE85FEA0002095C0=4D0
52072 ? 2025CD000FA92099=393
52080 ? 93CE880FA8D930CE=619
52088 ? 202FC820D2FF608E=421
52096 ? 00F0F520D2FF88A9=58F
52104 ? 209993CE4C80C0C9=50A
52112 ? 0DF0020D2FF9993=4BD
52120 ? CEC801D0D0A9320=579
52128 ? 20D2FF60A92020D2=48A
52136 ? FFA94F20D2FFA94B=58C
52144 ? 20D2FF60A9138D00=452
52152 ? DEA9128D00DE69A9=4CD
52160 ? 538D00EA9528D000=40E
52168 ? DE60A996188D87CE=547
52176 ? 8C82CEA8C82CE2004=4D4
52184 ? CC20E000CE870ED0=677
52192 ? 02386820FD0C80EE=509
52200 ? 60A9FA8C82CEA820=597
52208 ? 04CC88D0FA8C82CE=616
52216 ? 602004CC8A82A80A=3EE
52224 ? D0FDAA0200C00020=45E
52232 ? 25CD8A90220A8C20=364
52240 ? 95CCAD8E0CE20D2FF=573
52248 ? A92020D2FFA90320=3A6
52256 ? ABCC20D8C9604D7D=48A
52264 ? CE8D7DCEA208AD7D=4A8
52272 ? CE2A9010AD7DCE49=411
52280 ? 088D7DCEAD7DCE49=460
52288 ? 188D7DCE2E7C0CE=3D5
52296 ? 7DCEAD0E160A000=516
52304 ? A90099004C801840E=
52312 ? D0F660A99320D2FF=5B3
52320 ? 60A8A5A2290FD01F=37E
52328 ? ASD448A5A22910F0=4A1
52336 ? 05A9A44C800CA920=42B
52344 ? 20D2FFA90085D4A9=510
52352 ? 9D20D2FF6885D468=53F
52360 ? 6020D2FFC8B1FDC9=620
52368 ? 21D0F608602025CD=4B9
```

```
52376 ? A90C20A8CC2095C0=46D
52384 ? 60A9058E81CEA9A9=4E6
52392 ? 2020D2FF4A00FA8E=503
52400 ? 81CE00C914F00A9=585
52408 ? 7FF00160A91460A9=456
52416 ? 7F0020E4FFC90130=504
52424 ? 07C9D880038E960=4AF
52432 ? 60C941900EC95890=494
52440 ? 08C9619006C97880=49C
52448 ? 0249206A88A480A9=2D5
52456 ? 20E1FFD0034C59CB=533
52464 ? 2868AA6860AD00DE=485
52472 ? 49016A9003A90060=357
52480 ? AD01DE6A8A000DE=2C0
52488 ? 49026A686860200C=223
52496 ? CD0FB8D01DE20EC=508
52504 ? CC002025CD2028D0=373
52512 ? A90D20D2FF60A829=300
52520 ? F08A6A6A6A0930C9=3CA
52528 ? 3A30018690720D2=21F
52536 ? FF6820F0A930C93A=31B
52544 ? 300318690720D2FF=2F4
52552 ? 60444F574E4C4F41=2C4
52560 ? 44204D45E552131=243
52568 ? 2020205245434549=228
52576 ? 5645213520202045=1FE
52584 ? 58495420544F2042=28A
52592 ? 4153494321362020=22F
52600 ? 2053415645204259=28A
52608 ? 544553212620553=285
52616 ? 452012205344F50=26D
52624 ? 209220544F205245=2C4
52632 ? 5455524E20544F20=20C
52640 ? 4D454E5520292145=28C
52648 ? 4E544552204E554D=2F9
52656 ? 4245522021494620=281
52664 ? 414444524553320=266
52672 ? 495320494E204845=2C8
52680 ? 582C119D9D9D9D9D=476
52688 ? 9D9D9D9D9D9D9D9D=508
52696 ? 9D9D9D9D9D9D9D9D=508
52704 ? 9D9D9D9D9D9D9D9D=508
52712 ? 4958205749544820=385
52720 ? 2421535441525420=2E3
52728 ? 414444524553320=31E
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 414444524553320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D205449544C4520=26E
52784 ? 284D415820313620=1E5
52792 ? 438415227332020=219
52800 ? 21124E494E414C20=1B3
52808 ? 40494922C205452=2M5
52816 ? 592041474149420=249
52824 ? 3A021444954320=216
52832 ? 4F52205441504520=26B
52840 ? 282042F454202920=1E0
52848 ? 3F21000000000000=000
```

## A reminder of how to use the Telsoft service.

download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program

will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run.

### Option 6 for CBM-64

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



Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&69FF
20 CLS:PRINT
30 INPUT " START ADDRESS (Hex) ";A$
40 A=VAL("&"+A$)
50 IF A>&6F87 THEN 200
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT "~A "
80 INPUT " : " B$,C$
90 IF LEN(B$)<>16 THEN 50
100 T=0
```

```
110 FOR N=0 TO 7
120 X$=MID$(B$,2*N+1,1):GOSUB 300
130 IF E=1 THEN 260
140 X$=MID$(B$,2*N+2,1):GOSUB 300
150 IF E=1 THEN 260
160 B=EVAL("&"+MID$(B$,2*N+1,2))
170 "A=B:A=A+1:T=T+B
180 NEXT
190 FOR M=1 TO LEN(C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E=1 THEN A=A-1:GOTO 260
220 NEXT
```

```
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-B:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=B*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)>65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6A00 :A9C80AFA20120F4,4C6
6A08 :FF20A16C20486DC9,38A
6A10 :31F008C934F8E9C9,4C8
6A18 :35F0084C0C6A4C47,280
6A20 :6AA98C20C3FAF8E,4B2
6A28 :A000A2FF20FAFFA9,4FD
6A30 :03A220F04FFA9C0A0,4C0
6A38 :FEA20020F04FFA9C,4BC
6A40 :0C20E3FF20F78A9,439
6A50 :A915A20120FAFFA08,3E7
6A60 :0C6C90F8200C6C80,34B
6A70 :F8A0008477B47884,416
6A80 :D56DA5782F0C98,4B7
6A90 :D0E2200C6C80099,469
6AA0 :7180C820056C009,364
6AB0 :D0F8A000A574298,422
6AC0 :D000A51C05718A5,354
6AD0 :1D65730577C820C,209
6AE0 :B008520C3F8C200,524
6AF0 :60C81A0F00A57320,435
6B00 :826D200C6C80A0C5,3CC
6B10 :7AF000A95020E3FF,478
6B20 :20E7FAC67A620A,34F
6B30 :6C00C537F000A9,40C
6B40 :5020E3FF2077FAC,48C
6B50 :676AA573A89856F,43E
6B60 :D00E20E7FA9020,388
6B70 :E3FF4C36A6766,46A
6B80 :A0008478A47B200,2C9
```

```
6B00 :6CB0F2917620056D,477
6B10 :C8C47500F1200C6C,45A
6B20 :80E3C57AF000A950,48E
6B30 :20E3FF20E7FFAC67,499
6B40 :6A200C6C800CFC570,3C1
6B50 :F000A95020E3FF4C,447
6B60 :167A28C76A20E7FF,429
6B70 :A573A898509856F,416
6B80 :A58AC982D05820D7,3F9
6B90 :6BA9C820556CA955,588
6BA0 :20306EA95020556C,29B
6BB0 :A915A20120FAFF20,394
6BC0 :F768A471C8000985,505
6BD0 :6FD05190D0F7A90C,4A4
6BE0 :20E3FF20A56DA95A,437
6BF0 :0502A96F8503A907,3D7
6C00 :20006520006EA900,2DA
6C10 :6DA9520006EA90D,202
6C20 :20E3FF20F0A0A9D,202
6C30 :20E0FF4C0C6AA955,38F
6C40 :20386EA99620556C,20E
6C50 :4C6A68A475200C6C,2D2
6C60 :0008FA200C6C200C,316
6C70 :6C4C86B4C6A9A9,336
6C80 :2020E3FFFAV6F20E3,43D
6C90 :FFA9B20E3FF68A9,51E
6CA0 :9CA000A6A00092D0,41E
6CB0 :00A21320FAFFA212,387
6CC0 :20E4FF68A297:23F,4C8
6CD0 :FFFA29620F46A20A,553
6CE0 :9CA000A6A0002D0,41E
6CF0 :E0A21320FAFFA212,387
6D00 :20E4FF68A297:23F,4C8
6D10 :00A21320FAFFA212,387
6D20 :20E4FF68A297:23F,4C8
6D30 :00A21320FAFFA212,387
6D40 :F4FFB00C9007D005,248
6D50 :6084C0C6AA7E20,20B
```

```
6D60 :496C06BF00023060,374
6D70 :A58AC982D0062079,369
6D80 :6E80C680991A201,447
6D90 :20E4FF68A297:23F,4C8
6DA0 :608AA2D2CA0C8A0D,5AA
6DB0 :FBA0A6A9000A7EA0,450
6DC0 :20A96C00008FAA7E,449
6DD0 :60A9E0000A20FF20,452
6DE0 :F4FFA900058AA90C,460
6DF0 :20E3FF20A0A0A9A,3E4
6E00 :20006EA9090802A9,2F0
6E10 :6F0503A00020F6B,39C
6E20 :20156DC941F000C9,370
6E30 :42F011C943F8174C,362
6E40 :616CA9000A20120F4,335
6E50 :FF4C076CA9000A203,3C4
6E60 :20E4FF68A297:23F,4C8
6E70 :A20420FAFF6E8A05,433
6E80 :7C20E3FF44FE20A8,46B
6E90 :6DA98820006E20F8,2C4
6EA0 :60A01720156DC941,200
6EB0 :F000C942011C943,413
6EC0 :F0174C616CA9000A,372
6ED0 :0120E4FF68A297:23F,4C8
6EE0 :07A20520F46F4C09,314
6EF0 :6DA987A20A20E4FF,3D6
6F00 :E68AA0A7000009,443
6F10 :00E0A00A20120F4,3E0
6F20 :FFA21320E3FF20E3,495
6F30 :6C2053AC0820006E,2E3
6F40 :A90520006E20F6B,2C1
6F50 :20A0A0A90520006E,274
6F60 :20F8A020A0A0A905,26B
6F70 :20006EA90820A0B,2DE
6F80 :60847EA90320006E,2A9
6F90 :A0991A20020F4FFB,49F
```

```
6F00 :A90C20E3FF20A0B,3EF
6F10 :A90720006EA99A85,306
6F20 :02A96E0503A000020,361
6F30 :F86D20A0B020996D,3C0
6F40 :20996D20996D20A0B,317
6F50 :6DA9A20006E20F8,2C6
6F60 :6D20A0A0A9082000,278
6F70 :6E20F8A020A0A0A9,348
6F80 :4910057A267A2678,299
6F90 :A90FA20020F4FFB,3D5
6FA0 :60A90020006E20A0B,2B7
6FB0 :6D20A0A0A90820A0B,33A
6FC0 :20A0B020E7FF20E7,445
6FD0 :FF604029F0A6A6A6,3FE
6FE0 :0930C93A300318F,1F1
6FF0 :690720E3FF60290F,312
6000 :0930C93A300318F,1F1
6010 :0720E3FF60290F,312
6020 :78A200A578A2A900C,30B
6030 :A578A988578A57A,390
6040 :4910057A267A2678,299
6050 :CAD0E0020E3FF0C,5AC
6060 :B182C90000F6C060,4F7
6070 :067DAA920E3FF,478
6080 :CAD0FAA67D00C97F,55F
6090 :D00A90620F4FF0B,4FD
6100 :00F812A97F9C200B,3C3
6110 :00C90A000A0C90D0B,5A1
6120 :06C907F002A90060,2D1
6130 :06720E3AC0820006E,2E3
6140 :A20120FAFFA903A2,484
6150 :0720E4FFA903A20,403
6160 :20E4FF9829020F4,48A
6170 :A47CA997A20920F4,41F
6180 :FFA903A2020F4FF,464
6190 :A991A20020F4FFB,49F
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23650,0:CLS:PRINT
30 INPUT "Start Address ";a
50 IF a>1135 THEN GO TO 200
60 IF a<60000 THEN GO TO 20
70 PRINT a1
```

```
80 INPUT " : " i$;
85 IF B$="END" THEN GO TO 200
90 IF LEN B$<>20 THEN GO TO 200
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=B$(2*n+1 TO 2*n+1)
130 GO SUB 300:LET y$
130 IF E=1 THEN GO TO 260
140 LET x$=B$(2*n+2 TO 2*n+2)
150 GO SUB 300:LET y$+16*x
```

```
150 IF E=1 THEN GO TO 260
170 POKE a,y:LET a=a+1
180 LET t=t+y:NEXT n:LET y=0
190 FOR m=1 TO 3
200 LET x$=B$(17+m TO 17+m)
205 GO SUB 300:LET y$+16*x
210 IF E=1 THEN LET a=a-1:GO TO 260
220 NEXT m
230 IF t=y THEN PRINT " : " i$;:GO TO 50
```

```
240 PRINT "Checksum Error"
250 LET a=a-B:GO TO 50
260 PRINT "Typing Error"
270 LET a=B*INT (a/8):GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23650,0:STOP
300 LET e=0:LET x$=CODE x$-48-7*(x$-9)
310 IF x$<0 OR x$>15 THEN LET e=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :E0C364ECCD66DCCD,631
60016 :50EDC347E39F0C,5AF
60024 :80EDC347E39F0C,5AF
60032 :35C4B7EAC366EACD,508
60040 :15ED3FEACD366EACD,5FD
60048 :15ED3FEACD366EACD,5FD
60056 :EACD66ED11E5E0B6,55C
60064 :903FEFF121310FC,45B
60072 :15E11CDE0E6173E,302
60080 :20121310FCDD1FED,3DA
60088 :30B3C250EDC01FED,58B
60096 :30B3C250EDC01FED,58B
60104 :10F8326E3FE30002,3E9
60112 :80F326E3FE30002,3E9
60120 :3E65FECD0E3C6A5,5A1
60128 :3E65FECD0E3C6A5,5A1
60136 :0AE1312CDEB0C0,552
60144 :02F23A69FE68020,51A
60152 :00214853C6A0E8F,3AC
60160 :004789226FE000,10A
60168 :11CDEEDC1FED309A,47F
60176 :12130CCDEB0C79FE,45C
60184 :02F23A69FE68020,51A
60192 :ECCD1FEDDAAEA21,574
60200 :6FEFBE2B1335B11,326
```

```
60208 :0E0E12133E0012CD,340
60216 :07ECCDA6E33AAEA,681
60224 :CD1FEDDAAEA2178,518
60232 :E0E12133E0012CD,340
60240 :60E8B56F3E000C67,30C
60248 :3E000E2000CDD70E,49F
60256 :3E2132005CC3FF0E,487
60264 :3E00326FEF3270E,3C7
60272 :EDDAAEA21780E,434
60280 :EDDAAEA21780E,434
60288 :0E3C6A0E3FE0020,586
60296 :0E3C6A0E3FE0020,586
60304 :E12130C3A6A0E8F,302
60312 :200CDD1FEDDAAEA,5DC
60320 :21FEDDAAEA21780E,584
60328 :21FEDDAAEA21780E,584
60336 :9EC22E03E3E63E2,599
60344 :E3E6032E3E3E3E3,480
60352 :32E4E33000C0FE21,503
60360 :2003CD15ECCDD70E,581
60368 :CDAECC21E5E0B6,55C
60376 :E0F8326E3FE000C6,422
60384 :00214853E0004B66E,561
60392 :0C7FE00020E2A25,48C
60400 :0020F63EACD0B4E,589
60408 :003DFECC366EACD,3E8
60416 :3E030FBC3BDEAF3,594
60424 :0E03AFD3FF10F83E,3DB
60432 :40D3FF3E003E003E,56F
```

```
60440 :31D3FF3E003E003E,56F
60448 :320D5C32405C30E1,250
60456 :03FE21915C0B9F0B,52F
60464 :CD50E0C366EACD13F,56B
60472 :0E06D6ED366EACD13F,56B
60480 :21E5E03E00C00E,454
60488 :CDBA0ECC366EACD,654
60496 :E0C30D77ECCD77E,50F
60504 :CDBA0ECC366EACD,654
60512 :E233E00C00ECC,661
60520 :04ECC3CDA3ECC30E,498
60528 :04ECC3CDA3ECC30E,498
60536 :04ECC3CDA3ECC30E,498
60544 :93EC3C97FE000C,521
60552 :04ECC3CDA3ECC30E,498
60560 :000BF03E20C0B4E,651
60568 :F13DC3FECCD0A0E,651
60576 :CDA3ECC3CDA3ECC30E,5A6
60584 :CDBA0ECC366EACD,654
60592 :C9F513E6F0C01FCB,60C
60600 :1FCB1FCB1FCB1FCB,60C
60608 :3AFAC6ECC0A071215,490
60616 :1FA00FF630E30AF,60A
60624 :D4ECC00712130C921,46C
60632 :04ECC3CDA3ECC30E,498
60640 :173E20772310FC3E,339
60648 :000779E52170EFA,53B
60656 :77C50E0077A6CB1,449
60664 :300D7EE0077A6C,3C9
```

```
60672 :E0E10326FEF3721,355
60680 :6FEFCB1623C1600,394
60688 :20E2C1E1C9110001,394
60696 :216A00CDB50C393A,32F
60704 :963277EFD47EDDA,529
60712 :2EEDF1C366EACD,508
60720 :ED7BE601F60203FE,54C
60728 :AF2177E35200237,2FC
60736 :1C9CD77E030E0C9D,0F0
60744 :47EED0E0E0E0E0E0,5E6
60752 :F00BF3A01E00E0E0,5E6
60760 :20043E3610020E307,187
60768 :D3FF07B7FF1C9F55A,675
60776 :01E0E00200A3E36,376
60784 :D3FF07B7FF1C9F55A,675
60792 :000BFF60037C00B,59
60800 :FFE60237C00BFF6,626
60808 :3020040B7FA7C93A,360
60816 :01E0E00200A3E36,376
60824 :10023E36D3F0B7F,357
60832 :1C9CD47E03A73E0D,30E
60840 :F1C366EACD366EACD,508
60848 :20FDF1C9DACCDD30,62A
60856 :120FAC3C0D5E3FE,780
60864 :7F2013C0DF0E0E0E,537
60872 :200CDE0020053E20,28A
60880 :D73E00D71003E20,384
60888 :D73E00D73000C0E,4E0
60896 :2120033E00D73E3F,2E6
```

```
60904 :D73E00D71E1D1C1,640
60912 :1C9FE07201FECB28,4F3
60920 :19FE0C2014FE0020,360
60928 :10FE00200C020F0A,387
60936 :00E0E000A11E3E,40A
60944 :000C93E007C9C0D00,32C
60952 :3E00C001163E1032,1C4
60960 :095CC00121601CD,302
60968 :1122C9C5E121600CD,257
60976 :1122C9C5E121600CD,257
60984 :C00116C0D47E30F8,451
60992 :05C00EE1D1C1C93A,50D
61000 :35C00C8F200C3A00,287
61008 :5C0F521300C00AEF1,403
61016 :A7C937C9F511000,30E
61024 :C018DE11C944457,40A
61032 :4E404F4144449447,284
61040 :2040454555553120,216
61048 :2020524545454545,276
61056 :4500552020202020,217
61064 :697420746F204261,32F
61072 :7369E30020E0573,2D0
61080 :652053796D26F6C,393
61088 :205368966742020,300
61096 :204780746F20E245,2C9
61104 :747572E20E2046F,28C
61112 :4D454552202000A,378
61120 :4E445522045540,389
61128 :424552200000000,1C1
```

