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COMMODORE user

Incorporating Vic Computing

Volume 1 Issue 7 April 1984 UK Price 85p

LAST CHANCE

THE BIG ONE: £1,000 COMPETITION

BETTER than Basic

VAT returns

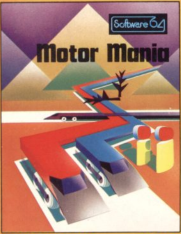
POKES for the Vic

DEALING with LIGHTNING

REVIEWS: WORDPRO 64 GRAPHIC EDITORS

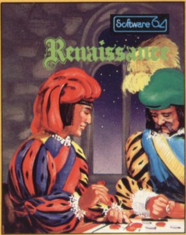
MACHINE CODE GAMES ACTION FOR THE 64

Software 64



MOTOR MANIA **£8.95**

THE CLASSIC CAR RACE GAME FOR THE 64!



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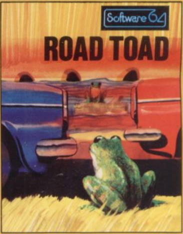

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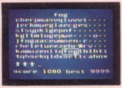

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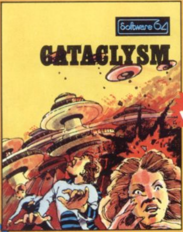

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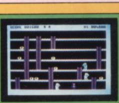

BONZO 64 **£7.95**

This best-selling game for the VIC-20 is now available on the 64! Featuring the most intelligent and devious monsters you have ever tried to avoid, the Bonzos, this game is a real joystick wrencher. Move Hans, the handyman, up and down the ladders to pick up the boxes from the different levels.

But don't meet a Bonzo on the way!

NEW

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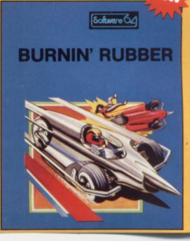

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COMMODORE User

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Richard Hunt gets to grips with the two Forth cartridges available from Audiogenic, one with and one without 3K memory.

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If you have trouble working through your tax return, a program that helps you through the labyrinth might be a good idea. *Microtax* purports to do just that. How did it fare under scrutiny?

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Ken Ryder's been looking at a range of spreadsheets for the 64 and starts with *Abracalc* and *Busicalc*. Next month, he continues with Handic's well-established *CalcResult* and its 'Easy' sibling.

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Easy to enter, easy to win ... our competition to win a thousand pounds' worth of goodies for your Vic or 64 reaches the end of the trail.

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How do the latest computer games get on to your dealer's shelves? Usually through a distributor. Lightning is one of the biggest games distributors around. Bohdan Buciak went along to find out how it runs.

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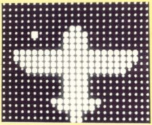

Straws in the wind

by

Henry Deckhand

One of the problems with playing things as closely to your corporate chest as Commodore does is that people tend to fill the previously abhorred vacuum ... with rumours.

At press time, the following stories are running round, some of them mutually contradictory, including those we are fairly confident about.

We wouldn't advise you to hold your breath waiting for any of them to come true, even if substantiated by an official Commodore statement, given the company's tendency for changing its mind.

The already-announced 264 may be launched in the UK before the US, because of problems it's encountering with the American FCC, the agency responsible for ensuring, among other things, that your micro doesn't screw up the neighbours' radio reception.

UK marketing manager John Baxter did confirm this one, but he was clam-lipped about whether the reputed delays in writing the financial software that will come bundled with the machine were another cause for the hold-up.

When it happens – and the original US launch date was this month – it's said that the 264 will have 121 colours, a full-travel keyboard, and what is described by Commodore's PR person as "inbuilt software", though whether that means the sort of RAM-resident WP, scheduling and similar firmware that have made Tandy's 100 Portable so popular with the punters, they wouldn't – or couldn't – say.

Whether those 121 colours are real – or just combinations of the same 16 that you can get on the 64 – isn't out from under wraps, either.

Some reports on the 264 have suggested it'll be a sort of business-orientated 64, competing with Sinclair's QL, but if that is so, why have they given it joystick ports?

However, unlike the Vic and 64, they're non-standard, so you can't use Atari or Coleco joysticks on them.

They do *love* being awkward, don't they?

About its (presumed) big brother, the 364, even less is known. As in nothing.

However, as you read this, Commodore may be unwrapping not only those two awaited goodies, but also some really powerful business-style machines, including one with UNIX, and at last one IBM-compatible, possibly plus an IBM-ish portable, at the Hanover Fair.

Superbase
Superscript II
Calc Result

But didn't Commodore have plans for a powerful business machine already, we hear you ask? So they did, and it's been an on-off-on love affair ever since.

The news here is that it's on again, in the sense that there'll be 5000 or so of the 700-range machines, as they're called in Europe (or system B, in USA) available here in the spring at a real bargain price.

Well, at £1,995 plus VAT (that's nearly £2,300 tax-inclusive), it may not seem much of a bargain, but look what you get for your two-and-a-quarter grand:

- snazzy 715 machine in Porsche-designed cabinet, with detachable keyboard, including programmable function keys, and 256K of memory;
- equally snazzy 8250 low-profile disk drive;
- 6400 daisy wheel printer;
- Superscript word processing;
- Superbase database;
- CalcResult spreadsheet;

The snag, apart from the still-hefty price tag, is that the 700 is virtually a discontinued machine, so while there are some attractive packages already written for it (eg from Peachtree), there are unlikely to be any more.

Also, while nearly all previous machines from CBM have been upwards-compatible, so that a program written in the late Seventies for an 8K calculator-keyboard Pet will run on an 8096 business machine (though not, of course, vice versa) and it's even possible to reconfigure the 80-column machines to think they have 40-column screens, there's no way to reconfigure a 700 machine so that it thinks its a 2000, 3000, 4000 or 8000 machine.

As the man in Commodore's Slough technical department put it so elegantly: "If you think of a way of doing it, please let us know."

Incidentally, the 264's unlikely to be upward-compatible either, which would be really crazy, when you consider what an enormous software-base they'll be disregarding, if this is the way it turns out.

On the disk front, there's no news of the hoped-for upgraded disk drive to replace the snail-like 1541 for the Vic and 64, though it's reputedly in the pipeline.

Undismayed by the cool response punters gave for the single-drive version of the 4040, the 2031, theyhave now produced a single-drive version of the 8250 drive, but at a price (£495 plus VAT) destined to turn off its natural market, those who want something more powerful than the 1541 but not ready for twin disks.

Also, it can't be connected to the 64 except via an interface like the Interpod, which itself slows up access somewhat.

On the positive side, though, it *is* fast, and with the right POKEs, can be made to think it's an 8050, so there's a certain amount of compatibility with that now abandoned format, and the wide range of software written for it.

Still on disks, there's no sign of a second drive for the SX64 Portable, though since the gap left where one should be is too small to accommodate spare disks, it's difficult to guess what they had in mind for the space – assuming they had *anything* in mind.

And if you're a cassette-user dismayed that the SX64 has no cassette port – something even the 700 series has/had, for all their power – the news is that someone (not Commodore) is working on a way to remedy the omission.

Our lips are sealed until it's up and running, but it should be soon.

Meanwhile, what of the Vic? Everyone keeps talking as if it's about to be phased out in favour of the 64, and some of the people saying it have been from Commodore. Remember the famous Vic-for-64 trade-in, which never happened?

It still keeps on selling, and Commodore keep on making them, and in fact the US assembly line's been extended.

Makes you wonder how they managed to sell a billion-dollars' worth of kit last year, doesn't it?

An unfair levy

The micro business is booming and the music biz is on hard times, so the micro business should subsidise the music biz, right?

Wrong?

But, surely, you're against piracy, right?

You are? Good. It's reckoned that every computer game sold is pirated at least ten times, so perhaps you think that a levy on blank tapes would help plough some money back in the direction of the victims of piracy.

So it might, if the people who are proposing to impose tape levies all over Europe weren't totally unaware that there is any kind of problem in the micro world.

This is hardly surprising, since the international lobby campaigning for such a levy is composed entirely of people from the music and video biz: the International Federation of Phonogram and Videogram Producers, whose report, "The Private Copying of Sound and Audio Visual Recordings" is being used to frame the proposed EEC regulations which will impose the levy.

You will read the report in vain if you're looking for any reference to computer software piracy.

So, even if you think a tape levy might be the answer to piracy – and there are some very coherent arguments against – if the currently proposed legislation is passed without amendment, you could find yourself paying as much as £1 extra per cassette without the consolation that it was, at least, going towards the production of bigger and better software for your micro.

Instead, you could find yourself subsidising the latest pop craze's taste in yellow Rolls Royces. Why the computer industry should be expected to underwrite the fat cats of the inefficient music biz is hard to understand.

The new laws should start coming into Parliament by the autumn, so you've got plenty of time to write to your MP objecting to the proposal.

Take the screen test and be a STAR!

in the Live Wire high score competition*

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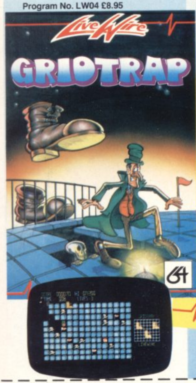
Program No. LW04 £8.95



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IT HAS IT ALL!... EXCITEMENT... HUMOUR... STRATEGY

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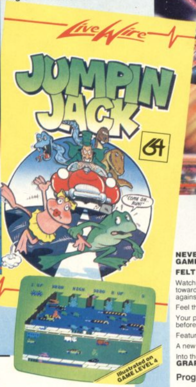
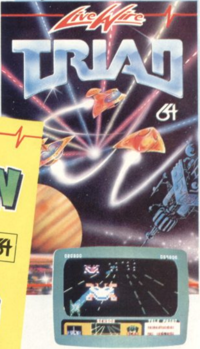


TRIAD 64



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Royal Warrant sparks storm

We don't know if Ma'am is logging the Royal Corgi feedtimes on a database and whether the chosen micro is a humble Vic or a mighty 700, 'cos they're not saying, but someone at Buck Hise loves Commodore enough to give them a Royal Warrant.

And has sparked off a mighty row among those who feel that the Royal accolade might have gone ... say ... to a *British* micro.

Yelled David Broad, chairman of the British Micro Manufacturing Group: "It is sad and disappointing that an opportunity has been lost to encourage truly British manufacturers."

(That "truly" is a nice touch, because as a Buckingham Palace spokesperson pointed out, the Queen's Commodore was assembled in the UK, even if it carries a US trademark. But to continue ...)

We asked Sinclair, who might well have liked a Warrant to add to Sir Clive's knighthood, what they thought, and a spokesperson said icily: "We're very pleased for them" – presumably she meant Commodore – "but apart from that we've no comment." ●

Oxford's games attack

Oxford Computer Systems, originator of the very wonderful Interpod, is thought of generally as a company exclusively concerned with treating the computer as a business tool, an image that will have been heightened by its recent announcement of cross-compilers which will convert 8096 software for the 700, a range of machines about to receive a big marketing push from Commodore.

It has also produced a cross-compiler for the 8000 series of "business Pets" which results in machine code programs for the 64, and – particularly exciting for the serious programmer, this – a Pascal compiler for the 64, a snip at only £49.95.

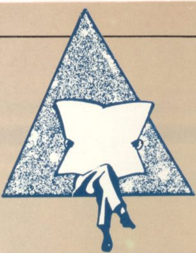
However, the business-only image is dented somewhat by the near-hysteria emanating from Oxford's HQ in Woodstock, Oxon, about its very first *game*!

The unprecedented event even infected its usually sanguine PRO, Jeremy Biggs, who issued a near-incoherent press release, packed with expressions like "is reported to be", "is believed to be", "will probably be" and "expected to be".

What this all adds up to, according to Oxford's Tony Wilkes, is a driving game called "Turbo" (no connection with the fast-cassette LOADing system of the same name used by some of the new games from other companies) rather along the lines of the *Pole Position* arcade game.

It'll be out any day now (ie early April), will be available as cartridge or cassette, and will cost less than a fiver, which is good for a quality 64 game.

But the proof of the pudding – or the driving – will be the actual product, which we'll let you know about once we've prised one out of them. ●



Currying favour

People like Rumbelows and Dixons thought it was a good idea to add home computers to washing machines and hi-fi. Currys did too, but it set up the Micro-C shop-within-a-shop to deal with business computers and a sprinkling of the domestic version (the idea being that you need specialised knowledge to sell computers – very true, very true).

Now Micro-C has moved out to independent premises and is devoting itself exclusively to business systems (IBM PC, ACT Sirius and Apricot et al.) That means you'll have to wade through the Hotpoints and Hoovers at Currys to get the Commodore 64 or Vic. But Currys tells us there's a member of staff trained to deal with computers at every one of its 500 branches. ●

"The new Micro-C – away with home computers, in with crown green bowling."

We have a number of ex-review programs and books that we'd like to give away (we need the space). We'd prefer to donate them to a hospital or a school, though users' groups would also be candidates for our generosity ...

Most of the software is for the Vic, though there's quite a lot for the 64. And most of it is games, though there's some other stuff here.

Anyone with a good cause who wants some of it should drop a line to the Editor – quickly!

Apologies

Catalogue Sales (namely the lovely Nicky ...) have asked us to convey our apologies to:

1) *Readers who've ordered Vic-tapes; and*
2) *Those who've ordered Tim Onosko's highly-praised book,* Getting the Most from the 64.

1) The l-o-n-g delay on the Vic-tapes (it says here) was because there was one or two unfortunate hitches (known in technical language as bugs) and since we reckoned you'd want something that worked, we held things up while we sorted them out.

However, by now you should have received your tape(s), but if not, please ring and shout (but not too loud, since she's got sensitive eardrums!)

2) Meanwhile, Prentice Hall, Tim's publishers, were taken completely by surprise by the enormous demand (that's in addition to the hundreds ordered via CU) so they completely sold out.

This means that some people may have to wait a few extra days to receive their copies until the next shipment arrives from across the Pond.

We apologies for any inconvenience this may cause but, rest assured, all orders will be met.

Again, many apologies. ●

Commodore International Computer Art Challenge.

£150,000 in prizes to be won!

The Challenge. Commodore Computers are pleased to announce their first International Computer Art Challenge, and invite entrants to submit their work for judging by June 1st, 1984.

Entries for this important new competition must be generated on Commodore 64 or Vic 20 computers, and may consist of either a still picture or of dynamic graphics of no more than 60 seconds duration.

There are three age categories: under 12; 12 to 17; and 18 years or over. All entrants must be able to demonstrate their skill on Commodore equipment and explain their methods and development of their entry if required to do so by the panel of judges.

Prizes in each of the 3 age groups and the 4 entry classifications (explained in the leaflet) are as follows:

1st Prize. £1,500 worth of Commodore equipment to the winner's choice.

2nd Prize. £1,000 worth of Commodore equipment.

3rd Prize. £700 worth of Commodore equipment.

In addition, winners will have the opportunity to see their work in a series of unique exhibitions across the world, and a special scholarship worth £5,000 will be awarded to one winner in each participating country to further his or her art education.

All entrants will receive a certificate of entry. There are no cash alternatives to any of these prizes.

How to enter. Leaflets with full details of the Challenge and the entry form are available at Commodore dealers, Commodore User Clubs, most major retail computer shops and at stores with a computer department. In case of difficulty or for additional copies, please write to:

The Commodore International Computer Art Challenge,
Granard Communications, 4 Babmaes Street, London SW1Y 6HD,
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Please rush me a leaflet and entry form for The Commodore International Computer Art Challenge.

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Cosmic Split

You are caught in a vicious jungle of giant insects. Centipedes are attacking you from all sides. Killer fleas are dropping from the sky, and to top things off there's a venemous spider lurking in the background.

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METRO.BLITZ

Metroblitz

The object of this game is to defend your city against an onslaught of suicidal aliens.

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Kystals of Zong

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Art for Art's sake

"The Commodore International Computer Art Challenge will open up an unexplored area to home computer users." Sounds a little like Star Trek? No, it's John Baxter, Commodore UK's marketing Manager. There's more: "we have a responsibility to constantly push forward the frontiers of technology".

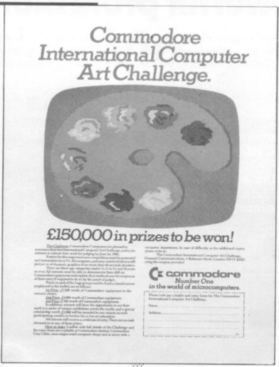
So the Challenge is under way, unveiled at London's Hippodrome nightspot to light shows, booming music, boring speeches ...

Absolutely anyone can enter the Challenge; there are three age categories, ranging from under-12s to the over-18s, all competing for prizes worth a total more than £150,000 (sorry, no real money; you just get Commodore equipment). Lucky winners will also get their materpiece toured round the world as part of an exhibition.

But hold your breath for the Big Prize: the lucky winner (only one in each country) will get a £5,000 endowment to enable him or her to study computer graphics "at a prestigeous educational establishment" anywhere in the world.

The Challenge is not confined just to this green and hi-tech land; it's crossing whole continents to Europe, America and Canada. But back to John Baxter: "we see this as a significant move towards a closer working relationship between technology and the Arts". Perhaps that would sound better coming from someone like, say, the world president of the International Society of Education Through Art.

Enter Professor Brian Allison of the (aforementioned) INSEA. "This major competition represents an important coming together of art and technology which is vital for the future of both subjects." After all, he should know.


Commodore International Computer Art Challenge.

£150,000 in prizes to be won!

Commodore

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Going for a prize

So what do you do? First of all, your entry must be generated on either a Vic or a Commodore 64. You can produce moving (dynamic graphics) or static work. If it moves, the cycle must be no longer than 60 seconds. Both of those categories have been split to take into account the complete artistic spectrum. So you could produce something abstract (a Picasso, maybe?) or representational (the Mona Lisa wearing a hairnet).

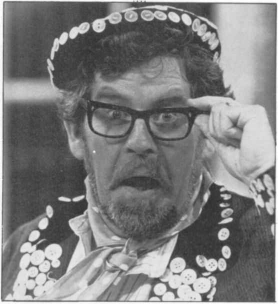
No prizes for guessing who will help judge the UK entries when it closes on 1 June – Prof. Brian Allison and John Baxter, ably assisted by famous TV art exponent, Tony Hart.

Rolf and Tony

Not quite coincidentally, Commodore has launched two drawing programs for the 64. Their respective titles haven't been decided yet but one will include "Tony Hart" and the other, "Rolf Harris" (he of the mammoth canvas, mammoth paint brushes and funny noises).

The Rolf Harris program is aimed at youngsters and has no hi-res graphics facility. You use the joystick to choose a shape or character (not just the conventional 64 character set) from the wide variety at the bottom of the screen and position it anywhere on the screen. Colours are changed in the same way. According to Gail Wellington, Commodore's software manager: "it will certainly cost less than £10 and will be available on tape on disk".

The Tony Hart program does have hi-res graphics and is much more sophisticated. It will allow freehand drawing and quite a few of the facilities found on computer-aided-design programs. That should cost less than £10 too – you might use one of these for your Challenge entry?



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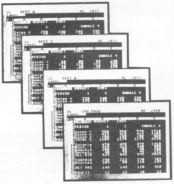

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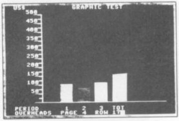

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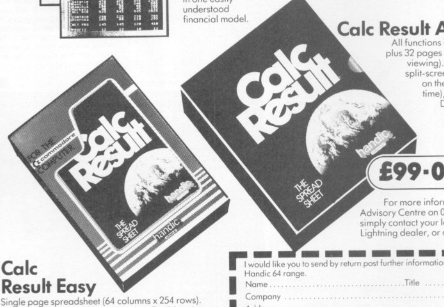

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Thinking ahead

POKEing around the Vic

An A to Z of useful addresses

There are lots of potentially useful memory locations around the Vic, locations which can be addressed directly or from a Vic program by PEEKs that check their contents or POKEs that change their value.

In browsing around we've come across a veritable catalogue of interesting effects. Here's a list of some (in numerical sequence) and what you can do with them; it's based on a chapter from the editor's forthcoming book on the Vic for Penguin.

● INPUT query

Location 19

You don't always want a question mark to appear when an INPUT statement is executed: POKE 19,1 will suppress the question mark.

On the other hand, it also screws up the printing; so you have to reset things immediately after the INPUT with a POKE 19,0 – as in:

```
100 POKE 19,1: INPUT "ENTER
    SOMETHING"; Z$
110 POKE 19,0: PRINT Z$
```

● Kill LISTing of line numbers

Location 22

POKE 22,35 will stop your line numbers from appearing when you LIST a Basic program – could be useful if you're building a miniature word processor.

● End of Basic variables

Location 52

This tells you where variables for a Basic program will stop (the highest limit of memory that they can occupy).

● End of Basic

Location 56

This tells you where Basic stops in memory. Normally it contains 30, and if you get an OUT OF MEMORY error a POKE 56,30 may recover things for you.

● Empty key-board buffer

Location 198

POKE 198,0 will clear out the keyboard buffer, thus avoiding any nasty surprises on your next INPUT.

● Cursor position along line

Location 211

The value in this location indicates the current position of the cursor in terms of number of character positions along the line.

● Quotes mode

Location 212

POKE 212,0 kills the quotes mode; POKE 212,1 turns it back on.

● Line location for cursor

Location 214

The value in this location indicates the current position of the cursor in terms of number of lines from the top of the screen.

● Multi-colour mode

Location 646

This functions like a CTRL/colour key combination – if POKEd with a value from 0 to 7. If you give it a number between 8 and 15 it will display in the Vic's multi-colour mode. Try this sample demonstration:

```
10 FOR M=0 TO 15: POKE
   646,M
20 PRINT "VALUE OF 646 IS" M
30 NEXT
```

● Keyboard buffer

Location 649

Location 649 holds the number of characters that can normally be held in the Vic's keyboard 'buffer', a bit of memory that watches what's going on at the keyboard and acts as a kind of 'type-ahead' store – you can enter a few more characters before the screen has finished displaying what you last typed and they won't be lost. Normally the buffer can hold 10 characters, but you can POKE 649 with any other number. POKE 649,0 prevents any input at all from the keyboard.

● Keyboard repeat

Location 650

In its standard form, four of the Vic's keys will repeat as long as you hold them down – INST/DEL for inserting and deleting, the two cursor movement keys, and the space bar. You can make *all* keys repeating by POKE 650,255: you can make *no* keys at all repeat by POKE 650,255: and you can return to normal with the four repeaters by POKE 650,0.

● SHIFT/CTRL keys

Location 653

This location indicates whether these three keys are pressed – bits 1, 2 and 3 respectively for the three keys. Use PEEK (653) AND 1 to test for SHIFT; for the CBM key use PEEK (653) AND 2; and PEEK (653) AND 3 checks for the CTRL key.

● RUN/STOP

Location 788

To prevent use of the RUN/STOP key, POKE 788,194. To get it back again you POKE 788,171. This also stops the TI/TI$ clock, incidentally. To kill both RUN/STOP and RESTORE, see location 808.

● SAVE stopper

Location 802,803

Including POKE 802,0: POKE 803,0 in your program will prevent anyone from SAVEing it. Kill RUN/STOP and RESTORE as well (see below), otherwise it would be easy enough to reset the system.

Unfortunately the would-be thief has to RUN the program first – these POKEs don't work in direct mode. You can get back to normal with POKE 802,243: POKE 803,243.

