

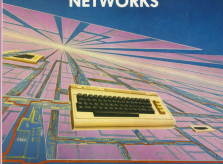
# Commodore **HORIZONS**

**The independent Commodore magazine**

75p August 1984

**BIT SWITCHING EXPLAINED • FLIGHT SIMULATOR  
UTILITIES AND LANGUAGES REVIEWED**

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Commodore Horizons welcomes readers' contributions — either articles or program listings. Articles should be typed double-spaced with a wide margin. Programs should, whenever possible, be printed out on plain white paper, accompanied by a cassette. We cannot guarantee to return every article or program submitted, or please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.



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If you don't know what Bit Switching is, you're missing out on an important programming concept — read this article for instant illumination

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It starts here — the largest Software File ever, with games and utilities galore for the 64 and the Vic 20, both unexpanded and with Super Expander

### Relative files on the IBM

The IBM disk drive is not the easiest peripheral to use — this article gives you the programs and subroutines you need to get it under control

### Answer book

Technical expert Jack Cohen copes with more of your programming and hardware queries, including character sets, garbage collection and machine code

### Competition

Microsoft offers three lucky readers the chance to win computers for the 64, with a year's free subscription to the new Microsoft 64 network service

## EDITORIAL

MILAM OR BLISS — it's not a matter of taste. It's also a matter of where you're standing. No, this isn't a theological reference, nor is it an introduction to a discussion of the finer points of philosophy. Instead it's a reaction to the *Fine Commodore* show.

The *Novotel Hotel* isn't the most inspiring of buildings. The place is surrounded by a frenzied one-way system and the entrance suggests that it leads to a vast car-park rather than an apartment hotel. The show itself occupied two large halls. Striding between the two, Commodore users bumped against the hotel's more customary clientele of tourists, to the surprise of the mainly American and Japanese visitors waiting to embark on the next stage of their package tours. The Commodore staff who stayed in the hotel from setting up on Wednesday to dismantling on Saturday didn't deserve much sympathy. Not only did they lose sight of the outside world for the duration, but they lost sight of each other as well, communicating by walkie-talkie instead.

Discussions at the show was the matter of the two halls as Radio Luxembourg plugged it out with the likes of *RadioLogic*, *Llamasoft* and *Bubble Bus*. This left exhibitors with speech controllers looking for megabyte expansion kits, but certainly grabbed the attention of arcade fans. Unused joystick were as rare as an unpopular game from *Llamasoft*.

Uppatun was the quieter end of things (and not just because we were there). Surprisingly, despite all the surrounding hi-tech competition, the most popular stand here was a computerized version of *tenbols* — tradition dies hard sometimes. But the hardware stars upstage were the new Commodore micros, although it was the peripherals which attracted the most attention from Commodore owners. The *Plus 4*, which breaks away from Commodore's customary catalog for home micros, comes with a range of matching peripherals. They're all very nice, bearing a pleasing resemblance to the *Orin Atom* range. More importantly, the disk drives are four to five times as fast as the 1941, and are said to be compatible with the 64. So if you own a 64 you'll lose in terms of matching dross, but you'll gain in speed.

This should bring a sigh of relief to disk users — and an end to the odd situation of turbo-loading cassettes being faster than disks.





## LETTERS PAGE

### German ham

PERHAPS you could pass on the following information to Morris Bailey (May '84) and all other "hams" with Commodore computers.

Station DL4 FBR, operator Helmut Lomberg, has programs for the Vic 20 and the 64, an article on these — without listings — appeared in the first edition of a new German magazine called "W4" in April. The program allows for transmission, reception, CQ call, test, sending to tape, transmitting from tape and automatic taping of messages. Mode of transmission is RTTY.

Give Helmut a call, and you'll probably get all the information you need.

Now to a request. Are there any UK readers who'd like to exchange listings for the Vic 20 for listings for Vic or 64 published in German magazines?

I'd be pleased to hear from those who'd like to add a few new games or utilities to their collection. Likewise I would

be pleased to receive program listings for music or graphics on the Vic 20, as well as utilities for machine code programming.

Incidentally, Commodore users in the UK should be thankful that software prices are — compared with German prices — almost ridiculously low, the average price for a game on disk here being about £20 at present exchange rate, and with very few cases — usually imported British programs — of cassette being available too. David Zwigg-Pfeiffer, Zingelshaus 24 D4452 Griesau-Ep W, Germany

### Window no-go

I OWN A 64 and wondered if you could give me some help with a short program to create a window of four lines which would not scroll up — as in the window in The Hobbit.

A J Mlynick  
West Norwood  
London

THE BEST way to do this is to set up a split screen, with graphics in the top half and text below. Unfortunately this requires a complicated machine code program, and

can't be done in simple Basic.

### CompuThink again

COULD YOU put me in touch with Mr R W Gregory, who had a query on CompuThink drives in the Answer Back section of the June Answer Back?

I have a CompuThink Disk Controller Board (DD DSK CTL PD) which, in conjunction with your advice, should solve his problem.

A MyCane  
100 Telford Lane North  
Leacock Hill  
Preston  
Lancs

MR GREGORY — are you out there? Since we don't have a second of your address we've printed Mr MyCane's in the hope that you'll be able to take advantage of his kind offer.

### Lively play

PLAY FOR LIFE is an organisation for promoting cooperation between parents, teachers and the toy trade and industry to create life-affirming playthings for children.

Play for Life is currently compiling a guide, and it is intended to include a section on computer programs. Our primary concern is for playthings for the five to twelve year olds, but our interest extends to children of all ages. It would be most grateful if any software houses who feel they produce suitable programs would send me three.

The criterion for inclusion is that the programs should be constructive, creative entertainment. Thus we are looking for utilities that encourage the users to extend themselves, and their imaginations. Graphic and music utilities are excellent examples.

The sort of games that we're looking for are, may be harder to qualify, perhaps because there are so few of them? Action sapping, dragon slaying games are definitely out! Documental power simulations are similarly excluded. A lack of overt violence is no qualification, war games may still be aggressively competitive, to what are we looking for? Simulations that deepen understanding, role play games wherein the player helps others, arcade games that encourage coordination and swift reaction, but not if they depend on or include violence and aggression, and how about multi-player games that require the participants to work together?

We are greatly encouraged by the increasing media interest in Play for Life. Its first meeting in February received extremely sympathetic coverage on BBC Radio 4 and positive interest has been already shown by some of the quality press, not only in the Play for Life idea, but also specifically in appropriate computer software.

Avick Oller  
Montford  
Goddards Avenue  
Chorborough  
Suff. Sussex

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"Rock McSteel of Hardware  
meet Eddie Sponge in  
Software!"



## PC and Z seen

COMMODORE'S plans for the business market are becoming more ambitious. UK general manager Howard Skeworth claimed at the Fifth International Commodore Show that with CBM's policy of self-efficient manufacturing and aggressive pricing, Commodore could become IBM's major PC-compatible rival.

The IBMPC compatible machine runs on a 16-bit 8088 chip, with 256K expandable to 512K. Storage is on dual 5 $\frac{1}{4}$ " disks, and RS232 and Centronics outputs are provided. There's a 9-inch monitor with a range of display format options.

Users will be glad to know that the Microsoft Flight Simulator works faultlessly. Commodore's John Collins commented that the PC is "Markedly different to the Japanese computer" — an which it is based — "in both function and design."

The PC is intended for launch in early 1985.

The ZX801 "Zee Machine" is in an earlier stage of development. The main chip is a Vics-compatible 8018, with 256K user RAM and 128K for screen handling.

Memory can be expanded to 512K. The Zee Machine features full 16-bit addressability, with dual integrated 1.3 Mbyte disk drives and a 10 MB hard disk controller.

## COMAL coming

NEW utilities from CBM software showcased at the Show included COMAL, PILOT and LOGO language programs and an Assembler.

COMAL, available in August for the 64, is a structured language similar to Pascal. PILOT and LOGO are to be sold in two separate packages.

The Assembler package will enable you to program in assembly language directly onto the 64.

# New CBM micros debut at Show



Commodore Plus/4 — new line, new price, built-in software

COMMODORE'S two new home micros, the Plus/4 (formerly the 264) and the Commodore 16, made their UK debut at the Fifth International Commodore Show in London on 10-16th of June.

Both machines operate on a new variant of Basic, version 1.1, which means that C16 software can be run on the Plus/4. Via 30 and Commodore 64 programs will not be compatible.

The Commodore 16 comes in a Vic-style metallic-grey case. Designed for the first-time user, it has 75 programming commands including full graphics plotting and program editing. There are four cursor keys and a "help" key, which highlights programming errors.

The C16 has two joystick ports and 118 colours (15 colours at 8 luminesc levels, plus black). The display is 40 columns by 23 lines. There are two sound generators, a cartridge port, and a new type of cassette unit port to connect the existing C155 cassette deck.

The C16 offers 128 user RAM with 128 ROM, and will be sold in the form of a starter pack with the computer, cassette deck, introduction to Basic part 1, and "several" games for £129.99.

The Commodore Plus/4

"fits between the CBM4 and the Vic4 in terms of facilities. At the moment there are no definite plans for the future of the V164."

The Plus/4's major selling point is its four built-in software packages, which are stored in ROM and accessed through the function keys. There's a word processor, spreadsheet, database and business graphics package — the same range as you'll find on Sinclair's QL, which costs 1400.

The four packages can share and exchange information through the Plus/4's screen windowing facility, which allows two packages to work simultaneously on the screen.

Further innovations include a new style case similar to the forthcoming Japanese MSX machines, with four cursor keys arranged in a diamond

shape, an escape key and a reset button.

The Plus/4 is compatible with the 1541 disk drive, but is being marketed as a "package" with the MP7083 5 $\frac{1}{4}$ " disk drive and the MP7082 dot matrix or DP51101 daisy-wheel printer as an ideal small business system.

The Plus/4 will cost £249, and like the C16 should be available in September.

New peripherals include the MCS801 seven-colour dot-matrix printer, at £799, the MP7082 80 cps dot matrix at £145, and the DP51101 daisy-wheel at £199. All are compatible with the Vic 20 and 64 as well as the new micros.

The 1541 disk drive will replace the 1541 at the same price, £279, and the new cassette deck, the 1531, for the C16 and Plus/4 only, will cost £44.99.



The Commodore 16 — for the first-time user

# Thorn-EMI to show TOTL 64 commitment

# Haig call-up

THORN-EMI Computer Software Distributors will be attempting to grab a large slice of the Commodore software market over the next few months.

Thorn's plans are based on the Creative Sparks label, a range of educational games from the USA's Horware, and the TOTL programs for which Thorn-EMI are now the UK's sole distributors. The Horware programs include arcade games such as Ghost Manor, Pool Challenge, The Pit and Rascal's Tootle for the 64, and Phoenix's Career and Shamus for the Vic.

Educational titles include Eds on Keys, Foomaker, Jory Machine and Alphabet



Zoo. More titles are promised throughout the summer and

Thorn has titles scheduled throughout 1985.

At the Horware press launch Thorn-EMI's Henry Klides emphasized the importance of a solid dealer network, reasonable profit margins and good technical support, all of which the company hope to supply.

The TOTL writer programs include Informator, a CBM64 database for £49.95 on disk; Speller, a spelling checker for £19.95 on disk; Text and Label, which together form a complete mail-labelling system for £44.95 and £24.95 on disk.

For the Vic + ISE, Thorn's TOTL Label 2.1, a mail-labelling program at £9.95 on cassette.

## Soft toys

MANY major software houses had new products at the Show. Microsoft's Career for the Cat was accompanied by a soft toy version of that very feline, which is being sold at £8.98. An astronomy program and games featuring the Mr Men characters are in the pipeline.

The California sports design utility was also on show, demonstrated by the designer

Smart Bishop of Bright Green Software.

Allison's Guardian is a faithful version of the Williams arcade classic Defender, complete with Landers, Missiles, Baiters, Bombers and Pods. Also on show were Eagle Empire, a Phoenix derivative, Son of Wagger, Panic Planet and Loco. Each game costs £7.95 on cassette.

Bubble Bus previewed the Quadrillion disk, which combines the Word Wizard, Label Printer, Power Printer and Advisor programs for

£14.95. Also on show were prototype forms of a sophisticated war game, Strike Force, and a handsign-teaching program for deaf children, KeySigns.

Kalbid's long-awaited Death Star made its debut on a giant video screen. This Star Wars version features sophisticated 3D effects.

Also appearing was Hoag 1, an arcade-type escape game in which you play a guard at a POW camp.

Audio's Heiser of Usher and Lee Hunter proved popular, if the inability to get hold of an uncopyrighted joystick is any measure, and the GAS-Kit, a graphics/animation/sound utility package at £14.95 on cassette or disk was previewed.

Finally the Paradise Group showed MusCalc, a range of American sound software products on disk which enable you to synthesise, arrange and print out music on your 64.

The disks, which cost between £19 and £49, may be accompanied by a range of music keyboards when they are distributed in this country. For further details contact Dennis James, MusCalc UK, the Paradise Group, The Metropolitan, Hatfield Road, London.

COMMODORE's American boardroom maneuvers become more and more Byzantine. The latest directorial appointment is former US Secretary of State Alexander Haig.

Haig, not Kirkbride noted for his knowledge of the computer industry, is the latest in a line of appointments made after two groups of executive resignations, prompted by the departure of Commodore founder Jack Tramiel in January.

Tramiel, meanwhile, is reported to be planning to set up his own rival to Commodore, having sold "all or most" of his 2 million shares in the company.

Now seeking £10m in finance to add to the \$40m he plans to invest himself, Tramiel's new company will apparently include his son Leonard and Sam Ratner, has a tin of CBI chairman Irving Gould's opposition to Tramiel's sons becoming involved with Commodore sparked Jack Tramiel's resignation.

Whatever the truth behind the boardroom battles, it will be ironic if Jack Tramiel's new company, which may be producing a rival to the Apple Macintosh and IBM PC, comes into conflict with Commodore itself when the Commodore IBM PC-compatible machine hits the market in 1985.



Haig — also in the ring



Cat — mouse-driven software?

# CES — pointing to tomorrow

Chris Jessiles reports on software trends at America's Consumer Electronics Show, where the giants of the hardware and software market display their state-of-the-art wares

CHICAGO'S Consumer Electronics Show is a massive event, which acts as a showpiece for the software and hardware products which will be hitting the market in the next few months.

One man in Chicago was most impressed by the giant strides which are being made in games technology. The industry seems to be going over towards interactive adventure-type games rather than arcade shoot-'em-ups, so we can expect the UK market to follow suit in due course.

Notable programs included *Summer Games*, from Epyx, an *Several Olympics* simulation for the 64, billed as "The Games that the Nintendo Game Boy" stood, *Summer Games* is one of several athletic programs — *BMX* and *Activision* have similar games.