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## **B**LUFFERS' GUIDE TO MICROS

**Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.**

Software packages seem stuck with a credibility gap. Not the same gap a between (a) the number of free hard-disk PCs which your MP promises each voter, and (b) the number you suspect will actually turn up. I'm thinking of a fixed law of nature — like the Special Theory of Relativity, which states that even the zippiest "turbo loader" can never reach the speed of light.

Similarly, the awesome Lanford Theory of Credibility Gaps explains that no software package ever reaches total credibility. As with Einstein's theory, the problem is that as you accelerate towards the speed of credibility, the total mass of updates and extra documentation approaches infinity...

This is such a revolutionary theory that I'll spare you its shattering implications. Let's start by looking at the factors of the equation which gives us the Credibility Gap, CG, measured in the standard units of kilobogles.

The first term is X, which stands for the lag between software and documentation. It's like this. When a programmer reluctantly fixes bugs in his major business software "Manic Space Goat Attack", he's likely to include new bright ideas. For example: a special control key which you touch when your boss sneaks into the office,

and which instantly clears all sprites, goats, and lurid graphics from the screen, relacking them with an obviously boring and worthy spreadsheet. (This one could be worth its weight in gold, and I'm copyrighting it.)

Unfortunately, fifteen thousand manuals describing the intricacies of "Manic Space Goat Attack" have already been printed. No way are they going to be thrown away and a new lot run off! The brand-new feature stays mysteriously undocumented...though in disk software you'll sometimes find an furtive extra file called README, full of outrageous claims about updates.

Our second variable, Y, stands for the lag between documentation and software. This is not the same as X. Here, cackling evilly, we can take an example from real life. The ultra-popular Amstrad PCW8256 comes with a word processor (Locoscript), and a manual explaining how to insert automatic page numbering. In Locoscript 1.0, still being sold, this has a slight bug: you press the indicated keys and, almost immediately...nothing happens. The software hasn't yet reached the level described in the instructions!

(Lumbered with Locoscript 1.0? Note that version 1.2, which corrects the bug and adds other improvements, can

usually be got by sending a grovelling letter to Amsoft.)

What shall we call the third variable? Just to be different: Z, the lag between software and (to use a posh word) its environment. Remember all those clever programs using odd bits of "reserved" memory — programs which went bananas when you plugged in the new peripheral or transferred them to a newer version of the same computer?

This doesn't just happen with Spectrums. The huge US outfit Ashoton-Tate got egg all over its face with dBase II. This database made use of memory locations reserved for the MS-DOS operating system, which was fine until the latest version of MS-DOS arrived from MicroSoft...and all of a sudden, the most popular database in the world wouldn't save files to disk. I felt deeply sympathetic, behind the outward sniggers.

You can guess the Law now. It goes:  
 $CG = X + Y + Z$   
 $CG > 0$

In other words, one or more of these lags is always present. The proof is, er, left as an exercise for the student. Anyone thinking they're able to disprove the theory will be treated with the same gentle sympathy reserved for those who write graphics programs to generate four-sided triangles.

