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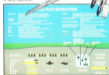


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# Our COMMENT

NO, IT'S NOT THE YOUR COMMENTORIE bumper summer annual, even though our cover might mislead you into thinking so. But, with these hot and heady summer days approaching, we hope to show what fun computers can be.

This is a period which has seen the reappearance of the Commodore name in the business market. The 16-bit PC (the PC16 or PC26, depending on whether you opt for a floppy or hard disc version) has been knocking around for a while now and Commodore's darling of the Las Vegas CES show in January, the C16, is due for release pretty shortly. With a machine which is compatible with the 64 and also capable of running under CP/M, Commodore must feel they've got a certain hit on their hands. We'll have to wait and see. In the meantime, read our week preview and judge for yourself.

But, for all you pleasure-seeking readers who can't taste your minds to such serious things at this time of year, we're offering welcome releases from the daily grind. With our jolly June competition, we hope to get you in the mood for the holiday season.

Computer camps are definitely in vogue. Two which include tuition on Commodore computers in their curricula are Camp Business and Address Adventure. Both incorporate a couple of hours computing a day with sport and creative activities such as drama, video-tape making and arts and crafts. These camps are geared to the under 10 year olds but Address do offer weekend or week breaks at Crest Hotels in the Thomas Valley, where special courses are offered in computing. Children can stay here with their parents free of charge.

But, these courses can set you back anything from £128 to £188 for a week, depending on where you go. Thank goodness then, that such warm-hearted and generous souls reside at Advance Adventure Ltd. They have offered Your Commodore a free week-long residential holiday at one of their computer camps. And because there was so much gnashing of teeth, shudding of tears and general anarchy in the hallowed Your Commodore offices over who was going to take it, and, basically, because we're all well over the age of 18 anyway (even though people tell us we look years



—younger...), we're giving away our holiday to the lucky Your Commodore reader who wins first prize in our 'holiday of a lifetime' competition! Now, there's a chance you shouldn't miss!

At long last, we've embarrassed to cheer up those readers who, having acquired a spanking new C16 at Christmas, were beginning to think they had a white elephant on their hands. These readers include M. Clavala from Malta who complains, "I have noticed that most games listings are for the Commodore 64 or VIC 20. Why not some for the Plus/4?" (which is, of course, compatible with the C16), and Ms. A. Buzin who asks the C16, "Is it extinct before it is born?". Well, not only are we offering C16 games breaks to a bevy of software reviews but, for those of you who wish to put your new machine to more constructive use, we've provided your very own assembler to type in.

When we advertised in Your Commodore for reviewers, we were inundated with requests. So many, in fact, that hundreds of you were left disappointed as software houses aren't prolific enough and our magazine isn't large enough to provide enough fodder

to keep you all happy every month! But, we're offering a new glimpse of hope to those of you who missed out the first time around. From September, we will offer a prize to the reader who submits the best review of the month, whether favourable or disavourable, of their latest software purchase. So, get writing!

The time has also come for you to show off your high scores. Arcade magazine, Phil South, might imagine that nobody is faster than him on the joystick, but I'm sure that many of you can deflate his ego. Send in your high scores (withnessed, please)... and anyone boasting a ridiculously high score will be lured into the labyrinthine labyrinths of Your Commodore to prove their case. Be warned!

And finally, let's end on a note of utter confusion and silliness with confusion-wrigger on the release date of Inverness's game, Confusion, which they now want us to be in final stages and will be up for grabs at the end of May, and the prize for the silliest computer game title of all time going to Zappo-Go-Bole Goolby, the latest from the Howson Consultants factory. Watch this space!



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Spoils for choice - a smashing selection of C78 software.



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### COMPETITION 62

It's holiday time! And, to celebrate this fact, we're offering a fantastic prize to all under 17 year old true Commodore readers in our fun to enter competition. If you can't bear to be parted from your Commodore for as long as a week, enter our competition and you could be the proud winner of an Ardmore Adventure holiday which offers the tempting combination of space, creativity and computers.

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# TOP 20 Gallup Software

Compiled by

## COMMODORE 64

TITLE	PUBLISHER
1 Soft Aid	QuickSilver
2 Impossible Mission	CBS
3 Pole Position	Atari
4 Ghostbusters	Activision
5 Bark Rogers	US Gold
6 Raid Over Moscow	US Gold
7 Rocky	Fishbird
8 Rocket Ball	Centrewest
9 Daley Thompson's Decathlon	Ocean
10 Football Manager	Addictive
11 Frak!	Statesoft
12 Combat Lynx	Darell
13 Bruce Lee	US Gold
14 Slip Shot	Amiga
15 Lords of Midnight	Beyond
16 Air Wolf	Hile
17 1985 The Day After	Mastertronic
18 Chiller	Mastertronic
19 Beach Head	US Gold
20 Fighter Pilot	Digital Integration

Retail sales for the month ended March 26th 1985.



## ◆ VIC 20 ◆ Top Ten

TITLE	PUBLISHER
1 Football Manager	Addictive
2 Mickey the Brick	Fishbird
3 Marble Madness	Ocean
4 Perils of Willy	Software Project
5 Vegas Jackpot	Mastertronic
6 Psycho Shopper	Mastertronic
7 Undermine	Mastertronic
8 Doodlebug	Mastertronic
9 Rockman	Mastertronic
10 Bullet	Mastertronic

Retail sales for the month ended March 26th 1985.

Compiled by Gallup for the industry's weekly trade magazine, Computer and Software Retailing. For details contact John Egan, Computer and Software Retailing, 212 Regent Street, London W1B 5AH (01-434 2191).



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## THE VOICE MASTER SPEECH SYNTHESISER

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IN ANY LANGUAGE AND WITH ANY ACCENT.

### The Voice Master Speech Synthesiser

The Voice Master enables your computer to speak in your own voice, in any language and with any accent.

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You can control the recording rate, play back speed, and volume for special effects. You can even program to speak backwards.

It is easy to use. Examples are included in the manual to make it easy to add speech to programs.

## THE VOICE MASTER - VOICE HARP

Voice Harp is a totally new musical concept from Voice Master powered software. You can actually compose and perform music in real time simply by humming, whistling or singing. It doesn't matter if you can't read music. Your voice or whistle pitch will enter the notes for your sounding keyboard and harp.

As you hum or whistle, the notes rise or fall on the scale automatically. You can add the notes, play them back, slow them back and forth, delete and copy them when finished. The score can be printed out.

In the performance mode you can change system, musical key or 100 chords. Even if you can't sing or whistle, the VOICE MASTER will show you how to sing it in step by step.

### OTHER SPECIAL FEATURES

A new generation of speech synthesiser which is able to read the spectrogram. Voice Master can play back speech in real time.

Another advantage of the Voice Master system is that word recognition and speech synthesis can work together. The Voice Master comes completely with a quality hard disk, two expansion slots and a keyboard. You can upgrade to a hard disk, speech synthesis, word play software and detailed instruction manual. Customisation and user program are included in the software. It is also possible to write your own programs. You can use speech synthesis and recognition in your own programs.

# ANIROG

Trade Enquiries

Unit 45 Minster Industrial Park, Minster Road, Garsdon, Kent, DA1 6A J. Tel. 0332 924618

# Data Statements

## Commodore attack business market

THE LAUNCH OF COMMODORE'S NEW IBM compatible 16-bit PC at the end of March marked Commodore's new offensive on the business market. At a press conference to launch the machine, David Gerrard, the UK marketing manager, presented Commodore's reasons behind launching the new PC while Paul Welch, the UK sales manager, outlined the PC and Commodore's support package.

The PC is available in two models - the PC 16 floppy-disk version and the PC 20 hard-disk version. They are very competitively priced: £1875 for the floppy-disk machine (this is 25% cheaper than the IBM PC) and £2295 for the hard-disk version (cheaper than any other hard-disk PC). The PC 16 has twin 800K floppy-disk drives and five expansion slots and the PC 20 has 640K floppy-disk drive, one 10Mbyte hard-disk and four expansion slots for IBM-type boards. They also feature an optional Intel 8087 floating point processor, 256K RAM memory expandable to 1MB, parallel and serial



interfaces and GW BASIC. David Gerrard believes that, with 128,000 users of Commodore business computers in Great Britain, that there are more Commodore micros installed in British companies than any other machine. With the new PC, Commodore hope to maintain and strengthen this hold on the British business market. A carefully planned marketing policy

has been developed to promote the PC. Commodore intend to provide effective support and back-up to both dealers and users. They have set up a specialised business systems management team which will operate nationally and internationally.

They hope to increase the number of dealers having access to the new PC by establishing a distributor network. This network will comprise five distributors - Norbair Micro Ltd., Northstar P.C., Peter & Paul Micro Distributor Ltd., S.T.C. Electronic Services and Westwood Distributor Ltd. Their dealer support scheme also includes a three-year warranty scheme, a training deal, financial back-up and a Commodore hotline.

The response from dealers has certainly been very positive. At the time of the launch there were already 2 months of advance orders.

Says Paul Welch, "The PC 16 and PC 20 represent exceptional value for money as they stand - with the comprehensive support package we have built around the machines, we believe they offer an unbeatable deal".

## Club spot

- Activision is issuing a free software club magazine, Activision Software Club News. The first 1985 issue is 14 pages long, is full colour and gives information on Activision's latest titles, and carries news, articles and reviews. Anybody contacting Activision may receive a free copy. Activision, 70 Harley House, Marylebone Road, London NW1. Telephone: 01-488 7588.
- US Gold has announced the US Gold Club. For a fee of 99.99 (plus 75p postage and packing), members will receive a US Gold membership and badge, a poster, membership card, discounts on US Gold software, US Gold merchandise and Gold Bulletins, a regular news letter containing information on US Gold games. US Gold Unit 16, The Parkway Industrial Centre, Heneggs Street, Birmingham B7 4LY. Telephone: 021-729 9830.



# Data Statements

## Tinker, tailor, soldier...fire!

WELL, MACBETH AND THE HOBBIT have been immortalized as computer games so why shouldn't slick stories of espionage follow suit? Hutchinson Computer Publishing have released their first computer game, *The Fourth Protocol* - *The Game*, based on Frederick Forsyth's novel. Hutchinson also plan to release games based on the Lone Wolf series by Joe Deaver and Gary Chalk: *High in the Dark*, *Five in the Water* and *Lone Wolf and the Ice Walls of Toros*. A game based in Len Deighton's *Blinking* is planned for release in the Autumn.

The game is only very roughly based on the book. As MI5 investigator, John Preston, your aim is to uncover the plot behind Russia's Plan Astora and prevent breaching of the Fourth Protocol. If you fail, a nuclear bomb will explode.

These are three parts to the game. In the first, you are using MI5's central communications computer, ComCom, and you're surrounded by various pieces of equipment such as a filing cabinet, telephone and calendar, all which play an important role in the game. There are 12 interacting plots going on at once. Some are red herrings, others are crucial and lead to the bomb. You are given 40 days to solve the plot - 1 hour 20 minutes in real time.

The second part is more straightforward. You'll travel around a limited London underground system in search of the bomb and also visit Dover and Bristol. There are over 300 locations in all. Once again there are red herrings. When you have found the bomb, you get a code to load the final part of the game.

The final part is a race action. Having found the bomb in a discreet building, you must kill the KGB agents to prevent them halting your efforts to defuse the bomb. Once you enter the building, it's a race against time before you either save the world, if all goes according to plan, or take yourself, if it doesn't.

The *Fourth Protocol* retails at £12.95 (tape) and £15.95 (disc).

Hutchinson Computer Publishing, 17-21 Conway Street, London W1P 6EQ.

Roll on the mega-adventure of *War and Peace*!

## In business

IT LOOKS AS IF THE CIB WON'T BE suffering the same fate as the B1 and Plus/1 machines - in, lack of available software when the machine is released. Naturally, this is largely due to the fact that the machine is 80 compatible so existing 80 software can be enhanced to take full advantage of the CIB's extra power.

Audiogenic certainly don't intend to be left behind in the software race. They have converted their Micro Swift Spreadsheet for the CIB and have already sent out samples to all Commodore world wide subsidiaries and major distributors.

The size of the worksheet on the CIB version has been increased - to 84 columns by 999 rows and explain the CIB's larger memory and 80 column



screen display. All the 80 functions have been maintained.

Audiogenic's word processing package, *Micro Wordcraft*, is now available on cassette. Audiogenic claim that the cassette version retains all the features of the disc version.

Audiogenic Ltd, 28 System Industrial Park, London Road, Reading, Berkshire, RG2 1AD. Telephone 0734 664646.

## Chatty Cheetah

THE LATEST SPEECH SYNTHESIZER FOR the 80 comes from Chetrah Marketing. Called the Sweet Talker, it retails at £24.95.

It is a plug-in module which interfaces to the Commodore 64 via the rear port. As an allpurpose synthesiser, it uses individual speech sounds strung together to make intelligible speech. The package also includes a manual and a demo cassette.

Phonetic sounds are used to program the device. These sounds are sent as numbers to the Sweet Talker in a sequence via a DATA statement. By combining Sweet Talker's range of phonetic sounds, Chetrah claim that almost any word in the English language can be created.

Chetrah Marketing Ltd, 24 Kay Street, London EC7R 3EQ.





# Data Statements

## A view to kill

SPECIAL AGENT 007 IS TO BE IMMORTALISED as a computer game. Denmark, the force behind Eureka!, has set stiff competition to acquire the rights to market the computer game version of the forthcoming James Bond movie, *A View To A Kill*.

They were aided in their bid for the game rights by the game's designers, Chris Palmer and Dave Bishop of Tigress Marketing. Having been approached by Denmark with a view to designing the game, Chris and Dave visited Pinewood studios, studied the scripts and story board and designed an outline of the program. "The people at Pinewood were knocked out", said Chris. It was certainly no easy task. Chris continues, "We had a very long story from which we had to design a game. With a James Bond film, you always know he's going to live. We had to design a game which maintained the Bond ethos but was still inaudible as a game". They claim that a lot of the Bond touches are there, such as the humour classes.

Once Denmark had acquired the rights, Tigress spent 2 weeks compiling the specifications for the game. They were determined to get it working in their heads before going near a programmer. They worked very closely with the programming house, Softstone, who are also covering Ultraman's Underworld to the Commodore 64.

The game's launch is intended to coincide with the release of the film at the beginning of June. It is based around three of the film's action sequences. It is a multi-level game comprising three modules each of which form a totally separate game.

*A View to Kill* starts in true James Bond fashion with the silhouetted Bond figure peering with his gun to the accompaniment of Bond music and assured credits. It also features a version of *Burn Burn's* title song from the film.

The first module takes place in Paris where badde, Mayday, has killed someone in a restaurant. Bond pursues her to the Eiffel Tower where she jumps off with the aid of a parachute. Now, as Bond, drive across the streets of Paris in a taxi in an attempt to reach her landing

spot before she does. You are hampered by the one way system: if you go up a street the wrong way you are halted by the police. If you fail to reach her, the game transforms into a car chase as you pursue her around the streets of Paris. The screen is divided into two views: a very impressive 3-D view from the taxi as you whizz (or crawl) past buildings or a plan view which scrolls over a map of Paris. Speed limits are imposed and the time and day (the whole game is played in real time) are displayed. I saw this part in its early stages, but was still very impressed.

The second part sees our hero, this time with glamorous girl accomplice, Tracy, in the City Hall. They have been captured and held there by the evil, Asian-type villain of the piece, Zarin. Having shot the dignitary, also held in the hall, Zarin forces Bond and Tracy into a lift over which he throws a bottle of flaming kerosene. With the aid of various gadgets, Tracy is rescued. You can then use Tracy to help you reach Bond by asking her to perform various tasks. She can obtain various objects to assist her in her mission via a duck-foot mechanism whereby she must choose objects as they scroll past. In true arcade

adventure style, there are a lot of rooms. Of course, Bond escapes to reappear in the next game.

The final part depicts a mine under Silicon Valley which Zarin has packed full of explosives and a detonator, which Bond and Tracy have to defuse. Explosives in the mine cause flooding and once again lucky old Tracy escapes. Bond teams up with former badde, Mayday who, like Tracy in the previous game, is rescued in time to help save Bond. Once again, the duck-foot mechanism is used to acquire various objects to assist her in her task. Bond has the option to defuse the detonator or remove it before time runs out.

Since the game is played in real time, if you complete the first or second game under the allotted time, you have longer to complete the subsequent game.

Although artistic licence has been used here and there, the game apparently sticks very closely to the film. Not having seen the film or the game in full, I cannot confirm this, but I was certainly very excited by what I heard and by the support I saw. I'm anxiously waiting to see *A View To A Kill - The Game*. It's full gles.

## On the right track



Neither joystick or mouse, the Marconi Tracker Ball is a graphic input device providing precise x-y cursor control by simple fingertip operation of the central ball.

Marconi have developed the 882 Tracker Ball for serious hobbyists, educational purposes and using graphics programs. It comes with a user guide and

graphics software as well as software to facilitate linking with the 882 to users' own programs. There are also other software packages available for the tracker ball, which retail for £29.95.

Further information is available from Central Trade Exchange, Ashton Lodge, Ashton Road, Doncaster, Leeds DN6 1NP. Telephone: 0302 64114.

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### From fun to Forth

- Elite has developed a version of their top-selling Spectrum game, *Airwolf*, for the Commodore 64. This game is the official computer game version of the Universal Studios television series and sold over 80,000 copies on the Spectrum within six weeks of being launched. It retails at £7.95.

Elite Systems Ltd., 35 Bradford Street, Walsall, Telephone: 0922 611291.

- Creative Sparks is hoping that their soon-to-arrive frosty reception with their new game, *Ice Palace*. Creative Sparks boast that the game features 'stunning sound effects' and graphics which are 'a masterpiece of fine detail'.

As the Crown Prince of a frozen kingdom, you must find the seven pieces of your murdered father's

coron before the wicked Ice Queen and her servants turn you to their evil ways. The game includes 7 levels and over 1000 rooms. You must collect various objects on your travels to help you in your task. It retails at £7.95.

Also from Creative Sparks is a C-16 version of *Tower of Evil* which follows the adventures of Andros on his mission to rescue Diana, the fair princess, imprisoned by a wicked Necromancer. There are over 80 rooms to search and 8 stories in the Tower of Evil and each story is inhabited by a different type of ghastly minion. The Tower of Evil retails at £5.95.

- On the more serious side, Mellbourne House have released a Commodore version of *Forth*, *C64 Forth+*. This high level language will enable the user to



run programs up to fifty times faster than those written in BASIC, without having to understand machine language. The language can be re-defined to suit individual programming requirements. It adds to *Fig-Forth*, colour, sprite, sound and graphics instructions. Using it, the programmer can create stand alone programs which can run on the 64 without the need to re-load the initial program. It is also possible to define your own character set. It retails for £14.95.

Mellbourne House, Castle Yard House, Castle Yard, Richmond, Surrey TW9 1ST. Telephone: 01-840 6844.



OUR PICTURES SHOW THE WINNERS OF the John Menzies Young Programmers of 1984 competition (top picture) and the joint Spectrum Group/PC/Commodore Computers competition.

In the top picture, back row, left to right, Tim Harwell (competition author and judge and author and publisher of *Interface Publications*); Carolyn Dew (under 12 winner), John Dove (over 13 winner) and Ian McLachlan (John Menzies Development Director). In the front row, left to right, are the 12-13 category winners with leading judge Professor Donald Michie from Edinburgh University. The boys are Stuart Cross, Neil McRobson, Grant Connolly and Martin Davern.

The bottom picture shows the Haley family, winners of the Spectrum Group plc/Commodore Computers competition, being presented with a cheque for £2,500 spending money as part of a prize of one 14-day holiday in Florida. From left to right on the picture are David Pleasance, National Accounts Manager for Commodore, Mrs Dorothy Haley, Bob Cleaves, General Manager Spectrum Group PLC, Richard and Stephen Haley, John Greenham, Manager of the Computer Department of Concess of Caversham where the Halays collected their entry form for the competition and Mr. John Haley.

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MANY GAMES THAT USE A BOARD divided into squares and 'men' that are not all of the same shape, are compared to the game of chess. The thought of a game that has stood the test of playing some many hundreds of years, being compared with these upstart 'computer games' in so many cases, quite takes. On the other hand **Archon** does have rather a lot to recommend it!

Like chess, it may be enjoyed by the novice, even though the player may not fully understand the strategy behind either his, or his opponent's moves far, hidden within this game, are several levels of play/game awareness.

normal fighting abilities ... for Archon, that is.

Characters each have a maximum number of squares on which that they may move. Some move on the ground and may not pass through other pieces, some have the ability to fly over creatures that are in their way.

The two sides represent the opposing forces of 'light' and 'dark', with the 'board' divided into not only white and black squares but also a number of squares that change colour as the game progresses. The colour of a square that a creature occupies affects its combat potential - with a 'light' creature being



more difficult to defeat on a lighter coloured square.

Each side has eight different creatures and each of these has combat characteristics that can affect the game strategy. Knights and Goblins, the 'pawns' of the 'light' and 'dark' respectively, can only fight at close quarters. They can 'hammer away' with their swords and clubs incessantly without apparently taking a breath ... but their lifespan is short and they can inflict only relatively minor damage.

A Dragon lives longer, throws its fire breath at a distance and inflicts great damage, but needs time to 'soak up' before it can deliver another fire bolt!



**Archon** is played on a 'board' with nine squares to a side. As in chess, the two opposing sides start the game by occupying the two rows of squares on opposite sides of the 'board'. Unlike chess, the two sides have different pieces that have different attributes! Also, unlike chess, when one piece challenges another, the display changes to a separate 'battle screen' where the two fight it out in arcade style combat. You may play using joystick (either a human opponent or against the computer).

Each side has a 'Magic User' that has the power to cast spells in addition to having what may be considered to be



Unicorn can throw energy bolts at a fairly rapid rate and move quickly but only have an average lifespan. Trolls and Golems are slow but powerful and can take more punishment.

Other creatures include Barbarians, Valkyries, Archers, Djinn, Sorlocks, Manticores a Phoenix and a Shapechanger, the latter mimicking the attributes of its enemy as a 'Grand Master' at this game.

Finally, we come to the Magic Users - the Wizard (light) and the Sorcerer (dark). They both have seven spells which may only be used once. These include lighting an enemy by summoning an Elemental, imprisoning an opposing piece,



healing wounds, resurrect a dead creature or entering the flow of time. This last spell enables them to manipulate the role of the changing coloured squares to their advantage.

Five of the squares on the strategy board are defined as 'power points': he who occupies all five wins - you also win if you eliminate all your opponents!

This is an enjoyable game at whatever level it is played - either as a 'bull in the china shop' thump-up or as a deeper strategic exercise. It is surprising that this is a very popular game in the USA, or that there is already a sequel - **Archon II** - ahead.



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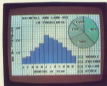
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distributed in England by Holt Saunders Ltd, 1 St Anne's Road, Ladbroke, BN21 3UN and should be available in the better bookshops, cost £18.95. Holt Saunders have a good range of computer titles and it may well be worth your while obtaining their booklet.

## Another from the USA

If you are into American adventure games — Zork, Deadline, Suspended, Evhanger, Starcross, Nemesis, Outblasts or Wizardry — then you may like to consider another of the books in Holt Saunders list:

But, one transformation will not be enough! There are even hints that up to three dress set changes may be necessary. Don't ask me to verify this — I'm only just managing to progress from an apt!

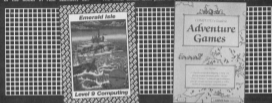
"The Witch's Cauldron" uses a 'rapid load' system (zipload!), so loading time is not just about five minutes. You start your search for the means to change shape in the Witch's Parlour. On screen you will see various items or furniture and — sitting quietly somewhere — a cute green toad!

The initial action takes place in this

realm they clearly show what is necessary to sustain interest whilst leaving your imagination to supply the rest. Pictures are 'drawn' by 'blocks' to the screen and so appear very rapidly.

Fortunately, you may SAVE your character and position within the game. This is carried out at "Hyperspeed" so may be repeated often with hardly any loss of playing time.