Also notable was CES's *Discman Dig*, an "educational" program with impressive graphics illustrating the



Summer Games — carrying the Olympic torch



Discman Dig — educational fun

history of dinosaurs, their distribution and extinction.

Next year's *Spy vs. Spy* is based on the popular *Mut* magazine's long-running cartoon series. You have to negotiate a building with twenty rooms, searching for lost and secret documents while planting bombs to eliminate the opposition. Again the program features impressive graphics.

Adventure International's *Incredible Hulk* game is one which is actually available in this country; the IBM 64 version costs £9.95 on tape or £19.95 on disk, and is the first in a series featuring Marvel Comics superheroes.

Although American software prices don't seem to be dropping, the quality of programming is improving all the time, and as reported in *July's* *Microbus*, a number of companies are planning to make US software more fully available in this country.

## Fast data access from Wafadrive

PROGRAMMERS needing fast data access for the 64 will soon have a choice of high-speed storage systems. IBM's SFS 431 is on the way, and hardware distributors *Roznicco*, best known for the DR2 804 Commodore-compatible tape deck, promises a new type of fast access storage system for the Vic and 64 later this Summer. The *Wafadrive*, initially available for the Sinclair Spectrum at £129.95, features two fast tape drives, each with a storage capacity of 128K. The storage cartridges, which are a special form of *Micro-Cassette*, will come in three sizes: 128K (£3.95), 64K (£3.50) and 16K (£3.45).

*Roznicco* spokesman Graham Booth claims that a high level of electro-mechanical reliability and data

integrity is designed into the *Wafadrive*, which has 8500 and *Cometics* outputs. A word processing package written by *Howson Con-*

sultants should be included in the system, which will cost about £180.

Several applications and entertainment programs will also be available at the launch, planned for October.

For information, contact Graham Booth, Roznicco, tel. 0494-452751.

## Soft switch to 64

THREE software houses are giving increased emphasis to their 64 catalogues.

*Multimedia House's* plans, dictated by Paula Byrne at the *Commodore Show*, recognize the fact that "the 64 is now a very important machine." Participating *Multimedia House* software includes versions of *Maggy* and *Proteus*, and new titles including a graphic adventure called *Castle of Terror*, *Sherlock Holmes*, an educa-

tional game called *Animal Action* and a break on *Commodore 64 Machine Code for the Absolute Beginner*.

*Salamanca*, best known for a range of *Dragon* software, is now going over headily to the *Commodore 64*.

### Development

Using a development system which turns *Dragon* machine code into C64 machine code, *Salamanca* plans to bring out *Wizard War*, *717 Flight*

*Simulator*, an epic adventure called *Castle Barrow*, and a number of other programs by September. *Salamanca's* Lucy Parker commented: "We're showing prototypes to a number of chain stores to get their reactions, and we'll be converting a list of software to run on the 64 in the next few months."

Furthermore, *R&D* systems of 17 Devonshire Hill Lane, London N17, Tel 01-881 3132, will be converting a number of small business packages written for the *Lynx* computers to the 64.

Titles include *Mallard*, an address management system for £19.95 on disk or £16.95 on tape, *Flexi-Base*, a database at the same price, and *diary*, *roster* and *accounting* programs.

Software support manager *Mr. Mall* promises a high level of technical support and a hot-line enquiry service for *R&D* customers.

# CYBERTRON MISSION

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COMMODORE 64 VERSION

# 64 Valhalla faster, better

**THE LONG-AWAITED** Commodore 64 version of the animated adventure Valhalla is now available, after long delays to the intended release date.

Legend's marketing manager Peter Maxham commented: "Although the game runs the same as the Spectrum version, £16.99, we've made considerable improvements to the graphics — the characters are now in colour — and some to the sound effects. We're also featuring on the pack a 1984 Game of the Year Disk, an award of which we're very proud."

Peter also pointed out that the game runs faster than the Spectrum original, so even those who just want to watch the game playing itself will get more out of it.



## Have today, yours tomorrow

**THE GOLDEN HARE** of Mansfield, prize in the treasure-hunt puzzle based on artist Kit Williams' famous book, is now up for grabs for Commodore users.

A new company, Harroff, of PO Box 365, London NW1 7JX, has bought the jewelled Hare from the winner of the Mansfield competition, and is now offering it as the prize in a software puzzle.

Harroff's Jeff Fossell said that the first part of the game, which will run on the 64 and Vic-16K, will be released on June 1st. Harroff's Prelude will cost £8.95, as will the second part. Harroff's Finale, which will be released 12 weeks later.

To overcome the problems of piracy the game includes software security measures and unique registration cards.

Although the price, the Hare, is valued at £20,000, Harroff will offer £10,000 as an alternative to the eventual winner.

Rather than digging up the countryside, all you'll have to do is pinpoint the location which is the solution to the puzzle.

Due to the nature of the puzzle Harroff's team is making copies of the game available for magazine reviews, but players are invited to write in if they have any advice to offer or questions to ask.

## Crawling, talking hardware

**THE CBM SHOW** saw the promise of a wide range of new 64 peripherals.

Ram Electronics, meanwhile, is working on a 256/128 KAM pack for the 64. Priced in either £K or £1K blocks to a maximum of 64 blocks, the pack should be available in September at around £300.

A Ram Electronics spokesman commented that it was too early yet to say whether software would be available to exploit the KAM pack. Contact Ram Electronics, 106

First Road, Fines, Hampshire, tel. 01264-1833, for more details.

At the Commodore show Ram was demonstrating the Speaker speech synthesiser for the 64, developed by PCB Micro-Systems. The unit, mentioned in July's News section, costs £34.95 and features both preset and alphabetic vocabulary. It faces competition from the Adman speech synthesiser, which has been reduced in price from £49.95 to £29.95.

Comax Software has

developed an Adman-compatible version of the arcade athletics game Track and Field, which was previewed at the show. Contact Adman Electronics through Mike Storrock, tel. 0611-749971, or at Rigon Way, Harrogate, 0423-62641.

For the musically-inclined, Milton Kayton Music and Computers, 17 Bridge Street, Leighton Buzzard, Beds (0525-796021) demonstrated at the show a range of 64 interfaces for MIDI equipped synthesizers. The Jellinghouse interface is a basic version costing £29.95, and for the more advanced Star unit you'll pay £89.95.

MEMAC is also distributing software which displays programming parameters for Yamaha's FM controllers, and an impressive demonstration using a DX7 and Sid Ops 6 with Expander was a popular feature of the Show.

Valiant's Turtle was up and crawling too, running off CBM's LOGO program. The turtle should be in the shops in September at around £230, though there'll be reductions for schools.












Dear Valiant's turtle go faster...



... than Harroff's hare?



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# Splat attack

**Pete Gerrard** sinks to submarine depths to review new games

HAVE ANYTHING will travel, as the old saying goes, and this month sees us succumbed in a variety of interesting locations from underwater to outer space, from the wild west to a haunted house.

Our underwater escapades begin in a game called *Submarine Commander*, produced by the Creative Sparks branch of Thomson Elite, for a Vix 30 with 384K expansion. Now, regular readers will be well aware of the fact that I don't often over-enthusiastic about games for the Vix. Indeed, my opinions about some of them must surely test the editorial comradship pot. However, *Submarine Commander* is one of the better games available, and it was extremely difficult to stop playing it and start writing this review.

## Stunning

You are put in the role of commander of a Mediterranean-based submarine, and in true Voyage to the Bottom of the Sea style your job is to rid the seas of as much enemy shipping as possible. There are three basic screen displays to help you in doing this, and the one that you'll probably be using most features a stunning high resolution drawing of the Mediterranean area, complete with a flashing dot representing your submarine, and several non-flashing ones (representing the enemy) which move around all over the place.

You have to check after them and when within range switch to another display, which this time shows what is to be seen on the sonar screen. When you've detected one or more of the enemy you must come up to the surface and switch to the third display, which now shows you a periscope's eye view of whatever happens to be sailing on the sea.

Having got the enemy in your sights, a swift press of the space bar sends a torpedo hopefully homing in for the kill. These enemy are not passive however, and there is a distinct chance of you coming in for some bombardment as well, in which case your only chance is to throw caution to the winds and descend to the sea-bed, trying to avoid descending into it. And yes, it is possible to crash if you attempt to take your submarine onto dry land.

A wonderful game, with a lot of things to think of at once, not least of which is remembering which key to press to do what, as your efforts at launching a torpedo result in your submarine blowing its ballast tanks and rapidly ascending to the surface. A highly recommended game.

One of the more ridiculous games to come our way this month is *Bob's Blender* from Pelonic, working on the suspended Vix 20. In this game you take on the role of

Bob, an electrician who is overworked and underpaid, a complaint that could do almost be shared by most of us.

Your rate of life is to tow houses, and, like some builders I could name, you haven't done a particularly good job on the last one that you visited, the job it says here is in the lack of financial motivation. As a result of this your company and underworked boss has sent you back to the house to get the job done properly, although this game presents us with a rather convoluted version of the above scenario since the only thing you have to do is mend a fuse.

This is even easier than it is in real life, since Bob's Blender apparently believes that you can stand a fuse merely by bumping into it. The fuse is situated in the centre of the house (your screen). The house wouldn't win any architectural prizes, since it only consists of one outer set of walls and one inner set with a doorway, beyond which is the fuse. To get to the fuse you are up against both a time limit and what the cassette tape said charmingly refers to as 'ghosties', planted there by your wicked boss.

## Bull

In the right hands this could have been turned into an interesting game, but whoever programmed it has regrettably got the wrong hands for brains, rather, since the game falls down on a couple of points. One, it is exceedingly dull, with one too much going on, and secondly the time limit that you're given to reach the fuse is ridiculously short. Even if the screen were devoid of walls and ghosties it's doubtful whether you'd be able to get to it in time. None of the games played at Steve Gerrard managed it, and in the words of the immortal bard, I'll give it one out of ten.

*Defender* by any other name is still *Defender*, but in defence of the company who've produced this version for the MSX expanded Via (Amiga Software), they at least have the good grace to call it Star *Defender*, and have the word Star in extremely small print and *Defender* in extremely large print on the cassette label card.

## Classics

You are, inevitably, a hero of galactic proportions, who has been chosen to save Earth from the dastardly aliens who've come here to do whatever dastardly alien do. In this case, they are attempting to abduct various members of the human race who have been stupid enough to stand at the bottom of the screen, while at the same time chasing after your space ship and trying to shoot you down. You, of course, have to rescue the humans and destroy the aliens in what has become an arcade classic. Shoot everything, and who dares wins. Now read on.

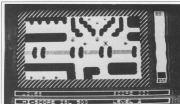
One thing which prevented *Defender* from following in the footsteps of *Space Invaders* and *Asteroids* and becoming a truly revered game was that you needed more fingers to play the game than nature provided you with. Fingers trailed around like wet spaghetti trying to find the right button to press at the right time. Among have remained pretty faithful to the original game, although they have at least brought the number of necessary keys down to nine. This is, of course, still far too many.

There are various different types of alien, some more deadly than others, but only one can steal humans. If this particular alien should manage to get a human to the top of the screen the human turns into a statue, which is the possibly most deadly enemy of all. Some of them follow you about, and require very fast movements to shoot them down. Either that, or a quick trip into hyperspace to re-appear somewhere else on the screen. With a radar to show you what's happening off screen, this is probably as close as you're going to get to having a proper version of *Defender* for the Vix.

You may need to abstract a friend to come and help you play it, but life becomes a bit



*Bob's Blender* — best of 1984 for the Vix 20?



Spies! — danger of strawberry jam

more reliable using a joystick. Only four keys to worry about then. Still, for anyone with fingers as dexterous as Paul Daniels, keep your eyes open for a copy of this.

Siemack Megawars have been churning out software for the unexpanded Vic for some time now, and *Alpha Master* is one of their latest efforts to convince people that all the publicity blarney is true.

Well, it isn't. This is a copy of *Spies Invaders*, although there are three different screens to negotiate rather than one. Using either keyboard or joystick you have to go through the usual Space Invader-type screen, and then on the second screen dodge the aliens and their fire as they bob and weave about all over the place.

Screen three is a test of your reactions, as asteroids race down the screen and you have to dodge out of their way. You can shoot them as well if you want, but as they quite often come down in parties of two or three, and your ship is wider than the gap created by shooting one of them, this isn't always advisable.

#### Walleys

I know the unexpanded Vic has a paltry 12K of memory to play with, but some people (Micro-Action, Llamawoft, Analogic etc.) manage to produce some very good, original software for it, with original being the keyword. Oh well, guess, let your wallets dictate the future course of software companies.

Some Commodore 64 games now, and this month's prior for the company that has produced the more ridiculous publicity campaigns of 1984 so far goes to Incentive Software Ltd., for a little number called *Spies!* (their exclamation mark, not mine).

*Spies!* comes toploaded with a lot of glossy inlay cards, brochures, competition news, and anything else you can care to think of. But at the end of the day we're more concerned with the quality of the game than the quality of the packaging.

I will admit that I was prepared to heartily dislike this game. Any cassette inlay card bearing the words "The Massive Exploration Area slides around in one exciting one hour into 'Strawberry Jam!'" is not guaranteed to send me rushing for the nearest joystick and bopping into action.

So when the game actually got started, it was a pleasant surprise to find that it really is quite good.

The "Massive Exploration Area" is the screen, which, in a nice display of high resolution graphics, scrolls randomly left, right, up or down, taking you and everything else with it. You, incidentally, are called Zippy, and your little blob's role in life is to avoid being carried by the screen into various various strange plants and collect some bonus points, while trying to avoid bumping into some of the many marbles that populate this "Massive Exploration Area".

There are seven levels in all to explore, and Incentive cheerfully tells you at the start of the game that you'll have "no chance" of escaping from level seven. Having never got further than level three I can well believe it. There is no escape zone as such from each level, you merely have to survive for a certain length of time, which is indicated by a sliding display at the right of the screen. Survival automatically takes you onto the next level where there are only as many marbles to be avoided.

Joystick response is very quick, perhaps too quick, but I found that playing it with the keyboard was even worse. One nice touch is that you can define which four keys control your movement, if you don't

like the ones Incentive have dedicated to the task.

An interesting and unusual game that stands despite everything. Who knows, this could be one of those rare occasions when a game for a home computer opens a dedicated arcade machine, rather than the other way round.

Feared on the cassette card accompanying *Megawars*, from Paramount Software, is an extract of a letter that they have apparently received concerning this game. It says "When I saw *Megawars* at my local Odeon showroom — I bought the computer". Makes a change from buying the computer I suppose.