*David Longford.*

## **P**ASCAL

Everywhere you look these days there seem to be articles slamming Basic, but rarely do you see a word written against Pascal. So what is this marvellous language that somehow manages to avoid all the faults Basic is plagued with? What can it do, and how easy is it to learn?

The first thing you are likely to notice when you look at a Pascal program is that it has a clear structure. First comes the program header, followed by the variable declarations, then the subroutine declarations, then finally the main program block. This structure is

compulsory; in Pascal you cannot produce the sort of higgledy-piggledy mess that so often passes as a Basic program. The listing is usually indented so that individual routines stand out clearly, making even long programs remarkably easy to read.

Structuring makes for disciplined programming; it forces you to stop and think what you want to do, what variables and subroutines you will need and so on before you start writing. The extra planning time which is needed is likely to be more than compensated for by a reduction in debugging time

when the program is finished, as a lot of the errors which can arise when writing an unstructured program will be avoided during the planning process. For example, drawing up a list of variables at the beginning will ensure that you cannot use the same name for two different variables.

A closer examination of a Pascal program will reveal that many of the commands are almost identical to those used in Basic. Compared with other high-level languages such as Forth and

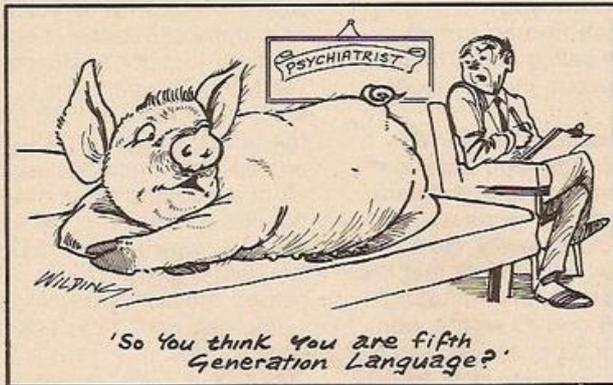
*(continued on next page)*

## PASCAL

(continued from previous page)

Logo, it looks comfortingly familiar. There are some new commands and techniques to learn, of course, but the fact that you can still use IF... THENs and FOR... NEXT loops gives you a definite head-start in the learning process.

But why bother to learn Pascal at all if it is so like Basic? Wouldn't it be easier to just learn how to structure your Basic



programs properly? Well, no, because there is one very important difference between the two languages; Pascal is compiled, whereas Basic is interpreted. All high-level languages are foreign languages to a computer, which only understands its own machine-code. The Pascal compiler translates your Pascal programs into machine-code, while the Basic interpreter merely provides a sort of dictionary containing translations of individual commands. Just as you would be able to read an English translation of a foreign book much more quickly than you could read the original version by looking up the meaning of each word in a dictionary, so the computer can run a compiled Pascal program much faster than an interpreted Basic one. You can achieve almost the same results as if you were writing in machine-code, but with much less effort.

What you can actually do with Pascal will depend on which version you have.

There are lots of packages on the market, for all the popular micros. There are considerable variations in price, and the most expensive are not necessarily the best. All of them should support text handling and all the standard arithmetic commands, but some have much better ranges of graphics and sound commands than others, and these commands are obviously very important, particularly if you are interested in writing games. Some are also much closer to standard Pascal than others, and this is obviously an advantage if you want to be able to make use of printed listings as well as writing your own programme. Oxford Computer Systems do a good version for the B.B.C., Commodore 64 and Spectrum, but take a look at the Acornsoft version for the B.B.C. and First Publishing's pascal 64 for the Commodore as well. HiSoft's pascal Compilers have also won good reviews all round.

Margaret Norman

## Could Do That

Games programming is a very special skill. In no other area does the programmer have to expend as much effort on making his code as efficient and as compact as possible. If you are writing a business program for a 16-bit machine, you've probably got plenty of Ram to play with, and your speed will only be a secondary consideration. By contrast, to write a good game on an 8-bit micro the programmer needs to ensure that every byte is profitably

employed and, of course, speed is crucial. On top of this, as a games programmer you will probably be working with a relatively crude processor, so you need to discover how it can be exploited to the fullest.

Games programming is indeed the greatest challenge of all. When you consider that Jeff Minter managed to cram the first version of Gridrunner into 3.5K on the Vic-20, you have to scratch your head in amazement.

On a smaller scale, the entries to our arcade classics competition have also worked miracles of compression. In November we asked you to write a version of Breakout in less than 20 Basic lines. The £15 prize goes to W. Jones, 24 Underhill Crescent, Abergavenny, Gwent, who shows here how to do it on a Dragon. His program manages to include sound, scoring and instructions in just 19 lines.

```

1 CLS:PRINT@44,"breakout";:PRINT@128," MOVE THE BAT AT THE BOTTOM OF THE SCRE
EN, BY USING THE LEFT AND RIGHT ARROW KEYS, TO MAKE THE BALL BREAKOUT THROUG
H THE FOUR COLOURED ROWS.":FORDE=1 TO 3000:NEXTDE
2 CLS@:BA#=#CHR$(148)+CHR$(156)+CHR$(152):BA=1:PRINT">breakout BALL= 1 SCORE= 0
0 " :GOTO5
3 KB=M-((PEEK(344)=223)AND M<478)+((PEEK(343)=223)AND M>449)
4 PRINT@M-1,STRING$(3,128):M=KB:PRINT@M-1,BA#:RETURN
5 FORA=31 TO 415 STEP32:PRINT@A,"<":NEXT:PRINT@416,STRING$(32,128):M=464
6 FORA=0 TO 3:FORB=1 TO 30:PRINT@A*32+64)+B,CHR$(191+16*A):NEXTB,A
7 W=2:X=RND(3)+30:Y=15:IF HI=1200 OR BA>20 THEN 19
8 Z=RND(3)-2:IF Z=0 THEN 8
9 GOSUB3
10 SET(X,Y,3):GOSUB3
11 XM=X+Z:IFXM<2 OR XM>61 THEN Z=-Z:XM=X+Z:Z:SOUND200,1
12 GOSUB3
13 YM=Y+W:IFYM<2 THEN W=1:YM=Y+W+W:SOUND200,1
14 IFYM>31 THEN RESET(X,Y):SOUND10,4:BA=BA+1:PRINT@16,BA:GOTO7
15 IF POINT(X,Y+1)=2 THEN SOUND 150,1:W=-2:XM=X:YM=Y+W:GOTO17
16 IF POINT(X+Z,Y+1)=2 THEN SOUND 150,1:W=-2:Z=-Z:XM=X+Z:YM=Y+W
17 IF POINT(XM,YM)>3 THEN SOUND 255,1:HI=HI+10:PRINT@INT(XM/2)+32*INT(YM/2),CHR@
(128):W=-W:XM=X:YM=Y:PRINT@26,HI:GOTO17
18 RESET(X,Y):X=XM:Y=YM:GOTO10
19 CLS4:PRINT@96,"YOU HAVE USED YOUR 20 BALLS YOURSCORE WAS ";HI:PRINT@320,"MAXI
MUM SCORE POSSIBLE IS 1200
    
```

# RESPONSE FRAME

## AMSTRAD MACHINE CODE

Do you have a problem related to your micro? Our team will do their 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?

● I am a competent Basic programmer, and now want to program my Amstrad in machine code. Can you advise me how to approach the task?

*David Browne,  
Clifton,  
Bristol.*

This question crops up over and over again. Probably, because people feel learning machine code is particularly difficult. No-one, after all, would ask the same question about learning Basic. If they did, the best answer would be: just dive in. And that is what most people do.

My advice on machine code is exactly the same. Low level languages are not much trickier than Basic. You simply have to be more

painstaking and more meticulous. Get hold of a good assembler — my own preference on the Amstrad is for the Devpac assembler — buy a book on Z80 machine code, and have a go.

To be more specific, buy a book that is geared to the Amstrad. Beginners are commonly recommended Rodney Zak's Programming the Z80, the definitive work on this processor. But in my experience this is far too general. Ian Sinclair's Introducing Amstrad CPC464 Machine Code, published by Granada, is a better buy for the complete novice, although it only takes you so far.

Half the problem when you are starting out is finding

your way around your machine; in other words, knowing where to store your code, how to incorporate it in Basic programs, how to write to the screen, and so on. All these problems are specific to your computer.

For this reason you will also need to buy the Complete Amstrad Firmware Manual which gives details of all the ROM routines and their jump blocks in RAM. It is expensive but invaluable. Without the Firmware Manual you would have to spend a lot of time duplicating routines that already exist. For example, why write a program to draw lines when there is a line draw routine already in the ROM?

*Jim Taylor.*

## SMOOTH SCROLLING

● How do I achieve smooth sideways scrolling on the CBM-64. Can it be done from Basic?

*Sean Hardman,  
Roadwater,  
Somerset.*

Smooth scrolling can indeed be done from Basic — but only up to one character space. The CBM-64's VIC chip has two registers — 53265 and 53270 — which allow the display to be shifted a pixel at a time. The

following program scrolls text from left to right:

```
10 FOR N = 1 TO 40:PRINT  
  "A";:NEXT  
20 FOR X = 0 TO 7  
30 POKE 53270, (PEEK(53270)  
  AND 248) + X  
40 NEXT
```

Note that as the display moves right it leaves a space at the left. If the size of the display is reduced to 38 columns, new data can be printed so that it scrolls into view from the left. Combining

this technique with a machine code routine to shift the entire screen by one character creates a continuous smooth scrolling effect.

POKE 53270, PEEK (53270) AND 247 shrinks the screen to 38 columns, blanking out the columns at the sides. For a fuller explanation of the techniques see Nalin Sharma's article in Your Computer, October 1985.  
*Jim Taylor.*

## SECOND OPINION

May I give my comments on the response headed Pseudo Bleep in the November issue? The answer to the first part — how to simulate BEEP in machine code — was partly correct: the routine is at 03B5H and DE should hold the length multiplied by the frequency. However HL does not hold the frequency, it holds a function thereof, calculated by  $HL = 437500/F - 30$ , where F is the frequency in Hertz. This can in turn be calculated by  $F = 261.6 * 2^{\uparrow} (B/12)$  where B is the beep number. (these should obviously be calculated before writing the program).

The answer to the second part — how to make the sound louder — is wrong, as

is the phrase "some programs manage to make the music play far louder than normal" in the question. Unless programs are named, I am afraid I must disagree with this. The loudspeaker is in a circuit which can feed it with logic 1s and 0s and nothing else. Therefore the amplitude with which it vibrates is fixed (unless the frequency is so high that the speaker cannot cope) and therefore maximum volume is heard when it is vibrated with an equal mark/space ratio at audible frequencies, which is exactly what happens in BEEP. All that a program can do, other than altering the quality of the sound, is make the volume less. However there is hardware which can amplify

BEEPs, including the tape recorder you play tapes into the computer with, if it has an internal speaker. Connect a cassette lead between the MIC sockets of computer and tape recorder, leaving the tape EAR socket unconnected, eject any tape and press PLAY.

As for the two channel routine which was supposed to give us extra volume, it did not even give two channels. In fact, it gave an ordinary beep, interrupted with a click at regular intervals. A two channel routine which works — like the one in Fairlight, for example — is possible, but is fairly complicated, and is also probably supposed to be a secret.  
*Ian Collier.*

# COMPETITION RESULTS

## GOONIES

November's Goonies competition offered some of the most enticing prizes ever. For the winner, a £400 Philips CD-150 compact disc music system, plus Cynici Lauper's Goonies Soundtrack. For the runners-up there were 25 treasure chests crammed with doubloons, two Goonies film tickets, and a copy of Datasoft's Goonies game.