The first two transformations are not difficult — once you begin to get a feel for the program. Once past these you will encounter the largest "maze" you would have yet met. It is not exactly a maze-in-the-



"Comparing Adventure Games" by Carl Townsend, published by Atlantis Press, price £11.95. It is well written and makes interesting reading. Other games are mentioned but those above receive a more in-depth analysis.

Not all the puzzles are solved for you, merely a number of "clue" points to help you continue. Even then the clues are not spelt out in plain English — your first task is to decipher the encrypted message! Each game uses a different cipher too. Check out this book.

## Home-brew witch

"The Witch's Cauldron" for the IBM PC, by Mike Gen, is an illustrated adventure that has a fresh approach, is fun to play, humorous, with ultra-fast graphics, a good command analyst and is not too easy.

In brief, you have incurred the wrath of the wicked Witch (see Hazelt). This has resulted in what may be considered as 'pun for the course' — you have been transformed into a lovely green 110401!

Your mission, should you accept it or not (S), is to regain your normal human form. This you can do by making use of appropriate spells or potions to be found in and around the Witch's somewhat superior haven. In other words, there are lots of rooms for you to explore in order to find the ingredients!

One room. You may move from place to place, either by specifying directions NORTH, EAST, UP, etc., or just by saying where you want to go — CUCHA, CHAIR, etc. This latter form of movement control is not always successful and I suspect it partly a quirk of the command analyst. Tropic commands may be quite complex such as 'UNLOCK THE DOOR WITH THE SILVER KEY' and 'GIVE THE WOMAN THE GOLD CHAIN'. Shortened forms of words are usually recognised but do not use less than the first four letters of a word; some strange things may happen if you do! Not necessarily harmful, just unexpected. The program is just doing its best to understand an imperfectly worded command. At least this is better than some programs that keep saying "Buh!"

First of all, you must change into a cat. This you do by — you didn't really expect me to carry on did you? Having made this giant first step, future changes are carried out by making a potion in the Witch's Cauldron and drinking it. Claws abound but, if you are really baffled — HELP will often do just that — albeit in a rather cryptic fashion.

The graphics are clear and readable and add greatly to the adventure. Time is kept pretty tight, relying on the pictures to set the mood for any scene. This they do well, striking an excellent balance between detail and mystery.

Some may call them sparse but, to my

accepted sense, rather a complex location pattern with no points of reference. You certainly cannot carry enough items to sleep in order to map it in the ordinary way. Once you recognise you have found it (I) just keep your head and, if you did not already have paper and pencil to hand, go and get them now!

Mike-Gen's latest is one of those unexpected finds that will give a great deal of fun to both beginner and expert alike.

## Latest from the top

Level Nine Computing are in an enviable position with their followers just waiting for the next offering to "tear up" as it appears. Such is the well earned reputation of one of our top adventure software houses.

"Eternated Isle" has, at long last, arrived. It follows Level Nine's latest pattern of text and graphics as has been seen in "Return to Eden".

Here the graphics drawing routine appears to have been spotted, go slightly less as they use a 'line and fill' technique, there is a slight but noticeable pause while they are 'drawn'. The time varies depending upon the complexity of the picture but is usually only between five and ten seconds.

The program uses a fast loading system and takes only 25 minutes to load. You



may SAVE or RESTORE your character and game position; this takes about 40 seconds, which is not long to wait for the knowledge that you have a secure base to return to — should something go amiss.

'Emerald Isle' returns to the basic theme of some of these earlier adventures, where the aim is to collect 'treasures' rather than have a final purpose such as in 'Trek the Viking' or 'Snowball'. The score is an — erge, erge — an an island. You have just arrived by parachute and are swinging gently by its cords high up in the trees.

The parathrifter name was a game since I had expected a more medieval plot, perhaps even within the realm of folk mythology. I had even teased up on this notion — just in case! Oh well, perhaps not time.

The plot thickens when you find yourself in an aerial, wooden city, built up on tree-top level. There are plenty of locations for the newcomer to 'Emerald Isle' to explore. Lots of potentially useful items to collect and also a selection of level Nine's oddball puzzles to solve.

Two rather nice poems come with each game. Before you stick these up on your wall, look on the reverse of the one showing 'Emerald Isle'. Here be the instructions. These are fairly rudimentary compared with some of Level Nine's previous games but are probably all that is needed.

For some 200 locations and about 140 pictures! The CBM64 version still has that range of descriptive text that has become the hallmark of all Level Nine's adventure games.

Make no mistake, this game in common with previous offerings from the same source, is intended to keep you gaming for days, if not weeks! It is a 'stealing' game that should appeal to most grades of adventurer. It is also a 'lively' game — if you die along the way, all is not completely lost, you will be resurrected to try again.

## Yet another cave

Most present day adventures will probably be fed up with hearing about the grandeur of adventure games — 'Adventures' — also known as 'Colonial Cave'. Versions of this game have been produced for almost every micro.

The CBM 64 has had two for some time, one by Level Nine and the other by Melbourne House — both respected purveyors of good software. To these must now be added a third. This time from Duckport, the software arm of Dataworld — publishers of a number of computing books.

It is somewhat surprising that a software house should join its leagues as such a revival when two versions are already on the market. Having said that, I

feel — about 14% minutes after I realise you are about if you want instructions. These are presented in a long gallop (50 words), a little difficult to read but they look great!

These 'on screen' instructions tell you very little but do follow the original guidelines. One point to watch is that the command analyzer does not accept complex sentences and consequently to travel north-east, you must use the shortened form NE or otherwise the program will look on NORTH-EAST as NORTH.

One interesting aspect of this input routine is the facility (sometimes) to travel to a location by simply typing in your chosen destination. Hence, if you are above ground and not lost in the woods, you can travel directly to the well-head by just typing BULLHEAD.

Once the main program has loaded you return to the normal CBM prompt — so there is more no excuse for misunderstanding the text! The choice of colours both for text and background make this version easy to read and understand.

That about sums up this game's good points. Its bad points are so bad that I feel that you would be wise to purchase one of the other two CBM 64 versions! There is no SAVE facility that I can find and on a game such as this has got to be a major drawback.



There is also a map of the island on the back of the poster. This may not be completely accurate — at least one of the boppers shown does not appear to exist, but at least it gives you some idea of what you have yet to see!

Your aim is to collect all the treasures that may be found on the island. There are twenty of these to collect out and you have to determine what is or is not a 'treasure'! But, take heart, most will be obvious once you have found them and anyway you can always check by toggling a close watch on your score.

This game is not too complex, but

would still recommend that all adventure players have at least one version of this enclosed classic in their collection.

So what is this 'Colonial Cave Adventure'? Well it is said to be the original Creechler and Williams mainframe version. There are presumably different 'original' versions because my treasure map of 'Adventures' does not help in the game's success!

This implementation has been programmed by Peter Gerrard, well known for his books on the CBM 64. It uses no rapid load system and consequently takes rather a long time to

if you feel that things have got beyond your control DO NOT type in QUIT, hoping to start again; with no waiting or request for confirmation the program is NINED and you will have to wait a further 140 minutes for it to load back in!

However, if ever temp-tamed, you are told your score and the program returns you to the Commodore 'cold user' screen. Having had the sort of thing happens a couple of times, I'm afraid I lost patience and manually checked the program in the bin! Both Dataworld and Peter Gerrard in particular should know better what a disappointment.



With this assembler from Joe Nicholson, you can, at last, put your C16 to serious use.

# C16 Assembler

**AN ASSEMBLER IS** THE machine code programmer's most important utility, as it converts assembly language instructions into machine code, the microprocessor's own language. The C16 has an excellent built-in monitor including a simple 'line' assembler. However, as this assembler does not represent in memory there is no way of editing the instructions. Also, it lacks labels which are very useful in branching and structural programming. In practice, a line assembler is useless to use for all but short machine code routines and, as

a machine code programmer myself, I urgently needed an assembler for the C16, so I decided to write my own.

This article describes a two-pass assembler which has the ability to handle labels and relative jumps. It can also produce machine code to run from a different starting address — useful if the assembler occupies a region of memory you wish to use in your program. Note that data and addresses can be entered directly in decimal, or in HEX if preceded by a \$ sign. For a detailed description of the BASIC instruction set the reader is

referred to one of the standard works on the subject such as 'Programming the 6502' by Rodnay Zaks, or the 'Mastering Machine Code' series in this magazine.

## Directives.

There are a number of directives which the assembler recognises in addition to the 6502 mnemonics. These are set out in Figure 1.

## Writing Text

The text is stored in DATA statements as this has several advantages. In text is not lost when editing the instructions and there is no need for a separate line editor making the assembler program shorter — an important consideration when writing for the C16. Text is stored from line 18000 onwards. To simplify entering text lines, two keys have been redefined:

- F2** prints DATA'' which combined with the use of the AUTO command greatly facilitates text entry.
- F3** lists the assembler text area.

## Assembler's own commands

There are several commands recognised by the assembler which can be used to get professional listings, print symbol tables etc.

**A or ASSEMBLE**  
An obvious one that the assembler prints the pass if it set on and does it's best to convert your instructions into machine code. If there is an error in the list, eg. LABEL NOT FOUND or RELATIVE JUMP OUT OF

RANGE, it will print the error and the line number where the error was spotted. When assembly is complete the computer will display=OK and a flashing cursor.

**L or LIST**  
When this command is used it prints START:1 from the line number you want the listing to start through to=RETURN. The program will list until it reaches an END instruction or until you press any key.

**PI** — Print on printer.

All output in the program is directed to the Commodore-1520 printer-plotter. Output can be directed to other printers by changing the CPIN command in line 2800 from channel 6 to the required channel.

**PO** — turn off printer.

All output returns to the screen.

**L or SYMBOL**

Used after assembling — prints a table of all the labels and their addresses.

**Q** — Quit assembler.

Saving and loading text is done by the normal SAVE and LOAD commands in BASIC. To save code use the S and L commands inside the machine code monitor which can be opened by typing MONITOR or M (shift G).

## Description of BASIC program.

The program occupies about 1800 bytes. When entering some of the longer lines it is necessary to use abbreviated commands, such as '?' for PRINT, to avoid exceeding the line length limit of the screen editor. The main functions of the assembler program are as follows:

Figure 1. Assembler directives.

ORG address.	Specifies the starting address of the assembled code.
TRU address	used after ORG. Although ORG specifies the location in memory of the assembled code, TRU enables you to assemble the code to run from a different address.
Text string of characters	This allows text to be put into the assembled code at that point.
BRT number (number number...) END	This allows a series of data bytes to be put in at that point.
—	Indicates the Assembler that it has reached the last line of the assembly program and must be the last line of the text. It may also be placed inside a program to stop assembly at a given point (useful for testing code).
( semi colon)	Indicates the assembler that all characters following on this line are not to be assembled. Similar to the BASIC REM statement.
( colon)	The colon precedes all labels. The assembler can handle up to 100 two byte labels.
= (equal)	This allows you to define labels as constants, eg. to set the label \$B to 100, type "=B=100".
R	Relative jump — on a line containing a relative jump, the label of the address to be jumped to must be preceded by an R.

Line 30  
Jump to initilay.

Lines 700-740  
Read a number/label in dec/hex.

Lines 750-790  
Find next instruction and set into operation (CS) and operand (DB). Find the line number (DATA) is on (R).

Lines 800-830  
"BTF" instruction execution loop. Read numbers from list one at a time and POKE numbers into memory. Signify "BTF ERROR" if syntax error in number list.

Lines 840-880  
Find addressing mode of instruction. K will equal 1 for implied addressing, 2 for immediate addressing, 3 for accumulator addressing, 4 for indirect addressing (only used in the JMP instruction), 5 zero page indirect X addressing, 6 zero page indirect Y addressing, 7 absolute indirect X addressing, 8 absolute indirect Y addressing, 9 relative addressing, 10 indirect X addressing, 11 indirect Y addressing, 12 zero page addressing and 13 for absolute addressing.

Lines 890-895  
Read numbers. If it is a label, find the label. If the label does not exist print "LABEL NOT FOUND" and next number as a B.

Line 900  
Define variables used in the program and the user defined keys, ie:

LS - the names of the labels,  
LS# - the addresses of the labels.

Key 2 is defined as "DATA".  
Key 3 is defined as LIST/0000.

Lines 1000-1010  
Input command. Exit if Q is inputted.

User commands:

Line 2000F Turn on printer.  
Line 2040F Turn off printer.  
Line 3000F LIST.  
Line 3060F PRINT/DEL.  
Line 3080F CLEAR/DELETE.

Lines 3700-3710  
LIST command routine — Double "GETIN" if printer being used.

Lines 5000-5110  
Print pass control.

Lines 5300-5310  
Second pass control.

Lines 5500-5520  
Define a label.

Handle directives:  
Line 6000 "ORG"  
Line 6010 ":"  
Line 6020 "TRU"  
Line 6030 "END"  
Line 6040 "BTF"

Lines 6000-6040  
Find command with appropriate addressing mode in table.

Line 6300  
"POKE" command into memory.

Lines 8170-8480  
Process data bytes (if any) for addressing.

Lines 9000-9090  
Command table. This must have the line number specified as there is an increment of 10 for each letter of the alphabet starting from 9000.

Line 9999  
An essential dummy line.

Line 65000  
An automatic end instruction.

### Example.

Here is a demo program. If you haven't done so already, RUN the assembler and then Quit to define the function keys. Press "F2" between the line numbers.

and the instructions, ie line 10000 should look like this:

10000 DATA,20004

Use the "AUTO 10" command from line 10000 onwards. It is assumed that line 41000 contains "DATA" END.

Remember to SAVE the assembler before executing this demo program (it may not work!). To run the demo quit the assembler and type "TYPE500". You should hear a 20004 sound. If you don't, check the text and assemble again. If it still doesn't work there could be a mistake in the main assembler program (or you could have forgotten to turn up the volume control on the TV set!).

To change the sound to one resembling a rocket taking off, alter line 10120 to "DATA"10A 00F and re-assemble. If you can't see why this routine works, don't worry. I am planning some articles on the internal workings of the CH.









**Phil South does a spot of  
hero-worshipping while  
ambling through the LIT  
show.**

SO, THERE I WAS, AT THE LIT '88 SHOW, with a sharp pencil, and the gleaming whiteness of the first page of my new reporter's pad flitting in and a few innocent passers-by. I was there to interview David Pritchard and Chessington Crane. I was late, though, and had to come back much later to get my interview.

Well! I had a stinking cold, and now I had to spend all day at this lousy show. I decided to stroll around a bit and look at what was on display. Nothing much, I judged.

"Hippo! heck! The place was teeming with celebrities: Kevin Keegan of Football Manager fame brushed past me, on his way to the well stocked bar I suspected, tapping by the way his tongue was dragging on the floor. Then I bumped

into some guy with long hair and a beard, loudly reminding a companion that had just crashed. I was about to say "Oh, Hippo, get yer 'air cut!" in mimicry of my arcade hero, Jeff Minter on the title page of PsychoBella, when I realised... the WAS Jeff Minter.

"Excuse me," I said boldly but unoriginally. "Are you Jeff Minter?"  
"I have that dubious privilege, yes," he said. The conversation thus began. I wasted no time inquiring for many games and the one available PsychoBella.

Then he took me over to a Commodore64 console was running his new game, Mama Llama, featuring his new favourite character, Rory the Savage Guineapig. "Mama Llama is a sort of crazed, freeform videogame," he explained, "not really like anything I've done before. It features many different planets, different galaxies, and all the characters have inventa... more realistic like that!" He went on further to demonstrate the method of entering the game at any level, a sort of grid-alike, and gave me a quick demo of Rory's part in the game. "I'm going to give Rory a game of his own next, I think. He's been the buddy for a while now, and I realise for himself a mark at being the hero."

Where did Rory come from? "Oh, someone wrote it to me and said could

their guineapig be in my next game," I thought. Rory the guineapig... how doesn't sound very menacing. But Rory the savage Guineapig, now there's a concept!

Games worth a mention from the LIT show are: Gryphon (Quikshot), a fast, graphically superior cartoon/arcade game; Master of the Lamp (Action) a marvelous 3D sort of Aladdin-esque code-sharing; Dropzone (U3 Gold) a great Hipsco-Defender combo and Torrey (Pitip) a sort of arcade-adventure, with startlingly good graphics more of a cartoon reality.

### Question time

Somebody asked me where I got the name Hippo. Simple! It's a triangulation of Philo, which I use on the hi-score tables of arcade machines I visit. Look out for me.

The only hi-score I can present you with this month is my current for CBS' fantastic Impossible Mission: 280. About an hour and three quarters went into that, so I think you owe it to me to try and beat it.

That's all for now, this is the ever-mapping Hippo, signing off.



Dave Crisp gets to grips with  
a couple of numeric keypads  
and some new joysticks.

**PUSH ME,**

**PULL ME**

NUMERIC KEYPADS ARE A BOON TO anyone who enters a lot of numeric data into their computer, whether for business or programming. Many larger computers and some of the Japanese machines have them as standard but 64 users will have to buy them as add-ons. We look at two of the numeric keypads available.

### **Voltmax**

This keypad consists of 16 keys; 0-9 are marked with the remainder left blank. This is so each key can be programmed to make it possible to customise the pad according to which piece of software you are using. This is done via a machine code routine which requires loading each time you use it. You may get conflict between the code used by the program and the code within your software. Although there is little to be done about this, problems are rare. The software provided for customising the keypad is easy to use and will save a small routine to tape or disc; this can then be loaded from within your home utilities program.

The actual keypad plugs into the two joystick ports. The programmable keys were very useful; with a little thought, a lot of time and keypresses could be saved to access things like the floppy. This made loading directories, etc, faster.

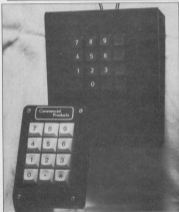
This is a very useful addition. It's a shame that you need to load software to use it each time but that's the price you pay for versatility.

### **Commercial Products**

This is not a programmable pad but it does have other advantages. The keys provided are 1 1/2" x 1" and 1/2" deep. A RETURN key would have been nice, but one can't have everything.

It is much smaller than the Voltmax product and looks practical rather than pretty. If it had only been about 1/2" less deep, it would have fitted into the storage slot of my SX-64. The keys are very nice and are sculptured. A ribbon connector trails from the top. This looks a little delicate; the pad would look better and stronger if multi-core cable was used.

This pad scores points over the Voltmax through being a hardwired connection into the machine. The original keyboard connector piggy-backs onto the plug provided. This requires opening the machine and identifying the



Commercial Products keypad (in front) and (behind) Voltmax keypad

relevant connector. Due to the very clear instructions, it is an easy and painless job. It takes about two minutes to fit it. If you have an SX-64, connection is not so easy, but is possible.

I can recommend either of these keypads; it depends on your requirements - the Voltmax for

programming, the Commercial Products for business.

### **Joysticks**

It seems that the initial flood of new joysticks has slowed down into a trickle and the only ones that appear now are from the well known names.





### Kempston Formula 1

This is a version of the old Kempston Pro, from what I could see there was nothing new about it except that it had undergone a fairly dramatic colour change. What was once a nice, robust, unusual, long-lasting black workhorse is now a nice, robust, unusual, long-lasting blue workhorse. Half a dozen friends have seen it and they all responded with the same cry: "It's great!", and I certainly agree with them.

But the joystick itself is good. The strong leaf switches give a definite 'click' and it survived the hammering I gave it. In my last review of the Kempston Pro I said that although it was a good stick, I did not personally like it, but I'm now proven and I'd like to be of my getting to like this one though. But it's colour makes it difficult to love.

### Kempston Formula 2

This suffers the same problem as the Formula 1: it's blue. Apart from that, it's not too bad. It's quite strong and lasted well although I did begin to get concerned about the shaft. It started to feel a bit 'gassy' but has not given up the ghost yet.

It was difficult to examine the switches since they are pretty well encased but, judging by the quality of the rest of its innards, I should imagine they are pretty hefty. The five buttons (one on the top of the stick and two on the base) are small but reliable. The semi-encased handle is more comfortable than it looks. This works well, it lasts well and the quality of the casing is excellent but there is nothing 'new' about it.

### Vulcan Gunshot 1

This looks good - two-tone colour that matches the 64. It is nicely styled with an

Vulcan Gunshot 1 and Gunshot 2



Kempston Formula 1 and Formula 2

optional auxiliary switch. It is by far my favourite to use except... it didn't last! After a few fall sessions with Impossible Mission, I found my rear kept falling to the left in kamikaze dives onto robots. Investigations resulted in the Gunshot being found guilty and its sentence was a strip down to reveal its workings.

In my article Gripping Stuff (Dec. 84 issue), I gave the Quickshot II a verbal battering. On spilling the guts of the Gunshot, I found the very same switches - four-painted stars of very thin metal which last about as long as butter in the sun. On the review model, cracks had already appeared in the arm so, occasionally, the arm would touch the contact and my spy would make involuntary, and often fatal leaps to the left.

On the whole, it looks good and feels excellent - no blasters (although that is possibly because it didn't last long

enough). But, if something was done about its reliability, I would like one.

There is also a rapid fire version - Gunshot II - which is available in black. If you could see the inside of the Pro with the outside of the Gunshot, I think you would have a good joystick. As they stand, I am not over-impressed with any of them. If I was going to buy any of them I think I would buy the Pro and then buy a tin of black paint and spray it!

Formula 1 keypad - £75.95  
 Vulcan,  
 Park Drive,  
 Baldock,  
 Herts.  
 Tel: 0462 89445

Formula 2 keypad - £75.95  
 Commercial Products,  
 28 Balmans Court,  
 Farnham Green,  
 Crawley,  
 Sussex,  
 BN7 3BP  
 Tel: 0293 58374

Formula 1 - £75.95  
 Formula 2 - £75.95  
 Kempston Micro Electronics  
 Ltd.,  
 Singer Way,  
 Welwyn-Based Industrial Estate,  
 Kempston,  
 Beds.  
 MK8 4JW  
 Tel: 0334 65653

Gunshot 1 - £5.95  
 Gunshot 2 - £15.95  
 Vulcan Electronics Ltd.,  
 200 Broad Street,  
 Hemlock,  
 London NW4 1RH  
 Tel: 01-265 8388

From graphics to machine code, there's a whole range of books to suit every Commodore user's taste. Garry Marshall and Evelyn Mills delve into some of the current titles.

**Title:** *Filing Systems And Databases For The Commodore 64*  
**Author:** A.P. and D.J. Stephenson  
**Publisher:** Collins  
**Price:** £7.95

THIS BOOK DEALS WITH HOW TO write your own programs for storing and retrieving information using the 64 and its peripherals. It deals with this in a straight-forward manner showing how the computer can be used for a valuable and much needed activity. At the same time, it provides a down-to-earth but basically orthodox treatment of its subject that gives database users all the background that they could need. In this way, it successfully bridges the gap between the needs of the pure user and those of the programming enthusiast, which seems to me to be the charm into which rather too many books unerringly plunge.

The book starts with a look at conventional, but barely organised, ways of storing information such as the cardboard box and labelled jam jars. From these familiar starting points, it draws out the features that a computer-based filing system must have, and then goes on to demonstrate the advantages that it has over a conventional system. That some demands will be made of the user, but at least some careful systematic thought, is also spelt out.

This leads on to an examination of the relevant features of computer memory and permanent storage media. Cassettes and discs are both discussed, and the ways in which they store files of information are explained. The authors believe the cassette-based operations are quite stable for the enthusiast, even though they are inevitably slower than using a disc and I am inclined to agree. To wait a few minutes is not unbearable and, as the authors point out, the time need not be wasted. You can go off and do something else and, if the system is set up to give an audible alarm when it is ready to

# REFERENCE



continue, you can come back to it then. The good thing about the explanations of the storage media is that they are quite explicit about the amount of storage that is available, on a disc or a cassette, and that they relate this directly to the amount of information that can be stored, either as a number of names and addresses or as a number of records each carrying, say, the details of one stamp in a stamp collection. At this stage we know precisely how large a file can be stored on a disc or a cassette.

