

# Commodore **HORIZONS**

**The independent Commodore magazine**

75p February 1984

**DISK DRIVES SURVEYED • SOFTWARE REVIEWED  
MATHEMATICAL LOGIC ON THE VIC AND 64**



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# Commodore HORIZONS

MONTHLY COMMODORE MAGAZINE

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## Submitting articles

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



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## CONTENTS

### Letters

3

A public response to our last competition, problems with Visual aid, and some handy programming tips

### News

7

A powerful new graphics tablet, the Koala Painter, arrives along with a selection of new musical hardware and software and a major explosion of arcade-style games — plus all the latest on Commodore's new mice

### Software review

14



Pete Howard continues his critical look at the best — and the rest — of the current games software releases, including Falcon Patrol, pictured above

### Disk drives discovered

19

In the dark about disk drives? Help is at hand in this illuminating feature which also explores the world of interfaces

### Profile

21

Merv Jeff Minton, the programmer behind the new motorist Miragalaric Llamas

### Elite

23

David Arnold introduces KPLUG

### Air war special

26

Play Alert Attack on the Vic and Plane on the 64 (first cover) by Stuart Hughes

### Sprit to programming

30

Three diverse creatures put under the microscope

### Vic arithmetic

33

Two's complement, turning positive numbers negative, and other Vic delights

### Software file

41

More varied programs from readers, with space games, singing birds, and a popular children's game revisited

### Keymap

37

How to specify which keys are valid during input from the keyboard

### Answer book

35

Technical questions from our readers tackled

### Market view

38

What's going on the latest on Commodore's market prospects

### Competition

50

The 64 Supplies Company gives you the chance to win a Commodore printer/plotter

## EDITORIAL

OUR CAMPAIGN TO persuade more independent companies to produce Commodore software certainly struck a chord with many of our readers. But keep your letters coming in — the more people who write to support us, the more pressure we can put on the software houses. And the higher number of potential purchasers we can point to, the more attractive will the proposition seem to software houses.

As we pointed out in our first issue there are very few firms producing Commodore software — particularly compared to the hundreds of small, innovative software firms producing original material for the Spectrum. We think it is time that those firms started producing software for the Commodore range of machines. If you agree, then why not join us in our campaign to persuade Spectrum software houses to start writing for the Vic 20 and CBM 64?

Response to the launch of the campaign in our first issue was strong, with only one person dissenting. This reader thought there was no need for the campaign, and that we should instead be supporting those companies who have already put time and investment into writing Commodore software. We have no intention of ignoring those companies — in each issue we'll be reviewing the latest software available and in our news we'll be trying to give readers an idea of what there is to look forward to. But we're not convinced by this reader's arguments, and the rest of the letters received on the support us. The point made by most readers was that their machines were superior to the range of software available was not. To pick one response at random: "What ought to be done is for someone to adopt a more positive attitude to the extensive potential of the 64. I therefore support your presentation to software houses to increase and vary software availability." And another: "On reviewing the software available, I find myself in total agreement with your editorial. Despite its potential the 64 would appear to be inadequately serviced by the software houses."

This reader added: "There are relatively few games available and virtually no educational software. So, please, more educational software for pre-D-level, and some software — any — in the shops." In fact the most common cry was for educational software, although there also seems to be a need for small business programs. Some requests were very specific — one "ardent user" is especially keen to get a good version of Scrabble. Whatever your needs, if you want more firms to produce software for the Vic 20 and CBM 64, write to us and let us know — we'll make sure your views are heard.

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## LETTERS PAGE

### Competition cornered

IN response to the inevitable problem in your 'Competition Corner', may I offer the following comment:

Five editors, leads, owners and writers.

Five programs giving readers news.

A floppy drive worth several quid.

To give incentive to a bid To solve a puzzle, what goes where?

Who owns the joystick by the chair?

And who it is that cannot see Their program on twenty-inch TTY?

Each has a peripheral, only one,

To make their program less of fun,

A joystick, value box, printer, pen.

That's four, so now let's think again.

A floppy reader, there that's first!

So who brought in that cassette drive?

This extra gadget brings to six Attachments we can add to Vic.

Master Roberts, problems solved.

Thought he'd make the puzzle better,

Then someone with any sense,

Or even Apple, Lisa, and more.

Could solve to win a high speed score.

He must be saving Commodore.

The pain of having to donate A fax magnetic storage plate.

This prize is not a give-away; Two hundred quid is what you'll see.

Plus seventy-five pesos if you are won.

By magazine who egg you on To purchase them, with cover staining.

"Win a prize if you are waiting.

Till the day you've saved the sum.

To buy your Elcom-Interpac".

If you're not in Club Hell News.

Are featured often in your book.

There's only one more thing to see:

"Purchase you? Hell No! O.K.!"

John Carter  
Maidstone

Age:

THE competition certainly caused a lot of problems (mainly due to our mixing up disks and cassettes) — we promise to sort things out at Club Hell Week from now on.

One reader suggested that the joystick belongs "in Newcastle, who left it there last week, and it was not noticed among all the mess.

She needed it for her BBC news but was ill this week."

Not true, but wrong answer. A lot of people, however,

have got it right so far, and we'll announce the winners and the answer next month. In the meantime we'll try to think of an alternative prize for John's entry.

### Slick Vic tricks

CONGRATULATIONS on producing a first-class issue. It is the first time I have found a magazine with programs using the Super Expander Pack on the Vic 20. It would be nice to see more.

Both readers on page 40 worked first time, quite encouraging after so many other magazine programs resulting in ERROR FN, etc.

Also both short programs produce interesting effects if Graphic 2 is changed to Graphic 1 or 3. Simple programs but great fun. They kept my son and I amused for a whole Sunday afternoon.

Christopher Molloy  
New Milton  
Wessex

### Chestnuts repeated

THE Mindfield program in the first issue of Commodore Magazine works well, but some points need to be clarified in the last term of Old Chestnuts.

Repeated need clarification. Using shift + RUN STOP to load a program results in the program being automatically run after it is loaded. LOAD (return) does not.

And programs to make the keys on the Vic repeat are unnecessary, because POKE 528,255 will make all keys repeat. (POKE 528,0 will return to normal — RUN STOP/RETURN will run.)

Keep up the good work with the magazine.  
J M Cherron  
Preston  
Chesil

### Vicsoft vexations

AS A newcomer my overall impression of Commodore Magazine was favourable. Some of the listings were very good, for example Apple

Fall which was easy to follow although it would have been helpful to have noted on the number of spaces in certain lines.

On the other hand the listing for Go into Space was very poor, with the control codes being practically impossible to read.

You may be interested to know of the problems with Vicsoft. I telephoned to order some software on the 11th October. The goods were confirmed to stock and my Account card was debited on the 13th October. Despite numerous phone calls to find out what had happened only part of the goods arrived on 1st November. I have complained to Access about the charging of cards without dispatch of goods and I maintain that this is contrary to instructions.

In my mind the choice of computers as the nucleus is between the Spectrum, BBC B and IBM 64. The BBC costs too much. The Spectrum has a heavy keyboard and so suited out of all the televisions, but lots of good programs. The Commodore was my choice despite the poor Basic — though if you get to grips with it you can probably manage anything.

D A Walford  
Dorset  
Estate  
Estate taken about the listings — and let us know if Commodore still doesn't take the point about Vicsoft.

### Take a tip

HERE'S some tips for Commodore 64 owners: POKE 808,128 disables run/stop and POKE 808,217 re-enables it. POKE 731,300 disables the list command and POKE 731, 307 re-enables it.  
Patrick Pater  
Barnsley  
South Yorks

This is the chance to air your views — send your tips, complaints and compliments to Letters Page, Commodore Horizons, 12-13 Little Newport Street, London WC2R 2JD





## Following up Falcon

STEVEN LEE, 26-year-old author of *Falcon Patrol* for the Commodore 64, is now planning his next game.

Provisionally called *Hidocan Bill* it will be released by Virgin Games at the end of January. In it you, as the *Hidocan Bill* of the title, must fight off a succession of attacks from unfriendly ants.

Steve is also working on a follow-up to *Falcon Patrol* — predictably *Falcon Patrol 2*. Using the basics of the original but with added features and a new main difficulty level, the game is predicted to be tricky.

# Speech built into new 364

THIS summer sees the launch of a new Commodore home computer with built-in speech, the 364 — and lower cost versions may follow later.

As well as built-in speech, the 364 will offer 256K of system ROM, 64K of bank-switchable RAM, luminouscopic colour and a redesigned keyboard plus numeric keypad.

The system is said to be "very flexible making it easy to produce lower cost versions". For example, cutting down on the RAM and stripping the

speech module could produce a 232 or 316.

The good news is that the 364's ROM offers all the *Vic Super Expander* commands. The bad news is that there are no sprites, and that *Vic* and 64 software will not run on the new machine.

The 364 uses *Basic 4*. This is the version of *Basic* used on

Commodore's business machines, as opposed to *Basic 2* on the *Vic* and the 64.

The new machine was shown for the first time at the Consumer Electronics Show in Las Vegas at the beginning of January — running a talking version of *Exocortex*.

It is expected to go into UK production this Easter.

## On the serious side of software

COMPANIES both large and small are being attracted by the market for software with serious applications — programs for use in business and in the laboratory.

Knowledge-based *Specific Software* has released a suite of book-keeping programs for the *Vic* and 64, while chemicals giant ICI is aiming for scientific users of *Pets* and etc.

*Specific Software's* suite of programs covers *Invoicing*, *Sales Accounts* and *Purchase Accounts*. Each is available on either tape or disk for both the 64 and a *Vic 20* plus 64K RAM, although the capacity and range of facilities vary accordingly.

For example the tape-based version of *Sales Accounts* for the *Vic* does not include address label printing which is available on tape for the 64 and on disk for both machines.

Prices also vary accordingly — so *Sales* on tape for the *Vic* costs £25.00, but rises to £300 for *Vic* disks. The 64 tape version is £75.00, rising to £120.00 on disk — this includes extra facilities such as cost analysis headings.

*Purchase Accounts* has the same price structure but the invoicing package costs from

£20.00 to £45.00.

The tape versions have a capacity of 60 accounts and 500 transactions, while the disks offer 300 accounts and up to 2,000 transactions.

ICI's three packages (*Times*, *RAP* and *Dropout*) are being marketed under the *Respage* title already used for its input/output interfaces. For versions say available now, but 64 users have to wait until March.

*Temals*, at £450, is a multitasking program which allows tasks to be written and tested individually before bringing them together within a common framework. Once in this framework, *Temals* operates in real-time to manage changing priorities from moment to moment.

So far *Temals* has been used to control laboratory experiments, but ICI expects applications to extend to industrial control and into the household/hobbyist market.

The two other programs have a more limited scope. *RAP* (the *Raygan Statistical Package*) is used for processing and evaluating arrays of experimental data, while *Dropout* assesses impact tests on materials.

## Brush up on your painting



*Keuka Painter* — *Amiga* graphics tablet uses laser peripherals

**SOFTWARE** house *Audiogenic* has moved into the peripherals market with the launch of a graphics tablet for the 64.

Called *Keuka Painter*, the tablet allows users to produce full colour drawings and illustrations directly on screen. The £99.95 package consists of the graphics tablet plus separate stylus, disk-based software and an instruction manual.

The software gives you a

three-window menu — commands, brushes and then finally colour palette which offers a choice of 16 colours and 16 patterns.

The commands section allows you to combine freehand drawings with previously saved designs and basic shapes included in the menu (lines, boxes, rays, etc.).

And *Brushes* gives you a chance to vary the style of the illustration by increasing or decreasing line widths.





## Sounding off on the right notes

THE NEWS is good for music-loving 64 users.

Software house Quikdrive is releasing a music program, *Ultimate 64*, at about £11.00, while a keyboard has arrived from a new company called Silym.

The Microsound 64, a full size, four octave keyboard, plugs into the 64's cartridge port.

Disk software converts keys depressed on Microsound into musical notes played through the TV backpointer. These notes can be stored in your 64 or saved to tape or disk for recalling.

Microsound 64 also features two slider controls which operate a simple music synthesiser. And Silym is developing more software enabling the C124 keyboard to produce more complex musical effects.

Microsound 64 is available from Autographix, 1A Reading Rd, Henley-on-Thames.

# Spectrum hits set for the 64

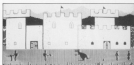
TWO OF last year's most popular games for the Sinclair Spectrum, *Valkalla* and *Magic Miner*, will soon be available for the C124 64.

*Valkalla*, the adventure from Legend Software which introduced the Marston graphic animation process, will appear in February.

Legend's managing director John Peel commented: "The Commodore 64 version of the game will be similar to the Spectrum one, but obviously the graphics will be better. For one thing, the characters will be more than one colour, and we should also be able to do more with the backgrounds."

Like the Spectrum version, *Valkalla* for the 64 will cost around £11, and the new release is expected to confirm its position as one of the most popular adventure games around.

*Magic Miner*, the much-



The production team from Legend's *Valkalla* adventure

imitated arcade-style game, should be in selected outlets at the same time. Software Projects' C124 64 program is an almost exact copy of the original 8-bit version for the Spectrum, regarded as one of the best 49K Spectrum games released last year. In *Magic Miner* the hero, Miner Willy, collects gems while avoiding attacks from cruel opponents. Each of the 28 screens has been recreated for

the C124 64 version.

Programmer Chris Lancaster said that the success of the game was such that it wasn't thought necessary to radically redesign it for the 64, but there would be some changes in the sound effects.

Overall he claimed the game would be well worth its estimated £7.95 price, and should be an addition to the 64 as it has proved to be so on the Spectrum.

## Rounding up the arcade games

CHRISTMAS is traditionally the time software houses make sure they have new arcade games on the market — and last year was no exception.

Heading the pack of new releases were titles from Radiogenic, Amic, Atari and Century-based PDS.

Radiogenic launched its series of dual cassette, with one side containing a Vic 20 program and the other a 64 version. First up were *Catsylen* at £3.95 and the re-released *Boon*, at £7.95.

In *Catsylen* you command the laser weapon defending the lunar city of Eritan from the onsets of the Jorian empire. Failure to destroy the saucers results in *Catsylen*.

*Boon* puts you in the role of a workman climbing ladders to collect bones from different levels of the screen. The bones are guarded by monsters which, Radiogenic warns, "do not just wander about the screen but actually try to trap you on a particular level".

For the 8K expanded Vic



PDS's *Magic Miner* — sport the alien at speed

Amiogenic also launched *Shilly* which it promises "makes Pac-man look like the truly-bear's picnic". The price of escaping the ghosts is £3.95.

Three new cartridges (Serpentine, *Scalax* and *Chop-Whizz*) and one disk (*David's Midnight Magic*) are aimed at 64 users. Each costs £29.95.

In *Serpentine* the snakes slither over your serpents while eggs and frogs also make game

appearances.

As commander of the *Scalax* submarine you have to destroy a convoy of ships. *Chop-Whizz* follows the military theme, but on land out at sea, as you pilot your helicopter to rescue besieged soldiers.

*David's Midnight Magic*, however, presents the more subtle pleasure of playing pinball.

It's back to a world of more

violent action at PDS. Its launches included *Metro Miner* (expelling the alien), *Moby Dick* (chewing up submarines), *Novobis* (saving the colonial planet) and *Comix Split* (defeating the insects).

The games, from North America, run on the 64 and cost £7.95 each.

Vic users had *Atic's Tank Battle* to tackle. The game runs on all memory sizes of Vic and costs £3.95.

For users after more arcade flavour Atari had converted some of the Atari classics to cartridges for both the Vic and the 64.

*Big Dog* and *Donkey Kong* come in at the top of the range at £29.99 each. *Pacman*, *Conquise* and *Defender* are £24.99, while *Balloon* and *Burglar* are the cheapest at £19.99.

This may seem expensive, but Atari argues that its games are "second-to-none, therefore the price is not too high in terms of the quality which you get."

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## Magic moments from Commodore

COMMODORE'S attack on the software market continues this year, with Magic Voice, Magic Desk and Basketball — the follow-up to Soccer — leading the charge.