We asked you to come up with a film or a book you

though would make a good computer game. Some of the titles suggested were bizarre, to say the least. No-one put forward the Bible, but we did have the game of the QL manual, the game of Guns of Navarone — "You control David Niven" — and Miss Cayley's Adventures, published in the Strand Magazine in 1898.

The trouble with these books and films is that it is difficult to imagine how they could ever be translated into keyboard action. A much more practical suggestion for a game conversion

was Mad Max III. The Thunderdome sequence, in particular, would make a cracking good combat game.

As no less than 20 entries came up with this idea we decided to leave the win to chance. The first prize goes to the first Mad Max nominator picked from the hat — Nick Moore, Cherry Trees, Swannaton Road, Dartmouth, Devon, TQ6 9RL.

Runners-up prizes to: J. Avern, Shalford; S. Green, Stapleford; D. Cook, Balham; D. Parish, West Wickham; J.

Elliot, Sevenoaks; P. Maddison, Lewisham; R. Drukker, Amsterdam; C. Broad, Oldham; P. Williams, Newbury; J. O'Connor; J. Ohanen, Finland; M. Groll, Brereton; D. Hubbard, Northwith; P. Ingram, Merseyside; G. Yates, Chorley; D. Perryman, Faversham; M. Camp, Sudbury; R. Hardstaff, Notts; I. Anderson, Leicester; G. Denne, London; J. Salter, Seaford; S. Ratko, Yugoslavia; G. Burge, Glasgow; D. Jordan, Pontefract; C. Wall, Maidstone.

## TRANSFORMERS

Last but not least come the Slags. These went to Carl Pollard from Newport, Shropshire for transforming a C16 into a trash can. Farukh Adia from Stoke, Newington transformed his Commodore into a Rambot, subtitled More chips part II. Ian Madden from Derby, under parental pressure wants to transform his Commodore into an Automatic bedroom cleaner, and Dennis Richards from London invented the Spectorbot, designed with Commodore bashing in mind.

Winners of the 50 Commodore games were: D. Owen, M. Sexton, P. Bromley, C. Tham, W. Sowden, D. Caley, M. Dickinson, R. Corremans, M. Dahl, G. Weller, T. Asphaug, P. Bennett, I. Khan, M. Bailey, S. Hiles, J. Clare, M. Slater, P. Allen, M. Tallqvist, E. Dickson, M. Bolli, C. Lockhorst, G. Hitchcock, J. Weller, R. Gill, A. Lincoln, N. Tovey, R. Hull, T. Beveridge, P. Calvert, J. Vibert, A. Sienkiewicz, N. Ganger, A. Schmidt, A. Mansour, M. Poynter, J. Gillespie, R. Schuchardt, A. Pickington, L. Smyth, S. Rutherford, C. Platt, G. Balfour, P. Clarkson, J. Fisher, M. Teglbærg, N. Gibbins, L. Fai Lee, M. Ratcliffe, G. Henderson, S. Evans.

Winners of the 50 Spectrum games were: S. Priestley, M. Dale, J. Burton, A. Jones, C. Morling, A. Fraid, A. Barlow, L. Chapman, A. Stevenson, P. Stevenson, J. Roberts, J. Lorkin, A. Stamp, M. Warlow, S. Cutts, G. Pittendrigh, A. Brand, R. Newton, D. Cook, M. Bill, N. Leveridge, S. Broster, I. McKay, S. Fell, D. Spencer, S. Balls, M. Jones, M. Davies, J. Somerville,

C. Ash, N. Owens, C. Rosenquist, M. Akin, R. Sherry, S. Knight, C. Hockney, M. Orton, R. Kenn, D. Sellars, S. Barrett, M. Sims, N. Pavis, S. McGibbon, B. Warren, O. Aysha, D. Grauskov, D. Taylor, W. Whitehouse, H. Thompson, E. Ashford, L. Herrett, N. Dickson, K. Hung Man.

What would you like to see your computer Transform into? That was the bizarre question we posed in our December competition. Many obviously drew inspiration from the TV series and had their computers taking various aggressive forms suitable for dealing with Deceptions and their ilk. Joysticks turned into lasers, disc and microdrives into deadly projectile weapons and grenade launchers.

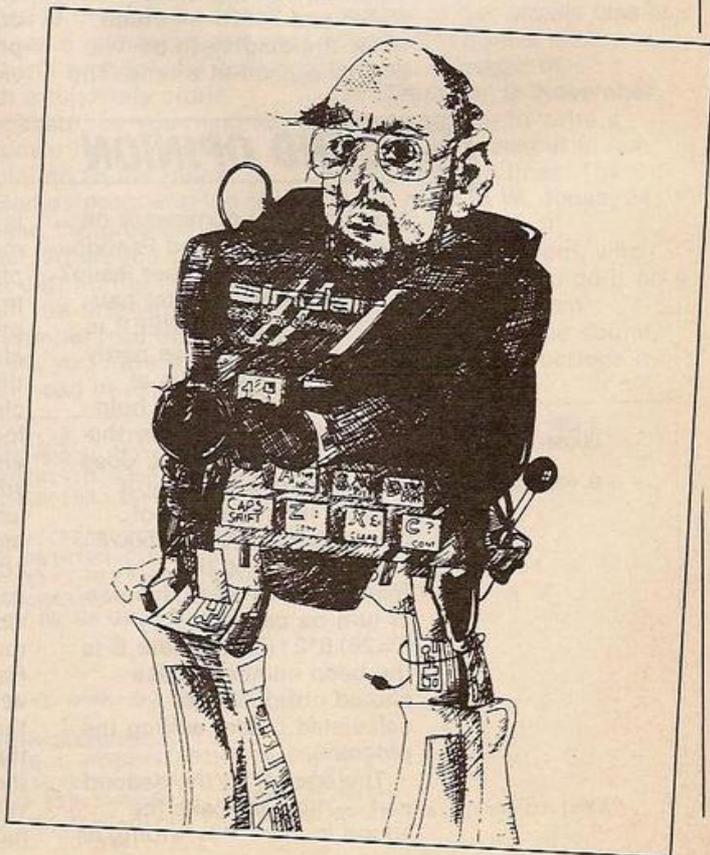
Winner of the Grimlocks Dinobot was Bjorn Jeffery from Goteborg, Sweden. He made rather a meal of it and Transformed his Spectrum into a plate of fish and chips. Another winner was Richard Higson of West Clevelys, Lancashire. He had "Your Computer" magazine turning into a C5. He didn't express an opinion on which was the more valuable, but suggested the C5 might come in handy round the office. Miss Bond from Stockport Transformed her Spectrum into a Chip Butty, and A. Williams sent in this picture of a well known computer manufacturer "more machine than man".

Among the Snarls winners was Stephen Martin from Palmers Green, London. He illustrated a process whereby a Spectrum might be transformed into a Commodore, tactfully, he did

not state if he considered this an improvement. Andrew Carson-Rowland from Hickley Leicestershire suggests that an overheating Spectrum transforms itself into a useless blob of melted plastic. Anders Nilson from Habo in Sweden thought his Computer might transform into "Your Computer", but would of course still be his. He must have willed away many a long winter's evening chuckling about that one. M J Fletcher from Maidenhead, Berks produced a Robodrag, being the only use he could now think of for his Dragon 32.

On to the Sludges now. Mark Middleton from Burton upon Trent has rumbled Sir Clive, and has him busy transforming dead

Spectrum's into QL's by the use of musclepower and Tippex. Robin McKie from Ayrshire suggested that Sir Clive should get his Spectrum to transform into a computerised boxing glove next time he goes near any Cambridge pubs. Mr. N. T. Hunt has invented the computerised hedgehog. Unlike its biodegradable counterpart, this animal is RAM proofed, crash resistant. Given the write procedure, it can plot its run, avoiding the buses and safely collect its bits then return to its nest and store them for a few bytes so it can goto sleep for winter. Darren Sutherland from Palmers Green transformed his Spectrum into GhettoBlaster.



# Software File

## DOWNLOAD

◆Spectrum ●IG Bradbury  
●Watford

This program allows readers with a 48K Spectrum and Interface 1 to take advantage of the Telsoft downloading service offered by this magazine without the need to purchase a special modem containing special firm ware. The only hardware that is required is a simple 300bps modem connected to Interface 1's RS232 communications port.

First type in the Basic bootstrap program in listing 1. This should then be saved on your

**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.**

microdrive by doing a Run 9010.

The next step is to type in the hex loader program which will be used to enter the machine code at 64000 which is the heart of the download program. This hex loader program can be found in listing 2 and is similar to the hex loader program used to enter the Telsoft program in December's issue of

this magazine. Once this has been entered save it for safety on microdrive by issuing the immediate Basic command RUN 9020.

Now for the tedious bit; using the hex loader program, enter the machine code for the "download" segment by typing in the hex data contained in listing 3. When this has been completed the program

will automatically save and verify the machine code on your Microdrive.

Ensure your modem is connected to your telephone, powered up and also connected to the RS232 port on interface 1. Do not dial the 300bps Telsoft service yet. Next load the "download" Basic program which will automatically load the machine code segment "download" into memory at 64000. A screen of information will be presented reminding you that two downloads are necessary — more about the reason for this later.

The first pass should be

### Listing 1.

```

10 REM "download" prog 26Nov85
50 CLEAR 63999
100 PRINT AT 10.10: INVERSE 1: "
NOW LOADING"; INVERSE 0
110 PRINT AT 12.4: "download0 CODE
DE 64000.+"
150 LOAD "*"m".1."download0"CODE
64000
200 CLS : PRINT AT 0.10: "Loaded
OK"
250 PRINT AT 2.0: "This program
reads programs in"
351 PRINT "Telsoft format via I
nterface1's"
252 PRINT "communications port
at 300 bps."
270 PRINT AT 6.0: "Only transmis
sion blocks with"
271 PRINT "good header and data
CRC's are"
272 PRINT "accepted.": AT 10.0: "
Two passes are necessary."
280 PRINT "Load and save BASIC
segments"
281 PRINT AT 12.0: "first and th
en CODE segments."
290 PRINT AT 14.0: "If necessary
select the display"
291 PRINT "option to obtain the
programs"
292 PRINT "memory map for BASIC
and CODE" segments."
400 PAUSE 200: PRINT AT 0.0:
410 PRINT "FLASH 1:" Press a ke
y to enter mac code": FLASH 0
450 PAUSE 0: CLS : RANDOMIZE US
E 64000: STOP
9000 REM Save program on MD
9005 ERASE "*"m".1."download"
9010 SAVE "*"m".1."download" LINE
10
9020 VERIFY "*"m".1."download"
9030 STOP
9040 SAVE "*"m".1."download0"CODE
64000.1416
9050 VERIFY "*"m".1."download0"CO
DE 64000.1416