I have no reason to doubt the authenticity of that letter, but what I do doubt is the sanity of the person who wrote it. *Megawars* is certainly not a bad game, but it isn't that good. I can't imagine reading out and buying, say, a BBC computer if I saw this coming on it.

It is described as a magical planetary trip, since the purpose of this game is to make a run from Pluto to Earth, calling off all the planets en route. But this is no simple pleasure trip, since the hostile inhabitants of each planet are out to prevent you from completing your journey. These inhabitants all looked considerably similar to me, and they all seemed to behave in similar ways as well. The only thing that made the various planetary hops different was the number of times that each set of aliens had to be killed. Once to go from Pluto to Neptune, twice to go from there to Uranus, and so on.

#### Star Wars

Controlling your spaceship is quite fun, since this is one of those games that believes that once you've started moving, you ain't never gonna stop! Thus you quite often find yourself bouncing aimlessly about the screen, bumping into walls and aliens in total disregard of space traffic rules.

Periodically a few astronauts, left-overs from the latest *Star Wars* epic no doubt, float about the place, and you can collect bonus points for picking up these galactic hitchhikers. But as going to pick them up sends your spaceship careening about like James Hunt on a bad day, this is probably not to be recommended. ▶



Star Wars — when garbage and flying saucers

Nice idea, shame about the program.

Terminal Software, as has been noted before, produces either games or dress, and if their latest effort *Triple Tournament* is anything to go by, they're getting back towards the game again. Not great by any means, but not at all bad.

*Triple Tournament* is precisely what it says it is, a collection of three games that can be played by either two players competing against each other, or by one player doing battle with the computer. For the two player option you'll also need two joysticks since, quite reasonably, there is no keyboard option on this one.

All three games are loaded in at the same time, and whatever mode you happen to be playing in you have the choice of having one round in succession with each one, or three rounds with just one of them. Your scores are toted up over the three rounds, and at the end of the third one the highest score naturally enough wins the game. Individually the games probably wouldn't merit an over-enthusiastic review, but presented in this way they're overcome any inherent flaws and together they emerge as quite a decent little package.

### Quilich

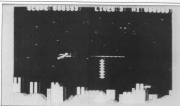
To take them in turn, *West World* is the old western favourite, the shoot 'em, but two opponents moving about on the screen, and whoever gets the first successful shot wins the bonus of 1,000 points. There's a collection of cast, horses and other debris between the players, and this must be shot through first before hopefully killing off your opponent.

*Space Race* is a real joystick wrecker, as you race along a corridor in space, bumping into all manner of enemy ships before attempting to dock with your base at the end of it.

Finally *Kamikaze* sees you in control of a ship at sea, under attack from a suicidal wave of planes. You have to shoot the planes before they can get you; no easy task.

An excellent idea from Terminal Software, and with 3 different speeds of play, this package is pretty good value for money. Let's hope that there's more of the same on the way.

Every dog has its day, and every game of



Kamikaze — Superstar version on the cheap

programs seems to have its month. Recently flight simulation programs have been appearing with the regularity of new computers, and one such for the Commodore 64 is called, simply, *Flight Simulator*, and is produced by Amiga Productions.

The basic scenario behind every flight simulator is the same: you have to take off, fly for a pre-determined amount of time (or to a specific destination) and then land again. With Amiga's program we have a choice of a number of airports to fly to, with take-off always taking place at Heathrow airport.

Controls are rudimentary, and the keyboard is extremely sluggish to respond, but then I don't suppose you'd expect a floating 340 to turn through 90 degrees in the length of time it takes to press a key. But this sluggishness is well annoying, as you are sometimes left staring in bewilderment wondering whether you've pressed the key or not.

Screen display is generally not very good, although you are presented with a nice high resolution map of the U.K. to show you where all the airports are. With that unerring instinct possessed by all reviewers, I managed to fly to Luton airport from Heathrow via somewhere near Essex. On arriving at Luton the 'plane was too remote control, and almost

delivered me to a crash landing with my being able to do anything about it.

Subsequent attempts failed on buses. A good flight simulator should make you feel that you're actually in the 'plane, but with this one I was never in any doubt that I was firmly entrenched in front of a 64, listening to the rest match commentary on the radio.

### Package

Software for the 64 is appearing at a flat old rate now, and some of the better programs to watch out for include *Killer Wall*, from Alligata. This involves manoeuvring along a set of high resolution tunnels and corridors, shooting light bulbs, fish and birds as you go. Getting through to the next level of difficulty is not easy, as a single mistake transports you back to the start again, but this is well worth the long loading time.

*Black Hawk* from Creative Sparks (Thors EMI) is another one worth investigating. In this you're on a raid across enemy territory in the great plane *Black Hawk*. Some superb graphics in your attempt to see off the enemy, and a nice mixture of attacking and defensive strategies is required before you'll get anywhere playing this.

K-Tel, whose initial launches were about as exciting as some of their records, have bounced back with something called *Cityblast*, which owes a little to *Demolitee* and a little to *Space Invaders*. The end result is quite interesting, but it didn't maintain interest for long at the General purpose arcade.

Finally, Advanced Computer Entertainment appear to be launching titles by the minute, with *Nitroball*, *Kryphon*, *Magic Carpet* and *Mind Control* coming together in one batch. Only *Mind Control* proved to be of any lasting appeal, and even that didn't last too long. But you may be attracted by ACE's low prices — £2.99 per program.

Commodore games of 1984 so far? Well, for the Vic you'll have to go a long way to beat *Charlie Bave* from Micro-Action, and the 64 game of the year has really got to be the *International Soccer* cartridge from Commodore. Disagree? I thought you might! ■



Flight Simulator — All right, Luton airport

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# Money juggling — enter the spreadsheet

Do you want to play the stock market, run a business or simply keep track of your bank account? Mike Grace explains how spreadsheets can alter your life

ELECTRONIC spreadsheets — sometimes even the word fills the air with a certain style, a feeling of slight electrostatic tremor. Images of money, executives in suits grouped around graphs and tables, forecasting vast fortunes, named young men with briefcases making their first million. No manor who we are or what we do — we have to admit to a certain fascination with the wheeler and dealers of the stock market, the gamblers in shares and gilts, the people who make and lose a fortune at the twists of a telephone and a crisp command to sell now. Unsettling stuff maybe — but romantic all the same.

But now, the world of the cash flow analysis, forecasting the financial future, profit and loss and other monetary terms has come into the home with the advent of the electronic spreadsheet for the home micro. After taking the business world by storm (Visicalc and Interscalc) the software manufacturers decided that the rest of us might also be attracted to this form of computer use — managing our money. The result has been a host of Visicalc imitators (most with the word "calc" in the title) for the home computer.

But what exactly does the phrase "electronic spreadsheet" mean? Or perhaps of more importance — what does the software do?

The easiest way to describe a spreadsheet is to imagine a simple sheet of paper with a few columns and rows, each labelled with a name.

The content of the paper is that you can write down the appropriate sums in the boxes and then add them (or whatever you want to) easily. It's like having a simple method of looking at your finances so you can understand what's going on. Think of another example of a spreadsheet, a bank statement. Again all you have is a piece of paper with figures, names being added and some being subtracted so you end up with the final total. Although the bank statement doesn't actually contain the boxes, they are still there if you think about it.

## Budget restriction

If you are restricted to budgeting a paper then every time you ask a "what if?" question you have to change all the figures and rework all the arithmetic — which is a bother and takes time. But suppose you

store the information for your budget into a spreadsheet in your computer — then you have the ability to ask "what if?" and the computer will work out all the sums for you. This is quick, easy and very valuable, so "what if the mortgage drops by 0.75%?" can be answered for a month or a year in about 5 seconds.

There are many other uses for spreadsheets, like checking your bank statements, entering your accounts, calculating stock control, budgeting for a wedding, etc., but the principles remain the same throughout. You enter all the figures and set up the structure of the spreadsheet once — and then forever more

is a great time saver, as everyone I know thinks of ways of improving their spreadsheets afterwards, and it's a great help to be able to move columns around instead of starting again.

Another small facility that is useful in practice is the ability to "fix" the titles. As you move around your spreadsheet obviously the titles will scroll off the page (or to speak as you go down or to the right). Once the titles have gone it can be annoying trying to ensure you put the figures into the right columns (you may have to scroll back and check, then scroll to the right again). By "fixing" the titles though they will stay along the top and left of the screen, and only the figures will scroll.

Column width is variable too you can have any number of figures in each column (which is important for larger figures (business accounts say) or for much smaller figures where it's handy to get more onto the screen (a stock for fee example).

Other features that Practicle Plus boasts are graphics capability and sorts and matches (you can look for all figures more than 40 for example). It is quite an amazing package for the price, and surprisingly the screen limit of 32 and 23 columns and rows is not as much of a problem as I thought it would be.

In view of the cost I feel this particular spreadsheet to be excellent value for money. It is available on both tape and disk from Computer Software Associates.

As far as I know **Plus Manager** is the only spreadsheet at present designed to work in 80-columns, for either the **Vic 20** or the **Commodore 64** (with an 80-column card). The great advantage of working in 80 columns is that you can see much more of the page in one go (or the screen) instead of having to scroll around a lot. The most amazing fact is that the software comes free (yes, free!) if you buy the 80-column card from Imper Design Ltd, (and you might well consider buying it if you are considering serious word processing). The only sad fact is that **Plus Manager** omits a couple of very handy features.

Looking at the good points first, **Plus Manager** comes on disk or tape and has the great advantage of 80 columns. The manual is easy-to-read, you can have changeable column widths and (just like Visicalc) this means titles and names can be justified to the left and numbers to the right, you can "zero"



you just alter the figures as appropriate and your computer does all the hard work for you.

**Practicle Plus** is the only spreadsheet I've reviewed for the **Vic 20**, and considering the price of £29.95 is quite amazing. There are an impressive array of properties, and I'll spend a few minutes explaining these as they make the difference between an easy-to-use spreadsheet and software that can frustrate you.

First **Practicle** has a "replace" function — which means you can swap the contents of one box for cell as they're called to another box or row of boxes.

Another very important feature is the "insert and delete" one, enabling you to add a column or row (or remove it after you've set up your spreadsheet). Again this

any cell instead of having to scroll around the sheet, and you can print out the contents of an individual screen in screen-print loading which is very useful. Another very useful feature is the ability to turn the automatic calculation off so you don't have to wait after entering a new number while the computer automatically recalculates all the formulas before allowing you to move to the next cell.

What I found lacking was the ability to "replicate". I had to enter every figure in every cell and the fact that after entering a number in a cell and pressing RETURN to get the data into the program, I then had to move the cursor myself either to the right or down before entering the next number. This may seem a little thing, but having been used to spreadsheets which gave you this option I found it very annoying to have it again. But as the software is free — it seems a little "graciously" to complain.

Superficially has produced a range of spreadsheets, and the one I had for review was **Basicalc 2** for the 64 (on OS9 + VAT for tape and AT1 + VAT for disk). I found the program extremely flexible (unlike the others you aren't tied to a specific stage, but can use the memory of 12800 cells in any



shape you like). Thus you could have an extremely long list of rows only 3 columns wide (for a list of stock etc) or the more traditional stage with 15 columns or more.

All the traditional features are there, with options, variable column widths, goto anywhere (called "jump" in Basicalc jargon) etc. As I mentioned before, you can also instruct the cursor to automatically move up, down, left or right after you have entered the data, so it's ready for your next entry — a great advantage in opening up and browsing the number of keystrokes.

Basicalc 2 has several "edit" features which allow you to insert and delete rows or columns, divide if you want all your figures as integers (delete number) or rounded to 2 decimal places (which you would for financial sheets), a "find" facility to allow you to search for a word or formula, etc. A very attractive feature is the ability to change the colour of your sheet to suit you, and if you "fix" the values then the colour of any part of the sheet that is fixed is also changed, helping you remember that you've "fixed" that area. I use this colour feature a lot, using different colour combinations for different sheets, thus budgets could be grey, bank statements blue, my personal accounts red, etc.

While all the software will allow you to print on your sheet, Basicalc 2 was the only one of the four under review that would allow me to print out on my STAC printer as well as on the faithful Commodore 1315 (or in my case the MPS

# BUSICALC

801) without any hassle. If you have a 1315 then this printer occasionally "hangs" after the instruction to print, but Basicalc saves for this and all you do is enter a shifted "C" instead of the modified "C" which is all you need usually.

There are plenty of other facilities, but in the space provided I cannot list them all. I feel this is an excellent program, just the best, but then it's not the most expensive and it is particularly easy for the beginner. There is tremendous scope in the mathematical ability (far too complex for me) but its major advantages are that it is easy to use, very flexible, and simple to understand. The formulas are not calculated automatically (very useful in testing things) and are worked out in order like  $2+4*2=12$  not 10. This type of mathematics is unusual for spreadsheets and Basic users may require a time to get used to.

In practice I couldn't really find any faults for the average user. There is no graphics ability, the manual I had was well-written but poorly presented, and it has the irritating habit of asking what size your spreadsheet is before you load it off disk (which I can never remember), but really this is insignificant.

One additional feature, which is invaluable if you like a professional appearance in your final printout, is the ability to print tree screens as many boxes as you like, so you end up with sentences and areas giving a very neat appearance. Although this package is more expensive the ease of use makes it worth the extra for the serious user, while providing a good introduction for the beginner.

## Balls-Boycot

Multiplex must be the "Balls-Boycot" of spreadsheets for the 64, available from Kober Software at a cost of £99.95, is really quite outstanding. Originally written for larger computers the manual still refers to the Apple, and all the diagrams in the manual are for 80 columns instead of the 64 columns of the 64 Multiplex owner quality.

Firstly, the presentation box of papers which contains a superbly-bound volume (the box doubles as a stand for the manual, which I found looked better in the diagram than in real life as it kept popping over when I used it). But the manual is comprehensive and well-presented, with slightly glossy paper neatly printed.

The manual contains a comprehensive training section and a well-written glossary describing every command and feature. Sadly the section on adapting a printer (for example an Epson or similar type) was inadequate and very clumsy, and I never really learnt how to print out on my five-colour dot matrix printer (because of the diagonal slash (/) — because of the difference in the ASCII codes — although I'm sure it can be

done). But learning to use Multiplex is a delight with the section on training.

In use the program keeps accessing the disk, a procedure I found seemed to slow me up quite a bit. The use of colour is consistent which is a shame. But the actual flexibility of the program is the main advantage, as it seems to do just about everything.

It has all the features I've mentioned so far in this article (of course) but some are even better. For example the column width is adjustable, but earlier previous programs where you have to alter all columns to the same new width, in Multiplex you can alter individual columns to different widths. Similarly it's possible to specify that you want 2, 3, 4, 5 and 7 set to 2 decimal places, while columns 4 and 5 are set to integer. All this is due to the fact that each cell, column or row has separate options for justification, width, format, etc. and text can be centred left or right (justified). You can even have the E symbol in any column or row.