Magic Voice, a speech synthesis unit at about £50, will be available early this year. It has a vocabulary of about 200 words which are entered by the command "N" "n".

Letters and numbers are also included, along with some suffixes for adding to words.

A number of talking games and educational aids are also on their way to run with Magic Voice — the arcade game Wizard of War and Golf; a series of talking books for infant school children; and nine pre-school packages

covering reading, arithmetic and thinking.

All except the talking books can be used without Magic Voice.

Vic users in search of education can turn to the series of six First Pack programs.

The Magic Desk cartridge, now expected early this year, can also be used with Magic Voice. This is a small business package using pictures to represent an office and its functions.

The first UK release, Magic Desk II, offers typing, value-adding and filing facilities.

Also on its way for 64 users is Basketball — a follow-up to the acclaimed Soccer. This is expected to be available later spring.

## Adventures away



Richard Shepherd's adventure challenge

COMMODORE users in search of adventure are being their prayers answered by four companies — in addition to Commodore itself.

Big Bear has released Twin Kingdom Valley for the 64. Combining text and graphics, the program is in the Hobbit mould with 175 screens.

Atari specialist English Software has gone underwater for Neptune's Daughters — a multiple screen adventure for the 64 at £9.95.

Two other 64 titles come from Richard Shepherd Software, at £6.50 each.

Ship of the Line takes you back to the 17th century and puts you in command of a Royal Navy warship cruising the Mediterranean.

Everest Everest brings you back up to date and sometimes down with a bump. As you

plot your way up the mountain you have to avoid avalanches, crevasses, thin ice and abominable snowmen.

The fourth company is 1988 whose Crystal of Zong, at £7.95, provides 64 users with arcade thrills as well.

Commodore itself has not forgotten Vic users. It plans to release a wide range of adventures, as we revealed in our previous issue.

These plans include more Scott Adams titles on the Vic and 64, along with other celebrated American games for the 64. Chief among these are Suspended, Deadline and the Zork trilogy — all from Infocom.

If you think you've  
something newsworthy,  
call 01-437 4343 and let  
us know



**VALHALLA**

# TERMINAL SOFTWARE

## commodore 64 games cassettes

### SUPER SCRAMBLE!

Personal Computer News (15-21 Sept '83) gave SUPER SCRAMBLE! an overall rating of NINETEEN OUT OF TWENTY and described it as: "Well implemented with beautifully smooth scrolling and very nice graphics"



### SUPER GRIDDER

"... a compelling piece of frivolity that could give hours of fun," was the verdict of Personal Computer News (22-28 Sept '83).



### SUPER SCRAMBLE!

"An excellent game!" said Computer & Video Games magazine (Sept '83).

### STELLAR DODGER

A game of skill and anticipation in which you must dodge your way through asteroids to complete your mission.

NEW



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### SUPER DOGFIGHT

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NEW



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# Mishits and bull's eyes in the battle for games users

*Pete Garrow looks at the games available — and picks out some winners*

LAST MONTH we looked long and hard at a selection of games software produced by Commodore for their own Vc 20 and C64 bit machines, and found it to be a very mixed bag indeed. Now we're going to finish off the Commodore games, then go on to review the opening shots in the software battle from other well-known companies including Virgin and Quicksilver.

Money Wars is an enterprising game hiding behind an unimpressive title, this one, like so many others, has its origins in the early days of the Commodore Pet in a game with the obscure name of Hobobauz.

More recently it has appeared for the Spectrum under the name of Handfinger's Heaven, and now this Vc version follows the same old rules.

You are in control of a little man who runs along the bottom of the screen, hidden behind three invaders-type defences. On the right of the screen is a bag of money, and it's your job to steer the man and get the money back to the left-hand edge of the screen. As this point you go back for some more, and all the action goes just a little bit faster and a little bit more furious.

To make life more difficult for you, the heavens have opened up, and from the top of the screen comes a perpetual shower of little arrows. Makes a change from cats and dogs I suppose.

These arrows, should they land on you, signify instant death, so for the greater part of the game you're trying to dodge in and out from behind barriers while hiding from arrows. In your defence, you can make your man run very quickly, and you can also give him a shield to shelter under, but both of these are up valuable bonus units so should be used discreetly.

This cartridge game requires you to use the keyboard, which is good enough for the limited controls you have to play with. You are helped by two small blocks which float about at the top of the screen soaking up the arrows, but after about the third money bag life is getting very frantic.

These arrows that are not absorbed and that don't hit the ground or you, crash into one of your three barriers and take a chunk out of it, and it isn't too long before your barriers begin to look very ragged indeed.

This game is casually addictive, and manages to work even life into an old theme by adding one or two nice little extras. Well worth a look.

## Comet

Ernest Wars. What, you may wonder, is an Ernest? According to one source, Ernest is a Cornish word used to describe holiday-makers, so this game about destroying comets ought to go down well in the west country.

Whatever they are, they appear in a game that is amazingly like Tank Attack, and some superb machine code programming gives you an extremely responsive scrolling screen as you scan the bottom for the next wave of attackers.

These attackers frequently hide behind jumbles of rocks, and hang out at the last minute, but they appear to be fairly peaceful, since they don't fire at you, they just keep advancing down the screen. When one of them reaches the bottom of the screen, the game is lost.

Recommended for players with nimble fingers, this cassette game is an easy one to get to grips with, but shouldn't hold the attention of the devoted arcade fanatic.

The reason for this is that the action lets the scrolling screen graphics down badly. The comets, like Cornish holiday-makers, move slowly about, and never seem to get very near to the bottom of the screen. This makes the shooting of them very easy. Just manoeuvre your sights into position and bang! Another one disappears.

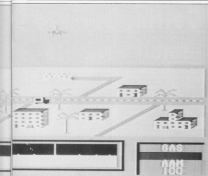
Getting rid of one wave of comets just brings on another lot, and so the game goes on. The comets don't appear to change their habits between levels, and they never get too close to the bottom of the screen. After 15 minutes of playing and winning,



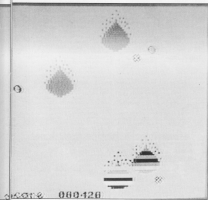
Virgin Software's Falcon Patrol — just disappears at last



Also from Virgin is Ernest — reminiscent of the great



Warning: Jet as you whizz through the heavens



Orbiters that without the jet

hoodlum jet in and the machine was switched off.

Of course, Commodore aren't the only company producing software for the Commodore 64. Three others have recently brought out new products, and the prices for the most gawkiish publicity must go to Virgin Software, for Falcon Patrol.

Falcon Patrol. I don't care whether the author of a program likes tinkering with Ford Escorts and drinking real ale in country pubs, but Virgin insists that you know all these things, and so while waiting for the tape to load you can read all about Steve Lee and his interests and hobbies. But what is he like as a programmer?

Reasonably good, as the opening screen shows us. A riot musical introduction leads you into the game, which starts with you in control of a VTOL jet, sole survivor of the falcon patrol, whose job it is now to defend the city against the invading enemy sabote.

To begin the game a nice graphical display shows the city in the bottom half of the screen, and a clear blue sky above. Your plane is just refuelling and topping up with missiles, you take off, and scan the radar for the signs of enemy planes.

Fuel disappears at an alarming rate as you whizz through the heavens over an impressive scrolling landscape. You can refuel at any of your many bases, but this is a hazardous task as the enemy makes no bones about destroying you while you sit there, like a lemon, frantically filling up with petrol.

In combat the movement of the planes is handled well, and the overall impression is that young Steve is a good programmer. The graphics and sound are handled nicely, and although you can only use a joystick to play the game, attempting to play it by using the keyboard would probably have been impossible.

In the first batch of software released by Virgin they were heavily criticised for the inanity of many of the games, and the fact that few of them would have been released by any other software company.

They appear to be taking steps to correct this with Falcon Patrol, and if other games live up to the same standards, they could yet become a leading company.

#### Smashed

But optimism smashed as Virgin's other game for the Commodore 64, Bismans, appeared on the scene. Oh well, back to the ridiculous.

This game was written by a 18 year old called Kevin Brennan, so the Virgin fact sheet informs us, and young Kevin has obviously figured out how to generate your own characters on the Commodore 64, as most of the moving graphics features home-generated characters.

The idea of the game is much more complicated than the game itself. You are inside a data bus (that's what it says) battling against the neuron flow. You have to reach the central core by destroying all the bits that the CPU sends out at you. These vary from level to level, but all have to be hit twice before they'll die.

One nice feature is a panic button which sends you onto the next level mid-game. ▶

ONE OF THE fascinating aspects of people who buy microcomputers is their desire to justify the expense, by claiming that they are buying more than just a machine to play games with or to learn computing on. This is quite illogical when you think of how much we spend on bills, videos, alcohol, clothes, out, etc., but if you do want to justify your purchase even if only to your inner self, what is available in the software line to solve your concerns?

Of course, the immediate reaction is the database/micro-processing accounting package that flourishes under a variety of names and forms, and I must confess that to me this software has a certain appeal. But is it really of any value to the average person? And if so, which is the better package? Oh, to be blunt, what do you look for and what can you buy?

In earlier times software of any value was pretty thin on the ground, and my own experience tended to alternate me as material I paid for suffered from bugs and restrictions that made the price a bit high. More recently the competition and the technical advances have tended to mean that we, the customers, are better served and better able to obtain value for money. This brings me to a company calling itself Dialog Software which has produced a very neat collection of programs with the usual-time user in mind. (My definition of usual-time is not a clear against anyone's physical appearance but more an expression of possible use and consequently price expectations.)

#### It takes two

Dialog is really Chris Ely and John Ayton, two entrepreneurs who decided that the Commodore 64 looked an interesting machine with potential for databases and the like and began to write software. They were able to form Dialog in January 1983. They opened a bank account after their very first sale (\$38,000) and have built from there. Today they have a solid base of seven programs aimed at the first-time user (which they call the first phase of their business) and are about to expand into the second phase.

The programs run on both the Vic 20 and the Commodore 64 (as well as the Spectrum and BBC machines) and cassette and disk-based. They all reside in memory at the moment (as the programs are for cassettes which does limit the amount of memory available). The second phase will be aimed at the more advanced user where disk drives will enable direct access to the disk, thus increasing the scope of information available and the potential for greater storage. What this means in real life is that if you were using the database for names and addresses that the existing phase limits you to a smallish number (between 100 and 200 perhaps on the 64) whereas this can be vastly increased once you can store the whole lot on disk and call them up as needed.

Let's have a look at the actual software. The first program available was DPM, a flexible database which has remained the mainstay of the company's range. One

# Getting down to small business

Mike Grace takes a look at the business market and finds Dialog well established

essential aspect of Dialog's service is the free updates which arrive once you have purchased a program. I bought DPM back in the early part of last year for my Vic, and have received two free updates since for the 64 which are excellent improvements on the original. (The Program for the Vic will run on the 64.)

DPM is user-definable — which means that you can decide for yourself how many fields you want and how long they need to be. For anyone not into databases you'll find I will briefly explain that this means you can more easily what you want because you can start by setting your own fields in field 1 just as a section on your record. Let's look at an example which is probably one of the most likely uses for DPM, an address book. If you wanted to set up fields for that you could follow the outline below:

- Field 1. NAME
- Field 2. ADDRESS
- Field 3. TOWN
- Field 4. COUNTRY
- Field 5. PHONE/LOCAL
- Field 6. TELEPHONE

Thus this example contains six fields, but DPM has the versatility of being able to add up to nine more should you want 100 stock number for a business, interests for a hobbies club, subscription for a society.

DPM will cater for numeric fields (as in subscriptions or stock prices) and you can perform simple calculations (addition, multiplication, etc) on them. Otherwise the fields are character only (which can be numbers of letters but you won't be carrying out calculations). The maximum field length is nine M characters (M was previously 99) which is far more than you'd be likely to need, but this gives the system greater flexibility.

Having set up your fields you just enter the data in — in the example above you would enter the names and addresses — and then save to disk or tape. Having done that

you can carry out sorts (extremely handy for names) and searches, amend the data, delete records, print out records, etc. What sets DPM apart from the other systems I've tried so far is the ease of use and the flexibility for the price (\$24 at present).

In the space available I will try and describe what I have found to be the real advantages of DPM in the nine months or so I've been using it. First, it is very easy to amend data, so if you make a mistake you don't have to keep going back and redoin the whole record just because of a silly spelling mistake. (Oddly enough with some systems I've tried you cannot alter a record without rewriting the lot.)

Secondly, if you decide to change the name of your file, you can do so easily. This is also very useful as I've often spent an hour or so keying in data only to discover I've got to change the title — which means starting all over again.

Thirdly, the program is all in Basic and you can take a copy of the disk or tape in case of damage later — another plus. If your programming is up to it you can alter the Basic to suit yourself, or Dialog will alter it for you for a sum of £18-620, bringing tailoring of software for the individual into an extremely reasonable price bracket.

Fourthly, a report writer option allows you to list out information in a format that suits you, only recording or printing the specific items you have decided to print. I found this most useful in drawing up lists of names and items that I was referring to at one time, then adjusting it to another list at a later date.

There are other examples I could quote, but space prevents me from telling more. I am impressed by the versatility and ease of use of this program. While it is limited for a businessman with 1,000 records or so, for the average micro-owner who would just like to catalogue a Christmas card list, or

ALBUM ( 0 )			
NAME 1	ADDRESS	TOWN 2	COUNTRY
NAME 3	ADDRESS 2	TOWN 3	LOCAL 4
HEPPY, M.DENIS	881	1 SOUTH VIEW	IT 20
THE THRELL, DR GORD	125	155 MAIN HIGH	WEL 500
WRIGHT	220	BLUE HILL	500
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Caution — instructions for entry and moving around are included



keep a record of his copies of *Playboy* Computing Weekly, this system is ideal — well-priced and most important, easy to use.

A subsidiary program called DPM Labels will allow you to print out mail-order labels from a DPM address file (think of those Christmas cards again), work well, and cost an extra £10. Can't be had.

Another Dialog program is Journal (£19.95) which is essentially a financial diary. On loading (and here the manual needs updating) it asks you need to load "JOURNAL.12" whereas my loading of the directory revealed that the program had been saved as "HDJOURNAL.1" you are greeted with a large title and the enigmatic question "Is use ID required?" Shades of secret service and mystery — but no, it's just a way of identifying which journal you want as the software has provision for you to keep several different diaries of the same date if you wish.

The instructions are adequate, and the layout is very nice. Once you get into it, entering and deleting data is pretty easy, but to be honest I question the necessity for having a computer diary at all, as it really is easier to write it all down in a book. Having said that, if you are involved in some of money then the addition and subtraction facilities are handy as it's all automatic (of course). After all, that's what computers do so well.

Some people do find databases difficult to work, so for themselves to be involved one of those people used to be met and so Dialog has made two packages similar to DPM, but with already defined files, and a rather nice graphic screen display, so that you can imagine you are using a standard form or page in a book. This is really taking non-fraudulence to the extreme, and of course you lose versatility as your fields have already been defined, but for the casual collector of information (such as a catalogue of articles or a collection of records) who doesn't really understand there to use the database this idea is perfect.

### Similarity

Although the two packages are very similar, Catalog is, to my mind, the better. On LOADING you are presented with a screen format which resembles a book containing four headings and 46 sections for your appropriate records. The sample data on the disk is called "A1.A1/MS" — it is really a catalogue of LPs with the title, artist, number and classification followed by a listing of the tracks on sides A and B. By contrast the other program, Dialog, has only eight sections but has four titles which you can name yourself. This is more restrictive the cataloguing magazine articles as you only have eight sections, but if no catalogue numbers are involved then it might be a better system for you.

The actual procedures involved in both are similar (involving less total programming of course). Both are reasonably priced (£19.95 for Catalog and £14.95 for Dialog) and are pretty versatile in both their instructions for entry and moving around the programs are included which

should make their use fairly easy after about 10-15 minutes (depending on previous experience).