The importance of making programs 'user-friendly' is also discussed. This is not a subject on which to be dogmatic, and the Sophisms are not. The things that can make a program user-friendly to the beginner can be intensely annoying to the experienced user. Even so, it is probably a good idea to make the experienced user pause before doing something as drastic as destroying previously entered information. A pragmatic approach is recommended and is built into the programs in the book, but only to a limited extent, which illustrates the idea without distracting attention from the essential purpose of the programs.

Definitions of the essential terms, such as files, records and fields then leads into a discussion of sequential-access and direct-access files, and the interaction between the storage medium and the type of file that should be employed with it.

The development of programs for storing and retrieving information begins with simple programs that effectively

simulate file-handling systems by reading their data from a 'file' held as DATA statements within the program. From this familiar beginning, we gradually progress to programs for handling data in files on cassette and on disc and the necessary commands are introduced as they are needed. The programs themselves are full of comments and are sufficiently well structured to make them readily understandable. It will be possible to amend and extend them with very little fuss.

After this, various methods of sorting files into order are introduced and programs implementing the methods are presented. There are programs in machine code, as well as in BASIC, since sorting a large file can be a lengthy process, so that the increase in speed that machine code gives can be much appreciated. After this, methods of searching a file are explained and implemented. If you have ever wondered why computer books tend to be full of programs for sorting, this explains how much quicker it is to find an item of information in a file that has been sorted into order than in one that has not.

The final chapters deal with files that are organised in various different ways, including the relative files that are unique to Commodore.

The book is neatly rounded out by a summary, a set of self-assessment questions at the end of each chapter, and a useful glossary. This is a very attractive, practical treatment of computer-based filing systems and databases. It will appeal

# LIBRARY



to anyone who has an interest in them, and will stimulate the appetite of people looking for a worthwhile computer application to get their teeth into.

**Title:** Graphics Book For The Commodore 64  
**Author:** Axel Flenge  
**Publisher:** First Publishing Ltd.  
**Price:**

**STARTING FROM PRIMITIVE BEGINNINGS** with bits, bytes, number systems and logic operations, this is a complete guide to graphics programming on the 64. It eventually progresses to bit-mapped graphics, designing your own character sets, sprites and even handling a light pen.

The book is aimed at the graphics programmer who will be writing in BASIC, although some programs are presented in assembly code. A complete and coherent treatment is given showing how all the 64's graphics features can be accessed. This is brought together in a chapter called 'Fundamental graphics programming', which manages to strike some sort of balance between dealing with the general underlying principles of graphics programming and the way that they can be brought to bear on the 64.

A chapter on the applications of graphics deals with perspective and producing images to represent three-dimensional objects in a realistic way. It also shows how to deal with animation

and graphics in ways that would be suitable for the latest gaming games.

This is as good a coverage of graphics programming for the 64 as I have seen. I particularly like the way that the different aspects are related to each other, giving an overall unity to the book. As there are a great many programs in the book, I was pleased to read on page three that a diskette containing all of them is available and that the ordering information is on the back of the book. Also, the back page is here!

**Title:** Tricks and Tips for Your Commodore 64  
**Author:** Larrah English, Klaus Gortz, Michael Angerhausen  
**Publisher:** First Publishing Ltd.  
**Price:** £8.95

'TRICKS AND TIPS' IS AN INTERESTING book. While there is nothing particularly new in its contents for the more experienced programmer, it does give the reader an opportunity to program in machine code. If you don't have an assembler, each program is duplicated in BASIC using machine code numerical data. All the machine language programs are very well documented and fully functional.

The book deals with a variety of subjects including high resolution graphics, character set defining, screen division, scrolling, cursor control and function key programming.

BASIC is extended to copying into

BASIC while there is a useful line BISTORT routine which is lacking in the 64. The 'too many negative numbers with the Frequency Function' is a good insertion in view of the fact that a positive answer can already be given by the 64 by a simple formula query. Other programs include auto-line renumbering and so forth. This brings us to the subject of programming in FORTH which is briefly discussed in four pages while a rather extensive study of the use of CP/M programming with the 64 is given. Useful if you have the ability.

For good measure we are given technical data for linking your Commodore 64 to a stereo output, but this is far too brief to be useful. Therefore, 20% of the book is devoted to Data Management and filing systems with full program listings.

Although this book is a mixture of various types of information but, pleasantly, it gives you the opportunity to bring out that assembler and program in machine language very effectively. No assembler? Well the basic loaders and programs are there with no apparent bugs in either language. A reasonable if somewhat expensive book.

**Title:** Machine Language Book for the Commodore 64  
**Author:** Larrah English  
**Publisher:** First Publishing Ltd.  
**Price:** £8.95

FOR THOSE WHO'D WISH TO LEARN machine code it should be clearly understood that this is a 'language' totally different from, and yet closely interlinked with, BASIC; it has therefore to be studied with considerable care and attention. The 'Machine Language Book for the Commodore 64' provides an excellent basis for doing this and the author is meticulous in his discussion of the theory and practice of the language.

Complete listings are given for a 6510 assembler, single step simulator and a disassembler; these listings are tedious to type in, but a disc; copy is available for purchase (particulars of purchase, cost etc. are given in Appendix F which is not listed in the book).

A short 'linkers' listing is also detailed and should give no problems in handling techniques. It is virtually essential to utilize this particular assembler with the book unless you know enough about machine code to use another (as most programs are structured around the LEA (author's assembler)).

Machine language programming is devoted mainly to high-resolution graphics with some minor programs on extending basic and input/output routines for filing and printing. Should you want a good formal tutorial on machine language this book can be highly recommended.

Anlog have been in the forefront of the Commodore games market for a couple of years, and were one of the first companies to experiment with C16 software. Alison Hjul paid them a visit.

AS A CHILD, I LIVED NEXT DOOR TO A house called Andora. My envy was twofold. Not only was our house merely distinguishable by its number (57) but Andora was such a wonderful, magical-sounding name, evoking thoughts of far-away places in the sun or fairytales princesses. Imagine my disappointment on discovering the total lack of magic or mystery attached to this name. The Blowers had Christian names - Andy and Dora. Being a moderately bright child, it didn't take me long to put two and two together!

Well, fifteen years on, I still possess a modicum of that infantile quick-wittedness. So, when I visited Anil Gupta of Anlog, and discovered that his fellow-director was a Mr Roger Gamon, I was quick to solve the mystery behind the name Anlog.

I visited Anil Gupta at Anlog's factory in Dartford, tucked away in a dusty corner of Dartford's Victoria Industrial Estate. It is quite indistinguishable from the other functional buildings stretching across the estate. But, once inside, there's no disputing where you are. Covering the walls, are box after box of inlay cards bearing the famous Anlog Insigma and such household names (if your house happens to contain a Commodore computer) as High Path 737 or PC Fuzz. While still mechanically stiff cards into cassette cases, and placed disinterestedly at me as I stumble into their boxed environment in search of Mr Gupta, the tape-copying machine hums furiously in the background.

**"You couldn't buy a computer anywhere else except the bedding department in Crawley"**

Anil Gupta appears a small man, exuding a wealth of ingenuity and business sense. He and Roger Gamon first met as design engineers at Philips where they helped make Philips totally automatic whilst increasing production fourfold. Anil is in charge of sales and marketing while Roger oversees development at their Horley branch.

Although Anlog's birth dates back to

# BEHIND CLOSED DOORS



Anil Gupta with factory staff

February 1982, it was a while before the two men left Philips. They started as computer dealers, selling VIC 20s from, of all places, the bedding department at the Co-op in Crawley. This was certainly no soft option! The profits didn't come rolling in - but they certainly did a big trade in vinyls and, says Anil Gupta: "Innumerable credits just came to look. You couldn't buy a computer anywhere else except the bedding department in Crawley. It was the only place where the computer salesman knew what they were doing".

In fact, being surrounded by bins wasn't their main problem. Nor was that people were disinterested in microcomputers; the main size of their audience contradicted this theory. Lack of suitable software was the crux of the matter.

They had opted for the VIC 20 as the first colour computer. This created a lot of attention since people had never seen a colour computer before. But most of the software was Commodore's own, rather poor quality, output.

Anlog only traced the rewards of all their hard work when they started to produce their own software. They weren't the first non-Commodore company to do so. Anil recalls the first Commodore show he attended: "I bought Williams' first game and Basic's Mark Attack.

He continues: "There were soon quite a few people on the market with good VIC games but Bagbyte had total supremacy. He didn't do an exhibition and the Midland Fair in April 1983. We hadn't realised that there were so many people interested in computers".

It was then that Roger and Anil

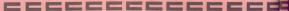
realised that one of them must leave to concentrate fully on Anlog and exploit the potential which lay ahead. Anil left in May 1983 and set up Anlog with Pauline Lucas, in accounts and Lynn Taylor, in sales. Both women are still part of the Anlog team.

**"Like every software house in the country at the time, we typed our own labels and did all our own packaging from home"**

In June, he started a computer shop. Anlog have two computer shops (one in Dartford and one in Horley) in which they sell a lot of bits and pieces apart from Anlog software. The shops are not profitable but Anil uses them to gauge the market. For example, he is currently investigating the possibilities of entering the education market and uses the feedback from customers as a guide. More of this later.

They finally set up business premises in the first week of July. The Commodore show had proven such a success that, says Anil, "The money we took there paid for our furniture and everything else".

So, who were Anlog's early programmers? They consisted of Anil's and Roger's children and an assortment of onlookers from the bedding department, whom Anil and Roger trained as programmers. They now have a team of 25 programmers; although they work in house they are all employed on a freelance basis. Referring to their first game, *Cavern Fighter*, a scramble type game on the VIC 20, Anil says: "The hardest part was trying to fit it into 32K of memory". As to initial production, "Like every software house in the country at the time, we typed our own labels and did all





Anil Gupta

Roger Zinner

our own packaging from home".

The company soon paid off very well. Anlog now has a string of successes behind them, probably the most famous being their Flight Path 737. But Anil clearly understands how much harder it is becoming to churn out one hit game after another.

He believes that steps must be taken to assist, or at least keep up with, American imports, particularly those marketed by the company with the *Infibus* touch, *Lo Gold*. "United we might survive", is his ringing call to action.

**"No software house in this country is big enough to fight the Americans at their own game"**

He has learned a very loose federation with 6 foreign companies (from Germany, France, Spain, Canada, Belgium and Holland) to market each other's programs, for example, *Map Man*, their current big seller, is a Canadian game. Says Anil: "No software house in this country is big enough to fight the Americans at their own game. An American software house usually produces 3-4 programs a year, funded by \$1-5000 a time. I doubt whether any software house in this country can spend that on one program. US Gold is pushing out software houses. Their games are very good".

Anlog is diverging from the games market. Anil is very worried about the tough competition. "It is very difficult for us to compete on a shelf life of 3-4 weeks". He thinks that a software company can only compete in the games

market with an infinite amount of games, but no British company has such resources. Anlog are now publishing other companies' games. Apart from their ties with 6 foreign companies as mentioned above, their sprite machine utility, for example, is from Norway and is the first piece of Norwegian software to be published over here.

Anlog were one of the first companies to enter the CIB market. But, Anil Gupta isn't very optimistic about the CIB. "I can't see it lasting very long, unless the low price brings it up again". He blames Commodore. Anil, in common with a lot of software companies, approached Commodore when the CIB first appeared. But Commodore would not loan out the CIB. They insisted that all programs must be released through them and that they should receive a percentage of the royalties. The result: "There was no software available, thanks to Commodore's marketing".

Once CIBs were generally available, Anlog were one of the first companies to discontinue theirs in order to write and market their own software. They were, also, the only company to turbo their CIB programs. Their games have sold well. The news from our review team is that Anlog is one of the few companies to produce high-quality software for the CIB - for example, *Star Commander*, *Interplan* and the inevitable *Flight Path 737* (see our CIB software special). Anil is clearly disillusioned by the general quality of CIB software. Referring to his other role, he says "When you are a shopkeeper, it breaks your heart when

children return software and say it's rubbish".

And says they will produce 3 or 4 more games this year for this machine. What else have they got up their sleeves, then?

Two new utilities were demonstrated at the LET Show - *Voice Master* and *Super Match*. *Voice Master* is a digital recorder which certainly offers a lot of potential for the non-games market. Says Anil Gupta: "The Saudi Arabians are fascinated - it can help them learn to speak English".

And there is certainly keen interest from the educational sector. Because of its voice recognition facilities, for example, handicapped people may use it to play and give commands in adventure games.

*Super Match* is a low-cost tool for creating video graphics. Graphics can be created by 'free hand' or 'tracing' from drawings clipped to the pad. (We review both these utilities in a separate article).

Anil is also entering the educational software market. His wife is a teacher and has helped convince him that there is a greater need for good, realistically-priced software.

Anlog's introductory piece of educational software is *Rhodesland* which covers 'well water for children from 8-13 years. It is the same program at different levels of English and maths. It provides value for money, is educational and entertaining. Kids will play it because they want to play it". This is the sort of positive approach needed to edge the sharks out of the educational market. Anil says he might sell this product as a loss leader, so long as it serves its purpose. The 2 cassettes and the booklet will sell for \$29.95.

I broached the subject of piracy. Anil seems to have given up trying to defeat the software pirates. He has joined various groups such as EAST but has now stopped answering any enquiries about pirated versions of his games. Stuck up beside his chair was a box-load of returned, pirated Anlog games.

Anlog has never pursued a direct publicity campaign. Anil seems anxious to maintain an image of an ordinary, medium-sized company. He believes that Anlog should be judged by its products if people like them, they'll buy them. They have no PR company and have done little PR work themselves, although Anil's assistant, Clara, will now be taking on this job.

**"There is not one game which we produce which I can actually play"**

Anlog have, for a long time, been in the forefront of the Commodore games market. But, moving to further fields might be the right decision for the man who confesses, "There is not one game which we produce which I can actually play".

Anirol are out to prove that they're not just a games house. Allen Webb got a touch of the Leonardo's while Phil South found his voice (...we're still waiting for him to lose it)

# ANIROL EXTRAS

## Super Sketch



Super Sketch consists of a drawing tablet and some software. Rather than operate on the pressure-sensing principle, the tablet uses a stylus on the end of a movable arm. By means of some potentiometers, the software is able to establish the position of the stylus on the tablet. This position is then mirrored on the screen by a small cursor. So, by moving the stylus around a shape, the shape can be transferred to the screen. Connecting the tablet is easy since it just plugs into portecik port 1.

While the original American software was on cartridge, it will be on disc and cassette in the UK (at least the Anirog version). On loading, a title page is displayed and nudging a button you're in business. The tablet has five buttons at the top. The central button controls a clamp which is used to hold paper in place if you want to trace a shape. The two outmost buttons, labelled LFT, are used to lift the pen from the paper so you can move about without drawing lines. LFT also enables you to leave the menu. You can return to the main menu by pressing the MENU button. The button marked SELECT is used to pick menu options.

This system operates in normal multicolour mode offering 160 by 200 resolution with up to four colours per character block. You can, within the colour constraints, set up to 10 colours in your picture. The software is completely menu driven with four menus available.

The main menu provides the main system options such as colour change, fill, draw, erase, clear, undo and page swap (two drawing pages are available). From this menu you have access to the

other menus. Both fill patterns and brushshape are user definable. While 16 pre-defined shapes are available, you can create your own. This means that you can design a four colour taster design and then print a shape with this design. These options offer a huge range of fillings and colour tones.

The normal drawing options of lines, rays, boxes, circles, ellipses, copy and a range of mirroring options are available offering excellent flexibility. There is a zoom window available which allows you to carry out intricate work. A window option allows you to work on any specified area of screen.

If there are any problems, there are a printer dump and information on how to use the pictures in your own programs. Anirog advise that they will provide back in the final version.

Overall this system operates faultlessly. The accuracy of the stylus is good and this is enhanced by the fact that there is almost a one-to-one size ratio between the tablet and the screen. The software was a joy to use being both simple and flexible. The simplicity of the software is exemplified by the fact that my ten year old daughter got to grips with it in minutes. The package comes with a series of line drawings which can be traced and coloured. At the price, this system is excellent value and great fun.

## Voice Master

The instructions suggest that you might be able to "...have your computer talking back to you in your own voice, allow your computer to understand what you say, and write music and play an instrument just by humming..." Oh really!

What you get is the basic unit, a small brushed aluminium box, hardware comprising a headset mike and walkman style cassette combo, and the disc with all the programs on it. The box contains a set of low quality sound sampling circuit, digitally recording the sounds you speak into the mike, and replaying the speech over the loudspeaker at your TV. An ideal popular example of the results you can get with this sort of system is the "Ghostbusters" and "We aliened out!"

from Ghostbusters by Activision. Once you have digitised your words, the results can be saved and played back on any PC, without the hardware. Good news for games programmers!



The voice recognition part of the package samples a word over and over, so that the word can be remembered, recognised and acted upon, even if you get a cold. You have to speak clearly though, it's no use saying "FIBBER!" if you want your feedback to ring live!

Finally, the voice help option gives you the ability to learn or create a tune into the mike, and have the computer print it out on a musical staff. Whether this last feature works or not, I don't have the digital idea, as the review copy of the disc I was sent didn't have the program on it. Shame, because this was one of the most exciting features of the advertising!

All in all, this is a very tidy and up-to-date piece of kit. The sampling of voice cannot be any better quality, without additional hardware to govern hi-quality output. As a piece of program development hardware, computer/human interface, up-to-date games design hardware, it is an essential buy for 1985. No '86 should be without one.

Super Sketch — £49.95 (cassette)  
£59.95 (disc)

Voice Master — £29.95  
Anirol Software Ltd.,  
28 Wood Hill,  
Dorfield,  
Oxon,  
OX4 2LL.



# SOFTWARE



# SPOTLIGHT

Our spotlight talks on another selection of new games and utilities.

**Poker**  
★★★★  
Tasknet  
\$2.99  
CD-ROM

MITING DOWN AT THE POKER TABLE with such a bunch of erstwhile villains and heroes of the likes of Max Dillon, Black Lake and Billy the Kid is bound to be an education. Even more so if your education is as sadly lacking in the essentials of card school as mine is. Suffice it to say that I now have a pretty clear idea as to precisely what you're supposed to do with the five cards you are dealt. Would you believe it, I even won a hand out bluffing some of the biggest bluffers in the world! You start off the game with a thousand quid in your pocket. With a bit of luck you could turn a profit as the computer plays every hand except your own... unless, of course, you want a bit of substance which it will give without, I may say, cheating. Well it is an honor to give you advice whenever you want it. Most of the time she will probably advise to throw it all in. Perhaps that's because the air is thick with cunning and there are more than a few fingers twitching on the trigger of a gun. As a spectacle this is a pretty spectacular piece of software although it does teach the beginner the particularities of the game.

R.M.

**Rail Boss**  
★★★★  
Compendium  
£15.99  
CD-ROM or 3.5" Disk Soft

IN THIS BUSINESS DISC BASED GAME you are boss of a small-time railroad in the Wild West. If you build a line through Indian and bandit country from Home City to the main line at Junction City you hit the big-time and win the game.

It loaded without trouble and the 18 page manual is easy to follow. The authors aimed high for a challenging game with pleasing graphics and a realistic (but not too detailed) simulation. Did they succeed?

Each turn represents a day. You may sell shares, buy a loco, hire or fire staff, build track and so on. You get reports on how you're doing and what is happening in the locality. Unfortunately, the pace is slow because you work through tediously repeated menus and information screens.

I completed a game in two sessions (there is a 'save' feature). The only challenge was to play on; I didn't fancy having another go. Once you get some track working there is little risk of bankruptcy but you can't make a fortune either because the robbers and greedy shareholders are programmed to limit your cash below £2000. The program only allows one work train at a time so you can't even plough profits into later construction.

M.B.J.

**Seaside Special**  
★★★★  
Tasknet  
\$2.99 (casualty)  
CD-ROM or 3.5" Disk

I RECKON GREENPEACE SUPPORTERS are going to love this new game from Tasknet. But, even if you aren't a Greenpeace supporter, you can still appreciate it.



You control Radney Roodney who is a diminutive beachcomber. What he seems to want in life is to kill off a few of the invasive 'Polypillians' by throwing radioactive seaweed at them. Getting the seaweed is the hard part.

Radney must rush about the beach collecting clumps of the said weed while avoiding the strange variety of mutants which inhabit the place. These creatures range from guards to jellyfish. Guards march up and down the beach and will shoot anyone who gets in the way. Jellyfish will sting you to death. Crabs just nip your toe and make you jump about the place, usually into a guard or jellyfish. Seagulls have also mutated into giant birds which try to carry you away and claim even try to eat you.

Once you have collected ten clumps of seaweed, or more, you can visit the beach and head for town Downing Street where the evil 'Polypillians' live. They will appear at windows and you must hit them at least five times to kill them. These 'Polypillians' don't half look like the people who are running our country you know.

The graphics are great and often very funny. The sound effects are varied and the sound of the sea is very realistic. The game also includes the tunes I do like to be beside the seaside'. I reckon it should have been called 'I don't like to be beside the seaside' for this game!

Overall this is an addictive, good fun-packed and sometimes frustrating game. Fans of Tasknet games will love it - I did.

P.R.B.



**Caverns of Sillahc**

★★★★  
 Interceptor Software  
 £19.99  
 CSM 84

THIS IS A NEAT MIXTURE OF ARCADIAN zapping and cavern exploration, and it's pretty damn difficult in the bargain.

The rooms have built huge

underground civilisation which is maintained by a central power plant and the agricultural androids they have stolen from you. You have converted an agricultural robot sprayer into a mean craft and it is up to you to retrieve the stolen droicks. But, naturally, there are obstacles in the way such as moving planets, anti-gravity mines, laser bases, alien cities, anti-matter blocks and floating electron charges. Locating the

entrance and blasting your way through is just the easy bit. Once you're in, all the problems start. Only skilful control will help you here, and a keen mind for strategy, otherwise your spare ships will go down like size jins. Not even the voice synthesiser wishing you luck in your mission can help you underground. How it goes it is time to retreat and try for a fresh assault.

R.M.

**Lunar Outpost**

★★★  
 Eya  
 £15 (casette) £21.95 (disk)  
 CSM 84

IT'S STILL NOT QUITE SURE whether or not I understand this one. Anyway, here goes.

You are the Lunar Assault vehicle commander charged with defending a lovely tank

outpost against the deadly Zytrons. You need to protect vital buildings containing fuel supplies, ammunition, repair and command centres. You must arrange how many days you can survive before help arrives from Earth and each lunar day there are four waves of Zytrons. If you defeat one wave without losing a building, you automatically move on to the next level. The game takes

place on two screens: the lunar map which covers about a quarter of the total area under your command, and the combat zone allowing you to fight the Zytrons in close up. You can skip from one map to the other when you decide to engage in battle. To survive you have some help. Power strips allow you to move without using your internal batteries, power stations to recharge,

repair stations to rebuild, munition buildings to re-arm and pulkars to jam the Zytron navigational computers.

In plus, the whole thing seems even more confusing. Nothing is immediately recognizable and it certainly doesn't invite you to take it seriously enough to find what's what.

R.M.

**Witchwitch**

★★★  
 English Software Company  
 £9.95  
 CSM 84 - joystick

SAVE THE VILLAGE FROM being enslaved by the local volcano. Carry the magic powder to the lair of the evil witch and try to make her good. Help her find the wizard who lives in the castle and open the flow of lava before it's too late!

Help the albino monkey locate the leprechaun, as he crosses the swamp by way of jumping from toadstool to

toadstool. Fight off the attacking bird, whilst avoiding the incoming landing plans. Success in this brings you to a hump-back bridge over a stream. Before you can cross, you must kill a number of ravens whilst avoiding the cat on a broomstick at the same time. The magic power is then passed on to an owl.

The owl now has to fly over a poisonous lake, with snakes, green and brown tortoises, and strange clouds that come about flashing everywhere. Zap the snakes with your powder pouch to gain energy and points, but don't get bitten or struck by lightning!