There is a very comprehensive menu including Mask (for erasing the data in a cell or groups of cells), copy, delete, edit, format, help etc. This last command will enable you to call up a comprehensive help section from within the program if you've misplaced the manual. You can also sort, search, move areas or patterns, fix cells, lock formulas if you want to, turn calculation off, create or delete windows and even put a border around your window.

If you want to save or load you can display the directory and then place the cursor over the file and press RETURN for automatic loading (very nice touch). Most features can be accessed several ways (in other words you can place the cursor over the command HELP and press RETURN or you can just type "H" to obtain the HELP screen) and I found the flexibility a little confusing at first as I had to



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more choices, but with time I settled into a routine.

So, how about my personal opinion? Well, there's no doubt Multiplan is exceptional and very flexible, but if you've a five time user do you need it? I suspect not, because it has so much that you wouldn't use that it seems a waste. But if you're running a small business (or even a large one for that matter) then this must be the spreadsheet for you — if you've got a 64. There's so much flexibility and so much scope that I know I'll never get full use of it, and manipulating data around is much easier than with other programs I've tried. Mistakes are easy to correct (delete and moving columns and rows is easy and quick) and one feature I really like is the ability to name an area of the sheet (for example in the budget in Figure 4 you could take the income column and NAME it

"Income") and then use that name in a formula (so we could arrive at the final total by putting the formula TOTAL = INCREASE \* EXPENSE/INCOME).

There are a few nice touches as well, like the little booklet (called a reference card) which contains all the commands and codes in one easy-to-look-at place, like the HELP system, like the use of the % symbol if necessary or the use of a bar graph, like the variety of methods of using the mouse, and so on. My final point is admiration for the way that formulas are created, which I will attempt to explain (although it's far easier to do it than write about it). If you wish to add 2 cells say, you would put the cursor into the TOTAL cell and then press "=" to let Multiplan know you are creating a formula. Then you just move the cursor to the appropriate cell — and as you do so the formula appears on the screen. So if you

were moving up one cell, the formula would state your original cell minus one row (because you've moved up a row). Then you key "=" and the cursor jumps back to the total box, and you move up 2 places this time so the formula reads the original cell minus 2 rows.

This sounds very complex, but in fact it's much easier to enter formulas this way, although the result on the screen can look very complicated. The real bit is that you don't need to write the complicated bit, you just move the cursor and the software does the rest.

Multiplan is by far the most sophisticated system I've seen, and if you need the complexity then I can highly recommend it.

Spreadsheet are essential for home budgeting, small businesses, any accounting, manipulating numbers for contractors, gear ratios, anything where constant calculations need performing. Most software does the same thing, it just seems that pricing more is more likely to make life easier. But for the infrequent user the cheaper systems are as good to use.

Trying to assess value for money is hard as it really does depend on what you want to do. I cannot really differentiate between the four I've reviewed, as all are good value for the price. If you're uncertain, I'd advise sticking to a cheaper system at first unless you know you'll be using it a lot, in which case spend as much as you can.

The biggest advantage to spreadsheets is, in my opinion, they make doing accounts fun. And that's worth a lot if it means better control over your money — and hence your lifestyle. ■

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# Utilities to give your 64 freedom from Basic

*Kevin Bergie discovers five software packages which supplement the 64's Basic — and help you to write machine code games, use tapes like disks, escape from FORNIX, diagnose faults and even avoid Basic altogether*

IF YOU love your 64 but hate its primitive version of Basic, there are a number of ways you can remedy the situation. There are an increasing number of utilities available which enable you to make better use of the sound, graphics, disk capabilities and other features of the 64, and in this article I'll be looking at five of them — Scope, a language intended for game design which compiles into pure machine code; ACOS+, which helps your cassette drive to act like a disk drive; Turbo Extended Basic, which adds commands for sprites, sound and graphics; 64 Doctor, a fault-finding program; and a version of the programming language Pascal.



A company named ISP has come up with a game designer language for the 64 called Scope. The basic says, "this remarkable product will revolutionise programming on the 64". Well, it certainly makes a difference. Scope was written by programmer Allen Pridde from the original version designed for the Sinclair Spectrum.

The program comes on tape or disk, with an instructive manual and demo routines. The package is housed in a large video case which a lot of companies seem to be favouring recently.

Scope supports 46 commands which allow the user to write programs in a form of assembly language that is easily understood. Coding started is very simple, just LOAD"SCOPE" and away you go. The demo programs can then be examined. There are seven, ranging from a sound effect to a horse race. By this time you should be fairly impressed with Scope.

To progress further you will need to refer to the manual and become familiar with Scope and its commands. The 66 page manual is very comprehensive, and should enable you to make good use of Scope. Each command is entered behind a REM statement, and the user must continue an area for the program to be compiled, therefore the first statement would look something like: 10 REM ORG:1500, 1500; the last character on each line must be a colon.

## Commands

The manual lists the commands and their uses. There are commands for handling numbers (VARIABLE & DEFC), colour and graphics (MOVE,MOVE etc), placing characters on the screen (PUT). There are a range of structural and conditional commands and a command to scroll the screen one character at a time. There are of course special commands for sprites and sound and a command for the raster.

ISP claims that writing time is 10 times faster using Scope, and that the result is 100% machine code. To get to the code the program must be compiled, using a SYSTEM command, and then saved with a utility program supplied with the package. The result is very good and very fast, but you need to calculate the start and end addresses of the code that Scope generates very carefully.

Apart from the demo programs supplied, there are many example programs in the manual to support explanations of the commands. The demo programs are also listed, along with a dictionary. ISP also intends to start a Scope user's club and a

programmer but busy membership will be first to Scope owners.

The overall impression ISP seem to give is that buying the program will help you become a "professional" overnight. This is not quite so, as Scope is a language, and as such will require some learning. Apart from this, Scope does come up to expectations and you can expect good results from it.



ISP claims that it will give full support to any Scope user who wishes to market a program written using Scope. It's possible to run a Scope-compiled program without Scope in the memory, if you know how. Considering the speed and simplicity of writing Scope programs, it would be surprising if there weren't a number on the market soon. At £17.95 on tape or £19.95 on disk, Scope is an excellent buy and should give you plenty of "scope" for your money.

From Melbourne House comes another utility called ACOS+ a collection of advanced Basic commands for the 64. Melbourne House claims that it will make your 64 cassette deck as convenient as a disk drive. While it certainly makes tape usage easier and more organised, it does not even start to compete with the speed of a drive. ■

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The SID chip is more than well catered for, with 4 commands: CLR, SOUND, SYNCH and WAVE. Their functions are to clear the SID chip, to play a note, to set an envelope and to set a waveform respectively. As with the other commands the sound commands come with explanations and small demos, but throughout the manual there is a lack of demo programs for the user; these should at least be a few routines to give the user a start for their library.



ACOS+ retails at £8.99, and for your money you get a tape with the utility, a tape format program and a game written using ACOS+. There is also a 48 page manual. The object in using this package, as in using any extension to the resident Basic on your micro, is to make programming easier and faster. The 64 is probably in more need of this than most micros, that is if you use Basic. The problem with all of these packages is the constant loading before having access to the extra commands or executing programs written with the package.

#### Format

The utility must be loaded and initialised before any of the features of ACOS+ can be used. Once initialised, you can load the tape format program to format your cassette, which also adds a directory to the front of the tape. The usual SAVE and LOAD commands are replaced by CLOAD and CSAVE. There are additional tape commands to load and update the directory, view and erase files, save or load a block of memory and verify a block of memory.

There are several commands that enhance the 64's resident Basic. HTAB and VTAB will move the cursor to the specified column or row. PLOT is a combination of the HTAB and VTAB commands. There are two familiar commands DEEK and DOKE, which are a 16-bit PEER and POKE. There is a MOVE command which allows the user to transfer a block of memory, which could be used instead of the COPY command.

The commands RASTERON and RASTEROFF redress and restore the interrupt routine; RASTERON is used to allow graphic displays to be flicker free. The PLAYER command uses nine parameters to set and define the player, the

command MISSILE is set and defined in the same way allowing the user to study set up joystick, sprites and boundaries. There are of course commands for sprites, with which the user can return the X and Y positions of a sprite and set collision detection.

#### Sounds

The SID chip is not ignored by ACOS+. There is a range of one word commands to allow any use of the SID. The user can use VOLUME, ENVELOPE, WAVEFORM and PULSE along with other commands to set up and create sounds or symphonies. Part of the user's manual is dedicated to explaining how to use these commands, and using the tape utility.

ACOS+ also has a demo game for users to sample. One final powerful command is USER. This allows the user to redefine any of the existing ACOS+ commands, or add new commands of their own to the existing commands. How about that? A utility that you can build on, what more could you want?

ACOS+ is very good; the performance comes up to expectations, and all of the commands will make life easier for those tired of using the 64's long-winded Basic. The bottom line, as always, must be, "do you need it" and "would it be a good purchase?" At £8.99 it's certainly not expensive.

Moving along, Turbo Extended Basic costs £14.99 and is produced by Auto Software. The program is cassette based and comes with a 23 page manual. This package is similar to ACOS+, with the exception of the tape utility.

There is a great range of commands, and we'll sample some of them to get a picture of the use of Turbo Extended Basic.

The first group of commands are devoted to sprites, in order to simplify sprite creation and manipulation. With commands like BCOL, MOVE, OFF, PUT, SDT and SPRTLE, sprites can be defined, moved and detected. The command BCOL will check for background collision, and there is also a command for sprite to sprite collision. MOVE does just that; moves specified sprites. To turn sprites off simply use OFF. To turn them on, SDT defines sprites and SPRTLE places a sprite at specified location.

#### Graphics

There are some nice graphics commands, as well as the usual ones — the new familiar BDR (border colour), CLG (clears graphics screen) and DRAW (draws a line). There is also a CIRCLE command, a handy-named FILL command (fills a block of memory with specified characters). There is also a HIREX command which sets up a hires screen with a specified colour; INK controls the character colour; and LINE allows you to draw a line with specified co-ordinates on the hires screen. LINE must be used with MODEL, which allows drawing or erasing. Each pixel on the hires screen can be set or reset with PSET and PRESET. The background colour is set with PAPER.

The last group of commands come under

the general heading of utilities. There are 13 commands under this heading, so only the essential ones will be looked at.

The first command is POP, as used on Apple's range of micros. This is a most useful command, allowing you to remove the last return from a GOSUB off the stack. So if you are in danger of overflowing the stack, POP can be used to pull the last RETURN address off, much safer than many GOSUB's are used. Turbo adds a PRINT AT command and a DOKE (delete) power command. There are two commands for setting memory HIM and LOM; using these commands the top and bottom of memory can be reset for code programs, alternate screens or character sets.

The command KEY waits for a key press and jumps to a line specified by the actual key pressed. This is a very compact and powerful command. The user can also STOP lines screens; other commands include TEXT, REPEAT, UNTIL and PALINE.

#### Price

Turbo performs reasonably well and compares with ACOS+ on the utilities, but not on the other features, and certainly not on presentation of tape and manual. ACOS+ also outstrips this package on price, a very important point to many of us!

If your 64 is floating ill, how about a 64 Doctor? It will only cost you £18.95 for disk or £17.95 for tape, and your 64 can get treatment in the privacy of your own home.



The package is produced by Computer Software Associates, and takes the hard work out of detecting hardware faults. 64 Doctor consists of a tape or disk with a 6 page instruction manual. To use the program, simply load and run it.

The program has a pictorial menu consisting of the keyboard, printer, disk drive, TV, Audio, cassette, joystick and RAM. The user can select between these areas and perform a number of diagnostic tests.

Testing the video display on TV surely allows the user to fine tune the unit, so that the display and colours are at the best position possible. The Audio test runs through a scale on each wick of the SID chip. If you can hear the scales then all is well, if not then something is wrong (although it's not clear what!) The

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Keyboard test displays an 8-directional arrow on one screen, and allows you to test the stick by moving it. The fire button may also be tested. Both tests may be timed and a list of possible faults is given if the test fails.

The Keyboard test is fairly comprehensive, and allows the user to test most of the keys, displays them on the screen, and marks them as they are pressed. Obviously if there is a fault here then it is fairly serious, and your machine will need expert 'doctoring'. To test the drive a blank disk is needed. The SAVE, LOAD and read-write functions are tested as well as the internal DOS functions. The printer test merely prints all of the ASCII characters three times.

#### Checked

The cassette deck can also be checked; this will check all of the normal cassette operations and report on any failures. The 64's RAM can be checked; this can be a simple check or a continuous check (overnight). There is an auto-test which will test the drive, RAM and printer displaying the results on the screen. The checks, whether auto or single, will be passed or failed, and locked as checked.

There is not much more one can say about this utility, except that it could be useful for minor faults; but how do you test the drive if your disk is faulty and the program won't load?

From Oxford Computer Systems comes Oxford Pascal for the 64. They claim that this version is a complete implementation

of Pascal, and in addition takes full advantage of the 64's features.

The package comes on disk or cassette, and has three programs and a game. There is a comprehensive manual and a sheet of corrections for the manual. The program still has a bug, which Oxford Computer Systems say they are attending to. The disk



version is priced at £49.95, and the cassette version is £14.95.

Pascal allows you to escape from Basic, and potentially gives you a faster, more flexible and compact language. Programming in Pascal is more strict and than in Basic, and Pascal programs need to be compiled and saved before use. There is a resident compiler which will compile and

then execute programs for testing. Full error messages are given.

One disadvantage is the amount of RAM left when the Pascal editor and compiler are in memory, but the memory available can be extended by disabling the compiler and compiling source programs from disk. If there is still not enough room for your programs, then they may be chained together with certain limitations.

#### Factor

The package comes with many I/O commands as well as commands for the editor and compiler. Compiling and testing programs is very fast, perhaps five times faster than Basic. Pascal programs are certainly easier to write and follow than Basic, but there are many constraints on the programmer. OCS Pascal includes a powerful multi-colour SprinG editor.

How graphics become very simple to use on more POKER and PEEKs, just simple commands. Text windows are supported, and sound is also treated. So not only are you getting another language, but also more powerful commands as in an extension to Basic.

OCS has now developed a Metacompiler program which will be used as an in-house utility. This will enable the main body of a language compiler to be generated quickly and easily, making production time and development costs smaller. Hopefully this means that we'll be seeing Factor compilers for a range of languages for the 64, and we'll be looking at these utilities as they become available. ■

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JOHN CLARKE, acting as a development manager for CompuNet, explained the role of Commodore and his company, ADF Network Services.