● RUN/STOP and RESTORE

Location 808

POKE 808,100 will kill the normal effect of typing RUN/STOP and RESTORE together – potentially useful if you want to remove the possibility of someone deliberately or accidentally exiting from your program. POKE 808,112 returns to normal. But be wary with this one: POKEing 808 with other values might well screw things up for good until you next switch off and on.

● Start of custom graphics

Location 7168

If you POKE 36879,255 the Vic will assume you want to use a set of user-defined characters in locations 7168 to 7600 rather than the standard character set.

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THE AGE OF COMPUTER LEARNING IS HERE!

● Start of alphabet

Location 32776

This location holds the start of the Vic's alphabet in ROM – useful if you want to transfer standard characters from ROM to RAM (7184 on) for customisation.

● Horizontal origin of display

Location 36864

This determines how far across the screen the display box is. Normally it's 12. POKE 36864 with a number less than that and it moves to the left: a higher number (up to 22, since that's the maximum width) moves it to the right. Try this:

```
10 FOR P=0 TO 22: FOR T=1 TO
   10:
20 POKE 36864,P: NEXT: NEXT
30 POKE 36864,12
```

Again, the first FOR changes the value and the next one is a timer loop. Line 30 resets the normal screen.

● Vertical origin of display

Location 36865

You can get a similar effect for the vertical positioning of the box. The range is 0 to 155, normal position is 38:

```
10 FOR P=0 TO 155: FOR T=1
   TO 10:
20 POKE 36865, P: NEXT:NEXT
30 POKE 36866,38
```

● Columns per display

Location 36866

This controls the width of the display box. Normally at 150 for 22 columns, you can POKE a number less than that to restrict the width – POKE 36866,129 gives a one-column screen. Below 129 and above 150 funny things start happening.

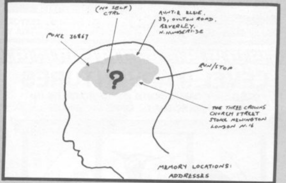
● Lines per display

Location 36867

Actually, 36883 seems to have exactly the same role – they both control the number of lines per display and both are normally set at 46 (divide by two and you get the standard size of 23 lines) or 174 (don't worry about why, but the contents of 36867 are always switching between the two numbers).

To change the depth of the display, POKE 36867 with an *even* number *less* than 46: try using an odd number or one greater than 46 and you'll get some odd effects!

If you ever want stretched characters, this is one location that you can have some fun with. Try POKE 36867,47 then CLR: the bottom border should have dropped out of sight and anything you type now will appear as a pair of stacked characters – so type '@' sitting on top of an 'A' (because the 'A' is the next character along in the Vic's character code table). Now you've got one input occupying two character spaces you can redefine some character codes at 7184 on – but since only 64 characters can be readily programmed and you now need two characters per code you're restricted to 32 new ones. You can then POKE 36869,255 to reference your programmed characters and start printing.


(NO SELF) CTRL
AUNTIE ELSIE, 33, OULTON ROAD, BEVERLEY. N. HUMBERSIDE
POKE 36867
RUN/STOP
THE THREE CROWNS CHURCH STREET STOKE NEWINGTON LONDON N.16
MEMORY LOCATIONS: ADDRESSES

● Screen table locations

Location 36869

Three useful POKEs:

- -POKE 36869,240 gives upper-case characters and graphics
- -POKE 36869,241 gives that in reverse
- -POKE 36869,242 gives upper- and lower-case characters
- -POKE 36869,243 gives that in reverse
- -POKE 36869,255 sets aside the first 64 entries in the character set as user-defined graphics

With some laborious arithmetic you also can work out from the contents of this location the whereabouts in memory of your screen table (which holds the 500 or so displayable characters). Normally of course it'll be at 7680, but it might move if you add extra memory.

The calculation in question could be done with this short program:

```
10 P=PEEK (36869)
20 A=((INT(P/16)-8)*2
30 IF P>127 THEN A=A+1
40 A=A*512
50 PRINT "SCREEN TABLE IS
   AT LOCATION" A
```

Location 36869 can also tell you where to find the character picture table, something you'd need to know if you were defining your own grahics. Again the calculation is a bit complicated:

```
10 P=PEEK (36869)
20 A=P-INT(P/16)*16
30 IF A>7 THEN A=A-8:GOTO
   50
40 A=A+32
50 PRINT "CHARACTER
   TABLE IS AT LOCATION" A
```

● Light pen X location

Location 36870

This holds the horizontal location of a lightpen in the form of a value from 0 to 255. That doesn't correspond exactly to any particular position on the screen, though, and to read it successfully you may have to do some experimentation and calibration.

● Light pen Y location

Location 36871

This holds the vertical position in the same way.

● Paddle A

Location 36872

This holds the potentiometer value from a games paddle, again in the form of a value from 0 to 255. It can also be used for one axis of a poentiometer joystick's position.

● Paddle B

Location 36873

As above for the second games paddle or the Y location of a potentiometer joystick.

● Tone generator 1

Location 36874

The lowest set of tones you can generate. All tone generators produce a range of three octaves; possible values are 128 to 255 (anything below that gives no sound at all).

● Tone generator 2

Location 36875

The middle range of tones.

● Tone generator 3

Location 36876

The highest tones.

● Tone generator 4

Location 36877

White noise generator.

● Volume control/Multi-colour

Location 36878

If this location contains a value less than 16, it indicates the volume for Vic's tone generators. Value 0 gives silence, 15 is the loudest you can get. The sound generators produce a range of three octaves; possible values are 128 to 255 (anything below that gives no sound at all).

Anything more than 16 and it's an indicator for an 'auxiliary' colour – irrespective of the background colour, every dot in a character can be in one colour when it's lit and in a second when it's not. This auxiliary colour is specified by the contents of 36878 if they are greater than 16, and you set it by POKEing 36878 with 16 times a number from 0 to 15 (corresponding to the 16 colours). POKE 36878,16*13 sets the auxiliary colour to light green, for instance. See also POKE 646.

If you want both volume control and an auxiliary colour you have to add the volume level to the POKE – so POKE 36878,16*13+5 would give light green plus a mid-range volume for any sound.

● Border/background colours

Location 36879

This location has the colour combination for the border and background box of the display. Normally it's 27 (cyan border, white background). Note that the screen-and-border code combinations listed by Commodore tend to omit the reversed-character form – adding eight to any of the usual combinations reverses the display in the box. So POKE 36879,8 gives white characters on a black background with a black border: POKE 36879,16 gives reversed characters on a white background with a black border.

POKE 36879,25 should make the border disappear.

●Reposition display

Location 36881

This location determines exactly where on the screen your display box is. The normal value in 36881 is 38 for British Vics (24 in other parts of the world). But if you POKE in a number lower than that the box will move down: and a number higher (up to 255) will move it up. This can be used for some impressive effects – here's a short demo:

```
10 FOR M=1 TO 255: FOR T=1
   TO 5
20 POKE 36881,M: NEXT: NEXT
30 POKE 36881,38
```

The first FOR puts successive values from 0 to 255 into 36881, the second one is a simple timer that slows things down a bit. Line 30 resets the normal screen.

● Joystick control A

Location 37137

Actually this is output register A, but bits 2,3 and 4 of the value in this location indicate whether switches 0, 1 and 2 on a switch-type joystick are open or closed (that's north, south and west): and bit 5 indicates the status of a fire button.

● Data Direction Register A

Location 37139

Determines the setting of the associated input/output port. POKE 37139,0 to disable the keyboard for use with joysticks.

● Joystick control B

Location 37139

Actually output register B, but it handles the east (switch 3) direction of a switch-type joystick. Bit 7 is the indicator bit.

● RESTORE

Location 37150

To prevent use of the RESTORE key on its own, POKE 37150,2. To get it back again you POKE 37150,130. Since the RESTORE key is pretty pointless except when used with RUN/STOP, the POKE 808 dodge might be more helpful to your programming.

● General-purpose timer

Location 37159

The value here determines how frequently the Vic goes to its Interrupt Request (IRQ) routine. That in turn decides how fast the cursor flasher, how frequently the keyboard is checked, how the TI clock runs, and other things – including how quickly the processor works.

Ordinarily it contains 72 for UK Vics (66 in some other parts of the world). Setting it to a higher number – like POKE 37159,255 – will speed up the Vic's processing. But be careful: the side-effects are many. Like your cursor will blink slowly, the clock will lose time, and the Vic may miss anything that's typed in. What's more, not all the processing will be accelerated: POKEs and PEEKs will slow down. ■

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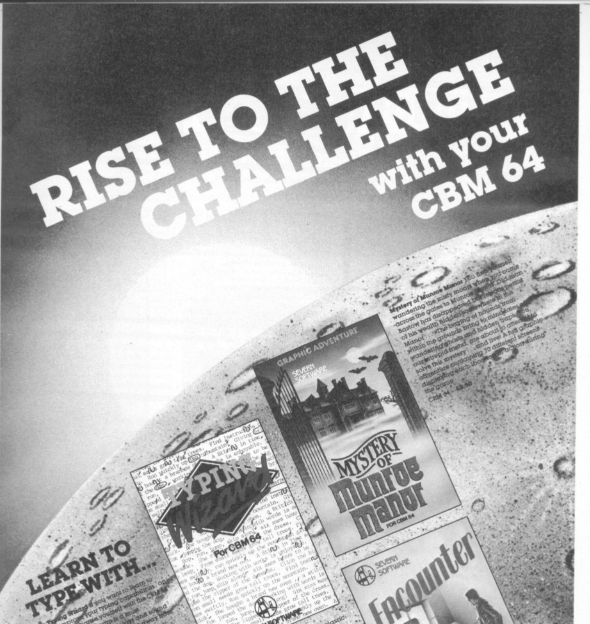

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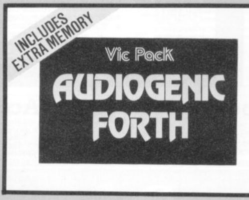
The Forth Page:

Audiogenic's Forth

by Richard G Hunt

Audiogenic has two Forth cartridges, one with and one without 3K RAM expansion. The latter is naturally cheaper, but it requires at least 8K expansion RAM to be resident.



I have to admit that I have been using the cheaper one since it was available first; and, not knowing then what I have since learned about Forth implementations I did not find it difficult to use. That this implementation differs in some respects from what Forth experts like Brodie and Winfield describe as 'typical' does not matter one bit.

Indeed what the creator of this implementation has done is to adapt a Forth system to fit the more unusual (from Forth's point of view) characteristics of the Vic computer. And he has been quite successful.

The Vic is a small personal computer for the home user. The Vic owner is not likely to have a disk drive, perhaps not even a printer. The Audiogenic Forth cartridge therefore compromises with the usual standards – specifically as regards the editor and virtual memory.

This means that certain words (e.g. [VLIST]) cannot be defined. Also, this Forth system compiles to machine code: which it makes faster but certainly more non-standard than most versions of Forth.

Manual labours

The cartridge is accompanied by a 82-page A5-size loose-leaf manual in a ring binder. It is divided into three sections. The first section (Manual) comprises descriptions of the dictionary; maths; the editor; constants, variables and arrays; structure; text and formatted numbers; the IEEE interface; defining words; interface; and so on.

Here it must be said that the text is useful but a little on the short side – because it does not pretend to cater for beginners. (There are a couple of hangups from earlier versions but these are not serious.)

The manual also covers the version for the 64.

Section 2 (Tables) provides a list of all pre-defined words and what they do. Alas, there seem to be some omissions in the tables where words listed are described – particularly unfortunate as these tables are the only source of dictionary contents.

There are six special words provided which recognise that the Vic is different to other computers, notably words that control the VIC chip and the function keys. **[COLOUR]** is one, but it does not seem to function quite as I expected: its arguments for background/foreground colour don't seem to resemble values to be found in the *Programmers Reference Guide*. In fact the values are **Background * 16 + Foreground** which is then placed in address $900f. Thus the line

: paint 16/mod colour;

. . . enables use of the colour table at Appendix B of the *Reference Guide* without further ado.

The final section of example programs contains information on how to put some definitions together. These include some printer routines, a [CASE] definition for structurists (which I have not yet tried) and an arcade game (which I have).

Typing in the game actually taught me much about Forth . . . especially as it did not [RUN] correctly. I suspect a typographical error had caused the number 32768 to be printed. As all Forth students should learn early on, that is larger (by 1) than the largest possible signed single precision number!

Under way

On switching on, the screen displays the usual credits, which promptly disappear when any key is depressed. At this point the non-standard features of the editor become apparent.

To enable the compilation of serious applications comprising several screens of code without resorting to virtual memory on disk, the editor provides editing screens out of RAM – expanding them to fit the screen and compressing them to RAM as required. I imagine it is much like a disk-based system, though the source code is definitely not saved. Screen 0 is the interpreter screen – pressing ‹return› involved the Forth interpreter. On the other screens the return key merely executes a carriage return.

The small screen size of the Vic is no hindrance. A screen scrolling routine provides a screen of the standard 64 columns by 16 rows. Additionally helpful is an area at the bottom of the screen which indicates

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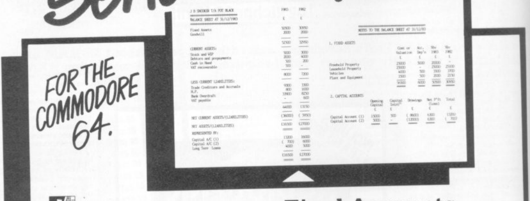
FOR THE COMMODORE 64.

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screen, line and column numbers. Data from the PAD may also be placed here.

What is odd is that for once on the Vic there is no vertical scrolling as the 16th line (of screen 0) is filled. Instead the screen must be cleared by a special word [CLR0].

When using screen 0 users will have to get used to the way in which commands are executed. Execution is displayed by way of a temporary message in red, which is erased when the next key is pressed. I do not find this any more difficult to use than a normal scrolling screen, but it does seem to have some effect on the colour of programmed displays. I have not yet solved how to change the 'ink' colour.

Editor commands are very powerful and are accessed by the function keys. There is no assembler available, though; and I'd guess that a standard Forth 6802 assembler might not work given the method of implementation. Memory maps are included in the manual, however. (All Vic configurations are covered as well as the 64.)

Programs are saved either to cassette or disk (the latter by specifying [DEVICE] in source code form). Thus to load and run an application one must first successfully load the source code, compile it and then run it; that is cumbersome – and when the source fails to load it is bothersome.

No error messages are given when loading or saving. So when working on a project I load the following two words which I find re-assuring if not helpful:

```
: CLOAD SLOAD 158 C@ 0 =
IF ."READY"
ELSE ."LOAD ERROR" THEN :
: CSAVE SSAVE 158 C@ 6 ‹ if
."READY"
ELSE ."SAVE ERROR" THEN;
```

The system responds with the inevitable "OK" in any case!

Conclusions

In fairness I think by definition any Forth implementation is going to lack some pre-defined words. Such extensions are easily implemented by the user. After all, that is what Forth is all about. . .

There is not a great choice of Vic Forth cartridges. The Audiogenic cartridge is in my opinion by far the easiest to use unless one is fully equipped with disk drive. Armed with this cartridge and a Forth textbook a beginner may spend hours of enjoyable programming without being beset with too technical problems.

At £24.95 the cartridge with no memory is good value. The version with extra memory would be an expensive option when a multi-cartridge board or memory board with its own expansion slot would be a more versatile combination.

Under review	**Vic Forth**
Description:	**Forth cartridge**
Supplier:	**Audiogenic** **PO Box 88** **Reading Berks**
Summary:	**Best non-disk option if you want Forth.**
Price:	**£24.95** ●

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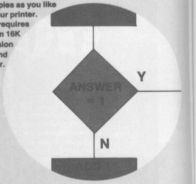

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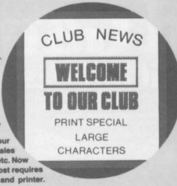

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Our regular round-up of games reviews

We get to see a lot of games here at Commodore User, so many in fact that we can't handle all the reviewing ourselves – we farm out some of them, which is why our reviews have someone's initials at the end of them. We look at everything we get, but we don't necessarily print all the reviews we write: instead, we tend to stick with (a) all the best games we come across and (b) those games that you're most likely to find in the shops or the mail order ads.

ANOTHER VIC IN THE WALL

Vic 20 (Unexpanded)
Keyboard or Joystick
Price £7.00

A variant of *Breakout* – a black screen and an endless procession of coloured walls to smash through. By utilising the rounded ends of the bat, both direction and velocity of the ball are at your command ... but only when you have developed the essential expertise.

BUG-BYTE
SOFTWARE
FOR UNEXPANDED VIC 20

It looks deceptively easy to play but in fact is a real challenge. Self-play mode is provided, just in case anyone should decide it is impossible. Obviously the graphics are uncomplicated (still hi-res, though) and the sound effects necessarily basic.

One of my all time favourites; I keep bouncing back for more. 28,000 to beat! *LS*

Bug Byte

Presentation: ■■■□□
Skill level: ■■■■□
Interest: ■■■□□
Value for money: ■■■□□

COSMIADS

Vic 20 (Unexpanded)
Keyboard or Joystick
Price £7.00

This one has been around a long time: age hasn't improved it and I'm sure Bug Byte could and should offer an improved version.

Well, if I must describe this offering – it is *Galaxians*: from out of an uninspiring formation of aliens, craft predictably swoop towards your laser base, crudely changing colour en route (must I continue?) to be followed by fearsome mother ships which you must hit several times (gosh!). The action (sic) commences embarrassingly slowly accompanied by annoying sonics. Your only reward is a patronising message between games.

Come on, BB. The wrapping looks exciting; improve the game! *LS*

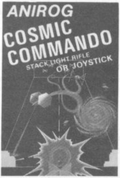
Bug Byte

Presentation: ■□□□□
Skill level: ■■□□□
Interest: ■□□□□
Value for money: ■□□□□

COSMIC COMMANDO

Vic 20 (+16K)
Stack Light Rifle or Joystick
Price £5.95

Anirog has been providing 16K games for proud expanded-Vic owners for some time now, and is quick off the mark for Stack's Light Rifle, obviously designed for the new hardware, but also eminently playable with a joystick: We're in a shooting gallery, displayed in perspective. Targets dodge and weave, inviting destruction; but our shots must count if we are to earn more ammo before exhausting our initial supply – so no wild blasting. On the other hand our bonus score is constantly ticking away. Target snatchers appear along with stealers ... and of course the pace hots up. The sonics are entirely appropriate.


ANIROG
COSMIC COMMANDO
STACK LIGHT RIFLE OR JOYSTICK

Two versions are supplied, with an on-screen gunsight for the joystick variant. Some excellent advice pertaining to loading and cassette-head care is printed on the insert (this should be universal practice). An unusual and effective high score screen adds to the presentation as does the expanded screen. *LS*

Anirog Software

Presentation: ■■■■□
Skill level: ■■■■□
Interest: ■■■■□
Value for money: ■■■■□

CYCLONS

Vic-20 +8K
Joystick only
Price £5.99

We are presented with a four-part opening menu giving the choice of four skill levels, fast or slow start, ricochet, and the option of a mountain range. This allows a fair degree of variation; but for my money the ricochet with a mountain range (different every time) makes for the best game.

You have to control a yellow spinning top which has constantly to avoid three whirling red cyclons which intermittently spit projectiles. Your task is to make them collide or to come to grief on the mountains. Alternatively you can flick (definitely not shoot!) bullets to the same end. You will need some practice to direct the top accurately, a very delicate touch and disciplined measure of control: no lunging here!

Then just as you are mastering the situation, a flickering green light, sometimes known as a Pulsar Death Ship, intrudes: try and avoid that!

SCREEN SCENE

CYCLONS
FOR YOUR
20

The graphics certainly won't make you gasp but they are adequate. So are the sonics. On consideration, if they were more complex maybe they could distract your attention from the matter in hand. My NFC (non-computerised friend) reckons "I could really get my teeth into this one". He's just about right. Nice one Rabbit! *LS*

Rabbit Software

Presentation: ■■■■□
Skill level: ■■■■■
Interest: ■■■■□
Value for money: ■■■■□

GALACTIC ABDUCTOR

Vic +16K
Joystick only
Price £7.95

It's a fact of life that it takes five minutes to load 16K games; fortunately this one is worth the wait. You are presented with a fully-expanded screen with a backcloth of twinkling stars (nice touch here) and a green

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The VIC SECTION

SCREEN SCENE

mountain range. Humanoids are lined up ready to be defended by a multi-colour laser base. Giant Abductor hawks swoop, soar and dive through a repertoire of several formations to attack your gun and snatch the humans.

The sonics really do mimic flapping wings. Four very accurate shots are needed to down each bird, causing them to change through cyan, purple and green before tumbling into the mountains. In reply, they drop eggs which hatch into homing mines. You will need quick reflexes and a mastery of a (unique) joystick action to despatch these. After you are completely wiped out it's on to the hall of fame!

ANIROG
GALACTIC ABDUCTOR

Altogether a good game with a most attractive screen display. The insert instructions are adequate. With their attention to detail and customer comforts, Anirog are again setting standards ... *LS*

Anirog

Presentation:	■■■■■
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□

GUN FIGHT
Vic-20 (any)
Keyboard only
Price £4.00

This is a cowboy shootout game, in which you have two cowboys on each side of the screen, with cacti and a constantly moving wagon you can use as cover.

Each man moves only up and down firing at his opponent. The winner is the first to hit the other man five times, then the game goes back to the beginning.

Being written in machine code makes *Gun Fight* a very fast game, but once you have got the hang of it the lack of variation in scenery or any progressive difficulty levels makes it undemanding.

The graphics and sound are reasonable, with little gunshot sounds when firing and the death march when you get shot. *BJ*

Solar Software

Presentation:	■■□□□
Skill level:	■□□□□
Interest:	■□□□□
Value for money:	■□□□□

SKRAMBLE
Vic +16K
Joystick only
Price £7.99

Wizard! At last a graphically superb arena in which to practice your skills as a Skramble Pilot. (Unfortunately my other versions of the genre are now made obsolete).

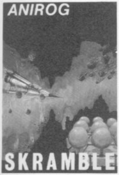
The 16K allows for an expanded screen with very clearly displayed targets nestling on the treacherous terrain (no squinting!). Colourful ammo dumps will return a variable score, displayed on detonation. Blue fuel dumps invite your attention, while the yellow missiles change to green on launching: will you be quick enough to avoid them? The finely-detailed penetrator craft has a pulsating exhaust enhancing the illusion of flight. And a feature I especially liked was the trajectory of the bombs, not just a simple plummet but a "lobbing" movement, needing that extra touch of skill to aim accurately.

Six colour sectors need to be negotiated. In the red sector rockets have to be avoided or destroyed; inside the green cavern Yo-Yos will plague you. Out into the open again, the blue sector has fireballs (again attractively depicted) which have to be evaded as they cannot be zapped. Over the purple city blocks, still picking up fuel (or else!) – where you are fighting rockets again. At last the cyan city-maze, only one more sector left: and that is as far as I can take you.

No complaints whatsoever about the sonics. But it is the graphics which really impress; a visual treat, in fact. With so much to see it is more than likely that I have missed some interesting features. To appraise the packaging: succinct instructions and a pertinent illustraion, so no disapointments. Need I dd that I recommend it! *LS*

Anirog Software

Presentation:	■■■■■
Skill level:	■■■■□
Interest:	■■■■■
Value for money:	■■■■■



JETPACK

Vic-20 +8K
Keyboard or Joystick
Price £5.50

Utterly superb space game with a more constructive scenario than usual. You are a delivery/test pilot on your travels about the galaxy and have the chance to do a bit of prospecting as you go. Of course there's a catch: those pesky aliens are out to get you again (will they never learn?) and there is a little matter of having to assemble your space ship before you can actually go anywhere! I didn't say it was easy ...