```

### Listing 2.

```

10 REM HEX CODE LOADER 27Nov85
20 CLEAR 63999: POKE 23658,8: CLS : PRINT
30 INPUT "Start address ":a
50 IF a>65415 THEN GO TO 280
60 IF a<64000 THEN GO TO 20
70 PRINT a:
80 INPUT " :":b#
85 IF b#="END" THEN GO TO 280
90 IF LEN b#<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x#=b#(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x#=b#(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y
185 NEXT n
189 REM Verify checksum
190 LET y=0
195 FOR m=1 TO 3
200 LET x#=b#(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT " :":b#: GO TO 50
235 REM Error handling code
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 REM SAVE download0 on MD
283 LET f#="download0": LET s=64000: LET l=1416
284 PRINT "PRESS ANY KEY TO SAVE CODE": PAUSE 0
285 PRINT "saving ":f#:" CODE ":s:":l
286 SAVE "*"m".1,f#CODE s,l
287 PRINT "verifying ":f#: VERIFY "*"m".1,f#CODE s,l
290 POKE 23658,0: STOP
295 REM Sub: Hex to numeric
300 LET e=0: LET x=CODE x#-48-7*(x#>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
9000 REM SAVE THIS LOADER ON MD
9010 ERASE "*"m".1,"hexloader"
9020 SAVE "*"m".1,"hexloader" LINE 10
9030 VERIFY "*"m".1,"hexloader"

```

### Listing 3.

```

64000 : 31FFFFCD76FCCDC9,604
64008 : FCCDEBFCCDA8FCCD,6F6
64016 : 27FCCDD6FA20F8CD,5B5
64024 : 59FBCD93FBCD27FC,5B7
64032 : 3AA5FD47CD47FC28,47B
64040 : F40602CD47FC28ED,449
64048 : CDC9FAC43DFB20E5,5C1
64056 : CDD6FAC43DFB20DD,5CE
64064 : CDEFFACD10FBCD71,60C
64072 : FACDE0FA3AA3FD4F,612
64080 : CDA0FBCDBAFB20C5,61F
64088 : CDB4FACD5FFAC92A,5EC
64096 : B25C363E2B3600F9,33C
64104 : 210313E5223D5CFB,33A
64112 : C92146FFCB4EC821,4A1
64120 : A4FDCB7EC02146FF,58B
64128 : CBC6AF2A47FFED5B,57B
64136 : A6FDED523804ED53,4E6
64144 : 47FF2A4DFF16003A,39C
64152 : A5FD5FFE00200216,3CF
64160 : 0119224DFF2AA6FD,3F5
64168 : ED5B49FF1922A6FD,516
64176 : CD7DFBC92146FFCB,5EF

```

(continued on next page)

# File

(continued from page 85)

64184 : 46C8ED4B4DFFED5B, 592	64592 : 24FCC110F21802E1, 42E	65000 : 0000000000000000, 0EB
64192 : 47FF2A49FF19EDB0, 52E	64600 : C1E52146FFCB66E1, 576	65008 : 0000000000000000, 0F0
64200 : C911BCFADFED52E5, 62E	64608 : C97EA7C8E5CDFDFB, 6C0	65016 : 0000000000000000, 0FB
64208 : C1EBCD07FDC9011C, 533	64616 : E12318F53E20C5CD, 469	65024 : 0000000000000000, 000
64216 : 0021A0FDCD07FDC9, 530	64624 : FDFBC110F7C911BE, 5CB	65032 : 0000000000000000, 008
64224 : 2146FFCB56C821A4, 4F4	64632 : 01ED53C35CAF32C7, 480	65040 : 0000000000000000, 010
64232 : FDCB7EC47DFBC921, 654	64640 : 5C3246FF11FFFFED, 54F	65048 : 0000000000000000, 018
64240 : 46FFCB5EC8060A21, 457	64648 : 5347FF2A655C1100, 31D	65056 : 0000000000000000, 020
64248 : A0FDC5E57ECDE0FB, 765	64656 : 5CED522249FF1100, 3A6	65064 : 0000000000000000, 028
64256 : 0601CD6CFCE123C1, 401	64664 : 00ED534DFF062021, 36B	65072 : 0000000000000000, 030
64264 : 10F00602CD6CFCC9, 40E	64672 : 4FFF36FF2310FBC9, 51A	65080 : 0000000000000000, 038
64272 : 2146FFCB5EC03AA3, 43C	64680 : 21004011014001FF, 25B	65088 : 0000000000000000, 040
64280 : FDCDE0FB3E20CDFD, 5E5	64688 : 173600EDB0C94E23, 3D4	65096 : 0000000000000000, 048
64288 : FB3AA3FD4FCD6CFB, 5D2	64696 : 4623ED43845C0120, 352	65104 : 0000000000000000, 050
64296 : 200721D5FEC6D1FC, 46D	64704 : 18ED43885CCD61FC, 516	65112 : 0000000000000000, 058
64304 : C921A6FDCD4DFB3E, 510	64712 : C9CDA8FC21DBFECF, 6C9	65120 : 0000000000000000, 060
64312 : 20CDFDFBC9F52146, 542	64720 : B6FC21EBFECDB6FC, 70B	65128 : 0000000000000000, 068
64320 : FFCB5E200621CCFE, 479	64728 : 2107FFCDB6FC2122, 4C1	65136 : 0000000000000000, 070
64328 : CD61FCF1C9E5237E, 5B2	64736 : FFCDB6FC2143FFCD, 68E	65144 : 0000000000000000, 078
64336 : CDE0FB17ECDE0FB, 6FF	64744 : B6FCC9F3CF1BF321, 654	65152 : 0000000000000000, 080
64344 : C921BEFEC6D1FC21, 549	64752 : 46FFFE312003CBCE, 520	65160 : 0000000000000000, 088
64352 : BAFD360021AAFDCD, 4E2	64760 : C9FE322003CDB6C9, 57E	65168 : 0000000000000000, 090
64360 : 61FC0601CD6CF3A, 43B	64768 : FE3320E7CBDEC922, 4CC	65176 : 0000000000000000, 098
64368 : A1FD3CCDE0FB21C4, 5D7	64776 : 7BFFED4377FF092B, 45C	65184 : 0000000000000000, 0A0
64376 : FEC61FCC906010E, 47E	64784 : 7E36003284FF2B7E, 322	65192 : 0000000000000000, 0A8
64384 : 003AA5DFE002801, 383	64792 : 36003283FFCB21CB, 3B9	65200 : 0000000000000000, 0B0
64392 : 4F21BCFDE5BA6FD, 59C	64800 : 10CB21CB10CB21CB, 3AE	65208 : 0000000000000000, 0B8
64400 : EDB0C921A1FD4E0C, 50F	64808 : 10ED4379FF217FFF, 47F	65216 : 6F673D0020426C6F, 310
64408 : C8C5CDA0FBC118F7, 65D	64816 : 36002336003E0932, 138	65224 : 636B730042616420, 330
64416 : 3E07A116005F216F, 28B	64824 : 7EFF2A7BFF7E327D, 486	65232 : 4352432000706173, 30C
64424 : FF197ECB39CB39CB, 511	64832 : FFCDB6FC2143FFCD, 68E	65240 : 732000084053454C, 297
64432 : 390600214FFF09A6, 30D	64840 : 1623CB1630122181, 246	65248 : 454354204F505449, 318
64440 : 77C90620214FFFAF, 43C	64848 : FF3A7FFFAE327FFF, 565	65256 : 4F4E002240312920, 261
64448 : B6C02310FBC93E07, 472	64856 : 233A80FFAE3280FF, 493	65264 : 4C6F616420626173, 3C6
64456 : A116005F216FFF19, 386	64864 : 2179FF7E23B620D9, 449	65272 : 696320736F757263, 410
64464 : 7E2FCB39CB39CB39, 489	64872 : 2A7FFED58B3FFED, 5C7	65280 : 65206F6E6C790042, 289
64472 : 0600214FFF09A6C9, 3C5	64880 : 52C93A7EFF3D327E, 42F	65288 : 403229204C6F6164, 243
64480 : F51F1F1F1FCDEDFB, 506	64888 : FF20132A7BFF2322, 393	65296 : 20636F646520626C, 2B9
64488 : F1CDEDFBC9E60FFE, 74A	64896 : 7BFF3E08327EFF2A, 419	65304 : 6F636B73206F6E6C, 331
64496 : 0A3004C6301802C6, 304	64904 : 7BFF7E327DFF3A7D, 4E5	65312 : 7900624033292044, 1FB
64504 : 37CDFDFBC9F3CF1C, 69B	64912 : FFCB27327DFFED4B, 567	65320 : 6973706C61792063, 33D
64512 : F3C9F30601C50601, 382	64920 : 79FF0BED4379FFC9, 58C	65328 : 6F6E74726F6C2062, 350
64520 : C50663C5C110FCC1, 489	64928 : 0000000000000000, 0A0	65336 : 6C6F636B73206F6E, 351
64528 : 10F6C110F02146FF, 43D	64936 : 0000000000000000, 0A8	65344 : 6C7900004000C057, 27C
64536 : CBA6CF1DF3D02146, 49F	64944 : 0000000000000000, 0B0	65352 : 710EF30D2117C61E, 2E3
64544 : FFCBE6C97723C9CD, 5C9	64952 : 0000000000000000, 0B8	65360 : FF7F761B0313003E, 2B3
64552 : 02FC38FBCD02FC30, 454	64960 : 0000000000000000, 0C0	65368 : 003C42427E424200, 21A
64560 : FB47E6FBFE8820EF, 5E5	64968 : 0000000000000000, 0C8	65376 : 007C427C42427C00, 29A
64568 : 7821A0FDCD24FC06, 461	64976 : 0000000000000000, 0D0	65384 : 003C424040423CFE, 2E2
64576 : 1BCD47FC2BE1C9C5, 502	64984 : 0000000000000000, 0DB	65392 : FDFBF7EFDFBF7F00, 66B
64584 : E5CD02FC3009E1CD, 4DF	64992 : 0000000000000000, 0E0	65400 : 007E407C40407E00, 2B0
		65408 : 0021107C40404000, 1ED

to load the Basic segment, which is normally just a bootstrap piece of code, and save it. The second pass will load all the Code segments for the program that is being downline loaded.

The segments should then be saved on microdrive. Information about the start addresses and lengths for these Code segments can be found in the Basic segment loaded or from the write-up in the magazine article.

Failing these two sources providing the necessary information, a third method is available which involves a further pass to obtain a display of the contents of the transmission block headers. Hit any key to display the option menu. Select the required option:

- 1 For downline loading the Basic segment
- 2 For downloading any Code segments
- 3 For getting a display of the transmission header blocks

When the option is selected the screen border will turn black with white bands about 3/4 in. wide being seen. This is the program trying to synchronise with an incoming transmission block. Now dial the 300bps Telsoft service and remember to switch your modem to line when you hear the modulated data being received.

Whatever option you have selected the screen will be cleared and if the Spectrum is receiving data

white bands about twice the width of the synchronising bands will be observed. If this does not occur you have something wrong with your modem setup or connections to the RS232 interface.

After a short while a line of information will be displayed on the top line of the screen giving the programs name and the total number of transmission blocks in hexadecimal that goes to make up the program. This

information gives you an idea of the programs approximate size — most transmission blocks are 286 bytes in length, of which 256 bytes are program bytes — and also the time it will take to make one pass through the transmission.

If you selected options 1 or 2 loading will now continue with progress being reported on the screen until all transmission blocks have been read successfully.

Loading of program blocks will cease as soon as all transmission blocks have been read successfully with the display of a zero report code and the "OK" message at the bottom of the screen. At this point the communications line may be closed to save telephone charges.

Now comes a very critical part of the downloading process. It is essential that the Basic Clear command is entered at this point before any other action is taken on the keyboard. Once the Clear command has been issued the segments can be saved and verified on microdrive using immediate basic commands.