"ADF and Commodore are jointly developing CompuNet. Eventually I'd like to see the service becoming fairly independent, as Microsoft is independent from Pronet. Our aim is to provide a sort of market place, allowing you to wander through the system and see the sort of facilities which we can provide. Obviously the service will be similar to Microsoft in some ways, and different in others; for instance, initially we won't have the huge database which Microsoft can offer through Pronet, but I feel that we have more to offer in terms of technical reliability, among other fields, and we're hoping to introduce software which will enable CompuNet users to access Pronet."

#### Research

CompuNet is now a working service, but numbers of modems available are being kept down until more checking has been done. "It's not an availability problem — we should be shipping out modems in large quantities by July — but at the moment the ICFUG members who have been given access to modems are helping us to research the system."

At the June Commodore show, where we talked, the CompuNet stand was handing out questionnaires which John hoped would give a better idea of the sort

of service the public expected from CompuNet.

"Obviously some of the ideas we have are already well established. We'll be offering telecopying, through a system called Telecopy, and an automated service by which you can exchange messages with other users. We're negotiating with a major bank to offer a banking service, though this idea isn't finalized yet. There's an area we call The Jungle, where you can just browse through seeing what other users have to say or what software they can offer. So far as the user software is concerned it's going to be very much a matter of request versus, but of course we'll be offering commercial software for downloading at a considerable saving. Part of the reason why commercial software houses are attracted to CompuNet is that we've incorporated a security system into each modem. Software downloaded from the system will run fine without the modem in place — and that's not just any modem, but the specific modem which was used for downloading. We've also done the best we can to make sure that the signal quality is reliable, and there's an error-checking protocol which should make the whole system very reliable."

#### Flexible

CompuNet's menu system makes it appear very easy to use, easier perhaps than the various viewdata services — Comlix, Oracle and Pronet. "I sometimes get confused using viewdata systems, but CompuNet leads you through whatever you

# Time make modem

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Chris Jenkins talks to  
and Microsoft

want to do, and makes it easy to find the sections you want to use. Of course the flexibility of CompuNet is much greater than that of viewdata systems, so we're not really trying to compete in a sense. We might not be able to offer such a large database, but then the Pronet information service hasn't exactly been born alive by Microsoft's! What we're trying to do is give users the services they want — they'll be able to do things like ordering books, records, wines, bulk groceries — and we'll charge a small commission on each transaction, as we will on user software which is sold through the Jungle section."

CompuNet's slow start is designed to attract service providers, so that once the system is fully operational a large range of facilities will be available. For the first three months the modem cartridge will be available only on mail order from Commodore, but by the Autumn it will be available from computer dealers. "The cost of the modem cartridge will be £99.99, and this includes a year's free subscriptions to CompuNet. Subsequent years will cost £30. We have a 1200/33 based system at the moment, although in London there's a 1200/1200 system which we're making available to software houses for speedload programs. Hopefully there'll be a complete 1200/1200 full duplex network eventually. Connect line charges will work out at something like 50p per hour at peak times."

#### Compete

John Clarke clearly believes that there is room for CompuNet to develop in competition with the longer-established Microsoft. "What we have here is a great way of putting out information — for instance, what about a service offering electronic 'reprints' of back issues of computer magazines? You could look through for articles you'd missed on a subject in which you were interested, then order a copy or have it printed out. That's just one idea — obviously the more you think about it the wider the range of possible services becomes. The public will only buy communications systems on the basis of what's there — what we're trying to do is to make sure that CompuNet gives them what they want." ■



John Clarke of CompuNet — "What people want they want"



# to your choice

able information networks now  
of the industry's growth areas.  
to Computer's John Clarke  
and's Jon Rock

MICRONET representative Ian Rock explained that the service was launched in March 1983, and has about 916 thousand subscribers.

"Essentially Prestel is a massive information service, and Micronet forms part of it, as a wholly independent organization. Micronet does three things — it provides communications facilities, so that once you've logged on to your system you can send letters, diagrams and so on.

"There's also a bulletin board, where you can leave any kind of message you want, either personal messages or computer problems or miscellaneous messages. There's now also a section for Starcom, an elaborate thousand-player galactic strategy game written by Mike Singleton."

"The second thing Micronet does is to offer the ability to download software. Currently BBC, Spectrum, Apple and Pet users can access around fifty free programs and fifty commercial ones. This facility will now be available for the Commodore 64, and games software will be about 20% cheaper than it would be if you bought it from a shop."

## Scope

Ian went on to explain that ICPLG members were helping with the development of the 64 service, and that software houses like Astrig, Bubble Box, Litanewh and Supercol would be making software available. "One trend is that we're adding to our non-games software — there's a lot of scope for us to provide business, educational and utility programs — we'd like to push all these areas equally."

Future plans include a service called Executive Micronet and an expanded education service. "Head Start will be a homeing learning service providing educational software for 5-12 year olds and their parents. School Link will start in the Autumn, and that's a service dedicated to secondary schools. We're looking to the future towards things like electronic homework." Leaving aside the question of how popular that idea would be with the children, Ian continued to explain Executive Micronet.

"It will act as a database of information for the small businessman, giving advice on

software and providing, for instance, examples of forms letters. Ultimately we'll have a range of downloadable software, initially for the Wren micro.

"The third main area of Micronet is information, which is more apparent because it's an instantly accessible service. As far as the 64's concerned, it will have a large database with news, reviews, forecasts, interviews, details of courses and so on."

Ian claims that it's taken this long to introduce a 64 service on Micronet because strenuous efforts have been made to make the system 100% right. "There were technical difficulties to be overcome — for instance acoustic modems weren't as reliable as they might have been, and they're now giving way to hard-wired modems.

"Don't you've got your 64, you'll need a modem and a hardware cartridge. The modem we incorporated is the Modem 1000, which plugs into the new standard Teletone jack socket. The cartridge actually does the downloading of the software, and you will find that there's no alternative to this cartridge commercially available. The cartridge will be about £30, and the modem £70 or £80. Since the modem has already been approved we aren't having to wait like other manufacturers are."

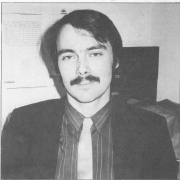
## Charges

To join Micronet all you need to do is buy the modem and its cartridge, then fill in an application form. Standard charges are

£33 per quarter, with extra for telephone connection time. "Since most users connect at off-peak times at local rates, charges tend to be about 40p per hour. The words 'please bill' tend to strike fear into people's hearts, but as I see most people don't become subject to the 5p per minute daytime connection fee. The other charges you'll see on your bill are for any items that you've ordered through the 'retailshopping' service, and charges for commercial software you've downloaded."

With around 3½ million "home accounts" being made to Micronet in the month of April, it's clear that the service is one of the most popular aspects of Prestel. "Micronet has brought Prestel to the attention of the man in the street, and in many ways has been the saving grace of Prestel. We're aware that we have to stay ahead — Micronet is an entertainment service, and we're planning to take people away from the use of computers for themselves. Certainly computers as we know them will change — there'll be a real reason to have a computer in the home as part of an information service."

Ian's impression that the running costs for Commodore's rival service, Compuserve, will be more than Micronet's, is a personal one: "We've blooded the trail and paid the penalties of being first in the field. The question is whether Compuserve will learn from us — in any case, it's an expanding market and the competition will be a good thing." ■



Ian Rock of Micronet — "Competition is a good thing"





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# Design a new character set for your Vic 20

David Shepherdson demonstrates how to give your Vic a painless face lift

**THIS CHARACTER** Worksheet program is one which I developed from an older one developed to help me design my own Vic 20 characters for a program so, at that time, there was no suitable program available. The original required an extra 3K RAM and, although it was effective, it was rather clumsy. This version will fit into an unexpanded VIC-20 (or +380) and by entering the following as either a direct command, or within another program, it will fit into a +14K VIC.

POKE 44132 : POKE 64830 : SYS 44824.

In this case, remember to take out the POKE 55 & POKE 76 in line 60.

First I would like to describe what the program does and how to use it, then what various routines do and other items of interest.

To use the program, simply load it and run. There are no particularly unusual POKEs in it, but I do recommend saving and restoring in case you have entered it.

Clear screen, an eight by eight grid is displayed with letters running Top to Bottom, and numbers on both sides. To

block in a square, simply enter the co-ordinates letter first, then number. If you decide that the letter not to have that particular block solid, then simply re-enter the same co-ordinates. This will remove the block. When you are either satisfied with the display or simply wish to see what the character looks like, then press 'G'. Within a second or so, your VIC will display, on the left of the grid, alongside each row, the decimal value of each row. These values are the required (decimal) figures for placing into your own programs in DATA

Character worksheet program

```

0 DIR$="7,7,7,7,7,7,7,7,7,7":CLR
10 PRINTCHR$(147):KEY$=" ANY KEY TO CONTINUE"
15 RIGHT$=" (HEX)16C31"
20 CHR$="#####"
25 GOSUB60000:POKE760,194
30 S$="66672 : 56+32-1 : 54+55+4 : 5C+7629 : C0+26720 : F0KE55 : 25 : F0KE56 : 10"
40 TL$="##### CHARACTER WORKSHEET"
45 IF (PEEK(1716)+24*PEEK(1767)+0)*THE$=0
50 PRINTTL$:FORI=8TO512:POKE7168+I,PEEK(32768+I):POKE84,PEEK(25600+I):NEXT
60 POKE84,0:POKE86,28:POKE88,8:POKE198,8:POKE89,8
70 GOSUB100:GOTO200
80
100 PRINTTL$
110 FORI=7662TO8888:STEP22:FORJ=8TO7:K=1+J:POKEK,79:POKEK+CO,0
120 NEXTJ,1:FORI=8TO8:POKE8C+I,1+128:POKE8C+J+CO,0
130 POKE8827+I,1+128:POKE8857+CO+I,0:NEXT :S=177
140 FORI=7576TO8882:STEP22:POKEI,8:POKEI-9,8:S=9+1
150 POKEI+CO,8:POKEI-9+CO,0:NEXT:POKE198,8
160 PRINTCHR$:RIGHT$(CHR$,23):"ENTER LETTER FIRST, "PRINT""S" TO SEE VALUES"
170 PRINTCHR$:RETURN
180
200 PRINTCHR$: " "(CHR$(157):CHR$(157):
210 GOSUB5000:IFR$="":R$="":THE$=10
220 PRINTR$:R$=ASC(R$)+64
230 GOSUB5000:IFV$="":V$="":THE$=200
240 PRINTR$:M$=150:V$=ASC(V$)+2+R$:IFPEEK(V$)=160THE$=60+79
250 POKEV,00:V$=8:W$=8:GOTO200
260
300 POKE198,8:POKE204,8
310 GETR$:IFR$=""THE$=10
320 POKE204,3:IFR$="S"THE$=1000
330 V$=VAL(R$):RETURN

```

Continued on page 58



```

540
600 PRINTOR:Y#I:IF<PEEK(653)=0#>PEEK(197)=4:THEN#00
610 RETURN
620
1000 SP=700:FORJ=0TO7:ZX(1,0)=SP:FORJ=1TO7:ZX(1,J)=ZX(1,0)+J:NEXT
1010 SP=SP+32:HEX
1020 FORI=0TO7:TX(I)=0:FORJ=0TO7:IFPEEK(ZX(1,J))<D:16#THEN#040
1030 TX(I)+=TX(I)+0TO ZX(1,J)=#
1040 NEXT:PRINTLEFT#ORR,3+I>:TX(I)
1050 NEXT
1060
1200 RS=CHR$(18):OS=CHR$(146):PRINTOR:RS;"E"/OS:
1205 PRINT"MAPLE"#"R#C"#"O"#"OY"#"R#R#"O#"E"#"R#T":POKE198,0
1210 GET#:"[F#E"#"THE#210
1215 [F#E"#"THE#3000
1220 [F#E"#"THE#4000
1230 [F#E"#"THE#5000
1240 [F#E"#"S"#"R#H#C"#"O"#"THE#210
1250 SY#4000
1260
3000 PRINTL#:"POKE#=#10,205:PRINTL#<CR#>#>
3010 FORJ=0TO7:POKEJ+68+I, TX(I):HEX
3020 PRINTTR#<2>:CHR$(20)+;"#":SPC(5):CHR$(144)+;"#":SPC(5):CHR$(20)+;"#":SPC(5):ON
R#(21)I>:"#
3030 GOSUB#00:PRINTCHR$(17):POKE#=#10,240
3040 GOSUB#100:FORI=0TO7:FORJ=0TO7:IFX(I,J)=1:THENPOKEZX(1,J):#0
3050 ZX(1,J)=0:NEXTJ,I:DO#200
3060
60000 [F#E:PEEK(30000)#0:20+64#PEEK(30000)#0:212=700#THE#RETURN
60010 PRINTOR:"[CORRECT"#"R#O#V":I>:"[E]
60020 SAVE"##"WORKSHEET".#
60030 VERIFY"WORKSHEET".#

```

You may then press 'E' to see what new character looks like (as it stands, the program will print it in four different colours) or by pressing 'C' you can return to the grid to continue to alter the chess, or by pressing 'R' you can start afresh. If you want either 'S' or 'Q' you can end the program and your VIC will start as it was before.

### Characters

Now, as for how it does what it does. Because of the difficulties of reading the Commodore Cursor and Colour Characters in a magazine, I've used their character numbers instead with the exception of line 30 which is explained in line 15. To save time when writing this program, I suggest that you use the Colours & Cursor keys themselves.

A quick rundown of the ones I used might be useful.

They are CHR\$(17) = Cursor Down, 18 = Reverse On, 19 = Cursor Home, 20 = Red, 30 = Green, 31 = Blue, 44 = Black, 46 = Reverse Off, 147 = Clear Screen & 157 = Cursor Left. By using Integer Variables in line 15 instead of normal numeric variables within a DIM statement, about a third of a K was saved and by using loops to the full, quite a lot of memory was saved.

In line 25 the GOSUB 60000 just checks that the screen is in the correct position. This is of course important not just because of the screen POKEs within the program, but because of the Character set requirements. The POKE TR, 194 cuts out RLV#-STOP key in case of accidents. However, it is still possible to stop the program by RLV#-STOP with RESTORE.

To cut this out, just add POKE 37196, 1 to line 25.

To save memory and time, I have standardised the most regularly used variables within many of my programs. Instead of YOL = 30000 etc, I decided upon 59 = 30079; 58 = 59 - 1 and so on. This way, instead of trying to remember which name I gave to any of the sound channels in a particular program, I just pick which channel and use 'S' with its last digit. For example, the white noise channel (SMP1), I always call S7. By having some standardisation between your programs it's surprising how much time you can save.

Line 45 merely skips the setting up of the auxiliary character set if you are reentering the program for a second time. One point that I have not seen with any program published is that when defining characters, the screen will be blank and nothing (apart from a beep) happens for a minute or so. I have added an extra POKE to this section, where another section is pulled into one of the sound channels at the same time to give the user the impression that something is happening and that the VIC has not gone away to sleep.