Features that particularly appealed to me were that you could abort an entry anytime (SHIFT plus RETURN), move quickly past various sections (just keep pressing RETURN), enter data and headings at any time, and press \* at any time to avoid repeatedly pressing RETURN. There are a lot of features of software that has been fabricated so that little things have been corrected.

Of course, you can enter and delete data, amend it easily, sort and search, and all the usual things. One nice touch is that whenever you make a move that might wipe your data you are reminded that you can SAVE to tape or disk — helpful for people like me who tend to have their minds on bigger things at times and inadvertently press the wrong button again. PRINTING is also fairly versatile, allowing you to print out the whole file, or just selected records in any order you like. Also back here the facility to check and see how many bytes of memory are left since you get near to "filling" your record up, although there is a bit of a time delay on this with no reassuring message to keep you happy that the program hasn't crashed.

### Amibook

The blurb with the disk (rather ambitiously I feel) claims that there are a whole host of possible applications such as listing accommodations, a creative notebook, hotel guide and directory. Whilst it is true there are some possible applications, I still think a good notebook may be quicker and easier for most of us. The fact it's quite a big book where this software is handy is in the ability to search and sort. For me this is the real advantage of any computer. Take saving articles from a journal. You must all know the frustration of searching through a pile of back issues looking for one particular article. Well, had you entered all those articles into something like Dialog then it would be a simple matter to call up the file and search for a keyword (such as 1541) — and there it would be on the screen.

However the problem is that it takes quite a lot of self-discipline to keep entering all those articles week after week (or even more to sit down after six months and enter the list). And that, really, is the snag with this software — to make it work you do have to keep hitting the keys. But if you can do that then these two packages are both good value.

As I mentioned earlier Dialog is planning a phase 2, which may well be available by the time you read this. For my money this is where the really exciting stuff comes in for disk drive owners — so keep watching the adverts or contact them direct (39 Shaws Gardens, London WC2H 9AT). But if you are still a tape-only owner and thinking of expanding your computer a little then the existing programs are an excellent introduction into the world of databases. But, as with all software — the best advice is for you to sit it and decide for yourself whether you could use it. ■

But as the next level isn't too far removed from the previous one, you might as well stay where you are.

This is reminiscent of the great Goldwasser, only without the grid. Your little ship can move up the screen a little way, and has total mobility in left and right directions, but is a bit slow when it comes to avoiding the death-destroying bullets.

The explosions when you die are satisfying, and the graphical display is a good. Plenty of white-blue colours, silly noises everywhere, and worth losing a few lives for.

But, and it's a big but, the game is very tedious in action. Joytick only, the unrefined display of defined graphics has been handled better by other games, and one little alien moving about the screen looks lost against the background of everything else. One could almost be forgiven for feeling sorry for the mice, and letting him pass.

### Visions

Colliding with an alien reveals that they aren't all sweeties and lights, as another life vanishes in the aforementioned graphical pyrotechnics.

I had visions of *People Turtles* being the result of some drug-induced games-writing session, but in reality it is a very good arcade game for kids, and anyone who (in the instructions from Quicksilver tell us) is young at heart.

In the case of *Blazing Adventure* on the River, the instructions are displayed on the screen before the action commences. You are told that you're going to indulge in the sport of turtle bobbing, as practised by the extremely nice people turtles.

These turtles float happily about in the river, and it is your job to control a little man, make him jump from turtle back to turtle back, and get over the other side of the river where some exciting fruit awaits you as a reward. You then have to get back again with the fruit, and when you do, drop it at the foot of a little tree on the river bank.

An owl in the tree jumps up and down with delight, and you have to go back and get some more. Up above, the blue sky has a cheerful sun beaming down on you, fluffy white and black clouds drift by, and from time to time a balloon sails across the sky.

*People Turtles* is a good clean game, and makes such a change from destroying alien and saving the universe. There are nine levels of play. The difficulty comes from jumping when the turtles are going to stay at the top of the river, in which case you can bump across them, and when they're going to float down to the bottom, in which case you'll jump into the river and die.

The only disappointment about this game was the graphical display of your man, as the rest of it is, well, the only words have got to be — so cute.

A cheerfully optimistic game, and anyone with kids might like to have a copy. Even if you haven't, the change from sapping alien to going turtle bobbing is a nice one to make. The sort of game that makes the sun shine on rainy days.

Quicksilver's move back into more ▶

■ familiar territory with Quintic Warrior, a doctor everything game including the traditional barbaric space crew depicting someone's idea of what Quintic Warrior ought to look like.

This joystick-only game got off to a bad start when the screen initially displayed five pages of instructions. Five pages! One would have done, and the first disappeared from view too fast to be read anyway.

All they tell you is, as per usual, gun operation, you are the quintic warrior who stands alone against the sinister evilness and mangled mutants in a dense city of a future gone mad. The usual run-of-the-mill outing that any games player will be familiar with.

Using your quintic sense, to say nothing of the blaster gun, you have to shoot at everything in yet another attempt to save some fabled city from doom and destruction.

There is something vaguely reminiscent about this game, as you stand alone at the top of the screen, firing at the swarmed horde of aliens coming up at you from below.

Where those N-Y rappers I could see moving up the sides of the screen refugees from another game? Was the one on the bottom of the screen on the run from Jeff Mince? Why can't anyone have original ideas anymore?

Yes, it's all too familiar again. The action is suitably fast and furious, and clearing one horde of aliens merely brings on another lot, until the inevitable happens and you die a gory death at the hands of the



Commodore's Horace Wars — everything mangled mutants. Or was it a crabman? Hard to tell really.

But disaster at the end of the game. Having been annihilated as usual, the screen froze and the words game over flashed on and off a few times. This is rubbing it in, but the words kept on flashing. Pressing every key resulted in nothing happening, until I reached the run/top key, at which point pressing run/top and reset got us out of the program and left a machine that would not respond to anything. That is, QuinticWar. Stick to turtle holding!

Hungry Horace! Is there anyone in the computer world who hasn't heard of Horace? Horace is a lovable little rascal who first appeared in a park on the Spectrum, picking the flowers and being chased by the park guards, while eating their lunches when they dropped some food attempting to chase Horace out of the park.

Horace has had a number of adventures on the Spectrum, and now the little chap has switched over to the Commodore 64, in a crossover game from Midhurst House.

Horace is a little sprite, with eyes and legs

and a bulbous body, who roams about the maze, that is the park, picking up all the flowers (usual sort of Pacman stuff), avoiding the guards and eating any bonus food that should appear. The maze has one entrance and one exit, and happily you don't have to pick every flower before going onto the next of four different levels.

Obviously, the further you progress the harder it gets, and at one point Horace was being chased by four different guards. He nervily surrendered and started again.

As well as the flowers, guards and food, there is a little bell hidden somewhere in the maze. Ringing the bell or eating it, which is what he appears to do, sends the guards into a panic, and makes life easier for a little while.

And so the game goes on. Get through the fourth level and it's back to the beginning again, with everything happening just a little bit faster. But this is not the end of it. One superb feature of the game is the ability to design and save onto tape for later use your own mazes.

This is done very easily in what is termed edit mode from the original screen menu before the game commences, and you can draw mazes, put flowers down, bells, entrance and exit, and check in a tunnel or two for good measure.

The game can be played in a virtual limitless number of different mazes, which will prolong it's lifetime indefinitely.

It is a great little game, and Horace shows himself to be just as much at home on the Commodore 64 as he was on the Spectrum. What's the next one coming out? ■

## cable software

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# Disk drive delights



NEW VIC 20 owners have to, although older ones were given the choice. Commodore 64 owners can do what they feel like, as long as they don't mind parting with an unreasonable amount of money.

Whether you choose for yourself, or have the choice forced upon you, anyone who is using a home computer, for whatever application, will sooner or later have to have some means of storing information.

With the popular Vic 20 Starter Pack it is assumed that you're going to be using a cassette deck, since this particular item is included in the package. For a Vic 20 this is a fairly safe assumption to make; not even Commodore would pretend that this computer is a contender in the "business machine of the year" stakes. A 22 column screen and a paltry 5.5K of usable RAM combine to put this machine in the purely beginner/budgetary ranks.

However, if you decide that you would like to use a disk drive, there are a number of options open to you, and later on we'll take a look at some of the more popular drives currently available.

For Commodore 64 owners the choice is there; you can buy a cassette deck at the fairly high price of £19.99, although these are currently difficult to come by, presumably because all of Commodore's stock is being used up in Vic 20 Starter Packs! On the other hand you can choose custom and the bank balance to the winds and go out and purchase a disk drive.

But first of all, why buy a disk drive anyway? That is indeed the question, since disk drives are certainly not cheap. At present, Commodore's recommended drive for both the Vic 20 and Commodore

## HARDWARE REVIEW

Pete Gerrard looks at life in the fast lane

64, the 1541, costs around £229.00. There used to be two different drives, one per machine, and the original Vic drive was intended to work with both machines.

The 1541, as we all now know, wouldn't work with the 64 when it first appeared, and a new unit was rushed into being. In the meantime a few unscrupulous dealers managed to make a fast buck by charging unwary users a large amount of money for installing a small amount of ROM chip in the original 1540 drive.

There are other drives available, including the entire Commodore range of drives for the Pet series of computers. 7.5 megabytes can be yours for a cost of just £2,495, although it is debatable whether anyone would spend 12 times the cost of the computer on a disk drive.

The advantage of disk drives should be obvious to anyone with the slightest interest in computing, and having spent a couple of hundred quid on buying a computer it must be assumed that you know at least a little bit about the business.

Cassettes are slow, and can store only a limited amount of information. For anyone performing any sort of file handling, cassettes are a virtual no-man's-land: random access is impossible, and only sequential access can be used. This is the difference between records and tapes: a record can play any track you want to simply by moving the stylus to the track in question, whereas a tape has to wind through the rest of the

cassettes before reaching the required one.

There are disadvantages to disks. Tapes are easy to copy, as anyone with a mini-disk sector tracker will testify. Even those little manufacturers' tricks of detecting whether the play button is still depressed on the cassette deck after the program has finished loading can be circumvented by quick reactions and a pair of scissors.

Disks are much harder to copy, they also (individually) cost a lot more, but if you are intending to use your system for any kind of serious use, disks it has to be. So, what are the kinds of drive currently available?

The aforementioned 1541 is a 170K single drive unit. You can use both sides of a disk if you are brave enough (I've been doing this with TwinDisk 1241-00 disks for some time now, without any problems . . . yet!), but most people recommend that you stick to using just one side of the disk. This drive has the advantage of connecting directly to the RS-232 serial port at the back of the 64 or Vic, and having two such ports on its own back. The contacts up to the computer, and one is for further daisy-chaining of disk drives or printers.

A word of warning though. Commodore states that you can happily daisy-chain disk drives in your team's system, and transfer programs quite easily from one drive to another, provided that you change the device number of each drive beforehand. You can change the device number by issuing the following series of commands: OPEN 15,1,1  
PRINT \*13,"M"CHR\$(CHR\$(100))  
CHR\$(21)CHR\$(32)+NDCHR\$(64)+ND)  
C L O S E I O  
where ND is the new device number. ■



Oxford Computer Systems' Interpop interface — sophisticated but pricey.

◀ you wish to give to a particular drive. Lacking HD signal it gets you back to device number 8 again.

This is all very well, but it doesn't always work. Two people that I know can not testify to having blown one of the 6226 chips in the 64 by attempting to link up two different 1541s, following the recommended procedure.

If you don't happen to know a friendly dealer who'll take 2 pairs of Quizzes off you in exchange for a new chip, replacing this will cost you a fair amount of money. This includes not only the £13.50 (or £25.00, at whatever price your dealer cares to quote) cost of the chip, but also the fixed service charge that is included for doing even the slightest amount of work, regardless of whether the job takes nine minutes or 96.

Apart from this odd habit of misbehaving every now and again, at least the disk drives work. They are slow, but they do the job that they were designed to do. That is, provide a reasonable storage facility for an acceptable price.

But what if you want to store more than 178K? To do this will not only require buying a more expensive disk drive, but it will also require buying an interface into the bargain.

#### Communicating

To start with interfaces first of all, there are a number of units currently available that allow your Vic or 64 to communicate with IEEE 1196 standard on all Commodore's other diskless drives, Centronics, and others.

For those of you with a desire to connect up to IEEE drives, the most expensive interface currently on the market is probably that available from Oxford Computer Systems (which lists at Hemingway Road, Woodstock, Oxford; telephone 09955 807989 at a price of £99.00). This has been recently outland from £121.00, but even so it is still bordering on the pricey side; it allows a Vic or a 64 to connect up to either IEEE or RS-232 drives.

Now you may be wondering why anyone should produce a unit that gives you an RS232 signal, when the two computers already have one on board. Well, in this area, as in many others, Commodore enters a world of its own when it comes to copying

"standard" products. In fact Commodore's RS-232 shows about as much resemblance to the real thing as Deane Deane does to Beethoven.

The Oxford device is known as Interpop, and plugs into the back of the computer, leaving a number of sockets free on Interpop itself. There are the aforementioned IEEE and RS-232 ports, as well as a Commodore RS-232 port to allow you to continue to drive-obtain other Commodore peripherals.

No doubt about it, Interpop is a sophisticated device, and in use it totally transparent to the user. It doesn't take any memory from the computer, it allows you to talk to all three strange devices, and has a number of built-in commands of its own. However, it's transparent is akin to that of a British Rail train, since if anything can go wrong with it, it will. More often than not a simple LOAD ERROR from disk will cause the entire system to go to sleep on you, and it will require a reset of at least Interpop (and in a bad case the complete computer) setup before the computer will talk to anything again.

If sophistication is what you're after, then buy Interpop. But there are less expensive options. For example, Data (at Green Road, Kitley Industrial Estate, Kitley, Liverpool, on 0931 548 7111) produces a cheaper member for both Vic and 64, at £99.95. This is purely an IEEE interface, and as it plugs into the cartridge slot of the Vic or 64 it's easy to get in the way of some commercial software, so demand to try a running version of the setup you'll after before parting with any money.

Others are available — for example from Impas (Mitra House, Second Way, Wembley, Middlesex, on 01-980 0999), Mirroware (1342B Route 23, Butler, New Jersey 07001, U.S.A., on 60941 200 838 9027) and Analogic (14 Crown Street, Reading, Berkshire, or call 02344 586734). Beethoven then you'll be able to get an interface for anything from a disk drive to a pop-up toaster.

But back to disk drives. There are a wide range available from Commodore itself, and an extremely small range available from everyone else. So small in fact that hardly anyone in this country is supplying anything other than Commodore's own disk drives.

The Commodore 4040 is a double drive unit, with each drive giving you a capacity of 170K, single sided. The cost of price you can expect to pay for this unit varies enormously, but you won't get much change out of about £300 unless you're buying secondhand. I've seen one person offering a 4040 for £250.00, so it is worth looking around.

But there's always a but! This drive does not have the latest version of Commodore's Disk Operating System (known as DOS), since that's what the drives tend to do when searching for a file. And writing, say, a relative record program with the 4040 is difficult, to say the least.

The dreadful 2051 should be ignored. This is a 4040 that has been chopped in half, but unfortunately the price didn't suffer the same fate and it remains an expensive single disk drive. By the time you've bought the relevant interface (floppy, or Oxford Computer Systems), you'll have paid out about twice the cost of your computer, so you might as well have bought the 4040 in the first place.

#### Big brother

Big brother to the 4040 is Commodore's 8050, another double drive system, but this time giving you around half a megabyte per disk. This has DOS version 2.5 installed in it, and with it a whole range of special disk commands to allow the user to easily create a random access system.

It will cost you a lot more money of course, around £800.00, but for a megabyte of memory, and random access, anyone considering using a Vic or 64 in business would do well to use the secondhand column for a touch above 8050.

There are bigger drives, notably the £250, a double sided version of the 8050, but the prices begin to rise beyond the level that even the most ardent computer enthusiasts would consider, so you'd be well advised to stay clear of them.