You then move to the forest with magic, snail, beetle, spider and sticky webs, all out to get you. Dispose of them with your powerful HOOD, before arriving at the witch's house.

She is busy brewing an evil potion in a bubbling cauldron. If you can drop the magic powder in that cauldron, she will turn into a good witch. But watch out for her evil cat - it's partial to a nice meal of evil!

Then it's off to the jolly old castle on the witch's broomstick to pick up the wizard. Fly over the erupting volcano and drop some magic powder into it to stop the lava

flow. The flow can be monitored at any time by pressing the space bar. Pressing 'P' pauses the game, so you can recover your breath once more, before tackling the next stage. This adventure has six tasks, with ten difficulty levels. You commence with five lives. It includes an on-screen scoring, with good graphics, and a soundtrack of several well-known light classical pieces of music, plus catches of other tunes. The hill-billy banjo piece at the start is especially loo-mapping!

It's a good game for the kids.

M.F.N.

### Break Fever

★★★★  
Interceptor Software  
£7.99 (cassette)  
C844 41 - joystick

IF YOU HAVE EVER WANTED TO TRY break dancing without breaking your neck then this could be the game for you. Interceptor claim it is the break dance game for the '84. This may be so but I am not keen on break dancing at the best of times.

This cassette has a fast load system similar to the excellent MOVA load which gets things underway fairly quickly. Once

loaded the title screen appears and the great sound track begins (the game's best point). A scrolling message thanks people who have helped with the game and also takes a stab at us poor reviewers! Printing five begins the game.

First of all you can select your break team's colours, a nice touch but I always used the standard default colour. Once this is done you can try your hand at the first dance. A graphical stage appears with a large backdrop covered in what seemed to me, meaningless graffiti. Your break dancer appears in the centre of the stage.

There are seven different dance movements, some of which are more

complex than others. They are: Turtle, Monkey Kick, Space Shuttle (which was mentioned in the title screen message as a 'wind up to snazzy moves') although I have no idea why, Headspin, Flip, Backspin and Backspin.

The game has no scoring system but ratings are given. They range from: 'You is bad news man' which is the lowest, right up to the top which is 'Awesome'. The graphics are quite good and the sound track is wonderful. However, I found the game pretty dull and not very playable at all. Interceptor have released some excellent titles in the past but this is not one of them.

P.J.B.



### Rocket Roger

★★★★  
Alligat  
£7.95  
C844 41 - joystick

IF 1984 WAS NOTABLE FOR NOTHING else it was definitely the year of the Platform and Ladder game. A variation on the original King Kong seemed to emerge every five days and I for one nourished a fervent hope that the new year would instill some originality in software writers. Alligat didn't seem to share my hopes and have released yet another of the damn things.

Having got that off my chest, I have to say that Rocket Roger is by far the best game of its type that I have yet seen. In size alone it beats most others. The playing area is one continuous scrolling screen, so that the player is able to view the entire game without first having to clear any screens.

The actual game play takes place in a window which occupies the upper half of the screen, the remainder being used to display your score, lives and level. This adds to the difficulty factor as, when you jump, you lose sight of the ground as the screen scrolls with you thus making it impossible to be sure of where or on what you will land.

The game starts above ground but, as you scale over high mountains with the

aid of your jet pack, you soon spy a deep hole, beneath which lies a vast cavern full of the usual paraphernalia of electronic launders, inaccessible platforms, elevators and monsters of the most unlikely kind. Fortunately, very little of the scenery, other than the monsters, is fatal to our reckless friend so that exploration is not as hazardous as it usually is the case.

The motive behind all this activity is the need to find and retrieve 99 fuel crystals to enable you to refuel your stranded space ship and escape the planet.

These games leave me cold but if you like them - as many of you must - then check this one out. It is, as I say, the best I've seen.

D.J.T.

**Headache**

\*\*\*  
 Richard  
 (25th month)  
 CBM 64

THIS IS A NEW GAME FROM the low-priced range of programs by Televisa's software house.

Your task is to help Ned deliver impulses to the brain inside a graphical head. Out to stop Ned are various Thinks. Don't worry though because you are equipped with an atomizer to zap them with. Head out to annoy you is. Head

**SUPER BASIC for the Commodore 64**

\*\*\*\*\*  
 Century Software  
 25/10  
 CBM 64

TO DATE I'VE SEEN SIX EXTENDED BASICs for the 64. This package is the cheapest of the bunch and, as such, proves an interesting exception to the rule that "you get what you pay for".

The code resides in the

work as expected. PAGE removes spaces and TABs giving you more line space. FORD AND PERK are available to permit the easy handling of vectors etc. POP is provided to let you lower a RETURN from the stack, but I consider it a programming failure if it must be used.

The graphics commands are venerable but a little multi-variant. Bit-resolution plotting in both high resolution and multi-colour modes are supported with full control of plot colours. The actual drawing commands are this on

**Icarus**

\*\*\*  
 Commodore  
 25/10  
 CBM 64 ( joystick)

REMEMBER ICARUS? HE WAS the ancient Greek who tried to fly too close to the sun with his wings of wax and feathers. With predictable results. Well, in this quaint game, you have to help poor Icaro re-find his father Daedalus who has guarded the path down the nest.

Using your joystick, help Icaro to fly over the land and seascapes of ancient Greece, avoiding vultures, hills, evil Ko



Reger. If he gets to the brain, a headache occurs and you lose a life. It's all sorry for the person with all this going on in his head.

The screen comprises an outline of a head with a series of ladders and platforms inside. The ladders raised a few problems to climb as Ned is twice as wide as they are. The graphics on the whole are well defined and nicely animated. The sound effects are good and nice, the music, however, leaves a bit to be desired. There is a two player option and you can begin play on any of eight levels. Each level has a new layout of ladders and different things to avoid and zap.

Overall this is a well presented game and is well worth the cheap asking price.

P.B.B.

square 4K between the ROMs and, by using the RAM behind the ROMs for the graphics window, steals very little of the area for BASIC. I applied this approach as being sensible and extremely desirable. In common with the other packages available, the extra commands cover the areas of graphics, sprites, sound and utilities. A well scan of the available commands (8 of them) shows that they aren't particularly exceptional but do fill many gaps. Structured programming is completely unsupported so if you want procedures, IF...THEN...ELSE or REPEAT UNTIL, look elsewhere.

The utilities section covers most areas. For program editing there are AUTO, RUN/PA, PAGE and DELETE. All

the ground with only points, lines and boxes. Neither FILL or CIRCLE are available.

Almost all conceivable commands are given for sprites. You can turn them on or off, specify multi-colour or lines, expand them, move them, change the colour and specify priorities. The only missing area is the detection of collisions. The sound commands are pretty extensive covering most of the basic functions. It's a pity that cross modulation of voices is not supported.

On the whole this is an excellent package which is very good value for money. The omissions in some commands aren't surprising when you consider that the package only occupies 4K.

A.W.



birds (which try to force you earthwards), giant bees (whose stings are fatal), clouds with smiling faces (which sap your energy), and the burning sun (which tries to draw you upwards into its fiery embrace - and disaster!).

You start out with five lives and can choose from five levels of play. Your energy can be replenished by landing on top of certain buildings. The lower you fly, the more points you score - but watch out for the black cat that follows you everywhere; it certainly isn't lucky!

The opening sequence has a nice piece of music - but why does it only last for fifty seconds! The sprites are rather mediocre and the sound boring. The kids should enjoy this for an hour or two.

M.J.A.

# SOFTWARE

## SPOTLIGHT



### Pestfinder

\*\*\*\*\*  
Activision  
19.99  
Com 64 - joystick

THANK YOU ACTIVISION, YOU'VE REASSURED me that all those coins plinked in Invaders machines in the dim and distant past were really funding a training programme for something worthwhile like Pestfinder. Make no mistake though, this game is to Space Invaders what laser-cut rockets are to warp drive. It's a sort of arcade adventure with the emphasis definitely on arcade.

The player controls a little creature called a Leeper, a little creature with a

liking for radioactive holidays. Leeper moves forward only on a vertical scrolling screen but then he moves forward whirling from side to side, gliding up and down complete with his own shadow giving the player an excellent perspective on all the action. There are obstacles to jump, riddling aliens and stationary debris to be shot and radiation pools to be torn asunder to reduce your radioactivity which naturally enough eventually kills you. The object is to wander through this scenario picking up the artifacts and depositing them at bases wherever useful benefits will befall the Leeper, old-fashioned things like an extra life every 5000 points and not at some ludicrously impossible target. As more artifacts are

found, more of the master map is revealed at the end of each sector, thereby disclosing yet more bases. Useful items of equipment also have to be acquired and can be selected from the menu which appears after each sector. There are hundreds of things to shoot but if you ignore the tactical choices open, you won't last for long. The graphics are smooth and clear throughout and, while the sounds aren't stunning, they've got that pulsating quality that made the original Invaders great. Activision just don't seem to produce bad games and this masterpiece is one of the most addictive I've seen in ages. Massage your monitor for it.

A.M.

### Pascal 64

\*\*\*\*\*  
New Publishing Ltd  
124.99  
Com 64 (Disk drive required)

MANY 64 OWNERS REMOAN THE LACK of structure of Commodore BASIC and buy add-ons such as Intertec's BASIC to improve matters. PASCAL is a highly structured language which will appeal to those who want to write concise and

intelligible programs. Like the UCSD system, this is a compiler which acts on a source code stored on disk. The source code is written using the 64's own editor and therefore has line numbers (a feature not seen in normal PASCAL). The compiled code is then transferred to disc and can be LOADED by use of a loader program.

The system includes the usual PASCAL commands but also contains a number of extensions such as POKI, PEIR and graphic commands. A 515 command is available as a link to machine code and

two programs can be operated simultaneously using interrupts. The seventy page manual is reasonable albeit rather obscure in places. Novices will require one of the standard text books to learn the language.

Since PASCAL 64 is compiled, it operates at a decent speed, although I couldn't confirm the claimed 90 to 98 fold improvement over BASIC. Overall an excellent package which, at a reasonable price, gives a good introduction to an exciting language.

A.W.

**Jack Attack**

\*\*\*  
Commodore  
E15.95  
CBM 64

JACK'S A STAMPEDE HIS FEET and a rain' 's go, to watch out you rotating heads, stick around and be squashed at your peril because this is not quite the bore it at first looks. Hint - read the instructions because

there's more to Jack than meets the eye.

On each level of play out of a total of 64, there's a different arrangement of blocks on the screen which Jack can manoeuvre around in true push-me-pull-you fashion. Play the building game right and you can squish the rotating heads which drop from the sky

and bounce around menacingly waiting to pounce on Jack. Of course there are many other ways to do a bit of squishing such as by Jack dropping on top of a head from a well-timed jump or sliding off the top of a block. But be careful, Jack can only jump three blocks high and some screens have water and Jack

can't swim. Other screens have strategically placed platforms for which there are bonus scores. Further bonuses are awarded for doing all the squishing you need to before the end of time runs out.

Overall, not a bad interpretation and combination of various tried and tested themes.

E.64.

**Congo Bongo**

\*\*\*  
US Gold  
E25 (cassette) £12.95 (disk)  
CBM 64

THE TROUBLE WITH US-GOLD IS THAT IT has set such high standards of game-worthiness in the past that anything less than the best can be a real disappointment. And there's no doubt that this is less than the best although it is nevertheless



better than the average offering.

So what do we have here? A two player, two screen jungle adventure no less. First of all you have to climb a jungle mountain avoiding the falling coconuts, through monkey plateau populated by a family of giddy-barking baboons and on up to Congo's lair. Lives are lost for just being plain slow, getting clubbed by a runaway coconut and falling into the river. Reaching Congo's lair automatically



takes you on to the second screen where you have to cross a fast flowing river by holding a rifle on the hippo, lily pads, passing fish and saving things on the other side. Shades of the ancient frogger here, me thinks. But forever onward. Success merely takes you back to the first screen although its not quite so easy this time around. More Impen-like monkeys no doubt.

E.64.

**Pangora's Box**

\*\*\*  
Commodore  
E15.95  
CBM 64

OH DEAR, IS THIS THE BEST THE MANUFACTURER can produce for its own machine? built this particular Pangora's Box is totally lacking in any delights. In game terms, it looks as old as the hills. The

1983 copyright is a dead give-away.

But still, on with the show. So does Pangora's Box contain Naughty Pangora has pulled the lid off her box and is letting all the nasty bugs escape. The bugs change colour all the time and the only way she can stop them from escaping is by blowing them on to the side of the box, which is the same colour as they are but only when they have reached full size. Great eh? It gets even better. If Pangora

gets bitten she automatically moves to the chair table where you have to help her drink the right antidote.

There are eight levels to the game and you progress after the time period for each runs out. The game only ends when 25 bugs have escaped or Pangora has run out of antidotal chair to drink. But then I almost forgot, there's always the power switch.

E.64.

**Penetration**

\*\*\*  
Melbourne House  
E1.95  
CBM 64

THIS GAME CLOSELY REMIMES 'Scramble' which was one of the first scrolling screen arcade shoot 'em ups in which you controlled a small space ship through caverns of varying complexity, whilst being shot at

by missiles launched from beneath you. The object of the game was to destroy a missile dump, or something similar, on the last screen. You lost a life if hit by a missile or if you ran into anything. That, basically, was Scramble and that, basically, is Penetration except that in the original, if my memory serves me right, you had to control your ship by the obscure practice of bombing fuel

dumps. This strange tactic has been abandoned by Melbourne House; you never run out of fuel or weapons in Penetration, only lives, and even then there is a simulate mode which gives unlimited lives but no score, unfortunately.

And there you have it, but for one very nice touch: no matter how adept all the players you become you need never get bored with it as

Melbourne House have included an edit feature with which you can redesign the entire game including the number and position of missile sites, tanks and the complexity of the caverns, by simply following the on-screen prompts. This feature, I feel, is the saving grace of what is, after all, a copy of a successful game.

D.L.T.

**Mr. Freeze**  
 \* \* \*  
 Bubble Software  
 £1.99  
 CBM 64 + joystick (optional)

THIS PACKAGE FROM BUBBLE BIRD is professionally produced, it loaded first time everytime, featured music (which can be off), had a game and continue facility and an infinite number of combinations for keyboard control.

Unfortunately, what it lacked was that spark of originality which sets the best apart from the rest. The game turned out to be yet another fairly ordinary platform, ladders, killer objects combination.

Set in a freezer, your job as Mr. Freeze is to de-ice six compartments made up of six different screens of varying levels of difficulty, playable in any order. Hindering your good work is a horde of frozen renegades like bats, chickens, lops, custard pies and so on as well as some cool customers in the shape of guardian robots.

Quite an original plot but the alternative boggle the mind - Mr. Icee Kool to clean your oven, Percy Tall to clean the lamp in the washes, first think of all these titles in the office. Yawn.

Apart from the background music, sounds were of the splash variety but graphics, while hardly innovative, were well executed with a smooth changeover as Mr. Freeze walked from screen to screen. High scores were updated from game to game. While the comp had all the features of better games produced these days,

after a few plays it left me cold (no pun intended!) but the price of the package has to be lauded in mind. That said the competition in this price sector is becoming keen and with the similarly named completely different Chiller around, I know where my money would go. If you don't have a platform/ladders type game, Mr. Freeze will fill a gap in any software library without draining funds. But with so many similar and better games around, paying a pound or two more might be a better option.

B.M.

# SOFTWARE SPOTLIGHT



**Aqua Racer**  
 \* \* \*  
 Bubble Bus Software  
 £1.99  
 CBM 64 + joystick

IF YOU ENJOY THE EXCITEMENT OF power boating, this game is for you. The player controls his boat, complete with outboard and wake from the bounding front and via the joystick around different courses of increasing difficulty. Forward is used for acceleration while pressing the fire button will change gear. The power boat is shown remote screen and the object is to complete each course within a given time without going outside the marker buoys or colliding with other boats which you inevitably have to overtake. The course and background scenery scrolls left and right with your direction of travel and all the graphics are

well produced right down to a little chap who fires his cannon at the stern of each race.

There are 20 ascending levels of difficulty and I found the qualifying round quite a test. Happily, there is a practice mode that avoids those busybodies in the other boats who always seem to get in the way. Any difficulty level can be selected for practice thus the horizon will be faced in full previewed.

The menu screen also shows High scores, keeping a record of three. An option of up to four players is provided although this is limited to each player having one turn and seeing how far he can

progress.

A humdrum tune accompanies the selection menu but otherwise effects are of the white noise variety porting engines, gear changes and collisions. Graphics are all well produced with good contrast to back the information and illustration side of things.

My only qualifications would be the lack of visual variety on each succeeding level. All in all though, it's a goodie.

B.M.



A.P. and D.J.

Stephenson sort out  
your data problems.

Sorting data into some kind of order involves an exceptional amount of processing time, most of which is spent comparing relative magnitudes. Although such individual comparison can be carried out in a few milliseconds using BASIC, the time taken for a complete numerical or alphabetical sort of, say, 1000 data items can take minutes, rather than seconds. Even one minute is a long time to wait just watching a blank screen. Of course there are efficient and not so efficient BASIC programs but even the best of them are often unacceptably slow. The answer, of course, is to use machine code subroutines which, in general, have the effect of changing minutes to seconds. Before attempting to describe them, we take a brief look at some of the hardware obstacles involved.

The execution speed of machine code solutions, however masterly in underlying design, must ultimately be limited by the hardware in general and the microprocessor, in particular. It is customary to measure the speed of a computer in terms of mips, which is an abbreviation for millions of instructions per second. The ATIGA used in the Commodore 64 and the 80C is rather slow in terms of mips — around 0.5 mips. In contrast, some of the mainframe giants have a speed of about 100 mips and the low fifth generation models are predicted to approach 1000 mips.

So, we can see that our Commodore machines, in common with most other present day microcomputers, make exceptional demands on software techniques to overcome hardware deficiencies. Perhaps we should point out that one mip means one million machine code

instructions (not BASIC statements) per second. When we consider that some BASIC statements require over 50 machine code instructions, it is clear that the situation is even worse. This means that BASIC must be the first casualty in the war against sluggishness, and its place taken by machine code.

As we have seen, sorting data into numerical or alphabetical order is an inherently slow process and programs which frequently have to sort data, such as filing systems and databases, require machine

code therapy to reduce active life.

### Integers and integer array storage

We have stressed the importance of machine code sorting but, in most cases, other parts of the program may be written in BASIC. We must, therefore, write the subroutines with this in mind. For example, machine code subroutines will be called from BASIC and then returned to it. The necessary parameters,

are stored and arranged by the BASIC interpreter. Although, in most cases, data will be held in numerical or string arrays, we ought to start from the bottom and consider how integers are stored in the Commodore 64.

A simple integer can represent signed whole numbers between -32768 and 32767. This requires 16 bits, 15 of them for magnitude and one for the sign, for sgn. The two bytes necessary for each integer are stored as shown in Figure 5.1.



Figure 5.1 How the BASIC interpreter stores integers in an array



Figure 5.2 The components of the array header

such as the number of data items and where they are in the memory map, must be passed over to the subroutine from BASIC. This means that we must have detailed knowledge of the way numbers and strings

Each integer of the array is stored in sequential addresses in the order, high-byte first, low-byte second. The starting address of each integer is therefore two ahead of the previous one.



## The array header

In addition to the block of integer bytes, the BASIC interpreter requires some administrative "paperwork" to be stored at the beginning of the block. After all, this array will have a name chosen by the programmer, for example *ARR*. There may be more than one array, so the array name, in this case, *ARR*, must be stored. The interpreter will also need

to know what dimensions it has. For example, is it 1000 *ARR(0)* or is it DIM *ARR(0,1)*. This information and some more bits and pieces are stored at the beginning of the block of integers termed the *array header*. The details are shown in Figure 5.2.

The details of the array header are as follows:  
 bytes 0 and 2  
 These are reserved for the two characters allowed for the array

name. Byte 1 will contain the ASCII code + 640 of the first character and byte 2 the ASCII code of the second character +500. But an array name can consist of only one character, in which case, byte 2 contains only +500. The constant 500 in decimal is, of course, 1E8 in decimal and ensures that the row is set to 1 for later identification purposes.

For example, if the array was

named *ARR*, byte 1 would have 1E1+640=1400 and byte 2 would have only the constant 500 because there is no second character.

Bytes 3 and 4

These represent an address pointer to the start of the next array of another matrix. Incorporating the start address of the present array by the contents of bytes 3 and 4 will produce the starting address of

## Program Listing 1

```

10 ! BUBBLE SORT
20 ! ARRAY OF SIGNED INTEGERS
30 NUMBER = #FB
40 CYCLE = #FD
50 POINTER1 = #57
60 POINTER2 = #59
70 FLAG = #FF
80 #=#0000
90
90 SEC
100 LDA NUMBER
110 SBC #1
120 STA NUMBER
130 BCS OUTERLOOP
140 DEC NUMBER+1
150 OUTERLOOP CLC
160 LBR #2F
170 ADC #F
180 STA POINTER2
190 LDA #10
200 ADC #0
210 STA POINTER2+1
220 LDA #0
230 STA FLAG
240 STA CYCLE
250 STA CYCLE+1
260 INNERLOOP LDA POINTER2+1
270 STA POINTER1+1
280 LDA POINTER2
290 STA POINTER1
300 CLC
310 ADC #2
320 STA POINTER2
330 BCC SKIP
340 INC POINTER2+1
350 SKIP LDR #1
360 SEC
370 LDA (POINTER2),Y
380 SBC (POINTER1),Y
390 DEY
400
410 LDA (POINTER2),Y
420 SBC (POINTER1),Y
430 EOR #00
440 NOOVERFLOW BPL NOOAP
450 INY
460 STY FLAG
470 SNOFLOP LDA (POINTER1),Y
480 TAX
490 LDA (POINTER2),Y
500 STA (POINTER1),Y
510 TXA
520 STA (POINTER2),Y
530 DEY
540 BPL SNOFLOP
550 NOOAP INC CYCLE
560 BNE SKIP2
570 INC CYCLE+1
580 SKIP2 LDA CYCLE
590 CMP NUMBER
600 BNE INNERLOOP
610 LDA CYCLE+1
620 CMP NUMBER+1
630 BNE INNERLOOP
640 LDA FLAG
650 BEQ FLAGCLEAR
660 LDA NUMBER
670 SEC
680 SBC #1
690 STA NUMBER
700 BCS SKIP2
710 DEC NUMBER+1
720 LDA NUMBER
730 SKIP3 BNE OUTERLOOP
740 LDR NUMBER+1
750 BNE OUTERLOOP
760 FLAGCLEAR RTS
READY

```

the next array — this can often be useful information.

#### Byte 5

This contains the number of dimensions in the array. For example, (DIM A%(100,3)) represents a two-dimensional array, so byte 5 would contain binary 10 (2). In fact, Figure 9.2 assumes this.

#### Bytes 6 and 7

These two bytes hold the array size.

#### Bytes 8 onwards

The array header finishes at byte 7 and the actual two-byte integers are stored sequentially following on from the end of the header. The first pair is element 0, the next pair element 1, and so on to the end of the block. In most cases, it is advisable to leave the space for element 0 empty and commence at element 1, if we do this, we save, from previous work, that incrementing the start address of the array by one gives the address of the first array integer. On the other hand, if we utilize the element 0 position, we increment by one saves subsequent increments of two will lead us through the remaining integer pairs.