The graphics are smashing, lots of lovely hi-res stuff as you zip about on your Jetpack or go walkies on the bits of extra terrestrial firma that appear from time to time along with the goodies like gold, jewels and fuel. Lots of zingy sonics too, phasey lasers and big bangs and more.

Oh I like it, I like it! I will say no more but go and get one quick. One or two player option.

How do they do like it for £5.50? It's companies like Ultimate that get my vote every time, look out Imagine, you have competition! *JDC*

Ultimate

Presentation:	■■■■■
Skill level:	■■■■■
Interest:	■■■■■
Value for money:	■■■■■

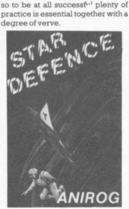
STAR DEFENSE

Vic 20 (+16K)
Keyboard and Joystick
Price £7.95

Defender by any other name, but with a multitude of features poked into 16K. There is an expanded screen accommodating double-width characters yet still leaving room to manoeuvre your craft – with superb control from the joystick. Whenever you ease off the thrust there is gradual deceleration; change of direction is instantaneous when needed.

Also to aid you in your quest to protect the purple humanoids from the green landers: smart bombs (RETURN), temporary invisibility (RIGHT SHIFT); jump to hyperspace (SPACE); radar (F3). And lastly you can jump through the glittering star gate to reappear at the scene of another abduction.

Your laser fire is portrayed in multi-colour mode (a Vic forté), as are the mutants which consequently appear to have actually mutated! Great stuff. Aiding and abetting the said transmogrifications are white diamond 'space hums' and green saucers (tricky blighters). Naturally space mines are discharged with gay abandon, so to be at all successful plenty of practice is essential together with a degree of verve.



To sum up; a program with plenty of meat and a colourful screen display (avoiding the mistake of tiny blue objects in a black sky) aided by a strong sound department. If there is a better version of *Defender* for our Vics, please let me have a copy ... *LS*

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Presentation:	■■■■■
Skill level:	■■■■□
Interest:	■■■■■
Value for money:	■■■■■

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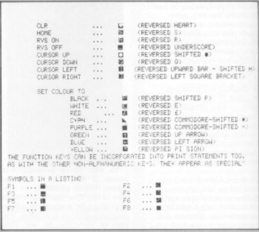
How to type in Victuals

When you see...	It means ...	And you ...
[CUP]	*cursor up*	press the 'cursor up' key
[CUD]	*cursor down*	press the 'cursor down' key
[CUL]	*cursor left*	press the 'cursor left' key
[CUR]	*cursor right*	press the 'cursor right' key
[HOM]	*cursor to the top lefthand corner*	press the HOME key
[CLR]	*clear*	press the CLR key
[INS]	*insert*	press the INSert key
[BLK]	*change to black*	press the BLK key (shifted 1)
[WHT]	*change to white*	press the WHT key (shifted 2)
[RED]	*change to red*	press the RED key (shifted 3)
[CYN]	*change to cyan*	press the CYN key (shifted 4)
[PUR]	*change to purple*	press the PUR key (shifted 5)
[GRN]	*change to green*	press the GRN key (shifted 6)
[BLU]	*change to blue*	press the BLU key (shifted 7)
[YEL]	*change to yellow*	press the YEL key (shifted 8)
[RVS]	*reverse on*	press the RVS ON key (shifted 9)
[RVO]	*reverse off*	press the RVS OFF key (shifted 0)
[SPC]	*space*	press the space bar
X followed by a number		repeat the specified number of times

We have two methods of presenting listings. When we can, we run them through a converter program that replaces the hieroglyphic control codes with more meaningful symbols.

These listings we generally run out on a letter-quality printer, though, and conventional graphics can't be handled on a daisywheel. So some listings are done on a Commodore printer, in which case you may see the standard control codes:



```
     CLR           ...   ■   (REVERSED HEART)
     HOME          ...   ■   (REVERSED S)
     RVS ON        ...   ■   (REVERSED R)
     RVS OFF       ...   ■   (REVERSED UNDERSCORE)
     CURSOR UP     ...   □   (REVERSED SHIFTED ●)
     CURSOR DOWN   ...   ■   (REVERSED Q)
     CURSOR LEFT   ...   ■  (REVERSED UPWARD BAR - SHIFTED H)
     CURSOR RIGHT  ...   ■  (REVERSED LEFT SQUARE BRACKET)

     SET COLOUR TO
             BLACK  ...   ■   (REVERSED SHIFTED P)
             WHITE  ...   ■   (REVERSED E)
             RED      ... ■   (REVERSED £)
             CYAN   ...   ◣   (REVERSED COMMODORE-SHIFTED *)
             PURPLE ...   ■   (REVERSED COMMODORE-SHIFTED -)
             OREEN  ...   ■   (REVERSED UP ARROW)
             BLUE   ...   ■   (REVERSED LEFT ARROW)
             YELLOW ...   ■   (REVERSED PI SIGN)
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SYMBOLS IN A LISTING
F1   ... ■                        F2   ... ■
F3   ... ■                        F4   ... ■
F5   ... ■                        F6   ... ■
F7   ... ■                        F8   ... ■
```

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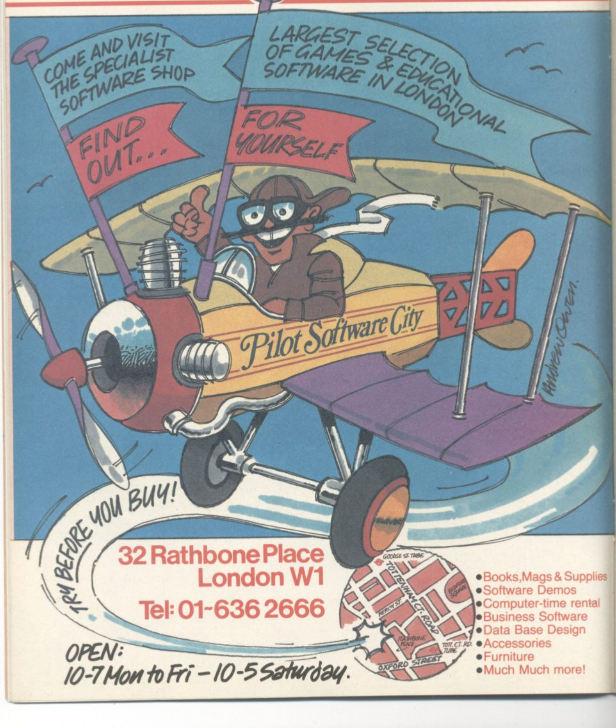
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Critical Mass

by Keith Edwards

Critical Mass is a two-player game based on a board game called Explosion. It will run on any memory size Vic-20 computer.

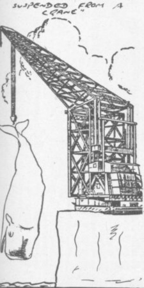
You are presented with a 6x6 grid. Each player in turn places one of his counters (either O or X) into an empty square or a square already occupied by one or more of his own counters.

However, each square has a point at which *critical mass* is reached and *fission* occurs. Corner squares explode when two counters are on them, side squares explode when containing three counters and central squares go up when four counters occupy their space.

When an explosion occurs the counters on the exploding square are distributed into the adjacent squares. Any enemy counters on the latter squares are captured and become counters belonging to the mover. Should receiving squares attain critical mass further explosions will result.

The player having no counters left at the end of his opponent's move is the loser.

The colours were selected to give good contrast on a black and white television. Users with colour TVs will almost certainly change them.


"THE WHALE WILL NOW ESCAPE FROM A STRAIGHTJACKET WHILST SUSPENDED FROM A CRANE"

```
10 S3=36876:S4=S3+1:V=S4+1:POKEV+1,155
20 CA$="▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶▶":CD$="▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼▼"
30 PRINT"▒▒▒▶▶▶▼▼▼▼╯EITH ▔DWARDS
40 PRINT"▶▶▶▼▼▼▼▼▼▶┌RESENTS...
50 FORTD=1TO2500:NEXT:POKEV+1,109
60 PRINT"▒▒▒▒":FORFX=0TO9:PRINTTAB(FX)"▔▁╲│╲▔♠L ╲♣♣♣▒▒":FORTD=1TO150:NEXTTD,FX:P
OKEV,15
70 DIMMA(6,6),L(6,6),CA(6,6):A$(0)="▒▒▒▔▒▒▒▔▒▒▒▔▒▒▒▔":A$(1)="▒▒▒♣▒▒▒♣▒▒▒♣▒▒▒♣"
80 FORLX=1TO6:FORLY=1TO6:READCA(LX,LY):NEXTLY,LX
90 FORTD=1TO1500:NEXT:POKEV+1,76
100 PRINT"▒▒▼▼▼▼  ┌──┬──┬──┬──┬──┬──┐
110 FORLX=1TO5:GOSUB730:NEXT
120 FORLX=1TO2:PRINT"  │  │  │  │  │  │  │":NEXT
130 PRINT"  └──┴──┴──┴──┴──┴──┘";
140 GOSUB790
150 X=0:GOTO370
160 FORLX=1TO4
170 GOSUB710:PRINT"▒▒▒▒▒▒":GOSUB800
180 GOSUB710:PRINT"  ▒▒▒  ":FORTD=1TO125:NEXT
190 NEXT:POKES4,150:FORLX=15TO0STEP-1:POKEV,LX:FORTD=1TO30:NEXTTD,LX:POKES4,0:PO
KEV,15
200 MA(TX,TY)=MA(TX,TY)-CA(TX,TY)
210 IFMA(TX,TY)>0THENGOSUB720:GOTO230
220 L(TX,TY)=0
230 EY=TY-1:IFEY=0THEN250
240 GOSUB620
250 EX=TX-1:IFEX=0THEN270
260 GOSUB640
270 EY=TY+1:IFEY>6THEN290
280 GOSUB620
290 EX=TX+1:IFEX>6THENRETURN
300 GOSUB640:RETURN
310 FG=0
320 FORTX=1TO6
330 FORTY=1TO6
340 IFMA(TX,TY)=>CA(TX,TY)THEN FG=1:GOSUB 160
350 NEXTTY,TX
360 GOSUB 460:IFFG=1THEN310
370 X=1-X
380 GOSUB790:POKE198,0:PRINT"▒▒┐LAYER:"LEFT$(A$(X),4)"▒ OHICH COLUMN?":GOSUB660
390 PRINT"▒▒          OHICH ROW ?  ":GOSUB680
400 IFL(TX,TY)<>X+1ANDL(TX,TY)THENPRINT"▒▒    ╲└┘▔│♠L ╲┌╳▔!!    ":GOSUB700:GOTO38
0
410 PRINT"▒                    "
420 MA(TX,TY)=MA(TX,TY)+1:IFL(TX,TY)=0THENL(TX,TY)=X+1
430 GOSUB720
440 POKE36876,0:IFMA(TX,TY)=>CA(TX,TY)THENGOSUB160:GOTO310
450 GOTO370
460 VG=0
470 FORLX=1TO6:FORLY=1TO6:IFL(LX,LY)=(1-X)+1THENVG=1
480 NEXTLY,LX
490 IFVG=1THENRETURN
500 FORLX=1TO8
510 PRINT"▒OIN FOR PLAYER: "LEFT$(A$(X),4):GOSUB800
520 PRINT"▒                          ":GOSUB800
530 NEXT:PT(X)=PT(X)+1
540 PRINT"▒▒    ♠┬┌▁▔ ♠│▔▔│▒▒
550 FORX=0TO1:PRINT"┐LAYER "LEFT$(A$(X),4)"▒ :- "PT(X)"▒":NEXT
560 PRINT"▒▒▒▒▒▒┐O YOU WANT TO PLAY ▒  AGAIN ? (╲/╱)
570 GETI$:IFI$=""THEN570
580 IFI$="Y"THENFORLX=1TO6:FORLY=1TO6:MA(LX,LY)=0:L(LX,LY)=0:NEXTLY,LX:GOTO100
590 IFI$<>"N"THEN570
600 END
610 DATA2,3,3,3,3,2,3,4,4,4,4,3,3,4,4,4,4,3,3,4,4,4,4,3,3,4,4,4,4,3,2,3,3,3,3,2
620 L(TX,EY)=X+1:MA(TX,EY)=MA(TX,EY)+1
630 PRINT"▒"LEFT$(CA$,TX*3)LEFT$(CD$,EY*3+2)LEFT$(A$(X),MA(TX,EY)*4):RETURN
640 L(EX,TY)=X+1:MA(EX,TY)=MA(EX,TY)+1
650 PRINT"▒"LEFT$(CA$,EX*3)LEFT$(CD$,TY*3+2)LEFT$(A$(X),MA(EX,TY)*4):RETURN
660 GOSUB760
670 TX=VAL(I$):PRINT"▒▼▼▼"LEFT$(CA$,TX*3+1)"◣"I$:RETURN
680 GOSUB760
690 TY=VAL(I$):PRINT"▒"LEFT$(CD$,TY*3+3)"◣▒"I$:RETURN
700 POKES3,130:FORTD=1TO1000:NEXT:POKES3,0:RETURN
710 PRINT"▒▒"LEFT$(CA$,TX*3)LEFT$(CD$,TY*3+2);:RETURN
720 PRINT"▒"LEFT$(CA$,TX*3)LEFT$(CD$,TY*3+2)LEFT$(A$(X),MA(TX,TY)*4):RETURN
730 PRINT"  │  │  │  │  │  │  │
740 PRINT"  │  │  │  │  │  │  │
750 PRINT"  ├──┼──┼──┼──┼──┼──┤":RETURN
760 GETI$:IFI$=""THEN760
770 IFVAL(I$)<1ORVAL(I$)>6THEN760
780 POKES3,220:FORDE=1TO50:NEXT:POKES3,0:RETURN
790 FORLX=1TO6:PRINT"▒◣"LEFT$(CD$,LX*3+3)LX:PRINT"▒▼▼▼"LEFT$(CA$,LX*3)LX:NEXT:RE
TURN
800 FORM=180TO236STEP4:POKE36876,M:NEXT:POKE36876,0:RETURN

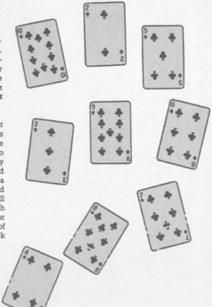
READY.
```

Higher-Lower

by Maurice le Vallois

A Vic version of an old and simple but rivetting gambling game. It will be a familiar to those millions who don't use their TVs for computing all the time, because the game features on the quiz program *Play your cards right* (nice ter see yer ...)