Well, as we've already seen there aren't too many "independent" drive's about, although a number of companies are now beginning to exploit the technology behind the three inch disk. All the ones that I've already mentioned use the standard five and a quarter inch disks, but newer computers, like the TI (Rathmill Inc 90044) 814444 are beginning to use the smaller three inch disks. No one has yet produced one for a Commodore machine, but it can only be a question of time.

Strange floppies, a cross between a disk and a tape, are also slowly coming onto the market of to the infamous Sinclair microdrive, but their reliability is as yet unproven, and their availability is very restricted.

So if you're going to add a drive to your system, you might as well make it a Commodore one. They're not the latest in the world, but they do work with Commodore's computers, and their prices are lower than other manufacturers' machines of the drive.

When microdrives and strange floppies become available in earnest, we'll let you know, but until they do, better the devil you know . . . ■

### METASALACTIC BLAME BATTLE AT THE EDGE OF TIME

Play and manage your own intergalactic V.C. Challenge in this fast-paced game for the Commodore 64. Challenge your opponent to a series of intergalactic wars and design the strategy to win the most battles in the 100 days since the introduction of METASALACTIC. Rating: 100% Fun Age.

### LASER ZONE

Challenge Laser Zone - an ultra 3D laser battle game for the Commodore 64. This game features a variety of weapons and tactics that can be used to win the battle. The game is rated 100% Fun Age.

Available for Commodore 64, 128K and 512K 15.



### MATRIX

Play Matrix, the latest challenge - the game of the year. Challenge your opponent to a series of intergalactic wars and design the strategy to win the most battles in the 100 days since the introduction of METASALACTIC. Rating: 100% Fun Age.

Available for Commodore 64, 128K and 512K 15.

### HOVER BOVVER

A fast-paced action game for the Commodore 64. Challenge your opponent to a series of intergalactic wars and design the strategy to win the most battles in the 100 days since the introduction of METASALACTIC. Rating: 100% Fun Age.



### ATTACK OF THE MUTANT CAMELS

Play Attack of the Mutant Camels - an ultra 3D laser battle game for the Commodore 64. This game features a variety of weapons and tactics that can be used to win the battle. The game is rated 100% Fun Age.



### CRASHBLAZER

Play Crashblazer - an ultra 3D laser battle game for the Commodore 64. This game features a variety of weapons and tactics that can be used to win the battle. The game is rated 100% Fun Age.

Available for Commodore 64, 128K and 512K 15.



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# Llamas at speed the Minter way

Graham Cunningham talks to Jeff Minter — the man behind *Gridrunner*, mutant canals and many others

YOU'VE SEEN THE llamas and the canals — now meet the man who runs the grid, Llamasoft's Jeff Minter. The first computer he ever came across was a Commodore machine, but it was a Po, not the Vic 20 or CBM 84 which he's since become a master of.

Jeff studied computers at sixth-form college in 1978, teaching himself Basic in four to five months. But he doesn't recall the time with much fondness. "We were taught a dead boring, dead low level schools language called Cool," he says. "We didn't get near a keyboard, the programs all went away somewhere else and we got printers back. And we had to do silly things like follow a convention that the figure 0 should be crossed rather than the number zero." But hidden away at the back of the classroom was a Po and Jeff eventually got to grips with it, moving on from Basic to machine code.

This was the time when Space Invaders was all the rage, although Jeff had his sights on something higher. He lives in Hampshire but he comes up to London to visit the arcade where he discovered Star Fire — "the first third person space game I've seen, where you were actually sitting in the ship". So he wrapped up his Basic version of Space Invaders and moved on to machine coding Star Fire, using borrowed books and standard monitors without assemblies. By this time too Jeff had bought his first computer, a ZX80, "after saving up for months".

## Out of step

But his programming was advancing out of step with his academic career. College may have introduced him to computers but it didn't allow him to take an A level course in the subject. As a result at university Jeff had to do mainly physics and maths "which I hated — I loaded up the maths and so I had to go". Next step was Oxford Polytechnic "for a more computer oriented course". Jeff also made another move, "my first big upgrade", from the ZX80 to a ZX81. Now this time was divided between poly studios during the day and graphics

programming for DE Tronic at nights.

Then came another change of direction. Jeff caught a virus which put him out of the polytechnic but "banned out to be one of the best things that ever happened to me". So 18 months ago it was more a case of "preparated Jeff" than "music Minter" — but then the Vic 20 arrived. Jeff bought one of the first ever Vics and he's still using it now. The reasons he chose the micro were the "nice keyboard, good value and the fact that I was familiar with Commodore machines". Then he wrote the first machine code game to come out under his own label, *Andes Attack* from Llamasoft, with the South American mountain chain combining the Peruvian connection.

## Animals

Canals had been Jeff's favourite animals at school, and he's going to Egypt this year to see them in their natural habitat. But now he prefers llamas — "they're hairy and usually more docile, although I've also got a minority interest in sheep and goats". Llamas have been used in traditional Peruvian designs for more than 1,000 years. Now they'll be appearing in a newly designed title page for all the Llamasoft games, in a mix of grey, beige and dark brown colours. As Jeff works he is surrounded by the same motif — on rugs, cushions and on his jumpers. Jeff was also delighted to read that one of the designers of the original Apple keeps a herd of llamas. Canals have not been forgotten, though — on top of Jeff's monitor perches a four-foot high model of one, "and other members of the South American canal family may appear in the future games".

*Andes Attack* itself is a version of *Defender*, revealing Jeff's love of the arcade. It was on display at the Commodore show in summer 1982, caught the eye of an American company, Human Engineered Software, and since then the llamas have never looked back. Next up was *Truxo* — "the first of the painting games which there's so many of now".

Jeff admits that *Andes Attack* and *Truxo* both show their arcade roots but he insists



Jeff Minter — with *Revenge of the Mutant Canals* on it

that originality is the key to writing a good game. He still visits the arcades whenever he's in London but he tries to work out what makes a game good rather than just copying it. "It's like musicians — they listen to music but don't just repeat what they've heard". And, anyway, Jeff adds: "Copying is boring, I've no intention of doing another *Donkey Kong*". He thinks that it's now ideas that should be encouraged — so "arcade people should not take the copies". He's now no player either in one overseas copies of his games credited to other local companies, and UK games incorporating routines he originally wrote.

After *Truxo* came *Abductor* "where you shoot the alien as fast as you can" — followed by the program which has made Llamasoft a household name among Commodore game fans, *Gridrunner*. Speed was again the corner, Jeff explains that he wanted "to do something very, very fast for the unprepared Vic". He thought



Jeff and Neil Gars in the middle of "so fast it will make Robinson look like a walk in the woods"

of the name first, having "loved the title of the film Blade Runner"; frequented a little from Centipede, redefining it around a space theme; spent a week on the ceiling, "getting as much as I could into 30K"; and then there was Gridrunner. The main masterpiece in the game he reckons is the Zapper, which he describes as "a very efficient remote weapon".

Jeff says Gridrunner "felt really nice as I was writing it". He was not the only one who liked it. The people in California called him up at 3 o'clock in the morning to pass on their congratulations. Gridrunner's success presented no worries about follow-ups. Jeff says he's "always full of ideas", and the one he chose to program next was Laser Zone.

Jeff will love this video game, and he's working on a follow-up now. Laser Zone gives you control of two space-ships which you co-ordinate to destroy all who intrude on the zone. Neil Gars, due to be released early this year on the Vic, sets you a similar

task — but controlling four ships, one on each side of the frame. If you move the left-hand ship up, the one on the right goes down as well; move the top ship to the right and the one at the bottom goes left. So if you fire when any ship is in the middle, you destroy its partner. Jeff promises that Hell Gate will be "so fast it will make Robinson look like a walk in the woods".

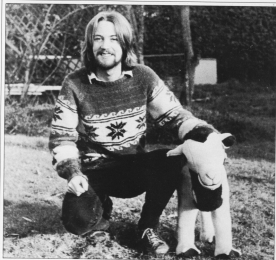
Laser Zone was the fifth game from the Llanosoft stable, all on the Vic 20. The arrival of the 64 brought a conversion of Gridrunner, followed by Matrix ("a kind of Gridrunner Part II") for both machines, and a conversion of Laser Zone.

Even when transferring a game from the Vic to the 64, Jeff prefers to write from scratch. As he explains: "This means you can tailor the program to the particular machine's capabilities." So Laser Zone on the Vic is written in entirely single-character colours "because this looks best on the Vic which has big pixels" — pixels being the dots which make up the screen. But on the

64 Laser Zone was multi-coloured "because the pixels are smaller".

In fact Jeff is "in love with the 64 — it's beautiful". The only advantage of the Vic is that "I can get more weird noises out of it than the 64". And the particular disadvantage is the Vic's small screen. Jeff agrees that the Basic on both machines is not too hot, "but the 64 is great for machine coding and the interrupts are really good". And "all the things wrong on the Spectrum are right on the 64: it's got a good keyboard, two joystick ports and excellent sound through the TV". But he does reckon that "whatever decided to put the disk on a serial interface was shooting it's own eye".

In fact Jeff is now incorporating a piece of German software into his tapes which speeds loading. Called Turbo, this twacker allows tapes to be loaded faster than disks. The only snag is that the frequencies involved are so high that the best type duplication services have to be used. ▶



Jeff with model game? — for one day there will be real flames in the garden as well

However, this has its advantages. As Jeff points out, "It will certainly hit software prices".

The Laser Zone conversion was followed by Steve Horner on the 64, with Jeff's tongue-in-cheek sense of humour growing ever stronger. In *Horror Forever* you have to mow 16 lawns while avoiding the owner of the mower you've borrowed. The immaculate lawns at a hotel Jeff stayed in during a show inspired the game. Almost immediately he and his father devised most of the ideas for the frames, one of which features a lawn nicely tailored around the shape of a llama.

It was back to the llama and the Vic 20 for the next game, *Mesogalactic Elixium*. Back to the Edge of Time. As Jeff explains: "I usually go from a 64 game now to one on the Vic, and then back to the 64." So next up was *Revenge of the Mutant Camels* for the 64, launched at the end of last year.

As the name suggests this is a sequel to

*Attack of the Mutant Camels*, which came out between *Guidance* on the 64 and *Matrix*. There's 42 phases in *Revenge* . . . and each has to be played differently each time. Jeff thinks that this randomness is one of the features of his games. He argues: "You could teach a robot how to play games like *Mutic Mites* on the Spectrum because each screen plays the same once you've mastered it." Although he adds that *Mutic Mites* itself is "very well programmed".

#### Skating kangaroos

In *Revenge* . . . rev, as he called this time, face a range of adversaries. Among the cast of enemies and distract 'n' weapons are mice and mutant, mutant camels; nuclear weapons (*Two Crails* is good news); skating kangaroos; boulders and mutant vipersets (Rock and roll-ops); mutant goats ("from my holiday in Cotsw"); spontaneously exploding sheep; saucers pouring tea on you and toilets that flush

down on you; and window-fans ("I've done a lot of practical research into the number of ways a human can fall off a window-board. All in all, it's a game where everything turns into something else").

*Revenge* . . . will be followed by *Hell Gate* and then Jeff has his eye on a 3D space game for the 64. He promises that "the new game will be at least as good as the old ones, probably better". Looking further into the future, he's keen on the new generation of sprite machines, giving high quality and easy-to-handle resolution — "you'll be able to see each hair on the llama's neck".

An extension has already been built onto Jeff's parents' house to handle his growing range of micros, battery of arcade stands, and collection of Pitman's notices. He turned down an offer to move to the US "although the jinxitis certainly tempted me". So the next step is a house of his own — and he vows that then there will be llamas in the back garden. ■



# Amateur group with an international cast

Organiser David Eneal introduces ICPUG, and invites Commodore users to make the most of its facilities

AS THE name suggests, ICPUG (the Independent Commodore Products User Group) is an independent club

catering for all those who own, have access to, or are interested in, a computer made by Commodore.

The club began in 1978 with only one machine to support, namely the Pet, and it was then known as the Independent Pet

**Berkshire:** Brian Jones, Mathematics and Computing Department, Slough College of Higher Education, Slough, Bucks. Telephone Slough 4450 on 01, home 07343 061 064.

**Derbyshire:** Ray Davis, 100 Normanton Rd, Derby, Derbyshire. Telephone 0332 4403. Meet at Derby Professional College, Compton Rd, Derby at 7.00pm.

**Devon:** Rosemary and Paddy Independent Commodore Products User Group, Douglas House, chairman, 97 Gasford Cliff Rd, Poole, Dorset.

**Essex:** Walter Green, 111 The Harbourside, Basildon, Essex.

**Essex:** A G Barnaby, 97 Shelley Rd, Chelmsford, Essex.

**Gloucestershire:** Mrs Janet Rich, Rose Cottage, 28 Old Court, Spring Hill, Cam, Gloucester, GL1 1 9PF. Telephone 0202 4798. Meet informally at the above address on the last Friday of each month.

**Gloucestershire:** Mrs Alison Schofield, 76 Heaton Way Rd, Cheltenham. Telephone 0242 58078 or 0242 27588. Meet on the last Thursday of each month at Cheltenham Ladies College, Railway Terrace, St Georges St, Cheltenham.

**Hampshire:** Tony Cooze, 7 Bessell Way, Petersfield, Hants, GU31 4LD. Telephone in Petersfield 62048. Meet on the second Tuesday of each month at Baddesley School, Petersfield at 7.30pm.

**Hampshire:** North Hants Regional Group, Rose Green, 109 York Rd., Farnborough, Hampshire, GU14 4AG. Meet every third Wednesday of each month at 76 Reading Rd, Farnborough, Hampshire.

**Hampshire:** Terry Cox, 10 Staplers Beach, Bournemouth, Hampshire, PO15 8EJ. Telephone in Farnham 24318. Meet at Gosport Community Association, Barry House, Barry Rd, Gosport, Hants, PO2 1 9PS, at 7.30pm.

**Hertfordshire:** Hertfordshire Regional Group, Brian Colquhoun, 75 Moorland Way, Stevenage, Herts. Telephone 0462 72762.

Meet informally on the last Wednesday of each month at the Princess Margaret Association, Pavell Lane, Hemel, Herts.

**Manchester:** Brian Ruffell Regional Group, 1111, Institute of Grocery Distribution, Group 148A, Levenshaye Street, Worsley, Herts. Meet on the second Monday of each month at the above address.

**North South East Regional Group:** Wing Commander Mark Ryan, 164 Chatterfield Drive, Kewford, Bromley, Kent. Meet on the third and fourth Thursday of each month at Charles Darwin School, Jan Lane, Biggin Hill, Kent, at 8.00pm.

**North West:** Roy Munday, Roywood, Lord Sumner Hill, Worsley, Manchester, Kent. Telephone 0223 12943. Meet on the first Wednesday of each month at 7.45pm.

**Northampton:** David Jones, 197 Victoria Rd East, Thrapston, Chelms, Northampton. Meet every third Thursday at Arnold School, Northampton. Telephone Chelms 84438.

**Northampton:** John Ingham, 53 Ardwick St., Barnby, Lincolnshire, NN18 9BA. Trying to form a Y10 group.

**London:** Barry Ellis, Business Studies Department, Polytechnic of North London, Holloway Rd, London N7, Pet group of the NCC which meets every other Tuesday at the Polytechnic at 6.00pm.

**London:** Michael Pinks, 196 Canadian Gardens, Croydon Rd, London W8. Telephone in 01-856 9111.

**Merseyside:** International Commodore Users' Group, Jeff Jones, chairman, 41 Virginia Ave, Lydiate, Merseyside, L15 2NS. Telephone 0211 528 4415. Meet on alternate Wednesdays at Stoughton Drive High School, Liverpool, at 7.00pm.

**Merseyside:** Geoff Smith, 108 Tordington Park Rd, Tordington, Midlothian. Telephone 01-997 284.

**Norfolk:** Peter Park, Brantley Hall, Wymon, Kings Lynn, Norfolk.

**Northumberland:** Graham J Southern, Seating House, 21 Foston St., Greth Post, Choppington, Northumberland. Telephone 0670 52042.