Most of the Basic program segments need some form of modification so that the program can be loaded from a Microdrive since the normal Telsoft mechanism assumes that your spectrum is not fitted with a Microdrive. This generally is not a difficult process if you are familiar with programming in Basic.

Code segments which need to be loaded in memory at around 25000 decimal or lower cannot be loaded without being corrupted by the download Basic program as it is relocated by the Basic Monitor when an ad hoc Microdrive buffer is created. This problem can be overcome simply by deleting the download

Basic program before entering the download machine code at 64000 decimal. This is achieved with the following Basic immediate commands:

**NEW** This deletes the Basic download program but preserves the machine code at 64000 decimal.

**CLEAR** This lowers Ramtop to say n if the code segment is to be loaded at (n + 1) decimal.

**CLS #** This reinstates shadow system variables.

**RAN D USR 64000** Enters the "download0" segment immediately.

**RAND USR 64000** Enters the "download" segment immediately.

Always remember to issue Clear and Code segments are loaded.

Transmission blocks consist of a maximum of 286 bytes each being separated from its neighbour with

approximately a 1/3 second pause in transmission. The block consists of two distinct parts; the header part which is always 28 bytes long and the data part which can vary in length from 258 bytes down to just three bytes.

Information as to the length of the data part is contained in the header portion. It is the information from the first 10 bytes of the header that is displayed in hexadecimal format as a line item by Option 3 of the download program.

## ALPINE ROAD-RACE

►AJ and PJ Marson  
● Amstrad CPC-464  
● Bristol, Avon

Race across open grassy plains, over great lakes, through the impenetrable darkness of a tunnel and, finally, over sparse desert-lands in the greatest race ever held on your Amstrad. Hear the pitch of the engine change as you accelerate and wrestle with your joystick as you overtake the other roadhogs on your stretch of road.

You've guessed it — Alpine Road-Race is a perspective car race game which gets its name from the traditional mountain range on the horizon.

Although predominantly Basic, the game runs extremely quickly and

without "flickers" due to using machine code for the time-consuming multi-colour graphics and the machine's flashing colour facility. This is a powerful feature that is often overlooked by Basic programmers trying to animate their programs.

To enter the program into your machine, follow these steps;

- Type in and run listing 1 — the Hex-loader.
- Enter the information from listing 2. To save typing, the Tab key has been defined to give a row of zeros.
- When all of the data has been entered, the loader will save the code. Save this somewhere well after the start of the tape — at least 40 on the counter.
- Type in and save listing 3 before the machine code on the tape.
- Rewind the tape and RUN" the program in.

On running, the title

screen will come up with some random best times. Two lines from the bottom of the screen, the current control method will be shown. This can be changed by pressing either J or K. Enter will start the game.

When the game starts, there will be two cars near the bottom of the screen. Yours is the higher of the two. If you collide with either of the other cars or steer yours off of the road, your car will explode and your game will end. If, however, you survive until the end of the desert stage, you will be congratulated and the computer will play a tune. If your time is good enough, you will be asked to enter your name for the best timetable.

**Conversion to disc:** Alter line 2130 to — 2130 MEMORY &807F:LOAD"!ALPCODE",&8080 etc.

```

10 REM LOADER PROGRAM
20 MEMORY &807F
30 MODE 2
40 PRINT"TYPE IN THE MACHINE CODE
AND CHECKSUM SEPARATED BY A COMMA"
50 PRINT"PRESS <TAB> FOR A LINE OF ZEROS."
60 PRINT:INPUT"START FROM WHERE ?",A$
70 IF A$="" THEN START=&8080 ELSE
START=VAL("&H"+A$)
75 KEY DEF 68,0,141,141,141
80 KEY 141,STRING$(32,"0")+",000"+CHR$(13)
90 FOR A=START TO &8530 STEP 16
100 PRINT HEX$(A,4);";";
110 INPUT";",D$,CH$

120 IF LEN(D$)<>32 THEN PRINT CHR$(7)
;CHR$(27);"NOT ENOUGH DATA";CHR$(27):GOTO 1
00
125 TOT=0
130 FOR B=0 TO 15
140 P=VAL("&H"+MID$(D$,B*2+1,2))
150 POKE A+B,P:TOT=TOT+P
160 NEXT B
170 IF TOT<>VAL("&H"+CH$) THEN PRINT
CHR$(7);CHR$(27);"CHECKSUM ERROR"
;CHR$(27):
GOTO 100
180 NEXT A
190 SAVE"ALPCODE",B,&8080,&4BF,&8480
200 END

8080:00000000000000000000000000000000,000
8090:00000000000000000000000000000000,000
80A0:00000000000000000000000000000000,000
80B0:00000000000000000000000000000000,000
80C0:00003F11152A000000003F33372A0000,162
80D0:0000063220000003F2A11EBBB003F2A,30E
80E0:3F7BF3F3F3F3F2A3F7BF3F3F3F3F2A,9DE
80F0:3F7BF3F3F3F3F2A3F2A000000003F2A,5C1
8100:000000000000000000000000000000,000
8110:00000000000000000000000000000000,000
8120:00000000000000000000000000000000,000
8130:00000000000000000000000000000000,000
8140:00000000000000000000000000000000,000
8150:00003F11152A000000003F33372A0000,192
8160:153F11EBBB153F00153FF3F3F3F3B73F00,682
8170:153FF3F3F3F3F00153F000000153F00,4CB
8180:000000000000000000000000000000,000
    
```

(continued on next page)

# File

(continued from page 87)

```
8190:000000000000000000000000000000000000,000
81A0:000000000000000000000000000000000000,000
81B0:000000000000000000000000000000000000,000
81C0:000000000000000000000000000000000000,000
81D0:000000000000000000000000000000000000,000
81E0:000000041000000000152A33223F0000,114
81F0:00157BF3F33F000000152A00003F0000,333
8200:000000000000000000000000000000000000,000
8210:000000000000000000000000000000000000,000
8220:000000000000000000000000000000000000,000
8230:000000000000000000000000000000000000,000
8240:000000000000000000000000000000000000,000
8250:000000000000000000000000000000000000,000
8260:000000000000000000000004100000000,041
8270:00003FF3B72A000000003F00152A0000,291
8280:000000000000000000000000000000000000,000
8290:000000000000000000000000000000000000,000
82A0:000000000000000000000000000000000000,000
82B0:000000000000000000000000000000000000,000
82C0:000000000000000000000000000000000000,000
82D0:000000000000000000000000000000000000,000
82E0:000000000000000000000000000000000000,000
82F0:00000015B70000000000001515000000,0F6
8300:000000000000000000000000000000000000,000
8310:000000000000000000000000000000000000,000
8320:00002A050A00000000000008741000000,101
8330:00001515B22A0000000000A4B0A0A0000,13F
8340:0000412AF2820000000005B797000000,23F
8350:00002A1505000000000001F000A000000,06D
8360:000000000000000000000000000000000000,000
8370:000000000000000000000000000000000000,000
8380:0A00000A41004141414100000000A00,163
8390:00000015000000000054105004105410A,0F1
83A0:820000500000000000158215820000,1B5
83B0:850005050A00410500410048150F8200,191
83C0:820041150A000000041000A8782410A,2B1
83D0:000A05150A0A2A004100416B15000000,164
83E0:00002A0A00000A410A0A004100A00082,160
83F0:0000050000000000824100000A414100,154
8400:000000000000000000000000000000000000,000
8410:000000000000000000000000000000000000,000
8420:000000005820000000000000A4B15000000,0F1
8430:000015000A870000000000005050000000,0B0
8440:0000058282820A0000000082001F0A2A00,26A
8450:0000154B0041000000000A15410A0000,10B
8460:00000820A0000000000000000000000000,08C
8470:000000000000000000000000000000000000,000
8480:018D84218984C3D1BC00008D849284C3,77A
8490:988447524150484943D300DD56001E00,541
84A0:AFCB1ACB1B21808019E5DD6E02DD6603,72C
84B0:DD5E04DD5605CD1DBC10610E50E081A,619
84C0:13AE77230D20F8E1CD26BC10EFC900E1,7B9
84D0:7E23E5FE1BC8CD5ABB18F4CD0689F53E,914
84E0:FFESCDA5BBD106041A137723772310F8,755
84F0:F1C30CB9CDA5BBDDB84D5DCDF84FF0A,AD0
8500:081BE1CDB84C8C8F84FF0B1BC9DD7E00,899
8510:CD84BF5DD5603DD5E02DD21000DD19,798
8520:DD4600DD4602DD4E0178FE002808C5E5,707
8530:7ECDF484E123C110F5F1C3B4B000000,8B0
```

```
10 REM ALPINE ROAD-RACE
20 REM By A.J. & P.J.Marson
30 REM
40 GOTO 2100:REM INITIALISE PROGRAM
50 INK 4.6.26:INK 5.26.6
60 RESTORE
70 !GRAPHICS.X.Y.0
80 !GRAPHICS.INT(CX(0)).INT(CY(0)).FNCHAR(CY(0))
90 !GRAPHICS.INT(CX(1)).INT(CY(1)).FNCHAR(CY(1))
100 TI1=TIME
110 REM ***** LOOP *****
120 WHILE D<5000
130 D=D+250/S
140 OX=X
150 J=FNJ(CTRL)
160 S=S+(3 AND (J AND 2)=2 AND S<125)+((J AND 1)=1 AND
.S>5):SPEED INK S.S
170 SOUND 129.800.100.3.0.0.S/4 AND 31
180 X=X-(2 AND (J AND 4)=4)+(2 AND (J AND 8)=8)
190 A=0:GOSUB 340
200 A=1:GOSUB 340
210 !GRAPHICS.INT(CX(0)).INT(CY(0)).FNCHAR(CY(0)):
GRAPHICS.INT(CX(0)).INT(CY(0)).FNCHAR(CY(0))
220 IF OX<>X THEN !GRAPHICS.OX.Y.0:GRAPHICS.X.Y.0
230 !GRAPHICS.INT(CX(1)).INT(CY(1)).FNCHAR(CY(1)):
GRAPHICS.INT(CX(1)).INT(CY(1)).FNCHAR(CY(1))
240 IF FNPOINT(X+5,Y-9)<>12 OR FNPOINT(X+10,Y-9)<>12 OR
FNPOINT(X,Y-15)<>12 OR FNPOINT(X+14,Y-15)<>12 THEN G
OTO 1020
250 WEND
260 READ A:NN=NN+1:INK 3.A:IF NN=4 THEN TI2=TIME:GOTO
1490:REM FINISHED
270 D=0
280 CS(0)=CS(0)+6:CS(1)=CS(1)+8
290 IF NN=2 THEN INK 0.0:INK 6.0:INK 7.0 ELSE INK 0.11
:INK 6.26:INK 7.13
300 GOTO 120
310 REM DATA FOR CHANGING GROUND COLOUR
320 DATA 2.0.12.9
330 REM MOVE CAR#A
340 OCX(A)=CX(A):OCY(A)=CY(A)
350 CY(A)=CY(A)+(S-CS(A))/10
360 IF CY(A)>119 THEN CY(A)=15:GOTO 410:REM INITIALISE
370 IF CY(A)<15 THEN CY(A)=119:GOTO 410:REM INITIALISE
380 CX(A)=CX(A)+DX(A)*(CY(A)-OCY(A))
390 RETURN
400 REM INITIALISE CAR
410 DX=INT(RND*70)+37
420 DX(A)=(73-DX)/104
430 CX(A)=DX+DX(A)*(CY(A)-15)
440 RETURN
450 REM SET INKS
460 CALL &BD19:READ A:BORDER A:FOR C=0 TO N:READ A:INK
C.A:NEXT C
470 RETURN
480 DATA 0.11.1.0.9.6.26.26.13.3.13.21.26.13.8.6.3
490 DATA 1.1.24.20.6.26.0.2.8.10.12.14.16.18.22.1.16
500 DATA 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0
510 REM SET UP SCREEN
520 ORIGIN 320.0
530 PRINT CHR$(23):CHR$(0)
540 WINDOW#0.1.20.12.25:PAPER#0.3:CLS#0
550 FOR A=-170 TO 170 STEP 4:MOVE A.0:DRAW 0.222.2:NEX
T A:REM DRAW ROAD
560 REM DRAW KERBS
570 C=4:L=45:Y=0:MOVE 174.0
580 WHILE L>=1
590 DRAW -170/222*L.L.C
600 C=C XOR 1
610 L=L*0.8
620 WEND
630 C=4:L=45:Y=0:MOVE -174.0
640 WHILE L>=1
650 DRAW 170/222*L.L.C
660 C=C XOR 1
670 L=L*0.8
680 WEND
690 REM DRAW MOUNTAINS
700 ORIGIN 0.0
710 H=20
720 A=-4
730 WHILE A<640
740 A=A+4:MOVE A.224:DRAW 0.H.7
750 H=(H+SGN(RND-0.5))*2
760 H=H+(4 AND H<6)-(4 AND H>32)
770 WEND
780 REM DRAW SNOW
790 PRINT CHR$(23):CHR$(2):
800 FOR A=240 TO 256 STEP 2
810 MOVE 0.A:DRAW 640.0.6
820 NEXT A
830 A=-4
840 WHILE A<640
850 A=A+4*(INT(RND*4)+1)
860 PLOT A.238.6
870 WEND
880 PRINT CHR$(23):CHR$(0):
890 WINDOW#0.1.20.1.25
900 RETURN
910 REM SET UP VARIABLES
920 NN=0:REM SECTOR NUMBER
930 CY(0)=15:A=0:GOSUB 410:REM COMPUTER CAR#0
940 CY(1)=60:A=1:GOSUB 410:REM COMPUTER CAR#1
950 S=80:SPEED INK S.S:REM PLAYER SPEED
960 D=0:REM DISTANCE GONE IN SECTOR
970 CS(0)=40:CS(1)=45:REM COMPUTER CAR SPEEDS
980 Y=32:REM PLAYER'S CAR Y
990 IF CX(0)<80 THEN X=96 ELSE X=48:REM PLAYER'S CAR X
1000 RETURN
1010 REM PLAYER DEAD
1020 !GRAPHICS.X.Y.0:INK 4.6:INK 5.26
1030 FOR A=5 TO 7
1040 SOUND 129.0.50.15.0.0.INT(RND*31)+1
1050 !GRAPHICS.X.Y.A
1060 FOR D=1 TO 70:NEXT D
1070 !GRAPHICS.X.Y.A
1080 NEXT A
1090 WHILE SQ(1)>127:WEND
1100 WINDOW#0.1.20.1.25:SPEED INK 20.20
1110 PEN 10:LOCATE 6.13:PRINT CHR$(22):CHR$(1)::A$="GA
ME OVER":CALL DBL.#A$.0:PRINT CHR$(22):CHR$(0):
1120 REM WAIT & ENTER TITLE SCREEN
1130 T=TIME:WHILE TIME<T+1500 AND INKEY(47)=-1:WEND
1140 WHILE INKEY#<>":WEND
1150 REM TITLE SCREEN
1160 MODE 0
1170 RESTORE 490:N=15:GOSUB 460:REM RESTORE COLOURS
1180 WINDOW#1.4.17.4.15:PAPER#1.3:PEN#1.1
1190 REM SET-UP INKS
1200 PAPER 0:PEN 2
1210 A$=SPACE$(2)+"ALPINE ROAD-RACE"
1220 FOR A=1 TO LEN(A$)
1230 LOCATE 1.1:M$=RIGHT$(A$.A):CALL DBL.#M$.0
1240 FOR D=1 TO 50:NEXT D
```