### Grid

The gaps at lines 68, 100, 260 etc are just instead of using 'REM' or a colon to separate each section for easier reading. These are obtained by entering a line number, pressing CTRL and RLV ON together, then SHIFT and 'M' and finally SPACE. You should now have an inverse slash and space. Press return and hit to check this. You should now have a line number without anything following it.

The next section POKEs to the screen the

right by right grid with inverse letters and numbers. Lines 200 to 250 is the INPUT co-ordinates routine using GET\$. - It is error trapped and will only accept 'A' to 'H' for the first digit, and '1' to '8' for the second, although either will accept '9' to see the values.

In line 260, Q is set to an inverse space, and PEEK#V checks to see if the location picked already holds an inverse space, if so, then it changes QQ to a grid pattern character. Lines 300 to 330 are simply the GET\$. routine. The problem this routine merely clears the Keyboard Buffer, and then (204) causes the cursor to flash. After the co-ordinate is entered, this is cut out.

### Options

Lines 600 and 610 are a true "Any key re-continue" routine. Instead of using GET\$. to check for a key press, (which does not check for Shift keys), this routine does. By PEEKing both 197 and 653 it is possible to check for ANY key. Location 197 checks for the usual keys, if no key is pressed then 197 holds the value of 64. Location 653 checks for Shift, CTRL, & Comm keys, if none of these is pressed, then 653 holds zero.

Lines 1000 to 1050 work out the values of the blocked in grid. S#(I,J) is set to 1 if a square is blocked in, if not, it is left as 0. This is in case you want to re-work the grid.

Lines 1200 to 1250 are just your options, the RS = Reverse On, and OS = Reverse Off. SY#4000 resets your Vic to Power Up Status.

3000 to 3100 just prints the defined character examples and then re-plays the grid and returns you to the main program. ■

# Control your 64 — master bit switching

John Cawell explains a crucial programming method

THE COMMODORE 64 is exceptional value with its excellent keyboard, stacks of memory, the best sound chip in the business, sprite graphics and extremely flexible operating system — that is, if you are capable of keying in the incredible amount of codes and points required to access most of the goodness that this best selling machine has to offer.

The handbook which accompanies the machine is dreadfully inadequate, so if you intend to do more than play games or run other people's programs, it will not be long before you start hunting the shelves of your local computer dealer for more practical information.

## Knowledge

The *Commodore 64 Programmer's Reference Guide* will no doubt be your first port of call. This certainly contains all the information that you need to become a proficient programmer, but unfortunately the guide assumes a more than average knowledge of Basic on the part of the reader. Other books have therefore kindly filled this gap — one or two are excellent, some average and quite a few considerably worse than useless.

However, with persistence and hours at the keyboard, one can reach the stage where one's programs can become useful and worthy of exposure to others, especially in the areas of text and software. But as soon as hi-res, graphics and sound are attempted, things become terribly complicated.

Unfortunately, unless you resort to Simon's Basic or one of the many graphic aids now available, tend of course the

disadvantage with these utilities is that they immediately reduce the market for your software to only those users who have that specific package; you must be able to use the dreadful Basic 2 commands with confidence.

Most of the commands are adequately explained in the literature and with patience their application will be understood. I have struggled with this problem for nearly six months now and the light is beginning to shine through. I managed to clarify most of my difficulties by diligent investigation and good old fashioned key hunting. My biggest problem was trying to find out what was meant by the following:—

POKE 1234, PEEK(1234) AND 199

or

POKE 12370, PEEK (12370) OR 19

These statements were used regularly in published programs and in the manuals and books covering the Commodore 64, but nowhere could I find an explanation of how the commands actually worked. Only since my decision to delve into machine code has the penny dropped, but had I known before what was happening things would have been much easier during my attempts to switch in and out locations on the 64's memory map. For that is what the two statements are all about: Bit Switching.

I hope that the following will help to clarify this topic for you. If you wish to gain full benefit from the exceptional flexibility of the 64 then it is imperative that you fully understand the logic of these.

Your 64 contains basically (except of over 4000 memory locations that are used by the software either pre-programmed into the computer in the form of Read Only

Memory (ROM), or by that which you enter through the keyboard or from some outside storage source such as tape, disk or cartridge. A number of these memory addresses or registers are put aside by the manufacturers to have special functions; for instance, to switch on or off sound channels, video banks, input-output devices, etc. One of the major advantages of the 64 is that these locations can be manipulated and different functions accessed by the programmer.

Before we can look at how to carry out these operations, it will be necessary to take a look at how the memory addresses or bytes are built up. Any one address or location consists of one byte, and as most of you will know a byte can store numerical values. It does this by switching on and off its bits. Each byte consists of eight bits or switches and each one of these bits can represent a binary digit.

## Binary

There is not room here to discuss binary numerals in detail, however this information is available in any introductory textbook on computer programming. In short, binary is a number system which uses only two digits, 0 and 1, and any number can be represented in binary. Inside the computer brain, the binary numbers are represented by pulses of electricity, with a pulse for 1 and no pulse for 0. A bit can therefore be on or off, 1 or 0. Hence, any byte's value can be represented by the eight switches, for example 00010000 represents 17 decimal.

As this system only uses two numbers, 0 and 1, it is known as binary. Of course, our normal numbering system is based on 10 numbers, 0 to 9, and is therefore known as decimal.

The location of the number counting from the right hand side provides the power of 10 by which each digit is to be multiplied. Let us take an example, decimal 1234:— (see figure 1)

The result of a binary computation is determined in exactly the same manner except that the location of the digit counting from the right hand side determines the power of 2 by which each number is to be multiplied. Let's take a look at a binary number and examine how it breaks down into decimal:— (see figure 2)

If the above makes sense to you we are now in a position to return to the original discussion of switching these various bits within bytes.

1	2	2	4		Decimal
3	2	1	0		Location
<hr/>					
$1 \times 10^3$	$+ 2 \times 10^2$	$+ 2 \times 10^1$	$+ 4 \times 10^0$	$= 1234$	Power 10
1000	+ 200	+ 20	+ 4	$= 1234$	Result

Figure one — decimal computation example

1	1	0	1	0	1	1	0	Binary
7	6	5	4	3	2	1	0	Location
-----								
1*2 <sup>7</sup> +	1*2 <sup>6</sup> +	0*2 <sup>5</sup> +	1*2 <sup>4</sup> +	0*2 <sup>3</sup> +	1*2 <sup>2</sup> +	1*2 <sup>1</sup> +	0*2 <sup>0</sup>	=214 Power
128	+ 64	+ 0	+ 16	+ 0	+ 4	+ 2	+ 0	=214 Result

Figure one — Binary to decimal translation

Why should we want to do this? Well, each of these individual bits within a byte actually acts as a switch in its own right, and various combinations switch on or off the special functions previously mentioned. For instance, take a look at address 10111 in the Programmer's Reference Guide. The upper 4 bits of this address control the location of the screen memory which, can be moved to anyone of 15 different locations plus the one that it automatically defaults to on powering up the 64. If that is not complicated enough, bits 1,2 and 3 control the location of the character memory.

Bits are labelled from right to left in accordance with their numerical power as in the table, in other words 0 to 7. So bit 4 of a byte or address is 1, that is to turn it on, you can POKE the byte with decimal 16 (2 to the fourth power). This POKE clears the whole byte and replaces it with a 16, or in binary, 00010000.

The problem is that practically all of the bytes in the 64 carry out a variety of operations, as we have seen with XOR, and in many instances you will want to be able to switch on or off a specific bit without affecting any of the other bits. Obviously it will not be possible to do this by POKEING a single decimal number. However this can be carried out by using our OR and AND commands illustrated right back at the introduction to this article.

#### Bits and bytes

The OR statement or keyword examines each individual bit of the original byte and compares it with the corresponding bit of the OR byte. If one OR the other of the bits is on, that is a 1, then the resulting byte will give a 1 in that specific bit. If neither of the bits is on, the resulting specific bit will be a 0. Therefore, if we wished to change bit 4 to a 1 without changing any of the other bit settings within a particular byte,

we should POKE 10111, PEEK 10111 OR 04.

The AND keyword behaves in a similar manner to the OR, and examines each individual bit of each byte and compares it to the corresponding bit of the AND byte, but this time it sets the bit on only if both the first bit and the second bit are 1's.

Let's take the original byte as 00011111 or decimal 31.

Original address 00011111 = 31  
AND with 216 11000110 = 216  
Resulting byte 00000110 = 2

Therefore ANDING 16 with 204 clears bits 0,1,2 and 4. This would be written as POKE10111,PEEK10111AND204.

The information as to which bits should be switched to effect different actions is given in the Programmer's Reference Guide, and armed with the means to carry out these operations you will find the Commodore 64 to be a very amenable and powerful machine. ■

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# Address

Chris Payne of *St. Alban's* sends this program for the PC.

ADDRESS is a computerized version of the

"little black book". It keeps track of names, addresses and phone numbers with the option to save or load addresses.

It also has a useful feature which enables you to find an address without going through the whole list.

Options include ENTER ADDRESS, (surname), (surname), (house number), (street),

(town, county, postcode), (phone number); VIEW ADDRESSES, which shows the whole list; and FIND ADDRESS, which finds an address given a surname. There are also LOAD and SAVE options.

The program can be adapted for the Vic by changing the PEEK in line 20 which controls the screen colour.

```
10 DIMB(2000),R#(200),S#(200),C#(200),D#(200),E#(200),F#(200),G#(200)
20 POKES200,B:POKES320,I:POKES44,I:REM###ADDRESS BOOK REVISED###
30 PRINT"##### CHRIS PAYNE'S
40 PRINT"##### ADDRESS BOOK
50 PRINT"##### (REVISED EDITION)
60 PRINT"#####?14184 C. PAYNE"
70 PRINT"#####PRESS ANY KEY TO CONTINUE."
80 GET#:"IF#=""THEN80
90 PRINT"#####
100 PRINT"##### 1) ENTER ADDRESSES"
110 PRINT"##### 2) VIEW ADDRESSES"
120 PRINT"##### 3) FIND ADDRESS"
130 PRINT"##### 4) SAVE ADDRESSES"
140 PRINT"##### 5) LOAD ADDRESSES"
150 PRINT"##### C SELECT NUMBER 3"
160 GET#:"IF#=""THEN160
170 IF#=""3"THEN#5:GOTO200
180 X=VAL(C#):IFX(1000)5THEN160
190 IFX(1000)5THEN160
200 GNDOT0210,370,500,500,650
210 R#1
220 PRINT"#####ADDRESS NO.:"A
230 INPUT"#####SURNAME OF PERSON :":S#(R#)
240 INPUT"##### :":R#(R#)
250 INPUT"#####NO. OF HOUSE, STREET :":B#(R#),C#(R#)
260 INPUT"#####TOWN :":D#(R#)
270 INPUT"#####COUNTY :":E#(R#)
280 INPUT"#####POSTCODE :":F#(R#)
290 INPUT"#####STEL. NO. :":G#(R#)
300 PRINT"#####M.L.C. ?"
310 GET#:"IF#=""THEN310
320 IF#=""1"THEN320
330 PRINT"#####MORE ?"
340 GET#:"IF#=""THEN340
350 IF#=""1"R#(R#)+500THENR#(R#+1):GOTO220
360 GOTO300
370 FOR#1TOR#
380 PRINT"##### :":B#(R#):" "
390 PRINT"##### :":R#(R#)
400 PRINT"#####ADDRESS :":B#(R#):", :":J#(R#)
410 PRINT"#####TOWN :":D#(R#)
420 PRINT"#####COUNTY :":E#(R#)
430 PRINT"#####POSTCODE :":F#(R#)
440 PRINT"#####STEL. NO. :":G#(R#)
450 PRINT"#####PRESS ANY KEY."
460 GET#:"IF#=""THEN460
470 IF#=""1"THEN#5:GOTO200
480 NEXT
490 GOTO300
500 P#1:INPUT"#####ENTER SURNAME OF PERSON :":#
510 PRINT"#####:#:""3":FOR#1TOR#
520 IFB#(R#)=""THENPRINT#(R#):F#(R#)
530 NEXT
540 IF#=""THENPRINT"#####SURNAME :":#:"...NOT FOUND...":FOR#1TOR#(R#):NEXT:GOTO300
```



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```

320 IFND=1THEHS=9:SC=SC+25
330 IFND=2THEHS=19:SC=SC+25
350 POKES4,0
360 FORT=1TOS99:NEXTT
370 GOTO40
380 IFYC7680THENDY=Y+22
390 IFY>8164THENDY=Y-22
420 POKECX+Y7,0
430 GOTO110
500 POKES4,220
510 POKEC1,9
520 FORL=1STO8STEP-1
530 POKEV0,L
540 FORN=1TO300
550 NEXTN
560 NEXTL
580 POKES4,0
590 POKEV0,0
595 PRINT"J"
596 IFSC<=STHEN600
597 HS=SC
598 PRINT"#####WELL DONE A NEW HIGH SCORE!"HS:SC=0
599 GOTO605
600 PRINT"#####YOU SCORED ";SC
605 INPUT"#####ANOTHER GAME Y/N"JH
610 IFH="Y"THEN1
670 PRINT"J"
690 END

```

## Meteors

A program for the unexplained 'Po 20' from Andrew Lovatt of Newcastle

IN METEOR ATTACK, you are in a ship shown on the left hand side of the screen. You can move up and down, and have to shoot the meteors which fly at you from right to left. If one gets past you, you lose a life.

The number of lives depends on the skill

level you input. At level one you only have one life, and the meteors move faster. Your remaining lives are indicated in the top right hand corner of the screen and your score at the top left.

### Program notes

10-40 Initialising  
45 Sets up lives and colours.  
50 Sets variables.  
60 Randomises the meteors.  
70-140 Sets up screen.  
150-300 Checks for key input to move

310-350 Checks for score or if meteor has passed.  
360-370 Checks if you have run out of lives.  
400-450 Fire routine.  
460-480 Randomises meteors.  
490-650 Increase score if you hit, poke explosion.  
700-750 Input skill level.  
800-840 Checks for another game you or no.  
850 Instructions.