**Northumbria:** Ian Blyth, 40 Wilton Close, Wansbeck, Coes, 0268 793. Telephone Wans 471 or 371.

**Northumbria:** Alan Martin, 50 Kober Rd, Bury St Edmunds, Suffolk. Telephone Bury St Edmunds 4195. Meet at the Coach House, Long Buckland, Bury St Edmunds, Suffolk.

**Nottingham:** Arthur T Green, 7 Bee Ridge Ave, Purley, Surrey, CO2 3AR.

**Northumbria:** Coventry and Warwickshire Commodore Computer Club, 468 Light, 22 Croydon Rd, Wyke, Leicestershire, CV35 9JY. Warwickshire: Telephone 02463 40711. Meet at Stoke Park School and Community College, Coventry on the fourth Wednesday of each month at 7.00pm, no meetings are held in July, August or December.

**West Midlands:** West Midlands Via User's Group, Ian Brown, 4 The Oval, Abingdon, West Midlands. Meet monthly. Provide a free program library and advice on hardware and software. Send a large SAE for information.

**Yorkshire:** Bob Wood, 15 Rowland Cres, Westwood, Barnsley, South Yorkshire. Telephone 0246 81181.

**Northumbria:** David Gibson, 14 Cavendish Road, Carlisle, County Antrim, BT8 7BA, Northern Ireland.

**Westland:** Don MacIntyre, 27 Palmerton Crescent, Newton Mearns, Glasgow, Scotland. Telephone 0447 629 5666.

**Northumbria:** John Smith, 19 Howlands Rd, Nottingham, Nottingham, Nottingham. Telephone 02043 43602. Meet on the first and third Thursday of each month.

**Wales:** Simon Kainwood, Penrynsgate Hall, Talbont, Dyfed, West Wales. Wales: J J Thomas, The Hill, Bryllyn, Gwynedd, Dyfed. 0449 423. Telephone 024023 024.

Users Group. Now, we cover all the other machines as well, such as the Vic 20, 40 and 900. This was reflected by the change of name last year.

ICPUG is a truly amateur club run by its officers, committee members and other enthusiasts in their spare time. In spite of this, or maybe because of it, the club has become renowned throughout Commodore circles worldwide. The quality and content of its newsletter is well known and the latest copy will often be seen in a prominent position on the desk of many a Commodore executive. Our technical experts are consulted by the computer press and recognised as a source of reliable information concerning any of the machines.

The relationship between ICPUG and Commodore is one of the best existing between any user group and its associated manufacturer. This fact is highly prized by either side and information flows regularly both ways.

ICPUG publishes six newsletters in a year packed with information, reviews, programs and hints concerning all things Commodore. It also runs a technical advice service, keeps a library of public-domain software, supports an ICPUG slot on Prosal and Microsal, provides postal notice columns in machine code, and mans stands at all large computer exhibitions such as the Pet Show, PCW Show and others throughout the UK.

ICPUG organises the setting up of local groups which now cover most areas of the country. We are interested in hearing from anyone who would like to start a new group — and funds are available to start in this.

To see how many clubs there are just look at the list published alongside.

Anyone with any interest in Commodore computers should be a member of ICPUG. Membership is £7.50 a year (concessions from £11.00). Further details from the membership secretary, Jack Cohen, 20 Brimstrey Road, Newbury Park, Eford, Essex GU2 1EF.

If you want your club mentioned on this page write to Clubnet, Commodore Magazine, 12-13 Little Newport Street, London WC2R 3LD

```

0 REM
1 REM ALIEN ATTACK
2 REM
3 REM BY J.R. NELSON
4 REM
5 REM ON VIC20 +16K RAM
6 REM
7 FOKI 36076.13
8 SC=256*PEEK(16440)
9 CL=37699
10 IF SC<4896 THEN CL=39400
40 HD=0
50 HD="VIC"
60 FOR W(30)/V(30)
100 S=0
110 SP=30
120 X=0
130 Z=1
140 PRINT"##### L I E ##### T T R A C K"
150 PRINT"#####HIGH SCORE#####
160 PRINT"##### :HD
170 PRINT"#####INSTRUCTIONS ?"
180 GETH
190 IF RE="Y" THEN 3000
200 IF RE="N" THEN 150
300 C=0
310 PRINT"SCORE:";S
320 FOR I=1 TO 30
330 X(I)=RND(1)*675
340 Y(I)=INT(RND(1)*600)+22
350 NEXT
360 V=0
370 C=0
1000 S=PEEK(280)
1005 C=0
1010 IF R=33 THEN D=-1
1020 IF R=25 THEN D=1
1030 IF X=0 THEN D=1
1040 IF X=21 THEN D=-1
1050 FOKESC=X+22.32
1060 X=X+D
1070 FOKESC=X+22.32
1080 FOKI CL=X+22.6
1090 IF R=15 AND V=0 THEN X=X+V*D
1095 D=C+1
1100 IF C=SP THEN 1140
1110 D=1
1120 IF V(SP)=0 THEN SP=SP-1
1130 IF SP<0 THEN SP=0
1140 IF V=0 THEN 1200
1150 FOKESC=X+V*62.32
1160 V=V+1
1165 IF V=23 THEN V=0:FOKESC=76.8:GOTO1200
1170 K=PEEK(50+X+V*62)
1171 IF K=233 THEN V=V-1:K=K-1
1172 IF K=168 THEN 2000
1173 IF K=223 THEN V=V-1:K=K-1
1180 FOKESC=X+V*62.46
1185 FOKEL=X+V*62.6
1190 FOKI36076.238-V*30
1195 IF C=0 THEN C=1:GOTO1140
1200 IF V(I)=C# THEN 1300
1210 IF RND(1)*.2 THEN 1000

```

# Air war special on the Vic and the 64

STAR GAME

## Alien Attack

Destroy the aliens with John WITLOW

ALIEN ATTACK is a games program for the Commodore Vic computer which requires more than the internal 8K RAM. The program was written on a Vic + 16K RAM pack, but it should work with a lower memory expansion. Before I go into how the program works, I will give a brief description of how to play the game.

You take control of a spaceship at the top of the screen and must defend your planet against the invading aliens. The alien fleet will appear at the bottom of the screen and



will slowly move towards you. Your ship is aimed with a single laser cannon that can be fired downwards by pressing the RETURN key. As your ship is steered by navigation computers, it will continue to move in one direction until it reaches the edge of the screen, or you change direction. This can be accomplished by pressing Z to move left, or X for right.

To destroy an enemy ship, you must hit it in the middle, otherwise your laser bolt will bounce off the shielding covering the rest of the ship. As the alien ships only have short range weapons, they will only shoot when within range. Unfortunately, once fired, the enemy missile cannot be avoided, and your ship is destroyed. You gain points for destroying alien ships, but your score is reset to zero if you let any aliens through to your planet. As the game continues, the alien ships move faster and faster until they reach an incredible speed, and it is no longer possible to evade the fleet.

In order to play the game, you do not need to know how the program works, but for those who want to modify the program, I describe the main parts overleaf. ▶

```

1220 X(C)=DINT(RND(1)*87)
1230 Y(C)=DINT(RND(1)*15)+22
1240 A=Y(C)*22+30*X(C)
1250 Y(C)=Y(C)-1
1260 IF Y(C)=2 THEN 3000
1270 IF Y(C)<15 AND X(C)=100 THEN 4000
1280 IF Y(C)>22 THEN 1000
1290 POKER,32/POKER+1,32/POKER+2,32
1300 POKER+22,32/POKER+23,32/POKER+24,32
1310 A=A-22 B=A-30+CL
1320 POKER,200/POKER+1,100/POKER+2,223
1330 POKER+22,100/POKER+23,100/POKER+24,50
1340 POKER,2/POKER+1,2/POKER+2,2
1350 POKER+22,2/POKER+23,2/POKER+24,2
1360 GOTO 1000
2000 S=0+5
2010 FL=0
2020 FOR I=1 TO 8
2030 IF X(I)+1=KB AND YB=Y(I) THEN FL=I
2040 NEXT
2050 A=SC+X(FL)+Y(FL)*22
2060 POKESC6076,B
2070 POKER,77/POKER+1,66/POKER+2,70
2080 POKER+22,70/POKER+23,66/POKER+24,77
2090 FOR D=1 TO 2000 NEXT
2091 Y(FL)=0
2092 PRINT"SCORE:";S
2095 YB=0
2100 POKER,32/POKER+1,32/POKER+2,32
2110 POKER+22,32/POKER+23,32/POKER+24,32
2120 GOTO 1000
3000 S=0
3010 PRINT"SCORE:";0
3020 POKER,32/POKER+1,32/POKER+2,32
3030 POKER+22,32/POKER+23,32/POKER+24,32
3040 Y(C)=0
3050 GOTO 1000
4000 FOR I=Y(C) TO 1 STEP-1
4010 A=PEEK(SC+100+I*22)
4020 POKESC6076,250-I*5
4030 POKESC+100+I*22,90
4040 POKEL,100+I*22,3
4050 FOR J=1 TO 1000 NEXT
4060 A=SC+100+I*22,A
4070 NEXT
4075 POKESC+100+22,214
4080 POKEL,100+22,4
4090 FOR I=1 TO 10
4095 POKESC+100-I+22+I*22,255
4100 POKEL,100-I+22+I*22,4
4110 POKESC+100-I+22+I*22,127
4120 POKESC+100+22+I*22,60
4130 POKEL,100+I+22+I*22,4
4140 POKEL,100+22+I*22,4
4150 POKESC6076,1*5+130
4160 FOR J=1 TO 1000 NEXT
4170 NEXT
4175 FOR I=1 TO 10
4180 POKESC+100+I+22+I*22,32
4190 POKESC+100+22+I*22,32
4200 POKESC+100-I+22+I*22,32
4210 FOR J=1 TO 1000 NEXT
4220 NEXT
4225 FOR I=1 TO 10
4230 POKESC+100+I+22+I*22,32
4240 POKESC+100+22+I*22,32
4250 POKESC+100-I+22+I*22,32
4260 FOR J=1 TO 1000 NEXT
4270 NEXT

```

```

4190 POKE 36875,0
4195 POKE 36876,0
4200 PRINT"DO YOU HAVE BEEN DESTROYED?"
4210 PRINT"YOUR FINAL SCORE WAS"
4220 PRINT"OF "S;" POINTS."
4230 IF S=0 THEN 4500
4240 PRINT"DOES ANOTHER GAME ?"
4250 GET#A
4260 IF A#="" THEN 100
4270 IF A#="N" THEN 4250
4280 PRINT"DO YOU WISH TO EYE."
4290 PRINT"*****"
4300 END
4500 GET#A:IF A#="" THEN 4580
4510 PRINT"WHAT IS THE HIGHEST"
4520 PRINT"SCORE SO FAR, ENTER"
4530 PRINT"YOUR NAME:";
4540 INPUT HS#
4545 HS=S
4550 GOTO 4240
5000 PRINT"*****ALIEN ATTACK*"
5010 PRINT"*****"
5020 PRINT"*****DEPEND YOUR PLANET*"
5030 PRINT"FROM THE SHARDING"
5040 PRINT"ALIENS, YOU CONTROL"
5050 PRINT"THE TOP OF THE SCREEN"
5060 PRINT"AND MUST STOP THE"
5070 PRINT"ALIENS FROM REACHING"
5080 PRINT"THE TOP. 5 POINTS ARE"
5090 PRINT"AWARDED FOR EACH ALIEN"
5100 PRINT"DESTROYED, BUT YOU"
5110 PRINT"LOSE YOUR SCORE IF AN"
5120 PRINT"ALIEN REACHES THE TOP."
5130 PRINT"*****DESTROY AN ENEMY*"
5140 PRINT"YOU MUST GET A DIRECT"
5150 PRINT"HIT ON THE CENTRE,ANY"
5160 PRINT"OFF-CENTRE HITS WILL"
5170 PRINT"BE REFLECTED OFF THE"
5180 PRINT"SHIELDS."
5190 PRINT"*****HIT A KEY*"
5200 GET#A
5210 IF A#="" THEN 5280
5220 PRINT"*****THE ALIENS WILL*"
5230 PRINT"SHOOT AT YOU IF THEY"
5240 PRINT"COME WITHIN RANGE OF"
5250 PRINT"YOUR SHIP, TO HAVE THE"
5260 PRINT"SHIP, USE THE THESE"
5270 PRINT"KEYS: 2 LEFT"
5280 PRINT"X RIGHT"
5290 PRINT"RETURN FIRE"
5300 PRINT"*****YOUR SHIP WILL MOVE*"
5310 PRINT"IN ONE DIRECTION UNTIL,"
5320 PRINT"YOU CHANGE TO THE NEW"
5330 PRINT"DIRECTION OF MOVEMENT"
5340 PRINT"OR YOU BOUNCE OF THE"
5350 PRINT"SIDES OF THE SCREEN."
5360 PRINT"*****HIT A KEY*"
5370 GET#A
5380 IF A#="" THEN 5370
5390 PRINT"DO"
5400 GOTO 500

```

#### Program notes

- 1 Set volume to maximum
- 10 to 50 Find position of screen and colour memory
- 60 to 90 Reset high score
- 100 to 150 Set up initial variables for each game
- 160 to 190 Print title and high score
- 170 to 200 Print instruction if this is required
- 300 to 370 Set up variables for next wave
- 380 to 1000 Your movement
  - 1001 Your firing
  - 1000 to 1100 Find next alien to move
  - 1110 to 1120 Increase speed of alien
  - 1140 to 1150 Move your laser beam
  - 1200 to 1230 Add a new alien to the fleet
  - 1300 to 1400 Move alien ship
  - 2000 to 2120 Destroy alien ship
  - 2000 to 2020 Alien reaches top of screen
  - 4000 to 4020 Alien shoots at you
  - 4050 to 4180 Explosion routine
  - 4200 to 4220 Print final score
  - 4240 to 4300 Play another game, if required
- 4500 to 4550 Your score is the highest
- 5000 to 5400 Print instructions

#### Variables

- SC Pointer to start of screen memory
- CL Pointer to start of colour memory
- HS Highest score so far
- HS# Person who got that score
- X(100) X-position of enemy fleet
- Y(100) Y-position of enemy fleet
- S Your score so far
- SP Number of alien ships in the fleet
- NX Your x-position
- D Your direction of movement
- AS General input
- C Counter to show which ship is to move next
- I General looping
- YR I-position of laser bolt
- YC Flag for laser "bounce"
- A Keyboard input
- XR X-position of laser bolt
- K Contents of a given screen location
- FL Flag showing which alien has been hit
- J General looping

# Plane

High flying on the  
64 with **A Cape**

PLANE Di writes for the Commodore 64 and the object of the game is to shoot the plane as many times as possible before it reaches the ground and your game is over. The program should be saved before you run it.