Playing just involves betting that the next card the computer shows you will be higher or lower than the last one. Put like that, it's not too complicated; but it is surprisingly morish. And it's a pretty good adaptation, though there are a couple of flaws – you are allowed to play on even when you've lost all your money, for instance, which isn't exactly good training for Monte Carlo. Still, that's the kind of thing that a one line IF/THEN check could handle.



```
*** HIGHER LOWER ***

0 GOSUB61: POKE 36879,41: PRINT "[CLR][CUD][CUD][CUD][CUD][RVS][WHT][SPC5]HIGHER
,LOWER[SPC5]": PRINT "[RVS][CUD][CUD][CUD][CUD][CUD]BY MAURICE  LE-VALLOIS"
1 PRINT "[CUD][CUD][CUD][CUD][CUD][CUD][WHT][RVS]  INSTRUCTIONS (Y/N)  ": GOSUB6
2
2 GETA$: IFA$<>"N"ANDA$<>"Y"THEN2
3 IFA$="Y"THEN5
4 GOTO14
5 GOSUB61: PRINT "[CLR][WHT][CUD]FIVE CARDS ARE DEALT"
6 PRINT "[CUD]FACE DOWN THEN ONE[SPC4][CUD]CARD IS TURNED OVER.  [CUD][CUD]YOU A
RE THEN ASKED TO [CUD]BET ON THE";
7 PRINT " NEXT CARD  [CUD]BEING HIGHER OR LOWER.[CUD][CUD]AFTER YOU BET YOU MUST
[CUD]PRESS RETURN."
8 PRINT "[RVS][CUR][CUR][CUR][CUR][CUR][CUR][CUR][CUD][CUD]HIT A KEY": GOSUB62:
GOSUB63: GOSUB61
10 PRINT "[CLR][CUD]YOU START WITH A BANK [CUD]OF £50.": PRINT "[CUD][CUD]ACES A
RE HIGH AND[SPC5][CUD]PAIRS ALWAYS LOSE."
11 PRINT "[CUD][CUD]IF YOU GUESS ALL THE  [CUD]CARDS CORRECT YOU GET [CUD]A BONU
S OF £50."
12 PRINT "[CUD]USE KEYS H AND L.": PRINT "[RVS][CUD][CUD][CUR][CUR][CUR][CUR][CU
R][CUR][CUR]HIT A KEY": GOSUB62: GOSUB63
   POKE 36879,24: PRINT "[CLR]": FORU=0TO21: READDA: POKE 828+U,DA: NEXT: SYS828
15 V=36878: S1=36874: S2=36875: S3=36876: S4=36877: P=0: S=0: U=0: B=50: DIMA%(4
,13): Q=RND(-TI)
16 A$(1)="[BLK]♠": A$(2)="[RED]♥": A$(3)="[RED]♦": A$(4)="[BLK]♣"
17 D$="[HOM][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD]": POKE V,15: C=1: P=0
19 FORD=1TO5: PRINT D$; : FORI=1TO6: PRINT TAB(C)"[RED]▒▒▒": NEXT: POKE S2,200:
FORI=1TO50: NEXTI
20 POKE S2,0: C=C+4: NEXT: C=1
21 PRINT "[RVS][BLK][HOM]BANK £"; B; : GOSUB50: GOSUB52: YS=S: IFS>10THEN25
23 B$=RIGHT$(STR$(S),LEN(STR$(S))-1): PRINT D$TAB(C)"[BLK]"B$
24 PRINT "[BLK][CUD][CUD][CUD][CUD]"TAB(C+3-LEN(B$))B$
25 ONSGOTO26,27,28,29,30,31,32,33,34,35,36,37,38
26 PRINT D$"[CUD][CUD]"TAB(C+1)A$: GOTO39
27 PRINT D$"[CUD][CUD]"TAB(C)A$"[CUR]"A$: GOTO40
28 PRINT D$"[CUD]"TAB(C)A$"[CUD][CUD][CUR]"A$: GOTO26
29 PRINT D$"[CUD][CUD][CUD][CUD]"TAB(C)A$"[CUR]"A$: GOTO27
30 PRINT D$"[CUD][CUD][CUD]"TAB(C+1)A$: GOTO29
31 PRINT D$"[CUD][CUD][CUD]"TAB(C)A$"[CUR]"A$: GOTO29
32 PRINT D$"[CUD]"TAB(C+1)A$: GOTO31
33 PRINT D$"[CUD]"TAB(C)A$"[CUR]"A$: GOTO31
34 PRINT D$"[CUD]"TAB(C)A$A$A$: GOTO31
35 PRINT D$"[CUD]"TAB(C)A$A$A$: PRINT TAB(C)A$A$A$: GOTO31
36 PRINT D$TAB(C)A$"[CUD]J[CUD][CUL]A[CUD][CUL]C[CUD][CUL]K": GOTO40
37 PRINT D$TAB(C)A$"Q[CUD][CUL]U[CUD][CUL]E[CUD][CUL]E[CUD][CUL]N": GOTO40
38 PRINT D$TAB(C)A$"[CUD]K[CUD][CUL]I[CUD][CUL]N[CUD][CUL]G"
39 IFS=1THENS=14
40 C=C+4: IFC=20THEN71
41 IFP=0ORP=2ORP=4ORP=6THENGOSUB57: GOSUB60
42 IFP=8THEN81
43 PRINT D$"[RVS][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][PU
R]HIGHER OR LOWER": P=P+1
44 GETG$: IFG$="H"THENF=1
45 IFG$="L"THENF=2
46 IFF=0THEN44
47 IFP=2ORP=4ORP=6ORP=8THEN71
48 IFP=9THEN81
49 U=S: GOTO21
50 IFN>40ANDC=1THEN55
51 PRINT "[WHT]": PRINT D$; : FORI=1TO6: PRINT TAB(C)"[RVS]   ": POKE S2,220: NE
XT: POKE S2,0: RETURN
52 X=INT(RND(1)*4)+1: Y=INT(RND(1)*13)+1: IFA%(X,Y)=1THEN52
53 N=N+1
```

```
53 N=N+1
54 A%(X,Y)=1: A$=A$(X): S=Y: RETURN
```

```
55 PRINT "[HOM][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR][CUR][RVS][RED]SHUFF
LING": FORX=1TO4: FORY=1TO13: A%(X,Y)=0: NEXTY,X: FORX=1TO2000: NEXT
56 N=0: PRINT "[HOM][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CUR][CUR][RVS][GRN]
[SPC9]": GOTO51
57 INPUT"[HOM][CUD][BLK][RVS]BET "; BET: BET=ABS(INT(BET)): IFBET=0THEN57
58 PRINT "[HOM][CUD][CUD][CUD][CUD][RVS][GRN][SPC20]"
59 RETURN
60 PRINT "[HOM][RVS][GRN][CUD][SPC44]": RETURN
61 FORI=38TO180: POKE 36881,I: NEXT: RETURN
62 FORI=180TO38STEP-1: POKE 36881,I: NEXT: RETURN
63 GETA$: IFA$=""THEN63
64 RETURN
65 FORI=1TO800: NEXT: PRINT D$"[RED][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD
][CUR][CUR][RVS]ANOTHER GAME(Y/N)"
66 GETA$: IFA$="N"THEN90
67 IFA$="Y"THEN69
68 GOTO66
69 PRINT D$"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][GRN][RVS][SPC21]"
70 A%(X,Y)=0: GOTO17
71 IFF=1ANDS>UORF=2ANDS<UTHENGOSUB76: GOSUB79: F=0: GOTO41
72 IFF=1ANDS<UORF=2ANDS>UTHENGOSUB76: GOSUB77: FORI=1TO1000: NEXTI: F=0: GOTO65
75 IFS=UTHENGOSUB76: GOSUB77: F=0: GOTO65
76 POKE V,15: PRINT D$"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR][C
UR][GRN][RVS][SPC15]": RETURN
77 PRINT D$"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CU
R][CUR][CUR][RED]YOU LOSE": FORI=128TO255: POKE S1,I: NEXT: POKE S1,0
78 B=B-BET: PRINT "[HOM][RVS][GRN][CUR][CUR][CUR][CUR][CUR][CUR][SPC15]": PRINT
"[HOM][BLK][RVS][CUR][CUR][CUR][CUR][CUR][CUR]"; B; : RETURN
79 PRINT D$"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUR][CUR][CUR][CUR][CU
R][CUR][CUR][CUR][RED]YOU WIN": U=S: FORI=255TO128STEP-1: POKE S3,I: NEXT
80 POKE S3,0: B=B+BET: PRINT "[HOM][RVS][GRN][CUR][CUR][CUR][CUR][CUR][CUR][SPC1
4]": PRINT "[HOM][BLK][RVS][CUR][CUR][CUR][CUR][CUR][CUR]"; B; : RETURN
81 FORD=1TO5: PRINT D$"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][BLU][RVS][S
PC18]_  |/\||N|N|⌐⊔ ";
82 PRINT "[RVS]|/  \||\ |\|⌐|\[SPC17]‾[SPC5]"
83 FORI=128TO220: POKE S3,I: NEXTI: POKE S3,0
84 PRINT D$"[CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][CUD][GRN][RVS][SPC44]";
85 PRINT "[RVS][SPC44]": NEXTD
87 B=B+50: PRINT "[HOM][RVS][BLK][CUR][CUR][CUR][CUR][CUR][CUR]"; B; : P=0: GOTO
65
88 DATA162,253,169,5,157,255,149,157,252,150,169,160,157,255,29,157,252,30,202,2
08,237,96
90 IFB>50THENPRINT "[CLR][CUD][CUD][CUR]YOU ARE "B-50: PRINT " POUNDS BETTER OF"
95 IFB<0THENPRINT "[CLR]YOU OWE ME "B
100 IFB<50THENPRINT "[CLR][CUD][CUD] HARD LUCK YOU LOST   "50-B" POUNDS"
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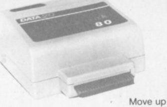

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In Business ......

Brass Tax

Is Microtax a help or a game?

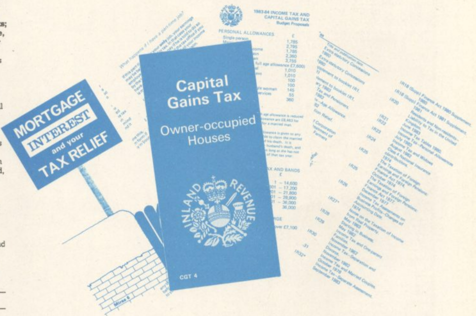
by Tony Harrington

Microtax, supplied by Tax and Financial Planning, started life as a cassette-based application written for the Sinclair Spectrum. It has since been translated to run on the Commodore 64; there are versions for the BBC and the Dragon and it is now available on disk as well as cassette. The program has not been rewritten, however, so it still has all the limitations of the original version for the Spectrum.

This article will concentrate on the tape-based version for two reasons: the first is that there are more disk-less 64 owners than there are those with disks; the second is that, speed aside, the two versions are basically identical.

One important point to note is that the version currently available is still geared to the 1982/83 tax year. The supplier claims that an updated version for the year 1983/84 tax year will be available 'any day now'. Because there have been very few significant changes in tax legislation over the last year this is not too much of a problem.

The package relies heavily on the question-and-answer method, and anyone using the outdated version will have to mentally adjust the dates in the screen prompts. The only real changes that have to be made are the altered allowances (they were £1565 and £2445 for single and married persons respectively and are now £1785 and £2795 respectively) and the mortgage limit which was increased from £25,000 to £30,000.



Who's It for?

The designer clearly meant Microtax to be taken seriously as a real alternative for employees working through their tax returns on their own. Because it is 'serious', it continually bumps up against the limits of what you can do with cassette-based software. It also raises interesting questions about how far a package-based approach can go towards assisting naive users – since we are not all tax specialists – to deal with something that most of us would rather hand over to a professional accountant.

I must say at the outset that I am filled with admiration for what Microtax achieves, given its chosen medium. A lot of work has gone into producing it and not much has been taken for granted. There are those who will find it interesting, even helpful. But designing personal tax packages is not an easy business, as we shall see.

Microtax comes in two parts, the program and the Tax Guide. The latter is not to be mistaken for an operating manual. It is no more and no less than a guide to the UK tax system. And although the program frequently sends the user back to the guide it is always for a more in-depth explanation of the UK tax system, never for additional information on how to operate the program itself.

The Guide is a daunting 137 pages long. But like encyclopaedias, you are not expected to read all of it, just the sections the program tells you are relevant to your needs. This comes as something of a relief as most users will not want to plough their way through 137 pages on the intricacies of the UK tax system.

The program is actually a suite of different programs, loaded sequentially. Each one has to be worked through before you can load the next. There are two sides to the tape, both containing separate sets of programs, so be prepared for a long work session (though as we shall see, not every program has to be worked through in its entirety by every taxpayer).

Load and go

It is important to realise that you cannot simply sit down with this package and bang out your income tax. Just as with the manual form, you need to do all the preliminary gathering in of relevant data. In case you've overlooked this, the program tells you as much at the start: "Before commencing we suggest that you gather together as much of the information as possible as listed in Appendix A."

The documents you require are: your previous year's tax return; your present tax return; your P60 form (the one given to you by your employer showing earnings for the year, your pension contributions and your tax deductions); the P11D and the P9D – the form returned by your employer, giving details of 'benefits in kind' (i.e. a company car is the prime example).

Other documents you need – or might need in certain circumstances – are:

- your assessment for 1983/84;
- details of the number of days you spent working abroad;
- details of building society rates paid in 1983 in respect of your house, and details of other loan interest for which you know you get relief;
- dividend vouchers;
- share transactions and contract notes;
- tax deduction certificates in respect of any pensions received;
- vouchers from building societies, banks and so forth, as well as deeds of covenant made.

Armed with all these you are ready to begin.

Well, almost. One of the problems with writing this kind of program is that there are so many factors that it has to take into account. The programmer cannot just assume that whoever buys it will know definitely one way or another whether they should in fact pay UK tax.

Home and away

Microtax has opted to treat in great detail the very difficult questions of whether the user is in fact domiciled and resident in the UK. I know of vastly more powerful personal taxation packages, running on microcomputers and mainframes, which do not attempt to provide as much guidance in this area.

From time to time, because of its subject matter, the program has to use the language of the Inland Revenue and of tax law. This language has nothing in common with everyday speech so the user must be prepared to go backwards and forwards between the program and the tax guide.

Terminology

As an example, when you begin the tax program proper, having answered all the preliminary questions, the screen asks: "Do you have any earnings which arise from an office or employment in 83/84? See B.2". The ordinary lay-person might suppose that 'earnings which arise from an office' means earnings which you get from working in an office. They would be wrong.

This is another tricky area, since neither 'office' nor 'employment' has been defined in the tax law. An office is usually referred to as "an existing permanent substantive position which has an existance independent of the person which fills it and which is filled in succession by successive holders". In other words earnings from an office means holding a company directorship or the like.

Employment, on the other hand arises when there is a contract of service as opposed to a contract for service. If you are paid under the PAYE system where you receive your pay net of tax, then you can be relatively certain that your earnings arise from a contract of employment.

By now it will have struck most users that one of the features of Microtax is that they will discover a great deal about tax law that they do not really need to know in order to fill out their income tax returns. One way of looking at this program – for all its seriousness – is to see it as another elaborate question-and-answer computer game.

The program goes on to ask whether your earnings are assessable as earnings under Schedule E, or as profits of a trade or profession under Schedule D. If you don't know, the program won't be able to help you. It will simply bring you up short at this point.

Contracts of employment

You are now ready to begin filling in your tax return. The first value you are asked to put in is your gross pay, then the program moves on to benefits in kind (i.e. things like whether you have a company car, or whether your employer does other little extras for you like paying the mortgage or your children's school fees).

You can omit the benefits-in-kind section altogether, or omit it for selective contracts of employment (if you have more than one). For those who need it, it is a vital section of the program, since it is one of the most complex to calculate.

Benefits

Next comes the expenses program. All the expenses reimbursed or paid to you have to be taken into account, and the program is at least useful in reminding you of this fact. These can include:

- motoring;
- travelling;
- entertaining;
- mileage allowance;
- subscriptions;
- round sum expenses;
- free medical expenses;
- loans from your employer at an interest rate of under 15 per cent and
- getting goods or services below the market rate.

The program goes on to ask about things like pension contributions paid by you through the year. Most of this kind of information you could get off your P60.

This is followed by another program called Working Abroad – a question-and-answer session designed to see to what extent you have escaped the PAYE net by working abroad through the year. If you have or think you might be out of the country during the periods from the 6/4/82 to 5/4/83 or 6/4/83 to 5/4/84 then this section is important for you.

Compensation

Then comes a section on Compensation. The number of people who will buy this program and who will receive compensation for one reason or another through the year can probably be counted on two fingers. But if you need it, it is there.

The final section of Side A of the tape is a summary section, which totals all the values you have input so far. It tells you:

- that you are domiciled in the UK (or not);
- what your company car and benefits-in-kind are worth if you have them;
- what you expenses are worth.

Having done all this, you then have to put Side B of the tape on and only at this point are you ready to begin actually filling out your tax return!

Side B reminds you once again of the documents you need. Then it works through a maze of questions of the sort that you will find on your tax return form anyway. For example, were you married and living with your spouse during the tax year in question? Did your husband die during that tax year? And so on. It also tells you to do helpful little things such as entering the name and address of your employer on your tax form.

In Business . . . . . .

The next five sections in the program, headed Return 1 – 5, work through each of the sections of the tax return form, telling you to put in crosses, values and so forth.

Complications

Some of these sections are more complicated than others. For example, entering the total value of life assurance premiums paid by yourself through the year is fairly simple; working out the tax due on rents from furnished or unfurnished property, on dividend payments and so on, is not. Once again, you are free to move quickly through the sections that do not interest you.

I was reasonably convinced that all the things that one would normally stumble over in filling in a tax form were included in the program. These include everything from building society interests to alimony payments and supporting a permanently disabled child who has passed the home-leaving age.

Microtax then adds up all the information that you have put in on Sides A and B and lists them together with the personal allowances. The final program deals with the computation of your tax. At this point you have at last reached the point where you can utilise all those good things that Microtax promises you on the cover wrapping.

It does a little calculation to see whether, if you are a married couple, you would be better off electing for separate assessments. It also tells you whether you have overpaid your tax.

It is a fascinating program, better by far than most strategy games. But I couldn't help feeling that using it would take vastly more time than simply filling in the return with an old-fashioned pen. ■

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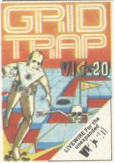
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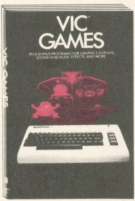
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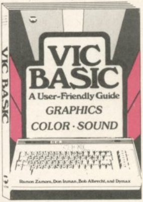
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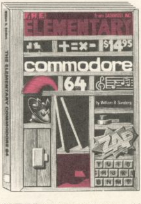
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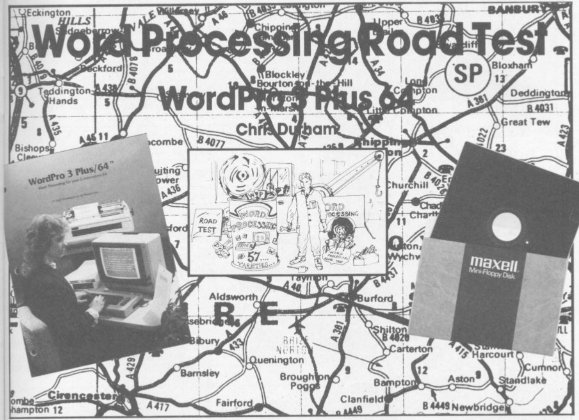
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This is a well known WP package from the Pet world in a new guise for the 64: anyone who has used the Pet version will quickly feel at home.

It comes on a disk which also contains example files. WordPro 3 splits the available text area into two parts; the main text and extra text. You are required to specify how you want the space to be allocated, but you cannot specify more than 329 lines for the main text area – that's about 13,100 characters. This seems rather mean considering how much other packages manage. Files can be linked together for printing, however, so this is not quite the limitation it may seem.

Functions available

WordPro only formats when printing, which means that it needs a lot of format commands in the text. There is a good range of these, and they produce professional-looking text. Format commands must be on a separate line from the text and are preceded by a 'format character'; in this case a 'tick' obtained by pressing a 'control' key followed by a slash (WordPro uses the CTRL key, the CBM key and f7 as 'control' keys; they all have the same effect and you can use whichever one is most convenient).

There is a Status Line at the top of the screen which indicates the current operating mode. The 'C' on the status line will be highlighted while in Control mode; the 'I' lights up while in Insert mode. And so on.

This is useful, but you must be careful to check which mode you are in as it is easy to overlook the indication. Insert mode, which is entered by pressing SHIFT CONTROL, enables you to insert text into an existing line; the remaining text is pushed to the right to make room. There is also an Insert Line command – CONTROL followed by INST – which opens up one new line for each depression of the INST key.

The Delete Line function is achieved by CONTROL DEL: like the insert function it deletes one full line every time DEL is pressed. To get out of both of these modes you have to leave Control mode by pressing the CONTROL key again.

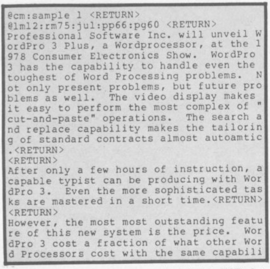
There is a delete word and sentence function as well: CONTROL 'd' activates it, pressing 'w' or 's' highlights the appropriate word(s) or sentence RETURN then deletes the highlighted text. An 'Erase' function (CONTROL 'e') provides really large deletions: 'a' deletes all the text, 'r' deletes everything after the cursor, 'l' deletes the range of lines previously set.

Finally, both the INST and DEL keys work as normal to do single character edits.

Block moves are also well supported. The range of text is set by CONTROL 'r'; you use the cursor keys to specify the range of lines to be highlighted, and the next command determines whether the range of text is copied or moved (CONTROL 'l' and 't' respectively).

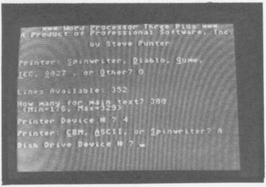
One point: that only *whole lines* can be moved. There are no facilities to move part lines, so you must reformat your lines accordingly by padding with spaces and then deleting them again after the move – boring but workable.

ROAD TEST
WP
WORD PROCESSING
ORD OCESSING
57.... VARIETIES...
WORD PROCESSING ROAD TEST



```
@cm:sample 1 <RETURN>
@lml2:rm75:jul:pp66:pg60 <RETURN>
Professional Software Inc. will unveil W
ordPro 3 Plus, a Wordprocessor, at the 1
978 Consumer Electronics Show.  WordPro
3 has the capability to handle even the
toughest of Word Processing problems.  N
ot only present problems, but future pro
blems as well.  The video display makes
it easy to perform the most complex of "
cut-and-paste" operations.  The search a
nd replace capability makes the tailorin
g of standard contracts almost autoamtic
.<RETURN>
<RETURN>
After only a few hours of instruction, a
capable typist can be producing with Wor
dPro 3.  Even the more sophisticated tas
ks are mastered in a short time.<RETURN>
<RETURN>
However, the most most outstanding featu
re of this new system is the price.  Wor
dPro 3 cost a fraction of what other Wor
d Processors cost with the same capabili
```

Post-formatted input: what you see is definitely NOT what you get. A typical WordPro screen layout.



```
      *** Word Processor Three Plus ***
A Product of Professional Software, Inc.

            by Steve Punter

Printer: Spinwriter, Diablo, Qume,
IEC, 8027 , or Other? O

Lines Available: 352

How many for main text? 300
 (Min=176, Max=329)

Printer Device # ? 4

Printer: CBM, ASCII, or Spinwriter? A

Disk Drive Device # ? _
```

WordPro Three Plus: the opening menu screen.

Tabs are set using CONTROL 's'; the 'backarrow' key is used to move the cursor to the next tab stop. There is a numeric code (CONTROL 'n') which has the effect of turning the ordinary tab into a numeric tab. This is supposed to allow you to line up your decimal points with ease; what it in fact does is to move the numerals to the left of the tab rather than the right. You still have to line up your own decimal points by ensuring that there are the same number of digits to the right of the decimal point in all the numbers.

Output

It is when one considers the available output options that you begin to realise that WordPro is getting a bit long in the tooth. WordPro assumes that you have either a Commodore printer or one of the standard letter-quality printers (such as Spinwriter, Diablo or Qume).

This means it can't take advantage of the new range of dot-matrix printers that are currently flooding the market. The manual even states that "Bold face printing is available on most letter quality printers and is not available on dot matrix printers". Where have they been hiding for the past couple of years?

You're also limited to connecting the printer to the serial port through a suitable interface. The lack of a parallel connection through the User port is really quite mean – most of the other WP programs for the 64 recognise that parallel Centronics-style printers exist.

One saving grace is that you can send ASCII codes to the printer from within the document; this means that you can use some of the facilities on a modern dot-matrix printer after all, even if it's a trifle laborious.

These codes are obtained in very much the same way as in Vizawrite and work just as well. You can even reassign a different value to the same key later on in the document to extend the range of commands available.

There are also little gems in the commands which enable you to keep a tight control on the printing. The 'forced space' is a space which will be treated as a valid character so that the two words it separates will not be split over two lines – a kind of reverse hyphen.

Likewise the ability to set the line spacing on the output; very useful for creating draft documents and then changing only one format command to print a fair copy.

Other facilities

The writers of WordPro have made a stab at using the colour facilities of the 64. Using CTRL in conjunction with the function keys enables you to change the text, background and border colours.

Unfortunately they didn't go nearly far enough in the way they did it. f1 increases the text colour value by one, f2 decreases it. f3/4 and f5/6 do the same for screen and border colours.

The big problem is that after pressing CONTROL you can only press the keys once; to step through the range of colours means pressing CONTROL and the function keys alternately. Heaven help you if you get confused while on an unreadable colour combination! Stepping backwards through the sequence is even worse, because you have to use the SHIFT key as well.

Why they couldn't have left CONTROL mode on until you finished changing the colours is beyond me, since they quite happily do it for other commands. And after all that you can't even save the colour combination when you save the file. There is a program included with the manual which enables you to permanently change the start-up colours; perhaps that's the easiest way!

WordPro allows full disk commands to be used following CONTROL '.' with the error channel being read by CONTROL ','. File commands are accessed by pressing SHIFT CLR/HOME, whereupon you are prompted to Recall, Memorize or Insert: pressing the appropriate first letter of the command then prompts you for the file name.

A plus point is the 'Extra Text' area; it's almost like having a second word processor running at the same time since you can swop back and forth between the two areas using CONTROL 'x'.

Its main use is for common paragraphs and mail-merge data: common paragraphs can be loaded straight into the extra text area from disk and are all named. To use a paragraph from this area you position the cursor in the main document where you wish the insert to take place; CONTROL 'a' then prompts you for the paragraph name.

As soon as you have typed it and pressed RETURN the paragraph is inserted into the appropriate slot. You can give the paragraphs meaningful names such as 'legal' for the threatening letter, 'apologies' for the 'we lost your order' note, and so on.

There is a useful column addition/subtraction facility. While not as sophisticated as the equivalent in Paperclip, it's better than nothing at all. The limitation is that the result of a calculation can only appear in the same column as the items you are working on.

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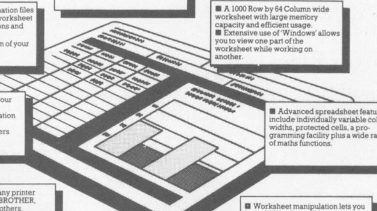

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WORDPRO 3 PLUS/64 commands

Control Functions

(All preceded by either the CTRL or CBM key)

a	Append lines from 'extra text' area
b	Print a variable block on screen
c	Clear tab
d	Delete words or sentences
e	Erase mode (a=all, r=remainder, l=line)
f	Find a given string
g	Goto a specified line number)
h	Hunt (restart a local find function)
i	Fill in variable blocks in text
k	Clear all tabs
l	Copy specified lines
m	Modify search – replace strings
n	Numeric mode
o	Output text
SHIFT Q	Exit to Basic
r	Set range (for block functions)
s	Set tab
t	Transfer previously set range of lines
v	Append groups of characters
x	Toggle between main text area and 'extra text' area
z	Enter delimiter for LIST area
*	Global copy (for linked files)
.	Send disk command
,	Read disk error channel
;	Enter a special character
[	Underline on
]	Underline off
(	Bold type on
)	Bold type off
–	Enter hyphen symbol
f5	Find variable block
↑	Delete a variable block
HOME	Clear data pointer to home position
RUN	Restart program (shifted RUN/STOP)
0	Read directory
4	Superscript
6	Subscript
CRSR RT	Restart global find function
@	Search and replace (l=locally, g=globally)
=	Column add/subtract
/	Format check mark
DEL	Delete one line
INST	Insert one line
SHIFT CTRL	Toggles Insert Mode

Formatting Commands

cm	Comment
cn	Centering (1=on, 0=off)
fa	Form advance
fp	Forced paging
ft	Create page footer
hd	Create page header
hl	Head left margin
hr	Head right margin
ju	Justification (1=on, 0=off)
lf	Send line feed to printer (1=on, 0=off)
lm	Left margin
ln	Specified number of line feeds
ma	Margin release
nx	Link next file
p#	Set page number
pg	Set paging
pp	Set page length
ps	Pause
pt	Set pitch
ra	Right alignment
sp	Set line spacing
vp	Vertical positioning

The manual

This is a real gem for the beginner. It is laid out in a very logical order as a series of Lessons and Exercises, starting with 'connecting the equipment' and working up through simple commands to the more advanced features. It assumed you know absolutely nothing about computers, let alone word processing, and this is definitely preferable to the alternative.

There are comprehensive summaries of all the commands and functions plus a useful index. There is also a glossary of terms to explain the 'jargon' words that appear in the manual; a nice touch, and one which more suppliers should copy.

Limitations

I was surprised to find that reading the disk directory destroys the text memory. In this day and age, and for the price, that seems completely illogical. True, you can read the directory into the 'extra text' area – but it overwrites anything you have there too. To have to save the text to disk before you can read the directory surely defeats some of the reasons for wanting to read the thing in the first place!

WordPro 3 also has a few less than friendly traits; two in particular that caused me problems. The first is inadvertently pressing RETURN while in 'insert' mode, which has the effect of deleting the remainder of the line.

The second is the 'erase' function. Despite what the manual says, you cannot escape from it if it's been selected in error. Unless you are very clever *something* is going to disappear! This is a pity when other considerations make WordPro a good package for beginners.

Conclusions

WordPro has been around for a long time, which as far as this version is concerned is both a strength and a weakness. A strength, because there are lots of people who know it and will want to stick with it. A weakness, because the suppliers don't seem to have taken the opportunity to bring it up to date and make it the first class package for both beginners and experts it could so easily have been.

I have mixed feelings about WordPro 3. The manual makes it an ideal package for the beginner, yet the limitations and outdated practices make it anything but user-friendly. At £92 I really cannot say it's good value for money. ●

FOR

- Good range of editing commands including block edits
- Column addition/subtraction
- Good range of disk commands
- Excellent manual for beginners
- 'Extra text' work area
- Excellent document assembly and mail-merge facilities
- Compatible with other versions of WordPro 3

AGAINST

- Text does not appear on screen as it will be printed
- Screen is cluttered by embedded formatting commands
- Directory overwrites text
- Limited range of printers and no connection through User port
- Price

Under review:	**WordPro 3 Plus/64**
Description:	**Word processor for the 64**
Supplier:	**Wego Computers** **22a High Street** **Caterham** **Surrey CR3 5UA**
Summary:	**Many features and good manual but outdated in approach. Rather expensive.**
Price:	**£92**

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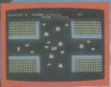

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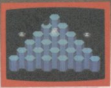

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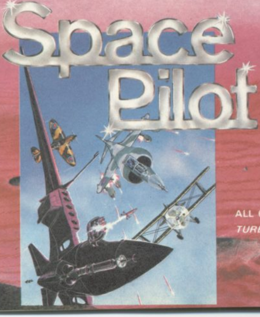

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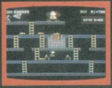

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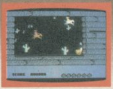

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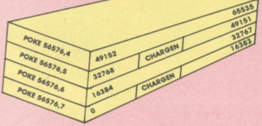
Commodore 64 Video:

The story so far: we're touring the 6566 chip, which gives the Commodore 64 its video. We have noted that the chip goes to memory for its video information, but can only reach 16K; the computer controls which 16K bank via control lines in 56576 (hex DD00). Then we looked through the functions of the video control words – sprite and non-sprite – at 53248 to 53286 (hex DD00 to D026).

We've examined all the bits in the video chip control registers. Now we'll ease back, and look at the 64's video structure. We'll talk about program design considerations.

In part 1 we discussed how the video chip gets its screen information directly from memory. We indicated that the chip must dig out all of its information from a single 16K slice. We might draw this as a diagram:

The video chip obtains screen information form one of the four "slices", two slices contain the ROM character generator.



We can control which slice we want by manipulating the two low bits in address 56576 (hex DD00). Normally, the processor picks the slice from 0 to 16383.

Once we've picked a 16K block, we must get all screen data from this block – the 'screen memory', the character set, and the sprites. We cannot get the screen data from one block, the character base from another, and sprites from still another. Because we are restricted, we must do a little planning and design our video information into out program.

After we have picked the 16K slice, we must set the video matrix (screen memory) to some point within it. We may pick any multiple of 1024 as a starting address. The normal 64 configuration is set to a value of 1, meaning we take the screen information from memory starting at address 1024. The video matrix, you may remember, is stored in the high nybble (that means multiply it by 16) of 53272 (hex D018).

We must pick our character base next. If we're in normal resolution, we may pick an even multiple of 1024 as a starting address: 0, 2084, 4096, etc. If we're in high-resolution mode we must pick *only* values of zero and eight, meaning that the hi-res starting address will be either 0 or 8192.

The normal 64 configuration is set to 4 or 6 for either graphics or text mode, meaning we take our character set from 4096 or 6144. You probably remember that the character base is stored in the low nybble of 53272.

So we'd expect a normal 64 to place into address 53272 a video matrix of 1, times 16, plus a character base of 4 or 6, yielding a total of 20 or 22. (You may in fact see 21 or 23 if you PEEK the location, but the extra bit doesn't matter – it's not used.) And if we switch to high-resolution without changing anything else, our character base of 4 or 6 will be trimmed back to zero ... explaining why we saw zero page when we tried POKE 53265,48 in part 1 of this series.

Let's try a few specific design jobs.

Task 1: Simple graphics

We're quite satisfied with the screen and character set, but we'd like to add a few sprites to liven things up. Fine: the normal 64 configuration leaves room for about four sprite drawings (numbers 11, 13, 14, and 15) provided we don't need to use cassette tape during the program run. This may be enough for a lot of animation; all eight sprites could use a single drawing, if that suited the task.

If we needed more than four drawings, we might be tempted to move the start-of-Basic pointer to a higher location, making room for the extras. That can work quite well, but it will probably call for two programs: a configuring program and a final program ... it's hard for a program to reconfigure itself and survive.

Task 2: New character sets

If we wish to use the regular character set as well as new ones that we might devise, we'll want to stay in the memory blocks from 0 to 16383 or 32768 to 49151 (these two blocks contain the ROM character generator at offset 4096 to 8191).

If we don't need regualar characters at all – we intend to use our own – it may be more convenient to switch to either of the other two blocks: 16384 to 32767 or 49152 to 65535. Since there's nothing but RAM in these two, we may find more room.

Note that some of these RAM addresses are 'hidden' beneath ROMs – Basic from 40960 to 49151, and the Kernal from 57344 to 65535. The video chip sees only the RAM ... but in a normally configured 64 system, programs will see only the ROM. You can POKE or store to the RAM beneath, but when you PEEK or load from these addresses you'll get the ROM.

That's OK; the video chip sees the RAM locations you have POKEd. Result: something for nothing! You can build a character base into RAM ... and not lose any memory from your system.

Task 3: Emulating a Pet

This is a clear-cut job. We want to move the screen to the same place that the Pet uses the screen. That's very straightforward from a video chip standpoint. (Note: if you type the following POKEs in one at a time, you may have to type blind for some of them.)

The Pet screen belongs at 32768, so we must select that slice with ...

POKE 56576,5

... so that we'll pick up RAM starting at 32768. The ROM character generator is still in place.

Since we want the screen (video matrix) to be positioned right at the start of the block, we must set it to a value of 0. The character base can stay at its value of 4 (for graphics mode), so we must set up address 53272 with zero times sixteen plus 4:

POKE 53272,4

That completes the video, but we have a few other things to do to make Basic work in a sound manner. We must tell Basic where the new screen is located:

POKE 648,128

And finally, we should set the start and end of Basic to correspond with a 32K Pet:

POKE 1024,0:POKE 44,4:POKE 56,128:NEW

Clear the screen and the job's done. Zero page usage is still different, so not all PEEKs and POKEs will automatically work on this reconfigured system ... but Basic and screen now match the Pet.

Task 4: High resolution plotting

There are only eight places in memory that we can place a high-resolution screen: 0, 8192, 16384, 24576, 32768, 40960, 49152, and 57344.

We tend to chose the two 16K blocks that don't have the character generator, 16384 to 32767 and 49152 to 65535. That way, we'll have more clear RAM to use; there will be more space left for our video matrix and any sprites we need.

If we want to write characters on the hi-res screen, we'll have to generate them ourselves or steal them from the character generator. Here's an odd thing: the video chip sees the character ROM at two different addresses – but the processor chip (and that includes your program) sees the same 4K ROM only at a third location: 53248 to 57343. Most of the time the processor can't see the ROM anyway, since the addresses are overlaid with the I/O chips.

So if our program wants to see the character set, it must flip away the I/O chip with POKE 1,51 – stop,

Part 4: Video structure and program design

by

Jim Butterfield

6566 Video – Sprite Registers

Sprite 0	Sprite 7			Sprite 0	Sprite 7
D000	D00E	Position	X	53248	53262
D001	D00F		Y	53249	53263
D027	D02E	Colour		53287	53294

Sprite bit positions

	7 6 5 4 3 2 1 0	
D010	X-position high	53264
D015	Sprite enable	53269
D017	Y-expand	53271
D01B	Background priority	53275
D01C	Multicolour	53276
D01D	X-expand	53277
D01E	Interrupt: sprite collision	53276
D01F	Interrupt: sprite/background collision	53279

6566 Video – Control and Misc. Registers

D011		Extend Colour	Bit Map	Display Enable	Row Select	Y-scroll			53265
D012	Raster register								53266
D013	Light Pen input							X	53267
D014								Y	53268
D016	X		Reset	Multi-Colour	Column Select	X-scroll			53270

D018	Screen (Video Matrix) vm13	vm12	vm11	vm10	Character Base cb13	cb12	cb11	X	53272
D019	IRQ	IRQ sense			LP	SSC	SBC	RST	53273
		IRQ enable			Light Pen	Collision Sprite	Back	Rastr	53274

Colour Registers

D020	Exterior	53280
D021	Background no. 0	53281
D022	Background no. 1	53282
D023	Background no. 2	53283
D024	Background no. 3	53284
D025	Sprite Multicolour no. 0	53285
D026	Sprite Multicolour no. 1	53286

don't do it yet! There are two problems.

First, once the I/O chips are moved out – sound, video, interface, everything – you won't be able to type on the keyboard; so you'll never be able to type the POKE to put everything back.

Second, the interrupt program uses these I/O chips for quite a few things and it will go beserk the moment you take them out of action. So we must use a program or a multiple direct command to do the job; and we must temporarily lock out the interrupt activity. Type the following statements as a single line:

POKE 56333,127: (lock out the interrupt)
POKE 1,51: (flip out I/O)
X=PEEK(53256): read part of character)
POKE 1,55: (restore I/O)
POKE 56333,129 restore interrupt)

X will contain the top row of pixels for the letter 'A'. If you liked, you could draw a character's shape with the following program:

```
100 INPUT"CHARACTER
    NUMBER";A
110 IF A<0 OR A>255 THEN
    STOP
120 B=53248+8*A
130 C=56333
140 FOR J=0 TO 7
150 POKE C,127:POKE 1,51:X=
    PEEK(B+J)/128
160 POKE 1,55:POKE C,129
170 FOR K=1 TO 8
180 X%=X:X=(X-X%)*2
190 PRINT CHR$ (32+X%*3);
200 NEXT K:PRINT
210 NEXT J
220 GOTO 100
```

To terminate this program, enter a number over 255. You'll note that most of the characters are drawn with 'double width' lines. A video technician would tell you that this reduces the video frequencies and is likely to cause less picture smear.

Summary

Arranging the video areas is almost an art. It takes a little practice, but you'll get the knack of it fairly quickly.

In our next section, we'll give a simple example of a program using sprites. In this way, we'll try to draw together some of the skills discussed so far in this series.

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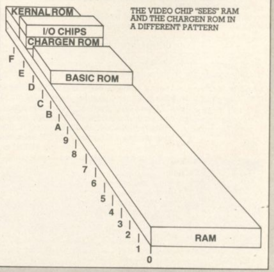
COMMODORE 64 ARCHITECTURE



THE VIDEO CHIP "SEES" RAM AND THE CHARGEN ROM IN A DIFFERENT PATTERN

SOFTCHIP
64
POWERFUL NEW COMMANDS FOR THE COMMODORE 64
another fine product from – Whitby Computers Limited

Mix 'n' Match

Whitby's extra Basic

Whitby Computers Ltd. (who reside in Whitby, believe it or not) produces a number of useful add-on products for Commodore computers to give us poor programmers extra commands to play with. This month we are reviewing a cartridge called the Softchip 64. It is aimed at people writing business packages, but the new commands and functions on it will be of use to any kind of programmer who feels restricted by the Commodore Basic (and who doesn't?). Most of them can be used either in direct mode or in program mode; and where there are restrictions (you cannot delete program lines in program mode, for example), these are not really too restrictive at all.

The *really* interesting thing is that there is a wide range of extra commands from which you 'pick 'n' mix' the ones you want. In this article we have reviewed one of Whitby's prepackaged cartridges of commands; but you are quite able to replace any of these which you think are not very useful and replace them with others. A full list is available from Whitby Computers. As every programmer has his own opinion as to what constitutes an ideal set of commands, this seems a very good way of pleasing as many people as possible, especially as the price is the same whether you have the standard article or a custom-built one.

How does this work? Simple – Whitby gives you a list of the commands it can do; and against each of them is noted the number of bytes the new command takes up. Then you just fill in an order form with the name of the command and the number of bytes, and your selections have to make a total of around 7,100 bytes. You can get a lot of commands in that space ...

When Whitby gave us the prepackaged 'Business Commands' cartridge, it was described as being for "the fella (sic) writing £30 programs for the greengrocer down the road ... its just our choice of what we think people might want".

Disk handling

Well, we think it's quite a good choice. The first group of statements simply implement the extra statements available in Basic 4.0 as 'Disk Basic', which replace the cumbersome old disk-handling commands with more easily-understood ones. For example, instead of **OPEN 1,8,15, "SO:TEMPFILE",** with the Whitby cartridge installed we can use **SCRATCH "TEMPFILE"**– or even **S "TEMPFILE".**

As these commands are pretty well known we will not discuss them any further. But they are useful.

Other commands

We'll now look at the most important of the other commands, passing comments on them as we go along.

BLANK	Tests a string to see if it is null or all spaces.
CIF	This statement, together with THEN, CEND, ELIF and ELSE provide a very powerful structured form of the IF...THEN statement. Apart from having an ELSE option, it differs from the normal Basic IF...THEN statement in that the action (the bit after the THEN) can be more than one line long.
DELETE	Removes a range of program lines.
DATIN	This statement allows the foolproof entry of dates, with automatic checking for the number of days in each month even allowing for leap years. The date format is 14-01-84 for 14th January 1984.
DERROR	Reads the disk error channel. This saves writing a subroutine using INPUT#.
DREAD	This statement is not as terrifying as it sounds! If you use INPUT#, you will know that it gets confused by commas and colons in the input string. In addition, you are limited to a string of less than 80 characters (not 89 as the SOFTCHIP manual says – one of its few errors). By using it on a file opened to the keyboard (OPEN 1,0) you can avoid all the "EXTRA IGNORED" problems. It should also work on cassette files.
ERROR	Wouldn't it be nice if you could trap DIVIDE BY ZERO and BAD SUBSCRIPT ERROR? Well now you can! After executing the ERROR statement, any errors do not cause the program to stop, but instead to go to the line number specified in the ERROR statement, where you can deal with them at your leisure. The SOFTCHIP sets a code in a variable ER to tell you which error has occurred. Unfortunately it does not tell you which line the error occurred in, which is a severe handicap. It also does not trap errors involved with the INPUT statement, or, surprisingly, errors generated by SOFTCHIP's own commands.
GENIN	Like DATIN, this replaces the INPUT statement. It allows you to specify the maximum length of the string to be entered, and also to restrict the characters allowed.
LWIND/SWIND	These two statements together allow a complete screen display to be stored on the disk and later reloaded. Both the text and colour information is saved, so you can save memory by not having vast amounts of program dedicated to setting up screen displays.
NUMIN	This is another of the very useful "foolproof input" statements, this time dedicated to numeric input. It is intended to be used for inputting money values, so it is restricted to 2 decimal places. It would be nice to have an option to use a different number of decimal places so that scientific or engineering users could input real values with it.
ON	This is an extension of the normal ON ... GOTO statement. If you say ON "AEGI" GOTO 100,200,300,400, the SOFTCHIP will carry out a GET statement; and if the key pressed was A, E, G, or I it will jump to 100, 200, 300 or 400 respectively. Any other key causes the program to continue at the next statement, in the same way as the normal ON ··· GOTO statement carries on if the

ic commands review

by Chris Preston

	variable is out of range. Very handy for accepting single-key commands this is.
PADS$	Pads a string to a specified length with spaces.
PCTRL	Allows you to change the character sent to the printer, so that all "£" signs (ASCII code 36) are printed as "#" (which prints a pound sign on some printers and has an ASCII code of 35). The trouble is you may have to write some code in assembly language.
PRINT#	This works in exactly the same way as the Commodore PRINT # except that you can use TAB without any of the normal problems.
SCOPY	Copies the screen to the printer. Graphics characters are replaced by spaces.
POP	Removes a subroutine return address from the stack so that you can leave it without doing a RETURN. This is often done if the subroutine detects an error, but you can run into OUT OF MEMORY errors if you are not careful. Basically, this command cancels out the last GOSUB statement.
PUSH	Allows you to insert a false RETURN address on the stack, to fool Basic into thinking you have done a GOSUB from that line. In effect, this gives you a 'calculated GOTO', so that you can say GOTO X where X is the variable. This is not the place to discuss the point, but many experienced programmers decry the calculated GOTO statement. Not a command we would fall over ourselves to use.
PRINT@	This statement allows you to justify all your money figures, so that the decimal points in a column of figures all line up.
RESTORE	The normal Basic RESTORE statement moves the DATA pointer back to the start of the program. With the new statement you can move the pointer to *any* line number.
ROUT/PER	This feature is a cross between a user-defined function (DEF FN) and a subroutine. ROUT defines a subroutine (which the manual misleadingly calls a function) which is called by PER. Like the Basic user-defined function, you can specify arguments which are then used in the subroutine. The advantage is that you can write a generalised subroutine called OP which uses a dummy variable X, say, and then by giving it different arguments call it by PER OP (A) or PER (OP3×B+12). In normal Basic you would have to say X=A:GOSUB 13000 and X= 3×B+12: GOSUB 13000. As you can have as many arguments as you want this represents a much more efficient way of coding this sort of problem. You can also have string arguments.
SCAN	Scans a string for a substring. You can search a string for space, for instance, or a "D" or "LEAD". During matching, the difference between capital and small letters is ignored, so "s" matches "S".
SORT	Sorts a one-dimensional array, which can be numeric or string. It can also perform a tag sort, so if you have two arrays, one a list of persons' names and the other their ages, the second array will be sorted in the same way as the first, so that a person's age is still in the element corresponding to his name. This is extremely useful in many applications.
SPC$	Gives a string of a specified length consisting of spaces. No longer will I have to set up a string SP$ of 80 spaces and then use LEFT$(SP£,Z).
SWAP	Allows you to chain from one program to another without losing all your variables.

Data entry

There are three 'data input' routines – **DATIN, GENIN** and **NUMIN**, for input of dates, numbers and general strings. When the operator has entered the string a variable *ek* contains the value of the key used to leave the field, which can be RETURN, CURSOR UP, CURSOR DOWN or STOP. This is invaluable in building up a proper data entry system, as with a bit of programming a screen full of data from a number of fields can easily be input.

Using Softchip

The cartridge plugs into the port in the usual way. When you turn on the 64 you get a message on the screen to remind you that you now have a super-Basic language – and also that the SOFTCHIP has gobbled 8K of memory, leaving you with 30717. This is not as bad as it sounds, because using the cartridge's routines will save you memory by making a lot of your Basic subroutines redundant.

The manual is well-produced and properly typeset, with only the occasional grammatical and spelling errors. It's laid out with one command to each page, and obviously has to be tailored to match the commands selected by the user. Whitby has not been afraid to add a page of corrigenda at the back, which is good to see. Too many manufacturers try to hide their mistakes and cause their customers no end of trouble trying to find out why they can't get the product to work.

In summary: this seems to be an extremely useful device. Many people will buy the standard cartridge at first, but you can go back to Whitby Computers for an expansion package to add more commands. Definitely worth the money if you write a lot of data processing programs. ■

Under review	Softchip 64 – Business Commands
Description:	**Extra programming commands cartridge for the 64**
Supplier:	**Whitby Computers Ltd 8 Chubb Hill Road Whitby N. Yorks YO21 1JU**
Telephone:	**0947 604966**
Summary:	**Very useful, very clever idea; good value for money.**
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Opening up spreadsheets

Business ifs and whats for the 64

by Ken Ryder

SPREADSHEETS – the tabular screen display programs with the "what if" capability – have come on more than somewhat since the original Visicalc first set the micro world on its ear with a price tag that made it clear you were buying something very, very powerful.

Since then prices have tumbled to match the hardware they're run on, and additional facilties have been added – multiple linked pages in memory, multiple windows on screen, calculations carried over from one sheet to another, that sort of thing – so that along with the invader or munchie-gobbling game, the word processing package and the database, the Visiclone spreadsheet has become part of the software library of almost every micro owner.

With spreadsheets now available for less than £30, the original user base of businessmen who wanted to check out the effects of changes like increased profit margins on their cash flow has been supplemented by an entirely new breed of users who employ them for personal accounts, appointment books, even a primitive kind of word processor.

This month, KEN RYDER looks at two spreadsheets under £100 and considers that the cheaper is actually the best value.

Virtually all spreadsheets have the following characteristics in common (stop us if you've heard it):

- ***the sheet itself occupies a "virtual screen" several times the size of your normal screen display, and as you move across, or up, or down, the display scrolls past the screen window;***
- ***data is input into single squares of the sheet, known as cells, in the form of text (LABELS), figures (VALUES), or FORMULAE, consisting of calculations performed on preceding values;***
- ***this means that if you input the figure 100 in cell A1 and the figure 200 in A2, then if A3 contains the formula A1+A2 it will display the figure 300;***
- ***the "what if?" facility means that it can recalculate instantly, so that if you change the contents of cell A1 to 200, the contents of A3 will change to 400 (often it is possible – and advisable – to switch off this recalculation feature while inputting large masses of data, since it can slow matters down rather);***
- ***labels, values or formulae, or columns or rows of any or all three of them, can be replicated, or copied, to other parts of the sheet, simplifying the setting up of a sheet structure before you input any data;***
- ***during replication, formulae can be copied with absolute or relative values, so that if A3 is replicated to C3, either the absolute values of the formula A1+A2 can be retained, or changed to the relative values of C1+C2;***
- ***cell contents can be formatted in various ways: labels can range left or range right, values or results of formulae can be displayed as integers, floating point, or pre-determined numbers of decimals (usually two, for the representation of decimal currency like dollars and cents, or pounds and pence), with or without rounding;***
- ***formatting can be confined to individual cells, replicated to specific areas of the sheet, or applied globally to the entire sheet (though individual exceptions to the global format may be specified);***
- ***data can sometimes be interchanged with other programs (often in Basic), but this often involves a rather complex routine known as Data Interchange Format (DIF) which is particularly useful for swapping data (but not formulae) between different spreadsheets eg, Visicalc and CalcResult;***
- ***some spreadsheets can load Visicalc files and modify them as if they were "native" files, which is useful for people who started with Visicalc but have swapped to a rival spreadsheet because of extra facilities it offers.***

Abracalc

Abrasco market several games, educational and business packages for Vics and 64s. They have now added a spreadsheet to their list, available on disk and cassette for £27.50/£25. The disk version is presented in a good-quality plastic binder for safe storage of the disk and documentation.

The software is written in Basic and occupies about 32.5K, taking about 90 secs to load on disk, but representing an 18-minute load on tape (yawn). After running, about 5K is available for the contents of the sheet.

This is a small spreadsheet consisting of 26 (a-z) columns and 40 rows. Initially four columns and 11 rows are displayed with the bottom half of the screen devoted to a 'HELP' menu (figure 1). This is useful while learning to use the sheet, but you can dispense with it subsequently, so that you can view up to 20 rows at any one at any one time.

Alternatively the screen may be split across the twelfth row and 8 columns of a different part of the sheet can be compared with the top half. The bottom half of the screen cannot be edited, but the values displayed change if affected by a recalculation.

Abracalc Commands

Command	Title
/a	Autocalc switch
/b	Blank current cell
/c	Clear
/d	Delete
/f	Free memory
/g	Graph
/i	Insert
/j	Justify
/l	Line
/p	Print
/q	Quit
/r	Replicate
/s	Storage
/v	Version
/w	Window size
/y	Unsplit screen
/z	Split screen
home KEY	Home the cursor
shift clr KEYS	Cursor to spreadsheet end
shift return KEYS	Cell display switch
F1 KEY	Change border colour
F3 KEY	Change screen colour
F8 KEY	Formula protect
← KEY	Cursor to left of row
↑ KEY	Cursor to top of column
! KEY	Recalculate
> KEY	Goto a cell

Abracalc Functions

Function	Description
SUM	Adds the cells in a row or column
AVE	Calculates the average of the cells in a row or column
MIN	Finds the minimum value in a row or column
MAX	Finds the maximum value in a row or column
COU	Calculates the number of non-label entries in a row or column. This information can be used to find the number of values in a row, which can then be used in further calculations

The layout of the sheet is fairly standard with three control lines at the top containing a cursor which flickers at an annoying rate. The cursor is controlled with the normal Commodore keys although the response is rather slow and jerky. The HOME key returns the cursor to the top left hand corner of the sheet and SHIFT/HOME takes it to the bottom right. In addition the left and up arrow keys rapidly take the cursor to the leftmost column or topmost row respectively. The relatively slow action of the cursor control keys is compensated by a fast GOTO option.

The column-width is nine characters and cannot be altered. Long labels are possible by typing continuously; as one field is filled, the characters automatically spill into the next. By default, numbers are displayed to two significant figures, and stored and manipulated to nine figures. Only integer or decimal numbers may be input; exponential format is not accepted.

Formulae are rather limited as only two cells, or one cell and a value may be included. Even then they may only be added, subtracted, divided or multiplied, i.e. SIN, COS, LOG etc., are not available. The spreadsheet does offer five special function formulae – SUM, AVE, MIN, MAX and COUNT, (table 1) – but they only operate on rows or columns, not matrices. There are no conditional operators, so IF THEN calculations cannot be performed.

Replication is limited to individual cells and is absolute, except for the above special functions which may be copied relatively. The contents of individual cells may be cleared, and there is an option to blank all the cells of a specific generic type i.e. labels, values or formula. This is useful for creating standard framework sheets.

The contents of a cell cannot be edited. The whole cell must be overwritten just to change one character; this isn't a great disadvantage as a cell may only contain nine characters maximum.

The JUSTIFY command is a little misleading as all it really does is to set the format of numeric values, allowing them to be displayed as integer, real or 'sterling'. It has nothing to do with the justification of text.

Output

Of course the spreadsheet can be saved and loaded to tape and disk, but the LOAD option has an additional facility: once a sheet has been loaded a second may replace it or be added to the values of the first sheet. Labels and formulae are ignored. Thus individual weekly sheets may be consolidated into monthly, monthly into quarterly and so on, a very useful facility sadly lacking on some more advanced spreadsheets.

The contents of the sheet may also be output to a Commodore 1515, 1525, 1520, 1526 or equivalent printer together with an optional title up to nine lines long and 30 characters per line. The sheet may be printed with or without grid references.

The data in up to 40 consecutive cells either rows or columns may be displayed graphically as a horizontal bar chart on the screen (figure 2) or output to the printer.

Documentation

Instructions consist of a small thin booklet of 10 pages. The first four pages introduce the spreadsheet and its workings, the remainder is a reference section to all the commands. The information is minimal, just enough to get started.

A little more effort with an example sheet introducing each command in turn would make the whole package more professional.

Conclusions

Abracalc is a relatively small spreadsheet aimed at the home user market. Its limited mathematical functions and lack of conditional operators make it unsuitable for business purposes, but are good enough for the more mundane household accounts. The graphs produced from the sheet are excellent, allowing data to be displayed in an easily digestable form. Unfortunately the whole product is undermined by poor documentation.

Price: £27.50 disk, £25.00 cassette.

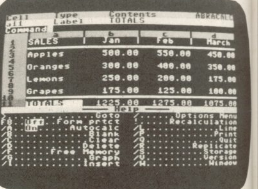
Busicalc

Supersoft, a well known purveyor of Vic and 64 software, has introduced two spreadsheets to its range, BUSICALC 1 and 2, and they will shortly be introducing a third. However, Busicalc 2 is at the moment the more powerful version until the semi-3D Busicalc 3 comes along. The software requires a three-part load taking about 90 seconds, and produces a 9.5K sheet.

Unlike many other spreadsheets Busicalc 2 does not have a fixed size. The user defines enough rows and columns to suite the application: the number of rows must be in the range 20 and 299, the number of columns between two and 125 and the product of the number of rows and columns must not exceed 22,500 cells.

As there is only 9.5K of memory for the sheet, you will run out of memory before you can fill up all the cells.

There is also a FIND command which will hunt for any string of characters, useful for locating