### Supplying the parameters from BASIC

Now that we know how integers and their array headers are stored, we can work out what form of BASIC assignments must be written before calling on a machine code program for processing an array. For example:

```
Parameter passing
100 H%=(N%)/256
110 L%=(N%-(H%*256))
120 P%=(251+L%)
130 P%=(252+H%)
140 S%=(49152)
```

N% = the number of integers in the array and a BASIC integer variable. This must be split into two component bytes. H% is for the high byte and L% for the low byte. Note from line 100 that H% is obtained by dividing by 256, since N% is already in integer form there was no need to use the INT function. The low byte L% is obtained from the remainder, using the equation in line 110. The two bytes are then stored in addresses 251 and 252 using

### Program Listing 2

```
10 REM TESTING H/C INTEGER SORT ROUTINE
20 REM GENERATE RANDOM INTEGER ARRAY
30 PRINT CHR$(147)
40 INPUT "SORT HOW MANY INTEGERS?":N%
50 REM FILL AND DISPLAY RANDOM ARRAY
60 DIM A$(N%)
70 FOR N=1 TO N%
80 A$(N)=(INT(132000+RND(1)))
90 A$(N)=A$(N)-14000
100 PRINT A$(N)
110 NEXT
120 PRINT
130 PRINT "SORTING"
140 PRINT
150 REM SET UP NUMBER PARAMETER
160 H%=(N%)/256
170 L%=(N%-(H%*256))
180 REM PASS NUMBER PARAMETER
190 P%=(251+L%)
200 P%=(252+H%)
210 REM CALL H/C SORT ROUTINE
220 T1="000000"
230 S%=(49152)
240 T%=(1/60)+0.5
250 REM DISPLAY SORTED ARRAY
260 FOR N=1 TO N%
270 PRINT A$(N)
280 NEXT
290 PRINT "PRINT 'SORTED' N% INTEGERS IN "T%
    "SECONDS"
```

FIG. 2. The machine code routine is assumed to start at \$C800 which is 49152 decimal.

### The bubble sort

Because of the importance of data sorting, many people have conversed upon, the problem and a bewildering number of different algorithms have evolved. A simple and well known algorithm, is the bubble sort. The details have been well documented but we will give a brief outline.

Two loops are involved. The inner loop compares, and if necessary, swaps adjacent items. The largest integer in the array always 'bubbles' down to the bottom — hence the name. It is no longer necessary to involve this integer, so the outer loop count is reduced by

### Program Listing 3

```
0000 38 A5 F9 E9 01 85 F8 80
0008 02 C6 FC 10 A5 2F A9 09
0010 85 59 A5 30 69 00 85 5A
0018 69 00 85 FF 85 F0 85 FC
0020 A5 5A 05 58 05 5A 00 57
0028 18 A9 02 85 59 90 02 6A
0030 5A 90 01 28 81 59 F1 57
0038 88 81 59 F1 57 50 02 49
0040 80 10 10 C8 84 FF 81 57
0048 8A 81 59 F1 57 8A 91 59
0050 88 10 F3 E6 FD 80 02 6A
0058 F8 A5 F0 C5 F8 D0 C1 A5
0060 F8 C5 FC D0 88 A5 FF F0
0068 13 A5 F8 38 E9 01 85 F8
0070 80 04 C6 FC A5 F8 D0 93
0078 A5 FC D0 BF 60
```

Program 3.1 The dump version of Program 3.1

one and the inner loop is again entered. On subsequent loop cycles, the next largest integer bubbles down to the last but one position, and so on, until the entire array is sorted. Since a large number of comparisons are necessary, the maximum speed, in BASIC, is very slow. In machine code however, the speed is increased to an acceptable level.

The use of a swap flag can speed up the execution of a bubble sort, particularly if the array is already partly ordered. In practice, an array is seldom completely disordered. The swap flag is reset to zero at the start of the outer loop and, if one swap is necessary, the flag is set to 1. If a complete cycle has occurred and the flag remains clear, it indicates that a swap was unnecessary and the array must be completely

sorted. As soon as this condition exists, no further loop cycles are required and the program can be terminated. In other words, the inclusion of the swap flag changes the pure bubble sort into a hybrid bubble/exchange sort.

### A machine code bubble sort

Program 9.1 is a listing of a bubble sort using the swap flag.

It can be called from BASIC providing, of course, that the necessary parameters are sent.

### Analysis of Program 9.1

The program uses many of the techniques described in earlier parts of the series. You may find it necessary to refer back to the December issue of 'Your

Computer' to remind yourself of indirect addressing. Once this has been examined and assembled, it can be thoroughly tested out by means of Program 9.2 which is written in BASIC.

### Using Program 9.2

To test out the machine code, the program first asks how many integers are to be sorted. The integers are obtained by means of the random number generator and placed in an array named A%. The raw data, in its unsorted form, is then scrolled down the screen, in order to satisfy the user of the prevailing situation before the machine code gets to work. The parameters necessary for calling the machine code are the usual POK! statements described earlier. Before calling the subroutine with SYS

4950, the time clock TH is reset. On return from the machine code, the integers are then displayed in correct order followed by a display of the time taken to sort them. Note that the time taken to set up and display the random array often exceeds the sorting time, providing a good illustration of machine code speed. The clock, of course, measures only the sorting time. It is worth spending some time trying out the system with different numbers of integers. By doing this, you will discover how the number of integers is related to the sorting time. You will find that the relation is far from linear, in fact it is almost square law in form and is the reason why the bubble sort is not popular if very large arrays are involved. However, sorting 500 integers only takes a few seconds.

#### Explanation of Program 9.1

Lines 80 to 70 Assign symbolic names to certain zero-page locations. (Zero page is essential for indirect addressing.) The number of integers in the array, together with certain other parameters, is picked up when running Program 9.2 which is used to test out the machine code. This is described later. It is sufficient in the machine to refer back to the few lines given earlier. For example, POK! 31118% places the low byte into the hex address \$B8, and the high byte into the next location \$C. Line 80 assigns the symbolic address NUMBER to \$B8, the high byte will be in NUMBER + 1.

Line 81 Increments the code is assembled starting at the address \$C000.

Lines 90 to 140 Decrements the two byte integer, NUMBER.

Lines 150 to 210 Sets the address of the first element in the array in POINTER 1 (two bytes) by picking up the starting address from location \$2 and \$3 and adding the offset 9. The addition of 9 ensures the fourth element of the array is not used.

Lines 220 to 250 Initialise the CYCLE counter and the swap FLAG.

Lines 260 to 280 Copy POINTER2 (two bytes) into POINTER1.

Lines 300 to 340 Add 1 to POINTER1 and stores the result in POINTER2 (two bytes). The reason for adding 1 is because the address of the next integer in the array is two bytes forward.

Line 350 Initialises the Y index register to 1 for indirect indexed addressing.

Lines 360 to 410 Subtract the first integer from the second, low byte then high byte, keeping the most significant byte of the result in the accumulator (this holds the

all important sign bit, indirect indexed addressing is used to pick up the integer bytes from memory. Remember that integers are stored with the high byte lowest in memory.

Line 420 Checks if the Y flag is set, if clear, it skips line 430.

Line 430 Assumes that the Y flag is set so reverses the sign bit.

Line 440 Tests the sign of the accumulator contents and bypasses the swap loop if positive (including zero). This ensures that if both integers are the same, no swapping occurs.

Line 450 Prepares the Y register for swapping.

Line 460 Stores the Y register contents in FLAG, in fact any non-zero number is sufficient to indicate a swap has taken place.

Lines 470 to 540 Handle the actual swapping of adjacent integers, starting with the high bytes. Ten is used if the higher bytes are tested first. The X register is used as a temporary storage cell because \$A3 is much faster than using a memory location. The stack could have used but P1A takes 8 cycles.

Lines 550 to 570 Increment the CYCLE counter by 1.

Lines 580 to 630 Compare the low byte of CYCLE and NUMBER. If the result is non zero, a branch is made to the label INVOKE\_LOOP. If the result is zero, the program 'falls through' to compare the high byte in the same manner.

Lines 640 to 650 Checks if FLAG is clear and, if so, a branch down to FLAGCLEAR is made ready for exit.

Lines 660 to 710 Decrements NUMBER (two bytes) to be taken into account.

Line 720 to 730 Checks if NUMBER has reached zero. The low byte is checked first, branching to OUTRLOOP if not zero. If the low byte is zero, the high byte is similarly checked.

The Commodore C128 is the hottest Commodore news from the States at the moment and should be available in the UK from mid-summer. Barry Miles provides a sneak preview from his study of a prototype of the machine.

THE BURNING QUESTION ARISE !!! "Has Commodore got it right this time?", especially in the wake of the still-fairly of the 800 and 700 machines, and the question-mark over the Plus/4, following its recent price cut.

The C128 possesses an enlarged memory and can operate in a special emulation mode, thus making it compatible with existing Commodore 64 software. It can also run under CP/M which is a substantial advancement. This machine has an integral disc drive option and it should be possible to read CP/M discs which have been formatted on other makes of disc drives.

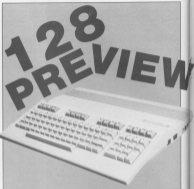
As far as looks go, the 128 is a very elegant machine. The main box which houses the CPU is pleasantly angular in shape and has ample space to take the integral disc drive. The keyboard is detached and as a cable which enables the user to place it at a substantial distance away from the main unit and monitor. The key-strokes are identical to the 64's, something which 64 users will find attractive.

The function keys are at the top right-hand corner of the keyboard which means that, using them shifted, requires two hands. There are four cursor movement keys on the top row. On the top left of the keyboard are the ESC, CTRL, TAB, ALT, HOME/ATH and CAPS LOCK keys. Adjacent to these is another group of four keys - HELP, LINE FEED, 40/80 DISPLAY and NO WORDS.

The machine has been made more manoeuvrable by incorporating a screen underneath the main unit into which the keyboard will slip.

The sockets to the rear of the machine are the familiar 64 ones. The C128 uses standard "D-type" connectors for joysticks, unlike the Plus/4 and C16. Also, the cassette connector connects to a normal type of Commodore cassette unit rather than the special one which is marketed for the C16 and Plus/4.

The integral disc drive in the machine I examined was a 5 $\frac{1}{4}$ " floppy-disc version, judging by the shape of the computer's



box, twin floppies should be possible but there are no plans to include a hard disc version at the moment.

When using the disc drive in the mode, it operates at the cumbersome 1M1 speed but it speeds up when in CP/M or C128 mode. One might have hoped that, when the machine is operating as a 64, the spare 64K of RAM would be used as RAM-disk to speed up operation of programs which require considerable disc access. Unfortunately, in pursuit of true 100% Commodore 64 compatibility, this facility has not been provided. Maybe it won't be long before people will devise methods of convincing the machine temporarily that it is operating as a C128 while disc access is taking place, only to switch back to 64 emulation mode as soon as disc access is finished!

### In operation

On power-up you are automatically placed in the C128 mode. The power-on message says 128K5 bytes free which is quite impressive to old Commodore hands! If you have an integral disc drive fitted, then the machine immediately tries to load the first program on the disc.

In C128 mode, the default is a 40-column screen display. However, you can

change to the 80-column display simply by pressing the 40/80 key after turning the computer on. Once you have entered the C64 or CP/M mode, you must press the RESET button to turn the machine off and on again to return to C128 mode. To enter C64 mode, you either insert a cartridge containing 64 type code or enter GD 64 and RETURN. The CP/M mode cannot be entered from the 64 mode but, from C128 mode, you type B002 CP/M and press RETURN. Alternatively, if you have a CP/M utilities disc in the disc drive, on power-up, CP/M will automatically be loaded.

In fact, one of the more exciting aspects of the C128 mode is that you can have it screen operating in 80 column mode, only one of which is visible at a time. Consequently, the computer can be writing on one screen while showing another, and the user can switch between them rapidly. The connectors on the machine permit you to use two monitors simultaneously, one showing 40 columns and one 80 columns. It is therefore possible to have two different displays controlled by a single program.

### BASIC

The new computer continues the improvement in Commodore BASIC





This month, Your

Commodore's "problem page"

provides a forum for those

wishing to contact other

Commodore fans.

# INPUT

## INPUT

Please can you tell me how to load a machine code program at an address outside BASIC so that I can load it directly later on.

Suppose I POKE in, either directly or by a BASIC program from DATA lines, a 128-byte machine code program starting at address 10000 (0A000). I use a monitor (e.g. CBM Macro Assembler Development System). I can, of course, SAVE the machine code program by "S PROGRAM", "BCEB", "CBM". I can then load it later by "LOAD", "PROGRAM", "S", without using the monitor.

Can I get the same result directly from BASIC, i.e. without resorting to the monitor to SAVE it in, please could you tell me how to do it.

AM, Perth  
Dunnet

## OUTPUT

Store the machine code in the area of memory between addresses 5000 and 50FF (i.e. 0110 and 020F decimal). After the machine code has been POKE'd into memory, calculate the 16 and 16-bytes of the start and end of your machine code program in decimal.

Then, POKE locations 43 and 44 with the 16 and 16 bytes of the start of the routine, POKE location 45 with the 16-byte \*1 at the end of the code and location 46 with the 16-bytes. Then, to avoid an out of memory error, the area where the variables start must be altered thus:

POKE 53 with the same value as location 43  
POKE 54 with the same value as location 44

Finally, type in: SAVE "program name", \*1 and either reset the values to what they were before else switch the machine off and on again.

## INPUT

After searching for several weeks to find a suitable RGB cable to connect my 4800 to Hitachi 14H TV/Monitor, I eventually located a source, but I was appalled at the retail price of \$199! I would therefore appreciate some advice on how to construct up the pins on the relevant DIN sockets (shown below) with a view to constructing my own cable.

Ken Parker  
Type and Wear

## OUTPUT

The Hitachi plug is on RGB format and the monitor appears to be composite video so, unfortunately, no connection can be made.



1. RED INPUT
2. GREEN INPUT
3. BLUE INPUT
4. VIDEO INPUT (L-LEVEL)
5. GND
6. VIDEO INPUT (H-LEVEL)
7. GND
8. VIDEO INPUT (H-LEVEL)
9. GND
10. VIDEO INPUT (H-LEVEL)
11. GND
12. VIDEO INPUT (H-LEVEL)
13. GND
14. VIDEO INPUT (H-LEVEL)
15. GND



1. LUMINANCE
2. GND
3. AUDIO-OUT
4. VIDEO-OUT
5. AUDIO IN
6. GND
7. AUDIO IN
8. GND
9. AUDIO IN
10. GND
11. AUDIO IN
12. GND
13. AUDIO IN
14. GND
15. AUDIO IN

## INPUT

In the last issue of Your Commodore, you included a program listing of Cherry Piker by J.G. East. As I own a Commodore 64, and was interested in this game, I was disappointed to discover that this program was for cassette and not disc. I have the Commodore Disc Drive 1541 and would like to load the program on to disc. Could you please tell me the best way to do this? The content of this magazine is the best of any dedicated to the Commodore 64 - keep up the good work!

M.J. Gieby  
Wimbledon

## OUTPUT

This is very simple. Replace the LOAD in 100 of part 1 with LOAD "P1". Replace the LOAD in 5100 with LOAD "P1" in part 2. Name the 1 program Cherry, P1.P1.

## INPUT

On page 47 of the December 84 issue, I read of a device called a "Sequential Circuits Model 64 Sequencer". I am a musician and very interested in the MIDI system. If I could obtain it from my 64, I would be ecstatic.

The device I refer to has never been heard of in the software marketing stores in Australia (which I suspect) so could you please forward me the address and details of where I could get one from or import it.

Peter Gale  
Australia

## OUTPUT

Sequential Circuits are an American firm whose products are definitely available in Australia. I suggest that you phone around some of the larger music or computer stores in Queensland. They should be able to help you.

I am trying to start a user group for the Commodore 628 printer/plotter with the aim of exchanging programs, hints/tips, etc... I would be grateful if you could mention this on the letters/news page of your magazine.

Anyone interested should contact me at the following address (S.A.E.) or on Postal Mailbox: 7822961J  
 Computer Courier: SCB 1  
 Lewis Belfs  
 86 Biches Head Road  
 Biches Head  
 Wake-on-Sleeve  
 W15 6J

Please could you include details of our user group. It is the Southport Commodore Computer Users Group which has now been going for 18 months.

We should like to establish regular contact with groups in the United Kingdom to help us overcome the shortage of up-to-date information, as magazines from the UK are usually 3 months old before they become available here.

S.C.C.U.G.  
 Box 790  
 Southport  
 Queensland  
 Australia 420

I should like to exchange experience, information, programs and literature about the Commodore 64. My name is Anđrija Kolundić, in Belgrade, I have organized the first and biggest club for personal computer fans. I have held courses in BASIC and machine language for Sinclair and Commodore computers. I have already taught 2000 pupils and am working with another 2000. I have also held courses on Yugoslavian TV and radio.

I am now writing a book on BASIC and machine language for the Sinclair Spectrum and Commodore 64. It will be the first book of its kind in Serbo-Croat (Yugoslavia's native language). I also contribute to two Yugoslavian personal computer magazines - Yu-Video and The World of Computers.

I own a Sinclair Spectrum, Commodore 64 and Commodore VIC 20, 3 disc drives, and 4 printers (VC 1515, VC 1520, MPE 681, Core 801/7 and over 1800 original programs). I also have two modems (Bridgeway 8428 and WCMODEM) and I wish to communicate

through the telephone network. I am also a radio amateur; my call number is YU1 PUE.

If you are interested in getting in touch, you can contact me at the following address:  
 Anđrija Kolundić  
 Vojvode Brane 31/4/44  
 11000 Belgrade  
 Yugoslavia

We should appreciate your mentioning the newly formed Christian Micro Users Association. We hope not only to link together a large number of Christian micro users but also to promote the use of micros in church related activities.

Anyone interested can send a large SAE to:  
 Christian Micro Users Association  
 6 Walsley Street  
 Sheffield S4 3EG.

We will send a sample magazine and further details.  
 P.A. Clark (Secretary)  
 Sheffield



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In this month's project, Garry Marshall shows how to add a professional touch to your programs with three-dimensional shapes.

# PROGRAMMING PROJECTS

MANY DIFFERENT SORTS OF PROGRAMS need to display realistic three-dimensional shapes. A computer-aided design program must be able to do this, as then its users can examine the shape of the object that they are designing. Adventure games with convincing graphics have a considerable edge over text-based games. For these, and other programs, it is useful to have at hand a simple means of generating the shapes.

One way of generating three-dimensional shapes is to start with the profile of an object, such as the one shown in Figure 1, and to rotate it through a complete circle about a vertical axis. Figure 2 shows how this simple procedure generates a three-dimensional object. It can be simpler, and rather more effective, to create the object by rotating its profile to equally spaced positions around the circle and to draw it in each of these positions. Figure 3 shows the plan view (with the axis of rotation at the center) of the situation when six equally spaced positions around the circle are used, and Figure 4 shows the resulting object with its facets.

The project is to write a program that will accept a number of facets, and will then draw the three-dimensional object with the given number of facets that is produced by rotating the profile. Figure 5 shows the sort of results that the program can give.

## First steps

We shall begin by preparing the facilities that the solution program will need to call on. Obviously, the program will need to display its results on the high-resolution graphics screen, and so it will help to have a subroutine to prepare the  $\text{BI}$  to do this. We have used a routine for this in an earlier project. With a reminder that it takes a fair time to do its job, a subroutine for this, starting at line 100, is shown in Subroutine 1.

The drawings of the three-dimensional shapes will be composed of straight lines. This means that it will be a good idea to have a subroutine for drawing a straight line that we can call on. It will work by drawing a dot at every position along the path of the line from one end to the other. We have used a

```
500 POKE 53272, PEEK(53272) OR 8
510 POKE 53265, PEEK(53265) OR 32
520 FOR I=8192 TO 16192: POKE I, 8:NEXT I
530 FOR I=1024 TO 2023: POKE I, 22:NEXT I
540 RETURN
```

Subroutine 1

```
1000 RO=INT(R/8): CO=INT(C/8)
1010 L=R AND 7
1020 BIT=7 - (C AND 7)
1030 BYTE=8192+RO*320+CO*8+L
1040 POKE BYTE, PEEK(BYTE) OR 2*BIT
1050 RETURN
```

Subroutine 2



Figure 1 Profile

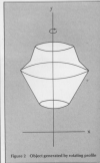


Figure 2 Object generated by rotating profile





## Subroutine 3

```

2000 (X(K)-X1) / DY=Y2-Y1
2010 IF D=0 THEN 2070
2020 FOR C=1 TO 12 STOP (20X(D))
2030 R=(X(C)-X1) / (C-1) * DY / DX
2040 GOSUB 1000
2050 NEXT C
2060 RETURN
2070 C=X1
2080 FOR R=Y1 TO Y2 STEP (20Y(D))
2090 GOSUB 1000
2100 NEXT R
2110 RETURN

```

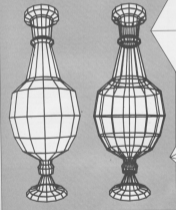
## Subroutine 4

```

10 GOTO 10
20 DIM X(12), Y(12)
30 DIM XP(12), YP(12)
40 DIM X(12), Z(12), XN(12), Y(12)
50 FOR K=1 TO 10
60 READ X(K), Y(K)
70 NEXT K
80 DATA 9
90 DATA 18, 26, 9, 16, 7, 12, 2, 8
100 DATA 2.5, 4, 3, 8, 5, -4, 6, -6, 9, -12

```

Figure 1. Typical results from the program.



routine for plotting a dot in column C and row R, on the screen in an earlier project. It is shown in Subroutine 2.

A subroutine for drawing a line also needs to keep testing the appropriate signs for C and R to this subroutine. Figure 6 shows the relationship between C and R for the points along a line

between the points (X1, Y1) and (X2, Y2). The difference between the y-coordinates of the end points of the line is stored under DY and the difference between the x-coordinates under DX. The slope of the line is then given by DY/DX. Line 2070 is needed to avoid division by zero when a line is vertical. It causes a

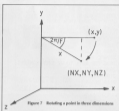
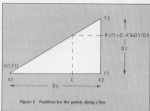


Figure 3. Positions for decentered rotation.



Figure 4. Object generated with six facets.

branch to line 2070 where the instructions for drawing a vertical line begin. The subroutine for drawing a line from (X1, Y1) to (X2, Y2) by drawing a dot at the appropriate position in every column from column X1 to column X2 is shown in Subroutine 3.



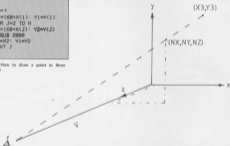
Subroutine 4

```

200 X1=100*(X11): Y1=Y11
210 FOR J=2 TO H
240 X2=100*(X12): Y2=Y12
250 GOSUB 2000
260 X1=X2: Y1=Y2
270 NEXT J

```

Figure 8. How to draw a point in three dimensions



Subroutine 5

```

120 Y0=Y11): Y0=Y11
130 FOR K=2 TO H
140 IF Y0<Y2 THEN Y0=Y1K)
150 IF Y0<Y3 THEN Y0=Y1K)
160 NEXT K
170 FOR K=1 TO H
180 X1K=X0C+(X2B/Y0) - Y0
190 Y1K=X0C+(Y2B/Y0) - Y0
200 MP1K=X0C): MP1K=Y1K)
210 NEXT K

```

Subroutine 6

```

30 DIM MP1K), MP1K)
200 MP1K=X0C): MP1K=Y1K)
350 FOR K=1 TO H
400 X1=X0C+(X2B/Y0) - Y1K)
410 Y1=X0C+(Y2B/Y0) - Y1K)
420 GOSUB 2000
430 NEXT K
440 FOR K=1 TO H
450 MP1K=X0C): MP1K=Y1K)
460 NEXT K

```

## Subroutine 7

```

400 DIM M(4), Z(40), X(40), Y(40)
200 FOR REP=1 TO 7
300 FOR I=1 TO N
300 M2(I)=M(I)*M5(DX2)+REP*(F) : M4(I)=M(I)*M5(2)+REP*(F)
310 M3(I)=M(I)*Y(I)+M2(I)*5000 : Y3(I)=Y(I)+Y(I)+M2(I)*5000
320 NEXT I
330 M1=150+M2(1) : Y1=Y3(1)
340 FOR J=2 TO N
350 M3=150+M2(J) : Y2=Y3(J)
360 GOBLB Z(000)
370 M3=M2 : Y1=Y2
380 NEXT J
470 NEXT REP

```

## Writing the program

With these tools ready for when we need them, we can begin to write the program. The first things to do are to get the number of facets for the three-dimensional object and to get its profile. The program can get the number of facets with the INPUT statement:

```
INPUT "NUMBER OF FACETS": F
```

The profile can be described by a number of points which, when joined, give the profile. We could enter the number of points on the profile and the points themselves with INPUT statements, but it seems more convenient to READ them from DATA statements. If we first read the number of points along the profile into N, we can then use this value to dimension arrays X and Y to hold the x- and y-coordinates of the points before reading the coordinate values into them. This is done with Subroutine 4.