# File

(continued from page 89)

```
LIST
10 MODE2
20 SC%=0:LI%=0:LET TM%=0:LET FI%=-2
30 LET CM%=3
40 LET B%=CHR$(170)
50 DIM B%(3,1)
60 PROCSETUP
70 PROCSCREEN1
80 PROCSTOM
90 PROCYOU
100 PROCMONST
110 GOTO 90
120 STOP
130 DEF PROCSCREEN1
140 COLOUR 5
150 CLS
160 FOR A%=0 TO 15:PRINT TAB(A%,3):CHR$(162):NEXT A%
170 FOR A%=0 TO 3:PRINT TAB(A%,7):CHR$(162):NEXT A%
180 FOR A%=6 TO 10:PRINT TAB(A%,7):CHR$(162):NEXT A%
190 FOR A%=15 TO 19:PRINT TAB(A%,7):CHR$(162):NEXT A%
200 FOR A%=0 TO 6:PRINT TAB(A%,11):CHR$(162):NEXT A%
210 FOR A%=10 TO 15:PRINT TAB(A%,11):CHR$(162):NEXT A%
220 REM FOR A%=18 TO 19:PRINT TAB(A%,11):CHR$(162):NEXT A%
230 FOR A%=3 TO 19:PRINT TAB(A%,15):CHR$(162):NEXT A%
240 FOR A%=0 TO 14:PRINT TAB(A%,19):CHR$(162):NEXT A%
250 FOR A%=17 TO 19:PRINT TAB(A%,19):CHR$(162):NEXT A%
260 FOR A%=15 TO 19:PRINT TAB(A%,23):CHR$(162):NEXT A%
270 COLOUR 2
280 FOR A%=0 TO 17 STEP 2:PRINT TAB(A%,25):CHR$(166)
290 PRINT TAB(A%,26):CHR$(167):NEXT A%
300 COLOUR 3:FOR A%=13 TO 16:PRINT TAB(A%,30):CHR$(170):NEXT A%
310 COLOUR 7:PRINT TAB(0,30):"SCORE ":SC%
320 ENDPROC
330 DEF PROCSETUP
340 ENVELOPE 1,2,-1,-1,-1,255,255,120,0,0,-150,120,120
350 ENVELOPE 2,1,5,0,-10,5,5,30,-1,0,-10,126,110,0
360 ENVELOPE 3,3,0,0,0,0,0,121,-10,-5,-2,120,120
370 VDU 23,1,0,0,0,0
380 *FX 12,25
390 RESTORE
400 FOR A%=0 TO 3:READ Z%:LET B%(A%,0)=Z%:NEXT A%
410 LET X%=18:Y%=22:LET UX%=0:LET UY%=6
420 FOR A%=0 TO 3:READ Z%:LET B%(A%,1)=Z%:NEXT A%
430 LET A%=CHR$(160)
440 ENDPROC
450 DEF PROCMONST
460 COLOUR 6
470 FOR Z%=0 TO 3:PRINT TAB(B%(Z%,0),B%(Z%,1)):
480 B%(Z%,0)=B%(Z%,0)+RND(3)-2
490 IF B%(Z%,0)>0 THEN B%(Z%,0)=B%(Z%,0)+1
500 IF B%(Z%,0)>19 THEN B%(Z%,0)=B%(Z%,0)-1
510 PRINT TAB(B%(Z%,0),B%(Z%,1)):A%
520 NEXT Z%
530 ENDPROC
540 DEF PROCYOU
550 X%=INKEY$(0)
560 IF X%="Z" THEN PROCLEFT
570 IF X%="X" THEN PROCRIGHT
580 IF X%="M" THEN PROCJUMP
590 D%=(X%+64):S%=(31-Y%)+32
600 IF POINT(D%,S%)=1 THEN PROCSTOM
610 IF POINT(D%,S%)=6 THEN PROCCLIE
620 IF POINT(D%,S%-32)=0 THEN PROCDDO
630 COLOUR CM%:PRINT TAB(X%,Y%):B%
640 ENDPROC
650 DEF PROCLEFT
660 PRINT TAB(X%,Y%):
670 LET B%=CHR$(170)
680 X%=X%-1:IF X%<0 THEN X%=0
690 SOUND 0,-15,1,1
700 ENDPROC
710 DEF PROCRIGHT
720 SOUND 0,-15,1,1
730 PRINT TAB(X%,Y%):
740 LET B%=CHR$(171)
750 X%=X%+1:IF X%>19 THEN X%=19
760 ENDPROC
770 DEF PROCJUMP
780 PRINT TAB(X%,Y%):
790 LET Y%=Y%-4:IF Y%<2 THEN Y%=2
800 FOR E%=130 TO 150:SOUND1,-15,E%,0,02:NEXT E%
810 ENDPROC
820 DEF PROCCLIE
830 COLOUR 1
840 LET CM%=3:LET TM%=0
850 SOUND 0,-15,28,8
860 FOR W%=172 TO 174
870 PRINT TAB(X%,Y%):CHR$(W%)
880 FOR WE%=1 TO 500:NEXT WE%
890 NEXT W%
900 LET LI%=LI%+1
910 PRINT TAB(12-LI%,30):
920 IF LI%=5 THEN PROCEND
930 FOR W%=0 TO 5:PRINT TAB(B%(W%,0),B%(W%,1)):NEXT W%
940 PROCSTOM:PROCSETUP:PROCMONST:PROCYOU
950 ENDPROC
960 DEF PROCDDO
970 IF Y%=22 AND TM%=1 THEN PROCFFILL
980 IF Y%=22 AND TM%=1 THEN ENDPROC
990 IF Y%=22 AND TM%=0 THEN X%=X%+1
1000 IF Y%=22 AND TM%=0 THEN ENDPROC
1010 SOUND 2,1,200,6
1020 FOR W%=Y% TO Y%+4
1030 PRINT TAB(X%,W%):B%
1040 FOR AA%=1 TO 50:NEXT AA%
1050 PRINT TAB(X%,W%):
1060 NEXT W%
1070 LET Y%=Y%+4
1080 ENDPROC
1090 DEF PROCFFILL
1100 COLOUR 1
1110 LET FI%=FI%+2
1120 PRINT TAB(FI%,25):CHR$(166)
1130 PRINT TAB(FI%,26):CHR$(165)
1140 FOR T%=1 TO 3
1150 SOUND 1.3,T%+30,1:SOUND 1.3,T%,1:SOUND 1.3,T%+30,1
1160 NEXT T%
1170 LET SC%=SC%+100
1180 COLOUR 7:PRINT TAB(6,30):SC%
1190 IF FI%=16 PROCWIN
1200 LET TM%=0:LET CM%=3
1210 PROCSTOM
1220 ENDPROC
1230 DEF PROCTOM
1240 LET TM%=1:LET CM%=1
1250 PRINT TAB(0,0):" ":PRINT TAB(0,1):" ":PRINT TAB(0,2):" "
1260 LET SK%=RND(100)
1270 LET SC%=SC%+SK%
1280 SOUND 1,2,100,10
1290 COLOUR 7:PRINT TAB(6,30):SC%
1300 FOR W%=1 TO 100:COLOUR 13:PRINT TAB(0,1):SK%:NEXT W%
1310 PRINT TAB(0,1):" "
1320 ENDPROC
1330 DEF PROCSTOM
1340 COLOUR 2:PRINT TAB(0,0):CHR$(155):CHR$(154)
1350 COLOUR 1:PRINT TAB(0,1):CHR$(151):CHR$(150):TAB(0,2):CHR$(153):CHR$(152)
1360 ENDPROC
1370 DEF PROCWIN
1380 FOR W%=180 TO 70 STEP -10:SOUND1,-15,W%,3:SOUND 2,-15,W%,3:NEXT W%
1390 FOR W%=60 TO 150 STEP 20:SOUND 1,-15,W%,6:SOUND 2,-15,W%,6:NEXT W%
1400 COLOUR 2:PRINT TAB(5,13):"Y":COLOUR 3:PRINT TAB(6,13):"O":COLOUR 4:PRINT TAB(7,13):"U"
1410 PRINT TAB(9,13):" ":COLOUR 2:PRINT TAB(10,13):"W":COLOUR 3:PRINT TAB(11,13):"I":COLOUR 4:PRINT TAB(12,13):"N"
1420 COLOUR 1:PRINT TAB(1,17):"ANOTHER GAME? Y/N"
1430 FOR A%=1 TO 1500:NEXT A%
1440 LET B%=INKEY$(0)
1450 IF B%="Y" THEN RUN
1460 IF B%="" THEN GOTO 1440
1470 CLS
1480 END
1490 ENDPROC
1500 DEF PROCEND
1510 COLOUR 2:PRINT TAB(5,13):"G":COLOUR 3:PRINT TAB(6,13):"A":COLOUR 4:PRINT TAB(7,13):"M":COLOUR 7:PRINT TAB(8,13):"E"
1520 PRINT TAB(9,13):" ":COLOUR 2:PRINT TAB(10,13):"O":COLOUR 3:PRINT TAB(11,13):"V":COLOUR 4:PRINT TAB(12,13):"E":COLOUR 7:PRINT TAB(13,13):"R"
1530 COLOUR 1:PRINT TAB(1,17):"ANOTHER GAME? Y/N"
1540 PROCSPEECH
1550 FOR A=1 TO 9
1560 READ A%
1570 CALL SAY
1580 NEXT A
1590 *FX 21,0
1600 FOR A%=1 TO 1500:NEXT A%
1610 LET B%=INKEY$(0)
1620 IF B%="Y" THEN RUN
1630 IF B%="" THEN GOTO 1610
1640 CLS
1650 END
1660 DATA 17,15,9,8,10,14,18,6
1670 DATA 34,20,16,4,1,53,35,52,0
1680 RESTORE
1690 DEF PROCSPEECH
1700 P%=TOP+100
1710 IOPT 0
1720 .SAY
1730 STA &FE41
1740 LDA #&0A:STA &FE40
1750 LDA #&2:STA &FE40
1760 .WAIT
1770 LDA #&40
1780 BIT &FE40
1790 BEO .WAIT
1800 RTS
1810 1
1820 ENDPROC
```