```

10 Q=7900:C=39620:B=7722
15 POKES6879,48:POKE36878,15
20 PRINT"J":POKE630,128
30 GOSUB1000
40 GOSUB700
45 FORR=1TO8L:POKE7695+R,62:POKE36415+R,0:HEXTR
50 X=1:Y=1:DO=1:BY=0
60 GOTO500
70 POKEJF0-X+22*Y,7:POKEB-X+22*Y,90
80 POKED,62:POKEC,0
90 FORT=1TOSL*30:NEXTT
100 POKEB-X+22*Y,32
110 PRINT"#####SCORE =":SC
120 PRINT"#####"
140 POKED,32
150 GETN
160 IFQ=7746THEN180
170 IFN="R"THENQ=Q-22:C=C-22
180 IFQ=8164THEN200
190 IFN="2"THENQ=Q+22:C=C+22
200 IFN="."THENGOTO400

```

Continued on page 20



# Mastercode Assembler for the Commodore 64

Full Commodore 64 Assembler/Disassembler



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**Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64. Its features include:**

- Machinecode monitor
- File Editor
- Disassembler
- Assembler

Mastercode is a full two pass assembler. It accepts labels, variables and equations within assembly language programs. It is possible to store programs anywhere in memory, even in parts occupied by the Assembler. Programs can be saved to either tape or disc.

#### The Machine Code Monitor includes:

- OUTPUT OF MEMORY TO SCREEN OR PRINTER ■ MODIFICATION OF MEMORY ■ DELETION OF MACHINE CODE PROGRAMS ■ SAVING OF MACHINE CODE FILES ON TO TAPE OR DISC
- LOADING OF MACHINE CODE FILES FROM TAPE OR DISC ■ STEP BY STEP TRACKING OF THE EXECUTION OF A MACHINE CODE PROGRAM INCLUDING DISPLAY OF REGISTER CONTENTS

The Disassembler will translate into assembly language the contents of any area of memory, whether the 64's ROM or a user program. Output may be sent either to the screen or a printer.

#### The File Editor includes:

- ENTRY OF NUMBERED LINES OF ASSEMBLY LANGUAGE INSTRUCTIONS ■ LISTING, INDIVIDUALLY OR IN BLOCKS, OF PREVIOUSLY ENTERED LINES ■ DELETION INDIVIDUALLY OR IN BLOCKS, OF EXISTING LINES ■ RENUMBERING OF EXISTING LINES ■ SAVING OF ASSEMBLY LANGUAGE FILES TO TAPE OR DISC ■ LOADING OF ASSEMBLY LANGUAGE FILES FROM TAPE OR DISC ■ ADDRESS OF A BLOCK OF MEMORY SPECIFIED BY THE USER TO THE USER'S ASSEMBLY PROGRAM

The Assembler allows the translation of assembly language programs into machine code with full error checking, labelling and a range of assembler directives.

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```

210 X=X+DX
220 IF X=20 THEN GOTO 230
230 IF (B-X+22*Y)=7702 THEN DX=X+DX
240 POKE 36876,B
250 GOTO 70
300 P=P+1
310 IF P=51 THEN GOTO 600
315 POKE 7690,P,32
320 GOTO 500
400 FOR I=1 TO 10
410 POKE 0+I,45
420 IF (B-X+22*Y)=(0+I) THEN GOTO 600
430 POKE 0+I,32
440 NEXT I
450 GOTO 210
500 R=INT(1+17*RAND(0))
510 R=R+22
520 B=7722+R
530 UP=38442+R
540 GOTO 70
600 POKE 36877,228:FOR L=15 TO 1 STEP -1
610 POKE 36878,L:POKE 0+I,42:POKE 0+I,43:NEXT L:POKE 0+I,32
620 POKE 36878,0:SC=SC+10
630 GOTO 500
700 POKE 36878,0:PRINT "*****INPUT SKILL LEVEL      MK1 TO 5*"
710 INPUT S1
720 IF S1>5 OR S1<1 THEN 700
725 PRINT "C"
730 RETURN
800 PRINT "*****YOU SCORED":SC:POKE 36879,27:PRINT "*****
      YOU WANT ANOTHER GO"
910 INPUT "*****Y/N) ":ANS
920 IF ANS<>"N" AND ANS<>"Y" THEN 800
930 IF ANS="Y" THEN RUN

```

## Hangman

More 16 games from Andrew Stand of  
*Byte* — one using the Super Expander

HANGMAN is a simple version of the old game. To play, the word or words are entered and RETURN pressed. The computer then displays a dash for each letter. When entering more than one word the words should be separated by a division (/) sign.

To guess letters just press the appropriate key. If correct the display will show the letter in place; if not another place will be added to the hangman.

Press \* to display the full word and the computer will display an invitation to play the game again.

```

100 CLR:PRINT "C":INPUT WORD:PRINT "C":LE=LEN(WORD):DIM ARR(LE):BL(LE):B=-1
110 FORX=1 TO LE:ARR(X)=MID$(WORD,X,1):NEXT
120 FORX=1 TO LE:IF ARR(X)="" THEN BL(X)=ARR(X):NEXT
121 BL(X)>"-":NEXT:GOSUB 200
140 C=0:GET#A:IF A#"" THEN 140
141 IF A#"*" THEN PRINT "*****":WORD:GOTO 200
144 FORX=1 TO LE:IF A#ARR(X) THEN BL(X)=ARR(X):C=C+1
145 NEXTX:IF C=1 THEN GOSUB 200
146 IF C=8 THEN GOSUB 220
150 GOTO 140
200 PRINT "A" TAB(22):FORX=1 TO LE:PRINT BL(X):NEXTX:RETURN
220 B=B+1:IF B=8 THEN FORO=1 TO 4:POKE 38553+X,2:POKE 7703+X,128:NEXT:RETURN
221 IF B=1 THEN FORX=132 TO 228 STEP -22:POKE 38481+X,2:
      POKE 7681+X,118:NEXT:RETURN
222 IF B=3 THEN FORX=1 TO 5:POKE 38423+X,2:POKE 7703+X,128:NEXT:RETURN
223 IF B=3 THEN FORX=23 TO 28 STEP -2:POKE 38423+X,2:POKE 7703+X,78:NEXT:RETURN
224 IF B=4 THEN POKE 38458,2:POKE 7738,65:RETURN
225 IF B=5 THEN POKE 38472,2:POKE 7752,87:RETURN
226 IF B=6 THEN POKE 38494,2:POKE 7774,102:POKE 38516,2:POKE 7796,102:RETURN

```

```

227 IFB=7THENPOKE38471,2:POKE7751,77:RETURN
228 IFB=8THENPOKE38473,2:POKE7753,78:RETURN
229 IFB=9THENPOKE38537,2:POKE7817,78:RETURN
230 IFB=10THENPOKE38539,2:POKE7819,77
240 PRINT"#####"
241 PRINT"#####ANOTHER GAME? Y/N"
242 GETX:IFX=""THEN242
243 IFX="Y"THEN100
244 END
250 PRINT"#####CONGRATULATIONS"
251 PRINT"#####ANOTHER GAME? Y/N"
252 GETX:IFX=""THEN252
253 IFX="Y"THEN100
254 END

```

## Connect 4

Andrew Sturt's version of Connect 4 uses the K1 with Super Expander

THIS GAME uses the graphics commands of the Super Expander because "the children like the way it draws circles"

Two players take turns placing disks by entering the column number. There are

seven columns in which six disks can be placed.

When a player gets four counters in a horizontal, vertical or diagonal row (see 5) to record the winner and start a new game.

```

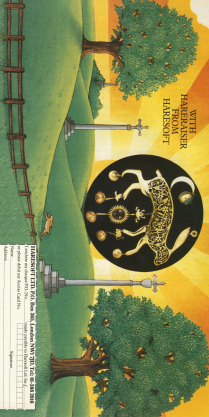
5 CLR:PRINT"O" GRAPHIC3:COLOR1,3,6,0:SI#="O":S2#="O":S1#0:S2#0:C#6
10 FORX=1TO7:DRW42,X#100,100TOX#100,000:NEXTX
30 FORX=1TO7:DRW42,100,X#100TO000,X#100:NEXTX
40 CHR14,2,"1 2 3 4 5 6 7"
50 X1=150:X2=250:X3=350:X4=450:X5=550:X6=650:Y7=750
51 Y7=650:Y6=550:Y5=450:Y4=350:Y3=250:Y2=150:Y1=50
58 CHR10,1,"BLUE":CHR10,5,"SI#":CHR10,9,"RED":CHR10,12,S2#
59 CHR16,1,"OR S TO RESTART"
60 CHR15,1,"COUNTER IN ROW?"
61 GETX:IFX=""THEN51
62 IFX<"1"ORX>"7"ANDX<"5"THEN61
63 IFX="5"THEN:SCCLR:GOSUB400:PRINT"O" GRAPHIC3:GOTO10
70 IFX="1"THENX=X1:Y#Y1:Y1=#Y1-100:GOSUB300
80 IFX="2"THENX=X2:Y#Y2:Y2=#Y2-100:GOSUB300
90 IFX="3"THENX=X3:Y#Y3:Y3=#Y3-100:GOSUB300
100 IFX="4"THENX=X4:Y#Y4:Y4=#Y4-100:GOSUB300
110 IFX="5"THENX=X5:Y#Y5:Y5=#Y5-100:GOSUB300
120 IFX="6"THENX=X6:Y#Y6:Y6=#Y6-100:GOSUB300
125 IFX="7"THENX=X7:Y#Y7:Y7=#Y7-100:GOSUB300
130 IFC#5THEND#2:COLOR1,3,0,0
131 IFC#2THEND#6:COLOR1,3,0,0
132 C#D
133 GOTO60
300 COLOR1,3,C,0:CIRCLEC,X,Y,32,20:PRINTC,X,Y
310 RETURN
400 GRAPHIC8:PRINT"#####NO WON BLUE OR RED"
405 PRINT"#####ENTER S OR R"
410 GETX:IFX<"O"ORX#<"R"THEN410
415 IFX="S"THEN(S1+S1+1
420 IFX="R"THEN(S2+S2+1
425 SI#=STR$(S1):S2#=STR$(S2)
430 PRINT"#####S STARTS-S/R"
435 GETX:IFX<"O"ORX#<"R"THEN435
440 IFX="S"THENC#6:COLOR1,3,6,0:RETURN
445 IFX="R"THENC#2:COLOR1,3,6,0:RETURN
455 SS$LIST
+
```

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THIS ARTICLE has been written to show that using Relative files is easy! Included in the article are 4 subroutines for file handling, 3 general purpose routines and a program for creating Relative files.

File handling is one of the most important techniques in serious micro computer programming. Good file design and handling is a great asset to any program, whereas bad file design and handling will spoil even the best of programs. Commodore mainly uses two types of files, Sequential and Relative, though there is a noticeable lack of information on how to use a Relative file. Sequential files are slow, and have their length limited by the amount of spare memory available after loading the program. This is because a Sequential file must be read into memory before any records can be read from the file.

Relative files, on the other hand, can be used by loading only the record required into the memory. This has two advantages: the first is that in a large file the records near the end of the file can be accessed quickly without waiting for all the prior records to be read. The second advantage of Relative files is that the length of the file is generally limited by the amount of space available on the disk, not the memory available in the computer.

### Relative

This will allow larger file lengths, the exception being that the 1541 disk drives have a limit of 700 records with a maximum length of 254 characters. This limit will allow files to hold up to 1788 of data. The main drawback with relative files is that the maximum record length must be set when the file is first set up; the record length cannot then be altered for that file. Relative files are formatted in the same way as Sequential files but, as stated earlier, to load and save Relative files the record number must be used to position the record in the file. The record number is usually calculated by a "hashing algorithm", which is described fully in the section "Creating record number".

Before running a program which uses Relative files, the file must be already on the disk. Program 1 creates a blank file ready for me by another program. Program 1 asks for the file name, record length and maximum number of records. When calculating the record length remember to allow 1 character after every field as a separator. It is recommended that you allow a few spare characters as space for later developments as the record length cannot be changed later. For an example of calculating record length see page 15 of the 1541 users manual.

### Sequential

When calculating the maximum number of records allow at least 1 above the estimated number as the hashing algorithm needs to have unused spaces in its file. The reason for these spaces will be explained in the section "Creating record number".

There are three general routines included in this article, 1) set the maximum number

## PROGRAMMING

# 1541 files made clear

Tony Harrison-Smith explains techniques for using relative files on your 1541 disk drive

```

7 REM ***** PROGRAM 1 *****
8 :
9 REM ***** CREATE BLANK FILE *****
10 OPEN#15,8,15
11 INPUT"FILE NAME :";RMS
12 INPUT"RECORD LENGTH (MAX 254) :";RL:IF RL<1 OR
RL>254 THEN 30
13 INPUT"MAX NO. OF RECORDS :";RM
14 PRINT:PRINT"PLEASE WAIT-CREATING FILE"
15 OPEN2,8,2,RMS+"_",L,"+CHRG(RL)
16 GOSUB 900
17 RL=INT((RM+1)/256)*256:R2=RM+1-RL
18 PRINT#15,"P"CHRG(2) CHR$(R2)CHR$(RL)CHR$(1)
19 PRINT#15,"END";GOSUB900
20 CLOSE1:CLOSE1:PRINT"FINISHED";END
21 INPUT#15,A,B,C,D:IFA=0 OR A=50 THEN RETURN
22 PRINT A,B,C,D:STOP:RETURN

```

```

1 REM **** GENERAL ROUTINE 1 ****
2 RM = 25 : REM MAX NO. OF RECORDS

```

```

6000 REM **** GENERAL ROUTINE 2 ****
6000 :
6000 REM **** DISK ERROR ****
6010 INPUT#15,A,B,C,D : IF A=0 OR A=50 THEN RETURN
6020 PRINT A,B,C,D : STOP : RETURN

```

```

6700 REM **** GENERAL ROUTINE 3 ****
6700 :
6800 REM **** POSITION RECORD ****
6810 RL=INT(RM/256)*256: R2=RM-RL
6820 PRINT#15,"P"CHRG(2)CHR$(R2)CHR$(RL)CHR$(1)
6830 RETURN

```

```

5900 REM **** SUBROUTINE 1 ****
5900 :
6000 REM **** CREATE RECORD NO. ****
6010 RN = 0: FOR I=1 TO LLEN(A$)
6020 RN = RN+ASC(MID$(A$,I,1))
6030 NEXT I
6040 RN = INT(RN-[INT(RN/RM)*RM])+1
6050 RETURN

```

COMMODORE 64

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Turn to pages 64 and 65 for this month's selection.



of records, 2) test for disk errors and 3) position the disk drive's read-write head to the record required.

1) — This is a one line routine which sets R#4 with the maximum number of records. This must be set as it is used to calculate record numbers.

2) — This is the standard routine for the 194 disk drive. The routine reads the error channel in line 6918. If the error flag is set in 0 (i.e. no error) or 30 (i.e. record not found) then the routine returns. Any other error is reported by line 6920 and the program stopped. If the error is not critical then the program can be restarted by typing CONT (twice).

3) — This routine positions the read-write head at the disk drive to the record required. The line CH#0 is the output channel number. The next two CH#50 are the record number where R1 is the low byte and R2 is the high byte of the record number. The last CH#50 positions the read-write head at the start of the record (i.e. the first character).