```
Cell        Type        Contents              ABRACALC
a11         Label       TOTALS
Command
         a            b            c            d
 1  SALES        |    Jan     |    Feb     |   March
 2
 3  Apples           500.00       550.00       450.00
 4
 5  Oranges          300.00       400.00       350.00
 6
 7  Lemons           250.00       200.00       175.00
 8
 9  Grapes           175.00       125.00       100.00
10
11  TOTALS          1225.00      1275.00      1075.00
              ———————— Help ————————
>.............Goto       /.....Options Menu
F8..Off..Form prtct      !.....Recalculation
/A..On.....Autocalc      /L...............Line
/B.............Blank     /P..............Print
/C.............Clear     /Q...............Quit
/D............Delete     /R..........Replicate
/F.......Free Memory     /S............Storage
/G.............Graph     /V............Version
/I............Insert     /W.............Window
```

specific items, or dates without scanning the whole sheet manually.

The column-width is variable up to 18 characters, and is critical to the input of values and the results of calculations. If the column-width is set to six then only a number containing six characters, including any decimal point, may be entered; longer values are not accepted. Also any values calculated by Busicalc will be limited to five characters, including a sign. This is because one character is reserved for a space to make the output more legible.

A string of asterisks is displayed if the character limit is exceeded, and the value is set to zero.

Labels longer than the column width can be entered, but are truncated on the screen. However when the sheet is printed the label spills into adjacent columns unless they already contain information.

Busicalc offers an extremely advanced split-screen facility, in comparison with Easy Calc or

Busicalc Commands

Command	Description
JUMP	Moves the cursor bar to a specified box
SAVE	Enables all or part of the worksheet to be saved on disk or tape. Can save image files (calculated values instead of formulae) to link with other packages. User-defined functions can also be saved
LOAD	Reloads a previously saved sheet. You can also add or subtract sheets
COMMAND	Displays disk directory, or sends a command to the disk unit
PRINT	Any part of the sheet may be printed out. Formulae can also be printed
REPLICATE	Copies the contents of one part of the worksheet into another. Formulae are optionally modified to allow for their change in pusition
INSERT	Allows one or more blank rows or columns to be inserted anywhere on the sheet. All formulae which refer to the part of the sheet that moves are adjusted accordingly
DELETE	Closes up the sheet to remove one or more rows or columns. As with INSERT, formulae are automatically adjusted
ERASE	Erases any area of the sheet
VU	Allows the scrolling window to be framed by up to four fixed areas
WALK	Programs the RETURN key to move the cursor bar up, down, left or right
FORMAT	Sets individual column widths for printing. Allows numbers to be formatted with commas – for example 123,456,789
OVERALL	The overall format determines the number of decimal places shown when the formulae are evaluated. Can be overriden within formulae
USER	Enables one of the three user-defined functions, W, X and Y to be modified
QUIT	Exit from BUSICALC 2
FIND	Searches for an item, and moves the cursor bar to the relevant box if it is found
f2	Selects the next colour scheme from the seven available

Busicalc Functions

Function	Description
&	Adds contents of a row, column or matrix
$	Calculates mean of a row, column or matrix
>	Finds the max. value in a row, column or matrix
<	Finds the min. value in a row, column or matrix
@	Counts the number of non-empty fields in a row, column or matrix
$	Calculates the standard deviation of an area
POS	Tests for a +ve result
NEG	Tests for a −ve result
ZERO	Tests for a null result

PRODUCT	ABRACALC	BUSICALC 2
Max No. ofRows	40	999
Max No. of Cols	1040	125
No. of Cells	1040	22500
Function		
Mean	***	*****
Count	***	*****
Max	***	*****
Min	***	*****
STDDEV	N/A	*****
SUM	***	*****
NPV	N/A	N/A
Conditional Option	N/A	***
Maths Functions	*	*****
Commands		
Edit Cells	N/A	*****
Recalculate	***	***
Copy	N/A	N/A
Delete	*****	*****
Insert	*****	*****
Move	N/A	N/A
Replicate	***	****
Goto	****	****
Merge	**	****
Cursor Control	****	*****
Formatting		
Colour	**	**
Cell Format	N/A	*****
Global Format	**	*****
Justification	N/A	*****
Column Width	N/A	****
Output		
Graphics	*****	N/A
Disk	*	*****
Tape	N/A	N/A
Disk Commands	*	*****
Printout	**	****
Split Screen	**	N/A
Window	N/A	***
Other Functions		
Function Key Use	***	*
Find	N/A	***
Page Facilities	N/A	N/A
Documentation	**	*****
Presentation	****	***
Overall Total	66	123
Price	Disk: £27.50 Cassette: £25.00	£81.65
Value for Money	2.3	1.5
Format	Disk or cassette	Disk or cassette
Supplier	Abrasco Grange Barn Eastcote Middlesex HA5 2EX	Supersoft Winchester House Canning Road Harrow HA3 7JS

Abracalc.

Up to five different areas of the sheet can be viewed on the screen at once. The column and row headings may be fixed across the top and left hand side of the screen respectively. In addition the column and row totals may be fixed across the bottom and right hand side of the screen. The remainder of the sheet may be scrolled and edited within this 'framed' area.

Complex formulae containing up to 38 characters, including up to 20 levels of parentheses can be used; so can the standard Commodore 64 maths functions.

Formula entry does not follow the normal mathematical hierarchy found in Basic. Instead it uses Reverse Polish notation commonly used in calculators, and the language Forth.

For example, Busicalc evaluates the formula:

+a3+20*2

as

+(a3+20)*2,

not

+a3+(20*2)

as you would expect from normal mathematical hierarchy.

There are several special functions – SUM, AVE etc. (table 1) – all of which can operate on rows, columns or matrices, i.e. a rectangular area of cells. The results of individual formulae can be rounded from 0 to 8 decimal places of accuracy by appending a rounding command to the formula.

This not a formatting command; once you've used this option the values held by Busicalc are stored as the rounded value, so you must be careful not to accumulate significant rounding errors.

Three user-definable functions, W, X and Y can be used to contain common formulae. The concept is similar to the DEF FN command in Basic except that up to 10 parameters may be included in the function.

The values of the parameters are specified when the function is called within a cell. For example V(1) indicates a parameter, eg the price of an item excluding the dreaded VAT. If we want the total price of the item including VAT the function W could be used to specify:

V(1)+(V(1)*15/100).

Every time such a calculation is required only the function W need be given together with the value of the parameter, eg:

+W(12).

If several parameters are used they are separated by colons, eg:

+X(a3:10:e4).

Short text strings may be appended to a formula giving the output some units i.e. %, mpg, ft, mm etc. making values more understandable.

Sheets may be colour-coded, eg red for one department, green for another. The F2 key selects one of the seven screen/border colour combinations available.

Output

All or any rectangular part of the sheet may be saved to tape or disk by specifying the top right and bottom left cell co-ordinates.

A hard copy of any part of the sheet may be sent to the printer connected to the serial Port or a Centronics compatible parallel printer connected to the User Port. Each individual printed column width may be different from the screen set width, and commas may be included in large numbers to make them more readable i.e. 15,647.04 – a very unusual feature.

Documentation

The documentation is an impressive 41-page typeset book. Busicalc is introduced, a brief example is given and all the commands are described in detail. The appendices include a summary of the commands, a comprehensive home expenses sheet to enter, and advanced sections on user-defined functions, and formulae.

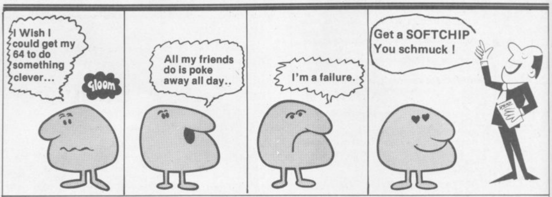
As the data created by the sheet may be needed by other programs the data storage format used is given, together with an example program to load a Busicalc file into a Basic array.

Conclusions

Busicalc offers a very flexible format enabling large or small sheets to be created, tailored to particular applications.

Unfortunately, the Reverse Polish notation deviates from normal mathematics and familiar Basic hierarchy, requiring a period of familiarisation for those used to it.

The lack of any graphics output is a serious failing, as it is often far easier to interpret graphical information than rows


I Wish I could get my 64 to do something clever...
gloom
All my friends do is poke away all day..
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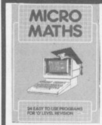

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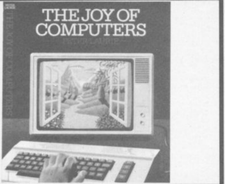
BOOK LOOK

The Joy of Computers



The Book:	The Joy of Computers
The Author:	Peter Laurie
The Publisher:	Hutchinson
The Price:	£9.95
The Reviewer:	Bohdan Buciak
The Conclusion:	Beautiful mish-mash

If you're prepared to pay as much as £10 for Peter Laurie's book *The Joy of Computers*, you would rightfully expect it to tell you how to get more pleasure and fulfilment from computing, how to do different and more imaginative things with your domestic bundle of chips. Not so, regrettably – this substantial (and not inexpensive) tome suffers from a badly misconceived title.

The only really practical enlightenment you'll receive comes in Part Two of the book, the section on programming. The uninitiated will find a comprehensible discussion of the basic problems (as it were) involved in organising and structuring programs. There's also an amusing account of a hypothetical program for eating lunch and a progressive discussion of how it can be enhanced and developed – but nothing much for the more experienced.

A few chunks of program are given (illustrating arrays and things) and then a few listings of games (in Basic) you might key in. That's followed by a complete program listing of a game called *Star Voyage* – more than 1,000 lines of it. Personally I'd rather run a marathon than key that lot in.

A large proportion of this book is devoted to the now-obligatory potted description and history of computing (helps to fill a few pages). Then there's a competent overview of the computer and how it works, right down to silicon level.

Peter Laurie certainly knows what he's talking about – in his time he's been one of the more respected computer journalists around. Trouble is, he knows *too* much: and he can't (or won't) decide what kind of reader he's aiming for. Which gives the whole book a dubious purpose.

So to section three – and that too seems inappropriate for this kind of book. It's a huge and rather plodding account of how computers are used professionally, with little sections on the different species of business software. Since when was business computing a joy?

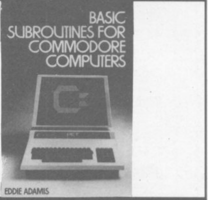
What value there is in this section must lie in the range and scope of uses discussed. the accounts are short and sharp. And Laurie doesn't miss anything out, indicating new and vital areas in computing – computer-aided design, networks, robotics, computer speech and vision.

This section is visually very well produced – as is the book generally. There are some really stunning full-colour examples of computer graphics (a double-page illustration begins each section) and each topic discussed is meticulously illustrated with photos and diagrams. Certainly full marks there.

The final section, called Progress, tries to put all the knowledge you've just assimilated into some kind of historic perspective. Laurie discusses the evolutionary process of computing and attempts to answer a few 'ultimate' questions.

Could computers become living organisms? Laurie probably worries about that – maybe computers won't provide us with much joy in the future.

Basic Subroutines for Commodore Computers



The Book:	Basic Subroutines for Commodore Computers
The Author:	Eddie Adams
The Publisher:	John Wiley & Sons
Price:	£10.50
The Reviewer:	Chris Preston
The Conclusion:	Too many conversions but still recommended ... even at that price.

Books which teach people how to program now fill the shelves at most bookshops. But most of these only deal with the theory of programming, providing little in the way of practical guidance.

As a beginner, what you need, once you've mastered the rules of Basic and can string a few lines together is something to teach you how to use your knowledge to write *useful* and *usable* programs.

Unfortunately, in those books which do offer sample programs, these programs are often riddled with bugs or misprints. Someone who is just learning to program is not going to be able to find any errors and put them right, and so is faced with the prospect of spending a lot of time keying a program in just to find that it does not work.

Basic Subroutines for Commodore Computers contains a large number of really useful programs. They range from simple conversions (gallons to litres, pounds to tonnes and so on) to business, loans and investments, matrix operations, statistics and sorting; they come as 22 chapters arranged in alphabetical order of subject.

Each 'problem' has its own subroutines written to solve it, which allows you easily to incorporate it into your own programs; and there's also a 'menu' which connects all the subroutines on a given topic to form a general program for matrix operations or temperature conversion.

This has an extra advantage that a program can be keyed in and tested one part at a time. That is the essence of 'structured programming'; and it means you can get a working program without having to key in hundreds of lines of code, adding to it section by section as time permits.

The programs do not use any advanced statements, PEEKs or POKEs. That means they're easy to understand but will also run on any Commodore machine without trouble. The only problem will be for people who own Vic-20s as the programs are set to give 40 column displays.

Conclusion? The book is just the thing for a beginner in programming. It will show you how to write problem-solving programs while providing the nucleus of a library of useful programs and subroutines. The printing method means that all the programs should work first time, assuming that they have been keyed in correctly.

The 64 ought to be an excellent computer for games – and fortunately some suppliers are indeed taking advantage of that. Others aren't. Here's this month's crop of reviews.

How do we assess games? Basically we play them – which may sound obvious, except that all the reviewers have seen so *many* games that they can apply a bit of comparative experience to the evaluation.

We rate games out of five for each of four criteria. **Presentation** means how well the thing is packaged and how good it looks on the screen: dull graphics and poor sound get marked down here. **Skill level** refers to how much skill (of whatever kind) is required to play the game – so if pure chance is involved, the game gets a low mark. (But don't dismiss it on that: some 'chance' games are great fun.) **Interest** is an answer to how well the game did at maintaining the reviewer's interest in it. And **Value for Money** is obvious enough: it's our overall conclusion about how it compares with other games and whether we'd buy it ourselves.

EXTERMINATOR

Joystick or Keyboard
Price £6.99

On loading this program I was greeted by a snazy title screen, repleat with flashing lettering, inviting me to proceed. Full of curiosity and ready for another skirmish with the insect world I chanced my arm: immediately I was in combat with a two-tone worm squirming through the fungi forest. I noted a green sprite-propelled mosquito and a convincing-looking scorpion too, but I was most impressed by the finely detailed eagle which squawked as it dogged my every move. This avian pest was assisted by a tarrantula which had to be avoided, being impossible to blast. My initial successes were marked by a change in screen colour ... but eventually I succumbed to overwhelming forces.

exterminator
Machine Code
Fast action game – shoot everything that moves
COMMODORE 64

A well implemented version of *Centipede*, carefully prepared right down to the title screen and with good use of colour, sound and sprite graphics.

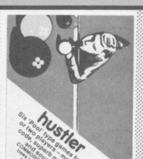
The storyline is obviously popular and this version should certainly add to its admirers. *LS*

Bubble Bus

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■■□

HUSTLER

Joystick or Keyboard
Price £6.99


hustler
Six 'Pool' type games for one or two players – machine code, superb graphics and sound
COMMODORE 64
Uses joystick or keys

A compendium of six pool-style games for one or two players. You position a plus sign to mark the point of impact, wait for the desired degree of velocity as indicated on the guage, press the button, and presto – another successful pot.

Obviously some complicated algorithms are employed in this engrossing simulation in order to replicate the interaction of angles, speed transfer of kinetic energy and resultant deflections. Without being really pedantic I can see no room for improvement in either the graphics or sound effects: and the ragtime accompanying the title and menu screens is a positive joy.

You can switch from game to game whilst the top scores for each is retained on the hi-score screen. An absorbing program; well worth having. *LS*

Bubble Bus

Presentation:	■■■■■
Skill level:	■■■■□
Interest:	■■■■■
Value for money:	■■■■■

MOBY DICK

Joystick only
Price £7.95

A jolly nautical jaunt which I found most intriguing – in fact, far more enjoyable than the scenario suggested. A white ship is patrolling the seas: and by judicously releasing depth charges, under your adept guidance, the ship is attempting to deplete an inexhaustible supply of submarines. In the first phase (it's too obvious to say 'wave') they do not retaliate: but later they'll reply with floating mines and tracking missiles.

Meanwhile the itinerant Moby Dick must not be harmed by a careless salvo, or a green ship will steam in and ram you.

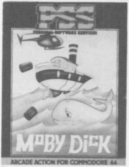
A further complication hovers overhead, dropping bombs. If you hit the helicopter the only decent thing to do is to catch the pilot before he splashes into the drink, scoring extra points into the bargain.

Sound effects are spot on.

Well worth adding to your collection – I'd suggest this program will provide hours of fun to most 64 owners as it is not too frantic. Recommended without reservation.

P.S.S. *LS*

Presentation:	■■■■□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□



WORD FEUD

Joystick or keyboard
Price £7.95

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But the game has a number of variations; like not displaying the word you're looking for, and bringing in four-letter words (they're all clean). A tougher section is the mixture of three and four-letter words.

Word Feud is also designed for one or two players. Single players can challenge the frog or butterfly which steadily eat the letters whilst you're trying to figure the word out. You lose if they manage to eat both words. For two players, there's two windows and a more competitive edge.

The bumf claims that Word Feud has a 750-word vocabulary, so the game shouldn't become predict-able. The letters are large and clear; and the graphics are good (especially the frog). Shame about the incessant pulsing sound – but you can turn that off.

This is a good game for parents and children to play together. Whether it's educational or not is a different matter. It's fun, it's well thought out and has more than one facet. Good use of function keys too. *BB*

Audiogenic

Presentation:	■■■■□
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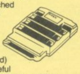

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Hand-holding for 64 graphics

The graphics are among the most praiseworthy features of the Commodore 64. It added an impressive sprite graphics capability to the Vic's facility with user-defined characters.

Only two cheers for Commodore, though, because neither of them are particularly easy to use in programs. A number of software houses are leaping into the breach with promises of simple graphics in return for only a few pounds of your bottom-drawer money. So it's a big hand for graphics editor packages... or is it? Mike Todd put three of them through their paces.

Many of the commands in SUPERFONT are unnecessarily complicated, often illogical. And things aren't helped by the inadequate notes supplied which fail to refer to some of the commands shown on the screen. Only by experimenting was it possible to determine what some of these did; there are others whose functions are still a mystery.

SUPERFONT is a package that could be handy after some experience, but I found it too cumbersome. A character editor is only going to be used on odd occasions and should therefore be totally self-explanatory and straightforward to use – which SUPERFONT 4.0 most certainly is not. There are better and easier character editors around; and I give this one 3 out of 10.

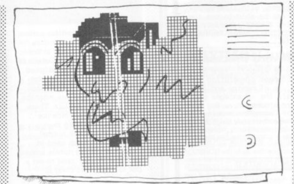
SPRITE MAKER

by English Software

This cassette program for designing and editing your own sprites costs £6.95.

Editing is done on a large 24x21 grid with a normal and double-sided image of the sprite shown on the right of the screen – extremely useful when working in multicolour sprite mode. There are also coloured patches at the bottom showing the selected sprite colours, easily changed using the function keys.

The range of commands available is limited but more than adequate. The current set of sprite definitions can be examined easily; and it is possible to get listings of the sprite data in a form suitable for future inclusion in DATA statements. Sprite definitions can also be saved to disk or tape, and details of how to load them back again are included in the notes.



When SPRITE MAKER loads a file of sprite data, the whole program is restarted and we have to endure the irritating title page yet again. (Can I please make a plea for software authors to stop being clever and annoying users with pointless animated title pages? They may have a place in games programs, but they are irritating beyond belief in utilities such as these.)

When drawing complicated sprites, the limited range of movement provided by the cursor keys is sometimes frustrating – especially when you have to type the dot or space and then move the cursor on to the next position each time. This program has one solution to the problem; there are two keyboard areas used for joystick-style cursor movements.

The two 3x3 key blocks with QWE and IOP at the top are used with the SHIFT key pressed; then you can move the cursor, laying down or erasing dots as it goes, according to which of the two groups of keys are used. For instance, keeping SHIFT+E pressed will draw a diagonal line of dots up to the right; SHIFT+K will erase the line of dots to the left.

This is a useful facility marred only by the fact that it takes quite a time for the cursor to move – and it is very easy to accidentally move the cursor too far. Both drawbacks are presumably inevitable because the bulk of the program is in Basic. On the other hand, when changing to a different sprite, the grid is filled almost instantly with the sprite design – which means there must be some machine code in there *somewhere*.

It is certainly straightforward to use and is worth considering. I give it 7 out of 10.

Under review:	**Sprite Maker**
Description: Supplier	Define sprites for the 64 English Software Box 43 Manchester M60 3AD
Summary:	Useful if a bit slow: 7/10
Price:	**£6.95**

GRAPHICS EDITOR

by Rabbit Software

Pay Rabbit £5.99 and you get this cassette containing a combined sprite and character editing package from a famous name.

On running the program you are asked whether it is sprites or characters you wish to design and whether you wish to retain any which already exist. If you opt not to retain the existing character set, you will be given the existing 64 character set to work on.

The program is simple to use, and a description of how to use sprites or a character set saved to disk or tape is included in the notes that accompany the cassette. (Details on using sprites are limited, however.)

There is a range of commands available to the user, which is good. Some of these are rather unnecessary, though, and I found the response to the keyboard at times frustratingly sluggish when editing sprites.

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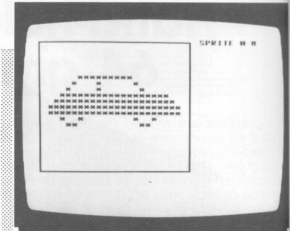


GRAPHICS EDITOR: drawing a car in the Sprite Editor mode (Rabbit Software)

The **character editor** screen shows 117 of the upper case/graphics character set at the bottom of the screen. Details of the character being designed are on the left; the character itself is shown at normal size, making it easy to see what the final result will be like. There is an 8x8 grid in which the character designing is performed and the normal cursor controls are used to move the editing cursor around with the "*" key used to set a dot and space to clear it.

There is also a second 'window' on the screen whose cursor moves around in unison with the editing cursor. It seems to serve no practical purpose...

The **sprite editor** works in much the same way, with a very large 24x21 grid and two sprites on the right of the screen to show what the sprite looks like at normal and double size. This is especially useful when designing multicolour sprites.

With both editing modes it is possible to select which sprite or character is to be edited, switch from normal to multicolour mode, change the screen and character colours, and save the completed character or sprite sets to disk or tape.

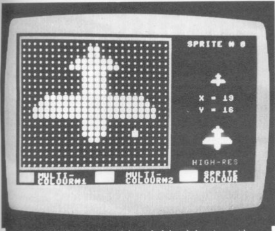
If you prefer to include sprite or character definitions as DATA statements, the program will give you a list of the necessary numbers – although you'll have to copy these down and type them into your program separately.

The 64 has effectively 512 possible character definitions, 256 in the upper case/graphics set and 256 in the lower case/text set. But only 117 of these can be defined and I could not find any way at all of working with the lower case/text character set.

On several occasions I accidentally pressed the RUN/STOP key which is reprogrammed to reset the 64 necessitating reloading the program from cassette.

Overall this is a useful package, if a little limited. It is extremely easy to use and I would give it 7 out of 10.

Under review:	**Graphics Editor**
Description:	Define graphics and sprites for the 64
Supplier:	Rabbit Software Unit 11 Forward Drive Christchurch Avenue Wealdstone HA3 8NU
Summary:	Handy, easy, a bit limited: 7/10
Price:	**£5.99**



SPRITE MAKER: creating a 'plane. Left hand drawing grid with normal and double-size sprites on right (English Software)

SUPERFONT 4.0
by English Software

SUPERFONT is a cassette-based program at £6.95 that is intended to allow you to design your own character set or to modify the existing 64 set.

It starts off with an irritating title page, totally out of place in utility of this nature. It goes on to set up the working screen with the usual 8x8 matrix for editing. The rest of the screen shows the range of commands available, the full upper case/graphics character set and other data relating to the program.

All this results in a badly cluttered display – which is at best unnecessary and at worst confusing.

The character set displayed can be flipped between the normal 64 set and the user-defined set, although again there is no provision for getting at the lower case/text character set. There are three modes of operation:

● **EDIT** mode allows you to draw a new character using the cursor controls, the 'Q' key to plot a dot and the back arrow to erase points. You can select a character from the character set and edit it, or design your own and insert it into the character set.

● **MOVE** mode allows the character in the grid to be scrolled horizontally or vertically using the cursor keys.

● **DRAW** allows the user defined character to be drawn at its proper size within the grid.

Complete character sets can in theory be saved to disk or tape, though I was unable to get the disk option to work at all. The program can load these character sets back again at any time; but to use them in your program will itself require a small program (given in the notes) to read the data back – the data is stored as a sequential file and so cannot be loaded back using the normal Basic LOAD command.

Under review:	**Superfont 4.0**
Description:	Define graphics for the 64
Supplier	English Software Box 43 Manchester M60 3AD
Summary:	Cumbersome: 3/10
Price:	**£6.95**

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The Commodore User Profile

Lightning strikes

How do the latest computer games titles get on to your local dealer's shelves? These days, that is done most effectively, and for most games by a distributor – a 'middleman' whose sole job is to take games from the manufacturer and get them to the retail outlets.

Record distributors are already in that kind of business and they've divined that computer games can be handled in precisely the same way as records. Lightning Records and Video found this out a little before the rest of them: and has capitalised on its entrepreneurial piece of foresight. Bohdan Buciak talked to Lightning's Loretta Cohen, a diminutive figure with a somewhat larger job title.

The sharp-eyed face of Ray Laren, Lightning's MD, appears regularly in the video and record trade press amidst bad puns about his "thundering" success. His claim to fame is that he started Lightning Records about twelve years ago and managed to fill nearly every jukebox in the country with chart topping 45s. That success bought him a large warehouse and suite of offices in dreary West London.

As well as distributing records, Lightning got involved in computer and video games – distributing both the software and the machines themselves. Now, the company has a Commodore dealership too: it distributes more than 7,000 games titles from almost every conceivable software house.

Loretta Cohen has the job of making that side of the business work. She admits to not knowing much about computers, but she does have formidable credentials in retailing. Her parents were video and TV dealers; and, before joining Lightning, she ran a small chain of computer shops. Her son now manages that (working for Lightning gives her little time for other activities). With that kind of background, she must know better than most what a dealer requires from a distributor – and what kind of service a good distributor should offer.

"Distributing software is no different to records and films in the sense of getting products around to dealers. But software needs more specialised looking after. Records can be easily heard; films get their reputation from being seen at the cinema. Software must be promoted."

Taking stock

Today's software distributor is far removed from the traditional wholesaler of tea, bricks or nougat bars, who merely takes orders and delivers the goods. Lightning sends a monthly catalogue to all its dealers which sets out items available, prices and everything else they need to know – Ray Laren likes to call it "the Bible of the computer industry". It may not be revered quite that much, and unlike the Bible, it is updated regularly.

That catalogue probably wouldn't be possible without Lightning's very own computer. Loretta Cohen sees it as the most important factor in her operation. Lightning's ten telesales girls type dealer orders directly in to the computer, which prints out a hard-copy down in the despatch department. It even lists the goods in the order they'll be taken off the shelves. (Is it a 64? You must be joking – it's a pocket busting Datasaab minicomputer.)

The computer allows mixed orders, so that a dealer can get deliveries of records, computers and software on the same order and in the same van. That's a major plus point since many record stores have now been persuaded to sell computer games.

The other plus point is that Lightning offers a 24-hour delivery service. "We can take an order and guarantee it'll be in the shop the next day." Sounds impressive? "We've been doing it for eight years already, as record distributors."

Granted, speed is a key factor in distribution – and Loretta Cohen seems to have got that sewn up. But she reckons she's doing more than just moving stock quickly. "We're also offering dealers an advisory service which, to my knowledge, is unique in distribution." That brings her back to the computer she's so fond of.

Ray Laren: from 45s to films to Frogger

Distributing advice

Apart from providing stock control facilities, the computer also provides a list of products she calls "fast-movers", and new products. The telesales girls can tell dealers which games are selling particularly well – especially when that game hasn't appeared on the dealer's order. They can also advise on new games which aren't available yet. Since the computer's got an extended order facility, any product not yet available can be ordered in advance, stored in memory until stocks arrive and then be despatched immediately.

"At present, our girls are taking orders on all our products but we'll soon have a special team just for software." Loretta Cohen's pretty keen on that; it shows how important her department has become.

Small and regular

Generally, Lightning doesn't distribute to the major chain-stores like Boots and Dixons because they have the buying power to negotiate their own contracts with software houses, at advantageous rates. But large concerns do use Lightning for topping-up. "We can get stock on their shelves quickly when there's a rush; at Christmas, for example."

Apart from those occasions, Lightning deals only with smaller concerns. "We don't encourage dealers to stitch themselves up with stock – we prefer small but

How to make money wholesale

regular orders." That's probably wise since games go out of fashion so quickly.

Despite that, dealers will inevitably have stocks of games that they can't sell. "Yes, but we have a safety clause. We'll take stock back if it's not been sold within 90 days, and give the shop 90 per cent credit. We think that's good and fair."

Software houses

But on the other side of the deal, how attractive is Lightning to the software houses? And what kind of service do they get? "Many software houses still service large retailers themselves. But they're now beginning to realise that they're better off putting their smaller dealers through a distributor, so that all their efforts can go into producing software."

Of course there's a price to pay for offloading the burden of getting games into the shops on to the middleman. "We agree on a retail price for the product (that's what the buyer pays) and take a margin, usually 50 per cent of it ... but there are negotiations to be gone through." With some distributors, the rate can be higher; but then, they're probably helping to promote the product themselves.

Loretta Cohen admits that the games market is now well and truly saturated. That should make her job easier, in theory, because software houses would be even more eager to sign up with a distributor in order to grab a slice of the market. "Software houses contact us 99 per cent of the time but most of them are still unknowns."

Nightmare software

Not only that, they invariably send samples of their wares. "I get anything up to a dozen parcels a day and it's quite a nightmare at the moment. But we do look at all of them because there may be a hot number there. That rarely happens these days ..." She's got more to say about that, too – but later.

Loretta Cohen doesn't do all the assessing herself, of course, and the process isn't particularly formal either. "I do a little; there are various people in the building who are interested, and we farm some out to youngsters who we know. A lot of it is done purely from gut reaction."

If she feels a game's worth distributing (that probably amounts to an educated guess that it *will* sell), she will impose a number of conditions on the supplier. One of these is that the software house must do its own promotion. "It's no good to me taking on a title if the software house won't promote it; that's the only way end-users are going to hear about the product."

The main criterion here is warehouse space – and that's at a premium. Loretta Cohen must make sure that her products really "move". The art of distribution lies in buying and selling quickly; keeping those storage overheads down.

Distributing Commodore

Lightning now has an official Commodore distributorship which means that it deals in hardware and peripherals too. "That's become an important and significant part of the business this last year," enthuses Ms Cohen.

But she qualifies that enthusiasm a little. "A year ago, Commodore was impossible to deal with. And at one stage, the general feeling here was that we shouldn't stay with them. The major problem was getting supplies and product details. Fortunately the situation seems to be improving."

In any case, Loretta Cohen has a great deal of praise for Commodore software. "We sell a great deal of it and it doesn't cause us much effort. The ROM-based games offer very good value. *International Soccer*, for example; we sold 2,000 copies in a week."

But Commodore stands apart from many independent software houses by having such a diversity of titles. "Yes, that's probably the secret of their success. Their 'O' and 'A' Level courses and the 'home' stuff doesn't sell in terrific volumes but they're steady movers. And there is very little in the range I could say was a bad seller." That must be mighty pleasing if your main concern is getting stock off those shelves.

On the hardware front, Lightning acts as distributor to retailers not big enough to have a Commodore dealership themselves. Obviously, Commodore prefers to shift stock in large volumes, leaving the distributor to supply smaller concerns.

But Loretta Cohen feels she can do that job better than Commodore.

Market views

"Because we call on dealers with other goods, we can offer the same 24 hour service for hardware and peripherals. Dealers pay us a little bit more and get their goods immediately rather than waiting for an uncertain delivery date from Commodore." Anyone who's ever waited for a Commodore delivery would nod sagely in agreement.

Loretta Cohen has been in software distribution long enough to be able to make some comments on that rapidly expanding yet notoriously unstable games software market. Lightning itself has learned a few lessons since it started getting involved in this area way back in 1978. It primarily dealt with video software, then mainly for the Atari games machines. The market now has shrivelled and Loretta Cohen has no doubts about the reasons. "They went on and on producing the same kind of games and killed their own market."

Is the home computer market heading in to that same self-destruct mode? "This year has got to see a shaking-out period. The market is saturated without doubt, and the established software houses are aware that they can't keep on producing repetitive titles. Quality, value and technical depth have got to improve."

But that doesn't mean the games market will eventually cease to exist. As Loretta Cohen points out, "people will always buy games". Her problem is making sure the games they buy are the ones she's distributing – and that problem gets larger by the day.

Lightning is currently stocking a small amount of business software for the Commodore 64 and Spectrum, because dealers have been asking for it. That seems to bear out the general feeling that people want to do more with their micros than just play games. "It will become an expanding part of the business but it's going to take a lot of looking at as far as we're concerned. We just can't afford the shelf-space; room is at a premium."

So it looks as though Lightning must look more closely at the software market and assess products more stringently. Not only that, Lightning itself is going to produce own-brand software – following in the footsteps of Virgin and K-Tel, no doubt. "I can't say much at present but we won't be launching more than six titles per year, and they're going to be good and original."

But will Loretta Cohen insist that her own products measure up to the standards she's now setting? "Certainly, I'm going to practice what I preach. That's why it's taken us some time to get off the ground." Obviously her concern with market saturation doesn't extend to Lightning itself. Time will tell ... ●

Loretta Cohen: she gets a lot of parcels

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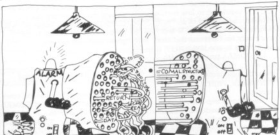
So what's COMAL?

An introduction to an unheralded language

by Brian Grainger

'COMAL' is short for COMmon Algorithmic Language. In some quarters it has recently come to prominence as a serious contender to Basic as *the* programming language for microcomputers. The aim of this article is to give you an idea of why that should be – to explain how, when, where and why COMAL came about: and to introduce the main facilities of the language.



COMAL started life in Denmark as the brainchild of one Borge Christensen. It has been understood for many years that Basic may be an easy language to learn, but it's one that leads to programs which tend to be difficult to read and understand: and consequently Basic programs are difficult to modify by anyone but the original author. And, even then after a period away from the program the author may well find it difficult to understand.

One solution to these problems is structured programming and the use of languages that are well suited to this technique. In the big-computer world, Algol was probably the first language to be used for this purpose: Pascal became popular on microcomputers.

But, both of these suffered from the same problem – they were (and are) quite difficult to learn, and they were (and are) very unforgiving to programmers who did not follow the strict rules of syntax.

The purpose behind COMAL, then was to combine the simplicity of Basic with the power of Pascal. The aim: to produce a language that was easy to learn but produced understandable programs.

During the late 70s COMAL was developed extensively, until in 1982 a definition of COMAL called the COMAL Kernal had been agreed. This is standard whichever computer uses COMAL. The main uses of COMAL were in education; but as with Basic, the COMAL language – and in particular the Commodore versions of it – has become quite generally accepted as a language for business applications as well.

Edit facilities

Let's look at COMAL in a bit more detail. And to start, we'll take the process of general manipulation of programs. In Commodore Basic you enter programs by giving a line number followed by some combination of characters which hopefully give a meaningful Basic statement – I say 'hopefully' because no check is made until the program is RUN. To delete lines, you type the number of *each* line to be deleted followed by 'return' every time. This can be a laborious process if a block of lines is to be deleted. (Of course certain facilities have been added to Basic by various 'toolkits' ... usually at the expense of program speed.)

By contrast COMAL has as standard AUTO line numbering facilities built into it: there's a RENUMber command: and it has the ability to erase whole blocks of lines by a DEL command.

The most significant aid to program input that COMAL offers whoever is **syntax checking** – with COMAL it is impossible to enter a program line which does not make sense. Any error is flagged immediately and a pointer is given to where the error might be; the cursor waits at that point so you can easily change the line. This means that *before* a program has been run you know that all the lines are correct from a syntax point of view.

Structured programming

To understand why COMAL is a useful language you need to know what structured programming is all about: so here's an instant introduction.

It has been shown that any computer program can be built up from three types of structure. First, there's **sequence** structure – a series of statements that follow one another in execution WITHOUT jumps. The **Condition** structure is typified by the IF/THEN construction – if the statement is true THEN execute one block of instructions ELSE perform a separate block of instructions. And third, a **Loop structure** is exemplified by WHILE statement is true DO perform a block of instructions.

To enable long programs to be built up from combinations of short ones, a segment structure is also useful.

While all these can be synthesised in Commodore Basic by judicious use of the GOTO statement and the limited 'structured' commands available, COMAL provides *all* the basic structured commands as well as some additional ones to make programming even more straightforward. Only in very rare instances is a GOTO statement necessary in COMAL, so that the spaghetti-like nature of some programs can be eliminated.

Together with the facility to segment programs and the ability to give variables sensible names rather than two-letter codes, this helps the user to write readable and understandable programs.

Conditional statements

Commodore Basic supports only one type of conditional statement, the IF/THEN statement. And this does not even conform to the basic condition structure. COMAL supports the full IF ... THEN ... ELSE ... ENDIF syntax; it also extends it to multiple condition structures in one of two ways – using multiple IF structures by use of the **ELIF** (ELSE IF) command; and using the **case** structure.

The following example for ELIF shows how a test between two numbers can be done in COMAL and Basic, COMAL using the IF ... THEN ... ELSE construct and the equivalent Basic with GOTO carrying out the same operation.

As for the **CASE** structure, here's an example of its use:

I will leave an exercise for the reader to try and write the above in Commodore Basic. The simplicity of COMAL will be immediately apparent if you try it ...

Loops

Commodore Basic supports only one type of statement to perform loops, the FOR ... NEXT construction. Once again this does not fully answer the basic requirement of a loop statement – which should allow *any* condition to be tested before deciding whether the loop is executed or not. To do this in Basic requires the use of multiple IF and GOTO statements.

COMAL has three types of loop. First, it supports **FOR ... ENDFOR** – identical to the FOR ... NEXT of Basic, except that in something like **FOR I + 11 TO 10 DO PRINT I** the PRINT I will not be executed at all. In Basic the instructions are executed at least once, which is usually not wanted.

Secondly, COMAL has a **REPEAT ... UNTIL** which allows a group of instructions inside the structure to be executed repeatedly until a set condition is true. The truth test is carried out *at the end* of the instructions, so they are executed at least once.

This can sometimes be inconvenient, though; and so there is a third type of loop in COMAL, the **WHILE ... ENDWHILE** structure. This is identical to REPEAT ... UNTIL but the truth test carried out *before* executing the instructions. So if the condition is true at the start the instructions will not be executed at all.

Here are some examples of loops in COMAL with the equivalent Basic statements.

See how the COMAL version's use of WHILE and REPEAT make the program much more readable. You will also note that with the Basic equivalent of Repeat, the IF test to get out of the loop is the *opposite* of what is really required – which doesn't lead to easy understanding of Basic programs.

Procedures and functions

This topic probably needs a complete article by itself, so I will only hint at the possibilities of COMAL in this area. Commodore Basic has a GOSUB and DEF FN to facilitate writing of the subroutines. They are woefully inadequate. GOSUB does not allow parameter rassing and it is restricted to line number identification instead of a meaningful name; DEF FN will work only for functions that can be defined in one line.

But COMAL procedures are named so that they can be made instantly meaningful – GET 'A'NUMBER, PRINTOUT for instance.

The second important feature of COMAL procedures is that parameters can be passed. This means that a procedure can be used with one set of input/output variables at one time: and a completely different set at another. Procedures can also be made CLOSED, which is rather like building a brick wall round them. Any variables used in the procedure cannot be confused with those of the same name outside the procedure – very useful if you build up your programs using lots of standard subroutines. Procedures in COMAL can call themselves indefinitely until the memory space runs out; Basic is limited to about 23 recursive calls. Procedures can be used to add new commands to COMAL, too.

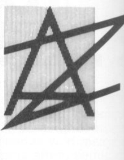
COMAL functions have all the advantages of procedures but return a single function value. Unlike Basic your function definition can be as long as you like.

As an example of a COMAL procedure here is one which will add the command CURSOR([row],[column]) to a Commodore 4032. The effect on calling the procedure (as in CURSOR (5,10), for instance) will be to move the cursor to the given row and column.

Additional features

From the example it can be seen that there are features of COMAL which do not exist in Commodore Basic. There are others. For one, the RND function has been extended to provide an easy method of getting a random integer. Two new arithmetic operators, DIV and MOD, have been added as well.

In the above examples line indenting is utilised to identify the structures easily. This is all automatic: the user does not have to type the additional spaces. Other things are automatic as



well. The colon in assignment statements such as A:=B need not be typed, NEXT can be typed instead of ENDFOR – it automatically gets converted; a number of command abbreviations exist (like for PRINT, '1' for REM. # for FILE) and the full form will be automatically provided by the system.

Disk handling has been easy with COMAL. The **PASS** command will allow all the file handling commands to be used without having to control a command channel. Disk **directory** listings can be obtained at any time without losing programs in memory. **STATUS** will read the disk error channel automatically.

The cartridge version of COMAL for the Commodore 64 will have inbuilt commands to control the graphics and sprite