There are gaps in the line numbers that we shall fill later when we declare more arrays. For the moment, we have the data that the program needs to carry out its task, and we can prepare the computer to display the result by:

```
LOCUS 000 NEW SET OF 40-RES SCREEN
before going on to work out how to compute that result.
```

With the data describing the profile, the numbers may not be at all convenient for the hi's high-resolution screen: they may make the profile appear very small, or they may make it too large for the screen. We ought to scale the numbers so that, no matter what they may be, they give a display that fits the screen.

Next, the program scales the data so that the y-coordinates (or row numbers) range from 0 to 150. The numbers of the screen rows range from 0 to 199, so our choice for the scaling ensures that the

displayed object will be of a good size and centrally located on the screen. The x-coordinates (or column numbers) are scaled by the same factor as the y-values.

In the following lines, the greatest value of a y-coordinate is found and stored under YG while the smallest is stored under YS. Then the data is multiplied by 150/(YG-YS) so that it occupies a range of 150 (that is, 150-0) rather than from YS to YG, and 40 is added to the y-values to make them range from 40 to 190 as required - see Subroutine 5.

At this point, we can draw the profile by introducing the scaled data values to our line-drawing subroutine. Since the column numbers on the high-resolution screen range from 0 to 199, we add 100 to the x-coordinates of the profile so that it appears positioned with reference to the centre of the screen rather than to the left-hand side. The lines necessary to draw the scaled profile shows in Subroutine 6.

When you are entering the program, this is a good place to pause to test it. But, make sure that you have saved it first! If there is a mistake, particularly in the routine for setting the high-resolution screen, it can cause the program to be lost.

## Shape creation

Rotating the profile to generate the three-dimensional shape, requires a little geometry and the ability to visualize the situation as it occurs in three-dimensions. There is nothing particularly difficult about it, and it can all be seen with the help of a couple of diagrams.

First of all, imagine what happens to a point on the profile as it is rotated to a new position. If there are  $n$  facets, the points will be rotated by  $360/n$  to get to its first new position. (Rotating it by twice this amount will take it to the second position,

by three times to the third position, and so.) The point is rotated about the vertical axis, but kept at the same height.

We now need three coordinates to fix the position of the point in three dimensions. The position is shown in Figure 7. The x- and y-coordinates of the new point are measured in the same directions as for the original profile, and the z-coordinate shows how far the point is in front of the plane of the profile. The diagram shows that the coordinates  $h_1$ ,  $h_2$  and  $h_3$  of the new point are related to the coordinates  $x$ ,  $y$  of the point on the profile by:

$$\begin{aligned} h_1 &= x \cos(360/n) \\ h_2 &= y \\ h_3 &= x \sin(360/n) \end{aligned}$$

This tells us where the point moves to. Now we want to know how to draw it, for we cannot actually create three-dimensional pictures, we can only draw representations of them on a flat two-dimensional screen. The way that this is done is illustrated in Figure 8. This shows where we must draw the point corresponding to our point in three dimensions when we want it to be in the same plane as the original profile. As before, a little observation of the right-angle triangles in the diagram shows that the coordinates  $h_1$  and  $h_3$  of the point that we should draw are given by:

$$\begin{aligned} h_1 &= h_3 \cos(360/n) \\ h_3 &= h_1 \sin(360/n) \end{aligned}$$

( $V$  is the distance of the observer from the plane containing the profile, as shown in Figure 8. It is given the value 100 in the program as this produces a satisfactory display.)

The profile can now be repeatedly rotated and drawn in each of its positions.

The arrays X(), Y(), Z() and T() are declared in line 40. The profile is drawn using the same code as was used to draw the original profile but with reference to X and Y replaced by X() and Y(). Although it would seem preferable to write a subroutine for this, instead of repeating the code, the contents of arrays would have to be swapped around to interface the subroutine to the program. As only a few lines are involved, it is simpler to repeat them. This gives us Subroutine F.

Running the program as it stands now will give a fairly convincing display, but it is improved considerably if each of the points that is used to describe the profile is joined to the corresponding point on the next profile. Adding these lines considerably improves the apparent solidity of the resulting image. To add the lines, we must save the points on the previous profile so that they are available

when the new one is drawn. The x- and y-coordinates, respectively, of the previous profile are saved in arrays named XP and YP. These arrays are declared at line 30, initialised at line 208, used to draw the required lines in lines 290 to 408, and updated for the next time in lines 440 and 468 - see Subroutine G.

The entire program is listed in Figure 5.

### Further developments

The ways in which you can extend and enhance the program include the following.

- The line-drawing subroutine can be improved by drawing a dot in every row, rather than in every column as at present, if the slope of the line is

greater than one.

- The program can be amended so that it does not draw the lines that would be hidden from the viewer, showing only the visible facets. This can be done by changing the number of repetitions required by line 200.
- The scaling system can be changed. Different scalings can be used for the x- and y-coordinates to produce a distorted image of the object for display.
- If you can fill in some of the facets with colour, it will enhance the display.
- The points need not be related to a single circular path, but can take positions on an ellipse of some other curve. A 'wobbly' curve will give interesting results.
- Different kinds of perspective to the one of line 170 can be used.

## Program Listing

```

4 INPUT "NUMBER OF PROFILES": P
10 REM H
20 DIM X(10), Y(10)
30 DIM XP(10), YP(10)
40 DIM X0(10), Z(10), X(10), Y(10)
50 FOR I=0 TO 9
60 READ X0(I), Y0(I)
70 NEXT I
80 DATA 0
90 DATA 18, 26, 3, 18, 7, 12, 2, 8
100 DATA 2.5, 4, 3, 8, 2.4, 6, -6, 9, -12
110 DIM L(9)
120 Y=YC(1): Y=YC(1)
130 FOR I=0 TO H
140 IF Y0(I)Y THEN Y=Y0(I)
150 IF Y0(I)Y THEN Y=Y0(I)
160 NEXT I
170 FOR I=0 TO H
180 X=X0(I)+I*(X1-X0) - Y
190 Y=Y0(I)+I*(Y1-Y0) - Y
200 XP(I)=X0(I): YP(I)=Y0(I)
210 NEXT I
220 X=X0(I)+I*(X1-X0): Y=YC(1)
230 FOR J=2 TO H
240 X=X0(I)+I*(X1-X0): Y=YC(J)
250 DIM L(9)
260 X=X0(I): Y=Y0(I)
270 NEXT J
280 FOR I=0 TO P
290 FOR I=0 TO H
300 X=X0(I)+I*(X1-X0)+I*(X2-X0)/P
310 Y=X0(I)+I*(Y1-Y0)+I*(Y2-Y0)/P
320 NEXT I
330 X=X0(I)+I*(X1-X0): Y=YC(1)
340 FOR J=2 TO H
350 X=X0(I)+I*(X1-X0): Y=YC(J)
360 DIM L(9)
370 X=X0(I): Y=Y0(I)
380 FOR I=0 TO H
390 X=X0(I)+I*(X1-X0)+I*(X2-X0)/P
400 Y=X0(I)+I*(Y1-Y0)+I*(Y2-Y0)/P
410 X=X0(I)+I*(X1-X0): Y=Y0(I)
420 DIM L(9)
430 NEXT I
440 FOR I=0 TO H
450 X=X0(I)+I*(X1-X0): Y=X0(I)
460 NEXT I
470 NEXT I
480 GOTO 480
490 FOR I=0 TO H
500 FOR J=0 TO H
510 FOR K=0 TO H
520 FOR L=0 TO H
530 FOR M=0 TO H
540 RETURN
550 FOR I=0 TO H
560 FOR J=0 TO H
570 FOR K=0 TO H
580 FOR L=0 TO H
590 FOR M=0 TO H
600 FOR N=0 TO H
610 FOR O=0 TO H
620 FOR P=0 TO H
630 FOR Q=0 TO H
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650 FOR S=0 TO H
660 FOR T=0 TO H
670 FOR U=0 TO H
680 FOR V=0 TO H
690 FOR W=0 TO H
700 FOR X=0 TO H
710 FOR Y=0 TO H
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740 FOR BB=0 TO H
750 FOR CC=0 TO H
760 FOR DD=0 TO H
770 FOR EE=0 TO H
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6260 FOR HHHH=0 TO H
6270 FOR IIII=0 TO H
6280 FOR JJJJ=0 TO H
6290 FOR KKKK=0 TO H
6300 FOR LLLL=0 TO H
6310 FOR MMMM=0 TO H
6320 FOR NNNN=0 TO H
6330 FOR OOOO=0 TO H
6340 FOR PPPP=0 TO H
6350 FOR QQQQ=0 TO H
6360 FOR RRRR=0 TO H
6370 FOR SSSS=0 TO H
6380 FOR TTTT=0 TO H
6390 FOR UUUU=0 TO H
6400 FOR VVVV=0 TO H
6410 FOR WWWW=0 TO H
6420 FOR XXXX=0 TO H
6430 FOR YYYYY=0 TO H
6440 FOR ZZZZ=0 TO H
6450 FOR AAAA=0 TO H
6460 FOR BBBB=0 TO H
6470 FOR CCCC=0 TO H
6480 FOR DDDD=0 TO H
6490 FOR EEEE=0 TO H
6500 FOR FFFF=0 TO H
6510 FOR GGGG=0 TO H
6520 FOR HHHH=0 TO H
6530 FOR IIII=0 TO H
6540 FOR JJJJ=0 TO H
6550 FOR KKKK=0 TO H
6560 FOR LLLL=0 TO H
6570 FOR MMMM=0 TO H
6580 FOR NNNN=0 TO H
6590 FOR OOOO=0 TO H
6600 FOR PPPP=0 TO H
6610 FOR QQQQ=0 TO H
6620 FOR RRRR=0 TO H
6630 FOR SSSS=0 TO H
6640 FOR TTTT=0 TO H
6650 FOR UUUU=0 TO H
6660 FOR VVVV=0 TO H
6670 FOR WWWW=0 TO H
6680 FOR XXXX=0 TO H
6690 FOR YYYYY=0 TO H
6700 FOR ZZZZ=0 TO H
6710 FOR AAAA=0 TO H
6720 FOR BBBB=0 TO H
6730 FOR CCCC=0 TO H
6740 FOR DDDD=0 TO H
6750 FOR EEEE=0 TO H
6760 FOR FFFF=0 TO H
6770 FOR GGGG=0 TO H
6780 FOR HHHH=0 TO H
6790 FOR IIII=0 TO H
6800 FOR JJJJ=0 TO H
6810 FOR KKKK=0 TO H
6820 FOR LLLL=0 TO H
6830 FOR MMMM=0 TO H
6840 FOR NNNN=0 TO H
6850 FOR OOOO=0 TO H
6860 FOR PPPP=0 TO H
6870 FOR QQQQ=0 TO H
6880 FOR RRRR=0 TO H
6890 FOR SSSS=0 TO H
6900 FOR TTTT=0 TO H
6910 FOR UUUU=0 TO H
6920 FOR VVVV=0 TO H
6930 FOR WWWW=0 TO H
6940 FOR XXXX=0 TO H
6950 FOR YYYYY=0 TO H
6960 FOR ZZZZ=0 TO H
6970 FOR AAAA=0 TO H
6980 FOR BBBB=0 TO H
6990 FOR CCCC=0 TO H
7000 FOR DDDD=0 TO H
7010 FOR EEEE=0 TO H
7020 FOR FFFF=0 TO H
7030 FOR GGGG=0 TO H
7040 FOR HHHH=0 TO H
7050 FOR IIII=0 TO H
7060 FOR JJJJ=0 TO H
7070 FOR KKKK=0 TO H
7080 FOR LLLL=0 TO H
7090 FOR MMMM=0 TO H
7100 FOR NNNN=0 TO H
7110 FOR OOOO=0 TO H
7120 FOR PPPP=0 TO H
7130 FOR QQQQ=0 TO H
7140 FOR RRRR=0 TO H
7150 FOR SSSS=0 TO H
7160 FOR TTTT=0 TO H
7170 FOR UUUU=0 TO H
7180 FOR VVVV=0 TO H
7190 FOR WWWW=0 TO H
7200 FOR XXXX=0 TO H
7210 FOR YYYYY=0 TO H
7220 FOR ZZZZ=0 TO H
7230 FOR AAAA=0 TO H
7240 FOR BBBB=0 TO H
7250 FOR CCCC=0 TO H
7260 FOR DDDD=0 TO H
7270 FOR EEEE=0 TO H
7280 FOR FFFF=0 TO H
7290 FOR GGGG=0 TO H
7300 FOR HHHH=0 TO H
7310 FOR IIII=0 TO H
7320 FOR JJJJ=0 TO H
7330 FOR KKKK=0 TO H
7340 FOR LLLL=0 TO H
7350 FOR MMMM=0 TO H
7360 FOR NNNN=0 TO H
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7380 FOR PPPP=0 TO H
7390 FOR QQQQ=0 TO H
7400 FOR RRRR=0 TO H
7410 FOR SSSS=0 TO H
7420 FOR TTTT=0 TO H
7430 FOR UUUU=0 TO H
7440 FOR VVVV=0 TO H
7450 FOR WWWW=0 TO H
7460 FOR XXXX=0 TO H
7470 FOR YYYYY=0 TO H
7480 FOR ZZZZ=0 TO H
7490 FOR AAAA=0 TO H
7500 FOR BBBB=0 TO H
7510 FOR CCCC=0 TO H
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7620 FOR NNNN=0 TO H
7630 FOR OOOO=0 TO H
7640 FOR PPPP=0 TO H
7650 FOR QQQQ=0 TO H
7660 FOR RRRR=0 TO H
7670 FOR SSSS=0 TO H
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7750 FOR AAAA=0 TO H
7760 FOR BBBB=0 TO H
7770 FOR CCCC=0 TO H
7780 FOR DDDD=0 TO H
7790 FOR EEEE=0 TO H
7800 FOR FFFF=0 TO H
7810 FOR GGGG=0 TO H
7820 FOR HHHH=0 TO H
7830 FOR IIII=0 TO H
7840 FOR JJJJ=0 TO H
7850 FOR KKKK=0 TO H
7860 FOR LLLL=0 TO H
7870 FOR MMMM=0 TO H
7880 FOR NNNN=0 TO H
7890 FOR OOOO=0 TO H
7900 FOR PPPP=0 TO H
7910 FOR QQQQ=0 TO H
7920 FOR RRRR=0 TO H
7930 FOR SSSS=0 TO H
7940 FOR TTTT=0 TO H
7950 FOR UUUU=0 TO H
7960 FOR VVVV=0 TO H
7970 FOR WWWW=0 TO H
7980 FOR XXXX=0 TO H
7990 FOR YYYYY=0 TO H
8000 FOR ZZZZ=0 TO H
8010 FOR AAAA=0 TO H
8020 FOR BBBB=0 TO H
8030 FOR CCCC=0 TO H
8040 FOR DDDD=0 TO H
8050 FOR EEEE=0 TO H
8060 FOR FFFF=0 TO H
8070 FOR GGGG=0 TO H
8080 FOR HHHH=0 TO H
8090 FOR IIII=0 TO H
8100 FOR JJJJ=0 TO H
8110 FOR KKKK=0 TO H
8120 FOR LLLL=0 TO H
8130 FOR MMMM=0 TO H
8140 FOR NNNN=0 TO H
8150 FOR OOOO=0 TO H
8160 FOR PPPP=0 TO H
8170 FOR QQQQ=0 TO H
8180 FOR RRRR=0 TO H
8190 FOR SSSS=0 TO H
8200 FOR TTTT=0 TO H
8210 FOR UUUU=0 TO H
8220 FOR VVVV=0 TO H
8230 FOR WWWW=0 TO H
8240 FOR XXXX=0 TO H
8250 FOR YYYYY=0 TO H
8260 FOR ZZZZ=0 TO H
8270 FOR AAAA=0 TO H
8280 FOR BBBB=0 TO H
8290 FOR CCCC=0 TO H
8300 FOR DDDD=0 TO H
8310 FOR EEEE=0 TO H
8320 FOR FFFF=0 TO H
8330 FOR GGGG=0 TO H
8340 FOR HHHH=0 TO H
8350 FOR IIII=0 TO H
8360 FOR JJJJ=0 TO H
8370 FOR KKKK=0 TO H
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8440 FOR RRRR=0 TO H
8450 FOR SSSS=0 TO H
8460 FOR TTTT=0 TO H
8470 FOR UUUU=0 TO H
8480 FOR VVVV=0 TO H
8490 FOR WWWW=0 TO H
8500 FOR XXXX=0 TO H
8510 FOR YYYYY=0 TO H
8520 FOR ZZZZ=0 TO H
8530 FOR AAAA=0 TO H
8540 FOR BBBB=0 TO H
8550 FOR CCCC=0 TO H
8560 FOR DDDD=0 TO H
8570 FOR EEEE=0 TO H
8580 FOR FFFF=0 TO H
8590 FOR GGGG=0 TO H
8600 FOR HHHH=0 TO H
8610 FOR IIII=0 TO H
8620 FOR JJJJ=0 TO H
8630 FOR KKKK=0 TO H
8640 FOR LLLL=0 TO H
8650 FOR MMMM=0 TO H
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8780 FOR ZZZZ=0 TO H
8790 FOR AAAA=0 TO H
8800 FOR BBBB=0 TO H
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8820 FOR DDDD=0 TO H
8830 FOR EEEE=0 TO H
8840 FOR FFFF=0 TO H
8850 FOR GGGG=0 TO H
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8870 FOR IIII=0 TO H
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8910 FOR MMMM=0 TO H
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8930 FOR OOOO=0 TO H
8940 FOR PPPP=0 TO H
8950 FOR QQQQ=0 TO H
8960 FOR RRRR=0 TO H
8970 FOR SSSS=0 TO H
8980 FOR TTTT=0 TO H
8990 FOR UUUU=0 TO H
9000 FOR VVVV=0 TO H
9010 FOR WWWW=0 TO H
9020 FOR XXXX=0 TO H
9030 FOR YYYYY=0 TO H
9040 FOR ZZZZ=0 TO H
9050 FOR AAAA=0 TO H
9060 FOR BBBB=0 TO H
9070 FOR CCCC=0 TO H
9080 FOR DDDD=0 TO H
9090 FOR EEEE=0 TO H
9100 FOR FFFF=0 TO H
9110 FOR GGGG=0 TO H
9120 FOR HHHH=0 TO H
9130 FOR IIII=0 TO H
9140 FOR JJJJ=0 TO H
9150 FOR KKKK=0 TO H
9160 FOR LLLL=0 TO H
9170 FOR MMMM=0 TO H
9180 FOR NNNN=0 TO H
9190 FOR OOOO=0 TO H
9200 FOR PPPP=0 TO H
92
```

# The Band's On The Run!

... 7 busy characters, 10 lost chords, 15 hours, 48 Traffic Wardens,  
95 London Tube Stations, 126,790 square feet of London,  
7 million Londoners ... 943 action filled screens.

PAUL McCARTNEY'S *Give my regards to*

# BROAD STREET

The new single is missing and the band have gone home for the weekend — leaving you just 15 hours to re-create the missing tune.

A race against time around London to find each member of the missing band. You have to watch out for blue meanies, wardens and Bats! A clever strategy game, full of excitement, brilliant graphics and all wrapped-up with McCartney music!



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For the Spectrum and Commodore ET 99

Available from W H Smith, Menzies, Laskys  
and all good computer stores.

**DAILY EXPRESS**  
*with*  
**'STUNNING'**



A.P. and D.J.  
Stephenson tie  
together the  
subroutines which  
form the basis of a  
filing system into a  
complete program.

# T.H.E.



# F.A.C.T.S

LAST MONTH, WE DEALT with a few of the major subroutines which might form the basis of a complete filing system. This article is devoted entirely to one program which fits them together. Although the program is complete in itself, it is hoped that you will alter it to suit your own needs and perhaps add additional options. It is written for tape files but it would be a simple matter to change the CP/M statements to suit disc based files. The complete listing is shown at Program 6.1

## Using the program

On first running the program, the complete menu of options is displayed although, at first there are only two possible choices: create a file or load an existing file, providing of course that one exists on tape. If any other option is selected, the "No file loaded" message is displayed and the menu regained by pressing any key.

### Option 1: Create file

The first screen message asks for an estimate of the maximum number of records required and the number of fields in a record. If you have just keyed in the program and you are in the testing stage, you should try out the program first with 100, 100 records and three fields to produce a test data tape. It would be rather foolish to start creating a long and valuable data file before the program has been fully tested using all options with a short dummy test file.

Next, you will be asked to enter the file headings. We suggest NAME, TELEPHONE and OCCUPATION for the test

file. But, there is a little snag. In order for the sort function to operate correctly on numerical columns, you must enter, where necessary, sufficient leading zeros to make all numbers contain the total number of digits. This is because all numbers are converted to strings. These preliminaries over, you will be asked to enter the actual data under each field heading. The current record number is always displayed at the top of the screen while data is being entered. When the current keyboard session is ended, key in **EXIT** to regain the menu page. Remember, you don't have to complete the whole file in one sitting. As soon as you are tired, you can save the file in its unfinished state and reload it later to carry on where you left off. The only difference is that you will then be adding new records to an existing file so you will need Option 3, "Add records" instead of Option 1, "Create records".



### Option 2: Load file

This can be a dangerous option to choose because any file already existing in RAM would be destroyed by overwriting it with the new file. To guard against using this by mistake, you are warned of the danger and can get out of the mess and regain the menu by pressing any key other than the space bar. Once you press the space bar, the new file starts to load over the existing file - so think carefully!

### Option 3: Save file

You supply the file name, which must not exceed 16 characters. You must arrange the controls of the cassette unit and the winding position of the tape used to receive the file.



### Option 4: Display file

Before using a file, it is comforting to look at it, before actually committing it to tape. Option 4 will do this for you by displaying a page of records at a time. The top field is always present, but any one of the other fields can be rotated into view by using the cursor keys. (This was explained in last month's issue when we described most of the subroutines in detail.

### Option 5: Add records

As mentioned above, this is used to add further records to a file already existing in RAM. The record number displayed at the top of the screen indicates the number of the one you are about to add.

### Option 6: Modify any field

We all make mistakes so this will be a popular option. You will be asked for the keyfield of the offending record. The first one or two characters are sufficient, and then the particular field which requires modification. The field data must then be completely re-entered. To ensure the

correction has gone in, have a peek at the file using Option 4.

### Option 7: Sort by any field

Humans like things in order, particularly alphabetical or numerical order. When you enter data into a file, it is far too much trouble to re-arrange the data in order before it is entered. Also, it would be quite out of the question to re-enter the entire file because a new corner, Thomas J, has to be entered between Thatcher M and Throver P. Obviously, we should make the computer own its mess and make it do the sorting afterwards - hence, Option 7.

To ensure maximum versatility, the file can be sorted under any field heading. For example, we may, for some reason known only to ourselves, like the file to be arranged in alphabetical order under OCCUPATION instead of name or perhaps, numerical order under TELEPHONE. Because of this, the question "Operate on which field?" must be answered, if you want to sort under TELEPHONE, it is sufficient to enter 16 or even T. The entire file will then be sorted in numerical order of telephone number, providing of course the leading zeros were correctly entered.

### Option 8: Check bytes free

When the number of records begins to grow - and they will - you should often take advantage of this option to see how many bytes are left. We could have made this a permanent feature at the top of the "Add records" display but this involves continuous housekeeping delays while the



BASIC interpreter cleans up the debris. By using a separate option, the delay is more likely to be tolerated.

#### Option 9: Delete record

The record to be deleted is found on receipt of the first one or two characters of the keyfield. The "byte" in the file is automatically closed up so you don't have to worry about wasted RAM space.