#### Program notes

- 0-99 Titles and instructions
- 10-100 Set up variables
- 100-500 Game movements, etc
- 600-630 Ending and re-run
- 700-640 Firing routine
- 1000-1010 No need to type these lines
- 2000 Graphics set up

```

0 REM *****
1 REM *
2 REM * COPY-RIGHT (C) 1988 R. COPE *
3 REM *
4 REM * PLANE IS A GAME FOR CSH 64 *
5 REM *
6 REM *****
7 REM
8 REM NOT FOR USE WITH SIMONS BASIC !
9 REM
10 FOKES3288,14:FOKES3289,0
20 PRINT "***** AIR- PLANE 64"
21 PRINT "-----"
22 PRINT "## BY R. COPE FOR THE CSH 64 COMPUTER"
23 PRINT "## INSTRUCTIONS FOR PLAY FOLLOW"
24 PRINT "*****"
25 IFPEEK(197)=6400T025
30 PRINT "***** INSTRUCTIONS FOR PLAY"
40 PRINT "***** V = LEFT B = RIGHT"
41 PRINT "## SPACE = FIRE *PRINT"
42 PRINT "*****"
43 IFPEEK(197)=6400T043
44 PRINT "***** FOKES3288,18
45 GOTO3000
100 SP=2004
101 SC=50276
102 RC=50297
103 RP=1025
100 FOKESP,0:FOKESC,0
101 IFPEEK(197)=31THENSP=SP+1:SC=SC+1
102 IFPEEK(197)=20THENSP=SP+1:SC=SC+1
103 IFSP<1984THENSP=1984:SC=50250
104 IFSP>2023THENSP=2023:SC=50295
105 FOKESP=-1,62:FOKESP+1,62
106 IFPEEK(197)=60THENGOTO700
200 FOKDRP,0:FOKERC,1
201 FOKDRP=1,62
301 RP=RP+1:RC=RC+1
455 IFRP>1984THG600
500 GOTO150
600 FOKES3272,21
601 PRINT "***** WELL DONE BUT YOU LOST YOUR GAME AFTER "
610 PRINT " A HARD BATTLE WITH THE AIR PLANE ***** "
620 PRINT " YOU SCORED "8" POINTS"
630 FORQ=8TO 2500:NEXT RUN
700 FOKESP,30:FOKESC,7
710 FOKESP+40,62:FOKESC,7
720 SP=SP+40:SC=SC+40
730 IFPEEK(SP)=0THENQ=Q+10:FOKES3288,15:FOKES3289,10
735 IFSP>1864THGSGOTO700
736 FOKESP+40,62:FOKESP,62:RETURN
740 GOTO700
1000 PRINTPEEK(197)
1001 GOTO1000
2000 FOKES3248:FOKES3248:CLR
2005 FOKES3272,PEEK(53272)/#ND340)+12
2010 FORI=12298TO12295:READR:FOKEI,A:HEX
2020 DATA 120,132,232,170,127,44,0
2030 FORI=12296TO12294:7:READR:FOKEI,A:HEX
2040 DATA24,24,30,30,165,255,90,66
2050 FORI=12764TO12764:7:READR:FOKEI,A:HEX
2060 DATA0,0,0,0,0,0,0
2070 FORI=12552TO12552:7:READR:FOKEI,A:HEX
2080 DATA0,0,24,24,24,24,0,24
2090 GOTO100

```

# Simple steps to sprite movement

Setting up sprites and then moving them around —  
Kevin Burple explains how

THIS ARTICLE is aimed at describing a few of the many ways of defining and handling sprites from user written programs. Included is a short program that sets up and moves sprites around the screen.

There are many sources of learning how to use the capabilities of your 64. The most

obvious is to read magazines such as this one, although magazines are of course limited by the amount of space available. If you wish to see sprites quickly and easily and have no desire to learn much about the way the 64 handles the information then one of the many sprite editors currently available would be a good buy.

For those who do not have money to throw away and wish to understand more about sprites, there are two books currently available which cover sprites adequately. One is Using the 64 written by Eric Gorrard and published by Duckworth 085751. This is an excellent book and covers all aspects of the 64. The other book is The Commodore Programmer's Reference Guide which is available from Commodore. Both of these books are very useful in general and of particular help with sprites. The program included here will only cover some aspects of sprite use, but one of the two books mentioned will add the rest of the information.

The program included here uses four sprites writing up two characters and moving them around the screen. The sprites are set up in two different ways so as to

```

10 PRINT"CLR1113 CDBLCK PLEASE WAIT A MINUTE....."
20 V=53248
30 POKEV+32,10
40 POKEV+33,14
50 PRINT"BLU1"
60 POKEV+21,255
70 POKEV+20,3
80 POKEV+39,4
90 POKEV+40,2:POKEV+41,7:POKEV+42,7
100 POKEV+37,14
110 POKEV+38,8
120 POKE2840,13
130 POKE2841,13
140 FORI=81062
150 READX
160 POKE33+I,X
170 NEXT I
180 GOSUB630
190 GOSUB740:PRINT"CLR3"
200 FORX=810350
210 POKEV+1,50:POKEV+0,X
220 POKEV+2,50:POKEV+3,X
230 NEXT X
240 POKEV+8,0:POKEV+1,8
250 P=192
260 FORI=810350
270 POKEV+4,I:POKEV+5,X
280 POKE2842,P
290 P=P+1:IFP>192THENP=192
300 NEXT I
310 PRINT"CLR1113 CB3 'A' TO FINISH OR 'B' TO S
32 AGAIN"
320 GETA$:IFA$="A"ANDAB$=""THEN320
330 IFAB$="B"THENPRINT"CLR1":GOTO200
340 POKEV+21,0:POKEV+32,14:POKEV+33,6:PRINT"CLR3
%:CHR$(154)
350 END
360 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
370 DATA3,200,200,0,2,0,192,170,120,194,150,00
380 DATA234,150,00,194,170,160,192,170,160,0,32,1
20,0,170,160
390 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
400 DATA" 11 11 "
410 DATA" 1111 111 1111 11 "
420 DATA" 1111 11111 1111 1111 "
```

demonstrate different defining methods.

Now for a brief look at the program. The first line clears the screen and prints a message in block. The variable 'N' is set to 5120 in line 30, which is the start of the sprite's and y registers. All of the work with sprites can be done using 5120 as a base address and adding the appropriate offset. Line 38 sets the border colour and line 40 sets the screen colour. Line 50 prints in blue and line 60 sets the sprite display register for all sprites to be displayed. If this address is set to 0 the sprites are turned off.

Line 70 sets the registers to select multicolour and lines 80 and 90 select the colours for each sprite. Lines 100 to 110 set and select multicolour for the sprites. Any sprite data is called by the 64 giving it a pointer. The sprite pointers are from location 2040 to 2047 — for example the pointer for location 2040 would tell the 64 where to find the data for sprite 0. The way to calculate the values to be POKE'd into these locations is:

address of sprite 0 is to be placed starting at location 812 (the cassette buffer) then (x) would be 13.

Lines 120 and 130 place the data for sprite 0 and sprite 1 at location 812. The loop in lines 140 to 190 reads in the data for sprite 0 and sprite 1 and POKE's it into the cassette buffer. The two branches on lines 180 and 190 set up sprite 2 and 3 then clear the screen. The loop from line 200 to 230 moves sprite 0 and sprite 1 across and down the screen. Line 240 places both sprite 0 and 1 off the screen.

#### Simple but effective

The variable 'N' is set to 192 in line 250 (192 is the pointer for sprite 3, 64\*3=1280 and 192 is the pointer for sprite 0). In the loop from line 260 to 380 the two sprites are moved across the screen, but at each pass through the loop the sprites are swapped. This is a simple but effective way of achieving animation. Lines 380-390 contain a routine to finish or start again.

The data for sprites 0 and 1 is in lines 360 to 380. The data for sprite two is in lines 400 to 600 and the data for sprite 3 is in lines 610 to 810. The last two routines read the data for sprite 2 and 3 and convert it into the correct values before POKE'ing them into memory, starting at location 1200 for sprite 2 and location 1204 for sprite 3. This technique is explained and documented in the Commodore reference guide. The advantage of this technique is that the user simply draws the sprite on the screen and the 64 does the rest of the work. The disadvantage is the time the 64 takes to do this — as will be seen by trying this program.

Of the sprite facilities not mentioned here the most important is collision detection and priority. Collision detection is set using locations 31210 (bit 2 is sprite to sprite and bit 1 is sprite to background). Location 31219 sets the sprite to background priority. The other technique that needs some thought concerns the expansion of sprites. The vertical expansion is set by location 31271 and the horizontal expansion is set by location 31277. ■

```

430 DATA" 11111111111111 111111 "
440 DATA" 111 1 111 11111111 "
450 DATA" 11111111 11 "
460 DATA" 111 11111 11 "
470 DATA" 11111 11 11 11 "
480 DATA" 111111 11 111 "
490 DATA" 11 111111111 11 "
500 DATA" 111111111111 "
510 DATA" 11111 111 "
520 DATA" 1111111 "
530 DATA" 1111111 "
540 DATA" 1111111 "
550 DATA" 11111 "
560 DATA" 11 11 "
570 DATA" 11 11 "
580 DATA" 11 11 "
590 DATA" 1111 1111 "
600 DATA" 11111 11111 "
610 DATA" 11 11 11 "
620 DATA" 1111 111 1111 11 "
630 DATA" 1111 11111 1111 1111 "
640 DATA" 11111111111111 11111111 "
650 DATA" 11 111 1 111 1111111 "
660 DATA" 1111 11111111 11 "
670 DATA" 1111 11111 11 "
680 DATA" 111 111 11 11 "
690 DATA" 11 111 111 "
700 DATA" 111111111 11 "
710 DATA" 111111111111 "
720 DATA" 11111 111 "
730 DATA" 11111111 "
740 DATA" 11111111 "
750 DATA" 11111111 "
760 DATA" 11111 "
770 DATA" 11 11 "
780 DATA" 11 11 "
790 DATA" 11 11 "
800 DATA" 1111 1111 "
810 DATA" 11111 11111
820 REM SPRITE 2
830 FOR I=81000
840 READ A$
850 FOR J=81002: T=0
860 FOR K=81007: B=0
870 IF MID$(A$,J+K*B+1,1)="" THEN G=1
880 T=T+B*2^(7-J)
890 NEXT
900 FOR L=12288+J+K*B, T
910 NEXT
920 NEXT
930 RETURN
940 REM SPRITE 3
950 FOR I=81000
960 READ A$
970 FOR J=81002: T=0
980 FOR K=81007: B=0
990 IF MID$(A$,J+K*B+1,1)="" THEN G=1
1000 T=T+B*2^(7-J)
1010 NEXT
1020 FOR L=13352+J+K*B, T
1030 NEXT
1040 NEXT
1050 RETURN

```



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# Two's complement: turning positive numbers to negative

"Two's complement" may sound like a misheard cliché but it is in fact an important mathematical concept, used for integers on the Vic, as Boris Allen explains

IF THE TIME is now two o'clock, then five hours ago the time was nine o'clock. In ordinary arithmetic  $2-5=9$ .

The world, and most of its machines, follow clock arithmetic. To turn through an angle of 450 degrees is to turn to the direction 90 degrees from one's original direction. 366 days from now is tomorrow's date that a different year, unless there is a leap year. His a car's odometer, one mile on from zero is 100000 (as 1000000 is too large to fit on the dial).

## Only a machine

A computer is only a machine, and a computer can only repeat itself. The basic element on the Vic 20 (and it can only repeat itself) is a byte. A byte takes values from 0 to 255, and (for example)  $255+1=0$  and  $2-5=255$ . A byte works in clock arithmetic to a base of 256, so there are 256 different numbers from 0 to 255.

On the Vic we can inspect the contents of bytes by the PEEK command, and if we

PRINT PEEK(N)

where N is the number of a location (in address) in memory, then we print out the value of the number stored in location N. The command to put a value into a location is POKE, and

POKE N, N

will store the value of N into the location N.

Trying different values for N reveals that it is not possible to POKE values of N less than 0 or more than 255 although this is possible in some other computers. As a byte contains eight bits, we can investigate the characteristics of a byte by "examining" (that is, "copying") the behaviour of an eight bit byte.

Eight bits from a binary number, where the bits are numbered from right to left. The rightmost bit is normally known as bit 0, and the leftmost bit is usually known as bit 7. Each bit has a different weighting in the formation of the value from that binary number:

Bit	Weight
0	1
1	2

2	4
3	8
4	16
5	32
6	64
7	128

For example, 11000100 as a binary number is equivalent to  $128+64+0+0+0+4+2+0$  as a decimal (or decimal) number, or 198. As can easily be found, when all the bits are equal to one the decimal value is 255.

Enter the program published with this article. Run the program, and, to the prompt for the input number, enter 198. The program's response is to print the value 198 and 1000110, and — as the binary equivalent of the decimal 198 is 1000110 — we obviously have a program to convert decimal numbers into binary equivalents.

The operation of the program is fairly simple, the decimal number is input and stored in variable V. The number V is then copied into variable N, variable A is set to zero, and variable B is set to one. Variable A is going to contain the representation of the binary number (bit by bit) and variable T will give the position of the digit.

## Looping

We go through the loop eight times, and the first task is to find out whether the number is odd, or even. If the number is odd then there is a bit equal to one in the rightmost position, and if the number is even the rightmost bit is zero. Function FNODD(Y) gives the result 1 if the number is odd, and the result 0 if the number is even. FNODD(Y), therefore gives the value of the right most bit.

Suppose we are going through the loop for the first time. The variable B is now equal to the value of the rightmost bit, the variable A has the value zero, and T has the value one. The assignment to A, by  $A = A + B * T$ , gives A the value of B.

T is now made 10 times larger, and the value of the variable N is halved by FNODD(Y), with no remainder (as a result of the INT operation in FNODD(Y)). Half of the

binary number 11001 is 1100, and half of 100010 is 10001, so by halving the number (and ignoring the remainder) we have produced a new binary number stored along one position.

At the next activation of the loop, we find if the new binary number is even or odd (it is the new rightmost bit zero or one?). We note that its value is A, by adding B \* T to A. T is now 10 times greater than before, and thus the bit value appears as (at the next digit along in the decimal number A).

The binary appearing value which appears at the end of the program is, in fact, an ordinary decimal number which we perceived as a binary number. When we have exhausted eight bits we end, even though the number may be greater than 255.

## Four down

Here are a succession of values to try

1
124
155
156
1000

to which the results for the first three are not that interesting. The fourth value (it 156) is interesting, as an eight bit binary number it is 10001000, or 0. The number 1000, as an eight bit binary number, is 11000000.

In this special byte arithmetic, of eight bits,

$255+1=256=0$  (as a binary number) and, as we all know, in ordinary arithmetic to produce zero you have to write

$$-1+1=0$$

Does this mean that  $-1$  is the same as 255, for eight bit binary numbers? Try  $-1$ , and you see that it is 11111111, and as you remember 255 is an eight bit binary number) is 11111111. Try  $-1$ , and the result is 11111111. Amazing?