```
COMAL                          Basic
0010 IF A=B THEN               10 IF A=B THEN
0020 PRINT "A                     PRINT "A EQUALS
     EQUALS B"                    B": GOTO 40
0030 ELIF A<B                  20 IF A>B THEN
     THEN                         PRINT "A GREATER
0040 PRINT "A                     THAN B": GOTO 40
     GREATER                   30 PRINT "A LESS
     THAN B"                      THAN B"
0050 ELSE                      40 .......
0060 PRINT "A LESS
     THAN B"
0070 ENDIF
```

```
0010 CASE COLOURS OF
0020 WHEN "RED", "YELLOW", "BLUE"
0030 PRINT COLOURS; "IS A PRIMARY
     PIGMENT COLOUR"
0040 WHEN "ORANGE", "PURPLE",
     "GREEN"
0050 PRINT COLOURSS; "IS A SECONDARY
     PIGMENT COLOUR"
0060 OTHERWISE
0070 PRINT COLOURS; "IS A COMPLEX
     COLOUR"
0080 ENDCASE
```

```
COMAL                     Basic
0010 NUMBER:=             10 NU = INT(10×RND(0)
     RND (1,10)              +1)
0020 PRINT                20 PRINT "TRY AND
     "TRY AND                GUESS MY
     GUESS                   NUMBER"
     MY                   30 INPUT "HAVE A
     NUMBER"                 GUESS"; GU
0030 REPEAT               40 IF GU>NU THEN
0040 INPUT                   PRINT "TOO
     "HAVE A                 LARGE"
     GUESS":              50 IF GU<NU THEN
     GUESS                   PRINT "TOO
0050 IF GUESS <              SMALL"
     NUMBER               60 IF GU<>NU GOTO
     THEN                    30
     PRINT                70 PRINT "YOU HAVE
     "TOO                    FOUND MY
     LARGE"                  NUMBER"
0060 IF GUESS >
     NUMBER
     THEN
     PRINT
     "TOO
     SMALL"
0070 UNTIL
     GUESS =
     NUMBER
0080 PRINT
     "YOU HAVE
     FOUND
     MY
     NUMBER"
```