### Programming details

The listing consists of the collection of subroutines which we treated in some depth last month. All that was needed to turn them into Program 5.1 were a few bits and pieces such as initialization lines and a menu. Figure 5.1 is a simplified structure diagram of the program and will help you to understand the overall plan and, in particular, how to trace the GOSUB numbers from the CPU GOSUB statement.

Line 200 is a trap again (independent selection of certain options when there is no file present).

### Suggestions for files

Having a filing system is one thing but knowing what to file is another. A file on names, telephone and occupation was quite suitable as a simple example but, in practice, it would be rather a banal exercise. The following suggestion may be useful as a guide to the kind of information worth putting on a computer.

The British have a fond for magazines of all types including, of course, computer monthlies. A pile of magazines can grow to an alarming height because most of us can't bear to throw any of them away just in case some particular article has to be looked up. The trouble comes when you want to find the obscure article. To avoid periodic hours of frustration it is worth spending a few hours (or days) putting all the article headings into some kind of order. Program 5.1, plus some dedicated keyboard work, will do just that.

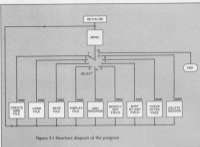


Figure 5.1 Structure diagram of the program

### Program Listing

```

10 REM RAM FILING SYSTEM FOR CASSETTE
20 FILE=0:FLD=0:NM="FILE NOT NMPED"
30 GOSUB 12000
40 GOSUB16000
50 PRINT"(1) CREATE NEW FILE"
60 PRINT"(2) LOAD FILE"
70 PRINT"(3) SAVE FILE"
80 PRINT"(4) DISPLAY FILE"
90 PRINT"(5) ADD RECORDS"
100 PRINT"(6) MODIFY ANY FIELD"
110 PRINT"(7) SORT BY ANY FIELD"
120 PRINT"(8) CHECK BYTES FREE"
140 PRINT"(9) DELETE RECORD"
150 PRINT"(10) END PROGRAM"
160 PRINT:PRINT:INPUT"SELECT OPTION ":ISX
170 PRINT CHR$(147)
180 IF SX<1 OR SX>10 THEN 40
190 IF SX<3 AND FLD=1 THEN 11000
200 IF SX<2 AND FLD=0 AND SX<10 THEN PR
INT"NO FILE PRESENT":GOSUB15000:RUN
210 ON SX GOSUB 1000,2000,3000,4000,5000
,6000,7000,8000,9000,230
220 GOTO40
230 END
997 REM *
998 REM **
999 REM CREATE FILE SUBROUTINE

```

```

1000 PRINT CHR$(147)
1010 PRINT"ENTER FILE SIZE (NUMBER OF RE
CORDS):"
1020 INPUT P$
1030 IF P$<1 THEN 1010
1040 PRINT"ENTER NUMBER OF FIELDS REQUIR
ED (2-10):"
1050 INPUT N$
1060 IF N$<2 OR N$>10 THEN 1040
1070 N$=N$-1:DIM A$(N$,P$)
1080 PRINT CHR$(147)
1090 FOR F=0 TO N$
1100 PRINT"ENTER FIELD HEADING":F+1
1110 GOSUB25000:IF F,0)=0
1120 NEXT
1140 GOSUB5000
1150 F1=1
1160 RETURN
1997 REM *
1998 REM **
1999 REM LOAD FILE SUBROUTINE
2000 INPUT"ENTER FILENAME "IN$
2010 OPEN 1,1,0,IN$
2020 INPUT#1,P$,N$,FL$
2030 DIM A$(N$,P$)
2040 FOR R=0 TO FL$
2050 FOR F=0 TO N$
2060 INPUT#1,A$(F,R)
2070 NEXT:NEXT
2080 F1=1
2090 CLOSE:1
2100 RETURN
2997 REM *
2998 REM **
2999 REM SAVE FILE SUBROUTINE
3000 INPUT"ENTER FILENAME "IN$
3010 OPEN 1,1,1,IN$
3020 PRINT#1,P$;PRINT#1,N$;PRINT#1,FL$
3030 FOR R=0 TO FL$
3040 FOR F=0 TO N$
3050 PRINT#1,A$(F,R)
3060 NEXT:NEXT
3070 CLOSE:1
3080 RETURN
3997 REM *
3998 REM **
3999 REM DISPLAY FILE SUBROUTINE
4000 C=1:B=1
4010 PRINT CHR$(147);PRINT"PRESS SPACE B
AR TO RESUME READ"
4020 PRINT L$
4030 PRINT A$(0,0) TAB(20) A$(1,C)
4040 PRINT L$;B$=B+1
4050 IF B$=FL$ THEN B$=FL$
4060 FOR R=B$ TO B$+PRINT A$(0,R) TAB(20)
A$(1,R);NEXT
4070 GET K$:IF K$="" THEN 4070
4080 IF K$=CHR$(13) THEN 4100

```



```

4090 IF KB="L" THEN C=C-1
4100 IF KB="R" THEN C=C+1
4110 IF KB="U" THEN D=D-10
4120 IF KB="D" THEN D=D+10
4130 IF C<1 THEN C=NFX
4140 IF C=NFX THEN C=1
4150 IF SC1 THEN S=(INT(FLX/10)+10)+1
4160 IF S>FLX THEN S=1
4170 GOTO4010
4180 RETURN
4997 REM *
4998 REM **
4999 REM ADD RECORDS SUBROUTINE
5000 PRINT CHR$(147);IF FLX=>NFX THEN PR
INT"FILE FULL";GOSUB15000;GOTO5120
5010 FLX=FLX+1
5020 PRINT"TYPE (EXIT) TO FINISH ENTRY O
F RECORDS"
5030 PRINT
5040 PRINT"RECORD NUMBER ";FLX
5050 PRINT;PRINT;F=-1
5060 F=F+1
5070 PRINT A$(F,0)
5080 GOSUB25000;A$(F,FLX)=0
5090 IF A$(F,FLX)="EXIT" THEN FLX=FLX-1;
GOTO5120
5100 IF F<NFX THEN 5060
5110 IF FLX>NFX THEN 5000
5120 RETURN
5997 REM *
5998 REM **
5999 REM MODIFY FIELD SUBROUTINE
6000 GOSUB14000;GOSUB13000;PRINT CHR$(14
7)
6010 PRINT"RECORD CONTAINING SELECTED FI
ELD";PRINT;PRINT L$
6020 FOR C=0 TO NFX
6030 PRINT A$(C,0) TAB(20);A$(C,R)
6040 NEXT
6050 PRINT L$;PRINT
6060 PRINT"CURRENT CONTENTS OF FIELD"
6070 PRINT A$(F,R);PRINT
6080 PRINT"ENTER NEW CONTENTS"
6090 GOSUB25000;A$(F,R)=KB
6100 RETURN
6997 REM *
6998 REM **
6999 REM SORT FILE SUBROUTINE
7000 GOSUB13000
7010 IF FLX<2 THEN 7160
7020 PRINT CHR$(147);PRINT"SORTING BY ";
A$(F,0)
7030 N2=FLX
7040 N2=(N2+2)/3
7050 FOR D=N2+1 TO N2*2
7060 FOR E=D TO FLX STEP N2
7070 FOR R=E TO D STEP -N2
7080 IF A$(F,R)>A$(F,R-N2) THEN 7130

```

```

7040 FOR C=0 TO NF3
7100 KB=AB4C,R1+AB4C,R1+AB4C,R=NF3:AB4C,
R=NF3)KB
7110 NEXT
7120 NEXT
7130 NEXT E
7140 NEXT
7150 IF N3>1 THEN 7040
7160 RETURN
7997 REM *
7998 REM **
7999 REM BYTES FREE SUBROUTINE
8000 PRINT CHR$(147);PRINT"WAIT";PRINT
8010 X=FREE(0)-(50*(FREE(0)+100)+45535
8020 PRINT"NUMBER OF BYTES FREE":X
8030 GOSUB15000
8040 RETURN
8997 REM *
8998 REM **
8999 REM DELETE RECORD SUBROUTINE
9000 GOSUB14000
9010 PRINT CHR$(147)
9020 PRINT"RECORD TO BE DELETED";PRINT;P
PRINT L#
9030 FOR C=0 TO NF3
9040 PRINT AB4C,0) TAB(20): AB4C,R)
9050 NEXT
9060 PRINT L#;PRINT
9070 PRINT"DELETE THIS RECORD (Y/N)?"
9080 GOSUB25000
9090 IF K#="Y" THEN 9170
9100 IF FL#>1 THEN 9160
9110 FOR P=0 TO NF3
9120 AB4F,R)=AB4F,R+1)
9130 NEXT
9140 R=R+1
9150 IF R<FL# THEN 9110
9160 FL#=FL#-1
9170 RETURN
10997 REM *
10998 REM **
10999 REM SECOND CHANCE SUBROUTINE
11000 PRINT"CAUTION : OPTION DESTROYS LO
ADED FILE"
11010 PRINT;PRINT
11020 PRINT"PRESS SPACE BAR TO CLEAR FIL
E"
11030 PRINT;PRINT"PRESS ANY OTHER KEY TO
REGAIN MENU"
11040 GET KB:IF KB="" THEN 11040
11050 IF KB=CHR$(32) THEN RM
11060 GOTO40
11997 REM *
11998 REM **
11999 REM DRAW LINE SUBROUTINE
12000 LB=""
12010 FOR K=1 TO 39
12020 LB=LB+CHR$(99)
12030 NEXT

```

```

12040 RETURN
12997 REM *
12998 REM **
12999 REM FIND FIELD SUBROUTINE
13000 PRINT CHR$(147);F=-1
13010 PRINT"OPERATE ON WHICH FIELD? (GIV
E HEADNG):"
13020 GOSUB25000
13030 F=F+1
13040 IF K=LEFT$(A$(F,0),LEN(K)) THEN
13070
13080 IF F=0 THEN 13030
13090 PRINT CHR$(147);PRINT"NO SUCH FIEL
D";GOSUB15000;GOTO13000
13070 RETURN
13997 REM *
13998 REM **
13999 REM FIND RECORD SUBROUTINE
14000 PRINT CHR$(147);R=0
14010 IF S3=8 OR S3=9 THEN F=0
14020 PRINT"GIVE RECORD ENTRY UNDER ";A$(
F,0)
14030 GOSUB25000
14040 R=R+1
14050 IF K=LEFT$(A$(F,R),LEN(K)) THEN
14080
14090 IF R=0 THEN 14040
14070 PRINT CHR$(147);PRINT"NO SUCH RECD
D";GOSUB15000;GOTO14000
14080 RETURN
14997 REM *
14998 REM **
14999 REM PRESS ANY KEY SUBROUTINE
15000 PRINT;PRINT"PRESS ANY KEY TO CONTI
NUE"
15010 GET K;IF K="" THEN 15010
15020 RETURN
15997 REM *
15998 REM **
15999 REM TITLE/STATUS SUBROUTINE
16000 PRINT CHR$(147);PRINT L$
16010 PRINT"    COMPACT RAM BASED FILING
SYSTEM"
16020 PRINT L$
16030 IF F1=0 THEN PRINT"FILE NOT PRESEN
T"
16040 IF F1=1 THEN PRINT"FILE LOADED:  "
K$
16050 PRINT
16060 RETURN
24997 REM *
24998 REM **
24999 REM INPUT VALIDATION SUBROUTINE
25000 K$="";INPUT K$
25010 IF K$="" THEN 25000
25020 IF LEN(K$)>18 THEN K$=LEFT$(K$,18)
25030 RETURN

```

READY.

**Want a holiday but can't bear  
to be parted from your  
Commodore? Our prize  
should solve such a dilemma.**

**ATTENTION ALL PLEASURE-SEEKING,** young Four Commodore readers! Oh, so you're not allowed to drink in pubs or drive a car or do any of those legal things which waste so much of us older folk's time. But, this month at least, you are the privileged group of four Commodore readers. For, only if you are 16-years of age or under will June's star prize be of any value to you. Of course, mum or dad or an older friend may enter - but, they can't keep the prize.

Consider waterskiing, fishing, swimming, tennis, sailing and... computers! If you think this is an unlikely mixture you've never heard of Ardmore Adventure holiday camps.

Ardmore are out to prove that education can be fun. On one of their special adventure holidays, you will spend 2-3 hours at the computer and the rest of the day taking part in a whole host of leisure activities such as badminton, basketball, BVD hiking, dancing, drama, fencing, judo, pottery, rifle shooting, sailing, swimming, treasure hunts and lots, lots more. There's something to suit every taste.

The camps are small enough to ensure that the campers receive personal care and attention but large enough to offer a wide range of activities and opportunities to meet new people with similar interests.

Those who choose computing as a specialist activity (and we're sure only four Commodore readers will) are taught to program under expert supervision. There is one computer (plus peripherals) per child and a teacher for every 15 pupils. There is no rigid syllabus; every child is encouraged to proceed at their own pace. The camp even awards proficiency certificates for progress and skills in specialist activities and courses.

There is a choice of residential or non-residential camps. They are held at three main sites - Sherborne School in Dorset, Newland Park in Chalfont St. Giles and at Ascot. There are three age groups - 4-6 years, 7-11 years and 12-16 years. What a golden opportunity for parents to get rid of their kids for a week (or, more to the point, a chance for kids to escape from their parents!).

Why are we telling you all this? Well, you've guessed, we're offering one lucky prize winner a week's holiday at one of Ardmore's activity camps. The holiday will be at their Chalfont St. Giles centre and should be taken at the end of August. The second prize is an Ardmore summer camp newsletter and the third prize an Ardmore summer camp T-shirt.

# COMP



David Walker, Camp Director

## How to enter

It's so simple. All you have to do is answer five easy multiple choice questions and write the answers clearly on the back of the envelope in which you send your entry otherwise we will not be able to accept it. The answers should be written on the envelope in the same order as the questions. There is no need to write the question numbers on the back of the envelope. For example, if you think the answer to question number 1 is John

McIntire, then the first letter will be C, and so on.

Since this is an activity holiday, the questions are all connected to sport. You may enter as many times as you wish but each entry must be on an official coupon and sealed in a separate envelope. Please write clearly on the coupon as it will be used as a label if you win a prize.

Fill in your answers, name and address on the entry coupon and send it to Ardmore Competition, Four Commodore, 7 Curlew Square, London W1R 3AL. The closing date for the competition is last post on Friday 28th June.

## Questions

1) Which of the following tennis players has won the Wimbledon Men's singles title 5 times?  
a) Bjorn Borg  
b) Rod Laver  
c) John McInire

2) Which football team have their home ground at Old Trafford?  
a) Arsenal  
b) Southampton  
c) Manchester United

3) For which county does Ian Botham play cricket?  
a) Yorkshire  
b) Kent  
c) Somerset

4) Who won the 500cc Grand Prix World Championship in 1964?  
a) Mike Hailo  
b) Mike Lawson  
c) Nigel Lawson

5) Where were the 1964 Olympic Games held?  
a) Rome  
b) Los Angeles  
c) Moscow

# COMPETITION



Fun at your fingertips



Cross-country skiing



Hold your reins



On your bike

### The Rules

Entries will not be accepted from employees of Angus Specialist Publications Ltd, their printers and distributors, and Ardmore Adventure Ltd.

This restriction also applies to employees' families and agents of the companies.

No correspondence will be entered into with regard to the competition results and it is a condition of entry that the editor's decision is final.

The How to Enter section forms part of the rules.

### Ardmore Adventure Competition

To give yourself a sporting chance, fill in the entry coupon (block letters please).

Name .....

Address .....

Postcode .....

My answers are .....

Remember to write your answers on the back of the envelope as your entry will be invalid.

# E

Be warned - there are bugs in this game from F.G. Tout. Fortunately, they are only ladybirds and beetles.



LAVINIA THE LADYBIRD JUST loves to eat grass. However, the beetles just love to eat ladybirds. Your task is to guide Lavinia through 12 gardens eating the grass and avoiding the beetles. If she eats too much, you can cure her indigestion by eating a flower and score an extra 100 points. Unfortunately, this will speed up the beetles. You score 10 points for each turf Lavinia eats.

To find grass shift your step. Move Lavinia by using the joystick in Part 2. Lavinia has 5 lives.

15 - 200  
308 - 430  
999 -  
Redefine Characters  
Redefine Alphabet  
Sprite Data

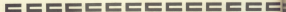
30 - 300  
3999 - 43070  
49999 -  
Music (Interrupts and data  
Machine Code (Riffened)  
Instructions

4  
5  
10  
15  
20 - 30  
40  
50 - 75  
80 - 85  
110 - 583  
600 - 630  
700 - 740  
826 - 910  
1000 - 4010  
4100 - 4140  
10000 - 10024  
11000 - 11075  
11020 - 11030  
1200 -  
40000 -  
Sound on, Call interrupt, etc.  
Gosub/Variables  
Set special multi-colour mode, screen colours  
Special position and memory location  
Define functions  
Call screens  
Main Routine  
Screen position of Lavinia  
Variables  
Check score, lives, etc.  
Sound effects  
Lives lost routine  
Screens 1-12  
Task completed  
Garden cleared?  
Game over  
Name for high score  
Beetle positions  
Title page

V  
V1, S1, S3  
N4)  
C  
E4  
S  
E1  
C14  
H8  
SP  
G4, T, 1  
E6  
Sprite data  
Sound  
Machine code Address  
Colour for can and amount eaten  
Amount of grass eaten  
Score  
Lives  
Garden number  
High score  
Speed of beetles  
Other variables  
amount of grass to eat per garden



Lavinia just about to be gobbled up by a rather large beetle.

















# THE WELL-TEMPERED 64



**Phil South has many strings to his bow. This month he tiddles about with music programming in BASIC, note values and duration and music software.**

The duration and pitch of notes in a piece of music are what makes it pleasing to the ear. Catchy rhythms and use of pleasant notes and combinations are what makes the difference between a best selling game (such as GrandMaster) and an annoying noise that the user can't wait to toggle off!

In music, there are many different lengths of note. You probably recall them from your school days; they have weird names like semibreve, minims, crotchets and demisemibreves. Well, for the sake of simplicity (and a certain pseudo-American modern quality) we'll adopt the usual American equivalents:

Semibreve=whole note=4 beat  
Minim = 1/2 note = 2 beat  
Crotchet = 1/4 note = 1 beat  
Quaver = 1/8 note = 1/2 beat  
Demiquaver = 1/16 note = 1/4 beat

We won't bother with the hemidemis- or hemidemidemisquaver varieties, because they don't occur too infrequently to bother with, but this is complicated enough without them!

The duration values are as follows:

whole note = 300  
1/2 note = 150  
1/4 note = 75  
1/8 note = 37.5  
1/16 note = 18.75

In musical notation, when a note is dotted, it is dot marked on the stem (not after the note) as length is increased by half. This is easy to do to our

```
10 REM ***** BY FLIPPO*****
20 PRINT : PRINT : PRINT : PRINT
30 INPUT "FREQUENCY " : F
40 PRINT : PRINT
50 F = INT(F/96.80881)
60 HF = F/255
70 PRINT "HF IS " : HF
80 H = INT(HF)
90 L = HF - H
100 PRINT "THE DECIMAL PART IS " : L
110 LP = L*255
120 PRINT "MP " : "1H
130 PRINT "LP " : "LP
```



computerised notes, by simply adding half as much again:

- 1) 1/2 note duration = 300
- 2) Half it = 150
- 3) Add it to first value making a dotted note = 750

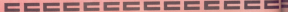
This means that we can add expression to a piece by trial and error, adding and subtracting duration values or stems, to achieve the rhythm of our choice.

**Now you've struck an right note!**

Now, the only thing missing from your knowledge about the 500-Ohm note values: which values to poke and where to get which pitch.

Sound, as I mentioned last month, is a series of waves, commonly regarded to resemble those made by throwing a stone into a pond, except that sound moves not in concentric circles, but in concentric spheres.

Different sounds can be measured in terms of "frequency": how many waves per second passing a fixed point in space or how many "cycles per second". The scientific word for cycles per second is Hertz (Hz), named after German scientist and father of wireless telegraphy, Heinrich Hertz (1857-94). The distance between the successive peaks of the waves is measured against time: the interval it takes between one wave passing the spot and the next one. If this is 2 seconds, then the frequency of the wave is (1/2) Hz.



This is all well and good, and makes me look like a physics whizz, but what do you actually do?

Well, in order to make a note from the computer, you must PCOR two numbers into it: the High Frequency (HF) and the Low Frequency (LF) values. In order to find HF and LF from the frequency of your note, use the following equations. For example, the pitch for the note of A over middle C is 440Hz, to spin this into the HF and LF we must go in listing 1.

This program breaks the frequencies down into units usable to the SID, for instance, 440Hz gives a result of HF = 07, LF = 36, which according to the Commodore 64 manual is spot on. See the following table.



Note/Octave	HF	LF	Note/Octave	HF	LF
C 1	1	18	C 4	17	37
C # 1	1	35	C # 4	18	42
D 1	1	52	D 4	19	53
D # 1	1	78	D # 4	20	180
E 1	1	98	E 4	21	154
F 1	1	118	F 4	22	227
F # 1	1	132	F # 4	24	63
G 1	1	151	G 4	25	177
G # 1	1	178	G # 4	27	56
A 1	1	205	A 4	28	214
A # 1	1	231	A # 4	30	141
B 1	2	6	B 4	32	94
C 1	2	37	C 5	34	75
C # 1	2	68	C # 5	36	85
D 1	2	104	D 5	38	126
D # 1	2	140	D # 5	40	208
E 1	2	178	E 5	43	52
F 1	2	220	F 5	45	198
F # 1	3	8	F # 5	48	127
G 1	3	34	G 5	51	97
G # 1	3	100	G # 5	54	111
A 1	3	155	A 5	57	172
A # 1	3	219	A # 5	61	126
B 1	4	12	B 5	64	168
C 1	4	73	C 6	68	148
C # 1	4	139	C # 6	72	169
D 1	4	208	D 6	76	252
D # 1	5	25	D # 6	81	161
E 1	5	103	E 6	86	208
F 1	5	165	F 6	91	140
F # 1	6	16	F # 6	86	254
G 1	6	108	G 6	102	194
G # 1	6	206	G # 6	108	223
A 1	7	33	A 6	115	68
A # 1	7	163	A # 6	121	12
B 1	8	33	B 6	126	126
C 1	8	147	C 7	137	43
C # 1	9	31	C # 7	146	83
D 1	9	199	D 7	153	247
D # 1	10	60	D # 7	162	31
E 1	10	205	E 7	172	210
F 1	11	114	F 7	180	25
F # 1	12	32	F # 7	193	252
G 1	12	216	G 7	205	133
G # 1	13	104	G # 7	217	189
A 1	14	187	A 7	230	174
A # 1	15	70	A # 7	244	181
B 1	16	47			

## Soft options

There are a number of pieces of software available that allow the user to benefit from the muscles of the SID-chip, without having to program it all in yourself. The first of these is Music Maker (Commodore); this is the one with a plastic overlay keyboard, and it effectively turns your 64 into a sophisticated Casioport. You have options to reassign the keys, play mono or polyphonically, and change the sound of the synth with single keystrokes. Not a bad little package, but a little limiting in the end. Good for people who are used to a musical keyboard!

Synth 64 (Musica/Adamsalt) is less of a performance synth or sequencer, but more of a programmer's aid. It lets you write music using merely the note letters: A, C, D etc. This is all very nice, but it is a bit complicated, and as such you'd be better off programming in BASIC!

Music Composer (Electronic Arts) is exactly that: a first class music composer, allowing you to compose music on a staff. When you've done it though, you can't print out the results and you can't change the sound of the voices. A bit of an enigma, this one.

Multicoord Synthesizer (Ranik) is a super performance synth/sequencer, bearing amongst other things, a real-time play that you don't get with other computer synthesizers.

But none of these are nearly as comprehensive and user friendly as Music Maker (Supersoft) which is easy to use, well laid out and well documented.



## What's on next month

Interlogs are machine code routines which give an impression of movement and sound happening simultaneously. I'll be explaining all about them, and giving more detail about synthesis.