The leftmost bit for  $-1$  and  $-2$  is equal to one, and this is commonly known as the "sign" bit in the special form of arithmetic. This special form of arithmetic is called "two's complement" arithmetic, and

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```

0 REM PROGRAM 1
10 FNH(Y) = INT(Y/2)
20 FND(Y) = Y - 2*FNH(Y)
100 INPUT V
110 N = V
120 A = 0
130 T = 1
200 FOR I=1 TO 8
210 B = FND(N)
220 A = A + B*T
230 T = T*10
240 N = FNH(N)
250 NEXT I
300 PRINT
310 PRINT V, A
320 GOTO 100
READY.

```

Run this program and, in the reports for the input number, enter 288

is used for integers on the Vic.

The reason why two's complement arithmetic is so important becomes clear when you realize that computers can only store "positive" values. When we perform calculations we need both positive and negative numbers, and so we have to find some way of treating certain positive numbers as if they were really negative numbers.

The 6502 processor, which the Vic uses, has a special "sign" flag, which is set by reference to bit 7 in the accumulator, and though not all computers use two's complement arithmetic, most do.

#### Values

First, however, work out what a positive number becomes a negative number. 127 is an eight bit binary number is 01111111, though note that on the Vic the first zero is missing. The binary number 128 is 00000000 and thus has a sign bit set to one, so 128 must not be 128, but be some negative number (just as 255 is -1). If you enter 128, then you find that it is 00000000.

Now integers on the Vic take values between -32768 and 32767. Integers are stored in two bytes, and as a storage bit binary number 32768 is 1000000000000000, and the binary number 32767 is 0111111111111111. Integers on the Vic are stored according to the two complement convention.

#### Logic

Two's complement also explains about the INT function, so:

```

PRINT INT(3.4), INT (-3.4)
and the results are 3 and -4. The INT
function always rounds down in value, and
not towards zero. Now try:
PRINT INT (1/2), INT (0.2)
in which the results are -1 and 0. The
explanation of the latter pair lies with all
other INTs.

```

As an eight bit binary number, the binary number 1 is equal to 00000001 and, to divide by two, we "lose" off the last bit so the rightmost bit. To keep it as an eight bit number, we add in an extra zero on the left: we produce 00000010 (as in the print statement above).

The binary number -1 is the two's complement number of eight bits 11111111. To divide by two we lose the rightmost bit, and this leaves us with a seven bit number. To make the number up to eight bits, we have to add another bit at the left. As the number is negative, we have to keep the sign bit correct, and so we insert a one at the left. This gives 11111110, which is (as we know) equal to -2.

Now try to

```

PRINT 3-3, 3-4, NOT(2)
and you will find -0, 0 and -3. Start with
the last first. As a binary number, 2 is
00000010 and -3 is 11111101. If the last two
binary numbers are compared, it can be
seen that they are very similar where there
is a bit value 1 in the first there is a bit value
of 0 in the other, and vice versa.

```

#### Flipping

The NOT function acts at the level of bit, and flips each bit from a one, and vice versa. This is why NOT(2) is -3, and NOT(12767) is -32768.

If something is "true", such as 1-1, then the Vic prints out -1. The binary equivalent of -1, however, is 11111111 — that is, all bits are "true". When all bits are "false", then the number is 00000000, or — in binary — 0.

There is another way of storing positive and negative numbers, known as "one's complement" arithmetic. In this form of arithmetic a negative number is again indicated by the sign byte being one, but the rest of the number differs from the two's complement version.

If the positive version of the number X has the binary value 00001111, then the binary equivalent of -X is 11110000. The one's complement form is produced by taking the positive number, and flipping the value of every bit. This is exactly the operation performed when we find NOT(X).

To form a two's complement number we read in many places that the bits in the number have to be flipped, and one added to the result. In other words, to form a two's complement number, we first produce a one's complement form and then add one to the two's complement form.

Try this:

```

PRINT NOT(3) + 1, 1 + NOT 3
to which the answers are -5 and -3. The
function NOT does not expect the
following value to be in parentheses, and it
finds the one's complement of (3) + 1
which is, of course, -5. The second item
in the print list is thus how to find the two's
complement version 3. The value of 3 which is
-4, to produce the two's complement result
in -5.

```

The Vic many checks on what it is possible to perform with two's complement integers. To enter

```

%# - 12767 + 1
is no produce an "ILLICIT QUANTITY
ERROR". In our eight byte arithmetic,
127+1=128, and if we were those values
into two's complements versions,
127+1=-128. There need to be a suitable
series of checks on admissible values, so
that errors such as 32767+1=-32768 do
not occur. ■

```

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# Scan those keys

Specifying which keys should be valid during input from the keyboard is not too difficult — Adnan Warma explains how overleaf



```

1000 GOTO
1010 GOTO
1020 GOTO
1030 GOTO
1040 GOTO
1050 GOTO
1060 GOTO
1070 GOTO
1080 GOTO
1090 GOTO
1100 GOTO
1110 GOTO
1120 GOTO
1130 GOTO
1140 GOTO
1150 GOTO
1160 GOTO
1170 GOTO
1180 GOTO
1190 GOTO
1200 GOTO
1210 GOTO
1220 GOTO
1230 GOTO
1240 GOTO
1250 GOTO
1260 GOTO
1270 GOTO
1280 GOTO
1290 GOTO
1300 GOTO
1310 GOTO
1320 GOTO
1330 GOTO
1340 GOTO
1350 GOTO
1360 GOTO
1370 GOTO
1380 GOTO
1390 GOTO
1400 GOTO
1410 GOTO
! KEY SCAN PROGRAM
!
! ONLY PERMITS THE RETURN OF THOSE
! KEYS STORED IN KEYS.
!
! ALL OTHER KEYS ARE IGNORED.
!
! ASSUMES A CALL BY THE 'USER-11'
! FUNCTION, WHERE 'I' IS A SUFFY
! ARGUMENT. THE VALUE RETURNED IS
! THE ASCII CODE OF THE KEY FOUND.
!
! IF KEYS DOES NOT EXIST, OR HAS NO
! CHARACTERS, THEN THE NULL
! I.E. CHR(0) IS RETURNED.
!
!
! LINES LOCATIONS 8FD & 8FC FOR INDEXING
!
! LOCATION 8FD WILL BE USED TO STORE
! THE NUMBER OF CHARACTERS ON KEYS
! IF IT IS FOUND.
!
*END*
!
! TRY AND FIND KEYS
!
! GET START OF VARIABLE STORAGE.
!
WRITEB  = 8400
WRITEB  = 840F
WRITEB  = 840F
WRITEB  = 8FF4
!
!
! LDA WRITEB
! STA WRITEB
! LDA WRITEB+1
! STA WRITEB+1
!
! ARE THERE ANY (MORE) VARIABLES TO TEST ?
! CHECK ON BYTES, END OF WORD COUNT

```

```

1000 PRINT "LOADING KEYS CAN PROGRAM"
1010 :
1020 REM S=START ADDRESS OF PROGRAM.
1030 REM TO RELOCATE, SIMPLY CHANGE
1040 REM THE VALUE OF S.
1050 S=49152
1060 FOR H=0 TO S+100 STEP 16
1070 T=0
1080 FOR L=0 TO 15
1090 READ DWT
1100 T=T+DWT
1110 POKE H+L,DWT
1120 NEXT L
1130 READ TL
1140 IF TL<1 THEN PRINT "NUM ERROR IN(1):INT(16-H/16)+1236"
1150 NEXT H
1160 :
1170 REM SET UP THE 'USER' VECTOR.
1180 POKE 700,0-INT(15/256)+256
1190 POKE 700,INT(15/256)
1200 PRINT "JOB DONE"
1210 :
1220 :
1230 DATA 163,45,133,251,165,44,133,252,165,252,197,48,269,0,165,251,2460
1240 DATA 197,47,249,51,166,0,177,251,41,128,248,15,24,165,251,183,2672
1250 DATA 7,133,251,165,252,166,0,133,252,144,221,269,177,251,179,41,2590
1260 DATA 128,248,233,138,261,197,268,228,134,177,251,269,79,269,221,269,2642
1270 DATA 269,177,251,261,0,269,0,169,0,168,248,31,133,253,268,177,2412
1280 DATA 251,72,269,177,251,133,252,164,133,251,32,268,269,248,251,164,2694
1290 DATA 253,134,48,248,269,253,268,249,169,0,168,0,0,0,167,2212

```

First of all, anyone has to be loaded into memory — using the Basic loader program

```

1470 0000      : BE LESS THAN START OF WORD, SO
1480 0000      : ONLY REQUIRED TO CHECK LO-BYTES
1490 0000      : IF HI-BYTES ARE ERRUL.
1500 0000      :
1510 0000      : CHECK          LDA FREEZF+1
1520 0000      :                   CMP #00000001
1530 0000      :                   BNE 00000000
1540 0000      :
1550 0000      : CHECK LO-BYTES
1560 0000      :
1570 0000 00F0      : LDA FREEZF
1580 0010 0500      : CMP #07700
1590 0010 0000      : BNE 00000000
1600 0014      :
1610 0014      : OK, THERE ARE VARIABLES TO TEST.
1620 0014      :
1630 0014 0000 0000 : BINARY  LDA #0000
1640 0014      :
1650 0014      : PREPARE TO TEST THIS VARIABLE FOR
1660 0014      : IDENTITY -- IS IT AN INTEGER ?
1670 0014      :
1680 0014 00F0      : LDA #00000000
1690 0018 0000      : AND #0100000000
1700 001A 0000      : BNE NOTINT
1710 001E      :
1720 001E      : IT MUST BE AN INTEGER -- SKIP TO
1730 001E      : NEXT VARIABLE BY 2 LOCATIONS.
1740 001E      :
1750 001E 10        : SKIPPER  CLC
1760 001E 00F0      : LDA FREEZF
1770 001E 0000      : ADC #0000
1780 0020 00F0      : STA FREEZF
1790 0020 00F0      : LDA FREEZF+1
1800 0022 0000      : ADC #0000
1810 0024 00F0      : STA FREEZF+1
1820 0026      :
1830 0026      : HAVING STOPPED OVER THIS VARIABLE,
1840 0026      : DO AND TEST FOR MORE VARIABLES TO
1850 0026      : BE CHECKED.
1860 0026      :
1870 0026 0000      : BCC CHECK
1880 0026      :
1890 0026      : VARIABLE FOLLOWS AND NOT AND INTEGER
1900 0026      : SO WAS IT A REAL ?
1910 0026      :
1920 0026 00      : NOTINT  INY
1930 0026 00F0      : LDA #FREEZF+1
1940 0026      :
1950 0026      : PRESERVE IT FOR POSSIBLE LATER CHECK
1960 0026      :
1970 0026 00      : TAA
1980 0026 0000      : AND #0100000000
1990 0026      :
2000 0026      : IF THE RESULT IS ZERO, THEN A REAL
2010 0026      : HAS BEEN FOUND, SO SKIP OVER IT.
2020 0026      :
2030 0026 0000      : BNE SKIPPER
2040 0026      :
2050 0026 0000      : A STRING HAS BEEN FOUND, SO TEST
2060 0026      : FOR THE LETTERS "E" & "E".
2070 0026      : "E" IS TESTED FIRST, BECAUSE ALWAYS
2080 0026      : AT THE CORRECT POSITION, IN STRING.
2090 0026      : BIT 7 OF THE SECOND LETTER IS SET.
2100 0026      : SO A COMPARISON IS MADE w/ THE
2110 0026      : REVERSE "E" CHARACTER.
2120 0026      :
2130 0026      : SECOND CHARACTER TO TEST IF
2140 0026      :
2150 0026 00      : TAA
2160 0026 00F0      : CMP #0000
2170 0026      :
2180 0026      : IF NOT KEYS, SKIP OVER IT
2190 0026      :
2200 0026 0000      : BNE SKIPPER
2210 0026      :
2220 0026      : SECOND LETTER OF STRING WAS PM "E",
2230 0026      : WHICH IS A GOOD CHECK, BUT NOW TEST

```

I HAVE BEEN programming micro-computers for several years now, and during that time have found many annoying flaws in their operation, especially when using Basic. One of the more obvious of these is the inability of Basic to permit any specification of which keys are valid during input from the keyboard.

In other words, there is no easy way of telling the computer that certain key presses should be ignored. Using Commodore Basic, it is possible to use the GAIT statement, but this takes a disproportionate amount of time as the number of valid keys increases, and further suffers from susceptibility to the Stop key. I decided, therefore, to write a simple-to-operate utility program for the C64/64 in machine code, that could be called from Basic with ease. In the remainder of this description, the program is referred to by the name Keyscan.

Keyscan communicates with Basic via three "channels":

- (1) Information is given to the routine in a string KEYS (can be abbreviated to KEY).
- (2) The routine is initiated by the USR function, with a dummy argument (in a similar fashion to FRE and PLO).
- (3) The return to Basic is made with an integer value representing the ASCII code of the (valid) key found -- with a special error case.

### Simplicity

Keyscan is simple to use. First of all, it must be loaded into the computer's memory. This can be achieved using the supplied Basic loader program. Keyscan is completely relocatable, so wherever the loader program places Keyscan into the unused RAM at \$0800, the user can store Keyscan in (for example) the cassette buffer by changing the value of variable % in line 1000 of the loader to read \$-028. Use common-sense when moving Keyscan. If you put it in the cassette buffer, then load a program from tape, Keyscan will be overwritten; almost certainly causing a crash when next invoked.

Once loaded, the USR vector must be modified to point to Keyscan. This is quite simple, and is demonstrated in lines 1000 to 1090 of the loader. Thereafter, Keyscan can be called using the USR function.

As listed above, Keyscan needs to know which keys to search for. This is done by creating KEYS. Put simply, KEYS is a string which contains all the valid characters to be searched for. Any keys not in KEYS will be ignored during the scan. The default is to ignore the Stop key (which in fact can be included by using CTRL and C while entering the string, in an identical fashion to changing row colours).

There is plenty of protection to make Keyscan relatively friendly. If you forget to define KEYS (Keyscan cannot find KEYS), or if KEYS has no characters in it (eg. KEY = " "), then Keyscan will return to Basic immediately with code 0 (ASCII NULL). In the more possible case, you may forget which keys are legal, but you can break out of Keyscan using the Warm Start (RUN/STOP/RESTORE).

Having defined KEYS, the user can call Keyscan by the USR function. Any argument supplied to USR (0) will be ignored by Keyscan. Keyscan will then wait until a valid key is pressed on the keyboard; whereupon it will return to Basic with the ASCII code of that key. This is all demonstrated in the example program, which simply tests for the keys A, B, C, D and X, ignoring all other keys. The example program will finish when X is pressed.

```
10 KEY%="SC000"
20 IN%="C0001000000000"
30 IF IN%="A" THEN GOTO 40
40 :
50 PRINT
60 PRINT "YOUR PROGRAMS: "1000
70 GOTO 20
80 :
90 PRINT "END"
```

Basic example program

A fully annotated assembly listing is provided, and is commented here. Lines 1000-1100 define the variables used by Keyscan. Whenever reference is made to System variables or Kernel Routines, the official name (as supplied in the IBM 56 Programmer's Reference Guide) is used to increase the clarity.

In lines 1400-1540 Keyscan must search for KEYS. A scan is made through the Basic variables, and when a variable is found, it is tested to see if it is KEYS. If no more variables are found, Keyscan returns to Basic.

When a variable is found, certain checks are made. The first is "is it an integer?" (lines 1500-1620). If a numeric variable is found, it must be stopped over, by line 1700-1820. Lines 1800-1900 test if this variable is real, and if so will skip over it.

In order to be in line 2000-2270 a string must have been found. Checks are now made to see if it is KEYS. Lines 2400-2450 must be KEYS, so a last check is made to make sure that there actually some characters to search for, to prevent the routine from "hanging".

Having found a valid KEYS, certain data must now be obtained: where is the string stored, and how many characters are there to search for (lines 2500-2580). The computer now waits (lines 2600-2620) for the user to type a key. When entered, the key is compared with those in KEYS until a match is found. When the match is found, the ASCII value is calculated (lines 2690-2690). To return a value to Basic, the Integer to Floating Point routine is used.

Hopefully the above notes used in conjunction with the Assembly listing should make modification fairly easy to achieve. As an example, the user may wish to alter the string variable used by Keyscan from KEYS to one of his own choice. This could be arranged quite simply by changing the ASCII codes stored at SC000 and SC001.

Note that because of the way Keyscan is written, and also because of the way Basic recognises variables, the first letter of a string variable name is stored as its ASCII value (hence the data at location SC000); and the second character is stored as the ASCII value with bit 7 set. This is why the data for a "reversed" letter E is stored at location SC001.