```
COMAL                     Basic
0010 INPUT                10 INPUT "GIVE ME
     "GIVE ME                AN INTEGER"; NU
     AN                   20 AN =1 : CO = NU
     INTEGER":            30 IF NU<=0 GOTO 70
     NUMBER               40 AN = AN × NU
0020 ANSWER:              50 NU = NU - 1
     =1; COPY:            60 GOTO 30
     =                    70 PRINT
     NUMBER                  "FACTORIAL";
0030 WHILE                   NUMBER;" ="; AN
     NUMBER >
     0
0040 ANSWER: =
     ANSWER ×
     NUMBER
0050 NUMBER: =
     NUMBER -
     1
0060 ENDWHILE
0070 PRINT
       "FACTORIAL";
     COPY; "=";
     ANSWER
```

```
9000 PROC CURSOR(ROW, COLUMN)
9010 POKE 216,ROW-1
9020 ROW:=32768+(ROW-1)×40
9030 POKE 196,ROW MOD 256
9040 POKE 197,ROW DIV 256
9050 POKE 198, COLUMN-1
9060 ENDPROC CURSOR
```

TUNNEL SOFTWARE

COMMODORE 64 EXTENDED BASIC

This package comes in the form of a cassette and a thirty page instruction manual. It is designed to allow the Basic programmer to make full use of the advanced sound and video interface devices built into the computer and at the same time provide useful utilities. An assembler has been included as an integral part of the package so that the advantages of Basic and machine code can be intermixed in one program.

LOADING: the cassette contains the program which has to be loaded into the computer before any of the new commands can be used. This is done simply by pressing SHIFT and RUN/STOP together or by typing LOAD. Either way, the program will load from the tape and automatically run so that it is now ready to be used. To save time when loading the program a TURBO loader is included. This is a small program which loads itself into the computer and then loads in the extended basic in a mere forty-five seconds, (as fast as if it were loaded in from a diskette). This does NOT mean that another program has to be loaded in first, all the necessary loading is fully automated once LOAD has been typed for the first time.

LOCATION: once the program is loaded, it will position itself in the memory behind the resident BASIC ROM and several other smaller places which are not normally used by the computer. This means that the program will only take 2.5K away, leaving 35.5K available for the storage of a BASIC program. The extended basic is 16K in length and is located from $9800 to $D900 hex. It does not replace the original BASIC ROM. All the new commands work in addition with the existing basic, however, any small pieces of software enabling the computer to be used with non standard printers, etc will not work.

INSTRUCTION MANUAL: provided with the program is a thirty page manual which explains how to use each command separately and in conjunction with other commands. An understanding of Commodore Basic is assumed.

GRAPHIC commands: the package allows the selecting of display modes and storage of one text and one graphic screen at the same time. There is a full set of colour and drawing commands which enable the drawing of dots, lines, solid rectangles and solid triangles. Five powerful sprite commands are included which enable fast sprite manipulation and definition.

SOUND commands: there are four sound commands which combined form an extremely powerful synthesiser. This section is designed to make music at a higher level than the BBC micro, for instance the pitch of a note can be represented using the standard notation 'C#5' as well as number form. This allows music to be written and debugged with much ease. All the functions of the sound device are incorporated into the new commands, as well as the software music and frequency modulation techniques.

STRUCTURED PROGRAMMING: there are five commands added to assist in this field. This includes the well known PROCEDURE commands which allows second generation subroutine nesting.

UTILITIES: provided are commands for accessing the disk drive, copying the screen to the printer, defining the function keys, program line deletion, and other useful commands, such as RENUMBER which will renumber a program including goto's, gosubs, on ... goto's, etc.

ASSEMBLER: the three pass assembler acts in the same was as the assembler resident in the BBC micro. The source code is contained in the BASIC program and is assembled using one of the commands.

There are in total FIFTY ONE extra multifunctional commands as well as the assembler contained in the package. The cost including postage, packing and VAT is £14.95.

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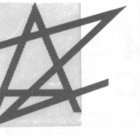

facilities as well. Facilities to control the sound will be an option.

Availability

The question you should now be asking yourselves is where you can get your hands on COMAL! Well, various versions exist depending on the computer used. COMAL has been distributed in the UK as a public domain program for about two years now; and it has been used by such diverse areas as training colleges, ITEC's and dental surgeries. There are implementations for 4032 and 8032 computers with 4040 and 8050 disk drives. An extended version is available as a public domain program for the 8096 and 4040/8050 disk drives, and this is also available as a ROM board for other Commodore Pet series computers.

COMAL for the Commodore 64 made its appearance this year. The public-domain version will work with disks *or cassettes*. A variant has been produced for those people, mainly in Education, who have a network of 64s attached to a single disk drive. The extended cartridge version for the 64 is expected to be available early in 1984.

To obtain a public domain version of COMAL send a disk or cassette (disk only for Pet versions) with return postage and details of computer and disk used to me at 73, Minehead Way, Stevenage, Herts SG1 2HZ. Please mention that you heard of COMAL through this article. The COMAL semi-compiler, some sample programs, notes and details of COMAL manuals will be sent.

The ROM-board version of COMAL and the Commodore 64 cartridge (when it appears) can be obtained through UniComal Denmark APS, Christiansholmsgade, DK 8700, Horsens, Denmark.

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Ram Electronics Hot off the shelves we've got the new RAM Serial IEEE Bus that fits into the user port leaving the Cartridge slot free! Available for Vic or 64 price £49.95 — but with this coupon £44.95. See the ad on page 28 or call 02514 5858 for further details.

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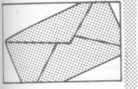
Write away

This is your page: normally we write for you, but here we listen. Feel free to let us know what you think – about the magazine, about Commodore, about suppliers, about life, art, the meaning of existence or whatever. We don't print everything we receive, of course; but anything that might be of specific relevance or general interest will make it to these pages.



Vic-to-64

I have a Vic 20 and am shortly getting a Commodore 64. Do you know if there are any programs available which will let them "talk" to each other via the user ports. If not, would it be possible for your magazine to publish one (also a program for using a modem) as I'm sure there are many people like myself who are buying a 64, but still hanging on to their Vic and would find this program useful.

Mr. A. Mather, 138 Clensham Lane, Sutton, Surrey SM1 2NG

I regret we have been unable to find any advertised program for combining a Vic-20 and a 64 (if anyone out there knows of one – let us know).

There are a number of programs to run Pets with either machine, since the Pet lacks both sound and colour facilities; there is good reason therefore to want to use the processing power and peripherals of the Pet with the sound and colour facilities of the Vic-20 or 64.

Unfortunately the same reasoning does not apply to a Vic/64 link, since the 64 has virtually everything the Vic has – and more! One reason why you might want them connected is for a two-player, two-machine game; this would require some knowledge of the information that had to be passed between the machines.

Basically, there is no technical reason why the two machines *cannot* be connected; it is more a case of why they need to be connected. For example, the software to run an 'alternative move' game would be different (and less complicated) than that required to have the two machines fully interactive.

To use a modem requires an RS232 interface unit in addition to the appropriate software. Interfaces and modems for the Vic are readily available, the cheapest probably being the kits from Maplin Electronics. The 64 should be able to use the same hardware items, but the software will be different.

To give full details of how to get the two machines talking to each other would take more space than I have here, but perhaps the Editor will take pity and publish a full article for just this purpose perhaps with a few hints on converting a Vic modem program to run on a 64. How about it, Ed? *Ok: article now commissioned – Ed.*

Program searching ...

Some three years ago I had the dubious pleasure of landing in hospital for a couple of weeks; fortunately I also had the pleasure of making the acquaintance of a Vic-20, and of course its owner who happened to be one of the only two people on the ward. He had brought his own TV and had got the staff to agree to let him spend his spare time programming. After I had shown some interest in the computer he agreed to let me finish the program he was doing.

I cannot remember the name of the program or for certain the name of the magazine, but I have a feeling it was **Vic Computing** – the program was one based on characters from *Lord of the Rings*.

Do you have any idea what the program was called or when it was published?

A.D. Pierce, Bampton.

Sorry, nothing to do with us in our *Vic Computing* days. Any readers recall this thing?

Comments and query

I have recently purchased my first copy of **Commodore User** and I am duly impressed. Could you please inform me as to the cost of obtaining back issues.

I hope that you bear the consumer in mind when you offer products, unlike some of your competitors. ie: I am still awaiting a reply regarding a bad tape purchased from "Commodore International" August 1983 issue. This sort of bad practice makes one rather reluctant to place regular orders for magazines.

I have two grumbles regarding most other mags, which perhaps your ed. may bear in mind. I learn a great deal and get a lot of pleasure from magazine listings (accurate ones). But why do some mags print so small that it is almost impossible to read? Commodore symbols are not the easiest things to read at the best.

Please, dear ed: remember that we are not all experts, but some of us are quite ordinary folk who derive a lot of pleasure from our hobby of computing. What may seem a simple operation to you professionals can be a very frustrating problem to us beginners.

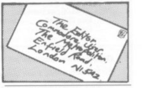
You also asked what we readers think of Commodore. Well, I think their back-up service is lousy. I joined the VicSoft Club in October 1983 and am still waiting for my disk box which was offered with £5 membership; also the VicSoft Catalogue would seem to be a bit of a rip-off since the cost of the software is the same as my local computer shop plus 50p for p&p. That means that four items cost me an extra £2, some benefit for paying £5 to join the club.

Could you also help me with a frustrating problem which possibly has a simple answer. How is the following symbol generated on a CBM 64? ⧄

Thank you for your patience in reading my letter, but you did ask what we thought. Keep on producing a good magazine and I will keep on buying it.

Derek Rawnsley, 9 Saltergate Road, Messingham, Scunthorpe, South Humberside DN17 3SZ.

We don't think there *is* a character like that. The nearest we can think of is the back slash – PRINT CHR$(109), POKE 77 into a screen location, or hit shifted M on the keyboard.



Recovery tip

There is a way to regain control of the Commodore 64 after you experience the keyboard lockup upon deleting a character on the bottom line of the screen. All you must do is press the shift key and the "2" "3" keys. This will start the Datasette going (assuming you have one). Then hit the run/stop key and you have your computer back!

**Scott C. Jensen,
1732 Beechwood, St Paul,
MN 55116, USA**

Commentary

Some more comments on your magazine, but first a word about the 'Vic-64 trade-in'. I too received the (standard) "we haven't decided yet" reply from Commodore when I asked them, and that was several months ago. However, don't feel that you *have* to wait for Commodore to make up their mind; try your local dealer.

I would be grateful if you could give a mention in your magazine to my local Spectrum dealer, The Model Shop. Even though we went in on a Saturday (not the best time!) and even though there seemed to be more people in there than I would have thought possible (it's a small shop), their computer salesman gave us excellent service – and a very good deal indeed on our Vic-20 for a CBM 64, even throwing in a bit of software with it. Full marks to them!

Now, to your magazine. Not so much an out-and-out compliment, more of a niggle. It's just that the mag seems so *random*. Apart from Tommy and the games reviews, the rest just feels untidy. Don't get me wrong, it's all excellent stuff. I'd just like to see a bit more structure to it.

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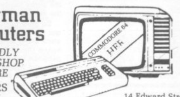

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Copy write

I read with some amazement your comment on an answer to a reader's query in 'Tommy's Tips' of your December issue. The question requested some clarification about acceptance of programs on an 'all rights' basis. The answer was, of course, that the programs then belong entirely to the magazine instead of the copyright remaining the property of the writer. Your comment was: "A bit brutal, perhaps, but otherwise we'd never be able to tweak or edit anything".

Has it escaped your notice that there is a huge magazine market for writers outside the computer field and that, with *very* few exceptions, this market operates entirely on a 'First British Serial Rights' basis? And that all these magazines "tweak or edit" as much as they like or think necessary? Are you not taking advantage of the fact that too many programmers are simply not aware of the facts of life as far as copyright is concerned? What will happen to magazines like yours when the best programmers do find out?

"A bit brutal, perhaps"? Oh no, dear Editor! A bit larcenous, and no perhaps about it!

Have you the nerve and the probity to print this letter – unedited? Better still, how about changing editorial policy before it's too late?

A. Gianota, 15 Ampthill Road,
Aigburth, Liverpool 17.

Probity? Wonderful word ... The point about 'First British Serial Rights' almost invariably applies to text contributions from professional writers, and anyone who wants that kind of arrangement with us gets it – most of our columnists work on that basis. But our magazine always carries a panel stating "Material accepted on an 'all-rights' basis unless otherwise agreed". And "unless otherwise agreed" actually *does* mean "unless otherwise agreed".

I stand by the comment. We *must* have the legal freedom to amend programs as required: that at least was what our solicitor said. On the other hand, we don't normally enforce it, came to think of it. Anyone wants our permission to use something we print, we tell them it's ok if the author agrees. And we never stop authors reusing material they've submitted.

Incidentally, we did not edit this letter – offensive though we found it. And on the subject of legal niceties, it's libel to call someone 'larcenous' without evidence of deliberate theft. We look forward to losing your subscription custom, dear Mr. Gianota.

DTL Basic confirmed

I noticed that a review was done in **Commodore User** December on the DTL Basic Compiler. I want to support Chris Durham (who did the review) wholeheartedly in his summary: "doesn't match up to claims or price." As a matter of fact, I would like to add that I feel that these people didn't do their homework or their debugging properly; if I had to write a program like that, my boss would fire me straight away. I think Mr. Durham was actually very kind in his review – I would have used quite a few more explicit and nasty adjectives.

Albert van Aardt, 13
Langlaagte Street, Heidelberg
2400, South Africa.

PANegyric

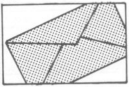
I feel I must draw your attention to a book called *Sixty Programs for the Commodore 64* published by Pan at £5.65.

After many tedious hours of typing, checking and debugging programs from this book we find many either crash or don't run at all. One program (16 pages long) has a GOTO command for a line which doesn't exist!

We are extremely angry that these programs are not checked and run before being published and sold to the public.

I am writing to you in the hope that you will print a warning to other frustrated users who are most probably tearing their hair out trying to find out what's wrong.

Mrs. B. Carter, 14 Brookside,
Waltham Abbey, Essex EN9
3JR



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◆

For example, I'd be all for an Adventure section. When I had a Vic, the only Adventure programs that I could buy and know that I'd be getting quality stuff were the Scott Adams cartridges. Apart from that I hadn't a clue. With arcade games you can tell its quality from a few minutes play; you can't with Adventure.

Also, why not sections for beginners, and at the other end of the scale, machine-code buffs?

If you had sections for the different parts of the computing world like this, perhaps people would be able to identify more with the magazine. I know I would.

Andrew Dilley, Cairngorm, Roke Lane, Witley, Godalming, Surrey GU8 5NF

PS: I can't plead enough for an Adventure section. Please, please, please!

Well, we *do* have a structure to the magazine ... even if it doesn't look like it! For instance, we always plan for the following:

Vic Section
- ***games reviews***
- ***Forth on the Vic***
- ***book reviews***
- ***Victuals***

64 Section
- ***business (usually WP)***
- ***games reviews***
- ***book reviews***
- ***Victuals***

Other stuff, may be Vic or 64
- ***news pages***
- ***Tommy***
- ***Butterfield***
- ***non-games reviews***

Not machine-specific
- ***supplier profile***
- ***letters***
- ***competitions***

As for a regular Adventure section, we'd love to carry one. Problem is, we don't know of anyone who could write it – no one in the office is an Adventure nut. Any volunteers?

Kind Words about Stack

After reading the tribute to Stack Computer Services in the February edition of your magazine it seems to me reasonable to add my little tribute to Mr. Jeff Orr and his thrusting (and at the same time caring) organisation.

I recently had a small problem getting a printer to function. It was in no way the fault of the small interface supplied by Stack but I wrote to them in search of advice. A few days later I had a phone call to my home from Stack at Liverpool. The person I spoke to was charming, infinitely patient and extremely capable. He spent a good deal of time dealing with, first my total ignorance in computer matters and second supplying the solution to a problem which was not directly his concern.

After putting the phone down I realised that I was not clear on one small point. I phoned Stack at the number my unidentified caller had given me but found nobody really able to help me. All efforts to identify my mysterious caller failed and it was only when I wrote to the company again that it emerged that my contact had been Managing Director Jeff Orr himself who was quite prepared to supply all the help required without charge.

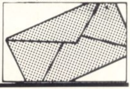
As chairman of a 50-year-old company myself I cannot help feeling that the computer industry has an assured future with people like Jeff Orr in the vanguard.

Peter Bonar, Thornton Construction Co, Mandale Industrial Estate, Thornaby, Cleveland.

BLAGGER tip

A tip for those of you with the excellent *Blagger* by Alligata for the 64, who find it impossible to get past sheet 1 and wonder about the rest. Try sharply tapping the space key whilst the title screen is showing (this gives you five lives) then press CTRL and key A through Z to play other sheets.

A.M. Adams, 72 Bierley Lane, Bradford, West Yorkshire



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Rock 'n' Roll is the new Commodore 64 version of the famous Spectrum game. But times change and now it's even harder to succeed in 'Showbiz'.

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Single-line Competition

February one-liner winners

Our favourite Italian program cruncher does it again with a snappier one-liner than anything Philip Marlowe could come up with. Filippo manages to put Johann Sebastian's C Major Prelude onto one line.

Shame on those who didn't spot the deliberate mistake. You can't get an 88 character line on the CBM 64 though you can on a Vic!

And please next time, no random avant-garde electronic garbage all over the screen!

★ **Mark Cousins** of Acklam, Middlesborough

– an attractive enough pattern, but is that all it does?

```
1 GRAPHIC2:X=220:CIRCLE2,X+Z,512,200,300:Z=Z+20:IFX+Z<>820GOTO1
```

★ **Anthony Boyd** *of Manchester*

– generates prime numbers up to 65000 (more if you change the number at the beginning)

```
1 FORN=1TO65000:F=0:FORJ=2TON-1:F=F+((N-J*INT(N/J))=0):NEXT:X=-(F=0):PRINTRIGHT$
(STR$(X*N),6*X):NEXT
```

★ **Ian Logan** of Aberdeen

– perhaps excessively accurate loan repayments calculator

```
1 PRINT"ENTER LOAN,INT%,TERM":INPUTL,R,N:R=R*.007:M=L*R/(1-1/(1+R)↑N):PRINT"£/MO
NTH"M/12
```

★ **Filippo Pozzi** *of Voghera, Italy*

– eat your heart out, JSB!

```
1 S=36875:POKES+3,15:FORK=4222TO5362STEP2:POKES,PEEK(K):POKES+1,PEEK(K+1):FORT=0
TO165:NEXT:NEXT
```

★ **A.M. Simnett** of Sheffield

– decimal-to-binary converter

```
1 INPUTA:FORI=14TO0STEP-1:Z=AAND2↑I:A=A-Z:Z=Z/2↑I:Z$=RIGHT$(STR$(Z),1):PRINTZ$;:
NEXT:GOTO1
```

Write a one-line program

No real restrictions, though we do ask for *original* offerings – and do use the form below! But you can use Vic or 64 and on the Vic you can assume any memory size and/or the Super Expander if you want.

If you want to submit more than one entry, you're welcome to do so: at least one of them must be on the form, the others should be on a separate sheet *with your name and address on the sheet.*

The five best entrants, those with programs that do as much as possible in a single line, get Fame, Exposure, Success, and a sweatshirt (not necessarily in that order).

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Entry: ☐☐

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Address:

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Wanted buyer for excellent CBM64 game idea. Excellent game, could be produced and marketed by a software company. David Stagg, 21 Millers Meadow, Rainow, Macclesfield, Cheshire SK10 5UE

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4032 12" screen Fat, very good condition, rarely used, plus Papermate Wordpro and Whitby Softchips which give 32 useful commands. £525. To: Mr. P.M. Lee, 200 Stanley Road, Teddington, Middx

Swap Data Products 2230 drum printer (300LPM) for 1540 or 1541, have other industrial standard equipment too. All require interfacing. Write John, 85 Dalcross Court, Hemlington, Middlesborough, Cleveland, Yorks

10 If age > 14 and if computer = + in your life goto 20 be my penpal. Caz, 49 Macmurdo Road, Leigh on Sea, Essex SS9 5AQ

Commodore 64 plus C2N, books, manual, Programmer's reference Guide, tapes (including Assembler and Llamasoft games), Quickshot joystick, dust cover. Original boxes. Bargain at £275 ono. Buyer collects. Marc, 01-961 6032

Calling Vic-20 Users I would like a teenage penpal from anywhere in the country. My address is Jackie McIntyre, 1 Lever Park, Portstewart, County Londonderry, N. Ireland (Age 16)

Vic-20 for sale with £100 of software £88. Tel: Cheslyn Hay (0922) 418340 or call in at 34 Shaws Lane, Gt. Wyrley, nr Walsall, Staffordshire after 4pm or at weekends

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Software of good quality wanted for distribution in Norway. Contact Eivind Brydon, Manager, 65 Daisy Bank Road, Manchester M14 5QL. Norwegian Software Club

A not very experienced Vic-20 and CBM64 owner would like friends to exchange information etc. Mr. W. Urwin, 4 Poplar Street, Waldridge, Chester-Le-Street, Durham DH2 3SE

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Help could anyone tell me how to get out of the Elvenkings Dungeon, and Hall in The Hobbit? If you could contact me. Write to Steven Cracknell, Mines Tavern, Laxey, Isle of Man

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DTL-BASIC 64	1.2	3.4	2.0	2.0	2.1	2.0	2.1	1.1	1.6	1.7
DTL-BASIC 64 with integers	5.0	8.2	5.6	4.7	4.8	4.9	5.16	1.15		

DTL vs PETSPEED

I would be grateful if you would give me the opportunity to comment upon your comparative review of our product DTL-BASIC 64 and our competitor PETSPEED 64 in the December edition of **Commodore User**.

The essential conclusion of the review was that although DTL-BASIC has many advantages over PETSPEED – it is more compatible with CBM Basic; it produces smaller programs; it can compile extensions to Basic; it is compatible with existing machine code subroutines; it has no trouble compiling large programs – these benefits are overshadowed by the apparently poor speed improvements that can be achieved and cites the standard benchmark results to back this up.

The review mentions that DTL-BASIC has a feature to enable integers to automatically convert floating point variables to integers but concludes that their use would not have much effect and would require amendments to the source code. It is this point that I would like to take issue with.

All that is necessary with DTL-BASIC to achieve the full performance improvement is to add a single compiler directive at the front of the program to tell the compiler which variables can be treated as integers. As you can see from the figures below, the results can be dramatic; rather than being slower, DTL-BASIC produces the fastest program in six out of the eight benchmarks (much better results can be achieved for larger programs).

If I may make a couple of further points: as your reviewer points out, PETSPEED-compiled programs are generally larger than the original while DTL-BASIC programs are always significantly smaller. For many users this benefit is very significant and not only because it enables bigger arrays to be used; one user has found that the suite of programs that originally required two disks and which when compiled with PETSPEED spread across three disks would fit on a single disk when compiled by DTL-BASIC. This is of tremendous value, especially on a single-disk machine.

Incidentally, the end user price of DTL-BASIC 64 is £99.50 not £114.42 as mentioned in your article.

Amit Ray, Marketing Director, Dataview Limited, Colchester.

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PETSPEED 64	0.5	0.9	6.5	7.2	7.5	9.5	11.8	94.3
DTL-BASIC 64	1.2	2.9	8.8	10.1	10.3	16.0	23.7	105.2
DTL-BASIC 64 with integers where possible	0.3	1.2	3.2	4.3	4.5	6.5	9.8	101.2

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