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The computer will ask you a mathematical question. If you answer correctly, you must pick a square.

If the square is yellow, your turn ends. If it's any other colour, you must select another square. The computer

selects squares until it picks a yellow one, after which the player has another turn.

The colours and the questions are selected randomly so no two games are the same.

## Program Listing

```

1 REM CRG
2 FORK=0:LEW,2:FORK=3281:R=CHR#"ABRND":ITS=""
10 G=1:G=152:G=10
30 REM CLR
100 DIM G(15,15,2):PRINT"CL"
200 REM#FILL IN GRID#
210 FORN=1:TO2
220 FORT=1:TO5
240 A=INT(7+RND(1))%4
250 B=INT(7+RND(1))%4
260 IF G(N,B,1) THEN G(N,B)=A
270 G(N,B,1)=1:FORT=1:TO4
280 G(1)=INT(2+RND(1))%3:G(2)=1:G(3)=2:G(4)=3
290 G(5)=INT(2+RND(1))%3:IF G(5) THEN G(4)=3
300 PRINT#4:BI:FORV=2:TO5:PRINT#4
310 IF G(N+1)=1:OR G(N+1)=2:OR G(N+1)=3:OR G(N+1)=4:GOTO200
320 V=ATN(PI)
330 NEXT V
340 NEXT X
400 REM#ADD:DISPLAY:CHAR:TEXT#
400 REM CLR
410 PRINT"Q" PLAYER COMPUTER"
415 REM GHT
420 PRINT"R" FORT=1:TO2
425 REM DRN GHT DRN GHT
430 PRINT#4:G:TTTTTTTT"R"TAB(45):G:TTTTTTTT"R"
440 NEXTH
445 REM DRN DRN
450 PRINT"Q" TAB(20):"Q"
455 REM DRN
460 PRINT"Q" 1 3 5 7 9"TAB(20):1 3 5 7 9"
465 REM PUR

```









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At last, a number of the leading software houses have noticed the C16. Phil Bonner assesses what they have to offer.

# Sixteen Up

IF YOU BOUGHT A COMMODORE 16 last Christmas you were one of many, and you may now be feeling rather disappointed at the small quantity of good software that has so far appeared. If so, cheer up! Large numbers of games are beginning to hit the market and, although many of them are rewrites from other machines, they are none the worse for that. I have taken a good look at a number of the latest offerings from the independent software houses and, although some are good, several others are well worth buying. For convenience, I have grouped them in categories.

## Shoot-em-up games

Everybody wants to own at least one game based on Space Invaders, and Xargon Wars, from Coreline Graphics, is an excellent example of its type. Nothing about the game is original, yet it is colourful, challenging and addictive.

You shoot from the ground at waves after waves of aliens — sixteen types in all — which are intent on blasting you out of existence. The aliens move in a variety of flight patterns, so a different strategy is needed for each screen, and they take forms which range from motorcycles to giant birds. The chief difficulty lies in avoiding their bombs, which rain down fast and furious — lightning reactions are necessary. Xargon Wars is written in machine code and shows just what can be achieved within 96K of memory. It sets a very high standard for other authors to emulate.

Tyrannol's Zap-It is in some ways similar, but now you are able to move vertically, up to about a third of the way up the screen. For some peculiar reason the aliens are attacking in helicopters, though later waves change to cubes and flying saucers, some of them drop bombs, which look like letter 'Z's though the main problem lies in avoiding the aliens themselves, as they meander gently from right to left, gradually getting lower as they proceed. Rather curiously, some of them have been made invulnerable, so you have to dodge them and not rely solely on your firepower. The game is well conceived, but suffers slightly from a lack of variety. It is also interesting that you can only fire one shot at a time, but nevertheless it is fun and quite addictive.



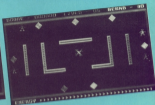
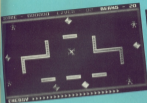
Coreline



Coreline



Coreline



Berks

At £4.95, Microdeal's **Arena 3000** is quite a bit cheaper than most of the other games reviewed. Your task is unashamedly to slaughter everything in sight, after which you start again on a new screen. There are eight different types of opponent, each which has its own pattern of movement, so you must work out which types must be killed first because they present the greatest danger. Some home in on you with deadly accuracy, some need more than one hit, while others are really tricky — they don't shoot once but explode into different patterns!

It is a difficult game, but if it gets too advanced you can employ an assistant to do the firing while you steer, using two joysticks. There is not much variety in the game, but it is well programmed, its fast loader is excellent and it represents good value for money.

First Impressions of Amirog's **Star Commander** are not favourable, but once you get into the game you find there is much more to it than meets the eye. You are in a three dimensional shooting gallery, with spaceship targets swooping critically towards you. They are difficult to hit because of their unpredictable motion, but you must beware of wasting ammunition as you have only eighteen shots available. These are not replenished until you reach screen three, so every shot must count. After the first screen, various hazards appear, including Target Abductors, which limit your scoring, and a particularly evil beast called an Annihilator Raider, which, not surprisingly, rids your stock of ammunition.

The game certainly grows on you, and is really not bad at all. It is a refreshing change from the usual 'fire as fast as you can' games, and I found it very enjoyable.

By no means original is **3D Time Trek**, also from Amirog. All the usual features of the Trek games are here, although the Klingons, the USS Enterprise and Captain Kirk are not mentioned by name. It is a

mixture of a strategy game and arcade game, where you have to search the galaxy — in this case an 8x8 grid — and destroy any aliens you find. Your energy is limited, so you need to find a friendly planet from time to time to recharge, and to repair any battle damage. The ship is fully equipped with navigation and battle computers, and has long-range sensors to detect any enemy presence.

The graphics are quite good, without being 'spazzy', as described in the cassette insert, but the game has a depressing habit of failing to respond unless keys are pressed repeatedly, and on several occasions the program 'hangs' completely, so that I had to switch it off and start again. These faults should really have been put right before the game was marketed. A shame, as it is otherwise very good.

Amirog's **Mindpokes**, on the other hand, is beautifully programmed but incredibly difficult! For those not acquainted with games of the 'Centipede' type, let me tell you that you are in a garden infested with insects, in which, not surprisingly, nothing but mushrooms will grow. You have got to find up with the situation that you have taken the rather drastic step of going out to shoot all the insects — in particular a rather nasty multi-segmented thing called a miripode. Unfortunately, each segment has to be shot separately if you are to kill the beast. Meanwhile the other insects are attacking in droves — as should it be assumed — and they are very hard to avoid.

The graphics and colour are good, and the sound excellent. There are fifteen different screens, each more difficult than the last, and I confess I failed to get past screen two! For those of you with lightning reactions, this game would be unobtainable. For me it was just too hard!

## Dodging games

In this section I have included CR1's **Berks**, although it involves a good deal of

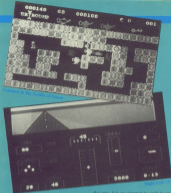
shooting as well as dodging. This was my favourite of all the games reviewed, but what a silly title! Perhaps the author, Jan Williams, lives in that county to the west of London!

It turns out that **Berks** are strange little men, who wander aimlessly around the screen whilst you, vicious brute that you are, do your best to wipe them out. They are protected, however, by Drones, which are diamond-shaped and home in on you unwaveringly. The Drones cannot be killed, but only paralyzed for a few seconds. Each screen — of which there are no fewer than 32 — contains a variety of obstacles. If you bump into one of these, or into the perimeter wall, you lose control for a while, and then the Drones can get you. So your task is to shoot the berks while dodging the Drones and avoiding the obstacles — say, really! The game is fast, colourful, original and completely compelling. You should buy it as soon as possible.

In complete contrast is **Space Docking** from Tynesoft. The aim of the game is to collect six fuel pods from a Planet's surface and, dodging asteroids and satellites, to take them to the six open ports of a large mother-ship orbiting above. At this stage, the spaceship blanch, off and you start again on a later level. At least, that is what is supposed to happen, but the program has a bug, which kills you every time you successfully dock a fuel pod! The game is written mainly in BASIC, with some machine-code routines, and by altering the BASIC part I was able to get it to run. It proved quite reasonable, but should never have been released in its state. Quite unplayable!

Microdeal have taken a similar idea in their **Centrek in Space**, but they have turned it into a marvellously entertaining game, which is varied and calls for real skill, yet is easy on the lower levels. Your mother-ship lands on a succession of strangely named planets, where you have to first refuel, then collect as much loot as possible, while avoiding or shooting the





rather which circled across the screen in both directions. After the landing stage you take off for another planet, but further dangers lurk en route, because your ship sometimes runs out of fuel—trapped. If this happens you need to go for spares, then return to the mother-ship's coordinates before the time allowed expires. During this phase, the joystick responds superbly, adding to the challenge.

It is an excellent game, with superb graphics and sound, and it includes a high-score table, unlike many of the other games.

Atari's *Perch* is another beautiful little game, in which you play the title role — a member of that endangered species, the Pink Penguin! Your task is to protect your hoard of diamonds by crushing wicked Arctic monsters between ice cubes. As with all the Atari games, the tape is a fast-loader, but this one contains versions for the Commodore 64 and the VIC 20 as well as the C64. The C64 game lacks some of the facilities of the 64 version, but is really very similar and great fun to play. Large bonuses are available for killing the monsters quickly and for being up your diamond in a row. The sound and graphics are excellent, with beautiful animation; you should certainly add this one to your collection.

## Simulations

With the exception of 'Zap-64', the Dynaset games I have seen are of poor quality, and *Orbital* is no better than

the rest. It is an attempt to cash in on the success of games such as *Digital War*, but it completely fails to provide any interest or excitement. There are four field events and four track events, in each of which you must post up vigorously at the 0 and 2 keys to increase speed. In the field events you then press the space-bar to release your shot, javelin or whatever. The graphics are poor, and the long-jump and javelin events contain a bug which makes it impossible to succeed. Most disappointing!

*Flight Path III* is Atari's C64 version of their successful flight simulation game for the 64 and the VIC. The aim is to take off safely, clear a range of mountains and land at a runway on the other side. You control your speed with the function keys, and other keys are used for flaps, undercarriage and low-altitude turns. The direction, and the rate of climb or descent are controlled by the cursor keys, which is a pity as a joystick would have been better. There are six difficulty levels.

The program is written largely in BASIC, which makes it rather slow to respond to the controls, but it is challenging and fun to play, though more as a game than a serious flight simulation exercise.

## Adventure games

Classic adventure games of the text Adams type are very popular with those who pride themselves on their lateral thinking. The large scale text-and-graphic games, which have had such success on other machines, are difficult on the C64

because of its limited memory, but text-only adventures are perfectly possible. Here people, in fact, think them superior. Microdeal have released two such games, both in the classic style. By entering two-word commands — generally a verb then a noun — you progress from rooms to rooms, meeting hazards and finding clues to the whereabouts of some sort of treasure.

*Atlanon Adventure 1* is set in a haunted house, where you are trying to find the fabled Atlanon Diamond and escape alive. Once I had managed to get into the house — no mean task — it played happily for some time until suddenly...Crash! Syntax Error in line 51. On investigation, line 51 turned out to be gibberish, as indeed was line 58 as well! The fault was easy to correct, but there is no getting away from the fact that it shouldn't be there at all. I hope Microdeal will do something about it.

In *Williamburg Adventure 1* you have been transported in America to the battle against a mad wizard, evil spirits and the cops in your search for the Golden Treasure. This time the program did not crash, and for less than 14 it is good value for money. The descriptions are somewhat sparse, but nevertheless I found it an enjoyable game to play.

The final game reviewed, again published by Microdeal, is *Cathoon Union The Temple Of Doom*. This is of the type known as an arcade adventure, where you will have to go from room to room, collecting treasures and avoiding hazards, but now you use a joystick as in an arcade game. This particular one is a real star — it amazes me that they have managed to cram so much into 16k of memory. There are over two hundred chambers, brimming with difficulties and complexities, and some truly evil opponents. The graphics and sound are first-rate. You need to watch your oxygen level, keep your lamps filled and collect as much loot as possible, while all the time moving around at great speed. It is, to be fair, very, yet thoroughly competitive. The cassette comes in quite the grandest packaging I have seen, complete with an instruction booklet and, for some obscure reason, a plastic key-ring. It really is good, and deserves to be reviewed.

In terms of sales, the C64 has been much more successful than many software producers expected, and they are being forced to look onto this. I predict that the coming months will see a large amount of high-quality software, bearing in mind that it is easily the most inexpensive home computer on the market. The starter pack is available now for as little as £58. Remember, too, that the Plus-4, which will run C64 games, has also come down in price, increasing the market further.

Things are looking up, just watch the space!



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Accounts 15	£ 20.00
Accounts 16	£ 20.00
Accounts 17	£ 20.00
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## Mike Roberts' first project in our D.I.Y. add-ons series is a centronics interface for the Commodore 64.

LAST MONTH'S INTRODUCTION TO the subject of building your own add-ons for the C64 told you about all the preparations you need to make to start.

By now I assume you own a soldering iron, a pair of pliers, some solder, and some clippers or wire strippers - because you need these to construct this month's project, which is a centronics interface for the Commodore 64. This interface is needed because parallel printers are cheaper, more easily available, and a lot better than the equivalent Commodore device. The centronics standard is the only really standard interface in the computer industry. Even so-called standards, such as the RS232 interface can cause problems.

The way the interface works is simple - eight (or even seven) bits of data travel the characters to the printer. Two handshake lines for information transmission between the two devices, and everything grounded. Thus the minimum configuration is 10 or 11 lines. However for our purposes we will be using a 30-way cable for the 10 information lines, and 10 ground lines (one printed line for each information line - it's safer that way).

You may be wondering what a handshake line is. Well, one line links the computer to the printer, and the other goes from the printer to the computer. When the computer puts data onto the data lines it pulses its line to the printer to tell it that it's ready, and waits. When the printer 'sees' this it reads the data off the data lines and prints it; the printer then pulses its handshake line to tell the computer to put more data onto the line, and waits. And so the cycle continues.

The C64's two serial data lines and four handshake lines should now be converted into the previously discussed 10 I/O lines! But, this is not the case. The user port is used on the flip side of the little-used RS232 port on the left hand side of the C64.

This port is already configured as a centronics interface, but Commodore in their infinite wisdom, decided not to provide any conversion details or driver software. I hope to remedy this.

The driver software provided is installed by the now familiar SW59152. To print you use the command LSR in the form '(M)USR(1)' or 'PRINT LSR(1)'; to stop printing you use LSR again, but with an argument of 0 as in 'PRINT LSR(0)' etc.

I chose this system because it seemed a change from the complexities and

# THE HARD FACTS

limitations of having to open a file to the printer; I prefer in most cases the BBC micro method of printing, and it was easier for me to program. One small point is that the wiring goes consistently 'wrong', I don't know why this happens, but I think it is something to do with I/O priority. If anybody does know about it - please write to Your Commodore as it would be a great help. Also anything printed while print mode is in operation will be ignored to the screen (although you can't see it while information is being transmitted to the printer!).

There are some limitations to this system, most commercial software may not run or may need some modification.

## Construction

How to connect up. Type in either the BASIC listing or the assembly listing and save it somewhere safe; you must load and run this every time you turn the computer on.

You need a 10 way male Amphenol (precision displacement type) connector, a 30 way ribbon cable (of any convenient length - about two metres is common), and a 12 way single sided 0.1 inch edge connector. Any reputable electronics supplier should have these in stock but Tandy, Marshall Electronics, and Maplin can supply them by mail order if you get into difficulty.

Next you must place the cable flat across the 'top' of the Amphenol connector making sure that the red strips

in the cable is going to be gripped by pin 1 (the front of the connector is numbered). At this point you will notice that there are 16 spare connections on the Amphenol connector. Do not fear, nobody is really sure why they are there but they're harmless. When the cable is firmly in place, the back of the connector must be pressed on. This is an irreversible action and must be right first time.

At the other end of the cable you must separate out all the wires for about three inches and strip the insulation. Now, every alternate wire must be separated. The odds (ie, the wires that start with the red strip) are data lines and the others are the ground lines. The ground lines must all be soldered together in two bunches onto pins A and M (all alpha designations and positions on the user port are in the back of the manual). Next you must connect the pins of the Amphenol and the edge connector in the following sequence:

- B - 11
- C - 2
- D - 1
- E - 4
- F - 5
- H - 6
- J - 7
- K - 8
- L - 9
- M - 1

Now, all you have to do is plug everything in and off you go.







## Basic Listing

```

10 rem"#####
20 rem"+++
30 rem"+++Centronics Driver Software+++
40 rem"+++
50 rem"+++ (c) Mike Roberts 1985 +++
60 rem"+++
70 rem"#####
100 i=4918011n=775
110 ok=0:l=n:l+n*5:for i=0to7:reada:ifa=999
thenend
120 pokel,a:l=i+l:ok=ok+a
130 next:readc:ifa<vethenprint"you've m
ade a mistake in line"ln"- retype it"
140 goto10
1000 data0.172.162.11.142.17.3.122. 209
1008 data172.142.10.3.96.166.97.234. 938
1010 data129.240.3.76.150.192.162.0. 752
1018 data194.201.162.0.142.1.221.169. 10
80
1020 data0.141.0.221.149.255.141.3. 930
1028 data221.173.2.221.7.4.141.3. 773
1030 data221.169.28.141.38.3.169.192. 99
1
1038 data141.37.3.96.72.169.192.141. 853
1040 data28.3.149.101.141.24.3.104. 570
1048 data141.1.221.72.173.18.221.9. 851
1050 data144.141.13.221.169.4.141.0. 833
1058 data221.169.1.153.221.168.221.201.
1348
1060 data0.208.230.104.76.138.135.72. 96
3
1068 data173.13.221.41.16.208.3.76. 751
1070 data271.284.169.251.141.0.221.169. 1
276
1078 data0.141.1.221.133.221.173.13. 733
1080 data221.41.239.141.13.221.169.284.
1344
1088 data141.25.3.169.71.141.24.3. 577
1090 data169.0.141.13.221.104.99.64. 800
1098 data163.138.142.36.3.162.135.142. 9
22
1100 data39.3.96.0.0.0.0.0. 136
2000 data999
ready.

```



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# BUSINESS FILE

Dave Crisp gets up-to-date with the latest in diary systems for the Commodore 64.

DIARY SYSTEMS ARE CURRENTLY IN vogue and, thus, are now included in the firmware of many PCs. The value to the user of such a system depends largely upon the individual but I think the advantage of a computer-based diary is lost if it is not kept continually on-line.

The two packages reviewed here are very different. They are Desk Diary from AZAD and CBM-64 Diary, from Handle Software. Both systems compare quite well with similar systems which I have seen running on much larger machines than the Commodore 64.

## Desk Diary

This comes on two disc program and data) and is accompanied by a truly comprehensive and professionally presented user guide (36 pages, including a workable index).

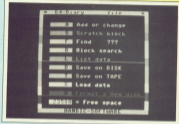
Once the program is loaded, the user is asked to enter a password followed by the date and time. In fact, the time is of little value since it never coincides with your watch; it loses time as the system initiates.

Apart from recording appointments, names and addresses, personal memos, etc., it can record quarterly expenditures, income tax and bank details. It maintains records on a quarterly basis since the data disc is only able to accept one quarter at a time. The software also interfaces with Easy File, Easy Calc and Easy Script (2-way compatible) which should make it additionally attractive to Commodore software users.

An 'appointments window', situated at the top right of the opening menu, provides for a rolling display of 10 days records, with display starting from the Sunday prior to the date entered on load-up. The pointer is easily manipulated by the cursor control keys. Similarly, '+' and '-' commands allow the window to jump ahead or back in sets of 10 days.

Entries are easily maintained and inserted. They are saved to-disc on creation in Easy Script format by use of the F1 and F6 keys respectively.

Diary data items are created and held just as easily, although there are restrictions on the amount that can be held (e.g. only 4 pages are devoted to telephone numbers and addresses). But



44-Day

there should be sufficient space available for even the most devoted diarist.

The search and analysis facilities are comprehensive, allowing for event recall as well as date and text searches.

AZAD claims that entries can be made as far in advance as 1990, although calendars are available as far ahead as 2000.

The system is written in 6000 assembly language to keep up performance levels and is completely menu-driven. The screen layouts are both clear and precise.

Overall, this is a sophisticated and potentially useful addition to any small computer configuration.

## CBM-64 Diary

This package is neatly marketed and, as with the majority of cartridge-based systems, loads almost instantaneously. The manual is very sparse but the software is so easy to turn and use that a detailed manual is hardly necessary.

64-Day is more a data storage and retrieval system than a fully-fledged diary. Data is held in blocks (70 lines of 37 characters) and is entered and retrieved as free-form strings. The user can optionally use block numbers (think of a block as a screenful) or dates as keys to records. Text searches are quick and responsive.

This system does not pretend to be as all-encompassing as Desk Diary but, if you merely need to store data and dates (on an annual basis), it is simple to use and fairly versatile.

## Conclusion

On balance, Desk Diary offers greater value for money since it offers most comprehensive services. But the system is a little cumbersome and requires regular maintenance to ensure that the best possible results are achieved. Your choice of system must depend on the use to which you are to put the package.

**Desk Diary**  
Price £34.95  
Handle Software Ltd.  
5 Albert Road  
Crowthorne  
Berkshire  
Tel. 0344 738880

**CBM-64 Diary**  
Price £29.95  
AZAD  
c/o Associated Services Ltd.  
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London  
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Program Name \_\_\_\_\_

Computer/memory size it runs on \_\_\_\_\_

Amount of memory program occupies \_\_\_\_\_

Other computers/memory size which your program runs on without conversion or use \_\_\_\_\_

Does your game need or use joystick? \_\_\_\_\_

Yes

No

Have you sent your game to another magazine? \_\_\_\_\_

Yes

No

Is it original or a variation on a theme? \_\_\_\_\_

Your Address \_\_\_\_\_

Telephone Number \_\_\_\_\_

Times to contact you \_\_\_\_\_









# Choosing the right computer is a good start — but can you find the right software?



At SUPERSOFT we're very conscious of the fact that people who spend several hundred pounds on computer equipment are looking to do rather more than play Space Invaders.

Financial planning is a rather grand name for something you've been doing all your life — making credit cards! Perhaps if Mr. Moneybags had used **BUSICALC** he would have been able to balance the books a little better.

For home, club or small business use **BUSICALC 3** should pay for itself in no time at all; for larger companies we recommend **BUSICALC 5**, one of the few really valuable programs that you can open to use in a day.

Although your Commodore 64 is a powerful musical instrument you need to be a pretty good programmer to understand how it all works. Unless, of course, you buy **MUSIC MASTER**.

To use **MUSIC MASTER** requires no prior musical knowledge, though in the hands of an experienced musician it will prove an invaluable tool. You don't need to know the first thing about programming either! **MUSIC MASTER** is the musical equivalent of a word processor, remembering the notes you play and allowing you to replay and edit them as you wish.

**INTERACTOR PILOT** is a space flight simulator. Nowadays simulators are widely used to train pilots and astronauts because — to be frank — it's a lot cheaper (and safer) than the real thing!

Imagine, if you will, life in the 22nd century: space travel is commonplace, and on the outskirts of the galaxy the first war between civilizations is being fought. A shortage of trained pilots has prompted the Federation to develop a computer simulation that allows you to gain experience without paying for their mistakes with their lives. With the aid of your Commodore 64 you too can learn to pilot the Interceptor Mk. 3 craft. But be warned — this is no game!

Other SUPERSOFT products include the **MIKRO ASSEMBLER** cartridge, the only assembler that's ideal for beginners yet powerful enough for the professional (most of our competitors use 85). The **WCTREE** cartridge adds dozens of commands to Basic including tokens, wild-card commands, and, on disk there's **MASTER 84**, a really comprehensive package for the keen programmer.

Of course, we do also publish game programs, and with classics like **STAR QUEST** and **KAMIKAZE** in our range we are one of the market leaders. But we must stop coming up with the sort of programs that are going to lie in use for months and years, not hours and days — the sort of programs that make you glad that you bought a computer — and glad that you bought SUPERSOFT!

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