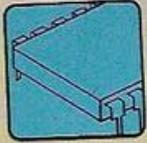
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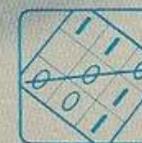
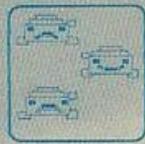
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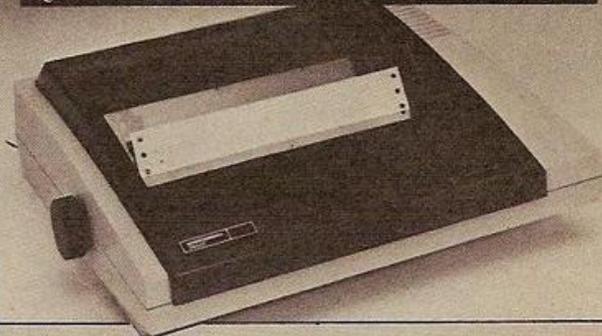
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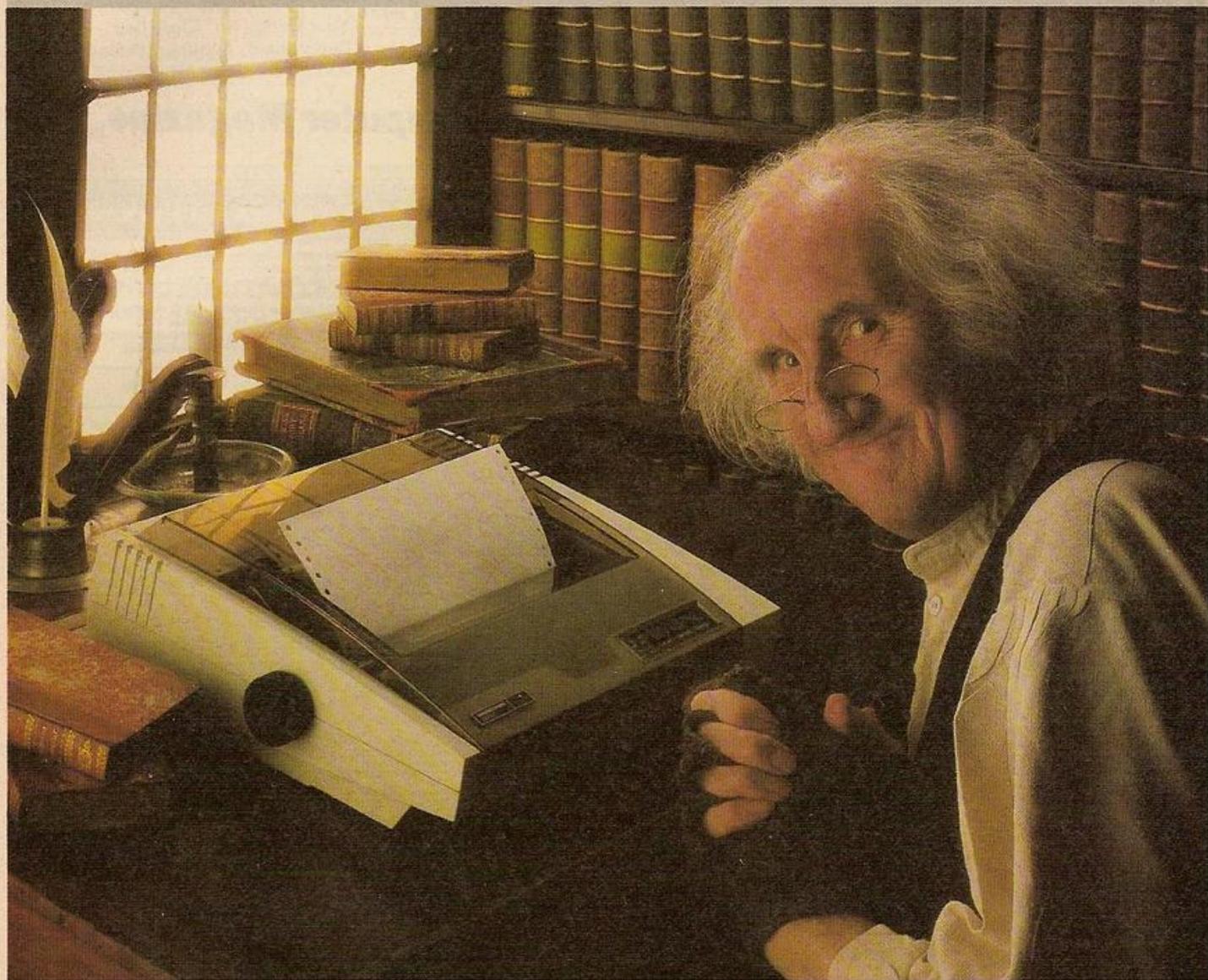
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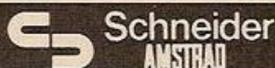
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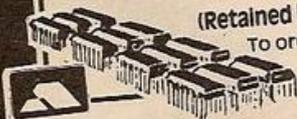
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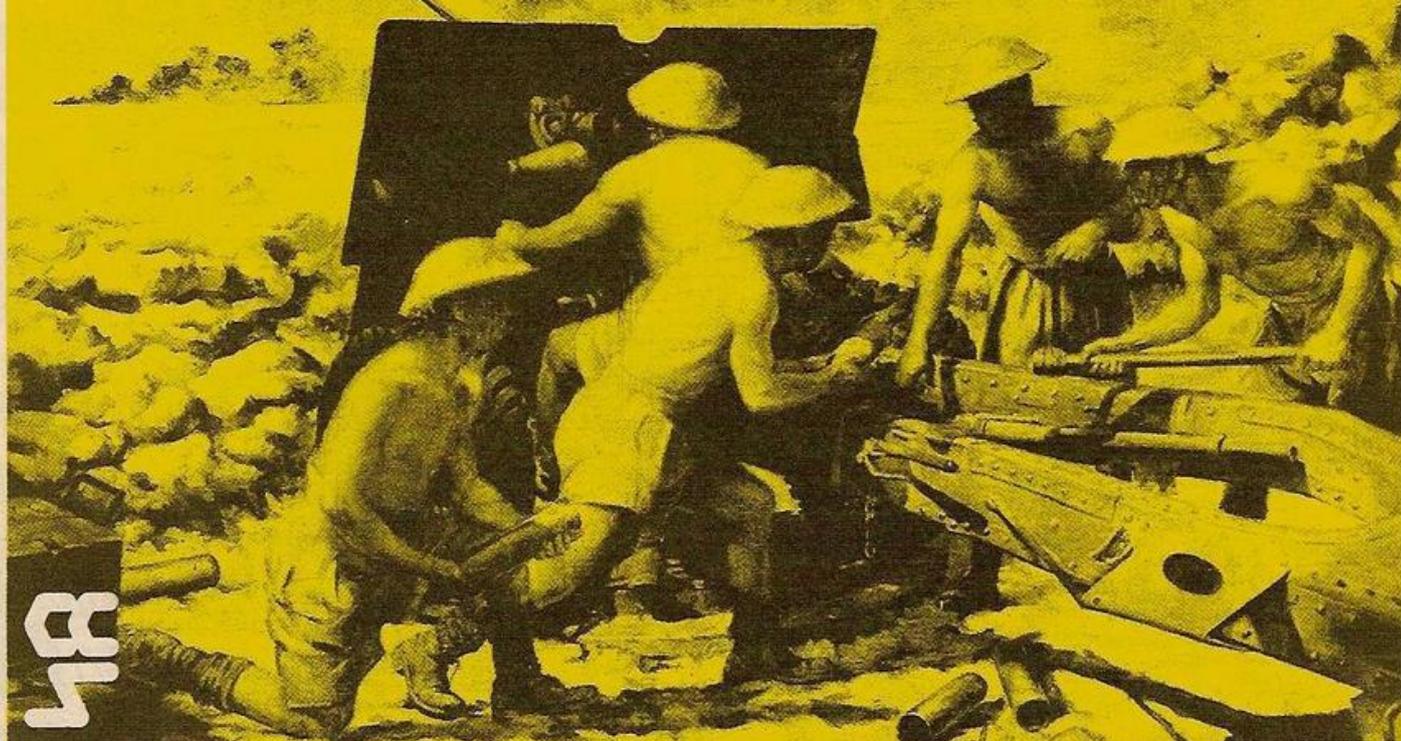
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