### Routines

These routines are all used by the following set of subroutines and therefore must be included in any program.

Creating a record number is achieved by using a hashing algorithm. A hashing algorithm is a routine which takes a key field, for example a persons name in an address program, and converts the key field into a record number. The hashing algorithm used in subroutine 1 takes the string AB and converts it into a record number by adding each ASCII value in the string and then dividing by the maximum number of records. The remainder plus one is the record number. The routine zero is added to the remainder so that record number 0 is invalid. It can be seen that this method will cause some records to have the same record number, which is why spaces must be left in the file. The spaces in the file do not use up any significant memory on the disk, as they are read as empty records, but they do allow for an overflow on the record numbers.

When the following routines try to save a new record, if the record number is already taken then the routines move to the next record number until an empty record is found to save the data into. If too many records try to go to the same area in the file then the loading and saving times will increase dramatically. In this situation the file must be re-created with the maximum number of records (increased) or a new type of hashing algorithm.

### Loading

Included in this article are two ways to load a record from a Relative file: 1) load record from a known record number and 2) load a record with a known key field.

1) — Load from a known record number is shown in subroutine 2. Before this subroutine is called the file name (F#5) and record number (R#) must be assigned. Line 6130 sets the error flag to 0, opens the command channel and the Relative file F#5. The read-write head is positioned at the record required and the disk error

channel is checked in line 6130. Line 6130 inputs the first line of data via line 6140 checks to see if the record is empty. I.e. it holds only the character \* or the disk error = 30. If the record is empty then the channels are closed, the error flag is set to 1 and the routine returns.

Assuming the record is not empty, line 6141 repositions the head at the start of the record again and line 6150 loads the record into memory. Line 6160 checks for any disk error and then line 6170 closes the channels and returns to the main program. NOTE: Line 6130 can be altered to read your own individual record format.

2) — Load a record by key field is shown in subroutine 3. This routine is similar to subroutine 1 with the addition of lines 6230 to 6283. These lines compare the first item in the record (KEY) with a known key (AB).

If AB and KEY are not the same then the record number is increased by one in line 6260. If the record number is greater than the maximum number of records then the record number is set to one. The next record is then loaded and the process repeated until an empty record is found or a match is found between AB and KEY. If a match is found then the record is loaded by line 6275. NOTE: Line 6275 can be altered to read your own individual format.

There are two subroutines for saving records in a file. 1) overwrite existing record in; by known record number and 2) save new record. As with all the subroutines in this article the file name (F#4) and record number (R#) must be assigned prior to using these routines.

1) — Overwriting a known record is shown in subroutine 4. Line 6310 opens the

```
6090 REM **** SUBROUTINE 2 ****
6099 :
6100 REM **** LOAD RECORD BY NO. ****
6110 EP=0:OP#15,8,15:OP#42,8,2,F#5
6120 GOSUB 6900:GOSUB 6900
6130 INPUT#2,KEY
6140 IF A#50 OR KEY="*" THEN EP=1:CLOSE#2:CLOSE#1:RETURN#4
6145 GOSUB 6900:GOSUB 6900
6150 INPUT#2,X15,X25,X35,X45
6160 GOSUB 6900
6170 CLOSE#2:CLOSE#15:RETURN
```

```
6190 REM **** SUBROUTINE 3 ****
6199 :
6200 REM **** LOAD RECORD BY KEY ****
6210 EP=0:OP#15,8,15:OP#42,8,2,F#5
6220 GOSUB 6900:GOSUB 6900
6230 INPUT#2,KEY
6240 IF A#50 OR KEY="*" THEN EP=1:CLOSE#2:CLOSE#1:RETURN#4
6250 IF A#KEYS THEN EP=270
6260 R#=R#+1 : IF R#>R# THEN R#=1
6265 GOTO 6120
6270 GOSUB 6900:GOSUB 6900
6275 INPUT#2,X15,X25,X35,X45
6280 GOSUB 6900
6285 CLOSE#2:CLOSE#15:RETURN
```

```
6290 REM **** SUBROUTINE 4 ****
6299 :
6300 REM **** OVERWRITE RECORD ****
6310 OP#15,8,15:OP#42,8,2,F#5
6320 GOSUB 6900:GOSUB 6900
6330 Z#=" "
6340 PRINT#2,X15;Z5;X25;Z10;X35;Z15;X45
6350 GOSUB 6900
6360 CLOSE#2:CLOSE#15:RETURN
```



## ANSWER BACK

### Simple Simon's

I AM INTERESTED in buying Simon's Basic for my 64, and wondering that it contains various disk and printer commands. Since I don't yet own these peripherals, will I get "Device not present" messages?

Could you make some suggestions on how to draw graphs of mathematical functions?

Lastly, I am interested in the possibilities of using the 64 for the control of appliances such as central heating systems. Could you suggest any books that might help?

David White  
Wymouth  
Dorset

THE ERROR messages will not appear on power up, but only if you try to address one of the non-existent devices.

A program to plot a sine wave is given on page 126 of the Programmers' Reference Guide for the 64.

Try the 6502 Applications Book by Rodney Zaki, published by Hytek, which should still be available from computer specialists. The chips used in the 64 are of the same family and use the same instruction set.

### Total garbage

I AM WRITING a large program on the 64 which involves creating disk datasets and processing them. The trouble is that I get terrible delays during program execution, and since I make extensive use of string arrays which I reassign, I think the delays are due to "garbage collection".

Could you explain "garbage collection" and advise me how to get rid of the delays?  
D.M. MacDonald  
Glasgow

GARBAGE collection is a

problem with the 64 because of the Basic 3 language. Strings are stored in memory starting from the top of RAM downwards. Automatic garbage collection takes place when the pointers to the bottom of string storage match the pointers to the top of arrays. The redundant strings are removed and the remaining ones are moved upwards in memory, thus leaving space for more strings.

For example, if you define `AB = "string"` and then set `AB = "memory"`, the first 65 becomes redundant, but will remain in memory until PEEKing (garbage collection) is performed. If you build your string using GET then many strings are created, as follows: `"M", "Ma", "Mac",` and so on.

This solution is to restructure the program so that data is stored in RAM by PEEKing then PEEKing the data when required. Another is to hold several strings at once, then extract what you need using MID\$.  
The time taken for garbage collection is given by `.00005* (S + 1)*2` where S is the number of strings created.

### Banks of the 64

IN USING the programmable character facility of the 64 I have been frustrated by the limitations this places on memory available for the actual program. Why does 28 of character set utilize 33K RAM to 12K? I have a suspicion that the Programmers' Reference Guide is trying to help, but I can't understand what it's telling me. Can you help?  
S.J. Chavira  
Canada

THEY IS because you are putting your character set in the first 16K bank of the 64. The 64 powers up in this bank, which is Bank 0, `0000-FFFF`. As you'll see, putting your character set in this bank then lowering the top of Basic to prevent the set from being overwritten restricts the available memory to `16K-1K = 15K`. If you use Bank 3 (`5C000-5FFFF`) then more memory will be available. Try the following program:

```
10 PEEK56676,4
20 PEEK53275,23
30 PEEK568,330
40 PRINT:GOTO1475
50 PEEK0 = 0702847
60 PEEK56330,137
70 PEEK1,51
80 J = PEEK55348 + 3
90 PEEK1,55
100 PEEK56330,139
110 PEEK569152 + LJ
120 NEXT L
130 END
```

The program is rather slow, since it is in Basic. Your character set will now reside at `49032 to 51099`, and you can alter the existing set, which the above program copied into RAM by PEEKing the appropriate address within the above range using the formula `p = 4932 + a*9 + 4` for the address to PEEK your one eighth of the character required. Thus PEEK `p+8` is the position of the character required measured from the start of the character set and "4" is the "nth" bit of that character. If you prefer to watch the characters changing then don't use line 40.

### No NEWs is good . . .

I understand it's possible on some machines to link together two separate programs loaded independently into RAM. On the 64 the resident program is NEWed when loading another program. Is it possible to avoid this?

MACROINE CODE programs can be loaded into the 64, and the resident program is then not NEWed. The programs must not overwrite each other unless this is provided for in your coding.

As for Basic programs, by loading them within the program called overwriting, and providing that the called program is not larger than the existing program, then the new program will run automatically and retain the variables from the old.

Of course the resulting listing will be the called program, not the original, but you can get around this by overloading the original program as the last line of the called program.

You can stop the program from repeating the first run by having a line such as 10

`A = A + 1: B/A = Z/ERN` through commands.

### Basic bottom

COULD YOU tell me how to move the bottom of Basic above the high resolution screen area, as shown on page 127 of the Programmers' Reference Guide? I have tried altering the values of memory locations 43-44, which results in the program apparently loading in the right place. Typing LIST produces a listing of the program, but RUN produces a SYNTAX ERROR. I've searched the Guide but have failed to find any explanation.

See below  
Fiddlington  
Middletown  
New York  
Use `POKE44,(POKE44,POKE44,0) CLR I + RETURN`, where I is the value of the high byte address.

### Watson commands

I OWN A Vic 20 with a 16K RAM pack and Dr Watson's assembler. I would like to know the best way to add extra commands via CHARACTER, such as YDU, X.Y, SOUND (L,L), TIME, INC, PAPER, programmable function keys and so on. Also is it possible to use variables, or to make an extension of the Basic tokens by changing the vectors?  
M. Goussard  
Funchingh With  
Austria

THE CHARACTER vector is in RAM, and therefore can be changed to point to your own version of the routine, which would interrupt the required keywords and direct the computer to your own subroutines to implement "SOUND", and so on. Before changing CHARACTER, you must disable interrupts with SET, and after the change restore with CLR.

If you need help with a technical query or problem write to  
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Commodore Horizons,  
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Street, London  
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**1000 GOLDEN Puma-Puma** by C64 6.5. 7141111, retail £80 £180 worth of Program Tapes and Cartridges for C64-64 £80. Minico, 818 Anbury Road, Newbury, Berks. Tel: 0493 62344.

**COMMODORE** computer 5000 series machine, weight scales, well used, also includes Ram cassette unit with masses of software games, files, news, educational etc. pack 200, price £275.00, price-0081 2690 870717.  
**FFYRUS FINANCE** - Manual + Star Trek, Briverton, West Mans, York, Jan 83, Modern Games as new £28 or more for 1000000 or C64. Contact: Advanced 14 Castro St, South 17A, Tel: 081 861 8199.

**SWAP** 64 set with 10, 50k in excellent condition for resale. 64K Games, Aristo (Shanghai), Marston, Romco, Super Rom, Revenge Storage Game, Qid Yag, King 0011 104 8697 or call swap for Ashton Speech Synthesiser and 5000.

**Edinburgh** 1000 printer for sale with C64 64 10 25 10 25 1 1 month 100, 100, Goodwin 7 Joystick - £7 and 10 20-10 12 pen game. Tel: 0454 0000. Tel: 0454 0000.  
**VIC 20, 10K cassette reader, soft manual, updated printer, book of games, 2 cartridges inc. Rom Expansion, disk reader, 1000, Romco 2025.**

# Micronet modems make connections

*Solve the puzzle and you could be one of three winners of Micronet Modem systems for the Commodore 64. Tony Roberts sets the problem — just connect up and you could win!*

MICRONET IS offering over £500 worth of networking equipment as prizes in this month's competition. A year's subscription, communications cartridge and modem are on offer to the three winning entries.

The members of the Hill Peak micro club have all clubbed together to establish a network connecting all their machines, providing all the computers are switched on, it's quite possible to send a message from any individual to any of the. Even though any one message can be sent not more than 100 metres, just so long as it encounters another powered-up computer, that computer will re-broadcast the incoming message until the message reaches its destination. Even a switched-off computer doesn't get in the way: an incoming message is still conveyed through, just so long as the total journey between the powered-up computers is not more than 100m, it'll get there.

All went well until one day Peter and John both left their machines switched off: suddenly no-one could get a message through to Gillian or Nadia. Here's a map showing the network: where do the two girls live?

Simply tell us the code letters for the girls' houses, and complete this re-broadcaster in an apt, amusing and original manner in fibrous words or less: "I would like to join up with Micronet because . . ."

The Micronet service for the Commodore 64 will open in August. Micronet already has 10,000 users who enjoy the facilities of electronic mail, bulletin boards, daily computer news and features, downloadable software and convenient shopping for their

computer keyboards.

Micronet is brought to your computer screen via Frotz and your telephone line. Its 10,000 "pages" of information are stored on eight mainframe computers throughout the country.

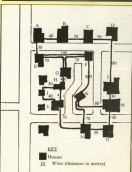
Using your 64 and the Micronet communications cartridge, designed by DE Ltd, designer of the award-winning VICE2000 modem, you'll be able to download commercial software at up to 20% less than retail prices, play the 1000-player game Starnet, send and receive electronic messages, and more. For more details see the interview with Micronet's Ian Beck in this month's Profile section.

The winners of June's Melbourne House competition will each receive a copy of *Happy House* or *Happy Gas Mining* for the 64. They are: Richard Taylor, Penwortham; John Conradi, Swaleside; M N Daniel, Crickehowell; J Oakes, Basildon; Mark Berkeley, Thornbury; Natasha Murray, Toxteth; Michael Dicks, Uxbridge; Phil Kennedy, Eastwood; Gregory Harman, Ashford; N H Taylor, Romford; Jay Nicholson, Tonqway; B Watson, Balbaggie; Anthony Piper, Brentwood; Lela Phillips, Altonvale; M E Proctor, Chiltoneri; Gavin Harris, Staines; Michael Bailey, Sutton Delaval; Nadea Solazzi, Ilford; D Gamble, Doughtlington; R C D Dow, Coventry.

The winner of the British Micro Graphix competition is Edward Pope from Tamworth.

The winner of our special Commodore Show competition is Howard Kleinman of Golders Green, London. Howard's prize is a £44 disk drive.

Send your answers to Competition Corner, Commodore Horizons, 12-13 Little Newport Street, London WC2E 3LD — to arrive no later than the last working day in the month on the cover of this issue. The name of the winner, and the solution to the puzzle, will be published in the issue after next.



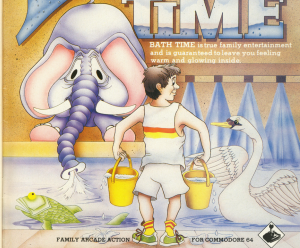
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BATH TIME is true family entertainment and is guaranteed to leave you feeling warm and glowing inside.



FAMILY ARCADE ACTION

FOR COMMODORE 64



The object is to protect a swan and a fish happily living in their bath. If the water level in the bath gets too high the swan will swim away; if it gets too low, the fish will die - but watch out for the elephant and the little boy. R.R.P. £7.95