```
2220 C038 : FOR THE FIRST LETTER AS A 'C'
2230 C038 :
2240 C038 00 INY
2250 C039 01FB LOW (FREQZP),Y
2260 C03C C9AD CWP #C
2270 C03D C9AD CWP #C
2280 C03F :
2290 C03F :
2300 C03F : THE CORRECT STRING HAS BEEN FOUND,
2310 C03F : NOW TEST TO SEE IF THERE IS ANYTHING
2320 C03F : IN IT TO SCAN FOR.
2330 C03F :
2340 C040 C0 INY
2350 C040 C0 INY
2360 C041 01FB LOW (FREQZP),Y
2370 C043 C780 CWP #000
2375 C045 C9AD CWP #C
2380 C047 :
2390 C047 : KEYS DOES NOT HAVE ANY CHARACTERS
2400 C047 : OR NO MORE VARIABLES WERE FOUND
2410 C047 : SO PROCEED NULL FOR EXIT.
2420 C047 :
2430 C047 0000 MOVE#S LOW #000
2440 C049 00 TAY
2450 C04A F01F BRD EXIT
2460 C04C :
2470 C04C :
2480 C04C : KEYS EXISTS AND DOES CONTAIN SOME
2490 C04C : CHARACTERS, SO SET UP SCAN INFORMATION
2500 C04C :
2510 C04C 00F0 SCAN STA FREQZP+2
2520 C04E C0 INY
2530 C04F 01FB LOW (FREQZP),Y
2540 C051 00 PWA
2550 C052 C0 INY
2560 C053 01FB LOW (FREQZP),Y
2570 C055 00FC STA FREQZP+1
2580 C057 00 PLA
2590 C058 00F0 STA FREQZP
2600 C05A :
2610 C05A : NOW IT IS SIMPLY A CASE OF SCANNING
2620 C05A : THE STRING TO GET A KEY PRESS
2630 C05A : LEAVE THE KERNEL ROUTINE SET IN
2640 C05A :
2650 C05A 20E0FF GETKEY JSB GETIN
2660 C05D 00F0 BRD GETKEY
2670 C05F :
2680 C05F : A KEY HAS BEEN PRESSED, SO CHECK FOR
2690 C05F : ITS LEGALITY.
2700 C05F :
2710 C05F 00F0 LEY FREQZP+2
2720 C061 :
2730 C061 00 SCALOP#P DEY
2740 C062 00F0 BRD GETKEY
2750 C064 :
2760 C064 : IF THE KEY WAS NOT LEGAL, IT WILL
2770 C064 : BE IGNORED.
2780 C064 :
2790 C064 : CHECK IT IN THE STRING.
2800 C064 :
2810 C064 01FB CWP (FREQZP),Y
2820 C065 00F0 BRD SCALOP#P
2830 C068 :
2840 C068 : A VALID KEY WAS PRESSED, FOR WHICH
2850 C068 : THE ASCII CODE IS NOW IN THE ACCUMULATOR.
2860 C068 :
2870 C068 : NOW MAKE A Tidy EXIT.
2880 C068 :
2890 C068 00 TAY
2900 C069 0000 LDY #000
2910 C06B :
2920 C06B : RETURN VIA THE INTEGER-TO-F.P. ROUTINE
2930 C06B : WHICH CAN BE USED TO RETURN VALUES
2940 C06B : TO THE 'USR' FUNCTION.
2950 C06B :
2960 C06B 0000 SC0000 BRD EXIT JWP (00000)
2970 C070B0 C000 BRD EXIT 0000 FREQZP
2980 C070B0 C000 BRD EXIT 0000 MOVE#S
2990 C070B0 C000 BRD EXIT 0000 SCALOP#P
3000 C070B0 C000 BRD EXIT 0000 SCALOP#P
```

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800000 - 0000 00000 000000  
800000 - 0000 00000 000000  
800000 - 0000 00000 000000  
800000 - 0000 00000 000000  
800000 - 0000 00000 000000

700000 - 0000 00000 000000  
800000 - 0000 00000 000000

800000 - 0000 00000 000000

DATE		AMOUNT	
TO	BY	TO	BY
01	01	01	01
02	02	02	02
03	03	03	03
04	04	04	04
05	05	05	05
06	06	06	06
07	07	07	07
08	08	08	08
09	09	09	09
10	10	10	10
11	11	11	11
12	12	12	12

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- Cash summary - independent condition
- VRT (value added tax) program
- Print out - sales notes feature

800000 - 0000 00000 000000

800000 - 0000 00000 000000

800000 - 0000 00000 000000

800000 - 0000 00000 000000

800000 - 0000 00000 000000

800000 - 0000 00000 000000

800000 - 0000 00000 000000

800000 - 0000 00000 000000





```

6003 IF F%15 THEN PRINT "*****" GOTO 7001
6004 N=1:RETURN
6010 END
6020 N=1:RETURN
6030 END
7000 PRINT "J"
7001 F%=0:FOR T=0 TO 100:POKE T,200:POKEY T,200:POKEY V,0:NEXT
7002 PRINT "***** SCORE =":SC
7004 RETURN
7099 END
8000 END
9001 PRINT "J"
9002 POKE 26679,27
9003 PRINT "*****"
9004 PRINT "*****"
9005 PRINT "*****"
9006 PRINT "*****"
9007 PRINT "*****" G%:PRINT "*****" U%:PRINT "*****"
9008 PRINT "*****" G%:PRINT "*****" B%:PRINT "*****"
9009 PRINT "*****" MARK:MARK%:PRINT "*****" G%:PRINT "*****"
*****
9009 PRINT "*****" GOTO 9009:PRINT "*****"
1:ACE
9010 GOTO 9009
9011 PRINT "78 POINTS"
9012 POKE 26679,200
9013 PRINT "***** = 100 PTS (BLK)"
9014 PRINT "ACE"
9015 PRINT "***** = 50 PTS (VEL)"
9016 PRINT "ACE"
9017 PRINT "***** = 10 PTS (RED)"
9018 PRINT "ACE"
9019 PRINT "***** = 5 PTS (PUR)"
9020 PRINT "ACE"
9021 PRINT "***** = 2 PTS (GRN)"
9022 PRINT "ACE"
9024 PRINT "***** = POINTS (CYN)"
9025 PRINT "ACE":PRINT "88 = BONUS POINTS"
9026 FOR T=1 TO 999:NEXT
9027 T%=0:GOTO 9009:RETURN
9030 FOR T=7168 TO 7169+99:REDEF:POKEY T:F:NEXT
9001 DATA 3,7,15,31,56,128,248
9002 DATA 255,127,63,63,15,3,1,0
9003 DATA 0,193,255,255,227,227,255
9004 DATA 0,255,255,255,255,255,227
9005 DATA 193,224,248,248,253,30,31
9006 DATA 127,128,252,252,248,193,128,0
9007 DATA 219,219,219,255,255,255,255
9008 DATA 24,248,248,248,252,254,255
9009 DATA 24,24,24,24,24,24,24
9010 DATA 7,15,31,31,63,127,255
9011 DATA 0,0,0,0,0,0,0,0
9012 RETURN
9030 IF T=2 THEN GOTO 9009
9031 GET#1:IF#="" THEN GOTO 9030
10000 END
10012 POKE 26679,29:POKE 26683,255:PRINT "J"
10013 PRINT "***** CONTROL*****"
10019 PRINT "*****"
10020 PRINT "*****"
10021 PRINT "LEFT-----RIGHT"
10022 PRINT "*****"
10023 FOR T=1 TO 999:NEXT
10024 POKE 26679,255:GOTO 9001
10025 END
20000 PRINT "***** YOU HAVE SCORED":SC
20001 FOR T=1 TO 9999:NEXT
20002 END

```

# Connect 4

From *Las Alitas on the Isle of Wight*,

CONNECT 4 for the Commodore 64 utilizes high resolution graphics and prints out graphics on an on-screen version of the popular board game of the same name. In order to make use of the full screen, each disc is made up of 4 x 3 characters and the graphics for the row numbers are arranged to be in the center of each disc.

During play, the selected row for each disc is made by pressing keys 1 to 7. Pressing F1 starts a game, whereas F7 resets the instructions page prior to the start of each new game.

A simple machine code routine is used during the title page sequence in order to reduce the time taken to screen print this.

## Variables

A used to read data

T general purpose

X disc position in x

Y disc position in y

CS screen position of disc

RP used to recall Connect 4

SD S/D of data in error trap routine

VC video chip start address

AN "ans + crs disc \* 25"

BS "crs disc + crs left \* 3"

SD shape of disc

F1 space  
F7 colour of disc

## Functional Listing

14 clear screen  
18 screen and border black  
18 generate AN (used to simulate PRINT A T)  
20 screen message during data transfer  
22 clear sound chip  
24 volume to maximum  
26 set up waveform and tone for voice 1  
32 reserve memory  
34 turn off keyboard interrupt timer  
36 switch in character  
38 read complete character set from ROM to RAM  
40 switch in F/D  
42 10-1000 keyboard interrupt timer  
44 clear variables  
50 define disc and graphics  
58 define Connect 4 for 100  
66 set up machine code routine  
72 error trap routine to check for correct data  
74 set character pointer to 147H  
80 clear screen: title page machine code routine  
82- 92 test for title page  
94 expand sprites in x and y  
96-100 define shape, location and colour of sprite  
112 switch in sprites

114 check for game restart  
116 variable T to 0  
118 peek keyboard  
120 check for number of cycles on key pressed  
122 checks for F1 or F7  
124 stop 'till no key pressed  
130 clear screen: colour black  
132 clear keyboard buffer  
134-140 define shape and colour of disc  
142 set initial variables  
144-146 print row number at bottom of screen  
152 check for key pressed: switch off tone 1  
154 switch off Connect 4  
156 if F7 clear screen: print title to start game  
158 if F7 scroll instructions  
160 if outside range return to 152  
162 turn on tone 1  
164 set position of disc on screen  
166 if no free space then return to 152  
172 erase disc if printed  
174 print to disc  
176 calculate new position  
178 delay loop  
180 if new position spans three change tone and return to 172  
182-184 change colour of disc  
186 clear keyboard buffer: read Y; return to 152  
188-218 character set data for graphics  
264-300 sprite data for title page  
388-416 machine code data

```

10 :
12 REM ***** CLEAR SCREEN / SET INITIAL VARIABLES *****
14 PRINTCHR$(147)
16 VC=53248:POKEVC+22,0:POKEVC+33,0
18 AN="#####"
20 PRINTLEP1:CHR$(13):SPC(8):CHR$(5):"SETTING UP CHARACTER SET"
22 FOR T=0TO24:POKE54274+T,0:NEXT
24 POKE54296,15
26 POKE54276,32:POKE54277,24:POKE54278,40:POKE54279,0:POKE54272,147
28 :
30 REM ***** PROTECT MEMORY / TRANSFER DATA FROM ROM TO RAM *****
32 POKE52,48:POKE56,48
34 POKE56334,PEEK(56334):AND204
36 POKE1,PEEK(1):AND251
38 FOR T=0TO248:POKE14206+T,PEEK(53248+T):NEXT
40 POKE1,PEEK(1):OR4
42 POKE56334,PEEK(56334):OR3
44 :
46 REM ***** SET UP CHARACTERS *****
48 T=0:SUM=0
50 READ R:IF R=0 THEN POKE15368+T,A:T=T+1:SUM=SUM+R:GOTO50
52 :
54 REM ***** SET UP SPRITES *****
56 T=0
58 READ R:IF R=0 THEN POKE12688+T,A:T=T+1:SUM=SUM+R:GOTO50
60 :
62 REM ***** SET UP MACHINE CODE ROUTINE *****
64 T=0
66 READ R:IF R=0 THEN POKE49152+T,A:T=T+1:SUM=SUM+R:GOTO66
68 :
70 REM ***** ERROR TRAP ROUTINE *****
72 IF SURLC(70626)HIGH=PEEK(HIGHCHR$(147):CHR$(5):TAB(3))"ERROR IN DATA STATEMENTS" |||*10
TOP
74 POKEVC+24,:(PEEKVC+24):AND248:OR14
76 :
78 REM ***** SET UP TITLE *****
80 PRINTCHR$(147):SY$49132

```









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This is, the ultimate Fruit Machine for the VIC with nudges, hold and repeat 100% machine costs. "Overall Jackpot is a beautifully written simulation giving superb graphics, animation and use of colour. In fact, the program makes Commodore's Fruit Machine cartridge look unacceptably cheap and rusty." Home Computing Weekly No. 20 19-7-82..... £3.50

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```

1 REM "BLOCKBUSTER", A LITTLE THING FOR
PLAYING WITH MULTI-COLOUR GRAPHICS.
2 REM
3 REM BY MICRO-ANTICS
4 REM
5 REM DON'T TYPE IN REM STATEMENTS
6 REM COL<> IS THE 4 COLOURS, H# IS FOR
HEX VALUES
10 DIMCOL(3):H#="0123456789ABCDEF"
20 INPUT"CONT OR DATA (C/D)":A#:IF A#="D
"GOTO250
30 PRINT"3":INPUT"SCREEN COL":COL(0)
40 INPUT"CHARC COL":COL(2):IFCOL(2)>7
THENPRINT"STD COLOUR CODE ONLY":GOTO40
50 INPUT"BORDER COL":COL(1)
60 INPUT"AUXILY COL":COL(3)
61 REM SET SCREEN AND BORDER
70 POKE36879,COL(0)*214+COL(1)+8:POKE
36878,COL(3)*214
71 REM INC NO OF ROWS, DEC COLS, PROTECT
MEM, MOVE CHAR SET, LEN OF KBD BUFF=1.
80 PRINT"3":POKE36867,48:POKE36866,149:
POKE36869,255:POKE32,26:POKE56,28:POKE
649,1
81 REM CREATE BLOCK CHAR AND BLANK.
90 FORI=0TO7:POKE7176+I,255:POKE7424+I,0
:NEXT
97 REM LOOP TO PUT CHAR DATA ON SCREEN.
98 REM X IS CURSOR LINE, Y IS ROW, T1 IS
CURSOR POS, CHAR1 IS BLOCK.
99 REM SUB3000 CALCULATES CHAR BYTE (T)
AND BIT (T2)
100 X=0:Y=0:FORI=0TO192:T1=7680+X*21+Y:
POKET1,1:POKET1+1,1:GOSUB3000
109 REM CO IS COLOUR TYPE OF BIT PAIR.
110 CO=(PEEK(T)AND3*2+T2)/2+T2:POKET1+30
720,COL(CO):POKET1+30721,COL(CO):GOSUB10
80:NEXTI
119 REM LOOP TO DISPLAY HI RES CHARS.
120 FORY=0TO1:FORX=0TO2:T=7722+18+Y*X*21
:POKET,2+3*Y+X:POKET+36720,COL(2)+8:NEXT
X,Y
129 REM START INPUT.
130 X=0:Y=0
139 REM T=CSR POSN, T2=COL POS OF T, TC=
COL AT CSR.
140 T=7680+X*21+Y:T2=T+30720:TC=PEEK(T2)
149 REM TIME TO CHANGE CSR COLOUR?
150 IFSEC=INT(T1/20)GOTO170
159 REM RESET CSR TIMER & CHANGE CSR COL
160 SEC=INT(T1/20):POKET2,NOTPEEK(T2)AND
7
169 REM D=VAL OF KEY PRESSED + SHIFT KEY
FACTOR. 64 IS NO KEY.
170 D=PEEK(197)+PEEK(653)*166:IFD=64GOTO
150
179 REM KEY PRESSED, RESTORE COL UNDER C
SR.
180 POKET,1:POKET2,TC
189 REM CALC GOTO NUMBER FOR KEY SELECTD
190 CO=-6*(D=123)+7*(D=23)+6*(D=131)+5*
(D=31)+4*(D=17)+3*(D=34)+2*(D=25)+(D=41)

```

```

3
200 GNC000TO250,250,250,250,240,260,230,
270
210 IFD<>49GOTO150
212 REM "E" KEY, NORMALISE SCRIN AND RETH
TO START.
220 POKE36869,240:POKE36866,150:POKE3686
7,46:POKE36879,27:POKE631,0:GOTO20
222 REM CSR RIGHT
230 GOSUB1000:GOTO140
232 REM CSR DOWN
240 X=X+1:X=X*(1+(X>23)):GOTO140
242 REM PUT NEW COL IN AND GOSUB2000 TO
PUT IT IN HI RES CHAR.
250 POKET2,COL<CO-1>:POKET2+1,COL<CO-1>:
GOSUB2000:GOTO140
252 REM CSR UP
260 X=X-1:X=X-24*(X<0):GOTO140
262 REM CSR LEFT
270 Y=Y-2:Y=Y-16*(Y<0):IFY=140GOTO260
272 REM GO BACK FOR MORE.
280 GOTO140
282 REM ROUTINE TO PRINT OUT DATA
290 PRINT"CHARACTER DATA"ID=0
300 PRINT"XXXXXXXXXXXXXXXXXXXXXXXXXXXX"
310 FORCO=0TO7:T=PEEK<7184+D*8+CO>:PRINT
T,"*"

```

## Astro Wars

From David Jones for the unexpanded Vic.  
THE PROGRAM notes for Astro Wars

are: line 118 sets up the variables. Line 120  
clears the screen and turns on the sound.  
Lines 130 to 170 set up the user defined  
graphics, lines 180 to 200 put you and the  
alien on the screen. Lines 210 to 340 move  
the alien and do various checks. Lines 350  
to 430 move you and do more checks. Lines

440-470 are the hit routines and check to see  
if you have any more left.

This program is for the unexpanded Vic  
20 and was a joyride but can easily be  
changed to the use of keys (lines 350-400).  
Also the hit alien has to be destroyed  
several times.



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